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THE Boston *Herald* makes some judicious observations on the report of a committee of British manufacturers, who recently visited this country, to ascertain, if possible, the causes of American success in taking away the iron trade from them. The committee found that the chief cause of the superiority of the Americans lay in the excellence of their machinery, which, by enabling a man to accomplish an immense amount of work, reduced the labor-cost on the product. Thus, they found that, in rolling steel bars, so much is now done by machinery that the labor-cost, per ton, is only a small fraction of what it was ten years ago; and, in making rails, beams and other shapes a similar reduction in cost has been effected. All this is, undoubtedly, as true as it is interesting, but the *Herald* asks, very pertinently, who it is that gains by the introduction of all this labor-saving machinery. It is certainly not the consumer, who, in this country, pays more for his rails, or bars, or beams, than he did ten years ago, when, as we are told, the cost of making them was far greater; and the *Herald* concludes that the saving is all diverted into the pockets of the manufacturers, who are enabled, by means of it, to pay interest on vast issues of speculative securities, the sale of which has served to enrich a good many people, and, we hope, will not serve to impoverish a good many more. Undoubtedly, it is fair enough that the people who introduce economies in their processes and machinery should profit by them, but the natural course of events is that the competitors of the people who first introduce them invent new economies, to enable them to compete for customers with their rivals; and, in the end, the public gets a reasonable share in the advantages secured by such improvements. In many branches of American industry this has been the result, and it is probable that a falling-off in the demand would reduce in the same way the cost of iron. Meanwhile, it is due to the management of the United States Steel Company, which, as the largest and most conspicuous manufacturing corporation in the country, receives a good deal of abuse which is quite misdirected, to say that its policy has always been, not to take advantage of the necessities of its customers to extort high prices, but to keep prices down to a moderately remunerative point; and this policy, pursued with discretion, ought to save it from the violent shocks which are as disastrous, in the end, to consumers as to producers.

ALTHOUGH the great coal-strike seems in the way of settlement, through the intervention of Mr. J. Pierpont Morgan, it is likely that a measure for the repeal of the duty on coal, which the Administration is known to favor, and which is supported by a strong popular sentiment, will be carried through Congress in December. Whether the repeal will result in any large importation of anthracite depends on the price of the Pennsylvania product; but there is a great deal of anthracite in the world, in France, Germany, Wales, Scotland

and Canada, and high prices, with the duty removed, would undoubtedly attract it here. Even if the "round coal" could be brought to our seaport towns more cheaply from Pennsylvania, it is not impossible that a traffic might be built up in the "boulets d'anthracite," which are made in France and Germany of the dust from the anthracite mines, and are sold very cheap. The people of New England, in particular, seem to have become convinced of the fact that they are not fairly treated in the matter of fuel, and are likely to be more open in future to propositions for a better and cheaper supply than they have been hitherto.

SO many people have made inquiries of us in regard to the Massachusetts and Rhode Island anthracite that it may be of interest to give some further information. In all, twelve mines have been opened into this anthracite bed, which covers an estimated area of five hundred square miles, including the whole State of Rhode Island, and extending into Massachusetts as far as Worcester. The coal varies in quality from that found in Mansfield, which contains only four per cent of ash, to the deposits at Worcester and Providence, where it is in great part converted into graphite, so that the product of a mine now worked in Providence is said to be ground up and sold for stove-blackening and lubricating paste. All the mines in Massachusetts, consisting of three in Mansfield, one in Wrentham and one in Raynham, have been abandoned, but one of the mines at Portsmouth, R. I., has been worked intermittently for many years. From this mine seven hundred and fifty thousand tons of coal have been produced and sold; and the quality of the coal was for a long time regarded as so good that it brought a higher price, at the mine, than any other anthracite in the United States. Early in the history of the mine, the Portsmouth coal was sold, at the mine, for five dollars a ton for "round" coal, and half that for the "slack," but this was soon reduced to three dollars for the round coal, or coal in lumps, such as is used for domestic purposes, and fifty cents to a dollar for the slack, and at these prices the operation of the mine was found for many years profitable. It appears that the discouragements attending anthracite mining, both in Rhode Island and Massachusetts, have not come from any inferiority in the quality of the coal, but from the irregularity of the veins, which, though thick, reaching twenty-three feet in Mansfield, and thirteen in Portsmouth, vary greatly within short distances. Whether these irregularities would make it impossible for the New England mines ever to be permanently worked with profit on a large scale, in competition with those of Pennsylvania, is uncertain, but the fact that one of them, at least, has successfully met that competition for half a century, and that the quality of the coal improves with the depth of the vein, suggests, at least, that at the present time, when the price of Pennsylvania anthracite in New England and New York is about three times the average for the last twenty-five years, and is likely to remain far above that average for many months, an effort might be profitably made to extend the workings, and introduce the economies incident to operation on a large scale, so as to render New England permanently independent of Pennsylvania anthracite.

THE old Hall of Records in New York is to be taken down immediately, by order of Justice Leventritt, of the Supreme Court, on the application of the Corporation Counsel. The building is close to the excavation of the new rapid transit subway, and the sand on which its foundations rest is in danger at any moment of escaping into the subway trench, so that its removal is a matter of necessity. Although it has some historical interest, the structure is of no value otherwise, and would soon be superseded by the new Hall of Records, now building. Meanwhile, it is a disfigurement and encumbrance to the City Hall Park, and would be better out of the way.

PROFESSOR KEUSSMANN, of the Wilhelm-Gymnasium, at Hamburg, delivered an interesting lecture recently before the Society of Architects and Engineers of Hamburg, on the Roman Campagna. Every one knows that this district, now the reproach of Italy for its deadly malaria, was, in antiquity, a beautiful and healthy region, filled with farms and

villas. The change to its present condition has been ascribed to all sorts of mysterious moral, as well as physical, causes; but Dr. Keussmann says that the simple solution of the mystery is that, in the times of the Roman Republic, the land was carefully drained by means of a network of underdrains which still remain. In some places, where the ground was naturally unfavorable, four sets of pipes have been found, one above another, the lowest being more than fifty feet below the surface. Under the Empire, the system of farming in Italy, as all students of history know, was gradually changed. The small estates, kept in good condition by thrifty freeholders, were gradually bought up, and consolidated into vast "latifundia," or ranches, owned by great city capitalists, and cultivated by slaves, under the charge of an overseer. It is impossible to carry on with slaves the diversified and careful tillage which small proprietors find profitable, and the "latifundia" sank into the condition of our Southern plantations under slavery, all the more enlightened details of the system of farming formerly pursued being neglected. The drains, which the slaves knew nothing about, and their overseers cared nothing about, were allowed to choke with mud, and the ground soon became as saturated and foul as ever. As crops could not be grown in water-soaked soil, the more marshy portions were devoted to pasturage, and the few remaining people of intelligence fled from the increasing malaria. It is curious that, even now, although fifteen hundred years of misery have made the name of the Campagna a synonym for wretchedness and crime, its condition is worse, perhaps, than ever, and from the same causes. The present proprietors of the land are still, for the most part, the members of the noble Roman families, who display about the same business energy and interest in their property that the Senators and courtiers who preceded them did. In order to save themselves trouble, they have, very generally, let their Campagna estates, on long leases, to speculators, who, instead of cultivating them, or spending any money in reclaiming them, find it most profitable to leave them barren, and even to clear away what remains of habitation they may find, to make room for vast flocks of sheep, which roam over the hills and marshes, under the charge of a few half-savage herdsmen, brought from the miserable mountain villages of Umbria. The number of herdsmen required is so small that the actual density of population in the district under the very shadow of St. Peter's is substantially the same as that in the Pampas of Argentina. These wild men, the "sandalled ones," as the Romans call them, have no houses, living in huts made of cornstalks, or in holes dug in the ground. They have a superstitious dread of malaria, whose effects they know only too well, and, to ward off the "evil air," they kindle fires of rubbish near their huts, which, of course, serve only to attract swarms of mosquitoes, bearing infection with them. In the whole Campagna there are only eighteen official physicians, so that the public health receives practically no attention whatever; and the Italian Government, although it understands the condition of the district, has not felt itself strong enough to take any effective means for remedying it.

THE scheme, which is said to be due to the lamented King Humbert, of Italy, for supplying water to the dry regions of Apulia is to be carried out, the necessary legislation having been completed. The water is to be taken from springs high up in the Apennines, and is to be conducted through a main aqueduct, nearly two hundred miles long, eight miles of which is carried by a tunnel through the ridge of the Apennines to the edge of the Apulian plain. Here the aqueduct divides into many branches, which serve one hundred and ninety-four villages, containing seventeen hundred thousand inhabitants, situated in the provinces of Foggia, Bari and Lecce. The total length of the branches is forty-three hundred miles, and the cost of the undertaking is estimated at twenty-seven million dollars. The people of the territory to be supplied are among the poorest and most wretched in Italy, so that no attempt will be made to earn interest on the investment, by means of water-rates, fountains being simply established in each village for public use.

A FIRM in Germany, taking a hint, perhaps, from the people in the suburbs of Lyons, who whitewash even their tile roofs, has prepared a cheap white paint, apparently containing Portland cement, which is put with a brush directly over the tarred felt roofs so popular there. A roof of tarred felt, without the covering of gravel commonly used in this

country, becomes intensely heated in summer, through the absorption of the rays of the sun, and heats the rooms under it; and the manufacturers of the new paint claim, probably with reason, that the rooms under a roof covered with it are much cooler in hot weather, while the paint, by protecting the tar in the felt beneath it from the sun, prevents the evaporation of the volatile constituents of the tar, and this prolongs the life of the roof. In New England, where the sun's rays have less power than they have farther south, and where the white gravel generally used over a tarred roof reflects much of the heat, roofs of this kind are popular and satisfactory; but in New York and Philadelphia they are considered to deteriorate rapidly, and it seems as if a good coat of cement whitewash might do much to protect them, and to extend the use of what is, under favorable circumstances, one of the best and cheapest of roofing-materials.

THE first stage of the competition for the Liverpool Cathedral has been completed by the selection of five, out of the one hundred and three competitors in the preliminary trial, for invitation to compete again. These five are Messrs. Austin & Paley, of Lancaster, and Messrs. C. A. Nicholson, George Gilbert Scott, Malcolm Stark and W. J. Tapper, of London. Of these, Messrs. Austin & Paley, George Gilbert Scott and Malcolm Stark are well known to fame, even on this side of the Atlantic. Mr. Tapper is somewhat prominent in the profession in England; and Mr. Nicholson appears to be comparatively a new man. He must, however, be a man of great ability, for, besides the award of selection for the second competition which he wins by one of his designs, a second design, also submitted by him, receives honorable mention.

THE *Builder* gives an interesting account of the great dam across the Nile, at Assouan, now just completed. It will be remembered that, when the project of storing the floodwaters of the Nile was first discussed, a site was selected for a dam just above the First Cataract, and a little below the Island of Philæ, where the river passes between high, rocky banks. A dam could be built here, sixty feet high, giving ample storage of water for many years; but the ruins of the Philæ temples, which stood just above the dam, would be completely submerged; and, in deference to the universal outcry against destroying these monuments of antiquity, the plans were changed, so as to make the dam much lower. It is this last plan which has been carried out; and, although the Temple of Hathor and the Nilometer will be entirely under water during the three months of flood, the Temple of Isis will be covered only to the floor. Considering that the new dam will give much less than one-third the storage capacity of the one originally projected, so that the water must be used with great economy, it may be questioned whether the Egyptian peasants have much reason to applaud the scruples of the archaeologists, especially as the soaking of the mud and silt on which the ruins of Philæ stand is likely to destroy them before many years; but it is too late to make any change now.

SOME of the circumstances attending the execution of this great work have a curious air. We are told that, for the sake of economy, no trial borings were made to test the ground on which a dam a mile and a half long was to rest, it being comfortably assumed that "sound rock would be found everywhere at a convenient level." Unfortunately, this assumption was not confirmed, and, after the contract was signed, an immense amount of extra foundation work had to be done, to carry the footings down to solid ledge through the "rotten granite," and masses of "micaceous schist, of a very friable nature," which existed in various places. Notwithstanding these troubles, the work seems to have been carried through with characteristic British persistency and thoroughness, and the engineers and contractors have good reason to be proud of what they have accomplished. A novelty in water-storage, which it was necessary to provide for, arose from the necessity of allowing the first waters of the Nile flood to escape through the dam. It is these waters which bring down the fine silt on which the fertility of the Nile valley depends; and to cut it off would be to ruin Egyptian agriculture. For this reason, an immense number of sluices are provided, near the base of the dam, which are opened when the first flood-waters appear, and kept open until the "red water" has been succeeded by that clearer product of the melting snow on the Mountains of the Moon. Then they are closed, and the clear water allowed to accumulate, to serve, later, for simple irrigation.

