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WHERE is one circumstance in connection with the fall of the roof of the power-station at South Boston which seems to us significant enough to point out, because it is a circumstance which is common not only to very many building accidents but to mishaps of many kinds; accidents in mines, wrecks at sea, railroad accidents, fires and many other mischances very very often are found in connection with this circumstance, so often in fact that it is not possible to avoid the deduction that, so far from being merely an ancillary circumstance, it must be in many a case the cause in chief of the accident itself. In the South Boston disaster the loss of life was small because the night-gang had not yet appeared on the scene; it occurred, then, "between shifts." How often that very phrase occurs in the reports of accidents! It is paraphrased in marine accidents by the statement that "the watch had just been relieved," or, in the case of theatre fires, by the statement that it was "between performances." There must be a cause for the many accidents that occur at just this juncture, and we are strongly inclined to believe that often their immediate cause is a moral defect of the last working-gang and not a structural defect in the work or an intellectual deficiency in the designer of it. Just as the strength of a chain lies in its weakest link, so the value of a working-gang depends on not only the technical skill of its least expert member but equally on the sense of duty of the least conscientious member of it. Do we not see daily, in these times of trade-union control and punishment, when the whistle blows at the end of the short working-day, the saw withdrawn from the half-cut kerf, the float stopped in the middle of the stroke, and the wrench dropped before the nut is properly screwed home? If nothing happens overnight, no great harm is done, but the evidence seems to be that things do happen with peculiar frequency just after men knock off work, and we believe that many a fatal accident is due to the conscienceless way in which some mechanics drop their tools the instant the whistle blows. The framer or the housesmith who does not thoroughly finish his work before leaving it may be surprised in the hereafter to find himself charged with having occasioned avoidable manslaughter. The danger from negligence is greater in the case of structural metalwork than it is in any other branch of work, for there is a great temptation for a weary man to leave till the next morning the final tightening of a bolt or rivet in an awkward place rather than stick it out alone on the job for another half-hour. Even if the framework does not collapse before morning, it is not at all certain that he will remember that he left something loose the night before, or that an impatient foreman may not assign another worker to that particular part of the work and send him to another part of the building, and so seeds of dissolution are planted which may produce their harvest the next day, week or year in spite of all the factors-of-safety the designer can devise. Even extraordinary watchfulness on the part of foremen, inspectors, clerks-of-work and architects cannot guard the work against the wilful carelessness of the workman who drops his tools when the whistle blows.

JUST what caused this accident, which fortunately occasioned the loss of only two lives, cannot at present be stated. The method employed under the Massachusetts laws by the medical examiners is a quieter and less clamorous one than that followed in other States where the coroner's inquiries furnish to the newspapers so many columns of valueless and unsavory so-called testimony, but as it is quite as efficient and reaches conclusions quite as satisfactory to public opinion and to the guardians and executors of the law, we can afford to await the result of their investigations. The structure that collapsed was designed, we understand, not by an architect but by one of the engineers regularly in the employ of the Electric Company that was building the power-house, and so we can, without impropriety, rejoice that no architect's reputation is to suffer because of the mishap. If there was an error in design, either the drawings or calculations will declare it, but if the accident was due to some untightened bolt or unheaded rivet it will be very difficult to prove that fact or pick out the workman responsible for the careless oversight.

WORKMEN always have been glad when the day's work is done, so that they might have the daily chance to clean up, go home and rest, but the modern celerity with which this stoppage is brought about is due largely to the disciplinary methods of the trade-unions, a discipline founded upon punishment and terrorism to an unwise degree. A recent case in New York shows to what length this discipline can be carried by a conscienceless walking-delegate. It seems that a certain workman, who had gone "out" with his fellows when a strike was declared, was being partly supported in his enforced idleness by his Union and its sympathizers. Being a decent sort of a fellow, seemingly, he one day took a broom and swept off the pavement before the little tobacco-shop of his sister with whom he boarded, but, alas! he was seen engaged in this — for a striker — degrading occupation by a walking-delegate or other spy and at once his strike-money was cut off, because, forsooth, he had worked! Fortunately, all labor-unions are not controlled by such methods, and there are leaders who have a vastly better conception of their duties and are intelligent enough to employ more legitimate and at the same time much more effective means for gaining the ends they desire. For such unions and their leaders we have only respect and esteem, and so, although we do not know the character of all the laws in question, we applaud the efforts of the Massachusetts Federation of Labor, who, through their legislative committee, have brought about the enactment, by the last Legislature, of fourteen labor measures. Doubtless, some of these measures are highly right and proper, and we can safely rejoice that they have become the law of the Commonwealth. As to those measures which are pernicious, if any such there be, we can regret their enactment, of course, but not find fault with it, because they are but the evidence that those who know now that they are bad have not exercised that eternal vigilance that is the duty of each one of us.

SPEAKING of factors-of-safety, the employment of which is becoming more and more out of date, or rather which themselves are constantly being reduced in value because of deductions made from the accumulating records of observation of experiments upon full-sized materials, the engineers in charge of the East River Bridge are probably just now inquiring with some anxiety how far, as regards that structure, that factor has been reduced in its efficiency owing to the change in traffic conditions. The sudden and audible buckling of some tie, strut or other member of the suspended framework of Roebling's great masterpiece a few days ago, caused by the sudden accumulation of load due to a blockade in the middle of the bridge, was unquestionably alarming to those who were present, and it is a reminder that the life of a bridge, even

when as thoroughly cared for as this has been, is not everlasting. Unquestionably, when the bridge was designed provision that seemed ample at the time was made for the growth of foot and vehicle traffic, for some form of steam or cable car, and, possibly, for horse-car traffic as well, but no human prescience, we believe, could at that time have foreseen the advent of the heavy trolley-cars with their crowded freight running at their present short intervals, nor could have imagined that electrolytic action might become a force that had to be reckoned with outside the laboratory. As to this matter, it is a gratification to note that the Boston City Engineer reports that his examinations during the last month show that the damage caused by electrolytic action in the streets of that city is diminishing at a satisfactory rate, thanks to the adoption, by the Boston Elevated Railroad Company, of improved connections which assure less straying by its currents on their return to the power-houses. There are, however, still considerable sections, presumably in the neighborhood of the power-houses themselves, which are called "danger sections," where electrolytic action is still carrying on its secret and imperilling attack upon all metalwork within its reach.

JUST now much attention is being given to deciphering the readings of the modern commercial barometer, the operations of the various branches of the iron industry, and although different observers deduce different conclusions the general opinion is that much encouragement can be drawn from facts as they stand. The fact that iron production for the first six months of this year exceeds that of the first half of last year by over a million and a half of tons would seem to indicate a marked change for the better, even though the margins are small, and the further fact that at the same time unsold stock has decreased during the same period by over one hundred thousand tons seems to prove that the demand has been phenomenally active. But it seems to us that an observation of a physical fact of this kind is not of much use unless accompanied by data regarding the distribution of the output and the causes that have led to the demand. We believe that during the period in question little in the way of railroad building in this country has been going on, so that one of the unhealthiest factors is at once eliminated, since nothing is more indicative of impending disaster than the excessive expansion of railroad lines into unproductive territory. We take much comfort, on the other hand, in noting that one of the industries that is most incommoded just now, through inability to get enough steel for the filling of its orders, is that of the makers of large agricultural implements, and as the majority of our people are intimately concerned with the successful prosecution of agricultural operations, this demand betokens a degree of pecuniary ease with a very large class which agrees with what we already know about the profit accruing to this country because of the fine crops of the last two seasons. It is not proper, of course, to assume that all of these agricultural implements are sold to our own farmers, for, thanks to the diligence of our consuls, an immense foreign trade in these fine American tools has been built up, and steam-plows, harvesters, binders, thrashers and what not made in Chicago are now operating on the great farms and ranches of Australia, Hungary, the Argentine Republic and elsewhere. The volume of the export of manufactured metalwork which has grown up in consequence of the waning of activities at home has reached unimagined figures, while even England herself, in 1897, imported nearly a hundred thousand tons of pig-iron and quarter as much in the shape of blooms and billets. And if this happened in a year when the industrial situation there was paralyzed by the great engineering strike it is probable that under normal trade conditions the volume of her importations may increase. Meanwhile, in spite of the demand, and the fact that the volume of unsold stock is decreasing because of it, the price of iron is somewhat less per ton than it was a year ago. Just what this indicates we are not certain: perhaps it means a willingness on the part of iron-masters and iron-dealers, now that they are taking a more active part in the world's market than they did formerly, to realize that it is not really needful to take quite so great advantage of the protection that the law gives them, a willingness, that is, to allow consumers to enjoy a little more nearly the benefit of real values.

ONE of the most interesting cases of the adaptation of natural forces to human needs was that of the Swiss engineer, we think it was, who framed a house out of iron pipes through which he conducted the water of a mountain stream, the water circulating under pressure through all parts of the frame. The object, or one of the objects, was to secure a structure that would in summer be cooler and in winter somewhat warmer than houses framed after the ordinary manner, the theory being that, as the temperature of the stream was practically the same the year throughout, the water-filled pipes would absorb or give out enough thermal units to make an appreciable difference in the temperature of the enclosed space. What success attended the experiment we do not know, nor do we know how successful have been the attempts in this country to heat buildings by piping them with water from hot-springs and boiling-geysers, but it is a fact that in our ordinary methods of building we too often follow rule-of-thumb methods and do not use enough intelligence in devising ways in which our houses may be made both warm and cool without calling in the facile, but expensive, aid of the heating engineer. Until the ubiquitous small boy and the careless housemaid change their character the double-glazing of sashes, the readiest means of saving fuel, is not likely to be commonly adopted; but there are many ways now neglected by which the walls of our buildings could be arranged so as to effect the same desirable end. One of these ways is shown in a recent number of the *Clay-worker*, which shows the easy possibility, perhaps desirability, of reverting once more to the Roman *hypocaustum* as a practicable model for an economically heated dwelling. The house illustrated in our contemporary is a double dwelling, 35′ x 50′, the walls of which are laid up with the ordinary hollow-tile, 8″ x 8″ x 16″, each tile having four cells, so that it is possible to plaster direct on the inner surface of the tile without much fear of the transmission of dampness, much less chance at least than in the case of the ordinary brick house so treated. How many of these flues are used for heating is not declared, but, doubtless, the occupant of the house, the postmaster at Newark, Ohio, will be willing to furnish facts to inquirers. He declares that a two-year test has shown the building to be highly satisfactory in every way, and that as some special care was taken in burning and selecting the tile he is satisfied that his house is better looking than if built of pressed-brick. The door and window finish, also hollow, had, of course, to be moulded for the occasion, but the photograph shows the building to be sufficiently agreeable in texture of wall-surface.

THE Olmsted Brothers have done not only a graceful but a very useful thing in bringing about the publication of Charles Eliot's little treatise on vegetation and scenery in the Metropolitan Reservations of Boston. It is deplorable that two of the assistants, Mr. Codman and Mr. Eliot, that the founder of the firm counted on to help in carrying on his work of improving landscape after the non-artificial method, should have been cut off so early in their careers. Just as the work done by Mr. Codman at the World's Fair showed how skilful a practitioner he was likely to become, so this treatise of Mr. Eliot's shows how well he understood what it is desirable to do, and this posthumous publication cannot but convince the public of the desirability of having carried out some of the ameliorations of nature in the Reservations which he hints at. All of the reports and publications of the Metropolitan Park Commission have been prepared with a good sense and an eye to really interesting the public in the work to be done that has not only made them efficient instruments in the easy procurement of the needed appropriations, but has left them classics in the domain of official papers. We might say almost as much for the reports of the Metropolitan Water Board and for those of the Rapid-Transit Commission, but these, able documents as they are, being more purely technical, do not come so nearly up to that literary standard where it is proper to use the word classic. In this little book of Mr. Eliot's an ingenious device has been used in the illustrations whereby through lifting a superposed portion of a print there is found revealed on the print below the semblance of the vista that would be disclosed after the obstructing growth represented by the superposed portion of the print had in actuality been cleared away. It is an extremely ingenious way of producing an object-lesson, the same sort of thing that is sometimes used by architects who, after an elaborate drawing has been made, find that the treatment of the roof, say, does not please the client and so, in place of making a series of new and elaborate drawings, make their changes on fragmental "flaps" and, rendering each flap in harmony with the original drawing, can then pin them one after the other over the unpleasing portion of their design and show the client a series of different effects.

ACCIDENTS WITH GAS.

Doorway, Rue du Grosse Horloge, Rouen.

