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BOSTON is having, on a small scale, a repetition of the New York struggle over the tenement-house laws. As the building regulations of the city now stand, all tenement-houses more than three stories in height must be of first-class, that is, fireproof, construction throughout. The consequence of this provision has undoubtedly been to check the construction of tenement-houses within the building limits, and to transfer it to Brookline, Dorchester and other places just outside the limits, where the laws are less strict, and where immense numbers of non-fireproof tenement and apartment houses have been put up within the last few years. To our mind, this has been a disadvantage to the suburban places, and an advantage to the city, but every one is not of that opinion, and a determined attempt is being made to secure the relaxation of the ordinances relating to the city proper. In aid of this attempt the familiar arguments are brought forward. We are told that "the laws are so strict that where land values are high, as in the crowded tenement districts, it does not pay to tear down old buildings in order to put up new ones"; and we are expected to infer that, if the law were "softened up," the "old rookeries" would be pulled down, and "clean, sanitary dwellings" erected in their places. A singular observation is made to support this view, that, according to the city fire-officials, "more than half the fires in the tenement-house areas are purposely started." We should say that this disclosure of the propensity of the occupants of tenement-houses to arson was conclusive evidence that the present law should not be relaxed, particularly as all the older part of Boston is composed of the most dangerous mixture of wooden and brick buildings, which nothing can preserve from conflagrations except an increasing admixture of structures really fireproof.

IT is a mistake to suppose that the conditions in the Boston tenement-house district do not admit of fireproof construction. As all architects know, the additional cost of such construction over that with wooden beams need not exceed fifteen per cent, with structural steel at normal prices, and the saving in repairs pays a large interest on this extra outlay, to say nothing of the fact that better tenants, at higher rents, can be obtained for such buildings. We should be as much pleased as any one to see the North End and West End "rookeries" swept away, but to sweep them away, and replace them by the ordinary Brookline and Dorchester tenements would be a very questionable advantage. In fact, the old wooden "rookeries," although they are not attractive in appearance, often have better light and ventilation than the modern brick tenements; and, unless the latter can afford greater security against fire, there is not much reason for desiring a change, even so far as their occupants are concerned, and none at all in the interest of the community at large.

THE city of Birmingham, Alabama, proposes to adopt a code of building regulations, and to choose an inspector to see that they are carried out. The newspapers give only meager details of the proposed regulations, but they seem to

be strict enough. As in New York, every building must be erected under the supervision of an architect, and the minimum thickness of brick walls is to be thirteen inches. We think that it is a mistake to require thirteen-inch walls for small and low buildings. There are hundreds, perhaps thousands, of houses in the Eastern cities in which eight or nine inch walls, four stories high, have stood for half a century in good condition; and an eight-inch wall, eight stories high, is said to be still standing in Chicago. If eight-inch walls will carry four stories safely for fifty years, it is a hardship to poor people to compel them to build thirteen-inch walls for their modest two-story dwellings. Not only is a considerable sum added to the cost of their houses, but a very appreciable deduction is made from the space inside of them, without advantage to any one. It is generally understood that the insurance companies are the chief advocates of regulations increasing the thickness of brick walls. So far as party-walls are concerned, the probability that wooden floor beams might meet in the middle of an eight-inch wall is a sufficient reason for requiring a greater thickness; but outside walls are not exposed to this danger, and, as builders will agree, a good eight-inch wall, which can be bonded through its whole thickness with headers, is, proportionally, much stronger than a twelve or thirteen-inch wall.

THE Boston *Advertiser* has something to say about steel-frame buildings, which is not very new, but in the course of which it mentions the fact that "iron structural work" has recently been found at Herculaneum, in such good condition, after being buried in the ground for more than eighteen hundred years, that "it is now being employed in a modern Italian building." It is hardly conceivable that pieces of antique structural iron, the only ones, if we are not mistaken, ever found, except the fragments of lattice girders in one of the Roman baths, should be allowed by the vigilant Italian officials to be appropriated by local builders; but supposing the story to be true, search should at once be made for other specimens, in order that they may be analyzed for the benefit of science. It is now known that Herculaneum, instead of being overwhelmed by a flow of lava, as is commonly supposed, was buried in fine ashes of the same sort as those which covered Pompeii; but at Herculaneum the shower of ashes was accompanied by heavy rain, which packed the dust and cinders into a mass which has now become almost a solid rock. It is known that the eruption which destroyed Herculaneum was accompanied, like other volcanic eruptions, with the disengagement of vast quantities of sulphurous acid gas, which would, presumably, have been absorbed by the rain, and carried down into the mass of ashes. Any iron buried in these ashes would, then, be exposed for many months, until the moisture had completely dried out of the mass, to the action of watery vapor combined with sulphurous acid. This would very rapidly destroy any modern iron or steel, and a metal capable of resisting its action deserves to be carefully studied. Some small pieces of iron have been found at Pompeii, under dry ashes, still recognizable, although corroded; but we are told that these fragments from Herculaneum were, when found, "in as good condition as when first used." Possibly the iron may not have been in actual contact with the moist and acid mass; and it may be that the solidifying of the coating above it prevented circulation of air, and in this way kept off corrosion; but, in any case, the matter is of great practical importance.

THE great contest in the building trades in New York is, we hope, substantially over. Notwithstanding the threats of the walking-delegates of the Parks order to "tie up" all building, by ordering strikes of such unions as they still control, the great majority of the unions of building workmen have accepted, in substance, the agreement offered by the Employers' Association, and building has been actively resumed. Meanwhile, workmen, as well as others, are likely to make silent note of the contrast, in regard to the benefits secured for their constituents, between Mr. Parks and his kind, who have kept their men poor, through continual strikes, while they filled their own pockets, and curried favor with politicians by the display of their power, and the late Peter M. Arthur, of the Brotherhood of Locomotive Engineers, who,

although he hated publicity, and kept himself as much out of it as possible, was able to keep the members of a powerful labor organization constantly employed, at good wages, and under satisfactory conditions, at the same time that he was honored and trusted by the employers. In fact, Mr. Arthur may be considered to have been the best exponent that the industrial world has yet seen of the principle that the interests of employers and of those whom they employ are substantially identical; and that the man who works for his employer faithfully, skilfully and intelligently is the one to whom his employer can afford to pay the highest wages and extend the most favors. Naturally, the demagogues who live by cultivating the notion that employers and employed are natural enemies, and who found in Mr. Arthur's successful management a standing refutation of their doctrines, hated him bitterly, and he was continually denounced by the radical labor journals; but the locomotive engineers, whose interests he had defended, and whose conduct he had guided, for nearly thirty years, with equal wisdom and integrity, did not need to ask what other people thought of him; and his example will, we may hope, be as influential after his death as it was in his lifetime.

MR. ARTHUR S. CUTLER, city architect of Lowell, was drowned at Strafford, New Hampshire, a few days ago. His family had been spending the summer at Strafford, and he was amusing himself by rowing on the lake, when, as is supposed, he was seized with faintness, or with some affection of the heart, and fell overboard. He was an expert swimmer, and could hardly have failed to make his way to the shore if he had been conscious at the time of the accident.

MR. AUGUSTUS F. LASH, a person very well known to Boston architects and builders, died a day or two ago, at the age of eighty-two. Mr. Lash was the first man in Boston to undertake on a large scale the removal of old buildings. This has now become an important industry, employing many hands, but it was a novel business sixty years ago, and Mr. Lash and his partner long enjoyed a practical monopoly of it. During his business career he is said to have removed more than three thousand buildings, among which were many of historical interest, such as the Wendell Phillips house on Essex Street, the Stackpole house on Devonshire Street, the Commercial Coffee House on Washington Street, and "Marm Dunlap's Store," on Theatre Alley, now a part of Devonshire Street.

MR. HENRY ALLEN DARROW, one of the pioneer architects of Omaha, Nebraska, died there a week ago. Mr. Darrow settled in Omaha in 1877, when the city was little more than a frontier settlement, and designed many of the principal structures which its growth has rendered necessary.

A BELGIAN inventor proposes to protect buildings against fire by an ingenious application of wireless telegraphy. The buildings to be protected are fitted with wireless transmitters, which are put in operation by the expansion of the mercury column in a thermometer-tube. Each transmitter includes a notched wheel, which produces a special signal, peculiar to the building or room in which the transmitter is placed. In the nearest fire-department station, or some other suitable place, is a receiving instrument, which not only gives the alarm when the automatic signal is received, but records the exact location of the fire. Whether the apparatus has been tried in actual service we do not know. The signals used in wireless telegraphy are of such a character that it would be difficult, we should think, to produce them automatically with such apparatus as would be available in an ordinary fire-protection service; and the noises and obstructions of a city would not make the task any easier; while, even if they could be transmitted with certainty to the receiver, with the necessary clearness, it seems as if confusion might arise if two or more alarms happened to be given at the same time. We have no wish to disparage what is, at least, an ingenious invention; but architects cannot experiment with ingenious inventions, at the expense of their clients, unless they have positive proof that the devices have already been tried with success, under average conditions. The expense of the wire connections for city fire-protection is not very large, at least in this country, and there is not enough gained by leaving out the wire to make it worth while to sacrifice efficient and certain operation.

THE people who imagine Khartoum to be a collection of tents, among which dervishes gallop on their swift dromedaries or Arab steeds, spearing all persons who refuse to acknowledge the Prophet, will, perhaps, be surprised to learn that the "blocks and streets" of the town are already occupied by structures of "plain and massive," as well as elegant, architecture. The buildings of Gordon College are nearly completed, as are those of the War Office, the Courts of Justice, and the Post-office. Two banks, the Bank of Egypt and the National Bank, are in full operation; there are two fine clubs, the Soldiers' Club, for military men, and the Soudan Club, for civilians, and fine warehouses are going up on all sides. Considering how few years have elapsed since the black hordes of the False Prophet overwhelmed the city and the garrison, the citizens must, we should say, take a considerable interest in the movements of the tribes by whom they are surrounded. Undoubtedly, in the end English enterprise and perseverance will overcome the hostile power of the natives, just as our Indians, who, it will be remembered, interfered seriously with the building of the Union Pacific Railroad, have, in less than a generation, sunk from dreaded warriors to anthropological curiosities; but the civilization of the Soudan is not likely to be completed without some checks.

FROM the other side of the Continent comes a tale with plenty of moral to it, if one is inclined to seek such a thing in every amusing story, and, fortunately, it is not needful to mention name of person or of locality. It seems that, recently, a certain California town was notified that Mr. Carnegie had consented to make it one of the beneficiaries under his benevolent system of increasing the educational opportunities of his adopted country, whereat there was at once public rejoicing and a special rubbing of hands on the part of the library trustees. Their exultation was, however, quickly chilled by receiving from a certain architect a long communication in which he claimed that it was due solely to his unaided personal efforts that this happy result had been achieved, and that consequently he wished the trustees to understand that he considered that he had valid claim upon them for appointment, at the usual full commission, as architect to the proposed new building; and he further generously offered to work over without charge a certain design prepared by him for the library so as to adapt it to the new selected site and fit it to Mr. Carnegie's gift. In support of his claim he narrated how, finding, in 1902, that the town had no library, he "took the trouble to locate one or two of the Library Trustees" — entire strangers to him — and suggested that they should approach Mr. Carnegie, but was told that an unavailing attempt had already been made. The architect, however, felt sure that should he prepare a new design and submit it to Mr. Carnegie the prayer would be granted and the town secure its library, and he would prepare such design if it were to be understood that he should be appointed architect to the building at the usual commission. This proposition he now maintains was accepted, and he argues that as Mr. Carnegie had experienced a change of heart it must be because of his efforts, and he consequently calls upon the trustees to make good the promise he received. In support of his contention he offers, further proof, which on the face of things seems likely to be of questionable worth, for among other things he declares that the design proposed by him "is, or should be, still in your [their] possession," while it seems to us his claim would have been stronger if he could have declared that it was in Mr. Carnegie's possession or had even been seen by that gentleman. The trustees rejoin by saying that in some degree the tale is true, but that in one all-essential particular the claimant is at fault, for they point out that the gentleman named by the architect as having closed the bargain with him was not capable of binding them, since, although now one of the trustees, he was not at that particular time a member of the Board, but was simply one of a certain private committee which at that time was endeavoring to secure, by public subscription, enough money to build the library without Mr. Carnegie's help. Apparently the architect has drawn hasty conclusions from insufficient premises and must content himself with being one of the architects invited by a properly empowered board of trustees to submit a design in competition with other architects. The most obvious moral to be drawn from this is that when one sets out to "locate" a trustee he should do it with the same scrupulous care he would practise when visiting a land-office. Hares are not the only thing that a hungry man — anxious for a dinner or for a job — should take particular care in catching.

DEATH BY WATER-GAS.¹

ILLUMINATING gas has suffocated three hundred and ninety-six people in Massachusetts during twelve years. The death-roll has increased much faster than the production of gas during this period.

In 1889, 3,173,000,000 cubic feet of gas were made, and there was only one death by suffocation in the State.

For 1899 the volume of gas was 4,939,000,000 feet, and sixty-nine persons lost their lives through its use. This shows an increase of 55 per cent in the manufacture of gas, and a multiplication of the deaths by sixty-nine. In other words, the rate of increase in mortality was one hundred and thirty-four times that for gas production, between these two years.

In contrast with one death and 3,173,000,000 feet of gas in 1889, a life was lost for every 554,000,000 feet made in 1890, when six people were suffocated. Gas ended the lives of fourteen persons during 1891, or one for every 235,000,000 feet of gas produced. In 1892, 221,000,000 feet of gas were made for each of the sixteen deaths from its use. Seventeen lives were a part of the price paid for gas in 1893, or one for each 209,000,000 feet. It required only 143,000,000 feet of gas to bring about the death of each of the twenty-five persons that perished in 1894. Thirty-eight people were suffocated during 1895, or one to correspond with every 101,000,000 feet of gas made. The entire population, save twenty-nine, escaped death by gas in 1896, the mortality being one to every 153,000,000 feet of gas. In 1897 gas extinguished the light of life in sixty bodies, and the ratio was one death to every 78,000,000 feet. Only 68,000,000 feet of gas were necessary in 1898 to compass the death of each of its seventy-two victims. Sixty-nine people were suffocated during 1899, making the ratio one to each 74,000,000 feet of gas. In 1900 the public escaped with a loss of only forty-nine members and 100,000,000 feet of gas were required to end a life.

Forty-three times as much gas was made per person suffocated in 1889 as in 1899. This points to a radical change in the quality of gas and a great increase of its deadly properties.

Two sorts of gas are made from coal for general distribution. Coal-gas is a product of soft or gas coal when heated in retorts or benches. Water-gas is made by the admission of steam to incandescent anthracite coal or coke. Both gases are enriched by the addition of oil-gas, made from gas-oil or petroleum. The most important difference between coal and water gas as to their effects when breathed into the lungs is due to the proportions of carbonic oxide which they contain. In coal-gas carbonic oxide forms from 5 to 10 per cent of the total volume. Water-gas contains 20 to 30 per cent of carbonic oxide by volume. Carbonic oxide owes its deadly properties to some effect on the blood of a person breathing it, rather than to the mere exclusion of a suitable amount of oxygen from the lungs. It has been shown in laboratory tests that a very small percentage of carbonic oxide in the air of a closed apartment is fatal to animal life. Either coal or water gas will cause death when mixed with the air in sufficient proportions, but a much smaller percentage of water than of coal gas will lead to fatal results. For these reasons the general use of water-gas for purposes of illumination is much more dangerous than like use of coal-gas.

Prior to 1889 the amount of water-gas made in Massachusetts was comparatively trifling, and in that year it formed only 2.3 per cent of the total of coal and water gas. From this time forward the percentage of water-gas and the deaths by suffocation went up together. In 1890, when there were six deaths, the percentage of water-gas was 6.3. With fourteen deaths in 1891 water-gas stood at 23 per cent. Water-gas reached 34 per cent in 1892, when sixteen people were suffocated. Seventeen people lost their lives during 1893, when the percentage of water-gas was 41. In 1894 66 per cent of water-gas was accompanied by twenty-five deaths. Water-gas rose to 62 per cent in 1895, and the mortality by gas was thirty-eight. While twenty-nine lives were lost in 1896 the percentage of water-gas was put at 64. Thus far the number of annual deaths by gas lagged behind the percentage of water-gas to the sum of water and coal gas.

It was to be expected, however, that suffocations by gas would multiply faster with the higher percentages of water-gas, and this is just what happened. With water-gas at 65 per cent in 1897, the number of suffocations rose to sixty. In 1898 the percentage of water-gas was 64, and there were seventy-two victims. For 1899 water-gas stood at 63 per cent and there were sixty-nine deaths. In 1900 the percentage of water-gas dropped to 58, and the number of victims to forty-nine. In view of these figures it may be said approximately that one life is lost annually for every one per cent of increase by water-gas in the total of water and coal gas.

Thirty-two plants continue to distribute pure coal-gas and twenty-six plants sell either water-gas or a mixture of water and coal gas. From 1889 to 1900 inclusive there were only ten deaths by suffocation with gas in all of the places where pure coal-gas was distributed. During the same period three hundred and eighty-six persons were suffocated where either water-gas or a mixture of coal and water gas was in use. In 1889 the plants selling pure coal-gas made 89 per cent of the total production of coal and water gas, and there was no death by suffocation where the pure coal-gas was used. For the same year there was one death from water-gas. Water and mixed gas were only 18 per cent of the entire output in 1890, but five lives

were lost where they were employed. Pure coal-gas on the other hand, with 82 per cent of the total volume made, resulted in only a single death. For 1891 the product of pure coal-gas stood at 67 per cent of the total gas made and destroyed a single life. The percentage for water and mixed gases in this year was only 33, but thirteen persons lost their lives where these gases were distributed. In 1892 not a life was lost by pure coal-gas, though it formed 40 per cent of the entire product in Massachusetts. Mixed coal and water gas, representing 60 per cent of the volume made, suffocated sixteen persons during the year last named. Water-gas alone and mixed with coal-gas was 59 per cent of the entire amount made in the State during 1893, and it killed sixteen people. Pure coal-gas made up the other 41 per cent of the product, and only one life was lost by its use. In 1894 pure coal-gas killed two people, and water-gas and mixed water and coal gas killed twenty-three people. As to the total volume made the percentage of pure coal-gas was 27 and that of water and mixed gases 73 for the same year. Pure coal-gas ended only one life during 1895, while water and mixed gases killed thirty-seven persons throughout the State. For this year the output of coal-gas alone was 22 per cent and that of water and mixed gases 78 per cent of the total volume. The output of plants making only pure coal-gas was only 18 per cent of the entire volumes of gas for the State in both 1896 and 1897, and it caused no death in either year. Water and mixed gases in these years, with 82 per cent of the total volumes, suffocated twenty-nine and sixty persons.

During the years of 1898, 1899 and 1900, pure coal-gas remained at 19 per cent of the volumes of all gas in the State, and in these years one, two and one person, respectively, were killed by its use. In the three years just named, water and mixed gases, with 81 per cent of the annual volume of gas, ended the lives of seventy-one, sixty-seven and forty-eight people, respectively.

