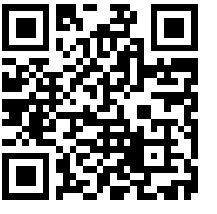

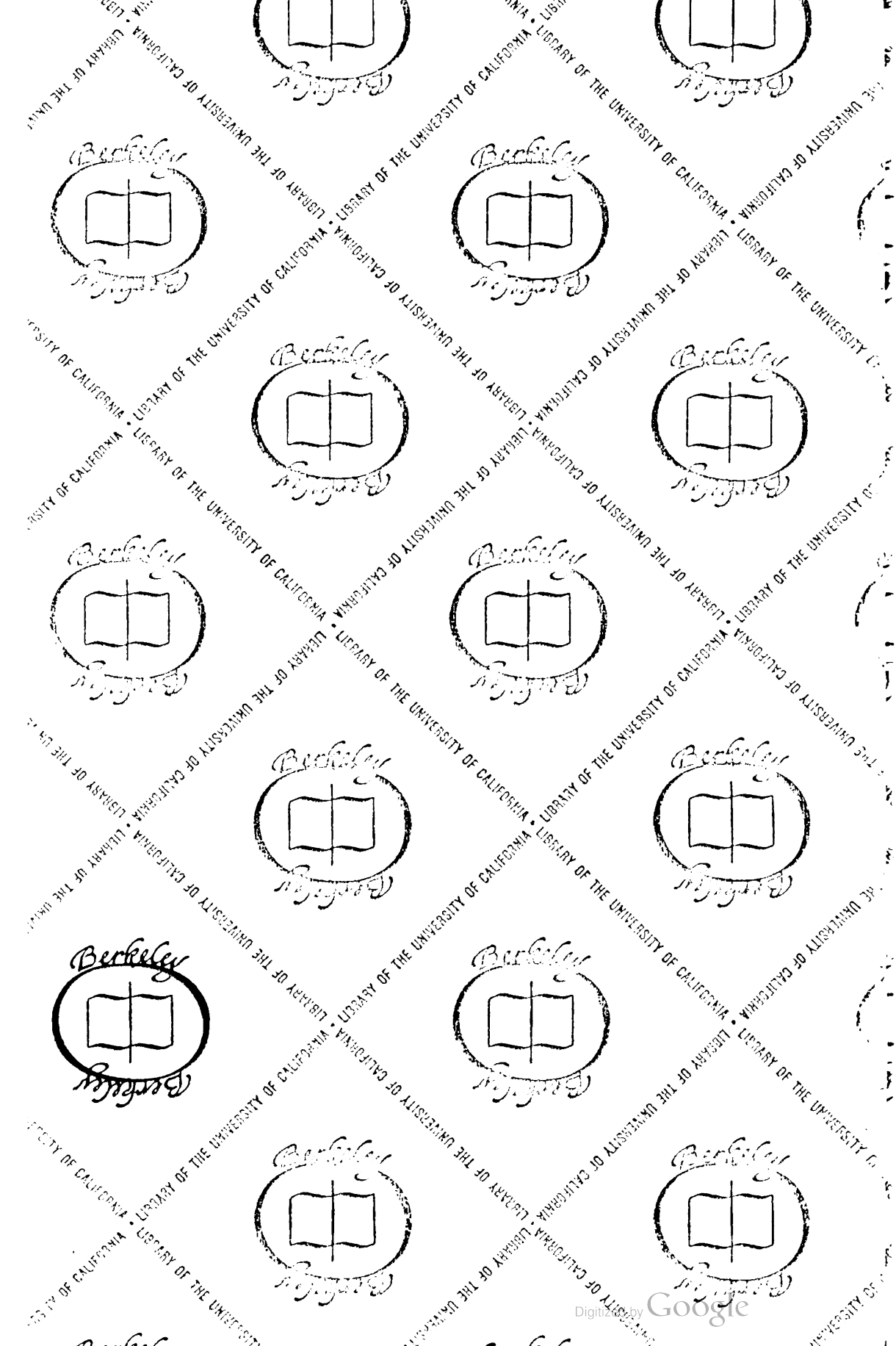

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Of California

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Contents for May

San Francisco City Hall. This Magnificent Structure Was Partly Demolished by the Earthquake, Fire Completing Its Destruction

THE

Architect and Engineer

Of California

VOL. V. MAY, 1906. NO. I

A Los Angeles Architect's Impressions of the San Francisco Earthquake and Fire.

By OCTAVIUS MORGAN, Architect.

PERHAPS, while a little long-winded, the best way for me to give my impression as to the fire and earthquake, is, to describe what I have seen and where I went.

On receiving the news in Los Angeles, Wednesday morning, April 18, that a great earthquake had occurred in San Francisco, at 5:20 a. m., I immediately secured a ticket for the first train for San Francisco, leaving Los Angeles at 3:30 p. m., having a great desire to see the effect of earthquakes on buildings of modern construction, that is, steel frame buildings in particular, and also, if possible, reinforced concrete structures.

By the time the train started, we heard that fire was raging in San Francisco, and possibly the entire city would be destroyed. I found on the train many excited San Francisco people.

We arrived at Tracy the next morning (the 19th), at 7 o'clock. Here we saw the first effects of the earthquake. The water tank had been shaken down, the cast iron columns broken, and the bottom plates which rested on the concrete piers had shifted. Whether this was done by the earthquake or the thrust when the tank fell, I could not say.

At Contra Costa a Federal officer came through the train and notified all passengers that they would not be permitted to go to San Francisco by the way of Oakland pier, the military having entire control of the city, and only those who could show official permit, would be permitted to enter; that the only point of entry into the city was on the south by way of Valencia street, and only then when good cause could be shown.

At Sixteenth street, Oakland, the train stopped and all turned out. We made up our mind we would try to get across by hiring a boat or some other means. Mr. O. C. Morgan of the Morgan Oyster Company, was on the train and came up to our little party and became one of it. We discussed ways and means to get into the city, he on account of business interests and I from curiosity, to see the effect of the earthquake and the fire that was now raging. I suggested to my namesake, Morgan, that he might get one of his oyster boats to take us over. He thought it would be impossible to make arrangements this afternoon, it being now about 3 o'clock, but would make arrangements for tomorrow.

That night we went up to Pleasanton, some thirty miles away, to stay, Oakland being so full. There we had canteens filled and lunches put up, and we started on the first train in the morning, which was stopped way up in Oakland, the train not going down to the water front.

Incidentally I would say here, that that Thursday afternoon I walked through the city of Oakland, up Broadway and through the center of the city. We noticed as we went along that all chimneys had been shaken off, excepting a few that were north and south—lengthwise. This showed clearly that the shock was from north to south. When we got up into the city where the brick buildings were, we found the front walls of many shaken out into the street, corners cracked, fire walls generally shaken off, and cornices down, that is, terra cotta or brick cornices of the poorly-constructed buildings. The schoolhouse tower of wood was twisted around and columns twisted out of shape. When we got right up into the business part, we dropped off the street car to make closer examination. I quickly saw that the best buildings were the least damaged, that the inferior-constructed buildings, whether brick or wood, were the ones that were damaged by the earthquake.

I hunted up the twelve-story steel-frame bank building, it being the only one in the city. I found the sidewalk enclosed, to keep people from walking close to the building. At first glance there was nothing to show that any harm had been done to the building, but on closer examination, I found cracks in the stone facing of the building, more particularly about two-thirds of the way up. I could see evidence of the plaster being shaken off from the ceiling of the interior of a number of rooms, and on the north side, the relieving arches over the windows in the brick wall had shaken out in many cases. Possibly the steel frame may have a kink in it about two-thirds of the way up. This can only be determined by stripping the building at this point. This satisfied me of the safety of steel-frame buildings under earthquake shock,—not preventing them from being damaged, but preventing them from being destroyed.

It was reported to us that some four or five persons had been killed by falling brick. The city was under martial law—all banks and saloons closed and steps taken for relief, especially of the refugees from San Francisco, who were coming over in great numbers. Tents were being set up in the park and food depots established. We came to the conclusion that Oakland would be full that night, and so, pulled out, as before stated. We did think of going down to San Jose and coming up by the Coast Line, but heard that bridges were destroyed and the line twisted out of shape. We also heard that the shock of the earthquake had been great at San Jose, and at all other points on the Peninsula, especially in the neighborhood of Stanford. We heard that between two hundred and three hundred lives had been lost in San Jose and neighborhood, that many large buildings had been shaken down, and that at Stanford University all the principal buildings had been shaken down—the Gymnasium, the Library, the Chapel, and the Triumphal Arch—and about one-half dozen persons had been killed and injured there. My son Octave was at Stanford, but not seeing his name among the list of injured or killed, I concluded he was all right, and was anxious to see him to get his report, and at once wrote him to be sure to get into San Francisco and take in the effect of the earthquake and fire.

We further heard that the shock had been severe right up the Salinas Valley, and had jumped across the bay to Santa Rosa, a small place of 8000 or 10,000 inhabitants, where the damage by the earthquake was more severe than at any other place, in proportion to population.

Pleasanton—which is truly named—is on the rising ground up Niles Canyon, towards Mt. Diablo. We found here no evidence whatever of the earthquake. And this I would say, that I found that the earthquake had not had much effect on buildings built on solid foundation,—bedrock; but had

been most destructive in filled, alluvial and sandy soil. Even where the buildings were erected on piles, they stood well.

As I said before, Friday morning when we got down to Oakland and found there was no way of getting out to the pier, we made a break for Oakland Creek, thinking we might find some way to get over. When we got to the water edge we found a tugboat pulling out,—in motion. We jumped on. They did not throw us overboard; so we were able to make a landing about one-half mile south of the Ferry slip. The tugboat was loaded with big puncheons of fresh water.

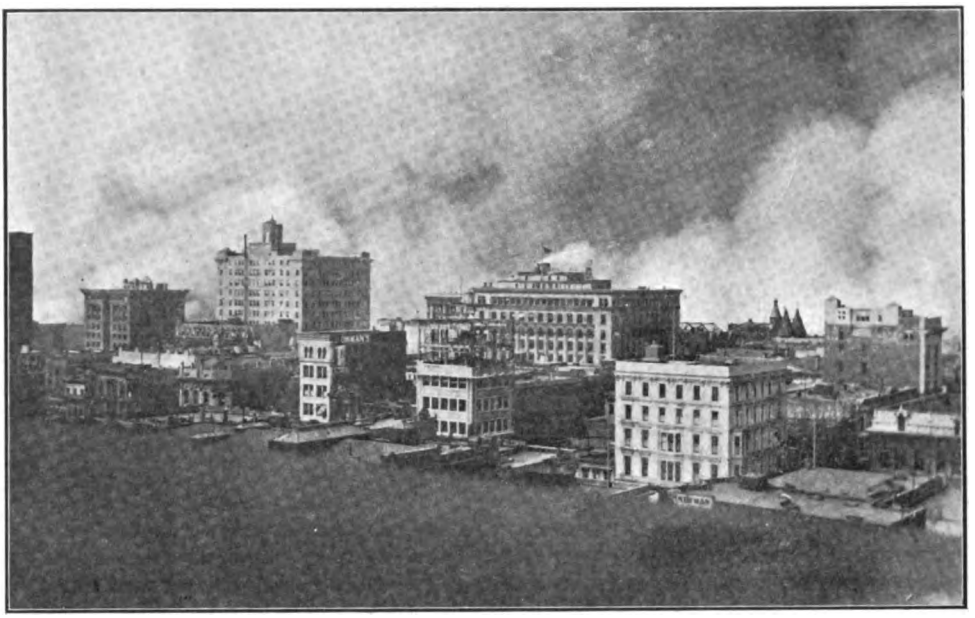
Where we came out on the cobble-stone front, from the pier, we found quite a number of old brick buildings standing, but badly shaken up by the earthquake. These buildings were only two stories high. The fire had burned right up to the back of them, and everything along that side of the street was burned clear, as far as I could see to the north and to the west,—the big fire-proof buildings looming up in the distance. To the south, on the hill, was the brick Sailors' Home, apparently intact, and on close examination I found only one chimney shaken down. This building was founded on bedrock.

We presently came to the Folger Coffee Company, corner of Spear and Howard. This building had escaped the fire, fire burning up to it, across the street and behind it. This building was partly four stories and partly six stories in height, and a brick structure. I had occasion later to examine it closely, going through it. It was undamaged by fire, but the earthquake had shaken down the smoke-stack and had cracked the building at the junction of the four and six-story parts, and had thrown out the fire walls on the south side and four-story portion, the fire walls not being anchored. This building was a well-constructed brick building, supported on piles driven about forty feet.

The six-story portion had an interior steel frame, but no steel in the outside wall, the joist being wooden, except the fifth story which had steel beams for its principal members and reinforced concrete for its inferior members, and a reinforced concrete floor covering the entire area. Above this was timber construction for the interior. This reinforced concrete floor, in my judgment, acted as a diaphragm to stiffen the building and hold it in shape, preventing it from rocking out of square and preventing serious damage from the earthquake. This portion of the building was used for their coffee-roasting and manufacturing purposes. The concrete floor had been put in as a fire-proof floor to cut off the coffee roasting department.

The adjoining four-story building was used for warehouse purposes, and had a full steel frame, the brick walls of the exterior being built in and around the steel columns and beams; the floors were reinforced concrete floors, the principal beams being steel, the inferior beams being reinforced concrete, spacing about three feet centers. This building was not damaged in any way by the earthquake, excepting the south fire wall, which, as I said before, was shaken off, it being merely a temporary wall, put on until such time as the building would be extended in height,—the building being planned for this purpose. The warehouse was heavily loaded with coffee. The stories were quite low,—about nine feet. As before said, the only damage was at the junction of the four and six-story portions. This again confirms my idea that well-built buildings will resist quite a severe earthquake shock.

We now turned north, along the water front, coming to the Ferry Building. Here I found the stone work of the tower, above the roof line—which appears to have been the bending point—loosened up, and several



Skyscrapers After the Earthquake and Before the Fire, Showing Comparatively Little Damage by the Temblor.

pieces shaken off; otherwise the tower did not appear to be injured structurally. The flag-pole was bent over like a whipstock, to the north.

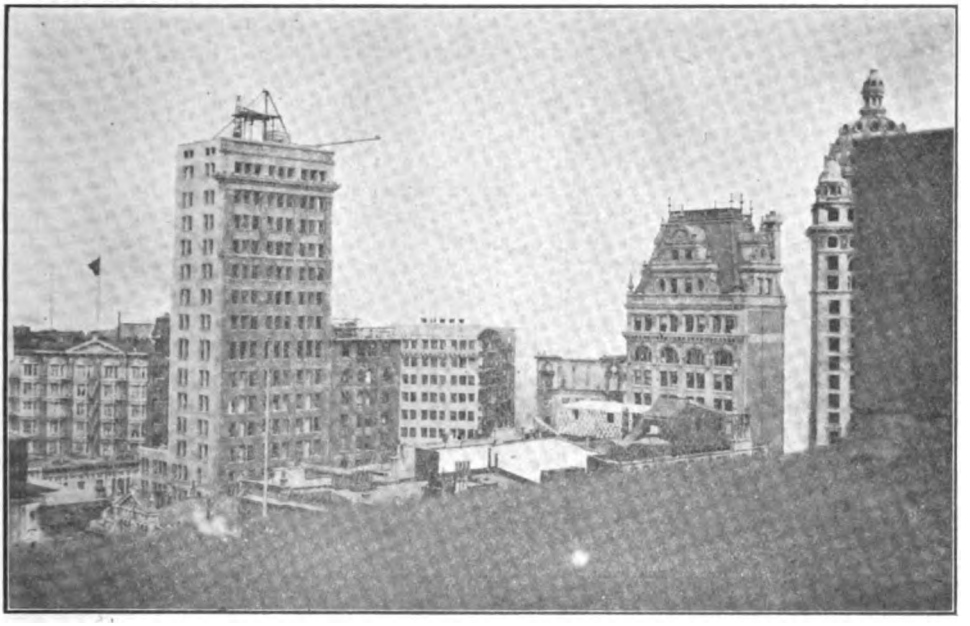
I noticed here that several sheds on the pier had been shaken down,—insufficient bracing or underpinning.

We went along until we came to about Jackson street. From here on to Telegraph Hill were quite a number of warehouses and wholesale houses yet unburned. The fire was eating into them towards the north very rapidly. I walked along the street by the side of many of them, looking for the effect of the earthquake. The newer and best-built buildings, even four stories high, did not show much, if any, effect of the earthquake. The older buildings had their fire walls shaken down, and showed other minor evidences of the earthquake.

One four-story building that was in possession of the soldiers and from which they were taking crackers and other foodstuffs, I noticed particularly. It appeared to be in good condition. And I noticed another four-story brick that was in good condition. In fact, here was another evidence that where buildings were on solid foundation, they stood the earthquake shock best. These buildings were hugging close to the foot of Telegraph Hill, which is merely a rocky upheaval.

We came to the Globe Flour Mills and the lumber yard around it. Being acquainted with the proprietor of the mill, I went into it and made quite a close examination. It did not show any evidence of damage from the earthquake. The first story of a portion of it was of concrete construction, the upper portion brick. This was supposed to be a fire-proof building. Here I left my coat and traps, intending to make it a rendezvous, and then zig-zagged back up towards town, going by the unburned buildings and keeping shy of the soldiers guarding the different buildings and blocks.

We went along Battery street, through the burnt ruins, by the Custom House. This I closely examined later. It is a four-story building, with



Another View of San Francisco Skyscrapers After the Earthquake and Before the Fire.

streets on three sides and a vacant excavation for the new Custom House on the east side. I found that this building had not been injured, as far as I could see, by the earthquake, nor by the fire, excepting the wood door on the north side, which was blistered. I found that the buildings across the street, to the west, were not burned, but had been shaken up by the earthquake. They were old buildings, but not seriously wrecked. And diagonally across the street, on Jackson street, I saw a new four-story brick building that was undamaged either by fire or earthquake. The upper portion was unoccupied.

My conclusion is, that the Government regulation and method of building is best both for fire and earthquake; but while the buildings are fit for their purposes, they would not be generally advantageous for general commercial usage. This Government building, as usual, was of low stories, slate roof, very heavy walls, and small windows, deeply recessed. This recessing prevented the windows being broken by the heat, as only the rays coming at right angles to the building could strike the glass. This building constructed on piles, was a substantial, heavy, brick building, the walls being about two and one-half feet thick, and is evidence that a heavy monolitic structure is almost earthquake proof. Perhaps, being on pile might have helped it, the shock being lost, although one would think the contrary would happen.

We pushed on through the burnt ruins to California street, looking at the Mutual Insurance building, an eight-story fire-proof building. This retained its form, though entirely gutted by fire. All other structures around it were destroyed, and as far as eye could reach, to the east and south.

We are now getting amongst the fire-proof buildings. The next was the fourteen-story Merchants' Exchange, an immense buildi
about twelve months. It retained its form, though gutted

plastering and everything inflammable were destroyed, and other damage done, though, as far as I could see, the building is structurally unimpaired. The floors in this building were reinforced concrete floors; the fire-proofing of the columns, tile.

Across the street was the building occupied by the California Bank, and other three and four-story buildings. These were destroyed. The wall of the one next to the beautiful one-story Merchants Trust Building, had toppled over onto it and crushed through the roof. This little building was gutted, but can be quickly repaired. Adjoining this one-story building on the west is the twelve-story Hayward building, or, as it is now known, the Kohl building. Apparently it was intact, the earthquake not making any visible marks, except a few stones in the facing were cracked, but the fire had blackened it and gutted the three or four lower stories. Above that the rooms can be quickly made ready for occupancy. This building had finished cement floors and metal-covered finish. The Merchants Exchange, across the street, had wooden floors over the concrete, and wood finish. It was subject to greater exposure and heat than the Hayward building, having a lot of six and eight-story, wooden-joist buildings around it, on the east and south, from which the fire found its way to the inside, through the windows, the alley on the east being only about ten feet wide. The Merchants Exchange building really acted as a screen across the street to the Hayward building, and the one-story Merchants Trust building also served to protect the building, by the fifty-foot open space on the east; California street on the south and Montgomery street on the west also protected the building And due allowance should be made for this, in comparing the destruction in the Merchants Exchange and in the Hayward building.

On the Mutual Insurance building, I assume the loss to be about seventy per cent; on the Merchants Exchange, forty to fifty per cent., and on the Hayward building, ten to fifteen per cent.

Looking north on Montgomery street, towards Chinatown, everything had been destroyed by fire, though the walls were standing generally.

The Hall of Justice showed very seveley the effects of the earthquake, all of the enclosing stone work on the tower being shaken off and the steel frame left exposed, supporting the dome at the top, which was little damaged; the bending point appearing to be at the junction of the roof, above that being shaken off.

We noticed the old California Safe Deposit building was totally gutted, —the exterior walls left standing. Across the street, on either side of California, everything was gone, the walls of the German Savings and Loan Society building being standing, but the interior destroyed. Everything to the right and left was gone, and forward, as high up the hill as could be seen, excepting that the walls and tower of the brick Episcopal Church were standing, but the interior was gutted by fire. This was another evidence that solid foundation was a good thing.

We turned north on Kearney street to Pine, down Pine to Montgomery, to the Mills building. Here we could see but little effect of the earthquake, but the fire had pretty thoroughly gutted the building. This was supposed to be a first-class fire-proof building. We noticed the tile on the underside had fallen off in many places, and we have since heard that nearly all of the built-in safes above the first story, had been ruined and contents destroyed. I should judge the damage to the Mills building was fully fifty per cent.

Across Pine street the old Stock Exchange building left nothing but a heap of brick. It was totally destroyed. The front of this building was of granite, and it was a very solid structure, some six stories in height.

We noticed the Nevada-Wells-Fargo Bank building and all the other old buildings around it. These were of wooden-joist construction and had all been ruined and destroyed by fire. The vaults apparently, though, were intact.

We keep along Montgomery to the Union Trust building. This building showed little or no evidence of the earthquake, but fire had gutted it. The lower or bank floor was least uninjured,—all wood work being burnt out and plastering gone. The first story and basement were the least hurt. I should judge the building was damaged about twenty-five per cent. This building was protected on the east by the eight-story standing wall of the Hobart building, which building had been destroyed by fire, but this wall was left standing. The Union Trust building was protected on the west and east by the open spaces of Montgomery street and the wide junction of Market and Post streets, and by the ten-story Crocker-Woolworth fire-proof building. This building, the Crocker-Woolworth, was apparently uninjured by the earthquake, but was damaged by fire, possibly from twenty to twenty-five per cent.

Across on the other side of Market street everything was gone flat. East of New Montgomery street, the old Palace walls stood up, in almost perfect condition. The building, which was seven stories and basement in height, was entirely gutted by fire,—nothing left standing but the walls. This building had many cross walls, and from my best information, had bond irons built into the walls. It certainly stood up well under the earthquake shock, and from my best information, was not materially injured structurally by the earthquake,—plastering being shaken off and skylights broken.

Across the narrow alley to the west was the Monadnock building, just ready for occupancy,—the lower stores occupied. This building was steel-frame construction, with reinforced concrete floors and reinforced concrete beams and steel girders and expanded metal partitions, the walls on the narrow street and rear being twelve-inch walls, self-supporting, resting on their own foundation and built in between the columns, but not supported on the girders. The side wall stood intact. The rear wall was gone. They had used dynamite on the building immediately in the rear, and this, I think, caused the destruction of the wall. The stone facing on this building was shaken up by the earthquake, otherwise the building appeared to be structurally intact. Upon the west was a vacant lot, upon which they were building an annex to this structure. To the west of this was The Examiner building, a pile of debris.

Across Kearney street, on the corner, was the beautiful seventeen-story Call building. It held its shape apparently to the eye. But all interior combustible material was destroyed by the fire, and the interior stone work badly chipped and mutilated by fire, especially on the east and south sides, from the burning building on the south, which building was destroyed. The visible evidences of the earthquake were from two-thirds of the way up, where the stone was broken, and at the springing of the dome, where the balustrading and other ornamental work were forced off, and at the base, where the sidewalks were uprooted out of shape. How much structural damage was actually done to this building can only be told by stripping. I noticed in this building that the arches were concrete arches, built in between I-beams, about a three or four-foot span, that the columns were fire-proofed with tile, which had spalled off in many cases, though I believe the fire proofing was sufficient to prevent structural injury. On the west were two other fire-proof buildings, which were little damaged by the earthquake, but

were burned out by the fire. On the face of it, I should judge that the Call building was damaged about fifty per cent.

Across the street, on the north side of Market street, we have the fourteen-story Mutual Savings Bank building. This beautiful little building, while retaining its shape, was ruined by fire, the combustible buildings on either side causing its destruction. I should judge the loss on this building would go fully fifty per cent.

On the opposite corner of Kearny and Market stood the Chronicle building. The old building, some ten stories in height, was gutted, the exterior walls standing, but the entire interior was cleaned out like a funnel. Whether this was caused by the fire or the shock of the earthquake, I do not know. In the section right on the corner, all the interior beams were piled in the basement, from the upper stories, rivets being sheared.

On Kearny street to the north was the new sixteen-story annex to the Chronicle. This was not completed, but the fire had burned out what little wood work there might have been in it. The earthquake had apparently shaken it up, the visible evidence being the shaken and cracked brick pier facings, and about two-thirds of the way up. This appears to be the bending point on all of these tall buildings,—about two-thirds of the way up, the brick work and stone work being crushed, cracked and broken at this point. I should estimate the loss on the old Chronicle building to be about eighty per cent.

Went north, up Kearny street, about two blocks. There I found a new eight-story structure, The Marsden building, incompleted, with reinforced concrete floors and all steel work fire-proofed solid with concrete. This building apparently had not been damaged by the earthquake, but the terra cotta trimmings on the outside had spalled off on account of the heat, and what little wood work there was in the window frames had been burnt out. All other buildings immediately around it had been destroyed by fire, they being wooden-joist construction.

The building on Post street, owned by the Crockers, and occupied by the Sloane Furniture Company, had all the exterior walls standing in good shape. The interior was burnt out by fire and wrecked apparently by dynamite, the columns apparently sinking into the ground, carrying down with them all the beams and floors to a center.

I understand that dynamite was used indiscriminately on fire-proof and non-fire-proof buildings, the men handling it not being familiar with the construction of the buildings,—a useless waste of property.

I turned back on Market street, down Montgomery, to the Rialto building. Knowing this to be a fire-proof building, I was surprised to see this a wreck. The exterior walls were all standing, apparently in good shape, but the interior columns and beams were sunk into the basement, and the building was open from the basement to the sky. Here again I was told that dynamite had been injudiciously used. While the fire might have destroyed everything burnable in the building, yet I think, had it not been for dynamite, the building would remain structurally intact. This building was fire-proofed with concrete and had reinforced concrete floors.

Across the street were the remnants of the Crossley building,—a pile of debris, as were all the buildings in this neighborhood, excepting an eight-story fire-proof building, on the opposite side of the street, which had not been badly damaged by fire, but had been shaken up by dynamite; the lower story not being burnt out, but the windows were destroyed and the east wall very much cracked. This was a very narrow building, not more than forty feet wide. Some said the cracking of this wall was caused by dynamite, used on the adjoining building which had been blown to smithereens.

Going west on Mission street to Third, we came to the Abramson building, a fire-proof structure. This retained its shape, though gutted by fire. And here we can look into the rear of the fire-proof buildings adjoining the Call building on the west. The rear of these buildings had been wrecked by dynamite.

Getting back on Market street, traveling west, I find the walls of the Phelan building standing,—everything else gone. And on the south side of Market street all that remained of the magnificent Parrott building, the Emporium; the front wall was standing intact, otherwise the building was a ruin. The two lower stories of this building were fire-proof construction, and above that, steel columns and girders and wooden joist. The loss on this building was probably ninety per cent.

Now, we come to the great Flood building, on the site of the old Baldwin Hotel, twelve stories in height. This building was damaged on its exterior facing by the earthquake, the northwest corner of the first story stone facing being very much shaken up. The east wall did not show any sign of a crack, being entirely exposed to view. The fire damaged all the rooms on the street side,—possibly three-fourths of the entire number of rooms, and entirely gutted the first story. The bottom of the tile arches, and the tile fire-proofing columns, in some places, had fallen off. The Western Banking room on the corner of Market and Powell, while greatly damaged, could be put in shape for use very quickly. The safe deposit room in the basement was little damaged.

Up Ellis street stands the Hamilton Hotel, a building ten or twelve stories in height, very narrow, being not more than forty feet wide. This holds its shape well, but was entirely gutted by fire.

Going up Powell street to the St. Francis Hotel, we find the fire had gutted this beautiful structure, and the earthquake left its marks by shattering the stone facing, the bending movement of the structure to the north and south apparently crushing and cracking the stone facing and brick work, in the same manner as the overloading of a brick or stone pier.

All the buildings around Union Square are gone. The new steel frame of the Butler building, being some eight stories high, just up, the lower story partly enclosed with masonry, at the corner of Stockton and Geary, was standing in good shape, apparently uninjured by the earthquake or fire. This can only be definitely determined by close examination.

Also, a little further down on Geary street, was standing the sixteen-story skeleton steel-frame of the Whittell building, about fifty feet square, not enclosed in any manner. This frame apparently stood the earthquake and fire with little material injury.

Going out on Market street, we come to the Market Street Bank building, owned, I believe, by the Crocker estate. This building apparently was the least damaged by the fire, of any standing. It is a fire-proof building. The earthquake shook up the brick facing. The banking room on the corner was fit for occupancy, except all glass was broken. This was done, I believe, by the dynamite, or, maybe, the heat from the Odd Fellows' building across the street. The walls of this building were standing, though it was entirely gutted by fire, being wooden-joist construction.

In the rear of the Market Street Bank building is the new Post Office. The ground all around had sunk out of shape, from one to two feet, leaving the sidewalk and everything resting on the ground, in bad shape. The Post Office Building itself is damaged by earthquake, but not very extensively the granite facing in many places being cracked and spalled; the arch stones being broken as though the rocking motion of the earthquake had caused enormous stresses, and in one place a stone had been squeezed out. On the

Palace Hotel After the Fire. The Best in Brick Construction. Extant in the Early Seventies and Believed Fire-proof From the Lessons Taught by the Chicago Fire.

City Hall Before the Fire. An Example of Poor Construction.

The Baker and Hamilton Building. Typical Example of a Class "B" Building After the Fire.

northwest and southeast corners, there was most evidence of the movement caused by the earthquake. The interior plastering was shaken off and many slabs of marble shaken down. The fire did no damage to this building, except on the north side, toward the buildings fronting on Market street, which were all destroyed by fire; here the windows were broken and wood work blistered. The usual open spaces, solid construction, low stories and small openings of Government buildings, protected the structure.

Going back to the Mint building, I found it little injured by the earthquake, apparently, excepting the smoke-stack was shaken down. The fire had burned the window frames and windows on the north side; otherwise the building appeared to be uninjured. The usual low height and open spaces had been effective in protecting the building.

Going farther west on Mission street, we came to a seven-story building, just about completed, about forty feet in width, for the Coffin Company. This building was apparently uninjured by the earthquake, as far as I could see. The fire had burned out the wooden frames and had spalled the stone work on Mission street front.

Getting back to Market street, we came to the City Hall. This building apparently shows greater effect of the earthquake than any other, the whole upper story being thrown down, and all of the mason work, cast-iron columns, etc., of the tower, up to the springing of the dome, shaken or thrown down.

The Hall of Records was apparently uninjured by the earthquake. Fire swept through this building, eating up what little wood work there was in it, it being a fire-proof structure. A view of this building would create the impression, from its solid construction, that all other buildings in San Francisco must have been shaken down; but only the older and inferior-constructed buildings had been damaged anywise near in the same proportion

as this building. I think the weight of the roof and the rocking motion of the earthquake threw out the walls, the roof having steel trusses spanning from wall to wall,, and the walls being simply heavy masonry walls. The walls did not shear off square, but at an angle of about 45 degrees, stepping down with the brick work at the level of the second floor joist. This building had a high basement, first story and a second story.

I went across to look at the beautiful one-story Hibernia Bank building. The earthquake had not injured it, but fire had ruined it. Being a granite structure, the stones toward the Grant building had all melted or spalled off. This building was free, a large vacant lot being on the north and west and the two streets on the south and east; but the heat from the six-story Grant building—a wooden-joist structure, cast-iron columns, inferior construction—had caused the destruction of the Hibernia bank. The loss on the bank building is, perhaps, about forty per cent.

Going out Market street to Valencia, to Dolores street, I reached the limit of the fire area. The limit of the fire area appears to have been the limit of brick buildings. Apparently this fire destroyed ninety-nine per cent of all the brick buildings and gutted all of the fire-proof buildings in San Francisco. All that are left are the frame buildings in the residence district, west of Van Ness Avenue, west of Dolores street and south of the line of the Southern Pacific Railway. Everything else to the bay is destroyed, excepting a few frame buildings on the top of Telegraph Hill and Russian Hill.

At the top of Nob Hill, the magnificent Fairmont Hotel, isolated at east three hundred feet from any other building, had all the wood work destroyed by fire. This structure was nearing completion and would have been ready for occupancy this fall. It has a concrete base and steel frame, the concrete extending to the top of the granite, forming backing for the granite. Above this the steel frame is enclosed with brick and faced with terra cotta. The earthquake showed no apparent effect on the concrete base or granite, but above the line of the concrete backing and granite facing on the northwest side, the terra cotta was cracked and shattered, showing the crushing force of the rocking movement of the earthquake.

From this point we could get a clear sweep in every direction, of the fire zone. Desolation in every direction. All I could compare it to is a forest fire, such as I have seen in the mountains of Colorado, the ruins standing up like great, gaunt, skeleton stumps.

Before I finish, I must refer to the four-story building occupied by the California Electric Company, at 642 Folsom street. This building was about 150 feet square, and a brick structure, the interior being of wooden-joist construction. The buildings around it were all destroyed by fire, but the buildings were not very large. There was a vacant street on the south, a single one-story frame building on the east, which was destroyed, on the north an alley, and on the west a private yard about thirty feet in width. This building was little damaged by earthquake, the north fire wall being shaken out.

All windows in this building were provided with galvanized iron frames and sash and wire glass. There were exterior doors in the basement, adjoining the frame building, covered with tin. These doors were charred, but retained their form and strength. The wire glass on the west and north was cracked, but retained its form and protective qualities. This building stood out alone, uninjured by the fire, excepting the cracked glass, and little injured by earthquake. Everything around gone. And standing up was the 10,000-gallon steel tank twenty feet above the roof of the building, supported on T-shaped brick walls. Another evidence that buildings built on

solid foundation were not so much affected by the earthquake. This is rather high ground and not far to bedrock.

I might say that I visited San Jose, taking in all the principal streets. I noticed here that the damage was greatest to the inferior-constructed buildings,—brick, stone and frame. In many instances the buildings were shaken out of plumb, the front shaken out, and fire walls gone. The Court House was greatly damaged, although it held its shape, the walls on the north side being crushed at the first-story level, by the rocking motion. The frame buildings injured, were wrecked by the giving away of the underpinning, whether brick or wood. These were all old buildings, and I think the wood work of the foundations had rotted out and did not have their full strength, so that when the rocking motion came, they simply collapsed.

CEMENT BLOCKS NO GOOD.

I went to Palo Alto, and there it was thoroughly demonstrated that hollow block construction was no good. One two-story and one three-story building of hollow concrete block construction had collapsed. The rocking motion had thrown the walls down right flush with the ground level, not one stone being left above the ground level.

To conclude: I believe that the full steel-frame and the reinforced concrete buildings to be as nearly earthquake-proof as possible. That the more rigid and homogeneous a building can be made, the better it will stand earthquake; that a brick building from being composed of a multiplicity of separate pieces, is not good construction for earthquake, unless thoroughly bonded and tied, and the brick work well laid in cement mortar, and the walls heavy; nor yet stone buildings or veneered buildings. That concrete is fully as good, and, perhaps, better for fire protection than tile. That concrete for filling between beams, especially when used as a monolithic floor, reinforced with steel, is better for earthquake or fire protection than hollow tile filling or flooring, and not only will resist crushing, but distortion, better than tile. That the destruction of San Francisco by fire was primarily caused by the earthquake, which started innumerable fires, which burnt up the inferior-constructed buildings surrounding the well-constructed buildings, setting fire to, and destroying well-constructed buildings and gutting all the fire-proof buildings. That if it were possible to eliminate all the old frame buildings and highly inflammable structures from the congested district of our cities, conflagrations would be hardly possible, as fire starting in a good building would be slow-burning and under control before it could get a start. That every effort should be made to eliminate the frame and inflammable inferior structures as quickly as possible from the congested district, and the only way to do this is, to reduce their earning power. So long as this class of buildings earns a greater percentage on their value than the high-class improvements, so long will they stay. Cut off their earning power and they will go. Prevent any improvements, repairs or alterations to this sort of structure, and their time is limited. The value of wide streets at frequent intervals, to give facility for curbing and fighting fire, was demonstrated by Van Ness Avenue and Market streets. If the fire had not been started on the north of Market street as well as the south, I believe it could have been confined to the south of Market street. But the fire crept up on both sides of Market street, and was not stopped until it reached Van Ness Avenue and Dolores street,—both wide streets.

My observation has shown me that metal frames and sash and wire glass, and wood doors covered with metal, are a reasonable protection against fire. That the steel frame and reinforced concrete only can be called fire-proof construction. That a brick building, to be effective, must have

cross walls,—the more the better. See the Palace Hotel. That a good, well-built brick building, even with wooden joists, must not necessarily be shaken down by earthquake or burned by fire.

That even in a conflagration or an earthquake, good workmanship and good construction are great factors in preventing the building from being destroyed.

Buildings erected on alluvial soil, loam, sand or made ground suffered more from earthquake than any other.

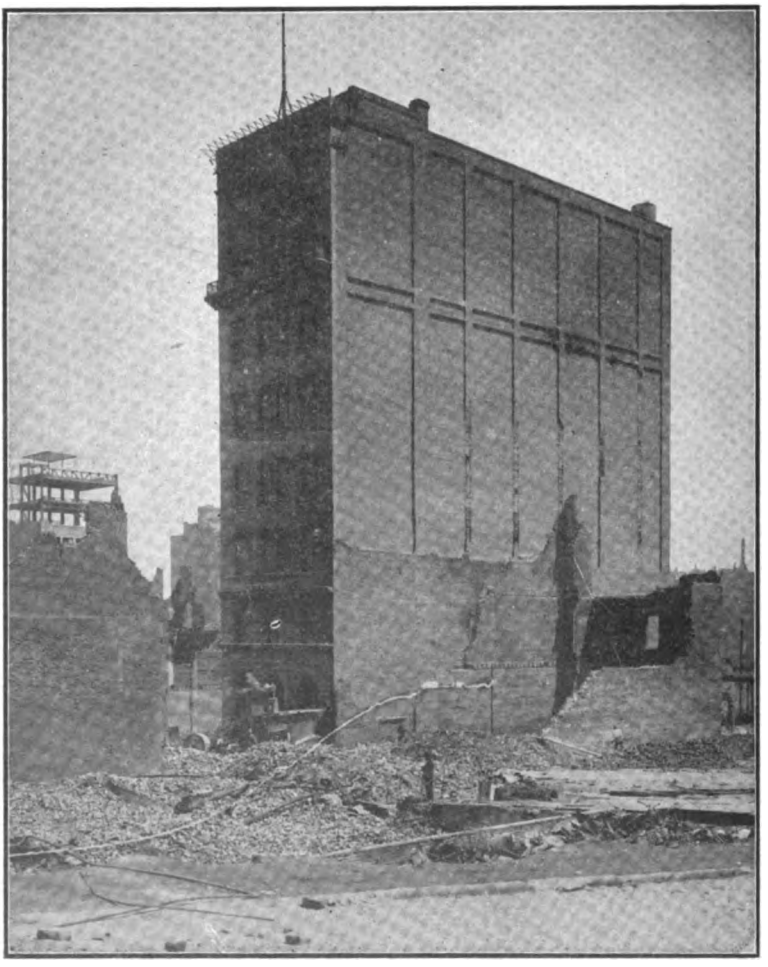


Fig. 1. Pacific States Telephone Building on Bush Street Near Kearny. The Side of the Building is Supported by Reinforced Concrete Cantilever Slabs. A. A. Cantin, Architect

Passing of the Stone Cornice and Finials

By HARRY LARKIN
Member of Technical Society of the Pacific Coast

THE conflagration, long predicted for San Francisco, has come, but not in the manner or in the locality looked for. This wooden city of ours has long been looked upon with wonder by residents of other States and they could see in their minds eye, the resident sections being wiped out by fire, aided by our high winds.

This catastrophe has taught many lessons that architects and builders must bear in mind while re-constructing the city. It is apparent that brick and stone buildings are little more fire-proof than wood construction in a big conflagration, and the comparative amount of damage done by the earthquake was largely in favor of wood construction. The well braced wooden residences, resting on good foundations suffered very little from the tremor.

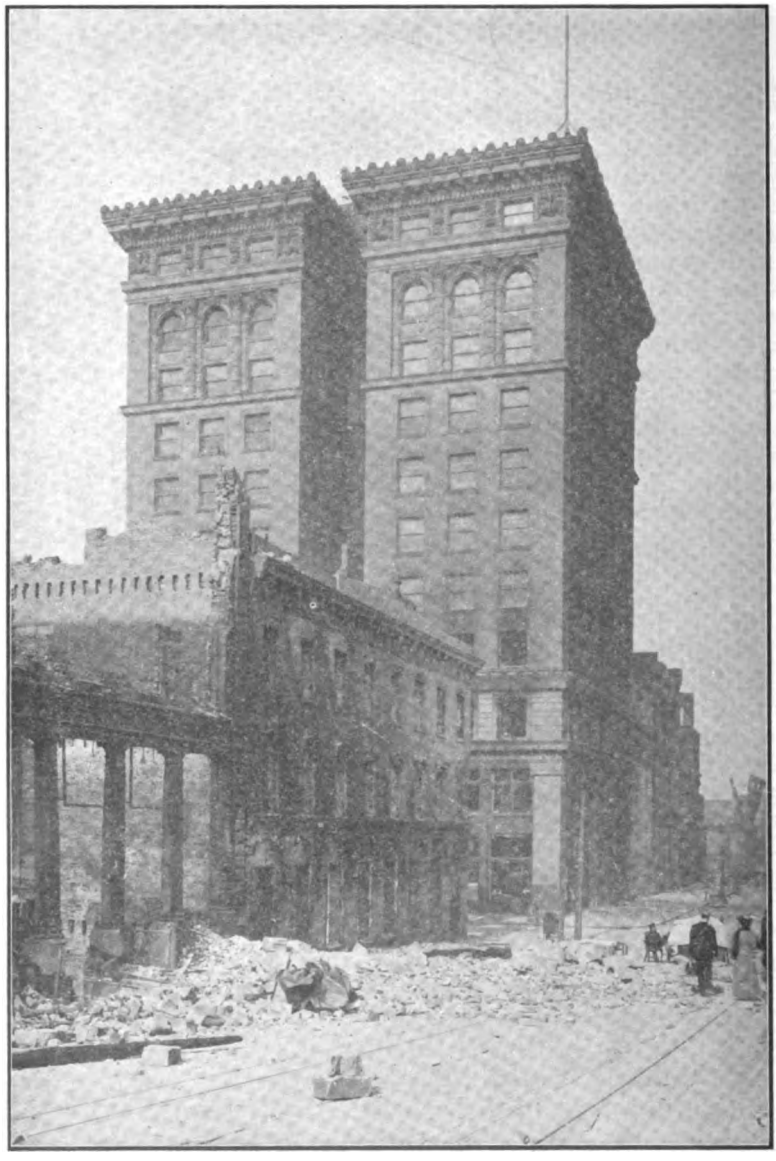
The best built brick and stone buildings all suffered before the fire reached them. As an illustration, a portion of the Crocker Estate building at the south-easterly corner of First and Mission streets, collapsed in the first shake, although it was considered one of the best built, modern, fire-proof constructed buildings in the city. The placing of heavy weights of stone at high points, such as cornices and finials, had done a great amount of damage in falling. At the Stanford Memorial Chapel, more damage was done by these weights crushing their way through roofs, etc., than by the actual racking of the building.

To quote Grover Cleveland: "It is a condition, not a theory that confronts us now." We must put our wooden buildings on good foundations, avoid high basements without cross partitions, and brace the buildings from every point. In brick construction cross walls and anchors must be used and a more perfect bond made with the veneer of stone or face brick.

Now is our opportunity to prove the old adage: "Everything is for the best." The architects, engineers and builders have a clean field. Here is the chance to cover the best suited part of San Francisco with apartment houses and hotels—that district lately occupied by Chinatown and Telegraph Hill. Now is the chance to put all the wholesale houses on the flat ground close to rail and water transportation in the Tar Flat district; the manufacturing establishments in The Dumps, beyond Channel street, at the Potrero and out Division and Harrison streets; and the banks and offices from Montgomery street to the water-front.

Now is the time to carry out Mr. Burnham's ideas for parks and wide boulevards with civic centers. Salt water reservoirs should be placed at all high points, each with its independent pumping station and distributing system for fire protection. Artistic overhead trolley lines should replace the antequated cable roads and a liberal policy adopted by the administration that will encourage capitalists to use their best endeavors to beautify the city while investing their money.

We must all forget our personal prejudices and work as a unite with the object in view of making the New San Francisco the model city of the world for beauty and convenience. The site and surroundings will permit, in fact they cannot be excelled. All that is needed is the spirit. Let us, one and all, put our shoulder to the wheel and in five years San Francisco will be our pride, more than ever it was.



The Kohl or Hayward Building at Montgomery and California Streets. This Building is a Class "A" Fire Proof Structure With Metal Window Casings. The Seven Upper Stories Were Not Damaged in the Least by Fire and the Building Was Uninjured by the Earthquake

How the Earthquake Affected Certain Buildings

By MAURICE COUCHOT, C. E.

ON Wednesday, April 18th, at 5:13 a. m., San Francisco was shaken by a violent earthquake which did considerable damage to some of the buildings. It was the writer's good fortune to be in the city immediately after the shock and to be able to make an inspection of some of the effects of the earthquake on the different classes of buildings.

The Class "A" building, having a steel frame, withstood the temblor very well. This class of buildings, when properly designed for dead, live and wind loads, thoroughly braced and rigidly connected and riveted, with deep girders and gusset plate connections, can be entirely depended upon to resist the action of seismic disturbance, even if such would be of larger intensity than the last one.

The only apparent damage in all the sky scrapers was very slight and consisted mostly of a crushing, splitting or spalling of some of the veneer stone work at the extreme corner piers when the piers rested directly on the foundation. Such was the case in the St. Francis, the Flood building and the Kohl building.

In other cases the damage was in the very well defined characteristic of a cross indicating a swaying or possibly twisting movement inducing diagonal strains in the masonry in some of the piers—the masonry not being able to resist diagonal tension would crack normally to the strains. This is very apparent in the new Chronicle, the Fairmont Hotel and the Monadnock.

The Call, Crocker, Shreve, Union Trust, Merchants Exchange, Mills and Mutual Savings Bank buildings were practically uninjured except for some of the plaster being knocked down, and some of the lintels slightly cracked or the joints had slightly opened.

Even some of the steel frame buildings which the writer knew to be of poor design, where no provision had been made for wind stresses and the connections were of the shelf type, affording the minimum amount of stiffness, these stood the shock very well, the only apparent indications being of larger amounts of plaster destroyed and more stone veneer disjointed. It is remarkable, also, that the stone cornices of belt courses of the above buildings stood so well.

The Class "B" buildings, as built previously, were, and will be (if built again on the same laws), a constant danger. They were nearly all cracked by the shock, not necessarily so as to be torn down, but enough to show that the construction is faulty. The main reasons that I can give are very poor workmanship, the absolute worthlessness of lime mortar and in many a case, faulty designs, lack of proper supervision and enforcement of specifications and city ordinances, and the tendency of slighting work and trying to do work cheap. I may be blunt in my assertions, but I stand for what I saw, and I am speaking the truth.

The frame buildings stood very well, and are absolutely safe below three stories as long as the foundations are properly built. So much for the earthquake.

In regard to the fire, we have passed through the same experience as Baltimore, Boston, Buffalo and Chicago. The same faults have been emphasized, and, while it is a costly lesson, it is the hope of the writer that all that are and will be engaged in the rebuilding of the city will profit by it.

In a conflagration of this magnitude, hardly any building material or

combination of materials may be said to be fire-proof. Our big sky-scrapers, our pride, have all been more or less damaged. Wherever the steel frame was strongly designed and properly protected they stood the fire well, but where not protected, they failed—a thing that should never have occurred.

The only protection that can be said to protect steel frame thoroughly is to have it absolutely incased in concrete, having all metal at least 2½ inches imbedded—it will give the steel frame a protection and a rigidity not otherwise obtained.

Concrete has stood best of any material, as was the case in Boston and Baltimore. Common brick has failed more than I ever expected. Terra cotta for floors is a failure. In the partition it has also failed, due a great deal to the lack of stiffness and not being keyed, and to the presence of a number of openings with wooden frames.

The plaster partitions, either hollow or solid, have failed. They would not have failed had slag or cinder concrete been used instead of lime or plaster mortar, which turns to sand when exposed to fire.

The main cause of failure of the metal lath partition is the omission of plaster at the base at the chair rail, at the picture mould and the absurd connection of a steel stud to a wooden slipper or head plate.

Granite, marble and sandstone have all gone to pieces when exposed to heat. Pressed brick has stood best of all. Terra cotta decorations come next, when not too much decorated, hard and well burnt.

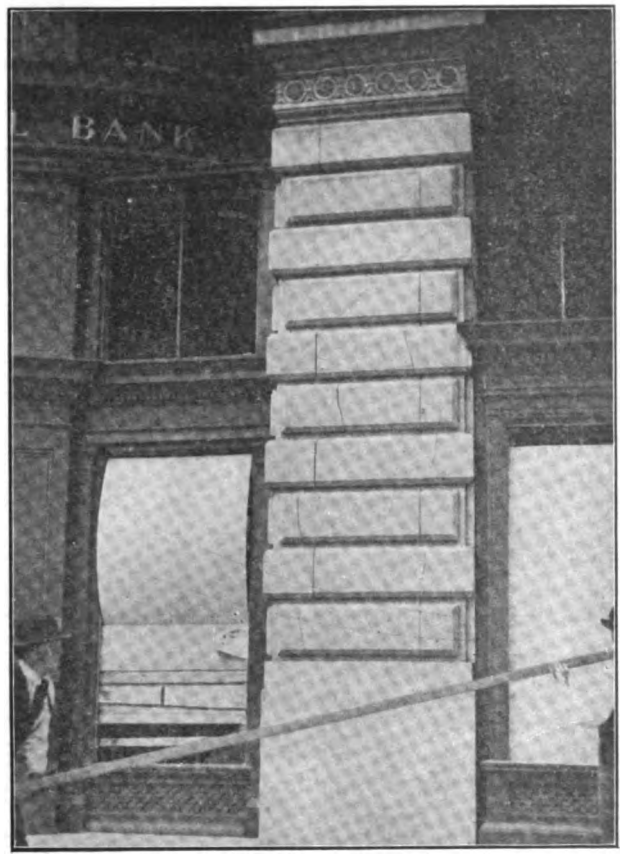
In regard to brick work, brick should be bonded every course. On the line of the Fleming bond with a course of headers and sketchers every course. To lime mortar should be added cement in the proportion of half and half, or even more. Brick should be wetted. This would increase the cost slightly, but I believe it would be a good investment and a very good and cheap insurance. Clipped course for bonding pressed bricks should be entirely condemned, as the result has been seen in one of our biggest buildings. The whole side from the second story to the eleventh was entirely stripped because the 4-inch veneer had only been bonded to the backing by a clipped course every tenth course.

Reinforced concrete had but few examples in the calamity, but as few as they were, they all stood the earthquake and the few that were through the fire came out hardly injured.

The Museum in the Academy of Science on Market street is a good example. This was built nearly twenty years ago by Ransome, as was also the borax works in Alameda. The Bekins Warehouse at West Mission and Thirteenth streets is another example. This building was in course of construction. The brick work is shattered, but the concrete work is intact.

The city ordinances are now in the hands of a very able committee for revision. They ought to be made very liberal, but at the same time very strict, as building laws are not made to tell a good architect or builder what to do, but to prevent a bad design and a poor construction and are to insure safety for the owners.

A Bureau of Inspection, composed of architects, engineers and inspectors, directly under the Board of Public Works, should be empowered to examine all plans submitted and see that the laws are complied with. It may also be said that it is not possible that such another conflagration will again happen as the new condition will be entirely different. We will not see any more some splendid building like the Call, Crocker, Shreve or Mutual Savings Bank entirely surrounded by low buildings of a very inflamable character. Every building rebuilt in the burnt district will be of very substantial construction and will be a protection to one another and prevent any rapid spreading of fire.



How the Earthquake Cracked the Stone Piers in the New James Flood Building — *Albert Pissis, Architect*

Structural Lessons of the Earthquake Disturbance

By CHARLES DERLETH, Jr.,
Associate Professor of Structural Engineering, University of California.

NEARLY five weeks have elapsed since the fatal earthquake day, and everybody has been busy helping on the one hand to bring order out of chaos, and studying on the other to learn the lessons to be taught by the earthquake and fire destruction.

Different people have different points of view. Therefore our great calamity teaches different lessons to different classes of students. The California Earthquake Investigating Commission is studying purely the earthquake problem and is devoting itself to the purely scientific phenomena. The astronomers and physicists are studying the nature of the earth's crust in this vicinity. They are investigating the structural problems of the earth's crust with the weapons of the geologist. On the other hand the engineers are attacking the question in its relation more directly to man and to human works. They are studying the earthquake resistance of buildings of different types of construction; they are investigating the effects of the temblor on water works and sewers and streets, on bridges and machinery.

