The American Architect and Building News, Vol. 27, No. 733, January 11, 1890 eBook

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We wonder whether every one who receives these first issues of the International Edition of the *American Architect* comprehends the significance of the step which we, with the kind support and appreciation of our subscribers, have ventured to take. How many of those who turn over our pages realize that this is by far the most ambitious and costly architectural periodical in the world, and that it has been reserved for America to try to present every week, with a due proportion of the more valuable models from the past, an adequate view of all the best architecture which modern civilization can show? Strangely enough, in carrying out our plan of representing contemporary architecture as it should be represented, it is to Americans that we must most earnestly and urgently appeal for cooperation. We know where we can get drawings, plans, photographs, descriptions and details of all the best current work in North and South Germany, Italy, France and England, and even in Russia, but to secure anything like a decent representation of modern American architecture has hitherto been, according to our experience, absolutely impossible. Not long ago a discussion took place in England about architectural periodicals, and one or two of the American journals were mentioned with commendation, on account of the beautiful drawing and process-work in their illustrations, as well as the value of their text. Not long afterwards, a disparaging commentary on this discussion was made in one of the English professional papers, to the effect that it was a great mistake to value so highly the illustrations in the American journals, for the reason that, although charmingly executed and fascinating, they rarely represented architectural work of any importance. Our readers, especially those faithful friends who have stood by us for years, will understand that this was a sharp thrust, but it is, and not through our fault, altogether too well deserved. While in all other countries where architecture is practised, every important competition is regularly illustrated from the competitive drawings themselves, which are, as a matter of course, placed at the disposal of the professional journals; and plans, elevations, sections and perspectives of all new buildings of interest, and often photographs from the models for the sculptured detail, and illustrations of the schemes for heating and ventilation are gladly furnished by the architects, who understand perfectly that their professional reputation depends in great part on the publicity which is given to their work through the medium of the technical press: in this country, on the contrary, the attitude toward technical journals of a great many architects, and among them some who are constantly engaged upon very important work, is one, apparently, of grave suspicion. The most earnest appeals by letter on the part of

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the editors for permission to publish plans or elevations of a successful building by one of them meet with no response. Then the editor takes two or three days from his abundant leisure, and calls personally upon the professional magnate. The latter seems pleased to see him, shows him the drawings of the building in question, appears to be gratified at his praises, and readily agrees to allow the publication of the plan and perspective. The editor lays these drawings aside, and proposes to take them with him, but the architect politely insists that he cannot allow him to burden himself, and promises that he will send them immediately by express. The editor returns to his desk, and arranges space for the expected drawings in the next issue, but they do not arrive. Two or three weeks go by, and he then writes to the distinguished architect, to remind him of his promise. The letter brings neither the drawings nor any other response, and, after a final entreaty, as unsuccessful as the rest, he abandons his efforts, to begin them again with a fresh subject, who proves as slippery as the other.

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After a good many years of such struggles, we should be inclined to say that we would trouble ourselves no further, and that American architects who are capable of carrying out important work successfully, and do not want other people to know it, may please themselves in the matter, were it not that, in a journal which now intends to show what is done all over the world, we most earnestly wish to have American, architecture properly represented. We are sure that the best of it is equal to the best anywhere, and we want to be able to prove it. The treatment of our modern mercantile and business structures, particularly those ten or twelve stories in height, is more successful than any other work of the kind in the world; the planning of our office-buildings is unrivalled anywhere, and some of our apartment-houses will bear comparison with the best in Paris—which are the best anywhere—and are more interesting, on account of the more complex character of the services which we must provide for. Besides this, many details of American construction, such as the encased iron framing-and isolated pier foundations of the Chicago architects, and the heating and ventilating systems in use everywhere here, are far in advance of foreign practice, and we want our foreign readers to see this with their own eyes, and to give their American brethren their proper rank in the profession. To do this we must have the material, and we appeal once more to American architects who have it to furnish it, and to those who do not have it themselves, but who know where it is to be found, to get it for us, or to put us in the way of getting it. Plans, elevations, perspectives, sketches, photographs, negatives, descriptions, whatever is good, we want to show, for the benefit and reputation of the profession in America far more

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than for our own, for we know better than the profession how very valuable publicity of the kind is to architects. The late Mr. Richardson, even to a comparatively late period in his professional career, was afflicted with the usual bashfulness about having his work published. We well remember the solicitations, the refusals, the renewed appeals, and, finally, the reluctant and conditional assent to have a single gelatine print from one of his perspectives published. This was the drawing, we think, of the Woburn Library, and was accompanied by a plan. Finding that he had suffered no severe injury from this exposure of his design to the gaze of the cold world, Mr. Richardson soon became one of our kindest friends, and if reputation and employment are things to be desired by an architect, we may say with all due modesty that what he did for us was repaid to him a hundred-fold, for, great as was his talent, it must, without the publicity given to his work through means like ours, have had for years only a local influence. As it was, however, every issue of ours with one of his designs was studied in a thousand offices and imitated in hundreds; his name was in the mouths of all architects throughout the Union; our plates were reproduced abroad; the illustrated magazines, finding his reputation already made in the profession, hastened to spread it among the public; and at his lamented death, a few years later, he was the central figure of American architecture. Now, although we do not say that all the architects who send us their drawings will attain the fame of a Richardson, we do say that Richardson would never have attained a fraction of his reputation if he had not allowed his designs to be published, and we need hardly say further that if any architect has done a good piece of work, and has it published, more people will know about it than if he kept it to himself; and the more people know about his good work, the more will come to him to get some like it, the better will be his standing in the profession here, and the more credit he will do his country abroad.

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It may be as well to disarm criticism and complaint by stating that there will be throughout the year more or less of irregularity in the appearance of the additional illustrations in the International Edition, owing partly to steamer delays, and partly, perhaps, to misunderstanding of our instructions on the part of our correspondents. It will not be proper, therefore, to compare one issue with another, and assert that we are falling short of our promises. When the end of the year is reached, the subscribers to that edition will find, on review, that our promises have been fully kept, and that the edition has been what it professed to be. Naturally, defects and deficiencies will be more apparent at the outset, when the complicated details of supply have not been definitely adjusted.

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The profession in Brooklyn, N.Y., has to mourn the loss of Mr. Charles Keely, son of Mr. Peter C. Keely, the architect of so many Catholic churches all over the country, and associated with his father in business. The practice of the office is enormous, fifty churches, it is said, being sometimes in process of execution from the designs of the father and son, and of the excellent work done there, no doubt much was due to the younger man's talent. Mr. Keely was about thirty-five years of age, active and popular. He died of pneumonia in Hartford, at the house of the bishop, whom he was visiting on business.

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A deputation was presented to the Ways and Means Committee of Congress the other day from the Free Art League, which urged the abolition of the present duty on foreign works of art. The deputation consisted of Mr. Carroll Beckwith and Mr. Kenyon Cox, with Mr. William A. Coffin, who, after mentioning some of the obvious reasons for abolishing the tax, stated that, in response to a circular sent out by the League, fourteen hundred and thirty-five communications were received from artists, teachers of art and others whose opinion would be of value. Of these, thirteen hundred and forty-five desired the immediate abolition of the duty, eighty-three favored a moderate duty, ten per cent being mentioned by twenty-eight out of the number and seven wished the present impost retained. The Ways and Means Committee, according to the newspapers, listened politely to the artists for a time, and then turned their attention to the duty on carbonate of soda. Whether, in the presence of practical matters like carbonate of soda, they will ever, think again of the tax on mere works of art, remains to be seen.

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Fire and Water says, referring to some remarks of ours about the policy of transferring the fire-extinguishing apparatus of small towns to any neighboring large one in which a serious conflagration happens to break out, that we were mistaken in "supposing" that the insurance companies might refuse to pay losses in suburban towns occurring during the temporary absence of the regular protective apparatus, and that as the contract of insurance does not mention anything of the kind, the companies would be compelled to pay losses, whatever happened to the engines, so long as their policies remained uncancelled. Now, in the first place, we did not "suppose" or "assert," as another paper says we did, anything about the matter. We simply said we had been told that the companies would not pay in such cases, which was true. We were told that, and by an insurance agent, who ought to know something about it. Moreover, this was not the first time we have heard the same thing. Not long ago, in a discussion in the city government of a town near Boston, one of the members protested against allowing the town engines to leave the limits of the municipality,

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for the same reason, that the insurance companies would not pay losses occurring while the engines were absent. As to the contract in the policy, we have often seen clauses requiring the insured to notify the company of any circumstances affecting the risk, of which the absence of the town engines might be considered one, so, in our ignorance, we, and, we imagine, a good many others, would be glad to have an authoritative statement from the companies themselves on the subject.

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According to the *Wiener Bauindustrie Zeitung*, the splendid Brunswick monument at Geneva is on the point of falling down. Every one remembers the history of this structure, which was erected in 1879, at a cost of six hundred thousand dollars, to the memory of Charles the Second of Brunswick, the “Diamond Duke,” as he was called by the Germans, who, after his expulsion from his principality by his subjects, on account of his extravagance and general worthlessness, took up his residence in Geneva, and, on his death, in 1873, bequeathed all his property, about four million dollars, to the city. The municipality was grateful enough to carry out in a very sumptuous manner the last wishes of its benefactor, who desired to be commemorated by a monument in the style of the later Scaliger tomb at Verona, and from the designs of Frauel was erected the hexagonal Gothic pavilion, surmounted by an equestrian statue of the Duke, which is so well known to architects. The Veronese prototype of the monument is a tolerably insecure affair, but the modern imitation is still larger and heavier, and two years after its completion the substructure began to come to pieces. It was then clamped with metal, but water got into the joints, and further repairs were soon necessary. In 1883, the Carrara marble of which it was built had so far decayed that the rebuilding of the whole with more durable stone was seriously proposed; and now, examination, having shown that the whole affair is likely to collapse at any moment, the city authorities have asked for authority to raise eight thousand dollars, by loan, to put it in secure condition. To tell the truth, it would not be an irreparable loss to the world to have the structure go to ruin. An imitation of an existing monument is not likely to be a very inspiring work of art, and this was not extremely successful, even as an imitation; while the historical fact which it immortalized, that the last representative of one of the six great German princely families, whose ancestors had been reigning sovereigns for a thousand years, had been obliged to set up the images of his haughty forefathers in a community of Republicans, because his own people despised and hated him so much that they could endure him no longer, was not of a character to arouse noble thoughts in the mind of the beholder.

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We have before called attention to the great and rapidly increasing importance of the South American Republics, and, while there seems to be no prospect that our proximity to them will be of any commercial advantage to us, some of our young architects and skilled mechanics, who speak Spanish, might perhaps find profitable employment there. At present, the most prosperous city is Buenos Ayres, which, from one hundred and sixty thousand inhabitants in 1870, increased to four hundred and sixty thousand in 1888, and has gained very rapidly within the last year. We must confess that our own ideas of Buenos Ayres still retain a reminiscence of gauchos and lassoes and buffalo, but this grows fainter as we find illustrations in the foreign papers of the newer buildings going up in the city. The last we have seen is of an enormous dry-goods store, after the model of the “Bon Marche” or the “Printemps” in Paris, which is known as the “Bon Marche Argentin,” and covers at present ninety thousand square feet of land, while thirty-five thousand feet adjoining have been secured, and are to be used for the enlargement of the present building which will soon become necessary. There are said to be a good many architects already in Buenos Ayres, but first-rate mechanics are, or were not long ago, so scarce that the municipality imported plumbers under contract from London to do work on public buildings.

CIVIL AND DOMESTIC ARCHITECTURE.—I.[1]

The term Civil and Domestic Architecture includes all public and private edifices, that is to say: honorary monuments, such as triumphal arches and tombs; buildings for the instruction of the public, such as museums, libraries and schools; houses for public amusements, as theatres, amphitheatres and circuses; structures for public service, as city-halls, court-houses, prisons, hospitals, thermae, markets, warehouses, slaughter-houses, railway-stations, light-houses, bridges and aqueducts; finally, private dwellings, as palaces, mansions, city and country residences, chateaux and villas.

[Illustration: Memorial to the Heroes of the Franco Prussian War, Berlin.]

The first care of all social organizations, at their inception, must have been to provide shelter against inclement weather. In primitive times society was composed of shepherds, or agriculturists, or hunters, and it is presumable that each of these groups adopted a shelter suited to its nomadic or sedentary tastes. For this reason to shepherds is attributed the invention of the tent, a portable habitation which they could take with them from valley to valley, wherever they led their flocks to pasture; agriculturists fixed to the soil which they tilled, dwelling in the plains and along the river banks, must have found the hut better adapted to their wants, while the hunters, stealing through the forests, ambushed in the mountains, or stationed on the seashore, naturally took safety in caves, or dug holes for themselves in the earth, or hollowed out grottos in the rocks.

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An imitation of the tent is found later on in the form of the Chinese and Japanese structures; the principle of the cave appears developed in the subterranean dwellings of the people of India and Nubia; while the hut is the point of departure for all Greek and Roman architecture.

As soon as man had contrived a shelter for himself, before considering improvements that might be made in it, he turned his thoughts toward the divine being of his worship, and the first steps in art were taken in the monuments which he raised to his gods. Then, confounding kings with deities, he reared palaces like unto temples. But civil architecture, properly so called, came into existence only with an already advanced state of civilization, when cities were forming and peoples were organizing. After having satisfied the demands of the moral nature, after having erected temples to their gods and palaces to their kings, the people began to group together and surround themselves with fortifications. Next the material needs of society made themselves felt; aqueducts were constructed to supply water; bridges established communication between the opposite banks of streams; dikes confined the rivers within certain bounds; streets were laid out along which houses were built in orderly fashion, public squares were marked off where the products of industry could be exchanged, where justice was dispensed and where the great affairs of State were treated; then came mental and physical demands, a felt need for the training of body and mind, and out of this want grew theatres, stadia, gymnasia and thermae. In time we find the history of a single people developing; and with this development a necessity arising for lasting monuments to commemorate its various stages; public services rendered by certain illustrious men called for some enduring memorial; and relatives and friends, with whom one had lived and whom the dread enemy had snatched away could not be left without sepulture. Is there nothing after death? And so honorary monuments, triumphal columns, statues and tombs sprang into being. Again, with the growth of a people, wealth increases, and every new victory assuring an added degree of ease introduces at the same time extravagant tastes; a people after enduring suffering cries out for its portion of pleasure; it was to satisfy this demand that circuses were built, and amphitheatres where the eyes could feast on imposing spectacles; private houses became more comfortable, they were improved in arrangement, they were enlarged and embellished; at length an extraordinary display of sumptuousness began to appear in the dwellings of the great, —that luxury of decadence which marks the close of ancient civilization.

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With the advent of Christ came new ideas which caused new departures, not only in religious and monastic architecture, but in civil architecture, as well. Christianity, in proclaiming a new virtue, love, created retreats for the unfortunate, asylums for their reception and hospitals for their care. Monkish orders, in their efforts to prevent the destruction of old manuscripts, spread knowledge around them, and following the example set by them in their monasteries, outside colleges were founded. With the dissemination of knowledge, cities roused out of their long sleep; their independent spirit began to shake off the yoke of their oppressors; they formed themselves into communes and various privileges were granted them. Under certain conditions, and in consideration of the discharge of certain obligations, the commune is seen at length assuming the administration of its own affairs. From this moment an assembling-place is needed where communal interests can be discussed and where questions can be put to vote. The town-hall, with its belfry from which could be proclaimed afar all immunities won, supplied the want. Around this centre markets sprang up, and exchanges where merchants could negotiate and transact business. Finally, the less exclusive modern spirit made itself felt, and, soaring beyond the city bounds, it projected works of a genuinely public nature, not for the benefit of this or that city, but for the entire country. Political centralization, governmental unity, later on, made it possible to run canals through different provinces, to establish barracks for troops over broad stretches of territory, to build court-houses and prisons, to reconstruct hospitals on new plans, and to open more extensive exchanges, markets, warehouses and slaughter-houses. Public instruction also had its imperious demands, and States were forced to sprinkle their lands with school-houses of every grade, from the simplest asylums and primary and secondary schools to special government institutions; libraries and museums were founded to satisfy still other claims of education. Then with the ever-increasing wants of a civilization, eager for progress, in the presence of the important discoveries of science, before the invasions of finance and the extension of governmental machinery, architectural designs are indefinitely multiplied to supply suitable departmental buildings, banking-houses, houses of commerce, quarters for public officers and public boards, railway-stations, inns, custom-houses and toll-houses; to say nothing of private residences and play-houses, bathing establishments, casinos and villas, whose designs change from time to time with the manners and customs of the period or people.