From these facts it is clear that the dangers incident to the use of pure coal-gas have not materially increased. On the other hand the lengthening list of deaths with water and mixed gases is out of all proportion to their volume compared with pure coal-gas.

Of the thirty-two plants now distributing pure coal-gas, only nine have contributed to death by suffocation. Two deaths have been caused by gas from one of these plants, the other eight are charged with only one death each, from 1889 to 1900. In Cambridge, where 294,000,000 feet of coal-gas were made in 1900, there has not been a death by suffocation with gas during the twelve years under consideration. The plant at Salem made 63,000,000, that at Taunton 55,000,000, that at North Adams 48,000,000 and that at Brockton 45,000,000 feet of pure coal-gas during 1900, and no death has been caused by gas from these plants from 1889 to the latter year. Plants at Newton and East Boston, that made 108,000,000 and 58,000,000 feet of pure coal-gas, respectively, during 1900, have supplied the gas for only one death each in twelve years.

These examples show that cities large enough to offer shelter for the very ignorant and dissipated classes are practically free from deaths by suffocation, where pure coal-gas is used.

Twenty-nine plants were distributing either water-gas or mixed water and coal gas in 1900. Gas from each of twenty of these plants caused death by suffocation in the period included by 1889 and 1900. Only one large plant, that at Lawrence, distributed water or mixed gas during these twelve years without fatal results. In the Lawrence plant the product has been mixed gas since 1890, and the highest percentage of water-gas during the period was 37 in 1900.

The total product of the Lawrence plant reached 146,000,000 feet in 1900. Next to that at Lawrence, the largest plant that has distributed mixed or water gas without fatal results is located at Spencer, where 6,600,000 feet of water-gas formed the entire output for 1900.

At Athol water-gas alone has been made during the twelve years, and three persons have been suffocated. In 1900 the product of the Athol plant was 5,300,000 feet. Mixed water and coal gas has been distributed in Worcester since 1888. Deaths by suffocation began in that city in 1890, and have continued in six subsequent years, reaching a total of sixteen for the period. In 1900 the product of mixed gas was 274,000,000 feet. The highest ratio of water-gas to the annual output was 56 per cent in 1899; in 1898 and 1899, when the percentages of water-gas were the greatest, there were eight deaths by suffocation in Worcester.

In Fall River mixed gas was made up to 1891, and water-gas alone thereafter. Gas has caused the death of six persons in this city, and five of these have been due to water-gas alone. In 1900 the production of gas at Fall River was 178,000,000 feet.

Prior to 1891, the plant at Pittsfield made only coal-gas, but mixed gas began to be distributed in that year. Since 1896 water-gas alone has been the product of this plant. Four lives have been lost by gas in Pittsfield, and three of these deaths have occurred since the manufacture of coal-gas was discontinued. The gas output for 1900 was 20,000,000 feet in that city.

Pure coal-gas was made in Haverhill prior to 1892. Beginning with that date mixed gas has been distributed in four years, and water-gas alone in five. This city has been the scene of seven suffocations by gas, all of which have occurred since water-gas was introduced. For 1900 the product of gas at Haverhill was 121,000,000 feet. Both water and coal gas have been made at Lynn during the twelve years from 1889 to 1900, except in 1893, when coal-gas alone was the product. During this period the city has had six deaths with gas. The largest percentage of water-gas in the total product at Lynn for any year was 43. In 1900 the gas output of this plant was 198,000,000 feet.

¹The facts herein stated are mainly drawn from the annual reports of the Gas and Electric Light Commissioners. Copyright, 1903, by Alton D. Adams.

Prior to 1891 there was no gas-plant at Framingham, but water-gas was introduced in that year. Gas from this plant has killed three people. Only water-gas has been made at the Framingham plant, and the output for 1900 was 8,700,000 feet. Amesbury and Chicopee each have plants that make only water-gas, and one death by suffocation has occurred in each place since water-gas began to be distributed. The plant for water-gas at Amesbury has operated during the period from 1889 to 1900. Prior to 1892 the plant at Chicopee made coal-gas, but in that year water-gas was introduced, and the manufacture of coal-gas was discontinued thereafter. In 1900 the output of gas at Amesbury was 7,000,000 and at Chicopee 17,000,000 feet.

Only coal-gas was made in Holyoke prior to 1897, and there were no deaths by gas. In that year water-gas began to be mixed with the coal-gas and one death has been the result. The largest percentage of water-gas in the mixture at Holyoke for any year was 32. During 1900 the Holyoke plant produced 80,000,000 feet of mixed gas. Springfield had a supply of pure coal-gas up to 1896, when water-gas began to be made there. Since this date the supply has been mixed gas, the greatest annual percentage of water-gas being 29. No deaths by gas are recorded for Springfield before the introduction of water-gas, but since that event there have been two victims. Gas to the amount of 162,000,000 feet was made by the Springfield plant in 1900.

The manufacture of water-gas began at Malden in 1897, and mixed water and coal gas has since been distributed. From 1889 to 1897, when the product was pure coal-gas, there were no fatal results, but since the later year gas from this plant has suffocated one person. The percentage of water-gas in the product of the Malden plant reached 36 in only one year. In 1900, the product was 98,000,000 feet of gas.

Equipment for the manufacture of water-gas was added to that for coal-gas at New Bedford in 1892, and mixed gas has since been distributed during each year except 1893, when only coal-gas was made. There were no fatal results from the use of gas at New Bedford before 1892 or in 1894, but since the later date three people have been suffocated by mixed gas. In only one year the ratio of water-gas in the total output at New Bedford has reached 42 per cent. For 1900 the production of gas in this city was 57,000,000 feet. Lowell has had more gas victims than any other city in the State except Boston, and all the deaths have occurred since the introduction of water-gas in 1893. Prior to that year, pure coal-gas was distributed in Lowell with no fatal results. Since 1893 mixed gas has been supplied. Death by suffocation began at Lowell in 1895, when the percentage of water-gas was pushed up to 46. Four deaths occurred in 1897, four in 1898 and four in 1900, when the volumes of water-gas were 39, 42 and 50 per cent of the respective mixtures. Intervening years supplied five other victims of gas, making the total seventeen. The plant at Lowell supplied 371,000,000 feet of mixed gas during 1900.

Boston has a long lead in the total list of gas fatalities, though not a single suffocation with gas occurred in the city during 1889, when coal-gas formed 99 per cent of the total volume made by its plants. Seven companies distributed gas within the corporate limits of Boston during the entire period from 1889 to 1900 inclusive. Two of these companies, the East Boston and Jamaica Plain, have made only coal-gas and are confined in their distribution to certain portions of the city, where there is no other supply of gas. Only one death by gas has occurred in the territory of the East Boston plant and none whatever in the territory of the plant at Jamaica Plain, during the entire period of twelve years. The other five gas-plants have constantly supplied the remaining parts of the city, including the town of Brookline. The territories of these plants overlap to some extent, and water and coal gas have been distributed therein in varying proportions. It is convenient here to consider these five gas-plants and their territory under the general title of Boston. Using Boston in this sense, its production of gas in 1889, when no one was suffocated there, amounted to 1,735,000,000 feet. In 1899, when gas found fifty-eight victims within the Boston limits, the volume of gas made there was 2,502,000,000 feet, or only 44 per cent greater than the amount for 1889. Boston has been the scene of most of the deaths by gas within the State, because the greater part of all the water-gas made has been distributed within its limits. In 1890, Boston made 70 per cent of the water-gas produced in Massachusetts, and had 60 per cent of all the gas victims. For 1891 the per cent of water-gas went up to 82 and for suffocations by gas to 69 for Boston. In 1892 the city claimed 80 and 81 per cent respectively, of the water-gas and the deaths by gas. Water-gas remained at 80 per cent and the number of gas victims rose to 87 per cent for Boston in 1893. Boston still made 80 per cent of all water-gas and claimed 91 per cent of the loss of life by gas in 1894. The State at large now began to gain in the production of water-gas, and in the incident mortality, for the per cent of the former dropped to 78, and of the latter to 89 in Boston during 1895. In 1896, Boston had 79 and 89 per cent respectively, of all water-gas and the deaths due to its use. For 1897, the like figures were 77 and 86 per cent. The lead of Boston was reduced to 75 per cent in water-gas and 73 per cent in the number of suffocations during 1898. The like figures in 1899 were as to water-gas 73, and as to fatalities 86, per cent. In 1900, owing to a reduction of the volume of water-gas made in Boston, the city had only 67 per cent of the product and 70 per cent of the deaths by gas.

When water-gas formed only one per cent of the volume made in

Boston, in 1889, there was not a single suffocation there. Water-gas went up to 8 per cent of the product in the city during 1890 and there were two deaths from its use. For 1891, the percentage of water-gas was 37, and Boston was the scene of nine gas fatalities. Another rise brought water gas to 52 per cent of all gas made in the city, in 1892, when thirteen persons were suffocated. Of the sum of coal and water gas made in Boston during 1893, the water gas formed 67 per cent and fourteen lives were lost through its use. The next year saw water-gas rise to 88 per cent of the mixture, and twenty-one unfortunates were added to the list of its victims at Boston. Thirty-three people were suffocated in the city during 1895, when water-gas was 96 per cent of all the gas manufactured there. In 1896 water-gas fell back to 91 per cent of the mixture in Boston, and the lives of only twenty-six people were sacrificed by this means of illumination. Four parts of coal-gas and 96 per cent of water-gas went to make up the supply at Boston in 1897, and the lives of fifty-two persons paid the penalty of its use. The following year saw the per cent of water-gas and the number of suffocations at the figures last stated. In 1899 the percentage of water-gas in the product at Boston was again 96, and the mixture found fifty-eight victims. During 1900 23 per cent of coal-gas and 77 of water-gas made up the Boston output, and, as might have been expected, the number of deaths by gas fell back to thirty-four.

During 1889, 1,735,000,000 feet of gas, 99 per cent pure coal-gas, was manufactured in Boston and not a life was lost by its use. In 1899, with a product that contained only 4 per cent of coal-gas, every 43,000,000 feet found its victim.

For the period included by 1889 and 1900, the production of water gas throughout the State amounted to 23,462,000,000 feet. Of this amount the seven companies already considered under the heading of Boston, namely the Bay State, Boston, Brookline, Roxbury, Dorchester, South Boston and Charlestown companies, made 17,949,000,000 feet, or 76 per cent. In the territory supplied by these seven companies there were 315 deaths by suffocation with gas during the twelve years, or 79 per cent of the 396 deaths in the entire State. The percentage of deaths at Boston thus nearly equals the ratio of the water-gas made there to the total product of water-gas in Massachusetts for the twelve years.

All of these facts point to the conclusion that the distribution of water gas, pure or mixed, is far more dangerous to human life than like use of pure coal-gas, and that the danger increases rapidly with the proportion of water gas in the mixture. The comparative dangers of pure coal-gas with water or mixed gas are illustrated by ten deaths where the coal-gas and 386 where water-gas or mixed gas has been supplied. A rising number of suffocations has borne witness to the fatal quality of water and mixed gases in almost every city where they have been supplied. The experience of smaller places has been repeated on a grander scale and with more terrible results in Boston. In the light of facts, it is unnecessary to invent any peculiar excuse for the occurrence of 268 deaths by gas in the limits of older Boston, that is exclusive of Roxbury, Dorchester, South and East Boston and Charlestown. This older section of the city is the site of most of the cheap hotels and lodgings, and here the population is most dense. No doubt similar sections in the centres of Lowell, Worcester and other cities would prove on investigation to be the sites of the larger numbers of suffocations. There is no reason to assume that the people of Boston have less regard for life, exercise a smaller degree of care, or are more drunken than their neighbors. Gas claims most of its victims in Boston because more water-gas is present there to do the deadly work. So true is this, that Boston's percentages in the total death list and in the State's volume of water-gas are almost identical.

While the poorer and less educated classes have suffered most by gas suffocation, because of the inferior construction and crowded condition of the buildings they inhabit, neither wealth nor intelligence affords security from the dangers of water-gas. Many examples might be given but two or three must suffice.

On May 15, 1890, the wife and daughter of President G. Stanley Hall, of Clark University, lost their lives by suffocation with mixed water and coal gas, at Worcester. On April 12, 1897, Dr. William A. Gibson was found suffocated by gas in his room on Columbus Avenue, Boston, though one window was partly open. On March 2, 1900, Norman G. Baker was suffocated with gas in a room at the Parker House, Boston. In neither of these instances was there any indication of suicidal intent. Examination of the reports of suffocation by gas shows that of the 396 deaths, 116 were probably cases of suicide. There is strong presumption, however, that the suicidal intent would not have been carried out in most of these cases had pure coal-gas been the agent used for the purpose. These presumptive suicides number only 29 per cent of the total deaths.

In addition to the persons who have perished, hundreds of others have been found in an insensible condition that would shortly have ended in death, but for the timely arrival of aid. Death by suffocation with water-gas on a grand scale in Massachusetts is a result of Chapter 252, of the Acts of 1890. The Legislature by this Act removed the restrictions on the sale of water-gas and left private interest to determine the distribution of this deadly substance. Before 1890, the sale of gas containing more than 10 per cent of carbonic oxide was prohibited by section fourteen of Chapter sixty-one of the Public Statutes. The act of 1890 was promoted by those interested in the manufacture of water-gas and was the result of some years of agitation.

Chapter 428 of the Acts of 1888, authorized the gas commissioners to license the sale of water-gas, but required them to specify the percentage of carbonic oxide that gas might contain in each case, and to certify that it could be used with safety. Seven companies applied for licenses under the Act of 1888, but the Commissioners refused to grant any of them because of the dangers incident to the use of water-gas. The Commissioners pointed out in subsequent reports that the distribution of water-gas carries with it much greater danger than that of coal-gas.

In the Legislature of 1890 other forces were more potent on the question of water-gas than the facts presented by the Commissioners or the remonstrances of those who feared its deadly properties. The result was complete license for the sale of water-gas.

Experience has now demonstrated the relative advantages of coal and water gas. Starting at the works, it appears that the cost of coal-gas is materially less than that of water-gas, for equal outputs. Consumers have not benefited by the introduction of water-gas, for the range of prices is lowest in places where only pure coal-gas is sold. The general difference of two or three candle-power between coal and water gas is too slight to be of much importance.

FIREPROOFED WOOD AS A BUILDING MATERIAL.¹

IN the construction of large buildings, the question of fireproofing has at last assumed its proper position at the head of all other questions concerning the manner of construction.

As representatives of this twentieth century, we congratulate ourselves upon our advanced civilization, and our industrial and scientific development, but it is a lamentable fact that numerous problems of vital importance to the life and happiness of our race are still unsolved through stupid neglect.

Two of these problems are fireproof construction and sanitary regulation of disease. There is little cause for complacency over these subjects when contrasting the world's condition to-day with that of two or three centuries ago.

Fortunately we are at last waking to the gravity of the situation, and material advancement has been made in the past decade. It has taken us 2,000 years to learn that great conflagrations are the result of human neglect and ignorance, rather than visitations of Divine wrath. The same is true of widespread plagues and distributed malignant diseases.

We have made marvellous progress during the past few hundred years in the method and magnitude of our building operations. The introduction of iron and steel into this class of construction marked an era in architectural history. With their advent came the use of the term "fireproof construction." It was fancied that steel beams, iron columns and tile or concrete floors would make a building indestructible. Alas! we know to our sorrow that the term "fireproof" is often a delusion. Buildings, as generally constructed during the past twenty-five years, were no barrier to fires, and, as a matter of fact, not so safe as if built of solid wooden beams. These would at least be slow-burning, and not wreck the whole building by the buckling of columns and beams as soon as heated.

Our cities are filled with magnificent structures, marvellously constructed, but a very small percentage of them are at all fireproof. It is absolutely true that our great cities to-day are but little less inflammable than they were in 1666, when this city was swept by fire from Tower to the Temple, with results sufficiently awful to make a period in history. Similar conflagrations have occurred with painful frequency all over the world since that time, and now, after a lapse of 250 years, are still of yearly occurrence. Were it not for the high efficiency attained by the noble body of men, the firemen, in all our cities, consequences of fire would be far more appalling than they are. This is particularly true in America, where the craze for high buildings has made the fireman's work doubly hazardous.

The time has come when all permanent construction should be strictly incombustible. That the public has awakened to this fact is evidenced by this gathering of representative men from all parts of the world to discuss the various methods of solving the problem.

The necessity of fire prevention is beginning to be appreciated. Energy and money are freely spent in exploiting all kinds of fireproof construction. Fortunately the public has lost its credulity, and no longer accepts the statement that a system of construction is fireproof unless it is proved to be such by practical test. Your chairman is one of the pioneers in this class of experimental testing. His splendid work during the past few years by sifting the meritorious processes from numerous trashy ones, has aided greatly in classifying the many proposed methods of fire protection.

In the United States during the past few years, much investigation of this character has been done by the New York City authorities, also by the National Board of Underwriters at their testing laboratory in Chicago, and by the Insurance Engineering Experiment Station in Boston. All are doing excellent work. I am informed that much similar work is being accomplished by experts in various Continental cities. I regret that I have been unable to secure records of their work.

If this class of investigation receives the support it deserves, the results will be invaluable, and reduce to a minimum the fire-hazard

of large buildings. Among the various materials for reducing fire-risk is the so-called "fireproof wood." It is upon this subject your executive has kindly requested me to address you to-day.

First of all, let us have a clear understanding of what is meant by the term "fireproof wood." For the information of those unfamiliar with the subject, it should be stated that the term "fireproof wood" is a misnomer; for all such woods will burn if exposed for a sufficient time to a high degree of heat. Strictly speaking the processes of treatment do not make the woods *fireproof*, but simply render them fire retardants. Fire-resistant wood is a much more logical term. The public has been somewhat deceived by the representatives of certain processes who make the silly claim that woods treated by their methods are rendered absolutely incombustible. Such statements are foolish, for they lead to expectations of resistance which cannot be achieved. When the deception is discovered it causes unjust criticism and mistrust of the whole product.

The term "fireproof wood" is a trade name, and should not be taken in a strictly technical sense.

New York City is probably now using more fire-resisting wood than any city in the world. This results from two causes: first, the Building Law, which requires that such treated wood shall be used throughout all buildings over twelve stories (or 150 feet in height); and secondly, to the fact that the city proper is too limited in area to spread, and enormously high buildings have become necessary. Scores of buildings erected during the past two or three years are over fifteen stories high, and many of them twenty-five and thirty.

It has been my privilege, under the direction of the Bureau of Buildings, to test most of the wood which has been used in these buildings. For the year ending the first of this month, I have tested and reported upon upwards of 3,500,000 feet. The greatest part of this material was for floors which were laid on the top of strictly fireproof floor construction of concrete or the hollow tile. The balance of the material was used for trim. An evidence of the magnitude of building construction now going on in that city is the recent filing of plans with the Bureau of Buildings for one structure in which 2,000,000 feet of fireproofed wood will be required.

I would here add that there are at present three companies supplying this treated wood to the city of New York. There are other companies established for the same purpose in Philadelphia.