Neither purely scientific nor the entirely technical investigations are sufficient within themselves alone. To obtain the best results, the various investigators, from their different points of view, must co-operate for mutual benefit and clearer understanding. No one individual or body of individuals can handle the whole problem. Much time will elapse before all the data can be collected, and more time still will be consumed in digesting the results and formulating conclusions.

Geologists and physicists are anxious to learn the seat of the disturbance and the nature of the ruptures in the crust of the earth. They are desirous of studying the laws of transmission of earthquake waves and the effect of different strata and varying topography upon the intensities and directions of shock. This earthquake is not of the volcanic type, but belongs rather to those phenomena which associate themselves with mountain making forces. The coast ranges are young and are growing, and the Pacific Coast for that reason is from time to time more or less subject to crustal stress. When this stress in any locality exceeds the strength of the rocks some type of slipping or movement must take place. The earthquake of April 18th appears to be the result of a very complex system of crust movements and the physicists are anxious to attack a problem which it is presumed will add much to our present knowledge of seismology.

Manufacturers, contractors and engineers in their field are anxious to learn of the destructive tendencies of earthquakes and how different structures, different material and different grades of workmanship have behaved. Since this earthquake was followed by a great conflagration in San Francisco, they are further anxious to study the fire-resisting qualities of different types of structures and of the component substances of which they are made.

Less than five weeks, as I said in the beginning, have elapsed since the beginning of this active investigation and the time really is not ripe to state final conclusions, and yet hypotheses and conclusions are to some extent at this early date necessary in order that they may bring out discussion and criticism. On the purely theoretical side the geologist must advance his working hypotheses regarding the nature of the cracks, the positions of the lines of weakness, and the probable conditions of rupture and motion. On the other hand the representatives of the technical professions must advance conclusions regarding the behavior of structures and materials. They may not all be right, but they will bring forth argument.

The writer has examined the earthquake destruction in Berkeley and Oakland, and has visited the property of the Spring Valley Water Company. He has also spent much time in San Francisco examining the earthquake damage and fire ruins. Confining himself to the lessons to be learned in San Francisco and vicinity regarding the course which should be pursued in the immediate future to insure in the new San Francisco greater structural stability against earthquake vibration and more certain resistance to fire, the following conclusions are advanced. They are not to be understood as final, but as mere tentative statements advanced as opinions which the writer is ready to change or modify as discussion and criticism reveal more complete facts and develop early observational errors.

1. The cornices on the top walls of ordinary brick and stone structures should not be heavy nor have great projection. The earthquake has generally demolished them. A considerable number of lives have been lost by falling brick and stone from these sources. In the future cornices and top walls should be more securely anchored with metal, their masonry bond should be made with care, and cementing materials should be of the highest quality.

2. Terra cotta and similar materials should not be so profusely and boldly used in the future. They are not good structural materials. They have been badly cracked by earthquake vibration. The north wall of the Fairmont Hotel, where it is composed of terra cotta, has been miserably cracked. Pressed brick work with good mortar and a proper bond is a far stronger material.

3. Wooden buildings and cheap brick structures should be discouraged in the business section of the city.

4. Frame structures upon soft ground should have carefully framed foundations to act as units to distribute the load as a whole; such buildings should have carefully constructed framing to prevent their collapse.

5. Brick buildings when without steel work and of light construction should have small height, three to four stories at the most. The bond of the brickwork should be carefully inspected and floors securely tied. On soft ground their foundations should be even more carefully designed for stiffness of framing and distributing power than those for wooden buildings. Roof trusses of wood should be properly framed, and have lower chord tension members, especially when the trusses rest on brick walls. Faulty trusses have generally thrust out the brick work due to the sinking and spreading of the roof frames. The High School building in Berkeley is a typical example. Roof trusses of steel for school buildings ought to be used and not wooden trusses. The Majestic Theatre in San Francisco clearly shows how such trusses have kept high brick walls from collapsing.

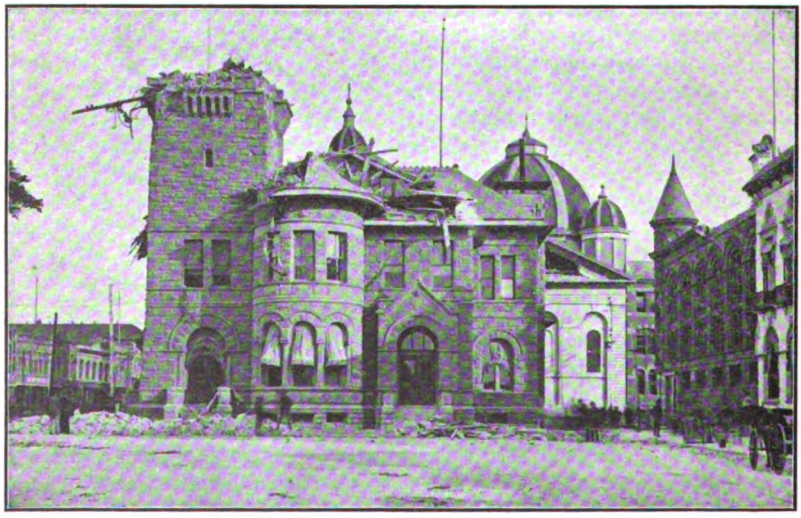
6. Cheap lime mortar should be allowed in the future for no buildings. Cement, with just enough lime to make it workable, should be more generally insisted upon. The High School building at Berkeley again may be taken as an example of a lime mortar building, although the writer regrets to state that he could name hundreds of buildings. In the light of what has happened it should be a crime to use bad bond and lime mortar for brick work in school and public buildings, in fact in all buildings. Mortar has been too generally applied to dry brick. The First National Bank of Berkeley may be referred to with pleasure as an example of the use of cement mortar. Let contractors examine that building. Let them remember, too, that it was severely criticised because of its heavy steel framing. I do not believe the owners of the building now regret the expenditure of extra money for cement mortar or for a few pounds of steel. Let the builders of the City Hall in San Francisco examine the excellent brick work with cement mortar in the pumping stations and gate houses of the Spring Valley Water Company. I must especially note the brick work of the waste way gate house at San Andreas dam and the brick tunnel leading away from it which were practically on the line of fault. Brick in cement mortar with good bond stand surprisingly well.

7. Brick buildings of greater height than four stories should have heavy walls and a proper number of interior crosswalls to give lateral stiffness. The Appraiser's building, or Custom House, was unharmed by the earthquake; the Palace Hotel stood the shock splendidly, the latter being an excellent type of brick structure whose brick walls were thoroughly reinforced with iron rods.

8. At the time of the earthquake there were entirely too many top-heavy and improperly braced brick and stone towers and steeples in San Francisco. I believe where they are merely ornamental, they should be discouraged as far as possible. Their ruins are everywhere to be seen in San Francisco. The Ferry tower might have had heavier diagonal framing.

High School Building at San Jose After the Earthquake, April 18, 1906

Jacob Lenzen, Architect



Post Office at San Jose, After the Earthquake. Original Height 120 Feet; 45 Feet Broken Off

John Knox Taylor, Government Architect

Most towers lack in interior cross walls and in the necessary steel frames. I believe that reinforced concrete where not too boldly employed, could be well adapted for these purposes.

9. Important buildings like the Postoffice should not be placed on filled or treacherous ground.

10. High buildings on soft ground with pile foundations of the proper design have withstood the earthquake shock well. Considering the nature of the material on which the Ferry building rests, it stood the shock extremely well, because of its excellent pile foundation. The Call building foundation represents another type apparently equally well fitted for service with its particular conditions of foundation material.

11. Reinforced concrete should be more respected in the future by the building laws and trades unions of San Francisco. There is no reason why buildings of this type, designed by competent engineers, should not be six to eight stories in height.

12. Low buildings of this type of construction would seem to the writer far better able to resist earthquake shocks than brick, stone and frame buildings.

13. On soft ground footings for ordinary buildings, too light to require pile foundations, might have footings, foundation walls and cellar slabs of reinforced concrete to act as units and give distributing power.

14. Reinforced concrete sewers should be studied in the light of the brick sewer destruction which has been so generally meted out in the made ground of the city.

15. Important water mains should avoid soft ground and when they must necessarily pass from firmer to softer ground, they should be provided with flexible joints and cut-offs.

16. Important water mains upon which the fire service depends and which must run through the made ground, should be riveted wrought iron or steel, have flexible joints at intervals, and be lodged in tunnels, say of reinforced concrete. Earthquake disturbances like that which produced a billow like surface near the water front might severely crack such tunnels without great injury to the pipes, due to the properties of the metal, the nature of the joints, and the clear space between the tunnel walls and the pipe. Such a construction would further give more probability of access to the pipe in case of a calamity.

17. Important net-works of pipe in the gridiron system might be arranged in more or less independent units, arranged with respect to the soft and the firmer grounds of the city, so that pipes in made ground could be quickly separated from those on a more solid foundation. The main conduits running from the storage reservoirs to the city should avoid marsh land as far as possible, but where they must necessarily cross swamps and marshes, they should be provided with flexible joints and not be too firmly blocked to their platforms.

18. Brick chimneys should be built with cement mortar and not be too high. In many cases a forced draft had better be considered. A study of reinforced chimneys should be made; I believe they would withstand shocks much better than brick ones.

19. In the business section of the city, Class "A" buildings should be encouraged at the expense of Class "B" structures. Skimping of steel frames should meet with entire disapproval. Diagonal bracing should [illegible] and interior corridors do not prevent. Heavy knee brace framing or portal framing should receive more attention.

20. Steel columns should run through more than one floor and column joints should be so distributed as to bring a minimum number at any one floor level.

21. Cast iron columns should not be used.

22. Heavy stone ornamentation should not be hung to the steel frames and heavy centralized supports on the first floor should be avoided when possible. I believe that the Flood building is open to criticism in these respects. Except on suitable firm ground buildings over twelve stories in height would seem unwise. No expense should be spared for foundations of buildings of a greater height.

23. Face brick should be carefully bonded to the back brick in Class "A" buildings. Large areas of face brick fell, for example, from the west wall of the Merchants Exchange building because of improper bond.

24. Reinforced concrete buildings of careful, honest and intelligent design should be allowed to enter competition in San Francisco. See Note 11.

25. Building laws of San Francisco should be reconstructed in the light of the Baltimore fire, our earthquake and our conflagration.

26. Granite and sandstone have been badly chipped and spalled by the fire. Terra cotta has not stood the heat well. I have no respect for this latter material either structurally or as a fire resisting medium. Concrete has stood the heat splendidly. Brick walls with lime mortar have thoroughly disintegrated by fire. What the earthquake began the fire finished. I cannot condemn the lime mortar too strongly. It has no place in engineering work and architects should learn to listen to good advice.

27. Belgian block pavements have spalled miserably.

28. Hollow tile partitions in the General Postoffice have been greatly destroyed by the earthquake. In other buildings, notably the Mills building, hollow tile partitions and floors have shown great weakness to fire from a structural standpoint, though the individual blocks may have been able to stand the heat. From what I have seen I am decidedly not an advocate of hollow tile construction either from the fire or the earthquake standpoint See also Notes 2 and 26.

29. Almost invariably floors and partitions of reinforced concrete have withstood the temblor magnificently and have shown up excellently in the fire test. By the fire most all other types of floors have been thoroughly disintegrated. Everywhere in the city may be seen buildings standing, whose partitions and floors, where intact, prove to be of concrete and reinforced work.

30. Our so-called fire-proof buildings have not been protected by proper window construction. The wooden window frames have quickly ignited from surrounding fires, the ordinary glass panes have been quickly cracked, giving quick access of fire to the interior, thus allowing the tall fire-proof structures to act like chimneys under forced draft, because of the elevator shafts; and where the floors and partitions have been of sound materials like concrete, the contents of the rooms and offices have been roasted as though they were in ovens or furnaces.

31. No structure is fire-proof against a great conflagration. The so-called fire-proof structures can only be said to retard the progress of fire, and this they cannot do without improved window design.

32. Metal window frames, metal shutters, Venetian blinds, wire ribbed glass windows and other devices of this kind should be more fashionable in San Francisco in the future.

33. Important buildings should have roof tanks or cellar tanks or both for water storage, with pumps.

34. Artesian wells should be encouraged.

35. High buildings like the Mills building, in which the floors are supported on steel frames, but whose outer walls are self-supporting, should not be imitated in design in the future. When such a building is badly shaken or when it has its outer walls locally damaged, repair is difficult. In Class "A" buildings where the steel frame carries the wall of each floor independently, such difficulty vanishes.

36. San Francisco should have more wide streets like Van Ness avenue.

37 The business district should be safeguarded by a salt water system in addition to the regular water supply for fire service; and where salt water pipes must run through made ground, they should be provided with flexible joints and with a tunnel construction as above suggested for main water pipes; or they should be on the surface.

38. San Francisco needs a better fire boat service.

39. The small distributing reservoirs within the city limits should be connected with the main conduits by suitably large pipes independent of the regular gridiron system. They should be carefully designed and be easy of access. Some of the necessary delay in forcing water through crippled street mains to the various city reservoirs and pumping stations might, with the above provisions, have been avoided.

40. Class "B" buildings ought not to exist in the main business and banking districts of the city, and certainly no wooden or easily inflammable structures should surround expensive fire-proof buildings. In our present calamity wooden buildings have acted like kindling wood.

41. Interior floors of mosaic or tile with metal covered woodwork add to a building's safety against fire. The Kohl Building had such an interior.

42. The effect of heat and cold upon steel frames of high buildings in the regions of fiercest fire should be studied in connection with the types and thickness of fire-proofing.

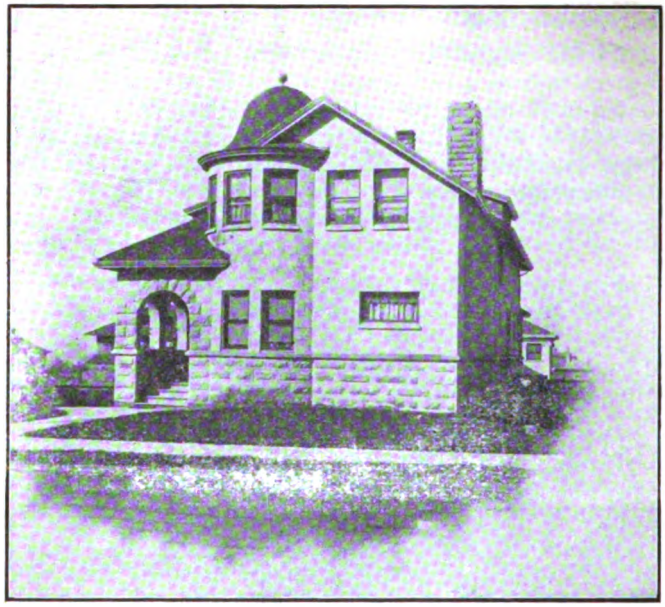
43. Electrical insulation for high tension transmission should be rigorously inspected.

44. Inspection of all classes of construction should receive greater encouragement in the future. Dishonest work and incompetent design should be advertised. San Francisco has paid dearly because she allowed bad construction.

In the above tabulation the writer has not intended to criticise any particular building or advocate any special type of construction. The ideas are frankly advanced impersonally and without prejudice, as the first impressions of a two-weeks examination of the ruins. Only continued study and conference with others can result in safe and reliable conclusions.

Admitted to Practice

At a recent examination of the California State Board of Architecture, the following were granted certificates to practice: W. J. Saunders, 333 Mason building, Los Angeles; G. A. Goersch, 537 East Thirty-sixth street, Los Angeles; E. J. Burke, Hellman building, Los Angeles, and G. E. Bergstrom.



Residence of William B. Gester at Berkeley. This House Is Built of Reinforced Concrete and "Roman Stone" and Was Uninjured by the Earthquake
Jas A. Leonard, Architect

Reinforced Concrete in the Earthquake

By WM. B. GESTER, C. E.

THE architects and engineers of the world are gathering with the most intense interest notes of every fact and every experience possible in connection with the late disastrous combination of earthquake and conflagration in and about San Francisco.

There will be very many records of happenings noted by dwellers in structures of wood and brick and stone, and in those of steel frames, and the lessons derived therefrom should be numerous and valuable.

Inasmuch as my own experience of the temblor was had within the walls of a reinforced concrete building, it may be of interest to many to have a record of the sensations felt, and the effect of the shaking upon the structure.

An illustration of the building accompanies this article. It is a "story and a half" dwelling located in the eastern portion of Berkeley, a few blocks south from the University of California.

The seismic disturbance in this district was probably just about as violent as it was in the University grounds, where accurate measurements were automatically recorded. The vertical height of the earth wave is said to have been one inch. The intervals of the waves were about one second, and the disastrous portion of the disturbance lasted about one minute and a half. So this particular piece of the earth's crust was lifted and dropped vertically, a distance of one inch, about a hundred times.

To the uninitiated this may not carry an idea of much impressiveness, but to all to whom it was an experience, it was one of awe, compelling a peculiar profound conclusion [illegible] of infinite human insignificance and help-

lessness. In the house in question, those of us who could hold ourselves to side or head or foot of our beds did so. But one of the occupants, an active, athletic young fellow weighing about 170 pounds, was thrown by the shock from his bed to the floor. Scrambling to his feet to reach the door of his room, he was immediately landed upon his hands and knees, and thence flung in a huddled heap into the angle formed by floor and wall. Pictures, furniture, the chain-hung electroliers, everything not fastened to floor or wall, was put into instantaneous motion, the commotion and the din being indescribable.

The building itself, however, came through the racking with so little damage that it serves as an example of the value of a simple type of ferro-concrete construction.

The foundation walls, having a base 20 inches thick, are constructed of well-tamped 1-2-5 concrete made with domestic Portland cement.

The walls above the foundation, to the line of the first floor joists, are 12 inches thick, and above this line they are but 8 inches thick. Of this thickness, 2½ inches is a veneer of blocks of cast concrete known as "Roman Stone," or Stevens Cast Stone, thoroughly anchored by corrugated galvanized iron ties to the main body of the wall. This "Roman Stone" is made of poured concrete, a 1 to 4 mixture of Pacific Portland cement and finely crushed rock from the California City quarries in Marin County.

The main wall is a well-rammed 1-2-5 concrete, reinforced with vertical one-quarter inch iron rods, spaced 16 inches apart, and tied horizontally with heavy baling wire. The outer walls and the arches of the vestibule are of solid blocks of "Roman Stone."

Except for the arched vestibule, the structure is a monolith, and the effect of the temblor is such as might have been expected. The whole building rose and fell as a single mass, without creak or groan or complaining strain, but with a very solid impact it came down after every lift, chunk-chunk-chunk, as if it had been a great cast iron box.

The following damage was suffered: One chimney, not the large one seen in the illustration, but a lighter one in the rear of the building, was twisted just above the roof line, so as to require rebuilding. Inasmuch, however, as this chimney was not braced above the roof, and differed but little in construction from thousands of others that suffered similarly, no particular deduction can be drawn.

The pointing of the keystones only, in all the arches of the vestibule, was cracked so as to require repointing. Not a single other joint in the building was disturbed or injured in the least, and not a stone was broken or cracked.

The joints of the keystones that were loosened were so affected because of lack of weight above the arches, there being but one course of stone between the top of the arches and the comparatively light portico roof.

The principal deduction to be drawn, therefore, from this particular experience is that reinforced concrete wall construction, in its simplest form, if only well done, is proof against a more than ordinary severe earth crust disturbance, and that with proper anchorage and honest mortar joints, a stone veneer will be held to it in absolutely perfect condition.

Fig. 3. The Kann Building Having Reinforced Concrete Floors. This was the First Building on Market Street to Be Re-occupied After the Fire

Bliss & Faville, Architects

How Reinforced Concrete Stood Earthquake and Fire

By JOHN B. LEONARD, C. E.

THE great earthquake which occurred in San Francisco on the morning of the 18th of April, followed by three days of conflagration, was probably the most severe test that modern building construction has encountered. A great many conclusions, some of them diametric, will be drawn by those who have been privileged to study the ruins of this city. For the benefit of those who have been unable to make a personal study of the situation and who are particularly interested in reinforced concrete, the writer submits the following views together with such data as he has been able to collect.

Owing to the antagonistic building ordinance, there did not exist in San Francisco an all reinforced concrete type of building of sufficient magnitude to make our data complete. With but one exception, this construction existed in the burned district only in the form of floor construction and fireproofing. In other sections near the city there were small structures built entirely of reinforced concrete. These received the full force of the earthquake and show no damage therefrom. They seem to have ridden the waves of vibrations, as one occupant describes it, as though they were so many cast-iron boxes rising and falling enbloc, with an entire absence of the rumbling and grinding noise which was prevalent in all other classes of construction. Two notable instances of this construction being the residences of Wm. B. Gester of Berkeley and Henry Gervais of San Mateo.

The Marsdon building, situated on Kearney street, between Sutter and Bush streets was in process of construction. It consists of steel columns and steel girders, the floor slabs and intermediate beams being of reinforced concrete. The columns were fireproofed by being incased in concrete. This building did not suffer at all from the fire test but had a very severe test from the earthquake owing to its unbraced condition. The floors show no cracks and the concrete on the columns appears sound; the exterior brick walls are badly damaged.—Messrs. Meyer & O'Brien, Architects.

Figure 1 represents the Pacific States Telephone and Telegraph Company's building, situated on Bush street near Kearney. The building is constructed of steel columns and beams with reinforced slabs. The condition of the floor slabs is reported to be good. The foundation on the side of the building shown in the view consists of reinforced concrete cantilever slabs and shows no settlement whatever.—A. Cantin, Architect.

Figure 2 shows the Young building, at the corner of Stewart and Market streets. This building was within one block of the water-front and everything surrounding it was destroyed by fire as were also its contents. The floors were constructed of reinforced concrete of the old suspension type in which the strap was exposed on the underside of the beam. Their general appearance indicates that they have gone through terrific heat without appreciable injury. The building is on pile foundation, as it is situated in the portion of the city that is constructed on filled ground. The portion of the street on the corner, it will be seen, has settled on this account about 2 minutes. The columns were protected with Expanded Metal Lath and plaster and seem to be in very fair condition.—Herman Barth, Architect.

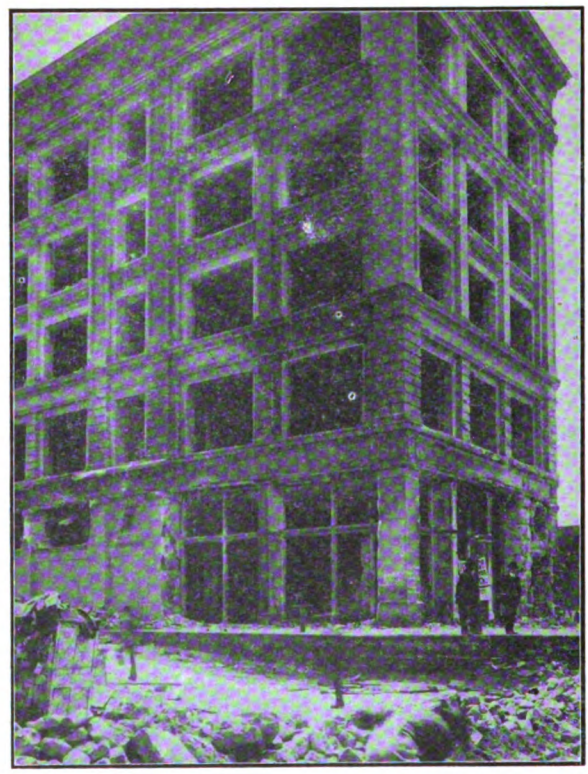


Fig. 2. The Young Building, Corner of Steuart and Market Streets, Showing Admirable Condition of Concrete Floors Which Were Constructed Under the Suspension System **Herman Barth, Architect**

The Aronson building, situated at the corner of Third and Mission streets, is constructed of steel columns, girders and beams with reinforced concrete floor slabs. The columns were fire-proofed with tile. The floors are all in position and have a good appearance. The fire-proofing of the columns is in a lamentable condition. In the basement, there were two columns that were fire-proofed with concrete which are intact, while two columns, closely adjoining, fire-fire-proofed with tile, have buckled down nearly, if not quite, one foot, from the heat. The present condition of these columns indicates that a large portion of their estimated load must have been relieved by the arching action of the floors above.—Hemmingway & Miller, Architects.

The Rialto building at the corner of New Montgomery and Mission streets, consists of steel columns and girders with reinforced concrete floors. The two corners suffered from an explosion in the interior of the building, the character of which is unknown. The balance of the floor work seems to be in excellent condition. The foundation of the building was also of reinforced concrete.—Meyer & O'Brien, Architects.

Figure 3 is a view of the Kann building, situated on the south side building did great damage to the rear portion. The portion extending back from Market street to a depth of about 70 degrees is excellent condition. The construction consisted of steel columns, girders and beams with reinforced concrete slabs. It was subjected to

Fig. 8. Ferry Building, the Tower of Which Was Badly Strained by the Temblor and Is Now Being Reconstructed of Reinforced Concrete by the Pacific Construction Company

a very severe fire test, but enjoys the distinction of being the first mercantile building on Market street to be reoccupied since the conflagration.—Bliss & Faville, Architects.

Figures 4 and 5 show the effect of blasting on the Casa Calwa Wine Company's building, on Townsend street, near Third. The buildings to the east and north of this were burned to the ground. Part of the damage done to the Casa Calwa building was caused by the dynamiting of the adjoining buildings in an endeavor to stop the fire and shows the behavior of the reinforced concrete floors when their span was unexpectedly changed from 20 to 40 minutes by the destruction of part of the wall. The intermediate spporting beam having lost its wall support at the outer end dropped from beneath the slab, even tearing out some of the reinforcing rods attached to the intermediate beam. The floor shows a remarkably small deflection under existing circumstances. The slab on the second floor shows sufficient strength to support not only its 40-foot length but the intermediate beam as well as even when the wall support for this beam was destroyed. The construction of this building consists of steel columns and girders with reinforced concrete intermediate beams and slabs. No other portion of the building has suffered any damage whatever and is now being filled with a stock of wine. The foundations were also of reinforced concrete.—Messrs. Meyer & O'Brien, Architects.

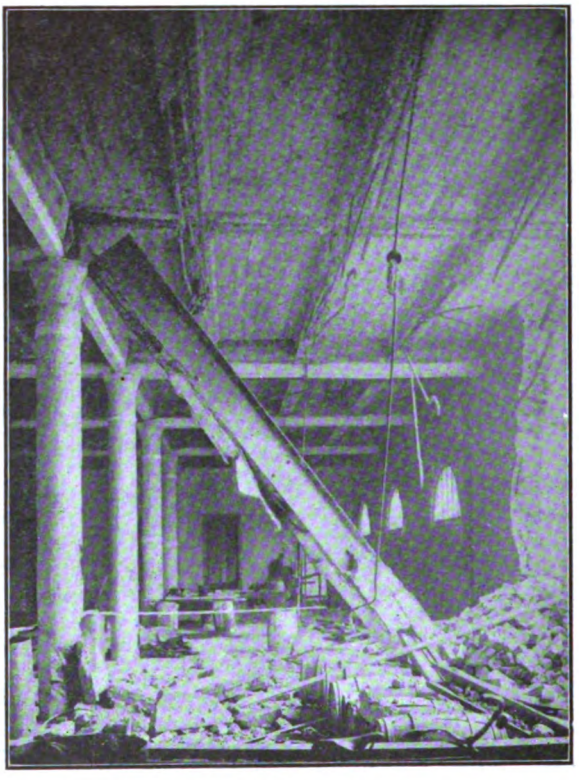


Fig. 5. Interior View of the First Floor of the Casa Calwa Building
Meyer & O'Brien, Architects

Figures 6 and 7 are exterior and interior views of the Bekin Van and Storage Company's building on West Mission street, near Thirteenth. This building is constructed of reinforced concrete columns, girders, beams and slabs with exterior brick supporting walls. It was under construction at the time of the earthquake, there being but three of the six proposed floors completed. The concrete for the basement floor and columns was completed on February 1st, the second story columns and second floor March 25th, the third floor columns and third floor April 12th. A careful examination of the concrete portion of the building fails to reveal any sign of injury or cracks as a result of the earthquake, while the exterior (brick) walls have suffered severely. One bay at the front of the building was filled with highly inflammable goods which were destroyed by the fire. The effect of the fire on the underside of the second floor was to pit the concrete only sufficiently to expose a small portion of the rods in a few places, but did not seem to effect the strength of the floor. This concrete was less than one month old. The owner of the building intends, if the new city ordinance will permit, to replace the brick interior walls with reinforced concrete. The conservatism of the previous building ordinances compelled him, much against his wishes, to build originally with brick exterior walls.—Ralph Warner Hart, Architect.

Figure 8 is a view of the Ferry building, at the foot of Market street. The construction of this building consists of steel columns, girders

and intermediate beams with reinforced concrete slabs. The entire building rests upon pile foundation; the tower consists of steel columns, beams and bracing with brick curtain walls faced with stone. The tower having been so badly damaged by the earthquake its immediate reconstruction was imperative; the State Board of Harbor Commissioners have already awarded the contract to the Pacific Construction Company for its reconstruction in reinforced concrete. All the reinforced concrete floors in this building were found to be in perfect condition and the only necessity for even partially restricting the traffic in the building was caused by the failure in the tower.

There are many other buildings constructed with reinforced concrete floors supported on steel girders, some with steel beams and others with reinforced concrete intermediate beams which are typically represented by the views shown in this number.

The reinforced concrete bridge at Pollasky, consisting of ten 75-foot spans, together with wings, a total length of 780 feet, shows no defect whatever from the earthquake.

The 112-foot concrete arch, designed by the writer, which was built across Dry Creek in Stanislaus county, near the city of Modesto, also passed through the temblor without showing the slightest sign of crack or failure.

At the present time, so far as the writer is informed, there has been no tests made on any of the ruins, but preparations are now being made to enter into this field of investigation. When this has been completed very definite information will be obtainable as to the amount of damage, if any, suffered by the reinforced concrete construction.

An inquiry among architects and engineers, together with my own observations, have failed to reveal any instance of failure on the part of reinforced concrete. Its general behavior has been such as to make it the most favorably considered material for the rebuilding of San Francisco by the investing public. This uniform expression of confidence by the laymen becomes the more noticeable because of their expressed convictions of the insecurity and danger of brick structures, based upon their observation during the destruction of a city.

Of the damage occurring by the earthquake in San Francisco, over 90 per cent of it was visited on the brick construction. The tall steel frame buildings of the Class "A" type have inspired a great deal of confidence through their behavior. However, before a positive statement can be made regarding their condition, a careful examination and survey will have to be made of their connections. The writer is aware of several instances where the rivets have been sheared off entirely, and for that reason feels very confident that the condition of these buildings cannot be accurately stated until at least the principal connections have been stripped and thoroughly examined. The adaption of a method for future connections in "Class A" buildings to be built in San Francisco will be greatly influenced, if not wholly controlled, by the conditions found to exist in the present buildings.

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Bjenks: "They say it isn't easy to keep a girl in your kitchen nowadays, but I've had the same cook twenty years."

Bjones: "That is a great record. How did you manage it?"

Bjenks: "I married her."

o o o

Friends: "Hello, old man! how are you? I hear you've written the very latest novel of the day."

Author: "Well, I had at twelve o'clock; but it's three o'clock now."

Fig. 6. ***General*** *View of the Bekin Van and Storage Building, Having Brick Exterior Walls and Interior Construction Entirely of Reinforced Concrete. The Only Damage to This Building Was to the Brick Exterior Walls.* *Ralph Warner Hart, Architect*

San Francisco and Baltimore on Fire

By A. DODGE COPLIN, Architect

OUT from the dome of the sky and over the domes of stately buildings from the Potomac to the Golden Gate rings out the alarm of fire. Comparative data, if you please, twixt the smoke and curl of heat that rose from one Atlantic sister city and the breathless force of devasting heat crouching for staggering leaps through the raking sky line of the Western Metropolis. Great as our Sequoia Giants are to the fern leaves of Eastern villages, so equally colossal in magnitude is the recent disaster standing out against Baltimore and other known calamities of like character. Extreme as must be the comparison between the two once glorious municipal specimens of our Commonwealth as to size of evident disaster, still in each case the triumphal entry of the sturdy and indomitable Yankee is ready to meet the breach, plug the leaks, hoist the sail, and flags, and slam out the news to creation's hosts that the work of restoration shall go on. And how shall it go on? Here we collide with a vital point.

The writer was in Baltimore a year and a half ago to inspect the ruins and commencement of rebuilding, and also again this winter to note the progress of new work and rehabilitation. Most vividly portrayed for those who learn through observation's realm, is the lesson gleaned from the Eastern method. Baltimore in need made haste. Yes, and in the hustling, headlong rush for new structures came what already portends to flatten itself out over San Francisco.

Like a shot from a gun and with the cry "On to Baltimore," came masses of cheap, half burnt brick, masses of cheap unskilled artisans, and into walls that should have reared themselves to endure were heaped the twist of clay called brick, with enough sand and water to resemble mortar. And today it all stands, or rather is held up by adjoining buildings to attest to the inadvisability of the excess of so good a thing as "hustle." Let San Francisco crowd forward with her beacon lights fusing above the harbor fog line, but when she begins to lay the stones for time again, see to it that the long view of the future is engrossed on her banners.

Let the coming generation, some of whom were recently born in the throes of the quake and fire, live to grow and learn that the present second edition of the '49 spirit has built a vast city of steel and reinforced concrete upon the golden laden rocks of California hills. May they also know that our architects and scientific men have lived to learn and from a ten years' study here presented in a day, have been able to formulate deductions coupled with past experiences that go to make up the city invincible.

As to the technical and practical problems involved in the new district pensation of Greater San Francisco, it is quite unnecessary to look for any sensation in new innovations of a structural character. The lesson written on the lining of the smoke rift clouds is to do all things well. The present status of our best steel fire-proof buildings are a logical conclusion of the inventive and scientific mind of man. And if they are erected at their best the final analysis shows that they are for the normal needs of the affairs of man quite up to the mark.

While it is possible that reinforced concrete will cut a heavy factor hereafter in quake and fire-proof buildings, still there is nothing to bar the wise use of other lines of our best stones and pressed brick and terra cotta work.

As a sum-bonum let us select the best—do the best and begin to rear and build for enduring time.

Send up the skyscraper on San Francisco's undulated dunes, and underneath the top soil gridiron the sub-soil with interwoven steel and concrete until this cradle of steel rocks serene, our superstructures through the oft repeated quakes of mother earth.

As to the anatomy and material entering first class work let the experience now on tap for the architect cause him to enter the building arena like horse and rider going into battle—one and the same. May the steel be braced, tied, anchored, wound and bound as never before. Then with the outer architectural cloak and the inner utilitarian features all latticed and amply tied into one common whole, we will have monuments fit to perpetuate the destiny and names of men upon whom a great duty now devolves.

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Forty Men to Plan New City

UNDER authorization of a resolution adopted by the general relief committee, Mayor Schmitz announced the appointment of a committee of forty which is empowered to take charge of the work of framing suggestions for the guidance of the Supervisors in the widening of streets, correction of grades and other public improvements, as well as all other matters affecting the rebuilding of San Francisco. The committee of forty is as follows:

Mayor Eugene E. Schmitz, City Engineer Thomas P. Woodward, Major McKinstry, United States Army; Edwin Duryea, president of Engineers; Marsden Manson, civil engineer; William R. Hagerty, president Labor Council; P. H. McCarthy, president of the Building Trades Council; Supervisor Fred T. Nichols, president of the Carpenters' Union.

Architects—William Curlett, James Reid, Frank Shea, Willis Polk.

Builders—Jeremiah Mahoney, Jeremiah Deneen, C. E. Loss.

Attorneys—Garret McEnerney, J. E. Reinstein, A. Ruef, W. M. Metson, Gavin McNab.

United Railroads—Thornwell Mullaly, Tirey L. Ford.

Southern Pacific Company—E. H. Harriman, W. F. Herrin.

Western Pacific—W. J. Bartnett, Virgil Bogue.

Ocean Shore Railway—J. Downey Harvey.

Santa Fe Company—Mr. McDonald.

Bankers—I. W. Hellman, J. D. Phelan, William Murdock, J. Dalzell Brown.

Real Estate Agents—Thomas Magee, J. R. Howell, G. E. Umbsen.

Individual Members—W. H. Leahy, H. E. Law, F. H. Hilbert, Rudolph Spreckels, W. J. Dingee, William Babcock, R. E. Hale, F. W. Henshaw, R. H. Countryman, Thomas F. Graham, F. J. Murasky.

Superintendent of Golden Gate Park—John McLaren.

As Advisory Members—D. H. Burnham, John Galen Howard and Benjamin Ide Wheeler.

The Mayor also announced the appointment of the following auxiliary committee of citizens to work in conjunction with the Supervisor's committee:

William Curlett, architect; J. Deneen, builder; Mr. Berkeley, structural engineer; Wm. H. Leahy, building committee; Frank Shea, architect; J. W. Mahoney, builder; A. Ruef, attorney.

The Architect and Engineer of California.

Lessons of the San Francisco Earthquake and Fire

By CHARLES W. DICKEY, Architect

THE great earthquake and fire in San Francisco have taught us many lessons in construction. A vast amount of exceedingly bad construction has been laid bare, but, what is more important, some of our so-called good buildings have failed utterly. Most of the fine modern brick and stone buildings of which we were so proud were of Class B, of Class C construction. These were all more or less damaged by the earthquake and were entirely consumed by fire. This form of construction, viz.: brick walls supporting their own weight and a part of the floor loads, with interior columns and girders of steel and with wood joists, might as well be prohibited at once for buildings of more than four stories. The brick walls crack and crumble in an earthquake and the large amount of woodwork makes a fire disastrous. So-called fireproof buildings, in which the brick walls were self supporting, also behaved badly. A high brick wall should not be allowed in any class of construction.

But with all the discouraging failures, one class of construction stood the test fairly well. I refer to the buildings of steel cage construction with fireproof floors and partitions. These buildings stand conspicuously among the ruins and are, in most cases, structurally intact. But a close examination shows many weak points even in these. The tile floors, wherever subjected to intense heat, have failed miserably. The flange tile has spalled off, allowing the flames to reach the steel beams which have sagged and in some cases have collapsed. The tile partitions have failed utterly and the metal lath and plaster partitions have not stood much better. The latter have the advantage, however, of being more easily repaired.

The re-inforced concrete floors have stood wonderfully well in all cases, and wherever steel has been encased in concrete it has proved invulnerable.

The advantage of re-enforced concrete over brick construction is clearly shown in two instances: In Alameda a two-story re-enforced concrete building stands intact, while a brick building about 50 feet away is badly wrecked. In San Francisco, at 13th and Mission streets, a warehouse was in process of construction with brick external walls and interior columns, girders and floors of re-enforced concrete. The brick walls are completely shattered, but the concrete work does not show a single crack.

Stone facing has been a failure wherever exposed to the fire and many stones were cracked and displaced by the earthquake.

The following are a few of the conclusions that may be drawn from an examination of the effects of both earthquake and fire:

Steel cage construction is unquestionably the best, but it should have gusset connections; the floors should be of reinforced concrete, all structural steel should be entirely enclosed with concrete, and the external walls should be of brick, terra cotta, or concrete, thoroughly secured to the steel frame. A curtain wall of re-enforced concrete with the net work of re-enforcement entwining the columns and sprandrel beams and with the brick facing bonded into the concrete with a course of headers in every sixth course, would seem to be the best thing for walls.

All sash and doors and their frames should be of metal, filled with cement, and all trim should be of metal. All elevators and stairways should

be separate and should be enclosed with fireproof partitions or wire glass. All woodwork in partitions should be eliminated and in office buildings linoleum should take the place of wood floors.

It would probably be wise to limit the height of buildings of this class to twelve stories.

Buildings not exceeding six stories might well be built entirely of reenforced concrete and faced with pressed brick or terra cotta, thoroughly bonded into the concrete. It would seem reasonable to limit the height of buildings with self-supporting brick walls to four stories, and in all cases cement mortar should be used with possibly a little lime added to make it work smoothly. All face brick should have a row of headers every sixth or seventh course instead of depending on either metal anchors or a clipped bond.

Wherever wooden joists are used they should be most thoroughly and effectively anchored to the walls both at ends and at sides and so arranged that they will tie the building together in an earthquake, but so that if burned they will be released so as not to pull down the walls when they drop.

These lessons, with many others, may prove of great value in the remodeling of the San Francisco building laws.

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Exhibit of Arts and Crafts, Los Angeles

THE first annual exhibit of the Arts and Crafts Society was given during the last four days of March in the auditorium of the Ebel Club Building, Los Angeles, and was an acknowledged success.

The exhibit included oil and water color paintings of excellent average quality by a dozen local artists. Other features included miniatures on ivory from New York and San Francisco, as well as Los Angeles, an interesting collection of architectural drawings and photographs, a series of the now well-known "Beaumont Prints" by Hector Alliot, including his very remarkable composit photograph of the likeness of Our Savior, book plates, photographs collected from all parts of the United States, in itself an interesting exhibit; executed designs for wrought iron and other metals, and a representative selection of "Craftsman" furniture. Fine exhibits were those of Carl Enos Nash and a few pieces of furniture made of highly polished and beautifully marked wood loaned by J. E. Klippert. Mr. Nash exhibited for the first time a very unique round dining room table which is capable of being enlarged, yet retaining its circular shape, a number of ancient books dating back to the earlier days of printing, among which were a few pages from an illuminated Mss. Bible of about A. D. 1480.

The San Francisco Guild of Arts and Crafts was splendidly represented in all its branches. The "Arts and Crafts" of Santa Barbara furnished some of the most charming work in metals and shells applied to electric lighting fixtures. The "Arts and Crafts," which is less than a year old, has fully vindicated its existence and has thus early proved its usefulness by demonstrating to the public, several thousand of whom visited the exhibition, that Los Angeles is the home of an unsuspectedly large number of very capable workers in the applied arts. This artistic success may be fairly attributed to the efforts and forethought of the president of the society, R. Mackay Fripp, loyally assisted by several of the members.

Among a number of other highly interesting and commendable exhibits under the direction of the Ebel Club, to which the entire building of the

Ebel Club was given, were the Colonial, Indian, Oriental, Spanish and Educational: The Educational exhibit was designed to show what the public schools of Los Angeles are doing in the line of the arts and crafts, consisting of examples of work from the Kindergarten to the first year work in the Polytechnic High School.

The work shown from the Polytechnic was remarkably fine, consisting of work benches, architectural drawings, tables, chairs, book shelves, and artistic textiles, wallpaper, magazine cover and other decorative designs.

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Says Owners Are at Fault

Architects Can Build Fire-Proof and Earthquake Proof Structures, if Sufficient Money Is Allowed

By O. A. JOHNSON, Head Draughtsman for Meyers and Ward, Architects

OUR city of the Golden Gate, the western Mecca of the tourist, is gone from us, and we who knew and loved her so well shall miss her as long as we live.

As I gazed over the ashes of the ruined city, I recalled how in days gone by we draughtsmen used to condemn the ramshackle buildings of the downtown district as we sat in court over the beer table of some Rathskeller.

Many a block we condemned to the flames, but always with the proviso that the tenants would save their belongings and lives. We were humane, for draughtsmen have tender hearts. All we wanted was the shanty razed that a more useful and grander building might adorn its site.

Little did we dream how terribly our sentences were to be carried out. We could not conceive then the idea that a higher court had overrulled all our motions and passed judgment on office buildings, mansions, warehouses and shanties alike.

Let us pray that this same high court shall see fit to subpoena some individual who can bring order out of chaos, and furnish him with ideas for planning a city more beautiful and grander than the human mind has yet thought of.

We have listened to lots of talk about a "City Beautiful," and have read columns of manuscript telling us how we can obtain it. Beautiful pictures have been shown us, pictures that were rendered by men skilled in the art of planning and beautifying large cities. These pictures and the manuscript are now in the possession of our City Fathers and now a terrible calamity has laid bare an immense area of the city and given the promoters of the "City Beautiful" a chance to make good.

Wild and disjointed talk of wide streets here and there, and only "Class A" buildings within certain limits will not help to build our city up. A committee of level headed and cool men, picked from the ranks of the merchants, professional men and artists, should be appointed to draft a new set of building ordinances and plan a scheme for the rebuilding of the city. This committee should be carefully selected and architects and engineers of good standing should be in the majority.

The aftermath of all great calamities is wild talk about how to avoid a repetition. So in San Francisco today, we hear that brick will never

do for a building material because it is so easily shaken down. Those who say this have not stopped to consider how the walls that fell were built, nor how the mortar was mixed and laid on. This is only one of a thousand wild ideas that are advanced, but unless sound men have in hand the replanning of the city, this kind of talk will have its influence.

Quick action must be the by-word of this committee, so that capitalists who wish to rebuild immediately will not get discouraged and quit. It would be a crime to neglect this opportunity for building the city on the lines laid out by Mr. D. H. Burnham, and it would be a greater crime to hamper the city's growth by enacting some foolish building laws.

Van Ness avenue was no doubt the means of saving the Western Addition, and Dolores street saved the Mission. This fact suggests the idea that we have more streets like these in the new city. Primarily, they should be placed for better fire protection, but with a little study they could probably be placed so as to connect with our small public squares, these in turn, to have a broad boulevard surrounding them.

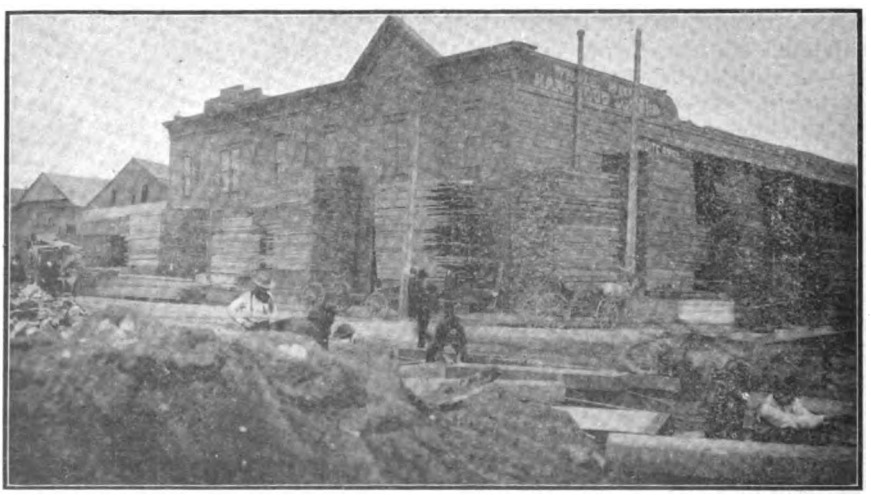
Every few blocks a small grass plot and trees could be planted in the center or at the sides of these boulevards or shade trees could be planted at intervals all along the sides. These avenues will be the future driveways of the city and should be made attractive as well as useful.

What the oasis is to the desert traveler, so would the public squares be to the sightseer after he has driven by the blocks of buildings.

Out on the dome of what was the City Hall, a Goddess is keeping silent vigil over the ruins. She is smoke grimed and dirty, but still unshaken and holds aloft her torch of enlightenment, seemingly trying her best to guide us in our struggle to rebuild. She is typical of the San Francisco spirit—defiant and hopeful in the face of misfortune.

This for the calamity howler. It was on built ground that buildings sank, and it was poor construction where brick walls fell.

There are, and always have been, architects in San Francisco who can build earthquake and fire-proof buildings when the owner is willing to pay the price. The building laws do not need half as much correction as the owner.



White Bros'. Lumber Mill. This Picture is Unique in That the Building and Great Piles of Lumber Escaped Destruction Although Fire Raged on all Sides. It Is the Only Hardwood Lumber Yard in San Francisco that Was Not Burned.

Fig. 4. The Casa Calwa Building, Townsend Street Near Third, Showing How the Reinforced Concrete Floors Remained in Position After the Supporting Walls Had Been Demolished by Explosions in the Adjoining Building. Meyer & O'Brien, Architects

Wired for Eastern Architects

MANY of the San Francisco architects wondered why so many members of the profession in the East hurried to the Coast immediately after the burning of the city. The following from the editorial columns of the Pittburg, Pa., Leader, of April 23, throws some light on the subject:

"Those persons who have been discussing the future of San Francisco and asking whether the city will hold her position as the metropolis of the Pacific Coast have had their question answered by a telegram from the Mayor of the ruined city to the Mayor of Pittsburg. It is so eloquent of the future that it is easily the most notable message from the city since the catastrophe. (?) It reads:

"'How many architects or architectural draughtsmen can you furnish us, and how quickly can they leave for San Francisco?'"

Architects Offer Their Services

AFTER the big fire members of the architectural profession met at the residence of William Curlett at the corner of Pierce and Vallejo streets, San Francisco. Henry A. Schulze, president of the State Board of Architecture, stated that the purpose of the meeting was to offer the services of the architects to the civil and military authorities for bringing order out of chaos. No time should be wasted in technicalities, Mr. Schulze said, the object being to get down to business as quickly as possible.

John Galen Howard spoke of the great possibilities which were now offered to aid the authorities in making San Francisco the greatest city of modern times. It was resolved that those present volunteer their services in the inspection of the safety of buildings, or in any other capacity whatever, and it was so ordered.

J. W. Reid, John Galen Howard and William Curlett were appointed to wait upon the authorities to offer the aid of the architects in the reconstruction of San Francisco.

o o o

Skyscraper Entirely of Steel

SAN FRANCISCO is to have a fifteen-story steel building constructed after the manner of an ocean liner or a battleship. All the walls are to be of steel plates. This will be the first building of this kind in the world.

Thousands have noticed the steel frame of a building in course of construction on the north side of Geary street, between Grant avenue and Stockton street. It is the George Whittell building and the framework withstood the fire. Since the conflagration Architect Frank Shea of the firm of Shea & Shea has had a consultation with George Whittell. Shea suggested that the building would be both fire and earthquake proof if no masonry was used in its construction. Whittell gave Shea authority to do whatever he thought was best, and as a result the walls instead of being stone will be of steel.

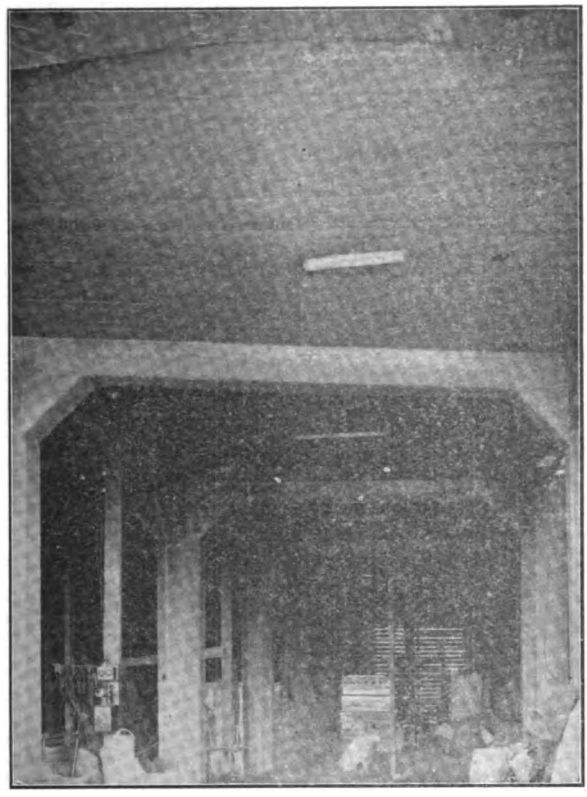
The building will cost $275,000, and will be ready for tenants in six months. The different floors will have partitions placed in position until prospective tenants select the area of floor room they require, and then the walls will be placed in position to suit them.

"It will be the first steel building erected in the world," said Frank Shea "and I am sure that it will be the most up-to-date style of building and that thousands will be copied from it."

o o o

Women and Wine

Women and wine, together they shine
On music and poetry's page;
And right they should, for however good
They are both improved by age.—
William J. Lampton, in the Bohemian for May.



Interior View of the Bekin Van and Storage Warehouse
Ralph Warner Hart, Architect

Bekin Building an Example For Reinforced Concrete Advocates

By RALPH WARNER HART, Architect

THE fire resisting quality of reinforced concrete has again been demonstrated. There is no longer any question that well made concrete used as fire-proofing is superior to any other material practical to use for this purpose. We have, however, learned in addition that there is no material or construction so stiff and strong and so qualified to resist shocks as this same reinforced concrete.

This is especially demonstrated by the condition of the two completed stories of the Bekins warehouse (see photographs) which I have under construction on West Mission street near 13th, and which will be six stories high. In spite of the fact that all this work was green, the third floor slab having only been completed Saturday, May 14th, the reinforced concrete columns, beams and floor slabs are absolutely undamaged and uncracked by the earthquake. The only damage to the work was by fire, and this damage due solely to the fact that the concrete was green and wet, having been wet down with a hose every day.

That this building was subjected to a severe shaking is evidenced by the condition of its brick outside walls which are cracked and shifted out of place to such an extent that some parts of same must be taken down and rebuilt. The undamaged condition of the reinforced concrete is the more remarkable in view of the fact that it had to assist in holding the outside walls in place instead of having the walls assist in stiffening the inside structure.

It must also be borne in mind that no steel reinforcement was introduced with the intention of resisting earthquake shocks. The whole design of the structure was simply for the usual dead and live loads of a warehouse. This is the best evidence in favor of the contention of reinforced concrete designers that this construction produces a monolithic building so bonded and tied together that no other construction can equal it for stiffness and rigidity.

Without doubt the splendid showing made by this partially erected building will have the greatest influence in determining the kind of structures with which to replace the buildings destroyed by the recent fire in San Francisco.

o o o

San Francisco Architects' Club Meets

By C. E. ROESCH

THE spirit of determination to follow all pursuits as if there had been no interruption, was beautifully exemplified by the large attendance of members and the degree of interest shown by those present, at the regular monthly meeting of the San Francisco Architects' Club, held at their temporary quarters, 2411 Clay street, San Francisco.