RELATIVE PERMANENCE OF STEEL AND MASONRY CONSTRUCTION.¹—II.

W. HILDENBRAND, M. Am. Soc. C. E.—With reference to the old Roman viaducts and aqueducts mentioned in this discussion, which are frequently quoted as evidence of the longevity of stonework and its superiority over iron structures, the speaker wishes to draw attention to the fact that in other Roman structures may be found equal evidence of the durability of iron. Remnants of bridges over the Rhine, built by Julius Caesar, have been dug up during the past fifty years, while the work of regulating the bed and current of the Rhine has been going on. In Caesar's "*Commentarii de Bello Gallico*" one of these bridges is minutely described, corresponding in construction to what would now be called a timber trestle, consisting of heavy oak logs connected with iron bolts, clamps and spikes. Quite a number of these logs were found under the bed of the river, nearly 2,000 years after they had served for carrying the Roman legions over the Rhine in their attempt to subjugate a free nation, and the timbers, as well as all iron bolts and spikes, were in a perfect state of preservation.

This fact corroborates Mr. O'Rourke's assertion that iron submerged in pure water will probably never corrode.

Of course, every object in this world perishes, or, rather, disintegrates and changes into some other form; but, if building materials can be preserved for several thousand years, it may be said that, for all practical purposes, they last forever.

The question whether metal will in the future be considered as permanent and durable a building material as stone cannot be solved at the present time, and it is not likely that any who are here will live to see it solved. The answer to the question cannot be found by theorizing, but depends entirely on experience, which should extend over centuries.

At present we have, so to say, no experience at all about the durability of iron or steel structures. It is barely sixty years ago that the first iron bridges were built, and it is doubtful whether a single one of that age is in existence to-day. Nearly all the early iron bridges have been removed and replaced by modern structures, not on account of having been decayed or weakened, but because they had outlived their usefulness, and stronger ones were required to accommodate the increased and heavier travel of modern times. Our experience as to the durability of iron and steel structures, therefore, is very limited, and only of recent date.

If a stone building and a steel building were erected side by side, and both structures were left to themselves, without any attempt to protect them against the effects of the atmosphere, there is no doubt that the stone building would stand very much longer than the steel building. In New York City there is an example in the New York and Brooklyn Bridge. The massive stone towers, which are now more than twenty-five years old, have no protection against the weather and have never been repaired. They are to-day as they were left by the hand of the mason twenty-five years ago, and according to a recent thorough inspection, they are just as good and perfect as they were on the day they were finished. On the other hand, the steel and wire work requires constant attention; there is hardly a time when no men are seen suspended in the meshes of the wirework repairing something or putting on a coat of protective paint.

The speaker has had the opportunity of examining suspension-bridges erected more than forty years ago, and while he found the cables, as a whole, in perfect condition, he also discovered one or two places where, through the accumulation of water or through imperfections in the protective paint, the wires were considerably corroded and needed repairs. All of this shows that metal structures require attentive watching and constant renewal of paint or other protective coverings, and that any oversight or inattention is followed by grave consequences.

With our present knowledge, therefore, we may sum up by saying that unprotected masonry, as well as unprotected ironwork, is perishable, but that the former will last much longer than the latter. However, if iron or steel be well protected, it is known that it will not decay in thousands of years, and will be as durable, if not more durable, than any stonework. Will the means for an efficient and permanent protection of steel ever be discovered, or will a new metal be found which has the same strength as steel and which naturally is not subject to oxidation?

H. S. HAYNES, M. Am. Soc. C. E.—Mr. Hildenbrand has referred to iron bolts in bridges built by Caesar across the Rhine. In the Colosseum, built about A. D. 80, the courses of heavy travertine masonry, laid with knife-edge joints, without mortar, were connected by iron cramps fairly well protected from the weather. Many of these were cut out in the Middle Ages, but those which remain appear to be in good condition. The vault of the Pantheon, 140 feet in diameter, is of concrete supposed to be strengthened with iron rods. This vault, built about A. D. 125, is, to all appearances, in excellent condition. From these instances, it would seem that iron, used structurally in connection with stone or concrete masonry, may remain efficient for nearly 2,000 years.

Iron is not readily oxidizable in pure water, for the oxygen therein chemically combined is only separable at an excessively high temper-

ature. It is the atmospheric oxygen ordinarily present in water that is the oxidizing agent. Water absorbs carbonic-acid gas to an extent equal to its volume, and the water thus acidulated acts powerfully upon iron or steel. It follows that in large cities where the atmosphere is heavily charged with the products of combustion, the falling rain would be correspondingly charged with carbonic-acid gas, and, therefore, that the effect of oxidation upon steel construction should be proportionately greater from exposure under such conditions.

A. L. JOHNSON, M. Am. Soc. C. E.—In reference to a statement concerning the corrosion of the steelwork in the large buildings in Chicago, C. T. Purdy, M. Am. Soc. C. E., was one of the members of a Commission to examine and report on the condition of those buildings. The speaker having talked with Mr. Purdy recently concerning this matter, it may be appropriate to give some of the results as described by Mr. Purdy. His report has undoubtedly been printed ere this, and probably, therefore, there will be no objection to the promulgation of the information at this time. The Commission examined quite a number of the buildings in Chicago and found numerous cases of corrosion in the columns; but it was not developed that the corrosion was confined to the outside columns, or even that it was greater in them than in the interior columns. The beams in the foundations, Mr. Purdy said, were found to be in uniformly good condition. The Commission's recommendation would be that in future all the steelwork for these buildings should be entirely surrounded by a Portland-cement or lime mortar, this covering being filled in solid behind the fireproofing.

In St. Louis a very well constructed building, erected about twenty years ago, is now being dismantled. The construction consisted of solid external walls, cast-iron columns throughout the interior, and steel beams painted with red oxide-of-lead paint. The building was eight stories high, and of fireproof construction, the floor-arches being mainly of brick, though there were also some concrete arches. The steel throughout is in a thoroughly well-preserved condition, it having been in all cases entirely embedded in Portland-cement mortar or concrete covering. The paint also has been thoroughly preserved, and in the speaker's estimation an embedment in Portland-cement mortar is the only means of preserving that preservative.

Professor Spencer Newberry, Manager of the Sandusky Portland-cement Company, recently gave a lecture² in Chicago, which the speaker regards as one of the most valuable articles, with regard to steel-concrete construction, that has appeared in print for some time, covering, as it does, all sides of the question, and some sides in an entirely new manner, such, for example, as the theoretical considerations involved in the preservation of iron by Portland-cement covering. In this article he shows that the cement, theoretically, is not simply a neutral or non-injurious agent, but is actively engaged in preventing the formation of rust.

The speaker's company has samples of steel embedded in cinder-concrete, in the form of broken pieces of a test span, made in the fall of 1898, and tested in February, 1899, these pieces having lain on the ground uncovered, subject to the action of the elements, for more than three years. On numerous occasions these pieces have been broken open for the purpose of observing the condition of the metal, the most recent case having been before the Engineers' Club of St. Louis, last January, in connection with a talk given by the speaker; and in all cases, without any exception, the metal has been found to be as bright and clean as the day it came from the rolling-mill. The quality of the cinders in this sample was considered very poor, containing a good deal of dirt, and the fine material was screened out. This the speaker regards as desirable, though not absolutely necessary, where cinder-concrete is used, inasmuch as, if it is not done, a slight film of rust will be formed on the metal. This film, however, never increases in thickness, but, as it costs little to avoid it, the best practice would call for the screening of the cinders. In the speaker's opinion, the reason for this difference in action is due to the fact that the fine stuff contains finely divided particles of sulphur, which are readily dissolved by water, slightly acidulating the same, and, until the concrete dries out thoroughly, a slight corrosive action is taking place. This is soon neutralized by the influence of the Portland-cement, but not before a film of rust, not in itself materially injurious, is formed.

Mr. Darrach has expressed himself as of the opinion that at the present time we are not able to calculate the strength of steel-concrete beams with any degree of accuracy. The speaker, of course, will have to take exception to that statement, he having on numerous occasions endeavored to show how this could be done, and, being of the opinion that the data with regard to the materials used being known, he could arrive at the maximum carrying capacity within about 15 per cent, which is certainly close enough for all practical purposes, in view of the factor of safety used. Of course, the strength and the modulus of elasticity of the concrete and steel must be known, and, as to the former material, these functions are seldom accurately known, chiefly because no special tests are made to determine this for the materials available for that particular work. Their influence on the character of the design is enormous, and, on work of any considerable size or importance, these values should be obtained before the designs are prepared.

As to the relative lasting qualities of the different kinds of engineering structures, the speaker is of the opinion that only a few forms

¹ An Informal Discussion at the Annual Convention, May 21, 1902, of the American Society of Civil Engineers and printed in the Society's *Proceedings* for August, 1902. Continued from No. 1398, page 13.

² Before the Annual Meeting of the Associated Expanded Metal Companies, and reprinted recently in *Engineering News*.

of stone masonry can compare in length of life with a concrete construction reinforced with steel properly distributed through the cross-section. Strange as it may seem to those not conversant with the facts, the maintenance-charges for stone masonry, on many railroads, exceed these charges for steel structures in proportion to the relative quantities of each. On railway work it is usually a condition of taking what you can get, rather than what you would like to have. Many forms of sandstone are worthless. Limestone is dissolved in the course of time by atmospheric influences, and there are really only a few kinds of stone that can be considered as everlasting, and these are usually so expensive as to prohibit their use. A very good example of the dissolution of limestone masonry is afforded at the Cabin John Bridge. Underneath the arch may be noticed stalactites forming along the line of the mortar joints between the granite arch-stones, from the spring-line some distance up toward the crown. The back-filling of the arch consists of a considerable depth of limestone-rubble masonry. A considerable quantity of water finds its way down through the haunches of the arch and then through the mortar joints of the arch-ring, and the stalactites indicate that the air and water are dissolving this limestone backing. This same action exists, to a greater or less degree, in all limestone structures.

In a large city in Indiana the speaker recently examined some limestone bridge-masonry which had been in place for about forty years, and much of it could now be scraped up with a fire-shovel.

In the speaker's opinion, plain concrete construction would not be everlasting, on account of the cracks which are almost certain to develop in such structures, these cracks filling with water and freezing in the winter, and gradually getting worse and spawling off as the years go by.

In steel-concrete construction, if the metal is properly distributed and proportioned to the cross-section, these cracks can be absolutely prevented. The speaker's company has built walls 300 feet long, with steel reinforcement, in which no expansion-joints were provided, and in which not a sign of a crack is to be seen; and would take a contract to build such a wall a mile long, under this guaranty.

To accomplish this result, however, it is necessary to have a subdivision of the metal reinforcement into small areas thoroughly disseminated through the section, just as in successful arch-construction it is necessary to have the metal thoroughly disseminated in small areas through the upper and lower portions of the sections. Heavy concentrations of metal at points 2 or 3 feet apart will not give the peculiar stretching quality to the concrete obtained by the other method, and which is essential to success.

When properly built, this steel-concrete construction will not crack; will not be disintegrated by frost; will not be dissolved by the elements; and, in the speaker's opinion, is the only kind of engineering structure that can be considered permanent, with the exception of one or two kinds of rock masonry, the cost of which in most cases would be prohibitive.

F. LYNWOOD GARRISON, Assoc. M. Am. Soc. C. E. — Since there seems to be some confusion or misunderstanding regarding the corrosive action of atmospheric and other influences upon iron, it might be advisable, in this discussion, to state briefly a few of the most important characteristics of metallic iron that are pertinent to the subject, although, in so doing, the risk of repeating some well-known facts must be incurred.

1. To begin with, iron is one of the metals most easily oxidized and affected by moisture, consequently it never occurs in the metallic state.¹

2. Iron does not undergo any alteration in pure dry air at ordinary temperatures.

3. In moist air iron becomes coated with ferric oxyhydrate having approximately the composition $\text{Fe}_2\text{O}_3(\text{OH})_2$. The rust varies in composition with the conditions under which corrosion takes place.