The impregnation of wood with chemicals to render it fire-resistant is by no means a new idea. Numerous experiments with various chemicals were made as early as 1825 by Fuchs, Gay-Lussac, Boucherie, and later by Löchlin and other Continental chemists. However, it is within the last few years only that the business has been put upon a practical commercial basis.

It is conceded, by most experts who have carefully studied the subject, that the fireproofing of wood is a safeguard and, under ordinary conditions, will greatly reduce the fire-risk. It will, however, be consumed by continued application of flame, and under certain conditions especially favorable to fire, may support a slow combustion by itself, but the same conditions of heat would also ruin many other accepted fireproof materials. To my mind, the non-inflammable nature of the material is its greatest value.

When a fire occurs in a room trimmed with ordinary wood, its inflammability makes it immediately dangerous. The flames leap from one point to another, dashing through windows and transoms, thus spreading the fire to adjoining rooms. If the wood is finished with oil or varnish, the flames will run along it with marvellous speed. If finished with well treated wood this tendency of spreading the flames is reduced to a minimum; even if the burning material in the room is sufficient to ignite the treated wood, it burns so slowly that life and property are much less menaced. It would at the worst be a distinctly slow-burning conflagration. That in itself is a great safeguard, because it allows time for the arrival of the firemen.

Numerous inorganic materials are being exploited to replace wood entirely in fireproof construction. If it were possible to find a substitute for wood, which possessed its merits and none of its failings, it would be most desirable. So far, I have never seen anything which had the lightness, strength, durability, cheapness, ease of working, and last, but not least, the elements of beauty for decorative purposes which wood possesses. For these reasons it will surely long remain a favorite with architects.

Granting the value of fire-resistant wood as a structural material, the next problem is to determine what degree of fireproofness should be exacted, and how the standard of quality can be maintained.

Not being acquainted with the methods employed on this side to accomplish these objects, I will confine my remarks to our practice in New York.

In the early stages of experimentation it was customary to build a small house of the wood to be tested, usually duplicated by a house of untreated wood; then applying a vigorous fire both inside and out, and noting results. This method possesses spectacular elements which are very convincing, and while it may be useful as a general test to demonstrate the degree of immunity from fire that a wooden building may be made to possess, the heavy expenditure of time and money required for such a test precludes the possibility of employing it for regular series work. This is the only value such a demonstration possesses, for the results of fire-tests made upon wood treated a year or so ago may bear no relation to the product of the same company to-day. It is essential for public safety that regular serial tests should be made upon all material delivered for use, as is the custom in the manufacture of steel, cement and other structural materials.

Unfortunately there is no recognized test for fireproofed wood. In

¹ A paper by Professor Woolson, Columbia University, New York, N. Y., prepared for the International Fire Prevention Congress, held in London, Eng., July 6-11, 1903.

America a variety of tests have been proposed by different investigators, most of them being the direct application of heat or flame to small test-specimens, and noting the duration of flame and glow produced, as well as the amount of wood consumed. One method recently proposed makes the amount and character of gas given off from dry distillation of small fragments of wood a basis of classification, but no uniform method has yet been adopted.

An effort was made a year ago by the Building Bureau of New York City, in conjunction with the various fireproof-wood manufacturing companies, to decide upon some standard method of test. But the project was abandoned. The present method of testing is as follows:—

When a shipment of lumber is prepared, an inspector proceeds to the works, and selects at random one sample from every 2,000 feet of material. This is sent to the laboratory and tested; reports being sent to the Building Bureau and the manufacturer. Two tests are applied to each sample. One a "shaving test," which is a test used by the United States Navy, and the other a test devised by the writer, which for want of a better name is called a "timber test."

The shaving test, while useful in a general way to determine the flaming properties of treated wood, is, nevertheless, unsatisfactory. We are now making series of different tests in an endeavor to supplant it with something more reliable. The test is conducted as follows: a pan 1 foot in diameter and 6 inches deep is mounted on legs. The bottom is formed by a heavy wire screen of $\frac{1}{4}$ -inch mesh. This wire bottom is covered with a layer of shavings 2 inches deep, and a Bunsen burner is applied underneath for twenty-five seconds; then the burner is removed, and the lengths of time during which the shavings support (1) flame and (2) glow are recorded, and also the area of shavings burned.

The idea of this test is that shavings from properly-treated wood will not support flame any considerable time, and that the flame will gradually die out without material enlargement of the burned area. After test, the remaining shavings are thrown away. There are no means for making a permanent exhibit of the results, except by photographs, which would be difficult to take and quite unsatisfactory. The wood must be accepted or rejected on the judgment of the operator, based upon notes taken while observing the test.

Besides these obvious disadvantages, there are two other strong objections to the shavings test: first, the extreme difficulty of always maintaining the same conditions of flame and heat under the shavings; and second, the impossibility of securing a uniform quality of shavings for tests. The Navy specifications call for the use of the Bunsen burner with a flame giving about 500° Centigrade = 932° Fahrenheit. Now, Bunsen burners vary considerably in the size of flame they produce, so, although every precaution was taken and the same standard temperatures were determined in each of two flames at some definite point, the results of tests upon the same kind of shavings might show widely different figures, because of the general variation in the character of the flames. Much depends also upon how and where the tests are conducted: whether under a smoke-hood with a strong draught, or in an open room where air-currents could strike the flame and cause it to sway. The most serious objection, however, to the shavings test, and the one which, in the writer's opinion, is fatal to its use as a standard method of comparison, is the impossibility of making the shavings of uniform size and quality. The samples here exhibited demonstrate the objection made.

These shavings were all made by the same carpenter and were as nearly alike as possible for him to make them. You will note that some are fine like sawdust, while others are very coarse, with all graduations of size between. Another objection is that in coarse-grained wood like oak, the plane, in making the shaving, splits many of the large pores and allows the crystallized chemical to fall out, thus removing a part of the fire-resisting agent. Lastly, no wood in the form of shavings would be exposed to fire in a building. It would seem that further evidence is unnecessary to demonstrate the inappropriateness of this test alone as a standard of comparison.

To avoid the difficulties of this and similar tests, the previously mentioned "timber test" was designed. Though not entirely satisfactory, the results, as a whole, have been gratifying. During the past two years, the writer has conducted over 4,000 tests upon fireproofed wood, the majority being "timber tests." Scarcely any criticism of the method of test has been offered by clients, though the results were often not gratifying.

The specimens for this test are accurately cut to a size $1\frac{1}{2}'' \times 3\frac{1}{2}'' \times 12''$. These "timbers" are tested in pairs by being laid across the top of a 6-inch gas crucible furnace, in which a constant temperature of $926^{\circ}\text{C.} = 1,700^{\circ}\text{F.}$ is maintained. This particular temperature was chosen because it is given by the New York Building Code as approximately the heat of a burning building. At the end of two minutes the specimens are removed, and duration (1) flame and (2) glow noted for each.

The temperature is under constant control by means of a Le Chatelier pyrometer, the "couple" being placed between the two specimens, thus recording the heat exactly at the point of application. The proportions of gas and air are regulated to furnish a vigorous flame 8 to 10 inches above the furnace, so imitating an ordinary fire.

After test, the specimens are sawed in two at the middle and tracings made of the unburned wood. These tracings are then carefully measured by planimeter and the percentage ratios to the original cross-section calculated. The percentage of unburned wood is printed upon the tracing of each specimen, and then blue prints are made which become a part of the permanent record.

The accompanying exhibit contains samples of these blue prints, also a number of tested specimens of different varieties of wood both treated and untreated, showing the comparative results in each instance. It will be noted that the tested specimens show a straight line in the cross-section on the side not exposed to the fire, whereas the untreated specimens are burned on all sides. This is good evidence of the fire-resisting properties of the wood. In general, the untreated woods show a cross-section area approximately 10 to 25 per cent less than the treated samples. However, the value of the "fireproofed" wood cannot be rated by this feature alone. Account must be taken of the tendency to ignite and support combustion. This is indicated by duration of flame and glow after the specimen is removed from the fire. In every instance the contrast in time of flame and time of glow, between the treated and the untreated wood, is very marked. The average duration of each taken from 688 tests on four varieties of treated soft woods was 7 and 12 seconds. The same data taken from 846 tests on four varieties of treated hard woods was 10 and 14 seconds.

Similar calculations based upon tests of untreated wood, though not averaged from nearly so many tests, gave for soft woods, flame, 1 min. 19 sec.; glow, 1 min. 53 sec.; and for hard woods, flame, 2 min. 31 sec.; glow, 6 min. 29 sec.

Those figures give a ratio of 1 to 11 and 1 to 9 for flame and glow between treated and untreated soft woods, also 1 to 14 and 1 to 27 for hard woods. That is, the tendency of untreated woods to burn is 10 to 20 times that of treated woods. This measure of the property of retarded combustion is as important as the determination of the percentage of unburned areas, for in the first stages of a fire, minutes are valuable. Experience has shown that a variation of five per cent should be allowed in cross-section area, because of structural differences in the wood, fluctuation in temperature, and personal error in measuring. In fact, like all investigative work, it is never safe to estimate average values from the results of a few tests.

The advantages of this method of test are: (1) a test-piece of uniform size, large enough for practical comparisons, and small enough for numerous tests to be made with slight waste of material, thus insuring a fair average report; (2) a constant temperature and uniform time of application of heat; (3) an estimate of the tendency to support combustion as indicated by the times of flame and glow; (4) the ability to accurately measure the amount of burn, and make a drawing of same for permanent record—the specimen itself can also be easily preserved for future reference if desired. In brief, every element of the test is practically constant, except the character of the wood and the treatment it has received. Necessarily these must always remain variable.

The lumber is thoroughly dried before testing, and care exercised to keep everything uniform.

The specimens are placed so the side which was originally the outside surface of the board faces the fire. This is necessary because the Building Bureau permits one inch outside treatment on floor sleepers and other large materials, which is encased in concrete or a coating of other fireproofed wood.

It will be noted that hard woods, like long-leaf yellow pine, oak and maple, when treated, differ only slightly in unburned area from untreated lumber.

They are naturally "slow-burning" material. It would scarcely be necessary to fireproof hard wood if the preservation of structural strength were the only consideration. But the danger from inflammability should make a surface treatment imperative. Soft woods which waste rapidly under flame should be treated throughout.

Although treated wood has many advantages as a fire retardant, it also has its failings, the worst being its tendency to become hydroscopic. There are processes which claim avoidance of this tendency to gather moisture when exposed to dampness, but I have had no opportunity to prove their merits. Because of this difficulty, the Navy has discontinued the use of fireproofed wood, except for interior trim, furniture, etc.

When in this damp condition a new difficulty arises, because the chemicals employed produce a corrosion on metals. Neither of these difficulties appear harmful where the wood is ordinarily dry and protected by paint, varnish or oils.

A strong point in favor of the treatment is, that the wood does not seem to become perceptibly more combustible by the application of oils and varnish. Among the experiments I will make at the conclusion of this paper is one designed to demonstrate this feature.

A further defect of treatment is to weaken the wood and make it brittle. Although this does not always result, it is a recognized possibility, and the Navy specifications reject material which has lost over thirty per cent of its original strength.

In New York city no attention is paid to the question of strength, for the method of steel construction does not require the wood to support loads.

Whether the treatments are permanent, I am not prepared to state. Our experience with them is too short to predicate a positive opinion. Samples kept in my laboratory two years show no signs of deterioration, and we have here some samples treated in 1895 which we will test to show they still retain their fire-resisting qualities.

Some processes, however, do employ volatile chemicals, as is evidenced by a bloom which appears on the wood after standing for some time; it is also shown upon the sides of these jars of shavings which are about two years old. So far as my experience goes with lumber treated for New York City there is very little tendency to

this sort of deterioration. Neither has there been any evidence of decay. When used under ordinary conditions of dryness, and protected as it usually is, I see no reason why well-treated wood should not remain sound and effective indefinitely. However, I believe, the question is one to be systematically investigated.

There are two other well-known defects: namely, discoloration and difficulty in working due to hardness. Both of these are increased by excessive treatment, hence the manufacturer is always tempted to lessen the treatment. This fact is the only argument necessary for regularly testing the material as delivered for use.

Last, but not least, from a builder's point-of-view, the wood is costly. But considering the awful destruction of life and property which fire constantly causes, the saving of expense should not be allowed as an excuse for the use of inflammable materials which invite public calamity.

THE UNDERWRITERS' LABORATORIES AT CHICAGO.¹

THIS experimental bureau was organized in 1893, and originally devoted itself exclusively to testing electrical devices and materials and collecting accurate statistics and reports on fire-losses caused by electricity. Later, its work was enlarged to include all forms of lighting and heating appliances and the testing of extinguishers, retardants, and fire-alarm signal-systems of all kinds.

Up to the present time tests have been completed and reports issued on more than 2,400 separate systems, appliances and materials.

The objects of these tests are to determine the comparative efficiency of all forms of fire-retarding and fire-extinguishing systems and devices, and to secure such safeguards in the construction of all lighting and heating appliances as will reduce to a minimum the hazards incident to their use.

The institution is supported financially by the stock fire-insurance companies doing business in the United States, and by fees collected from the manufacturers of appliances submitted.

All tests are carried out under detailed specifications agreed to by the various National organizations representing the interests affected.

In the electrical department the specifications used are those of the National Electrical Code, which is the recognized American authority on safe wiring and safe electrical construction. This Code was originally drawn, and is extended from year to year, by a convention, to which the following American organizations send delegates: The American Institute of Architects, the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, the American Street Railway Association, the Factory Mutual Fire Insurance Companies, the International Association of Fire Engineers, the National Board of Fire Underwriters, the National Electric Light Association, the Underwriters' National Electric Association, and the National Electrical Contractors' Association.

The names of such appliances as are shown by the tests to meet the specifications are printed in a list which is issued quarterly. All manufacturers whose names are given in the list are required to enter into a contract with the Laboratories covering their factory practices, and samples of all articles listed are purchased in the market from four to twelve times a year, and re-tested to discover any departure in later factory practices from the standard set forth in the requirements.

This work covers every electrical appliance in common use whose introduction may have any bearing on the fire-hazard. It secures the active coöperation of all of the manufacturers in the United States, from the largest to the smallest, all of whom make a practice of submitting new appliances to the Laboratories before putting them on the market. In this way hazardous features are eliminated at the outset, and the number of fire-losses is correspondingly reduced.

A practice similar to that inaugurated in the electrical work has been followed in the departments since organized, and the lists of approved fire extinguishing and retarding appliances thus far issued, like the electrical lists, are followed generally in the classifications and ratings of the insurance companies and in the specifications of architects, engineers and builders.

In a similar manner the disapproval of the Laboratories tends to keep faulty appliances out of building equipments.

Over 30,000 copies of the quarterly electrical lists are regularly called for, the quarterly lists of permitted gas-machines and systems reach 28,000 copies, and the lists of approved extinguishers, watchmen's time-detectors, and other signal-systems are coming into quite as general use.

Coupled with the Laboratory work in all departments, careful watch is kept on the record in practice of all the appliances covered; more than a thousand correspondents located throughout the United States are reporting regularly to the Laboratory organization, and prompt reports are received of the failure or apparent failure of any listed device successfully to perform in service. This feature of continuous record of field experience is considered quite as valuable in an instructive way as are the Laboratory experiments themselves.

In the retardant work gas-ovens have been built, the largest capable of reproducing the severest possible fire conditions over an area equal to that of standard-sized fire-doors. The gas used is obtained by pipe connection with the natural-gas fields in the State of Indiana, a very large continuous supply being available and the gas being peculiarly well-adapted for fuel.

Electrical power is used throughout the Laboratories, including the hydraulic department, a recent addition being an electrically driven fire-pump capable of delivering 500 gallons of water per minute at 100-pounds pressure. This department, which covers the test-work on hose, hydrants, valves, automatic sprinklers, nozzles and similar apparatus, is also equipped with a 5,000-gallon reservoir, a 4,500-gallon pressure-tank, a 6-inch standpipe 70 feet in height, and a large amount of small apparatus for pressure-work and measurements.

In the department devoted to lighting and heating, other than electricity, 380 different makes of acetylene-gas generators and 200 devices and appliances using petroleum and its products have been tested and reports issued.

In the electrical department examinations, tests and reports have been made on 1,650 different devices and materials.

The plant at present occupies one two-story and basement brick building with yards adjoining, and a storage floor in a second building. Six resident engineers and a total of eleven persons are constantly employed, all of whom devote their entire time to the work.

Each department is supervised by a Committee of Consulting Engineers appointed by the various National Associations having the different subjects in charge, the members of which are residents of different sections of the United States. All Laboratory reports are issued to and reviewed by these Committees before being utilized as a basis for the Lists of Approved or Permitted Devices and Materials issued by the National bodies.

The Protective work is covered by a Committee of the National Fire Protection Association, the Electrical work by the Underwriters' National Electric Association, and the work on Lighting and Heating, other than Electricity, by the Committee of Consulting Engineers of the National Board of Fire Underwriters.

The plant is, I believe, unique in the character and extent of the work it carries on, and is the only institution in the world comprehensively covering the fields of fire-protection and the fire-hazards as they apply to all devices and materials introduced for general use.

MILAN NOT A SUMMER RESORT.—Milan is in summer the hottest city in Italy, the temperature not being influenced by the ocean or the mountains, as in Venice, Genoa, Naples, Palermo, Bologna, Florence and Rome. Consequently there are few villas near Milan, whose wealthy families spend their summers preferably along Como and the other Italian lakes. — *Exchange.*



[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.]

INTERPRETATION OF CONTRACT.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—A certain specification contains this provision:—

"The Building Law of the City of Boston is made a part of any contract based upon the specification."

The Building Law, Section 78, requires that—

"Outside windows or openings of every elevator-shaft shall have three vertical iron bars painted red, equally dividing the opening."

Does this clause in the specification above quoted require the contractor at his own expense to provide these vertical iron bars? W.

[We think that it requires the contractor, without question, to furnish such bars. — EDS. AMERICAN ARCHITECT.]



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

A COMPETITIVE DESIGN FOR THE IMPROVEMENTS AT THE U. S. MILITARY ACADEMY, WEST POINT, N. Y. MESSRS. FROST & GRANGER, ARCHITECTS, CHICAGO, ILL.: QUADRUPLE PLATE.

GENERAL PLAN OF THE SAME.

SECTIONAL VIEWS OF THE SAME.

Additional Illustrations in the International Edition.

THE SOLDIERS' AND SAILORS' MONUMENT, RIVERSIDE PARK, NEW YORK, N. Y. MESSRS. STOUGHTON & STOUGHTON, ARCHITECTS.

¹ A paper by William H. Merrill, Jr., prepared for the International Fire Prevention Congress, held in London, Eng., July 7-10, 1903.

SOUTHEAST VIEW OF THE SAME.

DETAIL OF TERRACE OF THE SAME.



Entrance to Soldiers' and Sailors' Monument, New York, N. Y.

