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408 CALIFORNIA STREET,

SAN FRANCISCO, CAL.

VOLUME 11.

FEBRUARY 18, 1890.

NUMBER 2.

**The California Architect
and Building News.**A monthly Journal devoted to the Architectural interests of the Pacific Coast.
Published on the 18th of each month by THE CALIFORNIA ARCHITECTURAL PUBLISHING COMPANY, 408 California Street, San Francisco, Cal.

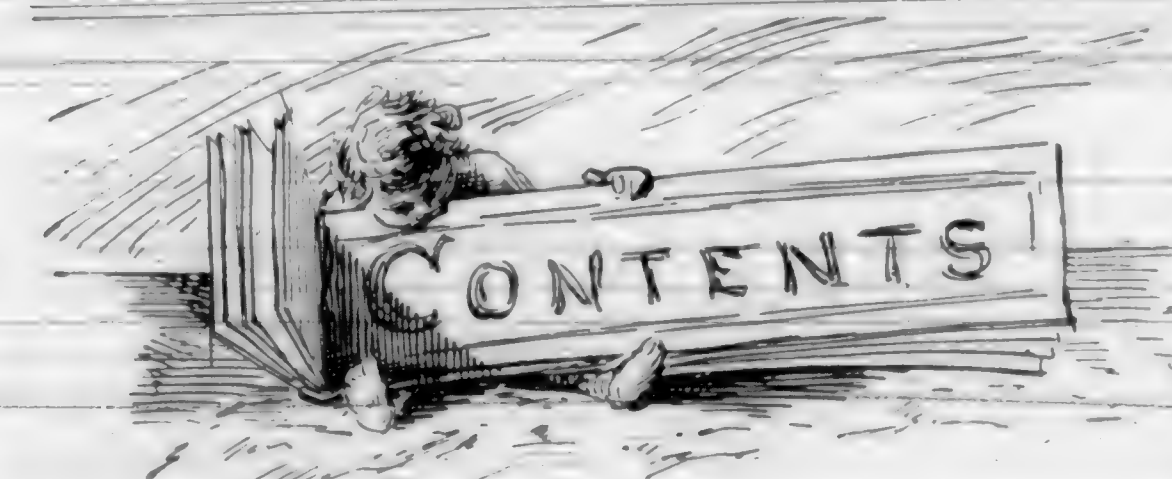
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ARCHITECTURAL PUBLISHING COMPANY, and all communications addressed to the
office of the Company, 408 California Street, San Francisco, Cal.

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NOTICE OF MEETINGS.SAN FRANCISCO CHAPTER, AMERICAN INSTITUTE ARCHITECTS,
meets second Friday of each month at 408 California Street.
TECHNICAL SOCIETY, meets first Friday of each month at
408 California Street.THE regular monthly meeting of the San Francisco Chapter
of the American Institute of Architects was held Friday
evening, February 14th. Reports were received from the
Trustees, the Executive Committee, and several special Com-
mittees. Following is the report of the Committee on awarding
the prize offered by the Chapter to the students in the drawing
class.In November last it was determined by the Chapter to
inaugurate a competition for the benefit of the Chapter's classes,
and in pursuance thereof a prize of ten dollars (to be expended
in books) was offered for the best design—with honorable men-
tions for second and third designs—in the order of their merit.
Messrs. Pissis, Cuthbertson and Sanders were appointed a Com-
mittee on awards. The work of the class for the preceding
year was also to receive the attention of the Committee. The
designs were to be handed in at the first meeting of the Chapter
in January, and the award to be announced at next meeting in
February. In pursuance of the above, the designs were duly
received and your Committee have made the following awards.First prize to Mr. Sam C. Benson for panel of vine leaves,
unsymmetrically arranged and flatly treated, the leaves com-
pletely fill the panel, and all carved out of the solid. It is
adaptable for various purposes of both internal and external
wood work, and is notable for care in execution, and practical
character of design, though it is not without faults; among
which may be mentioned as the most noticeable, the spot caused
by the massing of a single bunch of grapes unsymmetrically in
the midst of a flat area of leaves. Had the bunch of grapes
been more broken up, with others appearing in the other parts
of the field, the effect of the panel would have been greatly
improved.The honor of first mention is awarded to Mr. Joseph Rowell
and Mr. Van Vlack for their respective designs. The first, for
thistles filling a spandrel, exhibiting considerable originality in
design, but unfinished and crude in treatment, the lines being
stiff and the foliage wanting in conventional adaptation to
material. The second, a symmetrical arrangement of vine,
graceful and careful in arrangement, very neatly executed, but
wanting in originality of design, are judged by the Committee to
be equal in merit.The flat studies were also examined. First mention being
awarded to Mr. Van Vlack, on account of the number and gen-
eral excellence of his studies. Second mention is awarded to
Mr. Rowell for the same reason in a less eminent degree.Messrs. Carstensen, Pries and O'Connor, a joint commit-
tee from numbers 15 and 25 of the International Furniture
Worker's Union of North America, and the Wood Carver's As-
sociation appeared before the Chapter and presented the follow-
ing communication:

To the San Francisco Chapter A. I. A.:

GENTLEMEN—We, on behalf of the Furniture Workers and
Wood Carvers respectfully present to you the desire of those
Trades we represent, to secure as far as possible, to the me-
chanics of this city, the inside finishing and fitting up of the
buildings constructed in this city. We believe it is not neces-

sary to argue upon the desirability of this work being done at home, for as we are raising our families here and form a part of this community, the wages we receive for our labor are thus returned to the general circulation. If the work on which we depend for our support goes to other cities, how are we to exist here? Believing that you are in sympathy with us, more particularly now that many of our men are idle, we would ask you to use your great influence to keep the work of this city, in this city.

Very respectfully, the joint committee,
HENRY CARSTENSEN,
Secretary.

The President in reply to the communication assured the committee that the members of the Chapter were well aware of the desirability of retaining as far as possible all such work for our own mechanics, and would do all in their power to further that end. After transacting the other business of the Society, the meeting adjourned.

WHERE is probably no large city in the United States so poorly represented in the matter of public buildings as the city of San Francisco. With a tumble down Post Office, an insecure jail, and an uncompleted City Hall, the citizens truly have little to be proud of, but if they can live on hope for an indefinite number of years to come, they may yet have their dreams of progress and improvement realized. Fair progress is being made with the New City Hall. There is some possibility if not probability of a lot being purchased as a site for a new post office, and when the jail shall no longer afford storage room for the unfortunates now overcrowded in its unhealthy cells, the authorities will per force be obliged to take some action towards providing fitting accommodations, so that when a chinaman is arrested for violating the cubic air law, he will not be incarcerated in a cell affording him still less of the blessed air than he obtained in his own stifling bunk in an underground hole in the Chinese quarter.

The recent burning of the Girls High School may not be an unmixt evil. The Board of Education propose to replace the burned building which was a frame structure, with a fire proof building of substantial construction and artistic appearance, and if it teaches the lesson that it is true economy to build substantially it will be worth the present loss incurred.



THE LATE GENERAL VALLEJO.

General Mariano Guadalupe Vallejo, died on the 18th of January in Sonoma at the age of 81 years, surrounded by nearly all the members of his numerous family. General Vallejo was a pioneer among pioneers, and the most distinguished native Californian. He had occupied the most prominent positions, having been Governor of California during the Mexican rule and State Senator during the present government. He was a high minded, honorable gentleman, with fine taste and considerable learning, which, considering the difficulties in obtaining books and the means of education in early days, was really remarkable. His hospitality, liberality and progressive ideas were proverbial. Every visitor at his home was welcome at all times, and with true Spanish hospitality, could stay as long as he desired. Many instances are related when he made presents to people of thousands of acres of land. He gave Andreas Hoepner, a Russian gentleman, a ranch of over 4,000 acres for teaching music to his children. The General inherited from his ancestors great talent for construction; the standard author in mathematics in Spain, in the beginning of this century, was a Vallejo. His father, Don Ignacio Vallejo, one of the original settlers in California who came with Father Junipero Serra, was an engineer and built many of the presidios and irrigating works at the time of the Missions. He at one time projected, and proposed to the authorities of Monterey, the conduction of water to that city from the river Carmel. That project has been carried out by the Pacific Improvement Company, at an expense of half a million dollars. The father of General Vallejo estimated the cost at \$10,000, by employing the Mission Indians. General Vallejo was the founder of Sonoma; he built the first structures in that place, consisting of his residence, officers' quarters, barracks, and the church. We give a drawing representing them as they existed before 1848, from a description and sketch by the General's son, Dr. Vallejo. The capital of California was at one time, the city of Vallejo founded by the General; he projected and partly built at his own cost all the State buildings, but the removal of the capital to Sacramento, prevented him from finishing them. With the death of General Vallejo, the State has lost one of her prominent men and the best authority in historical facts in California.

E. J. MOLERA.

THE STRUCTURE OF SANDSTONE.

Read before the Liverpool Architectural Society, by Mr. T. Mellard Read.

Sandstones, or, in masons' language, "freestones," from the freedom with which most of them are worked when freshly taken from the quarry, are plastic or sedimentary rocks. That is, they are composed of separate particles which have once existed as sand, like that we see on our own shores, or in the sand dunes of Hoylake or Crosby. Sandstones are usually more or less laminated, and are stronger to transverse stress at right-angles to their natural bedding than in any other direction, a fact recognized in every architect's specification, which states "all stones must be laid on their natural bed," a direction that unfortunately sometimes begins and ends in the specification. The cause of the superior strength is not, however, generally understood.

I have devoted some considerable time to an investigation of the internal structure of sandstones, which I have communicated from time to time to various scientific societies and publications, and will now briefly explain in a manner I judge will be most likely to interest architects and engineers. The particles or grains of which the rock is built up are of various forms and sizes, from a thoroughly rounded grain, almost like shot, to a broken and jagged structure, and to others possessing crystalline faces. These grains, most of them possessing a longer axis, have been rolled backward and forward by the tides or river-currents. The larger grains naturally lie on their sides when freshly deposited, with their axes in the plane of bedding; the smaller and more rounded particles naturally tend to occupy the interstices between the others, and in this way rude divisional planes, or laminations are formed. Each layer forms a sort of course like coursed-rubble in a wall, and by the necessities of deposition a certain rude geometric arrangement results, by which the particles of the future rock overlap each other, and thereby gain what is known to architects as bond.

But, so far, this is only like "dry walling," the mass wants cementing together to make it solid. The cementing process happens in this way in our rocks, which are almost purely silicious: Water containing a minute quantity of carbonic acid in solution, which most rain-water does, especially when it comes into contact with decaying vegetation, has the power of dissolving silica to a slight extent. This is proved in various ways, and is shown in the fact that all river water contains more or less silica in solution.

The circulation of water through the sand deposit of which our rocks are made dissolves part of the grains, and the silica taken up is redeposited on others. I cannot explain the chemical reaction that produces this deposition, but that it takes place in the rock during some period of its history is certain. I exhibit a quartzite pebble taken from the triassic sandstone at Stanlow Point, which, as can be easily seen, was at one time worn perfectly smooth by attrition and long-continued wear, for the quartzite is very hard. Upon this worn surface you will see spangles and facets which reflect the light, and on closer inspection it will be evident that they are crystals of quartz that have been deposited upon the surface of the worn pebble after it became finally inclosed in the rock.

A microscopic examination of the granules of the rock itself will show that many of them have had crystalline quartz deposited upon their surfaces, and in some cases rounded grains have in this way become almost perfect crystals.

An examination of the best sandstones for building purposes shows that they possess more of these crystalline particles than the inferior ones, and a good silicious sandstone shows its good quality by a fresh fracture sparkling in the sun. In addition to these crystalline deposits of silica I believe it exists also as a cement which binds the particles together when in contact.

It certainly is, however, with this secondary silica that the original sand has become a building stone, and the particles have become interlaced and bound together. Thus, in building parlance, the grains are the rubble of the wall, the currents the quarrymen, masons and laborers, and the silicious infiltration the mortar.

It is a remarkable fact that most of the pebbles included in the red rocks are quartzites, or indurated silicious sandstones; and, as showing that their solidity and hardness are due only to a further continuation of the deposit of silica in the interstices, it has been proved that the purple quartzites are purple only by reason of the original coloration of the grains which have been inclosed between the original grains and the secondary silica.



BUILDING BY E. J. LENNOX, ARCHITECT, IN *Canadian Architect*.

DAMAGE TO ADJOINING STRUCTURES FROM HEAVY BUILDINGS.

With the increasing size and weight of modern office buildings there come not only serious problems of safe and economical construction, but the still more difficult question of how to prevent damage to adjoining structures, not merely from undermining of foundations which can be avoided by suitable underpinning, but from the actual compression of the soil.

If anyone will take the trouble to examine the old and comparatively light buildings alongside of which some high and heavy structure has recently been erected, the chances are that he will find the old buildings more or less damaged by their new neighbor, and cracked walls and sills, and especially cracked lintels over the nearest windows, will show that the old wall next the more recent structure has been carried bodily downward. As before intimated the settlement in most cases is not caused by any defect in or injury to the foundation of the old building, but by the fact that the heavier structure has compressed the soil and taken the lighter one down with it.

As the evil is progressive, increasing as the new building goes up, and for some time after it is finished, it cannot be provided against once for all, but the remedy must be progressive also, and the only way to prevent the injury is to keep the old wall wedged or screwed up while the new one goes down. The only instance we know of where this has been done is in the case of a large building now being erected in Chicago, where the soil is so compressible that such a building is expected to settle three or four inches during construction, and where one fine tall building has had one corner carried down four or five inches by a heavier building alongside, with the result of very badly cracking the older structure from top to bottom through the nearest line of windows. To avoid such a disaster the wall of the old building some seven stories high, next which the new building just mentioned is being put up, is temporarily supported on screws, and is by them kept slightly above its normal position so as to allow for settlement between times. These screws will support the old wall for some six months after the new building is finished, and until all settlement is over. With a less compressible soil, or a lighter building, perhaps iron counter-wedges between stout bearing stones would give sufficient lift, and could be left in when the new building was completed.—*The Engineering and Building Record*.

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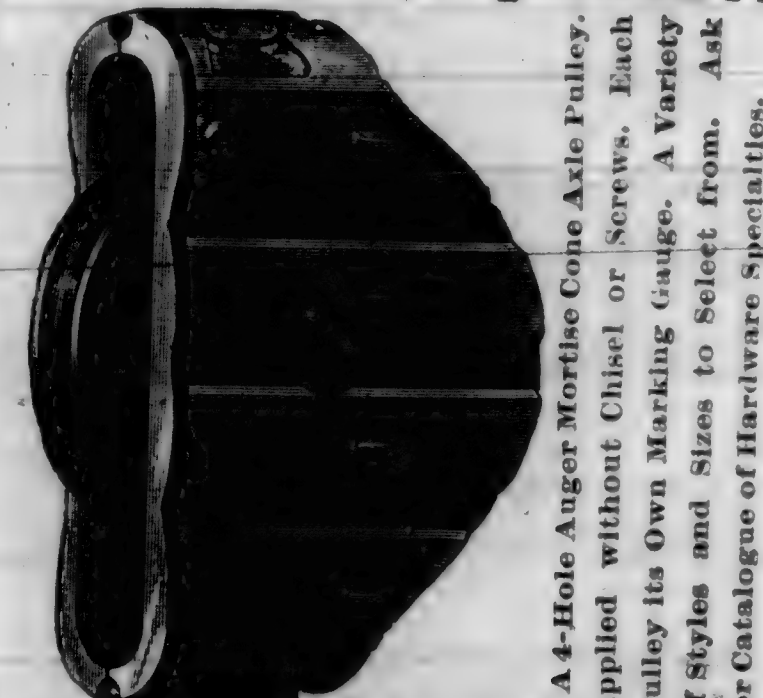
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SAN FRANCISCO, CAL.

1890.

NUMBER 2.

regular monthly meeting of the San Francisco Chapter the American Institute of Architects was held Friday February 14th. Reports were received from the Executive Committee, and several special Com- Following is the report of the Committee on awarding offered by the Chapter to the students in the drawing

November last it was determined by the Chapter to at a competition for the benefit of the Chapter's classes, pursuance thereof a prize of ten dollars (to be expended s) was offered for the best design—with honorable men- r second and third designs—in the order of their merit. Pissis, Cuthbertson and Sanders were appointed a Com- on awards. The work of the class for the preceding as also to receive the attention of the Committee. The were to be handed in at the first meeting of the Chapter ary, and the award to be announced at next meeting in ry. In pursuance of the above, the designs were duly d and your Committee have made the following awards. t prize to Mr. Sam C. Benson for panel of vine leaves, metrically arranged and flatly treated, the leaves com- fill the panel, and all carved out of the solid. It is ble for various purposes of both internal and external work, and is notable for care in execution, and practical ter of design, though it is not without faults; among may be mentioned as the most noticeable, the spot caused : massing of a single bunch of grapes unsymmetrically in idst of a flat area of leaves. Had the bunch of grapes more broken up, with others appearing in the other parts e field, the effect of the panel would have been greatly ved.

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The flat studies were also examined. First mention being awarded to Mr. Van Vlack, on account of the number and general excellence of his studies. Second mention is awarded to Mr. Rowell for the same reason in a less eminent degree.

Messrs. Carstensen, Pries and O'Connor, a joint committee from numbers 15 and 25 of the International Furniture Worker's Union of North America, and the Wood Carver's Association appeared before the Chapter and presented the following communication:

To the San Francisco Chapter A. I. A.:

GENTLEMEN—We, on behalf of the Furniture Workers and Wood Carvers respectfully present to you the desire of those Trades we represent, to secure as far as possible, to the mechanics of this city, the inside finishing and fitting up of the buildings constructed in this city. We believe it is not neces-

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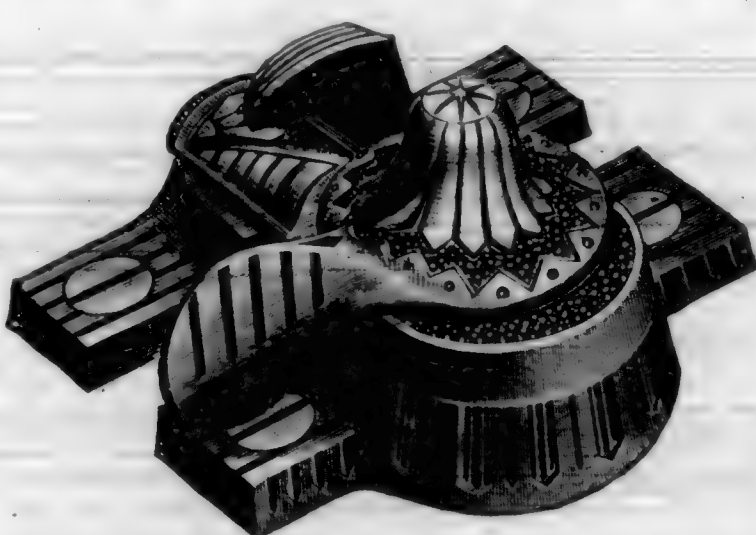
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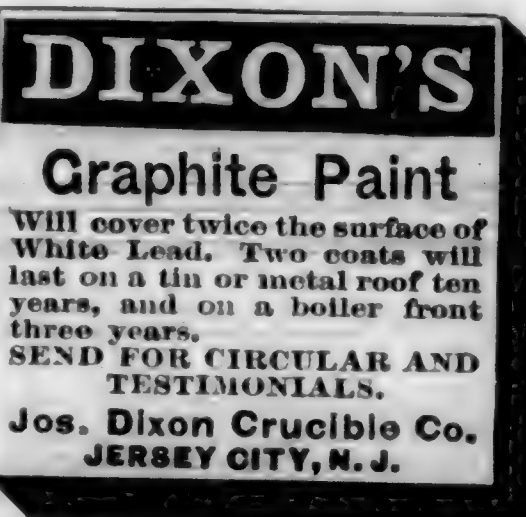
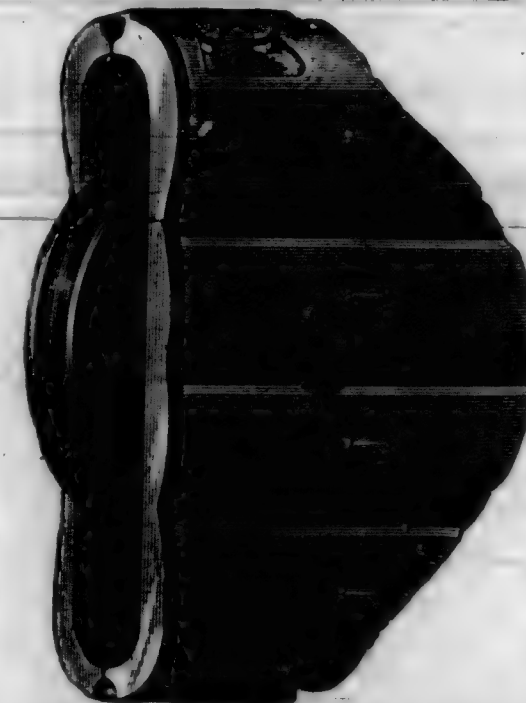
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SAN FRANCISCO, CAL.

VOLUME 11.

FEBRUARY 18, 1890.

NUMBER 2.

**The California Architect
and Building News.**A monthly Journal devoted to the Architectural interests of the Pacific Coast.
Published on the 18th of each month by THE CALIFORNIA ARCHITECTURAL PUBLISHING COMPANY, 408 California Street, San Francisco, Cal.