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Civil architecture, in the proper sense of the term, originated with the Greeks and was extended in a surprising degree among the Romans. All the other peoples of antiquity devoted themselves to the rearing of religious and sepulchral monuments, and to the construction of palaces for their sovereigns. Their political organization did not lend itself to development in other directions. So long as a people is not considered as an individual there can be no thought of erecting for its comfort or education structures of any considerable importance; so long as it has no existence as a civil body there can be no call for the building of edifices wherein to discuss its own affairs or the affairs of State. Nevertheless, aside from temples and palaces, there are certain works of public utility which are forced upon all civilizations, and among all organized peoples a domestic architecture exists which answers to their needs and which we cannot pass over in silence.

The sacred books of the Hindoos give us the plans on which their cities were built. There were forty different kinds of cities, distinguished one from the other by their extent and form. The streets crossed at right angles. The centre of the city was reserved for sacred uses and was inhabited by the Brahmins; around them dwelt the people, and the angles were occupied by the exchanges, markets, colleges and other public structures. The city was always walled, with a gate on each of the four sides and one at each corner.

Private dwellings varied in height according to the rank of the owners. Those of the inferior classes could have only one story above the ground-floor, and in most cases they were limited to the ground-floor itself. The door was never placed in the centre of the facade. Its position, as well as its height and breadth, was fixed by rule; the same was true of the windows. The streets were supplied with running water, and adorned with avenues of trees; they were bordered by rich shops and houses set close together, with no intervening spaces. The palaces, which were composed of separate buildings, approached by porches, were usually erected around small courts, and these courts were almost always planted with trees. The roofs were flat, and the narrow, rude staircases were made in the thickness of the walls. The Hindoos also constructed huge reservoirs, and reared columns and square triumphal arches in honor of their heroic victors; they are also known to have built bridges, the piles of which, formed of enormous blocks, were connected by stones of a single piece.

Passing into China we encounter a civilization whose antiquity rivals that of India. However, there are no very ancient remains there. But there is documentary evidence that the Chinese, several centuries before the Christian era, built from the same designs that they use to-day. Architecture being the expression of the needs, instincts, character and traditions of a people, and the Chinese having in no way modified their manner of living or their traditions, we can easily understand why their architecture has undergone no modifications.

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The Great Wall, running along the north of China proper, with a length of fifteen hundred to eighteen hundred miles, is the only Chinese work that can boast of its antiquity. It is attributed to the emperor Tsin Hoang Ti [Che Hoang-te], who reigned in the third century before our era, and who is said to have employed in its construction five or six million men. The foundations are of hewn stone, the rest is of brick faced with smoothly-joined stones. The wall is battlemented, flanked with towers, and is provided at certain intervals with fortified gates. It is broad enough for six horsemen to ride abreast on it.

Among the great works of the Chinese, mention is also made of the bridge of Loyau at Sueno chou Fou; it is built over the point of an arm of the sea and comprises two hundred and fifty piles made of material of enormous bulk. The roadway is formed with single blocks of granite, and is guarded on each side by a balustrade.

There are other bridges raised on vaulted arches. Others, still, are decorated with triumphal arches, such as that of the Province of Kiang-Nan; and again there are others built of wood, like the bridge of King-Chou-Fou, with the flooring supported by iron chains fastened to rocks.

The cities are generally laid out on a square plan with the angles directed as far as possible toward the four cardinal points, and the predominance of a single architectural type imparts a certain monotony to the streets. The enclosing walls are flanked with towers and their gates are surmounted by lofty structures which include an arsenal and a guard-room. Besides the temples and commemorative monuments erected on the same plan as the temples, at the entrance to certain streets and before certain edifices monuments in the form of gates are to be seen. These structures, called *pai leou*, are nothing else than triumphal arches raised to the memory of emperors, generals, mandarins and all those who have rendered important services to the country. The bases of these arches are of stone, the rest is made of wood; they have a single bay, or one principal bay with two smaller ones, and the top is in the form of a Chinese roof.

The palaces present a succession of spacious courts surrounded by buildings and are entered through gates in the form of triumphal arches. Each separate portion of the structure is destined to a special use. The women and children are usually relegated to the rear court.

The houses have one or two stories; their dimensions are regulated by law, according to the rank and condition of the owner, and, as in all Oriental dwellings, there are but few openings on the street.

While the Hindoos built with enduring materials, the Chinese generally used brick and wood. The explanation of this fact is to be sought not so much in their fear of the earthquakes with which they are constantly threatened as in their narrow-mindedness and lack of ambition; they saw no reason why an edifice should outlast the generation for which it was constructed.

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Judging from the ruins of Persepolis, the Medes and Persians must have attained to a high degree of civilization in the time of Cyrus, but we have no authentic records concerning their civil architecture. Their art is derived from the Babylonians and Assyrians, from whom they must have largely borrowed their customs.

The Assyrian palaces consisted of three wholly distinct groups of buildings, three divisions which we find exactly reproduced to-day in the seigneurial and princely dwellings of Persia, India and Turkey. First, there was the seraglio, or the palace properly so-called, which comprised the reception-halls and the men's apartments, and which is known now throughout the East under the name of *selamlik*; then came the harem containing the private rooms where the master saw his wives and children with their guards of eunuchs and their throngs of attendants; and lastly, there was the *khan*, a cluster of dependent structures including servants' quarters and out-buildings. In princely palaces each of these divisions included several courts, and the whole was disposed around a principal court, the court of honor. The entire assemblage of edifices was nothing more than one vast ground-floor. "The design followed in the arrangement of these composite dwellings," it has been said, is almost naive in its simplicity: the plan is merely divided into as many right parallelograms as there are services to be provided for, and these rectangles are so disposed as to touch along one side or at one of the angles, but they never interfere with or command one another; they are contiguous or adjacent but always independent. Thus each of the three divisions (seraglio, harem and khan) presents a rectangular figure, and each borders one side of the principal court, which is neutral ground,—the common centre around which all are grouped. The same principle of arrangement is applied to the subdivisions of the great quarters; the latter are composed of smaller rectangles distributed about an uncovered space, on which each apartment opens, with no direct communication between adjoining rooms through partition-walls. In this way all the sections of an edifice were clustered together and at the same time isolated; and each of these sections had its special use and its pre-assigned occupants.[2]

Drains were contrived under the palaces, and certain square rooms were covered with dome-shaped vaults.

The houses, built of brick, were of two different types; some were covered with hemispherical or parabolical calottes, others had flat roofs with a tower in the fashion of a belvedere. They were generally quite low, except in large cities like Babylon, where they were sometimes three or four stories high.

The towns were regularly laid out; the streets ran at right-angles to each other; quays were built along the streams, and bridges established communication between their banks. The large cities were protected by a fortified wall. The gates were arched and flanked each by two towers which were separated by only the width of the entrance. Some of the gates were ornamented, others were plain, but each one was in itself an edifice of quite complicated structure.

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The city gate played then, as it still does all through the East, an important role in the life of the urban populations. It was an agora for the Greeks, a forum for the Romans. The people gathered there to chat, and learn the news, and there the old men acted as arbitrators in case of quarrels. In the same way it was at the palace-gates, which were always constructed on the model of the city-gates, that the court attendants assembled, and that petitioners stood in waiting.

The Phoenician cities also were surrounded by fortified walls, and dwellings were burrowed into the very body of the ramparts. In order not to extend the limits of the city too much, the houses in the central portions were built very high. In the chief quarters of Carthage some of them had as many as six stories; they were covered with flat roofs, and, as is the case of all warm countries, the streets were narrow. The residences of the rich merchants were of a marked character and were easily distinguished; they were all provided with cisterns; they had inner courts adorned with porches, and with open galleries along the upper stories. The streets, squares and courts were paved with broad flags, probably for the purpose of saving every drop of water that fell. There were also public cisterns, and ports for shipping. As their country abounded in stone that could be easily cut, the Phoenicians used no artificial building material: they are not known to have built of brick before the Roman period.

In Judea, while enormous, rough blocks were used in huge structures, the houses were made of unburned brick, with ceilings of palm or sycamore beams covered with a layer of hard earth. In order that the variations in temperature should not be felt in the interior, the outer walls and the roof had to be quite thick. All the dwellings were covered with flat roofs surrounded by a parapet, and here people passed the night in certain seasons. Most houses had only a ground-floor; but the residences of the wealthy sometimes boasted of an upper story, and certain windows, doubtless those lighting the women's apartments, were provided with lattices similar to the *moucharabiehs* of the Arab houses of the present day.

The villages were generally built on the hill-tops, and the more important of them were surrounded with fortifications. Jerusalem was the seat of royalty. It was there that David reared his palace, to which Solomon added numerous edifices that occupied thirteen years in construction. Other great works were undertaken by the Hebrews, with the view of carrying to a distance the precious water of the springs; and they were compelled to supplement their scant supply of water by digging wells and making cisterns.

In Egypt, the attention of archaeologists was so long riveted on the temples and tombs that it is only recently that a study has been made of private dwellings. To-day, however, something is known of these.

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The streets of Egyptian cities were usually laid out regularly, but they were so narrow that, except in the principal ones, two chariots could scarcely pass. This narrowness of the streets, which is frequently observed in the ancient Arab cities, and which has been so long maintained in all hot countries, had the advantage of securing shade at all times on one side of the street. The buildings along the street were ordinarily separated from each other by alleys; they were rarely more than two stories high, except in such large cities as Thebes, where they sometimes reached four and even five stories. The houses were so arranged as to meet the demands of the climate. A court often preceded the apartments which were disposed along both sides of a long corridor. In other cases the rooms occupied three sides of the court; or oftener still the court was surrounded on all sides by the different structures. The ground-floor was reserved for the stables; it was used also for storing the corn, and it contained the kitchen and the cellar. The family occupied the upper stories. Above the whole was a terrace where they could enjoy the cool air and even pass the night, when the heat was excessive. Sometimes the terrace was protected by a light roof supported by slender wooden columns. There were but few windows, so as to keep the sun out as far as possible, and such as there were were placed nearly at the top of the rooms.

The houses were built of unburned brick, made from a heavy clay, mixed with a little sand and chopped straw; this was shaped into oblong slabs which were dried in the sun. Bricks of ordinary size measured 8-2/3 in. x 4-1/3 in. x 5-1/2 in., the large ones were 15 in. x 7 in. x 5-1/2 in. There were special marks to indicate where they were manufactured; some came from the royal works, some from private shops. The foundations of the buildings were not deep; the walls were whitewashed, or painted in bright colors; the floors were of brick or flagging, or simply of hardened earth; the roof was flat, with a framework of palm branches covered with a coating of earth sufficiently thick to prevent the infiltration of the rain. The dwellings of the wealthy lords were usually erected in the centre of a garden, or of a cultivated court, and occupied a considerable space. The entrance was announced by a colonaded porch or a pylon, and the interior was like a small city,—the dwelling in the background, with the granaries, stables, servants' quarters and out-buildings disposed here and there about the enclosure.

In the more important palaces, the dwelling of the master stood in the centre of a rectangular court, the sides of which, on the right and left, were occupied by the storehouses.

Like all other peoples of antiquity, the Egyptians were obliged to protect their towns from the incursions of enemies. The greater part of their cities, and even the principal villages, were therefore walled. Man will never cease to fortify his cities until these fortifications have been proved unavailing before the power of new engines of destruction.

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In this rapid review of the civil architecture of the ancient peoples of Asia and Egypt, we have discovered no traces of structures whose destination indicated any care for the development of the lower classes of society, no remains which implied their participation in any municipal life whatever, no edifice erected for the purpose of national education. Such institutions had no place under a theocractic government which absorbed into itself the entire nation. When it had made provision for the defence of its cities, erected temples to its gods, reared palaces for the earthly abode of its monarchs and tombs for their future life, when it had satisfied the simple material needs of the people, what more could be asked?

[To be continued.]

FOOTNOTES:

[Footnote 1: From the French of G. Guicestre, in "*Encyclopedie de l'Architecture et de la Construction*."]

[Footnote 2: Perrot and Chipiez. "*Histoire de l'art dans l'antiquite*."]

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[Illustration: *Paris*]

The pavilions of the city of Paris.—Domestic and urban sanitation.—Views of old Paris.—Palaces of the liberal arts and the fine arts.—Retrospective exhibition of labor.

The City of Paris desired to have in the Champ de Mars a serious and useful exhibition, so it began by paying no sort of attention to the decorative and architectural side of its two pavilions, placed in the centre of the upper garden between the monumental fountain and the central dome. It was not afraid, in spite of its surroundings, to shelter itself within the simplest of buildings in plaster, with a decoration meagre and accentuated by the needs of construction. In fact, the large entrance doors, all of wood, were made afterwards and applied to the plaster, and the same may be said of all the visible woodwork; but this lack of ingenuousness in the construction is not to be too severely blamed, since it is a question of pavilions which are to disappear after an existence of six months. Economical reasons are always worthy of respect, and the modesty of the Municipal Council on this occasion ought to be praised. But what one has a right to criticise is the unhappy idea which placed these pavilions in such a manner as to completely obstruct the view of the exterior porticos of the palaces and industrial sections when one stands before the central dome in the centre of the garden. This criticism once made, there only remains to give expression to praise of the exhibit made by the city of Paris. Very well arranged inside, very well considered, it

possesses enormous interest principally from the point-of-view of hygiene and the sanitation of the city. This is a question

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much studied for a long time back, and is one which marches towards a solution which promises to be perfectly satisfactory in view of the progress already made. Wide streets have replaced narrow alleys, air circulates freely everywhere, trees and enormous gardens have been planted on every side, and the salubrity of the house is assured by a severe inspection, one which will become yet more severe, it is to be hoped, in the case of those owners who are inclined to despise regulations. It would be so simple in place of continuing the ancient ways, whose inconveniences are so well demonstrated in the large model of an unhealthy house exhibited in the pavilion of the city of Paris, to adopt all the new systems of sanitation which, on their part, are shown in application in the model of a sanitarily perfect house which has been placed opposite to it. To establish this comparison two very simple models of construction have been selected, proving that healthfulness is not merely an attribute of luxury, but that the most modest houses can present all possible guaranties from this point of view. The healthfulness of houses, and consequently of cities, depends amongst other multiple but relatively simple causes on two preeminent conditions,—that of the removal of excrement, and the purity of the water-supply. In a large degree the first condition is subordinated to the second. “Everything to the sewer” is recognized by the most competent hygienists as the best system, but only on the condition that water shall be abundant and that no stagnation of the material shall be allowed. These problems, which were for a long time studied by M. Durand-Claye, and to which he devoted himself until his premature death unfortunately took him from us, have received the attention of his devoted successors, who have already brought to fruition interesting solutions which prompt us to hope for a completely satisfactory system in the near future.

Three glass reservoirs, containing water from the Seine, from the Ourcq and the Vanne, allow us to perceive the difference of quality which exists between these three sources of supply, the first of which, with its yellow color, is anything but appetizing, and the second is not much less doubtful, while the third, alone, presents the limpidity and transparency which one has a right to demand in potable water. Nevertheless, one should not believe, as many persons do, that the water that we see in this reservoir, and which has been taken within the limits of Paris, is the same that is distributed from time to time through each quarter. The water there used is taken up-stream and before it has been soiled by its passage through the suburbs and city.