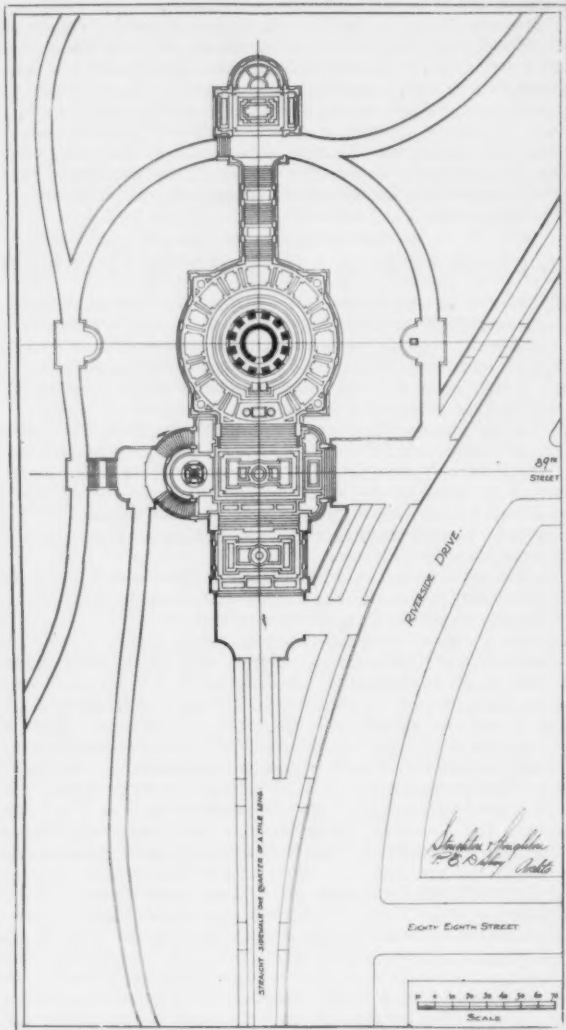
THE CANTORIA IN THE SISTINE CHAPEL, PALACE OF THE VATICAN, ROME.



FIREPROOF STADIA.—The plan of a fireproof stadium to be erected on Soldiers' Field, Cambridge, has been anticipated by the completion of a similar structure dedicated to a different purpose at the University of California. The latter building is an open-air theatre, made of concrete, which stands in a grove of trees forming part of the general scheme of the college buildings. Its plan is a close reproduction of the old Greek Theatre of Dionysius, and it has a seating capacity of 8,000 persons. When President Roosevelt spoke there in May the theatre was filled for the first time. These two fireproof, permanent buildings are the first of their kind in this country, but they will undoubtedly be copied soon in those localities where the frequent occurrence of important athletic contests justifies them. The burning of the large south stand on Soldiers' Field during the course of the Harvard-Princeton game a few weeks ago serves as a clear illustration of the dangers to which the enormous crowds at popular spectacles are at present regularly subjected. The danger is multiplied when the timber stands entirely enclose an area, as they do on many college fields, thus leaving an entirely inadequate means of exit in case of fire.—*Boston Transcript*.

DEMONSTRATION OF IRRIGATION.—One of the notable exhibits in the United States Building at the Louisiana Purchase Exposition will be furnished by the Geological Survey. Prof. A. H. Thompson is now in the valley of the Salt River, gathering data which will be used in the construction of three models that are to demonstrate the Government's irrigation plans to the uninformed public of the Eastern States. One model will be of the 250-foot Tonto storage-dam; the second will include a section of the box canyon below the dam, and the third, showing a typical irrigated area, will be a close reproduction of Mesa City, on a scale of 21 inches to the mile. The last model will show every house, farm and orchard, as well as all the ditches, with their head-gates and power-works. Mesa City is a model irrigated community. Originally settled by the thrifty Mormons, the holdings are small and the utmost use is made of every acre. It is situated on a fertile table-land about eighteen miles east of this city.—*N. Y. Tribune*.

LIME IN THE OCEAN.—As the geologist wades about among the pools or follows the shore line at low water he is impressed with the prodigious amount of lime segregated from the sea water by the superabundant marine life exhibited on all sides. Every pool, every



Plan of the Soldiers' and Sailors' Monument, New York.

rock, is teeming with life of some kind, and most of these organisms have secreted a certain amount of lime from the sea water to form their shells or their bone, internal as well as external, structure. Most of the pools are lined with so-called "sea mosses," more strictly calcareous fern-like corallines of pink or purple hues, the lime secreted by minute polyps. In addition to this, there are many forms of algae, or sea plants, that secrete lime. Considerable masses of a structureless limestone are so formed in the Bay of Naples. Apart from the vast beds of sea shells we know to be secreted in the mud and sand, as well as those shells, like the abalone, found under the rocks, an enormous amount of segregated lime is represented by various forms of crustacea, particularly of the worm or annelid family, encased in tubes of lime. These tubes cover the floors of caves, while the walls are still more densely coated with limpets and rock barnacles, while in the crevices hundreds of little crabs crawl about and menace you with suspicious eyes and formidable claws, and hermit crabs carrying their whelk shell home on their backs swarm in the pools. With such a teeming superabundance of lime-gathering life, the mining geologist no longer wonders at the vast amount of limestone he meets with in the marine rocks, in which his blanket veins of lead and silver are found, as at Aspen and Leadville, Col., and throughout the world generally wherever lead abounds. He sees now how it is that he occasionally finds a fossil sea shell in the limestone walls of his mine, and only wonders he does not find more. In mines farther east he would find the limestone composed of nothing but a mass of sea shells. Deposits of comminuted shells and coral sands, thrown up on shore by the stormy waves, may be cemented into a compact rock, or limestone, by the redeposit of carbonate of lime between the fragments. In such a way is formed the "shell limestone" of Florida, and doubtless many of our old fossiliferous limestones were formed in this way.—*Mines and Minerals*.

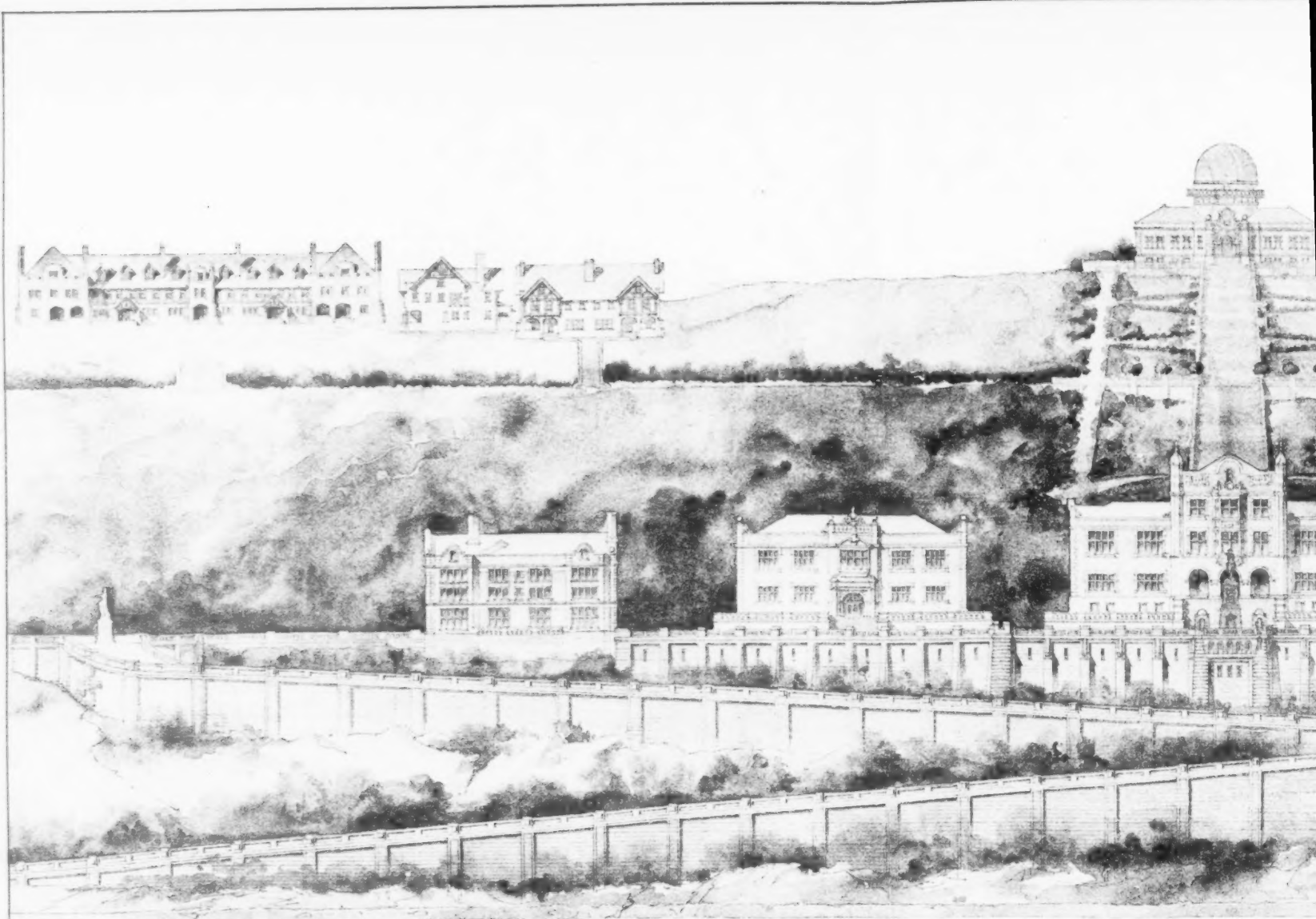
PUBLIC DENTAL OVERSIGHT OF SCHOOLCHILDREN.—Since last October the children in the public schools of Strassburg have had a chance to have their teeth taken care of free, the city paying the dentists. Among 10,661 children only 165, or a trifle more than one per cent, were found to have sound teeth.—*Exchange*.

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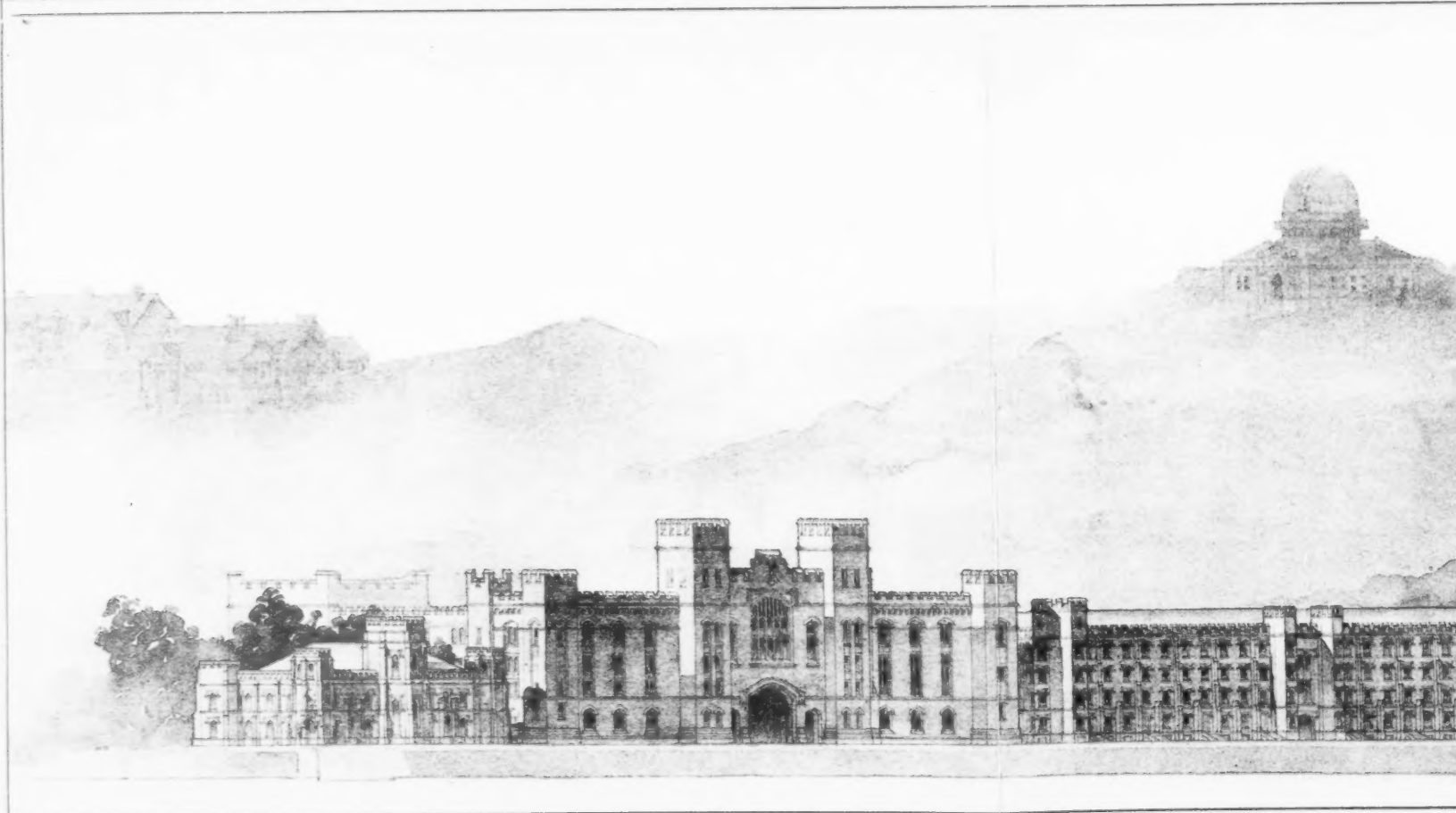
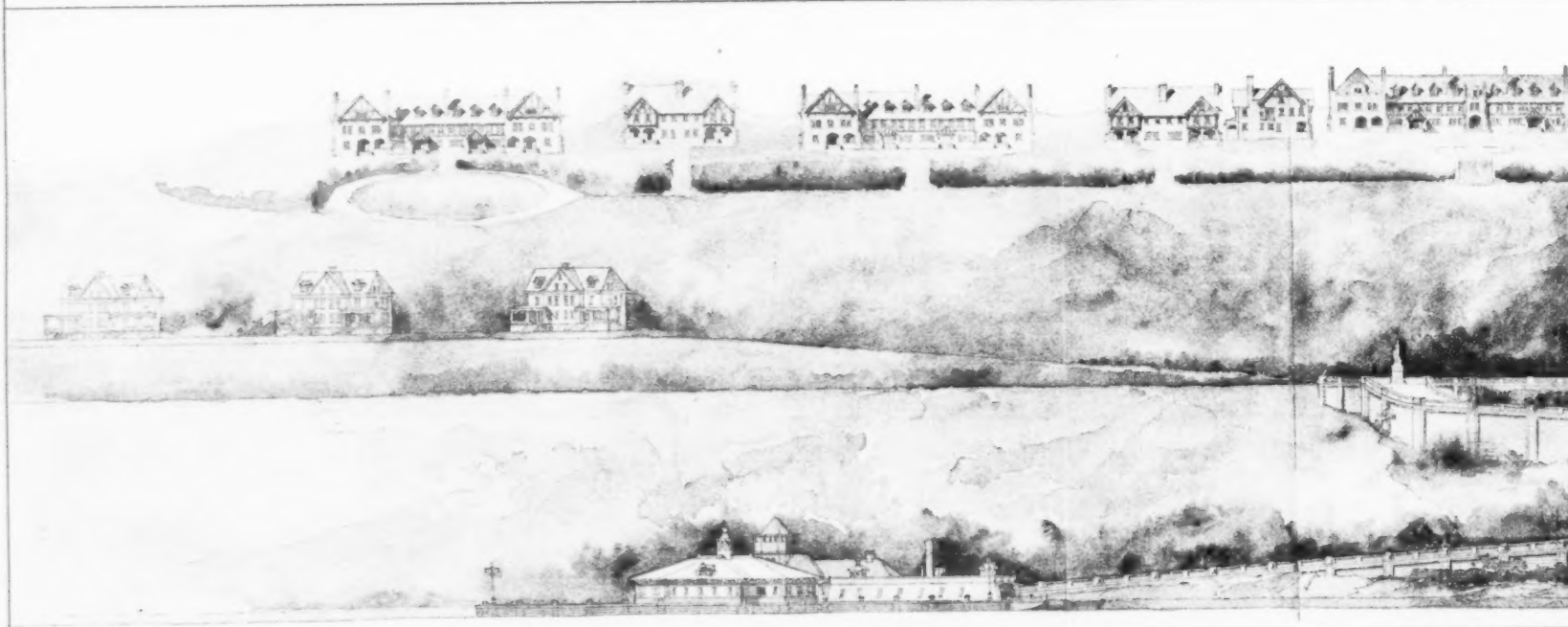
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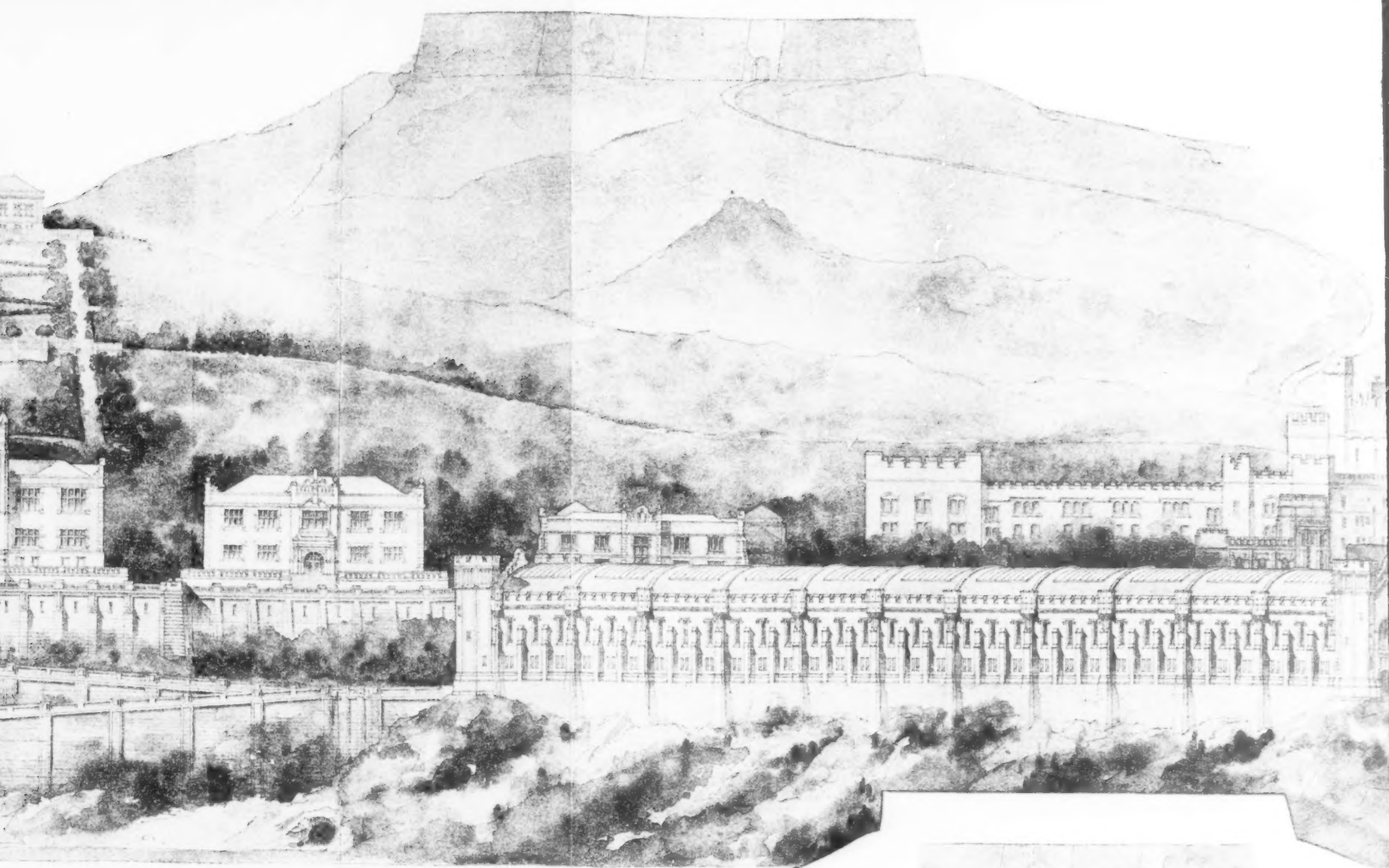