4. According to Percy, iron does not rust unless there is an actual deposition of liquid water upon the surface of the metal.²

5. The presence of certain gases and vapors, even in minute proportions, such as sulphuretted hydrogen (H_2S), hydrogen, chlorine, and acetic acid, accelerates rusting in moist air, though no liquid water may come in contact with the metallic surface. Carbon dioxide (CO_2) and ammonia gas are said to act less energetically in this respect.³

6. Iron rust often contains minute quantities of ammonia, due, it is supposed, to the decomposition of the water by the action of the oxide on the metallic iron, the oxygen combining with the iron, and part of the hydrogen uniting in the nascent state with the nitrogen of the air.

7. Pure water deprived of air appears to be absolutely inert, as far as corrosive action is concerned, on contact with iron, even at 100 degrees Cent.⁴

8. Rust formed far beneath the water consists of black hydrated magnetic oxide.

9. The formation of rust takes place in the beginning but slowly; after a thin coating has once been formed, the corrosive process goes on more rapidly.

10. Aqueous solutions of potash, soda and ammonia preserve iron from rusting, provided they are not too dilute.

¹ Exceptions must be made where the iron is of undoubted meteoric or non-terrestrial origin. In such instances, it is usually alloyed with a large proportion of nickel.

² *"Metallurgy of Iron and Steel,"* p. 27.

³ Bonsdorff, *"Répertoire de Chimie,"* Vol. 4, p. 171.

⁴ Mallet, Rept. British Assoc., 1840, p. 229.

11. Water containing not more than one-fifth its volume of lime-water is said to preserve iron from rusting.⁵

12. The contact of iron with more electro-positive substances, such as zinc, retards corrosion; whereas contact with more electro-negative substances, such as tin, lead and copper, accelerates the rusting.

13. Magnetic and similar oxides of iron, which constitute the basis of iron scale, protect the iron which they coat, but hasten the corrosion of rusted iron, whether such be the adjacent portions of the same piece or in separate pieces which are galvanically connected. This protective action is shown by the comparatively slow rusting of Russian sheet-iron, of "blued" iron, and of castings that retain their original skin.

14. While contact with zinc and highly zinciferous brasses retards rusting, contact with copper, or brasses rich with copper, hastens it.

15. According to Martell, the purer qualities of mild steel when used in ship-hulls are more likely to be corroded than impure iron. A steel ship requires more care than an iron one. Nickel steel is not so likely to be corroded in salt-water as the ordinary and purer grades of steel.⁶

This array of more or less well-known facts might be indefinitely elaborated; however, it covers the subject completely in a general way. It seems to be a perfectly sound conclusion that, other things being equal, where likelihood of corrosion is effectually prevented, iron (steel) makes as permanent and durable a building material as masonry. Better, in fact, for, whereas the latter will certainly, in time, disintegrate, the former cannot. Unusual conditions may certainly exist in which the molecular structure of the metal may change; such, however, must be regarded as abnormal and exceptional.

A statement has been previously made in this discussion to the effect that, inasmuch as iron properly covered with fireproof material or concrete will not corrode, uncovered iron in the interior of buildings will be immune from corrosion because it is then covered from the weather on all sides. Were walls and roofs absolutely water or moisture proof, in fact, if the buildings were hermetically sealed, top, sides and base, then, and then only, would the interior metal be free from corrosive influences. As a matter of fact, in most cases, the danger from corrosive deterioration are much exaggerated; the greatest objection to steel buildings is their instability in fires. Mild steel, at a white heat, is about as stiff as cheese, whereas masonry is not affected in the same way at high temperature, and resists collapse to a far greater degree.

The speaker's belief is that, in practice, a thick covering of cement-concrete is the only material that absolutely protects iron from corrosion. Such a compound structure unites the advantages of both component materials, and greatly surpasses in strength and durability an edifice made of either alone.

All are familiar with the remarkable strength and endurance of "wire-glass," the glass sheet being cast and rolled so that the wire net is completely covered with the glass, imparting to the natural fragility of the latter a certain amount of elasticity and abnormal strength; the glass, in turn, absolutely protecting the wire from corrosion. So long as the wire is covered, such a composite sheet will hold together, unless broken by a force greater than the tensile strength of the wire.

Not being a structural engineer, the speaker may be unfamiliar with certain objections to composite concrete and metal structures; in his ignorance, however, he cannot but think that such compound constructions will be the true and logical line of development in the future.

THE TOWER OF ST. MARK.

WHERE is still to be seen on the Piazza of St. Mark a lamentable mass of ruins containing all that is left of the bell-tower of the Venetian Republic; but busy hands are rummaging amongst this mass of rubbish, this dusty pile, for the sake of withdrawing from it any uninjured pieces of the Campanile, and the great courtyard of the Ducal Palace is transformed into an ossuary where are already accumulated the scattered members of the colossus. These members, bas-reliefs, bronzes, statues and decorations are here carefully grouped together, awaiting resurrection. One might call them an image of a monument painfully sketched-out as in a dream, a maladroit evocation. One might imagine that these works of art gathered together here are fatigued through having been throned on high during long ages over the grand public place of Venice, and are disturbed at the idea that they must again take their place in the eye of the sun.

One of the bronze statues from the Loggetta, Minerva, has lost her buckler; her sword is broken, her casque is cleft by a terrible blow. Apollo, headless and dismembered, lies on the ground; Mercury is disfigured, and has lost his nimble hands. There are also a certain number of statues which the most painstaking effort will hardly succeed in curing of the wounds caused by their fall, and fitting them for a place on the new pinnacle, which is going to be erected for them.

You doubtless know that the engineer, Signor Giacomo Boni, has been summoned to Venice, and ordered to prepare for the rebuilding of the historic tower. From the Roman Forum, where he

⁵ *"Gmelin Handbuch,"* Vol. 5, p. 185.

⁶ *Journal, Iron and Steel Inst.,* No. 1, 1889, p. 66.

was directing the new excavations with extreme ability — where he has already made some astonishing discoveries, the young engineer has gone to care for the Venetian Forum — that group of monuments of a different epoch, to be sure, but one which equally recalls several fair pages of history, and at the same time is a precious necklace of artistic treasures. A link has given way under the weight of time; the Campanile has crumbled, and Signor Boni has begun his work by carefully picking over the ruins.

It is only in the early days of the month of October that an ending will be made of cleaning up the Piazza. The thing which makes the work difficult is the fact that the tower, which was unwilling to throw itself upon St. Mark's, or upon the Ducal Palace, has buried under its ruins a portion of the arcade of the Royal Palace. It might have dragged them down in its own fall, if it had had less thought for the surrounding monuments. It will be necessary, therefore, before disinterring this arcade, to shore it up in some fashion, after the Piazza is cleared up; and before laying the foundations of the new tower, it will be necessary to make excavations, so that a study of the structure of the sedimentary deposit may be made, and any defects in the old foundations laid bare. These excavations will extend through a zone of about 6 metres beyond the old foundations of the monument, and will go 4 metres below them. The second portion of the work, having to be carried out with extreme care, cannot be finished before next spring; then the new foundations will be laid, with an area of from 200 to 400 square metres, on ground consolidated by piles which are to be driven by the quiet and non-disturbing action of hydraulic pressure.

It is natural that investigations into the stability of the Venetian soil, the sinking of the ground-level, its movement, its former undulations, and those which are still to be feared, should have to be carried out with extreme slowness. Fortunately, they have discovered an aid of extreme importance — a bench-mark; on the third gradin, at the left of the entrance to the Campanile, there has been discovered an ancient mark indicating the sea-level. Thanks to this mark it will be possible to know whether there has been any sinking of the foundations of the tower, and as well, whether other parts of Venice have sunk also. As it is a question of level, in relation to the primitive level of terra firma, they now have a new factor for studying the problem of the general subsidence of the islands in the Lagoon, a problem of capital importance for Venice, whenever the stability of its monuments are considered.

This subsidence of the ground-level is a fact abundantly proved. It is now only necessary to determine how important a factor it is. The level of the Roman paving in Venice lies 2 metres below the present level, while the level of the mediæval pavement lies only 1.70 metres below, and this gives a coefficient of geological subsidence of 9 centimetres for each hundred years. The phenomenon is one of great importance, and it is time that the Venetians took proper cognizance of it. As to its causes: it is thought that it had been found in the settling of the layer of clay into which the piles have been driven. Moreover, the phenomenon is continuous and periodic. It is enough to recall that the ancient monuments were built flush with the water, that it is only from the year 500 that buildings were placed on gradins, and the Piazza of St. Mark itself offers a curious example of this. The Campanile, which is the most ancient monument on it, was, before its fall, lower than it was intended to be by its builders, because of the fact that the pavement of the Piazza had been raised. In fact, under the modern pavement is found an earlier one; then, lower still, are found relics of the *opus spicatum* of the Middle Ages, such as we see it in the paintings of Gentile Bellini, and, finally, still farther down, we come to vestiges of Roman occupation and the level of beaten earth, upon which walked primitive man.

Signor Boni excels in archaeological investigations. He has created a special method, of which I shall shortly probably take occasion to write to you, which has enabled him to reconstruct, in great part, the primitive history of the Roman Forum, by a system of vertical research and horizontal examination of successive layers of ground, of pavements, of substructures, more or less ancient, of historic stories (*étages*), in a word, and as the Piazza of St. Mark is really the Venetian Forum of Roman times, the excavations which he is going to carry out will probably give rise to discoveries of great historic importance.

Because of the subsidence an interesting problem presents itself. Ought the Tower of St. Mark, which it is desired to have rebuilt on the same spot — with the same architectural proportions — a perfect copy in fact, to be built to the same height from the present level of the Piazza, or still higher? for the Campanile has buried itself to the amount of 70 centimetres, so that it was by so much lower than when first erected. Of the five gradins which form its base, two and one-half had become buried beneath the level of the Piazza, and as it is now a question of historical restoration, it ought to be right to take account of the origin of the Campanile, and rebuild it to its original height. Objection has been made to Signor Boni that this heightening of the Campanile might disarrange the harmony of the lines of the Piazza, through the equivalent lowering of their lines, but it is only necessary to remember that 70 centimetres is no great portion of a tower nearly 100 metres high.

One thing Signor Boni absolutely refuses to do, and that is to rebuild the Campanile in any other spot. To do this would be to disarrange the harmony of the entire group of buildings on the Piazza, since the Campanile being the most ancient structure there, it is entirely natural that the architects of the other monuments must

have taken it for their point of departure. "Any displacement," says Signor Boni, "would disturb the symmetry of the Piazza; and in making use of the word 'symmetry' I give it its Greek meaning, and not that which is directly attributed to it. Symmetry does not mean equality; the word rather signifies a harmony of the *ensemble* of elements that are not discordant, but merely unequal. The Acropolis for example, is composed of members that do not repeat one another, but that does not prevent its having perfect symmetry."

The new Campanile will differ from the old one only in certain details of construction, in its foundation, in its elevation, in the employment of resources of modern construction. Signor Boni is absolutely determined that the material employed shall guarantee a perfect stability. He will, therefore, watch over its choice. The old monument was composed, in great part, of old Roman material. There have been found amongst the ruins splendid specimens of brick of the first and second centuries, marked with the stamps of Nero, of Claudius, and of Antoninus Pius. There have also been found a score of bricks with unknown stamps which have revealed many things — such as the existence of Roman *figulinae* (brick-yards) in the cities of the vanguard, which, on the slope of the Alps, the Latins built against the invasion of the barbarians; and also of the active life of the garrison of these cities, and several details of their domestic life. Several of these bricks still bear the imprint of the footmarks of animals who trampled on them while the clay was still green, and there are imprinted stamps of domestic animals such as goats, lambs and pigeons. Upon these bricks have been found traces of ancient Roman mortar, which, as is well known, was very strong; while the Venetians of the Middle Ages used a mortar composed of Istrian lime and a calcareous debris — a mortar, moreover, which did not set properly, as it absolutely lacked hydraulicity. In the reconstruction which is being planned with a view, particularly, to secure the greatest resistance to compression, it is almost certain that there will be found beds of clay which will yield bricks identical to those of Aquillia, which were indestructible. As to the mortar, it will be made from a mixture of Istrian lime and the famous pozzolana, which even resists dynamite. The foundations whose resistance is the chief consideration, will be reinforced, as I have said above, so that their powers of resistance will be doubled, and, finally, the soil will be consolidated by means of piles of huge dimensions.

