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THE AMERICAN ARCHITECT AND BUILDING NEWS.

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JANUARY 8, 1898.

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THE new Boston building-regulation, under which all tenement and apartment houses must be of fireproof construction, has been the occasion of a certain amount of interesting discussion. The law was enacted with the usual clause, reciting that it should take effect on its passage. By Massachusetts usage, this means at the expiration of thirty days from the time when the Governor's signature is affixed to the document; so that proprietors of apartment-houses had about five weeks, exclusive of the time occupied in the discussion of the measure, to prepare themselves for evading it. The rule commonly followed in such cases is that where plans have been filed and permits issued before a new building-law goes into effect the structure may be erected according to the law in effect at the time of granting the permit; and it was obviously desirable for speculators to secure permits for building apartment-houses with wooden floor construction before the act compelling the use of iron and terra-cotta should take effect. In many cases, after the plans were filed and permits issued, the persons to whom they were issued took no further steps to carry out their plans, regarding the permit as a valuable asset, which they might use later, if they wished, to enable them to build with wood where their neighbors and rivals were compelled to use iron. One or two operators, indeed, openly advertised for sale lots for which permits had been obtained for apartment-houses of the so-called "second-class" or wood construction, as if the possession of these permits enhanced the value of the land. Meanwhile, the builders who deferred making their plans until the law went into force, and who have arranged, in conformity with it, for fireproof construction, now find that they will be obliged, when their buildings are done, to compete for tenants with the owners of neighboring buildings, erected at the same time with theirs, but of much cheaper construction. Naturally, they regard this as an injustice to themselves, if not as an evasion of the law on the part of their competitors. So far as the Department of Buildings is concerned, it is obvious that the Commissioner has no right to delay the examination of plans, and the issue of a permit, in anticipation of a change in the law which has not yet taken effect; and all permits must be issued in conformity with the law as it exists at the time when his official action is taken; but the question of the length of time during which a permit shall retain its vitality is one which, so far as we know, has never been submitted to the courts, and must probably be solved by legislative action.

THE most suggestive commentary on Colonel Waring's management of the Street-cleaning Department in New York is to be found in the fact that the death-rate of the city was lower last year than it has ever been since a record of it was kept. There are, however, certain details of the processes by which this result has been accomplished, which are to be found in the annual report of the Department, just published in the *City Record*. It will be remembered that, under the present municipal regulations, ashes and garbage are collected separately in New York, and the garbage is mainly disposed of at the works of the Sanitary Utilization Company on Barren Island. The ashes and cinders are, at present, thrown into the sea, but the Commissioner proposes a much more rational way of disposing of them, which is not only interesting, but novel, so far as this country is concerned. Analyzing the contents of the New York ash-barrels, he finds that they include, on an average, twenty per cent of recoverable coal, fifty per cent of fine ash, and thirty per cent of coarse ash, clinker and stone. Twelve hundred thousand cubic yards of ashes are collected in New York, every year, at a cost of six hundred and forty thousand dollars. The cost of separating this into its component parts, ready for utilization, would be about one hundred and fifty thousand dollars, which must be added to the cost of collection. The result of separation would be, however, to furnish on the city's premises, ready for sale, one hundred and forty-four thousand tons of coal, which, at two dollars and a half a ton, would be worth three hundred and sixty thousand dollars; six hundred thousand cubic yards of fine ashes, worth, at twenty-eight cents per yard, one hundred and sixty-eight thousand dollars; and one hundred and eighty thousand yards of clinker, worth, at seventy-five cents a yard, presumably for concrete work, one hundred and thirty-five thousand dollars; the total value, at these prices, being six hundred and sixty-three thousand dollars. Adding the cost of separation to that of collection, the city would thus save five hundred and thirteen thousand dollars a year. It may be asked how fine ashes could be sold, even at so low a price as twenty-eight cents a yard, but Colonel Waring points out that ashes, mixed with lime, make a mortar stronger and lighter than lime and sand, and that the dealers who manufacture the machine-mixed mortar, now almost universally used by builders in New York, would probably be glad, if the substitution could be legalized under the building acts, to take and use a material which would enable them to supply a mortar, as good as their present product, at less than two-thirds the price.

THE Councils of the City of Philadelphia have under consideration an ordinance, providing that aisles in theatres, public halls and places of amusement shall not be less than six feet wide. Of course, the intention of this ordinance is to make escape easy in case of fire, but it is by no means certain that its enforcement would have such a result, and so many other evils would be induced by it that we should be sorry to see it adopted. In general, freedom of movement through a room is not so much promoted by widening the aisles as by increasing their number; for the reason that a crowd of terrified people, all pressing to be first, will crush and trample each other, even in an open street; and a six-foot aisle, which may be completely blocked by six persons, wedged in like an arch between the seats on each side, only serves to accommodate a greater number of frantic fugitives than a narrower one. As every architect knows, schoolrooms with single desks, in which each row of desks is separated from the next by an eighteen-inch aisle, are extremely favorable to orderly and rapid circulation. As the children can only pass through these aisles in single file, there is no wedging caused by those behind trying to get past those in front, and the movement goes on steadily, but with a quiet rapidity that is rather surprising to one who sees for the first time a fire-drill in a good school. There is no reason why a similar system of narrow, but numerous, aisles should not be applied to theatres with equal advantage; and it is to be remembered that a six-foot aisle, terminating at a six-foot door, is sure to cause crowding and confusion at the door, through the instinctive hesitation which checks most people at doorways; while a twenty-inch or two-foot aisle, terminating at a door of ordinary size, keeps clear, as, in case

of hesitation of any person at the opening, the next in file can easily pass him and escape.

ANOTHER grave danger in increasing the width, rather than the number, of aisles in places of amusement is that they are sure to be encumbered. The strictest police regulations are insufficient to prevent the obstruction, by persons sitting in chairs, or on the steps, of the aisles in theatres as at present arranged; and if obstruction, which any person of ordinary prudence can see to be dangerous, cannot be prevented, it would be tenfold more difficult to prevent the obstruction of aisles of what would seem a preposterous and unnecessary width; while, as the increased width of aisles would involve a considerable loss of seating-room, and, in consequence, an appreciable inroad on the manager's pocket, his interest would lead him to wink at evasions of the ordinance, which he would not tolerate where they might be the cause of inconvenience to his patrons.

THE work of restoring and making secure against fire the old part of the Massachusetts State-house is now substantially completed, and the structure is once more occupied. Meanwhile, it has been decided to apply a somewhat similar treatment to Independence Hall, in Philadelphia, which has been altered and added to in a way to make its present appearance quite different from that which it had at the time of the Revolution. While the central portion has not been materially changed, the wings, one of which was built in 1735, and the other two years later, have been so transformed that it will be necessary almost to pull them down and rebuild them, to restore them to their original appearance. This work has already been begun, and will interest the public, as well as those immediately concerned. Some one was thoughtful enough, at the beginning of the operations, to put up a notice, requesting workmen to take at once to the contractor all ancient objects found in tearing down the old work; and in a few days a flint-lock musket, a chain-shot, and an ordinary round cannon-ball, which had been discovered in cavities in the brickwork, were brought in.

ARCHITECTS and engineers who have ridden through the Boston Subway have probably observed with interest the method by which the sides of the excavation are held firm against the pressure of the outside earth, without encumbering the space with a thick retaining-wall. In brief, the system employed consists in setting against the bank of earth vertical I-beams, something more than three feet apart, which are secured at the top to the overhead structure of the Subway, and are, presumably, held at the foot by being inserted into the mass of concrete which forms the bottom of the tunnel. It is evident that a short, vertical steel beam, held fast at each end, resists earth pressure very advantageously, and it is only necessary to turn arches, of concrete, brick or metal, as the case may be, between the beams, to secure a very effective retaining shield, which occupies only a fraction of the space which would be required for an ordinary retaining-wall, acting merely by inertia. Recently, a similar system has been applied to the waterproofing of cellars. As every one knows, the waterproofing of basements below the level of high tides is, in the seacoast cities, generally accomplished by lining the walls with asphalted felt, in several thicknesses, with melted asphalt, or some similar composition, spread between the layers; and, as the pressure of water from the outside would soon force in the felt, if unprotected, it is lined, inside, with a wall of masonry, the thickness of which is proportioned to the probable hydrostatic pressure to be resisted. In practice, this thickness usually varies from sixteen inches to two feet or more, and it is hardly necessary to say that, in consequence, the waterproofing of a basement subtracts a good deal from its available floor-space. Under the new system, equal efficiency is obtained, with much less sacrifice of room, by making the interior retaining shield of steel beams, set vertically, and filled-in with concrete arches, after the fashion of the Subway lining, but with the difference that, as an ordinary basement does not afford a secure overhead attachment for the beams, they are held at the top by expansion bolts, set into the foundation-walls of the building. It is easy to calculate the necessary dimensions of beams to be used in this way, and the result of the calculation will show that, by using beams near enough together, the thickness of the shield may be reduced to a small part of that which would be required for a retaining-wall of the ordinary kind.

THE city of New Britain, Conn., which contains about twenty-five thousand inhabitants, discharges a part of its sewerage into a stream called Piper's Brook. A certain Belden, who owns a farm situated on Piper's Brook, finding that his cows would not drink the water of the brook, after the New Britain sewage had been turned into it, sued the town for damages. The suit has just been decided, by the award, in his favor, of seventeen hundred dollars and costs; and, as the continuance of the injury would, of course, occasion renewed damage, the municipality of New Britain has already voted to authorize the mayor to appoint a committee of three citizens to consider the problem of local sewerage, with power to employ experts. As several other towns in Connecticut are in much the same situation as New Britain, it is likely that sewerage schemes will be much discussed in the State for the next few years.