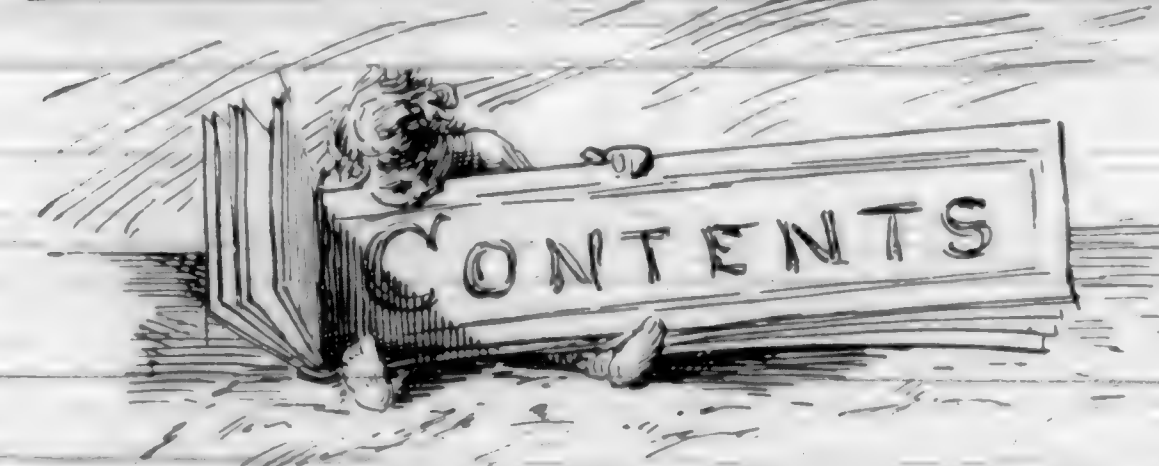
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408 California Street.THE regular monthly meeting of the San Francisco Chapter
of the American Institute of Architects was held Friday
evening, February 14th. Reports were received from the
Trustees, the Executive Committee, and several special Com-
mittees. Following is the report of the Committee on awarding
the prize offered by the Chapter to the students in the drawing
class.

"In November last it was determined by the Chapter to
inaugurate a competition for the benefit of the Chapter's classes,
and in pursuance thereof a prize of ten dollars (to be expended
in books) was offered for the best design—with honorable men-
tions for second and third designs—in the order of their merit.
Messrs. Pissis, Cuthbertson and Sanders were appointed a Com-
mittee on awards. The work of the class for the preceding
year was also to receive the attention of the Committee. The
designs were to be handed in at the first meeting of the Chapter
in January, and the award to be announced at next meeting in
February. In pursuance of the above, the designs were duly
received and your Committee have made the following awards."

First prize to Mr. Sam C. Benson for panel of vine leaves,
unsymmetrically arranged and flatly treated, the leaves com-
pletely fill the panel, and all carved out of the solid. It is
adaptable for various purposes of both internal and external
wood work, and is notable for care in execution, and practical
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chanics of this city, the inside finishing and fitting up of the
buildings constructed in this city. We believe it is not neces-

sary to argue upon the desirability of this work being done at home, for as we are raising our families here and form a part of this community, the wages we receive for our labor are thus returned to the general circulation. If the work on which we depend for our support goes to other cities, how are we to exist here? Believing that you are in sympathy with us, more particularly now that many of our men are idle, we would ask you to use your great influence to keep the work of this city, in this city.

Very respectfully, the joint committee,
HENRY CARSTENSEN,
Secretary.

The President in reply to the communication assured the committee that the members of the Chapter were well aware of the desirability of retaining as far as possible all such work for our own mechanics, and would do all in their power to further that end. After transacting the other business of the Society, the meeting adjourned.

There is probably no large city in the United States so poorly represented in the matter of public buildings as the city of San Francisco. With a tumble down Post Office, an insecure jail, and an uncompleted City Hall, the citizens truly have little to be proud of, but if they can live on hope for an indefinite number of years to come, they may yet have their dreams of progress and improvement realized. Fair progress is being made with the New City Hall. There is some possibility if not probability of a lot being purchased as a site for a new post office, and when the jail shall no longer afford storage room for the unfortunates now overcrowded in its unhealthy cells, the authorities will per force be obliged to take some action towards providing fitting accommodations, so that when a Chinaman is arrested for violating the cubic air law, he will not be incarcerated in a cell affording him still less of the blessed air than he obtained in his own stifling bunk in an underground hole in the Chinese quarter.

The recent burning of the Girls High School may not be an unmixed evil. The Board of Education propose to replace the burned building which was a frame structure, with a fire proof building of substantial construction and artistic appearance, and if it teaches the lesson that it is true economy to build substantially it will be worth the present loss incurred.



THE LATE GENERAL VALLEJO.

General Mariano Guadalupe Vallejo, died on the 18th of January in Sonoma at the age of 81 years, surrounded by nearly all the members of his numerous family. General Vallejo was a pioneer among pioneers, and the most distinguished native Californian. He had occupied the most prominent positions, having been Governor of California during the Mexican rule and State Senator during the present government. He was a high minded, honorable gentleman, with fine taste and considerable learning, which, considering the difficulties in obtaining books and the means of education in early days, was really remarkable. His hospitality, liberality and progressive ideas were proverbial. Every visitor at his home was welcome at all times, and with true Spanish hospitality, could stay as long as he desired. Many instances are related when he made presents to people of thousands of acres of land. He gave Andreas Hoepner, a Russian gentleman, a ranch of over 4,000 acres for teaching music to his children. The General inherited from his ancestors great talent for construction; the standard author in mathematics in Spain, in the beginning of this century, was a Vallejo. His father, Don Ignacio Vallejo, one of the original settlers in California who came with Father Junipero Serra, was an engineer and built many of the presidios and irrigating works at the time of the Missions. He at one time projected, and proposed to the authorities of Monterey, the conduction of water to that city from the river Carmel. That project has been carried out by the Pacific Improvement Company, at an expense of half a million dollars. The father of General Vallejo estimated the cost at \$10,000, by employing the Mission Indians. General Vallejo was the founder of Sonoma; he built the first structures in that place, consisting of his residence, officers' quarters, barracks, and the church. We give a drawing representing them as they existed before 1848, from a description and sketch by the General's son, Dr. Vallejo. The capital of California was at one time, the city of Vallejo founded by the General; he projected and partly built at his own cost all the State buildings, but the removal of the capital to Sacramento, prevented him from finishing them. With the death of General Vallejo, the State has lost one of her prominent men and the best authority in historical facts in California.

E. J. MOLERA.

THE STRUCTURE OF SANDSTONE.

Read before the Liverpool Architectural Society, by Mr. T. Meillard Reade.



BUILDING BY E. J. LENNOX, ARCHITECT, IN Canadian Architecture.

DAMAGE TO ADJOINING STRUCTURES FROM HEAVY BUILDINGS.

With the increasing size and weight of modern office buildings there come not only serious problems of safe and economical construction, but the still more difficult question of how to prevent damage to adjoining structures, not merely from undermining of foundations which can be avoided by suitable underpinning, but from the actual compression of the soil.

If anyone will take the trouble to examine the old and comparatively light buildings alongside of which some high and heavy structure has recently been erected, the chances are that he will find the old buildings more or less damaged by their new neighbor, and cracked walls and sills, and especially cracked lintels over the nearest windows, will show that the old wall next the more recent structure has been carried bodily downward. As before intimated the settlement in most cases is not caused by any defect in or injury to the foundation of the old building, but by the fact that the heavier structure has compressed the soil and taken the lighter one down with it.

As the evil is progressive, increasing as the new building goes up, and for some time after it is finished, it cannot be provided against once for all, but the remedy must be progressive also, and the only way to prevent the injury is to keep the old wall wedged or screwed up while the new one goes down. The only instance we know of where this has been done is in the case of a large building now being erected in Chicago, where the soil is so compressible that such a building is expected to settle three or four inches during construction, and where one fine tall building has had one corner carried down four or five inches by a heavier building alongside, with the result of very badly cracking the older structure from top to bottom through the nearest line of windows. To avoid such a disaster the wall of the old building some seven stories high, next which the new building just mentioned is being put up, is temporarily supported on screws, and is by them kept slightly above its normal position so as to allow for settlement between times. These screws will support the old wall for some six months after the new building is finished, and until all settlement is over. With a less compressible soil, or a lighter building, perhaps iron counter-wedges between stout bearing stones would give sufficient lift, and could be left in when the new building was completed.—The Engineering and Building Record.

Sandstones, or, in masons' language, "freestones," from the freedom with which most of them are worked when freshly taken from the quarry, are plastic or sedimentary rocks. That is, they are composed of separate particles which have once existed as sand, like that we see on our own shores, or in the sand dunes of Hoylake or Crosby. Sandstones are usually more or less laminated, and are stronger to transverse stress at right-angles to their natural bedding than in any other direction, a fact recognized in every architect's specification, which states "all stones must be laid on their natural bed," a direction that unfortunately sometimes begins and ends in the specification. The cause of the superior strength is not, however, generally understood.

I have devoted some considerable time to an investigation of the internal structure of sandstones, which I have communicated from time to time to various scientific societies and publications, and will now briefly explain in a manner I judge will be most likely to interest architects and engineers. The particles or grains of which the rock is built up are of various forms and sizes, from a thoroughly rounded grain, almost like shot, to a broken and jagged structure, and to others possessing crystalline faces. These grains, most of them possessing a longer axis, have been rolled backward and forward by the tides or river-currents. The larger grains naturally lie on their sides when freshly deposited, with their axes in the plane of bedding; the smaller and more rounded particles naturally tend to occupy the interstices between the others, and in this way rude divisional planes, or laminations are formed. Each layer forms a sort of course like coursed-rubble in a wall, and by the necessities of deposition a certain rude geometric arrangement results, by which the particles of the future rock overlap each other, and thereby gain what is known to architects as bond.

But, so far, this is only like "dry walling," the mass wants cementing together to make it solid. The cementing process happens in this way in our rocks, which are almost purely silicious: Water containing a minute quantity of carbonic acid in solution, which most rain-water does, especially when it comes into contact with decaying vegetation, has the power of dissolving silica to a slight extent. This is proved in various ways, and is shown in the fact that all river water contains more or less silica in solution.

The circulation of water through the sand deposit of which our rocks are made dissolves part of the grains, and the silica taken up is redeposited on others. I cannot explain the chemical reaction that produces this deposition, but that it takes place in the rock during some period of its history is certain. I exhibit a quartzite pebble taken from the triassic sandstone at Stanlow Point, which, as can be easily seen, was at one time worn perfectly smooth by attrition and long-continued wear, for the quartzite is very hard. Upon this worn surface you will see spangles and facets which reflect the light, and on closer inspection it will be evident that they are crystals of quartz that have been deposited upon the surface of the worn pebble after it became finally inclosed in the rock.

A microscopic examination of the granules of the rock itself will show that many of them have had crystalline quartz deposited upon their surfaces, and in some cases rounded grains have in this way become almost perfect crystals.

An examination of the best sandstones for building purposes shows that they possess more of these crystalline particles than the inferior ones, and a good silicious sandstone shows its good quality by a fresh fracture sparkling in the sun. In addition to these crystalline deposits of silica I believe it exists also as a cement which binds the particles together when in contact.

It certainly is, however, with this secondary silica that the original sand has become a building stone, and the particles have become interlaced and bound together. Thus, in building parlance, the grains are the rubble of the wall, the currents the quarrymen, masons and laborers, and the silicious infiltration the mortar.

It is a remarkable fact that most of the pebbles included in the red rocks are quartzites, or indurated silicious sandstones; and, as showing that their solidity and hardness are due only to a further continuation of the deposit of silica in the interstices, it has been proved that the purple quartzites are purple only by reason of the original coloration of the grains which have been inclosed between the original grains and the secondary silica.

Yellow sandstone is colored also by iron, and I have frequently seen the red sandstone shading off to yellow without any division whatever. The various shades and tints of sandstone are necessarily due to the coloration of the individual grains.

Most of you will, no doubt, have observed the sort of marbling or grain upon the stone of our old buildings, such as the town hall, which I believe was obtained from quarries occupying the site of the St. James cemetery. This is due to what is called current bedding; that is to say, the grains have been arranged along oblique lines and curves instead of in parallel laminae. This stone, which is geologically equivalent to the Storeton stone, and of the same nature, has stood very well. Some of the Storeton stone, if free from clay galls, although very soft when quarried, becomes hardened by exposure, and will stand the weather much better than a harder and more pretentious material.

The rocky substratum of a district can be well seen in its ancient buildings, for in old times carriage was so important an item that the old builders could not go far for their stone; hence we see that the old churches of part of Lancashire and most of Cheshire, and a large portion of Shropshire, are of red sandstone. Some of it has stood very well, while some has decayed into shapeless masses. There is a tendency to exfoliate parallel to the exposed or worked surface, in all stones, irrespective of the way of the bed, but more so where the stone is set up on edge, or at right angles, to its quarry bed. It is interesting and peculiar to see in some of the old buildings erected with pebbly sandstone how the white quartz pebbles stand out from the surface like warts. This is due to the greater indestructibility of the quartz pebbles, and the weathering away, or denudation, of the sandstone face.

Before leaving the subject of local sandstone it will be necessary to refer to one quality they have which is of excellent utility as regards the storage of water, but which is a decided disadvantage in building stone—that is, their porosity. I have proved by actual experiment that a cubic foot of Runcorn stone will take up three quarts of water by capilarity, and that it is possible to make a syphon of solid sandstone which will empty a vessel of water into another vessel with capilarity alone. This shows the absolute necessity of damp-proof courses, not only in the main walls of buildings of stone, but even in fence walls, for the continual sucking up of moisture from the earth, and its evaporation at the surface of the stone, make it rapidly decay. I think I could show you this fact in almost any stone building in Liverpool or elsewhere the stone is in direct connection with the earth. It also shows the necessity of taking care that no stones go through the wall to the interior surface, and of precautions, for backing up stone walls with less porous materials, or the introduction of a cavity. If you could suppose such a sandstone wall 40 feet long, 20 feet high and 1 foot 6 inches thick fully saturated, it would hold almost a ton of water. Of course, it never would be fully saturated, because of the evaporation from the surfaces, but with a southwest aspect, and very wet weather, it might become half saturated. But what does evaporation mean? It means the loss of so much heat and the burning of so much coal to supply its place. From this it will be seen that a pure sandstone wall is a thing to be avoided.

The subject is so wide a one that I have felt compelled to restrict my remarks to local sandstones, but the general principles of structure apply to all sandstones alike.

It is difficult by written description to tell you how to select a good stone, but one essential is that there shall be a good deposition of secondary quartz, as shown by the crystalline sparkling on the freshly fractured surface.

It must also be free from very decided laminations, for these constitute planes of weakness and are often indications of the deposition of varying materials, or the same material in various grades of fineness. It must also not be full of argillaceous and iron-oxide inclusions. It should possess a homogeneous texture. The best way to study building stones is to study them in old buildings, for nature has then dissected their weaknesses.—*Stone.*

The *Boston Transcript* applauds the idea of having an architect's name conspicuously placed on the building he has designed. It would save so much time to persons who purpose to build in making up a list of architects to be avoided.—*Ex.*



EL REFUGIO, Mexico, Jan. 5th, 1890.

TO THE EDITOR OF THE

CALIFORNIA ARCHITECT AND BUILDING NEWS—

Dear Sir:—As I promised you before leaving San Francisco for a year's stay in Mexico, I have made notes of such of my observations as I think will be most likely to interest the subscribers to your journal, and take this opportunity to send them by a courier who leaves to-day. I will not bore you with a description of the journey, more than to say it occupied nearly two weeks, the last hundred and forty miles being done on mule's backs over the roughest kind of mountains, and along trails where a mis-step would have been fatal.

I enclose several photographs of the scenery in this vicinity, and of the towns and villages on the route. The cathedral appears to be the principal architectural feature of the towns. It is said to be a fact that when the cathedral at Chihuahua was built, about one hundred and fifty years ago, that no staging or scaffolding of any description was used, but as the walls were



CATHEDRAL.

built up, the interior of the church was filled with earth, which was also banked up on the outside of the walls to a corresponding height, and only removed upon the completion of the building.

I noticed in passing through Chihuahua that the poles for scaffolding purposes were made of small sticks bound together with rawhide, so spliced that from short pieces a scantling was formed answering for a three-story building. The window openings in a Government building under construction, instead of being temporarily closed with boards or cloth as is customary with us, were built up with adobe.

The towns and villages we passed through on our way to this place looked (at first sight) like huge brickyards with the kilns unburnt (all the buildings being of adobe.)

The general plan of the dwelling houses is a square with only one opening on one side, with a central court yard from which



TOWN OF JESUS MARIA, CHIHUAHUA, MEXICO.

doors open into the rooms. No windows are considered necessary. This may have been originally designed as a protection against the Indians, (at one time very troublesome) but is now doubtless continued from habit. The sameness in the appearance of these dwellings is very monotonous. The roofs are almost flat and are covered with mud, though this method of roofing seems strange at first sight, yet you must consider that mud is plentiful and wood and timber very scarce in many parts of Mexico, and the people very lazy; in fact most of the work is done by peons, or what were peons before the law set them free. But as most of them don't know they have been liberated, they go on working for their employers as before, earning two or three bits a day, and always in debt to their employers. The Indians who carry our mail are paid only three bits a day, and their position is no sinecure either, as they have to traverse on foot a distance of one hundred and forty miles in two days—yet they are a contented lot notwithstanding, and if they earned more would only gamble it away, and be no better off. All their desires are fulfilled if they get plenty of beans to eat, a few rags to wear, a blanket to sleep in, and firearms for their personal use.

I received the sample copy of the journal you sent me and congratulate you on the improvement you have made in its appearance since the new management took control.

We had a new cable for the mine sent us last month and it came in on a mule train as do all our supplies. Much difficulty is experienced with loads like this, however, and the *modus operandi* is quite curious. To begin with as much of the rope is coiled on the back of the first mule as he can carry, a loop of ten feet or so is then left slack and the cable then coiled to form the load of the mule following, and this proceeding is followed until the entire cable is loaded, when the train starts off on a journey of several days' duration. As a man is required for each mule the expense of transportation by this method is necessarily considerable. The cost in this instance amounted to five hundred dollars.

With best wishes for the continued success of your journal,
I remain, Yours very truly,
ALEX. H. EVERETT.

ECONOMY IN THE USE OF STEEL IN BUILDING CONSTRUCTION.*

By W. L. B. Jenney, Architect.

Fireproof work has become the rule rather than the exception in all important buildings. Our cities are growing rapidly, land in business centers becoming more and more valuable, and as a necessary consequence the buildings are built higher and higher.

Chicago has a very wise law, namely, that all buildings over 100 feet high shall be fireproof.

No hotel, theater, or apartment house can be popular unless fireproof. Any business man would think himself inexcusably careless if he left a thousand-dollar bond over night in other than a fireproof vault, and yet we trust our greatest treasures, our wives and children, in very combustible buildings, and ourselves are often away on business for weeks at a time. Too many sad examples are recorded of the folly of such risks. It is pleasing to see that at length the importance of fireproof dwellings has come well to the front and is meeting with universal endorsement.

*A few paragraphs on this subject having appeared anonymously in the *Chicago Tribune*, and, as such an article, to be of value, must have the stamp of authority, Mr. Jenney has, at our request, reviewed and enlarged it.—*EDITORS INLAND ARCHITECT.*

This extended use of iron in building, at a time when other demands are fully equal to the average, has advanced the price of raw material and encouraged the "combination" to advance the price of beams three-tenths cents per pound.

Evidently, it becomes the duty of the architect to study how he may economize and produce the desired results at least expense. An opportunity is offered in the use of steel instead of iron.

The I-beam is the important factor in fireproof construction. When we consider that the ultimate tensile strength of iron beams is but 48,000 to 52,000 pounds per square inch of sectional area, while that of steel is from 63,000 to 70,000, it is easy to see that if the section of the beam is such as to give the greatest practical value to the metal used, there is a saving in the weight of metal by the use of steel instead of iron, amounting to one-quarter or even one-third.

As the price per pound is the same for steel and for iron beams the saving in money is enormous. For example, I have under construction a building which will require \$250,000 worth of steel beams. Should iron beams be used, it would add at least \$50,000 to the cost, with no advantage, but rather with the disadvantage of the additional load on the columns and foundations. To effect this saving, the architect must base his calculations on a tensile strength of say, 60,000 pounds per square inch, and must be sure he obtains it in the steel.

To be certain of getting this result, the specifications must not only demand it, but also that test bars be taken from each "blow" or charge of the converter and tested in the presence of an agent appointed by the architect; and that no beams will be received unless up to the required strength. That it is not difficult to obtain this strength is seen from the "test sheets," showing the testing of 276 "blows" of the converters at the mills, made by an engineer from my office. Of the 276 tests only thirty are below 64,000 pounds and the lowest is 61,500.

As the quality of the steel improves these figures enlarge. I think that even now we might insist upon a minimum tensile strength of 64,000 pounds per square inch, without any increase in the cost to the consumer.