THE records of the coroners' offices in every large city show each year a list of fatalities due to the use of illuminating or fuel gas in buildings. The thirteenth annual report of the Board of Gas and Electric Light Commissioners of the Commonwealth of Massachusetts, published in January, 1898, enumerates one hundred and five instances of gas-escapes which happened during the year 1897, and which caused the death of 60 persons and injury to 74 others. A few of these cases were due to intended suicide, but the larger number were clearly accidents. The casualties occurring in other States are undoubtedly equally large in proportion, and perhaps even exceed the above figures in the case of seaboard cities, where a vast number of immigrants land every year, many of whom are not familiar with the management of gas.

As is well known, many gas-companies now manufacture water-gas, which they enrich with naphtha. This gas contains a much larger percentage of carbonic oxide than coal-gas, and since carbonic oxide forms the principal poisonous constituent of illuminating gas, a greater number of fatalities result in those cities where water-gas is used. The percentage of carbonic oxide in gas varies from six per cent in coal-gas to as much as twenty-five per cent in water-gas. Carbonic oxide is strictly odorless, and therefore pure water-gas would be a very dangerous gas to use. Fortunately, it cannot, *per se*, be used for lighting purposes, and must be mixed, or "enriched," with coal-gas or naphtha to make it suitable for illumination. This admixture imparts to the gas the peculiar, strong and pungent odor, by means of which it is readily detected, when it escapes unburned in even small quantities. Notwithstanding this fact, the many accidents point to the necessity of diligent care in the use of gas-fixtures and fittings, emphasize the need of popular instruction in the management of gas, and tend to show that an official supervision of gas-piping and gas-fittings in all classes of buildings would be as desirable as the official regulation of plumbing and drainage now enforced in a large number of cities.

Illuminating gas (both coal and water gas) possesses another quality, making it dangerous under certain conditions, *i. e.*, when mixed in a certain proportion with atmospheric air (from 13 to 20 per cent) it becomes a highly explosive compound. Ignorance of this fact is a prolific source of accidents and explosions. When gas escapes, it is imperative that one should not search for the leak with an open light. Yet, even the employés of gas-companies frequently come to grief by a disregard of this simple rule. Witness the following account taken from the columns of a daily paper: —

"Because of repeated complaints of the odor of escaping gas being in evidence in the neighborhood of —— Street, a gang of men was sent down there by the —— Gas Company to locate the supposed leak. After a hole had been dug near the curb in front of the house, the foreman went down *with a lighted lantern* to examine the pipes. The escaping gas was ignited by the flame, and an explosion followed, throwing the man out of the trench. The occupant of the ground-floor was knocked down by the force of the explosion, and all the windows of his place shattered. The explosion also caused a fire."

Similar severe accidents happen when an escape of gas occurs in the cellar of a building, or when a gas-meter springs aleak. In all such cases the safe rule to follow is never to search for the leak with an open flame or lantern, or to strike a match near the gas-meter, or even to handle any tool or instrument which may cause a flying spark.

Many a case of gas asphyxiation arises from the ignorance of persons who have never used gas before. Immigrants and travellers from remote country towns are victims in a large percentage of these cases. Persons who have never lighted a gas-flame before in their lives are apt, upon retiring at night, to blow out the flame in the same way that they would a candle or oil-lamp, and the next morning they are found asphyxiated in their beds. Intoxicated persons sometimes commit the same fatal mistake.

The Massachusetts Board of Gas and Electric Light Commissioners considered several expedients to guard against this accident. They suggested that a legislative act might be passed requiring in the sleeping-rooms of cheap hotels and lodging-houses the use of some kind of gas-burner from which gas cannot escape except when lighted. At last year's Gas Exhibition in New York several inventions tending to accomplish this object were shown, and types of gas-burners are now manufactured which automatically shut off the supply of gas if the burner is blown out, either by design or by accident, as, for instance, from a draught of air passing over a flame while it has been turned down low. The danger in relying upon such safety-burners arises from the fact that these appliances may not always prove to be reliable and durable, and may refuse to work at the proper moment. It is not denied, however, that it is within the range of mechanical possibility to construct a device of this kind which would be simple, safe, durable and at all times efficient, and encouragement should be offered to inventors of this line of appliances.

Another frequent source of accident by asphyxiation is found in gas-keys which are worn out and have become so loose that they turn easily. It frequently happens with such fittings that, upon retiring for the night, persons turn out the gas, and accidentally or carelessly reopen the burner partly, though enough to cause a dangerous escape of gas. Many cases of fatalities recorded in statistics are due to this cause. The remedy is too obvious to require any further description.

Other accidents arise from fixtures defective by reason of the stop-pin being either absent (so-called "all-around keys," which persons unconsciously may turn too far), or because of its having fallen out. Such old-fashioned fixtures are, unfortunately, often to be found in hotels and lodging-houses. Years ago, the author suggested that the use of such dangerous fixtures should be prohibited by legislative act. The law should also provide for an efficient inspection of the gas-fixtures in hotels, lodging-houses and similar buildings. The above-named Commission proposed, as a further safeguard, a law prohibiting the use of gas in sleeping-rooms containing less than a definite number of cubic feet.

Fatal accidents occur through the stupid custom, still existing in some hotels, of turning off the gas at night from the bedrooms. Occupants often leave their gas-flame turned down low, on retiring, and, by reason of the practice mentioned, the flame becomes extinguished without the burner-cock being turned off. When the gas is again turned on, early in the morning, it escapes through the partly-open burner and asphyxiates the occupants before they awaken. This bad practice is not confined to hotels and lodging-houses only, but also occurs in boarding-schools, and in apartment and dwelling houses. Equally bad is the practice of turning off the gas at the main service during the day, as it leads to similar dangers, by reason of people leaving gas-cocks open when they attempt to light the gas early in the evening, before it has been turned on at the meter. Two cases in point were related in the daily papers not long ago, as follows: —

Case 1. "Yesterday the body of E. S. was found in his apartments. He had seemingly been asphyxiated with gas, which was issuing from a *jet not turned off*. S. went to bed sick at an early hour, leaving the burner turned down low. His brother-in-law always turned off the gas in the cellar, so that no accidents would occur during the night. Early in the morning he used to turn it on again, so as to make the gas available in the gas-stove, which his wife used in preparing the morning meal. This practice resulted in the death of his boarder."

Case 2. "T. C. was found in his room overcome by gas and died later at the hospital, to which he had been removed. He was in the habit of sleeping with his gaslight burning. That night the gas in the lodging-house had been turned off for only a few minutes to make certain repairs. No one thought of the habit of the man sleeping with his gaslight burning. The turning out the gas had, of course, extinguished the gas-flame in the man's room, and when the gas was again turned on full force it escaped into his room, while he lay in bed sleeping, and caused his death by inhalation."

Gas-explosions may also occur when the meter is frozen and attempts are made to thaw the same out with a heat of flame.

A much more serious matter is the frequent escape of gas into houses from breaks or leaks in the street mains. These escapes may occur into houses which are not provided with a gas service. As long as the pungent odor of the gas warns the occupants of the leak danger of accident may be averted. Unfortunately, the gas, after filtering through the soil, sometimes loses its peculiar odor, and cases of whole families being asphyxiated from the escape of gas are by no means uncommon. Very often escapes of gas merely cause sickness or headache and, the true cause not being at once apparent, the gas-company is not notified and the leaks are not immediately repaired. Such escapes are particularly dangerous in winter-time when, by reason of being heated, the houses act like huge chimneys in drawing up the gas-polluted air. Where the street-surface is paved with impermeable pavements, like asphalt, and in winter, when street-surfaces are frozen hard, the escape into the interior of houses is much more likely to occur than where the pavement is an old-fashioned, loosely-jointed, cobblestone pavement. The report referred to states that from 1889–1896 13 cases occurred of this kind, in which 75 people were rendered unconscious.

Finally, the air of houses may be continuously contaminated by slight escapes due to leaky house gas-pipes, or to defective fixtures, loose bracket-joints, or worn-out gas-keys. The leaks may be so slight as to be hardly noticeable. In many cases of headaches, languor, nausea, drowsiness, prostration or loss of consciousness the cause is to be sought in a slight escape of gas. The public is generally inclined to attribute such illness to "sewer gas" entering the house through defective plumbing, and the true cause is seldom thought of. A writer in a recent issue of the *N. Y. Evening Post* speaks about the danger as follows: —

"A frequent cause of neuralgia and headaches is the poison of illuminating gas. When the house is supplied with what is known as 'water-gas' a recurrence of such maladies should prompt a very careful investigation of the fixtures. Water-gas contains a poison of admitted virulence, and the fact that it is colorless, tasteless and odorless makes its power for evil the greater. Absolutely tight fixtures are the only protection. . . . Periodical examination is essential, for what seems

secure to-day may be insecure to-morrow. Old fixtures are likely to be loose in screws or joints, the thread of the thumb-screw may be worn out and turn at a touch to let the poison escape, with no one the wiser, or in moving furniture the arm of a chandelier or side-bracket may be wrenched enough to permit its escape. A safe plan is to have each fixture put through what is called the pressure-test. This properly done by a good plumber will show quickly any defects or chances for leakage."

Not long ago the writer had in his own house a case in point. When the gas-lights were lit in the evening a peculiar odor arose, which caused severe headache, but for which the reason could not be immediately ascertained, as the odor ceased completely in daytime, when the gas-fixtures were turned off. The house gas-pipes were tested and found in a tight condition. The gas-fixtures also showed no leaks. The gas-company was sent for to clean out the main service, it having occurred to the writer that an accumulation of naphthaline in the meter or the house pipes or the service might cause the gas when burning to smell in the way it did. The service was thoroughly cleaned out, the meter was removed, emptied and cleaned, the house pipes were blown out by means of a pressure-pump, but all to no avail; the odor returned in the evening when the lights were burning. After much searching, the cause was at last found in slight leaks at the burner joints, which permitted an escape of unburned gas whenever the keys were open and the flames lit. These joints were made tight with white lead and the odor immediately ceased.

In the statistics of gas accidents other less frequent causes appear, among which I mention the following: —

(*a*) Fixtures of gas and electric lights so constructed that the gas-key might be accidentally turned in the dark instead of the electric key.

(*b*) Gas escapes from the gas cooking-stove by means of the water boiling over and extinguishing the gas-flame.

(*c*) The breeze from an open window blowing out a gas-flame which has been turned down low, the gas then escaping unburned and causing an accident.

(*d*) A flame turned down low for the night being extinguished by a sudden reduction in the gas pressure.

(*e*) The connecting rubber hose of a gas-heating stove becoming either loose in the joint or completely detached and causing an escape of unburned gas.

(*f*) Two gas-keys, one for light, the other for a gas-stove, being placed so near together that one might be mistaken for the other and turned unintentionally.

(*g*) The tubing of a gas chandelier or other fixture becoming split and permitting escapes of gas.

(*h*) Disarranged electric gas-lighting fittings intended by the pulling of a chain to open a valve, letting out the gas, and at the same time light it by a spark.

(*i*) Finally, gas leaks may cause headaches and loss of consciousness where gas escapes from the rubber-hose connection to a table gas-lamp.

The majority of cases quoted are clearly due to lack of a reasonable and ordinary care on the part of the consumers of gas. What is needed are plain instructions to users, and emphasis should be laid on the fact that, unless burned, illuminating gas is a highly dangerous substance, and that due care is required in its use. The danger of asphyxiation is somewhat greater where water-gas is manufactured and distributed, for reasons explained above.

It is not the intention of the writer to create a prejudice by these notes against the use of lighting-gas or gaseous fuel, for, as long as it is confined in tight pipes, gas is perfectly harmless, and if burned properly or used with reasonable care there is not the slightest danger connected with its use. Even the fire-risk is comparatively small. Statistics gathered by German fire insurance companies show that in the five years from 1881–1885 only 14.7% of the fires caused by lighting were due to gas, whereas 85.3% were due to the use of kerosene and oil lamps. In 1892, 1,089 fires arose from kerosene and oil, and only 80 fires from gas.

Wm. Paul Gerhard, C. E.

THE COLUMBIA UNIVERSITY SCHOOL OF ARCHITECTURE.

New York, July 10, 1898.

To the Editors of the American Architect: —

Dear Sirs, — The Architectural League last month held its June meeting in our Architectural Library, and I took advantage of the opportunity to explain to the members just what we are trying to do for professional draughtsmen. Perhaps some of your readers may like to read what I found to say, so far as I can recall it.

The papers on the teaching of Drawing, History and Architectural Engineering, of which I spoke, may be had on application to the bursar. Yours truly, William R. Ware.