MR. WILLIAM JAMES LINTON, the most celebrated of modern wood-engravers, died in Connecticut a few days ago, at the age of eighty-five. In these days of process-plates few people know or care much about wood-engraving as a fine art; but in the early part of the career of the *Illustrated London News* Linton's beautiful work formed one of the greatest attractions that its managers could offer, and the wide circulation of that journal spread his fame all over the civilized world. Linton was, however, of an active and enterprising character, and interested himself in various schemes, political and otherwise, which did not always prove successful, and in 1867 he came to this country, settling finally in New Haven. He found generous appreciation here, and his youthful enthusiasm being a little spent, he lived quietly in his house at East Rock, winning universal esteem. Yale University made him a Master of Arts, and he was elected to the National Academy of Design, the American Society of Painters in Water-colors, the Century and the Grolier Clubs. His leisure moments were employed in literary work, and he published an admirable book on the "Masters of Engraving," besides several volumes of poems.

THE recent alarm about yellow fever in the Southwest demonstrated the necessity of some national regulation of health matters. The spectacle of the inhabitants of one State promenading their frontiers, armed with shot-guns, to keep out the inhabitants of a neighboring State, in some remote part of which a few cases of sickness, of a doubtful kind, have been reported, or of railroad trains being forcibly stopped at a State boundary, and their passengers sent back, or turned adrift, is one which, we hope, may never be seen again in this country; but it is certain that, unless inter-State quarantine, at least, is put into the hands of the national Government, every outbreak of the ridiculous panics which seize ignorant people in presence of what they imagine to be an epidemic will be followed by amateur defensive measures of this sort, involving the temporary ruin of commerce, and incalculable loss and suffering to innocent persons. So evident has this become that the New York Board of Trade has appointed a committee to inquire into public feeling on the subject, with the idea, if the replies to its circulars are favorable, of bringing the matter before Congress. It is much to be hoped that its efforts may meet with a suitable response.

A SCOTCH Company has thought of a novel way of utilizing an abandoned railway tunnel. It seems that a bankrupt road owned a tunnel, about three quarters of a mile long, which was sold, together with its other assets. A corporation was formed to buy it, and three thousand tons of loam, well enriched, were carried into it, and planted with mushroom spawn. The place being dark, damp and warm, the mushrooms grow finely, and a narrow-gauge track, made from the rails and ties of the original railway, is laid not only through the tunnel, but, over the old road-bed, as far as Edinburgh, where the crop is marketed. As a mushroom-bed in good condition produces a fresh crop every night, the business is flourishing, and, presumably, profitable. A somewhat similar use has been made of an abandoned railway-tunnel in Roumania, which is rented for storing wine, and brings in a good income.

THE IMAGINATIVE ELEMENT IN LANDSCAPE.

IN the enjoyment of natural scenery the element of association is a main factor. It is impossible to say how far it goes in the forming of æsthetic impressions, as distinguished from those purely sensuous attributes of a scene that are produced by qualities of line and shape, of color, light and shade, atmosphere and sunshine, accent and mass. These qualities play upon the mind in varying modes and combinations of rhythm, harmony and effects of contrast, stimulating the imagination and calling up corresponding forms of association in a way that defies anything approaching analysis.

These associative influences vary, of course, according to individuals, to race and to circumstance. We know that with a people like the Japanese, for example, such influences play a greater part in the production of æsthetic and even ethical impressions than do the directly sensuous qualities. Every delicate variation in line, form and tint in a given natural object seems to convey a corresponding imaginative attribute, making the visible thing but the symbol of a mental actuality. Hence everything material has its equivalent concept in the imagination, made up of a complex of fine meanings and shades of meaning. The latter, with that people, is the reality and the material object is but its token.

With us, the influence of natural objects is more direct, and while the effects of association are very great, yet the influences are exerted so unconsciously to ourselves that we are not aware of the important part they play — indeed, not sufficiently aware to appreciate their value in our modern life. In natural scenery we have a refuge from the artificial conditions of our high-pressure civilization. Its enjoyment is like a soothing bath to a fevered system; its contemplation, acting upon the senses and playing upon the mind in corresponding measure, attunes the being afresh and restores the normal balance of our physical and moral natures, so intimately interwoven. The meeting of this need constitutes the great service of large public parks. These, when properly treated, are precious examples of pure nature, restored and idealized in a way to make the most of their possibilities; a fact that makes them necessary to the well-being of every modern urban community. This end, therefore, must chiefly be held in view in their design and their adaptation to the most extensive and varied use by the public.

The things from which refuge must be sought are the nervous irritations that come from daily friction with the thronging multitude; the spectacle of and participation in its struggles, its perplexities, its cares and worries; the noise, excitement and confusions that make up the grand, discordant turmoil of the city scenes. It is evident that, to afford the desired relief, the opposites of these must be offered so far as possible.

Absolute Nature would seem to be the ideal, with the presentation of scenes in which we can surrender ourselves to her influence without reserve, as freely as though cradled upon the billows of mid-ocean, with only the water about us and the sky above us. But this is manifestly unattainable, as a rule; we cannot escape from our fellows, their presence and the evidences of their existence. We are thus brought to consider to what extent may Nature, as modified by man, be enjoyed in a way to produce the results that we seek.

Man is really as much a part of nature as any other thing or being; as the birds of the air, the fishes in the sea, the beasts of the forest. It is from our fellows as divorced from Nature, from the friction of those artificial relations which are not so much association as lack of association, that we seek escape. For example, the happy groups that we pass in a public park, enjoying the same relief as ourselves, do not jar upon our sensibilities as do the pushing and hurrying throngs that we meet in the city street. In the same way, the marks of man upon the landscape, though bespeaking the touch of his hand as plainly as writing upon a page, may be so related to nature as to accord harmoniously with the scene, if not to seem as spontaneously a part of it as the trees and the rocks.

There are few things more hideous than the gashes cut in a landscape by a railway. Yet even a railway may often have beautiful and even extraordinarily impressive aspects. The writer once stood upon the verge of a precipice in Mexico overlooking a great valley filled with a dense tropical forest. From his feet the course of a railway line could be traced far into the distance on its way to the Gulf coast, curving hither and yon, appearing and reappearing at successive stages on the mountain slopes until it returned to a point directly below with a difference in level of more than a thousand feet; thence making a grand avenue through what appeared to be a magnificent primeval forest, but which in reality was a coffee plantation, and then again looping itself over the landscape until lost behind the projection of a distant range. This line of railway and an *hacienda*, where, a few miles away, an irregular area of the golden green of sugar-cane fields contrasted itself with the deeper verdure of the forest, were the only evidences of man's handiwork visible in all that vast expause, which had an awesome sublimity in its beautiful solitude.

These slight inscriptions that man had made upon the face of nature by no means diminished the impressiveness of the scene. They were too trifling to be discordant. Here was the first part of our continent where Europeans had established their empire. Yet, after nearly four centuries, these were the only visible manifestations of the invaders to be seen in looking down upon the world they had conquered, and there was nothing which a single decade of abandonment might not totally efface from the field of vision. Placed in contrast with the grandeur of nature, against which they were as naught, these touches from human hand enhanced the impressiveness of the view. Again, with all their slightness these marks had mightiness of their own, suggesting the power of man in the world and the majesty of the dominion whose fabric was woven of such cobweb filaments as these!

In the rural or wilderness places where we seek refuge from the distractions and harassments of everyday life the success of our quest depends upon the degree to which we can keep from intrusion the evidences of that life. In perhaps nearly all the great parks that environ many of our cities, or which even form islands of nature in their midst, the hum of activity is more or less perceptible. It comes to the ear in the distant murmur of traffic, or in intermittent sounds like the shriek of locomotive whistles, faint in the farness. But the noise is accompanied by a sense of remoteness, of escape from the necessity of obeying or heeding its voice, and it may even seem subdued to a cadence as harmonious as the voice of the sea, gaining a rhythm of its own, like the sound of the wind in the woodland. Even the locomotive calls may appear but as the cries of animals in the forest. And so we learn the lesson that the multitude of discords contained in the clamor of the world of toil and strife are but elements in the all-embracing concord of the universe, in which each note finds harmonious relation. This is by no means to say that these urban sounds are elements to be desired. The greater the approach to the calm of rural solitudes, the better.

It is indeed a pity that all about New York's Central Park the "sky-scrapers" of modern architecture now so lift their heads that in hardly any part of that noble pleasure-ground can escape be found from an urban environment whose altitudes were never anticipated by the designers of the park, so that against them the loftiest foliage screens would prove ineffectual. But even here the rural scenes that surround one, the lovely glades and the ideal vistas, interpose a barrier against the ruthless intrusion of these constructions and help one to maintain a sense of apartness from the fevered and sordid existence without the pale.

In great public pleasure-grounds that stand more remote from the centres of urban activity this sense of apartness may approach nearer to the absolute. In places like Middlesex Fells, Lynn Woods and the Blue Hills around Boston, public reservations which reckon their acreage by the thousand, there are hundreds of spots where the feeling of the wilderness is scarcely disturbed. In such places there is nothing to mar the impression of pure nature. But the outward prospects from these pleasure-grounds form an important element in their use. These prospects may contribute very essentially to the range of sensation which belongs to the proper influence of these grand open spaces. In certain directions, for instance, the eye may roam miles and miles away to distant hills and mountains, with expanses of woodland between, where the hand of man seems to have made slight impress through generations of occupancy, and there is apparently no more break in the continuity of wild nature than in the briefer vistas within the reservations. In other directions the ocean spreads in its infinitude, with its bays and estuaries, carrying thought in calm flight to lands and worlds beyond.