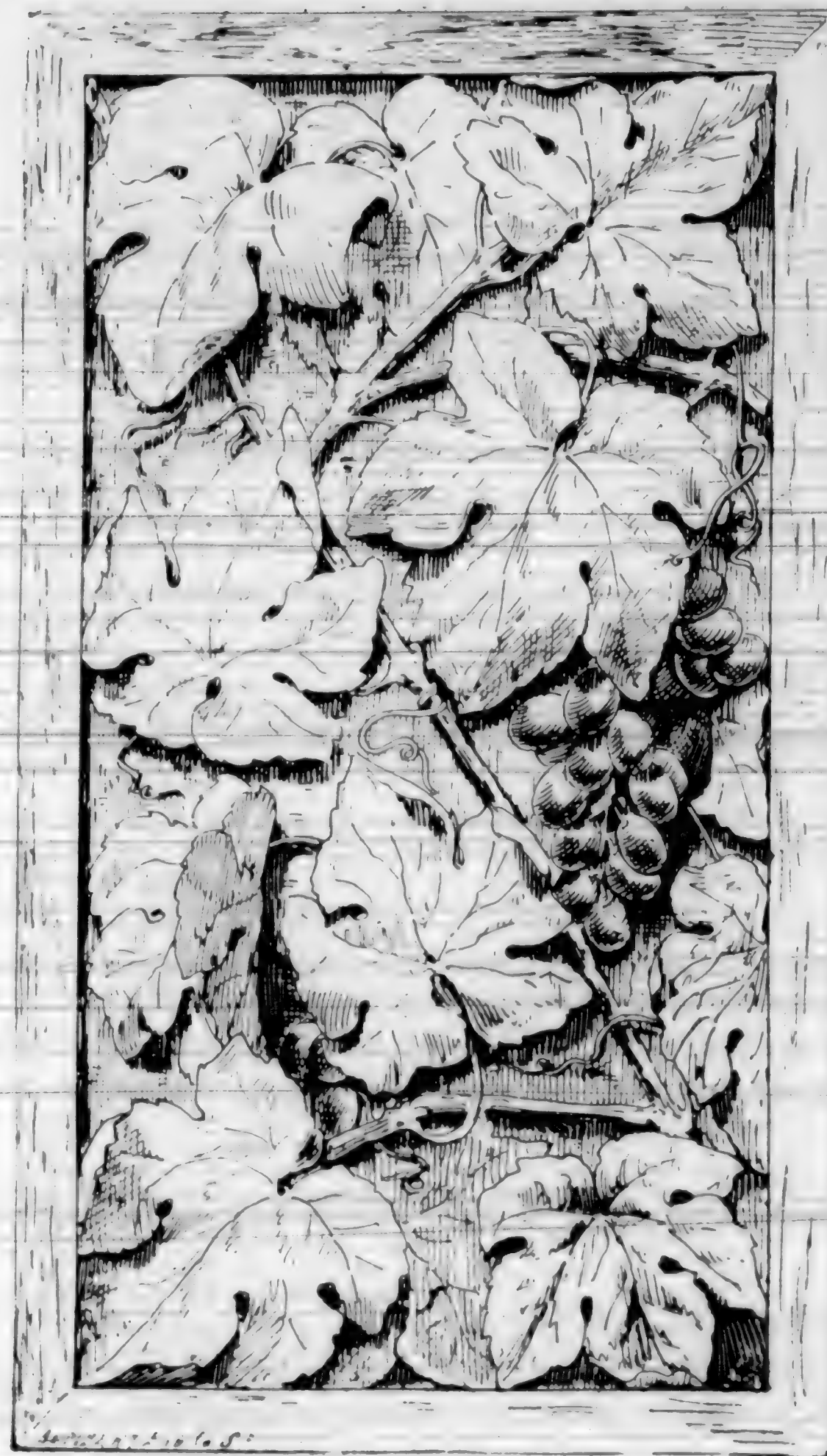
There are other tests required, for example, to insure that the beams shall not take a permanent set if moderately overloaded; that the beams can be punched without splintering and bent without breaking. After all the physical tests are satisfactory, the beams must be inspected for surface defects, and none but perfectly rolled, straight beams must be received.

It is true that such careful, thorough inspection is expensive to the architect, but the saving is so great that there is no other detail in an architect's practice by which he can save so much money for his client, and it should never be neglected.

There has been so much discussion of late as to the relative value of rolled steel columns and cast-iron columns. In bridges the cast-iron has entirely passed out of use. In a building to be filled with heavy running machinery, the architect should insist upon rolled steel columns, but for an office building, a store, or a warehouse, when the load is steady, it becomes a question of cost.

For cast-iron columns the architect must insist that from each heat of the cupola two test-bars be cast, each of which is tested by placing it on supports and loading in the center with a weight proportionate to the size of the bar and the distance between points of support. Should the bars break, the metal is inferior and not acceptable. Each column should be drilled in two directions for measuring the thickness of metal, and then careful examination made for surface defects. Cast-iron has the disadvantage of being liable to internal defects that the most rigid inspection might fail to detect, and consequently the columns are made heavier than otherwise would be necessary. Even with the disadvantage of greater weight, the "proposals" for furnishing cast-iron columns are at present usually less than for rolled steel. To avoid the uncertainty which forces the architect to specify cast-iron columns one-quarter heavier than he otherwise would do, some of the leading foundries are now considering the policy of adding to their plant a large testing machine, in which each column may be tested up to double the load which it is calculated to bear. Any foundry that has such a machine can command the best work at the highest price, for it will save to the owner twenty-five per cent. at least in weight of metal now considered necessary for safety.

These are but a small portion of the engineering features that the demand for tall, expensive, fireproof buildings has introduced into a Chicago architect's office.—*Inland Architect.*



FIRST PRIZE DESIGN BY S. C. BENSON.

CO-OPERATION IN ENGLAND.

The question of *how* to keep the man, or men, who act in a subordinate capacity seldom enters into the calculations of the head of any enterprise, whether mercantile, professional, or mechanical. There are however, some exceptions to this, as to every statement that may be made. We sometimes hear of a business house or financial institution giving its employees a stated share of the profits should there be any. We now hear from England that the building firm of Peto Bros. have been awarded a large contract on a public building, and will take this opportunity to try the effect of profit-sharing with their men. They make the announcement through a circular, that it will only apply to this contract, but if it works well, will extend to future cases.

The agreement will be to divide one quarter of the net profits among the men when the building is done and the accounts settled as a bonus above their wages in proportion to the wages they have earned. The conditions under which each man is entitled to his share are that he shall have worked long enough on the contract to have earned five pounds, at the regular rate of wages; that he shall not have neglected his duty, or misconducted himself or wasted his time, or in other ways have acted so as to diminish the profits of the contract, or injure the reputation of the firm for good and honest work; and, that he shall not have engaged in any strike for shorter hours, or for wages above the schedule of wages which prevailed at the time the contract was made, and upon which the contract was based. That the workmen may assure themselves of the fairness with which the division is carried out they are invited by the circular to send a representative to watch the making up of the accounts by the auditor of the firm, and to sign the balance sheet. In order to identify the claimants every man must obtain a printed

ticket from the time-keeper, on beginning his work, countersigned by the foreman, and noting the day and hour when his employment commenced, with his name, number and wages. This is to be again signed and countersigned when he leaves, and must be produced to secure a share in the dividend. What will be the effect of this innovation among the laboring element of England is, as yet, problematical. The trade-unions of that country may not take kindly to permitting some of their fellows doing as they please and thus bring about a contest that may try the executive ability of Messrs. Peto to cope with.

W. C. Prime, L. L. D. has made some interesting figures as to how much of the earth's surface would be required, in one section to properly bury all the men, women and children who have died since the creation. He says: The population of the earth is about 1,500,000,000. Suppose the human race to have existed for 6000 years and to have been always as great as now. In 6000 years you have sixty centuries and 180 generations, each a generation of 1,500,000,000. Now lay out a cemetery for one generation giving each man, woman and child five feet by two, or ten square feet. That gives a graveyard of 15,000,000,000 square feet and as a square mile contains 25,000,000,000 square feet, you want a graveyard not less than fifty five miles long by ten wide for one generation. Multiply this by your 180 generations, and get a strip of land 1800 miles by 55 wide, or a graveyard for the deaths of 6000 years. On that basis of figuring Texas contains ground enough for the burials of the 6000 years that are past and the 6000 years to come. But some one says the race of man has been on earth 100,000 years. Suppose it to be true and suppose the population to have been always as now. We have provided for 6000 years, and now want figures for seventeen times as many years. That is, you want 1,700,000 square miles or a spot 1700 miles long and 1000 miles wide. It would be only a *part* of the United States, and it is safe to say, that had the human race been in existence 100,000 years, a separate grave could be provided for each individual in the land east of the Mississippi River.



We illustrate this month a country residence from the designs of F. Lobbell architect, of Los Gatos.

An example of Japanese architecture promised in our last number to accompany the paper of Mr. Shimoda.

And on the double plate several interesting drawings descriptive of the new Auditorium Building designed and erected by architects, Alder and Sullivan.

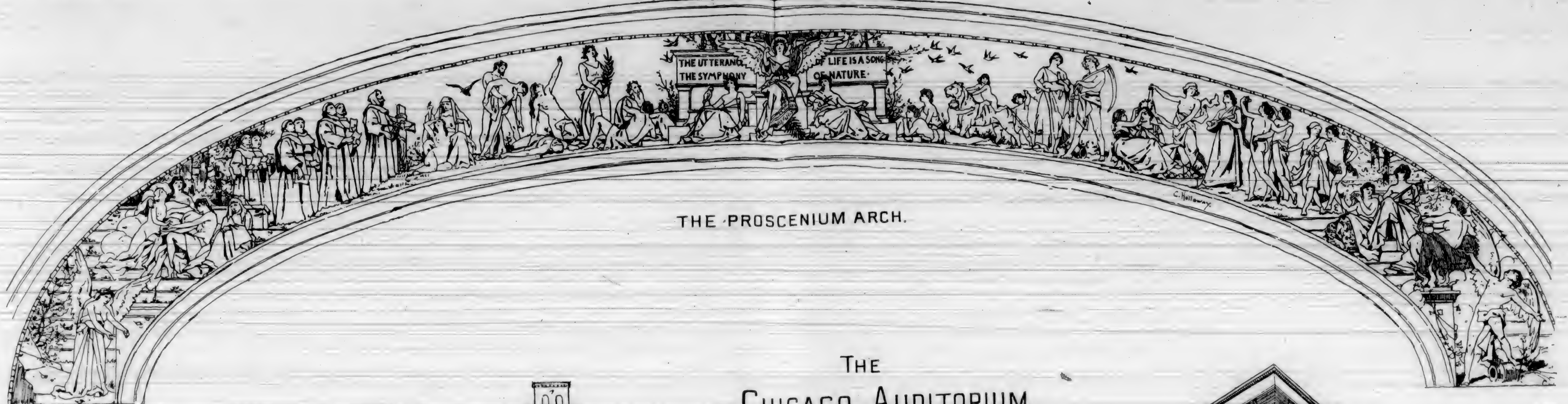
Two fire places and mantels are being designed by Curlett & Cuthbertson for the rooms of the Sutter Club now being finished in the New California State Bank Building at Sacramento. The lower portions are of red stone and the upper of hard woods.

Our double plate shows some interesting drawings of the celebrated Auditorium Building lately completed in Chicago. the architects, Messrs. Adler and Sullivan have designed and constructed a building, that is not only a credit to themselves, but to the profession in America as well. From the foundation to the finishing, the various requirements of strength, durability, utility and fitness have been carefully studied and provided for. The following facts are compiled from the Daily Inter Ocean, which contained a long and interesting description of the building. The building has a frontage of 162 feet on Wabash Avenue, 362 feet on Congress street and 187.6 feet on Michigan Avenue, covering an area of 62,000 square feet.

The foundations consist of a four foot base of concrete, resting on a floor or platform of pine lumber.

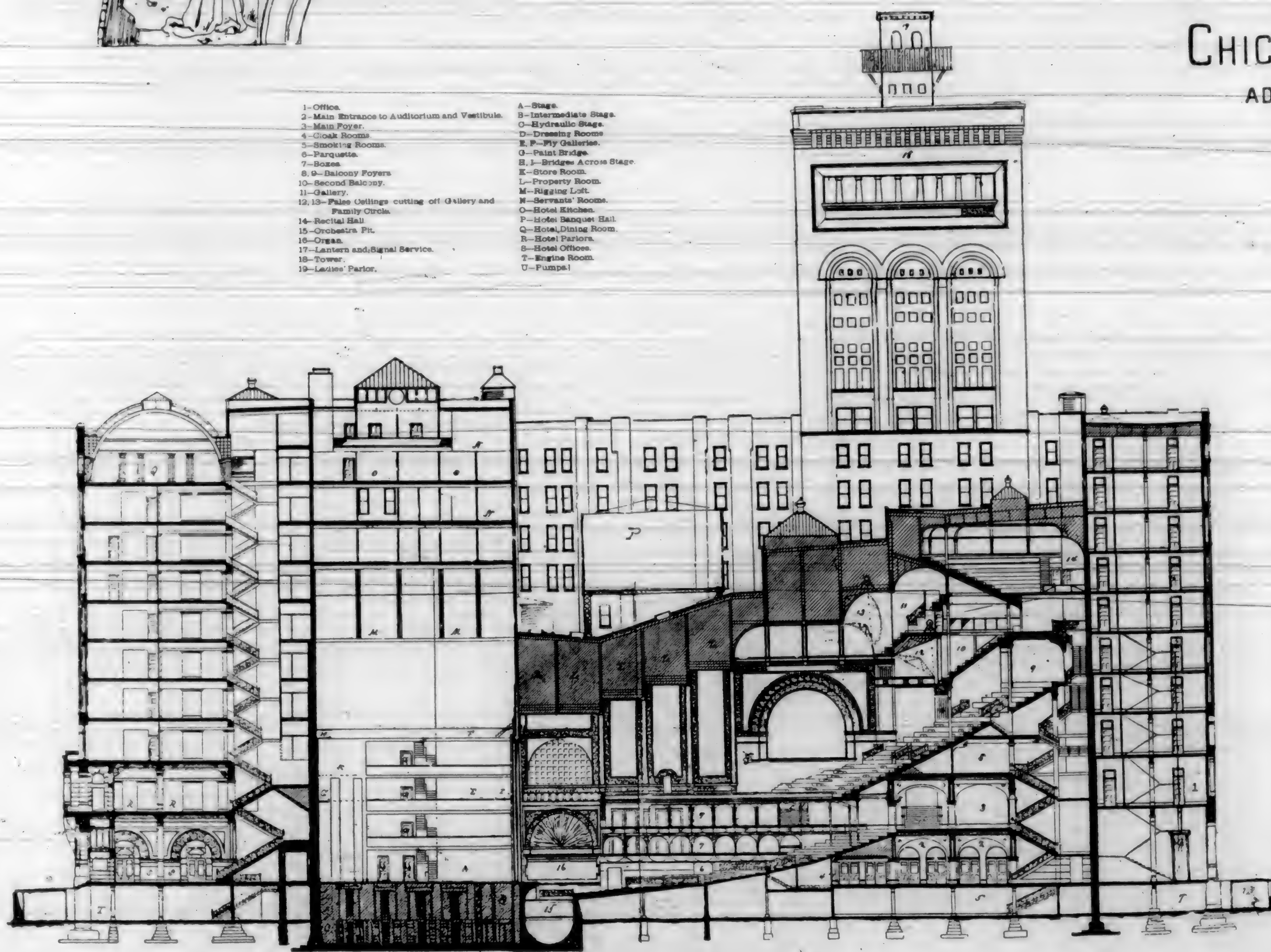
Seventeen million bricks enter into the walls of the building, which are faced with Maine granite and buff Bedford stone.

There are eleven dynamos, eleven boilers, twenty-one pumping engines, and thirteen elevators; ten thousand electric lights, two hundred and thirty miles of electric wires and cables; over twenty-five miles of gas and water pipe; over fifty thousand



THE
CHICAGO AUDITORIUM.
ADLER & SULLIVAN,
ARCHITECTS.

- | | |
|--|-------------------------|
| 1-Office. | A-Stage. |
| 2-Main Entrance to Auditorium and Vestibule. | B-Intermediate Stage. |
| 3-Main Foyer. | C-Hydrostatic Stage. |
| 4-Clock Room. | D-Dressing Rooms. |
| 5-Smoking Rooms. | E-P-M-Galleries. |
| 6-Parquet. | F-Paint Bridge. |
| 7-Boxes. | G-Bridges Across Stage. |
| 8, 9-Balcony Foyers. | H-Gore Room. |
| 10-Second Balcony. | I-Property Room. |
| 11-Gallery. | M-Rigging Loft. |
| 12-13-Plaza Galleries cutting off Gallery and Family Circle. | N-Servants' Room. |
| 14-Rectal Hall. | O-Hotel Kitchen. |
| 15-Orchestra Pit. | P-Hotel Banquet Hall. |
| 16-Organ. | Q-Hotel Dining Room. |
| 17-Lancers and Signal Service. | R-Hotel Parlors. |
| 18-Tower. | S-Hotel Office. |
| 19-Ladies Parlor. | T-Engine Room. |
| | U-Pumps. |



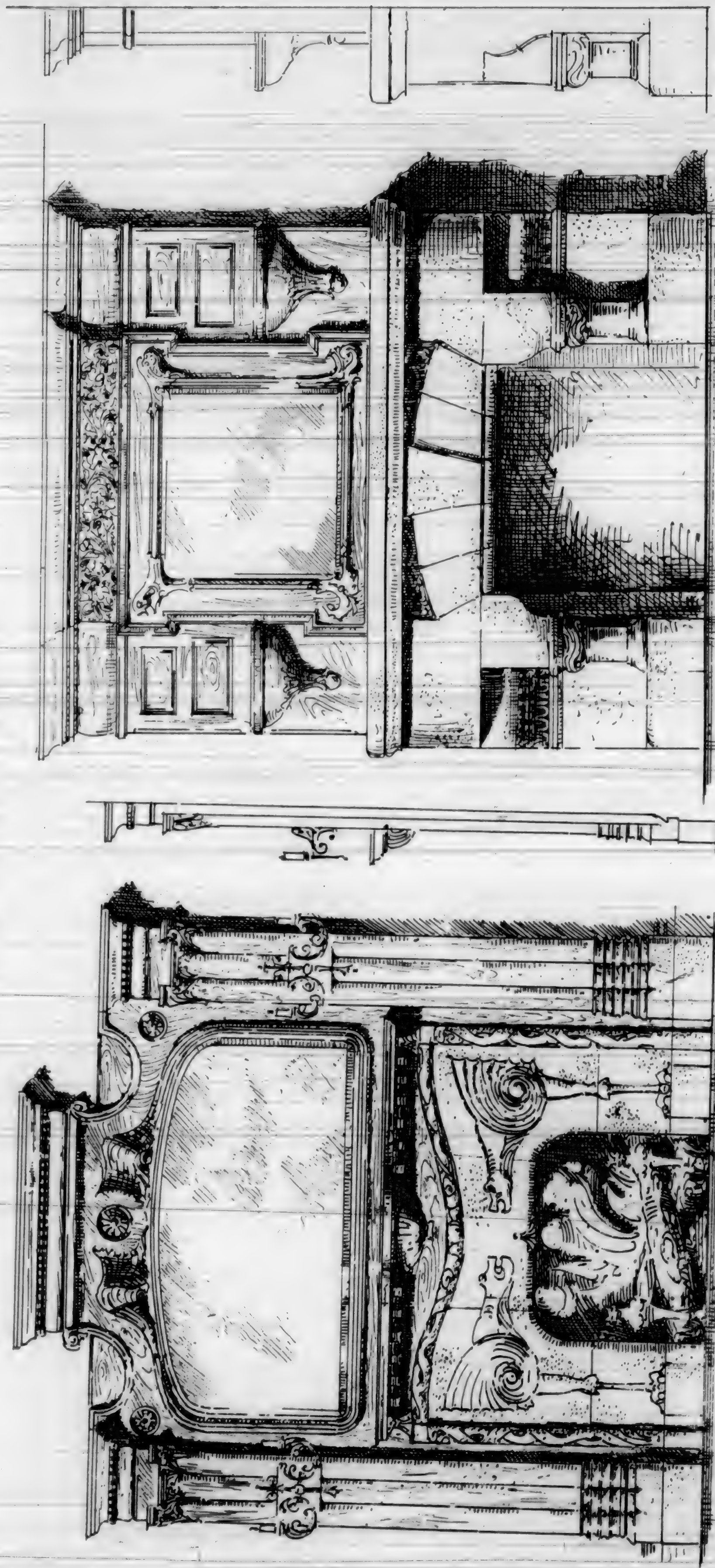
A CROSS SECTION OF THE AUDITORIUM.



FEBRUARY 1890.

MANTELS FOR THE SUTTER CLUB, SACRAMENTO.