Plans for the future were discussed, committees were appointed, and the general club business was transacted in the customary way.

A committee composed of the following members was appointed to find permanent quarters: A. R. Johnson, chairman; Wm. Crim Jr., Thos. Smith, and M. B. Betts.

All members are requested to register their new addresses. They should be sent to the present address of the Club, where they will be entered on the records. Also all draughtsmen who are not members of the Club, and draughtsmen from other cities are invited to place their names and addresses on file, and every assistance will be given them in securing positions.

All those who know of positions, and architects in need of draughtsmen are requested to communicate with the Club.

A special meeting of the directors was called for Wednesday, May 16th, to consider the reports of the various committees on location, etc.

Mention was made of several new firms having entered the field, of interest to architects.

Wm. Crim Jr. and Earl Scott have opened offices at 1400 Webster street, and are prepared to do architectural draughting and the construction of buildings.

Mr. C. F. Archer is associated with Mr. H. C. Corwin, as Architectural Engineers. They are being consulted relative to the cost of Class A buildings, and their advice is being eagerly sought by prospective builders. They have several projects of importance under consideration, which only await the preparation of the new building ordinance.

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SAN FRANCISCO THE CITY BEAUTIFUL

As Chicago, Boston, Baltimore and other great business centers recovered from the terrible loss they sustained by fire, so will San Francisco rise from the blackened ruins of her former self—ruins which followed in the wake of the flames which swept the city April 18 and 19—to be a greater, a grander and a more prosperous city than before the disaster. As far as possible the city is to be rebuilt along the Burnham plan with wide streets, and many parks and boulevards. The city will be so constructed that a repetition of the recent disaster will be impossible. Streets will be changed, driving thoroughfares widened and beautified and property will be condemned wherever and whenever such process will work to the general good of the community. Great parks and avenues will tend to stop the spread of flames and there will be independent water systems for different sections of the city, so that the entire municipality will not be dependent upon a single main pipe line as was the case before the fire.

The rebuilding of the new San Francisco has already begun. An army of architects, engineers and surveyors has been at work since the day following the conflagration and with the removal of the great piles of debris will come the active construction of new and modern buildings.

It should not be many months before the city will have at least half a dozen great office buildings ready for occupancy, since all those structures upon which work had been started before the fire are intact. Among these is the Butler building, facing Union Square, Monadnock building, Kohl building, Whittell building on Geary street, the addition to the Chronicle building, the Atlas building and several others.

Fortunately, the plans and specifications for the new twelve-story Head building for Stockton street, William Curlett, architect, the sixteen-story

Schroth building for Union Square, Cunningham & Politeo, architects, and the Humboldt Bank building, Meyer & O'Brien, architects, were saved, and construction work on all these great fire-proof structures is to begin at once.

It is interesting to note that none of the class A buildings were damaged in the least by the earthquake. This is vouched for by architects and engineers who visited these buildings before fire wrecked them. But even the fire unharmed the steel work and the only damage done was to the brick and stone. The fire has demonstrated very forcibly that the Romanesque arch and heavy cornices of stone or terra cotta are undesirable. The arches shattered and collapsed under the vibrant strain, while stone and terra cotta cornices were displaced and hurled in fragments to the streets below. The so-called fire-wall also failed to withstand the seismic convulsion, being flung broadcast, mere fragments of brick and mortar.

This was not San Francisco's first baptism of fire. Three times in the early days it was almost wiped from the map. Yet it began business again on the smoking ashes and rose from its ruins a greater city than before. The property losses of the present fire are vastly greater than those of the early fifties. It is, indeed, the most colossal destruction suffered by any modern city. The record set by Chicago has been passed.

San Francisco has set about to rebuild with confidence. In five years the once great business center, now in ashes, will have risen again, a glorious monument to California pluck, energy and indomitable courage.

The Burnham plans are admirably conceived, and can be carried out, for they are founded on basic principles. The plans should now be carried out, not primarily because of the beauty of the effect to be created, but because of the convenience involved in the arrangements. The plans provide for taking care of traffic and for making each part of the city accessible to the people in every other part.

THE BURNHAM PLAN

Wide avenues or boulevards should divide the city into sections, these boulevards serving not alone as ornamental driveways, but as protection against the spread of fire. The hill summits should be crowned with parks and reservoirs established in them. Van Ness avenue could be widened and parked.

The business center of the city should be where it has always been—where it has grown up as a matter of convenience.

Underground electric street railways should certainly be established and cable lines and trolley lines be abolished. There is no uglier thing than an overhead trolley line on a main street. Its only excuse is its cheapness.

I have always believed in the great future of San Francisco, and today my belief is stronger than ever.

JOHN GALEN HOWARD.

Probably no man who has given of his time and money and influence for the relief and upbuilding of the stricken city has so endeared himself in the hearts of the people of San Francisco, and, in fact, the entire State of California, as Mr. Edward H. Harriman, president of the Southern Pacific Railroad Company. No sooner had the news of the calamity reached Mr. Harriman at his office in New York City than he hurried West in a special train and telegraphed ahead a personal contribution of $100,000 to the relief committee and instructions to his subordinates in the great company of which he is the head to move without delay and without charge food supplies from all points of the compass intended for the relief of the homeless. Besides this he ordered that refugees be given free transportation over all the Harriman

THE MAN OF THE HOUR

lines, and this magnanimous act enabled hundreds of unfortunates to leave the stricken city who otherwise would have been cast upon the then badly overtaxed and overworked Relief Committees.

Mr. Harriman has indeed done a service to San Francisco which, no matter how great his personal interests may have been, could hardly be excelled by any individual or corporation. His offer to produce a loan of $100,000,000 that the people may borrow at small interest enough money to rebuild their burned buildings, was still another expression of good will and generosity that should not be overlooked. Mr. Harriman is the type of American who believes in doing. Like Roosevelt, he is an ardent student of the strenuous life. No better example of this could be had than the record of what he has done for San Francisco in the past four weeks. The following, spoken by Mr. Harriman at a meeting of the Committee of Forty, is characteristic of the man:

"I feel less qualified than any man here to begin the making of suggestions. My advice in a nutshell is to start work. We ought to work more and talk less. Mistakes may be made by going ahead, but I don't care if we do make mistakes. It is better to do something than to stand still. If mistakes are made they can be remedied, but unless there is action there is sure to be a loss of spirit. I don't care where or how the start is made. For myself I can say that, although I would pay a man to do the work if I could get him, I would pitch bricks to clear the way. Do something and the work will all be done."

The usefulness of the brick building has by no means been impaired by the crumbling of so many structures built of this material in the earthquake. The main fault appears to have been with the poor grade of mortar used, as in nearly every case where first-class cement was applied and the bricks had been properly built around a steel frame, there was no crumbling, or cracking, to speak of. Instances of this were the new Chronicle building and the Monadnock building, besides several of the big warehouses.

BRICK WELL LAID IS ALL RIGHT

The insurance people are going to insist on a broad policy being followed by the Citizens' Committee in framing new laws for the rebuilding of San Francisco. They realize that it is to their interests to have the city rebuilt in a manner that will make it as safe from future fire losses as modern construction will permit. They propose to do everything in their power to prevent a repetition of the conflagration which laid waste $350,000,000 worth of property. Besides the insurance interests there are many influential business men and large property owners who are equally desirous of having ordinances framed that will permit of a class of construction which will be as near fire proof and earthquake proof as possible.

REINFORCED CONCRETE IN THE NEW CITY

Reinforced concrete now seems to be the most generally favored material and some of the most pretentious buildings, for which plans are now being made, call for this class of construction. Many buildings will be built entirely of reinforced concrete while others will have reinforced concrete foundations and interior walls.

It has long been an open secret that a certain element in San Francisco is opposed to reinforced concrete construction. Unfortunately, this element heretofore has been able to dictate to the powers that were. In consequence, the city ordinances have made it impossible for the tax payer, should he so desire, to build a reinforced concrete structure. The labor interests, we are told, fought against this class of building, believing that it would injure the business of masons. The brick men, too, have not taken kindly to concrete construction. While these objections

were only natural when normal conditions prevailed, it is unreasonable to see how they can be taken seriously in the present emergency. There is enough building in prospect now to keep all branches of the industry mighty busy for years to come. Under the circumstances there is no good reason why reinforced concrete construction should not be given the same consideration and leeway as brick, stone and wood. Chicago, Seattle, Los Angeles, in fact, every city of any size in the west or east has taken up concrete construction and a single failure from a fire resistive standpoint is yet to be recorded.

If the authorities of San Francisco fail to accept and permit this class of construction in the rebuilding of our city, they will but prepare the way for a repetition of the awful disaster which nearly blotted the city off the map on the 18th of April last.

Failure to permit reinforced construction will not only delay and hamper the rebuilding of the city, but will prevent proper fire protection.

* *

SPARKS FROM THE FIRE

Every newspaper and trade publication in San Francisco was burned out.

To use an apt slogan of a well known dry goods establishment: "Watch us grow."

The future was never brighter for the San Francisco architect, and every one, in fact, who is in any sense connected with the building industry.

Colusa sandstone has proved to be an excellent fire resistive material. The Shreve and Kohl buildings demonstrated this. The earthquake, too, appeared to have little effect on the stone.

Good hollow blocks, well constructed, withstood the earthquake in a number of instances, notably at San Jose. On the other hand, inferior blocks, poorly laid, crumbled like so much dry plaster. The hollow block buildings at Palo Alto were badly demolished.

There should no longer be any question about the practicability and durability of reinforced concrete. Wherever this building material was used no damage resulted, either by earthquake or fire. Now let the authorities frame a building ordinance that will permit of the use of this kind of building material for complete construction.

The Architect and Engineer of California is just one year old. The publishers had planned a big anniversary number, but the fire not only wiped out our printshop but it destroyed many valuable manuscripts written for this special number, together with about 400 half tones and many costly photographs and priceless drawings.

We don't need those Chicago architects and engineers. There are plenty of good craftsmen right here in California who are quite capable of rebuilding a great city without outside assistance. It is kind of our sister city to send these men here, but building conditions are different in California from what they are in the east and no one understands local peculiarities better than our own architects and engineers. Hence we say, let our people build the new San Francisco.

Many valuable drawings were lost by architects in the fire. Some of these were unfinished sketches for new buildings. In practically every instance where anything was saved it was the draughtsmen whom the architect had to thank. Few architects realized the extent or seriousness of the fire until it was too late to reach their office. Probably no one firm succeeded in saving more of his office effects than G. Alexander Wright who, with the assistance of his draughtsmen, carried several wagon loads of data books, blue prints, and valuable drawings to a place of safety before the fire wrecked the building he occupied.

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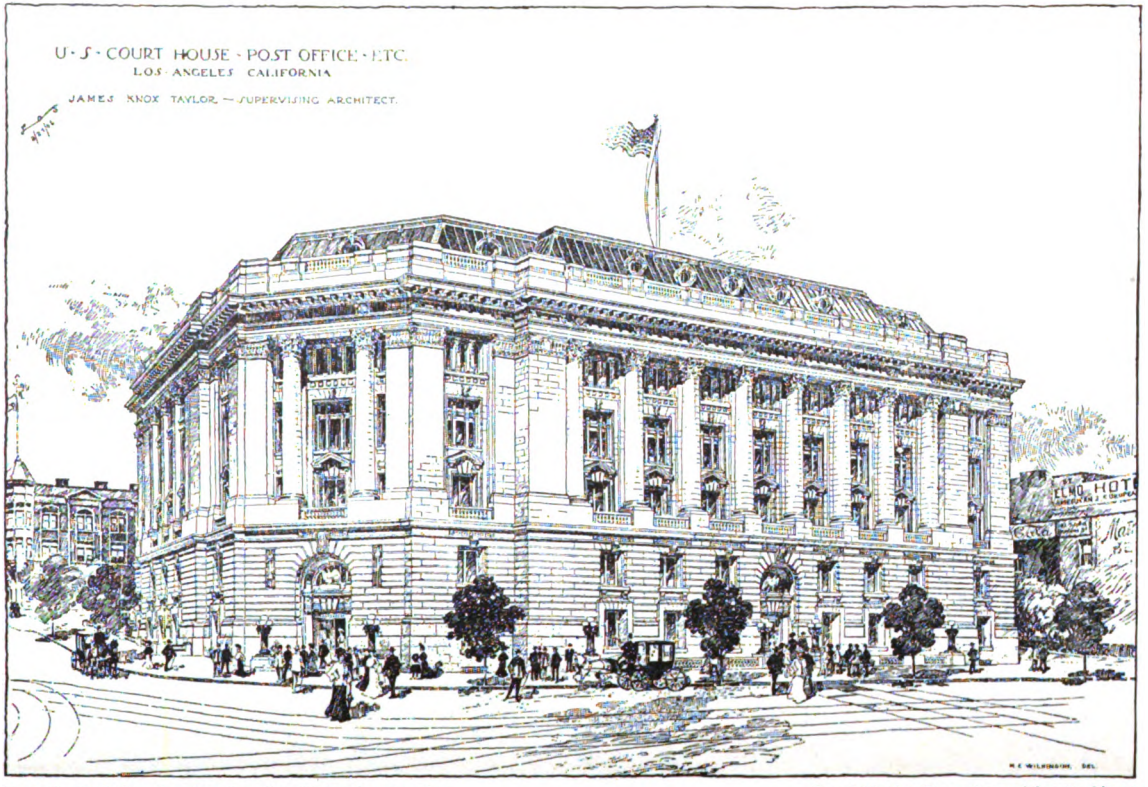
Contents for June



Postoffice Building, Los Angeles, Now Under Construction

James Taylor Knox, Supervising Architect

THE

Architect and Engineer

Of California

VOL. V. JUNE, 1906. No. 2.

Why Believe in San Francisco's Future*

By HERBERT E. LAW

CONFIDENCE must have a secure basis. Architecturally one cannot hang a stately dome to a star by a silken thread, or rest a modern, class "A" building on fancifully colored, inflated paper bags. A philosophical conclusion demands adequate premises. No historical development is the outgrowth of a moment, but has a sufficient cause. It is equally impossible for confidence in San Francisco's future to be invincible, unless it rests upon a solid foundation of fact. What, then, are some of the elements which come to us who face the conditions as they are with unfilmed eye—which enter into the supreme and steady confidence in what appears to be the inevitable outcome of recent events in this home city of ours?

Among them are, first, San Francisco's geographical situation. Its greatness is inevitable and its future secure, not merely by reason of the few decades of human effort and achievement which the peninsula has witnessed. These were assured aeons ago by the operation of great natural laws which carved out of solid masonry the Golden Gate and dug this bay with a carrying capacity sufficient to float the fleets of the world.

Second, strategically San Francisco could not be ignored, or neglected, if the nation desired to do so. Related as it is to the defense of this long reach of the Pacific Coast and to our island possessions in the Pacific, it makes demands upon the attention of the government which in themselves would be sufficient to insure an important city on the slopes of these hills. Were the present dwellers in San Francisco to desert it in a body, it would be rebuilt and inhabited by those whom the government's activities would bring here, and because of its immense importance strategically it has a grip upon the future which nothing can break.

Our confidence is based, third, upon the brief history of this city's life. It was founded by the Pioneers. They were strong men who faced stern conditions with a resolution which nothing could shake. When they found it, it was a stretch of sand dunes, an apparently uninhabited waste. There are still some of them enjoying an honored old age among us, who have seen it develop until it became one of the most active, aggressive

*In a personal letter to the publisher of the Architect and Engineer, Mr. Law, who, by the way, is recognized as one of San Francisco's most progressive and successful business men, writes as follows: "I am very glad to do anything which will make clear the steady, sturdy, rational confidence of those vitally interested in San Francisco, and congratulate you cordially upon your enterprise in being the first among California magazines to publish after the disaster, and with every good wish for the spread of the facts which you are able to give as to present conditions and future progress."

and prosperous cities on the American continent, and who have witnessed the gradual transformation from the Pioneer conditions and architecture to modern activities and buildings on every hand. They have left their impress upon the city. They have passed on their loyalty and affection for it as a priceless heritage, and those who take up the work today breathe intense loyalty in the very atmosphere and have caught some of the stern determination and resolution of those who first looked upon this location and labored in its development.

Fourth, we believe in the city commercially. A mere cursory glance at the bank clearings, at the wholesale and retail business showing of this city for the last ten years will make clear to the most unobservant the tremendous development which has been in progress. This means volumes to those who are vitally interested in this matter. It is not the record of achievement that interests us, but the element of prophecy in it, for the tremendous strides in the city commercially are weighty suggestions of what is inevitable by reason of its location, and because of the opportunities that are opening to it increasingly in the Orient. The Pacific will be a highway of commerce, a scene of the most dramatic developements in the world's history. Some of the richest and most populous lands on the globe lie just beyond us, and through our gateway there will flow in and out the currents of commerce which will rise with the progress of time until what seems to us so mighty a stream today will be like a mountain rivulet in comparison with the majestic sweep of the Mississippi.

But above all else, we believe in the future of San Francisco with confidence because of the spirit of our people. Calamity is not an unmixed curse. It is never desired, and its losses are not anticipated with any eager expectation, but it does have in it some elements of recompense. To one who has been intimately associated with those who have been struggling with the problems of the city during the recent days, there has come a realization of the depth and sincerity of the devotion of our people to the city and its interests, which is a solid source of satisfaction and an adequate basis for rational hope. They have shown a courage, resourcefulness, energy, optimism and unity which even the stern conditions which they faced and fully realized cannot defeat. There is a cheerfulness and a buoyancy which are not irrational nor are they at all due to the mere hysterical excitement of the moment. They are the expression of the same splendid spirit which conquered the plains and crested the mountains in pioneer days. They are the exemplification of Western grit and determination. They are characteristically American, and the present calamity is simply the tool by which a greater future than we have ever known can be carved. Someone has said that "men are more important than broad acres or luxury or gold mines." In Walt Whitman's phrase, "Produce great persons—the rest follows." In a similar line somebody looking upon the sterile country about Plymouth Rock said to one of the dwellers there, "What do you raise on this rocky soil?" to which the reply was "We raise men."

We have every reason to be steadfast, quiet and confident as we see that sturdy spirit of determination which seizes upon disaster with ungloved hand and molds it into opportunity, which discards its coat and lays aside society's conventions and goes at existing conditions without fear or fretting.

There are some in this city who may not recover. This possibility is inevitable, although it is one of the pitiable results of such a disaster. On the other hand, the city today offers larger opportunities for harder work and greater achievements than ever before since its foundation, and out

Design for the New History Building, San Francisco Cunningham & Politeo, Architects

of the stress and strain of present conditions, as a result of the earnest and united effort, there will develop the most modern and splendid city on the American Continent, a fitting monument to those who founded this city on the sand dunes by the sunset sea, and to those, who, when calamity sweeps upon it suddenly have no greater joy than to spend cheerfully their time, effort, thought and money for its re-creation on new and nobler lines.

Glass Houses For San Francisco

By THEODORE H. SKINNER, Architect

(A new type of architecture will soon be seen in San Francisco as a result of the recent fire. A syndicate of New York restaurant men is planning to erect what will be known as "The Glass House." No site has yet been chosen for the building, as the representative of the syndicate, who is now in San Francisco, does not believe it would be expedient to select a location until some definite idea may be formed of the drift of the throng.

"The Glass House" promises to be the most elaborate as well as the most unique structure yet seen on the coast, or in fact in any other city of the country. The architects claim they can put up a glass building that will be absolutely fireproof. Certainly the erection of this unique building will be watched with unusual interest. The plans have been drawn by Putnam and Cox, Rand and Skinner, the well-known Boston firm of architects, who are now in San Francisco.) Ed.

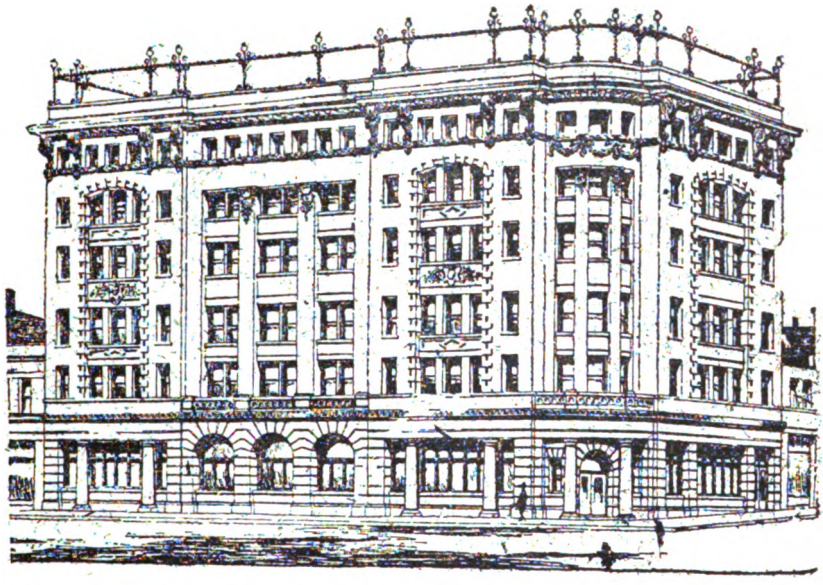
THE complete destruction of the many "fireproof" building materials in the recent conflagration should lead in the future to a more careful examination of the fire-resistant qualities of other building materials before they are accepted by architects and builders as being fireproof. One of these materials is glass.

We have been too prone to accept the so-called tests conducted by interested contractors or manufacturers as a proof of the results we wish to obtain. We have all too readily embodied in our practice materials which have not made good their titles in the supreme tests of Baltimore and San Francisco.

About 1900 the late Edward Atkinson established an insurance experiment station at Boston where materials could be tested. Its laboratory work and its reports have been of great value, and should be more widely known. The station's report on the Baltimore fire, reread at this time, would apply line for line to San Francisco, and it should be in the hands of all who are interested in the rebuilding of the city.

Two facts of vital moment at this time stand discoverable both in the report and in the ruined city, viz., that reinforced concrete and reinforced glass did the work they were intended to do. Although seared and scarred, they were in position when the fire subsided.

Leaving aside the discussion of concrete and its merits and faults, let us see if there is not a larger field than generally imagined possible for the use of reinforced glass, or, commonly speaking, wire-glass, which will enter largely into the construction of the restaurant projected for San Francisco. As a fireproofing or fire-resistant material, we find that in metal frames wire glass has stood the severest assaults of the flames, as,



Office Building and Roof Garden for Mr. Frank H. Burke, San Francisco G. A. Dodge, Architect

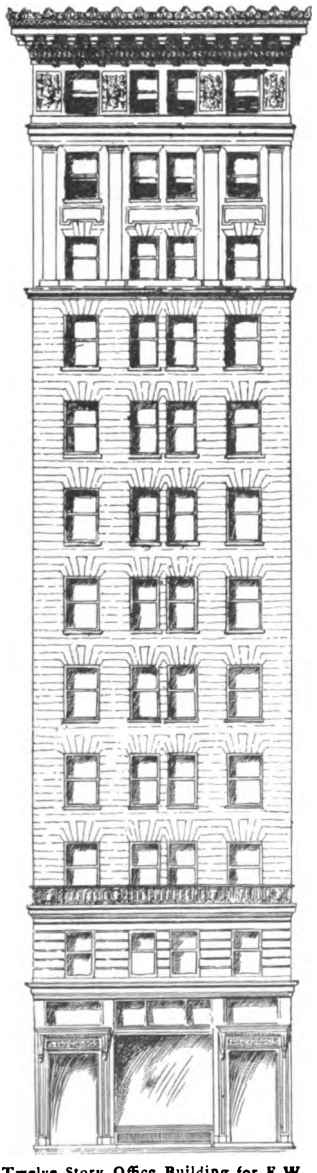
in a few cases observable, fire entered buildings at unguarded openings and, the interiors becoming ignited, the wire-glass was subjected to fire on both sides at once. Even then it did not utterly fail, and stuck to its frames as long as the latter lasted.

Why this material has this high heat resistance we need not discuss now. Suffice it that it has, and that it is proof against destruction even under extraordinary circumstances. May we not, then, enlarge its application with advantage? May we not substitute double sheets of it for our curtain walls in steel-frame buildings with an air space between? We can go even further than this, entirely encasing our building with sheets of it held to the protected frame by invisible clips. By this method of construction we can do away entirely with windows as openings for light and have translucent walls everywhere, with clear panels arranged for vision. On such a case of glass the elements would have no effect. Acid smoke would not eat it out; soot would not cling to it and disfigure it, and disintegration would not mar the beauty of its form.

As such a casing would be much lighter in weight than masonry, lighter steel framing and economy would follow. Perhaps greater scope might be given to the fancy of the design, and a new architecture be possible. There would be no greater expense incurred than in other types of architecture. Rich ornaments could be cast or moulded while the glass was in viscous state; color could be introduced in unlimited extent, and the beautiful city of Revelation would become a reality on earth, with its shining walls, towers and spires that would glisten in the sunlight and rival the gems of a jeweled crown.

Annealed glass bricks and slabs with higher crushing limit than stone are already in use abroad, and buildings largely of glass are beautiful realities in Brussels, Berlin, Nuremburg and Turin. That we are about to enter upon an era where glass plays an important part may be well believed.

Will be Many Skyscrapers



Twelve Story Office Building for E.W. Hopkins, Pine Street, San Francisco
Bliss & Faville, Architects

IT is inspiring to note the confidence festing in the future of San Francisco which big property owners are mani- by ordering immediate preparation of plans for new buildings. The desire of the owner will permit. While he is trying to get a rea- is clearly to rebuild as quickly as conditions sonable settlement of his insurance, he is hav- ing plans made for the reconstruction of his burned property, so that when the insurance people tell him to go ahead and clear away the debris he will be ready to build without further delay.

It is not at all probable that the business center will be materially changed. Market street will continue to be the Broadway of San Francisco and from this great thorough- fare will radiate, as formerly, the various business houses, commercial, financial, wholesale and retail.

The skyscraper will be even more promi- nent in the new San Francisco than it was in the old city. Plans now in architects' offices call for scores of office buildings of Class A construction, varying from eight to eighteen stories. A few of these are pictured in this number of the Architect and Engineer. The twelve-story building shown on this page is to be erected by E. W. Hopkins at Pine and Leidesdorff streets at a cost of $200,000. It will have stone facings and metal frames.

The fact that more rapid progress is not being made on some of the big skyscrapers that were under construction before the fire and which were damaged very little, has been the cause of comment. Among these build- ings are the Whittell and Butler structures near Union Square. The steelwork of both is intact, and if construction was rushed they could be made ready for occupancy long before some of the new buildings can be put up.

Every man should think for himself
But not of himself alone,
For others have some right to pelf
As well as wrongs to atone.

American Architecture as Viewed by An English Architect

By ARCHIBALD C. HOPE, Architect

YOU ask me for my impressions of American architecture from an English architect's standpoint. Sir, to express all I think would, perhaps, fill a ten-volume novel, but as your space is valuable I will endeavor to put in a few words—my *first* impressions.

In New York everything seemed *big* and gaudy—from flat irons downward—even the underground railway, with its four tracks was *big*.

In Chicago the buildings are not only *big*, but monstrous—one gets a creek in the back of the neck looking up at the sky scrapers and trying to comprehend the fine detail around the twentieth story. The chief item an architect notices up there is the immense cornice—intended, of course, to be in proportion to the height, with the result that there was not much chance of seeing anything above the same.

This, I assumed, was the chief reason why so few attempts had been made to break the sky line (as seen from the street grade), as with the exception of one or two very early scrapers was the case.

Some attempts have been made to obviate this mistake by placing the main Eaves cornice two-thirds up the building and making a tall "attic" story above—still, however, keeping the straight sky line—thus falling from grace again.

One just completed by Messrs. Burnham & Co. has attempted a feature in a pent house on top of a flat roof.

This, when viewed from a sufficient distance, is a relief to the monotony.

But it remained for me to reach the far west city of San Francisco before finding really neat—well considered—classical detail. Here I find details considered from the point of view they are to be seen from, and where they *can* be seen in addition to up aloft.

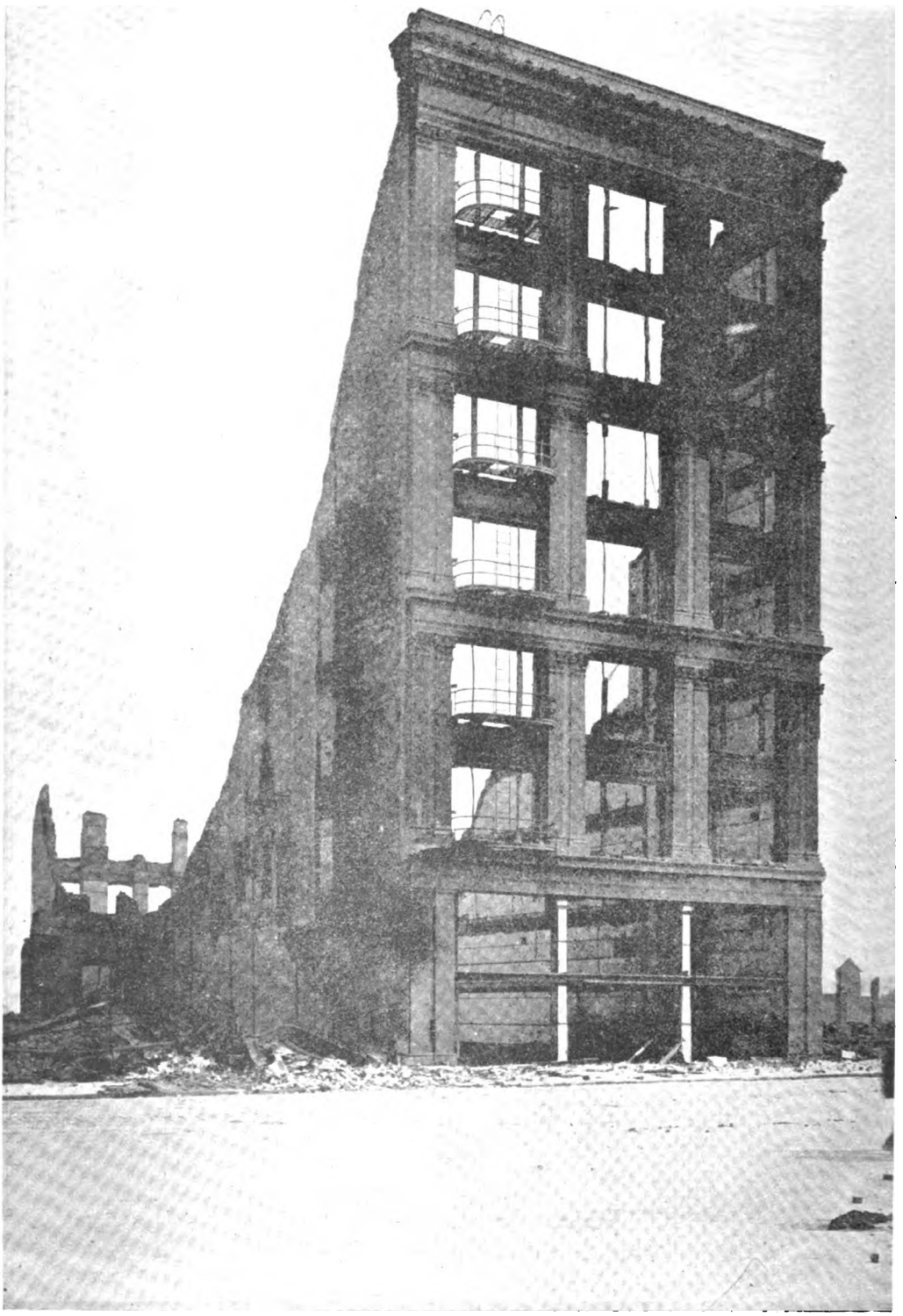
It is my regret not to have seen San Francisco in its full beauty before the calamity of April 18th last.

Even now what an artistic treat it is for an artist to wander through the villa residence district—shutting out, of course, the street kitchens and office placards—admiring what is still intact and restoring many ruined edifices, from the tiny pieces left, to build ones imagination on.

As to my sentiments or opinions on scrapers and the necessary steel construction, an Englishman has nothing at home with which to make comparisons—unless it be the large flour mills and bonding warehouses at the sea coast ports, which are fast being converted into reinforced concrete buildings some four or five stories high and often continued ten or fifteen feet out over the water side from the first floor level.

These are built on R. I. C. piles and R. I. C. wharves, and are standing the best of knocking about and sea worms much better than either wood or sandstone or concrete blocks.

This is the nearest approach to a building material of a monolethic nature to be at all comparable with your steel constructed buildings—but as I have only seen it over here as applied to floor loads—not piers—the comparison is only imaginative.



The Bare Building in Market Street. This Structure Was Unharmed by the Earthquake Wright and Polk, Architects

Too Many Temporary Buildings

By T. PATTERSON ROSS, Architect

IT IS unfortunate that the city authorities should have permitted the construction of so many shacks in the business section of the burned district of San Francisco. I fear this seeming oversight on the part of those in power will act as a check to the erection of permanent buildings to a far greater extent than we now realize. Architects should discourage as far as possible the construction of temporary buildings. Once property owners get into the way of building cheap structures it is difficult to interest them in more substantial buildings. One reason for this is that the temporary structure commands a very fair return on the investment—a condition that at once appeals to the man who wants quick returns. The temporary building can be put up quickly and the owner has little difficulty in finding a tenant who will lease for a term of two or three years. It is my opinion that the authorities should discourage this type of buildings except in certain districts and the time the structure is allowed to remain up should be limited to such a short period that the property owner would prefer to build permanently even though by doing so he would be losing immediate income.

I understand that some owners who have put up temporary buildings have made five-year leases with their tenants, and I am afraid the authorities will have hard work compelling these owners to cancel the leases, tear down the temporary structures and erect permanent buildings inside of the five years. The building of these temporary shacks not only hinders the erection of permanent buildings, but it disfigures the business section and makes an eye sore almost as disheartening as the ruins out of which these flimsy affairs have sprung. There is, of course, no architectural beauty about them and the only possible excuse for their existence is that they provide a temporary means of carrying along business that otherwise would have to be abandoned.

It should not be necessary, however, to build shacks on the sites of former Class A, B and C buildings. Business sites should be held in reserve for permanent buildings only, and the man whose business was once carried on in these localities should be willing to shift to some other section where temporary structures are less obnoxious, until a permanent building has replaced the one destroyed. I think temporary buildings should be kept west of Powell street.

Some property owners declare that it would be a waste of time and prevent the city's growth if everybody in the business section waited until their insurance is adjusted and the debris cleaned so as to put up permanent buildings. That may be so, but is it not better to waste time now, if we must call it time wasted, rather than six months or a year or two years hence, for sooner or later the temporary shack will have to come down and be replaced with something substantial?

There will probably be few important changes in the style of architecture in the new San Francisco. There may be less of the heavy stone and terra cotta cornices, galvanized iron being substituted. More attention will be paid to the strength of a building rather than the appearance. There will probably be more reinforced concrete construction, and it is safe to say that where bricks are used greater care will be exercised in the workmanship and in the kind of cement used.

Who Is to Blame for San Francisco's Plight

By CHARLES PETER WEEKS, Architect

BURNING purifies—burning was once a punishment for crime. To-day it is not the same crime nor the same burning, but a burning for crime just the same. The olden crime was against religion. Today's crime is against economics.

Two hundred million dollars have been tossed into the air in the San Francisco fire. Let us find out the criminals.

To an extent ignorance wears the guilty stripes but short-sighted greed, carelessness and weakness are the real criminals.

The owner is primarily to blame for loss in the San Francisco fire and rightly suffers for his own crime. But the city, too, is to blame for absolute lack of complete inspection of building plans and buildings, weak building laws and affording no protection to the careful owner against his reckless neighbor. The architect is to blame in being too willing to acquiesce in the owner's desire to build cheaply in fear of losing a commission.

The contractor is to blame for not giving golden workmanship for golden recompense.

This school of experience to which we have all paid a large tuition should teach us all in future to stop these crimes and avoid their results.

By what right do you endanger my office building by erecting your wooden shack alongside? Is there not room enough for such houses outside of the business district?

Why are not specifications read and buildings inspected by the authorities so that inferior workmanship cannot exist? Why is the owner penny wise and pound foolish?

Why is the architect not a big enough man to refuse to build cheap and to see that he builds strong?

In New York the money lenders employ architects to inspect plans and specifications and buildings to see that their interests are protected. San Francisco would do well to adopt this custom.

When a city is down and out, the thing to do is to bring it to life. If pine and galvanized iron will do it let us use them. But care must be exercised that the same old greed does not mislead us.

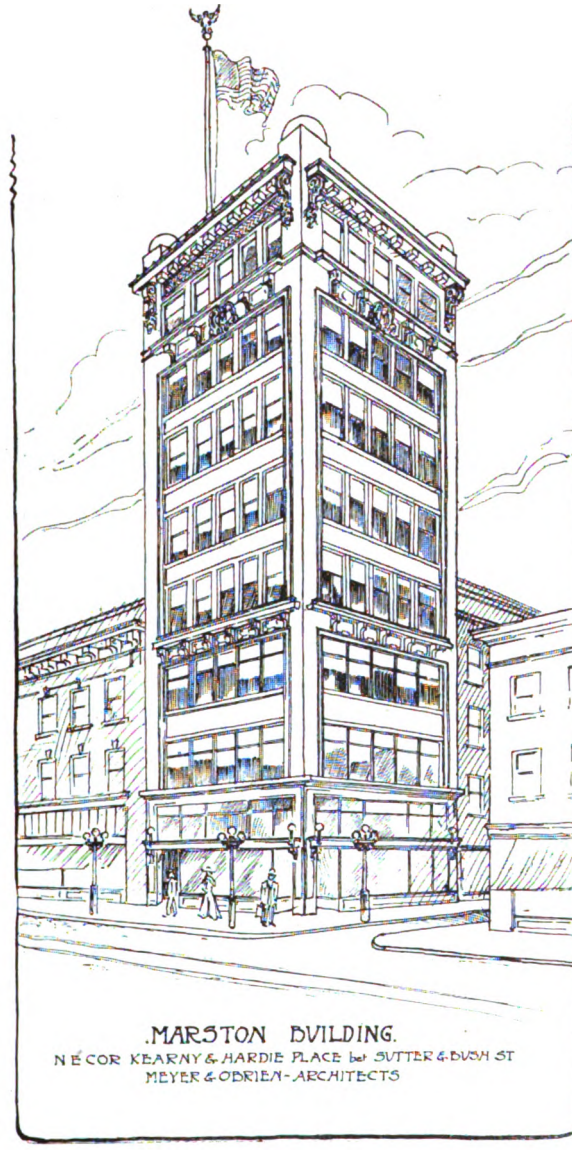
It is not necessary to give a warning note to all for many are planning to rebuild a class "A" city. Many men who, before the fire, would have been contented with wood are now planning for fireproof structures. Reinforced concrete is the joyous cry of the hour, echoing the death knell of hollow tile.

There is undoubtedly a tendency to blindly fly to reinforced concrete, knowing by experience that all other materials failed. Reinforced concrete was not subjected in our late fire to the same test as other materials.

If a brick wall cannot be honestly built, how much less is a reinforced concrete building liable to be well built?

Reinforced concrete buildings in other parts of the country have not all been successful. The best built buildings are the best, in reinforced concrete as well as other material. Therefore, it will be well for the owner to be careful in the selection of his designer.

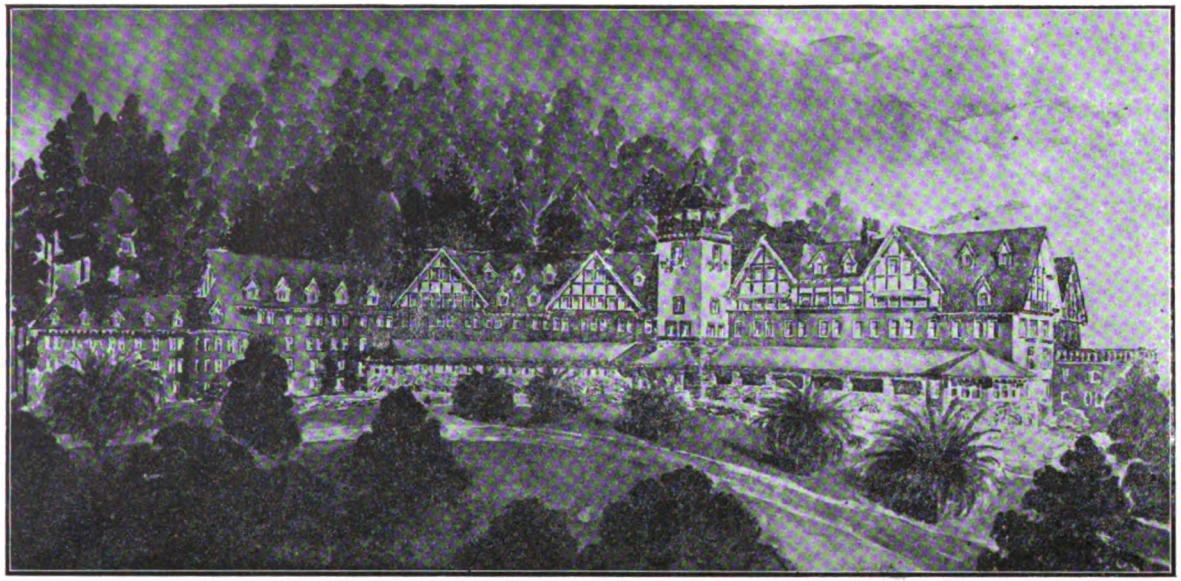
This material in combination with good brick will undoubtedly form a great part of San Francisco's future big buildings.



The elimination of stone and the restriction of projecting cornices will modify the style of future buildings and have a tendency to produce a logically artistic facade in the hands of well trained designers.

A Gothic style is more in harmony with the structural form of a steel building than the classic style and will be followed and adopted more and more in the future.

The man who makes it a practice to look on the bright side of life not only has an equal chance with the other fellow of getting a fair share of this world's goods, but he has a much better time while he is at it.—Exchange.



Accepted Design for New Tourist Hotel at Claremont Park, Berkeley

C. W. Dickey, Architect

The New Claremont Hotel

By C. W. DICKEY, Architect

AS FAR as site is concerned, the new Claremont Hotel has the advantage of any similar building in California if not in the United States. The grounds themselves are surpassingly beautiful with a garden of fourteen acres that has been lovingly cultivated for a period of forty years. A wild overgrown creek, huge old pines and oaks, and numberless rare trees, shrubs, and flowers combine with the broad lawns to present a most perfect setting for the new building.

The location is also very accessible. It can be reached in five minutes from Berkeley, fifteen minutes from Oakland, and, when the new branch of the Key Route is extended to the grounds, it can be reached from San Francisco in thirty-five minutes. The field from which it can draw for its patronage is thus a large one, exclusive of tourist trade.

The hotel building has been designed to specially fit the location. It is in the rambling Elizabethan style, winding in and out with the contour of the hill, with stone terraces and porches and walls of broad cedar shingles and rough plaster. It will be set back on the side hill at sufficient elevation to get a view of the full sweep of the bay and Oakland over the tops of the trees. The extreme dimensions of the building will be 152 feet by 676 feet, and it will be four stories in height, containing 210 guest rooms, all of which will be bright and sunny and every second one of which will have a bath. The observation tower will be 140 feet in height, overlooking the surrounding country.

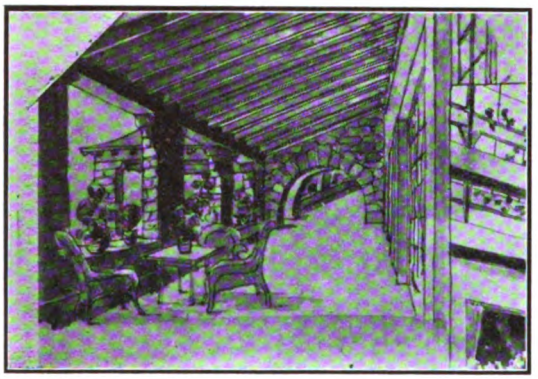
There will be three approaches to the building: Foot passengers will enter the grounds from the Key Route Station through a covered portico leading to an underground tunnel, which will be brilliantly lighted and treated as a grotto with delightful surprises and lighting effects. One can reach the hotel elevators without climbing any stairs and thence be quickly lifted to any floor he may wish to reach. Carriages will enter by the present driveway, which will be extended to enter a broad porte-cochere at the base of the tower. Automobiles will have a special entrance from the tunnel road leading to a porte-cochere directly adjoining the lobby. A commodious garage will be provided to the south and a stable to the north of the building for the accommodation of the two classes of vehicles.

The general arrangement of the floor plan of the hotel is as follows: A large dining-room is placed near the center, facing directly west, with a frontage of 142 feet, overlooking the bay and an equal frontage overlooking a sunken garden in the rear. To the south of this dining-room occurs the lobby and palm room, 58 feet by 153 feet, facing the front garden and also the tunnel road, with a hall and banquet room back of same and guest rooms beyond. To the north of the dining-room are located the culinary department and servants quarters.

The whole interior will be carried out in the English style, both in decorations and furnishings.

A maximum amount of public space and a maximum number of rooms are arranged to overlook the bay and the hotel grounds. There will be a promenade porch on the front of the building 542 feet long, from which guests may obtain a panoramic view of the surrounding country.

The hotel is to be equipped with every modern convenience to be found in similar buildings in other parts of the world. It will be strictly first-class in every way.



Front Porch, Claremont Hotel

Palm Room and Ladies' Parlor, Claremont Hotel

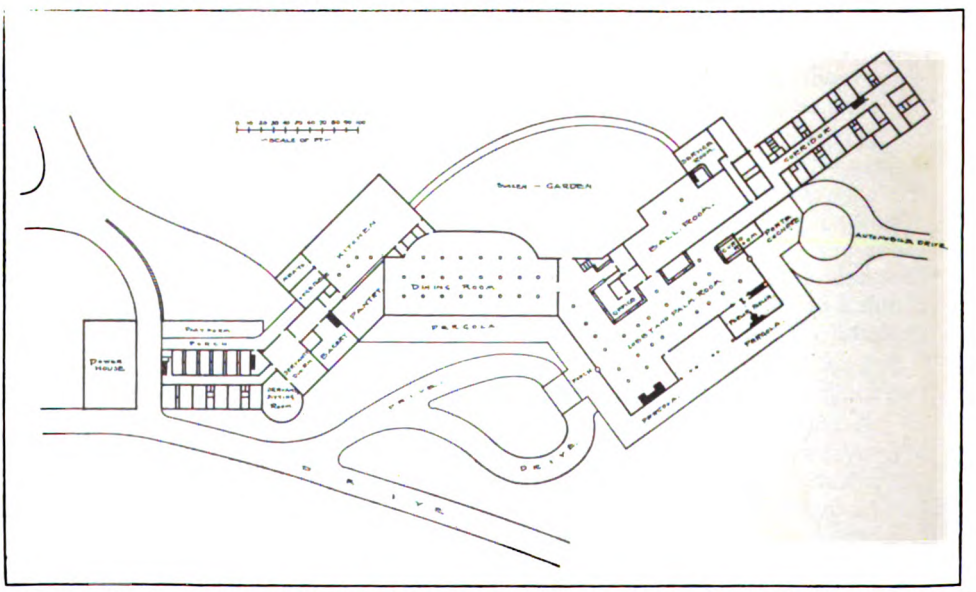
The culinary department power plant, and public rooms are designed large enough to accommodate 100 more guest rooms should it be desired to add them.

There is to be a complete refrigerating and ice making plant, laundry machinery, electric lighting and steam heating plants and hydraulic passenger and freight elevators; also a bakery, pastry kitchen, butcher shop, etc. Service and pipe tunnels will extend under the entire length of the building with a track and cars for carrying trunks, etc.

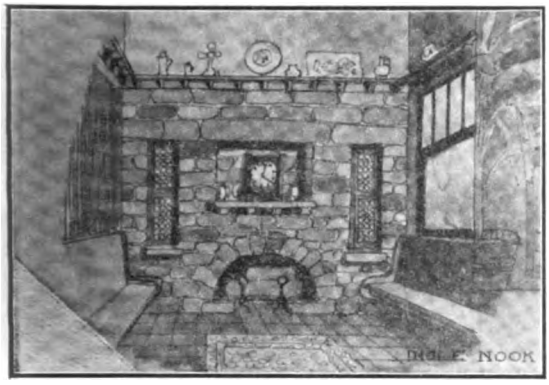
To the south will be located a club house containing billiard and card rooms, bowling alleys and bar, lockers and dressing rooms.

About fifteen acres have been added to the original hotel buildings, and on a portion of this land will be located the tennis courts, etc.

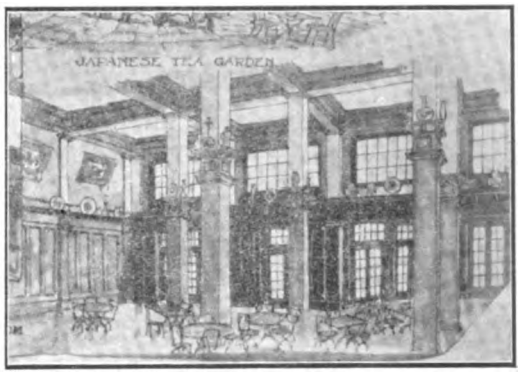
Beautiful drives will lead from the hotel in all directions through the foot hills, and, with the Berkeley Greek Theater and other local attractions, the guests need never lack amusement.



Ground Plan New Tourist Hotel at Claremont Park, Berkeley — C. W. Dickey, Architect



"Engle Nook," Claremont Hotel



Glimpse of Dining Room

Earthquakes and Earthquake Proof-Buildings

By WILLIAM F. SCOTT

A MATCH will start a flame that will light a cigar. This same flame will light a city into an unquenchable blaze if the conditions of fuel and air supply are favorable and the provisions for fire protection unfavorable.

In the recent San Francisco catastrophe, says the Canadian Architect and Builder, we have a case where the fuel was the wooden buildings and the air supply that ever present draught through the Golden Gate. The earthquake supplied the match and incidentally destroyed the water supply for fire protection, which under the most favorable conditions was not of the best on account of the steep hills throughout the city. This great western port of the United States was a wooden city, the exceptions where wood did not prevail consisting of a comparatively small percentage of buildings in the business section The "Native Son" always gave as the reason for this fact that buildings of wood were safe against earthquake shocks and because of the non-combustibility of the California redwood were insured against a great conflagration.

That their faith in wood has been "shaken" and will be transferred to steel or steel concrete is the lesson written in the ashes of this catastrophe. The fire swept over an area of about seven square miles and of the buildings in this burned district the modern steel frame structure stood out in grand contrast to all other types. They even stood the test better than might be expected because few of them were built in any way different from the conventional Chicago-New York Steel Skeleton which was designed to resist static loads and wind pressure only, and in which such strains as would be caused by an earthquake tremor were not considered. The cumulative resistance in the joints of these steel frames was undoubtedly a great factor in helping them to withstand the recent earthquake shocks, but to make this function positive the joints should be specially designed for the forces they must resist. Certainly reinforcement of this sort would add greatly to the power of the building to retain its enclosing materials from displacement.

That the steel frames stood the test is more than can be said of their covering, or rather of the methods of binding the enclosing materials to

their skeleton. The manner in which the brickwork between the steel framing of the tower of the magnificent City Hall fell in ruins about it is a good illustration of a vital point in the design of the conventional skeleton construction when applied to buildings that are to resist the strains of an earthquake shock. This tower was built on a steel skeleton frame well braced in the circumferential framing, but not provided with steel bracing in the vertical radial planes. The walls of the main building and colonnade which formed the architectural base of the tower were of ordinary masonry construction and served the purpose of bracing the steel in the radial planes, thus when these walls were disturbed by the earthquake shock the tower was free to oscillate, which in turn caused the displacement of the spandrel filling between the steel framing.

The tremors of an earthquake pass over the face of the globe as waves in the fluid earth. They are more complicated than the waves of the ocean, but their effect upon a building is analogous to that produced upon a boat at sea. There is a vertical and a horizontal force in the motions of these waves, therefore, if a building is to safely ride them it should be built with the same continuity and rigidity of frame as is obtained in the great ocean liner of today which, considered structually, may be likened to a pair of huge curved plate girders braced transversely with trusses and gusset portals. The ideal earthquake-proof building, then, should be, figuratively speaking, an ocean liner on end with the stern supported on a sufficient base of concrete and with the windows built in the same manner as are the port holes of the ship. But the architect is not permitted to make such radical departures from the conventional types of buildings. He must have square windows and pierce one-third his walls upon which he must write the alphabet of historic architecture. The ideal, therefore, is impossible, but a compromise between the ideal and the common type of skeleton construction is practicable.

It is beyond the scope of a short article to enter into details as to just what such a compromise would be; these details would vary with the individuality of every engineer who attacked the problem. However, I would premise three certain and fundamental requirements that must be considered in these details:

(1) There must be a rigid connection between the columns and girders of the skeleton frame, but flexibility must not be sacrificed to rigidity.

(2) There must be continuity in the foundation for the skeleton.—The writer is of the opinion that the principle of constructian of the "lighter" should be kept in mind for these foundations.

(3) There must be a comprehensive method of binding the enclosing masonry with a view to making it an integral part of the skeleton.

Steel-concrete and steel were mentioned above as competitors for place in the faith of future earthquake-proof builders. The developments in this method of constructian are comparatively recent, chronologically speaking, but there is no doubt that reinforced concrete will be an important factor in the development of these buildings. Earthquake-proof building, we have said, must have continuity and rigidity of frame and must withstand severe shocks. The driving of reinforced concrete piles 35 or 40 feet in length without any shattering proves that the resistance of this material to shocks is very great; and as for the continuity and rigidity of this form of construction there is no more ideal method of obtaining both. It is just a question of placing sufficient reinforcing material where it will perform these functions.