It is an open question in a School of Architecture, as it is in a University, and in every place of education where the students are somewhat mature, what is the best system of study. It is not clear whether such students are best served by a fixed curriculum, in which prescribed studies are taken up in a prescribed order and pursued for a given term of years, as is the case in our American Colleges, and in the Gymnasia of Germany, the Colleges and Lycées of France, and the Public Schools of England, and in Technical and Professional Schools almost everywhere, or whether advanced studies, including technical and professional subjects, cannot be followed to better advantage under a freer system, such as is found in the German Universities and in the École des Beaux-Arts in Paris, a system under which every student studies what he pleases, when he pleases, as he pleases, taking up whatever he likes best or finds he is best fitted for, in whatever order he will.

But this is a controversy in which we ourselves have not been obliged to take part. The question has been settled for us and settled in the happiest way. Starting seventeen years ago as a Department of the School of Mines we necessarily came under the rules of that School, and the first thing to do was to frame a four-years' course of study conformable to the courses previously existing. This four-years' course still obtains, though it has been so much changed as almost to have lost its identity. All the subjects formerly shared with the other departments either have been taken into our own hands, such as the Mathematics, Mechanics and Engineering, or, like Physics, Chemistry, Geology and Botany, have been discontinued altogether. Our students have to study the elements of physics and chemistry before they come to us, and this suffices to give them the general notions, which are all that an architect has occasion for. The time formerly given to these studies is now more profitably spent upon a course in Building Materials, specially devised to meet the scientific needs of our own students, into which is incorporated such further scientific instruction as is needful. For this we draw freely upon our neighbors and thus, thanks to their friendly coöperation, profit quite as much by our scientific environment as when we were an integral portion of the School of Mines. The lectures and recitations, moreover, have been concentrated in the first three years, leaving the fourth year almost entirely free for what is virtually post-graduate work. But it is still a four-years' course, and though some men manage to accomplish it in three years, and others give five to it, it still presents a definite curriculum, a prescribed path leading to our degree.

Whether or not such a definite line of work is really best for professional schools as distinguished from schools of liberal culture, there seems no doubt that it is best for young men who are still in a state of pupilage.

Meanwhile, however, there has sprung up alongside of it the freer system of study. We do not indeed receive young men of the age and standing of our regular students, except into the regular course. The statutes expressly declare that "Special Students are not desired, though men of maturity are sometimes received as such for reasons of weight." But if a man has been a professional draughtsman for three or four years this is generally found to be a sufficiently weighty reason for accepting him as a Special Student, and in the last half dozen years nearly a hundred such have been on our books. These men study what they please in whatever order they choose. Thus we have the two systems working harmoniously together side-by-side, each serving its own men better than the other could do.

These draughtsmen are received on exceptionally favorable conditions both as to fees and as to the period of their attendance. They pay thirty dollars for each two months. This entitles them to instruction in the draughting-room and to four hours a week of recitations and lectures. Draughtsmen who are temporarily out of work can accordingly drop into the school at almost any moment and take part in whatever they are qualified to take part in. In the German Universities and in the École des Beaux-Arts there is not only freedom of study but also freedom of teaching. Almost anybody can get leave to take part in the instruction. There have, accordingly, grown up in Paris, outside the École itself, a considerable number of private *ateliers*, in which the ablest architects in France give the students the incomparable benefit of their personal counsel, and a number of circumstances happily combine to make this scheme the most triumphantly successful scheme of architectural instruction that the world can show. The backbone of the system is the French Academy at Rome and the annual bestowal of the *Grand Prix* leading to it. This in turn leads to government employment when the students return to France. The promise of a prosperous career attracts to the school a company of able candidates who year after year frequent the *ateliers* in the character of *anciens*, and the presence of these mature and skilful men gives to the work of the school a character and quality nowhere else to be found.

All these favorable conditions are obviously exceptional and local and they cannot be expected to repeat themselves elsewhere, least of all in this country. Even if government patronage and the promise of government employment kept men year after year at their studies, the conditions of professional practice in this country are so unlike what they are in France that it would be impossible for the men at the head of the profession to take an active and responsible part in directing them.

But the repeated testimony of the men who have profited most by what the École des Beaux-Arts has to offer seems to show that it is to this unique opportunity of intercourse with able men that its paramount excellence is due. The emulation, the *camaraderie*, the honors and the prizes are picturesque and profitable circumstances, but they may be dispensed with, and in other places other customs and influences may produce equally good results. But this opportunity for personal guidance is not elsewhere to be had. Men must go, and must, probably, long continue to go, to Paris in order to enjoy it.

This advantage a school like our own cannot possess. It must be carried on not by exceptional men occupying conspicuous positions in the ranks of the profession, but by ordinary persons like ourselves, fairly intelligent and well-informed, but who, however devoted and faithful, are nothing out of the common. In this case it would be easy for us, like the Fox in the Fable, to disparage the fruit we cannot reach, and to point out that it is only the men that are exceptionally far advanced in their studies who really enjoy these exceptional advantages in any great degree. We might even maintain that an overpowering personal influence is likely to do as much harm as good, and that the most famous masters have seldom turned out famous pupils. They stimulate imitation, not originality. But it is more to the purpose to consider that, this source of influence being closed to us, we are the more concerned to make the most of the more humble appliances within our grasp, and to strive by perfecting our system and methods to make up for the lack of such personal inspiration.

It is to our continued efforts in this direction that are due the radical modifications in our curriculum that have already been mentioned, and in all these changes we have been guided by two or three considerations to which we have come to attach special value. In the first place, we have tried to arrange it so that the different branches of instruction that are going on at the same time may co-operate with one another to enforce the same points, and we find it practicable, with a little management, to make the History, the Ornament, the Design, the Freehand-drawing, the Perspective, and sometimes even the Descriptive Geometry and the Shades and Shadows, all illustrate one another and combine to illuminate the same subject-matter.

In the next place, we have tried to manage so that the students, while strictly conforming to certain requirements, shall at every stage of their work have a degree of latitude and freedom, always finding some necessary element to supply from their own taste and intelligence. We find that this tends, as we expected it would, to develop in every student whatever independence of character and spark of originality he may chance to possess.

How sedulously we have observed this principle even in the study of Draughtsmanship, which, if anything, might be pardoned for being imitative, insisting that, even in copying a drawing, the copy shall not slavishly follow the mechanism of the original, I have already set forth at length in print. In the same spirit we accustom our students from the moment they come to us to exercises in what might be called *absolute* design, in which they have to rely, like the aboriginal savages, on their own taste and judgment, and on the nature of things, not upon precedent or prescription. Indeed, as far as possible, we carry the same idea into the teaching of Mathematics and Mechanics, substituting problems for theorems and discovery for demonstration, wherever the subject to be investigated can be brought within the range of the student's own investigations.

But the final test of this procedure comes at the end of the course, and nothing gratifies us so much as to find, when the Graduating Theses come to be made, that they are as unlike each other as are the men who make them, that they seem to bear no common stamp characteristic of our School, however uniform they may be in excellence, and that they might reasonably pass as having been made under the instruction of as many different masters as there are students. They often look very much as if they had come out of so many different offices.

Indeed to develop in the school a distinctive method in design by which the style of contemporaneous building shall be influenced and controlled as the architecture of France seems to be influenced by the fashions which from time to time prevail in the École des Beaux-Arts is by no means our object. This would be, under the circumstances, an improper and most unbecoming ambition. It was, to be sure, suggested, some years ago, in high quarters, that the schools in this country would do well to take up and solve the problem of developing a new architectural style, which should be thoroughly national and should express the characteristics of the Twentieth Century civilization in this country. But this cry finds no echo in our minds. It is for the architects themselves, practising in their offices, to create, as they may, the architecture of the future, by erecting the most sensible and beautiful buildings they can. It is the business of the schools to see to it, so far as we may, that the architects themselves have the good sense and good taste, and the self-reliance and independence of mind which shall qualify them for this task.

The thing upon which we chiefly rely, both to foster this individuality and to make up for our disadvantage in not being able to command the personal services of the best men, is the study of architectural history. This brings to the knowledge of our students such abundant resources that each can freely choose for himself what best suits his turn of mind, and, at the same time, brings into our service, as coadjutors and colleagues, the great masters of all ages.

It is the prominence thus given to historical studies which constitutes, I think, as also I have taken occasion to point out in print, the special characteristic of our work. It is the devotion to them of what might be considered an extreme amount of time and attention which chiefly discriminates this school from its neighbors. At one time, indeed, the attention given to these studies was somewhat excessive. But now that we are able — by an arrangement which is, I believe, unique in institutions of learning — very nearly to dispense with recitations and lectures in our Fourth Year, and to give all the time to work in design, the balance is corrected. We can now well afford, besides giving from three to five hours a week in the first three years to the study of Architectural History and Ornament, with illustrative exercises in drawing and tracing, to add stated problems in Historical Design. In the second and third years, moreover, under the head of Historical Research, six or eight weeks are every spring given up to the study of the books and photographs, and of the collections and museums at our command. Of this work each student brings every week a written report, accompanied by tracings, sketches and drawings.

This experience familiarizes the men with books, and accustoms them to their use, while it supplies them with abundant resources not only for the special exercises in Architectural History, but for all their work. If they are at any time at a loss for a suggestion they turn as famil arly to Bramante or Peruzzi as to ourselves, and these masters become enlisted, as it were, upon our personal staff.

Nothing is more interesting indeed than to take a masterpiece of one of these masters, such as the arcade of Santa Maria della Pace, the façade of Santa Francesca Romana, or the great triumphal arch at Naples, study out its governing motives, both of construction and of expression, and give it out as a problem to be solved by the student. If then he makes a careful drawing from the original in the style in which he has rendered his own version, so that the element of draughtsmanship may be eliminated from the comparison, and compares the two drawings, it is as if he had the Old Master himself at his elbow, condemning his lapses in taste and judgment, as with authority. It will go hard if the comparison does not reveal some merit in the original work, either of conception or of execution, which might otherwise have escaped detection.

All this is rendered possible and made of inestimable value by the collections to which I have just referred. Of these our own store of photographs and drawings and of prints and engravings, all classified and arranged according to their subjects, forms a conspicuous part. The Willard collection of architectural casts and models at the Metropolitan Museum, probably the most carefully selected and best arranged, if not the largest, of any in the world, offers another opportunity of which, so far, we have made less use than perhaps we might. But the special thing to which the attention of the League should be directed is the splendid architectural library which the munificence of Mr. and Mrs. Avery has placed at their disposal and ours. The Trustees of the University have greatly enhanced the value of this benefaction by administering it in the most generous spirit. They not only keep the library open through the evening, but have added close at hand a large room furnished with draughting-tables, a convenience not elsewhere to be found, while a special custodian well informed as to the contents of the books makes it easy and profitable to consult them.

I think there are only two points of importance that I have not mentioned. One is the instruction in office-work, which is carried on under the name of Specifications, and which is supplemented by the course of lectures in Building Materials already mentioned. But this has no special interest for men who are already in offices. The other is this, that in our Fourth Year the men who wish to become Architectural Engineers separate from the others, substituting special studies in Scientific Construction and Practice for the work in History and Design. But this feature, also, I have made the subject of a paper which is still in print, and I need not detain you to explain the matter in detail.

THE WATER-GLASS FRESCOS IN THE HOUSES OF PARLIAMENT.

MEMORANDA by Professor Church, F. R. S., concerning the wall-paintings in the Palace of Westminster, are issued as a Parliamentary paper. Mr. Akers-Douglas, M. P., the First Commissioner of Works, in a prefatory note remarks that "the Government and the public are much indebted to Professor Church for the great amount of trouble and skill which he has gratuitously bestowed upon these paintings. I propose now to ask him to be kind enough to advise as to the steps to be taken to carry out his further recommendations."

Professor Church observes that he considered it advisable last autumn to deal once more with the two large water-glass pictures by Maclise in the Royal Gallery, as well as the five frescos by Dyce in the Queen's Robing-room. He remarks with regard to the paintings by Maclise: "I formerly stated that it would probably be advisable to protect the surface of these wall-paintings with a preservative solution containing as its chief ingredient hard paraffine wax. I waited until the present year before venturing to carry out this plan, being anxious to ascertain previously whether efflorescence took place after the cleansing operations conducted three years ago. However, so little change of any kind had occurred since 1894 that I felt confident that the suggested application might be safely made. It was of course necessary first of all to clean once more the surface from accumulated dust and soot. This having been accomplished by an air-blast, careful dusting, and the use of bread, the paraffine wax (dissolved in toluol to which had been added a small quantity of a specially prepared copal varnish free from lead) was applied.