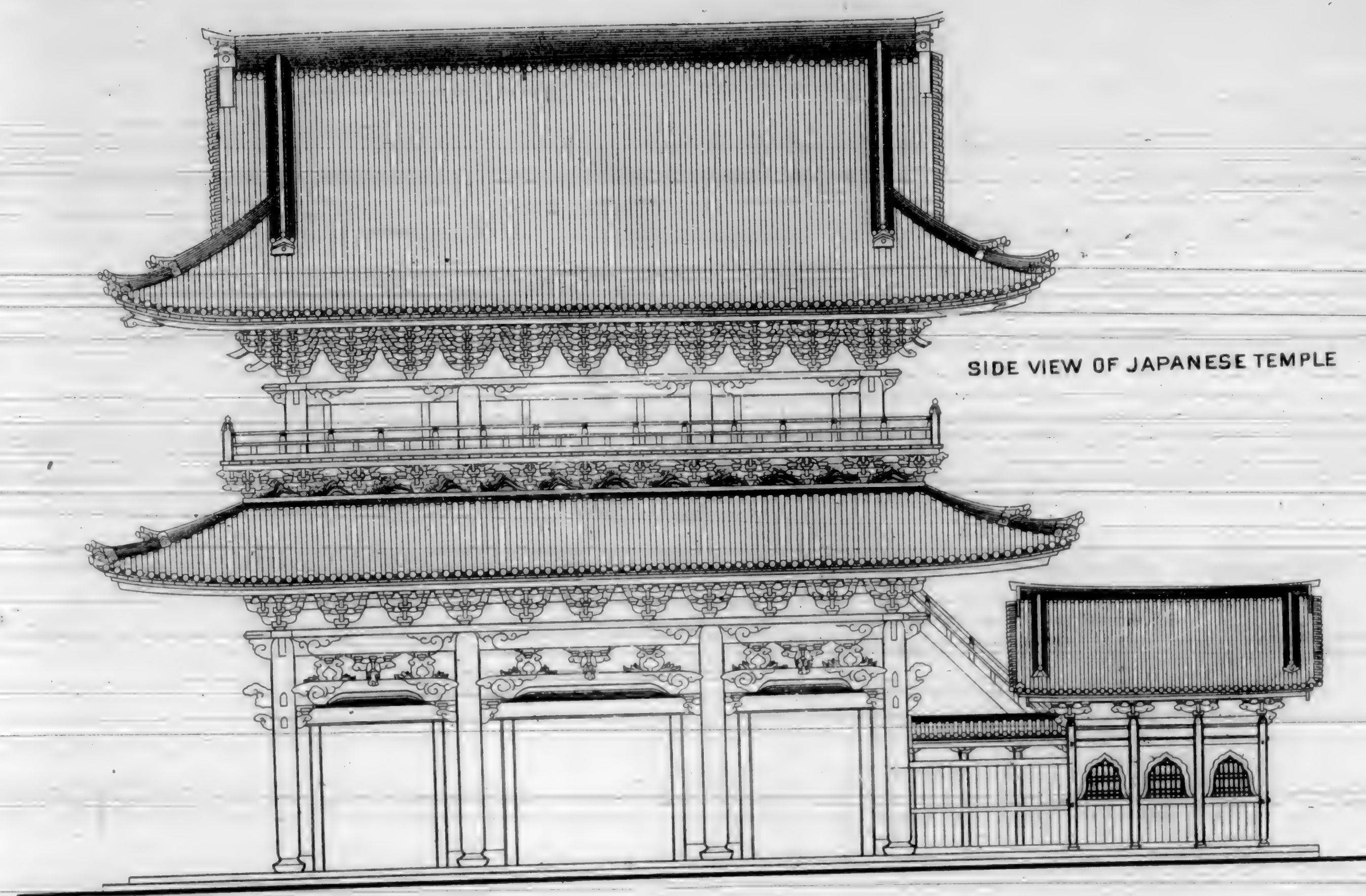
Curlett & Culbertson, Architects.



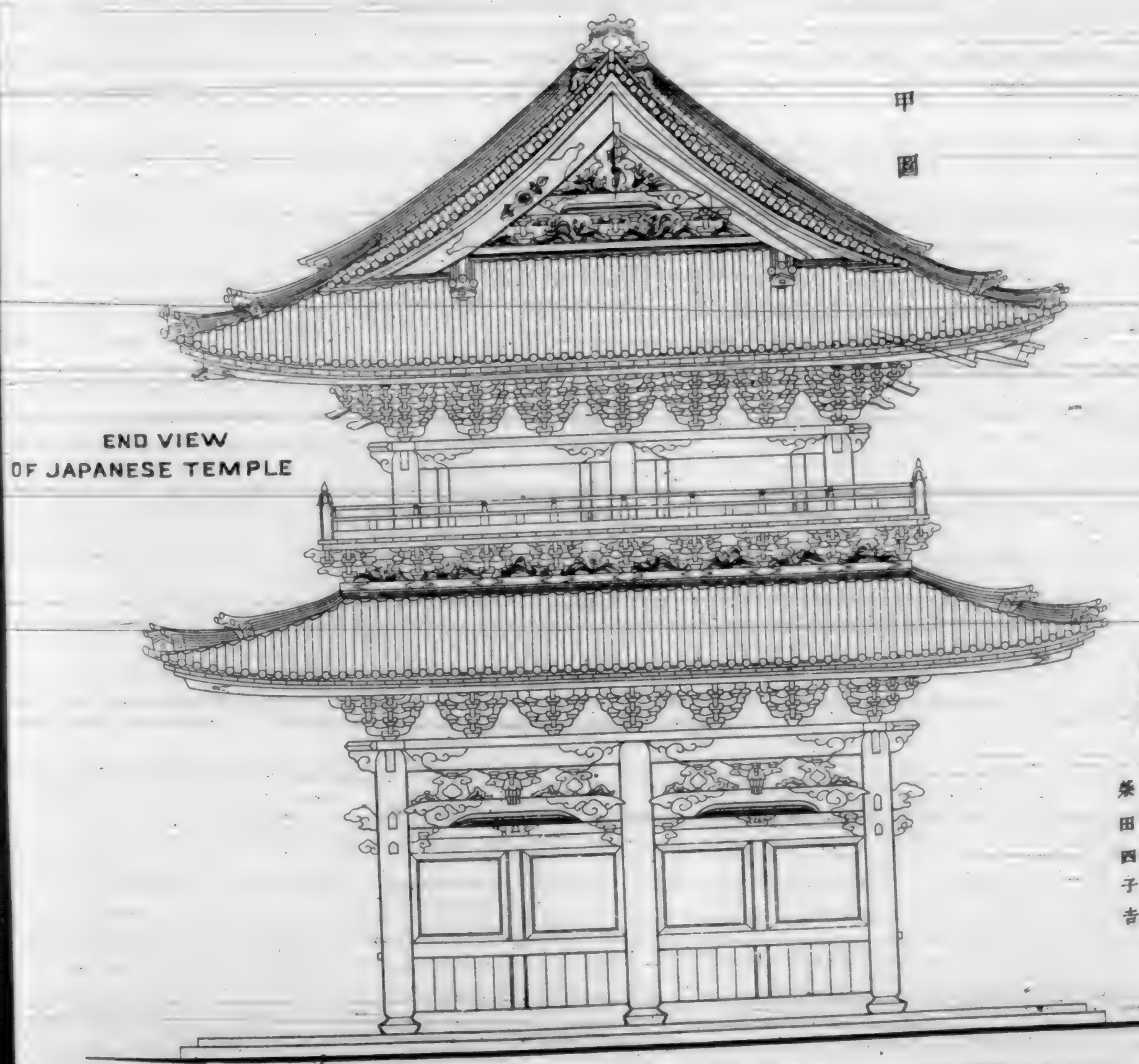
PARLOR

Library

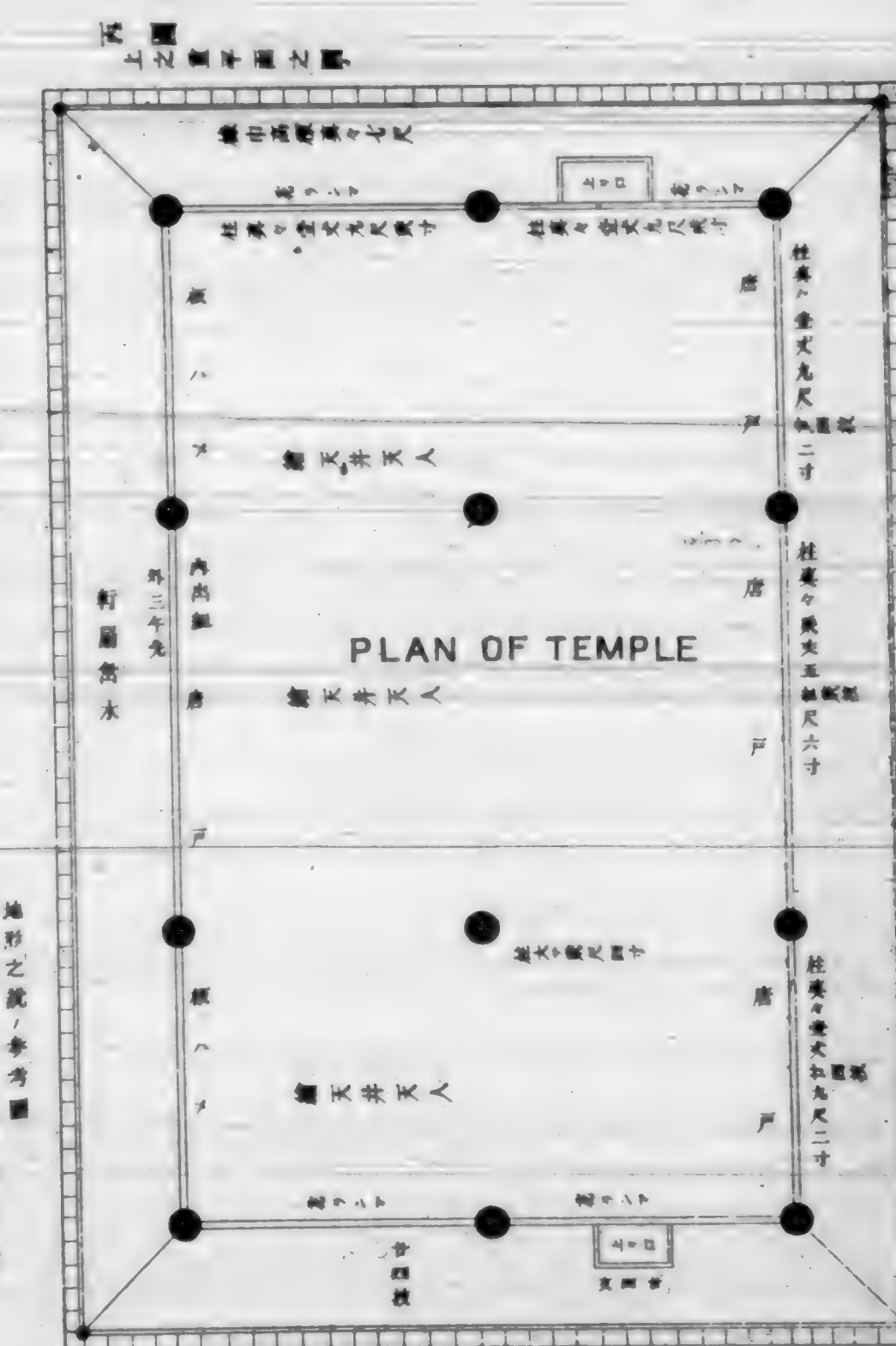
VOL. XI No 2.



SIDE VIEW OF JAPANESE TEMPLE



END VIEW OF JAPANESE TEMPLE



PLAN OF TEMPLE

square feet of Italian marble mosaic floors, containing over fifty million separate pieces of marble.

The cost of the building with its equipments, etc., reached nearly three million dollars.

The office portion of the building is located in the ten stories fronting on Wabash Avenue, and is reached by a broad flight of marble and iron steps, and three elevators. There are one hundred and twenty-six offices finished in antique oak.

The hotel occupies the ten stories on Michigan Avenue and Congress street fronts, and has four hundred rooms.

The entrance to the theatre is from Congress street. Its high arched ceiling studded with electric lights, and supported by massive pillars of porphyry, its inlaid mosaic floor, its graceful box offices of bronze, its marble walls of scintillating colors contrasting with the polish of the mahogany trimmings, make a scene to vie with Aladdin's palace.

The seating capacity of the various portions of the theatre are as follows: Balcony, 1432; Family circle, 437; Gallery, 526; Parquet, 1442; 40 Boxes, 200. Total, 4937.

PROTECTING ELECTRIC WIRES.

The rules of the Boston Manufacturers Mutual Fire Insurance Company for guarding insured property against the hazard of stray currents of electricity generated outside of mill yards are as follows:

First—No foreign wires of any kind shall be attached to buildings insured by this company for the purpose of carrying electric currents across the yard to any point.

Second—All electric wires which may be required by the insured shall enter the premises at one point near the headquarters of the nightwatchman, where they can be kept under supervision; each of said wires shall be guarded by a protector against strong currents, operating by opening the circuit, and by a lightning arrester.

Third—Such protectors against strong currents shall be located in a dry, accessible place inside the building, and as near the point of entrance of wires as possible, and shall be without ground connection; such protectors shall be mounted on non-combustible and insulated supports, which shall be provided with a receptacle for the burning or melted parts of such apparatus.

Fourth—The lightning arresters on all wires must be placed between the protector against strong currents and the electrical portion of the apparatus within the building to which such wires are connected. No ground wires for such lightning arrester shall be attached to gas pipes within the premises of the insured.

Fifth—All electric wires which may enter the premises of the insured must be insulated between the line wire on the insulator attached to the buildings outside and the protecting device within with the best quality of waterproof insulation. Moreover, such wires must enter at a distance of not less than three (3) inches from any other wire or any conducting material.

Sixth—If any wires carrying high tension or strong currents are to be carried over or under other wires on the property of the insured they shall be attached to poles so near to each other, with one wire so far above the other that if a break should occur the pendant wire between these poles may not be long enough to come in contact with the wire below, or, if not carried on poles, these wires shall be so placed or protected with guard wires as to render a contact between different wires impossible.

Seventh—If the high and low tension systems are in use in the same yard, even when developed within the works, the wires must be kept separate, and so wide apart that no contact or cross arc can be made.—*Fire and Water.*

ANNUAL MEETING OF THE CALIFORNIA ELECTRICAL SOCIETY.

The annual meeting of the California Electrical Society was held at their rooms the 3d instant. By the reports of the officers for last year, the Society is in a good financial condition. The following named officers were elected for the ensuing year: N. S. Keith, President; Orion Brooks, Vice-President; W. W. Wight, Secretary; W. Hanscom Jr., Treasurer, and Edward Roe, H. T. Bestor and A. W. Smith as the three other members of the executive committee. On account of their aid in the science of electricity the following named gentlemen were proposed and unanimously elected honorary members of the Society: A. G. Davis of Baltimore, G. H. Pride of New York, and P. B. Cornwall, L. L. Baker and Alvinza Hayward of this city.

THE MYSTERY OF THE SPHINX.

BY CHARLES S. ROBINSON, D. D., LL.D.

At the foot of the pyramids of Ghizeh, immediately below one who is sitting up on the ledges, there rises out of the verdureless sands, confronting the observer like a statue which looks toward him but not at him, one of the most singular creatures that ever the art of sculpture has given to the ages. A fantastic imagination of some forgotten artist has planted there in the desert an image with one of the oddest heads and one of the awkwardest bodies that can be conceived.

This is what has been known as the Great Sphinx. It is massively constructed, and carved with admirable ingenuity, but no line of any style of beauty has it anywhere to exhibit. The ears are enormous, and disreputably long; the nose is gone beyond criticism; the mouth is now ragged, thick-lipped, and uncouth; the beard is boorish; the open eyes stare blankly into space; the wig bags flatly and flaringly out on either side; the chin has lost half of its stony hair and all of its ancient semblance of dignity; the face was formerly painted, but the red color has been washed off by the sand-showers on the weather side. Altogether the structure seems pretty much gone under the effects of age and decrepitude, and has quite the look of a used-up heathen idol.

And still all tourists agree that there remains a tranquil majesty in the mien of it, which every one would recognize the moment his eyes caught a glimpse of the forehead aloft in the air. Even the fastidious Dean Stanley appears to have considered it "a giant representative of royalty." And he further pronounces that "it fitly guards the greatest of royal sepulchers." So finally he offers his testimony that "with its half-human, half-animal form, it is the best welcome and the best farewell to the history and to the religion of Egypt."

There it stands very quietly, and everybody must be allowed, with due charity, to cherish his own opinion. Coarse in its construction as a work of art, stiff and clumsy in every lineament, it is yet able, as the notebooks of a thousand visitors testify, to impress the souls of Eastern travelers with the vague sense of its greatness. It is better seen from below. The first sight of it, when caught as a part of that matchless landscape displayed from the top of the Great Pyramid, inevitably belittles and dwarfs its proportions. It looks grandest of all from the long and winding approach of the old path. Most persons know that the general figure is of a colossal form, sculptured roughly from the cliff on which it reclines; indeed, it is a lofty rock cut into a symbolic shape representing a lion lying down, with the face of a human being, erect above the forepaws,—a brute's body with a man's head and neck. The body seems to lie reclining at length in the sand; the head is poised finely, with noble features; the figure stands more than fifty feet high, and once had a royal helmet above; the stone is nummulitic, full of millions of minute marine shells, thus showing that years ago this part of the plain lay under the waters of the distant sea.

The entire effect is much lowered because of the overpowering achievement of size in the pyramids close by. Harriet Martineau has an amusing account of her eager anticipation as she went forth upon these excursions around Cairo. Always she said to herself, "Whatever else my eyes will see, they will see the Sphinx." But when she rode up toward the Great Pyramid she was so absorbed that she missed the sight altogether of this idol, and thought afterwards it had been only a heap of rock piled up there amid the interminable sands of the desert. But an attentive contemplation of it subsequently enabled her to reach, and even retain, her former enthusiasm. She says it made her half afraid of it. She noticed particularly that they had placed a man "sitting in a fold of the Sphinx's neck, as a fly might settle on a horse's mane; in that crease he reposed, while far over his head extended the vast pent-house of the jaw, and above that the dressed hair upon either side of the face, each bunch of it a mass of stone which might crush a dwelling-house; so life-like, so huge, so monstrous,—it is really fearful. The full gaze and stony calm of its attitude almost turn one to stone."

It is likely, however, that the Sphinx owes much of its singular impressiveness to the sense of mystery which for generations has inexplicably surrounded it. It is, perhaps, the most written-up and advertised curiosity in the East. Poetry and legend, painting and etching, have vied with each other in throwing a glamor around this forlorn idealization of mythology. The Bedouin say that there are spirits who in the night-time visit the Sphinx. One wears the form of a giant man; the other, that

of a beautiful boy. These move together, and may be detected by the smell of the incense which, as they burn it under the nostril of the idol, floats all through the neighboring air. It is dangerous to interrupt them in their worship at twilight, and hence no Arab child ventures out there after dark among the mysterious tombs in the ledges. The wild sons of the desert call this Sphinx *Abu'l Hol*, "The Father of Terror," and they keep shy of all contact with it.

Besides this, there is the nurses' story of Rhodopis, the maiden who, when she grew old, bewitched people that passed. In her childhood, however, she was a sweet little girl; and one day, when she was bathing away down by the great sea, an eagle bore off her shoe, and took it over the Libyan sands, clear to Memphis. There she suddenly dropped it upon the lap of the king of Egypt as he sat at judgment. And the shoe fell so strangely, and it was such a small and delicate shoe, and the beautiful embroidery upon it was so dainty, that messengers were sent over the whole land to find the owner. They caught the fleeing damsel down in Naueratis, and she was brought to the palace. Then the king married her. And when she died he built the third pyramid for her monument, even though some said she was a witch; he said she was only a beauty.

Beyond these fanciful legends there always remained the fact, everywhere admitted, that nobody knew what this Sphinx was, or who built it, or when it first saw the light, or what it was for any way. It appeared so different from everything else, that the best scholars shrank back from giving an opinion. The name of sphinx was applied to it only from some supposed resemblance which the figure had to what used to be pictured in the Greek mythology. Indeed, it has often been thought that the Egyptian term took its origin a thousand or two years after a new race of conquerors overthrew the ancient dynasties. The kings were dead and forgotten who caused these vast figures to be fashioned there in the temples, and the temples were long in ruins before the name of Sphinx was applied to their work. And it may be that it was just that sense of inexplicableness in mythology which fixed the title here.

In the Greek fable we are told that there was once a monster who was born the direful daughter of Typhon and Chimæra. She had the body of a lion, with its breast, feet, and tail, but the face and head of a female, and the wings of a bird. She was sent by Mars to avenge the death of his son, the dragon slain by Cadmus, and by Juno sent to Dionysus' city to ravage the territory of Thebes. She had been taught to make riddles by the Muses, and one of these she offered on the Phicean Hill: "What creature is that which has one voice, is four-footed, two-footed, and at last three-footed?" Those who could not answer she devoured, and the whole land fell into awful fear. The oracle told every one who asked for help from the gods that Thebes could not be freed until some one should solve the Sphinx's riddle. Finally Creon, who, at the time, was king, lost his son, seeing him devoured by the monster. A proclamation followed, that whoever should answer the Sphinx should be the king of Thebes and have the monarch's sister Jocasta for his wife. Edipus then came from Corinth into Egypt, and at once answered the enigma. "Man," he said, "is the animal which has but one voice; in his infancy he is four-footed, for he creeps on his hands and feet; but he goes on two feet when he is grown, and, when old, he carries a staff for his help." Then the Sphinx, conquered, flung herself down and died.

This was the Grecian story, but it had no connection with the Egyptian theology, and the Sphinx at Ghizeh was in its place a thousand years before the Greeks came to reign in the land of the Pharaohs. It is useless to wander around among the scholars. They differ with each other, and sometimes grow fierce. Mariette says the idol belongs away back in the fourth dynasty; Cheops (who is supposed to have erected in the oldest times the Great Pyramid) found it dilapidated, and gave it a new life with some needed repairs, and so immortalized his name. Then comes Brusch Bey, saying that this statement of Mariette "bears a lie on the face of it." And Piazzi Smyth actually grows spiteful at these efforts to bring the image any more into notice; he declares that this mutilated object is only an image of superstition, fairly obscene with its idolatrous impiety, unfit to be in the neighborhood of the pyramid or associated with its name. His language grows almost amusing in its explosion of petulant temper: "That wretched Sphinx, I repeat, need be no more referred to again by any Christian man, woman, or child, looking for instruction to the Rock of Ages alone," thus he concludes.