Again, however, looking elsewhere, the great city covers the landscape with its expanse of buildings. In this huge sea of humanity, whose surging life finds synthetic expression in the mass of buildings that, with something akin to movement, seem to break wave-like against the valley slopes, there is likewise an element of tremendous impressiveness. To the distant beholder the city's remoteness gives it, also, its place in nature.

The various views of distant urban scenes in which disturbing details and unseemly foregrounds are lost, in which the ugliest constructions are effaced by the general effect of the mass in which they are blended, are therefore something to be regarded in plans of park development. In their relations to surrounding landscape they may form elements in the scenery as valuable as they are important — for instance, in the manner in which the broken surfaces of a widespread city catch the light at different hours of the day and under varying atmospheric conditions, and accordingly weave themselves into manifold effects of texture; or the picturesque vistas of the variety of architectural compositions formed by the towers and spires, and masses of buildings, framed in the foliage of a woodland opening. An example of this may be cited in a certain view from the Bears-Den Road on the southward slope of Middlesex Fells: the glittering dome of the State-house crowning Beacon Hill six miles away, the Blue Hills beyond, and the urban landscape continued hitherward almost to the foot of the declivity. From another point-of-view in the same reservation a notable picture is formed by the Tufts College group of buildings in Medford, accented by a graceful tower. Other striking outward views are those of Melrose town in its rock-rimmed valley, seen from the crags on the east; and of the charming suburb of Winchester in the beautiful Mystic Valley, with its chain of lakes, from the bordering hills on the west. Scenes like these, far from forming unpleasant reminders of the urban life that has been left behind for a few hours of free companionship with nature, will doubtless, to most minds, be found to possess a heightened charm apart from their great picturesqueness. This charm lies in the emphasis given to the sense of relief from the conditions obtaining in the outside world, tinged with an indifference to cares left behind, much like that with which a dweller in Paradise might regard the forsaken scenes of his earthly life.

SYLVESTER BAXTER.

VISITS TO SCIENTIFIC INSTITUTIONS IN EUROPE.[1]

IN an emergency caused by a disappointment to your Programme Committee, I agreed to say something to you about some of my visits to certain scientific institutions across the water. That one which, if I could tell you the whole story, would perhaps be the most interesting of all to this audience was the Imperial Institute at Berlin, the Physikalisch-Technische Reichsanstalt. It was planned mainly by the great Hermann von Helmholz, and was founded by a most noble donation from Siemens, whose name is well known to all electricians, as well as to other scientific men.

This institution is under the care of the Government. It is, as its name declares, an Imperial Institute. Its duties are twofold, as the adjectives in its name may indicate. One part of its functions is the study of many refined physical problems, some of them too extensive or too costly to be dealt with by private means, or even by the semi-public means of the great German universities. Another important labor of the institute is the verification of almost any precise mechanism or apparatus submitted to it for the purpose.

In order to illustrate to you the extent and variety of the work done in the Reichsanstalt, I took the published list of the work accomplished by it during the year in which my visit fell, and began to copy the titles, but it is too long to read to you.

Among the more strictly scientific labors it was pursuing, I will name a few. It was engaged in measuring the expansion of water more accurately than had been done before. It was measuring the weight of a cubic foot of steam, with reason to hope that the accuracy attained would surpass that attained even by that great master of accuracy, the famed Regnault. It was studying the change of elasticity of a glass bar or tube caused by changes in temperature: its elasticity at the freezing-point and its elasticity at the boiling-point of water differ 10 per centum in some of the glasses which were used, and but 1 per centum in others. It had prepared a most elaborate normal barometer, and had compared with this the working barometer which is used for all ordinary purposes. It had made three series of measurements of the expansion of the three steel screws used in Fizeau's wonderful apparatus for measuring expansion. All this is work of a high order, and it is work very necessary to have done; and the Reichsanstalt has the facilities for doing it. They have a personnel of men competent to do it, and the superintendence of a man well fitted to lead in the doing it.

As a sample of the other kind of work done there, almost anything which you can mention as desirable to be verified can be verified there. They verify thermometers, or determine their errors and furnish a table stating what corrections are needed for these errors. They verify the accuracy of screws; the leading screw of a lathe, for instance, or the screw of such a micrometer as has been made by two of our past presidents for the Yerkes Observatory. They measure the expansion of steel bars designed to become scales by receiving an accurate graduation into millimetres or other lengths, or to be used in making an astronomical pendulum. Riffler, for instance, has had the expansion of the steel rods of his pendulums determined in the Reichsanstalt. They investigate alloys desired for special purposes, or required to possess certain specified properties. One gentleman desired an alloy which should have no magnetic properties, and the Reichsanstalt studied the matter and furnished such an alloy. They investigate gyrometres, instruments for indicating the number of revolutions of a rotating axis by a continuous indication. They verify tuning-forks. If one is constructed to make 500 vibrations in a second, they can determine the actual number almost to the hundredth of a vibration in a second. They determine the durability of incandescent lights, and also their efficiency. All such questions and such forms of apparatus are submitted to the Reichsanstalt, and you would be surprised to learn for how small a fee the desired information is afforded. As you see, this is a pretty wide field of activity. In order to do such work, they employ a great number of trained scientific men. In Germany a trained scientific man will accept such a position, because it is considered honorable, and because it gives him a recognized and desirable social position. So the institution can command a high degree of talent and training for its work.

One day I met, in Berlin, two Americans whom I had the pleasure of knowing in this country, and we visited the Reichsanstalt together. That which most interested us was the magnificent institution as a whole. One most interesting apparatus was one designed for the establishment of a standard of light. You all know that it has been proposed that the ultimate standard of light for all measurements should be the light given out by a certain area of platinum at its melting-point. It will probably be some time before this proposed standard can be conveniently and practically applied. The Reichsanstalt has suggested, and is trying to prepare, an alternative source of light designed as a standard for comparison in all accurate measurements. This standard is one in which a given area of platinum is heated, not to its melting-point but to that temperature at which the quantity of light radiating from it and also passing through a given absorbent screen shall be precisely one-tenth of the whole energy radiated. Their screen consists of a tube, closed at the two ends by plates of quartz of a determinate thickness, and filled with distilled water; and the standard of light which they hope to make practical is to be derived from a given area of platinum heated to that temperature at which this screen of quartz and water shall transmit one-tenth and absorb nine-tenths of the whole energy radiated. In the apparatus which so greatly interested me four different observers were to look, at the same time, at this source of light, each having his different measurement to make.

The apparatus, too, with which they compare thermometers seemed to me a most interesting apparatus. They have means for maintaining constant the temperature of a liquid medium in which they place a number of thermometers to be compared, and the apparatus will maintain some temperatures constant within one-hundredth of a degree for hours. Think of the skill, think of the apparatus required to do that, and then think of a building larger than our City Hall, filled with such skill and such apparatus, and you have a suggestion as to what this Reichsanstalt really is. . . .

The other institution in France which interested me was the International Bureau of Weights and Measures. Some twenty years ago, most of the governments of the larger civilized States united in appointing an International Committee of Weights and Measures, in the hope of preparing accurate copies of the metre and the kilogramme.

There is no measure of length, except the metre, which is not too ambiguous for general use. I once read a statement which had been copied from German into French, and then from French into English, which gave a certain length in inches and thousandths of an inch. I was interested to know the precise length intended. The question to be answered by conjecture was, What foot and inch were those used in the statement — the English (for the statement is now in English) or the Paris foot (for the statement was last in French), or one of the many various German standards of confused length (for the statement was first made in German, and almost every German petty State had its own contribution to the confusion of standards of length)? The only solution of the whole matter was, that the truth could not be learned from the announcement, unless I could find whether the Austrian author had used the Austrian standard, or that of Heidelberg, where he wrote; or that of Leipsic, where publication was made; what course the French translator took, and what the English. If Mr. Warner wrote the statement, and it was published in New York, conjecture would be safe; or if an Englishman wrote and London published. But when you consult the literature of precise measurements which is worth translating, the metre is the only standard of length which is not ambiguous, and the same is true of the kilogramme. How many different pound-weights are there?