As to the exact and integral reconstruction of the monument, it appears that Signor Boni has at his command all the necessary elements, the most exact drawings, from the piling up to the angel which used to crown the edifice. The reproduction, therefore, should be perfect. It will only be necessary to introduce certain modifications in the arrangement of the interior staircases, the hanging of the bells, and so on. The sole architectural modification will be the elevating of the whole by the 70 centimetres now buried beneath the pavement of the Piazza, and this will, at the same time, preserve historic fidelity and answer a technical purpose, because a granite socle can only consolidate the structure and protect its base from the saline emanations rising from the soil.

The Loggetta of Sansovino will also show itself once more. This graceful little structure had the misfortune to be backed against, or, as it were, hung against the Campanile. It will not be rebuilt in the same way. The Loggetta will be placed on the foundations of the Campanile — upon the same block — so that there will no longer be any cracks or movements to be feared. A quantity of fragments of statues from the Loggetta have been saved. Its historical restoration will therefore be easy. It is intended to restore it to its former position, that is to say, to serve as the entrance to the Campanile.

"In five years," Signor Boni says, "we shall hear again the 'Marangona' — this is the name of the largest bell in the Campanile — and doubtless he will be able to keep his word."

As you see from these remarks, his plans have been very carefully studied, and we can count on his following out the execution of the work with the calm steadfastness and conscientious ability which distinguish him; but that which shows that Signor Boni is in true sympathy with his work is that he is in no way obsessed by the hysteria of the writers and artists who saw in the downfall of the Campanile di San Marco only a pretext for making a graceful flourish, and announcing to the whole world that their sensitive souls had been rent and wrung by the disaster, and that they had shed bitter tears over the ruins of the monument. A good deal might be said upon this hypocritical ranting, which has been only too favorably received by the newspapers, and at the inquests which were held over the fall of the tower. We will be content to present to the hearts of these too soulful artists the masculine figure of Signor Boni, who, without crocodile tears, or the aid of the hackney muse, is going to rebuild the Campanile, and who really is about the only man in Italy capable of accomplishing the task.

HONORÉ MERU.

BOOKS AND PAPERS

THE first part of a very valuable book¹ has just appeared, "The Eighteenth Century Architecture of Bath" (England), by Mowbray A. Green, A. R. I. B. A. It is illustrated profusely by measured drawings, photographs, sketches and reproductions of old

¹ Published by G. Gregory, Argyle St., Bath, 1s. 6d., in paper covers; 4 parts, and limited to 500 copies, numbered.

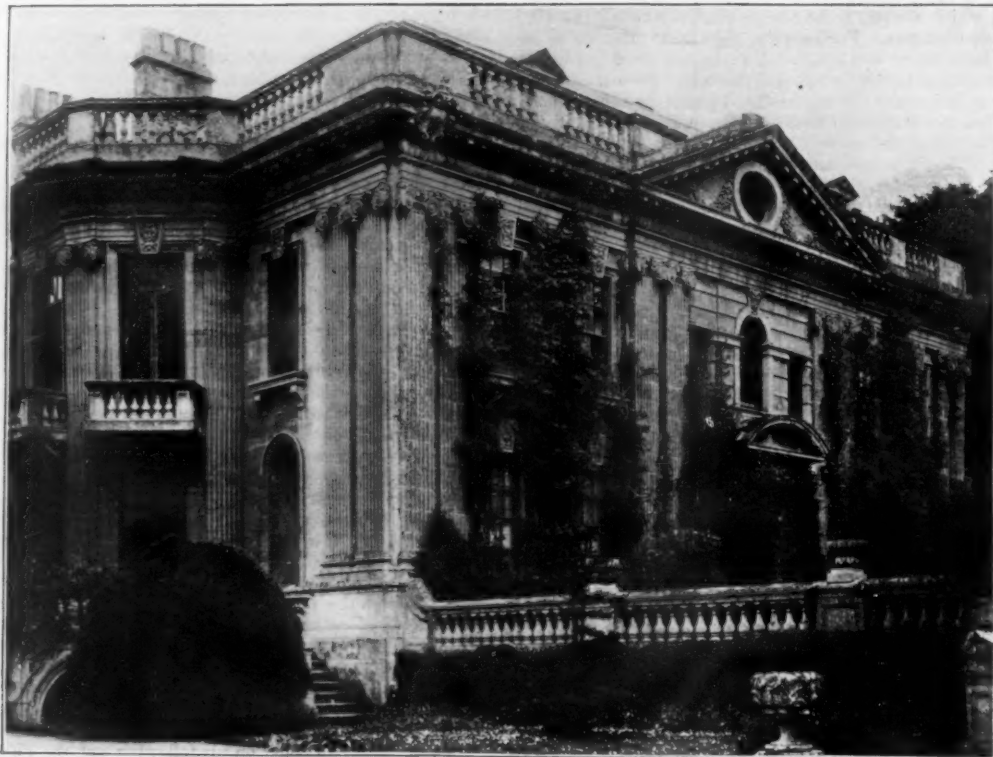
maps, and is a work which every architect interested in eighteenth-century domestic architecture will be glad to possess. Part I only takes us down to the first quarter of the eighteenth century when the elder Wood began his work of renovating the old city. Most of the houses were then a sort of transition from gabled Tudor frontages and mullioned windows to the Palladian style of the latter half of the century; and it is interesting to follow Mr. Green's illustrations showing this gradual adoption of Classic details. First of all, apparently, windows were altered, as we see large sash-windows take the place of casement-windows in the pointed gables; and then the gables disappear and we have broken pediments over the doors and windows, cornices and Classic doorways. Bath should be interesting to Americans, as its architecture must have been in some measure the cousin-german of the Old Colonial work. Looking through Mr. Green's book one sees details with which those cognizant of the Old Colonial architecture of the States are familiar. The luck of rebuilding a city which fell to the lot of the two Woods has rarely been experienced except in later times, under the last Imperial régime in France, when Baron Haussmann ruled lines across the map of Paris and swept away all buildings which came in the way of the new streets. Money was no object, as it was other people's! And apparently the elder Wood acted much in the same way. Landowners in Bath arranged for demolishing old buildings and putting up new ones, possibly with much too free a hand, for nothing or next to nothing

impossible on account of the rough means of transit, to exercise such care in the use of the stone as at the present time. In addition to this, he had been accustomed to work executed in hard Yorkshire stone, which would preserve the sharpness to a much greater degree."

The book is unfortunately, of necessity, printed upon somewhat glazed paper, but as the four parts will consist of only about 200 pages, it will not be over weighty in spite of its numerous illustrations. It is the only work treating exclusively of the domestic architecture of Bath in detail and apart from the history of the city. All other works are more or less historical "guides."

AUSTRALIAN SOFT WOODS.

THE heavy timbers in which Australia is so rich have become famous for their exceptional hardness and durability, but comparatively little is known outside the Commonwealth of the numerous soft woods admirably adapted for the manufacture of furniture and for other industrial purposes. Such timbers are abundant in New South Wales, and are found principally in the immense brush forests of the coastal districts. Several of these timbers have a wood grained and marked most beautifully, and capable of receiving the highest polish, while others are fragrantly perfumed. Amongst the chief varieties of woods of this class may be mentioned the red-cedar, the beautiful wood of which is admirably adapted for the



Widcombe House, Bath, Eng.

remains in Bath of an earlier period except the Abbey church. And yet how benighted was the building-trade in those days. "In Wood's *Description of Bath*' he makes the following cogent remarks on the working of Bath stone: 'My speaking of this House leads me to explain the Defects in the Management of the Mason's trade at Bath. Our Free Stone is beyond dispute a most excellent Building Material, as being Durable, Beautiful and Cheap: It has been generally worked in the Quarries upon the Hills round about the City by Men who stile themselves Free Masons, i. e. Masons, whose Province it is to work Free Stone, and from thence carried, ready wrought, to the several Places where it was to be used in Building; by which Means the sharp Edges and Corners of the Stones are generally broke. In this Condition the Free Stone work is usually set up by other Men, who call themselves Rough Masons, i. e. Masons whose Province it is to work the Refuse of the Free Stone or the common Wall Stones: and thus by dividing the Mason's Trade into two Branches, the Works in Bath lose that Neatness in the Joints between the Stones, and that Sharpness in the Edges of the Mouldings, which they ought to have: and which People accustomed to good Work in other Places, first look for here.' There is a great deal," continues Mr. Green, "to be said in favor of Wood's view of the matter, but of course, in his day it was

finer kinds of cabinet-makers' work. Some of the cedar-trees grow to immense size, as much as 2,500 cubic feet of valuable timber having been obtained from one tree. In addition to the cedar may be mentioned tulip-wood, yellow-wood, white-maple, myall, marble-wood, mock-orange, and many others. Besides their use for cabinet-making, many of the brush timbers are of great utility for the rougher kinds of carpentry, while some, both hard and soft woods, are admirably adapted for coach-builders' and coopers' work. The chief description of pine growing in New South Wales is the Moreton Bay white-pine, found in the coast districts as far south as the Bellinger. It is soft, light, and easily wrought, and suitable for all the interior woodwork of houses, as well as for cabinet-making. The red or black pine is extensively distributed over the Liverpool Plains, and in the Lachlan and Darling River districts, as well as around Berima. It is beautifully marked in the grain, takes a fine polish, and has an agreeable fragrance. There are numerous other varieties of pine, but these resemble in their main features the trees already described. Australian deal is an excellent timber, and is obtained in very large scantling, the tree frequently reaching 120 feet in height. It is soft, close-grained, easily wrought, and remarkably free from knots. Its use, therefore, is extensive for cabinet-makers' work and

house-fittings. The New South Wales Government Statistician mentions several of the more useful of the soft and fancy woods of the State. They include the beech, which attains a height of 100 to 150 feet, with a diameter of 3 to 5 feet, giving a strong white, close-grained, and durable wood, easily worked, and greatly valued for decks of vessels, flooring, turnery, and furniture-making; the black bean, growing to a height of 120 to 130 feet, with a diameter of from 4 to 5 feet, with a handsome, close-grained, dark-colored, durable wood; the black-oak, used for bullock-yokes, tool-handles, shingles, etc.; and the black-wood, resembling walnut, and highly valued for making furniture. Another valuable timber is the rose-wood. It is strong-grained and durable, with a color resembling Spanish mahogany. Among other woods may be mentioned the silky-oak, which attains a height of 70 to 80 feet. The color is a light gray, beautifully crossed with silvery waves, and when polished the surface has a delicate lustre. Bedroom suites made from this wood possess a dainty appearance. Satin-wood is another useful timber, yellow in color. It is soft and silky to the touch, close-grained, and easily wrought. This wood is also suitable for cabinet-making, and is considered to be superior to the satin-wood used in the European and American furniture trade. When the system of forest conservation becomes more general in the State, the supplies of many of the timbers mentioned will become practically inexhaustible, and are certain to be in large demand for export purposes.

JOHN PLUMMER.



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

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DETAIL OF STAIRCASE, NASSAU HOUSE, BATH, ENG.;—DOORWAY TO BEAU NASH'S HOUSE, BATH, ENG.

SEE "Books and Papers" elsewhere in this issue.

[Additional illustrations in the International Edition.]

THE ROMAN CATHOLIC CATHEDRAL, WESTMINSTER, LONDON, ENG. MESSRS. JOS. F. BENTLEY & SONS, ARCHITECTS.

WE republish this week, from the *British Architect*, a plate taken from a large drawing, prepared under the direction of the late Mr. Bentley, which doubtless illustrates the exterior of the Cathedral from its most favorable aspect, and which is not liable to the defects that inevitably arise in photographic records. The drawing was prepared from the architect's scale-plans of the building, and corrected in detail from the work itself. It shows, moreover, the tympanum of the great entrance filled with mosaic after the cartoon prepared for the work.

The foundation-stone of the great church was laid on June 29, 1895, by Cardinal Vaughan. The total expenditure for work and material up to July 25, 1902, has been £162,871, but no cost of the Archbishop's home has been borne by the Cathedral Building Fund.