There is no necessity now, certainly, for further keeping up the sense of mystery which has had so much to do with the fame of this image. For everything which any one wants to learn, is told us by George Ebers, and Miss Edwards adds the latest confirmation. The sand, which covered all the front of the idol, has been excavated; something looking like a temple or votive chapel was found just between the paws the lion extends along the face of the rock; statues of King Khafra, three in number, one of which is now in the Bulak Museum, were standing quietly waiting to be dug up and to tell their story. The making of this rock into a figure of a deity was begun by Cheops; it was finished under the direction of King Chefen; and it was dedicated to Harmachis, the God of the Rising Sun. This is learned from a large tablet covered with hieroglyphics which was found fixed upon the breast of the animal down beneath the sands of the ages. There used to be an altar in one of the chambers, and this was so located that the sweet savor of a sacrifice might most easily be supposed to reach the god's nostrils.

That is to say, there is no longer any mystery of the Sphinx; it represents a transformation of the deity Horus, so an inscription discovered lately at Edfu relates; the god, in order to vanquish Typhon, the evil spirit, took the shape of a human-headed lion, thus he arose upon the imagination of those ancient idolaters in the remote past for their worship. Hence the Sphinx was the colossal embodiment of Egyptian idolatry at its highest power and basest degradation. The sun-god was not equal to his own defenses, and the structure lies in ruins. A strange sort of beauty must once have graced it as a thing of art; but the Mamelukes used the big head for a target when they practiced their artillery in shooting. That was what broke the nose and tore fragment after fragment out of the wig and the beard and the chin. Then the open desert invited the winds to come and bury the enclosure below; and so the old battered creature gazes out across the ages, lonely and lost in its vain attempt to summon its friends for rescue, with the far-off look of a deserted monarch. And so Egypt stands crownless to-day; the obelisks, the pyramids, the sphinxes—all are desolate. They lingeringly proclaim their own humiliation before their conqueror. And that was what the Lord said by his prophet in his Word: "He shall break the images of Beth-shemish that is in the land of Egypt; and the houses of the gods of the Egyptians shall he burn with fire." This was what the sad Jeremiah wrote while he was an exile in that country; his eyes had to bear the pain of sights he saw, but he hoped on and kept the faith.

It seems to me, that, if I were asked to offer a convincing proof of the certain fulfillment of Divine prophecy, I should be willing just to rest my case upon the picture which is here suggested. Could Jehovah, the living and true God, show more conspicuously the depth of the contempt and derision in which he holds these idols of the ancient mythologists of Egypt, than by exhibiting them in this plight of ruinous dilapidation? There they stand, battered and deserted, amid the rifled graves of their forgotten priests. Imagine the scene with the infidel and alien race of Mamelukes training their guns upon the temples where the Pharaohs worshiped their highest deities with incense and the bodies of beasts, and laughing with jeers of applause and congratulations whenever a better shot than usual shows by the little cloud of dust in the air that the cannon-ball nipped on the nostril of the Sphinx. *Sunday School Times.*

STUDENT'S COLUMN.

Relief (re-leef), Rilievo (ré-le-á-vo). The projecture or prominence of a figure above or beyond the ground or plane on which it is formed.

Relief is of three kinds, namely, low relief or bas relief (bā-re-leef); bass relief (bās-re-leef); basso rilievo when the figures do not stand out far from the plane on which they are formed, as in medals, festoons, foliage, etc.; demi relief, demi rilievo, when one half of the figure rises from the plane; mezzorilievo (met-or-med-zo-re-le-á-vo), a middle degree of relief in figures between high and low relief; high relief, alto rilievo or alto rilievo the projection of a figure half or more, as when a figure stands completely out from the ground, being attached to it in only a few places.

Intaglio (in-tāl-yo) is a figure cut into a material, as a seal, matrix, or the like, so as to form a depression or hollow.



PERSONAL.

John McArthur, Jr., the well-known architect of Philadelphia, is dead. Mr. McArthur has held high positions during his life-time, having been architect for the War Department during the war. His greatest work, however, is the Philadelphia City Hall, now in the course of erection, and which has already cost \$14,000,000.

I. K. Pond, of Pond Bros., Architects, Chicago, has come to this Coast on a pleasure trip.



A TEXT BOOK ON ROOFS AND BRIDGES.

PART II—GRAPHIC STATICS.

—BY—

PROF. MANSFIELD MERRIMAN AND HENRY S. JACOBY.

The above is the title of a new book just issued by John Wiley and Son, New York, 15 Astor Place. It treats of the *Analysis of Stresses* by graphic methods, together with additional matter so as to form a tolerably complete treatise on Graphic Statics, as applied to the discussion of common roofs and bridges. Abbreviated methods are employed in calculating wind stresses.

A novel feature of the book is that every other leaf is a blank, and of a suitable quality of paper, upon which drawings can be made, and new problems worked out with the assistance of given problems on the adjacent leaves. It is a text book that will be of great value in an Architect's or Engineer's library.

American Architect, Jan. 11, "Civil and Domestic Architecture," "Loss of Power by Radiation of Heat," "The Cost of a Small Museum," "The Ideal Disposition of the Dead," "Electricity's Victims in Europe," "Methods of Reducing the Fire Loss." Jan. 25, "The Art of the Vikings," Architectural Shades and Shadows, "Prehistoric Ruins and Works of Art at Yucatan."

Architecture and Building, Jan. 18, "Electric Motor for Domestic Purposes," "Hot Water Heating." Jan. 25, "Comparative Cost of Electric Lighting," "Notes on Estimating." Feb. 1, "Notes on Surface Drainage," "An Architectural Museum and Library," "Stray Thoughts for Young Architects."

Inland Architect, January, "Vaulted Churches in Romanesque Architecture," "Development of Architectural Style," "Economy in the Use of Steel in Building Construction."

Architectural Era, January, "The General Character of Romanesque Architecture."

Canadian Architect, January, "Office Management and Routine," "Architecture without Decoration."

Northwestern Architect, January, "The Reduction of Fire Loss."

Journal of Proceedings, (R. I. B. A. organ) "Paris Plasterers," "Height of Buildings," "Westminster Abbey," "Architectural Education."

The Engineering and Building Record, Jan. 11, "The Organization of an Architect's Office," "Improving Country Roads," "Wiring Buildings for the Electric Light." January 25, "Hydraulic Power in London," "Mills and Mill Engineering," "Recent Progress in Sinking Deep Foundations for Engineering Works." Feb. 1, "Government Action as to Accepting the Lowest Bid," "Experiments Relating to Hydraulics of Fire Streams," "A Report on Waste Water."

Sanitary News, Feb. 1, "Building in Other Countries," "Fire Proof Buildings."

The *Western Architect and Builder* of Denver has begun the publication of a four page weekly supplement.

Architects, Builders and Hardware Journal, Atlanta, Ga., January, "Iron Houses," "Poisonous Gases," "Does it pay to employ an architect?"

Manufacturer & Builder, New York, January, "Suggestion for World's Fair" 1892 illustrated, "The Linotype," "Buere-stock Cable road, Switzerland," "Effect of Vibration on a building."



Supervisor Bingham proposes an ordinance removing the Chinese quarter to the Potrero.

About \$2,000,000 is the value of the lumber trade of Portland, Or. and vicinity.

It is estimated that the Southern Pacific Railroad Co. lost over one and one-quarter million dollars by the recent storm in the mountains.

The Saw Mills in the Puget Sound region are said to have a total capacity for 1,000,000,000 feet of lumber per year, of which the output is about 750,000,000 feet.

In a certain locality in Boston \$2,000,000 is estimated to have been spent upon buildings all situated within a radius of one quarter of a mile.

In the suit of Pissis & Moore against Dr. J. H. Stallard, the Justice Court decided in favor of the plaintiffs, notwithstanding the contract had not been recorded.

Washington State has an increasing industry in the cedar shingle manufacture, which amounted to nine million shingles for the past year at a valuation of over two and one-quarter million of dollars.

The Illinois State Chapter, A. I. A., has been formed by a consolidation of the Chicago Chapter, A. I. A., with the Illinois State Association of Architects. A committee was appointed to consider the rental of a room at \$1,000 per year, on the third floor of the Art Institute. It was decided to make the annual dues of the new body not less than \$15 per annum.

The contractor or builder should never prepare the drawings and specifications. *He is on the other side of the case.* A learned judge once said that "a contractor preparing the drawings and specifications of work that he is to perform for a party who has little or no technical knowledge of the subject, is like the opposing lawyer preparing both sides of the case." However honest he may be, such a lawyer and such a contractor will give his own side the advantage.—*Ex.*

The Senate will probably appropriate the following amounts for public buildings: Oakland, Cal., \$300,000; Cheyenne, Wyoming, \$150,000; Helena, Mont., \$150,000; Salt Lake City, Utah, \$500,000; Stockton, Cal., \$85,000; Mammoth Hot Springs, Yellowstone National Park, \$10,000; Portland, Or., \$500,000; Virginia City, Nev., \$75,000; Hastings, Neb., \$150,000; The Dalles, Or., \$100,000; Salem, Or., \$100,000; Reno, Nev., \$75,000; San Diego, Cal., \$300,000.

Statistics recently tabulated show that there was consumed during the past year of clay products in building in twelve of the leading cities, the following number of brick: New York City, 1,000,000,000; Chicago, 440,000,000; Philadelphia, 300,000,000; Boston, 150,000,000; St. Louis, 200,000,000; Washington, 125,000,000; Cincinnati, 100,000,000; Cleveland, 84,000,000; Omaha, 80,000,000; Pittsburg, 80,000,000; New Orleans, 36,000,000; Indianapolis, 35,000,000; making a total for these cities of 2,730,000,000, which merely hints at the enormous consumption in the country at large.—*Ex.*

Governor Hill, of New York, in a recent message to the legislature, suggested that in view of the unsatisfactory condition of the county roads, the State should construct in every county two roads intersecting each other in about the center of the county, connecting with similar roads in the adjoining counties and so form a system of State roads to be kept in repair at the

expense of the State. The advantage to be gained would be convenient means of communication between different parts of the State, whether near or far. If this idea is carried out successfully in New York there will be an excellent precedent for other States to follow, and thus make public highways over the length and breadth of the nation.

A project is on foot to build a large salt water bathing establishment on the northwest corner of Sutter and Stockton streets; the water will come direct from the ocean, through several miles of pipe; the building will be a handsome structure, containing, besides a large number of single bath-rooms, one large plunge bath 50x100 lined with marble and two smaller plunge baths for private clubs whose membership will be limited to two hundred. One club being composed of ladies, and the other of gentlemen. Mr. Wm. Greer Harrison is at the head of the enterprise; the company has its office at 305 California street, and is known as the Pacific Ocean Bathing Corporation. Such an enterprise should be made a very profitable one—at present would-be bathers have long distances to go to enjoy the pleasures of a swim in salt water, and yet there are many who put up with the discomforts of a long ride and the consequent loss of time, for the sake of the pleasure they take in a dip.

M. Pechard, the French chemist, has discovered a new substance, called "oxalomolybdic acid," being composed of oxalic and molybdic acids. The crystals of this new acid can be kept unchanged both in light and darkness, but soon become blue if moistened and placed in the sun. When it is used upon paper it will not appear distinct unless put under the strongest sunlight, which turns it to a deep blue. However, this only happens when the solution is spread over some surface, as in the bottle it remains unchanged. To use it for photographic purposes, dip a sheet of paper into a saturated solution, dry in the dark, and then expose behind a common photographic negative for about ten minutes, when a very sharp blue print is obtained. If placed in contact with water, the color immediately disappears, thus allowing one to write upon a piece wholly exposed to the sunlight with a pen dipped in water; but heat this blue print once, and it turns a jet black, which water cannot change.

The American Fine Arts Society has been organized with a capital stock of \$50,000, besides which a gift fund was raised of upwards of \$30,000, now reported to have reached \$200,000, contributed chiefly by Cornelius Vanderbilt, George Vanderbilt, C. T. Barney, John D. Rockefeller, Robt. Gorlet, Henry G. Marquand and John D. Archibald. The Architectural League, Art Students' League, Society of American Artists, New York Art Guild and Society of Painters in Pastel, have united with the organization. A building is to be erected in New York soon in which exhibitions can be held and the study of Art pursued. "The formation of this powerful union", the committee having the matter in charge announces, "is doubtless the most important step yet taken in the establishment of a true school of American Art. It will correspond to the Ecole des Beaux Arts in Paris. It brings together no less than three hundred artists and architects of merit and as many more ambitious students. This Union is destined to become the Art power of the country.

Plans have been drawn for another suspension bridge across the Hudson, at a point where the river is narrowest, between Hoboken and Fourteenth streets, New York. Gustav Lindenthal is said to be the projector of the work, which is to be carried out by the North River Bridge Company, of which Jordan L. Mott, of the Mott Iron Works, New York, W. A. and W. F. Roebling, the famous bridge builders, are amongst the principal incorporators. The bridge is to have but a single span, 2,850 feet in length, thus outstretching the much talked-of English Channel bridge, whose longest span will be only 1,700 feet. To place a pier in the center of the river would incur a greater expense than a single span, as it is two hundred feet down to rock formation. The bridge will be 150 feet above the river and will be constructed of open hearth steel wire. The Brooklyn bridge was built with crucible steel wire that cost eight cents a pound, while the material now to be used is estimated at half that price. There will be six railroad tracks crossing, and the length of time taken to build is computed at not more than seven years, unless delayed by legal proceedings.

WARFARE ON OAK TREES.

"The world seems to have waged a special warfare upon oak trees," says a St. Louis man. "Before iron ships were built, and that was only twelve years ago, oak was the only thing used. When this drain ceased oak came into demand for furniture, and it is almost as expensive now as black walnut. No one feels the growing scarcity of oak like the tanner, and the substitution of all sorts of chemical agencies leads up to the inquiry as to whether other vegetable products cannot be found to fill the place of oak bark. The wattle, a tree of Australian growth, has been found to contain from twenty-six to thirty per cent. of tannic acid. Experiments have been made on the Pacific Slope, where the wattle readily grows, and in a bath of liquor, acid was made from it in forty-seven days, whereas in liquor made from Santa Cruz oak, the best to be found in all the Pacific States, the time required is from seventy-five to eighty days. The wattle will readily grow on the treeless plains of Texas, New Mexico and Arizona, the bark of which ought to yield five dollars per acre, counting the fuel as nothing."—*Invention.*

CAUSE OF THE TRACY FIRE.

RESULT OF BUILDING-INSPECTOR ENTWISLE'S INVESTIGATION.

Complying with your order to make an examination to ascertain, if possible, the origin of the fire in the building, 1634 I street northwest, owned and occupied by the Hon. B. F. Tracy, I have the honor to report that I have made a thorough examination of the building, and it is evident from the condition of the house that the fire first started on the west side of the front parlor on the main first floor, and its rapid progress was no doubt caused by the fire getting behind the wall paneling. The room was lined its entire height with panel work on all the walls, leaving small chambers through which the fire passed around the entire room and through the floor to the second story. It also passed out into the hall and by currents rapidly up the stairway, cutting off all chance of escape from the upper floors. The building was heated by low pressure steam; on the indirect system, and in tracing the supply to the different localities of coils and coil chambers there is no evidence that the fire originated from the heating apparatus or from any chimney flue, but immediately under the point where the fire started, there was situated in the basement a pump run by a Bunsen gas-burner, and it is possible that this may have been out of order, allowing the gas to escape to the room above, and the fire started by an explosion of gas. This building was erected in 1876, and there is evidence that it was carefully and safely constructed. An addition was made during last season on the east side, and the mansard roof removed from the front and the front all carried up. This last portion is damaged principally by smoke and water; nor was the basement of the old portion burned; the fire starting on the floor above, but that was greatly damaged by water. I cannot positively decide the origin of the fire, but the escape of gas and the explosion of gas seem the most probable cause.—*National Builder.*

ADOBE HOUSES IN LOUISIANA.

The following description of building the old style adobe houses in Louisiana when that peculiar style of architecture was a necessity, will be found interesting: Friends and neighbors were invited in sufficient number with ample refreshments made and provided. A place was selected convenient to the building with loamy soil suitable for brick, and a hole was dug of sufficient size for the quantity of material required. This, after deep spading, was watered to the consistency of brick mortar. Then green moss, of which a sufficient pile had been provided beforehand, was spread like a gray blanket over the mortar bed, when a certain number of men, barefooted, with trousers rolled up above their knees, tramped the circle, crushing in the moss to the bottom of the loose earth. Then came another layer of moss and another tramping and so repeated till the pit was full to the top of adobe—moss and clay. This material was then pulled out by blankets or sections as it was tramped in and taken to the building already completed except the wall or weather boarding for which this mixture was the substitute. In sections of country where there was no Spanish moss, prairie grass or hay was used as a poor substitute. Beginning at the sill they went up, firmly driving sticks nearly horizontal between the studding about every six inches, to hold the mortar to its place, and when

finished, these sticks were in the center of the wall. This, when half dry, was shaved off with a sharp spade and left to dry, and when well whitewashed made a solid and pretty wall, cool in summer and warm in winter.—*The Journal of Building.*

CITY BUILDING NEWS.

Buchanan and Washington. Owner, Isaac Strassburger; architect, SAM'L NEW-SOM; contractor, Geo. R. Lang; surety, Frank P. Latson, \$4,000; cost, \$13,500; signed, Jan. 28; filed, Jan. 31; payments, 75 per cent. on 1st and 15th of each month as work progresses; balance 35 days.

Buchanan and Geary. Carpenter work; owners, Miss B. K. Dunne, et al.; architect, CHAS. J. I. DEVLIN; contractors, John Blake, et al.; sureties, J. Sullivan and J. T. Lynch, \$1,500; cost, \$2,554; signed, Jan. 9; filed, Jan. 13; time, 5 weeks; payments, 75 per cent. as work progresses; balance 35 days; artificial stone work, contractor, Geo. Goodman; surety, Geo. Richardson, \$1,000; cost, \$1,575; filed, Jan. 13; payments, same as above.

Bush and Lyon. Frame cottage; owner, W. I. Morgan; architect, M. J. BUGBEE; contractor, A. J. Wheeler; cost, \$1,824; signed, Jan. 13; filed, Jan. 14; payments, \$456, enclosed; \$456, brown coated; \$456, accepted; \$456, 35 days.

Buchanan and Washington. To build; owner, Isaac Strassburger; architect, Samuel Newsum; contractor, Geo. R. Lang; cost, \$10,350; surety, F. Latson, \$4,000; signed and filed, Feb. 12.

California, between Stockton and Powell. Dwelling; owner, F. Hesse; architects, Townsend & Wyneken; contractor, R. O. Chandler; signed, Jan. 8; filed, Jan. 18; cost, \$5,057; payments, \$950, framed; \$950, enclosed; \$950, trimmed, etc.; \$950, completed; \$1,275, 35 days.

Chura Avenue and Seventeenth street. Cottage; owner, P. W. Braas; contractor, Gustave Pavel; cost, \$1,658; signed and filed, Jan. 23; payments, \$500, mortar on; \$600, completed; \$558, 35 days.

Clayton near Page. 2-story frame; owner, Henrietta Maynard; architect, SAMUEL NEWSOM; signed, Jan. 18; filed, Jan. 28; cost, \$4,300; payments, 75 per cent. on the 1st and 15th of each month, as work progresses; balance, 35 days.

Devisadero and Waller. 2-story frame; owner, Annie Green; architects, Shea & Shea; contractor, J. B. Taubman; sureties, F. G. Norman & J. Beaumont; signed, Jan. 9; filed, Jan. 14; cost, \$5,400; payments, \$1,023, enclosed; \$1,024, rough plumbing in; \$1,024, outside primed; \$1,024, completed; \$1,365, 35 days.

Devisadero near Clay. 2-story frame; owner, Mrs. E. M. Carter; contractors, John B. Gonyeau Bros.; architects, sureties, G. W. and C. A. Hooper, \$4,000; signed, Jan. 14; filed, Jan. 18; cost, \$11,800; time, 110 days; payments, \$2,950, frame set up, etc.; \$2,950, brown coated; \$2,950, finished; \$2,950, 35 days.

Dolores and Nineteenth. To build; owner, S. Hortop; architect, S. HATFIELD; contractor, C. Peterson; sureties, A. W. Starbird and W. Bennett, \$2,000; signed, Jan. 20; filed, Jan. 22; cost, \$3,600; payments, \$666; roof boarded, \$666; first coat mortar on, \$666; plastered, windows in, \$700, completed; \$900, 35 days.

Douglas Street. 2-story frame; owner, Bridget Carr; architect, T. W. McKee; contractors, W. C. Aickley, et al.; signed, Jan. 25; filed, Jan. 27; cost, \$1,400; time, 60 days; payments \$300; ready to be enclosed; \$300, brown coated and floor laid; \$300, windows hung; \$300, completed; \$400, 35 days.

Ellis and Powell. Owner, Edward Auzerais; architects, PISSIS & MOORE; signed, Jan. 13; filed, Jan. 18; payments, 75 per cent. on the 1st and 15th of each month as work progresses; balance, 35 days. Carpenter work, J. W. Wissinger; cost, \$20,885. Brick and stone work, Richardson & Gale; cost, \$20,350. Wrought-iron work, Bigelow & Little; cost, \$1,402. Cast-iron work, O'Connell & Lewis; cost, \$2,560. Plumbing and gasfitting, Fritz & Keau; cost, \$2,574. Painting, J. St. Denis & Co.; cost, \$1,223. Total cost, \$62,886.

Geary and Gough. Interior additions to church; owner, First Lutheran Church; architect, Samuel Newsum; contractors, Fink & Schindler; cost, \$2,025; signed and filed, Feb. 12.

Harrison and Eleventh. Alterations; owner, James Monan; architect, W. H. ARMITAGE; contractor, S. T. Green; surety, Frank P. Latson; signed, Jan. 18; filed, Jan. 23; cost, \$2,625; time, 60 days; payments, 75 per cent. as work progresses; balance, 35 days.