Now, as I said, the principal civilized governments united in forming this International Committee of Weights and Measures. This international committee, with the help of a French committee, have performed their task, and the mechanical and physical and practical work has been done a few miles from Paris, at Sèvres, in the Pavillon Breteuil, which was once a fine summer palace. This is now the home of the International Bureau of Weights and Measures. I went there one day, fresh from a long stay in England. In that country, if you desire access to almost any of the places which were likely to interest me, affidavits of respectability, in the shape of letters of introduction, are most essential, and I went to England in such health that letters of introduction were far from my thoughts. I went up to the high fence around the International Bureau without much expectation of getting access. In fact, one day I went there, and went away without even making application for admittance. But on another day, as I approached the gate, a gentleman who had been standing there was just going away as he saw me. He courteously lingered, and turned back to the gate. I told him that I was a stranger, and that I had followed their work with great interest, and wished to see what could properly be shown to a stranger. I could not suppose that he had ever heard my name; but I do not know how a man could have received an acquaintance with more cordial courtesy than he showed me. He welcomed me; he introduced himself to me, and introduced me to the head of the Bureau and to the third of the three scientific men of the establishment. Then the three took turns, each showing me that part of the equipment with which he was most conversant. I saw nothing abroad which interested me more than this institution, but I could not hope to transfer this interest to you without diagrams and photographs. There was the comparer with which they have verified the length of those wonderful platinum-iridium metres, of which our own Government has received two or three. I had seen the metres which our own Government received. I had been invited to Washington, to be present when the standard metre was to be unpacked from the box in which it had been sealed at this International Bureau at Sèvres. The superintendent of the Coast and Geodetic Survey, desiring to have some ceremony testifying to the importance of the event, had asked the heads of the bureaus at Washington whose duties made them interested in standards of length or weight, and the presidents of societies of engineers, and some of us plain professors also interested in such standards, and I had the honor to be among the latter. The seals were broken in the Cabinet-room by the President of the United States and his Secretary of State, and an instrument was drawn up and attested by the signatures of all the gentlemen present. That was my first acquaintance with the platinum-iridium standard metre of the United States, and it was most interesting to see the apparatus used in making it the most authoritative standard of length now existing within our country. I saw also at Washington

[1] Extracts from a paper by Prof. Edward W. Morley, Ph. D., LL. D., before the Civil Engineers' Club of Cleveland, and published in the *Journal* of the Association of Engineering Societies.

the platinum-iridium kilogramme which had also been scaled up at Sèvres and sent to this country and opened at the same time. On my visit to Sèvres I saw a most consummate flower of mechanical skill in the four balances with which the work on that kilogramme and on the smaller weights, required in the investigations, had been accomplished. These were balances nearly like the one which I used for some time. They have brought a new precision into the art of weighing. I suppose scales which weigh a ton of coal within ten pounds are as accurate as commercial scales of that capacity need to be. Now, scales weighing a ton of coal would have to indicate the difference produced by adding to their load a piece of writing-paper a quarter of an inch square, in order to equal, in precision and delicacy, the four balances which I saw at Sèvres. One illustration of their accuracy has been mentioned several times. I have mentioned it in this place. I may remark that I once heard this illustration repeated, to my no small amusement. I sat at a banquet and heard a physician of this city tell of a wonderful balance in one of the departments at Washington, which had the degree of accuracy which I will mention shortly, and I sat pleased and silent, for that balance was in my laboratory, and there was none at Washington. The story which the physician told was this: These balances are so delicate that, if you first put two one-pound weights side by side on one pan and counterpoise them, then, if you put one of the two weights on top of the other, the counterpoise will be too heavy, for one of the weights is now farther from the centre of the earth than before, and the action of gravity on it is lessened. Such an infinitesimal as this is quite within the delicacy of the instrument. I do not mean to say that one, or even ten, weighings would be sufficient to determine so small a difference. It is to be detected only by long and painful labor. But the error produced by weighing two pound weights, sometimes side by side and sometimes one upon the other, is a quantity *capable* of being detected by this balance, and it is a quantity which is to be considered in the reduction of all weighings made with it.

There was a barometer there the like of which has not been produced elsewhere, and an air-thermometer like the barometer. Regnault said, some fifty years ago, that between the freezing and the boiling point of water it was hard to measure a temperature much closer than a tenth of a degree. And he was right. But the Bureau at Sèvres has labored at this matter until, within those limits, it is possible to measure to the hundredth of a degree more accurately than to the tenth of a degree fifty years ago. A great increase of our knowledge of the behavior of materials will thus result from the investigations at Sèvres. . . .

One matter of which I wish to speak is the Royal Institution in London. If there is any place in London in which an American ought to feel at home, it is the Royal Institution. It was founded by an American, Benjamin Thompson, afterward Count Rumford, of the Holy Roman Empire. I do not know what was his precise aim. The institution is now somewhat unique. It is in some sort a scientific and literary club. Any one seems to be elected to membership on application, I think as freely as he could be admitted to our Case Library on paying his fee. The building has a library and a pleasant reading-room, well supplied. It has also a good many Americana, including letters from Franklin and Washington, as well as other matters especially interesting to Americans. It has also important laboratories, in which some of the most memorable work yet done in science has been accomplished. You will agree with me when I recall to your minds that here Sir Humphry Davy worked and here his greatest discovery succeeded him in the person of Michael Faraday. At the present time Dewar is professor of physics here, and Lord Rayleigh, the discoverer of argon, is professor of chemistry. Lord Rayleigh's work is done at his private laboratory, an hour from London, which, of course, I could not see. . . .

One other place which I visited in London was the office of the Warden of the Standards. London is a place which has grown. There is but little there which was built to order for its present use, one is tempted to think. Things are not often torn down in London; they are strong and lasting enough to be used for another purpose. And this Bureau of Weights and Measures, the office of the Warden of the Standards, was most interesting for this reason: One of the rooms in which standards are kept which have come down from the time of Queen Elizabeth is a chapel which is 600 years old. The very word "old" has a different meaning in England from that which it seems to possess in this country. Here the word "old" carries with it the suggestion, "Throw it away; get something new." With them the feeling is, that what is old is sacred, endeared, consecrated. The phrase "old fellow," as a term of endearment, was not invented on this side of the water. There it is at home; it is appropriate. I soon began to feel that there is no hope of salvation for a man in England who goes to a church less than 200 years old. In that old and venerable chapel, worthy of veneration, the old pound weights, the old gallons of Queen Elizabeth's time, seemed consecrated; seemed to have a glamor of romance and poetry about them. I never knew, till after visiting such scenes and seeing in them these special objects, how the meaning of the English language may change with change of longitude.

A NATURAL HOT-WATER HEATING SYSTEM. — Boisé City, Idaho, is to pipe into its houses warm water of 170 degrees temperature from a subterranean lake 400 feet beneath the surface. — *N. Y. Evening Post.*

A MODEL HOSPITAL FOR WORKMEN.

A CORRESPONDENT of the New York *Evening Post* says that M. Gouin, of the noted Gouin Construction Company of Paris, has recently completed, at a cost of $320,000, a magnificent addition to his social schemes, and one which is intended to benefit not merely his employés and their families but the whole working population of the Clichy quarter. This addition comprises a surgical hospital (with dispensaries for out-patients), besides two blocks of what are known in France as "habitations économiques," or model tenement-houses. The buildings — the hospital and the tenements — stand on opposite sides of a square which has frontage on four streets and are separated by a large, beautifully-laid-out garden. The hospital, which is literally surrounded by gardens, is so placed as to have a great number of sunny rooms. It sounds like a commonplace to say that it fulfils the strictest requirements of medical and surgical science, but when I showed it the other day to an American gentleman who has devoted much of his life to the improvement of hospitals, and who therefore looked upon every detail with the eye of an expert, he pronounced it "altogether and absolutely perfect.

The hospital, it must be understood, is not intended for paupers, but for self-respecting people of the working class. The surgical attendance is free, but patients pay for their board — 50 cents per day if in a ward or a $1 in a private room.

The two model tenements are five stories in height and contain sixty-five flats, each of them consisting of a good-sized vestibule, either one or two bedrooms, a kitchen, and a water-closet with abundance of water, besides a locked compartment in the cellar. There is not one dark room in either house, nor a single window that looks upon a court. Every room faces either the street or the pretty garden to which I have alluded; and the corridors and staircases are as well lighted as the flats. In each kitchen is a convenient little cooking-range (which takes up less space than a stove), gas and water, the latter being supplied from an artesian well 280 feet deep, another of M. Gouin's constructions. The rents in these houses range between $45 and $60 per year, according to the position and size of the flats. And I should add that even putting them at these low figures — at least one-third less than is asked for inferior lodgings of the same size in the neighborhood — this kind of property in Paris yields a net income of 4 or 5 per cent.

ILLUSTRATIONS

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

HOUSE OF W. H. GORSLINE, ESQ., ROCHESTER, N. Y. MR. J. FOSTER WARNER, ARCHITECT, ROCHESTER, N. Y.

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

THE HIGH SCHOOL AS ENLARGED, HARTFORD, CONN. MR. GEORGE KELLER, ARCHITECT, HARTFORD, CONN.

A TOWN-MEETING was held on February 6, 1882, at which an appropriation of $200,000 was made for erecting a new building. Additional appropriations, amounting in all to $85,000, were afterwards made by the town for the purpose of finishing the building and supplying it with furniture, library and apparatus.

The first stone of the foundation was laid on May 12, 1882, and the original building was occupied by the school on January 3, 1884.

The building is in the secular Gothic style, and is fireproof; the basement walls are of rock-faced brownstone; the outer walls above the basement are of Philadelphia pressed-brick, with the dressings of the doors and windows of brownstone. All the floors are laid upon brick arches supported by iron beams; the stairs are of stone, supported by brick arches, and the plastering of the walls and ceilings is laid directly upon the brick without lath. The building is 236 feet long, and averages 100 feet in width.

In the south end of the basement are four rooms, each 31′ x 43′, which are used as playrooms by the boys; in the north basement there are corresponding playrooms for girls. In the front of the basement is a working laboratory for the classes in chemistry.

The first story has four entrances, all with doors opening outward; on this floor are a reception-room, library, principal's office and four school-rooms, each 41′ x 33′, also four dressing-rooms.

The second story, reached by three broad stairways, contains the public hall, 64′ x 100′, capable of seating 1,200 persons; a lecture-room, 30′ x 40′, for such physical and chemical experiments as cannot well be performed in the working laboratories by the pupils themselves; three class-rooms and three recitation-rooms besides.

In the third story the only rooms originally finished were for the use of the classes in drawing and for the boys' debating club, but during the summer of 1890 the third story was finished, giving nine new rooms. One of the largest has been fitted with water and gas and other conveniences as a working laboratory for the classes in physics.