Terra Cotta and Brick

Notes on the San Francisco Fire

By F. W. FITZPATRICK
Executive Officer International Society Building Commissioners

(Probably no man is better informed on fireproof construction than Mr. F. W. Fitzpatrick, who describes his personal observations of San Francisco buildings after the great fire. Mr. Fitzpatrick is consulting architect and secretary of the International Society of Building Commissioners and Inspectors. This gentleman from Washington has a faculty of speaking out what he thinks, or, rather, writing out what he thinks, regardless of whom it may strike. If there are any evils to be uncovered he invariably succeeds in finding them.) Ed.

I REGRET that I cannot comply with the request of The Architect and Engineer of California for a copy of my report on the San Francisco earthquake and fire now being prepared for the Society of Building Commissioners, the United States Government, and other bodies interested in building. I have but just returned from California, and it will be days before the voluminous mass of data gathered can be put together in tangible shape, long after the Architect and Engineer will have gone to press. However, it is with pleasure that I am specially dictating these few notes and forwarding them with copies of some interesting photographs taken in the fire zone.

With unfortunately rare exceptions, San Francisco's buildings were not up to the highest standard of construction. With conflagration imminently possible—the city was 90 per cent frame and, with New Orleans, the most vulnerable to fire in the country—and earthquakes of more or less severity constantly recurring, the city should have been from 14 to 20 per cent better and consequently more expensively built than the great cities of the East, while, as a matter of fact, she was from 15 to 50 per cent poorer built than New York, Chicago, Philadelphia and Washington, or the new Baltimore.

The climate is not severe, and the people, not requiring extraordinary provision against temperature extremes, had grown lax in their demands, and, indeed, would not pay for the highest class of construction. Architects did not make a brave stand against this popular neglect, and many showed real indifference to, if not ignorance of, sound construction. And, of course, the manufacturers of different materials, in pretty fierce competition with each other, furnished what the market demanded, *ordinary*

materials. These materials, even the best, put together under indifferent supervision, have done their work as might have been expected, and the results are apparent to the trained eye, if not to the casual observer. Officially or otherwise, I have very carefully inspected destroyed or damaged buildings after all the great fires or natural disturbances occurring in this country during the past twenty-five years, and nowhere have I seen evidences of less provision being made against the manifestly possible contingencies than in San Francisco.

Even in the best classes of construction, rather poor mortar was used, and sometimes in very exposed places; and the bond, not only of brickwork, but of concrete and every other material, to the carrying parts or frame was lamentably insecure. In the earthquake, even if the parts were not thrown out, joints of poor mortar were bound to open, offering free ingress when fire swept along, to do great or little damage to that frame, as the nature of the so-called protecting material permitted.

In the cheap buildings many walls were thrown out bodily, particularly gables, by the quake. The unthinking blame these collapses on the material, and it is quite common to hear people say that wood is the only thing that will stand an earthquake. In every case, fallen brickwork will clearly show two things, that the bonding was poor and that the tying of the parts together was poor. Gable ends were cocked up in the air without much other tie to the roof than the flashing metal, virtually independent walls that even a good windstorm might blow over, let alone a quake of such violence as to throw over heavy bookcases standing against the wall, to shove pianos four and five feet away from their original location, to upheave streets and to twist rails much as you can a piece of cardboard. It was one of the most severe quakes that history records. Visit the unburnt portions above Van Ness avenue and note the quake effects upon wood construction. Houses tilted this way and that, like the card buildings of our youth; porches wrenched away from their moorings; absolute collapses in every direction. That wood stood as well as it did is attributable not to the material, but to the fact that to get a frame house together in inhabitable shape its parts have to be well nailed. The *nails* saved the wooden buildings if anything did. And if one-half the tying and binding that was done with nails in the wooden houses had been bestowed with the ordinary means at hand on the brick and stone structures, these would have given a better account of themselves.

The term "saved by" this or that material is being very liberally applied to the Class A and other buildings in the fire zone that were saved. Any such claim for any specific material in any one case is distinctly misleading and untrue, and is simply being made use of by skillful and rather unprincipled advertisers in an endeavor to mold public opinion in favor of their specialty. A particularly well-planned campaign is being waged by the interests opposed to the brick and other burnt-clay products. Even a superficial examination of the burnt districts shows the untenability of such claims. Note the Union Trust Building, the Aronson, the Mutual Life, for instance, and see how brick and terra cotta demeaned themselves. Note also the Mills Building. In fact, most of the so-called fireproof buildings had much brick and terra cotta about them, that of course stood infinitely better than granite or stone, and will require far less cost of repair than the stone or other structures. Just as a slight comparison between brick and stone, for instance, note the West Gate Apartment House, with the first two stories of stone completely demolished, while the upper four, of glazed brick and glazed terra cotta, are virtually undamaged. So in

Mills Building. The First and Second Stories of Stone Are Badly Damaged. Upper Stories of Brick Not Seriously Damaged — Joan Galen Howard, Architect

BURNHAM & ROOT

most cases did the brick and terra cotta work of light courts and division walls stand splendidly, wherever proper care had been used in the construction. Note the court of the St. Francis Hotel, where the face brick had not been properly bonded to the backing. Of course, that facing has almost entirely disappeared. And so it will always be with any work of however good material when it is improperly done.

In the Class A buildings *one* provision against quake had been taken in most of them. Their steel frames had been extra braced with diagonal and other what is usually termed "wind-bracing," and the result is evident. Wherever the protection of that steel against fire was at all adequate, the frame has stood perfectly and has successfully parried the rude assailment and buffeting of an awful quake. As far as the protection of those steel frames is concerned, wherever the work has been well designed and well executed, the results are satisfactory; where not, all and every system has been grossly inadequate. It is foolish to expect a two and three inch or even a four inch tile column covering, merely held in place at the corners with galvanized iron U's, to keep its joints intact in a quake and to thoroughly protect the steel member against 1500 and 1700 degrees of heat. And it is still more foolish to wrap that column with wire lath and plaster or a little concrete, in a vain effort to keep the member safe from fire. Then, in many cases, steam and other pipes have been placed against the columns inside of this fireproof casing. They have buckled, thrown off the fireproofing, and the results are seen in a hundred cases. Note the columns bent and out of shape in the Aronson Building, and in the Rialto and other places that have been protected by tile; and note those concrete-protected in the Hamilton Hotel, the basement of the Rialto and in the Fairmont Hotel. You will be convinced of the necessity there is to take extra precaution with columns, whatever material is used.

Tile floor arches gave a good account of themselves in most cases. The Flood Building, the Mutual Life, the New Chronicle, are in remarkably good shape, while those of the Crocker, the Mills and the upper floors of the Union Trust show up very badly. The concrete floors of the Call, the Sloan, the Shreve, the Grant and the St. Francis Buildings did well, while, on the other hand, twenty buildings of concrete-floor construction failed miserably. Most remarkable of all is the Fairmont Hotel. There the external fire was not extraordinary. Exterior stone and terra cotta work is in remarkably good condition and would lead one to believe that the building could be occupied in a very short time. There was nothing to burn in it but the finished door casings and the floors, yet the interior, in great part, is an absolute wreck, the steel work disjointed and literally wrapped into bowknots, and the concrete floors and partitions a mess of rubbish and tangled wire. The building can hardly be repaired for one-third its entire cost of construction.

The Roebling system gave a far better account of itself than did expanded metal, as a rule.

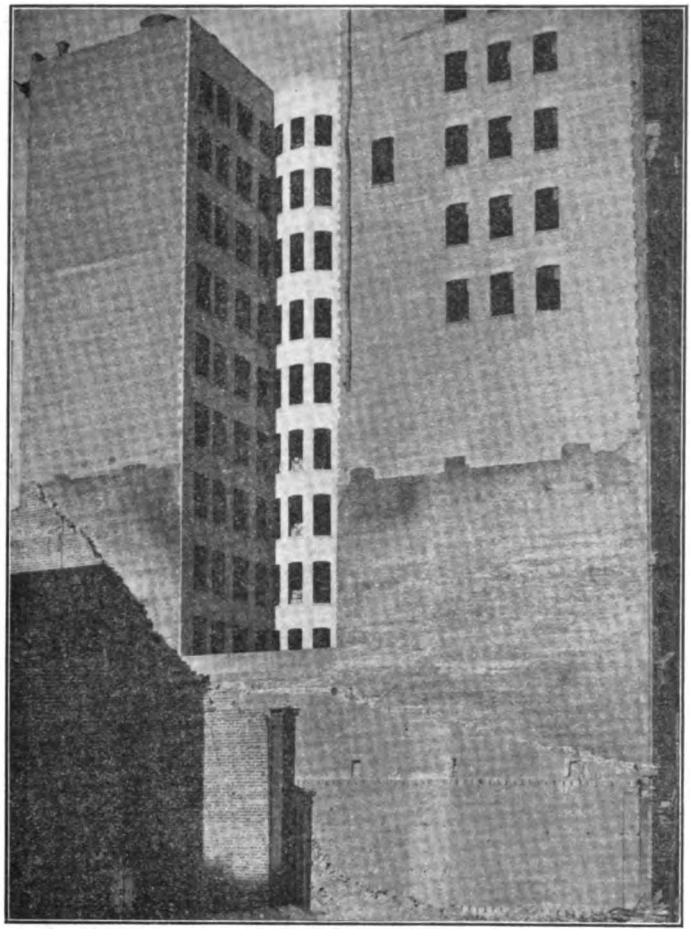
The Monadnock seemed to get the least fire, while the Mills Building was in the hottest of it.

The Kohl Building stood remarkably well. Even had the fire been particularly hot, its metallic doors and casings would have offered additional protection. As it was, the fire was not even intense enough to break some of the upper-story windows and gained no access to the building. Elevators were running and people occupying their offices within a few days. So with the New Chronicle Building. The repairs to the fireproofing there will not exceed $500. This latter was fireproofed in tile, while the Kohl was a concrete construction.

The new postoffice, the Appraiser's warehouse and the Mint were comparatively little damaged by fire. These buildings were somewhat isolated, of very substantial construction, and had the advantage of some local force to battle with incipient fires wherever started. Not so with most of the other buildings. There the tenants were driven out and the structures were virtually abandoned early in the fire.

One thing, not very extraordinary, but that is very surprising to the layman, is that the California Electric Supply building stands, in a pretty hot fire zone, comparatively unscathed and with the work going on the next day after the fire, the paint hardly blistered on the interior. Yet this building was of ordinary brick walls, with so-called slow-burning wood frame, virtually a forest of timber. These people were wise enough, however, to protect their windows with wired glass in metallic, automatic-closing sash. Undoubtedly the wired glass saved this building. It protected it from external fires while a few devoted employees fought every spark of fire on the roof and at other vulnerable points. Some unthinking ones say that that mode of construction of heavy timber must needs be the proper caper, since it stood so well. There was one other so-called "slow-burning" building of similar size that went up in smoke in forty minutes! Its windows were not protected with wired glass.

What folly it is for the advocates of this or that system or material to claim all the benefits of salvage by reason of the use of any particular one thing. Building is a tangible science; there is nothing occult or mysterious about it, and one can learn all there is to know if he will take the time and trouble. Quacks only lay claim to all-saving grace, etc., through some mysterious power of some one thing. Yet people believe them. Many owners of buildings perhaps conscientiously advertise them as "fireproof"



Court of Shreve Building, showing where the Hedder courses were used for Bonding, brick work in perfect condition. William Curlett, Architect.

simply because some particular part of the structure has fireproof tile in it or about it, or some portion is built of concrete, or some other one thing is done properly, and thereby absolving the owners of buildings from doing anything else to safeguard those buildings. That one act has thrown a sort of spell about all else! Gross ignorance or culpable negligence. A building is only fireproof when it is designed so in *all* respects, and *all* its materials are not only non-inflammable, but undamageable by fire. To advertise anything short of that perfection as "absolutely fireproof" ought to be a criminal offense. Tenants go into such buildings under false pretenses and make no effort to protect their goods, with the result that in a fire which may not destroy the owner's structure in toto, a tenant's goods are completely wiped out of existence; absolutely no protection has been afforded him.

San Francisco offers a remarkably good illustration of this idea or theory we have pounded into people for years, that a "fireproof" building is only as fireproof as its most damageable point, as a chain is only as strong as its weakest link. The illustration is this: where proper regard was had for the exterior of the structure, using material not readily injured

Showing Perfect Condition of Brick Court of Postoffice Building After the Earthquake and Fire

by fire, the exterior of those buildings is substantially intact or very little damaged. Where the frames were properly made and tied and braced, they withstood the quake and held all the parts together. Where these frames were properly protected with fireproofing material, and the partitions well laid and tied, and the floors stoutly and firmly built, the interior of the structure is in good shape. Where there was little of a combustible nature to create great heat, even the plastering is but a bit scarred. In the Kohl Building, where metallic or other fireproof trim was used, what little fire did creep in had nothing to feed upon and was quickly exhausted. In the few buildings where elevators or stairs were at any point enclosed, those stories were least, if any, affected by fire from within; the damage was from fire through external windows. Where these windows were protected by wired glass, as in the California Electric Building, the interior was virtually saved from damage, though violently attacked. Now then, assemble those various features together in the one building and you will have something that even the most obtuse laymen must recognize as a safe building. That and that alone will be a "fireproof" building, and until people learn to give equal attention to *all* the details of construction they will keep on building lamentably unfireproof buildings, however stout and safe some of their parts may be.

For San Francisco's rebuilding, strict adherence to these requirements is all that will secure for it just title to a well-built city. A serious mistake has already been made in not extending the fire limits. People clamor that to prevent them building cheap buildings in a still larger district would be a hardship upon the individual. A few dollars more spent in proper construction would be far less of a burden than would a recurrence of this awful disaster that, given the same conditions, is liable to, nay bound to, occur again. Indeed, in the long run, considering taxation for fire departments and all that sort of thing, it would be the very highest economy both to the individual and to the community should San Francisco be sensible enough to rebuild exclusively of Class A buildings whether high or low. But neither San Francisco nor any other city in this country will be sensible enough to adopt any such drastic rules for many a year yet, though that

time will surely come. But many billions of property will have to be destroyed before we learn our lesson. We Americans clamor loudly in regard to our superiority, our great advancement and so on, but in some respects we are atrociously slow in profiting by experience and learning how to do some simple things well.

A most careful and painstaking study of the results of quake and fire in San Francisco has not changed my mind one iota as to what constitutes a good building.

The standard of a perfect building must needs be the same everywhere, save that in localities where one may naturally expect earthquake as well as fire, even greater care should be taken. First and foremost, a proper foundation is to be secured. Much of the downtown district of San Francisco is on made ground. Caissons and concrete piers would seem to be the most natural foundation there, or a reinforced concrete pile, anything that secures a firm base on broad, substantial foundations for walls and columns. For the exterior I give the preference to well-burned brick and terra cotta trimmings. Some terra cotta went all to pieces in San Francisco, while much of it is substanitially intact. People must pay for the best. A manufacturer is going to give just what he is required to and paid for. It is the architect's business to see that materials will fulfill the requirements he establishes. Terra cotta must be thick and well burnt, the inside angles well filled and no little thin ornamental parts that will scale off and let flame to the interior of the member and the carrying iron brackets. In narrow streets and where surrounded by fire risk, it must be apparent to every one that granite and sand and lime stone are the poorest things one can use. You insure thousands of dollars of damage when you use those materials in such places.

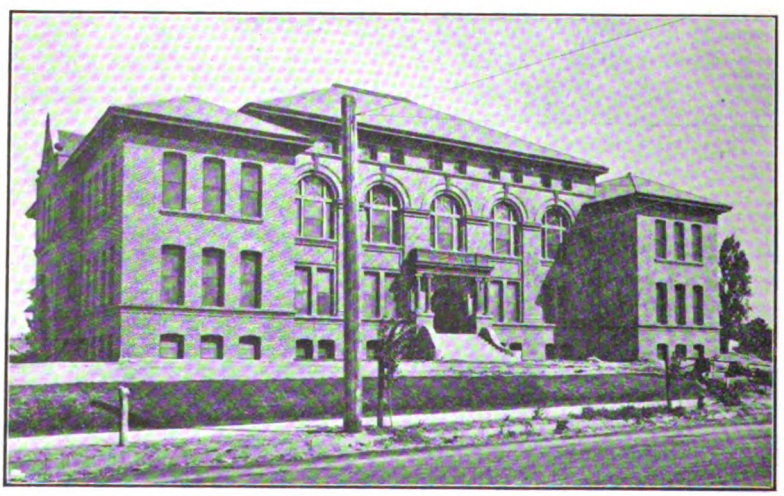
Avoid ironwork outside; all that must be used for store fronts, etc., should not be part of the structure. Let it go. Protect all external parts, like lintels under cornices or window soffits; leave not a particle of structural steel or iron where fire can get to it. Make the frame rigid and well jointed. Whatever quake movement there may be should be taken up in the elasticity of the steel member and not in the wracking and sheer of rivet connections. Tie all the facings thoroughly to the frame. Let the storied brickwork be each independent of the other, but bind it and bond it and secure it to the frame so that what movement there is to that brick wall will show itself only at the joint between stories. Then you will not have great patches of brickwork literally shoved into the street. Protect your frame from fire with a material that has already gone through intense fire in its manufacture. Floor arches and column protection and partitions I prefer of well-burned *porous* fireproof tile, in small units, but considerable depth of floors and width of partition. The best cement mortar should be used; no lime. All beams, girders and columns should be most carefully cemented first, then completely and closely fitted with concrete or brick or tile and surrounded with the protecting tile, thoroughly bonded and tied to this mass and to the steelwork. Metal fabric is cheap and when bedded in cement and remote from fire, ties the protecting material in a vicelike grip. Under no circumstances should a pipe or anything else of that nature be against the column inside of the protection. To do so is fatal in ninety cases out of a hundred. Narrow spans of deep, well-made concrete are a fair substitute for tile; but at a considerable distance from that concrete there should always be a suspended wire cloth and plaster ceiling. This will protect the concrete, as it did in many cases in San Francisco, from at least the first blast of heat and flame. Wide spans of concrete are theoretically very fine, but in practice the units are too big

and one is too much at the mercy of very ordinary labor, and I discourage those wide spans wherever I can. It will undoubtedly be very difficult to get steel in San Francisco and people will probably have to resort to wide span and various reinforced systems of floor construction. For moderate heights, a reinforced concrete column or a steel-barred hollow tile block column is all right, provided in the case of the concrete one it be protected externally with fireproof tile.

But to continue with the model building: The interior finish should be of metal or asbestos or other non-inflammable material. Every outside window should have wired glass and metal or asbestos sash and frame. And in places where external attack is certain, these windows should again be protected with really good shutters or by making double thicknesses of wired glass in the sash. Internally, elevator and stair shafts should be closed at every story and with automatically closing fireproof doors. Such enclosures ought to be veritable fireproof partitions, but where light is wanted wired glass is an excellent substitute. Then, too, the interior should be cut up into as small units as possible. Great expanses of floor are much desired by retailers, but the small unit is the only safe one. Fittings and furniture should be fireproof. And every precaution should be taken so that in incipient fires they can be successfully fought and restricted to the one little unit.

In such a building and such a one *only* is there absolute immunity from destruction. The tenant's property can only suffer from insignificant local fire. His interests are best safeguarded in such a building and the owner has a permanent, non-damageable investment. And such a building is not an extraordinary affair. To do all these things well, as above described, entails skill on the part of the designer, true; but the cost is surprisingly little over the first cost of a most ordinary and flimsy affair, while, as a matter of fact, sanely considered as an investment, such a building is ultimately an *actual economy*, a source of far greater profit to the owner, satisfaction to all concerned and the best assurance of the continued prosperity and well-being of the community.

How many such buildings will the people of San Francisco be sane enough to erect?



Washington Grammar School, Fresno
Brickwork by Fresno Brick and Tile Co. B. G. McDougall, Architect

Reinforced Brick Work

By ROBERT W. GARDNER

IT MAY not be possible for San Francisco to build as extensively as it should do of reinforced concrete, for unfortunately there are too few builders familiar with its uses, but there is one closely allied method that its builders should know. I refer to reinforced brick work. Broken stone for ordinary concrete may be difficult for them to obtain, but the bricks are there on the spot, and the steel wire or plain steel rods can be quickly gotten. No expensive lumber false work is necessary, and by the addition of the steel an eight-inch wall will be better and stronger than the plain brick work of twice that thickness, and for curtain walls a four-inch wall would be better in many instances than one of eight inches.

It is evident that the city could save millions of dollars and months of time by building intelligently with the materials at hand, providing it can break away from obsolete methods and the unyielding building laws founded on those methods.

Major Stokes-Roberts, of the Royal Engineers, has put up some remarkable examples of water tanks in reinforced brickwork for the British Government. He uses light brick walls with telegraph wire reinforcement to stand the thurst of tons of water. He makes a nine-inch reinforced wall do what no plain twenty-inch wall could do with safety without the steel, and he suggests the use of still lighter masonry. It is the principle of the wire-wound gun applied to brick work. The walls are laid up in cement mortar like any ordinary wall, excepting that wire ties are left projecting from the joints, and to these are bent light rods or wires along the surface of the brickwork.

Over this steel network a coat of cement mortar is placed, and the result is practically a reinforced concrete wall. Such a wall could be bulged or twisted by explosion or earthquake, but it could not collapse. It is knitted together and to the floors and columns with steel stitches that will not rip, and the most important of all just now this work can be done by the ordinary mechanic employed by any careful builder. Like a sailor's knot this wirework is easily done, but hard to describe. The result is a wall that will defy fire, water, earthquake, and the tooth of time.

To Practice Architecture in San Francisco

SINCE the fire the California State Board of Architecture has passed upon more than fifty applications for certificates to practice the profession in this State. The following have been granted credentials: Robert Morgeneier, 1065 Tenth Avenue Oakland; William J. McCaw; Theo. H. Skinner,formerly of Boston, 604 Mission Street; Frederick Noonan, formerly of Cincinnati, 1062 Ellis Street; O. G. Traphagen, formerly of Honolulu, 1179 Third Street; W. A. Newman, 402 Post Office Building; Creighton Withers, formerly of Newport, 1847 Fillmore Street; Mark Hay, 69 Portella Street; John Wright, 39 S. Broderick Street; W. T. S. Hoyt, 480 26th Street, Oakland;Thomas Beck, Watsonville; Henry H. Hedger, 1608 Golden Gate Avenue.

Bright Outlook For Terra Cotta

By W E. DENNISON
President of the Steiger Brick and Terra Cotta Company

OTHER writers have done and are still doing ample justice to the lurid scenes of the world's greatest holocaust. We feel almost lonesome in having escaped with no further loss than our offices in the Mills Building and a few thousand dollars worth of stock broken by the slight crumbling of the earth's surface at 5:13 o'clock a. m., April 18, 1906. Then was the commencement of the new San Francisco.

The exercises were intensely interesting and wound up with a baccalaureate sermon of flames whose eloquence held spellbound the throngs on every hilltop and devoured their every passion save that for the new city on the old site. The spirit of the days of '49 is now ancient history. The spirit of 1906 has the rostrum and will do all the talking during this century. It has appointed committees whose work will extend into the next century. "Terra Cotta" is chairman of one of the most active committees on the list, and already has to report progress—we have been awarded a forty-thousand-dollar contract for the architectural terra cotta which is to adorn the splendid new sky-scraper for the Humboldt Savings Bank to be at once erected on the southerly side of Market Street, east of Fourth Street.

Architectural terra cotta is too well established in the east to yield its own place to the onslaughts of the reinforced concrete men. I know full well that reinforced concrete has a very valuable place in structural work and will receive, at the hands of our architects the full measure of recognition, no doubt, but owners and everybody else will find that the class "A" buildings will not be put up without their full share of terra cotta ornamentation. Our best buildings here stand as monuments to its worth today, and are the best possible arguments that can be placed.

We, of course, have made a mistake in California, that is not likely to be repeated, in fire proofing. It has been well known for some years that terra cotta fire proofing should be porous and not dense, but owners and architects have been loath to incur the slight additional expense necessary to producing porous terra cotta. All of these facts will now have their proper recognition among the best class of architects, and the new buildings of San Francisco, where fire proofing of this nature is required, will be up to date with the best eastern practices.

The masterful lady with her meek spouse stood at the hallowed grave of her first husband. "Here," she said impressively, "lies a hero. You would not have been my husband today, Henry, had not John been killed at Gettysburg."

"Yes," cried Henry, with considerable feeling, "war is indeed a curse."

"By George, but I've got a jewel of a girl. I proposed by wire and told her to answer at my expense."

"Well?"

"And the frugal little thing waited until 6 p. m. and got night rates."
—Courier-Journal.

Cement and Concrete

Reinforced Concrete Frame Construction

By JOHN B. LEONARD, C. E.

THE term "Reinforced Concrete Frame Construction" will be understood as describing a building constructed of slabs, beams, girders and columns enclosed by curtain walls which are supported by the columns.

All the exterior forces to be resisted by this frame will be of the same character as exist for a frame constructed of any other materials. The proportioning of the resisting material, however, involves many variations from the conditions involved in designing steel buildings.

The first consideration of the designer is to secure as regular an arrangement of the columns as the convenience of the building will permit. A simple arrangement very materially decreases the labor of designing and also the cost of the construction of the building. Irregular arrangements very greatly increase the cost of forms, which is an important item in the expense of the building. A few such complications will increase the cost of the form construction to as much as $15.00 or more. A regular arrangement also permits of the use of materials to much better advantage.

SLABS—Rectangular slabs recommend themselves because of their economy. They enable the designer to take advantage of the reduction in bending moment by their ability to carry the loads to four supporting beams or girders. This condition, of course, involves reinforcing in both directions, which is an advantage, as it makes the slab of uniform strength. For constructive reasons, the slab should, under no condition, be less than three inches in thickness, and better be provided with haunches at each of its points of support, to avoid the objectionable sharp re-entrant angle. It is better to place the reinforcement in position, where possible, before the concreting is commenced, and carefully examine it to see that it conforms strictly to the designer's plans both as to amount and position.

An essential condition is that reinforcements be provided at the points of support to fulfill the case of continuity. Many who are designing work of this character are sometimes reluctant to do this because of the increased expense and an improper appreciation of its importance. A vast amount of faulty work can be directly attributed to the omission of this important detail.

If a mesh reinforcement be used, it should continue throughout the entire area of the panel in the bottom portion of the slab and additional sheets placed in the top over the points of support and extending a proper distance into the slab.

If rod reinforcement is contemplated, this continuity condition can be fulfilled by the bending up into the top portion of the slab, each alternate rod, the bend to be made at a point about .2 of the span measured from the support. Where one dimension of the slab considerably exceeds the other, it can only be designed as a beam in one direction, but some reinforcement should be used parallel to the longer dimension.

A comparison of the costs of these two types of slab reinforcement will, the writer believes, show that the rod reinforcement is economical for slabs of 4-in. in thickness or over. The shear condition in the slab seldom becomes a criterion but should always be examined.

BEAMS AND GIRDERS—The designing of beams and girders can be approached from two points of view. First, that of considering them as "T" beams; and, second, by treating them as simple beams. The treatment of the members as simple beams eliminates some possibilities of fault through careless workmanship. If the beam and slab are cast at one operation, or if the joint in the slab between two days' work be properly staggered, and before the second day's operations commence, cleaned, roughened and cemented properly, there will be a true "T" action.

The simple beam eliminates the doubt that might exist as to the above precautions having been properly executed but suffers the disadvantage of requiring more depth. This additional depth compels the increase of the height of the building in order to preserve the story clearance desired.

In beams and girders, shear conditions must always be carefully examined and in a large percentage of cases special provision made for their proper disposal. They should also be reinforced for continuity as this condition surely exists in this type of construction. The reinforcing of beams and girders is better accomplished by the use of a number of small-sized bars than by a few large ones; usually, however, there is not much latitude for variation in this direction because of the necessity of preserving a proper amount of concrete surrounding each rod. If plain rods be used in the reinforcement, care must be taken to see that the proper amount of surface for adhesion is presented to the concrete.

The continuity reinforcements, for constructive reasons, better be reduced to as few in number as possible, particularly in the girders. In the case of four girders supported by a column, there becomes an objectionable multiplicity of rods through the columns unless this precaution be observed.

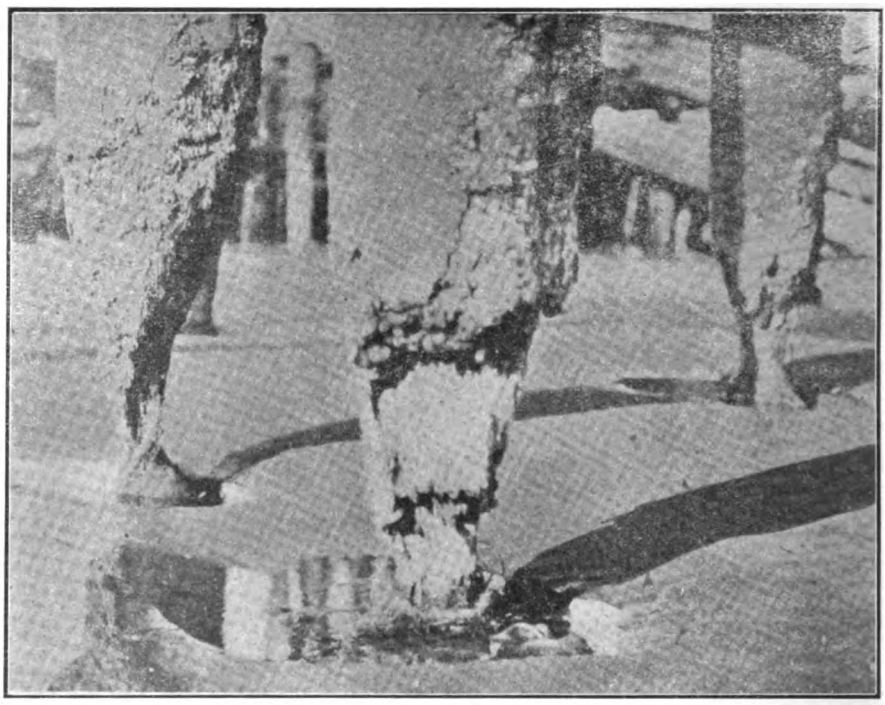
All girders should be provided with good substantial haunches, making an angle of not less than 45 degrees with the beam, and preferably 60 degrees. The writer believes it to be prudent to reinforce these haunches with at least two rods, these rods extending from the upper edge of the beam to the opposite side of the column. This is desirable because the inertia of the section of the beam, including the haunches where it joins the column is available to resist tranverse stresses occurring from external forces.

Provision for the proper disposal of the shear stresses can be made by the turning up of the rods used for the bottom flange reinforcement and where such rods are turned up, they should extend to as near the surface of the beam or slab as fireproofing conditions will permit. This turning up can commence at the point in the beam where the bending moment permits elimination of reinforcement for flange stress requirements. Under ordinary conditions, this detail will be sufficient to properly care for

Detail of Entrance First National Bank, Visalia
Millwork by W. K. Spaulding Lumber Co. B. G. McDougall, Architect

all shear stresses, but in cases where it does not, the designer can avail himself of the continuity bars which will, I think, meet almost the worst conditions.

In deep girders under heavy loadings, vertical shear bars or stirrups are certainly on the side of safety. The introduction of top reinforcements in such girders is desirable for the purpose of resisting possible lateral deflections. By passing the shear bars around the top of reinforcing members, the mass of concrete is bound together in such a way as to greatly enable it to properly perform its functions. That any amount of compression duty can be assigned to these top reinforcing bars is a matter of some doubt and it is hoped that the subsequent discussion will touch upon this point. If it can be relied upon, it is a valuable attribute, because there frequently arise conditions in a building where the depth of the beam is so limited that there is not sufficient mass of concrete above the neutral axis to resist compression stresses. Many such cases, however, can be properly solved by the introduction of larger haunches in the top of the beam. All beams and girders should be examined for horizontal shear along the neutral axis. This condition influenced the minimum width of the beam. In the case of "T" beams, the maximum width of the beam is affected by the thickness of the slab and usually limits its width to about three times this thickness.



Creosoted Wooden Piles, Showing the Effect of the Teredo and Limnoria; from a Photograph Taken at San Francisco a few Days Before the Earthquake

Wooden Piles and the Hull of a Wooden Vessel, Showing the Destruction Wrought by the Teredo and Limnoria From a Photograph Taken April 17

Strong Argument for Concrete

THE two pictures of creosoted wooden piles shown in this number of The Architect and Engineer of California were taken in San Francisco and Oakland by Frank B. Gilbreth, the well-known contractor. They show the effect of the teredo and limnoria on wooden piles exposed to the salt water, and offer still another conclusive argument for the use of reinforced concrete for foundation work.

Figure I shows a creosoted wooden pile in San Francisco almost entirely destroyed by the teredo and limnoria. In the vicinity of Puget Sound, Mr. Stewart, assistant chief engineer of the Great Northern Railroad, states that a stick of timber, rough sawed, will last about eight months; a peeled pile will last a year; a pile with the bark on will last a year and a half, and a creosoted pile from fifteen months to fifteen years. Such piles, however, even when driven under the same conditions, will be attacked entirely differently by the teredo and limnoria. Both of the accompanying pictures show piles that have been coated with a coal tar or creosote compound.

Referring to the recent disaster, Mr. Gilbreth, who has many large structural enterprises now under way in San Francisco, states:

"While it is practically impossible to put up any structure which is able to withstand an earthquake shock of great intensity and varying motion, it is possible to erect buildings capable of weathering a shock such as the recent one in San Francisco. The great devastation resulted more from the flame than from the earthquake itself, and this fact emphasizes the importance of using reinforced concrete for fireproof structures. It is safe to say that if the business section of the city had been constructed of reinforced concrete, the fire resulting from the upheaval would never have gained headway."

Structural Association of San Francisco

THE STRUCTURAL ASSOCIATION of San Francisco is a new organization that has come into existence since the burning of San Francisco. Meetings have been held once a week at temporary quarters in the Ferry building. The association is taking an active interest in all matters pertaining to the rebuilding of San Francisco from structural and engineering standpoints and it has shown especial agility in promoting and encouraging the use of reinforced concrete.

Prof. Charles Derleth, Jr., secretary and treasurer of the association, has sent out the following announcement:

I beg to inform you that at a meeting of the association, held in the rooms of the Harbor Commission in the Ferry Building, on Thursday, the 24th inst., upon recommendation of the Committee on Permanent Organization, it was unanimously agreed that the name of the organization be the Structural Association of San Francisco.

Scope:—The investigation and discussion of earthquake and fire phenomena and the formulation of conclusions as to the manner in which the best type of building construction should be modified to conform to the conditions observed.

Membership:—All persons directly concerned in the design, manufacture and use of structural and fire resisting material, are eligible for membership.

The following permanent officers were elected to serve for one year:

President—Professor C. B. Wing, of Stanford.

First Vice-President—Mr. W. J. Miller, of San Francisco.

Second Vice-President and Chairman of Executive Committee—Mr. Lewis A. Hicks, of San Francisco.

Third Vice-President—Professor Loren E. Hunt, of the University of California.

Secretary and Treasurer—Professor Chas. Derleth, Jr.

I.—Executive and Editing Committee (consisting of the Second Vice-President as chairman, and the chairman of each of the remaining committees as members).

II.—Committee on Foundations—Carl Uhlig, chairman; C. H. Liedbeck, Oscar Haupt, H. M. Smitten, M. J. Mayer, J. B. Balcomb.

III—Steel Construction and Design—C. H. Snyder, chairman; F. S. Edinger, J. D. Smedberg, Maurice C. Couchot, Chas. Derleth, Jr., H. C. Banks, N. C. Vensano.

IV.—Floors, Roof and Roof Covering and Ceilings—J. D. Galloway, chairman; F. A. Koetitz, F. K. Amweg, Smith, Emory & Co., Mr. Hoyt, Alex. P. Farago, Mr. Clark, A. E. Roberts.

V.—Fireproofing of Steel, Partitions and Interior Finish—Morris Kind, chairman; Mr. McBean, Jr., Percy Stuart, Loren E. Hunt, G. M. Scofield, John H. Gray, S. J. Johnson, F. H. Meyer.

VI.—Exterior and Floor Openings—Mr. Thurston, chairman; F. R. Muhs, R. S. Chew, Mr. Gates, Henry A. Gardner, Mr. Herrick, Arthur Cassidy, F. W. Kerns.

VII.—Reinforced Concrete—John B. Leonard, chairman; Victor Ross, Luther Wagoner, R. C. Berkeley, G. R. Field, Theodore Skinner,Chas. T. Dudley, R. Keatinge.

VIII.—Earthquake and History—Chas. C. Moore, chairman; Bruce Cornwall, Loren E. Hunt, Geo. Wagner.

Damp Proofing Reinforced Concrete

One of the most interesting meetings yet held by the Structural Association of San Francisco was that held on the evening of June 13th, when Reinforced Concrete was the subject of discussion. Timely papers covering various phases of this type of construction were read by Jno. B. Leonard, C. E., Louis A. Hicks, C. E., and Maurice Couchot, C. E. Mr. Leonard spoke particularly on slabs, beams and girders. Mr. Couchot spoke along the lines of designing and the preparation of details for concrete construction while Mr. Hicks dwelt on reinforced concrete curtain walls and the problem of properly damp proofing the same.

This latter point brought out a spirited debate. Mr. Hicks urged the use of concrete curtain walls in cage construction as particularly desirable for withstanding earthquake shocks. He said that it was evident from what he had seen since the recent disaster that brick and mortar will not stand a severe temblor no matter how good the construction. He also called attention to the fact that concrete blocks, where a very large proportion of cement had been used, had proved a failure.

Regarding the damp proofing of curtain walls, Mr. Hicks suggested that a wash consisting of an oil base mixed with cement could be used, although this preparation, he declared, had not been entirely satisfactory.

President C. B. Wing said that one of the popular methods in use is to wash the walls with a neat cement about as thick as whitewash. This is particularly applicable to a thin wall.

Mr. Couchot said that some trouble had been experienced in providing a suitable wash for a two-inch wall at Chico. An application of paraffine oil was finally used, and this has given excellent satisfaction.

Mr. Skinner, a Boston architect who has lately come to the coast, said that in his experience he had found very satisfactory an application of soft soap dissolved in hot water and put on with a whitewash brush, this to be followed by a second application of alum water. He said he usually used two pounds of soap to a gallon of water and a pound of alum to five gallons of water.

Mr. Leonard said that a soap and water preparation had been used on a concrete water tank in San Francisco with excellent results. The tank has been built nine years. In San Jose, the soap and alum solution was used all through the concrete in constructing an oil tank for the Union Ice Company, and the method was entirely satisfactory.

There was a discussion over the comparison of the beam to the truss.

The question of how and when to stop work each day on the construction of reinforced concrete beams was considered. Mr. Keatinge said that his theory is that the work should go on uninterrupted for twenty-four hours, but under the present labor conditions such a plan would be next to impossible. He considered it bad and very undesirable to have a joint between the beam and the slab. We have been making the joint heretofore by splitting the large girders. No matter how well a building may be designed, I claim that if the work is not properly executed, it will not stand.

Mr. Leonard suggested that the concrete be staggered; that is, to lay in a series of three-inch timber for over night and then remove in the morning. Mr. Keatinge wanted to know if there was any objection to splitting the girder vertically and Mr. Leonard said that at first thought he should think that that would accomplish the purpose.

New Recipe for Mince Pie

The following story suggests a new recipe for mince pie. It promises a product that will stand by a man even though it fails to aid digestion:

"Once, when I was a reporter," said David Belasco at a holiday dinner, "I spent two days with a gang of tramps in order to get material for an article on tramp life.

"These tramps were a merry lot. They had as many stories to tell as the end man of a minstrel show. The excellent mince pie that we have just been eating reminds me of a mince pie episode told by one of the wanderers.

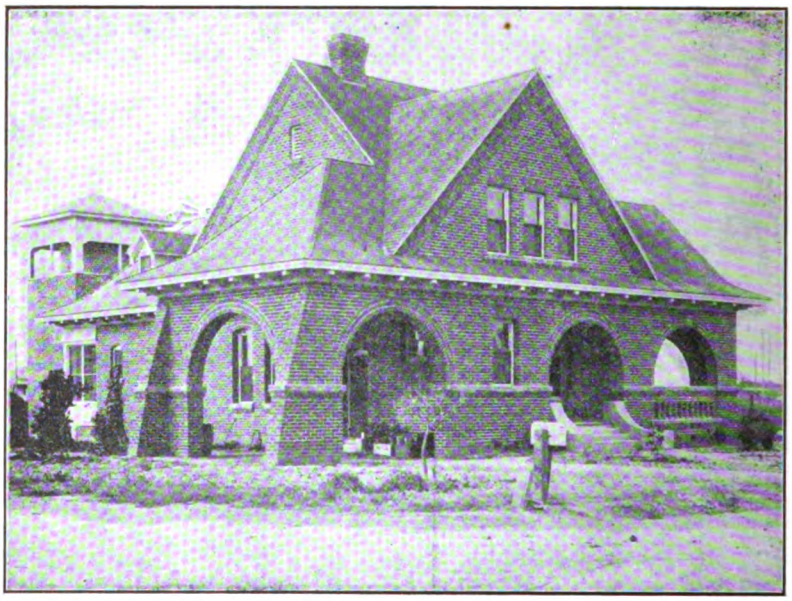
"He said that a friend of his, one cold day in January, knocked at the kitchen door of a farmhouse.

"'Well?' said the farmer's wife. 'You here again?'

"'Yes, ma'am,' said the tramp respectfully. 'I want to know, ma'am, if you'll be kind enough to give me the recipe for that mince pie what I had here yesterday.'

"'Well, the idea!' cried the farmer's wife. 'Landsakes, man, what do you want that recipe for?'

"'To settle a bet,' replied the tramp. 'My partner says you use three cups of Portland cement to one of molasses, but I claim it's only two and a half.'"—Ex.



Picturesque Brick Residence of Mr. F. J. Craycroft, Fresno

Some Fresno County Architecture

FRESNO, the garden spot of the San Joaquin Valley, proudly claims some fine examples of modern architecture, and in the works of Architect B. G. McDougall are to be found many handsome structures.

Mr. McDougall has been located in the valley, first at Bakersfield and later in Fresno, for twelve years, and during that time has planned some of the best buildings in the Valley.

Among the number is the Merced Security Savings Bank building, built of Colusa sand stone. The interior is finished in Verdi antique marble and mahogany and is arranged with particular care for the convenience of its various banking officials.

The Madera High School shows what can be done with the California Mission style of architecture as applied to a public school. It is built of brick and cemented. Mr. C. J. Lindgren was the contractor.

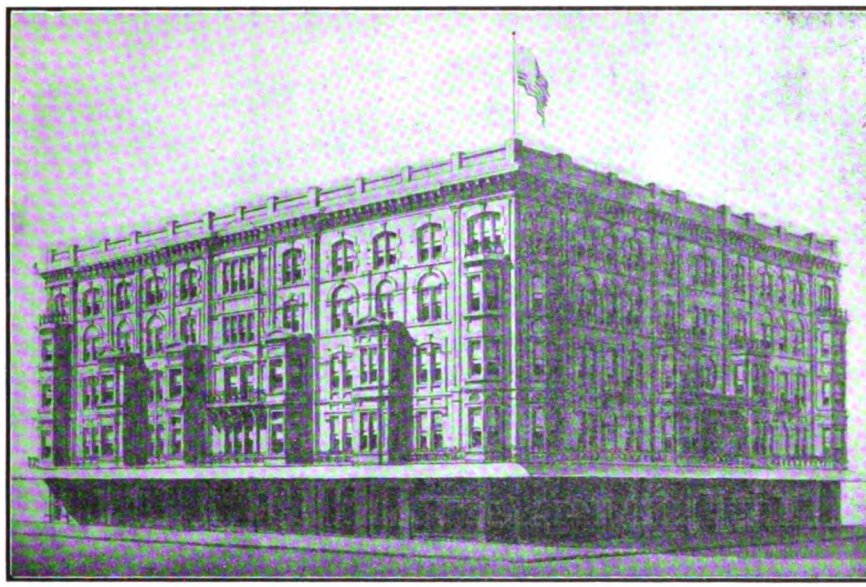
This school has eight recitation rooms and a large assembly room, besides the regular equipment of cloak and hat rooms, principal's office, teachers' rooms, etc.

The Madera jail is well designed and well built, and while small, has all the necessary equipment of a modern bastile.

The Fresno County Hospital is one of Mr. McDougall's latest efforts and has been called by visiting physicians a model of its kind. It is arranged in a series of semi-detached one-story buildings, each containing a large ward for patients and the necessary diet kitchens, toilets, nurses' rooms, etc. All are connected to a central—administration building by enclosed porches, so arranged as to permit of communication from one building to another or to the central administration building, without any loss of time or extra distance traveled.

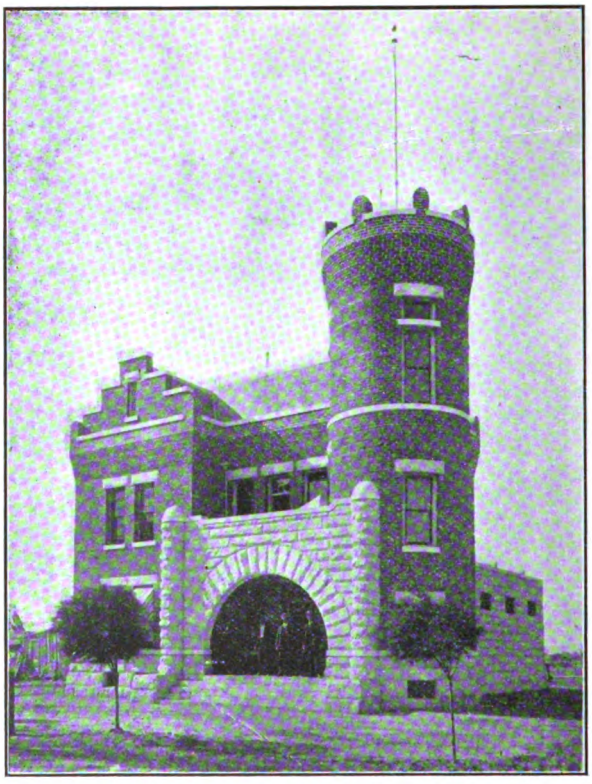
The buildings are of the California Mission style of architecture and built of brick and cement.

The hospital is equipped with its own water service, the tank tower being erected by the Pacific Construction Company of San Francisco, and



New Hughes Hotel, Fresno B. J. McDougall, Architect Electrical Work by Clark Steger

Residence of Dr. W. T. Maupin, Fresno H. A. Hansen, Builder



Madera Jail, Built of Brick and Stone
Brickwork by F. J. Craycroft & Son

C. J Lindgren, Contractor
B. J. McDougall, Architect

the boilers, pumps and various other machinery, including the heating plant, being installed by the Russel Vail Engineering Company of Stockton.

The Sequoia hotel is a new acquisition among Fresno's first-class hotels, and is admirably planned and equipped. The building was erected by Mr. Lindgren in the record-breaking time of four months.

The Washington Grammar School at Fresno is one of the city's finest school buildings, containing twelve class rooms and two large assembly rooms, a principal's office, chemical and physical laboratories, library, and teachers' rooms.

The Chamber of Commerce building was erected by Mr. Lindgren for the Fresno Chamber of Commerce in a small park in Fresno, as a place to house a permanent exhibit of the various products of the county. The building contains a large exhibition room and a secretary's room, besides a meeting room for the executive committee of the Chamber.

The remodelling of the Hughes Hotel at Fresno consists of some very extensive alterations, including a palm court in the center of the building on the ground floor, 50 feet square and 36 feet high, to a glass roof. This will be used as a lounging room for guests of the hotel and will connect directly with the new entrance on Tulare street.

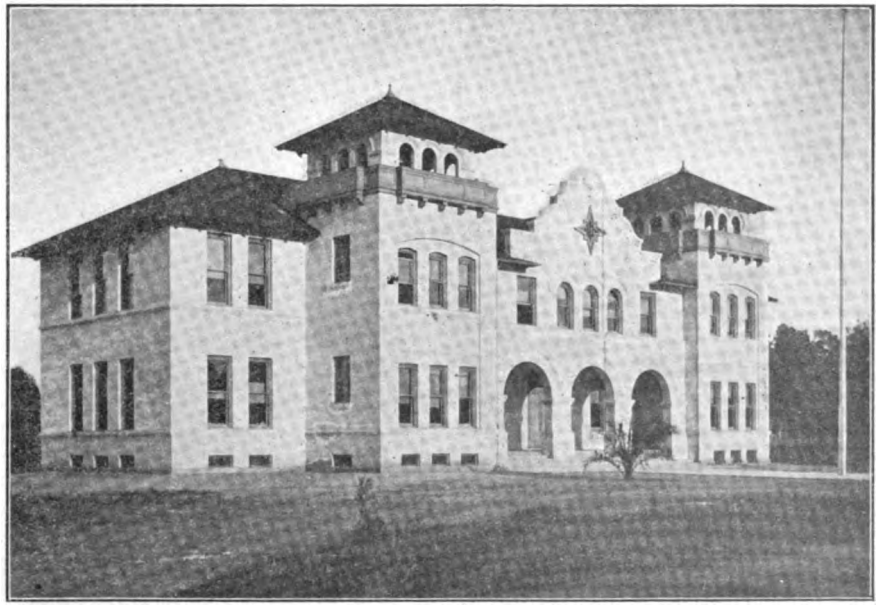
The remodelling also includes two extra stories, and when completed will be one of the most up-to-date hotels in the State.

The Patterson Block, on the corner of J and Tulare streets, is a typical office building of the San Joaquin Valley, the lower floor being devoted to stores and the second story arranged for offices in suites.

R. E. Hyde Business Block, Visalia

Plumbing by R. M. & H. Askin

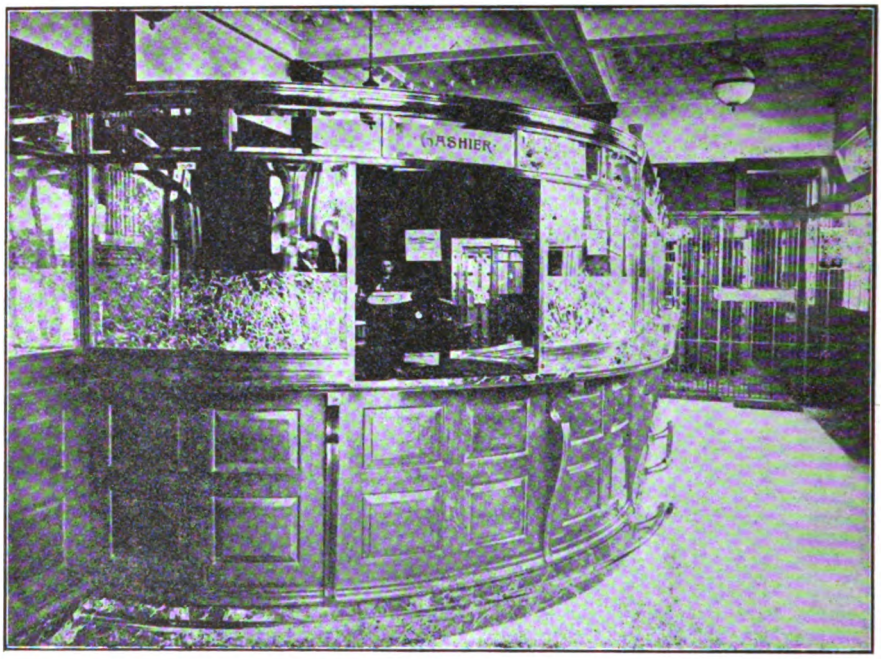
B. G. McDougall, Architect



Visalia Grammar School

Painting by Frank Childs

B. G. McDougall, Architect



Interior of First National Bank, Visalia

Millwork by Spaulding Lumber Co. B. G. McDougall, Architect

Bright Outlook For the San Francisco Architectural Club

By C. E. ROESCH

CLUB LIFE, the result of a prosperous condition in a community, is usually the first to suffer when these conditions become other than normal; this, however, was not the case in the instance of the San Francisco Architectural Club.

Since the hastily called special session on May ninth, permanent quarters have been selected, furnishings purchased and placed in position, the rooms redecorated, and the entire scheme of rehabilitation has been so completely and successfully carried out that when the members entered their new quarters to attend the regular business meeting on Wednesday, June sixth, they were most agreeably surprised at the thoroughness with which the various committees had performed their duties.

Expressions of approval were heard from all present, both as to the artistic arrangement of the interior and the accessibility of the location, 1007 Steiner street, corner Golden Gate avenue.

In view of the great difficulty in securing accommodations of every kind, the committee on "location" was heartily commended on their wise selection.

After the members had voiced their enthusiasm and delight over their new home, the regular order of business was resumed.

Financially the club is in excellent condition, and with a bright prospect of receiving the insurance which was placed with a strong company, and one which fortunately carried but little risk in San Francisco,

their affairs are in a most prosperous state. The enrollment is larger than ever, the membership increasing through the arrival of Eastern architects and draughtsmen who have decided to enter the local field, and every indication points toward a most successful career for this organization.

In view of this the dues for the months of April, May and June were suspended.

The local club is affiliated with the Architectural League of America, a national institution, the sister clubs of which have been most generous in offers of assistance, a library consisting of the principal works of interest to engineers and architects having been donated by the St. Louis Architectural Club. This library is to be placed at the disposal of all those interested, irrespective of members.

The Tee Square Club sends a very desirable work on Decoration, in addition to the replenishing of the current files of the various technical journals.