Laurel Hill Cemetery. Mausoleum; owner, James L. Flood; architect, Wm. Patton; contractors, Patrick Doegan, et al.; signed, Dec. 5; filed, Jan. 21; cost, \$66,700; payments, 75 per cent. as work progresses; balance, 35 days.

Lyons and Washington. 2-story frame; owner, Perry Stinson; architect, P. R. Schmidt; contractor, J. O'Connell; signed, Jan. 15; filed, Jan. 21; cost, \$3,100; time, 90 days; payments, \$575, enclosed; \$575, brown coated, etc.; \$575, hard finished, etc.; \$575, completed; \$500, 35 days.

McAllister and Webster. Two houses; owner, Elizabeth Gluck; architects, John & Balczynski; contractor, Adam Miller; signed, Jan. 20; filed, Jan. 23; cost, \$14,200; payments, \$3,000, up; \$3,000, enclosed; \$2,500, rough mortar on; \$2,500, ready for paint; \$3,500, 35 days.

McAllister and Larkin. Cast-iron work for 5-story brick; owners, J. G. and T. N. Day; architect, T. J. WELSH; signed, Dec. 2; filed, Jan. 13; cost, \$9,300; payments, 75 per cent. as work progresses; balance, 35 days.

Pierce and Fall. To build; owner, C. Westphal; architect, H. GEILFUSS; contractor, John F. O'Brien; signed, Jan. 20; filed, Jan. 23; cost, \$5,770; payments, \$865, frame up; \$865, enclosed; \$865, brown coated; \$865, white coated; \$865, completed; \$1,415, 35 days.

Pine and Polk. To build; owner, John Hemphill; architects, B. McDUGALL & SON; contractor, John H. McKay; signed, Jan. 9; filed, Jan. 20; cost, \$14,400; payments, \$1,800, excavating done, etc.; \$2,000, ready for second tier of joists; \$1,800, roof boarded; \$1,200, brown coated; \$1,200, sash glazed and hung; \$2,800, completed; \$3,000, 35 days.

Pine, between Franklin and Gough. Frame dwelling; owner, G. M. Davis; architect, W. O. Banks; contractor, J. G. Adams; sureties, F. Joost and S. H. Harmon; signed, Jan. 22; filed, Jan. 23; cost, \$3,870; time, 120 days; payments, \$1,500, first story joists in position; \$2,640, brown coated; \$2,500, completed; \$2,200, 35 days.

Another dwelling, costing \$8,500; same description in other respects; payments, \$1,500, first story joists in position; \$2,400, brown coated; \$2,500, completed; \$2,170, 35 days.

Pine and Polk. To build; owner, J. J. Conrad; architects, B. McDougall & Son; contractor, J. H. McKay; cost, \$4,680; signed, Feb. 10; filed, Feb. 13.

Pine and Kearney. Carpenter work; owner, S. P. Blumenberg; architect, Fred E. Wilcox; contractor, N. C. Post; cost, \$1,250; payments, 75 per cent. as work progresses; balance, 35 days.

Stockton and O'Farrell. To build; owner, Schiever Levy; architects, Schulze & Meeker; contractors, McGowan & Butler; cost, \$30,500; signed, Jan. 22; filed, Jan. 23; time, July 15, '90; payments, 75 per cent. as work progresses; balance, 35 days.

Stockton and Vallejo. To build; owner, Robert R. Hind; architects, Ashton & Stone; payments, 75 per cent. as work progresses; balance, 35 days; filed, Jan. 14; contractors, Faucher & Connor for brickwork, etc.; cost, \$24,300, with F. Joost and O. H. Greenwald, \$10,000; Henry Williamson for plumbing, gasfitting, etc.; cost, \$3,028; the Gray A. S. P. Company for patent stone walks; cost, \$1,100; E. J. Mosley for painting; cost, \$1,625.

Scott and Vallejo. To build; owner, R. K. Paine; architects, Smith & Freeman; contractor, R. P. Sanchez; signed, Jan. 20; filed, Jan. 21; cost, \$4,585; payments, \$500; second story joists on; \$1,100; covered in; \$833.25; plastered; \$973; completed; \$1,128.75, 35 days. Plumbing, Dully Bros.; filed, Jan. 23; cost, \$322; payments, \$195; rough plumbing in; \$135; completed; \$132, 35 days.

Scott and Jackson. Foundation, etc.; owner, Albert Gallatin; architect, Clinton Day; contractor, John McCarthy; cost, \$18,984; signed, Feb. 10; filed, Feb. 13; time, Aug. 31, '90; payments, \$6,000; brickwork ready to build; \$5,000; to second floor joists; \$3,213; completed; balance, 35 days.

Taylor, No. 1517. Repairing, except plumbing, etc.; owner, Martha Scooffy; contractor, Wm. Berry; signed, Jan. 16; filed, Jan. 17; cost, \$1,057; payment when completed; time, 35 days.

Townsend near Second. To build; owner, John G. Adams; architect, CHAS. I. HAYES; contractor, Jos. Moore; signed, Jan. 21; filed, Jan. 27; cost, \$6,468; payments, \$1,660; rough frame up; \$1,000; enclosed; \$1,618; completed; \$1,650, 35 days.

Van Ness Avenue and O'Farrell. Mill work and inside finish; owners, Mahoney Bros.; architect, T. J. WELSH; contractors, P. A. Buell & Co.; signed, Jan. 28; filed, Jan. 30; cost, \$15,000; payments, 75 per cent. as work progresses; balance, 35 days.

Van Ness Avenue and O'Farrell. Stairwork and steps; owners, Mahoney Bros.; architect, T. J. WELSH; contractors, Drew & McLaughlin; signed, Jan. 22; filed, Jan. 24; cost, \$5,000; payments, 75 per cent. on the 1st and 15th of each month, as work progresses; balance, 35 days.

Waller and Octavia. Completion of 2-story frame; owner, Pauline D. Skadberg; architect, M. J. WELSH; contractor, August Dolscher; signed, Jan. 29; filed, Jan. 31; cost, \$1,273; payments, \$125; brown mortar on; \$425; completed; \$425, 35 days.

Washington, between Polk and Van Ness Avenue. Brickwork; owner, Clark Blethorn; architects, Percy & Hamilton; signed, Jan. 20; filed, Jan. 25; cost, \$1,430; payments, 75 per cent. on the first Saturday night of each month; balance, 35 days. Carpenter work, same as above, except contractor is J. B. Gonyeau; and cost, \$5,781.

Oakland.

Market and Twelfth. High School; owner, City of Oakland; architect, W. J. Matthews; contractor, Robt. Smith; signed, Jan. 11; filed, Jan. 14; cost, \$14,385; payments, \$2,157.75, as one-fifth of the work is completed.

Chestnut and Tenth. 2-story frame; owner, Chas. Young; architect, Chas. Mau; contractor, M. Jackson; signed, Jan. 15; filed, Jan. 16; cost, \$2,161; payments, \$310.25, as one-third of the material is furnished and work done.

Tenth Avenue, between 17th and 18th streets. Cottage; owner, Edward Dolan; architect, Thos. McGauley; signed and filed, Jan. 20; cost, \$1,680; time, seven weeks from date.

Washington and Twelfth. Painting; owner, M. K. Blake; architect, W. J. Matthews; contractor, Al. Wood; cost, \$1,125; payments, 75 per cent. as work progresses; balance, 35 days.

Cypress and Sixteenth. To raise building; time, 60 days; owner, Saltsch Scheyer; contractor, J. C. Johnson; cost, \$1,800; signed, Jan. 23; filed, Jan. 30; payments, \$700, rustic on; \$650, first coat of mortar on; \$150, 35 days.

Webster and Fourteenth. To build; time, 45 days; owner, Mrs. E. F. White; architects, J. J. and T. D. Newsom; contractors, Wm. Sturgeon & Son; cost, \$5,000; payments, \$700, rustic on; \$900, floors laid; \$1,000, completed; \$900, 35 days.

Alameda.

Encinal Avenue and Morton street. To build; owner, Frederick Wick; contractors, A. W. Pattison & Co.; cost, \$3,100; time, April 15, '90; signed, Jan. 9; filed, Jan. 13; payments, \$900, chimneys built; \$800, exterior painted; \$900, completed; \$800, 35 days.

Encinal Avenue and Morton street. 1-story frame; owner, L. W. Sanborn; contractor, A. R. Henke; signed, Jan. 27; filed, Jan. 28; cost, \$1,900; payments, \$200, roof on; \$1,000, windows fitted; \$1,000, 35 days; time, May 1, '90.

Union and San Antonio. To build; owner, A. W. Fink; contractors, A. W. Pattison & Co.; cost, \$4,145; signed, Jan. 20; filed, Feb. 1; time, May 1, '90; payments, \$1,300, chimneys built; \$1,100, brown mortar on; \$920, when completed; \$1,125, 35 days.

Fresno.

F. Banta has been awarded the contract for an engine house to cost \$5,470.

Santa Rosa.

T. J. Furber has drawn plans for a \$13,000 church on Mendocino street.

Antioch.

A new school house to cost \$11,710, contractor J. B. McKenzie of Bonanza.

San Rafael.

Hotel Rafael property, three cottages; contractor, C. Chisholm; cost, \$15,500; and tower, cost, \$6,000. Residence, costing \$5,600, for L. Gerstle.

Livermore.

M Street. Cottage; owner, Wm. Thorn; contractors, Palmer, Hunter, Taylor & Wilder. Second and K streets. Cottage; owner, Joseph Fletcher. Arroyo Valle. Buildings; owner, J. C. Keene.

Oregon.

W. J. Snodgrass is building a \$20,000 planing mill of three stories at Oro Dell near La Grande. Also at the latter place it is reported plans for 50,000 three-story brick hotel soon to be built.

Washington.

Plans and specifications for a three-story building in Cosmopolis to cost \$40,000 have been drawn.

Whitcomb Court house designs have been submitted. The cost of the building which is to be of brick, will be \$65,000.

Seattle is to have a shoe factory costing \$100,000. W. J. Ilman, of Boston, is the projector.

TACOMA.

Five-story brick warehouse. Owner, F. S. Harman & Co.; architects, Farrell and Darner; cost, \$20,000.

Building. Owner, M. J. Cogswell; architect, S. Bertelson; cost, \$6,000.

Residence. Owner, F. Dittmore; architects, Farrell and Darner.

C. Langlois is drawing plans for the National Bank of Commerce, of a six-story brick and stone building to cost \$100,000.

Montana.

Supervising Architect Bell of Washington, has written to Postmaster Curtis, for information concerning the needs of Helena's Government officials, with the idea of drawings up plans for a public building.

Los Angeles.

Alpine Plaster and Cement Company, wooden building, corner Alameda and Washington streets, \$20,000.

W. S. Reavis, frame dwelling, Water street, between Reservoir and McDuff streets, \$1,316.

Pierre Nicholas, brick store and rooms above, northeast corner Marchessault and New High streets, \$5,000.

Mrs. Jennie Harbert, frame store with rooms above, Main street, near Thirty-third street, \$1,000.

Mrs. Sallie Harkness, frame building, Adams street, lot 1, St. James Park tract, \$5,500.

Mrs. J. C. McMenomy, frame dwelling, 741 Hill street, \$4,600.

State of California, frame gymnasium, Normal school grounds, \$9,500.

K. Messer, brick store, corner Rose and First streets, \$1,000.

W. C. Furrey, frame dwelling, corner Orange and Farragut streets, \$4,000.

City of Los Angeles, two-room frame school house, corner Pritchard and Flom streets, \$2,900.

City of Los Angeles, two-room frame school house, corner Swain street and Grifin avenue, \$2,900.

City of Los Angeles, four-room frame school house, corner Vignes and Thomas streets, \$8,508.

City of Los Angeles, four-room frame school house, Beaudry street, \$8,508.

City of Los Angeles, eight-room frame school house, Sixteenth street, \$13,997.

City of Los Angeles, eight-room frame school house, corner Ninth street and Stanford avenue, \$13,997.

City of Los Angeles, two-room frame school house, First and Savannah streets, \$3,495.

City of Los Angeles, four-room frame school house, Conwell and Grant avenues, \$7,750.

City of Los Angeles, four-room frame school house, Coliada street, \$8,989.

City of Los Angeles, four-room frame school house, corner Alpine street, \$9,993.

City of Los Angeles, brick high school building, Castelar street, \$59,900.

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The California Architect and Building News.

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408 CALIFORNIA STREET,

SAN FRANCISCO, CAL.

VOLUME XI.

MARCH 18, 1890.

NUMBER 3.

The California Architect and Building News.

A monthly Journal devoted to the Architectural Interests of the Pacific Coast. Published on the 15th of each month by THE CALIFORNIA ARCHITECTURAL PUBLISHING COMPANY, 408 California Street, San Francisco, Cal.

W. P. MOORE, President.

OLIVER EVERETT, Secretary.

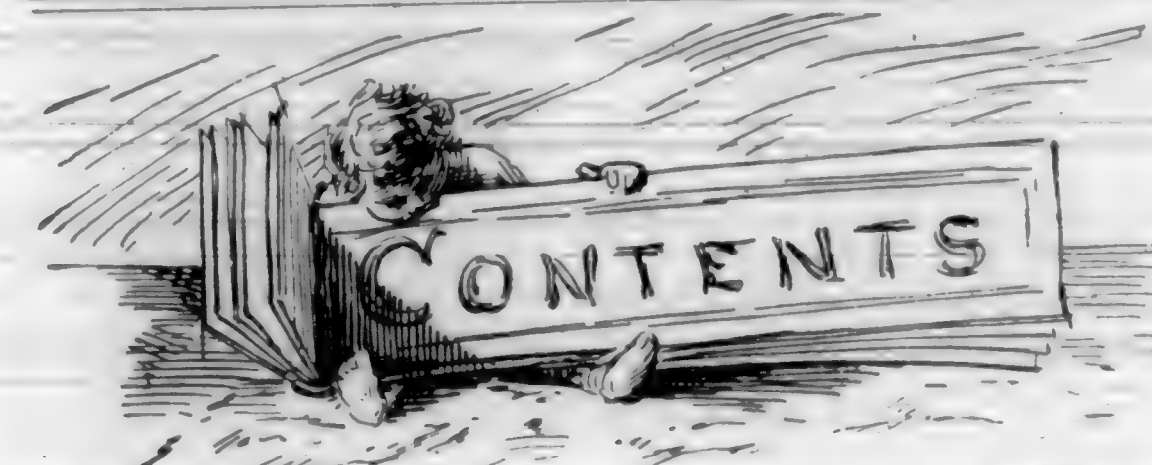
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Remittances should be in the form of postal orders, payable to THE CALIFORNIA ARCHITECTURAL PUBLISHING COMPANY, and all communications addressed to the office of the Company, 408 California Street, San Francisco, Cal.



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NOTICE OF MEETINGS.

SAN FRANCISCO CHAPTER, AMERICAN INSTITUTE ARCHITECTS, meets second Friday of each month at 408 California Street.
SETH BABSON, Pres. W. P. MOORE, Vice-Pres.
OLIVER EVERETT, Sec. John W. CURTIS, Treas.

TECHNICAL SOCIETY, meets first Friday of each month at 408 California Street.

JOHN RICHARDS, Pres. PROF. FRANK SOULE, Vice-Pres.
OTTO VON GELDERN, Sec. JAS. SPIERS, Treas.

At a special meeting of the SAN FRANCISCO CHAPTER OF A. I. A. held Feb. 28th, a committee was appointed to confer with the Directors of the Mechanics' Institute, concerning the proposed improvements to their property.

The regular meeting of the Chapter was held on the 14th of March, at which the usual routine of business was transacted.

At a regular meeting of the Technical Society of the Pacific Coast an interesting paper was read by Otto von Gelden on the history and construction of the Dry Dock at Mare Island, near San Francisco. The character of the ground, the construction of coffer dam adopted to carry the excavation some 35 feet below low water mark and the system of piling was fully described. The "gravity" mixer for concrete work was illustrated by drawing and the method of working described. The masterly economy of political engineering was lightly touched upon; one instance, a synopsis of which may be stated thus, "the powers that were" sent out a number of gun powder pile drivers, one of which cost some \$1700 and a royalty of \$3000 paid for the privilege of using it. A twelve horse power steam engine with steam up was kept in position in order to raise the piston when the powder failed in its work. About five per cent. of the piles were driven with this wonderful machine. The work was begun in 1873, is not yet finished, and up to the present time has cost two and three quarter million of dollars. The discussion on the subjects was continued till next meeting. An agent from an eastern manufacturing house, exhibited improved instruments for engineers, surveyors and architects. The level had an improved arrangement for detaching and re-adjusting the level to swivel stand. The transits shown had improved side standards whereby increased strength was gained; and more firmness given to the pivots of the tube, the scale on the circle being cut a short distance back from the edge and a vernier arranged for reading same; by this arrangement the scale will remain legible for a longer period than if cut to the edge. The regulating screws are worked by yokes against all movable joints which reduces the inaccuracy by wear to a minimum. A new form of draughtsman's scales was shown, and will soon be placed in the market, which consists of a layer of white celluloid let into the common wooden rule, thereby making a scale equal to one of ivory at a slight cost over one of wood.

THE proposition laid before the Mechanics' Institute to offer prizes for a scheme of utilizing this property commends itself as a sensible method of arriving at the best solution of the problem which stares the Institute Directors in the face. When this has been thus settled upon, definite instructions could be formulated for the guidance of architects to enter the final competition. Unless these definite instructions are given a great waste of work will be the result, as a good design in every other way through failure to fit in with the scheme of the Directors may be laid aside to the loss both of the public and the architect involved.

We are afraid that public spirit alone will not suffice to bring the best talent to bear upon this question and a stimulus of a money reward is required. And money spent upon this object

would very likely have the effect of saving a vast amount in the future.

The problem before the Institute seems to resolve itself into which of the following propositions, among others, would be most conducive to the welfare of the Institute and at the same time to the welfare of the citizens of San Francisco, its constituents.

1st. The removal of the Fair building to Folsom St., selling the Library building on Post St., and erecting a new Library building and hall on Larkin St. property with or without stores attached.

2nd. Selling both the present building and the Folsom St. property and concentrating both the Exhibition Hall and the Library upon the Larkin St. property again with or without stores.

There are other plans than these that may commend themselves, but these two seem the principal ones under consideration.

Now, sketch plans say to a scale of 20 feet to 1 inch showing what could be done with the different pieces of property to the best advantage would without doubt be an immense help to the arrival at some good result, and lead to a great deal better understanding by the Directors of their position. Such a proposition deserves very serious consideration on their part before rejection.

CHICAGO appears to have distanced all competitors in the race for the World's Fair, and we tender our congratulations. Chicago is a representative American city, full of energy, push, and if you will, of *cheek*. With the well known business activity of her citizens, it is a foregone conclusion that she will do every thing possible to make the important event an entire and complete success.

New York lost her chance through an unfortunate combination of circumstances and naturally feels pretty sore over the matter, and is somewhat disposed to say disagreeable things about her fortunate rival. However, she will have to take her loss philosophically and after she has had a little time to get over her disappointment will doubtless join the procession and give as much aid as she would expect to receive had the conditions been reversed.

THE *Canadian Architect* expresses the hope that the bill respecting the practice of architecture in the province of Ontario will become a law. It provides that before any man can be registered as a qualified architect, he must pass such examinations as may from time to time be determined on as sufficient to ensure his having a fair knowledge of architecture in all its branches. It is designed to give the public information as to the qualifications of the men they employ, so that if they choose to employ incompetent persons or none at all, they will only have themselves to blame for faulty construction or defective buildings.

It then goes on to say:

It will be argued that the object of this Act is to make the profession of architecture a close profession, solely to the benefit of its members and not necessarily for the benefit of the public, and that the public does not desire that such a Bill should pass. There is nothing in the Bill constituting the profession of architecture a close profession, but even if there were, we maintain that the public has shown in many ways that none but qualified men should be allowed to practice as architects. The newspapers, as representing the public, are always complaining of defects in buildings, resulting, as they maintain, from the ignorance of architects. Well, if there is this ignorance on the part of some architects, something should be done to weed the ignorant out of the profession and leave only the intelligent, as it would appear that the public is not capable of selecting the competent from the incompetent, or such mistakes would not occur, since there are qualified men, though not in such numbers as the unqualified. Unless there is a standard, the competent man

cannot say to the incompetent one that he is not a properly qualified architect, and that he should not claim to be an architect, as he injures the standing of the profession and calls down upon it the condemnation of the public. If he did, he would only be laughed at for his impertinence.

Architects, in submitting this Bill to the Legislative Assembly of Ontario, are only doing the work that the public should perform for itself. In nearly every case where a building has been found to be defective in any particular, the press has laid the blame on the profession as a body. If every case of failure were investigated, it would be found that the mistakes were owing to the engagement of an ignorant man, who had no right by training or natural ability to assume the duties of an architect, as well as to the fact that the public is unable to distinguish between the competent and incompetent. It certainly is not fair to blame a profession as a body for the errors of individuals who have no standing with the profession. These men claim to be of the profession, the public accepts their statements, employs them, finds them incompetent, and forthwith condemns the profession as a body as if there were no competent men in it, but that all were like those men whose statements they are so ready to accept. The Bill of Registration, if passed, will remedy this state of affairs, unsatisfactory alike to the profession and the public. The man who employs a registered architect will have some guarantee that he has a reasonable knowledge of his business, that is, after the Bill has been in force a few years—for as all men now professing to be architects will be entitled to be registered, it will require time for those among them who are incompetent to pass out of sight. If the profession asked the Legislature to pass an Act which would make it unlawful for any but a registered architect to practice architecture, and which would not allow anyone to erect a building except he employed a registered architect, there would be more than ample grounds for the throwing out of the Bill. The profession cannot gain anything from the passing of the Bill except in an indirect way. The men who are now practicing will in the course of a few years have to contend with young men who will have had the advantage of a thorough and systematic training. Our best men will feel the competition of these young men, and the inferior men must suffer materially. Yet in spite of such facts, nearly all the architects now practicing in this province are united in asking for the passing of this Act.