"Some parts of both pictures, being more tender and absorbent than the rest of the surface, were treated several times, indeed until suction had practically ceased. Not only was the improvement thus effected in the definition and general appearance of the paintings very decided, but there is good reason to conclude that the injurious

action upon these works of the impure London atmosphere, and of the occasional condensation thereon of corrosive moisture, will be considerably lessened in the future. It will be necessary to repeat the cleansing operations at regular intervals, say, every third or fourth year. And it may be expedient to apply the paraffine wax solution once again, especially over areas where weakness of the ground or of the pigments has been observed. This further treatment is the more desirable because of the loose condition of much of the blue pigment and of some of the dark red in the 'Nelson' stereochrome; for the small quantity of paraffine wax applied during the past season to this painting is not likely to suffice for the consolidation and for the attachment to the ground of these peculiarly powdery pigments."

As to the frescos in the Queen's Robing-room, Professor Church says: "During the three years which have passed since they were last cleaned and treated with paraffine wax they have hardly deteriorated at all. The surface was cleaned with bread, a few necessary but quite insignificant touches were given, and the same preservative solution as before was applied, the application being repeated twice or thrice on those places where the ground or the pigment was friable. With reference to the future treatment of these paintings, I recommend that they should be cleansed, and, if necessary, paraffined, at intervals of three or four years. I believe that by continued care and attention they may be maintained for a long time pretty nearly in their present condition."

The report also contains the following observations: "You will recollect that on the 22d of July last I addressed a letter to Sir John Taylor, in which I stated that there were four glazed paintings in the Peers' and Commons' corridors which needed attention. They had become disfigured since they came under my more particular observation, through the formation of dark stains, or through efflorescence and scaling. The pictures referred to are these: 'The Burial of Charles I,' 'Charles I erecting his Standard at Nottingham,' 'The Parting of Lord and Lady Russell,' 'The Last Sleep of Argyll.' You were good enough to approve of my proposal, but there proved to be practical difficulties in removing and replacing the glasses of these paintings, so that their treatment, expedient as I still believe it to be, has been deferred. I hope, after further modification, my apparatus for producing a powerful air-jet charged with bread crumbs may be brought into use. I beg to recommend that during the summer of 1899 the frescos in the House of Peers should once again be cleansed, under my supervision, and that the four glazed corridor paintings already mentioned should be so treated as to remove all their present disfigurements, such as the gray film on all of them, and the numerous dark circular patches, possibly of fungoid origin, which are increasing on various parts of the surface of one of the pictures."

MILAN CATHEDRAL.

THE City of Milan (situated in the heart of the fertile duchy of Lombardy, which, during the Middle Ages, was regarded as the richest province of Occidental Europe) was always one of the leading Italian cities, in regard to political power and wealth, and has at all times occupied an important place in the development of Italian architecture.

A relic from the period of her first splendor, when Maximian (Emperor from A. D. 286 till 305) made Milan the capital of the empire, is the arcade in front of the Church of St. Lorenzo. The era of her great bishop, Ambrose (340–397), is notable for the founding of the churches of St. Simpliciano, St. Nazaro and others, all being remarkable for their far-projecting transepts. Dating from the days of the Byzantine reign, in the sixth century, we have the domical structure of St. Lorenzo, erected between 552 and 569, a work which has at all times found enthusiastic admirers and imitators. The Carolingian epoch has left its impress in the choirs of St. Ambrogio, St. Eustorgio and St. Celso. From the same period dates the small circular church of St. Satiro, the work of Bishop Anspert (863–881). Even the dismal tenth century has left its traces in the ugly campaniles of St. Ambrogio and the Monastero Maggiore, and in portions of the Church of St. Calimero and others. The decline of antique art is slowly followed by the ascent of the art of the Middle Ages, of which St. Vincenzo in Prato (1030–1050), a structure of great simplicity, may be regarded as the first specimen. A work of greater import is the restored church of St. Lorenzo (about 1100), in which Byzantine influences are still noticed. Later on, the churches of St. Giorgio al Palazzo (1129), St. Simpliciano, St. Sepolcro, the campanile of St. Ambrogio (1128) and the church of that name, with its atrium or fore-court, carry the Lombard style to its fulfilment. Its more ornate further development and its transition into Gothic may be followed up in St. Marco, St. Eustorgio, St. Gottardo, St. Maria delle Grazie, St. Pietro in Gessate, and in the tower of St. Gottardo, the latter being one of the noblest examples of refined detailing. At the close of the Gothic epoch the construction of the wonderful Cathedral, which continued for centuries after, was begun.

The powerful influence exerted by this magnificent Gothic structure is revealed in the fact that the art of the Renaissance had its entrance into Milan much later than into other parts of Italy. As late as 1456 we find Filarete building his Ospedale Maggiore, with a strong leaning toward the Gothic, while Michelozzo, in the tall pinnacles of the Capella Portinari, seeks to rival those of the Cathedral.

The first to cause a break, in favor of Renaissance architecture, was Bramante, who, from 1473–99, in St. Satiro, St. Maria delle Grazie, and the north court of St. Ambrogio, adapted the highly-developed technic of brick construction to the new style. He was succeeded by Dolcebuono, who produced the attractive interior of the Monastero Maggiore, and by G. Solari, who continued the Ospedale Maggiore.

Finally, the Late Renaissance style is represented in Milan by some magnificent monuments, the earliest of which is the splendid Palazzo Marino, by Alessandro Alessi (1558–60). Then follow the churches of St. Fedele and St. Sebastiano, and the Palazzo Arcivescovile, by Pellegrino Tibaldi, of Bologna, works of a certain severity of conception, and lastly, St. Giuseppe, Palazzo Durini, Palazzo della Brera and the grand court of the Great Hospital, structures of great magnificence and splendor, by Ricchini's master-hand, in which this period reaches its climax.

The most important structure in the town, far famed as one of the wonders of architecture, is the Cathedral, dedicated to St. Mary. Notwithstanding a mass of documentary material handed down the centuries, the earliest history of the edifice, in its most essential points, is still enveloped in darkness and uncertainty. Several indications point to the years 1386 or 1387 as the date of the beginning of the work. As to the author of the plan, we are left entirely in the dark. Only this much can be said, judging from certain characteristics of the design, such as the wide span of the nave-vaulting, the slight projection of the buttresses, etc., that the designer was neither German nor French, but Italian. It is safe to say, however, that Marco Frissone, whom Vasari mentions as the author of the design, is not to be credited with this distinction, nor can Hans Fernach, of Campione, another one of the numerous "magistri" (guild masters) employed on the work, lay claim to the honor.

When, two years after the beginning of the work, the direction of the same was, for the first time, placed in the hands of a foreigner, Nicolas de Bonneaventure, of Paris, the ground-plan of the Cathedral and the form of the pillars had already been fixed upon. The latter's connection with the work was more in the capacity of decorative artist, than of constructing architect. It was he who made the drawings for the great windows of the choir. Simultaneously with him we find quite a number of other masters employed upon the great undertaking, each apparently carrying out, on his own responsibility, the job entrusted to him. One of the latter, a German, Johann von Firimburg by name, was given charge of the work after Bonneaventure's early leave. But he too retired shortly (June, 1391), owing to bad treatment and petty intrigues. The "*fabrica*," or Building Committee, disinclined to entrust one of the native masters with the supervision of the work, then looked about for a proper person in Germany, but without success. At this juncture, Gabriele Stornalocco, a noted mathematician, submitted a modified cross-section, reducing the height of the aisles from that of the original design. This, however, the committee lacked the courage to adopt. Finally, in November, 1391, the German master, Heinrich von Gemünd (Enrico Gamodia), arrives on the scene, and with his arrival the long-continued struggle between the Northern and the Italian conceptions of Gothic architecture begins. He gives his professional opinion, disapproving strongly of the adopted design, based on the employment of iron anchor-rods for the stability of the arches, an arrangement which he finds impossible to reconcile with his ideas of vaulting. His decided stand on the question calls forth a protest on the part of the Italian masters, who form a league directed against Heinrich. Through their efforts, the cross-section, recommended by Stornalocco, still further decreased in height, is finally accepted by the Building Committee, against Heinrich's advice. In this modified form the plan has essentially been carried out.

Another German architect, Ulrich von Ensingen, who was called to Milan by the committee in 1395, met with no better success in submitting recommendations for changes, based upon "Northern" ideas of Gothic construction. The Italians, among them as the most prominent Giovanni dei Grassi and Giacomo da Campione, won the field and kept it for several years, although continually embarrassed by the unprofessional meddlesomeness of the "*fabrica*," who arrogated to themselves the right to decree what details should be used. This continues until the death of Giovanni dei Grassi, in 1399, when again a foreigner is sent for, this time Jean Mignot, of Paris, who finds himself confronted by similar intrigues on the part of the native masters as were his German colleagues before him. He goes so far as to declare that a collapse of the building is threatening, and suggests alterations in harmony with "Northern" practice. Although enjoying the support of the reigning Duke, Giovanni Galeazzo Visconti, he fails in having his demands acceded to, and having devoted two years to this fruitless struggle, he, too, is driven away by the unceasing attacks of his Italian *confrères*.

While the native masters had thus successfully defended the national peculiarities of the design, the efforts of the foreign architects have still not been without impress upon the character of the same. For, while the latter were powerless to enforce changes in the system of construction, they nevertheless achieved great things in developing the details, and it is this very mixture of the Italian general plan with detail-work of the Northern type which greatly enhances the peculiar charm of this unique edifice.

Political strife, setting in after the death of Duke Gian Galeazzo, interrupted the work for a time. Work was resumed in 1410 under the charge of Filippino da Modena, who is entitled to the full credit

for the designing of the upper portions of the building, including that sumptuous decoration of buttresses and pinnacles, that wonderful filigree-work of white marble, which gave the sober exterior its fantastic character. In fact, as regards the essential impression of the exterior, Filippino is to be considered as the master that gave the structure those finishing touches which distinguish it from any other in the world.

In 1418 the eastern portion of the Cathedral was so far completed that its consecration could take place. Not until thirty-two years later, in 1450, was the construction of the western six bays begun. In 1468 a temporary west front was erected from fragments of the old Lombard cathedral, which had stood on the same site. Between 1490 and 1500 the cupola over the crossing was added by Francesco di Giorgio, of Siena, yet without the fantastic spire which was superimposed as late as 1750, following a model by Francesco Croce.

In 1567 Carlo Borromeo appointed the Bolognese, Pellegrino Tibaldi, architect-in-charge, who at once began the great west front, in Baroque style, continued, after 1584, by his successor, Ricchini. It being found impracticable to procure some columns of enormous size, which were called for in the plan, the work came again to a standstill, after three of the portals and two windows had been completed. Ricchini's pupil and successor, Carlo Buzzi, resumed the work in 1653, but while he made no attempt to alter the portions in Baroque so far completed, he turned again to Gothic as his means of expression, for the remainder of the façade. Although the work was again dropped shortly afterwards, his plan was preserved and was used, in 1790, by Soave, as a basis for the construction of a new façade which was finally completed under Amati's charge, by command of Napoleon I, Emperor of the French, albeit in simplified and debased form. As is, perhaps, generally known, this façade is now undergoing a radical change: it is being replaced by a Gothic design by Giuseppe Brentano, the outcome of two general competitions in which prominent architects of the leading nations presented designs.

ILLUSTRATIONS

[*Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.*]

CAFÉ OF THE RUSSELL HOUSE, DETROIT, MICH. MR. ALPHEUS W. CHITTENDEN, DECORATOR, DETROIT, MICH.

[Gelatine Print, issued with the International and Imperial Editions only.]

WROUGHT-IRON PANELS DESIGNED BY MR. MURRAY SMITH, NORTH CAMBRIDGE, MASS.

COMPETITIVE DESIGN FOR THE "HERALD" BUILDING, NEW YORK, N. Y. MESSRS. J. G. GLOVER & H. C. CARREL, ARCHITECTS, BROOKLYN, N. Y.

HOUSE FOR J. B. BIRDSELL, ESQ., SOUTH BEND, IND. MESSRS. PARKER & AUSTIN, ARCHITECTS, SOUTH BEND, IND.

MEMORIAL CHAPEL, LENOX, MASS. MESSRS. McILVAINE & TUCKER, ARCHITECTS, NEW YORK, N. Y.

THIS building, just completed, was erected at the cost of John E. Parsons, Esq., of New York City.

SOUTHERN DOORWAY OF XII-CENTURY CHURCH, DONNEMARIE-EN-MONTOIS, FRANCE.

DOORWAY OF THE CHÂTEAU MAINTENON, EURE-ET-LOIRE, FRANCE.

[The following named illustrations may be found by reference to our advertising pages.]

TWO VIEWS IN THE CAFÉ OF THE RUSSELL HOUSE, DETROIT, MICH.

THE HISTORICAL MUSEUM, BERNE, SWITZERLAND.

[Additional Illustrations in the International Edition.]

THE SOUTHEAST CORNER OF THE CATHEDRAL, MILAN, ITALY.

[Gelatine Print.]