There were two towers, one 126 feet high, at the northeast corner of the building, containing a clock with four dials, another 98 feet high, on the eastern front of the building, containing the astronomical observatory, which is surmounted by a hemispherical revolving dome 17 feet in diameter. This is furnished with a telescope having an object-glass of 9½ inches aperture, made by Alvan Clark & Sons, of Cambridgeport, Mass.

The system of warming and ventilation of the building was planned by Prof. Charles B. Richards of Yale University. Steam is supplied from boilers placed outside the building. All the rooms open into the 12-foot corridors, which divide each story lengthwise, so that the side walls of the corridors are also the inner walls of all the rooms; this arrangement admits of the introduction of warm air to each room at the end farthest from the windows, by devoting the corridor in the basement for its whole length to an enclosed fresh-air duct, into which fresh air is taken at both ends, communicating by independent hot-air flues with each room. The fresh air first passes through radiators at the ends of the corridor, by which it is partially warmed before it reaches the radiators at the mouth of each hot-air flue in the basement.

As far as warming and ventilation are concerned, each room is considered independently. The fresh air, after being warmed, is admitted through openings in the back or inner walls of each room. Supplementary steam-pipes for direct radiation are also placed under the windows in each room. The cooler and partially vitiated air is withdrawn through flues. Each room is provided with six of these 8″ x 12″ flues, four of which are placed near the floor, and two just below the ceiling. These arrangements supply fresh air at the rate of 30 cubic feet per minute for each pupil, and in ordinary weather change the atmosphere every fifteen minutes.

Ample ventilating-flues are also provided in each of the wardrobe rooms, and in these rooms a line of steam-pipes runs along the partition close to the floor, in order to dry the clothing in wet weather.

The water-closets, which are entered from the wardrobe rooms on each floor, are entirely outside the building, and each has its own system of warming, ventilation and drainage, which is also entirely outside the building.

Recognizing the necessity of enlarging the present school building at an early date, in October, 1893, the town purchased for $50,000 all the land adjoining the present High School grounds on the north, with a frontage of 300 feet on Asylum Avenue.

During the summer of 1896 the assembly-hall was divided into four school-rooms, corresponding to the Fourth-class rooms below, and capable of seating 240 pupils.

In November, 1896, the town of Hartford appropriated $160,000 for an extension to the High School Building.

This extension is designed by the architect of the present building, Mr. Keller, and, in connection with it, the plans were made so as to include a Manual Training Building, for which an appropriation has been made previous to the one for the High School Extension.

The High School has an area of 23,500 square feet, while the Extension has an area of 26,000, and the Manual Training Building 8,500 more, so that the entire addition to the High School is nearly one-and-one-half times its original area.

So extensive an addition to a building already complete in itself is not easily done without making the addition apparent; yet the new building is "married" to the old one so skilfully that the façade on Hopkins Street presents one harmonious whole, not suggesting in the least the impression of an addition. The extension will be executed in substantially the same kind of materials, except that the new roof will be fireproof, as well as the rest of the building. The extension is to be connected with the present building, and will extend northerly toward Asylum Street 190 feet, leaving a court in the rear over 40 feet wide for light and air between the new and old buildings. This court is enclosed on but three sides, being open toward the west. On the front, which faces the east, a staircase tower, similar in design to the present clock-tower, is placed 40 feet to the north of it, and the space between on the first floor is devoted to the main entrance to the building, giving ample vestibule and lobby room. This entrance is made a prominent feature of the design, coming, as it does, practically in the centre of a façade nearly 450 feet long. Three wide, round, arched doorways, flanked by the two staircase towers, each 24 feet square and nearly 150 feet high, give a commanding effect to the front.

The present main corridor is continued in a straight line toward the north, and leads to a porch at the north end of the building corresponding to the present girls' entrance. To the right of this porch, inside the building, is another wide stairway leading down to the basement and up to the third floor. The front of the building, west of the main corridor, is occupied on the first floor by two school-rooms and a reading-rooom, each 30′ x 40′, and a dressing-room, 14′ x 30′. The light in the new school-rooms comes from the long sides of the rooms, so that the inner wall is but 30 feet from the windows. On the second floor above these rooms are placed three science laboratories, each 30′ x 40′, with a large store-room, 14′ x 30′, in connection with them. Over the vestibule, between the two central towers, are two recitation-rooms, each 20′ x 20′. On this floor, and on the other side of the main corridor, is placed the new assembly-room, 70 feet wide, 106 feet long and about 46 feet high. It has windows on three sides, and a gallery at the south end. An alcove and teachers' platform is placed at the north, the entrance to the hall being at the opposite end, with side entrances from the corridor. The floor and gallery give accommodations for about 1,400. At the south end of the assembly-hall is a lobby, or corridor, 20 feet wide and 70 feet long, leading directly from the hall to the two central staircases contained in the towers. The physical-training room, or gymnasium, occupies the entire space under the assembly-hall, and is 24 feet high, which is the height from the level of the basement floor to the ceiling of the first floor. Instructors' room, examination-rooms, lockers for boys and girls, and other necessary accommodations, are conveniently arranged in the basement, which is well-lighted. On the third floor is the chemical laboratory, and provision for three class-rooms and additional dressing-rooms.

The Manual Training Building is placed in the rear of the Extension, and 43 feet away from it, and is of mill-construction. It is a two-story-and-basement building, 132 feet long by 64 feet wide. The basement and the first and second floors are level with the corresponding floors in the Extension, and each floor is connected by a covered way, 8 feet wide. The basement is to contain the forging-shop and an experimental laboratory, with an engine-room for furnishing power for the manual-training shops. The second story contains the wood-working and machine-shops, moulding and metal-working shops, besides an office for the superintendent, stock-room, locker, and store-rooms. The second floor is arranged for the drawing-room, modelling-room, carving, sewing, cooking, besides locker, store, and toilet rooms.

The heating and ventilation, which was under the supervision of Prof. C. B. Richards of the Sheffield Scientific School, Yale, is to be accomplished by the fan system, and is to include both the old and new parts of the main building and the Manual Training Building, all from one plant. A large fan is to be provided for supplying air to both buildings, in all the class-rooms and recitation-rooms, assembly-hall, and physical-training room.

This air, before entering the fan, is to be passed over tempering coils, by means of which it will be heated to a temperature of about 65 degrees. Directly in front of the fan (which has a double discharge), on either side, is placed a group of supplementary heaters, those on the east side for the entire main building, and those on the west side for the Manual Training Building.

At each of these supplementary heaters provision is made for causing the air either to pass over this heating-surface or else to pass by without touching it, and two lines of piping are to convey the air from each heater to the several vertical flues in each building; the air which passes over the heating-surface being carried in the lower pipe, which is called the "hot-air" pipe, and the air which passes by being carried in the upper, which is called the "tempered-air" pipe; thus forming what is commonly called the "double-pipe system."

At the base of each vertical flue a connection is made to each pipe, so arranged with mixing dampers that air of proper temperature to maintain a constant temperature in the rooms will be delivered into the flues, the mixing dampers being automatically controlled by the temperature of the room. Supplementary heating-surface is also to be placed in each room under the windows. The corridors and all rooms other than those named above are to be heated by direct radiation. Steam is to be supplied to all the heating-surface in the main building, the old as well as the new part, by a battery of four boilers 54 inches in diameter, two of which are now in use, but will be moved into the new boiler-house. These four boilers are to be run on low pressure of from two to ten pounds, and all returns to them from the direct radiation are to be by gravity. A fifth boiler, 66 inches in diameter, is to be run at a pressure of about sixty pounds, and is to be used chiefly for furnishing power to run the supply-fan engine, an engine for generating electricity, and a special engine for the Manual Training Building.

The indirect heating of the Manual Training Building is to be accomplished by using the exhaust steam from these engines, supplemented by live steam from the fifth boiler, through a reducing valve, at a back pressure not exceeding six pounds per square inch. This exhaust steam is also to be utilized in the tempering coils, for tempering the air before it enters the large supply-fan, and is also to be used in mild weather in the indirect heaters for the main building by means of a by-pass. The exhaust steam will first pass through a feed-water heater.

The returns from all the indirect surface will be trapped into a receiver and automatically returned to the boilers by a pump.

The removal of the foul air from the main building is to be accomplished by a large exhaust-fan in the attic, to be operated by an electric motor, all of the vent flues being connected with a foul-air chamber in the attic, from which the fan delivers the air into one of the towers and thence out of doors.

The ventilation of the Manual Training Building is to be through heated flues in the walls, all of which extend out of and above the roof, and are fitted with dampers just under the ceiling of the top floor.

The electricity which will be generated is to supply power to the large ventilating fan in the attic of the main building, and a few electric lights in engine-room and air-chamber.

COMPETITIVE DESIGN FOR THE NEW YORK PUBLIC LIBRARY. MR. FRANK MARION WRIGHT, ARCHITECT, MT. VERNON, N. Y.

This design was entered in the "preliminary" competition.

ARLINGTON PARK TERRACES, ARLINGTON, MASS. MESSRS. GAY & PROCTOR, ARCHITECTS, BOSTON, MASS.

THIS group of eleven eight-room houses is to be built at a cost of about $23,000.

STAIRCASE TOWER IN THE COURT-YARD OF THE HÔTEL DE VILLE, PARIS, FRANCE. MM. BALLU AND DEPERTHES, ARCHITECTS.

APSIDAL TREATMENT, NO. 28: PARISH CHURCH OF STA. MARIA AND SAN GIORGIO, BRANCOLI, ITALY.

THIS interesting XI-century church can be found in one of the villages near Lucca.