Some may imagine that this movement for the incorporation of the profession of architecture is local and recent in its character. Such is not the case. The question has been more or less before the profession for the last twenty-five years, since the Royal Institute of British Architects made a movement toward that end a quarter of a century ago. During the last three or four years the movement in Great Britain has assumed a definite form, and a Bill was submitted to the House of Commons in 1888, which, however, was withdrawn at that time, owing to the opposition of the Royal Institute of British Architects and the Civil Engineers, but submitted again in 1889 in a revised form. There is no doubt but that it will eventually pass. In some of the Australian colonies the matter has been taken in hand, and a Bill to incorporate the architects of these colonies is now under discussion. In the United States, Bills have already been submitted to some of the State Legislatures, and advanced several stages; and in many of the other States Bills are under preparation for submission to the Legislature. It will thus be seen that this movement is not a new or sudden one. It is rather an old one which has slowly gathered force until Acts of incorporation are now being asked for in all quarters of the world for the proper and equitable acknowledgement of the profession of architecture, in order that the public may be protected from loss of life and money through the ignorance of many supposed qualified practitioners. The membership of the Ontario Association of Architects includes 92 per cent. of all men now practicing architecture in this province, and when those who have applied for admittance to the Association are received, the percentage will be 97. The movement has received the full and hearty support of the medical profession in Great Britain. Medical men are brought into contact with the ill effects of bad building, drainage, etc., and knowing the results, are only too anxious to aid in securing such legislation as will remedy an evil which has caused many deaths, much sickness, and heavy pecuniary losses.—*The Canadian Architect and Builder.*

THE GIRALDA IN THE SPANISH CITY OF SEVILLE.

This famous belfry tower was built in 1196, as a minaret of a Mohammedan mosque. It displays the architectural characteristics of the Moorish people at the time they occupied the southern provinces of Spain. It now forms a portion of the Catholic cathedral. The tower is fifty feet square at its base, and is three hundred and fifty feet high.

There are records that on the present site there was once a heathen temple, erected by the Carthaginians, which the Romans afterwards appropriated to their own worship, and in turn were dispossessed by the Moors.

It is a curious reflection, that in the course of time and the unforeseen changes it brings, the present occupants may, perhaps, be forced in their turn to vacate in favor of still other beliefs.

VIBRATION IN BUILDINGS.

One of the most perplexing problems that confronts the engineer, is the vibration in buildings caused by running machinery Westinghouse, Church, Kerr & Co. of New York, being frequently called on to locate Westinghouse engines on the upper floors of buildings, have had a wide experience in this line, and have given the subject much thought. In determining these

questions, they say the character of the building, the ground on which it rests, the weight, power and speed of engines, are all factors which must be considered, some of which are very indefinite, or at least their effect is hard to predetermine, combined with which is the very important influence, namely, the relation which the speed of the engine bears to the natural time of vibration of the floor beams. It is evident that if the slight motion which every engine has is exactly in time with the natural vibration of the floor beam, each pulsation of the engine will increase the scope of the vibration of the floor, resulting in a most disastrous shaking, while if the pulsations of the engine are in discord with the floor, comparative quiet will exist. As floor beams are usually long, and their time of vibration correspondingly long, it is usually found that a fast running engine will give less of its vibration to the floor beams than a slow running one. It is also worthy of note that the vibrations of a fast running engine are more numerous and less forcible, hence easier resisted by the mass of the floor.

An interesting example of preventing vibration by discord was shown in the case of a Westinghouse 10 H. P. engine which, on an upper story of a silverware manufactory created such a commotion as to rattle the silverware on the shelves 100 feet distant. A change of 25 revolutions in the speed, which change was in the direction of increasing the speed, entirely stopped the vibrations. A most interesting

work of this nature, also, is in the great coffee house of Artuckle Bros. in Brooklyn, where two Westinghouse engines of 125 H. P. each and one of 45 H. P. are located on the fifth floor. These engines were erected on the heavy floor timbers, the floor boards being cut away and extra timbers being inserted between the joints. Across the timbers were placed oak stringers, which latter have been seasoning since the war in some unfinished vessels in the Brooklyn Navy Yard. On these the engines were mounted with plain fly wheels, and experiments were conducted to determine the speed at which it would be best to run. It was found that at 204 revolutions the vibration was at the minimum and was very slight, being as little as that caused by any of the ordinary driven machinery. The speed was therefore fixed at this point, and the wheels then made to give the proper belt speed.

The erection of engines as large as this on upper floors is somewhat novel, and should only be undertaken with full consideration of the surrounding conditions and with engines which are completely balanced.

The successful design in the competition for the Prudential Insurance Building at Newark, N. J., was submitted by Mr. George B. Post, architect, of New York. There were five invited competitors.



THE GIRALDA.

Most of the old houses on both sides of the Tiber, at Rome, have been removed, fine embankments of masonry have been erected, slightly deepening and widening the river to an average width of sixty-five yards, and on top of the embankments, on both sides, esplanades are formed as on the Thames embankment at London. One of the new bridges crossing the stream is thirteen yards wide, and near it at either end, stand new buildings seven stories high, completely shutting out the views of the Janiculum and San Pietro hills.

The Romans well understood the necessity of protecting from dust the materials with which they made their mortar; its importance is not sufficiently realized by the builders of to-day, as workmen may often be seen mixing mortar and concrete from materials that have been emptied in piles on a dusty street. More care should be taken by those who desire to get the best results at the least expense.

Washington, Feb. 24.—Secretary Windom has awarded to the Hall Safe and Lock Company of Cincinnati a contract for constructing steel-lined vaults, including two doors, in the Mint building at San Francisco, at their bid of \$23,936.

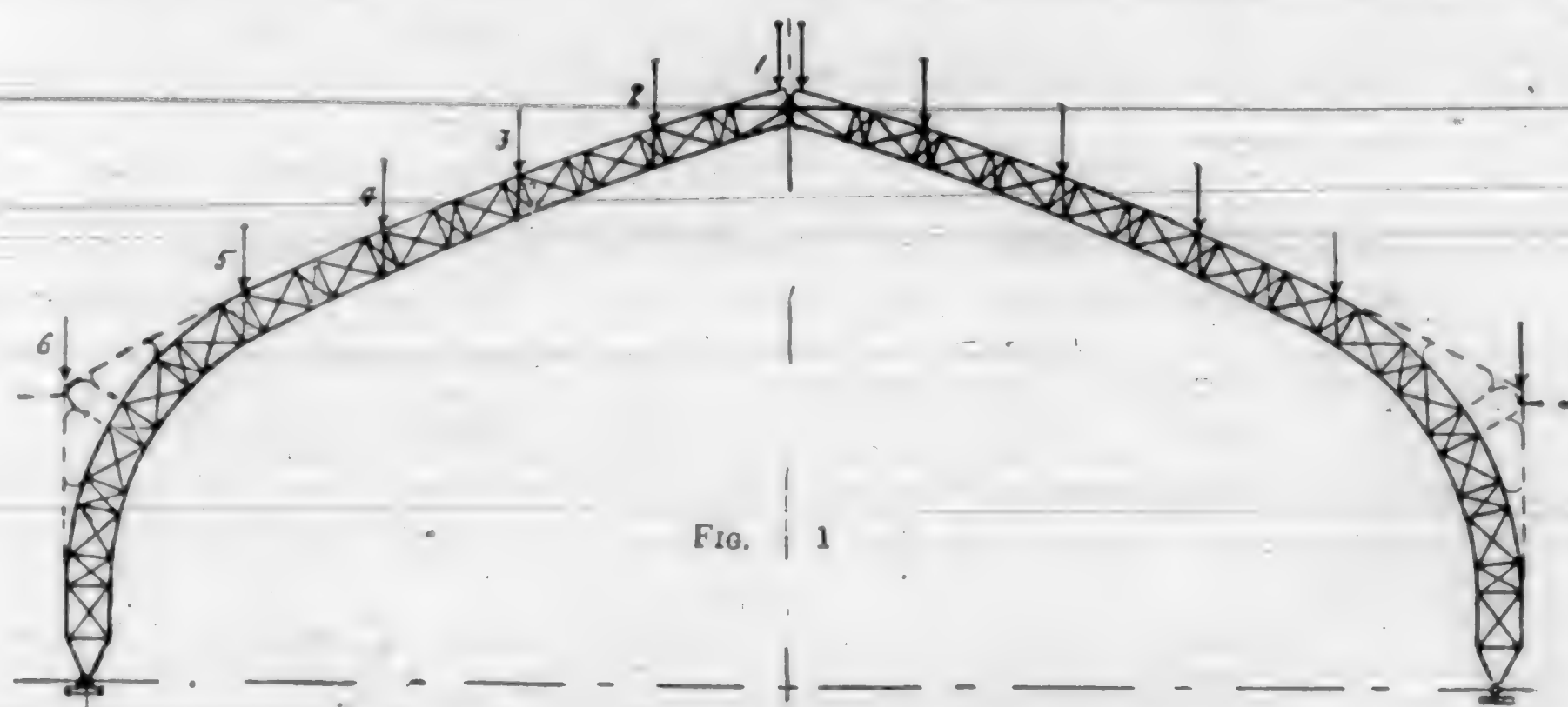
THE MACHINERY HALL, PARIS EXHIBITION.

Of the splendid series of buildings which formed the great Exhibition of last year, the Machinery Hall was undoubtedly the most magnificent in conception and scale. The architect and engineer specially charged with the design of this immense structure, were M. Dutert and M. Contamin respectively, and the confidence placed in their ability was fully justified by the universal admiration accorded to their great work.

The hall is 1,381 ft. long and 490 ft. wide, inside dimensions, and is divided into one great central nave 375 ft. wide in the clear, and 151 ft. 6 in. high to the ridge of its roof, with an aisle each side 57 ft. 6 in. wide, having a gallery floor over of the same width at 26 ft. 3 in. above the ground level. There are nineteen bays in the length of the hall, viz.: 1 bay at each end of 83 ft. 1 in., 1 center bay of 86 ft. 8 in., and 16 intermediate bays of 70 ft. 6½ in.

The side galleries are covered by a series of roofs, one to each bay, which have their ridges at right angles to the axis of the building, and stop against the vertical sides of the center nave just below its eaves, showing a series of low-pitched and slightly curved gables on the lateral facades of the hall. The construction of these side galleries and their roofs, though exceedingly well designed, offers nothing of exceptional interest for our consideration.

It is otherwise with the roof over the great central nave, and a brief description of its principal constructive features, together with a summary of the mechanical principles on which its stability and strength depend, may be of interest as a record, however insufficient, of this remarkable work.



The roof is carried by eighteen arched principals, at the distances apart above given, and two end principals of exactly similar appearance, but altered scantlings, which are the upper members of the glazed screens forming the end facades of the hall. The arched principals carry on each side the center line five ranges of longitudinal girders or main purlins placed vertically; those nearest the center on each side are only 3 ft. 10 in. apart, and carry a ridge gangway; the other ranges are spaced at a uniform distance apart of 35 ft. 2 in.

Three ranges of intermediate rafters are carried by the main purlins in each bay, following the lightly curved outline of the roof, and these rafters carry thirty ranges of secondary purlins on each side the center line, running continuously over intermediate rafters and main principals, the secondary purlins in their turn carrying the sash bars and light wood framing for the glass and zinc roofing. Each end bay is braced against wind pressure by a system of diagonal tie-rods, extending from the ridge to the gutter on each side.

The four longitudinal bays on each side the ridge between the outer main purlins are glazed in the center seventeen bays of the roof, the lower part on each side in those bays and the whole of each end bay being covered with zinc on boarding and having an inner boarded ceiling.

The sash bars are 2" by 2" by 1½" L iron 6 ft. 6 in. long, resting at each end on the secondary purlins, and fixed to them by cold riveting. They are spaced 1' 8½" centers for 20" glass, and overlap at the lower ends 7 in. The secondary purlins are formed of channel iron 5½ in. by 1¾ in., with a 2½ in. by 1¾ in. L iron riveted on the back to take upper ends of sash bars, the lower ends of same resting on the top

of the channel iron. The intermediate rafters are of riveted I section, web 15¼ in. deep by ¼ in., and four L irons 2.8 in. by 2.8 in. by 0.28 in. They are not continuous, but fit in between the top flanges of the main purlins, and fix to curved plate and angle iron gussets attached to the vertical web members of the latter.

The main purlins connecting the principals are lattice girders with N bracing, and are 6 ft. deep in the middle, becoming slightly deeper towards the ends; the top boom is level, and the lower boom falls from each side center of span, meeting the arched principal at each end with a bold curve. The booms are each formed of a vertical web 14 in. deep by 0.28 in., two angle-irons 2.8 in. by 2.8 in. by 0.28 in., and one flange plate 12 in. by 0.28 in. The lattice bracing consists of diagonal flat bars and vertical struts of double T iron. These girders are not radial to the roof line, but are vertical, this being the best arrangement for purlin girders of long span.

Each arched principal consists of two great curved rafters, pivoted at the springings and summit, forming a "three-hinged arch" (see fig. 1). This arrangement allows free movement under temperature changes without strain to the structure, the center rising or falling freely with a slight rotation of the semi-arches about the pivots. A range of temperature of 100° Fahr. corresponds to a difference in level of 2⅞ in. at the center pivot, and a horizontal movement of 3⅓ in. on each side at the level of the side gallery roof ridges, which last amount is small enough to be taken up by the elasticity of the gallery structure. The calculations of the stresses occurring in the principals are also much simplified by the triple articulation, since the forces acting upon each part are definite in direction and point of ap-

plication. The main dimensions of the arched principals are as follows:—

Spans between centers of pivots at springings 363 ft.; rise to center of pivot at summit 147 ft.; depth of arched rib at springing 12 ft. 1½ in., diminishing to 9 ft. 10 in. at the summit, where the two semi-arches abut against the center pivot. The springing pivots are turned steel pins 20¾ in. diameter, and 4 ft. 4 in. long, enclosed by cast-iron bedplates, having almost complete semi-cylindrical journals, the upper bedplate being bolted to the foot of the rib, and the lower one to a foundation plate which is secured to the foundation block by long bolts. The pivot at the summit is a turned steel pin, 14 in. diameter, and 2 ft. 4 in. long, similarly enclosed by cast-iron journals, each forming an almost complete semicircle, but with a slight space between their faces at top and bottom on the vertical center line to allow of the very small rotation accompanying vertical movement of the summit.

The section of the arched rib is that of a girder with trough booms facing each other, "see figure 2" and connected by St. Andrew's Cross web bracing with radiating struts, which divide the rib into alternately long and short panels. This peculiar panel division was devised to suit the spacing of the main purlin girders, each of which fixes to one of the diagonal bars crossing a short panel, actually vertical. Each boom consists of two side plates 17¼ in. deep by 0.35 in., placed 16 in. apart, a continuous flange-plate 30 in. wide by 0.28 in.; and four angle-irons connecting these plates 4 in. by 4 in. by 0.4 in. The single flange-plate, 0.28 in. thick, extends from end to end of each boom, but they are largely increased in



strength towards the haunches by a number of additional plates of varying length, which are stopped off in order towards the springing and summit. The flange-plates at the greatest section of the lower boom or intrados, occurring opposite the center of outer spandrel, are 1 inner plate of 0.28 in., 4 inner plates of 0.32 in., and 1 outer plate of 0.4 in. It is the same for the upper

A large part of our extensive river front, bridges, and viaducts, as well as many of our streets, are now lighted with electricity generated by the city at its own plant. The wires, lamps, and entire paraphernalia are owned by the city, free from any sort of control by private corporations. The system is being rapidly extended so as to embrace the whole city. It is the intention ultimately to make connection with stores, factories, and residences, so as to supply light for private consumption.

In our last issue we published several articles and portions of articles, taken from our exchanges, and by oversight neglected to give the proper credit to which they were entitled. We will consider it a favor if each subscriber will make the necessary corrections in the March number under the uncredited articles as follows:—

The article under the heading of "The Machinery Hall, Paris Exhibition," was an extract from a paper contributed to the *Journal of Proceedings of The Royal Institute of British Architects*, by Henry Reilly, Assoc. M. Inst. C. E. For "St. Louis City Hall Competition" we are indebted to the *Building Trades Journal*, of that city.

THE MACHINERY HALL, PARIS EXHIBITION.

Of the splendid series of buildings which formed the great Exhibition of last year, the Machinery Hall was undoubtedly the most magnificent in conception and scale. The architect and engineer specially charged with the design of this immense structure were M. Dutertre and M. Contamin.

of the channel iron. The intermediate rafters are of riveted I section, web $15\frac{3}{4}$ in. deep by $\frac{1}{4}$ in., and four L irons 2.8 in. by 2.8 in. by 0.28 in. They are not continuous, but fit in between the top flanges of the main purlins, and fix to curved plate and angle iron gussets attached to the vertical web members of the latter.

strength towards the haunches by a number of additional plates of varying length, which are stopped off in order towards the springing and summit. The flange-plates at the greatest section of the lower boom or intrados, occurring opposite the center of outer spandrel, are 1 inner plate of 0.28 in., 4 inner plates of 0.32 in., and 1 outer plate of 0.4 in. It is the same for the upper boom or extrados, except that the outer flange-plate is replaced by two angle-irons 4.4 in. by 4.4 in. by 0.44 in., which connect the spandrel webs to the principal.

The radiating struts fit in between the side plates of the boom, and between the outer purlins marked (5) on the figure [fig. 1], consists of a web 15.2 in. by 0.28 in., and 4 angle-irons 3.2 in. by 2.4 in. by 0.28 in. The diagonals are attached to the inner and outer faces alternately of the boom side-plates. Between purlins (5) they consist of four angle-irons only 3.2 by 2.4 in. by 0.28 in. Beyond purlins (5), the angle-irons in struts and diagonals become 2.8 in. by 2.8 in. by 0.28 in., and flange-plates are added 7.87 in. by 0.28 in.

The lower end of each semi-arch is made of almost triangular form, being narrowed down from 12 ft. at the foot of the lowest bay to 4 ft. at the cast-iron bearing-plate resting on the springing pivot, while the flanges are at the same time widened out to 4 ft.; it has two solid webs with thickening plates, which are reinforced by a diaphragm and gusset plates, with inside and outside angle-irons. The upper ends of the semi-arches are provided with two diagonal struts, formed of plates and angle-irons, which converge to the center pivot and take up the resultant thrust passing through it; these ends have a curved shape between the inner and outer booms, and are stiffened by webs, to which are fixed the ends of the center pair of main purlins, forming here the ridge girders. These girders are connected together opposite to each intermediate rafter by gussets of plate and angle-iron, between which a plate of lead, $\frac{5}{8}$ in. thick, is placed, and which yields sufficiently to allow the slight motion due to temperature changes.

The straight sides of the angle spandrel are of the same trough shape as the main booms before described, and of the same scantlings, with the single outside plate 30 in. by 0.28 in. The side-plates are cut so as to form openings of bold curved outline, and between them are fixed radiating members which carry on the lines of the radial struts in the principal, and are of similar construction.

In the plane of the vertical back of spandrel, which is that of the outer enclosure to the center nave, the arched principals are connected together by a series of latticed arches, semicircular on the soffit except in the center bay, and of which the extrados repeats the slightly pointed and curved outline of the side gallery roofs. Uprights in the spandrels of these arches support a continuous purlin girder, which carry the outer ends of all the intermediate rafters of the main roof and also its outside gutters. The principals are further connected by a range of lattice girders carrying the floor and forming the front of the side galleries.

The material employed in the main roof was almost entirely steel, specified to have a breaking tensile strength of 28 tons per sq. in., and a tensile limit of elasticity of $15\frac{1}{4}$ tons per sq. in.; also that at fracture a reduction of sectional area not less than 45 per cent. should take place, with an extension of at least 24 per cent.

Each ordinary main principal rafter weighed 196 tons, and each end principal rafter 240 tons, the ten main purlins in each bay weighed 42 tons, and the intermediate rafters, minor purlins, and sash-bars had per bay the total weight of 62 tons. The weight of material in the center roof framing per square foot of area covered was $22\frac{1}{2}$ lbs.

MUNICIPAL OWNERSHIP OF ELECTRIC LIGHTS.

Chicago is now engaged in establishing a Municipal Electric Light System. It is an undertaking directly in line with Nationalism. The work has progressed far enough to demonstrate itself a "sure thing," both as to saving money for the people and as a blessing to humanity. It therefore finds hearty endorsement, save only by our Gas Trust and private Electric Light corporations.

A large part of our extensive river front, bridges, and viaducts, as well as many of our streets, are now lighted with electricity generated by the city at its own plant. The wires, lamps, and entire paraphernalia are owned by the city, free from any sort of control by private corporations. The system is being rapidly extended so as to embrace the whole city. It is the intention ultimately to make connection with stores, factories, and residences, so as to supply light for private consumption.