In the same pavilion the Administration has exhibited the plans and the comparative views of the city taken at different epochs since 1789 up to the last months of 1889. We here see the march of progress in this immense city, expanding without cessation like a drop of oil, and as it enlarges crossed by great arteries which establish across its mass conduits for aeration, and at the same time suppress the agglomerations of former days.

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For artists and archaeologists and lovers of old Paris, whom these new transformations displease and who regret the picturesque past, the authorities have had the forethought to paint or photograph before demolition the quarters which to-day have disappeared, or are on the point of disappearing; and as a consolation such persons have very pretty pictures by M. Pansyer, representing St. Julien le Pauvre, the Rue Galande, the Place Maubert, the ruins of the Opera Comique, the flower-covered relics of the Cour de Comptes; and there has even been evoked for them the manor-houses of Clichy and Monceau such as they were in 1789, and also the quarter of the Bastile, which can thus be compared with their present aspect. Not far from these antiquities the City of Paris has exhibited some decorative paintings executed for its various *mairies*, the "Abreuvoir" and the "Lavoir" of M. D. A. Baudoin, and for the *Mairie* d' Arcueil-cachan "L' Automne et l'Ete," by M. A. Seon; "The Marriage," by M. Glaize, and a fine painting, "The Defense of Paris in 1814," by M. Schommer. Other compositions are signed by Cormon, Gervex and Boulanger.

Finally, to make an end of the important works which she has caused to be executed, the City of Paris exhibits models, at a reduced scale, of the new Sorbonne, of the Ecole de Medicine, and of the Ecole Pratique, at present in course of construction, also plans and photographs of buildings erected during the last ten years, such as schools, *maries*, *etc*. The department of sidewalks and plantations is represented by a reduced model of the Crematory at Pere Lachaise, plans and views of the new cemeteries at Pantin and Bagneux, as well as the future square of Montmartre.

The second pavilion of the City of Paris is more especially consecrated to instruction. After attending to the healthfulness of matter, attention must be given to the healthfulness of the mind and moral culture. By the side of the models of the school-rooms, where children find school-furniture studied with painstaking care and proportioned to their stature, have been placed the works executed by the school-children themselves of every kind, primary, maternal and professional. These works, in a general way, prove an average aptitude for the industrial arts, and indicate a real taste for beautiful forms. A hall is wholly set apart for the pupils of the special schools. Finally, around the two pavilions are arranged the numerous statues, purchased, or ordered by the City of Paris, archers, halberdiers, officers of the watch of the fourteenth to the seventeenth centuries, and we recognize, as we pass, the "Sauveteur" of M. Mombur, the "Science" of M. Blanchard, the "Art" of M. Marqueste, and especially the proud "Porte-falot" of Fremiet, which decorates the lower part of the staircase of the new Hotel de Ville.

PALACES OF THE LIBERAL AND FINE ARTS.

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The two Palaces of the Fine Arts and the Liberal Arts are of equal dimensions and similar aspect. They cover an area of 21,000 square metres. They are composed of a large central nave, measuring 209.31 metres in length by a width of fifty-three metres and one-half. The nave is surrounded with galleries on the lower floor and first story. On the garden under the porticos are restaurants. Each of these palaces is connected with the Industrial section of the foreign countries by a large vestibule thirty metres wide by 115 in length, one of which, that of the Fine Arts, contains the exhibition of sculpture, and the other contains a large part of the musical instruments. These two palaces are entirely of iron, terra-cotta and ceramic work. The entrance is executed by a large porch of three arches, and the wings on either side are pierced by wide bays. Each is crowned with a dome fifty-five metres high and thirty-two in width. These two palaces are striking examples of the richness which can be introduced in a moment by the artistic employment of terra-cotta and ceramic work, especially when the ceramic artists bear such names as Mueller, Loebnitz and Parvillee, to say nothing of MM. Breult, Boulanger and Mortreux, whose work we met in the ceramic division, or which we shall meet in our walks through the foreign pavilions. With M. Mueller, who has given his name to a kind of brick covered with enamel on one of its faces, ceramic work becomes a portion of the very fabric itself as well as of its ornamentation. This principle applied with rare talent to the covering of the two domes of the palaces has given a very curious and interesting result. This covering is composed of enamelled tiles of more than 600 varieties which are not superposed one upon another, but butt together side by side, and form a mosaic rather than a covering of tiles. Each dome contains about 50,000 pieces arranged in ninety rows and twelve divisions. The general tone is blue. The principal ornamental motive consists of a cartouche which bears in the centre two large letters “R.F.” in gold. The cartouche stands out on a background of cream-white, bordered with a meander. The effect is very brilliant and chatoyant. At the base of each dome twenty-four vases in pottery, three metres high, are arranged on the consoles of the attic which supports the roof, and in which are pierced bull’s-eyes decorated in tones of blue and natural terra-cotta. The domes of the pavilions at the angle of the palace on the side of the Seine are in the same way covered with enamelled porcelain tiles. This is a new product invented by M. Parvillee and has a great decorative richness. Above each bay of the two palaces is repeated a terra-cotta frieze two metres high, which bears children holding cartouches and standing out from a golden background. Pillars between the bays are encased in terra-cotta fluted panels with interlacements of laurel and oak leaves. The ironwork of these pillars is exposed and encloses the terra-cotta work like a Spanish net, with very original effect and very interesting constructive frankness. Finally, the balustrade crowning each palace is also of terra-cotta, and is formed of small pilasters and between them is repeated a *motif* of bucklers bearing lions’ heads. The balustrade is composed of 7,500 pieces and weighs 450,000 kilogrammes, and covers a space of 2,000 square metres.

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Independently of the exhibit indicated by its name and character, the Palace of the Liberal Arts encloses one of the great curiosities of the Exhibition of ’89; that is the “retrospective history of labor and anthropologic science.” “The aim of this exhibit,” said M. Jules Simon, in a report which he made as the president of the Superior Commission, June 15, 1888, “is to instruct the public in the history of the processes of manual and mechanical labor, which in the passage of centuries have resulted in the modern industrial utensils used in the arts and trades.” This exhibit has a particularly historical and technical character. It is far from excluding objects of art, for in several ages the utensils, those especially which were used in the liberal arts, were veritable jewels, either from their elegance of form, or from the richness of their material, or the grace of their details. We find chefs-d’oeuvre, for instance on a geographical map, on the handle of a chisel, on the barrel of a musket. Our ancestors were not possessed with the same passion for speed and cheapness that possesses us. Industry lost, perhaps, but the arts were the gainers. The aim of the retrospective exhibition is well defined. It is to retrace with broad strokes by means of the reproductions of diagrams and authentic monuments the stages of human genius. To achieve this result it was necessary to associate with the retrospective exhibition of labor that of anthropologic science, in order to show in the outset what man was when he left the hands of nature in the different physical forms of different races. The exhibit of anthropological science and history of labor comprises then five grand divisions—first, anthropologic and ethnographic science; second, the liberal arts; third, arts and trades; fourth, means of transportation; fifth, military arts.

The central nave of the Palace of the Liberal Arts is wholly occupied by this exhibit. Grand porticos and galleries of woodwork with platforms in the lower story, form four grand divisions with interior courts that approach by monumental staircases opening under the dome upon each side of the rotunda, which occupies the centre and shelters the theatrical exhibit. All around the porticos and galleries full panels were reserved upon which M. Charles Touche placed decorative compositions broadly treated in aquarelle illustrating, so to say, the history of labor.

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AN INGENIOUS PLAN FOR STRAIGHTENING WALLS.—Yankees, as a rule, are equal to any emergency; what the average Yankee mechanic fails to conjure up at a time when his wits are most needed, leaves very little room for foreign genius to think and work in. Yet it remained for M. Molard, a French architect, to contrive an original and ingenious plan for straightening the walls of the Conservatoire des Arts et Metiers, which threatened an absolute collapse owing to the extreme weight of the roof. A series of strong iron bars

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were carried across the building from wall to wall, passing through holes in the walls, and were secured by nuts on the outside. In this state they would have been sufficient to have prevented the further separation of the walls by the weight of the roof, but it was desirable to restore the walls to their original state by drawing them together. This was effected in the following manner: Alternate bars were heated by lamps fixed beneath them. They expanded, and consequently the nuts, which were previously in contact with the walls, were no longer so. The nuts were then screwed up so as to be again in close contact with the walls. The lamps were withdrawn and the bars allowed to cool. In cooling they gradually contracted and resumed their former dimensions; consequently the nuts, pressing against the walls, drew them together through a space equal to that through which they had been screwed up. Meanwhile the intermediate bars were heated and expanded, and the nuts screwed up as before. The lamps being again withdrawn, they contracted in cooling, and the walls were further drawn together. This process was continually repeated, until at length the walls were restored to their perpendicular position. The gallery may still be seen with the bars extending across it, and binding together its walls.—*Philadelphia Record and Guide*.

LOSS OF POWER BY RADIATION OF HEAT.[3]

[Illustration: The Martyrs Column, Naples, Italy.]

To him who holds the purse and pays for the coal consumed, it is of importance that between the energy of the burning fuel and the power developed by the engine there should be the least possible loss. Every unit of heat radiated by boiler-pipe, cylinder or heater is absolute loss, and must come out of that purse. In an electrical plant this matter is of great importance. There is less opportunity to have results obscured. There is, proportionally, a large possible loss between the coal on the grate and the far end of the cylinder, and this loss should be reduced to the minimum. Is it not always the best economy to throw away as little as possible, to save from waste *all* that can be saved? Is not the very *reason far being*, of the architect, the mechanical engineer, in fact of every man who is paid for his advice and direction, just this: that he shall bring to bear upon the subject, and impart to his client honest knowledge concerning the various matters about which he is consulted? That he shall keep abreast of the tide of discovery and improvement, and that upon these subjects he shall *know*, not trusting to mere hearsay or to unintelligent prejudice for his impressions.

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Some little time since a gentleman from a neighboring city called upon me for information upon the subject of coverings in general and their comparative values. Being an intelligent man he said frankly at the outset that he knew very little on the subject. He had, however, in common with all of us, heard the word “asbestos” used as a shibboleth for years, but he desired definite knowledge, and after he had digested the information he should act on his judgment. I devoted sufficient time to him to put him in possession of the salient points of the subject. His understanding was acute. He left me to seek elsewhere further light upon this matter. After some few days he returned and directed that the magnesia covering be applied to his work. In the course of conversation he remarked that he had received great diversity of advice from those to whom he had gone. One man, who had been years in the business of selling steam plants, told him that the best thing for him to use was hair-felt, even though the steam-pressure might run up to 125 pounds to the inch. Now, as a matter-of-fact, the man who gave that advice simply showed himself an unsafe guide; and from his inability to keep abreast with modern knowledge, that he had no conception of the fire-hazard which his advice was to thrust upon the innocent inquirer, and that his advice was little short of being morally criminal.

The subject of the fire-hazard of organic coverings has been pretty thoroughly investigated and can be pretty well-known, when there is any inclination to get out of ruts which long years of travelling in has deepened. How many fires (cause unknown?) have really originated from the slow carbonizing of organic material on steam-pipes? It is but recently that the hair-felt covering on the steam end of a Worthington pumping-engine, within ten miles of us, not only burnt itself but destroyed some thousands of dollars worth of walnut lagging. Cases of the combustion of these organic coverings are numerous and are well-known.

Few appreciate the great loss of heat from uncovered or imperfectly covered pipes. Many have an indistinct impression that there may possibly be some slight loss. But there is in many cases an absence of knowledge upon this subject where it should be complete. The most correct data available show that the radiation from uncovered two-inch steam-pipe, with 60 pounds steam-pressure, is 391.83 kilo. centigrade heat-units one foot one hour, or 21,739.78 kilos. of coal for 100 feet per year of 300 days of 10 hours each; one kilo. equals 2,205 pounds. Properly combining these figures we see that there are 23.97 tons of coal lost by radiation from that uncovered pipe. If the coal costs $4 per ton, the radiation from this 100 feet of pipe will amount to $95.87. From the same pipe covered with Wm. Berkefield’s fossil meal composition, 32/100-inch thick, the most powerful inorganic non-heat conductor used as a covering at the time these investigations were made, there was

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radiated 24,109 kilo. cent. heat-units one foot one hour, or 1,337.63 kilos. of coal for the year. This would be 1-474/1000 tons of coal at $4 per ton, amounting to $5.89. Then $95.87 less $5.89 equals $89.98, the saving effected by covering this pipe with William Berkefield's fossil-meal composition 92/106 of an inch thick. Or, in other words, the saving effected was over 93 per cent of the total possible radiation, using a thickness of one inch this loss would be reduced to $5.50.

From the same data we find (page 44) it stated that while the radiation through 25 m.m. of Wm. Berkefield's fossil meal was 7.7 heat-units, through 25 m.m. of carb. magnesia it was 6.7 heat-units, therefore the proportions 7.7: 6.7 = $5.50: $4.80 gives us the coal value of heat lost by radiation through the magnesia covering. To put this in another form: From the running-foot of two-inch pipe uncovered the loss is 96 cents, while, from the same pipe covered with the magnesia, the loss is less than five cents; or a saving of over 91 cents per year. To accomplish this saving the cost of the covering should be taken into account. This was 27 cents. Therefore, the investment in the magnesia covering is paid back in less than four months. The data which we have used were obtained by the use of a calorimeter measuring the quantity of heat passing through covering. The other possible method of arriving at this knowledge would be to accurately measure the condensation of the steam. In these experiments, owing to several reasons, it was not deemed advisable to rely upon the second method. Recently, however, I have seen in the *American Engineer* of June 12, a report of the proceedings of the Michigan Engineering Society containing a paper by Professor Cooley, of Ann Arbor, Mich., in which he says:

"The benefits of covering steam-pipes to prevent radiation are strikingly illustrated by the following example: The Thomson-Houston electric-light plant in Ann Arbor has about 60 feet of seven-inch pipe connecting the boilers with the engines and two large steam-drums above the boilers: in March, 1887, the steam at the far end of this pipe was tested to determine the amount of entrained water, the pipes and drums at the time being uncovered. An average of nine experiments gave 31.01 per cent moisture. In June of the same year, after the pipes were covered with magnesia sectional-coverings, the quality of the steam was again tested, the average of five experiments giving 3.61 per cent moisture; the tests were made by the same men from the same connections, and in the same manner. The pipes and steam-drums in March were subjected to a draught, which, of course, aided the condensation. Enough water passed into the cylinders to retard the engines, producing a disagreeable noise. In June the weather was warmer and the pipes and steam-drums were well protected. The quality of steam at the boilers was tested in June, and showed about three per cent moisture. Assuming

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that 100 incandescent horse-power were being developed at the time, and that each horse-power required 30 pounds of steam; if the steam is assumed to have 25 per cent entrained water due to condensation in the pipes and connections, then 4,000 pounds steam will need be produced in the boilers, or 1,000 pounds more than necessary. To produce this steam will require about 125 pounds of good coal per hour, or 1,000 pounds per day of eight hours. One-half ton per day at $3 per ton for 300 days, $450. The actual cost of the covering put on complete probably did not exceed $150."