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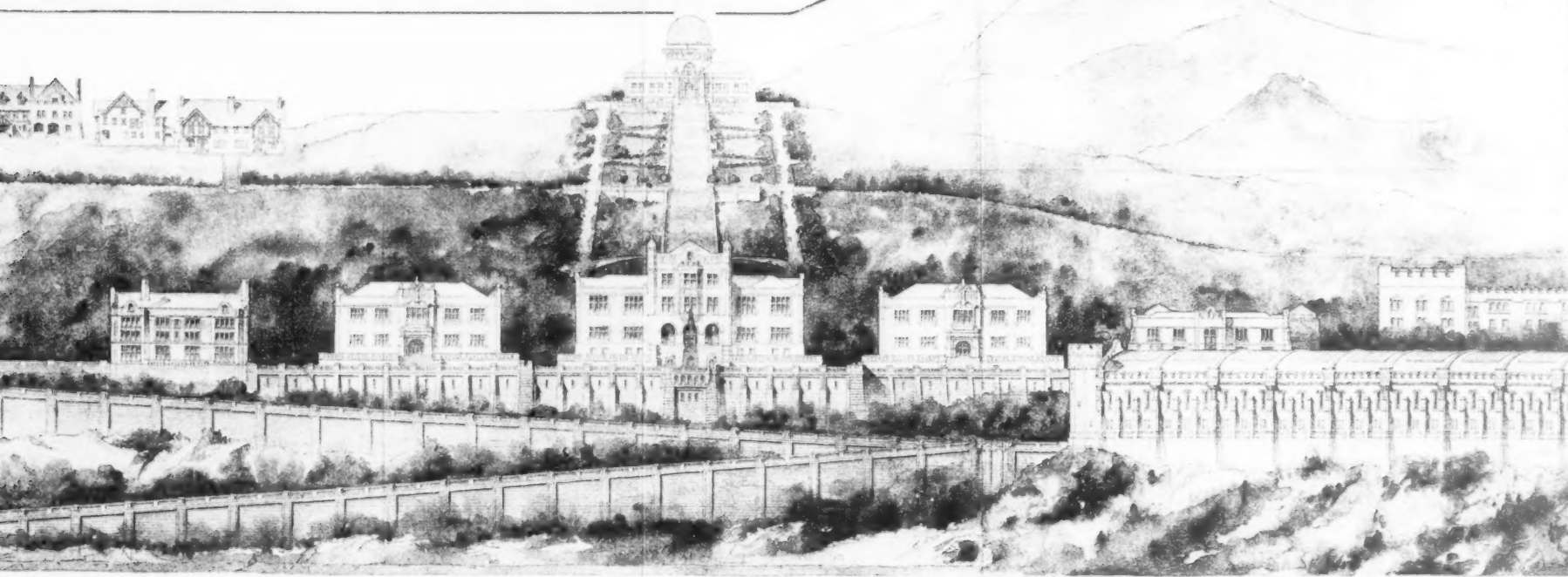


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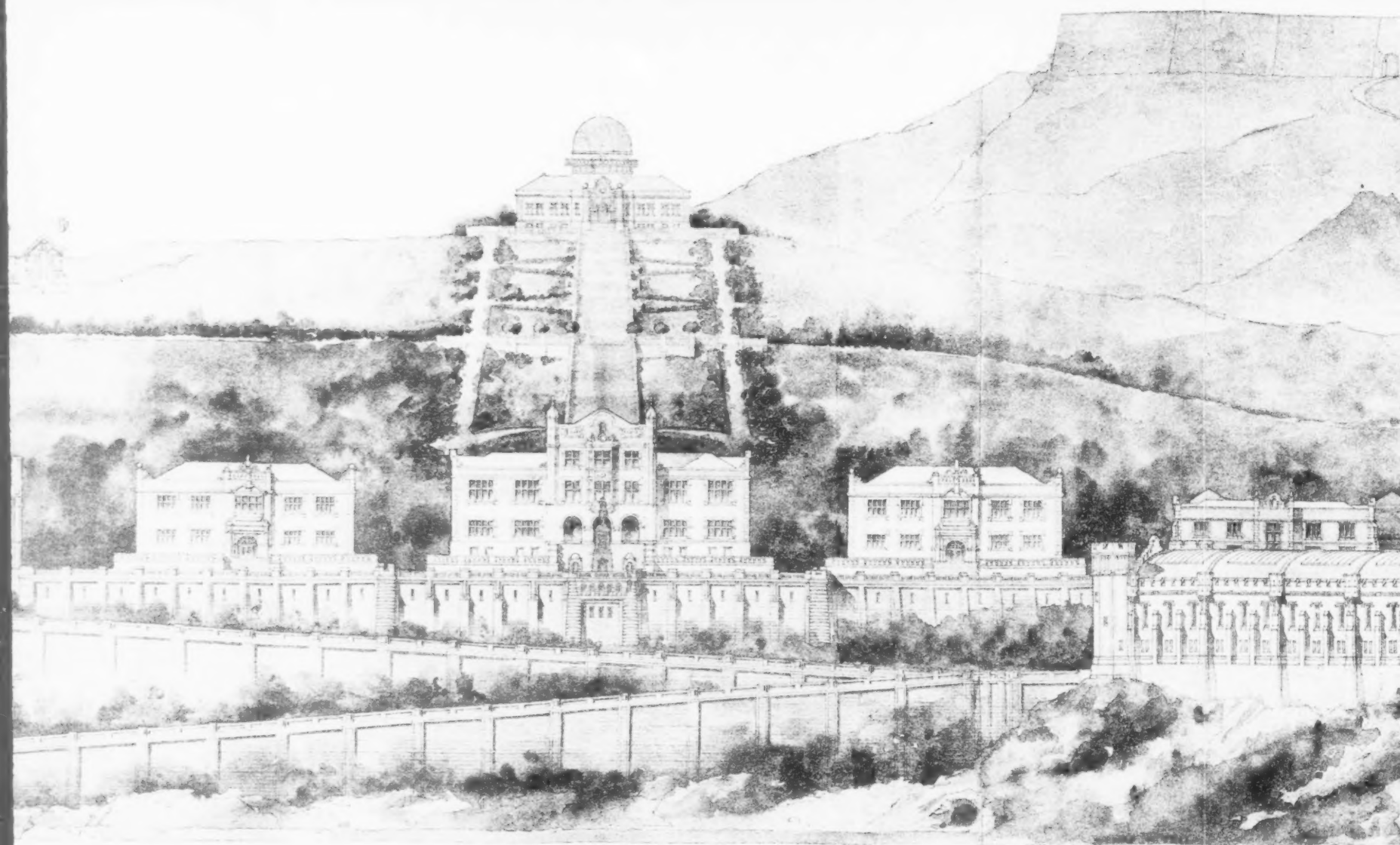


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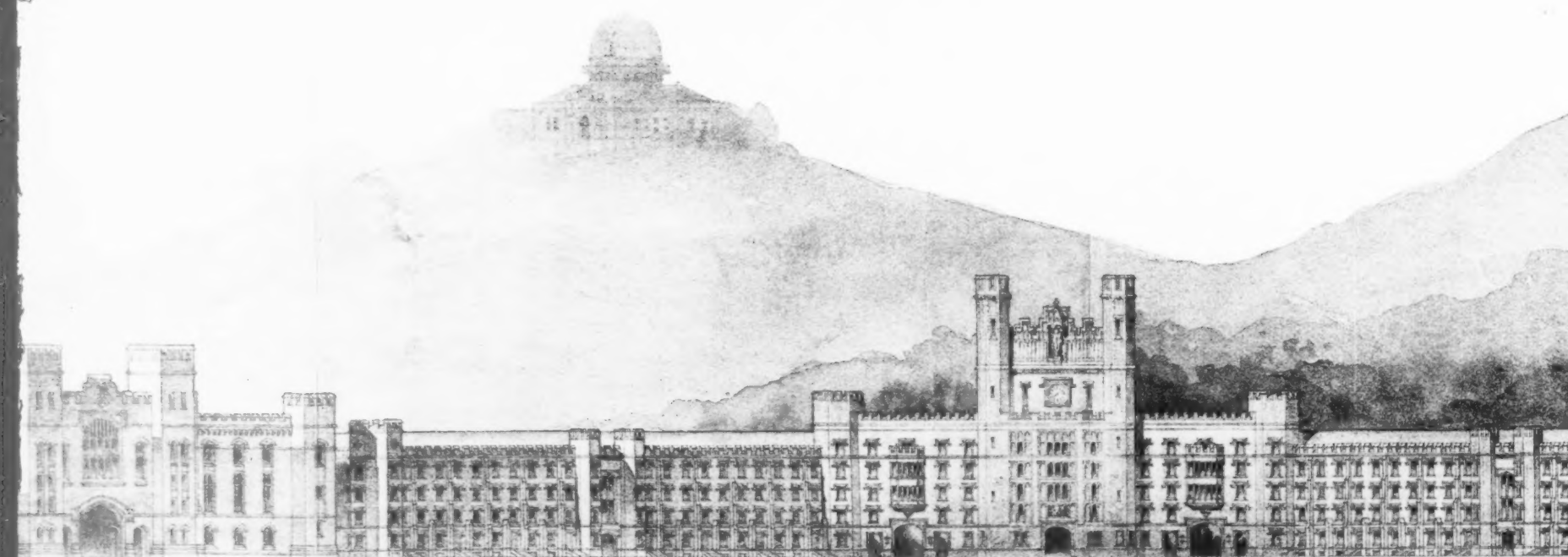
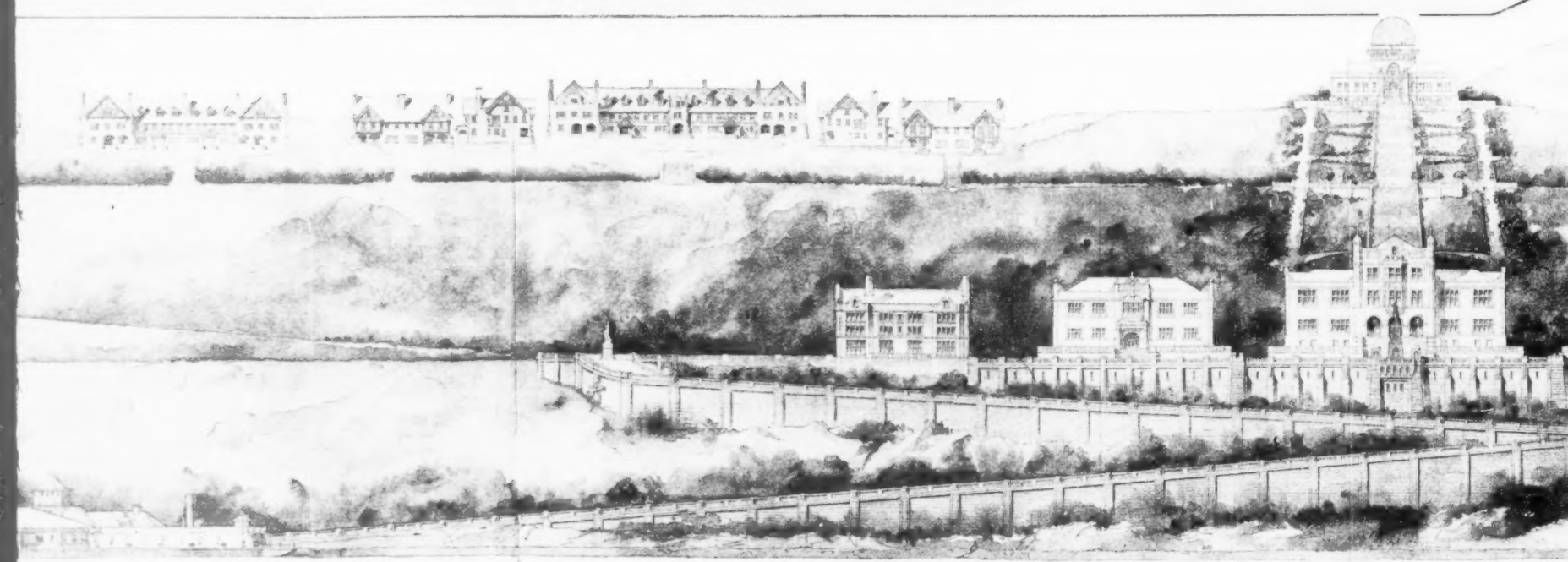