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

SKETCHES IN ROTHENBURG-ON-THE-TAUBER, BAVARIA.

THIS plate is copied from *Architektonische Rundschau.*

HOUSE NO. 3 TIERGARTENSTRASSE, BERLIN, PRUSSIA. MESSRS. MESSEL & ALTGELT, ARCHITECTS.

THIS plate also is copied from *Architektonische Rundschau.*

A GROUP OF ARCADES.

[Additional Illustrations in the International Edition.]

CORRIDOR NORTH OF MAIN STAIRCASE: LIBRARY OF CONGRESS, WASHINGTON, D. C. ARCHITECTS, MESSRS. SMITHMEYER & PELZ; P. J. PELZ; E. P. CASEY.

[Gelatine Print.]

THE decorations in the lunettes, representing "Religion," "Labor," "Study," "Recreation" and "The Family," were painted by Mr. Charles Sprague Pearce.

PORCH OF STA. MARIA MAGGIORE, BERGAMO, ITALY.

[Gelatine Print.]

IN close proximity to the "Capella Colleoni" rises the attractive porch of the north entrance to the Church of Santa Maria Maggiore, being in all 74 feet high, in the Italian Gothic style. Its lower, older portion, dating probably from 1137, in Romanesque forms, is covered by a barrel vault. The upper two-storied portion was erected two hundred years later, in the Gothic period, by M. Johannes de Camplyone, about 1350, being, however, less interesting and less successful in beauty of form than the Romanesque work. The grouping of the statuary appears especially unsatisfactory. It seems as if a better effect might have been obtained by exchanging the respective positions of the horseman and the Virgin Mary and attendants one with another.

MCEWAN HALL, EDINBURGH UNIVERSITY, SCOTLAND. DR. ROWAND ANDERSON, ARCHITECT.

THE plan of the Hall is based on the form of the ancient Greek theatre. The architectural treatment is the same as the rest of the new University buildings, designed by Dr. Anderson, viz., Early Italian Renaissance. The flat side of the semicircle abuts on the Medical School on the west, while the principal elevation is directly opposite on the east. Here is situated the principal entrance, 30 feet in height and 16 feet in width, flanked on each side by double pilasters and crowned by a semicircular pediment containing a carved representation of the ceremony of conferring academic degrees. Besides this, there are six other entrances to the Hall from the outside. The external wall is divided vertically by projecting buttresses, containing niches for statuary. It is divided horizontally into three sections; the lower section is panelled and is pierced by the circular windows which light the interior corridor; the intermediate section is blank, with the exception of one panel, which contains the inscription recording Mr. McEwan's gift to the University.

This section is divided from the upper by a band of Italian ornament, with panels at intervals containing sundry coats-of-arms. The upper of the three horizontal sections is arcaded in red stone, and is surmounted by an architrave, frieze and cornice and an open balustrade. The height of the outer wall from the base to the top of the balustrade is 64 feet.

An interior wall concentric with the outer encloses the Hall proper, and rising above the outer wall, to which it is joined by flying buttresses, supports at its summit the dome-shaped steel roof, which is surmounted by an ornamental lantern 30 feet high. The total height from the street level to the top of the lantern is 130 feet.

The outer and inner walls of the Hall are 12 feet apart. The space between them is, on the ground floor, utilized as a corridor, which gives communication between the various staircases, entrances and exits. The entrance to the principal staircase, which is placed in the south angle, is from the quadrangle of the University buildings.

From the first landing of this principal stair access is gained to the reception-rooms set apart for the assembling of the Senatus Academicus, distinguished guests, etc.

The staircases leading to the galleries are placed in the round projections at the south and northeast angles of the building.

From the corridor on the ground-floor entry to the Hall is gained by five separate doors.

The diameter of the Hall is 106 feet, while the height to the dome light is 90 feet. This gives an ample floor-space and provides abundant room for the placing of two galleries.

The area floor is laid with blocks of oak in patterns, and in order to allow of its being used for other than formal academic functions the seats on it are movable, only around the circumference are four tiers of fixed fauteuils, also in oak.

The wall is panelled in oak up to the height of the first gallery.

At the wall head is a carved stone frieze and cornice, above is a coved clerestory with circular windows 7 feet in diameter, while the whole Hall is covered in with a dome constructed of steel and panelled with wood. In the centre of the dome is a circular light 22 feet in diameter, which, with the clerestory windows, lights the Hall in the daytime.

The flat side of the Hall, that abutting on the new University buildings, is reserved for the platform, and the arrangements of it are especially designed for University ceremonies, as the Hall is primarily for academic purposes. At the back of the platform is a series of stalls, constructed of solid oak, for the members of the Senatus Academicus, University Court, etc., with special seats in front for chancellor, rector and principal.

A magnificent organ, probably the finest in Scotland, has been placed in the hall.

The organ-gallery, carried on carved oak pillars, projects over the back row of stalls, and the great organ is placed immediately above. Two other sections of the organ are placed high up on each side of the platform recess. All these are enclosed in handsome carved-oak cases, gilt and colored, corresponding to the rest of the woodwork of the Hall. A movable orchestra has been constructed capable of accommodating 300 people. The framework is of light steel, the floor and seats being of wood. It is made so as to fit over the stalls on the platform, and can be taken to pieces easily and as easily put together again.

The complete design for the Hall included a great tower at the northwest angle rising to a height of 230 feet. The lower part of it only has as yet been executed; it has been carried up to the height of the roof of the Hall.

INTERIOR OF MCEWAN HALL, EDINBURGH, SCOTLAND. DR. ROWAND ANDERSON, ARCHITECT.

NOTES AND CLIPPINGS

MOVING A HUNDRED-TON BRIDGE PIER. — The Northern Pacific has an interesting feat of engineering in hand in connection with the big Missouri River bridge, at Bismarck, N. D. The bridge is one of the largest in the country, resting on three piers. The east pier has slid from its original location a distance of several feet, owing to the sand shifting beneath the foundation. Laborers are constructing a new foundation at a depth of 70 feet beneath the level of the river, and the entire pier, weighing about 2,000,000 pounds, will be moved bodily from the old to the new foundation. The bridge will be supported by temporary trestlework while the operation of moving the pier is in progress, and the work of removal will, it is said, be accomplished in a few minutes, without any material delay of traffic. — *Boston Herald.*

DISCOVERIES AT TREVES. — The excavations that have been going on for months past on a plot of ground belonging to Herr Schabb, a manufacturer at Treves, have resulted in the discovery of a Roman private house, which will excite the interest of antiquaries almost as much as the famous public buildings at Augusta Trevirorum. The front of the house lies parallel with the principal street of the old Roman city. A number of blocks which served as pedestals for the wooden or stone pillars of a portico still remain. The entrance is distinctly recognizable between two buttresses and an immense heap of stones. A long entrance hall running right through the house, from front to back, is intersected by another corridor, so that the gigantic building is divided into four parts. Side corridors lead into the rooms. Of these the marble tessellated bath-rooms for hot and cold water and warm air lie side by side, and deserve special mention. The two latter were supplied with warm air through subterranean passages. The escape of the smoke was effected by means of hollow tiles laid on one another. The southwestern rooms have cellars under them. In a light court in the same part of the house there is a well-preserved window, the first ever found in a Roman building. The most interesting thing, however, is the magnificent and richly colored mosaic floor, a rarity of the first order. Experts assign the building to the first half of the fourth century, when Augusta Trevirorum attained the zenith of its splendor under Constantine and his sons. — *Berlin despatch to London Standard, August* 12.

The Lion on the Ducal Palace, Venice. — The new year will hardly have got well on its course when to the Doges' Palace in Venice will be restored the great Lion, erected there by Doge Andrea Gritti, who ruled from 1523 to 1538. To Gritti belongs the honor of restoring to Venice all the possessions she had held before the League of Cambrai. Gritti's monument was this Lion, set up before the middle gallery of the palace on the west side, twenty-three metres from the ground. After the fall of the Venetian oligarchy, vandals swept the lion away. The restored work, from the sculptor Urbano Bottasso, represents a majestic beast, at whose side kneels a Doge in robes of state. — *Exchange.*

The Forgotten Colonial Library. — The tearing down of the building which covered the east wall of Independence Hall has brought forward some unexpected testimony in confirmation of the specifications, as well as some unanticipated facts which are of great interest and importance. The face of this wall shows unimpeachable evidence of a building having existed of which the present generation had no knowledge, and to which reference is made in all old documents, letters, etc., but which had dropped out of sight. It is barely a century since stood fully equipped the "Colonial Library," corresponding to our "Congressional Library" of to-day, from which public men indited their correspondence. Well might Scrooge say, "and are we so soon forgotten?" But it is hard to think that the existence of such a building should have had no record. It has, fortunately, left its own record on the wall of the old State House. Concerning the Colonial Library, Frank M. Etting's "*History of Independence Hall*" says, on page 26, a resolution was adopted in 1752 to place at the southeast corner of the State House a structure for the use of the committees and "for our books." Etting adds that "the absurdity of such a building must have prevented its accomplishment." But here is the unimpeachable evidence that it was built, and the further evidence of correspondence dated from it. It probably went down with the changes made in 1813. — *Philadelphia Ledger.*