OUR plate shows what is perhaps the most picturesque portion of the edifice, which, as has been shown, is the result of so many conflicting efforts. It would be folly to apply to a work of this kind the ordinary rules, relative to unity of style, which we expect to see fulfilled in a great monumental structure. It is easy enough to criticise details. Already Jean Mignot, who was given charge of the work in 1399, found fault with the excessive distance of the baldachino over the corbelled statues, but he failed to appreciate the fact that these baldachini divide the piers in an excellent proportion. We may deplore the fact that the statuary, being, almost without exception, nineteenth-century work, harmonizes so little with the severe architectural lines of the structure, and yet we cannot help being impressed with the distinct charm these figures exercise upon us. However, the manner in which the clumsy lower masses, by the loosening of the top portions, are drawn heavenward, as it were, and brought to a harmonious ending, is worthy of the highest praise. Observe the masterful way in which the flat roof covering the sacristy, by a row of open-work panels, forming semi-gables, is brought into harmony with the main body of the choir! How original and attractive are the rows of pointed panels, or open-work gables, which take the place of a cornice! Again, note the buttresses, dissolving, as they shoot up, into a delicate mass of tracery, gables and pinnacles, all full of motion! Above this forest of pinnacles rises, flanked by four open-work stair-towers, the grand cupola, terminating in a slender spire whose top reaches a height of 300 feet above the square. And all this executed in the splendid white marble of Candoglia (Simplon Road), to which time has imparted an agreeable yellowish tint. It must be admitted that a most difficult architectural problem is here solved with a high degree of creative fancy and with the happiest calculation of the effect.

ONE OF THE SIDE-ENTRANCES IN THE WEST FACADE OF MILAN CATHEDRAL.

[Gelatine Print.]

THIS is one of the portals, flanking the central entrance, which, together with the windows above, were completed in 1630, by Ricchini, after the designs of Pellegrino Tibaldi. The sculptured work, said to have been modelled from drawings by the painter, G. B. Crespi, must be classed among the most splendid examples of decorative art. The chaste severity of the architectural framework and the delicacy of the profiles harmonize most happily with the sumptuous splendor of the ornamentation, giving a rich and admirable effect. To preserve these sculptures from destruction, it is proposed, after the demolition of the present front, to reërect them in connection with a campanile, designed by Luigi Beltranni.

THE SOUTHWEST CORNER OF MILAN CATHEDRAL.

[Gelatine Print.]

THE portions here shown form part of the work completed by command of Emperor Napoleon I. The band with trefoil arcades beneath, topping off the lower projection of the piers, is continued all around the building. It was designed originally for the choir by Johann von Firimburg, the German master. The splendid atlantes above it were carved after Carlo Buzzi's designs, some before 1735, by himself; others, like the sculptures in relief, depicting scenes from the Old Testament, by sculptors of later date. Most of these sculptures show great beauty of invention, as well as execution. Noteworthy for their beauty are also the corbels, supporting the statues of the Prophets, each showing a pair of cherubs in ever-changing variety of motion, although they cannot be said to belong to any distinct style of architecture.

INTERIOR OF ST. PAUL'S CHURCH, CAMDEN SQUARE, LONDON, ENG. SIR A. W. BLOMFIELD, ARCHITECT.

COMMUNICATIONS

[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

"BUILD AND COMPLETE."

BOSTON, MASS., August 1, 1898.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — In your issue of July 30th you take exception to the language of a call for bids for the "Veterinary Hospital," published by the "Fire Commissioner," the offensive words being "*to erect and partially complete*" a building. I should hardly think the wording of an "ad" of sufficient moment for editorial comment, and should let it pass as a trifle, chargeable to lack of news or the dog-day weather, were it not that your mild censure should fall on me and not on the commissioner, and I am therefore called on to meet it. Suffice it to say that the words expressed, as well as a concise phrase could, the peculiarity of the work to be done, and they were readily and clearly understood by the parties addressed, which I take to be the purpose of all business literature. One does not

expect the most elegant language in "specifications," or like compositions; but I have for years used the words "*erect and complete*," or "*build and complete*," in such documents, and would advise others to do so.

The following are a few English examples: "Erect and build, finish and make fit for habitation." "Erect, build and complete, cover-in and finish." "To erect, build, execute and finish." And for American cases (see "Lloyd") — "Execute and finish." "Erect and finish." "Build and complete." "Forthwith begin . . . erect, build and finish," and so on almost without limit.

Yours truly, JOHN A. FOX.

[No, even in dog-days, we do not care to play the part of criticaster and so were not having a fling at the Fire Commissioner or his architect. There cannot be too much precision in the use of words, particularly those used in contracts, upon which payment of money depends, and we are sorry that Mr. Fox, whose wording precisely declared his purpose in this case, and whose ordinary formula agrees with our recommendation, has not expressed an opinion as to whether a building may be "erected" and yet left unfinished. The duplication and tautology common in legal phraseology are the outgrowth of getting an indictment drawn in as many ways as possible, so that it may hold under one count even if it fail under all the others. But in so simple a matter as a contract enough is as good as a feast and the repetitious phraseology of the English forms is to be avoided if the single word "erect" implies full completion; if it does not then "erect and complete" is surely sufficiently explicit. — EDS. AMERICAN ARCHITECT.]

NOTES & CLIPPINGS

MODERN BRIDGE METHODS. — American bridge erectors excel in novel designs of falsework and in the rapid handling of long and heavy spans in short intervals, between trains and without delaying traffic, and some of their achievements in this line seem almost beyond belief in the Old World until accompanied by circumstantial detail. A recent achievement in bridge renewal by the Pennsylvania Railway's engineering force was viewed with incredulity even by a portion of the British engineering press, until the complete account left no further ground for doubt. On some of the French railways some creditable, although vastly slower, work has been done in bridge erection on principles quite different from those governing in some of our quick work. Here the practice has been to construct a new span parallel with and adjacent to the span to be replaced, to disconnect the ends of the old structure and at a favoring interval remove it bodily a little more than its own width to one side, the newly completed span being rolled into the gap, seated on the piers or abutment and connected for traffic, after which the old structure could be taken down at leisure. On the Western Railway of France a number of bridges have been replaced in the last eight years on the Paris-Havre line, among them four double-track lattice-girder bridges. All have been assembled at grade on the river bank in the axis of the bridge, and put in place by projections. This involved the rigid assembling of the successive spans of each structure, until finally the whole series of spans at each crossing was moved from one end, in order to get the last span into position and to advance the others to place. This method developed great frictional and inertia resistances, and eventually made the masses handled essentially continuous spans of 743.75 feet, 667.66 feet, 664.38 feet and 636.49 feet, respectively. The bridges were erected on fixed rollers and were given bearing on other sets of rollers put on the tops of the intermediate piers and arranged to engage the bottom chords as they advanced. These rollers were set in groups mounted on adjustable frames pivoted so as to give uniform bearings and distribute the pressure from the base. Some of these bridges were launched, or moved across the opening they were to span by means of tackle and hand windlass. This arrangement was capable of an average speed of 26.25 feet per hour, and a maximum progress of 32.8 feet per hour. Another of the bridges was moved by men walking back and forth on top of the bridge and operating ratchet levers, which turned fixed rollers, on which the bridge was supported. Sixty men were employed to operate the levers on the bridge in which this method of moving was employed. They worked in unison, and the structure was moved at the maximum speed of 26 1-4 feet per hour. In order to avoid unnecessary work on the last spans of a given crossing the spans were successively assembled and connected together one at a time. The forward span was first assembled and provided with pilot trusses, of perhaps half its length, in front, to engage the rollers in the piers ahead and to support it before the centre-of-gravity left the abutment. This pilot was allowed to remain attached until the erection was finished, and the succeeding spans were assembled on the site where the first had been assembled, adjacent to the first abutment and connected together as fast as the last completed span was moved forward one pier. — *Providence Journal.*

WHY SOME STATUES ARE ERECTED. — M. Jules Claretie, in the *Paris Temps* tells an amusing tale illustrative of the way in which decorations are sometimes obtained in France. M. Pegomas, or some other local busybody, yearning for a cross, a riband, or even the academic palms, calls on a rising sculptor and asks, "Could you do us a statue of Michelet for £300?" The sculptor replies, "If it is for a public square I think I could manage it for £250." M. Pegomas then posts off to the Ministry of Fine-Arts and relates how his fellow-citizens are anxious to adorn their town with the effigy of an illustrious man at a cost of £500 if the Government will only pay for the marble. The minister promises £250, and the trick is done. Should any subscriptions come in they go in advertisements, expenses, refreshments, and gratuities. When the statue is ready a member of the Cabinet, desirous of letting off a speech, comes down to unveil it, bringing, of course, a decoration for M. Pegomas. The sculptor is generally out of pocket, but he gets a good advertisement. — *London Chronicle.*

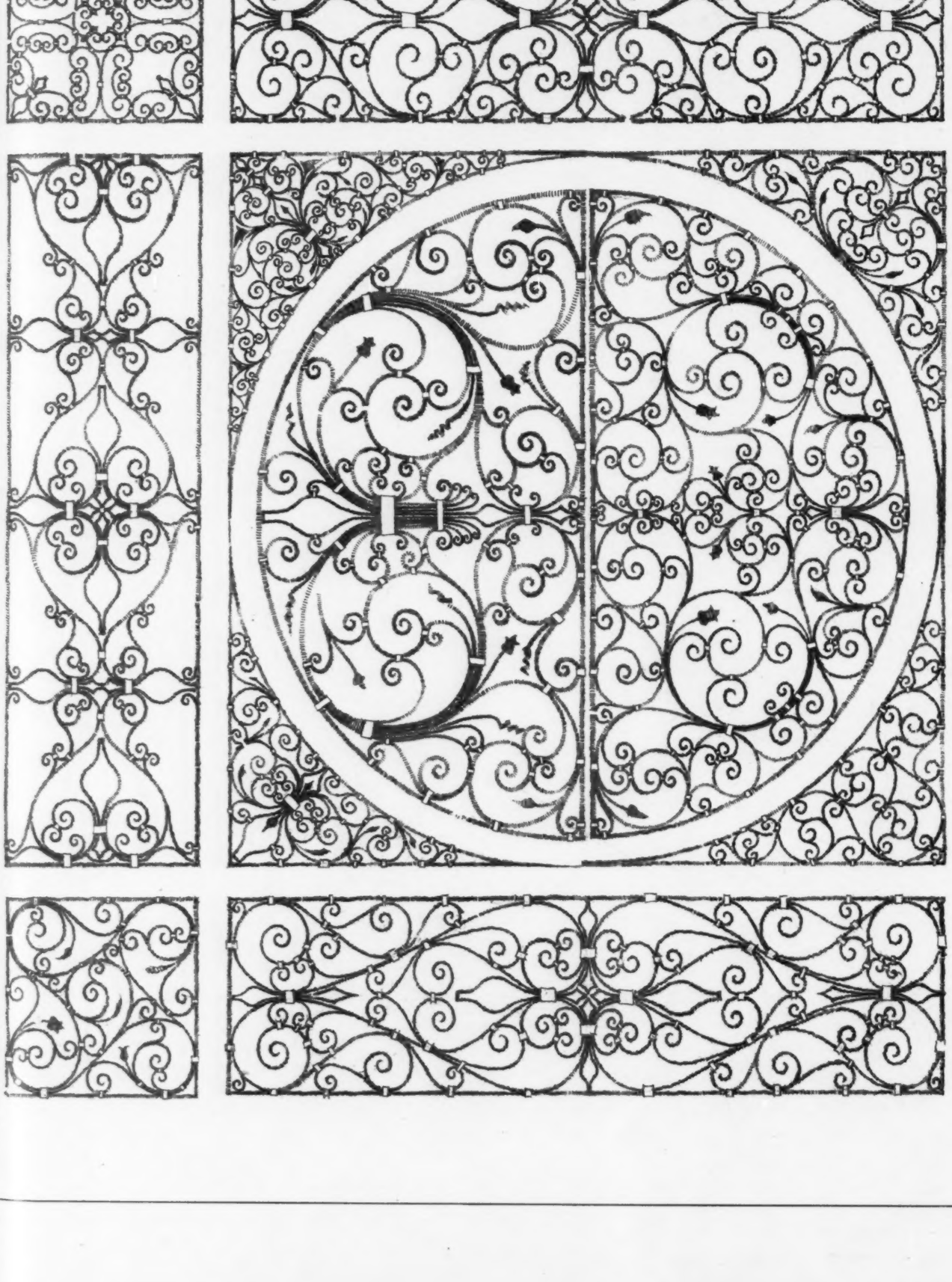
THE MONUMENT TO M. ALPHAND. — After the death of M. Alphand, who took such an important part in contriving and carrying out squares, streets, gardens, and sanitary improvements in Paris, and who was a man with a real genius for administration in this kind of enterprise, a committee was formed to erect a monument to his memory. M. Formigé was commissioned to design the architectural portion, M. Dalou was to submit a model for the sculpture, and the Municipal Council selected a site for the monument at the entrance to the Bois de Boulogne, which in its present aspect was almost the creation of Alphand. This was some years ago, but not even the pedestal has been commenced, and it is stated that the necessary funds have not been subscribed. This seems rather an ingratitude towards the memory of a man to whom the success of the 1889 Paris Exhibition was so largely due. — *The Builder.*