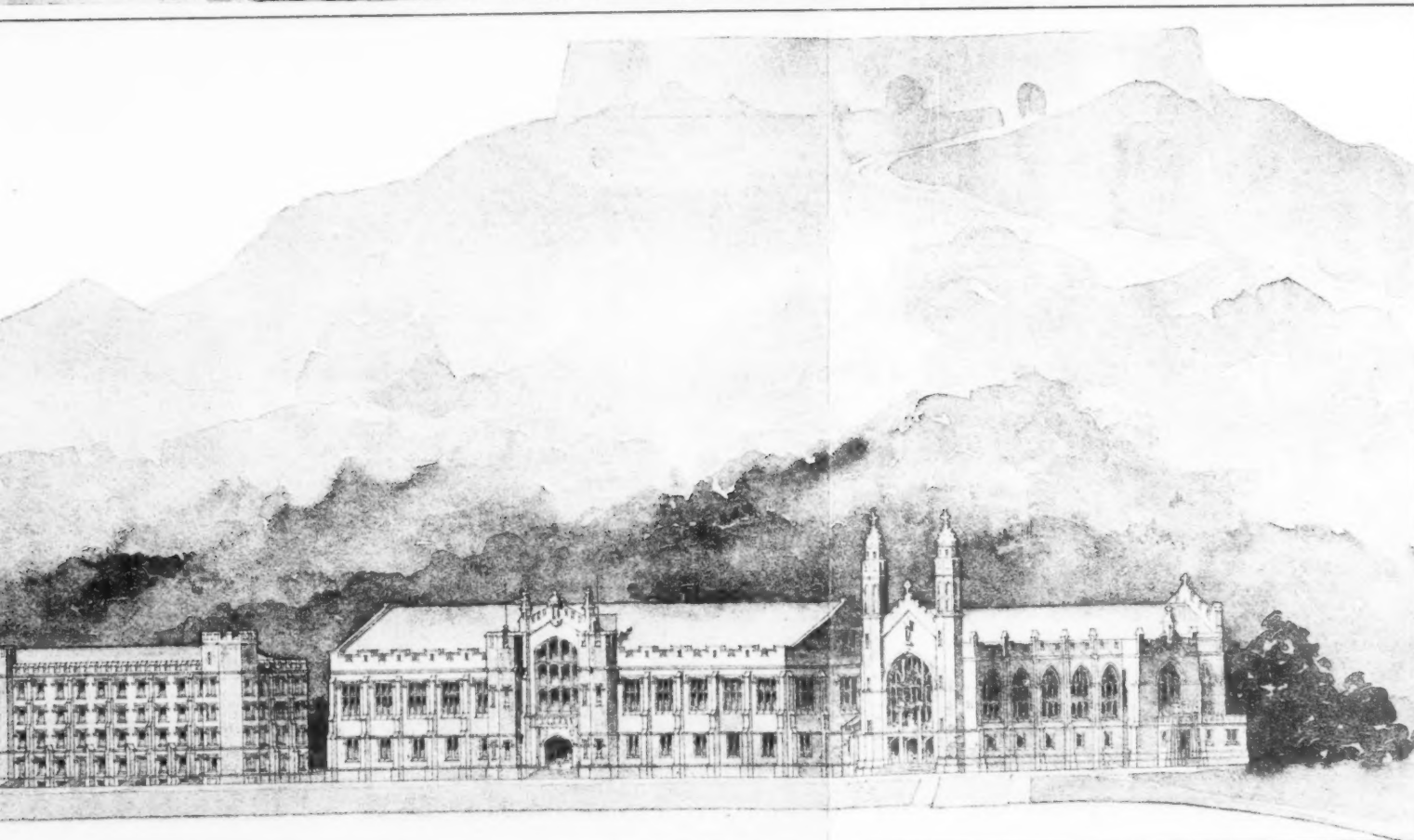
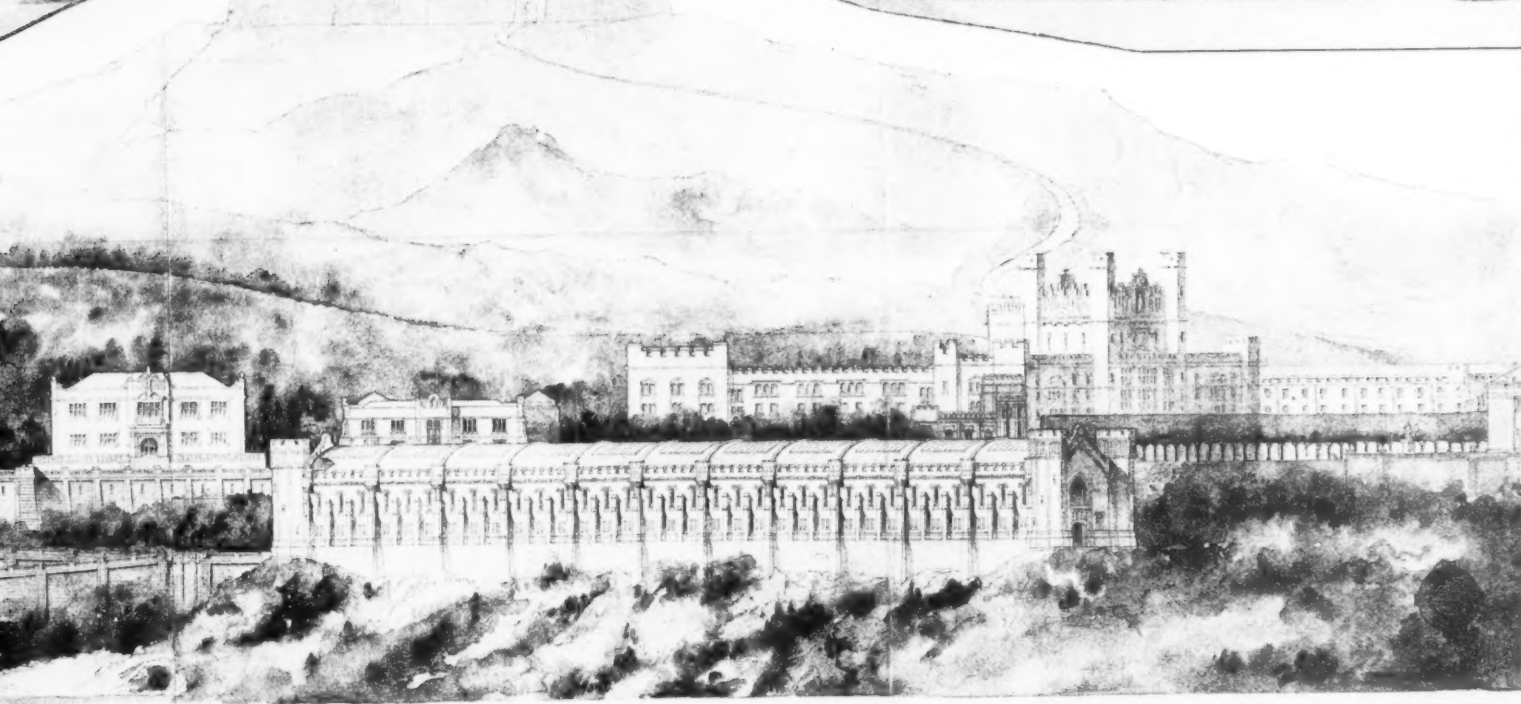
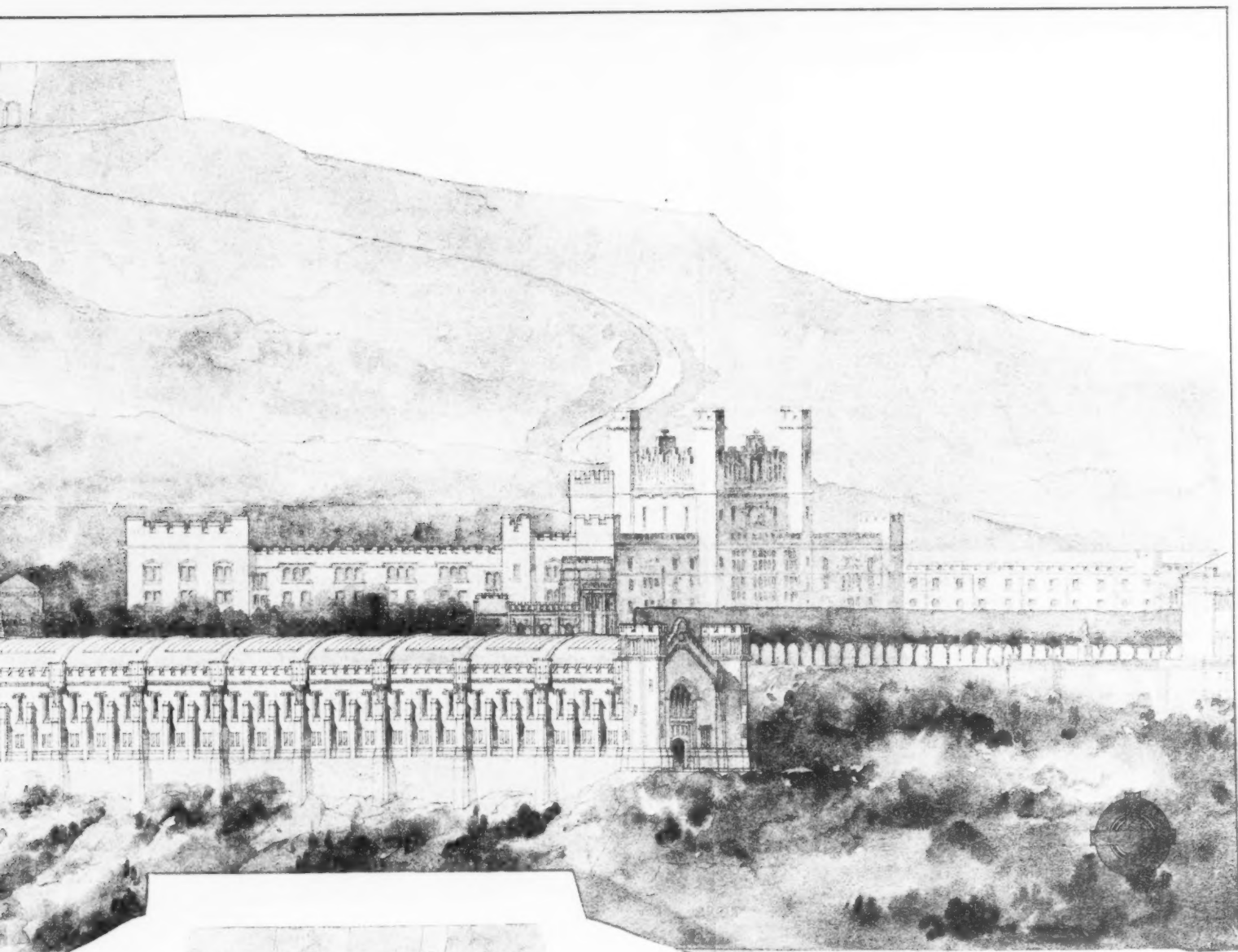
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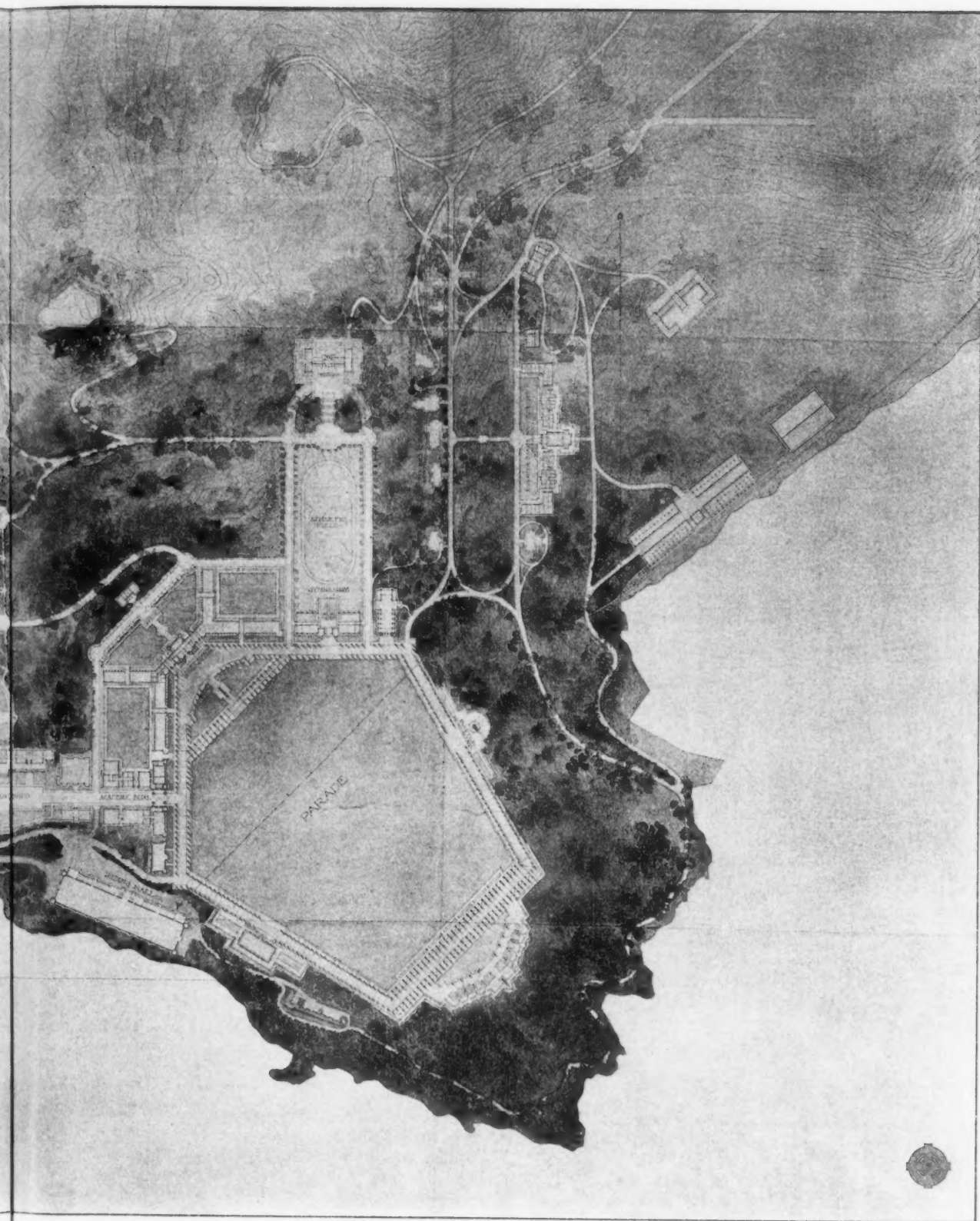
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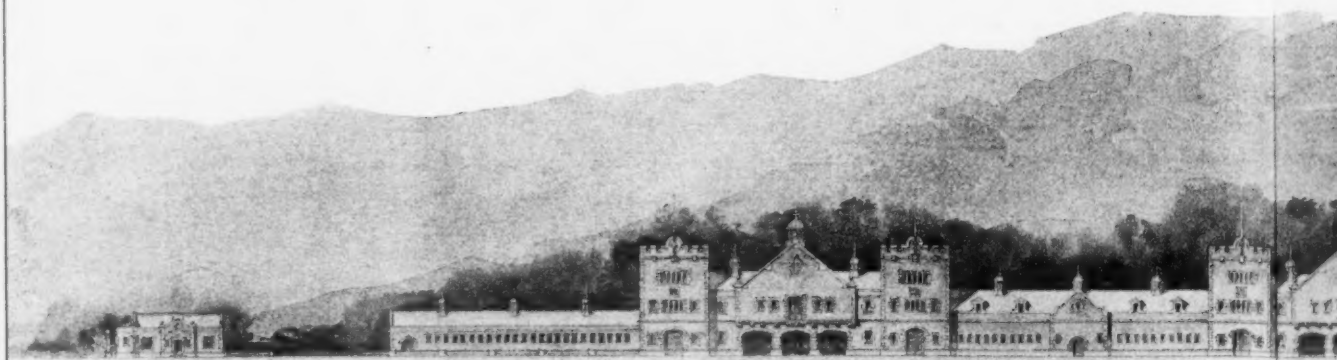
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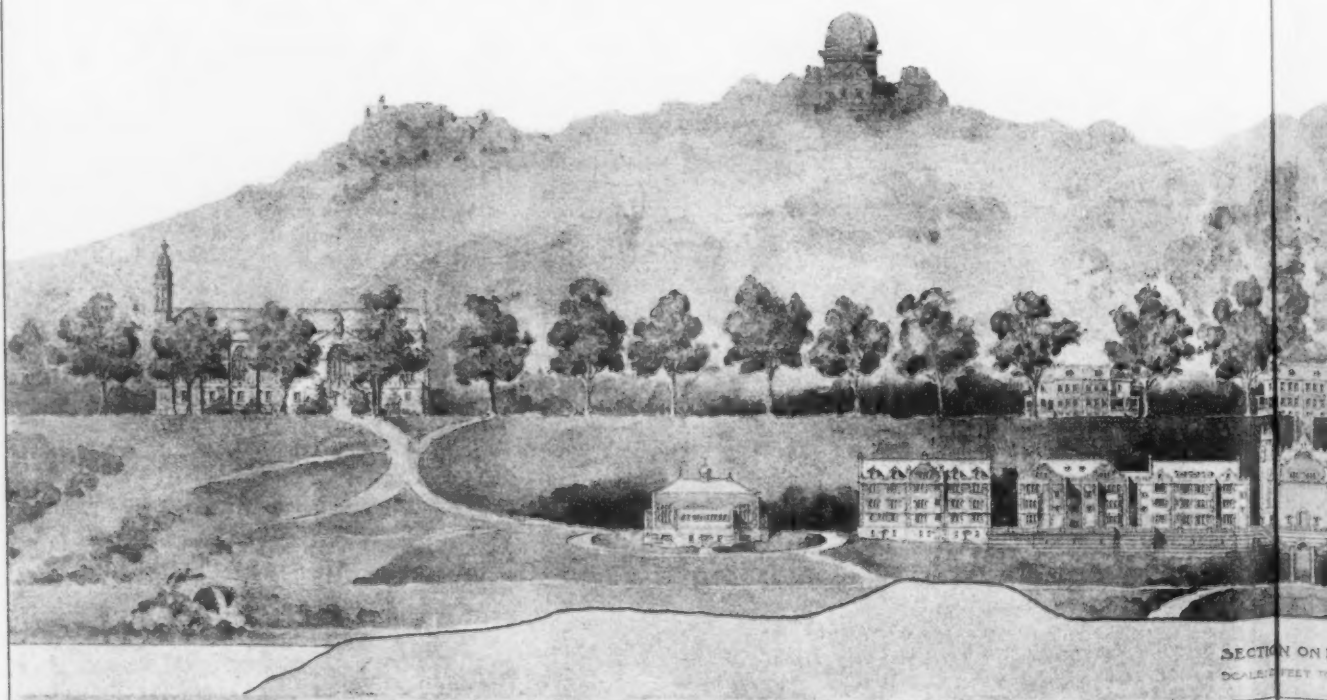
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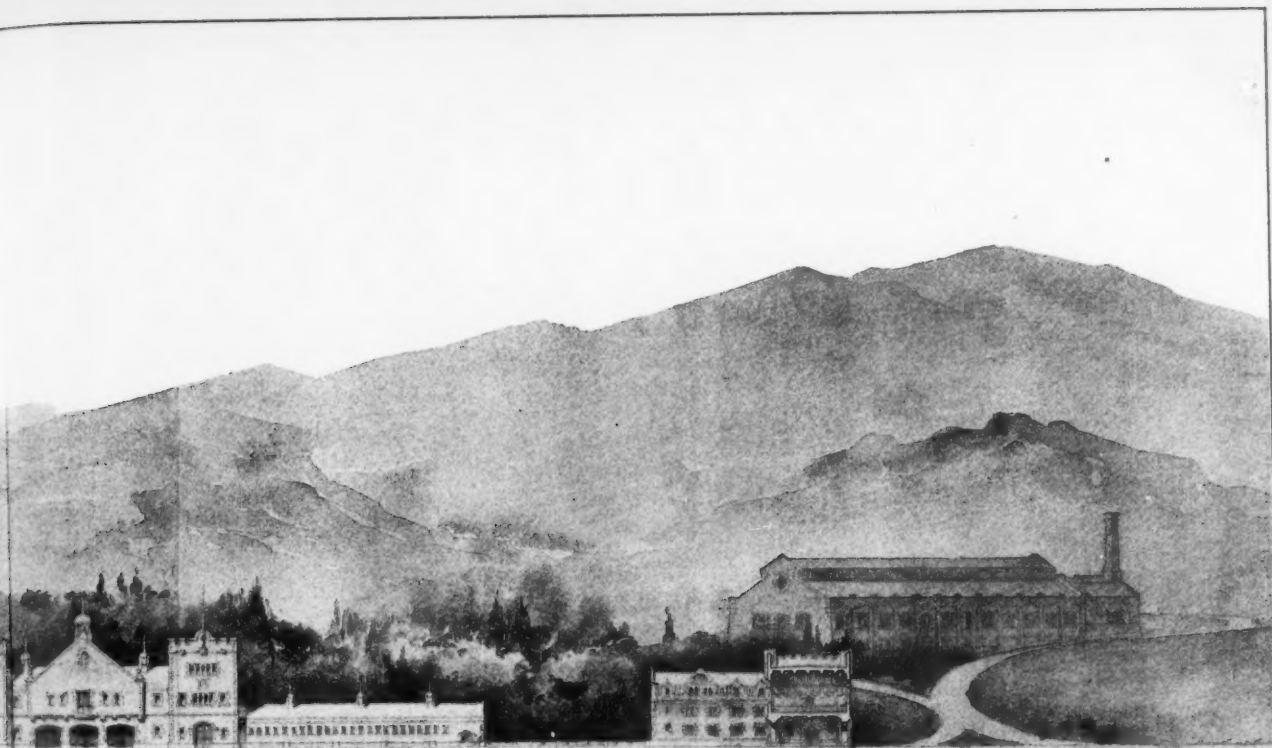
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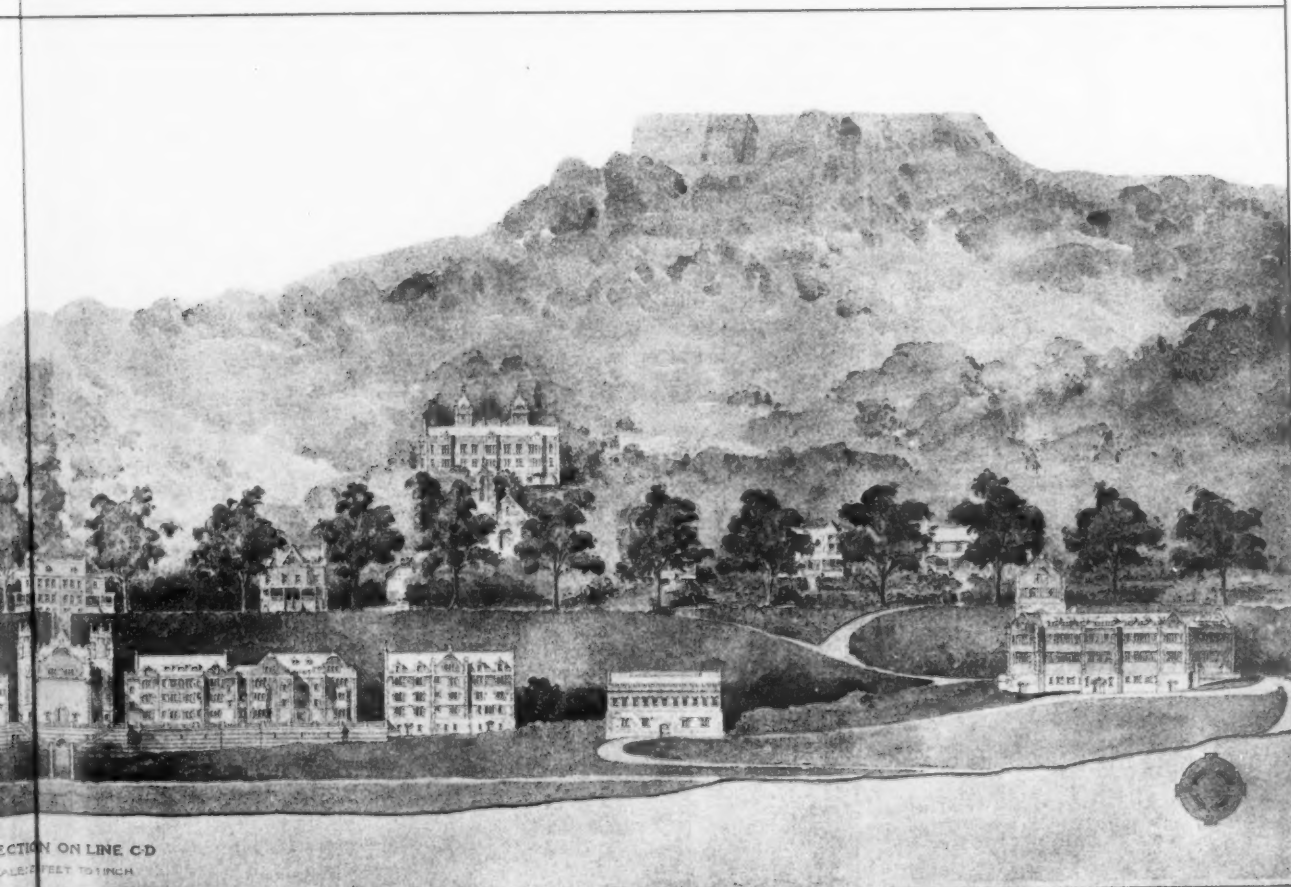
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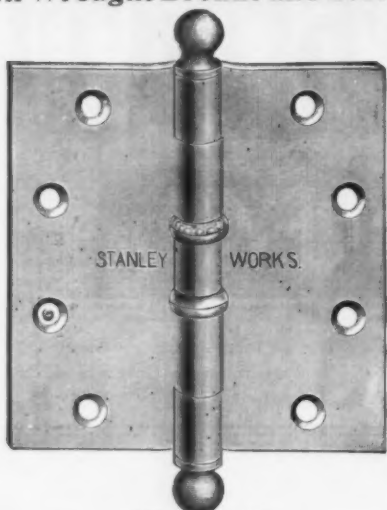
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CODE OF PRACTICE FOR SUB-ESTIMATING AND SUB-CONTRACTING

Adopted by the Master Builders' Association of the City of Boston, Aug. 2, 1894.