The Cathedral of Verona. — In regard to the Cathedral of Verona antiquaries have much disputed. It was certainly completed by A. D. 806, and the epitaph to an archdeacon, Pacificus (who founded seven churches in the city, and was himself a skilful artist in wood, stone and metal), tells that he ordered repairs thirty years after the death of Charlemagne, namely, 844. The apse and lateral walls near the chancel may be of the original structure, otherwise this grand and characteristic building cannot be referred, in any part, to date earlier than the twelfth century. A genuine and still intact specimen of the ninth century is the crypt of St. Zeno, founded to contain the tomb of that saintly Bishop of Verona, by Pepin, King of Italy. With low semicircular vault, supported by forty columns irregular in their shafts and capitals, this sole remnant of the original church embodies an idea yet new in Italian architecture; and a mysterious gloom, a brooding presence of antiquity, gives most impressive effect to those dim aisles and crowded pillars under its low-arched roof. As to the architects of this period little is known, except that the Comasque builders still retained the preëminence and privileges they had enjoyed under the Longobard kings, confirmed to them by Charlemagne, with exemption from all local statutes and burdens; and like favor being extended towards them by the popes, they were allowed to fix their own wages, while practitioners not of their society were forbidden to enter into rivalship against them. — *Exchange.*

The First Colored Civil Engineer. — It is not generally known that Andrew Ellicott's powerful engineer assistant in laying out the plan of the City of Washington was a colored man, Benjamin Baneker by name. Baneker was born and raised at Ellicott City, Md. His remains are in a cemetery there, unmarked and neglected, though he was the first colored man to distinguish himself as a mathematician and civil engineer in the history of this country. He possessed a wonderful genius for mathematics and the exact sciences, and long before he had gained prominence as a civil engineer was the author of an almanac which ranked as standard authority. Among others who were attracted by it was Thomas Jefferson, who freely admitted that the work of Baneker deserved and commanded his praise. Baneker was sixty years of age when he ran the lines for the City of Washington. He is described as a fine-looking specimen of a man, very distinguished in appearance, having a head and suit of white hair not unlike in general appearance to the late Frederick Douglass. He wore a drab coat of superfine broadcloth, and a Quaker hat, with a broad brim. It is not known exactly how much was paid to Baneker for his services, for engineers in those days did not command the salaries of the present times. Ellicott himself only received "five dollars per day and expenses" for his services, which, the records show, Jefferson thought too much. — *Washington Star.*

A Difference of Opinion as to a Holiday. — An illustration of the evils of hasty and ill-considered legislation on the subject of labor is afforded by the condition of affairs on the works of the coming Paris exhibition. The Chamber last year decided that artisans employed on the buildings should be entitled to one day's rest a week, but, fearing demagogues on the one hand, and the influence of clericalism on the other, abstained from specifying any particular day. Three-fourths of the workmen, of course, prefer Sunday, because that is the general day of rest, and it is plain that there would be endless confusion and delay if every artisan could leave work on any day he chose. If, on the other hand, a Sunday rest had been ordered, the radicals would have raised the cry that Sunday observance was enforced on those who wished to work. The law consequently has remained a dead letter, and a recent interpellation in the Chamber resulted in an adoption of the order of the day pure and simple by 330 votes to 169, few of the Deputies caring about meddling with so delicate a subject. The consequence is that the contractors have it all their own way, and that workmen who object to working seven days in the week can make room for others who have no scruples of the kind. — *N. Y. Evening Post.*

Removing the Walls of Mayence. — For more than 1,800 years the City of Mainz, or Mayence, as most people who don't live there call it, has been a walled and fortified place, with most considerations of convenience and commerce subordinated to those of war. At last, however, it has been decided that perhaps the residents of the town will be in no great danger if the ancient bulwarks are taken down. Anyhow, the experiment is to be tried, and as soon as the value of the land on which the walls stand can be settled the work of demolition is to begin. This land, of course, is Government property, and the official assessors think that it is worth $1,000,000. The citizens regard the price as high, but they will doubtless pay the sum demanded, since the rigid cordon is a terrible nuisance to them and a constant obstacle to the expansion of the city. The military authorities of Germany are said to view the matter with indifference, as opinions respecting the strategical value of fortified towns has changed much since the siege of Paris. The present tendency is to attach no importance to fortresses not directly on a frontier, and not even Emperor William thinks of building stone fences around his capital. — *N. Y. Times.*

The Exportation of Antiquities from Italy. — The Rome correspondent of the *Times* writes under date November 26th: An important decision regarding the export duties laid on such articles of commerce as fall under the very vague and elastic heading of "antiquities" has just been rendered by the Court of Appeals in Rome. As is known to all who have attempted to purchase such articles here, the export duty of 20 per cent levied on them by a law which is an inheritance from the Papal Government is not only a grave charge but one which it is sometimes embarrassing to determine, the value of such things being purely fantastic. The law, known as the Pacca edict, applies only to the late Papal territory, each one of the ancient realms of Italy having still its ancient regulation, the duty from Tuscany being 1 per cent, and that from the former Austrian possessions *nil*. The Roman Court has decided that it only applies to such objects as are recognized as "precious," *i. e.*, as of exceptional artistic or historical value. The limitation is as vague as the old definition, and perhaps the best results of the decision will be to compel the Government to pass a general and rational law, under which the possessor of an object having value from its antiquity shall be free to carry it out of Italy. Professor Villari, when Minister of Public Instruction, proposed a sensible and comprehensive law, which, while imposing a small duty and the necessity of a permission to export, for the purpose of controlling the exportation of the heirlooms of the nation, made it indispensable for the Government either to purchase or permit the exportation. This law, like most of those which the public good has called for, has ever since lain covered by the petty legislation for electoral purposes, which impedes all useful reforms other than those demanded by the constituents of the ministerial deputies. If an object is precious and indispensable to the honor or history of Italy, it is reasonable that its exportation should be prevented, but only by purchase, for it is an outrage that a man may not dispose according to his interests or necessities of articles which are his unquestionable property. — *The Architect.*

Cost of the Engineers' Strike. — When the engineers' strike commenced the trunk railways of the country at once suspended some of their mineral trains, the shipbuilding industry became restricted in its operations, and the shopkeepers in the affected districts began to find business falling away. These conditions have become gradually intensified during the past four months, and represent a loss to the country which can only be calculated in hundreds of thousands of pounds. As for the engineering employers themselves, most of them are still carrying on operations, but the output is comparatively small. Orders have constantly to be refused because it is impossible to execute them promptly, and heavy standing charges meanwhile have to be reckoned with. In some cases work would probably cease altogether but for the fact that to close down establishments which possess elaborate and expensive machinery is always a costly process. Granted that many establishments are facing the situation with boldness, and are getting gradually improved work out of apprentices and non-unionists, yet this is a factor which, in the main, can only tell effectively in the future and does little to minimize the present inconvenience. The Board of Trade returns for November convey a distinct warning as to the influence of the strike upon the country's export trade. Shipments of machinery show in this brief period a decline of £208,000, as compared with the returns for the corresponding month of last year. For the eleven months the decrease is £332,000, while, according to the report of our Commercial Attaché at Berlin, Germany's exports of machinery have increased by £475,000 in the first nine months of this year. Experience teaches that where German traders once gain a footing they never relinquish it. Beyond question, therefore, the engineers' strike means a loss, not merely of present trade but of future markets as well. Such a loss cannot, of course, be computed by actuaries, but it presents one of the worst aspects of a contest which could not have been better devised had its professed object been to destroy our industrial supremacy. In another way Germany is also the gainer. Our shipbuilding yards are at a practical standstill, owing to the non-delivery of armor-plates, heavy forgings, machinery, and boilers. Germany has learned to dispense with our assistance in the matter of ship construction, and this dispute was just the opportunity she wanted to enable her to complete her arrangements for underselling us in the one business which we thought to be peculiarly our own. In such circumstances a liberal estimate of the calamitous consequences of the year's strikes must be made. Looking at the matter broadly, estimating the loss on invested capital, the loss of profit, the loss of trade, present and prospective, the loss of wages, and the loss to the carrying, trading, and other interests of the country, competent authorities do not hesitate to declare that the strikes and lockouts of 1897 will leave us worse off, as a nation, to the extent of not less than £15,000,000. — *London Standard.*

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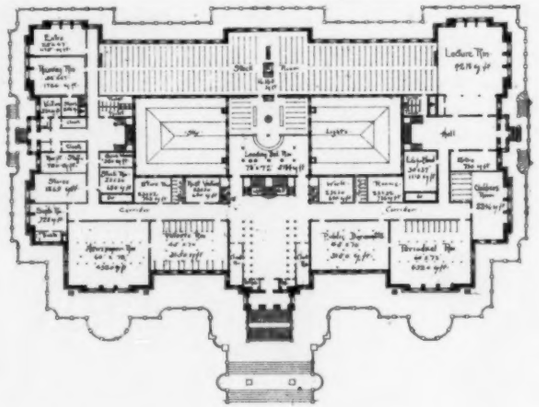

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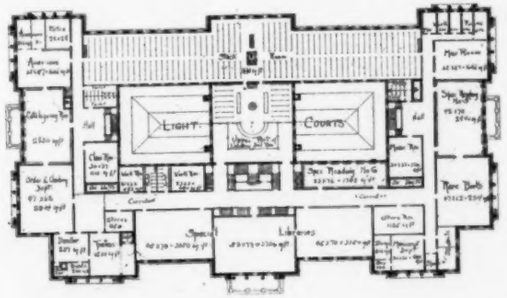