An interesting verification of the remarkable non-heat condensing quality of the magnesia covering occurred at Lynn, Mass. In the heart of the district in that city, recently the scene of the disastrous conflagration, there was located the machine-shop of Messrs. Rollins & Glozier. A two-inch steam-pipe there was covered with this material. The heat of the fire at this place has been curiously determined to have been between the minimum extreme of 2,756 deg. Fah. and the maximum extreme of 2,950 deg. Fah., in this way: Cast-iron melts at 2,756 deg. Fah.; wrought-iron at 2,950 deg. Fah. A portion of the cast-iron bed of a lathe was fused into an irregular mass, and on it, partly imbedded, was a wrought-iron nut not melted. The steam-pipe spoken of fell a distance of 20 feet, and some of the magnesia covering was broken by the fall, but so effective was its heat-resisting and non-heat-conducting power that the pipe was found to be uninjured, and it is being used again in the building which is being erected to take the place of the one burned. That the magnesia should have endured the ordeal successfully was not unexpected, for we know that it is used by the Herreshoff Manufacturing Company as a lining to the shells of its coil boilers, and it is there subjected to a very intense heat resulting from the forced draught used in this type of boiler. Instances could be multiplied indefinitely, but I refrain from occupying further time with them, citing, however, one recent pertinent case.

The trial trip of the new cruiser "*Baltimore*" took place in the middle of September. It is reported to have been in many ways eminently satisfactory. The report goes on to state: "Another noteworthy fact was the comfortable condition of the fire and engine rooms. A duplicate crew had been provided with the expectation of relieving the firemen in two-hour turns; but after the first two hours of the run the first watch refused to quit work and insisted in running the ship throughout the entire four hours' trial." Boilers and all steam-surfaces were covered with the magnesia covering.

So it appears that not alone is the man who pays for the coal interested in this question of most perfect insulation, but also the men who operate the plant as well. In time, those architects, those mechanical engineers, those engine-builders and those other advisers, who are paid to advise soundly and correctly, and who are represented by our figure with the re-entering angles, will, of necessity, change their form and begin to assimilate these new facts, or ossification will so spread throughout the whole figure

that they will be relegated to the shelf for curiosities as showing what strange geometrical forms the intellectual life of man may take.

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THE COST OF A SMALL MUSEUM.

[Illustration: Mr. A.A. Carey's Cambridge, Mass. *Sturgis & Brigham Archts.*]

More than once we have endeavored to impress upon our readers the importance of collections of casts and other art reproductions as factors in popular education. It is only through these that the body of our people can ever hope to become familiar with the great masterpieces of European galleries, which have had so much effect upon the taste of the people among whom they exist, and might do a similar good work in this country were they only brought within reach. Doubtless there are many who join us in the wish that not only every large, but every small city might have its gallery of reproductions as well as its public library—a gallery in which children could grow up familiar with the noblest productions of Greece and Italy, in which the laborer could pass some of his holiday hours, and in which the mechanic could find the stimulus to make his own work beautiful as well as good. But the principal reason why such collections are not more numerous is probably that people have an exaggerated idea of their cost, and, among those who might best afford this, there are doubts as to whether an undertaking of the kind would be appreciated in any but the large cities.

Thanks to the liberality of Mr. W.A. Slater, the experiment has been tried in Norwich, Conn., and the results of the first year of the Slater Memorial Museum in attracting and holding popular interest have far exceeded the anticipations of its founder and his advisers. As it has been Mr. Slater's desire that the museum established by him should serve not only to educate his townsmen, but also to stimulate others who had the means to follow his example in other parts of the country, he has given us permission to make public the cost of his collections, which, we doubt not, will be a revelation to many. In August of last year we gave a long description of the Slater Memorial Museum, not then quite completed, from which it was evident that within the lines laid down by Mr. Slater, by which it was determined that the collection should contain only reproductions, and no original works, there were no restrictions as to expense. The works selected were to be the best of their kind, and were to be set up and arranged in the most effective manner possible. The number of objects was to be limited only by the size of the building.

The useful little catalogue of the casts in the Museum, prepared by Mr. H.W. Kent, the curator, to whom we are indebted for the figures which we shall quote, shows 124 numbers in the Greek and Roman section, and 103 in that of the Renaissance. Among these are some of the largest casts made, such as the selection from the Pergamon reliefs, the Nike of Samothrace and the Font of Siena. They were all made expressly for the Museum, and imported from London, Paris, Berlin,

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Munich, Florence, Rome, Naples and Athens. In addition to these, there is a complete collection of the British Museum electrotypes of Greek coins, handsomely mounted, and the nucleus of a collection of photographs, about 600, including the best plates of Braun, Naya, Brogi and other celebrated photographers. Most of the statues are mounted on revolving pedestals; two hundred and fifty of the photographs are exhibited in individual frames, the backs of which are movable, that the exhibition may be varied as often as desired; and, owing to the lack of wall-space, draperies have been hung extensively throughout the hall, the material of which is heavy raw silk. We mention these facts only to show that economy was not a consideration in the execution of the Museum, and believe that our readers will be the more surprised to learn that its *gross* cost to Mr. Slater—excluding, of course, the building itself—was exactly $27,112.97. Is there any city or college in the Union in which this sum could not be raised for a similar purpose?

The cost of the building we do not give, because it would be useful as showing how much, rather than how little, could be put into such an edifice. It contains, besides the museum proper, the floor-space of which amounts to about 10,000 square feet, a lecture-hall with a seating-capacity of about 1,200, a library and four large class-rooms, which, if the intentions of the founder are fully carried out, will be used for practical instruction in the fine arts. Desirable as all these rooms are in a building of the kind, the only one which seems to us absolutely necessary is the lecture-hall. To open a gallery like this to the public, and then leave people to float about in it aimlessly, without a notion of its meaning or its purposes, is to do but half the work. Either regular courses of instruction or occasional lectures upon topics connected with the theory or history of art are necessary in order to make the Museum anything more than a collection of curiosities to the uninitiated, and such lectures are given during the winter at the Slater Museum.

Of the amount just quoted, the principal item was naturally for casts. The cost of these, including packing and transportation, but not setting-up in the Museum, was $13,968.68, making an average of a trifle less than $62 for each number in the catalogue. We ought to say here, however, that an average is a dangerous guide in a matter of this kind, owing to the enormous difference in the size and price of casts, as well as in the distance from which they come. Obviously, too, the cost of packing and importing a few casts would be proportionately much greater than in a large order.

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The casts once received, they must be put together, sometimes repaired and finally set up. Pedestals must be built for the statues, wall-spaces prepared for the reliefs. Therefore, a small force of skilled plaster-workers and carpenters is necessary. In Norwich most of the plaster-work was done by two men, a third being added occasionally, and the aggregate of this item in the expenses was $1,626.75. With regard to the carpentry, more work of this kind than would usually be necessary was required by the fact that a number of changes had to be made in order to adapt the hall to its use as a museum of art, its destination not having been determined when the building itself was completed. Consequently, some of the $4,690 paid for material and labor in this department would form a part of the building expenses in a structure designed especially for the purpose.

These were the principal expenses in the preparation of the Slater Museum. On photographs about $800 have been spent thus far, the electrotype coins cost something less than $750, and the balance of the total quoted was made up by such incidentals as the draperies and upholstering, photograph frames, the designer's commission and petty expenses.

Turning now for a moment to the other side of the balance-sheet, we shall try to answer the question, "Does it pay" to undertake a work of this kind, except in our large and central cities? If to the founder or founders of such an institution it be sufficient recompense for their liberality to see their gift used, appreciated and enjoyed by people of all classes, the brief experience of the Slater Memorial Museum answers the question with a strong affirmative. The Museum was dedicated on November 22 of last year. Since then it has been open regularly ten hours a week, divided among three days, and at other times to students and visitors from a distance. It is always free. There being no automatic machine for registering the admissions, Mr. Kent has requested visitors to write their names in a book provided for the purpose. The number who do so is naturally considerably less than the total number of visitors, particularly when the Museum is crowded, yet up to date the books show more than 10,000 names. The average attendance per week thus recorded, from the time of opening to July 1, was 283, the best month being December, in which 2,163 names were entered, the poorest June, with a total of 483. Especially gratifying has been the attendance on holidays, which shows that the interest in the Museum is by no means confined to those who have plenty of leisure. On Thanksgiving Day 800 names were registered, Christmas 932, New Year's 732, Decoration Day 850. For the benefit of the mill-operatives and other laborers who form the largest portion of the population of Norwich and the adjoining towns, to whom the Museum might do a world of good, we sincerely hope the day is not far distant when the building may be open at least a couple of hours each Sunday. The experience of the Boston Museum of Fine Arts in Sunday opening has been an unqualified success, and we wish that Norwich, as well as our own city, might profit by it. In Boston, we are told, the average number of admissions during the Sunday hours has reached as high as 1,000 per hour, and of these probably four-fifths are common workmen with their families.

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These facts and figures regarding the Slater Memorial Museum are valuable only so far as they go. They show that the first problem of a museum—to interest the public at large—has there been solved successfully. More than that is not to be looked for yet. The ultimate good which the institution will accomplish can be but imperfectly manifested in one generation. It is from the children now growing up, from their children and their children's children, that the deeper results are to be expected. As the beginning has been made, we can afford to wait for the rest, which will come in good time. The lesson to be learned from it now is, that such collections are needed, that they are appreciated not by a few but by many, and that, so far as the cost is concerned, they are within the reach of every well-settled community.—*New York Evening Post.*

* * * * *

SANITARY ENTOMBMENT: THE IDEAL DISPOSITION OF THE DEAD.[4]

[Illustration]

In this country, partly because there were few places of large population, and partly because it was an early and general tendency to use cemeteries rather than churches, and the grounds adjacent to them, the evils of earth-burial did not manifest themselves so soon or in so marked a manner as in the Old World. But there were instances enough to convince the most incredulous that a radical change must be made. Dr. Ackerly, writing in 1822, thus describes the condition of the burial-ground connected with Trinity Church, New York, forty years before: "During the Revolutionary War this ground emitted pestilential vapors, the recollection of which is not obliterated from the memory of a number of living witnesses." In the same year, the *Commercial Advertiser* published an article in reference to the present evils of earth-burial at the same place, in which it was said: "It will be remembered that the graveyard, being above the streets on the west, and encompassed by a massive stone wall, and the east side being on a level with Broadway, it results that this body of earth, the surface of which has no declivity to carry off the rain, thus becomes a great reservoir of contaminating fluids suspended above the adjacent streets. In proof of this, it is stated that, in a house in Thames Street, springs of water pouring in from that ground occasioned the removal of the tenants on account of their exceeding fetidness." At a later date, Dr. Elisha Harris brought this telling indictment against the same place of interment: "Trinity churchyard has been the centre of a very fatal prevalence of cholera whenever the disease has occurred as an endemic near or within a quarter of a mile of it. Trinity Place, west of it, Rector Street, on its border, the streets west of Rector and the occupants of the neighboring offices and commercial houses have suffered severely at each visitation of the pest from 1832 to 1854." It seems hardly necessary to add that the foregoing

statements are not intended to make the impression that there was a worse condition at the churchyard named than at any other....

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It may now be said: "Yes, this is all true, but we have changed all that! We no longer inter our dead in churchyards or burial-grounds within the limits of cities. We have provided cemeteries at great distances from our cities and large centres of population, and there the dead can do no harm."

To this the reply is easy and convincing: "that, if the dead endanger the living when the population is dense, they certainly also endanger them when the population is sparse. The danger is only diluted. It still exists, and it ought to alarm us just as truly when a few are imperilled as when many are." ...

Not to attempt to tell all that has been ascertained, it will be sufficiently convincing to quote from Sir Henry Thompson's utterance in the *Nineteenth Century* in 1880: "I state, as a fact of the highest importance, that, by burial in earth, we effectively provide—-whatever sanitary precautions are taken by ventilation and drainage, whatever disinfection is applied after contagion has occurred—that the pestilential germs, which have destroyed the body in question, are thus so treasured and protected as to propagate and multiply, ready to reappear and work like ruin hereafter for others.... Beside anthrax or splenic fever, spores from which are notoriously brought to the surface from buried animals below, and become fatal to the herds feeding there, it is now almost certain that malarial diseases, notably Roman fever and even tetanus, are due to bacteria which flourish in the soil itself. The poisons of scarlet fever, enteric fever (typhoid), small-pox, diphtheria and malignant cholera are undoubtedly transmissible through earth from the buried body." That the burial of a body that contains the seeds of zymotic disease is simply storing them for future reproduction and destruction is amply proved by the researches of Darwin and Pasteur, of whom the former has shown that the mould, or fertile upper layer of superficial soil, has largely acquired its character by its passage through the digestive tract of earth-worms; and the latter that this mould, when brought by this agency to the surface from subjacent soil that has been used as a grave, contains the specific germ of the disease that has destroyed its tenant.

It may now be asked: "Granting that these evils are inseparable from the burial of the dead in the earth or in tombs, what is the remedy? What else can be done?"

To this question not many answers can be given, because the modes of disposing of the dead have always been and must always be few.

Plainly, no such novel mode as casting the dead into the sea will be generally adopted. Plainly, also, the mode of the Parsees, grounded as it is in ancient, if not original use—-to give the dead to beasts and birds—will not become universal. And, plainly also, cremation will not be welcome to the many, free as it is from objection on the score of public health, if a method equally sanitary, and at the same time satisfactory to a reverent and tender sentiment, can be devised.

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The inquiry, then, has reached its limit; for, apart from the modes that have just been named, there are no others but earth-burial and entombment, and earth-burial, as we have seen, cannot be made sanitary under common conditions. Therefore, if the demands of affection and sanitation are both to be met, entombment is to do it, or it cannot be done.

Happily, better than any other method of disposing of the dead that has ever been devised, entombment has met the demand of affection. Never has any other mode so commended itself to men as this. There may have been at times a general adoption of cremation, and there may have been a general prevalence of earth-burial, but the one has not long satisfied the sorrowing survivors, and the other has owed its beginning and continuance to the apparent absence of alternative. Wherever the living have been able, and the dead have been dearly loved or highly esteemed, the tendency to entomb and not to bury has been constantly manifested.

To call attention to this tendency is enough to prove it, so easily accessible is the evidence and so familiar is its operation in the human heart. The most natural reference will be, first, to the mausoleum, the tomb of Mausolus, that was erected by his sorrowing Queen, Artemisia, at Halicarnassus, upon the AEgean's eastern shore, and that became at once one of the few great wonders of the ancient world. This was intended to do honor to the loved and illustrious dead, and this it did as no grave or pyre could do. This was also intended to protect the lifeless form from ruthless robbery and reckless profanation, and it performed this task so well that for near two thousand years no human eye beheld the mortal part of Mausolus, and no human hand disturbed its rest. At a far earlier time, Abraham, the Father of the Faithful, while he illustrated this tendency to entomb the dead, also offered an influential example to all who would do him reverence, as, in the hour of his great sorrow, he sought the seclusion and the security of Machpelah's cave for the last earthly resting-place of his beloved wife. There he buried Sarah; there he and his son and his son's son and their wives were all laid to rest, and the place of their repose hath not been violated even at this distant day. To this constant tendency constant testimony is borne by the massive and magnificent tombs in which India abounds, the tombs and pyramids that make marvellous the land of the Nile, the tombs that stood thick upon the Appian Way, and that rose superb upon the Tiber's shore, the modern use to which the Pantheon is put, the Pantheon at Paris and the Crypt of the Invalides, the Abbey of Westminster, matchless in memorials, the sepulchres within the hills that gird Jerusalem, and the sepulchre in which the Nazarene was gently laid when His agony was ended.

It remains to be considered whether entombment can be made sanitary. If it can be the problem is solved, for entombment has ever been the best that the living could do for their dead, and, with the added advantage of promoting, or ceasing to be prejudicial to, the public health entombment will be the choice of all whom cost or caprice does not deter.

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That entombment can be made sanitary is evident from the fact that in countless instances, in many lands and through long periods of time, it has been made sanitary by the ingenuity of man or by unassisted nature; and it is also evident from the fact that decomposition and disease germs are the dangers to be guarded against, and that against these both ancient and modern science have been able to guard. Not to enumerate all the modes that have been chanced upon or that have been devised by men, there are two that have been notable and are available for modern use—-embalming and desiccation.