ARTICLE I.

Obligation of Principal Contractor to Sub-Contractor.

A principal contractor is under obligation to treat upon an equal basis all estimates which he "receives" prior to putting in his own bid. Estimates must be considered as "received" when they come into a principal contractor's possession, either by his direct solicitation or by being accepted by him. The opening of a bid, knowing it to be such, constitutes receipt of the same.

A principal contractor is under no obligation to use a bid which he has not solicited, accepted, or received, but if he does not wish to use the estimate of a sub-bidder he should decline it, if proffered personally, or should return it unopened if sent to him by mail or otherwise. The retention of a bid should be construed as a receipt of the same.

A principal contractor, when making up his estimate, is not entitled to receive bids from sub-contractors if he is at the same time making himself their competitor by figuring their portion of the contemplated work. It is legitimate for a principal contractor to figure all portions of work, depending upon no one for what are usually known as sub-estimates, but it is not legitimate for him to receive bids from others for sub-work if he is himself figuring those portions independently.

ARTICLE II.

Award of Sub-Contracts.

The principal contractor having been awarded a general contract should immediately award the sub-contracts to the lowest bidder in each branch.

ARTICLE III.

Penalty for not Awarding Contract to Lowest Sub-Bidder.

A principal contractor failing to award a sub-contract to the lowest sub-bidder to whom he is under obligation as previously provided should be liable to pay damages to the said lowest bidder, in amount not less than ten per cent of the amount of the estimate.

Payment of such damages will not relieve the principal contractor from liability to discipline under provisions of Article X of the By-Laws of this Association.

ARTICLE V.

Payments to Sub-Contractors.

Unless the contracts made with sub-contractors otherwise provide, payments during the progress of the work should be made by the principal contractor to the sub-contractors upon the same basis of payment, in relation to amount of work performed, as is prescribed in the contract made by the principal contractor with the owner.

Final payment to a sub-contractor should be considered as due at the expiration of thirty days after the completion of his work and its approval by the architect or owner, unless otherwise provided by the sub-contract or agreement.

ARTICLE VII.

Obligation of Sub-Contractor to Principal Contractor.

Should a sub-contractor refuse to contract at the amount of the estimate he has given to a principal contractor who has used the said estimate in good faith, he then should be liable to the said principal contractor for damages in amount not less than the difference between the amount of the estimate which was submitted by him and the amount at which the principal contractor may be obliged to contract the work.

Payment of such damages will not relieve the sub-contractor from liability to discipline under provisions of Article X of the By-Laws of this Association.

ARTICLE X.

Bids to Architects or Owners.

When bids for separate departments of work on a building are solicited by the architect or the owner, they should be submitted with the understanding that they are direct estimates, for which direct contracts are to be made by the owner with the lowest bidder, and no other disposition of such bids should be permitted without consent of the bidder submitting the same.

Sub-bids should be given only to the principal contractors who are estimating the work in question, and should not be left with architects or owners for the inspection and information of principal contractors. Sub-contractors must understand that bids thus left with architects or owners are in great danger of losing their confidential character, and that if they so leave them they cannot claim protection or redress under the first article of this Code.

SUGGESTIONS.

Members of this Association having sub-contracts to let, or material to buy, should, as far as may be consistent with business principles, deal only with members of the Association, or at all events give their fellow-members an opportunity to compete, and then give them the preference, other things being equal.

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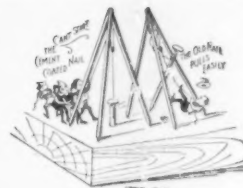
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Independence Hall, Philadelphia, Pa.		" 1729
Faneuil Hall, Boston, Mass.		" 1741
and others.		

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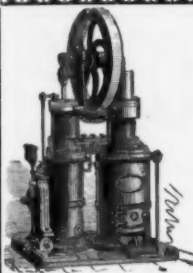
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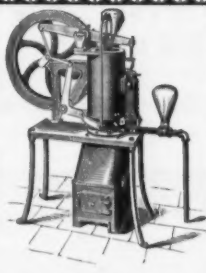
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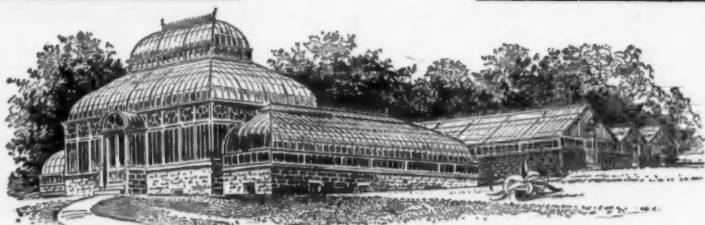
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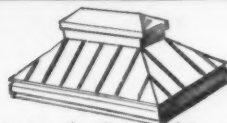
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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

bard and Greene Sts., and bids for the construction of the same will be opened in a few days. The new building will cost \$57,000 and will be located on the east side of Greene St., just south of Cider Alley. It will have a frontage of 100 feet, a depth of 90 feet, and will be four stories high. It will be of red brick, with gray brick and Indiana limestone trimmings, with slate roof.

Beverly, Mass.—The will of Edward L. Giddings bequeaths a sufficient sum to this city to erect and maintain a public library building.

Birmingham, Ala.—A new college will be erected by the Freedman's Aid and Southern Education Society, an organization of the North M. E. Church, to cost \$50,000.

Boise, Idaho.—Northrop Bros. have had plans prepared for a \$12,000 two-story brick and stone warehouse by Architects Campbell & Wayland.

An \$18,000 three-story brick and stone fireproof warehouse will be erected by D. W. Stun in accordance with the plans prepared by Architects Campbell & Wayland.

Boston, Mass.—Bowditch & Stratton have made plans for alterations in the dwelling-house, 27 Herford St., Back Bay, owned by B. B. Crowninshield.

Buffalo, N. Y.—The Larkin Soap Co., Seneca St. and Larkin Pl., proposes to construct a new eight-story addition, 69' x 129', to its present plant. Cost, \$109,000.

Burlington, N. J.—A Masonic Orphanage for the Grand Lodge of New Jersey is to be erected near this city. Plans have been drawn by A. H. Moses. The building will be of brick and stone construction, 38' x 63', costing about \$20,000.

Charleston, S. C.—A company is being organized with a capital of \$1,000,000 to erect a sugar refinery.

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

It will be known as the Carolina and Western Independent Refining Co. The business men have received the proposition most favorably. This city is asked to subscribe \$500,000.

Chattanooga, Tenn.—The contract for the erection of the Carnegie Library has been signed and work will begin at once on the foundation. The building will be located at the corner of E. 8th St. and Georgia Ave. It will cost, completed, \$50,000. The city will appropriate \$5,000 per annum for its maintenance.

Chester, Pa.—The Women's Christian Temperance Union are to erect a building here, at a cost of \$50,000.

The Chester Lodge of Elks have decided to erect a building here at a cost of \$20,000.

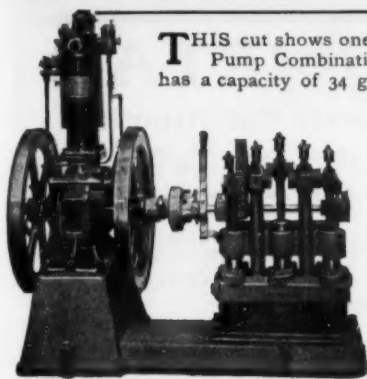
Chicago, Ill.—Contracts have been let for a three-story residence with exterior of terra-cotta and glazed brick, which is to be built at 4319 Grand Boulevard for R. G. Sykes, at a cost of \$35,000.

Plans are in preparation for a new \$750,000 clubhouse for the Union League Club. The structure will be located at the corner of Jackson Boulevard and Custom-house Pl. Designs by Architects T. H. Burnham & Co. call for an eight-story building, 100' x 150'.

A press report states that a new pumping-station two stories high, 40' x 80', will be erected by the Board of Local Improvements at Yates Ave. and 68th St. Cost, \$40,000.

Zachary T. Davis, Unity Building, has drawn plans for 3 three-story brick and stone apartment-buildings, 25' x 80', to be erected on Garfield Boulevard, near Centre Ave., at a cost of \$30,000. The architect will receive bids in about two weeks.

Oscar Cobb & Son, 85 Dearborn St., have prepared



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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

plans for alterations to the building at Wabash Ave. and Hubbard St. Cost, \$50,000.

The Chicago & Western Indiana R. R. Co. (B. Thomas, Gen. Supt.) will erect a twelve-story station on Polk St. Estimated cost, \$2,000,000.

Cincinnati, O.—McElfatrik & Sons, of New York, have submitted drawings for an eight-story office and theatre building to be erected on Vine St., above 5th. Roof garden over entire building. Owners, the Heuck Theatre Co. Cost, \$750,000.

Rumor states that May, Stern & Co. are to erect a nine-story brick building at 5th and Elm Sts. Cost, \$200,000.

Covington, Ky.—The Bell Telephone Co. will erect a three-story exchange building at 4th and Scott Sts., to cost \$20,000.

Danville, Ill.—W. E. Walker, of the Chicago & Eastern Illinois R. R. Co., has prepared plans for a 36-stall round-house to be erected here, at a cost of \$60,000.

Denton, Tex.—A \$40,000 pressed brick and stone school-building will be erected in this city for the North Texas State Normal School, in accordance with plans by Architect C. H. Page, Jr., First National Bank Building, Austin.

Denver, Col.—A two-story brick club-house is to be erected in North Denver, at a cost of \$40,000. Plans have been made by F. J. Sterner, Jackson Building.

Plans have been prepared by W. E. Fisher for a two-story stone and brick residence for Harry K. Brown, to be erected at 970 Logan Ave. Cost, \$18,000.

Elyria, O.—Henry Dykeman is interested in the erection of a new theatre building here, to cost \$50,000.

Fort Worth, Tex.—The Fort Worth Lodge, No. 221, I. O. O. F., have decided to erect a three-story building at 1st and Throckmorton Sts. Cost, \$75,000.

Indiana, Pa.—W. J. Shaw, Smith Block, Pittsburgh, is stated to have prepared plans for 2 buildings to be erected at the Indiana Normal School; estimated cost, \$70,000.

Kalamazoo, Mich.—The Lee Paper Co. has been organized with a capital stock of \$1,000,000 for the purpose of manufacturing book and writing papers. Fred E. Lee, Chicago, Ill., president. A new plant is to be built.

Laconia, N. H.—Gray & Wallace have secured the contract for erecting the Masonic Temple for about \$50,000.

Lawrence, Mass.—John Ashton, 477 Essex St., is reported to be preparing plans for a three-story school to be erected in Ward No. 2; probable cost, \$100,000.

Leadville, Col.—A new hotel and sanatorium is to be built near here, on Unesa Lake. A company has been organized with \$100,000 capital to erect the same. The plans for the buildings have not yet been fully considered, but a hotel building and a number of cottages, all thoroughly modern, are proposed. Dr. Hannelly is now in Denver arranging details. He will be the consulting physician of the new company.

Louisville, Ky.—Chas. W. Gheens has made plans for buildings to be erected on site of the Union Warehouses recently destroyed by fire, at a cost of \$50,000.

Manchester, N. H.—The new Hillsborough county court-house will be erected on the Market St. lot west of city hall. The expending of \$20,000 for a lot will leave \$45,000 at the disposal of the commissioners for the court-house itself.

Mansfield, Mass.—Seven double houses will be erected by Walter M. Lowney of the W. M. Lowney Chocolate Co., in addition to the \$50,000 brick factory building, the Central Block and a large stable to be built by him.

Milwaukee, Wis.—The Cutler Hammer Manufacturing Co. will erect a \$50,000 addition to its plant.

Minneapolis, Minn.—Plans have been filed for a \$40,000 two-story brick building to be erected at 5th Ave. and 3d St. S. for Clinton Morrison.

BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

Monroe, Mich.—St. Mary's Academy is to be enlarged at a cost of about \$150,000.

Montclair, Col.—Plans have been prepared by Architects Gore & Walsh, of Denver, for the Phipps Consumptive Home, to be erected here, at a cost of \$200,000.

Nashville, Tenn.—A block of business houses, to be known as the Arcade, will be constructed by the Arcade Co. Cost, \$85,000.

New York, N. Y.—Plans for the new Police Headquarters building have been submitted to the Sinking Fund Commission. The site of the new building, which is to cost \$500,000, is bounded by Grand, Centre and Broome Sts. and Centre Market Pl. Three domes will surmount the structure, which will be five stories in height. The centre dome will contain two extra stories and will rest on steel columns running down to the foundation. The basement story will be faced with white or pink granite. Indiana limestone will be used on the rest of the building.

Plans have been filed for the proposed new \$600,000 armory for the 69th Regiment. Hunt & Hunt are the architects. The building will cover the block on the west side of Lexington Ave., from 25th to 26th St., and will be four stories high with basement. The façades will be of marble and cut stone, and at either end of the building will be large memorial tablets inscribed with the names of the battlefields on which the 69th fought with honor.

The contract for the construction of the Aetna Insurance Company's new building has been given to Dawson & Archer, 150 Fifth Ave. The building will cost about \$450,000.

Rumor states that another new theatre is to be built by the Hon. Tim Sullivan and others on the southeast corner of 2d Ave. and 14th St. It is said the building will cost \$300,000, and will have a roof garden.

Orange, N. J.—The Building Committee of the Methodist Episcopal Church has selected Mr. Wilbur S. Knowles, 31 W. 31st St., New York City, to be the architect of their new church which they propose to build as soon as possible. Preliminary designs are now being prepared.

The contract has just been awarded for an apartment-house at Main St. and Oakwood Ave. to be built from plans prepared by Mr. Wilbur S. Knowles, architect, 31 W. 31st St., New York City. The building will be three stories high and will contain thirteen apartments.

Mr. Wilbur S. Knowles, architect, 31 W. 31st St., New York City, has lately prepared preliminary sketches for an apartment-house soon to be erected in this city.

Oxford, Ind.—Plans have been completed by Architect Karl E. Jyreh, 696 Fulton St., for a one-story brick factory building, for the Cabinet Specialty Co., at a cost of \$15,000.

Philadelphia, Pa.—The new Home for Aged Veterans and their wives to be erected at the southwest corner of 65th and Vine Sts. is to be a fireproof three-story building with basement. The exterior walls will be of gray stone trimmed with terra-cotta. Charles W. Bolton, architect. Cost will be \$25,000.

Pittsburgh, Pa.—Plans have been drawn by J. A. Thain, 3152 Prairie Ave., Chicago, Ill., for an apartment-house of three stories to be erected in this city for the Atlas Land Co. Cost, \$60,000.

Rieger & Carrier, Smith Building, have drawn plans for a twelve-story fireproof office-building to be erected on Grant St. for L. L. Aaronson, 518 Fourth Ave. Cost, \$200,000.

San Francisco, Cal.—A two-story frame parochial school is to be built on the east side of Alabama St., near 25th St. It will cost \$24,000 and be on plans by Shea & Shea.

Brown & Brown are about to expend \$25,000 in the erection of a three-story and basement flat building on the northwest corner of Geary and Laguna Sts. The plans are by Seifeld & Kohlberg.

A press report states that the lot on the northeast corner of O'Farrell and Powell Sts. is soon to be improved by the erection thereon of a seven-story and basement building of semi-fireproof construction. The exterior will be faced with buff and white enameled brick. The structure is intended for one or more stores on the ground floor,

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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

with a café in the basement, while the six upper floors will be fitted up either for offices or lodging-rooms to suit the future tenants. The designs are by Henry H. Meyers and Clarence K. Ward, associate architects. The cost of the building will be \$60,000.

Savannah, Ga.—Plans have been prepared for a six-story brick hotel to be erected here, at a cost of \$300,000. B. Dab, architect.

Shamokin, Pa.—The Shamokin Brewing Co. are to build a new plant consisting of several large buildings of brick and stone at a cost of about \$100,000. Wm. K. Koelle & Co., architects.

South Omaha, Neb.—Plans have just been completed by John Kiewit, Jr., for the new Christian Church to be built at 23d and I Sts. Cost, \$10,000.

Spring Lake, N. J.—Plans have been prepared by Architects Watson, Huckel & Co., Philadelphia, Pa., for a \$300,000 hotel building here, to replace the Monmouth Hotel destroyed by fire.

St. Helena, Cal.—A new hotel is to be erected here in the Spanish, or Mission type, of stone and plastered wood. It will have 120 rooms, and cost \$100,000.

St. Paul, Minn.—Reed & Stem have drawn plans for a building to be erected at 55 E. 5th St., for P. N. Peterson. It will be 50' x 125', three stories and basement, pressed brick front, iron beams and columns, galvanized iron cornice. Plans will be ready for figures in ten days. Cost, \$23,000.