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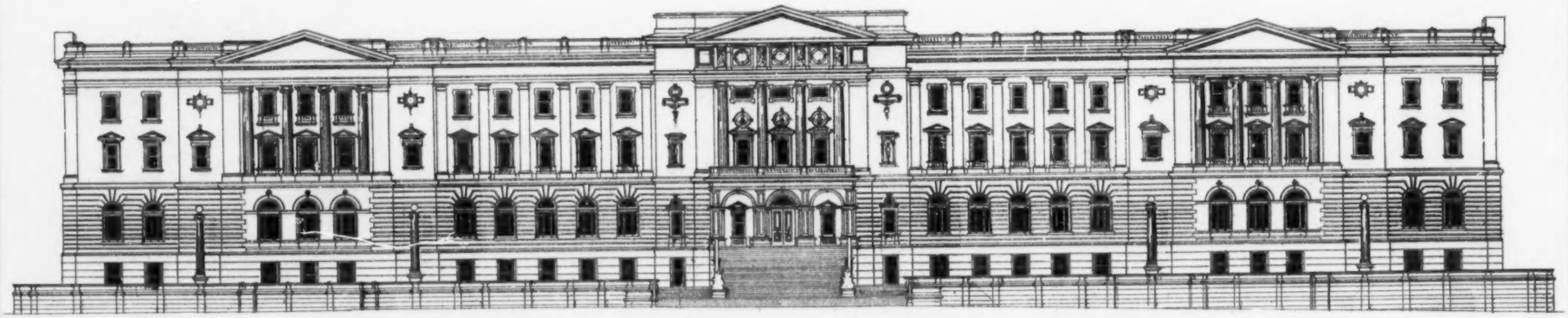

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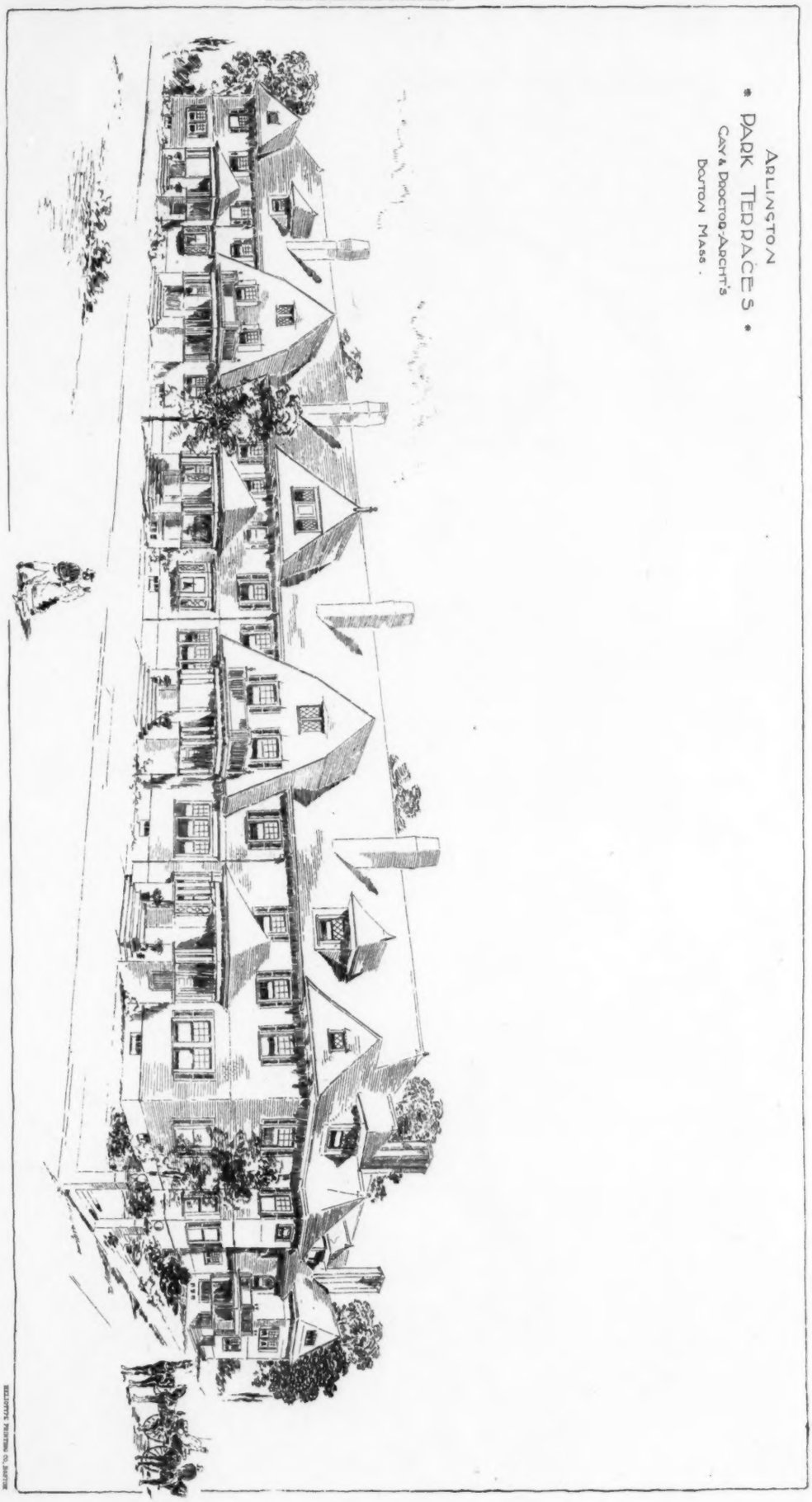

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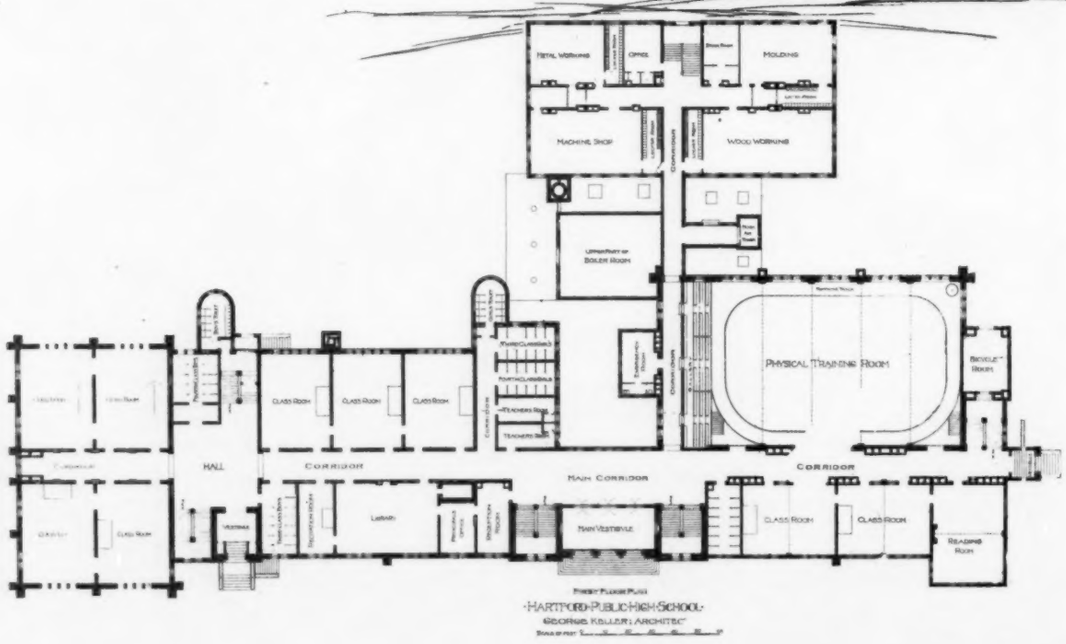

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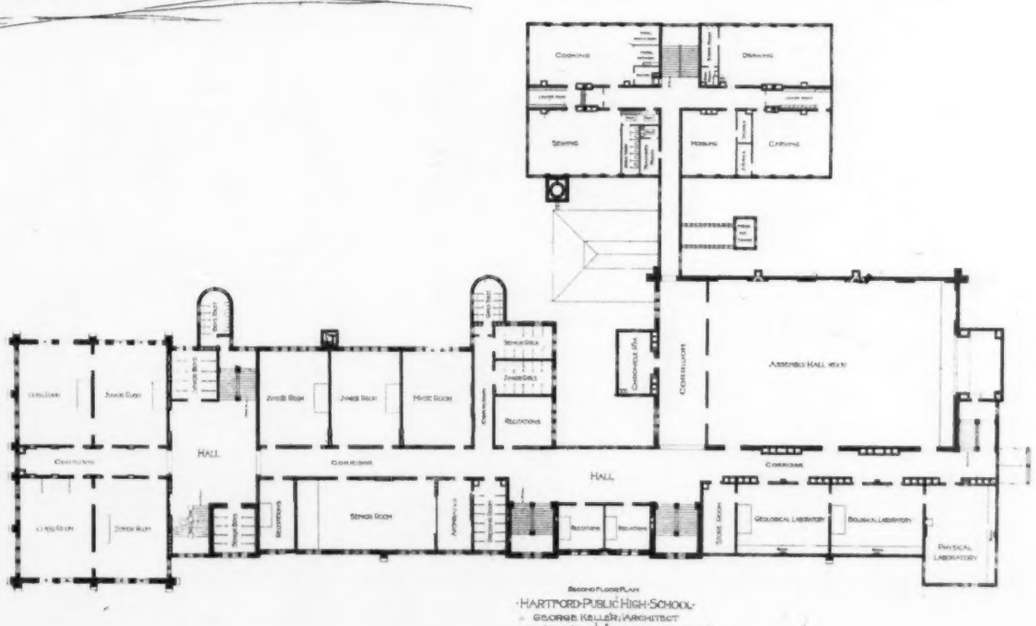

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