A striking illustration of the way interest is being revived is manifested by the resumption of the various classes conducted before the fire, and the addition of a class in sketching. This class is under the supervision of Mr. A. O. Johnson, a very capable instructor, who also conducts the class in rendering.

The following dates for the beginning of these classes have been decided upon:

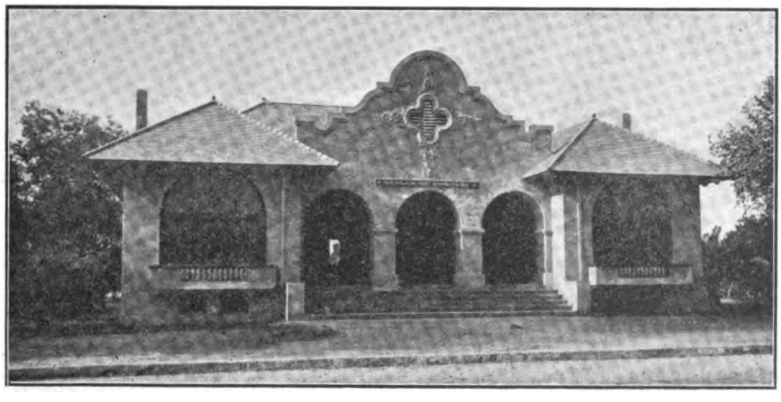
Rendering, A. O. Johnson, once a week, beginning Friday, June 15, at 8 P. M. at the clubrooms.

Steel Construction, C. F. Archer, once a week, beginning Monday, June 18th, 8 P. M., at the clubrooms.

Sketching class in water color leaves the clubrooms every Sunday morning at 9 A. M., for outdoor subjects, beginning the 17th inst

These classes are conducted without expense to the members, and are open to all who will take an active part, and show an interest in the work. The benefit to be derived from this instruction is quite apparent.

The following members were appointed a nominating committee to place in office a Secretary and one Director: Messrs. George Wagner, chairman; J. G. Drescher and O. R. Baxter.



Chamber of Commerce Building, Fresno

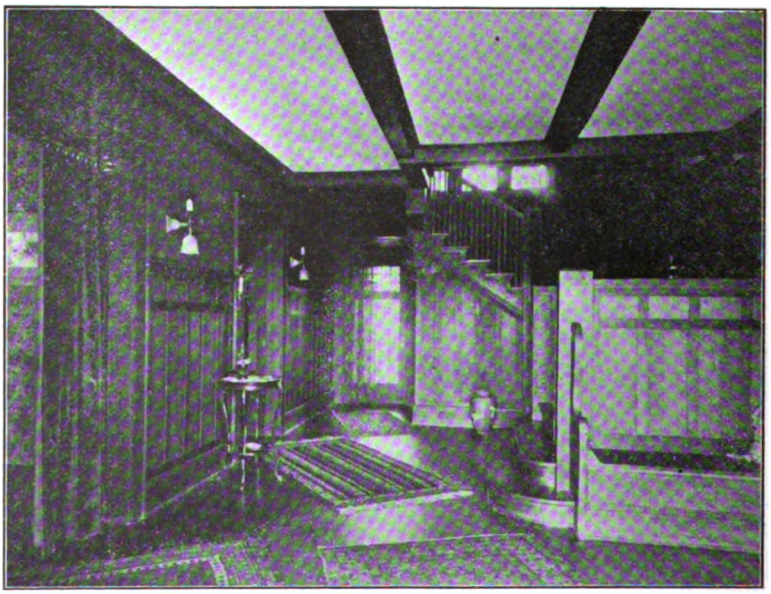
Brickwork by F. J. Craycroft & Son B. G. McDougall, Architect

C. J. Lindgren, Contractor

Residence of Mr. C. J. Lindgren, Fresno

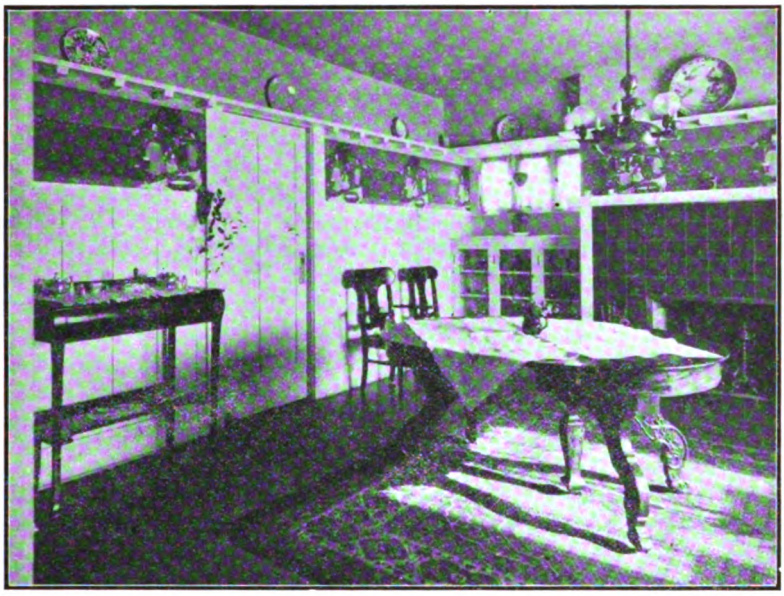
Electrical Work by Clark Steger
Plumbing by Barrett-Hicks Co.

B. G. McDougall, Architect

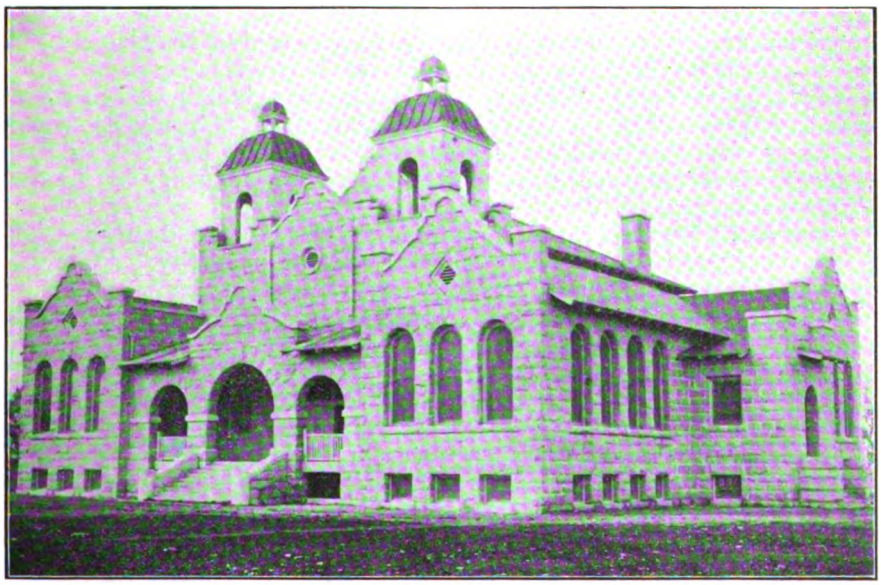


Lower Hall, Residence of Mr. C. J. Lindgren, Fresno

B. G. McDougall, Architect



Dining Room, Residence of Mr. C J Lindgren — B. G. McDougall, Architect



Porterville Grammar School

C. J. Lindgren, Contractor — B. G. McDougall, Architect

Inspiring Words From Baltimore

IT IS an ill wind that blows nobody good."

The affliction of the thousands at San Francisco will benefit the architects, the builders, the makers and dealers in building materials and thousands upon thousands of workingmen, yet not a man will be glad.

When the great fire swept over the business section of Baltimore the whole nation sympathized, while the people of the city stood stunned and almost helpless for days. But the disaster of Baltimore is dwarfed to almost insignificance by the appalling calamity that has overtaken the great city at the Golden Gate. In Baltimore millions turned to ash heaps in a day. In San Francisco the property loss will be probably four or five times as great.

In Baltimore not a life was lost and few people were made homeless. In San Francisco the loss of life is heart-rending, 200,000 people, men, women, children and babies were driven from homes into the streets and parks without food, clothing or shelter, while no less than 500 perished in the seething flames or the crumbled ruins of home or magnificent hotels or business structures.

With this striking contrast can we conceive of the crushing force with which this blow has fallen upon the people of San Francisco?

But order is coming out of chaos, the brave hearts of the stricken city are again beating strong and true, and determination to build is the one great plan next to the care of the suffering thousands.

Build! Of course they will build. They are Americans, with the true American courage and indomitable energy, the American faith and American will. As Chicago, Boston, St. Louis, Galveston and Baltimore arose from the devastation stronger, better and more courageous, so will San Francisco rise, and in the upbuilding gain new hope and greater civic interest and purpose.

It has been suggested that the upbuilding will be slow and less costly than before because capitalists will hesitate to invest. This is improbable. Americans are never daunted by disaster. As was said of Dr. Daniel C. Gilman: "He loves difficulties for the pleasure of overcoming them." That is the true spirit, and it will be as manifest in the upbuilding of San Francisco as it has been in thousands of other instances. Already has come a call for architects and builders, and the problem of how best to build to set at naught the earthquake's power is being given serious study by the great building firms of the nation.

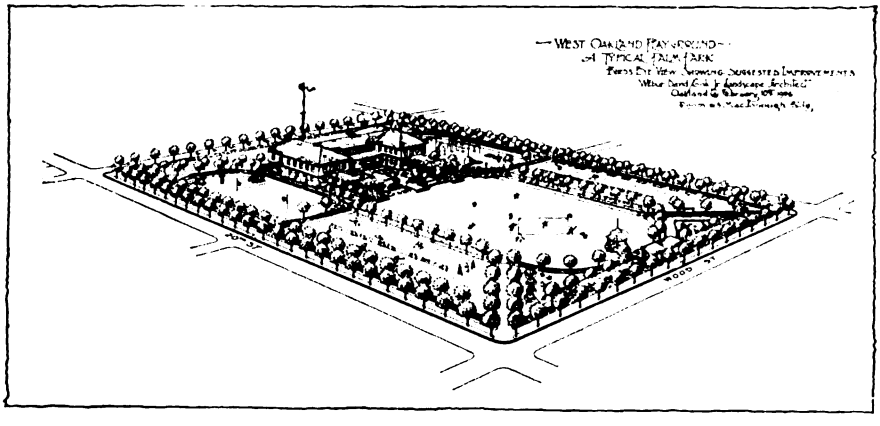
But there is another American trait that is greater than all others. "Faith, hope and charity, and the greatest of these is charity." Americans have faith unsurpassed, hope that is eternal, charity that knows no bounds, knows no creed, that considers not race or color. The cry of the suffering has but to be heard and the sordid in life is forgotten and the rain of charity pours in torrents from o'erflowing purses, the strings of which are loosed by the hands of men and women whose hearts are as tender as those of children. Americans are as vigorous in their charity as in their business life. The marvel of the world in business progress, Americans are also the marvel of the world in extending the helping hand to the afflicted.

"For inasmuch as ye do it unto the least of these, ye do it unto Me."

—Architects' and Builders' Journal of Baltimore.

No better assurance that San Francisco is going to rise from her ashes could be asked than the arrival of such great construction companies as the Fuller Company of Chicago, Thompson-Starrett of New York and Frank B. Gilbreth of New York and Boston.

Landscape Architecture



The West Oakland Playground

By WILBUR DAVID COOK, Jr., Landscape Gardener

IN RESPONSE to a request of Mayor Frank K. Mott I have submitted suggestions and plans for the improvement of the West Oakland playground.

It is proposed to make a Palm Park of this playground, the only one of its kind in the world as far as we know—in character to correspond with the suggested improvements for the Sixteenth-street station.

It is a matter of great importance to any growing city that its entrances should possess some features of such marked individuality as to instantly impress themselves upon the memories of visitors. It is at the city's front door that our impressions are formed, favorable or otherwise, and how can we expect a favorable impression with the existing conditions?

We suggest then that you have at the city's front door and adjoining the transcontinental highway, a type of playground which has proven such a tremendous success in Chicago.

So popular have these playgrounds proved that the city of Chicago has fourteen of them under construction for the benefit of its fortunate and progressive citizens. The attendance at the Chicago parks last year was over seven hundred thousand people attesting their popularity in a substantial manner.

Contrast for a moment the conditions which confronted Chicago with those of Oakland. In the case of the former city, block after block of exist-

ing buildings had to be condemned and removed before any park work could be begun. This, too, in thickly built up portions of the city, and while it is quite true that many of the condemned buildings were not architectually beautiful, it was nevertheless an expensive undertaking. In the case of Oakland, she owns the present park site, and the conditions are particularly favorable for the construction of such a playground at the present time.

Given a clean field, then, we would erect a field house on the Spanish order of architecture of rough cast concrete, with a low pitched red tiled roof of liberal overhang, the building to comprise a main building and two ells (one for the women, the other for the men) connected by a general assembly hall on the second floor and by an administration room and a series of colonnades on the first floor.

In the basement of the main building is a large salt water natatorium or swimming tank filled with sea water pumped in and heated to a temperature of 68 degrees fahrenheit. Surrounding this tank dressing rooms, lockers and shower baths will be found. This tank will be open to the general public on alternate days and evenings of the week, i. e. women and girls one day and evening, men and boys the next. An attendant will always be on hand to instruct in the art of swimming. Suitable bathing suits, towels and lockers will be supplied by the city for a nominal fee and all suits will be thoroughly sterilized after use, in the laundry in the basement.

In the administration room just overhead, a lunch counter will be found, this concession having been let by the city to the highest bidder, and the revenue derived therefrom utilized in the payment of attendants' wages.

In the men's ell on this floor is a reception room, in which is kept the current magazines and papers and the playing of various games is allowed, restricting only games of chance or any form of gambling. Here, too, will be found a smoking room. A room is provided for the use of the women on the other end of the building. In it will be held mother's meetings, sewing guilds, etc.; also lectures on the feeding and care of infants. As a matter of fact these rooms will be open all the time for non-sectarian meetings of any kind.

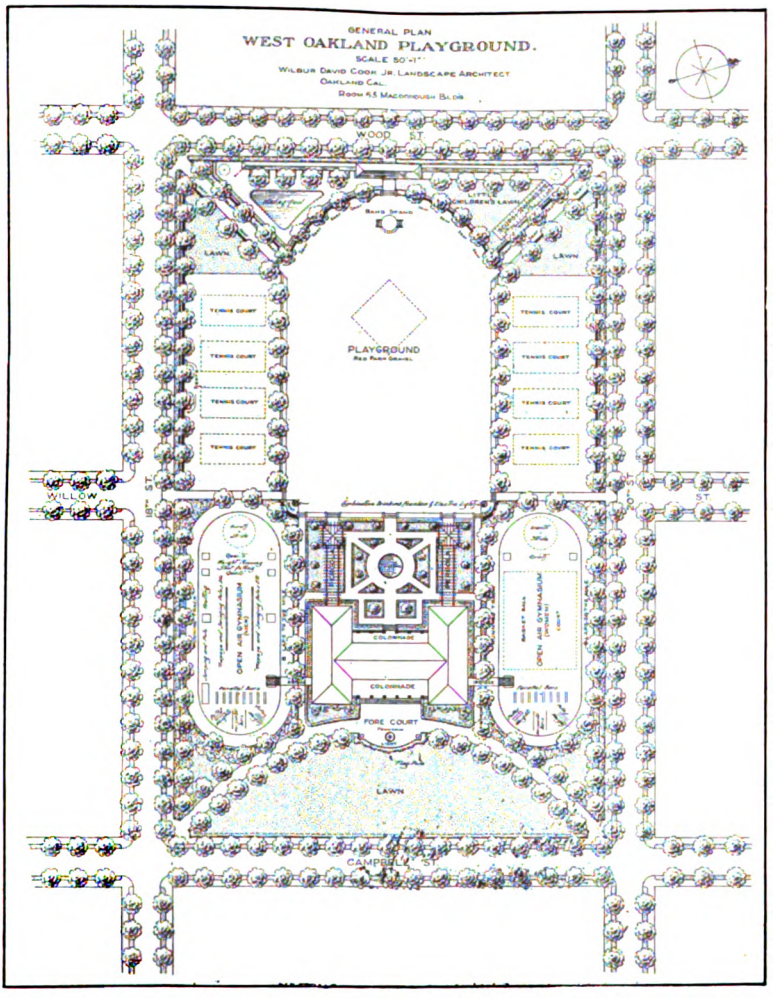
Separate indoor gymnasiums are provided for use in inclement weather and will be found over the respective reception rooms on the second floor. Separate outdoor gymnasiums are also provided for use in pleasant weather and will be referred to later in connection with the other outdoor features of the playground.

A general assembly hall is provided in the central building on the second floor, and is supplied with a stage, upon which illustrated lectures, musical and dramatic entertainments are given by the local talent of the community.

Leading from the reception room on the first floor are vine-clad Pergolas with seats, from which pleasing views of a formal flower court and basin are to be obtained.

Here, too, are well kept gravel walks edged with box, and bay trees set about in profusion and with parti-colored flowers forming a pleasing, restful setting to a rather strenuous playground beyond.

Access to this playground may be had either by the wide central walk or through these pergolas by descending three or four steps, as the playground is sunken to meet the present surface, which is about two feet below the existing street grades. This is a most happy condition, as it will save the city a great deal of money in the way of fill. The other portions of this playground will be brought up to the present street level. A glance at the accompanying plans will make our meaning clear.



General Plan of the West Oakland Playground Wilbur David Cook, Landscape Architect

The surface of this central playground and the tennis courts will be of red park gravel, which has proved of great value in standing the wear and tear of hard usage and of drying out most rapidly after hard rainfalls. Combination drinking fountains and electric lights are provided for in all parts of the playground. Here, too, will be found a band stand and a ball field, screened from the tennis courts by a permanent wire screen, to be covered with roses or wistaria. Ample seating accomodations are provided for those desiring to watch the various games in progress.

At the end of the central playground is a little children's playground, together with a suitable shelter, with side wings of covered seats backing the sand courts and children's lawn. On the right is a shallow wading pool filled with sea water, in which toy boats can be sailed and the little ones can wade at pleasure. Merry-go-rounds, teeter boards, see-saws, scups and swings will also be found on the children's lawn, also giant's strides. This entire playground is surrounded by a substantial fence and the little ones are safe from harm and are not playing in the streets.

Adjoining the field house at the right and left are the outdoor gymnasiums, supplied with apparatus of a substantial character to withstand the action of the elements. Here will be found pulley weights, horizontal bars, parallel bars, ladders, ropes, swings, trapeze, travelling rings, etc.; also eight lap cinder running track, and a place for shot putting, pole vault, quoits, high jumping, etc. (In Boston and Chicago the running tracks are utilized by candidates for the police force in training.) Toilet accommodations are provided under the steps in the respective gymnasiums, also an emergency gate for the use of attendants in case of injury. Access to these gymnasiums by the general public may be had by passing through the building and out over the bridges across the running tracks. While this may seem a bit round-a-bout, experience has shown it to be the best, as the attendants see and know who is making use of the apparatus and can place the blame for injury to persons or property. The women's gymnasium is similar in character, except that a basket ball court takes the place of the heavier apparatus.

The approach of the field house from the front is by a broad curvilinear path leading from the opposite corners and meeting in a formal forecourt, in the center in which is shown a combination fountain and light, all fountains being of the hygiene bubble type, thus doing away with that familiar menace to health the public drinking cup-and-chain.

The field house will have a pleasing setting of front lawn for color effect and is to be edged along the street front with a closely clipped privet hedge. The use of the Dracena palm is advocated to secure the sub-tropical effect so much admired by visitors. These trees will do well here if provided with tree pits filled in with good loam five or six feet deep.

The objection is often raised to a playground of this description by people unfamiliar with park conditions, that it is too fine for a manufacturing district. This objection does not hold good, however, as has been demonstrated time and time again by fact, not theory, as in the case of Chicago. A playground of this kind has been found to be of great value to manufacturing districts.

The employees of the various factories in the immediate neighborhood cut short their noon hour to make use of the apparatus and games to be found here and to make use of the swimming tank after the day's work is done. It is an interesting fact to note that the attendance to the Natatorium in McKinley park in Chicago from June 4th to October 2nd was 121,625 persons, proving the popularity of this one feature in a park of only thirty-six acres. It is also well to bear in mind the value of such an improvement to the railroad companies, both steam and electric. They should be called upon to assist in an improvement of this character, and once they understand its value you can rest assured of their hearty cooperation. In closing, I will cite one notable example, which can be verified by any one interested.

In 1896 the Metropolitan Park Commission of Massachusetts took possession of what is now known as the Revere Beach reservation, a strip of seashore property, about six miles out of Boston. Paralleling this beach property there were two lines of steam railroads, one the Boston and Maine, Eastern Division, and the other the Boston Revere Beach and Lynn, locally known as the Narrow Gauge. This latter road had the advantage of adjoining the beach, and it is this road that we are especially interested in. It had had a precarious existence up to this time, and its stock was listed at $55 per share on the market, with few takers, so that when the Commission took their location by right of eminent do-

main and moved the road bodily two hundred feet back from the beach it was the feeling that the road's doom was sealed.

The next move of the Commission was to condemn and remove all existing buildings between the railroad and mean low water, and to erect midway of the beach a State bath-house. Note the effect during the summer of 1905.

"It is not uncommon on hot Sundays for one hundred thousand people to seek the North Shore (Revere Beach), via the Narrow Gauge road, the Boston and Main, Eastern Division, and by the electric cars, and for as many more to go to Nantasket and Nahant." The minimum fare is ten cents a head (round trip), that is to Revere.

Now this is where the railroad people are interested. The stock of the Boston, Revere Beach and Lynn road jumped from $55 per share to $155, and is considered today a gilt edge proposition. So much for the practical demonstration of the value of *one* municipal improvement upon railroad properties. We have not mentioned the effect it had upon the electric roads simply because our attention was confined to this one particular railroad.

It seems a pity that Oakland has not taken steps before this to secure at least one or more of these small playgrounds. The older cities are awake to the fact that they are not luxuries but absolute necessities and that they can be made a source of revenue to the city. Such a playground can be constructed at a cost of about five cents per capita.

Our recent great catastrophe has fully proved the value of numerous open spaces. While a playground of this kind is not a Golden Gate Park and cannot offer us either in area or plantations as great a variety of effect, it can afford us an orderly, compact, convenient arrangement for the enjoyment of its various features, and above all it is accessible to many tired mothers and babies who are utterly debarred from going to Golden Gate Park, both on account of expense and the amount of time consumed in coming and going, as well as the uncertainty of climatic conditions. It has the added advantage of keeping what money is spent right here in Oakland, where it belongs, and we still have the Golden Gate Park to fall back on.

San Francisco—The City Beautiful

By DANIEL H. BURNHAM

WITHIN six months the new San Francisco with its wide driveways and handsome buildings will be well advanced, and in a year's time it will not be easy to find a trace of devastation.

The pride of San Francisco citizens, it seems to me, has been touched by the disaster and even the poorer people who lost their homes will soon build again on a more substantial and artistic scale..

In regard to the plans of the committee for the beautification of the new city, my views were chiefly desired along the line of modifications or extensions in the plans that I suggested for the streets and parks. I was asked for suggestions also as to public buildings, and recommended that they all be made strictly fireproof.

The new city will radiate from the City Hall. One of the beneficial effects of the earthquake was the destruction of the old City Hall, an incongruous structure that could not be made to conform to any possible system of plans for the beautification of the city.

I believe the San Francisco of the future will be the most beautiful city on the continent, with the possible exception of Washington.

Heating, Lighting and Electrical Work

Electricity Not a Factor In the Recent Disaster

By GEORGE J. WELLINGTON, C. E.

COMPLYING wth your request for a report upon the recent conflagration, I have purposely avoided one that is technical and have reviewed the subject from a practical standpoint. The primary cause of the late disastrous fire is attributable to the earthquake of April 18th.

A glance at the city from a point of eminence, shortly after the temblor had subsided, at once disclosed the fact that San Francisco was doomed.

Columns of smoke ascending from fires at many different points made apparent a condition that no fire department in existence could cope with on account of the impossibility of assembling sufficient apparatus at each fire to control it, particularly with little or no pressure in the hydrant mains.

The fires were started from many causes, prominent among which were combustion in drug stores arising from chemical combinations through breaking of receptacles, and the overturning and bursting of jars and tanks containing phosphorus.

Improperly constructed brick chimneys, inflammable materials coming in contact with open lights, and overturned oil lamps and stoves contributed extensively. Electricity, as far as can be learned, was not a factor, as the disabling of generating stations and the prompt throwing of switches by competent attendants, as well as the operation of automatic devices, placed this fruitful source of fire out of commission.

Lack of water, due to various causes, combined with the fatal accident to Fire Chief Sullivan, deprived the department of its most valuable resources.

Many fires in the residence sections were controlled and extinguished, but those in the business districts soon developed into conflagrations too fierce for the department to cope with, even had the water supply been efficient.

In the earlier stages no air was stirring, excepting draughts created by the flames, while during the afternoon of the first day a strong breeze carried the flames in an easterly direction, and fanned their fury to an extent that radiated the heat across streets to windward.

Dynamiting in the business districts, in attempts to stay the progress of the fires, resulted practically only in the breaking of all windows in the neighborhood.

The bay and broad thoroughfares, in addition to water from a private pumping plant in the Mission District, finally stayed the progress of the flames after their almost total destruction of buildings containing about three-fourths of San Francisco's wealth and population.

Unprotected openings of brick buildings, improperly hung and uncared for metal-clad shutters, ineffective rolling and ordinary iron shutters, were all conspicuous by their weaknesses. Exposed sides of hollow tile fireproofing again cracked away; concealed piping again forced fireproofing away from steel members that it was intended to protect; metal lath and plaster partitions again failed, and unprotected steel was warped and distorted, permitting floors to fall. Tall brick buildings of joisted interiors radiated heat followed by fire to wooden cornices and window frame.

Cast-iron columns stood the test because there was no water to crack them. Stone fronts disintegrated and fireproof buildings were left in thoroughly damaged condition by their inflammable contents.

Fire walls surrounding large areas fell after being deprived of their wooden supports.

In fact, everything that has been predicted by Fire Engineers occurred. The bigotry of architects, cupidity of contractors and penuriousness of owners have laid the Metropolis of the Pacific low. The work of intelligent architects came to naught against the creations of incompetent ones. The owners of well-constructed buildings were burned out by their criminally careless neighbors.

In many instances building talent was not engaged on account of its ability to construct permanently and well, but rather for its shrewdness in erecting structures that would earn greatest return for sums invested. Competition in this respect has led to the use of inferior materials and the evasion of building laws and Underwriters' recommendations. San Francisco possesses building laws in plenty which require enforcement rather than alteration. A valuable addition to the present ordinances would by one similar to that in force in some European countries which penalizes owners for fires that escape from their buildings, affording protection to men disposed to build well.

Great stress is being laid upon the condition of one office building that was burned out only to the fifth floor. Careful investigation discloses that very low and substantial buildings surrounded, and therefore it was not subjected to the intense heat and flames that attacked others of Class A construction.

Wooden window-frames in this building played their part, and while the interior wood finish was metal-clad, the glass in doors was destroyed, and hinges, held by screws driven through the metal into the wooden backing, gave way.

Another building with wire-glass windows in the business district stands practically intact by reason of its private water supply. This building was also not exposed to the intense heat that prevailed in other sections.

The integrity of brick fire walls built before the days of advanced business ideas was not disturbed by the earthquake, demonstrating that Class A buildings are not absolutely necessary to prevent spread of fires if proper and honest construction is practiced. Proper consideration should be given each class or fireproofings and retardments, as both have their limitations. Much will depend upon pride and the willingness of owners to safeguard their buildings.

The term "safe fire risk" does not necessarily mean a class of buildings that will inconvenience the conduct of business or bankrupt the owner with its cost.

On account of liability of rupture to public water mains by earthquake, independent pumping systems in each building or group of buildings will

be the solution of perfect private fire protection. For fire department use, a circulating salt-water system with a number of pumping stations should be provided.

As a provision against interruption of service by earthquakes, reinforced concrete cisterns with flexible linings, to provide suction for engines, should be built upon rock or pile foundations.

Whatever portions of this article may appear critical are expressed by one born and bred in San Francisco, with a desire if possible to assist in rebuilding a city which will be not only beautiful but safe.

Brickmakers' Opposition to Re-enforced Concrete

PREPOSTEROUS, insincere and selfish objections to re-enforced concrete are being urged by agents of the brick trust. There will be a very active demand for bricks in the next three or four years, but the local combination of brickmakers is jealous of its monopoly and afraid of the possible competition of re-enforced concrete.

Brick construction did not stand the earthquake shock very gloriously. Brick buildings suffered the greatest damage. The experience of April 18 teaches that brick is the most dangerous sort of construction in earthquakes. Nor did the brick buildings stand the fire much better than they stood the earthquake, as the burned territory testifies.

Re-enforced concrete, in the opinion of architects, engineers and building contractors, is vastly superior to brick, and is practically as good as steel in resisting earthquake and fire. There is no better building material than re-enforced concrete. Although designated as "Class B," the classification does not imply inferiority to Class A structures, but implies merely a difference of construction.

Re-enforced concrete has been tried and proved in Eastern cities, and its merits are recognized. The brick interests in the past have managed to have the building ordinances so written that re-enforced concrete was not permitted in this city. The time has come, however, when the city's need is stronger than the political influence of any special interest. San Francisco will not submit to any retardation of her growth for the sake of the allied brick manufacturers.

The building trades are not opposing re-enforced concrete; at least so says P. H. McCarthy. All the opposition comes from those whose business it is to sell bricks. There does not seem to be any effort on the part of these opponents to present a rational argument against re-enforced concrete. But they are endeavoring to have prohibitive conditions written into the proposed ordinance. They want the law to require that the walls of re-enforced concrete be of an an unnecessary and costly thickness. Such a condition would make a building of re-enforced concrete costlier than one of steel, and would, of course, be just as effective in the interest of the brick manfacturers as a flat prohibition of re-enforced concrete.

Both Marsden Manson and James D. Phelan are strong advocates of re-enforced concrete. Mr. Manson calls it a nearly ideal construction, and Mr. Phelan declares that he is done with bricks. Three of his buildings in San Jose, constructed of brick, were knocked down by the earthquake, and he intends to rebuild them in re-enforced concrete. Many other men are of the same mind, and they demand that their interests shall not be sacrificed to those of the brickmakers.—San Francisco Bulletin.

New Designs in Wall Paper

WALL paper, which always is thought of as a minor in the matter of house furnishings, is, in fact, one of the most important details in beautifying the home. No matter if the carpet, furniture and drapery are in perfect harmony, let the wall paper be contrary in color and design and the effect of the room is spoiled.

Every spring, when the housewife is busy with pan, broom and dusting cloth and the house is undergoing a thorough renovating, the paper hanger is in his glory. The designs this spring are as many and varied as the prices. As one looks over the vast array of designs for each particular room it would be hard to decide which is the prettiest pattern.

For the parlor and sitting room the panel and light colors in imported goods promise to be the favorite design; for the hall and library, the new crown effect; for the bed room, the stripe and floral work; and for the kitchen, the granite and varnished tile paper.

One pretty design in parlor paper is a dark green panel effect, the center of each strip being decorated with a landscape scene. These strips are to be used alternately. The border especially is noticeable, the scenery of the border being put on alternately, like the wall paper, making it appear as if it were one continuous strip.

Another unique design of the parlor paper is a floral pattern in links on a dark brown background. The paper for the ceiling is the new tufted patterns, which, when it is put on the wall, has the appearance of a tufted cushion. A beautiful pattern in small roses also is shown, though the floral design seldom is seen.

The crown effect is used generally in halls and libraries. This paper is put on in three pieces, the top piece having an effect of the crown. A beautiful design of this sort was seen in dark crimson. The crown was outlined with a pale gold strip.

The oriental styles also find great favor in many of the hall and library papers. One pattern of this sort was composed of several colors and the unique figures were outlined with a dull red. This sold as high as $3 a roll.

It seems as if all the new and dainty designs in floral colors are reserved for the bed room. Every flower imaginable is brought out in all of its dainty colors. One extremely beautiful design was a violet pattern which sold for 15 cents a roll. The flowers were arranged in strips along the paper and the border consisted of huge bouquets of the same flowers. The light ceiling paper went with this design.

Pink is greatly favored in bed room paper and this was carried out in a design of apple blossoms. The flowers are generally arranged in strips, as the stripe and the floral design are the favorite pattern. The prices of the floral paper range from 25 cents up to $4.00.

Fruit and trellies work for the dining room is at the same time unique and beautiful. One extremely handsome and also expensive design was seen in one of the Springfield shops. The background was of dark green trellis work, purple grapes twining among the foliage. When the paper was put on, the room had the appearance of an arbor, with pillars placed at the corners of the room. This sold for $1.75 a roll.

Of course, there are some pretty patterns that are not nearly so expensive and are equally pleasing. One dainty patterns, which sold for 40 cents a roll, had a dark background of blue. Small bunches of flowers and fruit were scattered at intervals along the paper and the border was outlined with dull gold. Still another design was shown in dark red, in which the fruit was small cherries.

Among the Architects

Information contained in this publication is gathered from the most reliable sources accessible, but to make it absolutely accurate the publishers urge the co-operation of the members of the profession

HUMBOLDT BUILDING OF CONCRETE.

No time is being lost in the erection of the New Humboldt Savings Bank building at Fourth and Market streets which was planned before the fire. The bank officials have instructed the architects, Meyer & O'Brien, to proceed with the building at once, and they, in turn, have passed the orders to the Lindgren-Hicks Company, who have contracted to put up the building. The only change in the original plans is the substitution of concrete for brick. The building will be eighteen stories high, of steel, concrete and terra cotta. The estimated cost is $500,000. The foundations are now being prepared.

MUTUAL SAVINGS BANK BUILDING.

No time is to be lost in putting the Mutual Savings Bank Building at the gore of Market and Kearney streets into condition for occupancy. Architect William Curlett is now busy on the plans and it is his intention to have a down town office in the bank building in another week so he can personally oversee the work. Mahoney Brothers have been given the contract to get the building in shape and they have a big force of men at work. The building stood both the fire and earthquake remarkably well and the architect is of the opinion that in five or six months the various offices will again be ready for occupancy.

Oakland Bank Building.

Oakland is to have a handsome Class A building from plans now being prepared by Architect C. W. Dickey of the Macdonough Building, Oakland. The structure is to be built at the corner of Twelfth and Broadway and will cost close to $350,000. The exterior will be of pressed brick with granite base and elaborate terra cotta trimmings. There will be eighty-five offices. The ground floor will be occupied by the Oakland Bank of Savings, which institution is to own the building. The interior of the banking rooms will be elaborate with marble and scagliola floors and walls. There will be two high speed elevators.

Contract for Lindgren Hicks.

From plans by Architects Oliver and Foulkes, Syndicate Building, Oakland, the John Breuner Company will at once begin the erection of a six story loft building at the corner of Thirteenth and Franklin streets, Oakland. The structure will be of reinforced concrete faced with brick and terra cotta. The contract for its erection has been given to the Lindgren Hicks Company for $70,000.

To Build Temporary Hotel.

Architects Bliss & Faville have moved their offices to the St. Francis Hotel, where they will be better able to superintend the reconstruction of the big hostelry and at the same time take charge of the erection of a temporary hotel building. The need of first-class accommodations for commercial men is strongly felt, and it is to supply this want that the St. Francis Hotel management has determined to arrange for temporary accommodations until the permanent structure can be finished.

Concrete Warehouse.

A reinforced concrete warehouse is to be constructed on East street, between Mission and Howard streets, by the East Side Improvement Company from plans prepared by Cunningham & Politeo. It was originally planned to make the building of brick, but since the earthquake and fire it was decided to use concrete. The building will be five stories. Piles are now being driven for the structure.

Big Contract Let.

The Fuller Construction Company has been given the contract for the erection of the new McGee building, next to the Mutual Savings Bank building, and work will be started almost immediately. The building is to be Class "A", of steel, with reinforced concrete floors, and will cost about $330,000. It will be twelve stories high.

Architects Lose Drawings.

The San Francisco architects shared with others the misfortunes of the fire, many of them losing all the work of their lifetime. John Galen Howard, the supervising architect of the University of California, lost all the drawings in his San Francisco office, about all the work he had done during his life.

Clinton Day lost thirty years' work, all that he had done since beginning the profession. Albert Pissis also lost all of his drawings. He was ill at the time of the fire. Among the other heavy losers are Frank Van Trees and Reid Bros., the latter having offices in the dome of the Call building.

Despite their losses, every architect in San Francisco that we know of has resumed business and all will do their full share toward the rebuilding of the city.

Personal Mention.

Charles E. Hodges, resident architect at Stanford University, has resigned and will return to his home in London, England. Mr. Hodges' work in Palo Alto has been subjected to considerable unjust criticism by the daily press. His determination to leave the university under such circumstances is regretted exceedingly by the members of the profession. Mr. Hodges was conscientious in his work and took great pride in planning and superintending the construction of some of the great buildings at Palo Alto. Mr. Hodges expects to return to America in six months and will open an office and live in San Francisco.

John Galen Howard, architect, has associated himself with John D Galloway, the well known structural engineer, and offices have been established on the ninth floor of the Atlas Building, 604 Mission street.

THE BUILDING RECORD.

Temporary and Permanent Structures Planned by San Francisco Architects.

Six story office building, Kearney and California streets, San Francisco.
Architects—O'Brien & Werner.
Owner—Louis Friedman.
Cost—$60,000.
The building will be 50x51 feet and will be of concrete and brick and will contain offices and stores.

Five story Class A building, East side of Second street, San Francisco.
Owners—J. G. Barker, C. E. Knickerbecker and H. R. Bostwich.
Cost—$150,000.
Architect—John Cotton Pelton.
The building will be five stories, steel skeleton and reinforced concrete floors, with metal doors and sashes.

Cafe Building, Ellis street, near Fillmore, San Francisco.
Architect—Charles Pfaff & Co.
Owner—H. Becker of Cafe Odeon.
Cost—$12,000.
The building will be in the style of the German Renaissance and will be of stucco work. There will be a ladies' parlor, grill and club rooms.

Two story frame building, Southwest corner of Golden Gate avenue and Van Ness.
Architect—T. Patterson Ross, Bush and Laguna streets, San Francisco.
Owner—St. Andrews Improvement Co., J. S. Webster, president.
Cost—$10,000.
The contract for this building, which will be a permanent structure and will contain one store and ten offices, has been let to A. H. Wilhelm.

Three story brick building, West side of Fremont street, San Francisco.
Architect—T. Patterson Ross.
Owner—Joseph Estate.
Cost—$30,000.
Plans for this building are now being made and will be ready for figures in a few days.

Apartment House, Northeast corner of Polk and Eddy streets, San Francisco.
Architect—T. Patterson Ross.
Owner—O. D. Baldwin.
Cost—$50,000.
The building will be of brick, four stories and will contain stores on the ground floor and three-room apartments above. There will be a marble vestibule and galvanized iron cornices.

History Building, Southeast side of Market street, between Third and Fourth street, San Francisco.
Architects—Cunningham & Politeo.
Owner—H. H. and Matilda S. Bancroft.
Cost—$200,000.
Bids are now being taken for this building which was described in this Bulletin three weeks ago. The structure will be ten stories, steel frame, concrete walls and pressed brick and terra cotta front.

Newspaper building, Market street, between Third and Fourth streets, San Francisco.
Architects—Meyer & O'Brien.
Owner—R. A. Crothers, proprietor the Bulletin.
Cost—$70,000.
The building will be four stories, modern construction and will be for the exclusive use of the Bulletin newspaper.

Three story building, East street, between Mission and Market streets, San Francisco.

Owner—Pabst Brewing Company (J. M. Wilkins and W. Neumann, Pacific Coast agents).

Cost—$50,000.

The Pabst Company has secured a 25-years lease of a lot 45x137 feet on which will be erected at once a substantial three-story brick building.

Store and office building, Geary and Powell streets, San Francisco.

Cost—$10,000.

Owner—Henry P. Sonntag.

Application for a permit to erect this building to be two stories, has been filed with the Board of Public Works; also an application to build an $8,000 structure at Bryant and Eighteenth streets by M. Fisher & Co.

Temporary building, Van Ness avenue and Turk street, San Francisco.

Architect—W. C. Mahoney.

Owner—A. B. Smith Furniture Co.

Cost—$12,000.

This structure will be 50x100 feet and one story. Work is already under way.

Church, Taylor street, near Lombard, San Francisco.

Architects and contractors—Beasley & Beasley.

Owner—St. Peters' Episcopal Church, Rev. William Bours, rector.

Cost—$14,000.

The building will be a frame structure on concrete foundations, with shingled roof and beam ceilings.

Telephone building, New Montgomery street, near Howard, San Francisco.

Architect—A. A. Cantin.

Owner—Pacific States Telephone Company.

Cost—$300,000.

This building will be Class A with foundations and floors of reinforced concrete. The exterior will be of pressed brick, terra cotta and copper with metal sashes and wired glass windows. The building is to be finished in 12 months.

Reinforced concrete building.

Architect—Sylvain Schnaittacher, 1725 Post street.

Owner—Moses Guntz.

Cost—$75,000.

The building will be built on Mission street and will be six stories.

Flats, Mason and Union streets, San Francisco.

Architects—Charles Pfaff, 1153 O'Farrell street, San Francisco.

Owner—Philip de Martini.

Cost—$50,000.

There will be fourteen flats. The building will be four and five stories, of concrete and galvanized iron.

Ten Story Class A Building, Bush and Kearney streets, San Francisco.

Architect—Charles Pfaff.

Owner—W. Friedman.

Cost—$180,000.

Plans have been accepted and contractors are figuring. The frame will be of steel and the outer material will be of stone and brick.

Concrete Building, Second and Minna street, San Francisco.

Architect—Ralph Warner Hart.

Owner—Morton L. Cook.

Cost—$50,000.

The building will be four stories, lot 50x100 feet and will be constructed of re-inforced concrete faced with pressed brick. There will be two elevators.

Store Building, South First street, San Jose.

Architects—Wolf & McKenzie, San Jose.

Owner—O. A Hale.

Cost—$25,000.

The building will be of reinforced concrete, galvanized iron, plate and prism glass and two stories high.

Office Building, Bush and Kearney streets, San Francisco.

Architect—W. H. Weeks, San Francisco and Watsonville.

Owner—F. A. Hihn.

Cost—$350,000.

The building will be 12 stories, Class A, with stone and reinforced concrete walls. The interior will be furnished in metal, including window casings, and the floors will be of marble and the cornices will be of ornamental copper.

Four Story Building—First and Folsom streets, San Francisco.

Owner—Henry E. Bothin.

Architect—Frank Van Trees.

Cost—$50,000.

This building will be four stories and will be the first of a dozen or more substantial structures which Mr. Bothin will build to replace burned structures. Mr. Bothin is head of the Judson Iron Works.

Warehouse, Battery, near Jackson street, San Francisco.

Architects—Sutton & Weeks, 2217 Bush street, San Francisco.

Owner—O. W. Nordwell.

Cost—$120,000.

The building will be six stories high, mill construction and of wood and brick.

Lodging House, Third and Tehama streets, San Francisco.
Architects—Sutton & Weeks.
Owner—Rolkin and Sharp.
Cost—$100,000.
The building will be Class "C", four stories and brick.

Bare Bros. are to erect a temporary building to cost $10,000 at the corner of Polk and Eddy streets.

Six story and Basement Office Building, Bush street and Clara Lane, San Francisco.
Architect—G. A. Dodge, Fillmore street, San Francisco.
Owner—Frank H. Burke, of Madison & Burke.
Cost—$170,000.
Building will be Class "A", of steel, brick and terra cotta, with marble vestibule. There will be a restaurant and roof gardens, elevators, etc.

Temporary Office Building, California street and Van Ness avenue, San Francisco.
Architect—William Curlett, Vallejo street and Pacific avenue, San Francisco.
Owner—Gantner and Mattern.
Cost—$10,000.
This building will be a frame structure, two stories and will be divided into stores and offices

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Reinforced Concrete Warehouse, Washington street, San Francisco.
Architect—William Curlett.
Owner—Name withheld for present.
Cost—$15,000.
Plans are being prepared for this building and they will be ready for contractors to take figures on in about two weeks.

Store and Office Building, Drumm and Clay streets, San Francisco.
Owner—Boyd Estate.
Architect—Nathaniel Blaisdell.
Contractor—Frank B. Gilbreth, Atlas Building, Mission street, San Francisco.
Cost—$125,000.
The building will be 60x72 feet and built of reinforced concrete.

Two Story Building, Eighth street, near Folsom, San Francisco.
Architects—Armitage & Rowell.
Owner—Galland Mercantile Laundry.
Cost—$30,000.
A permanent structure is to be put up at once on a lot 105 by 130 feet.

Store and Office Building, Van Ness avenue, near Geary street, San Francisco.
Architect—E. W. Hyde.
Owner—Friedlander & Goldstone.
Cost—$50,000.
Contractor—Daniel Einstein.
Work in this building is well under way. It will be three stories. 275 feet front and 100 feet deep and will contain about ten stores and 50 offices.

Concrete flats, east side of Van Ness avenue, north of Clay street, San Francisco.
Architect, W. C. Mahoney.
Owner, New San Francisco Home Building Company.
Cost, $500,000.
These flats will cover an entire block and will be three stories high. In all there will be 240 flats, all of which will be built of reinforced concrete.

Warehouse, Eighth and Hooper streets, San Francisco.
Owners, Whittier-Coburn Company.
Cost, $25,000.
Architects, Sutton & Weeks, 3966 Washington street, San Francisco.
The building will occupy the lot, 140x213 feet, on the north corner of Eighth and Hooper streets.

At Nineteenth and Minnesota streets, the Geo. D. Tay Company will build a warehouse, also from plans by Sutton & Weeks.

At Eighteenth and Minnesota streets the California Canneries Co. will put up a substantial building.

Three-story and basement brick building, Davis and Jackson streets, San Francisco.
Architects, Sutton & Weeks, 3966 Washington street.
Cost, $20,000.
Owner, David and Angus McKay.
The building will be used for stores and lofts.

Oakland.

Tourist Hotel, Oak street, facing Lake Merritt, Oakland.
Architects—Rand & Skinner, Atlas Bldg., San Francisco.
Cost—$150,000.
Owner—San Francisco & Oakland Building & Real Estate Co., office, Bacon Block, Oakland.
The hotel will be a frame structure, four stories with pitched roof; stucco work outside; 200 rooms; restaurant, banquet hall, etc.

County Jail.
Architect—W. J. Miller, Oakland.
Owner—Alameda County. (Contract to be made by Supervisors.)
Cost—$100,000.
The building will be three stories and will be built on a foundation of concrete. Rock faced granite will be the material used, reinforced with concrete.

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STOP THE SHACK BUILDING

We have read day after day in the San Francisco daily papers of the myriads of steel structures that soon will spring forth from the ashes of the former skyscrapers in the business center. The most vigilant observer may, however, strain his eyes to a condition requiring the services of a competent oculist and yet all he sees in progress is shacks, shacks, shacks,

The toadstool that achieves its full growth in one sultry night is poisonous, and the hastily thrown together shack will surely paralyze the building industry, the beauty and the final resurrection of San Francisco with the ptomaine of cheapness and greed, if its construction is not soon checked.

The Queen City of the Pacific has received a terrible blow, and not one of the after-effects will be as hard of recovery as the injury that will be done by the "temporary" buildings that now dot her surface.

It is true the builders of these "temporary" structures were allowed to proceed upon the assurance that the buildings would be removed after ninety days' notice. But many of them are built on leased land—land that has been leased for terms of from three to fifteen years—so it seems unlikely that our city officials will order the removal of these structures until the owners' ground lease has expired. Instead of a vast array of skyscrapers piercing the sky, are we to see for the next ten years a city of unsightly "groundscrapers"? (This is a new word, but it would seem to fit the occasion.) The merchant or property owner who is proprietor of one of these rough-board creations, patterned after the architecture of Nome City or Dawson—this owner must indeed be a poor politician if he cannot, after receiving a ninety-days notice, work up "pull" sufficient to effect the cancellation of the order to vacate.

The only way to get rid of these homely buildings is to pass and en-

force an ordinance requiring the removal within the next six months of *every* shack constructed without a building permit.

The waterfront where the traveler first enters the city, was formerly made picturesque by a fringe of old buildings which tottered toward the bay at almost dangerous angles. It was their very squalor and dilapidation that made them almost romantic. But now we are getting the cheap, rigid, perpendicular and level wooden abomination that flaunts its barren front into our face in a manner that is almost heartrending

The value of real property will not advance by leaps and bounds while these shanties exist. The much-wanted Eastern capital will not be poured in upon us when the advance agent of the Atlantic syndicate reports that the merchants are doing business in one-story buildings that wouldn't make a respectable hay-shed on an Eastern farm.

The San Francisco dailies will do their stricken city more good by making a crusade against these eyesores than they will by blowing out continuously great blasts of hot air about purely imaginative steel castles, the eventual existence of which is dangerously threatened by the persistence of these property-value degradents.

A. W. SMITH.

STATE UNIVERSITY WANTS FILE

Like many other business enterprises in San Francisco the Architect and Engineer lost practically all its office effects, including all back numbers of this magazine. Fortunately, through our Los Angeles office, we have been able to gather together a complete file. A number of subscribers who were burned out shared our fate, and in consequence many requests for books to complete broken files have been made to us. Among the applicants is the University of California. We would gladly supply this want if we could spare our single file, but we cannot. Perhaps there is some philanthrophically inclined subscriber who will donate to the University the missing books. If so we would be grateful and we are sure the librarian of that institution would be equally thankful.

GIVE US CLASS "A" BUILDINGS

It makes us smile when we read in some of the Eastern architectural journals that "After all, perhaps the two and three story frame building is the most desirable class of construction for San Francisco."

The author of this remarkable statement apparently reaches this conclusion after satisfying himself that California has been, and always will be, subject more or less to seismic disturbances. Now wouldn't San Francisco look fine robed, as it were, in nothing but two and three story wooden buildings?

As a matter of fact, wooden structures met exactly the same fate as stone and brick buildings. Wherever there was inferior underpinning the frame building toppled over or sank into the basement. Where the foundations were substantial no serious harm was done.

The big class "A" buildings were not hurt any to speak of by the quake, while the class "B" buildings, which were damaged, were invariably poorly constructed. In nine-tenths of the cases where stone and brick failed to withstand the shock the fault has been directly traced to either poor construction or bad cement.

San Francisco has been, and always will be, a great commercial center. It can help being a big city no more than can New York or Chicago. It must, therefore, have large buildings for the housing of its army of business and professional men, and its numerous industries and commercial interests. Wouldn't New York City's Broadway look lu-

dicrously funny with both sides of the great thoroughfare dotted with two story shanties? The tall building in San Francisco is indispensable, and as for an earthquake knocking it down, when substantially built, there is no more likelihood of such a calamity than there is of a gust of wind blowing over the big skyscrapers in the Eastern metropolis.

MORE ANENT MAYOR SCHMITZ'S APPEAL FOR DRAUGHTSMEN.

The Secretary of the San Francisco Architectural Club has written to the Secretary of the Toronto Architectural Eighteen Club saying that a rumor has gone abroad about the urgent need of architects and draughtsmen in San Francisco is without cause. The letter says that there are at present over 300 certified architects in and about the vicinity of San Francisco and over 1000 draughtsmen. Mayor Schmitz's proclamation sent to the mayors of other cities, asking for mechanics, architects and architectural draughtsmen before food or money, is perhaps the source of the rumor alluded to in this letter. There seems to have been a tendency to a rush of draughtsmen in response. Seventy were willing to go from Boston, but by the action of the Boston Society of Architects this number was reduced to eighteen, selected for general usefulness. If other towns responded proportionately in numbers and without the same judicious influence for selection there is good reason for the San Francisco Architectural Club to issue a warning.

One does not quite see of what avail, for rebuilding San Francisco, as it ought to be rebuilt and as it is likely to be rebuilt, an army of draughtsmen will be, unless accompanied by architects. It is a splendid chance, of course, for the draughtsmen to enter the train at Chicago as draughtsmen and come out architects at San Francisco. But it is only in competitions that we expect better work to come from unknown young men than from recognized leaders of the profession. Ordinarily in art, which is longer than life, age has an advantage; and in the architectural army at San Francisco there will have to be a fair proportion of colonels.

Architects do not float about so easily as draughtsmen, but, on the other hand, it is not necessary for them to do so. The work seeks the architect nowadays and a New York architect does not need to leave New York in order to carry on building in San Francisco. No doubt, when definite aim has taken the place of general intention at San Francisco, the architects of the East will be applied to for plans of the more important buildings and they will open branch offices in San Francisco in charge of representatives who will participate in and help to officer the general work of rebuilding.—From the Canadian Architect and Builder.

New Sand Lime Brick Plant.

The Schwartz System Brick Company "Scientific System" for the manufacture of sand-lime brick, W. F. Barnes, President, whose office is temporarily located at 2301 Scott street, San Francisco, is negotiating with a number of parties for the establishment of a sand-lime brick plant at San Francisco or vicinity. It is expected that this plant will be in operation as soon as brick will be needed for the construction of large buildings in San Francisco. It is understood that several well known contractors and builders will be interested in this new company. It is proposed to establish a plant with a capacity of 100,000 to 200,000 per day. It is well known that the sand-lime brick manufactured by the Schwartz "Scientific System" is of the very best, and they are recommended by some of the prominent architects and builders not only of California but throughout the East and foreign countries.

The sand-lime brick industry has advanced more in the last year than any other similar industry, from the fact that this product can be made cheaply, and the brick are absolutely uniform in size and are very durable. Another excellent feature of the sand-lime brick is that they can be laid up with mortar or cement with no greater thickness between the bricks than one-eighth to one-quarter of an inch, as their great adhesive qualities makes it possible for this to be done, and it would be almost impossible to break them apart from the cement or mortar after it once sets. In fact they make a building of the character of a solid stone.