It is a delusion to imagine that embalming is a lost art; that, like some other marvels of the ancient time, this is a secret process that perished with the people who employed it. Did we desire it, we could embalm our princes and our priests, and retain their shrunken similitudes for distant coming times to gaze and gape upon, as skilfully as they who practised this art in Egypt's palmiest days. Nay, it is doubtless far within the truth to claim that better than they did we could do; and we are actually apprised of better methods and results than they employed or could attain, and it is not unlikely that we shall hear of better methods still. But Egypt's method, or its modern counterpart, will hardly now be popular. It involves too much mutilation and too much transformation. When it has done its work little is left but bone and muscular tissue, and these are so transfused with foreign substances that a form moulded from plastic matter or sculptured from stone could almost as truly be considered that of the lamented dead as this. Moreover, indefinite preservation of the dead is not desirable, and is not desired. The uses to which the Egyptian Pharaohs and their humbler subjects have been put in these days of indelicacy and unscrupulousness in the pursuit of science or sordid gain are not such as to make many eager to be preserved for a similar disposition when the present shall have become a similarly distant past.

Desiccation, in striking contrast with embalming, is the process of nature rather than of art, and involves no mutilation and no substitution of foreign substances for human flesh, and does not by unnatural means preserve the semblance of the human form so long that a susceptible sentiment is shocked and a due return of material humanity to the elements that gave it birth prevented. Desiccation is so far a natural process that it seems not to have been thought of until nature had done the work and shown the product, and through many centuries, and upon an extensive scale, nature had employed the process before it occurred to man to copy her and adopt her method for the disposition of his dead.

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Wherever the air that enwrapped the lifeless form of man or beast was dry, desiccation anticipated and prevented decomposition. In deserts, upon elevated plains, upon the slopes of lofty mountain ranges, to which the winds that passed their summits bore no moisture, the dead have not decayed, but have dried undecomposed. In the morgue attached to the Hospice of St. Bernard, the dead, lifted too late from their shroud of snow, and borne thither to await the recognition of their friends, dry, and do not decay. In the "Catacombs" of the monastery of the Capuchins at Palermo, and in the "Bleikeller" at Bremen, the same phenomenon has appeared. Even Egypt is a confirmation of these statements, for it is probable that, had much less care been taken to preserve the dead, they would not there have yielded to decay as in other lands; and that moisture is so far absent from the atmosphere that the dead would have been preserved from decay by desiccation had not embalming been resorted to. Upon the elevated Western plains of this continent, the bodies of beasts and men by thousands have been preserved from decomposition by desiccation. To take one instance out of many that might be cited: A cave was not long ago discovered high up among the Sierra Madre Mountains, within which were found, where they had rested undisturbed for many years, the lifeless figures of a little aboriginal household, dried and undecayed. Father, mother, son and daughter, one by one, as death had overtaken them, had been brought thither, bound so as to keep in death the attitude that had marked them when at their rest in life, and there they bore their silent but impressive witness to the beneficent action of the unmoist air that had stayed decay and kept them innocuous to the living that survived them. In Peru, instances of this simple, wholesome process abound on almost every side; upon the elevated plains and heights, as also beside the sea, the dead of Inca lineage, with the lowliest of their subjects, are found in uncounted numbers, testifying that in their death they did not injure the living, because desiccation saved them from decomposition; and a recent traveller has vividly described the scene that a battlefield of the late war presents, and that illustrates the same process, where, though years have passed since the last harsh sound of strife was heard, the fierce and bitter combatants still seem eager to rush to conflict or to sink reluctant into the embrace of death. And all these instances furnish conclusive proof that decomposition can be controlled, and that its loathsome and unwholesome transformations can be prevented, if only the simple conditions are secured that have already so extensively effected this result. That these conditions can be secured no one can doubt, for, every-day, in almost every clime, by processes familiar and available to man, the atmosphere has moisture added to it or taken from it; and the extraction of the moisture from a portion of the atmosphere is all that is required to introduce the process of Peruvian desiccation into the sepulchres of Chicago or New York.

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It will naturally be further asked: "Is this all that has been done to demonstrate the efficiency and availability of desiccation for the dead?" To this the answer would be sufficient that the evidence that has been adduced is ample, and that, at once, in perfect confidence as to the result, mausoleums might be erected, with provision for the withdrawal of the moisture from the atmosphere, and for the passage of the desiccated air through the sepulchres in which the dead should rest. So little is involved, and so much has been accomplished without the application of any human skill, that it seems inevitable that, as soon as the resources of modern architecture and sanitary science are drawn upon, the desired result will be at once attained. But, to make assurance doubly sure, several carefully-conducted experiments have been made, under the supervision of the directors of the New Mausoleum movement, that prove that the conditions of desiccation can be controlled and that decomposition can be prevented, that where it has begun it can be stayed, and that prolonged preservation, with a fair approximation to the appearance in life, can be made sure for the recognition of absent friends, for transportation or the furtherance of the ends of justice.

When, now, it is added that desiccation has been ascertained to be an efficient agent in the destruction of disease germs, as proved by the experiments of Dr. Sternberg, of the Hoagland Laboratory, and by the investigations of other experts, enough seems to have been said to establish the truth of the assertion that entombment can be made sanitary, and that, therefore, entombment offers the satisfactory solution of the problem how to dispose of the dead so as to do no violence to a reverent and tender sentiment, and at the same time not to imperil the public health.

The proposition, then, soon to be submitted for public approval is this: to erect in the suburbs of our large towns and cities, perhaps even in their most thickly-populated parts, extensive and handsome edifices that will provide sanitary Sepulchres for the dead. To be comparatively inexpensive, they will have to be comparatively plain, and it seems not too much to hope that our cities will soon adopt this mode of disposing of the dead that depend upon the public care for burial, and that the horrors of a "Potter's Field," of which it cannot be divested, even in a fair and sea-girt isle, may be forevermore unknown of men....

Within there would be, as the unit of construction, each sepulchre so constructed that anhydrous air could enter, or could be made to enter and withdraw, laden with moisture and morbific matter, which it would convey to a separate structure, where a furnace would complete the sanitary work that the anhydrous air had begun, and return to the external atmosphere nothing that would be noxious. Each sepulchre, in itself and its surroundings, would appear to provide a place of repose, and would have electrical appliances attached

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to it for the instant indication of the return of consciousness to any who had been prematurely entombed, and would promise and provide the most perfect and permanent protection against intrusion or theft that can be found on earth. In arrangement these sepulchres would have to conform to the price paid and the taste of the purchaser. Many would be like the single graves that thickly ridge portions of our cemeteries; many more would be grouped together after the semblance of a family-tomb; but in the general impression, in the surroundings and suggestions, the resemblance to the provisions of a cemetery would go no farther. For here there could be no burning sun, no chilling cold, no inclement storm; for the living, as they should pay the last sad honor to the dead, or in any subsequent tribute of affection, there could be no exposure, and for the dead there would be only the constant semblance of the comfort and the quiet of the best-ordered and most tranquil home. Thus, in providing the utmost that exacting affection and sanitary science can require, and in taxing to the utmost the resources of art, in architecture, in sculpture and in the use of subdued and according hues and forms for appropriate decoration, these “Campo Santos,” or “Mausoleums,” or “Mansions of the Dead,” will seem to have realized the ideal disposition of the mortal remains of those who depart this life.

FOOTNOTES:

[Footnote 3: Extracts from a paper read before the Boston Electric Club, December 23, 1889, by F.C. Child.]

[Footnote 4: Extracts from an address by Rev. Charles R. Treat before the American Public Health Association at Brooklyn, N.Y., October 23, 1889.]

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THE VEKPLANCK HOMESTEAD, FISHKILL, N.Y.

[Illustration: The Old Verplanck Homestead at Fishkill, Hudson River, in which the Society of the Cincinnati originated.]

The Verplanck homestead stands on the lands granted by the Wappinger Indians, in 1683, to Gulian Verplanck and Francis Rombout, under a license given by Governor Thomas Dongan Commander-in-Chief of the Province of New York, and confirmed, in 1685, by letters patent from King-James the II. The purchase included “all that Tract or Parcell of land Scituate on the East side of Hudson’s river, beginning from the South side of a Creek called the fresh Kill and by the Indians Matteawan, and from thence Northward along said Hudson’s river five hundred Rodd beyond the Great Wappin’s Kill,

and from thence into the woods fouer Houres goeing"; or, in our speech, easterly sixteen English miles. There were eighty-five thousand acres in this grant, and the "Schedull or Perticuler" of money and goods given to the natives, in exchange, by ffrancis Rumbout and Gulyne Ver Planke sounds oddly to-day:

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One hundred Royalls,
One hundred Pound Powder,
Two hundred fathom of white Wampum,
One hundred Barrs of lead,
One hundred fathom of black Wampum,
Thirty tobacco boxes, ten holl adzes,
Thirty Gunns, twenty Blankets,
Forty fathom of Duffils,
Twenty fathom of stroudwater Cloth,
Thirty Kittles, forty Hatchets,
Forty Hornes, forty Shirts,
Forty pair stockins,
Twelve coates of B.C.,
Ten drawing Knives,
Forty earthen Juggs,
Forty Bottles, Fouer ankers Rum,
Forty Knives, ten halfe Vatts Beere,
Two hundred tobacco pipes,
Eighty pound tobacco.

The purchasers were also to pay Governor Dongan six bushels of good and merchantable winter wheat every year. The deed is recorded at Albany in Vol. 5 of the Book of Patents.

Before 1685 Gulian Verplanck died, leaving minor children, and settlements on his portion of the land were thus postponed. Divisions of the estate were made in 1708, in 1722, and again in 1740. It is not accurately known when the Homestead, the present low Dutch farm-house was built, but we know that it stood where it now stands, before the Revolutionary War, and the date commonly assigned to the building is a little before 1740.

The house stands on a bluff overlooking the Hudson, about a mile and one-half north of Fishkill Landing. It is one-story and one-half high, of stone, plastered. The gambrel roof is shingled, descends low and has dormer windows. The house has always been occupied and is in excellent preservation. Baron Steuben chose it for his headquarters, no doubt for its nearness to Washington's headquarters across the river, and for the beauty and charm of the situation. It is made still further famous by the fact that under its roof was organized in 1783 the Society of the Cincinnati. The room then used is on the right of the hall, and is carefully preserved. In fancy we can picture the assembly of officers grouped about Washington, in that west room overlooking the river, pledging themselves to preserve the memories of the years during which they had struggled for their country's being.

The whole neighborhood, especially the village of Fishkill which was the principal settlement in the county at that date, has many revolutionary associations. The interior army route to Boston passed through the village; this was a depot of army stores, and workshops and hospitals were established. Here was forged the sword of Washington, now in the keeping of the United States Government, and exhibited in the late Centennial collection. It is marked with the maker's name, J. Bailey, Fishkill.

The New York Legislature, retiring before the approach of the British, after the evacuation of the city, came at last to Fishkill, and here the constitution of the State was printed, in 1777, on the press of Samuel Loundon, the first book, Lossing says, ever printed in the State.

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Some years after peace was restored, the Verplanck family appear to have occupied the Homestead from time to time. Philip Verplanck, a grandson of Gulian the original grantee, was a native of the patent, but his public life was spent elsewhere. He was an engineer and surveyor, and an able man. Verplanck's Point in Westchester County, where Fort Lafayette stood during the Revolution, was named for him, and he represented that Manor in the Colonial Assembly from 1734 to 1768. Finally, Daniel Crommelin Verplanck with his large family—one of his sons being the well-known Gulian C. Verplanck, born here in 1786—came to live in the old home permanently. He had led an active life in New York, served in Congress and on the bench, and now retired to the quiet of the country. It was he who planted the fine old trees which now shade the lawn; among them the coffee-tree so much admired. About 1810 the north end, built of wood, was added to the old house. Architects were not numerous, apparently, in those days, so the Dutch type was lost in making this large addition, though the interior is quaint, dignified and interesting. It was from under its roof that Daniel C. Verplanck was carried to his last resting-place as his father before him, and generations after him lived and still live in the old Homestead.

For the above description, prepared with no little painstaking, of an interesting house and demesne, as well as for the loan of the photograph from which I made my pen-and-ink sketch of it, I am wholly indebted to a member of the Verplanck family and a mutual friend.

A.J. BLOOR.

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ROCK UPHEAVAL CAUSED BY HYDRAULIC PRESSURE.—There was a remarkable occurrence at the mills of the Combined Locks Paper Company at Combined Locks, Wis., on Saturday. From some unknown cause there was an upheaval of rock upon which the mills are located, throwing the mill walls out of place, cracking a great wall of stone and cement twenty feet thick and making a saddle-back several hundred feet long and six inches high in the bed rock beneath the mill. An artesian well two hundred feet away on the bluff has dried up. The damage to the mill and machinery will probably amount to several thousand dollars. The upheaval is supposed to have resulted from some hydraulic pressure between the seams of rock beneath. A panic occurred among the mill operatives at the time of the shake-up, but nobody was hurt in the stampede from the mill.—*Boston Transcript*, *September* 10.

ELECTRICITY'S VICTIMS IN EUROPE.

[Illustration: Monument to Minine and Pojarsky, Russia.]

Although the greatest number of deaths from electricity have occurred in this country—-more than one hundred—of which twenty-two occurred in this city, yet other countries have not been without such “accidents,” as has been erroneously stated by experts in the employ of the companies interested in the deadly high-voltage currents, and as the subjoined list, compiled by C.F. Heinrichs, the electrical expert, shows. The list is by no means exhaustive. Many European newspapers contain articles advising stringent measures to stop the causes of those accidents and the use of currents of electricity above six hundred volts.

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Following is a list of victims of electricity in Europe:

In February, 1880, Mr. Bruno, the euphonium player at the Holte Theatre in Ashton, near Birmingham, touched the conductors of a two-light electric plant and received a shock which rendered him insensible, and he died within forty minutes.

In October, 1880, the stoker of the yacht Livadia, which was lying in the Thames, near London, was ordered to adjust one of the Jablochkoff candles. He accidently touched the terminals of the lamp, and instantly fell down dead. The difference of potential at the lamp terminals was only fifty volts, but it was admitted at the time that the wires must have been in contact with the iron plate upon which the stoker stood, and that alternating currents of higher voltages from the main source caused the death, because with fifty volts an electrical energy of only .05 Watts would have been expended on the resistances of the skin and the vital organs of the victim.

In 1880, a workman touched a wire of a Brush installation at the Hatfield House, the residence of the Marquis of Salisbury, and fell down dead. The current was under eight hundred volts.

In July, 1882, on the occasion of a fire in Brighton, England, a fireman took hold of a fire-escape which was in contact with the wire of a Brush machine. He received a shock which doubled him up and disabled him for a long time.

August, 1883, an official of the Hungarian railway in Pesth was killed on touching a wire of a “Ganz” alternating-current generator.

August, 1884, Emile Martin and Joseph Kenarec were killed in Paris on attempting to climb over the fence of the garden of the Tuileries. Both victims came in contact with the wires of a Siemen twelve-light alternating-current generator. The difference of potential between the place of the accident and the ground was 250 volts. The current which would pass that way caused the deaths, and burns upon the hands, cheek and ear of the victims.

September, 1884, Henry Pink, an attendant at the Health exhibition in London, was killed on touching a Hochhausen dynamo of 1,000-volt capacity. At that time all electricians agreed that no currents over 600 volts should be allowed.

November, 1884, an engine-driver, William Moore, was instantly killed on touching the wire of an arc-light plant, at Messrs. Bolcknow, Vaughan & Co.’s, works, at Middleborough, England. The fatality was admitted to be due to the high-voltage current and bad insulation.

January, 1887, Richard Grove noted that his employer’s store, in Regent Street, London, was set on fire by electric-light wires. He rushed up on the roof of the building

to cut the wires. He received a shock and fell off the roof, dead. Secondary currents of Goulard & Gibb's converters (Westinghouse system) were held responsible for the fatality by electricians.

December, 1887, James Williams was killed by an electric-light shock at the Pontyminister tin-plate works at Bisca, in Wales.