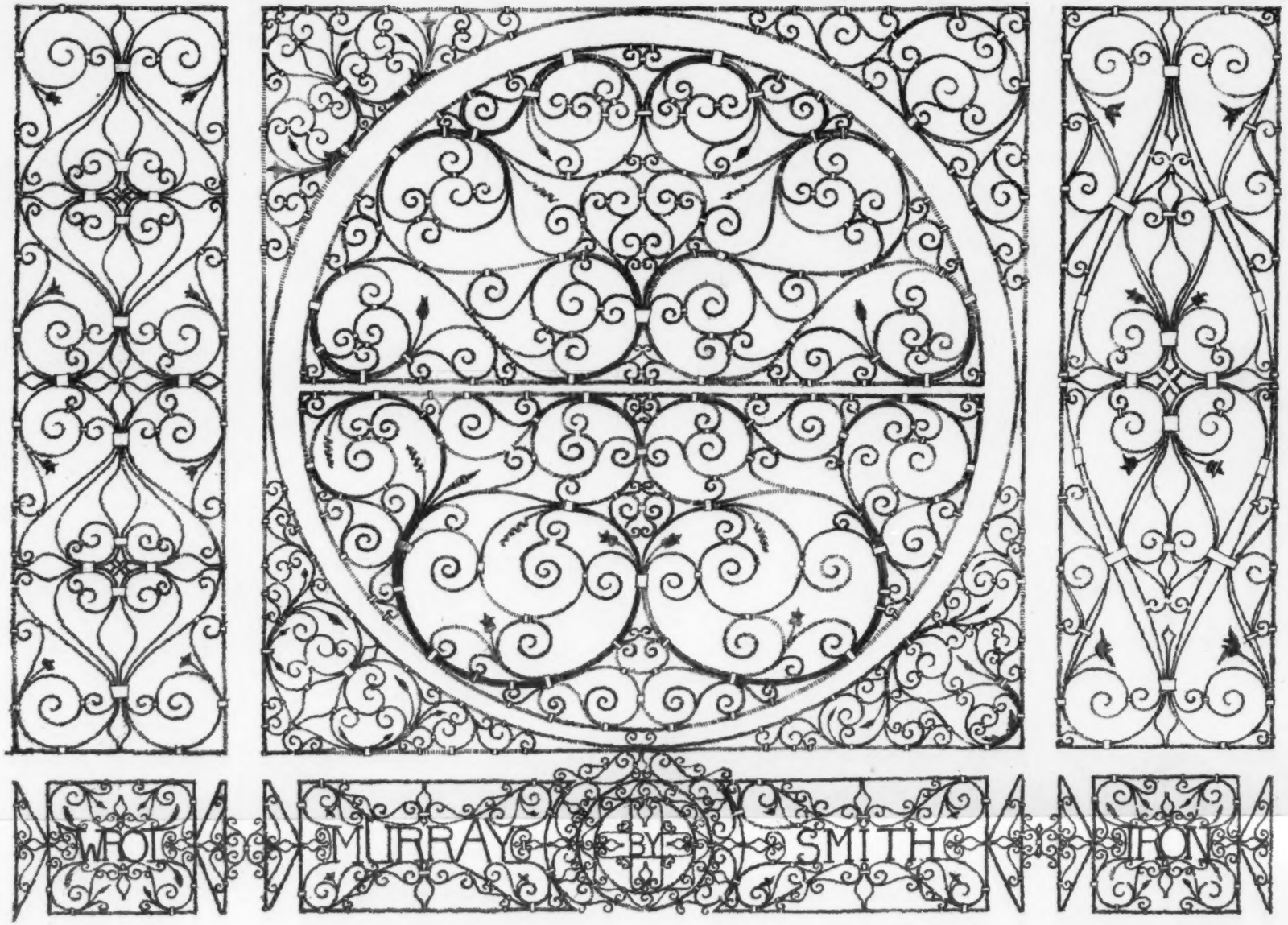
A MODERN LOOTING OF DUTCH TREASURES. — The young Queen of the Netherlands at her approaching coronation and asssumption of regal authority will be richer in jewels, plate, furniture, and rare works of art than a few weeks ago it was imagined she would be. Many years before she was born her father brought to Holland an operatic celebrity, with whom he had become fascinated in Paris, and installed her at the Château Loo with a genial effrontery of publicity at which the Dutch gorge rose. Both the Court at The Hague and public opinion were so hostile that she had to be sent back to Paris. As the price of her retirement without fuss she extorted from him permission to loot all the royal palaces and public museums and collections and carry off the things she fancied most to furnish the mansion he had taken for her near the Champs Elysées. It was years before the full extent of her immense depredations was discovered by the Dutch officials. Characteristically they said nothing, but kept a steadfast eye on the lady. She died the other day, and when her effects came up for sale at the Hotel Drouot the Baron von Zuylen was on hand and quietly bought up all that the Dutch Government wished to reclaim. Among the carloads of treasures thus returning to Holland are a great many heirlooms of the Orange family, as well as objects of historical interest. — *Harold Frederic in the N. Y. Times.*

THE DESOLATION OF CROMER. — The recent landslip at Cromer is only the last of a long series of catastrophes which during the past thousand years have buried more than a mile of land in the sea. One looks in vain for any mention of Cromer in Doomsday Book. It was then but a hamlet of the town of Shipden. But Shipden has lain now for many years at the bottom of the sea. At the beginning of this century it was still possible to discern the masonry of its church at low water. In those days Cromer was an inland town. But in 1837 an extraordinary gale drove the sea to such a height that the very existence of the town was in peril for many hours. Since then a breakwater has been constructed to protect the town. The neighborhood, however, is gradually disappearing. At Sheringham a frigate drawing 20 feet of water can now ride at anchor where forty years ago there was a cliff 50 feet high. It has been found necessary to move various buildings inland. A lighthouse was built in 1719 several hundred yards inland, but in little more than a century this lighthouse had to be abandoned owing to encroachment and a new one built still farther away. The Cromer cliffs are very sandy, and are especially exposed to the action of the sea, as they encounter the full force of the drift from the northeast. — *Westminster Gazette.*

A STIFF BRIDGE AT NIAGARA. — The extreme rigidity of the new 500-foot railroad bridge at Niagara Falls, N. Y., says the *Engineering News*, will, we think, be recognized by engineers as one of the most remarkable features of this, in many respects, very notable structure. Sidewise there seems to be no sway to the bridge under the most trying loads, as far as can be observed, while the vertical deflection of thirteen-sixteenths of an inch under a load of 7,000 pounds per lineal foot is about as close an approach to immobility as the engineer can expect from structural materials. The question which is naturally asked is, To what is this almost perfect rigidity of the Niagara arch due? In the opinion of experts several things have contributed to the result. First of these, perhaps, is the inclination of the arch ribs toward the axis of the bridge. This factor was specially pointed out by Gustave Lindenthal, M. Am. Soc. C. E., in the course of a discussion of the Niagara arch at the last meeting of the American Society of Civil Engineers. According to Mr. Lindenthal, a careful study of the most prominent metal arch bridges built in this country and abroad brings out prominently the fact that the movement under loads is always more noticeable in bridges having parallel arch ribs, of whatever type they may be, than it is in bridges having the arch ribs inclined toward each other at the crown. As examples most familiar to American engineers, Mr. Lindenthal cited the Washington Bridge, at New York, and the Eads Bridge, at St. Louis, both of which have parellel arch ribs, and exhibit a noticeable vibration, both laterally and vertically, in comparison with the Niagara arch, with its inclined ribs. A number of European arches, however, give quite as strong evidence of the greater rigidity of the inclined-rib construction. Two other things which also contribute to the rigidity of the Niagara arch are doubtless the employment of stiff members throughout for the lateral bracing and the adoption of rivetted connections. While pin connections and tension laterals would probably have saved considerably in time and trouble in erection, it can hardly be doubted that they would have been much inferior in point of stiffness, and in a structure of such cost and magnitude it was unquestionably wise to subordinate such minor advantages to gain increased rigidity in the structure as a whole. It is plain that the wearing out of the Niagara arch by impact or by movement under load is a very remote contingency, with the notable qualities of stiffness which it now exhibits under traffic. Indeed, there seems to be every reason to anticipate that the structure will be as capable of serving the purpose, barring injury by corrosion, a hundred years from now as it is to-day.

S. J. PARKHILL & Co., Printers, Boston, U. S. A.



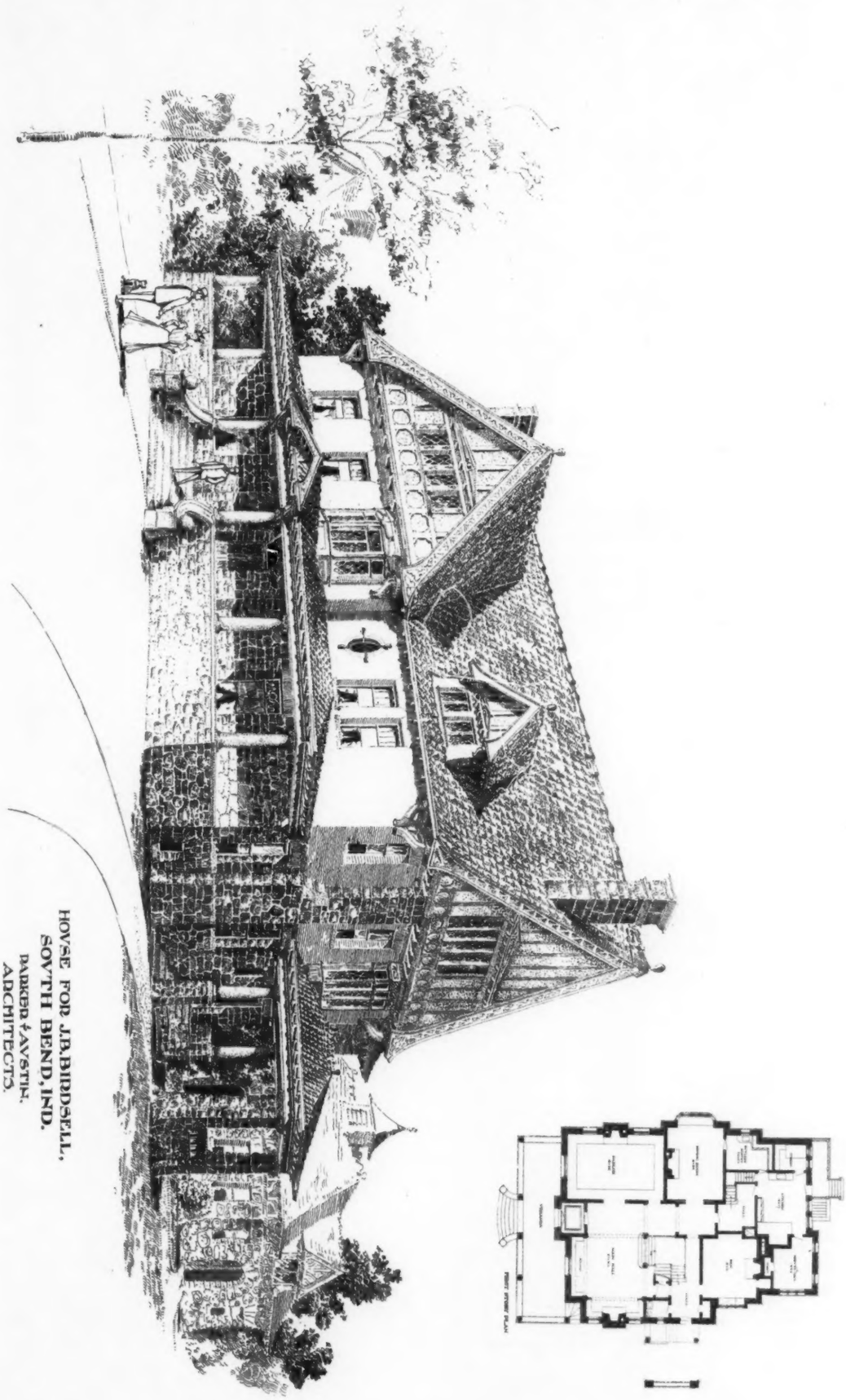


Halftype Printing Co., Boston.