This company owns all the Schwarz "Scientific System" patents for the production of sand-lime brick west of the Mississippi River, and it is contemplated before a very great length of time that several other plants of this system will be installed throughout the State. It is understood that the contract for a plant is already practically closed for Los Angeles, and for a plant near Pittsburg, Contra Costa County. This Company also will handle the output of the factory recently established at Monterey for the supplying of sand-lime brick, and are ready now to make deliveries for face brick purposes. Any communications may be addressed to 2301 Scott street, both with reference to putting in of plants, and to procuring brick at very moderate prices.

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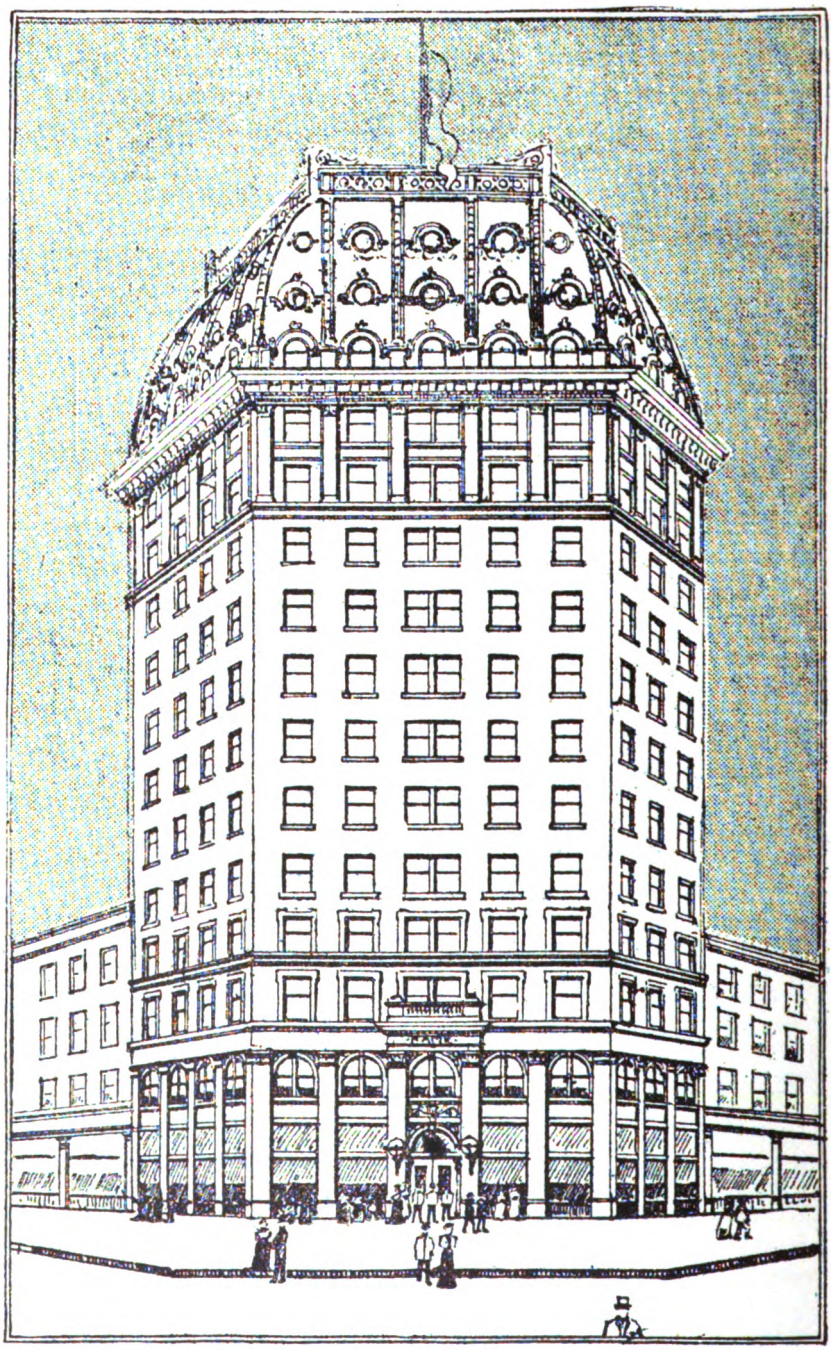


The Luning Building to be Erected at Market and Drumm Streets, San Francisco E. J. Vogel, Architect

THE

Architect and Engineer

Of California

VOL. V. JULY, 1906. No. 3.

What the Earthquake Actually Did to California Federal Buildings

By W. A. NEWMAN, Architect*

CONSIDERABLE interest has been manifested since the earthquake on April 18th last over the peculiar condition presented by the exterior of the San Francisco Post Office and Court House building at Seventh and Mission Streets. In the newspapers and magazines which have come to hand various writers give explanations amusing to those acquainted with the actual facts.

For years it has been averred that the Post Office was situated on a bog, that an underground stream was undermining the foundations and settlements would take place which would necesitate its being abandoned as unsafe. Such sensational statements, however, have not been borne out by recent events, for the beautiful structure still stands on practically the same lines as contemplated originally, an enduring monument and a credit to the skill and efficiency of the Supervising Architect, James Knox Taylor, and Superintendent of Construction J. W. Roberts.

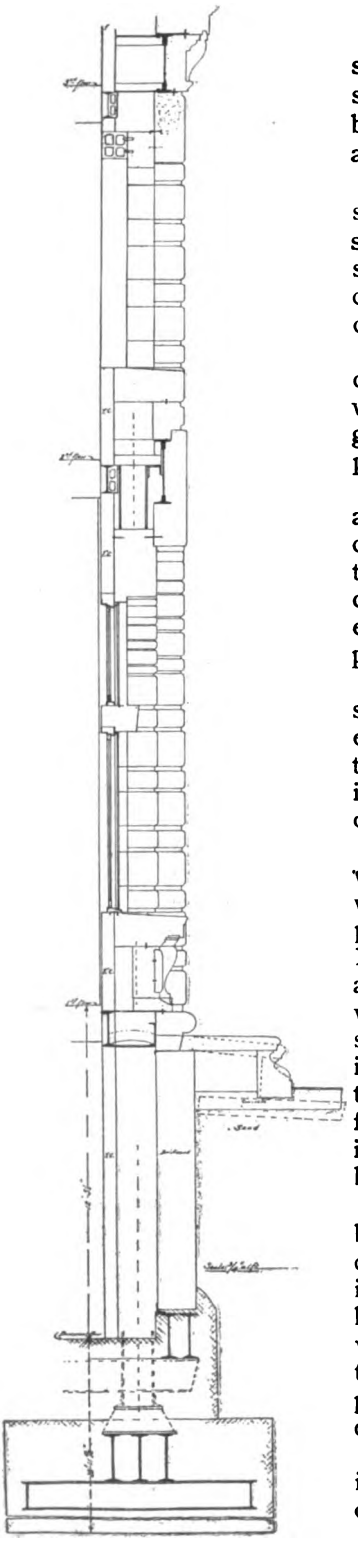
Sand covers the entire site of the building, which continues to a depth of 107 feet at Seventh and Stevenson Streets.

The steel grillage and concrete footings at Seventh and Mission Streets were placed upon sand at a depth of 33 feet below the first floor line; no piles having been used in the foundations.

The water table seat and seat supports, together with tile platforms, rest upon an eight-inch thick concrete base, directly on the sand, and are separate from the main foundations of the building.

The shock displaced the soft upper strata in Mission Street, raising and lowering the grade as much as three feet six inches in some places, allowing the sand to slide away from the concrete base, and permitting the sidewalk, platforms and granite seat supports to settle as shown by the photographs. The external appearance of walls at lower portions of pavilions caused much anxiety as to the safety of the building among many visitors and employees, which was hardly allayed, even after an examination of the curtain walls and upper stories which presented no damage.

*Mr. Newman was assistant to Mr. J. W. Roberts, Superintendent of Construction, during the erection of the new Postoffice Building, and his work was highly commended. Mr. Newman was recently admitted to practice architecture in California. His offices are in the Postoffice Building.



United States Postoffice and Court House, San Francisco. Section through exterior wall showing settlement of Platforms and Water Table Seat and Supports in Dotted Lines.

The mailing platform wall in the rear, one story in height, containing no steel frame, was separated from the main walls by the shock, breaking and tearing apart heavy wrought-iron anchors and cramps, etc.

The first story received the full force of the shock, the second story to a less extent, and scarcely in any places in the third and fourth stories is there any damage, the heavy granite cornice being absolutely intact and free from cracks.

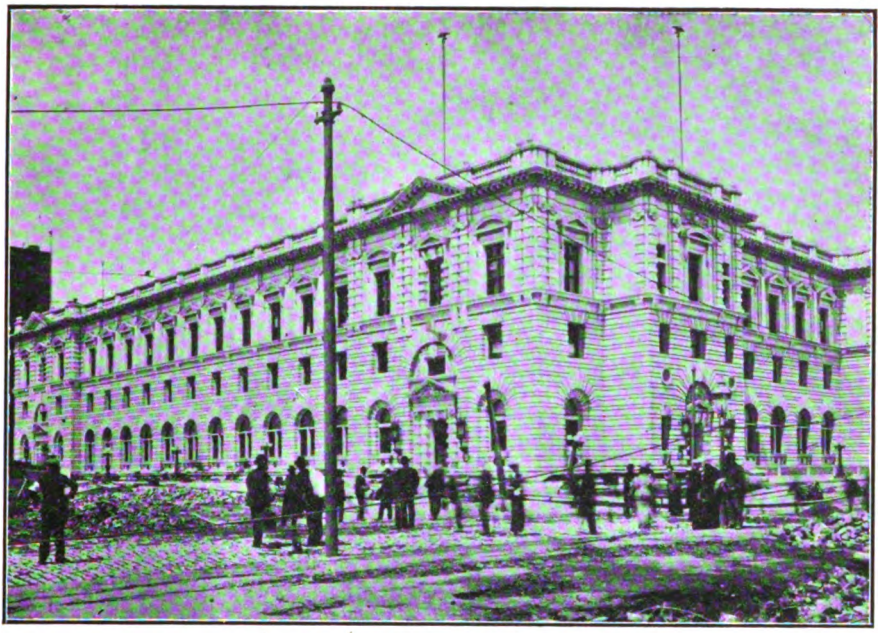
A large portion of the six-inch porous terra cotta blocks in partition walls in lower stories was rent and shattered; however, owing to the good quality of cement mortar used, many of the partitions will be saved.

Fire gained access to the third story, and after the heroic efforts of a few brave men, was confined to the suite of four rooms occupied by the United States District Judge, including the costly redwood library filled with books and other inflammable material which tested the fireproof construction used in the building.

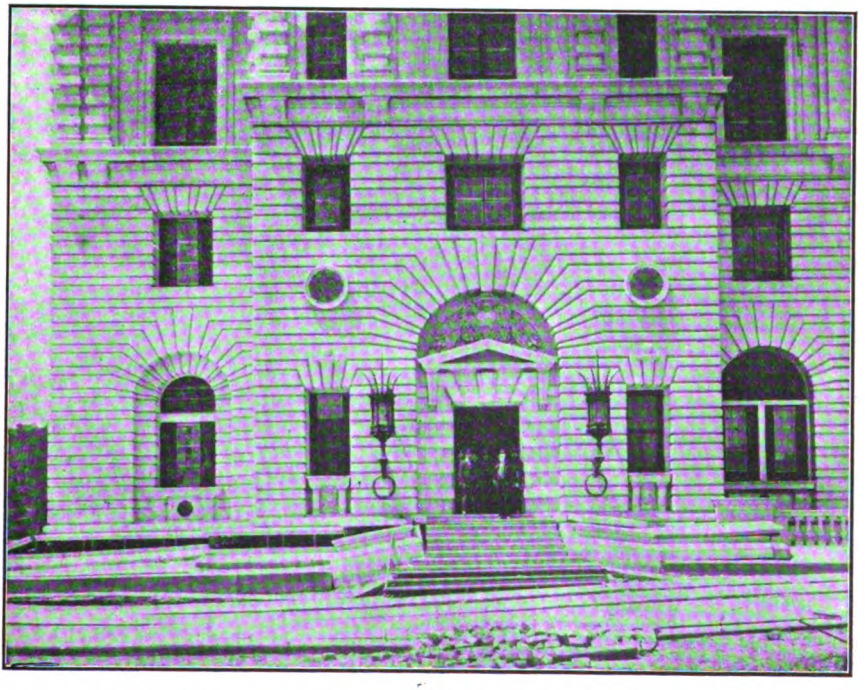
Two steel-lined vaults are contained in this suite. The outer doors were damaged considerably, but the inner vestibule doors and the contents were found practically uninjured, thus proving the value of this type of vault. The entire contents of the four rooms was totally destroyed.

The library, 27'0"x31'0" and 19'0" in height, with oak parquetry floor, contained curly redwood bookcases, furred out with wood studs, and paneling covering the four walls to a height of 13'6", above which were carved wooden consoles and a heavy beam ceiling. Over 30,000 volumes were burned in this room; the heavy marble consoles at window seats, together with the three-inch Gaen stone facing of mantel, were reduced to powder, but the reinforced clinker concrete floors, when cleaned of ashes, were found to be in absolutely perfect condition, as may be seen by any one who visits the building.

The clinker concrete floors throughout the building received no damage. The first-story corridor vaulted mosaic ceilings, placed upon reinforced clinker concrete backing, escaped unharmed, but ceilings at the entrance vestibules, where terra cotta was used, were damaged so as to necessitate expensive repairs. It is contemplated to use reinforced concrete to replace the damaged terra cotta work. Much of the defective clinker concrete work found in other buildings in this city may be attributed to the poor quality of the aggregate used.



Postoffice Building, San Francisco, Showing Entire Seventh Street Front



Seventh and Mission Streets Corner of Postoffice Building, San Francisco, Showing Settlement of Platforms, Sidewalk, Etc., with the Lines of the Building.

The excellent condition of the entire Mission, Stevenson and Seventh Street curtain walls shows the efficiency of the diagonal channel bracing used from columns to girders above at the various floors.

Under the influence of the quake the first-story stonework, which starts just below the grade line on top of the brick foundation wall (the later resting on the double exterior girders below basement floor) and is carried up to the under side of the exterior girder at second floor line was wrenched and broken, bulging outward at several small returns of pavilions where no diagonal bracing occurred.

The exterior walls reveal no cracks or bulging above the second-story sill course. Girders at this line carry the stonework to the third story, where others support the masonry above.

A terra-cotta cornice crowns the enameled brick court wall having 444 lineal feet, with a projection of two feet two inches. This wall and cornice is also in perfect condition, not a crack showing.

It is the intention of the Government to restore the Post Office building to its original condition. This will make a total cost for site, building and furnishings of over $4,000,000.00.

It has been customary in many of our progressive cities for one or a group of public-spirited citizens to donate a site for the Government buildings, as has been done at Fresno, Salt Lake City and Los Angeles.

It may be suggested at this time that such an opportunity is now afforded for a park from the Post Office through to Market Street, forming a fit setting for such a magnificent structure and a fire protection for the future. This should by all means be provided, as interference with or the destruction of the mails, the business of the United States Courts, etc., is a matter of general concern.

United States Mint.

At one time during the conflagration the United States Mint was surrounded on three sides by fire, and but for the courageous work of its defenders would have suffered much loss.

The roof covering (originally of sheet copper) was perforated with pinholes, caused by the action of sulphuric-acid fumes, in many places. The torrent of cinders started to burn where temporary asphaltum roofing had been placed upon the copper, and rafters underneath took fire, but were extinguished with little damage.

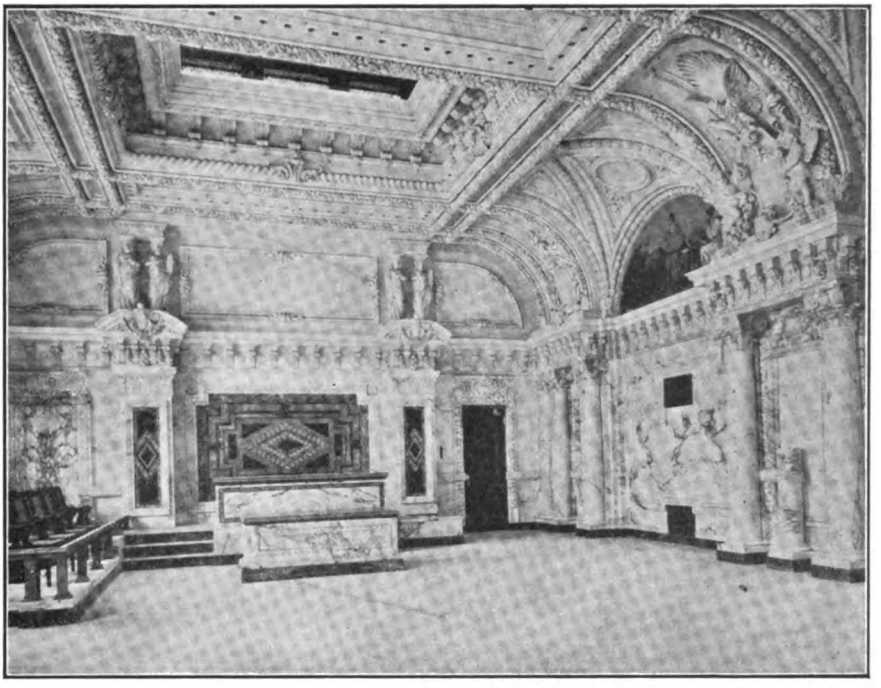
The amount of heat from adjacent buildings may be judged by the photograph, which shows the northeast wall badly scaled. This wall will be rebuilt.

The cast-iron shutters on the two lower stories, finished on the outside with a nonconducting covering, prevented the fire gaining access at these points.

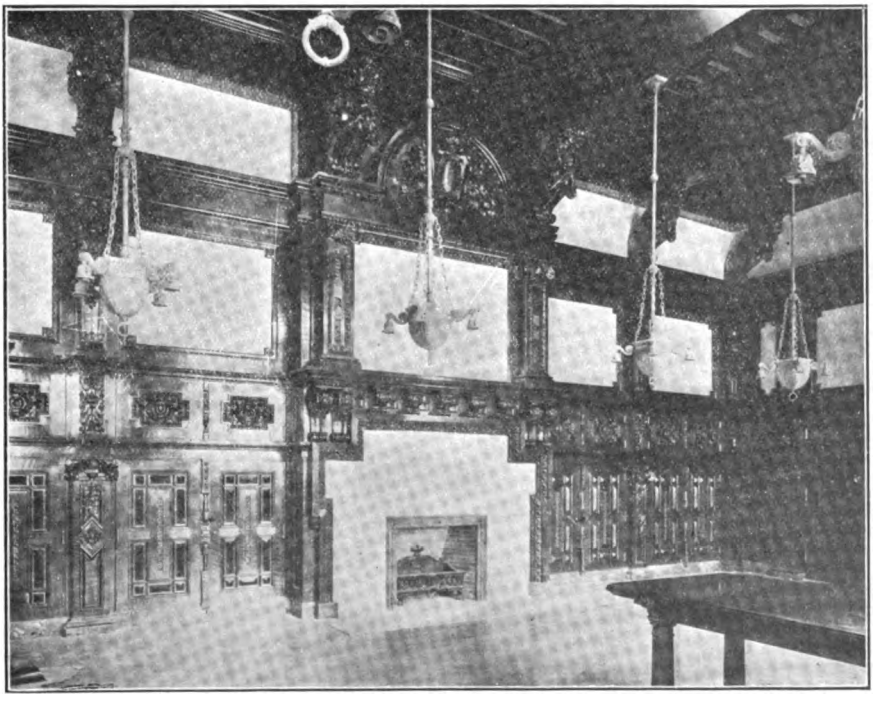
The two main chimney-stacks, 12'0"x12'0", towering 68 feet above the roof, were considerably injured. Four cast-iron columns, 21" in diameter, with horizontal and diagonal bracing reinforced the brickwork.

The cast-iron flanges and lugs at a point 12' above the roof were broken, necessitating the placing of a number of special wrought-iron plates to remedy the defects.

During the past thirty years the sulphuric-acid fumes have eaten away the ornamental cast-iron work at the top of these stacks to such an extent that small fragments fall from time to time upon the roof. It is contemplated to remove this ornamental work and lower the stacks about 24 feet.

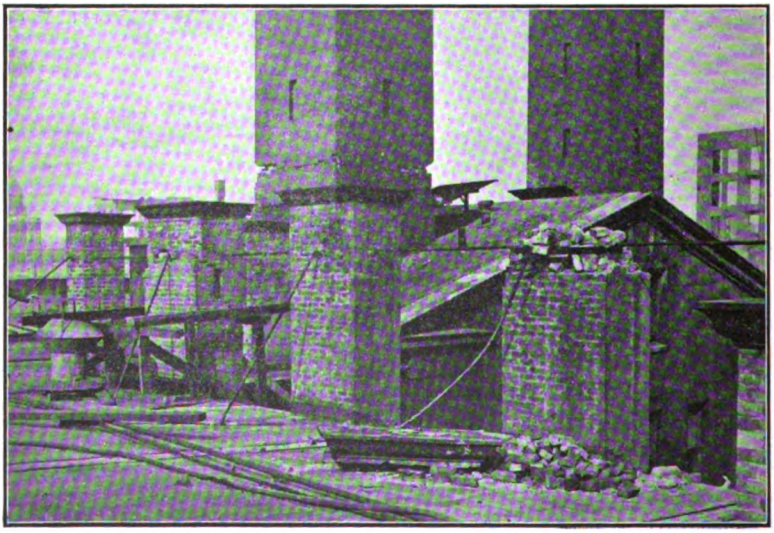


Postoffice Building, San Francisco, United States Circuit Court, Third Story. There was no Damage to any Work Shown in This Picture.

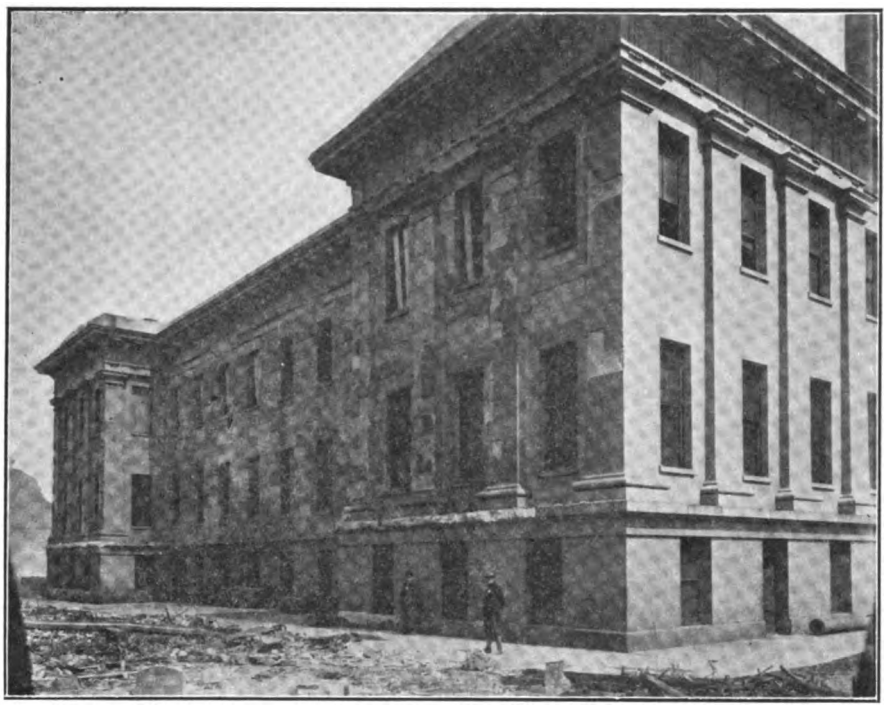


Postoffice Building, San Francisco, United States Court Library, Third Story. This Room was Totally Destroyed by Fire Together With 30,000 Volumes.

Postoffice Building, San Francisco, Showing Effect of the Earthquake on "Made" Ground in Front of the Building.



United States Mint, San Francisco, Showing Damaged Chimney Stacks.



United States Mint, San Francisco, Showing the Northeast Wall Scaled Off by Fire

The heavy stone and brick construction of this building, well braced with large anchors and ties, withstood the severe shaking, and only a few minor cracks may be seen as a result.

U. S. Sub-Treasury and Land Office.

The contents of this building were destroyed by fire, with the exception of the coin vaults, which are intact. It is proposed to remove the walls above the second-story sills and refit the remaining portion for the use of the Sub-Treasury until the completion of the new Custom House, when the Sub-Treasury will be provided with quarters in that building.

This structure was built in 1864 and occupied as a Branch Mint until the completion of the present Mint in 1877, when the building was reconstructed for the Sub-Treasury and other Government offices.

The brick walls and brick and concrete floor arches were not seriously impaired in the lower stories.

U. S. Appraisers' Building.

After very creditable efforts on the part of the officers and employees, this building was saved from fire. It was completed in 1881. The ground in this vicinity is all made land, it having been formerly covered by the waters of the bay; and, with a view to securing suitable foundations, and as a protection from the destructive influences of moisture, this building has been placed on a massive bed of concrete and the basement walls securely anchored thereto; no piles were used in this foundation. This structure remains practically unharmed by the earthquake and fire.

Sub-Treasury Building, San Francisco, Gutted by Fire

May Have Experiment Station

THE Structural Association of Engineers contemplates the establishment of an experiment station for testing the fireproof qualities of various sorts of building material. It is likely that one of the most elaborately equipped stations of this kind in the country will be organized soon.

At a recent meeting of the association there was much lively discussion over the comparative merits of building material for fireproof structures. Several members argued at length, and occasionally with some heat, over the comparative values of reinforced concrete and terra cotta. William Ham Hall championed concrete and answered the argument of Mr. Johnson of the National Fireproofing Association, who took up the cause of terra cotta.

In order that the experiment station should prove a fair arbiter of the merits of this material, it was urged that several engineers connected with the leading universities on the Coast be engaged to conduct the experiment at the San Francisco station.

Since the Baltimore fire, several of these experiment stations have been established in the large cities in the country. The Insurance Engineers' Experiment Station in Boston is accepted as the final judge of the fireproof values of material used in building in that city. Experts of these stations are sent to study conditions and results in all the cities of the country that suffer from serious conflagrations.

Insurance Investments

By J. T. WALSH, C. E., M. E.*

THE object of this article is to call to the attention of owners, architects and engineers a few important points that should be of some aid in determining upon what lines the reconstruction of San Francisco should take place. The recent disaster through which the city passed has taught us many lessons, as did the Baltimore and Toronto fires, and it remains to be seen if we are going to profit by these experiences. The country, at the present time, is enjoying an era of prosperity, and this is due principally to the progressive spirit of those people who do not hesitate to adopt measures, however radical they may be, which will aid eventually in increasing this prosperity.

At the present time the city of San Francisco, in accordance with this spirit, is commencing to rebuild, and the prospective builder is confronted with many important problems, one of the most important of which is the insurance problem.

The fundamental idea of insurance, in its many forms, is one of protection. This protection can be obtained in two different ways or a combination of both. The most common form of insuring is to deal with an insurance company which assumes the risk, (rightfully named), for a certain period on the payment of a rate which is fixed by the insurance company. This rate is determined by the insurance company after an investigation of the type of building, purpose for which it is to be used, the locality, proximity to other buildings, fire equipment and various other considerations.

San Francisco has always been regarded by the insurance companies as a place of doubtful risks, but in spite of this fact the companies have competed strenuously for the business and secured it, and, with a few exceptions, they now have very little of which to be proud.

The San Francisco conflagration has developed one fact that the other large fires failed to develop, viz., that insurance companies are not invulnerable. They have learned that it is necessary to prepare for great conflagrations, and even now are putting this knowledge to practical use by advancing rates.

It is only fair to assume that this wil continue, and that insurance rates in this city will be for some years to come very much higher than before the great fire. This point is one that interests the owner to a very great degree, as for business reasons he feels that on a large investment he must have some protection. He must know, too, that the insurance companies can reasonably ask these high rates, and that any reduction in them must come through his own efforts. The reasonable thing to do, therefore, is to devise methods which will enable him to reduce his insurance rates to a minimum, and at the same time yield a fair return on the extra investment.

Buildings may be classed, as far as fire hazards and rates are concerned, into three classes, frame, mill or slow burning, and fireproof. Each of these three classes have their proper place, and economic reasons will govern the owner in determining which type to build.

The fire has taught us that we had no absolutely fireproof buildings. Many so-called fireproof buildings were such in name only, and it is safe

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to say that no modern building is or can be made fireproof without the aid of fireproof materials applied in such a manner as will, to the best knowledge and skill, fulfill the purpose for which they are intended. In order to obtain a strictly fireproof building, we must consider other equipment in addition to that of the building proper. The equipment should be installed and various methods employed to make our structure reasonably secure against both external and internal fires.

Much has been done and is being done in other cities along these lines, and large industrial concerns are gradually coming to the point where they feel they can safely carry their own insurance, and at the same time have what is styled a safe risk.

Modern methods of construction, including steel and reinforced concrete, the use of fireproof material intelligently and skillfully applied, the installation of automatic sprinklers, with supply tanks on the roof, storage tanks in yards, trained employees to fight fires, efficient watch service, metal doors and shutters, metal window frames with wire glass, inclosed elevator shafts, automatic fire doors and various other devices, are all necessary in order to bring a building within the narrow meaning of a fireproof structure.

The installation of the equipment enumerated has been and is carried out successfully, so much so that many concerns are able to show a large saving in expense, after the interest on the increased first cost and the saving in insurance premiums have been carefully figured out.

Estimates on fire equipment are always available, as are also insurance rates, and it is a comparatively simpe task for an owner to procure the necessary data and then solve the problem.

Large concerns have found that it pays, and it is reasonable to assume that smaller concerns, by the applications of the same principles, can satisfy themselves as to the wisdom of the policy.

In San Francisco the city could also aid materially in reducing rates, by the installation of a sea-water fire system. This would necessitate pumping stations on the bay and the subdividing of the city into districts, each having its own water supply for fighting fires.

An installation along these lines would have the decided advantage of being independent of the present supply, which another earthquake might put out of commission and leave the city helpless again.

Local conditions at present are such that it will be found advisable to construct many buildings along fireproof lines, which construction previous to the fire would not have been justified from a business standpoint.

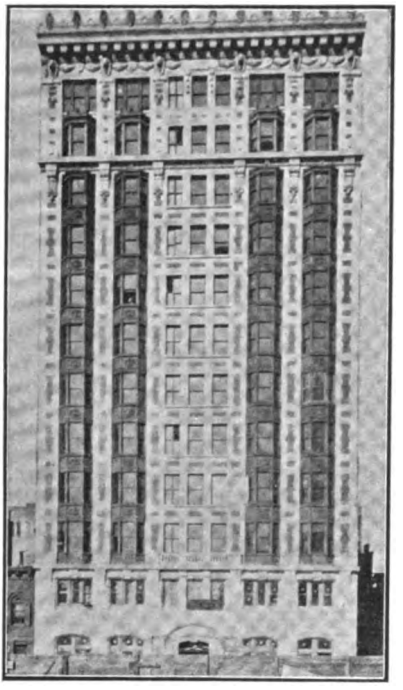
The saving in first cost, although of great importance, should not be the only consideration. Extra efforts should be made to build with the idea of permanence and safety, as it is only by such methods that the city will establish itself again.

With the vast resources of this State upon which to draw, with a fine harbor centrally located on the coast, and with the progressive spirit for which this city is noted, we should not allow ourselves to be blinded by the present disaster, but should begin to build, not with a penny-wise policy, but with one that in a few years we may look back upon with pride.

The clerk who has to get out of a warm bed on a cold winter morning is thoroughly imbued with the idea that the office should seek the man.

When Happiness came to town he fell in with two bunco-steerers, Inconstancy and Fickleness. One took his cash, and the other gave him in return a gold brick.—Ex.

Rebuilding a Great City and the Part Taken by a Big Construction Company*



The "Algonquin," New York, Thompson-Starrett Company, Builders

IT is only the other day that "skeleton construction"—the system of erecting buildings around and upon a steel framework—became an actual industry. Twenty years ago it was unthought of. Little by little it has dawned upon men, who paused in the street for a minute from day to day to observe the progress of a building that a revolution was being wrought in the oldest craft in the world. Now it is hardly a thing to surprise any one to see a part of the walls in place, several stories above ground, with nothing but some spindling steel uprights underneath to support them. A few years ago that very thing was one of the sights of the town. A demand brought into being this method of construction, which has become almost commonplace to the people who occupy the buildings as they stand today. There are inspiring things in business, in the application of brains and toil to the work to be done, and this change has a history that has even romantic aspects.

For hundreds of years the building industry had progressed little, if at all. It had lost ground rather than gained it, to judge by standards of skill and efficiency. Then came the need of more stories in buildings. Five and six floors on a lot of high value made office room too expensive. The skyscraper was called into being. To build it an entirely new order of ability had to be called into play. The problem was worked out by the engineers, for to the old craft of the artisan had to be added the knowledge of the bridge-builder and that genius in fitting means to an end which Americans are content to describe by the homely word, "gumption."

The modern skyscraper, that structure which, compared to the old-fashioned building, is as the great ocean liner to the sail ship of the olden days, requires ability in constructional engineering, mechanical engineering, electrical engineering, sanitary engineering, a complete mastery and adaptation of the skill and knowledge of many suddenly grown arts and trades and their adaptation to the new "creature" which was so odd when first brought into being, and is so necessary and taken for granted in this year of civilization.

The great construction company of today may be briefly defined as an organized body of engineer-contractors composed of specialists in the different lines of modern building construction. It has grown gradually

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*There is such a company in operation now in San Francisco and the article printed herewith is a faithful description of the organization and mode of operation of the Thompson-Starrett Company of 2053 Sutter Street, B. C. Dickinson, manager.—Ed.

in answer to the modern demand that the different operations which are involved in the construction of that single thing—a building—shall be conducted under one management, exactly as the department stores have been developed in the world of merchandising.

The idea of this organization is no new thing. In ship-building it has been regarded as impossible, and indeed it has been impossible to construct a great ocean liner except by a complete organization under one ownership and control. And so the ship-building business has grown under systematic and orderly management to a point where a single ship of today can carry in one cargo a greater bulk or tonnage than could ten of the greatest liners of twenty years back, or than a hundred of fifty years ago.

The difficulties in the way of establishing a single organization for building on land have been far greater than those which were surmounted in the case of ship-building, but the principle is the same, and it has won, as it was bound to do.

Forty trades, more or less, are engaged at one time or another in constructing the skyscraper. Four great departments of engineering are involved in the structural designing. To bring all these under one management, in the face of the opposition of the advocates of the older system of dividing the construction work among anywhere from a dozen to the full forty independent contractors has been no easy task.

Big construction companies at present only seek the work of building Class A buildings, which are, of course, only required on ground which is very valuable. Such undertakings, involving the expenditure of a large sum on each single operation, and requiring, as they do, a total suspension of all income during their construction, have demanded as the first essential speed, so that interest charges may be reduced to the minimum, and oftentimes so that the renting season of each year may be safely met. The saving of time may therefore be said to be a sine qua non in the construction of the skyscraper. The older system was found to be a time-saver only under conditions where expense was no object. It was in answer to the demand for time-saving, with economy, that the present organization has grown.

Rockefeller Building, Cleveland, Thompson-Starrett Co., Builders

How is it carried out? To give an idea of the scope of the organization, it should be explained that the business is divided into three heads, Executive, Accounting, and Legal. The Executive head controls seven departments of (I.) Construction, (II.) Purchasing, (III.) Drafting, (IV.) Civil Engineering, Designing, (V.) Mechanical Engineering, Designing, (VI.) Selling, and (VII.) Estimating. Each of these departments has its divisions down to the smallest practical detail.

The Construction Department, for instance, is divided into two main divisions, the first being the Superintendent's division, which includes (I.) payroll work, or work done direct by mechanics employed by the Company, and embracing fourteen different lines,

which under the old system would mean fourteen different interests to deal with, and (II.) sub-contract work, i. e., work done by sub-contractors. The second division of the Construction Department includes the four engineering lines without whose help no modern construction can be done. These are the Civil, Mechanical, Electrical and Sanitary Engineering Departments, which are concerned respectively with the foundations and steel skeletons; the heating and ventilating systems; the electric lighting plants and the sanitary systems.

Under the pay-roll work the company handles at different stages in the construction of a building fourteen different trades. This employment of numerous trades is a feature of the management which has been found to be in very truth the open sesame of a new order of things in the industrial world, for almost all trade disputes and other building trade troubles have been found to grow out of the jealousies arising between different independent employers' organizations, which formerly undertook to keep each department of a building by itself. The department store idea, as it has been called, does away with all this, for the very good reason that the employer of all the trades has no axe to grind for one trade as against another.

In Division I. are fourteen trades. The work under those heads is done altogether by mechanics "on the pay-rolls" of the company. In Division II. the work is let to sub-contractors, supervised by Thompson-Starrett men, but all the material for the pay-roll work is purchased and supplied at the building by the Thompson-Starrett organization.

It will thus be seen that every part of the construction of a building is first studied out beforehand, in the drafting, civil engineering and mechanical engineering departments. The selling department negotiates with architects and owners for the business.

When the contract has been undertaken the superintendents begin to mass their forces at the work. A time schedule is furnished them. The cellar must be done by such a date, the foundations so many days later, and so on until the elevators are running, and the tenants move in. The time schedule is adhered to as closely as that of a railroad train.

The concern maintains extensive yards for material in the cities where it happens to be engaged, and drafting rooms on an elaborate scale.

One of the valuable elements of the business is the knowledge of cost, which is kept up by the records of the company, covering the millions of dollars' worth of work done, as well as millions estimated on. Builders who trust to sub-contractors for everything, as the general custom is, can not have this accurate, up-to-date information.

Architect A. F. Rosenheim's Impressions of San Francisco

"NOBODY can design a building to stand against such elements as an earthquake, because of the impossibility of figuring on its intensity," declared A. F. Rosenheim before the regular monthly meeting of the Southern California Chapter of the American Institute of Architects, at Los Angeles.

Granting the admirable manner in which the best modern buildings of San Francisco stood the shake, Mr. Rosenheim argued, logically enough, that no human being can foresee the degree of intensity which may mark any seismic tremors.

Discussing expert opinions on the successes and failures of modern types of building construction, as exemplified in the recent disaster, he declared that no revolution in building construction need be expected as a result.

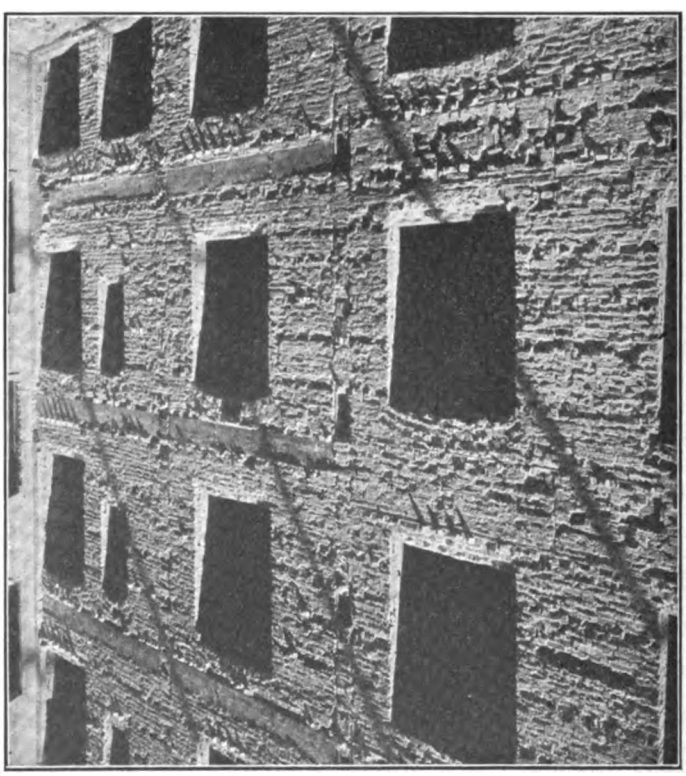
"The best buildings today are probably as well constructed as they will be for years to come. The only question is of the ability of the architect to persuade his client to allow him to build as well as he knows how.

"Unfortunately there is bound to be in San Francisco a repetition of the class of construction they have had heretofore. Architects are bound to be hampered by financial considerations on the part of their clients, and the result we can all guess."

In referring to a trip of inspection about the stricken city Mr. Rosenheim said: "I failed to see wherein the buildings of ordinarily good and honest construction in any wise failed, and as for those that went down in the earthquake, they had no license or excuse for standing at all."

Mr. Rosenheim's talk developed very clearly that he does not hold the form of reinforced concrete structure, so popular in Los Angeles, in high esteem. This attitude provoked a storm of animated, if not heated, discussion, as the resident architects are strongly and radically divided on this much-mooted question.

While unable to find in San Francisco any examples of the concrete structures erected in Los Angeles, Mr. Rosenheim and his companions examined carefully the reinforced concrete floors of the fine Wells-Fargo building, and discovered that in many instances where the flames had come in direct contact with the concrete slabs they had burned entirely through.



Court of the St. Francis Hotel. A Sample of Poor Brick Work

One-Room School in Classic Style—Built of Wood W. H. Weeks, Architect

Rural School Buildings in California

By W. H. WEEKS, Architect

PLANNING a school building has come to be one of the most important and exacting problems of the district school trustee, yet not a few trustees appreciate the fact. As a result it is not uncommon to find a country school sadly lacking in such essential features as high-class construction, lighting, heating and sanitation. This, no doubt, is sometimes due to financial limitations, but more often it is due to a lack of knowledge of the accepted rules and principles of modern school sanitation and construction.

It is my privilege to point out some of the ways by which the country school can be made more sanitary, convenient, and artistic.

Before planning the building it is necessary to provide the site. This should be centrally located, on high ground, if possible, where good drainage is assured, and where the purest air can be obtained, always remembering that the locality admitting the east light into the class room is the one above all others to be preferred in this climate.

In regard to the requirements of the model country school—and when I say requirements I have in mind the fact that where expense enters so largely into the problem it is impossible to have everything as we might wish. Still there are certain necessities that we cannot overlook, and many desirable features that should be incorporated in the school so far as our means will permit.

In planning the building the first consideration is the floor arrangement, which should be well studied so as to get the most convenience within the least possible space.

In studying the floor plan, the class room necessarily receives our first attention. It should be made the size required to accommodate the number of pupils who are to occupy it, allowing not less than 15 square feet of floor space to each pupil.

Where the light is from the left side only, the room should not exceed 25 feet in width and not over 32 feet in length. Too great a length should

Design for a Two-Room Building W. H. Weeks, Architect

be avoided. In France and Germany the maximum length of a school room is 30 feet. This is the distance to which the average voice will carry with ease, and the pupils in the back part of the room can easily read the writing on the front blackboard.

In connection with every school building provision should be made for a small room for the use of the teacher. This of course will incur a little additional expense, but it is money well expended, as this is a very essential part of the building.

Rooms must be provided for the hanging of cloaks and hats. Making use of the halls and class rooms for this purpose is not only unsightly, but unsanitary. The cloak room should not be less than 5 feet wide and should have outside light and ventilation. Numbered coat and hat hooks should be provided, placed in alternate heights of 4 feet and 5 feet for the accommodation of the different sized pupils; also shelves for lunch baskets and rubbers. It has been demonstrated that this room when placed in direct connection with the class room is more convenient, and under closer supervision of the teacher. In this arrangement also the ventilation in the winter months is more easily provided for.

A small heated and ventilated locker should also be provided in the cloak room for drying damp clothing if the heater adjoins the cloak room.

The halls should be of ample size so that there will be no crowding of pupils.

All ceilings should be 12 feet 6 inches to 13 feet high.

The question of heating and ventilation is a very important one and should receive the closest attention from the school trustees.

When we consider that all the best authorities on school architecture state that no less than 30 cubic feet of fresh air per minute should be furnished each pupil in a class room, we realize more fully the conditions under which the children labor in all poorly ventilated schools. There are several dangerous elements in vitiated air, but the fact that children are often afflicted with contagious diseases is one of the most important reasons for providing good ventilation.

The elaborate heating and ventilating systems, such as are used today in the modern, up-to-date city schools, where a blower is used in combina-

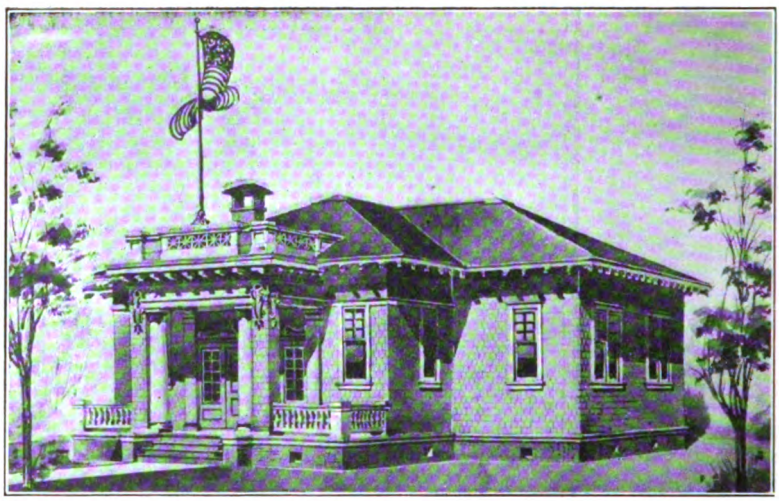
Design for a Two-Room Building in Mission Style W. H. Weeks, Architect

tion with air filters and automatic regulation of temperature, are very expensive. They cost too much to install and operate in a small country school where similar results can be obtained at a reasonable expense by the use of jacketed stoves or heaters in which fresh air is introduced through a conduit from the outside. In fact, the conduit should come from two sides of the building in order to get the best results. The conduit should be provided with dampers that can be easily operated from the school room. The air should come up from under the heater and between the stove proper and the outside covering, entering the room from the top. The foul air is then taken out through a vent flue, through which the smoke pipe is carried. Since the cold air falls toward the floor, the outlet should be placed in the wall at the floor line. The pressure of the fresh heated air thrown up into the room from the stove jacket will force out the foul air through the vent below. The vent flue, being heated by the small smoke pipe passing through causes an upward draught that carries the foul air to the outside. A number of heaters are made for this purpose and can be purchased at a reasonable cost.

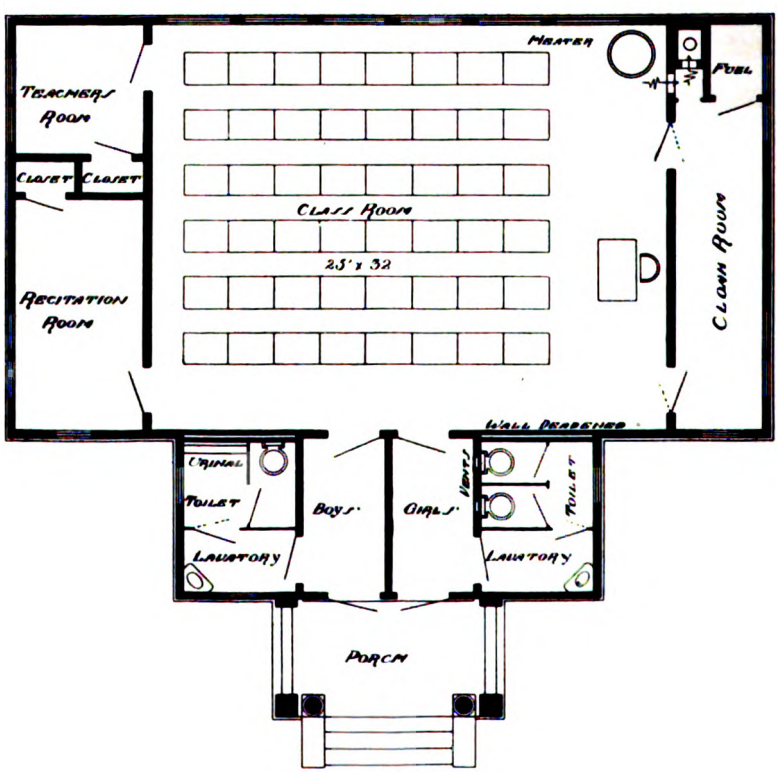
If the district is too poor to secure such a heater, then the stove can be encased with a metal jacket, providing for doors and other necessary openings and a fresh air inlet below. This jacket can be made easily and will be a great improvement over the naked stove which should never be used in the school room.

In regard to blackboards, there is a strong prejudice in favor of slate, on account of its durability. When the very best quality of slate is secured there can be no question as to its merits. The initial expense is, however, much greater than that of composition boards, which answer the purpose about as well, can be obtained in better lengths, and are much more easily applied. These advantages, together with the color—a pleasing shade of green—make the latter boards all that can be desired. No board should be accepted without being guaranteed by a responsible dealer or manufacturer.

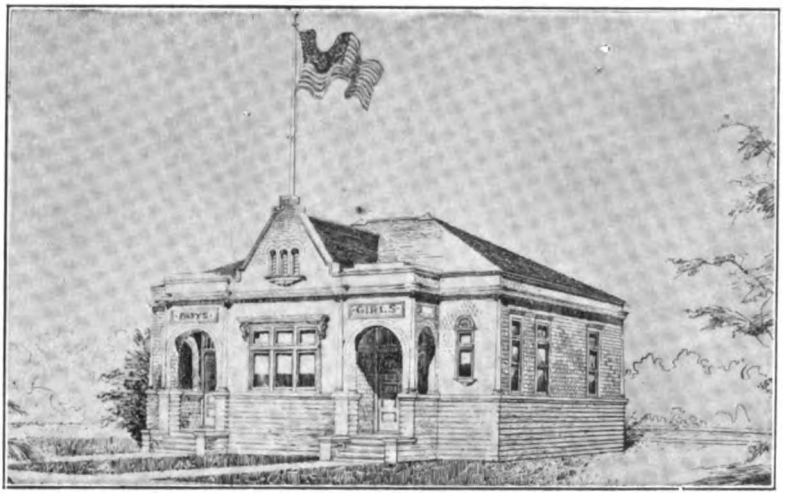
Hyloplate and other similar boards should be glued to a 1-2-inch board backing in order to get the best results. The Parshall green artificial slate has proved to be a very satisfactory board. It is really a slating which is applied either directly to the plastered wall, to heavy Manila paper



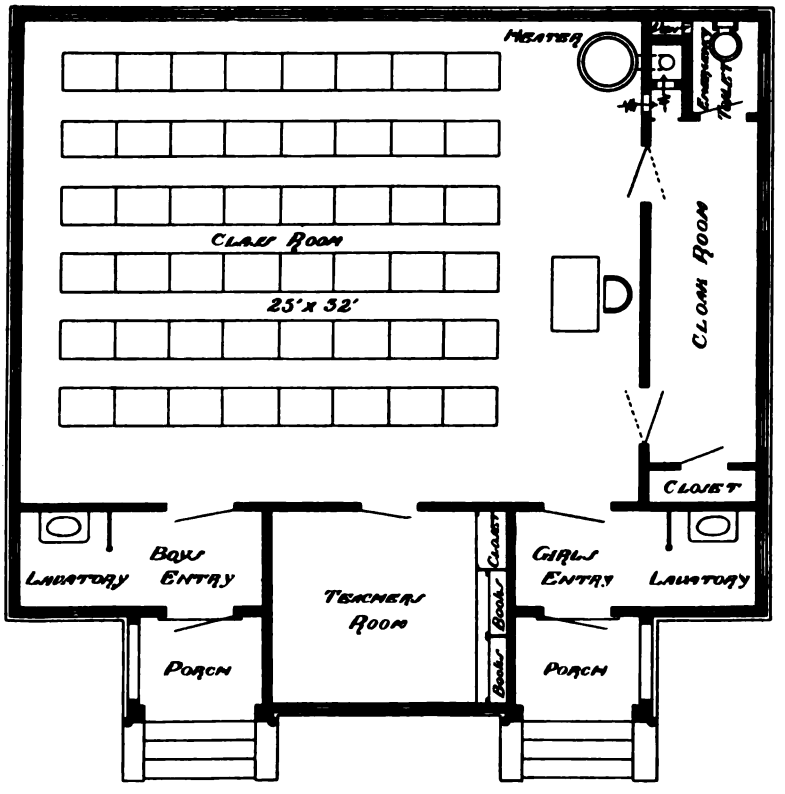
Exterior of Plan No. 1 — W. H. Weeks, Architect



Plan No. 1 for One-Room Building



Exterior of Plan No. 2 W. H. Weeks, Architect



Plan No. 2 for One-Room Building

glued to the wall, or to wooden boards. Much care must be taken, however, in preparing for this or any other artificial board of this class to see that the walls are properly seasoned and prepared before the preparation is applied, otherwise the board that ordinarily would prove good might prove unsatisfactory. A still cheaper form of blackboard is manufactured by the use of hard plaster and paint, but it is too easily damaged to be seriously considered.

Blackboards should be 2 feet 6 inches from the floor and from 3 feet 6 inches to 4 feet wide, with an extension back of the teacher's desk of two extra feet.

Grooved chalk rails should be provided under blackboards. Over the top of chalk rail, or rather 1-2 inch from the top, there should be a galvanized wire mesh cover, so that chalk dust can settle through and save the chalk and erasers from being covered with dust. The cover should have a wired edge and be made to open out for cleaning.

The lighting of the class room is the most important problem in school building. Under no circumstances should a pupil be forced to face the light, and in the best planned school rooms the teacher is equally favored. The only proper lighting is that introduced over the left shoulder of the pupil. High lights over the blackboard in the rear are better omitted, but are frequently used for architectural effect.