The Cathedral stands on a site of some 4 acres in Ashley Gardens, close to Victoria Station. It is entered by a fine porch, and the plan consists of a porch, a narthex, or vestibule, extending across the whole width of the Cathedral; a nave and two aisles, with eight side-chapels and transepts; a sanctuary, 4½ feet above the level of the nave, with the Blessed Sacrament and the Lady Chapel at the sides; beyond the sanctuary a raised choir, 13 feet above the nave, for the chanting of the Divine Office, with a crypt beneath it; a spacious gallery over the aisles and at the west end; and, behind the Blessed Sacrament Chapel, two vast sacristies and other rooms connected with them. The external dimensions are: Extreme length, 360 feet; width, 156 feet; height of nave, 117 feet; height of façade (not including the turrets), 101 feet; height of campanile, 273 feet; and to the top of the cross, 283 feet. Inter-

nally, the dimensions are: Length from the main entrance to the sanctuary, 232 feet; depth of the sanctuary, 62 feet; and of the raised choir beyond it, 48 feet—making the total internal length 342 feet; width of nave, 60 feet; width across nave and aisles, 98 feet; across nave and aisles and side-chapels, 148 feet; height of the main arches of the nave, 90 feet; and of the three domes of the nave, 112 feet. The chief materials are very hard brick and stone, set in cement-mortar. The foundations, of most solid construction, rest everywhere upon a bed of concrete which varies from 4 to 10 feet or more in depth. The external walls, to the height of 8 feet from the ground, are of granite; and the structure above is of red bricks, with a very large amount of decorative work in Portland-stone.

Internally the appearance of the Cathedral is exceedingly impressive, with the full view of its 342 feet of length; its vast nave, much wider and higher than any nave in England; the twelve lower arches on each side of the nave, supporting the stately gallery; above each two of these arches a lofty arch of 73 feet in height; above each two of the latter a still loftier arch of 90 feet; and, rising above the highest arches, the three domes of the nave. Besides the massive piers, there are (in the nave, aisles and transepts) twenty-eight columns of marble, with a marble front to the gallery; and the lower walls, and the piers to the height of about 38 feet are being covered with marble. The whole upper part of the piers and walls, the vaults and the concrete domes will be decorated with mosaicwork illustrating the history of the Roman Catholic Church.

For the flooring Mr. Bentley had prepared a design in marble, with squares of cipollino, in which were set fishes of a slightly red-tinted marble swimming in the rippled waves of the sea. An allusion to the idea of the church being a ship bearing her burden safely over the sea of life. This floor would have cost some £15,000, and, moreover, would have been of doubtful quality for a vast crowd of kneeling worshippers, who are liable to effect of chill even when such a floor is covered with matting. In Vienna the marble floor of the Cathedral is overlaid with boards in the winter, in Spain the floors are covered with mats, and in St. Peter's, in Rome, a plank is put down, on which the deacons stand to sing the Passion in Holy Week. It has been decided for the present to use a wood-block flooring, which is warm, noiseless and comfortable. The narthex, however, will contain Mr. Bentley's marble flooring, and the piers and columns will be bound together by a marble framing; so that the wood-block will appear as a canvas enclosed in its frame.

The acoustic properties of the Cathedral have turned out to be unexpectedly excellent. A speaker standing in the apse has been heard distinctly at the entrance-door of the Cathedral—the nave being empty. What will be the effect upon sound of a large audience filling the nave is one of the results looked forward to from the performance of music that will be given on the 11th of June. The science of acoustics appears still to be in an extremely backward condition, for no architect seems to know what his church will do with the sounds of the human voice produced in it. Mr. Bentley hoped that the preacher would be heard distinctly; but not even he could be sure until the experiment had been made.

The construction of the domes should be noted. No iron whatever is used in their construction. They are built of concrete of 4 parts broken brick to one of Portland-cement mixed with the least possible quantity of water. The concrete was prepared on a stage round each dome and thrown fresh on to the boarded centre, sanded to prevent its adhesion, in ranges varying from 3 to 5 feet deep, and screened on the upper surface to a graduated thickness so as to ensure an absolute uniformity in longitudinal and latitudinal section. No cement was used until it had been 13 weeks on the site and periodically turned over.

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ENTRANCE TO ESTATE OF E. ROLLINS MORSE, ESQ., NEWPORT, R. I.

THE ROOD-SCREEN: ALL SAINTS', GREAT NECK, LONG ISLAND, N. Y. MESSRS. CRAM, GOODHUE & FERGUSON, BOSTON, MASS., AND MR. SILAS MCBEE, ASSOCIATED ARCHITECTS.



THE LION OF LUCERNE.—A great deal of anxiety is felt in the country through the discovery that one of Switzerland's chief historical monuments—the Lion of Lucerne—is threatened with destruction. The Lion, which was chiselled from the solid sandstone-rock by the Swiss artist Aborn, in 1792, commemorates the massacre of the Swiss Guard during the French Revolution, and, as a work of art, is unique. It is situated in rather damp surroundings, above a pool in the glacier-garden at Lucerne, and the water has trickled through the sandstone, which threatens to crumble, and thus destroy the statue. An expert has been examining the rock, and by his advice it has been decided to cut away the surrounding rock and isolate the Lion.—*Geneva Correspondence London Chronicle*.

[Aborn may have cut the stone, but the Lion was modelled in 1821 by Thorwaldsen; the Swiss Guard was massacred in 1792, and the memorial was not a ready-made one.—Eds.]

AMERICAN BRIDGES, BEAUTIFUL AND UGLY.—We have only to look at the bridges of Paris, of London, of Berlin, to see that good bridges are the rule rather than the exception in European cities, and that eminent beauty and monumental character, as illustrated by some of the newest structures, are compatible with the latest achievements of engineering in metallic construction. On the other hand, when we look at our American cities, we shall see good bridges a rare exception. New York, for example, has but one good bridge of note, in the strict acceptance of the term—Washington Bridge over the Harlem. The High Bridge, close by, is part of an aqueduct. Chicago, whose river gives it a superabundance of bridges, outside of its parks has not a single one worthy of the name. Boston is another city of bridges, but most of these are inexpressibly mean affairs. In the parks, to be sure, Boston has many bridges of striking beauty, representing a remarkable variety in design. One—the Longwood Avenue Bridge, spanning the idyllic stream of the Riverway with a noble great arch—is for ordinary traffic rather than for park purposes. Some of the most deplorable of Boston's bridges cross the great channel which the railway-tracks cut through the heart of the city. Of these, the Dartmouth Street Bridge in particular, hard by Copley Square and the Public Library and against the rich façade of the Back Bay railway-station, is so aggressively offensive, with its steel trusswork of an excruciatingly distorted shape, that any expense would be justifiable to secure its replacement with something unobtrusively worthy of the site. But the tide in Boston appears at last to have turned toward the construction of good bridges. A handsome new bridge for combined parkway and ordinary traffic across the Neponset is one token of this tendency, but the most significant instance is that of the great new bridge to Cambridge under construction across the Charles River. Particular pains have been taken to give a monumental character to this bridge, which has received, prospectively, the name of the most beautiful in the United States.—*Sylvester Baxter on "Art in Public Works" in the October Century.*

THE SILVER-LEAF POPLAR.—The immense demand for paper and the great quantity of wood used in making pulp call for the replanting, with some hardy, quick-maturing tree, of the acres denuded by this industry. A future crop of wood must be assured. The silver poplar, or abele, an importation from Europe, now become wild in this country, will answer this purpose well. It is found in every great city and is almost the only shade-tree that will survive the numerous vicissitudes of city life. The suckering is a nuisance in the city, but helpful for planting. The tree frequently surrounds itself with several thousand sprouts suitable for forest planting or it may be grown from cuttings of the branches or of the roots. The silver-leaved poplar is of rapid growth under favorable conditions. It will flourish upon the mountain-slopes of the Eastern States, increasing from three-fourths to one inch in diameter yearly. The wood is white and similar to that of the cottonwood. There are many places where it would serve a good purpose for lumber. In 20 years there may be grown from 50,000 to 60,000 feet b. m. of lumber per acre from the abele—estimating 170 trees per acre, 20 inches in diameter and 20 foot length of trunk, which it is capable of attaining. Or considering it for pulp-production, there would be 6,500 to 7,000 cubic feet of wood per acre.—*Boston Transcript.*

AN OLD BROWN CEDAR.—Charles E. Bessey, of the University of Nebraska, writes to *Science* of a cedar which he asserts to be over 1,000 years old, as follows:—"In the Garden of the Gods, near Pike's Peak, Colorado, there are many large specimens of the brown cedar, *Juniperus monosperma* (Engelm.), Sargent, and in a recent visit to that place it occurred to the writer that these trees must be very old. On the 13th of August he was fortunate enough to find the stump of a recently cut tree, on which it was easy to distinguish the annual growth-rings. These were counted for a section of the trunk, care being taken to select a portion in which the rings were of average thickness, and on this basis the number for the whole stump was calculated. In this way it was found that this particular tree was between 800 and 1,000 years old. In other words, this tree was a seedling some time between the years 900 and 1100 A. D."

THE ARCHEOLOGICAL VALUE OF OLD COTTAGES.—Some of the most precious finds that have ever fallen to the lot of the antiquary and collector have been in connection with small cottage-houses in the country, the sites of which have been near old ruined castles, abbeys and mansions. As such ancient buildings fell into decay in times long past, the materials of which they were composed and the very furniture and fittings within them were utilized by humble people for the construction of dwellings, and in this way relics of the past that are well-nigh priceless have been found in the walls and woodwork of laborers' cottages. Some of the most beautiful colored-glass of a very early period known to English collectors was found in a cottage near Ripon, in Yorkshire, and the very leaden frames in which the glass was embedded were unique and of great value to connoisseurs. Both glass and leaden frames are supposed to have come from Fountains Abbey, near to the cottage in question. In another case, not far from Pontefract, the stones of a humble cottage were found to have upon them many names rudely carved. As the cottage was itself a tumbled-down affair, it was levelled to the ground by the owner, and antiquaries then determined that the stones, with the inscriptions upon them, had come from an ancient castle. The names were those of Cromwellian and other soldiers for the most part, but some of the carved names were evidently those of prisoners of a much earlier period. Some of the most beautiful specimens extant of ancient woodwork have come from ancient cottages, but in all cases the latter have stood at some point near an ancient castle or abbey.—*London Tit-Bits.*

A CEDAR-Forest WHITTLED DOWN.—The cedar-factory at Greenville, Ala., is no more. For more than ten years it has been one of the

most important industries in the South. It was built by some Richmond, Va., people, who found a little bucket-factory there and turned it into a big concern for making the little slats out of which lead-pencils are constructed. They built their own railroad out to Cedar Creek, where the timber grew, and gave employment to some 700 men, women and children. Now the cedar-timber is all gone, made into pencils, and ultimately whittled away by jack-knives of 70,000,000 people who have been sharpening pencils through the last decade. The timber being exhausted, the factory moves on to Mobile, where fresh supplies can be floated down the rivers and creeks from the interior.—*Boston Transcript.*

SUR LE TAPIS.—"On the carpet," again. Without any wish to charge so brilliant an author with the offences of her times we are compelled to observe, in the same book, that absurd carpet spread once more for the discussion of affairs. "Le tapis," on which things have been talked over in French literature, is—need we say?—not a carpet, but a table-cover; in fact, the green-baize table-cover of diplomatic convocation. On that are laid the papers, the protocols. A tapis is a carpet only when it covers the floor. Paper-hangings are called *tapisserie*, but even the English haste to burlesque (with an eye to "quaintness") the idioms of the stranger has not led our authors to speak of carpeting French walls. Would that "jumps to the eyes" and "it goes without saying" might be suppressed forever in English; but, at any rate, they are correct translations; whereas, "on the carpet" is not.—*London Chronicle.*

EXPERIMENTS ON STEEL IN CONCRETE.—By recent experiments to discover whether steel imbedded in concrete suffers any injurious changes, conducted by M. Breuillie, and described by him in the *Annales des Ponts et Chaussées*, it has been proved that steel does undergo certain changes. The paper on the subject shows that a salt is formed by the action of the cement on iron, also that this salt is dissolved by the water which penetrates into the concrete-steel. According to this action of the cement on the steel, it has been proved by experiment on ten 2" x 2" plates, that the weight of steel must undergo a change; it will be more or less "according as the newly-formed body adheres to the steel or not." An analysis of the plates was made, and an increase of weight was found, due to the formation of a silicate of iron. The tables given in the article of Mr. Breuillie indicate a regular increase in the weight. The author says: "If a soluble salt had formed, the plates taken out from the mortar should lose weight under the action of water. Nos. 46 to 50 were twice put in constantly renewed water, and they lost part of their weight. After 6 hours the loss of weight was on an average 2 milligrammes; after a second immersion of 7 hours the loss was 2.2 milligrammes. The salt which is formed at the contact of steel to cement seems to have an effect on the adhesion of the two bodies. To discover this point the author decided to find out whether the adhesion takes place on the setting of the cement, or whether it increases with age, as the salts do. The experiments made on thirty plates 1½" x 2½", placed on a horizontal surface of a concrete block, and then torn off after 2 to 5 days' intervals, showed that the adhesive increased uniformly, and cracked after 30 days. The above experiments convinced the author that (a) the cement attacked the iron; (b) water dissolved the composition which formed at the contact of the two materials; (c) the adhesion of the steel to the cement disappeared when water passed through the concrete-steel for a certain time; (d) the weight of the iron salts which adhere to the steel, and the normal adhesion between the steel and concrete increased with the time. Up to this time it has been thought that steelwork imbedded in concrete is not injuriously affected. These experiments certainly tend to disprove the assumption.