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June, 1888, in Terri, Italy, a tinner was killed on the roof of a building on touching an alternating-current circuit.

October. 1888, in Spain, at the Valladolid electric-light station a carpenter took hold of a wire of an alternating-current generator and could not let go. An attendant tried to pull the man off the wire and both were killed by the currents.

November, 1888, E.A. Richardson, employed at the Consett iron works, in the county of Durnham, England, received a shock from an arc-light plant, from the effects of which he died two hours later.

December, 1888, in Turin, Italy, an employe of an electric-light company was killed by alternating currents.

June, 1889, John Connelly, an employe of the Siemens Electric-Light Company, near London, was killed by an alternating current of 1,000 volts.

Speaking of recent cases here, Mr. Heinrichs said:

“It is to be regretted that some of our electrical experts of so-called standing, not only assist in keeping the facts from the public, but tell when under oath only half the truth, as was said a short time ago in a conservative electrical publication in London. One of these experts had to admit in the Kemmler investigations that all of his knowledge as to the harmless nature of the Westinghouse current was obtained by him from observations made upon himself and friends receiving alternating currents from an electro-medical apparatus. And the various susceptibilities of the different living organisms to electric influences he judged from the manner in which some of his friends dropped the metal handles. Had this expert made any calculations of the electrical energy expended in these trivial experiments he would have found that the whole electrical energy expended upon the living organism of any of his friends was below one-fifty thousandth of an electrical horse-power per second, and the difference of susceptibilities of any of his friends was infinitesimal, and the difference of the electrical energy between the minimum and maximum charges less than one-two hundred thousandths of an electrical horse-power. It is a well-established fact that alternating currents of an electrical energy of one-four-thousandth part of an electrical horse-power per second, if expended upon the vital organs, the nerves and muscles, of any human being, will cause instantaneous death in every case.”—*New York Commercial Advertiser*.

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[Illustration: THE ILLUSTRATIONS]

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost*.]

HOUSE OF G.M. SMITH, ESQ., PROVIDENCE, R.I. MESSRS. STOKE, CARPENTER & WILLSON, ARCHITECTS, PROVIDENCE, R.I.

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

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THE CATHEDRAL OF ST. MACHAR, ABERDEEN.[5]

“In the bustling manufacturing town which has lately become, and is likely for some time to remain, the extreme northern point of our great system of railway communication, a venerable cathedral, surrounded by tree, with a pleasant river sweeping past it, is scarcely an expected sight. But the two divisions of Aberdeen the old and the new town —are as unlike each other as Canterbury and Manchester. The old town, or ‘Alton,’ as it is locally termed, is not the most ancient part of a city of different periods, around which its modern streets and squares have ramified. It is a distinct hamlet or village, at some distance from the city, and edged away in privacy apart from the great thoroughfares connecting the manufacturing centre with other districts of the country. Its houses are venerable, standing generally in ancient gardens; and save that the beauty and tranquillity of the spot have led to the erection of a few pleasant modern villas, dotting it here and there, whoever treads the one echoing street of the Alton for the first time, feels that two centuries must have brought very little external change to the objects by which he is surrounded. In this pristine place, the short-spiked steeples, and the broad-slated roof of the old cathedral of St. Machar may be seen rising over a cluster of fine old trees which top the sloping bank of the winding Don, from the opposite shore of which the whole scene—comprehending the river, the sloping banks, the trees, and the gray old church—makes a very perfect landscape, rather English than Scottish in its aspect.

“A near approach develops something very peculiar in the character of this edifice. It bears throughout unmistakable marks of age, but none of decay. It is gray with the weather-wearing of centuries, but it displays none of the mouldering vestiges of Time’s decaying fingers; nor yet has it that prim air of good keeping which shows, in treasured antiquities, that careful hands have sedulously restored each feature that age may have injured. It is clear that the completeness of detail—the clean outlines, the hard, unworn surfaces—are characteristics of innate strength, and connect themselves with the causes of a certain northern sternness and rigidity in the general architectural designs.

“The secret of all these peculiarities is to be found in the nature of the material, which is granite—the same that has handed down to us, through thousands of years, the cold, stony eyes of the sphynx, precisely as the chisel last touched them—and retains, to the wonder of the Londoners, the glittering lustre of the polished cheeks of Rameses. The stern nature of the primitive rock—obdurate alike to the chisel and to time—has entirely governed the character of the architecture; and, while it has precluded lightness and decoration, has given opportunities for a certain gloomy dignity. About

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the porch, one or two niches and other small details, have been decorated; but as if the artist had abandoned the task of chiselling his obdurate materials as a vain one, ornament goes no farther, and all the architectural effects are the fruit of bold design. Such, for instance, is the great west window—not mullioned, but divided by long massive stone shafts into seven arched compartments; such, too, is the low-browed doorway beneath, with its heavy semicircular arch. The upper tier of windows—here called *storm* windows, perhaps as a corruption of *dormer*—are the plain, unmoulded arch, such as one sometimes sees it in unadorned buildings of the earlier Norman period. Indeed, though the building dates from the second age of the Pointed style, it associates itself in some of its features, very closely with the relics of the Norman age, especially in the short, massive round pillars which support the clerestory. The roof, with its carving, gilding, and bright heraldic colors, is in thorough contrast with the rest of the architecture, and the eye gratefully relieves itself from the gloom below, by wandering over its quaint devices and gaudy hues. It is divided into three longitudinal departments, panelled with richly-carved oak; and at each intersection of the divisions of the compartments with the cross-beams, there is emblazoned a shield armorial, with an inscription.

“It is an uncommon thing to find, as in this instance we do, the nave only of a church remaining, for the chancel was generally the part first erected, and sometimes the only part. The remains of the central and eastern portions of St. Machar’s tell how the western compartment braved the causes of destruction which to them had been fatal: they were built of freestone. Incrusted, as it were, in the eastern wall, are the clustered freestone pillars, with richly-flowered capitals, which of old supported the central square tower; and on either side are the vestiges of the transept, with the remains of the richly-sculptured tombs, represented in the accompanying plate, embedded in the wall. In Slezer’s, and some other representations of this building in the seventeenth century, the tower—a simple square mass, with a roof—appears to have been still standing, but the choir had disappeared.”

MONUMENT IN THE SOUTH TRANSEPT OF THE CATHEDRAL, ABERDEEN, SCOTLAND.

THE HOTEL DE SOTO, SAVANNAH, GA. MR. WM. GIBBONS PRESTON, ARCHITECT, BOSTON, MASS.

This hotel, which has just been completed, occupies a whole square in the heart of the city, and has a frontage of 300 feet on Liberty Street and 200 feet on Bull Street. It forms two sides of the square, the two-story kitchen and servants’ wing forming the third side. The climate renders it desirable to have it freely open and exposed to the cool

southeast winds which blow refreshingly up from the bay, and, as a winter resort, a southeast exposure of nearly

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half the rooms makes them sunny and dry. The building is four, five and six stories in height, and a flat roof, 50 x 70 on the highest portion, gives a fine view down the bay. A “solarium” is erected on this roof, to contain a tropical garden or to be used for dancing. The “parade” or garden, upon which all the southeast windows look, has been beautifully laid out, and there is not a dark room or a “back room” in the building.

A “rotunda” with glass roof at the rear of hall, first story, is intended as a lounging-room for ladies and gentlemen, and a veranda 35 feet in width in front opens upon Bull Street. Many of the rooms open upon covered verandas on the second, third and fourth stories. The dining-room is 50 x 120 feet, open to the air on three sides. The materials are local brick for the lower portions, and buff Perth Amboy brick and terra-cotta above. It contains about 300 rooms, and will cost, completed, about half a million. It is, except the Ponce de Leon, the largest hotel in the South. Special arrangements have been made for introducing large volumes of warmed or cooled air into the halls and corridors. The contractors are Mr. T. Lewman & Co. The Whittier Machine Co. did the elevator, heating and laundry work. The Brush system of electric lighting has been introduced throughout. L. Haberstroh & Son have decorated the walls and ceilings, making a special feature of the dining-room. Ground was broken just a year ago, and the house was opened for guests on New Year’s day.

MEMORIAL CHURCH OF THE ANGELS, LOS ANGELES, CAL. MR. ERNEST A. COXHEAD, ARCHITECT, LOS ANGELES, CAL.

This church which has lately been finished has cost about $25,000. The inside walls are finished in brick and stone.

ST. AUGUSTINE’S ROMAN CATHOLIC CHURCH BUILDINGS, BROOKLYN, N.Y. MESSRS. PARFITT BROS., ARCHITECTS, BROOKLYN, N.Y.

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[Additional Illustrations in the International Edition.]

CHATEAU DE JOSSELIN, MORBIHAN, FRANCE.—-FACADE ON THE COUR D’HONNEUR.

[Gelatine Plate.]

AN INTERIOR IN THE CHATEAU DE JOSSELIN, MORBIHAN, FRANCE.

[Gelatine Plate.]

TWO VIEWS OF THE HOUSE OF MRS. CONSINO, SANTIAGO, CHILI.

DESIGN FOR CHURCH OF THE GOOD SHEPHERD, GOSPEL OAK, LONDON, N.W., ENG. MR. F. PHILLIPS FIGGIS, ARCHITECT.

BUTLER'S WOOD, CHISLEHURST, ENG. MR. ERNEST NEWTON, ARCHITECT.

HOUSE AT PENNSYLVANIA, EXETER, ENG. MR. JAMES CROCKER, F.R.I.B.A., ARCHITECT, EXETER, ENG.

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This house has recently been completed for Mr. E.C. Philp, and stands in one of the best suburbs of the city. The materials employed are Wellington red brick for the facings above plinth, with Broseley tiles for the roofs, the few stone dressings being of Ham Hill. The walling up to the plinth level is of Westleigh limestone, as are also the piers surrounding the site, with wrought-iron railing between same. The principal chimney-pieces in the house have been made to special design, and are chiefly executed in American walnut and pitch-pine. The dining-room is panelled the full height up to a richly-modelled frieze in plaster, all to design, and the ceiling of this apartment is also panelled.

DESIGN FOR BOARD SCHOOLS. MR. GEORGE W. WEBB, A.R.I.B.A., ARCHITECT, READING, ENG.

This design was prepared in competition for schools near London, but, owing to a mistake in the date for sending in designs, it was too late for the competition. The plan is on the central hall system for boys and girls, the hall being 110 feet by 54 feet, and top-lighted. Fourteen class-rooms, each 30 feet by 20 feet, are provided, each divided from the central hall by movable glass screens. The infants' school, lodge, *etc*., form detached buildings. The total cost was estimated at L16,000.

FOOTNOTES:

[Footnote 5: It should always be kept in mind that these illustrations from the "*Baronial and Ecclesiastical Antiquities of Scotland*," by R.W. Billings, are republished very largely for the sake of giving instruction in one manner of the rendering of architectural drawings.]

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METHODS OF REDUCING THE FIRE LOSS.[6]

[Illustration: OLD DOORWAY AT NEWPORT R.I.]

The liability to injury by fire is a hazard inherent to all buildings, and this danger is a constant menace whose threatening destruction of values imposes upon the owner a persistent consideration, which endures as long as the building stands.

As every method of construction, the various mechanical processes and the stock in each stage of manufacture bears some relation to the fire-hazard as a supporter or possible originator of combustion, the engineer whose duties pertain to these matters must necessarily also consider the question of the fire-hazard in the important phase of prevention, as well as the direct application of those engineering problems required in the design and installation of fire apparatus.

The fire-loss is a most oppressive tax, much of which can be abated by the application of well-established means of prevention. In a practical sense, certain fires are to be considered as unpreventable, being caused by exposure to fires in other burning buildings, but there are very few fires whose destructive results might not have been prevented by the exercise of precautions entirely feasible in their nature.

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These several topics will be considered in reference to the reduction of the fire-loss on isolated manufacturing property, because the exercise of every possible precaution may not avail anything if the property is liable to be imperilled by fires originating in adjacent buildings.

SUPERVISION.

The prevention of fires must in greater measure proceed from the efficiency of the supervision exercised over the property in the order of the buildings, heed to probable causes of fire, and attention to the fire-apparatus.

In a manufactory there is a wide distinction to be made between to-day's dirt and yesterday's dirt; valuable results may be obtained by an inspection of the whole property made on Saturday afternoon by two men, such as foremen or overseers of rooms, who may be appointed to serve four weeks, their assignment terminating on alternate fortnights. The report should be made on a sheet of paper, divided so as to include all features of order and fire-apparatus in every room.

As property should be watched during the day Sunday, as well as at night, it is under the care of watchmen about five-eighths of the time, and the measure of this responsibility should be clearly understood.

The patrol should be recorded on a watchman's clock, not merely to show that he was not unfaithful, but also to prove that he was faithful.

Especially in districts liable to disorder and lawlessness, it is desirable to have a district-messenger signal-box in the works, visited once an hour, with the understanding that if the call is not made within fifteen minutes of the appointed time, it will be assumed that there is trouble and help sent at once.

Safety requires that the lanterns should be securely guarded; that the handle and sustaining parts of the lantern be connected together by rivets or by locking the metals together without relying on soldered joints; and thirdly, that the lamp should be put in from above, and never from the bottom.

CONSTRUCTION.

In its design, a mill for any standard line of manufacture is not a building whose arrangements and proportions are fixed upon at the whim of the owner, but it must conform to certain conditions of dimensions, stability, light and application of power to satisfy the requirements essential for furnishing every advantage necessary for producing the desired results at the lowest cost.

The destructive consequences attending fire in such buildings, whose iron and masonry construction is called fireproof, show that some other form of construction is necessary to obtain the desired results of minimizing the annual cost of the maintenance of the invested capital, as represented by insurance, depreciation, interest and taxation. There is little incentive for entering into unusual expenses in the construction of a manufacturing building for the purpose of increasing

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its resistance to fire, unless the additional interest on such increase in the investment is to be met by a corresponding reduction in the annual cost of the fire-hazard. In addition to these questions, involving the annual maintenance of the plant, the increase in the expense of the building above a certain point may prove poor management, by locking up capital for too long a time, and may tend to prevent the improvements in arrangement and construction which are necessary for the most advantageous manufacturing.

The method of mill building known as slow-burning construction combines the advantages of low initial cost and great resistance to destruction by fire, the final result being that the manufacturing is housed at the minimum annual cost. The fundamental principle of such construction is to mass the material in such a way that there shall not be any concealed spaces about the structure, and that the number of projections of timbers, which are more easily ignited than the flat surfaces, shall be reduced as far as possible; that iron portions of the structure shall not be exposed to the heat of any fire in the contents of the building, and furthermore, that the isolation of the various portions, both in respect to that of one building to another and of the various rooms and stories of the same building, shall be as complete as is feasible.

The most important feature is that of the mill floors, which should be laid on beams, generally of Southern pine, 12 x 14 inches, or two inches larger when required by unusual loads or longer span than twenty-two feet. These beams are placed from eight to ten feet apart between centres.

At the columns, beams rest on cast-iron caps.

The support from one column to the next should be made by cast-iron pintles, preferably those whose section is in the form of a Greek cross, as that presents advantages in the way of securely joining them to the timber beams. At the top of the pintle, a cast-iron plate should support the base of the column above.

Timber columns are preferred to those of iron, unless the load is greater than can be sustained by timber.

The floor planks for this type of floor are generally made of spruce plank from three to four inches in thickness, grooved on both edges and joined together by hardwood splines. These floor-planks should be two bays in length, breaking joints at least every four feet.

Above this the top floor, of 1-1/4 or 1-1/2 inch hardwood, is laid, and in some instances the resistance of the floor to fire is greatly increased by laying a coat of plaster on the floor-plank before the top flooring is built. But the general method of increasing the

resistance of the floor to fire is by covering the floor and beams on the under side with plaster laid on wire-lathing.