How did we succeed in getting such a work established without being headed off by private monopoly? Through a beginning so small as not to attract special notice! To our faithful servant, Mr. John P. Barrett, City Electrician, are we chiefly indebted for our good fortune. Some two and a half years ago, as Superintendent of City Telegraph Department, Mr. Barrett asked the City Council for a small appropriation with which to experiment in lighting the river front by electricity. About twelve thousand dollars was granted him. With this he purchased a small outfit, and commenced operations in an abandoned Fire Engine House belonging to the city. He laid his wires in the ground, from the first, and started a few lamps on the river front and at certain bridges. The effect was truly electric. The dark narrow river, dangerous alike to passing vessels and such people as were belated along its wharves, became like day, and safety was vouchsafed to all within the rays of these lamps. This small venture gave wonderful satisfaction, and the next year, a larger appropriation was voted with which to extend it, and try the lighting of a few streets. Mr. Barrett made the most of his opportunity, and the city's electric lamps soon became noticeable on prominent corners.

As these increased in number, the councilmen from wards not thus lighted, began importuning Mr. B. for an extension of the service to their wards. They would say to him, "My constituency are observing your electric lights down town, and, as tax-payers, want to know why they can't have the same thing out their way; what's the reason you can't run your wires out to our ward and give us the benefit too? To which it gave Mr. B. great pleasure to reply, "that is exactly what I propose to do, just as fast as you gentlemen will vote me the money to do it with." With the "Constituency" thus aroused and making demands, there was little disposition to refuse Mr. Barrett's request for a larger appropriation; in fact a vote against it would be political suicide.

During 1889, there was appropriated for this service, two hundred and seventy thousand dollars (\$270,000.) A large part of this sum is being expended in the building of three very substantial plants in as many divisions of the city. These will be completed and running by March 1st, next. In addition, a system of trunk lines is being rapidly extended throughout these districts, the wires being laid under ground. At present the city is operating 310 lamps. By March next 500 more will be added. March 1891 will see another 1000 added, making about 1800 in all. By March 1892, there will be in operation 2500, sufficient to light every street which is now lighted by gas. Chicago will be able to present to its visitors from all over the world in 1892, a sight to be found no where else,—a great city entirely lighted by electricity, the service performed by itself.

The present cost per lamp per night, according to the city electrician's last report, is about nineteen (19) cents. With the new plants in operation, the cost will be reduced to about (50) fifty dollars per lamp per year. St. Louis considers herself fortunate in contracting with a private corporation to supply city electric lighting at \$80 per lamp per year, an advance of sixty per cent. over Chicago's cost.

We now pay our Gas Trust the modest sum of six hundred thousand dollars (\$600,000) per year for lighting our streets. Our 25,000 electric lamps at \$50 each will do it for \$125,000,—and, as Mr. Barrett says,—give us forty times the light. The same authority says that the private consumers of the city electricity will pay less than for monopoly gas, and the city still have a profit on the business. In fact, he expects that after a time, the city profit on private consumption, will pay the expense of city lighting, and thus the city save the whole \$600,000 per year now paid the gas trust.

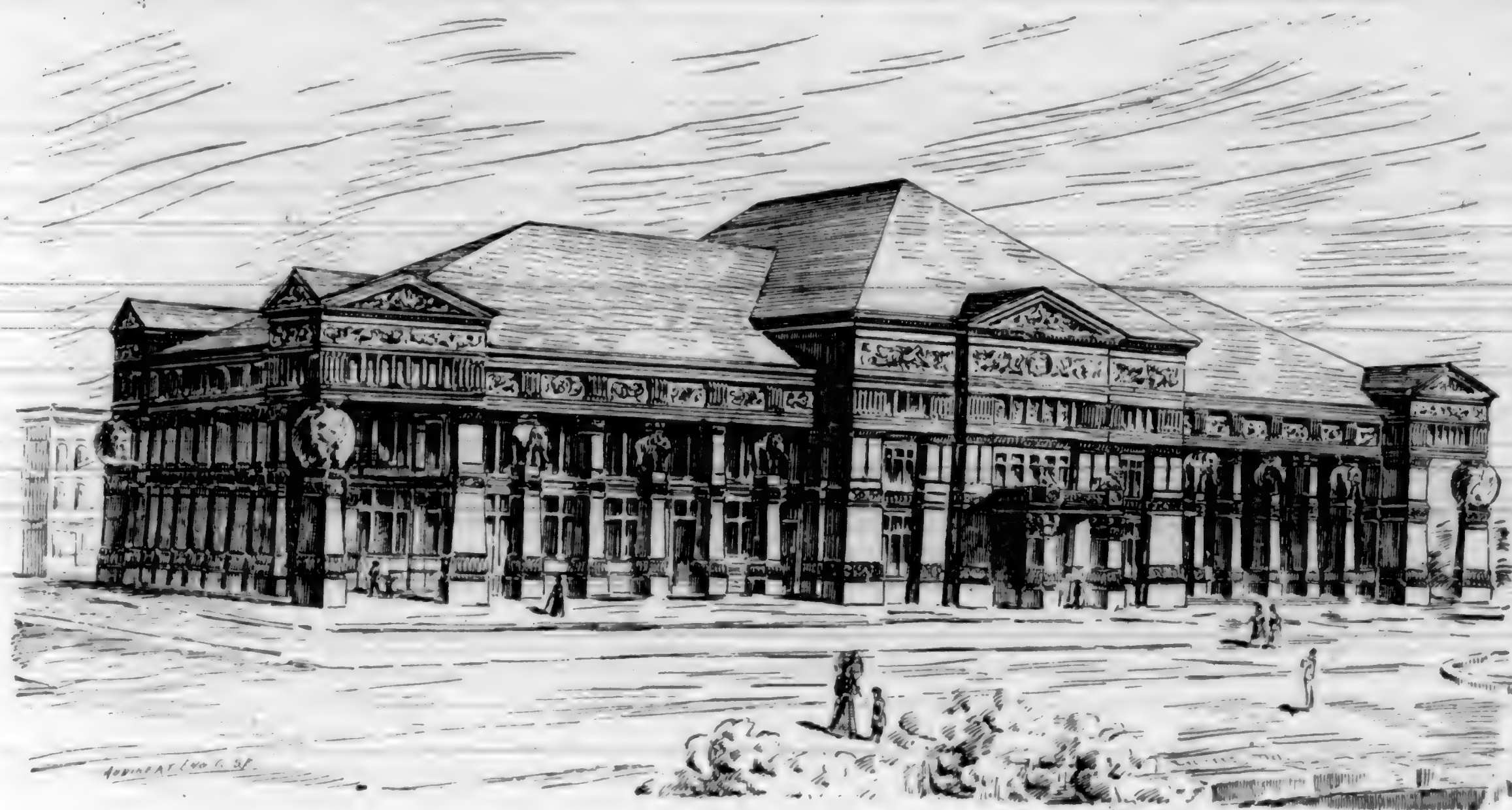
Thus is Chicago publishing to the world, in the universal language of dollars and cents, how much better and cheaper the people can perform their own service, than they can get it done by farming it out.—*The Nationalist*.

There is an excellent article in *The Architect and Contractor* on "Office Management and Routine," by R. W. Gambie Bonsfield.

The Northwestern Architect and Improvement Record for March publishes the second Royal Academy Lecture of this season of "Roman Architecture," by Prof. George Aithchinson, A. R. A.

Volume 1, Number 1 of *The Architectural and Building Monthly*, is the first issue of a new monthly published by A. J. Bicknell, New York.

CITY BUILDING



COLORADO MINERAL PALACE.—O. BULOW, ARCHITECT.

We present above the design for a mineral palace to be erected at Puebla, Colorado; the cut is made from the drawings of the architect, Mr. O. Bulow, whose project was chosen from among a number submitted in competition.

The description of the building is as follows, and embodies some very unique and pleasing ideas. The plan is a parallelogram, 333 feet long by 164 feet wide. The main entrance admits the visitor to the central chamber, circular in form, 100 feet in diameter and 70 feet to the apex of the dome which surmounts it, and which is flanked by two smaller apartments, each 75 feet in diameter, of similar finish and design.

It is intended to make the building a permanent exhibit of the various minerals, ores and building stones of Colorado and elsewhere, by so using them that they form a part of the construction itself, instead of being displayed in the usual manner. The various quarries will be each represented by one or more columns or pilasters of the particular variety of marble, granite or sandstone they produce, and the effect secured by the contrasting colors can be rendered very striking, if the designer exercises good judgment in massing his colors—though of course such conglomeration would be inadmissible under ordinary circumstances.

Different mines will contribute specimens of their ores with which to adorn the walls, arches and ceilings, which will contrast handsomely with sparkling galena quartz and pyrite, mica, agate and feldspar. In the center of the middle dome will be a prismatic fountain, modeled after that of the Paris Exhibition. The roof will be covered with burnished copper.

The style of architecture employed is Egyptian, with some details modified to meet particular requirements.

COURT DECISIONS.

Judge Van Reynegom has reversed the judgment of the Justice's Court in a suit brought by the Fire Wardens against Samuel Hancock, for violating that section of the Fire Laws requiring light shafts in all buildings to be lathed with iron laths previous to being plastered. Hancock was convicted, and fined fifty dollars for having failed to cover the framing in the light shafts at 414 Ellis street, in conformity with the iron laths called for. In the appeal, Judge Van Reynegom, in summing up, said there was no proof that a light shaft or well, according

to the meaning of the term, was on the premises; that the ordinance fails to define what constitutes a light shaft, but he presumed it must mean a well-like structure, extending from a skylight to its base, for the purpose of giving light; that as the premises in question had no enclosed shaft, but merely a hand railing running around the hole, and as architects had testified that there was no light shaft in the building, for these reasons he reversed the judgment of the lower court.

While admitting the power of the Board of Supervisors to pass such an ordinance, the Judge declared it had not legally exercised its powers in the present instance.



The management of this journal desires to extend a cordial invitation to all Architects on this Coast and elsewhere to contribute designs for publication.

Drawings should be made with perfectly black lines on a smooth, white surface. Good tracings, if made with black ink, answer the purpose.

The designs selected will be published without charge. All drawings, whether accepted or not, will be returned to their authors, who must bear express charges both ways.

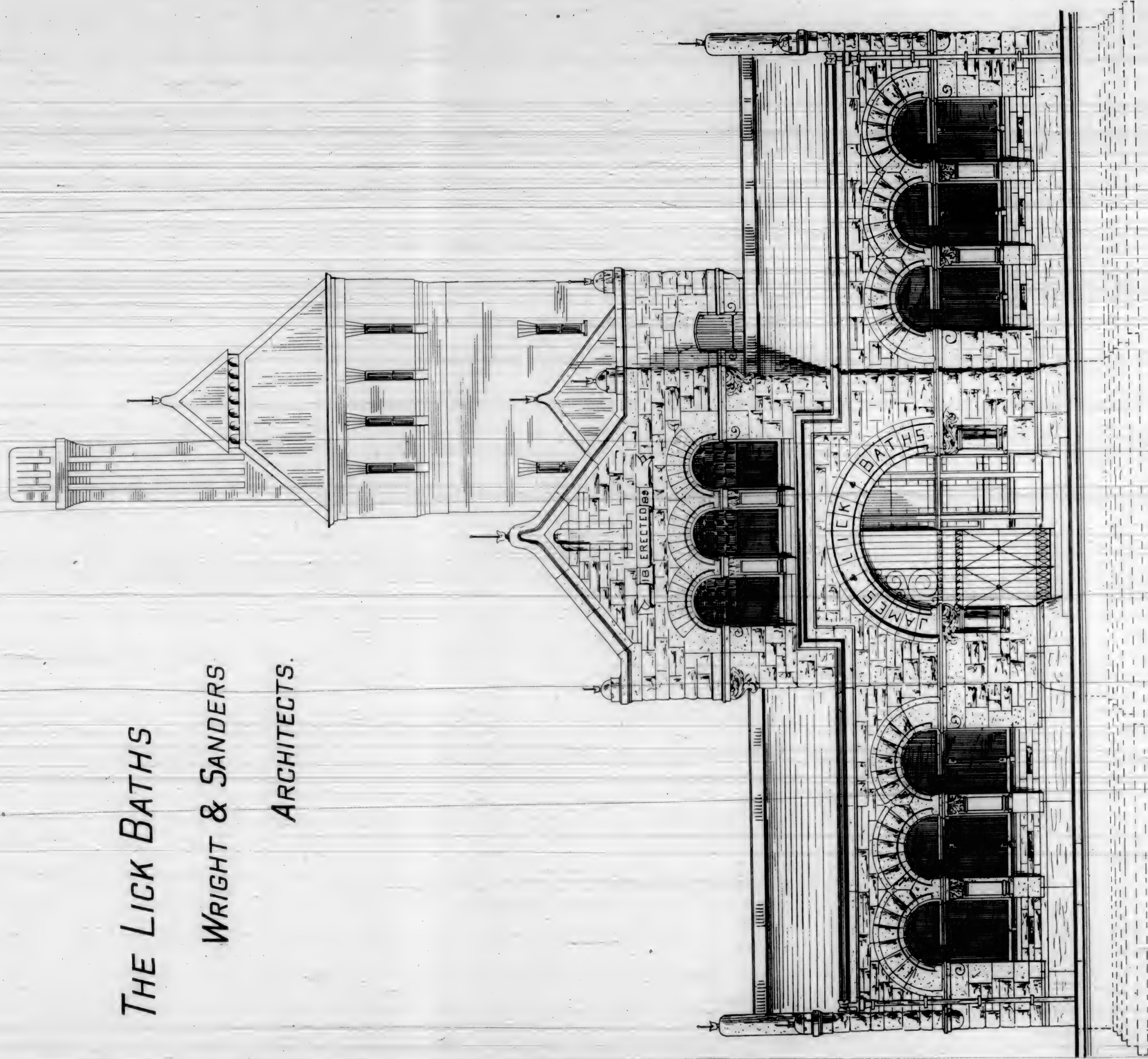
Our lithographs this month show a residence designed by Architect Young of Los Angeles, and the Lick Free Baths by Messrs. Wright and Sanders of this city. The other designs are described in the text.



THE LICK BATHS

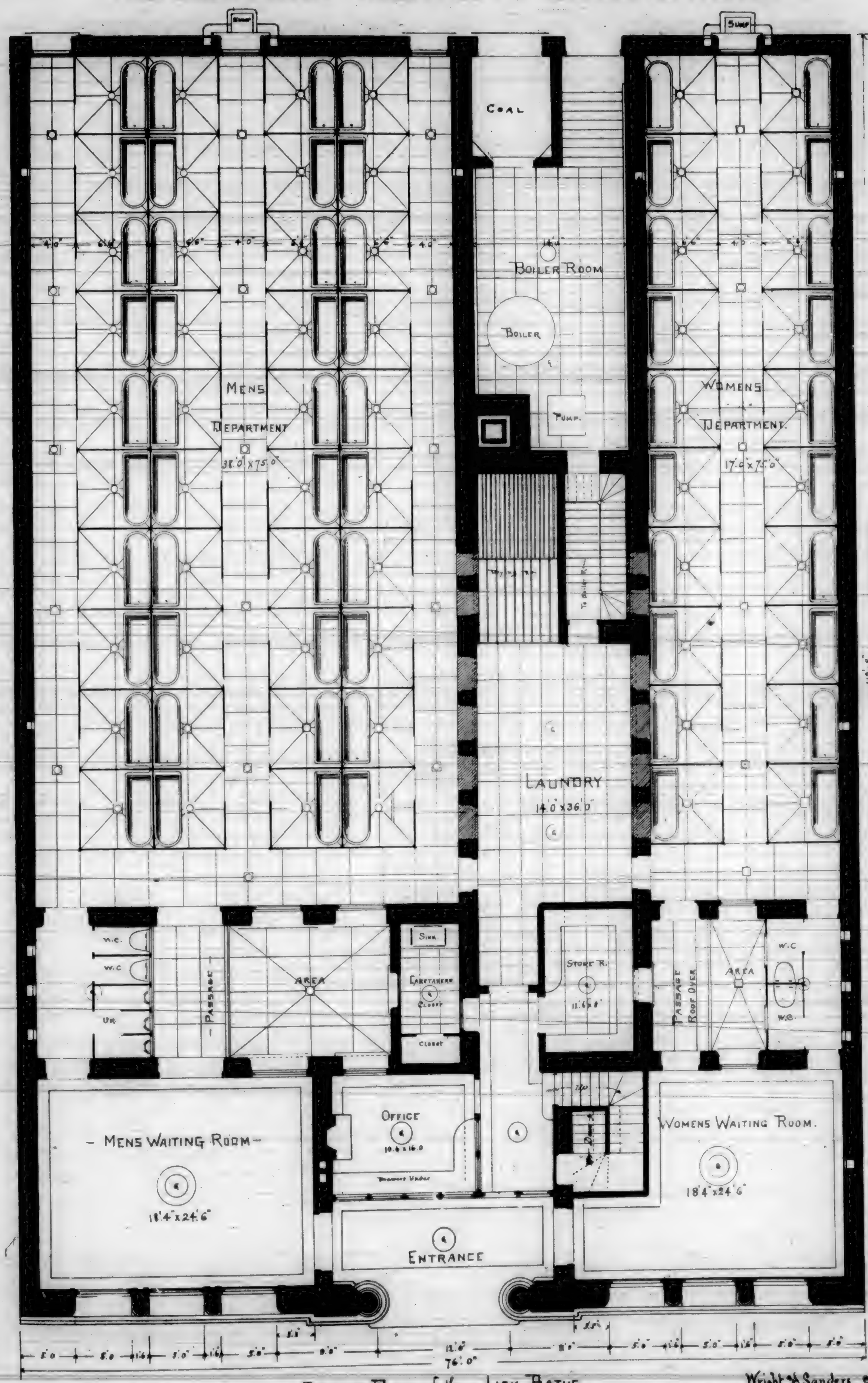
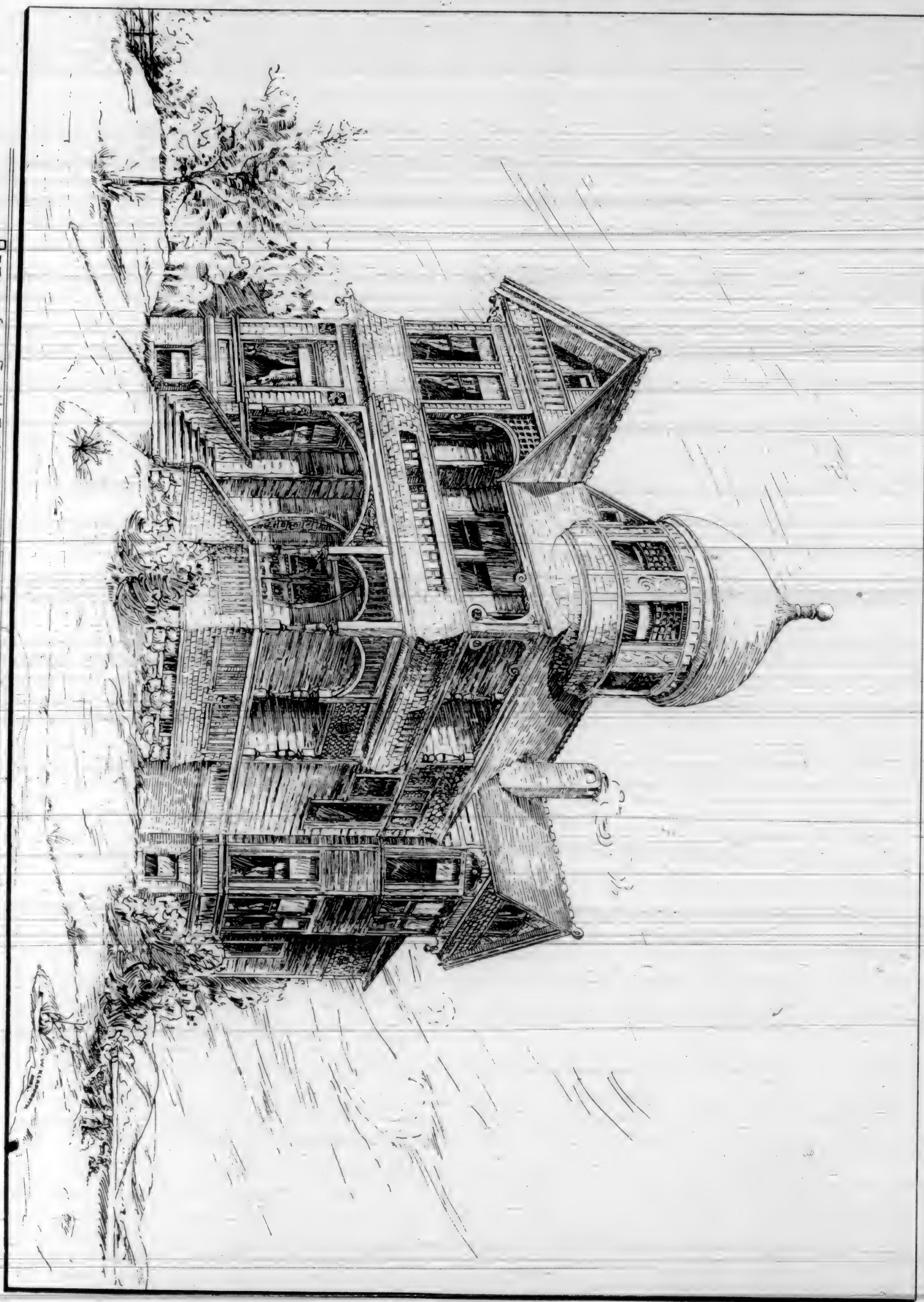
WRIGHT & SANDERS

ARCHITECTS.



FRONT ELEVATION ON TENTH ST.

RESIDENCE for H.E. KRONNICK Esq. LOS ANGELES, CAL. R.B. YOUNG, ARCHT.



GROUND PLAN of the LICK BATH

Wright & Sanders, Architects.