WEDGWOOD AND ITS MAKER.—"What a debt of gratitude the world owes to the energy, enterprise, and rare artistic taste of Josiah Wedgwood, who more than any other made the sculptor's art familiar to every household—made it possible, as Prime says, for workmen in English shops and laborers in the field to use for buttons and ornaments gems of the glyptic art of the best ancient artists. It was a fortunate inspiration when Wedgwood overcame his modesty in regard to his achievement and presented in 1762 a candle and breakfast service of his cream-colored ware to Queen Charlotte, who was so enthusiastic over the soft ivory tint of the paste, the delicacy of decoration, and beauty of shape that she ever after gave him her patronage and bestowed the name of "Queen's Ware" upon this rarely beautiful product of Etruria. The recognition ensured his popularity and success, enabling him to carry out many plans which he had before been unable, financially, to mature. One of his happiest inspirations was the engagement of Flaxman, the portrait-medallions of the factory being chiefly cast from the latter's models, also the classical cameo-like decorations of white porcelain biscuit which adorned the early Wedgwood. Meantime, says the *Delineator*, such is the reward of genius—this second Phidias worked for about a guinea a day. Wedgwood had much to do, both directly and indirectly, with the "porcelain mania." His gift to Charlotte resulted in a royal penchant for objects of virtue, imitated by her subjects and inherited by her daughters, particularly the Princess Elizabeth, who is chronicled as begging her mother to go to Strawberry Hill, where she declares she spent a morning after her own heart among its china and other treasures. Histories may stand unopened upon the library-shelves, but bring out the "Landing" pitcher with its rich blue, and the gallant Lafayette seems to step into the group gathered around it. "I caught a glimpse of him as he passed down Genesee Street," says one. "My grandfather shook his hand," says another. "My great-great-grandfather fought by his side," proudly declares a third, recalling his bravery, his affectionate remembrance of those who shared danger with him as exemplified in his kneeling to kiss the curb above a comrade's grave, with the touching remark: "Ici repose un cœur noble."—*Philadelphia Press.*

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The matter illustrated may in small part be classified thus:

PUBLIC BUILDINGS

City Hall, New York, N. Y.		Date 1803-12
Old State House, Boston, Mass.		" 1748
Pennsylvania Hospital, Philadelphia, Pa.		" 1755
Carpenters' Hall, Philadelphia, Pa.		" 1770
Independence Hall, Philadelphia, Pa.		" 1729
Faneuil Hall, Boston, Mass.		" 1741

and others.

CHURCHES

King's Chapel, Boston, Mass.		Date 1749
Seventh-day Baptist Church, Newport, R. I.		" 1729
Christ Church, Alexandria, Va.		" 1767
Christ Church, Philadelphia, Pa.		" 1727
St. Paul's Chapel, New York, N. Y.		" 1764
Old South Church, Boston, Mass.		" 1729
First Church, Hingham, Mass.		" 1681
St. John's Chapel, New York, N. Y.		" 1803
First Congregational Church, Canandaigua, N. Y.		" 1812
St. Peter's P. E. Church, Philadelphia, Pa.		" 1758
Gloria Dei Church, Philadelphia, Pa.		" 1700

and others.

IMPORTANT HOUSES

Fairbanks House, Dedham, Mass.		Date 1636
Royall Mansion, Dedham, Mass.		" 1737
Philipse Manor House, Yonkers, N. Y.		" 1745
Tudor Place, Georgetown, D. C.		" 179-
Mappa House, Trenton, N. Y.		" 1809
Woodlawn, Va.		" 1799
Mount Vernon, Va.		" 1743

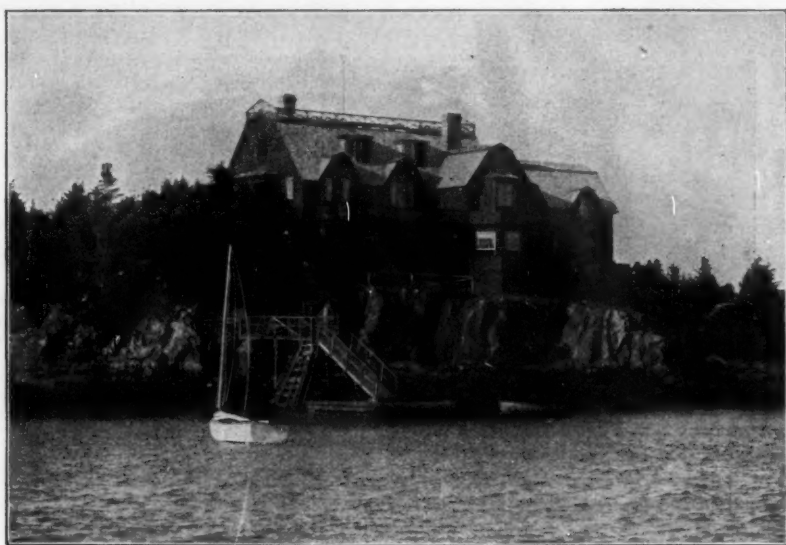
and others.

Incidentally there are shown special measured drawings or large views of the following features and details:

Porches and Doorways		67 Subjects
Staircases		21 "
Mantelpieces		81 "
Pulpits		6 "
Fanlights		60 "

In addition to the subjects enumerated above there is a large quantity of measured and detailed drawings of Cornices, Ironwork, Gateposts, Windows, Interior Finish, Ceiling Decoration, Capitals, etc., together with elevational and sectional views of entire buildings.

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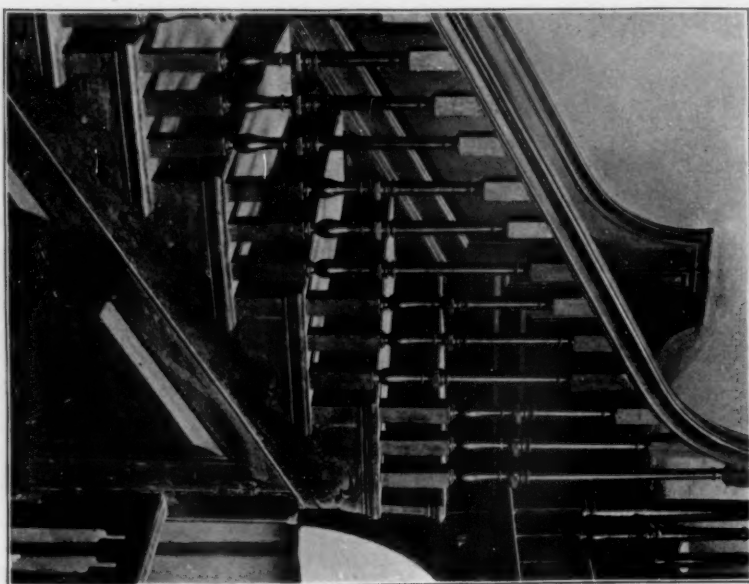
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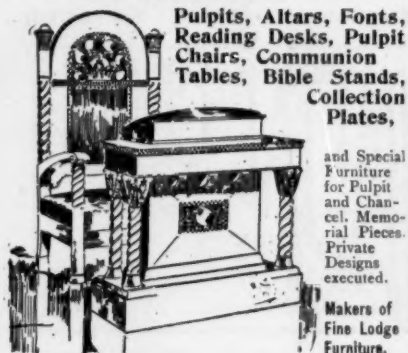
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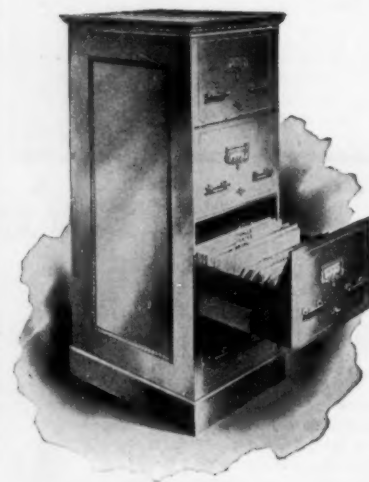
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The Bill prays for a preliminary writ of injunction, to be continued during the pendency of the suit, and upon the final determination thereof to be made perpetual, and also demands an accounting and damages.

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Part XI

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BUILDING INTELLIGENCE.*(Advance Rumors Continued.)*

Fall River, Mass.—The heirs of the late Rufus B. Kingsley have sold to Miss Amanda M. Archer the old Kirby stable and adjoining buildings and land on Rock St. It is probable that the new owner will erect a business block on the site.

Fort Worden, Mass.—The following work has been authorized at this place: Construction of one single officers' quarters, one double captains' quarters, one double lieutenants' quarters, one single non-commissioned officers' quarters, one single barrack, one administration building, one guard-house, one quartermaster and subsistence storehouse, one quartermasters' stable, one bakery, one coal shed, one oil house. The work will involve an expenditure of about \$175,000. Firms desiring to bid should address the constructing quartermaster, Fort Worden, Washington, D. C.

Greenfield, Mass.—The question of erecting a new high-school building here is being considered by the school committee. The building and site would cost about \$60,000.

Holyoke, Mass.—The Harmony Society, a German society, have had plans prepared by Architects G. P. B. Alderman & Co. for a four-story brick block to be erected at the corner of Park and Adams Sts. Cost, \$50,000. Work will be commenced in the early spring.

Lockport, N. Y.—Contract for the construction of the U. S. public building here has been awarded to E. H. Denniston Co., of Syracuse, at \$79,555. Certain additions to the original price of \$68,900 were made for furnishing different material for some parts of the work.

Logansport, Ind.—A \$25,000 apartment-house will be erected here by Keller Brothers.

Macon, Ga.—The congregation of the Centenary Church is to erect a \$20,000 edifice.

Manchester, Mass.—The contract for the erection of the new summer residence here for Gardiner M. Lane, of Lee Higginson & Co., 40 State St., Boston, has been awarded to Roberts & Hoare. It will be frame, two and one-half stories, 50' x 112', and cost \$50,000. Raleigh C. Gildersleeve, 150 Fifth Ave., New York, architect. The contractors have not yet placed contracts for material.

Marshalltown, Ia.—The Marshalltown Pottery Co. will erect a \$20,000 three-story pottery building. It will have gravel roof, stone foundation, door hangers, etc. George H. Washburn, Burlington, architect.

McKeesport, Pa.—The D. L. Clark Confectionery Co., having a capital of \$250,000, will erect a \$175,000 twelve-story brick and steel building, 38' x 108'.

Memphis, Tenn.—The Geo. B. Swift Co., of Chicago, Ill., has the contract for erecting the shops and roundhouses here for the Illinois Central R. R.; contract reported to be about \$500,000.

Menasha, Wis.—It is stated that a new hotel to replace the burned National Hotel is about to be built. C. W. Howard, Chris Walters and C. R. Smith are reported interested; probable cost, \$35,000.

Millford, Mass.—Plans have been completed by Architect R. A. Cooke, 57 Prospect St., for a new business block to be erected on Main St., near Water St., for B. E. Harris.

Milwaukee, Wis.—It is stated that the Wisconsin College of Physicians and Surgeons within the coming year will build an extension to its present building at a cost of about \$30,000.