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Such a mill floor and columns, while possessing in a very high degree features which offer resistance to the fire, being weakened by the temperature only to a slight extent as they are slowly burned away under the exposure to a very severe fire, also possess the merit of great economy, both as regards the low price of construction, and in that the floor is thinner in comparison with joisted floors of equal strength, saving in this respect, for every floor in a building, about ten inches in height of wall, stairs, belting, steam-pipes, and all vertical connections reaching from floor to floor, a saving which amounts to considerable in the total cost of a building.

The division of mills into various portions by means of fire-walls is frequently not so efficient as assumed, by reason of the lack of fire-doors to satisfactorily fulfil the purpose of resisting fire. The best form of fire-door is that made of two thicknesses of matched boards, placed at right angles to each other and nailed together, being covered on the outside with tin, securely locked together and held to the door by numerous hanging-strips. The door should be secured to the hangers by means of bolts, and not screws, and the rail upon which it runs strongly bolted to the wall. When closed, such a door should fit into a jamb and be securely held in this manner against the wall. Such doors are frequently hung upon an inclined track, and, by some application of highly fusible solder at the catch, are so arranged that they will be closed by the heat of a fire, if not closed by hand.

In this treatment of the arrangement of buildings to resist fire, consideration has not been given to the cost of land, which is, of itself, an important factor in determining what arrangement will be the most expedient for an establishment. Where land is expensive, or there are limitations in the space suitable for building, it is frequently necessary to build mills and shops higher than would be warranted by good judgment under other conditions; but where circumstances will permit it, the one-story mill has been very successful, not merely in immunity from fire, and very low cost per square foot of floor, but also in the advantages of manufacturing, particularly in regard to cost of supervision and movement of the stock in process of manufacture. These are questions which must be determined, not merely in regard to the various processes of manufacture, but the individual needs of each concern; the position of the fire-risk in the matter being that the hazard of a building increases very rapidly with its height, and to some extent with its area.

The extension of one-story buildings over too large an area will not be commended, and certainly, as regards the question of fire, it has a tendency to place too large a property in direct exposure to a very wide hazard.

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Some textile mills have been built in the form of the block letter U, this form having been decided upon as giving the conditions of lowest resultant cost. One wing, two stories in height, contains weaving; the other wing, three stories in height, contains carding and spinning, while the engine is placed in the connecting building. The pickers and the boilers are in outside buildings, so placed that they will not interfere with future extensions of the building into the form of the block letter H.

FIRE APPARATUS.

All methods for the prevention of fires fall so far short of the ideal of immunity that there is a necessity for fire-apparatus. The principle of the defence of a manufactory against fire is that of self-protection, by making the installation and management of the fire-apparatus equal to the progress of any fire which can possibly occur.

Fire-apparatus should be kept in service as well as in order. It is no exception to any other machinery, in that practice is essential to obtain any efficient results.

The practical results of private fire-organizations, where fire has occurred, have been very marked; and systematic and skilful work has been the rule, in place of the needless confusion and liability to breakage of the apparatus, which almost inevitably occurs in the lack of such organization.

The details differ with the arrangements and administration of every mill; but the general policy of definitely assigning persons to the positions for which they are best adapted, and where it is presumed they could be most useful, and to practice them in such work, is a rule which is common to all.

A great deal of fire-apparatus is destroyed by freezing water during the winter months, and therefore a special inspection of all such apparatus should be made late in the autumn, when the water should be drained from all portions of the system where there is liability of freezing, and all hydrants and valves should be well oiled, preferably with mineral oil. The hazard from a hydrant or other portion of the apparatus broken by frost, does not lie so much in the probability that disadvantage may result from the disuse of one element of the plant, as in the liability that such a breakage may interfere with the whole system and render it inoperative.

Buckets of water are the most effective fire-apparatus. They should be kept full, and distributed in liberal profusion in the various rooms of a mill, being placed on shelves or hung on hooks, as circumstances may require. In order to assist in keeping them for fire purposes only, they should be unlike other pails used about the premises, and in some instances each pail and the wall or column behind its position bears the same number.

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Automatic-sprinklers have proved to be a most valuable form of fire-apparatus in operating with great efficiency at fires where their action was unaided by other fire-apparatus, particularly at night. In mill fires the average loss for an experience of twelve years shows that in those fires where automatic-sprinklers formed a part of the apparatus operating upon the fire, the average loss amounted to only one-nineteenth of the average of all other losses. If the difference between these two averages represents the amount saved by the operation of automatic-sprinklers, then the total damage from the number of fires to which automatic-sprinklers are accredited, as forming a portion of the apparatus, has been reduced six and a quarter million dollars by the operation of this valuable device.

Although there have been numerous patents granted to inventors of automatic-sprinklers since the early part of the present century, yet their practical use and introduction has been subsequent to the invention of the sealed automatic-sprinkler by Henry S. Parmelee of New Haven, Ct., about twelve years ago. This device being the first, and for many years the only automatic-sprinkler manufactured and sold, and actually performing service over accidental fires, to him belongs the distinction of being the pioneer, and practically the originator, of the vast work done by automatic-sprinklers in reducing destruction of property by fire.

Although nearly or quite 200,000 Parmelee automatic-sprinklers have been installed, their manufacture has been supplanted by other forms; and the total number of automatic-sprinklers in position at the present time must be about 2,000,000.

When automatic-sprinklers were first introduced there were many apprehensions that leakage, and also excessive water discharged upon small fires, would be sources of damage. In England this opinion found expression in increased insurance rates in buildings where automatic-sprinklers were installed.

The logic of figures shows that this liability to damage is merely nominal in the case of well-constructed sprinklers. An association of underwriters who have given careful attention to the subject obtained the facts that from the automatic-sprinklers installed in some $500,000,000 worth of property insured by them, the average damage from all causes, except fire, was $2.56 per plant per annum.

Although automatic-sprinklers have proved to be so reliable and effective, yet, in order to provide for all possible contingencies, their introduction should not displace other forms of fire-apparatus, particularly stand-pipes in the stairway towers, with hydrants at each story. The hose at these hydrants should be festooned on a row of pins, or doubled on some of the reels made especially for such purposes. Stand-pipes are not recommended to be placed in rooms or on fire-escapes; and inside hydrants should not be attached to the vertical pipes supplying automatic-sprinklers.

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Fire-pumps are generally too small for the work required of them, 500 gallons per minute being the minimum capacity recommended. For a five-story mill there should be an allowance of 250 gallons per minute for an effective stream through a 1-1/8-inch nozzle, and for lower buildings the estimate should rarely be less than 200 gallons for each stream.

Contrary to the general assumption, a ring nozzle is not so efficient as a smooth nozzle, the relative amount of discharge of ring and smooth nozzles of the same diameter being as three is to four. For stand-pipes 7/8-inch nozzles are recommended, but for yard hydrant service the diameter should never be less than one inch, and 1-1/8 inches generally fulfils the conditions of best service.

The yard hydrants should be placed at a distance of fifty feet from buildings, and covered with a house which should also contain hose, axes, bars, nozzles and spanners.

Water-mains about a mill-yard should be of ample capacity not to cause an excessive loss by friction, their diameter being based upon a limit of velocity of ten feet per second for the maximum delivery.

RESULTS.

These methods of supervision, building and equipment do not refer to any ideality, but to measures which have been widely carried into effect for the purpose of reducing the fire-loss; the result of such action being to diminish the cost of insuring industrial property engaged in such normally hazardous processes as textile manufacture and other industries, down to a yearly cost of less than one-fifth of one per cent. This has been accomplished by the consideration of sources of danger and their abatement, and by a course which has been in line with sound engineering principles, and also practical methods of manufacture; and it has thus been proved that it is cheaper to prevent a fire than to sustain a loss.

There has been no attempt made to credit individuals with their share in these features of mill development. They have been the outgrowth of a continual profiting by experience, adopting some features and modifying others. The concurrent action of the large number of minds engaged on the same problem has led to duplication of methods; but the whole progress has been a matter of slow, steady growth, advancing by hairs' breadths, as the result of persistent efforts to adapt means to ends in the endeavor to reduce the cost of manufacture.

FOOTNOTES:

[Footnote 6: Abstract of a paper by Mr. C.J.H. Woodbury, read before the American Society of Mechanical Engineers.]

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[Illustration: SOCIETIES]

THE NEWARK ARCHITECTURAL SKETCH-CLUB.

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After a preliminary meeting held for permanent organization December 14, 1889, a constitution and by-laws were adopted, and the following officers elected: *President*, W. Frank Bowers; *Vice-President*, J.C. Swinnerton; *Secretary*, H.A. Hickok; *Treasurer*, W.C. Hudson. *The Executive Committee* consists of F.S. Sutton, A.E. Hudson, W.G. Smith, L.A. Virtue and E.K. Taylor, together with the officers. It is intended, in addition to the usual monthly competitions, to make a special feature of regular class-work throughout the year, this will consist of courses in constructional work, free-hand drawing, water-color work, plumbing, architectural history, *etc*. The courses will be under the direction of specialists in the various branches who are club-members. Applications for membership will be received by the Secretary, whose address is 762 Broad Street, Newark. The Club expect to have permanent quarters soon, which will be open every evening to members.

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[Illustration: 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*.]

AGREEMENT BETWEEN ARCHITECT AND CLIENT.

ALBANY, N.Y., December 26, 1889.

TO THE EDITORS OF THE AMERICAN ARCHITECT:

Dear Sirs,—As the services which an architect is supposed to render his client and the compensation for same have been the subject of considerable loss to us through misunderstanding, we have prepared for use the enclosed proposition, which covers most cases in our general practice. In work of such a nature as can't be covered by this proposition, we prepare one specially suited to the occasion, but in all cases insist on a written agreement which we consider is fair to both parties. Should you see in this proposition anything of benefit to the profession, you are at liberty to use same.

Yours truly, FULLER & WHEELER.

OFFICE OF FULLER & WHEELER, ARCHITECTS,
No. 86 STATE STREET, ALBANY, N.Y., —— 189 .

PROPOSITION.

Mr.——

We will prepare for you the Preliminary Sketches, General Drawings, Details and Specifications for proposed——

to be erected at——

for 3-1/2 per cent on the actual cost of same, which is to be determined by the amount of Mason, Carpenter, Roofer, Plumber, Stone-cutting, Heating, Ventilating, Iron-workers, Mantel and Elevator Contracts, including all extras and deductions. In connection with Heating, Ventilating and Elevator, we will either select the apparatus and approve the specifications as submitted by the dealers, or prepare plans and specifications for contractors to estimate on, according to the character of the work in contemplation, and

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as in our judgment will secure the best advantage to you. The cost of hardware, mantel facings, hearths, back linings, metal bands, electric work and decorations are also to be included in the total cost of said building, but we are not required to perform more than our customary work in connection with the last mentioned items, which is either to select them from manufacturers' stock or have submitted to us samples, sketches and specifications from which a selection is made. Any other work, not mentioned above, that we may be called upon to perform will be charged for at the same rates.

SUPERVISION.

We agree to professionally supervise work constructed from our plans, for an additional 1-1/2 per cent, or 5 per cent in all, where the work is in the city, and inspect work out of city at the same rate per cent, visits not to exceed 2 per month. In any case where a Clerk-of-Works is required, either on account of the magnitude of the job, or the inefficiency or carelessness of the contractors, the cost of same is to be paid by you in addition to our compensation for supervision or inspection, and said Clerk is to be approved by us.

We do not agree to be responsible for the acts of the Clerk-of-Works, or for the negligence or violations of contracts by the contractors any further than we can reasonably detect at the time of our visits of supervision or inspection; but such negligence or violations of contracts, as we detect, we will have corrected, so far as the power vested in us will permit and as speedily as possible.

You are at all times to consult with us about desired changes or additions to the work; to order all such changes through us; and to notify us in regard to any work done or material used that you consider is a violation of the contract.

No allowance from our percentage will be made for drawings contracted for and not furnished, except upon a refusal by us to furnish such as may be necessary.

The supervision and inspection contemplated by this agreement, is such as is calculated to and ordinarily will secure the furnishing of materials of the kind and quality required by the contract, and the performance of the work in accordance with the plans and specifications, and in a good, workmanlike and substantial manner.

CERTIFICATES.

Where the work is under our supervision, or inspection, we will issue certificates of indebtedness to the contractors, as per terms of contract. The final certificate being an adjustment of the contract and extras, and also an expression of judgment on our part

that the work has been carried out according to the general drawings and specifications and contracts by the contractors, but is not to form a legal obligation on our part.

If the building is not erected from said plans, the charges, instead of being based on the actual cost, will be based on the approximate cost, which is hereby estimated at $——, although the last-mentioned sum is not guaranteed to be the actual cost of said building. Should the actual cost exceed the approximate cost, we will make the necessary changes in the plans, so as to reduce the cost, should you so desire, without extra charge. Changes made in plans from other causes, charged for according to time consumed.

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Travelling expenses and other necessary disbursements in addition to fee for services.

PAYMENTS.

Payments shall be made as follows: Upon completion of the preliminary sketches, 1 per cent of estimated cost; upon completion of the general drawings and specifications, an additional 1-1/2 per cent of estimated cost; upon completion of details an additional 1 per cent of estimated cost; and upon completion of the work, the charge for supervision or inspection. At that time, also, any differences between the percentage upon the estimated and actual cost is to be settled, and any deficiency is to be paid or excess credited.

Travelling expenses and other necessary disbursements are payable when incurred.

In case contracts are not entered into for the work within six months after the drawings are ready for contractors to estimate, payment shall be made for the work done at the rates herein before specified, computed upon the estimated cost. Provided, however, that if at any subsequent time the plans and specifications prepared by us, are used and the actual cost exceeds the estimated cost, compensation upon such excesses, shall be made at the rates aforesaid.

REMARKS.

Respectfully yours,

Accepted, —— 189

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INSPECTION OF BUILDINGS IN NEW YORK.

NEW YORK, N.Y., December 22, 1889.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—In your issue of the 21st. I note an editorial setting forth how the New York City Health Department trapped an ingenious builder, who piped his sewerage into his back-yard, and I, and, I think I can safely say, many other architects of New York, would ask why you omit, when publishing such facts, to mention that such work was so put in and is continually put in, in as bad or in a very unworkmanlike and insanitary manner, under the supervision of the same department, and thus shows how the paid officials and inspectors whose business it is to pass upon and approve the plans and

specifications and to give continual inspection—to see, examine and test every length of pipe and every joint; who have the might of the law to strike down the offender who shall make bold to violate their mandates, fail to give protection to the innocent owners and purchasers of property, or curb the avaricious hands of unscrupulous builders and careless workmen.

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I should like further, to ask you to publish to the New York City public, the fact that the "Department", the "Health Department", with its Bureau of Plumbing and Light and Ventilation, and the Building Bureau of the Fire Department, are unable to protect property owners and purchasers from errors in sanitation and construction as they are supposed by too many to do. Owners frequently think that unless they want "fancy" drawings and fronts, an architect is superfluous. The "speculator" finds it no advantage, but rather the opposite, to have an impartial judge between owner and Contractor, or a close inspection over his subs; as he gains little by the fact of his having employed a thorough architect, when he comes to fell, and loses by the bill for services and the legitimate price he pays for honest work.

The bulk of speculative work done in New York is after the most trivial plans made by some mere draughtsman or carpenter, and the "superintendence" is under the "keen" eye of the builder and owner—who is usually one and the same individual and who has made a definite failure at all the branches of the trade and frequently many others, and now holds position as owner of the property by virtue of his having paid, entirely in mortgage, for the same. In the large majority of cases that have been under my observation, they are entirely incapable of passing an intelligent opinion on any of the materials and work that make up a building, or at least on very little, and the gross impositions practiced upon them by their sub-contractors is startling. Their work is covered-in and is so left, I doubt not, in the majority of cases, as the inspection furnished by the "Department" is entirely inadequate for proper protection. The confidence of the public is continually bolstered up by such descriptions as the editorial above mentioned.