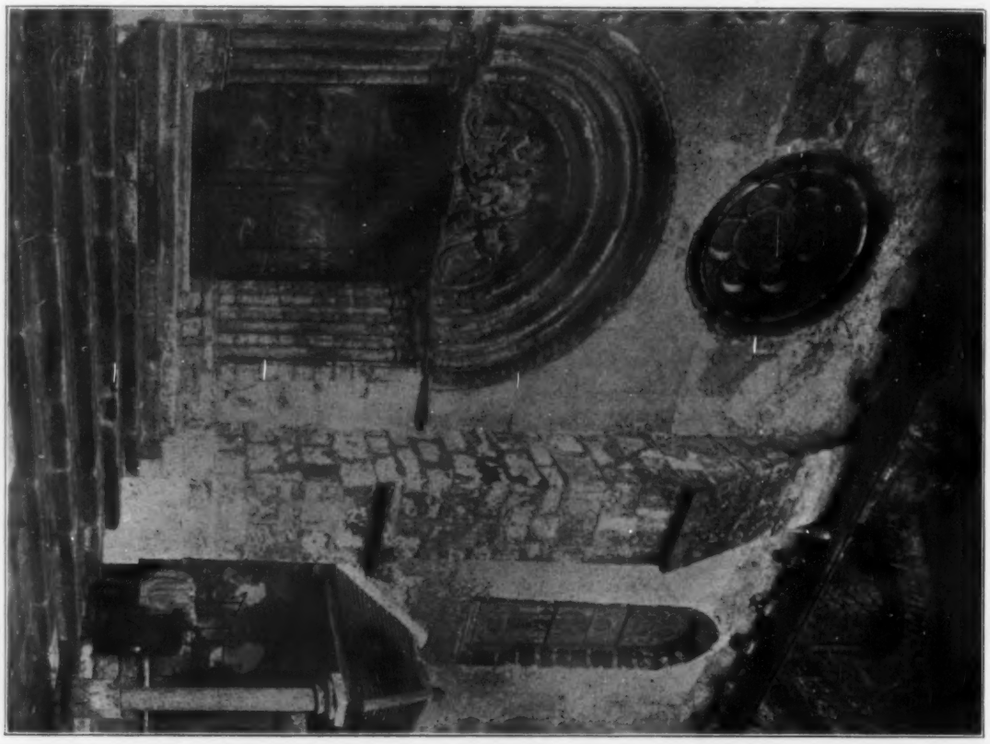
Heliotype Printing Co., Boston.

COMPETITIVE DESIGN FOR THE HERALD BUILDING, NEW YORK, N. Y.

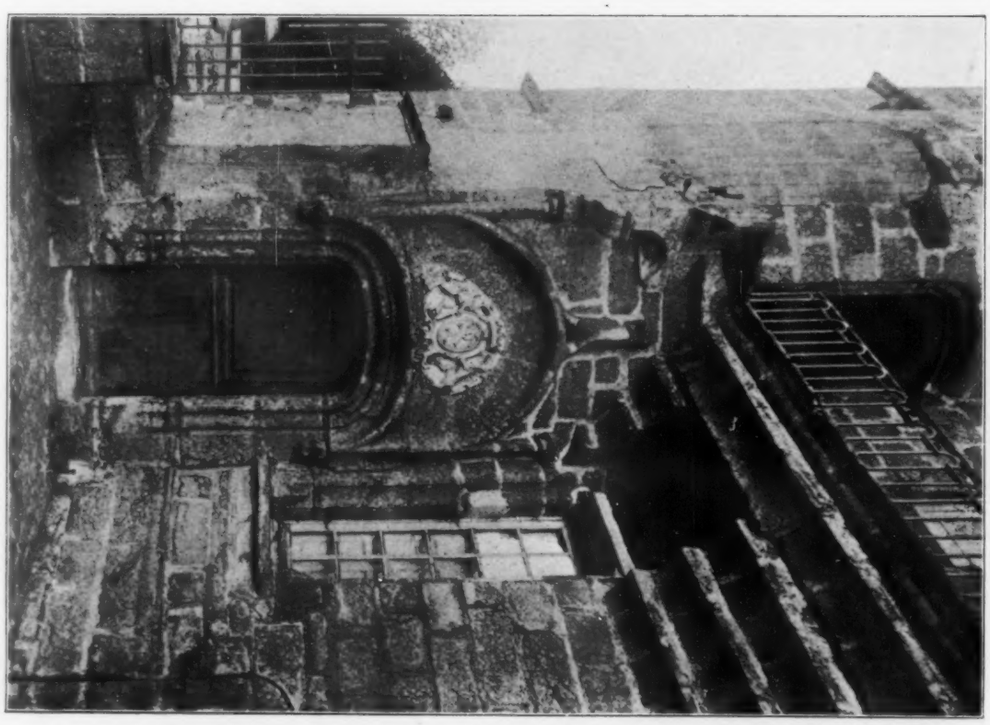
J. Graham Glover and Henry C. Carrel, Architects.



HOUSE FOR J.B.BIRDSELL,
SOUTH BEND, IND.
BARKER & AYRES,
ARCHITECTS.



Southern Doorway of the XII-Century Church, Donnemarie-en-Montois, France.



A Doorway of the Chateau Maintenon, Evre-et-Loire, France.

Memorial Chapel, Lenox, Mass.

McIlvaine & Tucker, Architects.

The American Architect and Building News

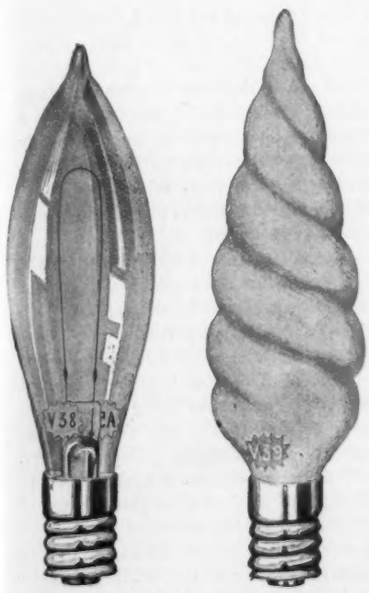
ADVERTISERS' TRADE SUPPLEMENT.

No. 195. SATURDAY, AUGUST 6, 1898. Volume LXI. No. 1180.

DECORATIVE INTERIOR LIGHTING.

With the advent of the incandescent electric-light there arose possibilities of making

the interior illumination of handsome residences more ornamental and pleasing than had been the case where artificial light had been formerly obtained by means of gas,



lamps or candles. It is quite natural that progress in the art of electric lighting has made it possible to still further beautify interiors by the additional subdivision of the electric-light obtained by employing miniature lamps, which may be used in light and graceful fixtures and distributed in groups of a more ornamental character than can be attained with the larger types of standard lamps.

These types of lamps are shown in our illustrations. They were originally designed and are manufactured by the Edison Decorative and Miniature Lamp Department, Harrison, N. J., a department of the General Electric Company. Candelabra lamps of these styles are now being very extensively used in fine residences, in hotels and in other places to which they are appropriate.

The infinite variety of decorative ornamental effects which may be obtained with these lamps in combination with proper fixtures should recommend them to our modern architects. Indeed, it is unusual in these days to plan a fine residence or hotel without making provisions for decorative illumination by this means.

Our advertisement will be found in another column.

GENERAL ELECTRIC COMPANY,
HARRISON, N. J.

STORM-SIPHONAGE OF TRAPS.

The circumstances mentioned below are true and happen in actual plumbing practice; the danger from these causes is well known and we respectfully solicit your thought and attention.

First. — During each heavy rain-fall the sewers in all buildings flush to their full capacity. At such a time this flush is sufficient to siphon a well-connected 1½-inch S-trap with 1½-inch vent, increasing to 2 inches in upper floors. This was actually a fact during a shower in this city June 10, 1898, lasting fifteen minutes. It is a fair deduction that all showers repeat such cases and that hundreds of traps are unsafe. In the cases under observation the resistance and reaction of air in the vent-pipe were sufficient to check the flow of bad air up the vent and same poured into the room through basin, lifting a metal plug from its place.

Second. — In severe cold weather, when vent openings and soil-pipe openings are frozen up, the traps lose their seal from discharge of adjacent fixtures. As is well known, at such times the complaints to the different health departments of sewer-gas and smells from plumbing fixtures are greatest.

In such cases as above mentioned our "Sanitas" trap has stood all tests for many years and has shown absolute safety from these dangers, being absolutely safe even when vents have become useless by stoppage, or by intricate turnings.

As manufacturers of a non-siphoning trap, without mechanical parts and having a full, free water discharge, with strong centrifugal or self-scouring flow, we respectfully solicit our fair share of your patronage.

Respectfully yours,

J. A. CUNNINGHAM, JR.,
40 Dearborn St., Chicago, Ill.

THE LUXFER PRISMS.

This is the name given to a system of glazing which has been patented in this country by the "Luxfer Prism Company," the American company whence the invention comes having their head office at the Rookery, Chicago. The system also includes patents with regard to pavement or floor-lights. The floor or pavement lights are somewhat of the same nature as those our readers are familiar with in this country, with, of course, some special improvements claimed by the new company. It is mainly to bring to the attention of our readers the new method of glazing upright sashes that this notice is written, as also a new system which is adopted in fixing the squares of glass.

The company have a warehouse in Hill Street, Finsbury, which is divided into several portions on the ground-floor, one of which has two windows facing Hill Street, each glazed with one square of plate-glass. This room is narrow and of considerable depth, and when standing at the end farthest from the window the place is gloomy, to say the least of it. Casement sashes are fitted to the window inside the plate-glass, these casements being glazed with Luxfer prisms; when these are closed in front of the ordinary glass the place is very considerably lighter, so much so that we were able to read the advertisements of the company when standing at the end of the room farthest from the window, and this on a very dull, wet day. The matter is easily explained by recollecting that the angle of the prisms or serrated face of the glass on the inside is arranged so that the rays of light shall be refracted in straight lines towards the farthest end of the room.

Some may be of opinion that shadows will be thrown the whole length of the room, by any solid objects therein, and to some extent this will be the case, and we can only advise those of our readers who require more light to examine the invention and judge of its merits

for themselves. Canopies, or reflectors, so-called (a more accurate name would be refractors), for fixing outside windows, are also made.

The method of glazing adopted is ingenious, and is as follows: The squares of glass are accurately ground, so that they shall be exactly 4 inches each way; the desired number are then laid out on a bench and an external frame of very light L copper fitted round the margin; each square is laid in position, having strips of copper about $\frac{1}{32}$ of an inch thick between. When the whole area is made up in this manner a few of the angles have a drop of solder put on, and the slab is lifted up and placed vertically in an electric bath composed of copper in solution, copper wires being hung from rods which form one of the poles of a dynamo machine, and the slab hung from rods forming the other pole. The machine, which is of low tension (4 volts) and large output, is then started, and copper is deposited on the copper strips, which increase in size until they slightly overlap the small teeth in the face of the glass, and also any open spaces there may be between the strips and the glass. After a time the deposit is complete, and we have an area of glass firmly held together by strips of copper so narrow as not to be any practical obstruction to the light. This, of course, is only a general outline of what can be done by the process.

The company have compiled a most useful handbook for architects, giving details to scale of various methods of constructing "canopies," etc., in iron, and full instructions as to the best prisms to use under varying circumstances. — *The Builder* (London).

A WELL-LIGHTED MACHINE SHOP.

In the designing and building of modern manufacturing plants one of the most important questions to be considered is the lighting of the interior of the building. Manufacturing plants at the present time are located, generally speaking, in large cities, or at least in regions where the population is somewhat dense, so that a great deal of loss is experienced by the owners on account of the help watching persons passing by or occurrences taking place in the adjoining streets. On the other hand, the importance of thoroughly lighting the interior of a shop is so great that this fact often takes preference over all others. Why not combine the two? Why not have a well-lighted interior and at the same time have the sides of the building so constructed that employés are unable to have their attention attracted by what is taking place in the surrounding streets? We illustrate herewith a machine-shop designed and built by the Berlin Iron Bridge Company, of East Berlin, Conn., for the Veeder Manufacturing Company, of Hartford, Conn. The Veeder Manufacturing Company are noted for the excellence of the Veeder cyclometer, which is one of the best, if not the best, instrument for recording the distances traversed by bicycles there is made in the country. The mechanism of these cyclometers is very fine, and in the different processes of manufacture it requires the best of light in carrying on the various operations. The business of the Veeder Manufacturing Company being largely on the increase, they decided to build an entirely new plant, and the illustrations herewith show their new machine-shop both externally and internally.