Minneapolis, Minn.—F. T. Heffelfinger is stated to have secured a permit for the construction of a stone dwelling at 2205 Park Ave., to cost \$20,000.

The National Biscuit Co., 244 Third Ave., north, will erect a three-story brick addition, 50' x 100', to cost \$28,000.

Moline, Ill.—The Moline Wagon Co. has let the contract to Gust Ed & Son for the erection of a four-story and high basement building, 80' x 220'; cost, \$50,000.

Montreal, Que.—R. Finley, 260 St. James St., and Jos. Perrault have prepared plans for the civil hospital. Estimated cost of the entire structure, including the laying out of the grounds, \$125,000.

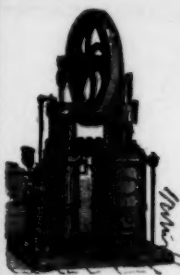
Nantucket, Mass.—Report states that Mrs. Oliver Ames, Commonwealth Ave., Boston, has purchased a large estate on Cliff Road, and is to lay out the grounds and erect a large mansion thereon.

Natchez, Miss.—Eugene M. Clarke, of the Temple Opera-house, is interested in the erection of a new theatre to cost from \$60,000 to \$80,000.

New Bedford, Mass.—Plans have been drawn by Thomas F. Houghton, 213 Montague St., Brooklyn, for a \$75,000 Catholic Church to be erected here for the new Portuguese parish. A site has been purchased on Rivet St., near Bonney St. It is expected to have the basement of the church ready for occupancy next winter.

New Britain, Conn.—W. H. Cadwell and W. P. Crabtree, associate architects, have made plans for the five-story brick furniture building, to be erected on Main St., for John A. Andrews.

New York, N. Y.—Henry Siegel will erect a ten-story store building on 6th Ave. and 14th St., to

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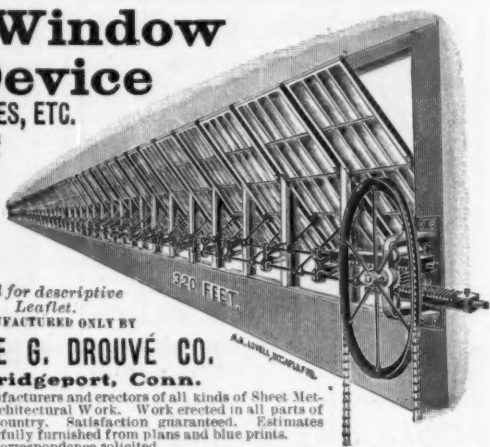
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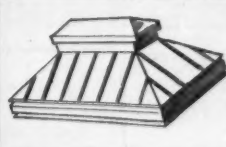
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BUILDING INTELLIGENCE.*(Advance Rumors Continued.)*

cost about \$1,000,000. Architects, Cady, Berg & See, 31 E. 17th St. Builders, Geo. A. Fuller Const. Co., 137 Broadway.

The corner-stone of the New York Custom-house was laid on October 7th. The ceremonies were made impressive by the presence of a number of committees of prominent men from the leading mercantile and industrial organizations and detachments of militia and regular troops. Speeches were made by Secretary Shaw and former Secretary Gage.

Architects Ludlow & Valentine, 100 Broadway, have just received appointment as architects of new church buildings to be built for the Lenox Presbyterian Church. The property is corner of St. Nicholas Ave. and 141st St. Size of plot, 114' x 127'. The buildings will be of brick and stone.

Owensboro, Ky.—The Christian Society is reported to be preparing to erect a \$25,000 church. Dr. R. H. Crossfield, pastor.

Peak's Island, Portland Harbor, Me.—Report states that the Welch Land Co. has awarded the contract for the erection of the big summer hotel here to R. S. Robinson, Deering, Portland. The hotel will contain office, dining-room, parlors, 75 sleeping-rooms, etc., and cost \$20,000. The building is to be ready for occupancy May 1st. F. H. & E. F. Fanett, 93 Exchange St., Portland, archts.

Philadelphia, Pa.—Addison Hutton, 400 Chestnut St., has drawn plans for a five-story basement and sub-basement fireproof building, to be erected at 827 to 831 Market St., for Strawbridge & Clothier, to cost about \$400,000.

Pittsburgh, Pa.—Marcus Rousseau, 307 Smith Block, is preparing plans for an edifice and a parish house for the St. Lawrence R. C. Church, to be erected on Penn and Atlantic Aves., to cost about \$200,000.

BUILDING INTELLIGENCE.*(Advance Rumors Continued.)*

Struthers & Hannah, 146 Sixth St., have prepared plans for a bank for the Merchants' Savings & Trust Co., to be erected on 5th Ave. and Stevenson St., to cost about \$40,000.

A building permit is stated to have been issued to Henry Phipps for the erection of a ten-story stone, brick and steel office-building at 6th St. and Duquesne Way, to cost \$800,000.

The McKessie-Davis Lithographing Co. will erect a \$50,000 seven-story brick and steel building, to be used for an engraving plant. Edwin Carroll, 421 Bissell Block, architect. It will be erected under the direction of the Lawton Mortgage Co.

A \$50,000 warehouse, having slate roof, steam heat, gas and electric light, fireproofing, elevators, etc., will be built by Weaver, Costello & Co., 232 Second Ave.

Plainfield, N. J.—The Board of Education is to erect a high school to cost about \$100,000.

Pocantico Hills, N. Y.—It is reported that John D. Rockefeller, New York City, will rebuild his country home at this place, which was recently destroyed by fire. It will be a granite structure and cost about \$500,000.

Salem, Mass.—Contractor H. P. Cummings Co., 178 Devonshire St., Boston, are erecting on Loring Ave. a \$15,000 brick building to be used for printing and publishing purposes, for S. E. Cassino, 102 Cabot St., Beverly. Architect, A. F. Gray, 53 State St., Boston. It will be 42' x 96', two stories, and have tar and gravel roof and steam heat.

Seranton, Pa.—Edw. Langley, Cornell Building, is the architect for a Manual Training School to be erected here at a cost of \$50,000.

Spokane, Wash.—The Centennial Mill Co. will rebuild its flour mill larger than ever, at a cost of \$75,000.

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BUILDING INTELLIGENCE.

(Advance Rumors Continued.)

Spring Lake, N. J.—It is reported that the Spring
Lake Hotel & Realty Co. have selected Watson &
Huckel, 1208 Chestnut St., Philadelphia, Pa., to
prepare plans for a \$150,000 hotel to be erected on
the site of the old Monmouth Hotel. It will be a
five-story structure, in the Spanish Renaissance
style, to measure 200' x 350', with wings at either
end 42 feet wide. The extension walls will be of
buff and red brick, with a Spanish tile roof.

Stevens Point, Wis.—H. A. Foeller, architect, of
Green Bay, has prepared plans for the \$20,000 li-
brary building. Will be of Bedford sandstone and
pressed brick, slate roof, galvanized iron cornice,
plate-glass, steam heat, hardwood flooring, cork
carpet, oak finish, etc.

St. Louis, Mo.—A new building is to be erected on
Delmar Ave., opposite Delmar Garden, by the De-
velopment and Investment Co., for the Mail Order
Publishing Co., publishers of the *Woman's Maga-
zine* and *Woman's Farm Journal*. The main portion
of the structure will be but one-story high. The
office section will be three stories high. In the rear
of the main building will be a large power-house to
furnish power, light and heat for the main building.
The cost will be about \$80,000. It is the intention
of the officers of the company to divide part of the
tract into residence lots, and several homes are to
be erected without delay.

Barnett, Haynes & Barnett are preparing plans
for a store and office building to be built at the
corner of Olive St. and Vandeventer Ave. This
building will be known as the Van-Ol building.
The entrance on Olive St. will be constructed of
white marble and will be one of the most beautiful
doorways in the city. The exterior will be treated
in a plain modern French effect. The front will be
of gray stock brick trimmed with white stone. The
building will be finished and ready for occupancy
by February 15, 1903. It will cost about \$50,000.
The Holman Paper Box Co. will erect a \$50,000
three-story brick factory building, 140' x 177', on
Chouteau Ave.

St. Paul, Minn.—A permit has been issued for a



Tower, Madison Square Garden, New York City.

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(Advance Rumors Continued.)

four-story brick flat to be erected on Nelson Ave.,
near Louis St., for M. J. O'Neill, to cost \$60,000.

Tacoma, Wash.—Russell & Heath have drawn
plans for a \$30,000 brick block to be built on A St.
and 11th Ave. for Wm. F. Sheard.

Taunton, Mass.—The trustees of the proposed new
Carnegie Library to be erected here at a cost of
\$60,000 have invited 16 architects to prepare plans
in competition for the building. Mayor R. E.
Warner, Chmn. Committee.

Terre Haute, Ind.—H. L. Breinig, Mgr. of the
Casino, is reported interested in the erection of a
new opera-house, to cost about \$100,000.

Torrington, Conn.—Preliminary plans have been
drawn by James E. Brooks, consulting engineer, 45
Broadway, New York City, for extensive alterations
and additions to the plant of the Coo Brass Co.

Wilmington, Del.—Geo. I. Lovett, 424 Walnut St.,
Philadelphia, Pa., is to prepare plans and specifica-
tions for a theatre, office and store building to be
erected on Market and 8th Sts.

Woodbury, Conn.—Work will soon be commenced
on a new Catholic church to be erected on Main St.

York, Pa.—The proposition to increase the city's
indebtedness \$40,000 for the construction of a
sanitary sewerage system is now being considered
by the taxpayers.

EDUCATIONAL.

New York, N. Y.—Amethyst Acc., nr. Morris Park
Ave., 2 two-sty' bk. & st. schools, 60' x 131', gravel
roof; \$65,000; o., City of New York; a., C. B. J.
Snyder, Park Ave. and 60th St.

FACTORIES.

New York, N. Y.—W. Thirteenth St., No. 414, four-
sty' bk. factory, 19' 4" x 65' 8", tile roof; \$25,000; o.,
G. B. Raffetto, 414 W. 13th St.; a., Anthony Ven-
drasco, 833 E. 136th St.

HOSPITALS.

New York, N. Y.—One Hundred and Sixty-fifth St.,
nr. Boulevard, 2 three-sty' & base, & attic bk. dor-
mitory & hospital, 28' 8" x 24' 8" x 42' 6" & 154' 8",
slate roof; \$100,000; o., N. Y. Inst. for the Instruc-
tion of the Deaf and Dumb, on premises; a., Henri
Fouchaux, Broadway & 162d St.

HOUSES.

Brooklyn, N. Y.—Argyle Road, nr. Beverly Road,
two-sty' & attic fr. dwell., 33' x 38' 8", shingle roof,
steam; \$9,000; o., Lizzie M. Moore, 1516 Beverly
Road; a., E. B. Chestersmith, 60 Broadway, N. Y.

COMPETITIONS.

COURT-HOUSE.

[At Walker, Minn.]

Plans and specifications will be received by the Bd.
of Co. Comrs. until October 28 for a court-house to
be erected in this city, and until October 29 for
erection said building. C. E. GRIFFITH, Co. Aud.
1399

PROPOSALS.

WATER AND SEWER SYSTEMS.

[At Fort McRee, Fla.]

Bids will be received by W. E. Cole, Q. M. Fort
Barrancas, Fla., until October 28, for water and
sewer system at Fort McRee. 1399

BUILDING MATERIALS.

[At Fort Yates, N. D.]

Bids are wanted October 29 for furnishing and
delivering at the agency railway station a quantity of
building materials. GEO. H. BINGENHEIMER,
U. S. Indian Agent, Standing Rock Agency, Fort
Yates. 1399

COURT-HOUSE.

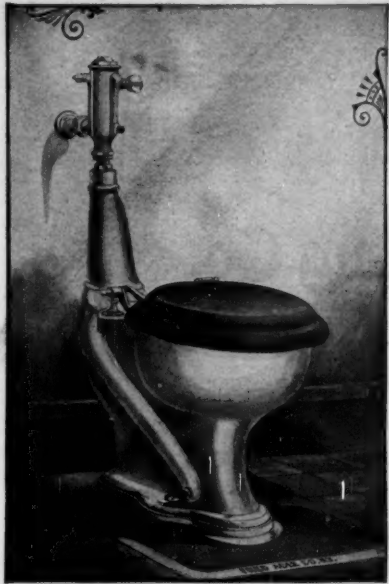
[At La Crosse, Wis.]