Sullivan, Ill.—Berkeley Brandt, Cable Building, Chicago, has drawn plans for 3 brick dormitories to be erected at the Illinois Masonic Home; estimated cost, \$40,000.

University Place, Neb.—The Executive Committee of the Board of Trustees of the Nebraska Wesleyan University held a meeting recently in the office of John M. Stewart, and took action which will result soon in the erection of a new structure on the university campus. The building is to cost about \$30,000, and work will be commenced so that before winter one wing will be up and ready for occupancy.

Vincennes, Ind.—The National Roller Milling Co., Hartford City, will build a new plant here, to be completed January 1, 1904. The cost will be \$100,000.

Waco, Tex.—The contract has been let for the big hospital to be known as the Providence Sanitarium. The building and equipment will cost about \$75,000. The contract was let to J. Wattinger, of Austin, and work will begin soon.

Washington, D. C.—Ground for the new National Museum for which Congress at its last session voted an appropriation of three and a half million dollars will be broken next spring.

West Allis, Wis.—The Allis Chambers Co. will start work on another of the unit shops of its system this fall, and by another year a large amount of the \$1,000,000 improvement fund of the Company will be used in making additions and improvements to its Milwaukee plant.

Winipeg, Man.—Plans have been completed by Boehme & Cordella, 503 Kasota Block, Minneapolis, Minn., for a brewery to be erected here for the Blackwood Brewing Co., Ltd. It will be 75' x 100', five stories and basement, of brick and cut stone, composition roof. Cost, \$50,000.

Woburn, Mass.—A site for the new high school has been selected. The building will be erected on



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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

the Dow farm on Montvale Ave., which has been purchased by the School Board. Cost, about \$72,000.

ALTERATIONS AND ADDITIONS.

Chicago, Ill.—Halsted St. and River, five-st'y alteration, 85' x 110'; \$30,000; o., Omaha Packing Co.; a., G. W. Constantine.

APARTMENT-HOUSES.

Chicago, Ill.—Sherman Ave., Nos. 1749-51, three-st'y bk. apart., 60' x 150'; \$50,000; o., E. J. Lehman Estate; a., E. R. Krause, 109 Washington St.; b., E. Lanquist, Chamber of Commerce Building.
Evanston Ave., Nos. 57-59, three-st'y apart., 53' x 82'; a., H. L. Ottenheimer, 109 Randolph St.; b., Paul F. P. Mueller, 823 Schiller Building.
Greenwood Ave., Nos. 5200-5244, 20 two-st'y bk.

CHURCHES.

Chicago, Ill.—Oakwood Boulevard, Nos. 201-213, six-st'y bk. church, 102' x 121'; \$110,000; o., Lincoln Centre Church; a., D. H. Perkins, 17 Van Buren St.; b., R. and S. Sollitt, 1100 Hartford Building.

HOUSES.

Chicago, Ill.—Touhy Ave., No. 912, two-st'y fr. dwell., 29' x 33'; \$5,500; o., Miss Edna Dickerson, 847 Chase Ave.; b., H. S. Gilbert, 232 Lunt Ave.
Clarendon St., No. 2185, three-st'y bk. dwell., 37' x 78'; \$8,000; o., Mrs. P. F. P. Mueller, 1408 Rokeby St.; a., H. L. Ottenheimer, 109 Randolph St.; b., Paul F. P. Mueller, 823 Schiller Building.
Greenwood Ave., Nos. 5200-5244, 20 two-st'y bk.

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(Houses Continued.)

dwell., each 20' x 43'; \$125,000; o., S. E. Gross, Masonic Temple; a., J. C. Brompton, Masonic Temple; b., Harper Bros., 92 La Salle St.

STABLES.

Chicago, Ill.—Norton St., Nos. 42-44, four-st'y bk. private barn, 40' x 75'; \$5,000; o., John B. Clow; a., S. N. Crown; b., N. F. Peterson.
Bond Ave., No. 7318, 14-st'y bk. private barn, 28' x 40'; \$2,000; o., T. C. Lutz, 138 Washington St.; b., C. Christensen, 7316 Yates Ave.

STORES.

Chicago, Ill.—Jackson St., Nos. 240-246, ten-st'y bk. store & lofts, 90' x 100'; \$200,000; o., McNeill Estate; a., Holabird & Roche, 1618 Monadnock Block.
Wabash Ave., Nos. 151-153, twelve-st'y bk. store & lofts, 40' x 153'; \$300,000; o., Mrs. E. Kimbark; a., Hill & Waltersdorf, 70 La Salle St.; b., A. Lanquist, Chamber of Commerce Building.

MISCELLANEOUS.

Chicago, Ill.—W. Forty-eighth St., Nos. 1033-37, one-st'y bk. car-shops, 32' x 200' & 60' x 150'; \$25,000; o., Streets Western Stable Car Line, 84 Van Buren St.; a., Rudolph Sehenek, 157 Michigan Ave.; b., George Thompson & Sons Co., 167 Dearborn St.

COMPETITIONS.

COURT-HOUSE.

[At Jackson, Minn.]
At 9 o'clock September 30, 1903, the Board of County Commissioners of Jackson County, Minn., will receive plans and specifications at the office of County Auditor at Jackson, Minn., for a \$60,000 fire-proof court-house. P. D. McKELLAR, County Auditor. 1444

PROPOSALS.

BUILDINGS.

[At Marion, Ind.]
Sealed proposals will be received at the office of Treasurer, Marion Branch, N. H. D. V. S., National Military Home, Grant Co., Indiana, until September 3, 1903, for construction of quartermaster's storehouse, laundry, officers' quarters, and remodeling storehouse, in accordance with plans and specifications, which may be seen in the Treasurer's office. JNO. Q. ADAMS, Treasurer. 1443

LIBRARY.

[At Athens, O.]
Sealed proposals will be received by the Board of Trustees of the Ohio University, at Athens, O., until August 28, 1903, for performing the labor and furnishing the necessary materials to erect a library building for the Ohio University, on a site designated according to the plans, descriptions, bills and specifications which are on file at the office of Frank L. Packard, architect, twelfth floor, New Hayden Building, Columbus, O., and at the office of L. M. Jewett, Secretary of the Board of Trustees of the Ohio University, at Athens, O., and open to public inspection between the hours of 8 A. M. and 5 P. M. on all working days until the day of letting. L. M. JEWETT, Sec'y. 1443

PROPOSALS.

LIGHT-HOUSE.

[At Baltimore, Md.]
Sealed proposals will be received at the office of the light-house engineer, 5th district, Post-office Building, Baltimore, Md., until September 3, 1903, for furnishing the materials (except metal work) and labor of all kinds necessary for the construction, erection and delivery of the Baltimore light-house, Md., in accordance with specifications and drawings, copies of which, with blank proposals and other information, may be had upon application to W. A. JONES, col., corps of engr., U. S. Army. 1443

HOSPITAL.

[At Fort Mackenzie, Wyo.]
Sealed proposals will be received here until September 2, 1903, for construction of a brick hospital at Fort Mackenzie, Wyo. Plans, specifications, instruction to bidders, proposal blanks and other information may be obtained at offices of depot quartermasters at Omaha, St. Paul, Denver and Chicago and at this office. CAPT. THOS. SWOBE, Q. M. 1443

Treasury Department, Office of the Supervising Architect, Washington, D. C., August 15, 1903. Sealed proposals will be received at this office until 3 o'clock P. M. on the 22d day of September, 1903, and then opened, for the construction (including heating apparatus, electric wiring and conduits) of the U. S. Post-office at Martinsville, Virginia, in accordance with the drawings and specification, copies of which may be had at this office, or the office of the Postmaster at Martinsville, Virginia, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1444

Treasury Department, Office of the Supervising Architect, Washington, D. C., August 15, 1903. Sealed proposals will be received at this office until 3 o'clock P. M. on the 21st day of September, 1903, and then opened, for the alterations to the U. S. Custom-house at St. Paul, Minn., in accordance with the drawings and specification, copies of which may be had at this office or at the office of the Custodian at St. Paul, Minn., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1444

Treasury Department, Office of the Supervising Architect, Washington, D. C., August 11, 1903. Sealed proposals will be received at this office until 3 o'clock P. M. on the 17th day of September, 1903, and then opened, for the low pressure steam heating apparatus, complete in place, for the U. S. Post-office at Aberdeen, South Dakota, in accordance with drawings and specification, copies of which may be had at this office or at the office of the Superintendent at Aberdeen, South Dakota, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1444

Treasury Department, Office of the Supervising Architect, Washington, D. C., August 11, 1903. Sealed proposals will be received at this office until 3 o'clock P. M. on the 10th day of September, 1903, and then opened, for the installation of a conduit and electric wiring system for the U. S. Court-house and Post-office building at Fergus Falls, Minnesota, in accordance with the drawings and specification, copies of which may be obtained at this office or the office of the Superintendent of Construction at Fergus Falls, Minnesota, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1443

Treasury Department, Office of the Supervising Architect, Washington, D. C., August 10, 1903. Sealed proposals will be received at this office until 3 o'clock P. M. on the 2d day of September, 1903, and then opened, for the erection and completion of a flying cage for the U. S. Government at the Louisiana Purchase Exposition, St. Louis, Missouri, in accordance with the drawings and specification, copies of which may be had at this office or at the office of the Superintendent of Construction, St. Louis, Mo., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1443

HEATING AND VENTILATING.

[At Indianola, Ia.]
Bids for the installation of a heating and ventilating plant in the high school building now being erected in Indianola, Ia., will be received at the office of the Secretary of the School Board, E. W. Hartman, Indianola, Ia., until August 31, 1903. Plans and specifications now at the Secretary's office. GEO. CLAMMER, President Board. 1443

REPAIRS AT HOSPITAL.

[At San Francisco, Cal.]
Sealed proposals will be received here until August 31, 1903, for repainting, plastering, kalsomining, tinning, shingling and repairing at the general hospital at the Presidio of San Francisco, Cal. Information furnished on application to J. MCE. HYDE, Deputy Quartermaster General, Chief Q. M. Dept. of California. Office of the Board of Supervisors of Napa County, State of California. 1443

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PROPOSALS.

Treasury Department, Office of the Supervising Architect, Washington, D. C., August 10, 1903. Sealed proposals will be received at this office until 3 o'clock P. M. on the 24th day of September, 1903, and then opened, for the construction (except heating apparatus, elevators, electric wiring and conduits) of the U. S. Court-house, Custom-house and Post-office at Seattle, Washington, in accordance with the drawings and specification, copies of which may be had at this office or the office of the Postmaster at Seattle, Washington, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1443

Treasury Department, Office of the Supervising Architect, Washington, D. C., August 5, 1903. Sealed proposals will be received at this office until 3 o'clock P. M. on the 9th day of September, 1903, and then opened, for the construction (including heating apparatus, electric wiring and conduits) of the U. S. Post-office at Holyoke, Massachusetts, in accordance with the drawings and specification, copies of which may be had at this office or at the office of the Postmaster at Holyoke, Mass., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1443

Treasury Department, Office of the Supervising Architect, Washington, D. C., August 8, 1903. Sealed proposals will be received at this office until 3 o'clock P. M. on the 16th day of September, 1903, and then opened, for the low pressure steam heating apparatus, complete in place for the U. S. Court-house and Post-office building at Cumberland, Maryland, in accordance with drawings and specification, copies of which may be had at this office or at the office of the Superintendent at Cumberland, Maryland, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1443

Treasury Department, Office of the Supervising Architect, Washington, D. C., August 8, 1903. Sealed proposals will be received at this office until 3 o'clock P. M. on the 14th day of September, 1903, and then opened, for the installation of a conduit and electric wiring system for the U. S. Post-office at Aberdeen, South Dakota, in accordance with the drawings and specification, copies of which may be obtained at this office, or at the office of the Superintendent of Construction at Aberdeen, S. D., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1443

ART GALLERY.

[At Charleston, S. C.]

The trustees of the James B. Gibbs Art Gallery, viz: Judge Charles H. Simonton and Mayor J. Adger Smyth, invite sealed proposals for the erection and completion of an art gallery, in the city of Charleston, S. C., agreeably to the plans and specifications now on file with J. H. Dingle, City Engineer, Charleston, S. C., and at the office of the architect, Frank P. Milburn, Columbia, S. C. For more detailed information see plans and specifications. Bids must be filed with Architect Frank P. Milburn, Columbia, S. C., on or before August 29, 1903. 1443

OFFICERS' QUARTERS.

[At Fort Rosecrans, Cal.]

Bids will be received at the office of the constructing quartermaster, 34 Keating Block, San Diego, Cal., until September 4, for the construction, plumbing, heating and electric wiring of two double officers' quarters, one double N. C. O. quarter, one coast artillery barrack at Fort Rosecrans, Cal. CAPTAIN R. H. ROLFE, quartermaster. 1443

ARMORY.

[At New York, N. Y.]

The Armory Board invite bids for the erection of an armory for the Second Naval Battalion on the bay between 51st and 52d Sts. Bids will be opened September 1. The amount of security required is \$75,000 and the contract is to be completed in 300 working days. 1443

PROPOSALS.

BUILDINGS.

[At Wayne, Mich.]

Chief Quartermaster's Office, 415 Pullman Building, Chicago, Ill. Sealed proposals will be received at this office until August 28, 1903, for the construction of a brick building for non-commissioned officers' quarters, and of a brick building for bakehouse at Fort Wayne, Mich. Plans and specifications may be seen here and at office of Quartermaster, Fort Wayne, Mich. MAJOR W. H. MILLER, Quartermaster, U. S. A., in charge. 1443

BUILDINGS.

[At Key West Barracks, Fla.]

Sealed proposals for constructing 3 sets officers' quarters, set N. C. staff quarters, Q. M. storehouse and band barrack will be received here until September 2, 1903. Information furnished on application. 1444

HIGH SCHOOL.

[At Prineville, Ore.]

Bids will be received August 31 by the Co. High School Bd. for erecting a brick and stone high school. John B. Shipp, archt. WM. BOEGLI, Sec'y. 1443

REPAIRS.

[At Hudson, N. Y.]

Bids will be received September 12 by Chas. H. Strong, Pres. Bd. of Mgrs. at House of Refuge for Women for repairs, alterations and fire-escapes in administration building, hospital and reconstructing prison building at said House of Refuge. G. L. HEINS, State Architect, Albany. 1443

PROPOSALS.

Treasury Department, Office of the Supervising Architect, Washington, D. C., August 8, 1903. Sealed proposals will be received at this office until 3 o'clock P. M. on the 15th day of September, 1903, and then opened, for the installation of a conduit and electric wiring system for the U. S. Post-office at Cumberland, Md., in accordance with the drawings and specification, copies of which may be obtained at this office or at the office of the Superintendent of Construction, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1443

SEWER CONSTRUCTION.

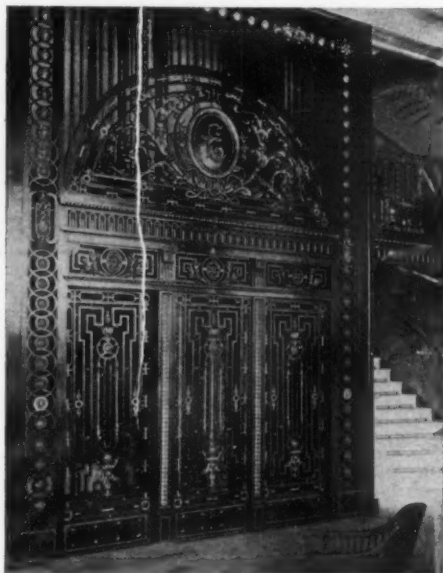
[At Washington, D. C.]

Office of the Commissioners, D. C., Washington. Sealed proposals will be received at this office until August 29, 1903, for constructing Section B of the B St. and New Jersey Ave. trunk sewer in the District of Columbia. Forms, specifications and necessary information may be obtained at this office. HENRY B. F. MACFARLAND, HENRY L. WEST, JOHN BIDDLE, Commissioners, D. C. 1443

BRIDGE.

[At Kansas City, Kan.]

Sealed proposals for furnishing and erecting a steel bridge across the Kansas River, at 12th St. in Kansas City, Kan., will be received August 31, 1903, and forth opened by the Board of County Commissioners of Wyandott County, Kan., at the office of the County Clerk, in the court-house of said county, in Kansas City, Kan. Plans, specifications and forms for submitting bids will be on file in the office of said County Clerk on and after August 1, 1903. F. M. HOLCOMB, County Clerk. 1443



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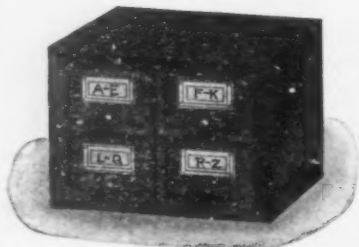
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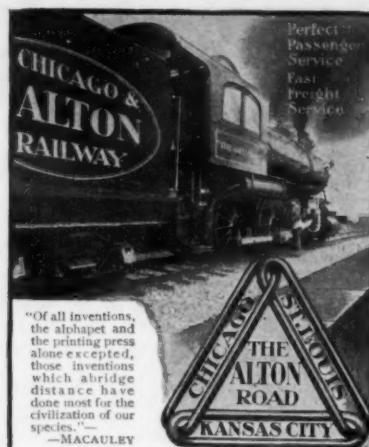
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SECTION 2. A Member having any ownership
 in any building material, device or invention,
 proposed to be used on work for which he is
 architect, should inform his employer of the
 fact of such ownership.

SECTION 3. No Member should be a party to
 a building contract except as "owner."

SECTION 4. No Member should guarantee an
 estimate or contract by personal bond.

SECTION 5. It is unprofessional to offer draw-
 ings or other services "on approval" and
 without adequate pecuniary compensation.

SECTION 6. It is unprofessional to advertise in
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 special branch (if such) of practice.

SECTION 7. It is unprofessional to make altera-
 tions of a building designed by another archi-
 tect, within ten years of its completion,
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 out due notice to the said designer.

SECTION 8. It is unprofessional to attempt
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 have been taken toward his employment.

SECTION 9. It is unprofessional for a Member
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SECTION 10. It is unprofessional to furnish de-
 signs in competition for private work or for
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 and unless a competent professional adviser
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 assist in the award.

SECTION 11. No Member should submit draw-
 ings except as an original contributor in any
 duly instituted competition, or attempt to
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 remains undecided.

SECTION 12. The American Institute of Archi-
 tects' "schedule of charges" represents mini-
 mum rates for full, faithful and competent
 service. It is the duty of every architect to
 charge higher rates whenever the demand for
 his services will justify the increase, rather
 than to accept work to which he cannot give
 proper personal attention.

SECTION 13. No Member shall compete in
 amount of commission, or offer to work for
 less than another, in order to secure the work.

SECTION 14. It is unprofessional to enter into
 competition with or to consult with an archi-
 tect who has been dishonorably expelled from
 the "Institute" or "Society."

SECTION 15. The assumption of the title of
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 natural ability needed for the proper invention,
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SECTION 16. A Member should so conduct his
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