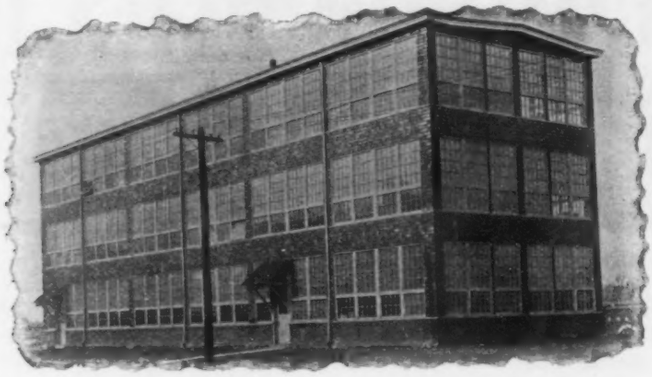


Fig. 1.

The first illustration shows the exterior of the building, which is of a somewhat novel construction. The supporting framework is entirely of steel, the greater portion of the construction being steel and glass. It is three stories in height, the exterior presenting a very ornamental appearance from the unique character of the construction. It is 30 feet in width, 110 feet in length, the three floors giving nearly 10,000 square feet of floor surface, every inch of which, owing to the well-diffused light in the interior of the building, can be occupied for manufacturing purposes.

Figure 2 shows the interior of this building, the photograph from which this illustration was made being taken in the second floor, showing the supporting girders of the third floor above and the trusswork forming the supporting girders for the sides of the building. The interior is heated by hot air forced into the interior of the building from an adjoining boiler-room by means of ducts located and made a part of the supporting columns of the building. This peculiar feature of the building was designed by C. H. Veeder, the President of the Company, and adopted by The Berlin Iron Bridge Company in their design.

Particular notice is called to the sides of the building, which are made almost entirely of glass, but arranged in sections, so that they can be easily opened and closed, thus securing plenty of fresh air. A great many persons have an idea if the sides of a building are made of glass that the interior in warm weather will be insufferably hot, the same as a greenhouse. The facts of the case are exactly opposite. Owing to the superior ventilation, secured by means of every other panel of the glass swinging on a central pivot, perfect ventilation may be secured, and thus, instead of being exceedingly hot in warm weather, it is extraordinarily cool, and pure clean air from the outside is furnished for the workmen.

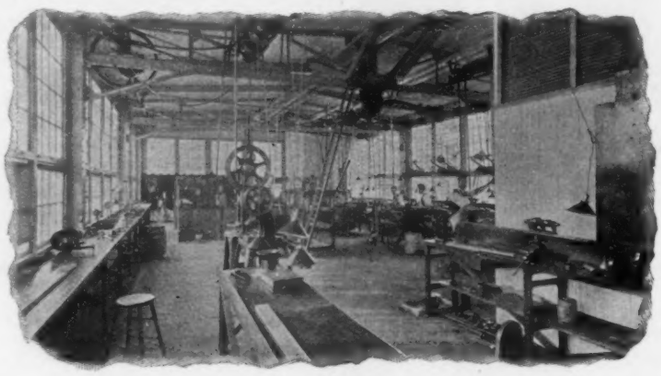


Fig. 3.

Figure 3 is also taken from a photograph and shows the interior of the upper floor of the building. This floor is entirely clear of columns, the roof-trusses being of sufficient capacity to support not only the roof-loads but also to carry shafting, pulleys, hangers, etc. Particular attention is again called to the lighting of the interior of this portion of the building. A large amount of glass admits and diffuses the light so thoroughly in and through the interior of the building that the very fine work of the Veeder cyclometers can be carried on in the centre of the building as well as on the outside. The building

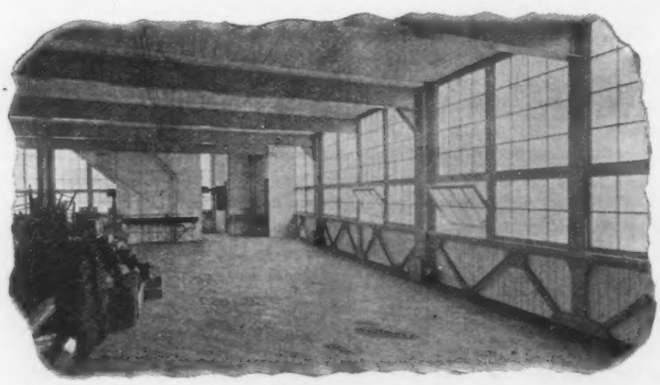


Fig. 2.

is a credit to the designers — The Berlin Iron Bridge Company.

The current both for power and lighting is obtained from the local Electric Light and Power Co. at the pressure of 220 volts and in two phases. The 110-volt lamps are distributed by the ordinary three-wire system, the numbers on each phase being about equal.

Power is derived from general electric two-phased induction motors. A 5-horse power specially-wound motor is used to run the elevator, the motor being directly belted to the hoisting mechanism and reversed by a special switch. In order to avoid excessive currents in the armature winding when starting, the end connections in the armature winding are made of high-resistance metal. Some trouble was found at first on account of the excessive momentum of the armature, but a flange-pulley was placed on the armature shaft and the belt allowed to run sufficiently loose so that the belt can slip on the armature pulley when the hoisting mechanism is stopped quickly. This arrangement has been in use several months and gives no trouble.

The tool-room and machine-shop are driven by a 5-horse power motor with standard winding, and the finishing-room is driven by a 3-horse power motor. The motors have proved to be very satisfactory, running steadily and requiring very little care.

BERLIN IRON BRIDGE CO.,
EAST BERLIN, CONN.

SEAMLESS COPPER RANGE BOILERS.

The Brown Brothers' Seamless Copper Range Boilers have long been recognized as the standard for the highest grade of plumbing work. Made in but two pieces, which are firmly forced together under hydraulic pressure, so that they become practically one, they are without seams to open, or rivets to work loose, and hence leakage is an impossiblity. As they are heavily tin-lined they always insure clean hot water, and being strengthened with an inside spiral rib they will stand any pressure that is brought upon a kitchen-range boiler.

Randolph & Clowes, the manufacturers, are looked upon as one of the leading firms in the business of manufacturing plumbing specialties, brass and copper tubing, and sheet brass and copper. Mr. George H. Clowes, the active manager of the business, was for many years head book-keeper of the old firm of Brown Brothers, of Waterbury, Conn., the original manufacturers of these boilers, and when this firm, in 1886, wound up its affairs, Mr. Clowes, with a keen insight into the possibilities of the business, associated with him Mr. Edward F. Randolph, a man of large business interests in New York City, and purchased the plant and business of the old company. When Mr. Clowes took hold of the affairs of the old concern its entire force consisted of about fifty men and one clerk; now more than five hundred hands are employed, with eight superintendents, and there are important branch offices in New York, Boston, Chicago, Cincinnati and Philadelphia.

While the growth of the business has been largely owing to the executive management of Mr. Clowes, still undoubtedly a large proportion of this growth is due to the fact that they have set their ideals high and have been satisfied with manufacturing nothing but the very best it is possible to produce. It is for this reason that architects specifying the Brown Brothers' Seamless Copper House Range Boilers can feel absolutely assured that their clients will obtain the very best range boiler that the market affords. If they wish to look into the matter more fully and satisfy themselves of the merits of these excellent boilers, we suggest that they send to the manufacturers for a copy of their booklet, "*Consummate Copper Capabilities*," which illustrates the process of manufacture, and is so well written that it makes interesting as well as profitable reading.

RANDOLPH & CLOWES,
WATERBURY, CONN.

The Bryant Electric Company, of Bridgeport, Conn., are erecting a new two-story power-house 50 feet square. The building has brick side-walls, and the framework is of steel-skeleton type. The floor of the building is supported on heavy girders and columns, which carry steel joists supporting corrugated-iron arches and concrete floor. The roof has clear-span trusses carrying corrugated-iron covering, lined with patent anti-condensation roof lining, which prevents the condensation of moisture on the under side of the roof covering, and avoids any damage or inconvenience from moisture dropping on the delicate machinery or material on the floor below. This building was designed and the steel material furnished by The Berlin Iron Bridge Company, of East Berlin, Conn.

RUST, THE ENEMY OF THE MODERN BUILDING.

There is probably no subject that is of more real interest to the architect than that of the preservation of iron from rust. Rust is one of the most insidious enemies that attack the modern building, depending so much for its strength upon its interior iron construction, hidden away behind brick and plaster. Ordinary linseed-oil paint is not a rust preventer, because careful experiments made by eminent scientific men have proved that linseed-oil is permeable to moisture and gases, hence the iron or steel may be slowly eaten away by rust while the coating of paint on the surface may appear intact. The ironwork on the modern building is carefully calculated so that it will stand the strain put upon it, but if, in the course of a long series of years, it becomes honey-combed by rust, what guaranty can the architect have that it will stand the same strain it would have done at the beginning? The only way to obtain any reasonable security in the matter is to coat the iron with a preparation which is non-permeable to moisture. This cannot be a paint but must be something in the nature of a varnish. After long and careful experiments, Edward Smith & Co., the well-known varnish makers, of 45 Broadway, New York, have introduced to the attention of architects and engineers a material which they call "Durable Metal Coating." This is not a paint but a specially designed varnish cheap enough to be used upon the structural ironwork of modern tall buildings, although, of course, a trifle more expensive than the cheap paints which are so often employed by the iron manufacturers. This "Durable Metal Coating" has been adopted by a number of leading railroad companies for use on their bridges and train-shed roofs, which are subjected to the destructive influences of the sulphur gases from the locomotive stacks, and with uniformly successful results. We should advise every architect who is engaged in the erection of buildings containing structural iron to write to us for a pamphlet fully describing tests of our Durable Metal Coating.

EDWARD SMITH & CO.,
NEW YORK, N. Y.

MURESCO.

In these days the duty of the architect is seldom entirely finished with the construction of the house. He is called upon to advise in the selection of carpets, wall-papers and furniture. His knowledge of color is brought into play and his judgment is in a large measure depended upon. Surely he does not want to leave the walls of the house blank and staring in their plastered whiteness, yet until the inevitable settlement and thorough drying-out of the timbers occurs, with the accompanying cracking of the plaster, it seems hardly worth while to use expensive wall-papers. If color effect alone is desired, it can readily be obtained by using "Muresco," made by Benjamin

Moore & Co., of Brooklyn, a material which takes the place of kalsomine, and has all of its advantages and none of its disadvantages. Its chief advantage over kalsomine is that it will not crack nor rub off on the coat, and as it resists all suction, it will have the same effect upon a hard or soft surface of plaster, so that patches will not show through it. Another specialty made by this firm is willow-green varnish stain, by using which the staining and varnishing becomes one operation. It is more especially intended for use on rattan furniture, although by a little experimenting the architect may probably find other uses for it. We should advise him to correspond with us and make himself better acquainted with our specialties.

BENJAMIN MOORE & CO.,
BROOKLYN, N. Y.

PITTSBURGH RECOGNIZED.

FIRST ORDER FROM OUR NEW POSSESSIONS IN THE WEST INDIES.

The Westinghouse Machine Company have already begun to reap some benefit from the recent brilliant successes of American arms in Cuba. They are to-day advised that their New York Office has received the initial order for a complete steam plant, involving a 100-horse power Westinghouse Engine and Westinghouse Generator, together with boiler, pump, piping, etc., this plant to be installed in Santiago de Cuba.

WESTINGHOUSE MACHINE COMPANY,
PITTSBURGH, PA.

NOTES.

We very much regret to learn that the large works of the Snead & Co. Iron Works at Louisville, Ky., were totally destroyed by fire last month. We learned of the disaster only through their request that we would temporarily intermit the publication of their advertisement, as it would do them no good since, for the moment, they would be unable to accept orders. Naturally we acceded to their request so far as rendering a charge for advertising goes, but, as we feel that an advertiser can do no more foolish thing than to allow his name to disappear wholly from a publication in which he has once advertised, we have chosen to aid our good friends in their misfortune by keeping a small card for them in our columns while temporarily removing their full-page advertisement. In times past we have had similar requests from advertisers who had been victimized by fire-losses and have always found we were subjected to delay and often loss in collecting accounts from them then outstanding, and were prepared to undergo the same delay in this case. But a few days after receiving notification of the catastrophe we received, with customary promptitude, the check in full for the quarter's advertising last expired and from this incident draw the happy augury that perhaps after all the conflagration was but a blessing in disguise.

The Snead Company is one of the oldest iron-working concerns in the country, and doubtless some of their apparatus, though still usable and still used, was out of date and was not really profitable, and the present chance to put in a thoroughly modern plant may be but the first step in a career more prosperous than ever, and all friends of intelligent activity and honest promptitude must join with us in hoping that this will prove to be the case.