The glass surface should equal at least one-fifth the floor space and the windows should not be less than 3 feet 6 inches from the floor, coming up as close to the ceiling as the casing and finish will permit. The best glass only should be used, divided where necessary to provide for the proper degree of safety from breakage. Sheet prism glass can now be obtained at a reasonable price and I would recommend its use in the upper lights of the windows, or at least in the transoms, for by its use the light in the room can be made more uniform.

The shades should be of the best quality and be made double; placed at the center of the window so as to work up and down. The edges should be reinforced and run in groved pieces so as to prevent a glare of light entering between casing and shade.

There is no good reason why toilets and other conveniences in the plumbing line should not be used in connection with the country schools. The principal trouble heretofore has been in the water supply and drainage; but the water supply can easily be taken care of by means of a pneumatic tank, placed in the ground near the building, and a force pump properly connected with the tank of the building. The size of the tank must be graded to suit requirements—say about 200 gallons to a class room. It will then be possible to have running water to all fixtures, sinks, toilets and basins—all of which can be relied upon. The toilets for the use of scholars should be automatic.

The question of sewage disposal has of late years become a simple matter. Formerly it was necessary to resort to draining into ditches, cesspools, and streams. Now, however, there is no occasion for these, for by the use of the Septic System of Sewerage, which is considered the only scientific system in use today, all sewage can be readily disposed of. Double cisterns are built and connected under ground. The first cistern is divided into two compartments. The first compartment or settling chamber receives the sewage, the liquid portion of which flows in a sheet into the second compartment. This in turn flows into the large flush tank, where, when the water reaches a certain point, it is automatically syphoned off into a drain pipe leading to a point where porous terra cotta pipes are run out in different directions. The sewage is distributed through the open joints of

Front Elevation, Plan No. 2 W. H. Weeks, Architect

these branch pipes, which are not more than 14 feet below the surface of the ground. At this depth the sewage will be oxidized. This arrangement can be simplified so as to give satisfactory results at a very little cost.

The woodwork on the interior of a model country school should be as plain as possible, omitting all fancy moulds and quirks, as they are only dust catchers and add to the expense. A natural finish makes the wood more beautiful and desirable. The different rooms should be wainscoted to the specified height. The plastered walls and ceilings should have a good sand finish, as it is more sightly than hard finish, and is freer from cracks where protected by wainscoting. The tinting shows to much better advantage when placed on such a surface.

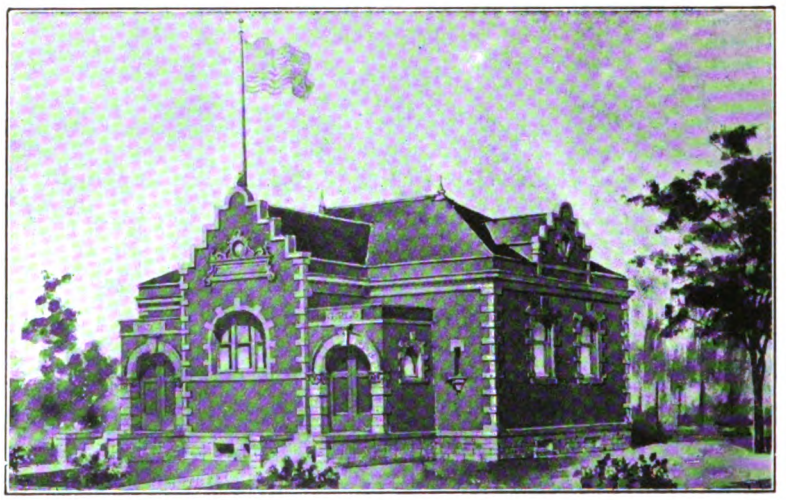
The color of tint for walls and ceilings should be selected to harmonize with the wood finish and blackboards; the exposure should also be taken into account. Light olive green is a very good color for an eastern exposure, but if green blackboards are used, the painter will find difficulty in getting the shades to harmonize. Rather than risk having the shades clash, it would be better to use some soft shade of brown or tan, with a light cream ceiling.

After planning the interior of the building and providing the necessary hygienic demands, we take up the problem of the outside appearance.

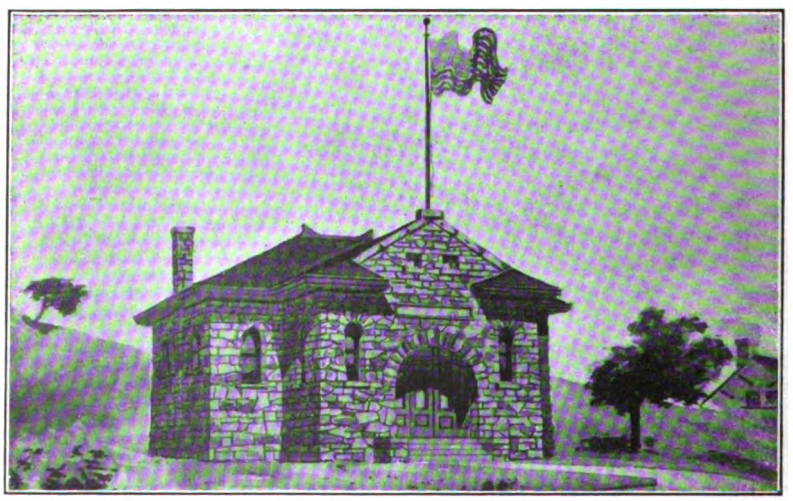
A building erected for any purpose should indicate its essential use by its appearance, especially a building designed for educational purposes, which should not only indicate its use by its appearance, but set an example of good taste and dignity for the community. A school building so designed will cultivate in the young that perception of proportion and relation to utility and adornment that constitutes taste in architecture and will fulfill a large part of its mission.

In the small country school as well as the schools of the large cities the best examples of architecture should be seen. The building should not be elaborate in detail, nor yet severely plain. Still it must have beauty, grace and dignity, be symmetrical in outline with well proportioned parts and with as little ornament as the style employed will justify.

The quality of the material to be used in the erection of the building will depend largely on the locality. Wood has been used almost exclusively



Village School in Dutch Style—Brick Veneered with Concrete Block Trim
W. H. Weeks, Architect



Design for Small One-Room Building—Built in Field Stone W. H. Weeks, Architect

for buildings of this class, but there is no reason why brick, stone, or concrete should not be used in localities where these materials can be cheaply obtained. The cost is slightly more than wood, but the building is far more durable. All buildings other than wood should be damp-proofed.

Heating, Lighting and Electrical Work

The Lighting of Temporary Buildings

By C. E. ROESCH

CRITICS, like the contagion of a fever-infected swamp, increase and multiply with the rapidity of a plague, at a time like that which we have just experienced, while those who do and dare are as scarce as the silver wolf, whose appearance in the pack signifies the return of peace and harmony.

Much has been said and written as to the advisability of erecting temporary structures, with advocates both for and against the placing of cheap wood and galvanized buildings on the sites previously occupied by high-class buildings, but the suggestion advanced by Mr. A. Dodge Coplin in his aptly drawn comparison between the Baltimore and San Francisco fires, in the May issue of the Architect and Engineer, in which he calls attention to the wasteful haste with which Baltimore was reconstructed, and permitted buildings to be erected with so little regard for stability that they "are held up by the adjoining buildings to attest to the inadvisability of the excess of so good a thing as hustle."

This phase of the question is one which should command the greatest consideration. It would seem decidedly better to put up an inexpensive "shack" to provide for the immediate needs of the various business interests, giving owners of property an opportunity to think carefully as to the type of building most suited to their needs, thus avoiding the mistakes which Mr. Coplin points out so clearly were committed in the rebuilding of Baltimore. This means a slower process of rehabilitation, perhaps, but a city is a thing for all time, regrets are vain, and it were better to go slow and well, rather than hastily and do things which in a few years must be undone.

Even with this point determined on, many problems confront the builder, not the least of which is the question of artificial light. The most practical means of illumination is dependent on many points, such as the purpose for which the building is to be used, if for mercantile purposes, the kind of goods to be displayed, the kind of illuminant which is most accessible and which will give the most satisfactory light at the least cost.

As these buildings are intended to serve for a limited time only, the lighting instrument should be as inexpensive as is consistent with service.

Some of the various modes of lighting which have been adopted recently have proven successful; one fault, however, is due to the fact that the quality of light has not been given sufficient attention, as, for example, the use of electric arcs in the display of dress fabrics is a serious error, for the decided violet color of the light and the absence of red rays changes

the entire prismatic scale. This is not true of the gas arc or the Nernst lamp, the latter being one of the truest artificial illuminants for the preservation of colors.

The most satisfactory method of lighting, and one which serves most purposes equally well, is the regulation 16-candlepower lamp. Its abuses rather than its uses has prevented it becoming generally approved, but when the proper regard is given the area to be lighted, and the lights are most advantageously placed, the result is more efficient than any other plan of illumination. It is quite possible, with the use of high-grade lamps and accessories in the nature of highly reflecting shades to obtain a degree of illumination for a given expenditure of current, equal to these other forms of lighting, and at the same time providing a superior device as to simplicity and reliability.

The lighting of a temporary structure is hardly within the realm of the "illuminating engineers," but if the following plan is carried out, the result should be eminently successful.

As an illustration, we will undertake the lighting of a building 50 feet front by 120 feet deep, to be used for the display of general merchandise. Place six openings in the ceiling, from which should be suspended, at a distance of 7 feet from the floor, pendants of five or six 16-candlepower clear lamps under 16-inch opal reflectors, with single light pendants in the windows, carrying the new high-efficiency lamps with their prismed reflectors. These pendants should be short, close to the ceiling, and, when the contents of the window calls for an unusually brilliant light, the mirrored trough reflector should be placed in the front angle formed by ceiling and window. This arrangement is also satisfactory for a restaurant or cafe, with additional lights from the side walls, arranged in two light brackets, one over each table, the bulbs pointing down at an angle of 45 degrees, fitted with reflecting shades. If these brackets are placed about 5 feet 6 inches from the floor, those seated at the table will be relieved of any intensity of light in the eyes. Stud lights, directly against the ceiling, aid in the general illumination.

The prime consideration, therefore, is equal distribution to provide uniform illumination, rather than strongly concentrated spots of light.

It is a sensible precaution to provide these reflector fixtures with arms for gas, as an emergency feature; these arms, fitted with incandescent gas burners, will be found of great assistance in the event the electric light fails.

Architectural Criticism by a Country Editor

The following breezy description is from the Tribune, of Britt, Iowa:

"The architect changed the specifications on the new building on the corner in front of the Treganza furniture store, and instead of building it two stories high, they built it two stories long. He also changed from a solid brick to a veneered building. It is veneered with tar-paper with tin trimmings, in longitudinal rows. It was thought at first that it was intended for a branch mint, as the skylight is put in like that in an assay office, but the ceiling is hardly high enough for that and the gables too pronounced. A nice row of such buildings would add materially to the aspect of the town and serve to carry out the idea of progressiveness now so popular. The beautiful glint of the tin ornaments in the sunshine makes it a thing of beauty, and no doubt it will be a joy forever."

Discussion of Some Details of Design and Construction of Sanitary Sewers

By W. T. KNOWLTON

THE question of how can we improve the condition of our sanitary sewers does not often arise in the ordinary affairs of every-day life. To the general public a sewer is an underground feature which, being out of sight, is usually out of mind as well. When once laid, no more is thought of it, unless some noticeable odor arising from some unknown source is remarked. Then we are all prone to lay the cause for such odor to the sewer.

To go into a few details of sewer design and construction is the intention of the writer this evening, in order that possibly there may be features discussed which may prove of interest to the members of this Association.

At the start, it would be well to state that the sanitary sewers only have been considered in this paper, storm-drains and combined sewers being left for some future time.

The materials generally used for sanitary sewers are the salt glazed vitrified pipes. For sizes over 24 inches, vitrified pipe may be used, but brick or concrete should be considered. The question of obtaining a sewer that will not have defective joints is an important one. If water is encountered in the trench, tight joints and water-tight work is always deemed advisable. The entrance of ground water during construction is detrimental to the work in hand while leakage occurring after the sewer is built may cause trouble in several ways. On the other hand, owing to the inelasticity of a properly jointed line of pipe the foundation for the sewer must be a stable one. The use of a concrete foundation on sizes of 18-inch and under is being recommended by several today. Recently near Rochester, N. Y., continuous sewers of cement were built for the smaller sizes, thereby doing away with all joints. A core of steel was used in the process of building this sewer, the core being constantly drawn forward as the work progressed. With the exception of cement, the materials used in this new method of construction requires but short haul and ought to be cheaper than vitrified pipe.

Brick sewers are well adapted for the larger sizes of 36 inches and over, but here the question of cost enters. Labor is expensive when bricklayers demand from $6.00 and upward for 8 hours' work, and scarcity of masons may tend to delay the work. For many of our larger sewers, concrete either reinforced or not is proving cheaper today than brick.

The size of the ordinary pipe sewer for sanitary design has generally attracted more or less attention. It is advisable to lay not less than an 8-inch pipe as a rule. On steep slopes at the upper end of laterals 6-inch sewers may be built, if the grade exceeds 2 per cent. There are cities where 6-inch sewers are used extensively, but owing to the liability of getting the pipe blocked by sticks or other foreign substances, a 6-inch size is questionable except for house connections. House connection sewers may be of 5 or 6 inches diameter. One eastern factory of 2500 employees uses a 5-inch connection.

The depth to which sewers are laid is governed, of course, by the elevation of buildings to be sewered, and for the ordinary gravity system. This matter is studied best from the general plan of the system. Sewer grades depend more or less on the velocity of the flow. For inorganic

material in sewers it is advisable to have a velocity of two and one-half feet per second, when flowing full, to carry the material onward; for sewers running less than half full the mean velocity will not be reached, however, and we must remember it will take a higher velocity to start a deposit moving than to keep it going.

On the other hand, deposits of organic matter in sewers are apt to be disintegrated by fermentation processes. Thus the larger solid matters are broken up. Later on, the formation of gases will tend to actually lift the deposit to the surface of the water so that it is readily carried along. Thus we see why the velocities of sewers running less than one-half full are sometimes sufficient to carry sewage on what would ordinarily be termed too flat a grade. As 75 per cent. of sewer systems often consist of 8-inch pipes, it might be interesting to look into some existing grades on sewers that have been in use for some years. The writer knows of some cities in the east where 8-inch sewers laid on a grade of .25 per cent. to .35 per cent. cause no trouble whatever. In one city a grade of .11 per cent. for an 8-inch pipe is in use. Owing to flat grades, the latter city is proposing to adopt .125 per cent. for a good many new 8-inch lines. In Cambridge, Mass., a 24-inch sewer laid 11 years ago on a grade of .06 per cent. has never caused any trouble, although the flow has been very slight at times. The writer was told that an 8-inch sewer in Michigan was built some years ago with a fall of but an inch in a hundred feet. The city of Manila is about to build their sanitary sewers. Here, owing to the fact that the surface averages but a few feet above tide-water, flat grades are necessary and a .4 per cent. grade is to be used. The writer has built 8-inch sewers on a .4 per cent. grade, but prefers .5 per cent. Velocities occurring from steep grades will have an effect on short lengths of flatter grades immediately following, and tend to carry along deposits that might otherwise occur.

In connection with the matter of sizes and grades comes the data to be decided upon for the quantity of sewage to be carried. The water consumption and future population must be estimated, and an allowance made for ground water leakage.

The writer has recently platted some diagrams for the flow in sewers on logarithmic cross-section paper to facilitate the design of sewers. The diagrams were carefully worked out from Kutter's formulæ and Flynn's tables, and are self-explanatory. Having a few prints of these on hand, they may be obtained from the writer.

Following the matter of grades, the use of flush tanks may be considered. If frequent flushing and some attention is given very flat grades have been found practicable. Among the examples noted above, an 8-inch sewer on a .2 per cent. grade is cleaned and flushed twice a year and gives satisfaction. The cost of cleaning for this sewer is about $5.00 per mile per year. Some few months ago the writer made a little investigation to ascertain the usefulness of the ordinary syphon flush tank. Replies to letters sent to several City Engineers where sanitary sewers have been in use for several years indicated that the automatic syphon is not held in favor. The experience of Worcester, Mass., would serve as a type for most of the places where letters were sent. The Superintendent of Sewers, Mr. Harrison P. Eddy, of Worcester, stated that after using different types of syphons for years, they have discarded the use entirely and are now filling the manholes at the summits by water from the city mains. The sewers are not flushed daily, but at intervals when found necessary, flushing some sewers which are very flat more often than others. This method is found to be much cheaper than with the automatic syphon.

One trouble with the Worcester flush tanks which is likewise found in Los Angeles, was the orifice through which the water was discharged into the tank. Where the amount of discharge is not over 300 gallons per day the stream enters the tank so slowly that bits of scale or dirt frequently close the orifice.

In other cities similar experiences are found. In one city on a visit to 116 tanks, over 40 per cent. were found to be stopped. As it generally proves necessary to have a maintenance department inspect the sewers regularly, the same men can flush the pipes by means of a fire hose attached to a hydrant when convenient, or by plugging the manhole outlet and let it fill to within a short distance of the top by use of a valve connected to the water service pipe which enters near the top of the manhole. The latter method is in use quite generally in eastern cities. A hose stream is, of course, much more effective than this filling of a manhole with water for flushing purposes. Cities in the middle west are somewhat divided as yet between the use of automatic syphons and hand flushing. The careful inspection and thoroughness needed to attend to this detail of sewer work ought to be under the charge of conscientious and reliable men. If not so, it may be advisable to have automatic syphons in use. For controlling the water which fills the flushing manhole, the manufacturers have recently placed a type of gate-valve on the market, and they are already in use with satisfactory results. By means of a counter-weight arrangement, very little energy is required to operate the gate.

To obtain a good sewer system some means of ventilation must be provided. The pipes and manhole chambers are liable to become filled at times with gases escaping from gas mains or other sources, so that unless an outlet is made for such gases, the gases may cause a nuisance whenever one is near the manholes. The presence in sewer manholes of illuminating and other gases is liable to cause an explosion, if in sufficient quantity or when ignited by electricity. Thus we see fatal accidents due to the blowing up of sewer manhole covers. To give good ventilation it has been customary to have the manhole covers perforated. This perforation may be carried too far, however, and too much area and opportunity provided for the inlet of water and dirt. The sewer may receive a large amount of water during storms so that it becomes a storm sewer, rather than a sanitary one. More detrimental, however, is the dirt which falls into the pan provided for catching it underneath the iron cover. The dirt soon fills the pan and becomes heaped up to the under side of the cover, so that the holes themselves fill with dirt. Where no pans are used the writer has seen discs of tin used to catch the dirt. In either case ventilation is stopped because there is from 3 to 6 inches of dirt underneath the manhole cover. It is better to reduce the number and size of openings in manhole covers, if ventilation is desired. It is the opinion of the writer that sewers can best be ventilated by the house sewers, using no trap between the street sewer and the soil stack which is carried above the roof of the house. This method of ventilation has been in use for some time past in eastern cities, and agrees with European practice. This subject was under discussion about 11 years ago in a Massachusetts city, where the writer was Assistant City Engineer. With very few exceptions, engineers at that time agreed upon the practice of ventilating the sewers through the roofs of the houses, and there is evidently no change in their opinion today. It may be best to use tight manhole covers entirely for very practical reasons. When the Street Department resurfaces the street or any excavation work is carried on, the manholes are apt to get covered entirely with dirt so that the perforations are filled with dirt. In some low places the air current has been found to go downward through the

holes in the covers. It has been found by experience that the air in sewers has been as good with tight covers, as with perforated ones.

In connection with a properly designed and constructed separate sewer system, a few words may be said of cities where sewers are constructed in a desultory manner, regardless of a comprehensive plan. The cost of maintenance of gravity systems should be reduced to a minimum. Where defective joints and broken pipes occur, sand and other foreign substances are apt to enter and fill up the sewer. This trouble may come from the house connections as well as the street sewer.

In some cities the design and construction of the house connections from the street sewer to the curb line is in the hands of the Engineer, and the writer believes that a better system is thereby maintained. Where such street improvements as paving, follows the sewer construction, it is a good plan to have the house connections built to the curb line in connection with the street sewer and previous to the paving work. As a rule, it is advisable to have one separate house connection for each building connected to the street sewer. Where the sewage of three, four or more large buildings enters the street sewer by a single 6-inch house connection, trouble is apt to follow sooner or later.

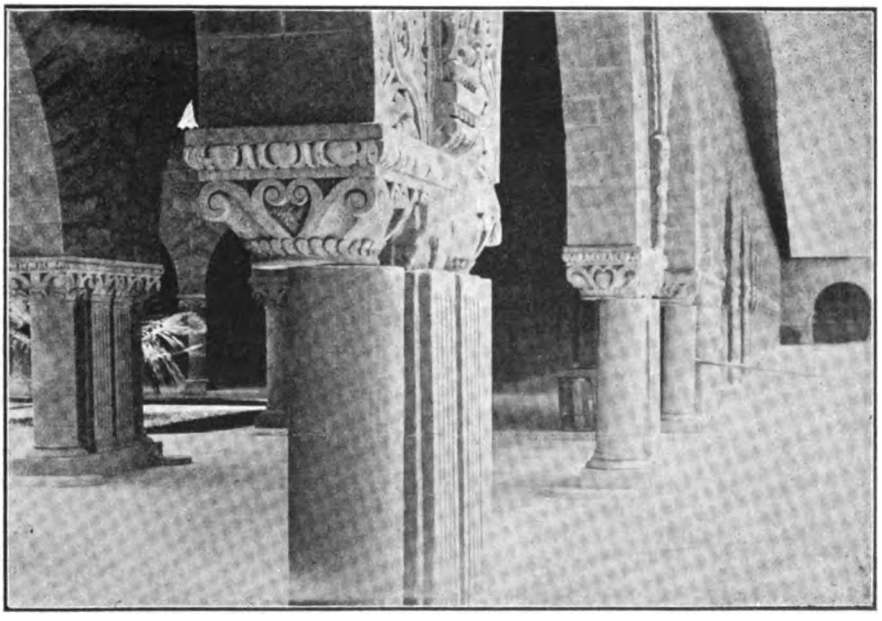
The matter of stoppages in constructed sewers is an important one. Besides sand,—rags, grease, sticks and other miscellaneous things may enter a sewer. To remove a stoppage caused by these things may be a costly matter, to say nothing of the inconvenience caused thereby. When sewers are built near trees, the roots of the trees may force their way through slight cracks at the joints so as to fill up a small pipe sewer. A concrete or water-proof covering may remedy this trouble.

Regarding breakage in constructed sewers, it is probable in many cases that such are due to the backfilling. When laid in trenches that require foundations, there should be great care exercised to secure good work. The specifications for this part of the work may be excellently worded, but sometimes impracticable. It is not easy to ram the material below and around the lower part of the pipe. The laborers do not appreciate the importance of such care, and the Inspector may be watching another portion of the construction. Suitable material for the backfill may not be at hand. If these points are not guarded against, the line of pipe will be liable to rupture at many places, should one pipe be broken. This is due to inelasticity of the joints as has been previously noted. To avoid ruptured pipe, fine sand or clean concrete may be used to fill up the springing line of the pipe. If the trench is backfilled before the joints have hardened, the sewer will adjust itself more or less to the settlement in the foundation. This reduces the liability to rupture, but increases the leakage if ground water exists in the soil. Where pipes are laid in gravel or rock cutting, room at the side of the pipe ought to be left for the proper compacting of the backfill. The pulling of sheathing is another cause of breaks in sewer pipes. The unequal pressure due to the releasing of the force, held in check by the sheathing, on one side of the sewer, has at times caused a lateral movement of the sewer. It is advisable to have four or five feet of earth over the pipe before starting the sheathing, and safer to leave it in place in many cases. Especially so is this the case when in fine running sand or quicksand. In dry trenches of which Los Angeles has many, the backfill can be replaced with ordinary care and secure good results.

It has been said that ground water at least doubles the cost of pipe sewers. The draining and pumping required for more or less time in advance as well as at the time of pipe laying, rapidly eats away the profits of the contractor. When designing the size of a sewer the allowance for

ground water may at times be one-third of the total capacity of the sewer. It is almost impossible to obtain water-tight work in wet trenches. Some 6 or 7 years ago, in Honolulu, the writer recalls the effort made by the contractors to have no leaks in the main trunk sewer of the system. This was a concrete sewer and extended up line from its reservoir outlet for almost 2 miles below the level of the ocean. Being adjacent to the water and in coral rock formation, much water was encountered. As every gallon of water that flowed through the sewer had to be pumped, the contractors were to forfeit a sum of money for all ground water leakage above a certain amount. Thus it was for the interest of all concerned to reduce the leakage to a minimum.

One point to be considered in the use of pipe sewers in wet ground is the depth of bell of the pipe and the thickness of the pipe itself. Deep socket pipe is to be preferred to standard socket for sewers where much ground water exists, even if it requires more time and money to obtain the deep socket pipe. Double strength pipe may be used to advantage in deep cuts. The ordinary standard pipe may not be able to bear the weight of the soil at all times. If the soil is compressible, the custom of placing a heavy spoil bank alongside the line of trench may cause an overloading of the soil and a consequent breakage in the sewer pipes unless the pipe is of sufficient thickness. It is possible that some present this evening may not know that in England our double strength pipe is of the same thickness as their ordinary standard pipe. The bearing power of questionable soils may be ascertained previous to construction, and likewise the strength of the pipe to be used. To render economical work as well as effective work is the endeavor of the Engineer, but it is sometimes doubtful whether it pays to assume risks that are liable to cause breakages in the sewer pipes. Even though the inspection given may be with care, the responsibility for the construction is placed upon the Engineer.



Triple Gable Arch to Inner Quadrangle, Displacement Five Inches, Stanford University

The Uniform Design of Reinforced Concrete Position of the Architect

By LOUIS F. BRAYTON, C. E.

REINFORCED concrete, although the most popular form of fireproof construction at the present day, is a veritable chaos as to its design.

Quoting from a recent publication: "Many systems are patented and it is a common matter for designs to be furnished free, contingent on the designer's patent being used."

This seems to be an unnecessary state of affairs. Reinforced concrete should be standardized. Structural steel construction has been standardized until all mills roll the same sections. Standards devised by the various steel companies are practically uniform. There are no patents to speak of, and all designers uniformly adopt the standard sections rolled, and specify the uniform connections.

There is no reason why reinforced concrete should not be brought to the same state of uniformity.

It is true that there are at present a great variety of so-called "systems" which have more or less merit, but it is also true that perfect construction can be and is every day being devised, which is not patented forms or methods.

Standard methods should be adopted in such a form that the architect, engineer or contractor, is made entirely independent of the so-called patented "systems," and at the same time the standards should be arranged so that where it is shown profitable, a patented section could be substituted for the reinforcement shown upon the plans of the designer.

Until some systematic action is taken to standardize reinforced concrete, designers will be handicapped by the necessity of specifying some particular "system" or leaving the plans open to a free-for-all scrap as to who can do the work for the least money.

"What is the position of the architect to-day?" This question has been asked by nearly everyone in the profession. Is the architect to be the agent of the contractor, is he to be crowded out of the business by those who "design and build," or is he going to maintain his old time prestage, and stand firmly for his rights as to the character of construction which is to go into the building under his management?

These questions must be settled at once and for all, if the architect is to maintain his self respect and the confidence of his clients.

At the present time there are comparatively few architects who undertake to show upon their own plans the methods which must be followed in the construction of the reinforced concrete portions of the building under consideration. It is explained that the good methods are all patented and it would be wrong to show any one system. This is true only to the extent that no contractor should not be given a preference by the specifying of his system. "There are just as good fish in the sea as have ever been caught," and the architect should assert his independence by showing upon his plans what he knows to be a good form of construction, and free from patent royalties.

This may mean considerable study to some, but to those who prove themselves capable it will mean a restoration of prestige not now enjoyed by many.

Competition where cost is to be the deciding point, and design the battle ground, is, to say the least, "penny wise and pound foolish," if not actually amounting to criminal negligence.

Cement and Concrete

Hollow Blocks---Good and Bad.

By WM. B. GESTER, C. E.

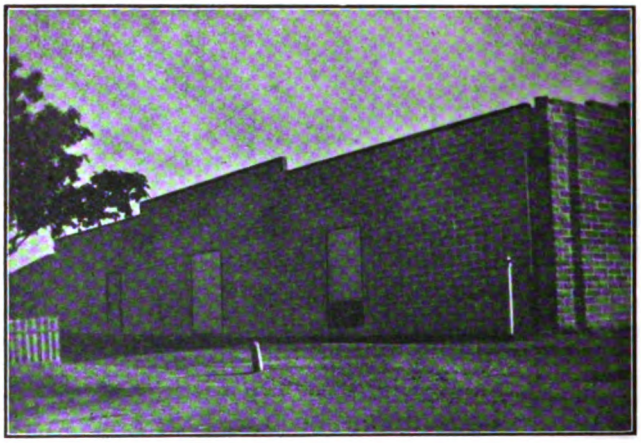
UNDER the above heading, in the April number of this magazine, attention was called to the fact that the rapidly growing hollow cement block industry in California was threatened with injury, because of lack of knowledge and proper care on the part of some manufacturers in the State. The statement was made that untested cements were being used, that proper attention was not given to the selection of the inert aggregates, sand and gravel and stone, and that in many cases the quality of work given the assembling of the constituent parts of the blocks was sacrificed to an unwise determination to produce a too large quantity of blocks within a given time.

Inasmuch as the great fire of April 18th and the following days destroyed the greater portion of the April issue, which therefore failed to reach all of the readers of The Architect and Engineer, it may be well to again call attention to the facts as above stated. At the same time, an opportunity is given to produce evidence of the undoubted fact that well-constructed hollow-block walls will stand very severe earthquake shocks.

Mr. Octavius Morgan, of Los Angeles, in his very excellent article in the May number of this magazine, relates the fact that he saw at Palo Alto two hollow-block buildings that the earthquake had shaken to the ground, and he draws a conclusion which other facts, quite readily verified, will hardly help to substantiate. He concludes that in Palo Alto "it was demonstrated that hollow-block construction was no good."

This is just a bit sweeping. What really happened was that the Palo Alto occurrences demonstrated that SOME hollow-block construction was no good. Judging theoretically only, it seemed that Mr. Morgan's general condemnation could be hardly justified. It seemed as though a well-bonded wall of properly made concrete blocks ought to withstand a pretty good shaking; and now, as a matter of fact, as later returns come in, it is really demonstrated that although some hollow-block construction is no good, some other hollow-block construction is not only very excellent, but really wonderful in its ability to withstand an earthquake of the most violent description.

The ordinances of the City of San Francisco do not (more's the pity) make any provision for hollow concrete block construction, so that we can draw upon no examples from that city. The one district in the State, however, that suffered a still greater proportion of damage from the earth-crust disturbance of April 18th than the City of San Francisco was that of Santa Rosa, in Sonoma county.



Hollow Blocks in the Earthquake. Lee Bros. & Co's. Warehouse, Santa Rosa, After the Temblor

The daily papers have recorded the sad experiences of the "City of Roses," detailing the great loss of life and property by the earthquake, so that it is unnecessary to repeat the story, except to state that buildings of every description, large and small, frame and brick and stone, were utterly destroyed, shaken flat. There was a small silver lining to the very black cloud. It evidenced itself in the manner in which hollow-block construction withstood the visitation. The accompanying illustrations graphically tell the story.

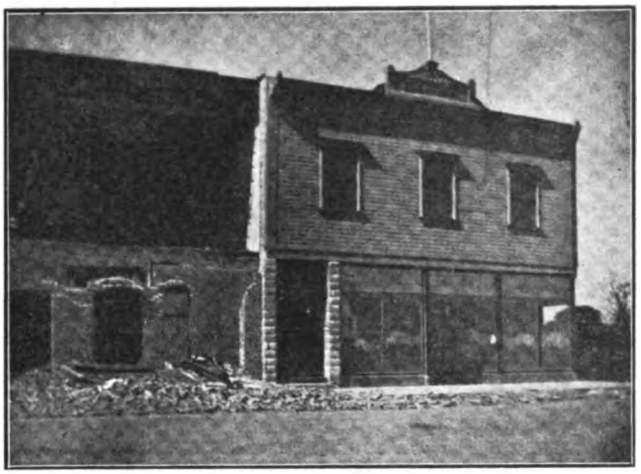
No. 1 is from a photograph, taken on April 20th, of the warehouse of Messrs. Lee Brothers & Co., Santa Rosa. The building represented is 66 feet wide and 145 feet deep, with walls 26 feet high, constructed of hollow concrete blocks, 12 inches thick. The corners at the top of the walls were slightly cracked, as barely shown in the illustration. A few dollars will repair the damage sustained. In the next block, the Santa Rosa Flour Mill and the adjoining warehouses, constructed of brick, were completely demolished. Directly acros the railroad right of way, a one-story bonded warehouse of brick construction was shaken to the ground.

Illustration No. 2 shows the relative effect of the earthquake upon two adjoining buildings in the town of Windsor, Sonoma county, the Masonic Hall, of brick construction, the front of which is entirely ruined, and the Odd Fellows' Building, 45 feet front by 108 feet deep, made of 10-inch hollow blocks by the Sonoma Stone & Construction Co., of Santa Rosa, which was so slightly injured that it was perfectly repaired at an expense of fifty dollars. The party wall between these two buildings, 108 feet long and 38 feet high, is of hollow concrete blocks, and it suffered by not so much as a single crack.

Mr. Samuel Purrington, of Mount Olivet, in the same district, had a hop kiln constructed last year of 12-inch hollow blocks. The building is 60 feet by 30 feet, and is 30 feet high. The earthquake was very severe at this point, but the hop kiln sustained no injury whatever.

The only hollow-block building in the town of Cloverdale, Sonoma county, is reported to have gone through the quake without hurt, while nearly every brick building in the town was damaged.

It is only fair to say that in every case mentioned in this list of hollow-block structures which successfully withstood the great earthquake, the blocks were intelligently made, with one part of sound Portland



Masonic Hall, (Brick) Odd Fellow's Hall, (Hollow Concrete Blocks)
The Fraternal Halls, Windsor, Sonoma Co., as they Appeared After the Earthquake

cement to four parts of clean, selected gravel. Also, that they were bonded in the walls with a good, honest mortar, containing a generous proportion of Portland cement.

None of these Sonoma county buildings was over two stories in height, and it may be argued that their squat form saved them. Their form may have been of advantage, but brick buildings of similar height went all to pieces. Also, the contention as to form would certainly not hold in the case of the Wempe box factory, at the corner of Adeline and Fifth streets, in the city of Oakland. This is a four-story building, 54 feet high, constructed of hollow concrete blocks ranging from 14 inches to 9 inches thick, which withstood the shaking that Oakland got without injury, while in the immediate vicinity of the Wempe factory two brick buildings, one of them a new one, were completely demolished.

A really fair conclusion in the matter would therefore seem to be that it is the quality of the material and the quality of the construction work that have proven themselves the main general factors in the matter of resistance to earthquake shock, whether the material were hollow cement blocks or something else, and that well-bonded walls of properly made hollow blocks are not only proof against an extraordinarily violent earthquake, but that they are infinitely better than some brick walls whose builders would protest if it were intimated that they were not well and honestly constructed.

Uncle Joe Cannon took a rural constituent out to dine at an expensive hotel in Washington. Uncle Joe is exceedingly fond of green corn on the cob and made almost his entire dinner from that vegetable.

"See-ay, Mr. Cannon," drawled the constituent, eyeing the heap of bare cobs on the speaker's plate, "how much do you pay for board here?"

"Oh, about six dollars a day," replied the Congressman.

"Well," commented his friend, "durned if I don't think you could board cheaper at a livery stable!"

Goverment Ideas on Cement and Concrete

A BULLETIN of more than ordinary interest to builders is that recently issued by the Department of Agriculture on the mixing of cement and concrete. The bulletin is the result of a very careful examination of this subject by expert authority and, while it relates more specifically to the use of this material for farm purposes, the principles laid down are of equal interest and importance to all those who use concrete in any form. The following are portions of the report, containing its main features and recommendations:

The many letters received and referred to the Office of Public Roads with reference to the use of cement and the adaptability of concrete for various farm purposes have made it seem advisable to issue a short bulletin on the subject, in which a proper method of mixing concrete is described, together with a few of the many uses for which concrete is well adapted. No attempt has been made to give a technical discussion of the subject, the sole object being to treat in an elementary way those points in concrete construction which are of particular interest to the farmer.

In the appendix will be found the results of tests made to determine the strength of reinforced concrete fence-posts, together with tests showing the effect of retempering Portland cement mortar, and a diagram (fig. 14) illustrating the variation in strength of cement mortar produced by different proportions of clay in the sand.

Cement.—The term "hydraulic cement" is applied to one of the most useful materials of engineering construction and one which in recent years has become widely extended in its field of application. Hydraulic cement possesses the property of hardening, or setting, under water, in which respect it differs from lime, which does not harden except in the presence of air. Thus it is evident that in all places where air is excluded, such as foundations, thick walls, etc., cement mortar should be used instead of lime.

Only two classes of cement will be discussed here—Portland and natural. The difference between these is due partly to the method of manufacture and partly to the condition and relative proportions of the materials employed, which are, generally speaking, limestone and clay. In the manufacture of Portland cement the separate materials are mixed in such proportions as have been found by experience to give the best results. The mixing is done by grinding the materials together in mills, after which the mixture is burned at a very high temperature in kilns, and the resulting clinker ground to an impalpable powder is known as Portland cement. In the case of natural cement the materials used have been already mixed by nature in approximately the correct proportions, being found in the form of a rock which is generally classed as a clay limestone, or a limey deposit technically called calcareous clay. This material is burned at a much lower temperature than Portland cement. When the manufacturer has each ingredient absolutely under control and can adjust the proportions to suit all conditions, it is reasonable to expect that a beter and more uniform product will result than when the materials are found already mixed. Portland cement is far more extensively employed than natural cement on account of its superior strength, although the latter is frequently used in cases where great strength is of little importance. The superior strength and durability of cement as compared with lime, together with the low price at which it may now be procured, have caused the former to replace the latter in engineering construction to a great extent.

Cement Mortar.—Cement mortar is an intimate mixture of cement and sand mixed with sufficient water to produce a plastic mass. The amount of water will vary according to the proportion and condition of the sand, and had best be determined independently in each case. Sand is used both for the sake of economy and to avoid cracks due to shrinkage of cement in setting. Where great strength is required, there should be at least sufficient cement to fill the voids or air spaces in the sand, and a slight excess is preferable in order to compensate for any uneven distribution in the mixing. Common proportions for Portland cement mortar are 3 parts sand to 1 of cement, and for natural cement mortar, 2 parts sand to 1 of cement. Unless otherwise stated, materials for mortar or concrete are considered to be proportioned by volume, the cement being lightly shaken in the measure used.

A "lean" mortar is one having only a small proportion of cement, while a "rich" mixture is one with a large proportion of cement. "Neat" cement is pure cement, or that with no admixture of sand. The term "aggregate" is used to designate the coarse materials entering into concrete—usually gravel or crushed rock. The proportion in which the three elements enter into the mixture is usually expressed by three figures separated by dashes, as, for instance, 1—3—5, meaning 1 part cement, 3 parts sand, and 5 parts aggregate.

In the great majority of cases cement mortar is subjected only to compression, and for this reason it would seem natural, in testing it, to determine its compressive strength. The tensile strength of cement mortar, however, is usually determirned, and from this its resistance to compression may be assumed to be from eight to twelve times greater. A direct determination of the compressive strength is a les ssimple operation, for which reason the tensile test is in most cases accepted as indicating the strength of the cement.

Mixing.—In mixing cement mortar it is best to use a platform of convenient size or a shallow box. First, deposit the requisite amount of sand in a uniform layer, and on top of this spread the cement. These should be mixed dry with shovels or hoes, until the whole mass exhibits a uniform color. Next, form a crater of the dry mixture, and into this pour nearly the entire quantity of water required for the batch. Work the dry material from the outside toward the center, until all the water is taken up, then turn rapidly with shovels, adding water at the same time by sprinkling until the desired consistency is attained. It is frequently specified that the mortar shall be turned a certain number of times, but a better practice for securing a uniform mixture is to watch the operation and judge by the eye when the mixing has been carried far enough. In brick masonry the mistake is frequently made of mixing the mortar very wet and relying upon the bricks to absorb the excess of water. It is better, however, to wet the bricks thoroughly and use a stiff mortar.

Cement Mortar for Plastering.—In plastering with cement, a few precautions must be observed to insure good and permanent results. The surface to receive the plaster should be rough, perfectly clean, and well saturated with water. A mortar very rich in cement is rather a drawback than otherwise on account of shrinkage cracks, which frequently appear. The mortar, consisting of two or three parts sand to one of cement, should be mixed with as little water as possible and well worked, to produce plasticity. It is essential that the plaster be kept moist until it has thoroughly hardened.

Concrete.—Cement concrete is the product resulting from an intimate mixture of cement mortar with an aggregate of crushed stone, gravel, or

similar material. The aggregate is crushed or screened to the proper size as determined from the character of the work. In foundation work, stone or gravel 3 inches in size may be used to advantage, whereas in the case of molded articles of small sectional area, such as fence-posts, hollow building blocks, etc., it is best to use only such material as will pass a one-half inch screen. An ideal concrete, from the standpoint of strength and economy, would be that in which all voids in the aggregate were completely filled with sand, and all voids in the sand completely filled with cement, without any excess. Under these conditions there would be a thoroughly compact mass and no waste of materials.

It is a simple matter to determine the voids in sand and also in the aggregate, but in mixing concrete the proportions vary a great deal, depending in each case upon the nature of the work and the strength desired. For example, in the construction of beams and floor panels, where maximum strength with minimum weight is desired, a rich concrete is used, whereas in massive foundation work, in which bulk or weight is the controlling factor, economy would point to a lean mixture. When good stone or gravel is used, the strength of the concrete depends upon the strength of the mortar employed in the mixing and the proportion of mortar to aggregate. For a given mortar the concrete will be strongest when only enough mortar is used to fill the voids in the aggregate, less strength being obtained by using either a greater or less proportion. In practice it is usual to add a slight excess of mortar over that required to fill the voids in the aggregate.

It is more accurate to measure cement by weight, unless the unit employed be the barrel or sack, because when taken from the original package and measured in bulk there is a chance of error due to the amount of shaking the cement receives. As it is less convenient, however, to weigh the cement, it is more common to measure it by volume, but for the reason stated this should be done with care.

Proportioning Materials.—For an accurate determination of the best and most economical proportions where maximum strength is required, it is well to proceed in the following way: First, proportion the cement and sand so that the cement paste will be 10 per cent in excess of the voids in sand; next, determine the voids in the aggregate and allow sufficient mortar to fill all voids, with an excess of 10 per cent.

To determine roughly the voids in gravel or crushed stone, prepare a water-tight box of convenient size and fill with the material to be tested; shake well and smooth off even with the top. Into this pour water until it rises flush with the surface. The volume of water added, divided by the volume of the box, measured in the same units, represents the proportion of voids. The proportion of voids in sand may be more accurately determined by subtracting the weight of a cubic foot of packed sand from 165, the weight of a cubic foot of quartz, and dividing the difference by 165.

For general use the following mixtures are recommended.

1 cement, 2 sand, 4 aggregate, for very strong and impervious work.

1 cement, 2½ sand, 5 aggregate, for ordinary work requiring moderate strength.

1 cement, 3 sand, 6 aggregate, for work where strength is of minor importance.

Coloring Cement Work.—In coloring cement work the best results are obtained by the use of mineral pigments. The coloring matter, in proportions depending upon the desired shade, should be thoroughly mixed with the dry cement before making the mortar. By preparing small

specimens of the mortar and noting the color after drying, the proper proportions may be determined.

For gray or black, use lampblack.
For yellow or buff, use yellow ocher.
For brown, use umber.
For red, use venetian red.
For blue, use ultramarine.

Concrete Work in Freezing Weather.—Although it is advisable under ordinary circumstances to discontinue cement work in freezing weather, Portland cement may be used without serious difficulty by taking a few simple precautions. As little water as possible should be used in mixing, to hasten the setting of the cement. To prevent freezing, hot water is frequently used in mixing mortar or concrete, and with the same object in view salt is added in amounts depending upon the degree of cold. A common practice is to add 1 pound of salt to 18 gallons of water, with the addition of 1 ounce of salt for each degree below 32 degrees F. Either of the above methods will give good results, but it should be remembered that the addition of salt often produces efflorescence. It seems to be a fairly well-established fact that concrete deposited in freezing weather will ultimately develop full strength, showing no injury due to the low temperature.

Rubble Concrete.—In massive concrete work considerable economy may often be introduced by the use of large stones in the body of the work, but only in heavy foundations, retaining walls, and similar structures should this form of construction be permitted. In placing these large stones in the work the greatest care must be exercised to insure each being well bedded, and the concrete must be thoroughly tamped around them. Each stone should be at least 4 inches from its neighbor and an equal distance from the face of the work.

Concrete Basement Floors.—Basement floors in dwelling houses as a rule require only a moderate degree of strength, although in cases of very wet basements, where water pressure from beneath has to be resisted, greater strength is required than would otherwise be necessary. The subfoundation should be well drained, sometimes requiring the use of tile for carrying off the water. The rules given for constructing concrete sidewalks apply equally well to basement floors. The thickness of the concrete foundation is usually from 3 to 5 inches, according to strength desired, and for average work a 1—3—6 mixture is sufficiently rich. Expansion joints are frequently omitted, since the temperature variation is less than in outside work, but since this omission not infrequently gives rise to unsightly cracks, their use is recommended in all cases. It will usually be sufficient to divide a room of moderate size into equal sections, separated by one-half inch sand joints. The floor should be given a slight slope toward the center or one corner, with provision at the lowest point for carrying off any water that may accumulate.

Concrete Stable Floors and Driveways.—Concrete stable floors and driveways are constructed in the same general way as basement floors and sidewalks, but with a thicker foundation, on account of the greater strength required. The foundation may well be 6 inches thick, with a 1-inch wearing surface. An objection sometimes raised against concrete driveways is that they become slippery when wet; but this fault is in a great measure overcome by dividing the wearing surface into small squares about 4 inches on the side, by means of triangular grooves three-eights of an inch deep. This gives a very neat appearance and furnishes a good foothold for horses.

Concrete Steps.—Concrete may be advantageously used in the construction of steps, particularly in damp places, such as areaways and cellars of houses; and in the open, where the ground is terraced, concrete steps and walks can be made exceedingly attractive. Where the ground is firm it may be cut away as nearly as possible in the form of steps, with each step left 2 or 3 inches below its finished level. The steps are formed, beginning at the top, by depositing the concrete behind vertical boards so placed as to give the necessary thickness to the risers and projecting high enough to serve as a guide in leveling off the tread. Such steps may be reinforced where greater strength is desired or where there is danger of cracking, due to settlement of the ground.

Where the nature of the ground will not admit of its being cut away in the form of steps, the risers are molded between two vertical forms. The front one may be a smooth board, but the other should be a piece of thin sheet metal, which is more easily removed after the earth has been tamped in behind it. A simple method of reinforcing steps is to place a half-inch steel rod in each corner, and thread these with quarter-inch rods bent to the shape of the steps, as shown in fig. 6, the latter being placed about 2 feet apart. For this class of work a rich Portland cement concrete is recommended, with the use of stone or gravel under one-half inch in size. Steps may be given a half-inch wearing surface of cement mortar mixed in the proportion of 1 part cement to 2 parts sand. This system, as well as many others, is wel adapted for stairways in houses.

Reinforced Concrete Fence Posts.—There is a constantly increasing demand for some form of fence post which is not subject to decay. The life of wooden posts is very limited, and the scarcity of suitable timber in many localities has made it imperative to find a substitute. A fence post, to prove thoroughly satisfactory, must fulfill three conditions: (1) It must be obtainable at a reasonable cost; (2) it must possess sufficient strength to meet the demands of general farm use; (3) it must not be subject to decay and must be able to withstand successfully the effects of water, frost and fire. Although iron posts of various designs are frequently used for ornamental purposes, their adoption for general farm use is prohibited by their excessive cost. Then, too, iron posts exposed to the weather are subject to corrosion, to prevent which necessitates repainting from time to time, and this item will entail considerable expense in cases where a large number of posts are to be used.

At the present time the material which seems most nearly to meet these requirements is reinforced concrete. The idea of constructing fence posts of concrete reinforced with iron or steel is by no means a new one, but on the contrary such posts have been experimented with for years, and a great number of patents have been issued covering many of the possible forms of reinforcement. It is frequently stated that a reinforced concrete post can be made and put in the ground for the same price as a wooden post. Of course this will depend in any locality upon the relative value of wood and the various materials which go to make up the concrete post, but in the great majority of cases, wood will prove the cheaper material in regard to first cost. On the other hand, a concrete post will last indefinitely, its strength increasing with age, whereas the wooden post must be replaced at short intervals, probably making it more expensive in the long run.

In regard to strength, it must be borne in mind that it is not practicable to make concrete fence posts as strong as wooden posts of the same size; but since wooden posts, as a rule, are many times stronger

than is necessary, this difference in strength should not condemn the use of reinforced concrete for this purpose. Moreover, strength in many cases is of little importance, the fence being used only as a dividing line, and in such cases small concrete posts provide ample strength and present a very uniform and neat appearance. In any case, to enable concrete posts to withstand the loads they are called upon to carry, sufficient strength may be secured by means of reinforcement, and where great strength is required this may be obtained by using a larger post with a greater proportion of metal and well braced, as is usual in such cases. In point of durability, concrete is unsurpassed by any material of construction. It offers a perfect protection to the metal reinforcement and is not itself affected by exposure, so that a post constructed of concrete reinforced with steel will last indefinitely and require no attention in the way of repairs.

Concrete Building Blocks.—Concrete building blocks, or cement blocks, as they are frequently called, are more extensively used now than ever before. These blocks are molded hollow primarily to reduce their cost, but this hollow construction serves other useful purposes at the same time. The fundamental principles governing ordinary concrete work, so far as proportioning and mixing materials is concerned, apply equally well to the manufacture of building blocks, and it should be borne in mind that strength and durability can not be attained by the use of any machine unless the cement, sand and aggregate are of good quality, properly proportioned, and well mixed. The aggregate for blocks of ordinary size should be crushed stone or gravel not larger than one-half inch. One of the chief causes of complaint against the concrete building block is its porosity, but this defect is in a great measure due to the fact that in an endeavor to economize, too little cement is frequently used. It is not unusual to give the blocks a facing of cement mortar consisting of about 2 parts sand to 1 of cement, while the body of the block is composed of a concrete of sufficient strength, though not impervious. This outside layer of mortar adds practically nothing to the strength of the block, and is used simply to give a uniform surface and to render the face of the wall more nearly impervious to water.

It would not be practicable, as a rule, to attempt the manufacture of concrete blocks without one of the many forms of molding machines designed for the purpose, nor would it be economical to purchase such a machine unless a sufficient number of blocks were required to justify such an outlay. Blocks in almost any desired shape and size, with either plain or ornamental faces, may be obtained on the market, and in the great majority of cases it is best to buy them from some reliable firm. Among the advantages claimed for hollow concrete block construction may be mentioned the following:

(1) Hollow-block construction introduces a saving of material over brick or stone masonry.

(2) The cost of laying concrete blocks is less than for brickwork. This is due to the fact that the blocks, being larger, require a much smaller number of joints and less mortar, and, being hollow, are of less weight than solid brickwork.

(3) A wall constructed of good concrete blocks is as strong or stronger than a brick wall of equal thickness.

(4) Concrete blocks, being easily molded to any desired form, will prove to be far more economical building material than stone, which has to be dressed to shape.

(5) Experience has proved concrete to be a most excellent fire-resisting material.

(6) Concrete blocks, being hollow, tend to prevent sudden changes of temperature within a house, making it cool in summer and easily heated in winter.

(7) The hollow spaces provide an easy means for running pipes and electric wires. These spaces may also be used wholly or in part for heating and ventilating flues.

How Hard Wall Plaster Stood the Test

By J. M. CURRY

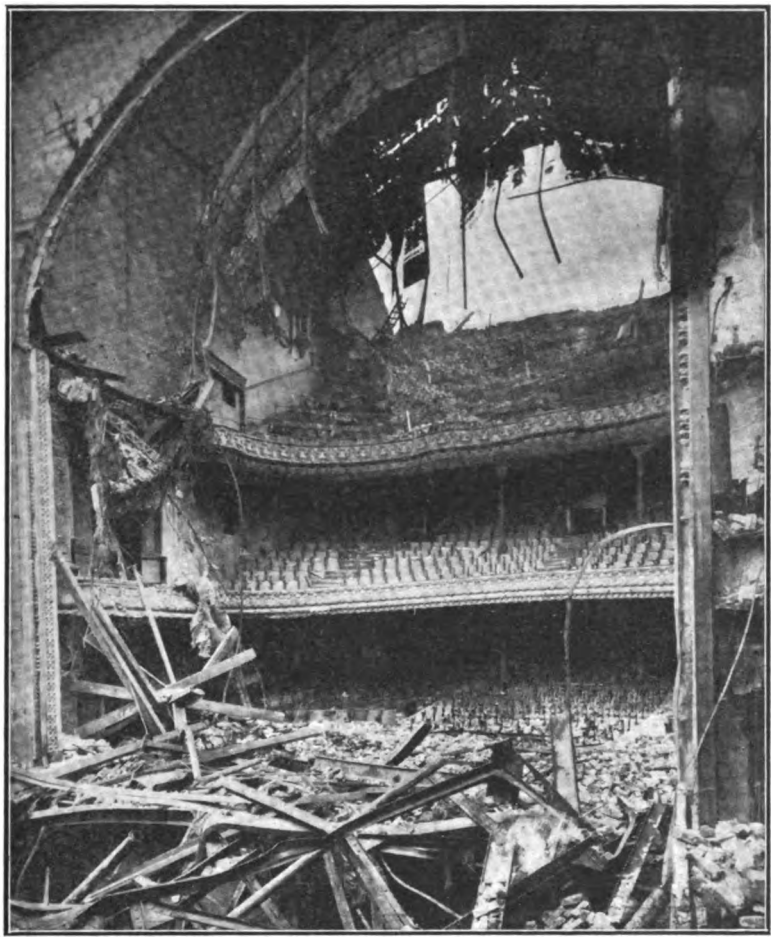
President and Manager of the Empire Plaster Company.