A NEW YORK ARCHITECT.

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A SEEMING ATTEMPT TO DEFRAUD AN ARCHITECT.

PITTSBURGH, PA., December 30, 1889.

TO THE EDITORS OF THE AMERICAN ARCHITECT:

Dear Sirs,—Please answer through the columns of your valuable journal the following:

I will designate A as the party for whom I drew plans, *etc*., B as the owner of property adjoining, and C as the contractor for A. I drew up plans and specifications for a 60' 0" front by 60' 0" deep building for A, including party-wall for A and B who has 35' 0" front by 60' 0" deep lot. I was employed to render full services, such as to draw up plans, specifications, details and superintend the construction of said building for A.

A wrote to me asking me whether I would allow B to use my plans and specifications to be copied. I answered, emphatically, that not under any circumstances would I allow it without compensation, as the plans, *etc*., were my property, and were only designed for A.

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A let the contract for erection and completion of the building to C, I having made the articles of agreement for same.

In the meantime I was notified that B and C were taking sub-bids for the erection of the 35’ 0” building, all with my plans and specifications. They were taking the sub-bids from the same parties that were to do the work for C on the building for A. B let C build the 35’ 0” building.

I notified B and C that I will collect my commission on the construction and completion of their building, to which notices I have no reply.

The 35’ 0” building was commenced at the same time as the building for A; my plans, specifications and details were used for the building by the same sub-contractors, *etc*.

The buildings are now nearly complete, and the building for B or the 85’ 0” building is a portion of the building designed for A with slight variations made by C.

I think the above to be very explicit; and now, gentlemen, I would like to ask you for your opinion as to my compensation, and to what extent I am entitled to it.

Yours very respectfully,

F.C. SAUER.

[We think that you are entitled to the full commission of five per cent on the cost of the 35-foot building, and believe that you can collect it.—EDS. AMERICAN ARCHITECT.]

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VENTILATING WOODEN COLUMNS.

ZANESVILLE, O., December 23,1889.

TO THE EDITORS OF THE AMERICAN ARCHITECT:

Dear Sirs,—We notice that in buildings in the East for factory purposes, all wood columns have a hole bored through the centre for ventilation. What size should the hole be for 12” x 12”, 10” x 10” and 8” x 8” posts. Also size of cross holes for the purpose of communicating with vertical hole, and how far from ends.

Respectfully yours,

A.E. PILING CO., LTD.

[We have referred this to Mr. C.J.H. Woodbury who replies that the method followed by the best mill-builders is to bore a hole along the axis one and three-fourth to two inches in diameter. The method formerly used was to bore the hole in half-way from each end after the column was finished, but as the auger would follow the grain of the wood, the holes would not always meet, and running out nearer the side of the column would produce structural weakness which has been revealed in tests of columns whenever destructive tests of such columns have been made. The better way is to arrange a lathe with a hollow headstock and a guide which will carry a pod-auger boring in from one end. This will define the axis of the column whether it is to be turned or left square. Near each end, say five inches, a couple of transverse holes generally five-eighth of an inch in diameter are bored. This arrangement is to reduce and in some cases prevent checking in the same way as has been used, time immemorial, for getting out hubs for wagon wheels.—EDS. AMERICAN ARCHITECT.]

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BOOKS IN WATER-COLOR PAINTING.

SPOKANE FALLS, WASH., December 11, 1889.

TO THE EDITORS OF THE AMERICAN ARCHITECT:

Dear Sirs,—Will you kindly advise, through the columns of your paper, what is the best self-instructing work on architectural water-coloring, and oblige.

INQUIRER.

[The best drill for the eye and hand that we know of can be obtained in the shortest time by getting Buskin's "*Elements of Drawing*," and doing faithfully and exactly all the exercises which he prescribes, including both those in black-and-white and color. Many people, however, do not care for this drill, but prefer to make a few bad imitations of simple chromos, and consider that equipment enough for architectural work. For those, Penley's large work, the "*System of Water-Color Painting*" is the best for copying from; or the aspirant may get some of the little Winsor and Newton "*Handbooks on Sketching in Water-Colors*," to show him how to choose and mix his pigments, and use as models to copy from some of the colored prints of architectural subjects which are to be picked up in the stores. There is a good deal of choice among these. We have ourselves published one or two, from originals by Mr. Botch, which will answer as well as anything we know, being admirable in color and architectural feeling, and just sketchy enough. Pains should generally be taken *not* to make an elaborate picture of an architectural sketch, and the processes preliminary to making a highly-finished water-color painting, such as laying a ground-color of neutral orange, and sponging it partly out, cutting out foreground lights with a knife, and so on, are best dispensed with. Chinese white, also, should be used very sparingly, and only where the scale is so small that it appears in the form of dots. A good lesson on the importance of keeping color subdued, for the sake of heightening architectural effect, can be derived from any of Front's works, which, by the way, might with great advantage be used to copy from. These will show the value of what most students consider beneath their notice—work in two tints and give the best models possible of artistic distribution of light and shade.—EDS. AMERICAN ARCHITECT.]

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[Illustration: NOTES AND CLIPPINGS]

THE DUTY ON GLASS AS IT AFFECTS CONSUMERS.—In a letter to the *New York Times*, Mr. J.S. Moore writes: As I am on the subject of glass, and as the members of the Pan-American Congress are inspecting our magnificent metropolis, I wish to call

their attention to two subjects. First, our dirty streets, and second, our splendid windows. Dickens has immortalized the “Golden Dustman.” In this city we have the “Dirty Ringman,” or we may say “Ringmen.” There have been millions in New York’s dirty streets.

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The most honest and persevering Mayors and other high officials have got stuck in New York street mud and were never heard of again. Our aristocratic home mud has flourished without any protection, and the pauper mud of Europe or any other mud could never beat our home product. Here our amiable and friendly Commissioners of the Pan-American Congress can see it demonstrated that our mud industry can flourish without protection. I will now call the attention of our Pan-American friends to the windows in New York houses. They are invariably of plate-glass, and there is not a city in the world that can beat New York in handsome windows. Now, then, it is an actual fact that the tax or duty on plate-glass is as follows: Plate-glass, 10 by 15 inches, 3 cents per foot, or 13.60 per cent; plate-glass, 16 by 24 inches, 5 cents per foot, or 19.78 per cent; plate-glass, 24 by 30 inches, 8 cents per foot, or 27.46 per cent. Now, we must admit that this is a moderate tax. The above glass goes into the houses of the rich. Of course, it will not do to tax influential and rich citizens. But now let me show how we tax that class of people who build three-hundred-dollar houses, or the hundreds of thousands of farmers who live in the far West. Those houses are glazed by what is known as common green window glass. Let me show to what extent we have taxed that class of people in 1888:

IMPORTS OF COMMON WINDOW GLASS IN 1888.

	Value.	Ad valorem.	Duty Collected, Per Cent.
Sizes not exceeding 10x15	$288,927	$190,815	66
Sizes 16 x 24	265,919	305,357	114.83
Sizes 24 x 30	346,486	440,685	127.15
All above that	477,132	626,740	131.35
Total	$1,563,497		

We have squeezed out of the neediest, most hard-working of our population $1,563,000 taxes on their “daylight” or window tax, which has gone into the Treasury; but we have squeezed at least $5,000,000 more and put it into the pockets of people who made similar glass. Our Pan-American guests may reflect on the above statistics and come to the conclusion that having flourishing window-glass industries may, after all, not be the highest blessing.

I beg to assure Mr. Carnegie that I am “not” a grumbler, as I don’t want to run the risk of having the door of heaven shut in my face when he succeeds St. Peter in office.

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THE NATURAL-GAS SUPPLY.—At the recent meeting in New York of the American Geological Society, Prof. Edward Orton, State Geologist of Ohio, and a professor in the State University, in his paper answered those who claim that the great natural gas fields of the country are practically inexhaustible, and that nature is manufacturing the gas by chemical combination in the subterranean cavities as rapidly as it is consumed by man at the surface. He claimed that the supply of natural gas in those States was not only limited, but was being exhausted very rapidly and would be drained in less than nine years. The gas, he said, is now being used as the basis of a varied line of manufactures, the annual products of which aggregate many millions of dollars, and it is driving, besides the iron and steel mills of Pittsburgh, potteries and brick works, over forty glass furnaces and a long list of factories in which cheap power is a desideratum. The gas is the product of ages, which has been accumulated in the porous limestone of Ohio and Indiana. It has been produced so slowly that when once exhausted it will take many thousands of years for it to again accumulate in sufficient quantities to be used, even if the elements necessary for its production were preserved, which he thought was not at all probable. The pressure which forces the gas out with such tremendous power that it sometimes reaches 1,000 pounds pressure per square inch, is not due to the pressure of the gas itself, but to the hydrostatic pressure brought to bear by the column of salt water that enters the porous stratum of rock containing the gas at the sea-level, and which by its weight tends to force the gas out. To the explanation and elucidation of this phenomenon, Professor Orton's paper was more especially devoted. The men who are engaged in the practical development of gas and oil fields, said he, made great account of rock-pressure. It is the first fact they inquire after in a new gas-field. They appreciate its importance, knowing that the distance of the markets they care to reach and the size of the pipes they can employ are entirely dependent upon this element. He defined the term "rock-pressure", and showed the decrease of its rate westward. He said four hundred thousand people in Northwestern Ohio and Central Indiana alone depended upon natural-gas for fuel and illumination.

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STATUE GIVING A DOUBLE IMAGE.—At the Italian exhibition in the Champ de Mars there was a statue that attracted much attention from the visitors. It represented Goethe's Marguerite standing before a mirror. This latter gave by reflection the image of Faust. The artifice was well concealed by the sculptor. In reality, it was not a double statue, but the figure of Faust was skilfully obtained by means of the folds of Marguerite's robe.

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Marguerite holds her arms in front of her, and these same arms form those of Faust, who holds them crossed behind his back. Faust's face is carved in Marguerite's back hair, and the man's figure is obtained, as before stated, by means of the folds of the woman's robe. This curious object might inspire some of our sculptors with an analogous idea. We do not know the name of the author of the statue, but we can say that it was exhibited by Mr. Francesco Toso, a Venetian manufacturer of mirrors. The statue was of wood, and of nearly life-size.—*La Nature*.

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SITE FOE THE KAISER'S MONUMENT.—Three or four Berlin banks have secured the preemption of all the buildings in Schlossfreiheitstrasse, with a view to pulling them down and fulfilling the Emperor's wish to have his grandfather's monument erected there. Only a few days ago three of the most eminent Berlin architects declared that the place was absolutely unsuited for that purpose. The banks are said to have agreed to pay 5,000,000 marks for the houses, and an equal amount as compensation, and intend to form a lottery of 40,000,000 marks, with prizes to the amount of 30,000,000.—*The London Standard*.

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[Illustration: TRADE SURVEYS]

The salient features of the business situation this week afford every encouragement to the promoters of new schemes and the pioneers in industry. Among the additional factors which will stimulate trade and business during 1890 are the following: The construction of fifty per cent more railway mileage than was built last year; a very great increase in lake tonnage; a large increase in inland water-way tonnage; a very great increase in rolling-stock; a greater increase in locomotive capacity than has been made during any one year in our history; greater activity in house-building, and greater activity in the building of shops and factories. Several other interesting features also deserve mention, among them the very strong probability of the establishment of a larger number of banks daring 1890 than were established during 1889 or any previous year; the more rapid expansion of the building and loan association system, particularly in the newer States; the increase in the output of the gold and silver mines of the West and Southwest; the opening-up of valuable coal-beds in many localities, which will tend to the establishment of little industries; a great increase in the area of land devoted to agriculture. Speaking generally, the agricultural interests will be stimulated. Speaking prophetically, it is very probable that prices will continue to advance, but by infinitesimal degrees. Speaking conservatively and in the light of recent experience, it is safe to assume and assert that production will be evenly gauged to consumptive requirements. Those who have kept a close eye upon the operations of manufacturers in all the leading channels recognize one very gratifying

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feature, and that is, that they are protecting themselves against unwarranted and unexpected advances in the cost of their raw material by making purchases for future requirements, ranging from three to six months. Users of cotton and wool are largely doing this; so are users of iron ore and iron and steel, as well as users of lumber, stone, cement and building material generally. This general policy of providing for legitimate future requirements is one of those instincts which safely guide the commercial world out of danger into safety. One fruitful source of panics in former periods of activity was the failure of consuming interests to supply themselves with raw material to complete their contracts. The business world has learned wisdom from its experience, and is now quietly turning a corner and wheeling into line safely early in 1890. The tanning interests of the United States have pursued this course in their limited field. The boot and shoe manufacturers, if they have not bought largely of raw material, have, at least, taken such steps as will guarantee them against a sudden advance. The clothing manufacturers have wisely purchased for their future wants; in fact, in almost every avenue of activity this policy has been pursued. The users of Lake ore have already bought five and one-half millions of the seven or eight million tons of ore they will want this year. The users of steel blooms and billets have bought so far ahead that manufacturers are now declining to make further contracts, excepting for very strong reasons. The Southern pig-iron makers are debating with themselves whether they will accept orders for pig-iron to be delivered next summer or wait a few months. Scores of illustrations of this sort could be enumerated. In many quarters this policy is believed to be an unwise one. Experience has shown it to be a safe one.

The iron industry, as a whole, is on a very permanent foundation. Manufacturers are hurrying to complete new works; lumber manufacturers, especially throughout the South, are stimulated to the greatest exertion by two new causes: First, a strong demand throughout the North for the superior lumber-mill products of the South; and second, a wonderful expansion of local demand in the South arising from the new industries there. The makers of nearly all kinds of machinery are busy with new work, fully one-half of which is for delivery in the new Southern or Western States. The manufacturers of steam-pumps, the manufacturers of appliances for new fuel-gas processes, the builders of heavy machinery for steam and electrical purposes, the manufacturers of hoisting-machinery and of machinery for mining purposes, as well as of machinery for general shop-use, have been booking more business since the 1st of October than their present shop-capacity will allow them to execute. Consequently, a general system of enlargement is in progress. Contracts have been lately given out for the construction of

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machinery to make machines of larger than usual dimensions. Our industries are being reorganized, and instead of engines of five, ten or fifty horse-power, engines of fifty to five hundred horse-power are now common. Agricultural operations are conducted by the aid of machinery upon a larger scale, and within the past six months a score or more of establishments for the manufacture of agricultural implements have been equipped with machinery, and facilities in the Western States, that indicate more clearly than anything else can do the magnitude and scope of our agricultural interests. Last year the rolling stock of the railroads was increased by some 54,000 freight cars, but it is probable that the additional orders this year will reach 100,000. The managers of several of the Western railroad systems have decided to erect repair-shops along their various systems, by which repair work and new work can be more expeditiously and economically done. The springing up of so many little industries along these new lines is creating local markets for farm-products. Last year the opening of coal mines, to the number of about sixty, promises a sufficient supply of coal to these new communities at a low cost. These encouragements are stimulating the outflow of population from the older States, and it is this outflow, coupled with the better conditions for living in the West through the development of industries, that is equalizing in such a healthy and natural way the great manufacturing and agricultural forces. By this growth of little industries, mechanical, mining and railroad, the decline in the value of farm-products is checked, or possibly altogether prevented; or, at least, the demand arising from this cause enables the farmer to obtain the very best possible price for what he has to sell. It is not out of place, at the opening of the year, to briefly direct attention to these forces acting beneath the surface. The manufacturer and merchant have nothing to fear from hidden destructive agencies. During the past two or three years several threatening commercial evils have arisen only to disappear by a self-correcting agency which seems to develop itself at the right time. The merchants and manufacturers of the New England and Middle States will find, this year, a much more valuable market west of the Mississippi than last year. The increasing demand for all kinds of raw material there during the past few months is a sure indication of the growth of a great market for the shop-products.

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