IN these rebuilding days when all building materials are being closely scrutinized and inquiries made as to how they stood the test of the quake and fire, those of us in the business who do not have to lie down and acknowledge that our material has not been a success and what we claimed for it, can at least have the satisfaction of saying, "I told you so." I have claimed that hard wall plasters, made from pure gypsum (sulphate of lime) are the only successful pastering materials. In my investigations since April 18th I have yet to find the first piece of it shaken from the walls where the buildings were not destroyed by fire, and not one job cracked enough to require repairing, while I have furnished at a low estimate at least five hundred tons of hard wall plaster in the past two months to repair broken plastering where the original plastering had been done with lime mortar.

I was especially pleased with the test of hard wall plaster in two buildings—one in Richmond, Contra Costa county, and the other on Rivola avenue, San Francisco, both being the homes of plastering contractors. The former is a six-room cottage plastered both outside and inside with hard wall plaster on wooden lath. The owner said he thought the house was being shaken to pieces, but after the temblor was over he could not find a crack in the plastering, while the other houses in the neighborhood plastered with lime mortar were totally wrecked. The house on Rivola avenue was plastered with lime mortar except the basement, which was done with a hard wall plaster. There was not a crack in the basement, while the plasterer had a fairly good-sized job repairing the remainder of the house.

In the burned district I found, except where the heat was so intense as to warp the metal or destroy the wooden lath, that the hard wall plaster had withstood the fire splendidly. When it was on brick walls it had to be removed with picks, while brick walls that had been plastered with lime mortar were left as clean as if they had never been plastered.

In the past few years some plaster manufacturers have attempted to cheapen their material by introducing a too bulky fiber or add too much sand, clay and other adulteration to make an easy spread, and some architects even specify plaster used in conjunction with lime mortar, which is another adulteration that is of no benefit, being quite as expensive and not nearly so good as pure plaster. Twenty-five years' experience with hard wall plaster has convinced me that commercially pure plaster of paris (calcined gypsum) properly retarded, mixed with the right proportion of clean, sharp sand, makes the ideal plastering material. It is moderate in cost, free from stain and an added strength to the wall in light construction. It has proved to be both earthquake and fire proof.



Interior View of the Majestic Theatre Photo by Walters

Inexpensive Homes

Two wretched looking tramps were brought up before a justice of the peace. Addressing the worst looking one, the justice said:

"Where do you live?"

"I've got the room above him, your honor."

"And where do you live?" said the justice, addressing the other.

"Nowhere."

There are men who seem to think it is better to be well-heeled than whole-souled.

"Why don't you wear that lovely dress you've got upstairs, Mummy?"

"Oh, I keep that for when ladies and gentlemen come to dinner!"

"Couldn't we pretend father was a gentleman for once, 'cos then you could put it on tonight?"—Sketchy Bits.

Terra Cotta and Brick

Brick In San Francisco

ALL sorts of stories have been told about the stability of brick buildings during the San Francisco earthquake. It has been said that brick buildings were shaken down, while others stood, but this assertion has been entirely unsupported by undisputed facts. What occurred before the fire broke out is at best but a misty memory to those who were present. And after the fire had run its course, so few buildings were left standing that it was impossible to say whether the earthquake or the fire was responsible for the wreck. Until there has been a fair test of brick buildings during an earthquake, unaccompanied by fire, it will be manifestly unwise to attempt to pass judgment upon the stability of brick structures or their power to withstand the tremors to which the earth is frequently subjected in some portions of the world. But, admitting for the moment the argument that brick buildings were shaken down, it can be said so were stone and wood structures, and it is perfectly safe to conclude from what has gone before that there will be no cessation in the use of stone or wood as a building material in consequence. If it is true that wood is shaken down by earthquake shocks, as it has been many times, why not cease building with wood in earthquake countries? It would be quite as reasonable to condemn wood as it would to condemn brick. One is no more likely to be destroyed by earthquake shocks than the other, yet there is a terrible hue and cry raised about the instability of brick, while wood is considered as safe as it ever was. Brick is quite as safe for tall buildings as stone. If properly placed about a steel frame, there is no reason why an earthquake shock should destroy it, unless it was sufficiently powerful to destroy wood or stone or any other building material at the same time. It is not against brick alone that the criticism of the construction engineers and architects should be directed, but against all materials which did not stand the shock, and that would include them all. The truth is that the brick walls, or the pieces of brick walls left standing after the fire, are quite as numerous as are the stone walls or the steel walls or the wood walls. The ruins contain quite as much brick as any other building material in quite as good state of preservation. There is absolutely no proof that the brick walls were not as stable as any other sort. There is no proof that brick walls succumbed before others, and there is no proof that brick isn't quite as safe for rebuilding as wood, stone or concrete.

What is needed in this controversy is a close adherence to facts and a disposition to give each variety of building material a fair chance with other varieties. Brick has withstood quite as great disasters as other building materials, and the ruins of San Francisco contain no proof to the contrary.—The Clay Worker.

Mr. Blinx's Bricks

How He Secured Material for the Only Brick Foundation Walls in Storkville Center

"THE only man in Storkville Center who had a house with brick foundation walls," said Colonel Calliper, "was Robert Blinx. Not but what bricks are to be had in plenty in that locality, for there is a fine pit of brick clay in the neighborhood, but stone is cheaper still in that rock-ribbed region, and the universal custom there was to carry the cellar walls up to the first floor of the same material.

"And so, when Robert Blinx built him this house with above-ground foundation walls of brick, why, naturally, those brick supporting walls were considered remarkable, but the walls themselves were not nearly so remarkable as the manner in which the brick contained in them were obtained, with the incidental fact that Mr. Blinx got his bricks for nothing.

"Mr. Blinx, as it happened, lived a little out from the center, on a road to the brick kilns, and right back of his place, on another parallel road, there was a row of cottages, occupied by men who worked in the brickyard.

"Now, Blinx had cats, and it was not long after he came there before his cats became a great annoyance to his brickmaker neighbors in the rear. The cats would come out into Blinx's back yard and garden of nights and howl and yowl frightfully and disturb the brick men's sleep.

"Pretty soon, as people do everywhere at other people's cats, the brickmakers began throwing things at Blinx's—bootjacks and old shoes and the usual things like that—with the usual ineffective results, until finally one night, just by the merest chance, one of the men picked up and threw at the worst of the cats a brick, which landed fair and square on its mark, with results most gratifying to the brickmakers.

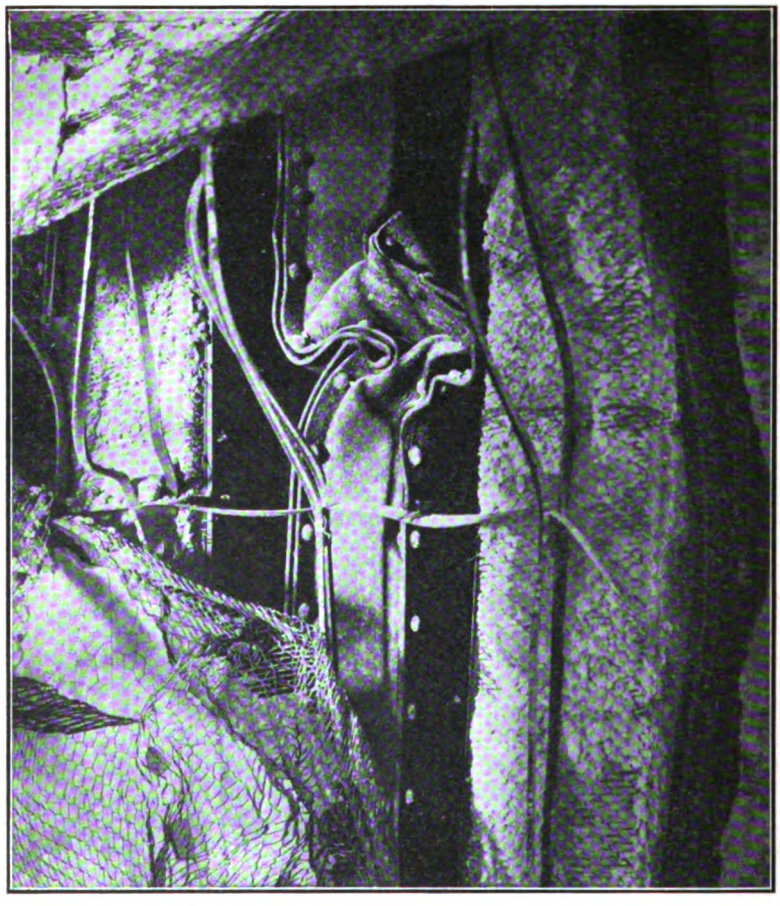
"After that they threw many bricks, which rarely hit what they were aimed at, but which did tear up Mr. Blinx's back yard and garden something scandalous. And then the throwing of the bricks suggested to Mr. Blinx an idea.

"Mr. Blinx came to think about building a new house. And he was a thrifty man, always saving where he could, and when those bricks began to come over he had an idea. Blinx set about collecting the bricks thrown at his cats, the mason having told him that if he built of that material his top foundation walls would require about 4,000 bricks.

"There was just a post and rail fence running along the rear of Mr. Blinx's property, between that and the brick men's yards, and now he put up, at the foot of his yard and garden plot, a six-foot board fence, setting it back about six feet, so that when the bricks struck it they would fall on his own land.

"All cats, everywhere, like to walk on the tops of fences, and all cats seem to welcome meeting other cats there as an amply sufficient provocation for clawing and spitting, fighting and howling; and no sooner had Mr. Blinx got his fence up than all the cats in Storkville Center, apparently, came nights to walk on it, and what had seemed the frightful howling of Blinx's cats seemed now to the sounds produced by this new great band of cats as but the feeble tuning up of a few scattering members of an orchestra to the gale that breaks loose when the whole outfit gets going.

"The brick men were stirred accordingly, and night after night, when they came home from work, they brought valises and carpet bags full of bricks, and when the cats started up they did. With the first squeak of



Showing a Buckled Column in the Fairmount Hotel

a cat you'd hear a brick land against the board fence, and when the cats got going—why, humph!

"I've heard what some persons thought was quite some racket in back yards here in the city when cats were caterwauling, but all that would be child's play to what you could hear out in this quiet country place when the bricks were thundering on Blinx's board fence and forty cats on top of it were wailing and screeching and screaming above the uproar.

"All this was music to Blinx. Why, he told me that on a number of mornings he carried away five wheelbarrow loads of bricks, and one morning he got seven. And in less than a month he had bricks enough for what he wanted, and to spare.

"Then he tore down the fence and drove away all the cats, his own included, and gave the neighborhood peace, and gave the mason orders to go ahead with the cellar foundation, and he had bricks enough left for the walls and pretty near enough left for his chimneys.

"Blinx is dead now, but the old house still stands, the first and only house with top cellar walls of brick ever built in Storkville Center."—New York Sun.

More First-Class Designs and Good Steel Construction Wanted

By W. W. BREITE, C. E.

WHILE a vast amount of literature has appeared on the subject of the seismic disturbances and consequent conflagration which visited the city of San Francisco several months since, much has been written of them that upon examination and investigation has not only been found to be misleading but untruthful as well.

The inability to make a comparison with some previous event of a like nature and equally as disastrous, has had a tendency to make many exaggerate, and the fear to be outdone by others has led some, under the stress of excitement at the moment, and while the city was still in a chaotic condition, to express views which now are seen to be absurd.

None will deny that the primary cause of the catastrophe was the earthquake, but to say that the responsibility for the destruction was mainly due to this, is not true.

A conservative estimate of the loss due to the quake made by a board of experts competent to judge, has been placed at about three-quarters of one per cent of the loss due to the fire immediately following, and the statement has well been made that, were it not for the fire, business would have quickly assumed its normal aspect, and the "shake" would have been a thing of the past, long ago.

Directly after the calamity there sprung up in our midst a multitude of experts, each and every one of whom rushed into print with his views and reasons, deducted in many cases from a very casual, superficial examination and in many other cases from no examination whatsoever.

Honest, competent criticism, together with common-sense discussion, should be encouraged, but derision and ridicule should meet the views and opinions of many of these so-called experts.

Thus we are told that "heavy stone ornamentation should not be hung to steel frames," and, again, that "heavy stone ornamentation should be securely tied to steel frames"; that "wooden joists should be securely anchored to tie the brickwork," and, again, that "wooden joists should not be anchored so that they wil not pull down the brickwork when the burn and drop away"; that "nothing is absolutely safe but steel-cage construction," and, again, that "brick construction is as safe as steel cage."

The steel expert tells us that steel is the only thing, the concrete expert likewise insists on concrete, the terra cotta man on terra cotta, the brick man advocates brick, and the lumber man has just as strong and convincing an argument on the superiority of frame buildings.

In fact, the mass of opinions and evidence along all lines is just as convincing, apparently, for, as well as against, any particular method and kind of construction.

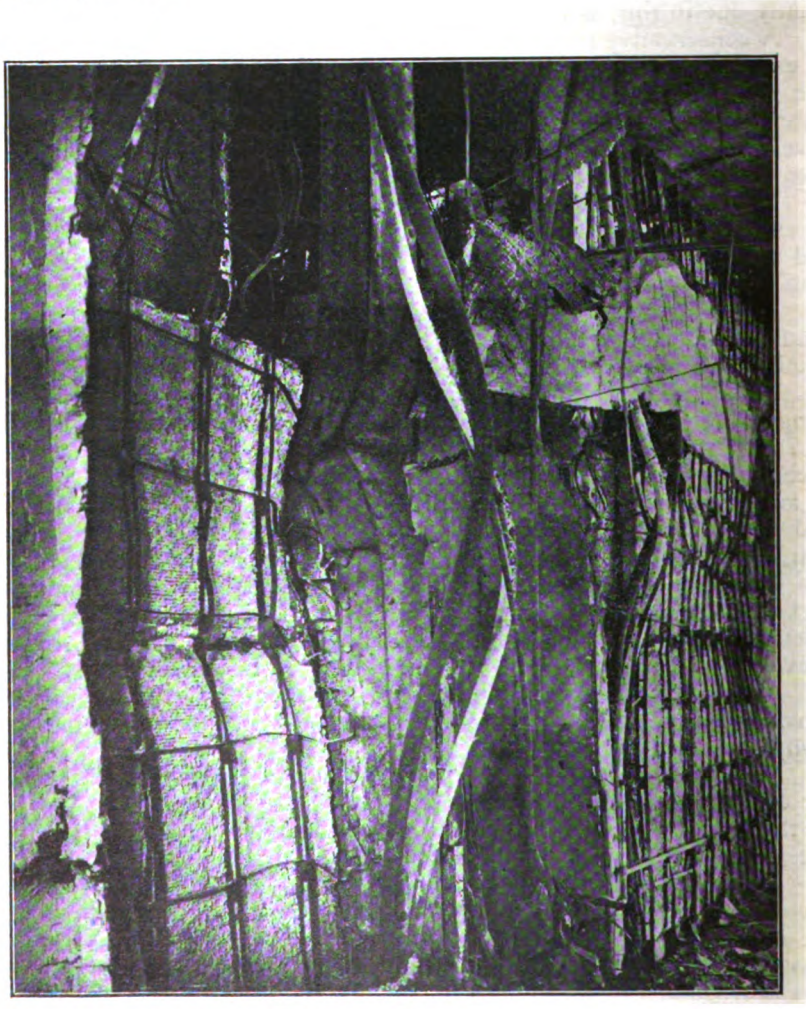
Each and every form of construction has its particular adaptability for certain kinds of buildings, but to insist that all buildings, irrespective of their uses, should be of steel, or of concrete, or of brick, or of any one particular form or kind, is certainly absurd.

Many suggestions have been made as to the building of earthquake proof and fire proof buildings, but it is the consensus of opinion that in the main there seems to be no need of changing the present methods. That there are many ways in which many of major and minor details of construction can be improved upon is an admitted fact, but these are mere matters of details, and hardly need a calamity such as we have had to bring them to the notice of any person of sound judgment.

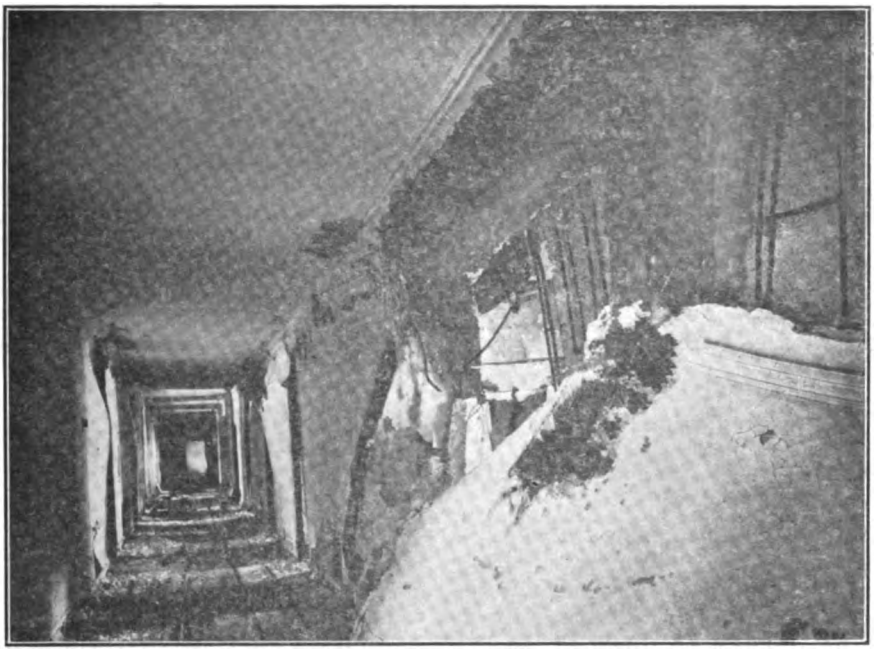
The pith and point of the many lessons to be derived from the recent catastrophe resolves itself into the question of good design and competent, honest workmanship and quality of material.

We need no earthquake or fire to illustrate the fact that half an inch of plaster will not fire proof, that bracket connections are inferior to gusset plates and knees, that lime mortar is not as good as cement, that poor workmanship is dear at any price, or, in summarizing, that poor design, detail and cheap construction is inferior to first-class design and first-class construction.

Let us heed well the lessons we have learned, and in future build as we should build, with nothing but the best materials, workmanship, brain and brawn, and honest, conscientious endeavor, and we may rest assured that our city will never again be visited with a calamity such as she has recently experienced.



Buckled Columns in the Hotel Hamilton



View on the Second Floor of the Fairmount Hotel

Effects of the Heat on the Fire-proof Tiling in the Union Trust Building

Interior Decoration

Wall Papers of Olden Times

By C. WALTER TOZER

THERE is a great deal being written now of old-time wall papers, due to the recent revival of the colonial decoration and furnishing which is now so much in vogue. The fad of collecting antique American furniture has naturally evolved an interest in wall papers of colonial pattern, and such antique wall papers are exceedingly rare today, owing to their perishable character. Although there are not a great many of these old wall papers in existence, still there are some to be found in New England, New York, Virginia and Georgia. There are indeed but a few houses in which these old papers have survived the workings of time and fortune. For the most part they have gone the way of perishable things. The few that exist in the Eastern States are fast disappearing, and just as they are going, the attention of the twentieth century decorator is turning to them again for a novelty, and some few of the old scenic papers are today being reproduced or imitated.

The artist and illustrator of the past have represented colonial interiors painted or with whitewashed walls, while as a matter of fact, when investigated thoroughly, they should show panoramic views, scenes from mythology and literature, landscapes with people, animals and birds —the architectural masterpieces of the Old World and the New.

Mr. R. J. Waring, the prominent English decorator, who was in New York early in April, said the colonial was our best style. He also said the colonial style could easily be developed from where it had been dropped, if clever workmen were instructed in the principles of style and were allowed to bend all their energies to its improvement.

The real antiques have now suddenly become very valuable, and their possession is becoming a source of great pride, especially in New England. Only back to 1880 it was said: "One can hardly estimate the courage it would take to own that one liked an old-fashioned paper." And now, in 1906, all the best manufacturers of wall papers are reproducing the very old designs, for which they find a ready sale among the most fastidious searcher for the beautiful. One wall paper importer says: "Yes, old-time wall papers are being revived, and no concern is taking more interest in the matter than ourselves. Among old designs which have not been printed for thirty or forty years, some have been taken up and done in colors to suit the tastes of the period, and we find that few of the new drawings excel, or even approach, the old ones in interest."

Wall paper was not manufactured in this country to any extent until as late as 1830. Most of the papers even then were imported. Those

which remain to us from Revolutionary days nearly all came from France. In the New England States the papers were chiefly scenic in type, while in the South they were of purely ornamental pattern, of the Louis XV. type. A fine landscape paper is still to be seen in Andrew Jackson's old home in Tennessee.

In those days, however, the printing of wall paper was an entirely different matter. All the wall paper printing was by hand with square, flat blocks, while today circular blocks turn out repeated patterns by the mile. Now one machine can hold a dozen blocks or more, each carrying a different color, while it took dozens of these blocks, formerly, to print one of the patterns which extend for several feet each way without a repeat, particularly where several colors were used.

Hand printing requires great patience and precision, but machine printing is merely a matter of careful attention to the machine. During the early commercial prosperity of some of the New England towns, their ships brought from foreign lands rolls of rare wall paper. Some of these decorated the homes while others reposed in some out-of-the-way place. There was really little thought given to the value of these artistic designs, and they were so carelessly treated that today they show plainly, on their surface, the ravages of time. Others, more tenderly cherished, are as fresh in their coloring as when first placed on the walls.

One paper found in an old Massachusetts home had the beauties of the Bay of Naples, with Mount Vesuvius in lively eruption, depicted on the walls.

Another, in an old Salem home, represented scenes from the life of Don Quixote. The paper is brown in coloring, with a background of white, and the panels depict phases of his journey, the first showing the eccentric knight taking his oath of allegiance before starting out on his career. Each panel is a story in itself.

Venetian scenes are also found in a number of these old papers. One has a background of red on which are thrown Venetian scenes in brown and white. Another is gray in coloring and represents scenes in Venetian life.

A group of peculiar wall coverings is described in a recent book by Kate Sanborn, entitled "Old Time Wall Papers." This, because of its intense interest, we will quote:

"In the year 1793 General Knox sent a party of workmen from Boston to build a summer residence on the banks of the Georges River. The mansion was to be much a French chateau, and was often so designated by visitors. It had several rooms which have long been an object of interest to those who visited the old house in recent years. The front entrance faced the river. The first story was of brick, containing the servants' hall, etc. The second floor had nine rooms, the principal of which was the oval room, into which the main entrance opened. There were two large windows on either side of the door, and on opposite sides were two immense fireplaces. This room was used as a picture gallery and contained many ancient portraits. It also had a remarkable clock. It was high, and the case was of solid mahogany. The top rose in three points, and each point had a bras bal at the top. The face, instead of the usual Roman numbers, had in Arabic, 1, 2, 3, etc. On the two small dials on each side of the case were little windows showing machinery. Beside the two windows, on one side of the room, was a magnificent mahogany bookcase, twelve feet long and elaborately trimmed with solid silver, which had belonged to Louis XIV.

"One room in the building was called the 'Gold Room,' and everything in it, even the counterpanes, was of gold color. The walls were covered with yellow paper—yellow as buttercups. Another room was papered with a magnificent pictorial paper, which had a background of sky blue, on which were a wreath, with torches, censers, with flowers above, and two loving birds, one on the nest and the mate proudly guarding—all in light brown and gray, with some sparkling mineral, or the tiniest particles of glass, apparently sprinkled over it, which produces a fascinating glitter and raised applique effect. This room was used as a dining-room.

Still another room was papered with scenic paper, representing the seaport town of Gallipoli, of European Turkey; armed men are marching, and you can see the water and picturesque harbor, and Turkish soldiers in boats. The red of the uniform brightens the picture, with a background of gray, and the views are enclosed in harmonious grounds, suggesting trees and rocks. The paper came in small pieces, before rolls were made."

In her interesting book the author also tells of the death room in certain New England residences. These depressing rooms had but one window. The paper was dark and gloomy—white, with black figures, and a deep mourning frieze. Benches were arranged stiffly around the sides, and there were drawers filled with the necessities for preparing a body for burial; linen and a bottle of camphor were never forgotten.

There are a number of these old papers we could describe, but for want of space we will let these descriptions suffice.

We are indeed fortunate that before the destruction of all these wall papers the fashion had turned backwards and with the revival of the love for antiques many which would have been destroyed have been carefully treasured.

Not only should these old wall papers be sought for and their preservation encouraged, but they are worthy of study by all who are interested in the revival of the colonial style. The true colonial room in the American home should be decorated with a paper of this type—possibly over a white wooden wainscoting.

The old papers were designed for old conditions. They were placed on old walls in old houses; the furnishings of these apartments were, in most cases, contemporaneous with the old-time papers.

Modern houses represent conditions wholly new and modern. Objects of beauty are always beautiful wherever placed and wherever kept; but old furniture, old pictures, old ornaments only yield their fullest value of beauty and significance in an environment that recalls their original habitat.

Old wall papers go as badly with new furniture and new rooms as can be imagined. Old wall paper calls for old furnishings much more loudly than the furnishings demand the old paper. But a room harmoniously furnished throughout with old paper, old furniture, old-time rugs on the floor, curtains of old-time patterns at the windows and openings, will have a charm and beauty hard to equal.

Fashions in Wall Coverings

THE season brings around its fresh suggestions in the matter of wall coverings. Changes in wall coverings have more substantial reason behind them than most changes dictated by fashion. Modern wall coverings are not permanent. Paper, which is the most popular material, has little sanitary value. It readily absorbs dirt, loses its color,

and in many ways ceases to be both useful and agreeable at the same time. Other materials are hardly more sanitary, and hence the need for frequent change in the wall covering is very apparent in most houses. In the majority of cases, in fact, it is changed less frequently than it should be, a circumstance due, perhaps not so much to cost as to the inconvenience entailed.

Fashions in wall coverings, therefore, represent not only an advance and improvement proposed by the vendors of such wares, but correspond to an urgent household necessity. The chief thing to be considered in changes of this kind is not the obtaining of the newest fashion, but betterment. A satisfactory wall covering is often permitted to outlive its usefulness, because it is pleasant and agreeable; in a word, because it is satisfactory, and no idea occurs to the houseowner as to how to improve it. The simplest remedy in such cases is the best—to renew it. If that be impossible, for papers and fabrics popular at one time cannot always be duplicated several years later, make the new covering as close to the old as possible.

There are few more irksome tasks in household equipment, says American Homes and Gardens, than the selection of the wall covering. It is a matter that tries the patience of the purchaser and calls for the utmost tact on the part of the salesman. It is always safest to consult a trained decorator, and when several rooms are to be done over proceed on a related scheme. The trained decorator may not always give complete satisfaction, he may not always be the cheapest possible agent to employ, but his increased cost, if any, is more than likely to be compensated for in the superior quality of his work; and the occasions when he fails are certainly bound to be fewer than when the untrained housekeeper sets forth to recover her house without any idea of what to do or how to do it.

Changes in wall coverings can seldom be made too frequently. They can never be made without inconvenience; without more inconvenience than, for example, would attend a complete change in furniture. But with the first indication of wear a change should be made. The latest fashions may, then, be followed with advantage. Often enough there is nothing else to be done, and the improvement in taste, both among the manufacturers and the decorators, is so pronounced that the new work is likely to have charm that the older did not have.

Where Advertising is Valuable

Perhaps there is no more difficult problem in the world of business than to arrive at a fair judgment of the advertising value of space in a newspaper. In the nature of things this value cannot be definitely measured, as are yards of cloth or bushels of wheat or pounds of coal. It is as intangible as is the something that lifts a great picture above the level of a mere painting. The canvas of each may be alike, the colors from the same tubes laid on by the same brushes, yet the result may have a market value of $100,000 a square foot as a Meissonier or $5 a square yard as hack work.

Circulation is often the only claim to an advertiser's attention that a newspaper presents. But circulation alone is far from being the all in all. There must be circulation or there can be no advertising value. The more circulation there is the better for the advertiser—if the right people are reached by it in the right way. And there the problem appears. Who reads the newspaper is vastly more important to the advertiser in its columns than how many read it.—*N. Y. Herald.*

Among the Architects

The New Building Ordinances.

The Supervisors have adopted the new building ordinances which are fairly satisfactory.

In regulating the use of concrete, the ordinance provides that all reinforced concrete walls shall be at least six inches thick; that if the area of wall surface included between two adjacent columns and adjacent floor girders is between three hundred and four hundred square feet, the thickness of the wall shall be at least eight inches; that if such area exceeds four hundred square feet the thickness shall not be less than twelve inches, the walls being supported on steel frames at each story, and that if the concrete be not reinforced all walls shall be at least twelve inches thick. The ordinance also provides that in reinforced concrete walls the area of steel reinforcement shall be at least one per cent of the area of the concrete, one-half to be placed vertically and one-half to be placed horizontally, and that no reinforcement shall be spaced more than twelve inches apart. Additional reinforcement is to be placed around all openings, all reinforcement is to be wired at each intersection, and to be rigidly connected at columns and girders to the steel frame.

As regards brick, the ordinance provides that brick walls shall be at least eight inches thick; that brick shall be laid either in cement-lime or cement-mortar; that all brick except on the face shall be completely surrounded with mortar; that every sixth course shall be a heading course, and that all brick walls shall have a supporting part of the steel frame, which shall extend to within two inches of the face of the wall.

The ordinance provides that the height of sky-scrapers, Class A, steel-brick buildings will be limited to one and one-half times the width of the street on which they may be located.

Class B, fireproof buildings 102 feet; Class C building, with metal lath, 70 feet, and with wooden lath, 55 feet; frame building, 45 feet.

Class A and Class B buildings are to be built of incombustible materials, and allowed in any part of the city. Class A buildings are to have steel frames carrying all wall and floor loads.

Class B buildings are to be built either with steel or reinforced concrete walls supporting a part of the floor loads, or with walls self-supporting only, the floor being carried on the steel frame; all floors to be fireproof, and except the frame to be equal in all respects to Class A.

Class C buildings are to be built with brick or concrete walls and timber interior; to be in effect the same as class B. Class C buildings of this sort will be allowed in all parts of the city.

San Francisco Architectural Club.

The regular monthly business meeting of the S. F. A. C. was held in the new clubrooms at 1017 Steiner Street, July 11th, and a large number of members attended.

All of the officers were in their respective places and business was transacted as before the earthquake. The members seemed to be in good spirits and looked prosperous. About ten applicants for membership in the club were elected members, the majority being Eastern men who have come here since the disaster.

The classes in steel construction and design were reported as having good attendance. Mr. Chas. F. Archer advised those members who wished to join the steel class to do so at once or they would miss the preliminary work.

Before the meeting adjourned the house committee was requested to arrange for a banquet to be given in September.

Honor for Young Architect.

Mr. G. Albert Lansburgh, a Californian, who has just returned to California with the intention of making his home here, was awarded at this year's salon in Paris, a gold medal for architectural com-

position which he exhibited. News of the award was cabled to this city. The young architect received his early education in the public schools of San Francisco and at the University of California. He went abroad seven years ago, spent a year in travel, and devoted six years to study in Paris. He is a graduate of the Ecole Nationale des Beaux Arts at Paris, received his Government diploma as architect last year, was awarded several medals in the regular competition in the School of Fine Arts at Paris, and made an excellent record while at that school.

The Luning Building of Concrete.

The fifteen story Luning building, which forms the frontispiece in this issue of the Architect and Engineer, is to be built of reinforced concrete. The structure is to be built by Geo. S. Fife from plans by Architect Edward J. Vogel, at the intersection of Market, Drumm and California streets. It will be a handsome and stately building, and will cost $400,000. The entire exterior will be constructed of the best reinforced concrete and finished in handsome colors. The dome and main cornice will be of dull copper. The main entrance will be composed of steel, and equally fireproof material, while the main vestibule will be of polished marble.

Brick from the Ruins.

An important feature in the rebuilding of San Francisco will be the disposition to be made of the many million of fallen bricks from the ruins. Many of the best are being used after cleaning, a number of machines designed for that purpose having been brought here. The structural engineers' organization has taken up the subject of investigating the feasibility of utilizing brick bats in making concrete for building purposes. Several instances of their successful use in the vicinity of San Francisco are on record. The effects of the earthquake have demonstrated that concrete containing broken brick has stood as well as almost any other concrete.

The large four-story factory of the Pacific Coast Borax Company, on the marshes of Alameda, was constructed of concrete which contained a large quantity of broken brick taken from one of the pioneer buildings of San Francisco. The foundations of Gladding, McBean & Co.'s large terra cotta and pottery works, near San Francisco Bay, were made of concrete containing refuse from the terra cotta and brick plants. Both of these structures were uninjured by the earthquake.

Hearst Wanted to Erect Twenty-Six Story Sky-Scraper.

Another instance of the deplorable results of the new building ordinance limiting the height of a building in the business section of the city to one and one-half the width of the street, is had in the case of William R. Hearst, of the Examiner. Mr. Hearst had plans completed by the well known firm of Eastern architects, Kirby, Petit & Green for a magnificient twenty-six story office and newspaper building to occupy the site of the burned Examiner building at Market and Kearney streets. The plans are now being altered for a 12-story structure which is to be the limited height of all buildings except those for which permits had been issued previous to the fire.

General Mention.

Mr. Charles Edward Hodges announces that having severed his connection with the Leland Stanford Jr. University, after seventeen years' association with the same, he has opened an office at 1123 O'Farrell street, San Francisco. He will give careful and prompt attention to all classes of architectural work and designing. Mr. Hodges already has quite a little work on hand, including a Sorority house in Palo Alto and two residences. Mr. Hodges had planned to go abroad but business has detained him, and his friends are naturally elated.

The Library of Congress is anxious to complete its file of the Architect and Engineer, and the librarian would greatly appreciate the courtesy of the gift of a complete file if any of our readers feel like making the donation. Free mailing labels to be used in forwarding the magazines may be had by applying at the office of the Architect and Engineer, 621 Monadnock building.

Messrs. D. H. Burnham & Co., announce that Willis Polk, formerly of Wright & Polk, and William C. Lewis of New York, are now associated with them in their Pacific Coast work and that they are forming in San Francisco an architectural organization for that territory, including a complete corps of designers, constructional and mechanical engineers.

THE BUILDING RECORD.

Permanent and Temporary Structures Planned by San Francisco Architects.

Two Story Brick Building—Alcatraz avenue and Adeline street, South Berkeley.

Architect—William Knowles, Union Savings Bank Building, Oakland.
Owner—J. H. Spring, Berkeley.
Cost—$30,000.
There will be stores on the ground floor and apartments on the second floor.
Mr. Knowles is also the architect of the Wright Block on Center street, Berkeley, which was described in these reports last week. Mr. Knowles is also making plans for several residences to be built at Piedmont.

Fraternity House — Stanford University, Palo Alto.
Architect—Charles E. Hodges, 1123 O'Farrel street, San Francisco.
Owner—Gamma Phi Beta Sorority.
The architect is ready to take figures on this building, which will be of frame construction, shingled exterior, bungalow type, and modern interior finish.

Brick Warehouse—Fifteenth street, San Francisco.
Architects—Meyer & Ward, Wells, Fargo building, San Francisco.
Owner—San Francisco Development Company.
Cost—$85,000.
Work on this building is under way. A third similar structure will be started as soon as contracts are let. The building will cover a lot 100x188 feet. It will be of brick and four stories high.

Theater—Napa.
Architect—W. J. Cuthbertson, 1231 O'Farrell street, San Francisco.
Owner—John Hayes.
Cost—$20,000.
The building, upon which work has recently been started, will be of pressed brick, two stories and will have a seating capacity of 1000.

Residence—Pine street, near Polk, San Francisco.
Architect—W. C. Mahoney, 1231 O'Farrell street.
Owner—Mrs. Roberts, 2630 Sutter street.
Cost—$7500.
This will be the first substantial residence to go up in the burned district, since the fire. The Roberts family had lived in that locality for 40 years and they are anxious to return to it. The house will be up to date in every respect and will contain considerable hard wood interior finish, tile vestibule, marble steps and other features.

Eight Story Building—First and Market streets, San Francisco.
Architects—Meyer & O'Brien.
Owner—Mr. Hooker of Hooker & Lent, real estate dealers.
Cost—$100,000.
The building will be of brick and reinforced concrete. There will be two elevators.
For the Lent Estate the same architects have plans for an eight story office building, Class A, of brick and terra cotta, cost $120,000, to be built at the corner of Post street and Grant avenue.

Bank Building—Alameda.
Architects—Oliver and Foulkes.
Owner—Citizens National Bank.
Cost—$40,000.
Plans have just been completed and figures are being taken for a two story building to be either of stone or concrete. The size of the structure will be 33x100 feet. The bank will occupy the ground floor, with offices above.

Temporary City Hall and Municipal Building—San Francisco.
Architects—Shea & Shea.
Cost—$150,000.
Plans have been prepared for a frame building and bids will be taken as soon as the location has been decided upon. A lot at Eighth and Mission streets has been offered the city for a period of five years. The building will be built either on this lot or on the small park close to the old city hall.

Four Story and Basement Building—South Side of Pine street, west of Van Ness avenue.
Architect—Chas. J. Rousseau, 820 Stanyan street.

Church—San Jose.
Architect—J. Cather Newsom, San Francisco and San Jose.
Owner—First Methodist Church.
Cost—$35,000.
Plans have just been accepted for this edifice which will be erected at the corner of Fifth and Santa Clara streets and will be on the Mission order of architecture. There will be a seating capacity of 1000. The exterior will be plastered, while the interior will be entirely of wood.

Residence—Berkeley.
Architect—A. Dodge Coplin , Bacon Block, Oakland.
Owner—Mrs. D. Ramsey, Piedmont Boulevard, Berkeley.
Cost—$15,000.
The house will be on the mission style, the entire interior will be laced up in a steel net over double diagonal close sheathing. A cement exterior, tile roof, reinforced chimneys and foundations will be features of the building.

Bank Building—First and Santa Clara Sts., San Jose.

Architect—Henry A. Schulze, Atlas Building, San Francisco.

Owner—Bank of San Jose.

Cost—$75,000.

Plans for this building have just been completed. They call for a five-story structure of reinforced concrete and earthquake as well as fireproof in every particular. There will be about thirty offices to a floor.

Hotel—Gough and Sutter streets, San Francisco.

Architects—Coxhead & Coxhead, 2322 California street, San Francisco.

Owner—Gustav Mann, present manager of the Hotel Majestic.

Cost—$100,000.

The building will be Italian Renaissance and four stories. There will be two baths for every three rooms or a total of 185 bath rooms. The main entrance will be on Sutter street, in the form of a semi-circular driveway and court, 30 feet high. There will be a private electric light and power plant.

Lick Baths—Tenth and Howard streets, San Francisco.

Architect—J. W. Dolliver Atlas Building, San Francisco.

Owner—Lick Estate.

Cost—$20,000.

The old bath house was badly damaged by fire and plans are being made for the rebuilding of the structure of reinforced concrete foundations and partitions and brick and terra cotta front. Mr. Dolliver also has plans for an apartment house and two residences.

Apartment House—North side of Sutter street, east of Mason, San Francisco.

Architects—Hemingway & Miller.

Owner—Abe Marshall.

Cost—$125,000.

The building will be seven stories. Class B, buff pressed brick, galvanized iron and bronze. There will be two stores and 120 rooms with 60 baths.

Alterations and Addition—Fourteenth street, Oakland.

Architect—Henry F. Starbuck, Oakland.

Owner—Mackay Furniture Co., Oakland.

Cost—$60,000.

A contract has just been let to John C. Ince of Los Angeles for alterations to the Mackay Company's present building in Oakland and the addition of three stories, making six in all. The front will be taken down level with the top of the second story, to be rebuilt of steel and brick. Up-to-date systems of electric heating will be installed.

Reinforced Concrete Building—West side of Battery street, San Francisco.

Architect—Ralph Warner Hart, San Francisco.

Owner—American Biscuit Co.

Cost—$300,000.

The building will be five stories and will occupy an entire block. R. L. Dunn is manager of the Biscuit Company. Mr. Hart will go East shortly to get ideas which will be embodied in the new building.

Five Story Building—Mission and Minna streets, San Francisco.

Architects—Henry A. Schulze.

Owner — Monroe - Greenwood Estate Company.

Cost—$75,000.

This building is to be Class C, mill construction and will be 160x32 feet, equipped with sprinklers, etc. It will be occupied by the Pacific Coast Paper Company.

Warehouse — Drumm and Pacific streets, San Francisco.

Architects—Armitage & Rowell, San Francisco.

Cost—$10,000.

The building will be built by the day. 80x120 feet and one story. The same architects are at work on plans for a 10 story Class A building to go on Kearney street and a five story steel and reinforced concrete building to be built on California street.

Three Story Brick Building—Front and Oregon Sts., San Francisco.

Architect—Theo. H. Skinner, Atlas Building, San Francisco.

Owner—Henry P. Sontag.

Cost—$18,000.

Plans are now ready and bids are being taken for this building, which will be of mill construction, three stories and basement.

College Dormitory—College Park, San Jose.

Architect—J. Cather Newsom.

Owner—University of the Pacific.

Cost—$20,000.

The building will be on the mission style of architecture, two stories and will contain 56 sleeping rooms. The exterior will be finished in doshed work in Portland cement on metal lath. The space between the studed partitions will be filled with silocel. The roof will be of tile.

Apartment House—Southeast corner of Oak and Steiner streets, San Francisco.

Architect—James Booker, 500 Fillmore street.

Owner—Scott Griffin.

Cost—$75,000.

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LEAVE US SOMETHING

It is unfortunate for California that so many exaggerations of the earthquake should have been sent out. Of course there was no opportunity to censor dispatches at the time they were being sent to all parts of the world, for there were other matters claiming the attention of the authorities then. Not until affairs began to return to their normal state and letters and newspaper clippings arrived did it dawn upon the Californian how seriously the Golden State had been injured by stories of wreck and ruin by the temblor. We learn that some of these reports were filed from points outside the State and we dare say they would have been quite as truthful had they been written in the city or town in which they were given publicity. The impression given the world was that the whole of California had been engulfed, or partly so, at least, by a terrible earthquake and that practically nothing had been left standing.

This brings us to the point which we want to emphasize—the fact that we have a few world famous pieces of architecture left, yellow newspaper reports and graphic magazine writers to the contrary, notwithstanding. These buildings stand up just as majestically, just as impressively, though possibly a little more somberly, because of the devastation about them, as they did before Mother Earth rebelled. We have in mind the Claus Spreckels' building, pictured by the Christian Advocate of London crumbling to pieces under the violent motions of the earth. The Spreckels' building stands today as it stood the day it was finished—a monument to good architecture and workmanship, entirely unharmed by the earthquake, damaged only immaterially by fire.

The Mission Dolores, reported entirely destroyed, was unharmed by either earthquake or fire, while

the Cliff House, said to have toppled into the sea, is the same Cliff House today as it was a year ago.

An Ohio architectural publication laments the destruction of the historic Santa Barbara Mission and devotes a number of pages in describing and illustrating the delightful features of this "once" picturesque mission. Anxious that the mistake be rectified and the true conditions be given to the world Sudger Glauber, Father Superior of the mission, has written to the Architect and Engineer as follows:

"Thank God, our old Santa Barbara Mission has not been injured or damaged in the least by the earthquake of April 18, 1906. We scarcely noticed the movement of the earth on that day, although we were in the mission church or about the mission at the time of the shock, 5:15 a. m."

From one of our valued exchanges in Baltimore is printed the startling information that the classic new Custom House was "totally demolished by the quake and fire." A full page is taken up to show an illustration of the Custom House "before the quake." The publication of this would be serious if it were not so funny, since the Custom House has not yet been built, the contractors having only recently completed the excavating.

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CONCRETE TO BE A FACTOR IN REBUILDING

It has become a recognized fact reinforced concrete will play an important part in the upbuilding of San Francisco. The closest adherents to this type of construction could wish for no better showing than that displayed in the recent disaster. In addition to the limited foundtion and fireproofing use of this material which heretofore prevailed, we may expect to see buildings eight stories in height, entirely of concrete, which state of affairs will be a direct result of its recent good behavior.

Naturally, the question of comparative cost of reinforced concrete construction and other forms is a mooted one. Generally speaking, the reinforced concrete building, as far as the structural elements are concerned, is about 25 per cent cheaper than the steel building and the total cost of the former, including finishing, is about 12 to 15 per cent less than the latter for the average building. Compaartive estimates on reinforced concrete building and Class "C" buildings, having brick walls and timber floors, show that there is but little, if any, increase in cost for the former construction over the latter type.

Can anybody claim that a building with brick walls and timber floors is the equal of one entirely of concrete?

W. P. DAY, C. E.

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STATE BOARD'S SUGGESTIONS

The State Board of Architects has made the following suggestions in relation to the restrictions of the new building ordinances in San Francisco.

Thorough inspections and investigations have been made through the burnt district and it has been found that safety is not a question of style of architecture, but quality of workmanship.

Cornices and arches need not be excluded from the new city. Where they were properly anchored and built they withstood the shock and the fire both. It is the opinion of the board that the city beautiful need not be without its picturesque cornices and decorations The Call and Kohl buildings are proof enough that good work on decorations will insure them against destruction.

The pile foundation has been found to be the most substantial. In the earth's vibrations it rests as does a chip in water. And the building rests securely upon it. Forty-five feet is advised as a safe depth for either pile or concrete foundations.

The height makes no difference in the matter of safety. Any building supported by what is known as the cage, steel frame will withstand any ordinary "number nine" shake. It is necessary for San Francisco to have its high buildings. With proper workmanship they can be built in such a way that they will be absolutely safe.

Bay windows are not considered safe. Though it is strongly urged that decorations be permitted, few projections should be allowed.

• • •

THE CEMENT SITUATION

The cement situation is really growing serious. Ordinarily, it would be possible, perhaps, to supply the demand but in view of the great number of reinforced concrete buildings that are going to be put up in the reconstruction of San Francisco, those in a position to know, say it will be next to impossible to supply the demand.

The California cement companies are running their plants night and day and they are also building substantial additions to their works. Foreign cement has been ordered by the ship load and the Eastern market is being called upon to relieve the situation, although heretofore there has been an iron clad agreement that the Eastern product should not be brought into competition with the local output.

The big construction companies have been forced to order their supply abroad. Until it arrives they will have to depend upon the local output for immediate needs. Many would use the California product exclusively if it were possible to get enough as it has frequently been claimed that the cement made here gives better satisfaction in this climate than that imported.

The supply of cement throughout the United States is extremely limited, and it is calculated that a cement mine would be worth as much now as a gold mine. Prospectors are abroad in the State trying to locate mines, and capitalists from the East are on the ground looking into the situation. The cement works in the East have all the orders they can handle in that part of the country, and it is extremely doubtful if much cement can be brought to this city from other points in the United States.

The following figures showing the average annual importation of Portland cement into the United States from 1890 to 1904 and the actual importations for 1905, may be found interesting at this time:

Period.	Barrels.	Value.
1890 to 1894	2,601,000	$3,415,000
1895 to 1899	2,013,000	3,115,000
1900 to 1904	1,863,000	2,497,000
1905	955,000	1,276,000

Thus, in fifteen years the United States has reduced the total imports of cement about 66 per cent, the sales of Great Britain being reduced from an average of $1,610,000 from 1890 to 1892 to $100,000 during the years from 1903 to 1905. In other words, instead of selling to the United States about 50 per cent of its imports of cement it now sells about 5 per cent of these imports.

Up to 1897 the export trade in American cement amounted to practically nothing. From 1897 to 1900 the exports averaged 55,000 barrels annually, with a value of $113,000, as against imports of cement valued at nearly $3,000,000. In 1900, 76,000 barrels, worth $163,000, were exported, and in 1905, 1,067,000 barrels, worth $1,484,000, were exported. The steady growth of this export trade will appear from the following table of amounts and values for the years from 1900 to 1905:

Year.	Barrels.	Value.
1900	76,000	$ 163,000
1901	218,000	439,000
1902	329,000	652,000
1903	271,000	419,000
1904	362,000	530,000
1905	1,067,000	1,484,000

In 1903 the imports exceeded the exports by $3,130,000, while in 1905 the exports exceeded the imports by $210,000. Cement production in the United States is said to have averaged in the years from 1896 to 1899, 12,000,000 barrels, and from 1900 to 1903, 23,200,000 barrels.

We dare say the next three years will see a doubling of the latter figures, if not a trippling, and the San Francisco market will have been largely responsible, too.

* * *

STANFORD WHITE ARCHITECT AND ARTIST

The killing of Stanford White by Harry K. Thaw came as a great shock to the architectural and building world.

There is more than common local interest in Mr. White's death, because only a few weeks previous to the tragedy he had been asked to prepare plans for a number of large office buildings in the city of San Francisco, to replace those destroyed by the recent fire. Among these was a fourteen-story structure for Mrs. Hermann Oelrich.

It is likely that the architectural firm of McKim, Mead & White will complete the drawings. The firm has a reputation that is world wide, and some of the most imposing as well as famous structures of the country were the creations of the genius of Stanford White, while Mr. McKim, the senior member of the firm, was, a year ago, president of the American Institute of Architects.

Madison Square Garden, known in every section of the country, was of Mr. White's creation.

Harry Thaw, the pampered scion of a multi-millionaire, married Evelyn Nesbit, actress, a year ago. In years past Stanford White had befriended her and helped her to success. Jealousy is believed to be the cause of Thaw's act. Stanford White's friends declare, however, such a felling to be without excuse.

Stanford White was born in New York City on November 9, 1853. He was educated at the University of New York, where he was graduated as Master of Arts. At an early age, his remarkable artistic gifts having manifested themselves, he was given the advantage of the highest possible training, and studied architecture with Charles D. Gambrill and H. H. Richardson.

Deciding that the time was ripe for that artistic education which Europe alone can supply, he went abroad in 1878, where he remained for two years, studying and observing with a rarely critical eye the masterpieces of art in France and Italy.

Returning to New York, he then began a career that never has been equalled, from both an artistic and financial standpoint, by any modern architect.

The Washington Arch, at the foot of Fifth avenue, is one of his works. He also designed the new buildings of New York University, the Univeristy of Virginia, as well as the pedestals for the statue of St. Gaudens and other statues in New York.

Mr. White was a fellow of the American Institute of Architects and a member of the best clubs of New York.

Central Iron Works.

The Central Iron Works was fortunate in escaping the big fire which followed the earthquake of April 18. The company's good fortune, in not falling a victim of fire was destined to be shattered, however, for the latter part of June a blaze started in the Florida street factory, that destroyed the entire building. The fire came at a time when the company was rushed with work, but its energetic managers, the Devotos, were not discouraged, and already the burned building has been rebuilt and business is proceeding with little or no interruption.

The Publisher's Corner

Roman Stone.

It has become generally recognized among architects and builders that concrete stone has many physical advantages over any natural stone, but it remained for the manufacturers of Roman Stone, fabricated according to the Stevens patents, to produce a product which in beauty and finish and texture would compare with natural building stones.

In almost all products made with Portland Cement as a bond the color is uniformly dead grey and the surface has a different texture than its interior which makes it impossible to cut or otherwise hand finish it.

Roman Stone has the life like look of living rock and a homogeneous texture which makes it possible to hand cut. It can be colored.

Most cement stone is manufactured by tamping a slightly moistened mixture of gravel, sand and cement into a rigid mould. Such a process robs the cement of its greatest necessity, that of water. This also makes a porous stone.

Roman Stone is cast into an absorbent mould which automatically takes up, holds, and returns to the cement the proper supply of water.

Roman Stone can be cast to meet any design at a slight expense over plain face work and the result is perfect.

All the rock used in the manufacture of Roman Stone is quarried and passed through breakers and mills which size it from 1-4 in. down to sand. The voids are carefully determined while the amount of cement used is in accordance with the highest engineering standards. The mixture is poured into the molds in the consistency of a thin grout and the result is a regular product.

Roman Stone is guaranteed to be absolutely fireproof.

The Holmes Lime Company, Inc., Mutual Bank building, San Francisco, are the Pacific Coast agents.

The Lennox Furnace.

The Pacific Blower & Heating Company has erected a large factory at 3261 17th street and is in fine shape to fill all orders for heating and ventilating apparatus. The factory is 60x110 feet, with a 7½ foot basement, making virtually two floors. The company has secured the exclusive agency on the Pacific Coast for the famous Lennox furnace. For twelve years the Lennox company has employed an expert heating engineer to study heating problems, and the steel furnace has been the result. Simplicity of construction has overcome all difficulties while at the same time greatly reducing the cost of manufacture. So much so that while it is not the cheapest furnace on the market, because it has quality, yet its price is not made so high by its factory cost as to keep its makers constantly apologizing. A solid steel shell, riveted by powerful machinery like a boiler, as dust proof and as gas tight as any steam boiler, covers fire pot, ash pit and all. There is not a packed joint of any kind to leak gas nor is the oxygen burned out of the air by coming in contact with the super-heated parts. A larger volume of air is heated at a lower temperature and at less fuel cost. Steel radiates heat quicker than iron and the upright steel walls do not collect ashes to retard radiation as does the horizontal construction.

The Lennox company was a pioneer in making steel furnaces. Today it manufactures more steel furnaces than any other one company in the United States.