The undersigned hereby give notice that sealed bids
for the erection of a court-house in La Crosse, Wis.,
will be received by the secretary of the committee,
J. K. Johnson, care county clerk, La Crosse County,
until the 29th day of October, 1902. All bids
must be in strict accordance with plans and specifica-
tions, prepared by Schick & Roth, La Crosse, Wis.,
which may be seen at the office of Schick & Roth, La
Crosse, Wis., on and after October 4th, 1902, and also
may be seen on application to the county clerk, La
Crosse County, Wis.; at the office of the *Improvement
Bulletin*, Minneapolis, Minn.; at the Builders & Traders
Exchange, Milwaukee, Wis.; and at the office of
the *American Contractor*, Chicago, Ill. Separate bids
for plumbing and heating will be received at the same
time by the same committee. F. P. COBURN, W. H.
GASPARD, J. K. JOHNSON, FRED DITMAN, C. A.
OLBERG. 1399

WHARF.

[At Fort Strong, Boston Harbor.]

Depot Quartermaster's Office, 170 Summer St.,
Boston, Mass. Sealed proposals will be received at
this office until October 24, 1902, for constructing
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PROPOSALS.

can be seen at this office. A. M. PALMER, Depot Quartermaster. 1399

TOWER.

[At Fort Greble, R. I.]

Office Constructing Quartermaster, 209 Thames St., Newport, R. I. Sealed proposals will be received here until **October 29, 1902**, for constructing frame tower around water tank at Fort Greble, R. I. Information furnished on application. CAPT. THOMAS H. SLAVENS, Q. M. 1399

Treasury Department, Office of the Supervising Architect, Washington, D. C., October 14, 1902. Sealed proposals will be received at this office until 2 o'clock P. M. on the 17th day of November, 1902, and then opened, for the construction of a shed over driveway at mailing entrance of the U. S. Post-office at Buffalo, New York, in accordance with drawings and specifications, copies of which may be had at this office or the office of the Custodian at Buffalo, New York, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1400

BUILDINGS.

[At Danville, Ky.]

The building committee of the board of commissioners of the Kentucky Institution for Deaf at Dan-

PROPOSALS.

ville will receive proposals until **October 28** for erecting two dormitory buildings, power building and steam plant, according to plans prepared by Dittos & Wisenall, 75 76 Blymyer Building, Cincinnati, O. B. C. RHODES, president board of commissioners. 1399

BARRACKS.

[At Watertown, Mass.]

Lieut.-Col. John G. Butler will receive bids until **October 23** for the erection of the two-story brick barracks, 45' x 122', at the Arsenal. Cost, \$32,000. 1399

BOILERS.

[At Flandreau School, S. D.]

Department of the Interior, Office of Indian Affairs, Washington, D. C. Sealed proposals addressed to the commissioner of Indian Affairs, Washington, D. C., will be received at the Indian office until **November 4, 1902**, for furnishing the necessary materials and labor required to install and set up complete, ready for operation, two boilers, for heating purposes in the hospital and school building at Flandreau School, S. D., in strict accordance with plans, specifications and instructions to bidders. For further information apply to Chas. F. Pierce, superintendent, Indian School, Flandreau, S. D. W. A. JONES, commissioner. 1400

PROPOSALS.**HOSPITAL.**

[At Fort Greble, R. I.]

Office Constructing Quartermaster, 209 Thames St., Newport, R. I. Sealed proposals will be received here until **November 8, 1902**, for constructing, plumbing, electric wiring and installing hot-water heating system in 12-bed brick hospital, Fort Greble, R. I. Information furnished on application. CAPT. THOMAS H. SLAVENS, Q. M. 1400

QUAY WALL.

[At Mare Island, Cal.]

Sealed proposals endorsed "Proposals for Quay Wall" will be received at the Bureau of Yards and Docks, Navy Department, Washington, until **November 1**, for constructing a pile and concrete quay wall at the navy yard, Mare Island, Cal. Appropriation available, \$48,500. Plans and specifications can be seen at the bureau or will be furnished by the commandant of the navy yard named. MORDECAI T. ENDICOTT, chief of bureau. 1400

ROOFING.

[At Chicago, Ill.]

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SEWER.

[At Cincinnati, O.]

Bids will be received by the Bd. of Pub. Service until October 23 for improving a portion of Linwood Ave., by constructing a trunk sewer and drains. GEO. F. HOLMES, clk. 1399

BUILDINGS.

[At Fort Snelling, Minn.]

Bids are wanted October 23 for erecting several buildings at this post. GEO. E. POND, Ch. Q. M., St. Paul, Minn. 1399

SCHOOL.

[At Stockton, Cal.]

Bids will be received by James A. Barr, clk. of high school bd., until October 30 for erecting a high school. Estimated cost, \$100,000. 1399

EXTENSION TO BUILDING.

[At League Island, Pa.]

Sealed proposals will be received at the Bureau of Yards and Docks, Navy Department, Washington, until November 1, 1902, for constructing a brick and steel extension to building No. 14, angle smithery,

PROPOSALS.

at the navy yard, League Island, Pa. Appropriation now available, \$12,500. Plans and specifications can be seen at the bureau. MORDECAI T. ENDICOTT, chief of bureau. 1399

Treasury Department, Office of the Supervising Architect, Washington, D. C., October 4th, 1902. Sealed proposals will be received at this office until 2 o'clock P. M. on the 10th day of November, 1902, and then opened, for the erection and completion of the U. S. Government Buildings, 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 Director of Works, St. Louis, Mo., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1399

Treasury Department, Office Supervising Architect, Washington, D. C., October 4th, 1902. Sealed proposals will be received at this office until 2 o'clock P. M. on the 5th day of November, 1902, and then opened for the mezzanine floor extension, Mail Street End, Registry Division, U. S. Court-house and Post-office building, New York, N. Y., in accordance with the drawing and specification, copies of which may be obtained at this office or at the office of the Chief

PROPOSALS.

Engineer & Superintendent of Repairs, U. S. Public Buildings, New York, N. Y., at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1399

Treasury Department, Office of the Supervising Architect, Washington, D. C., September 27, 1902. Sealed proposals will be received at this office until 2 o'clock P. M. on the 12th day of November, 1902, and then opened, for the safety vaults, vault-doors and work incidental thereto, in the U. S. Mint, Denver, Col. (new building), in accordance with drawings and specification, copies of which may be had at this office, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1399

Treasury Department, Office of the Supervising Architect, Washington, D. C., September 29, 1902. Sealed proposals will be received at this office until 2 o'clock P. M. on the 4th day of November, 1902, and then opened for a conduit and electric wiring system for the U. S. Public Building at Cheyenne, Wyo., in accordance with drawings and specification, copies of which may be obtained at this office or at the office of the Superintendent of Construction at Cheyenne, Wyoming, at the discretion of the Supervising Architect. JAMES KNOX TAYLOR, Supervising Architect. 1399

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SECTION 1. No Member should enter into partnership, in any form or degree, with any builder, contractor, or manufacturer.

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 drawings or other services "on approval" and without adequate pecuniary compensation.

SECTION 6. It is unprofessional to advertise in any other way than by a notice giving name, address, profession, and office hours, and special branch (if such) of practice.

SECTION 7. It is unprofessional to make alterations of a building designed by another architect, within ten years of its completion, without ascertaining that the owner refuses to employ the original designer, or, in event of the property having changed hands, without due notice to the said designer.

SECTION 8. It is unprofessional to attempt to supplant an architect after definite steps have been taken toward his employment.

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SECTION 11. No Member should submit drawings except as an original contributor in any duly instituted competition, or attempt to secure any work for which such a competition remains undecided.

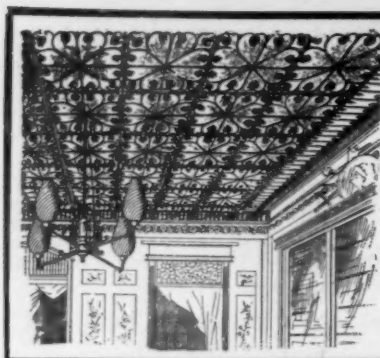
SECTION 12. The American Institute of Architects' "schedule of charges" represents minimum rates for full, faithful and competent service. It is the duty of every architect to charge higher rates whenever the demand for his services will justify the increase, rather than to accept work to which he cannot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

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

SECTION 15. The assumption of the title of "Architect" should be held to mean that the bearer has the professional knowledge and natural ability needed for the proper invention, illustration and supervision of all building operations which he may undertake.

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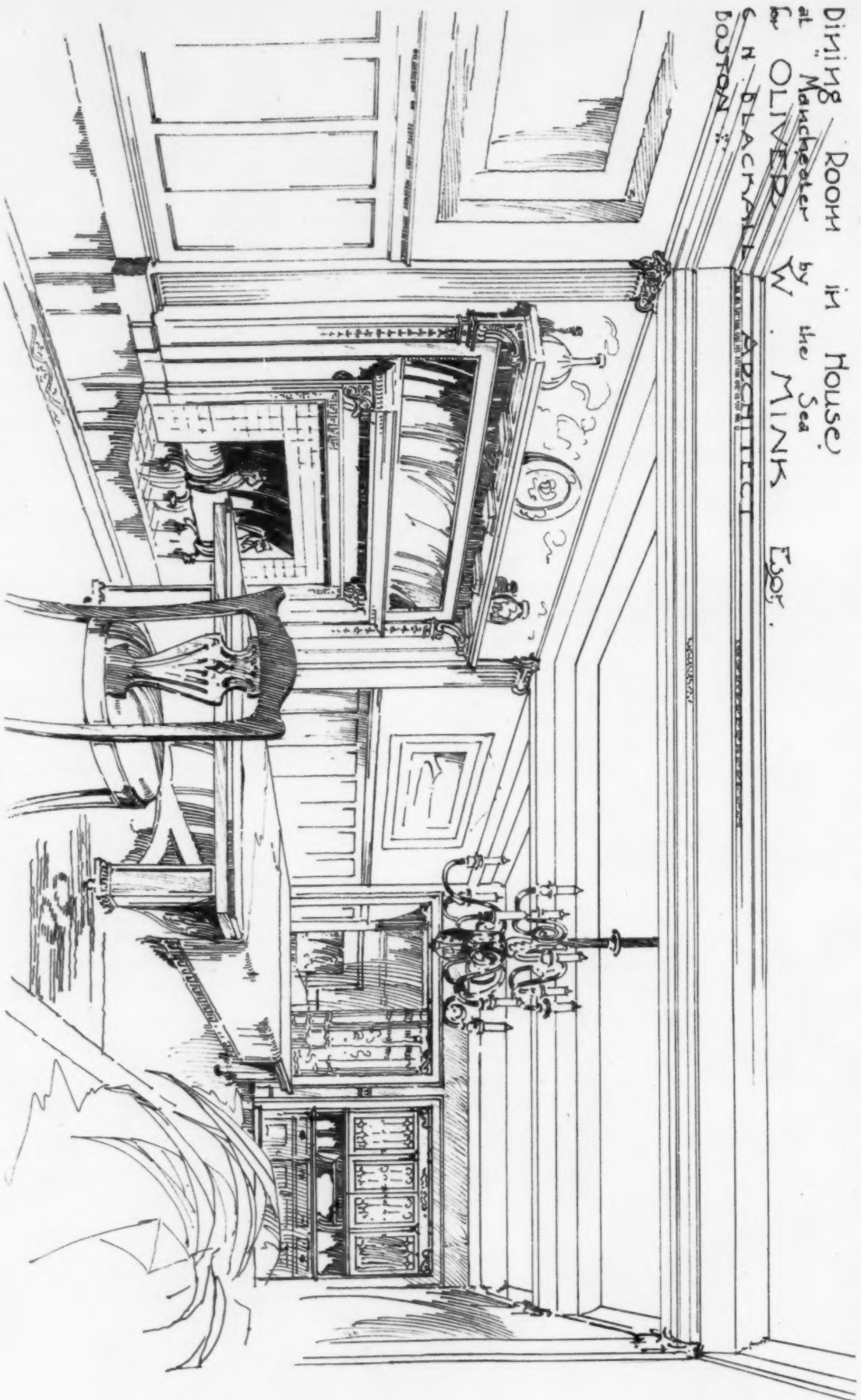
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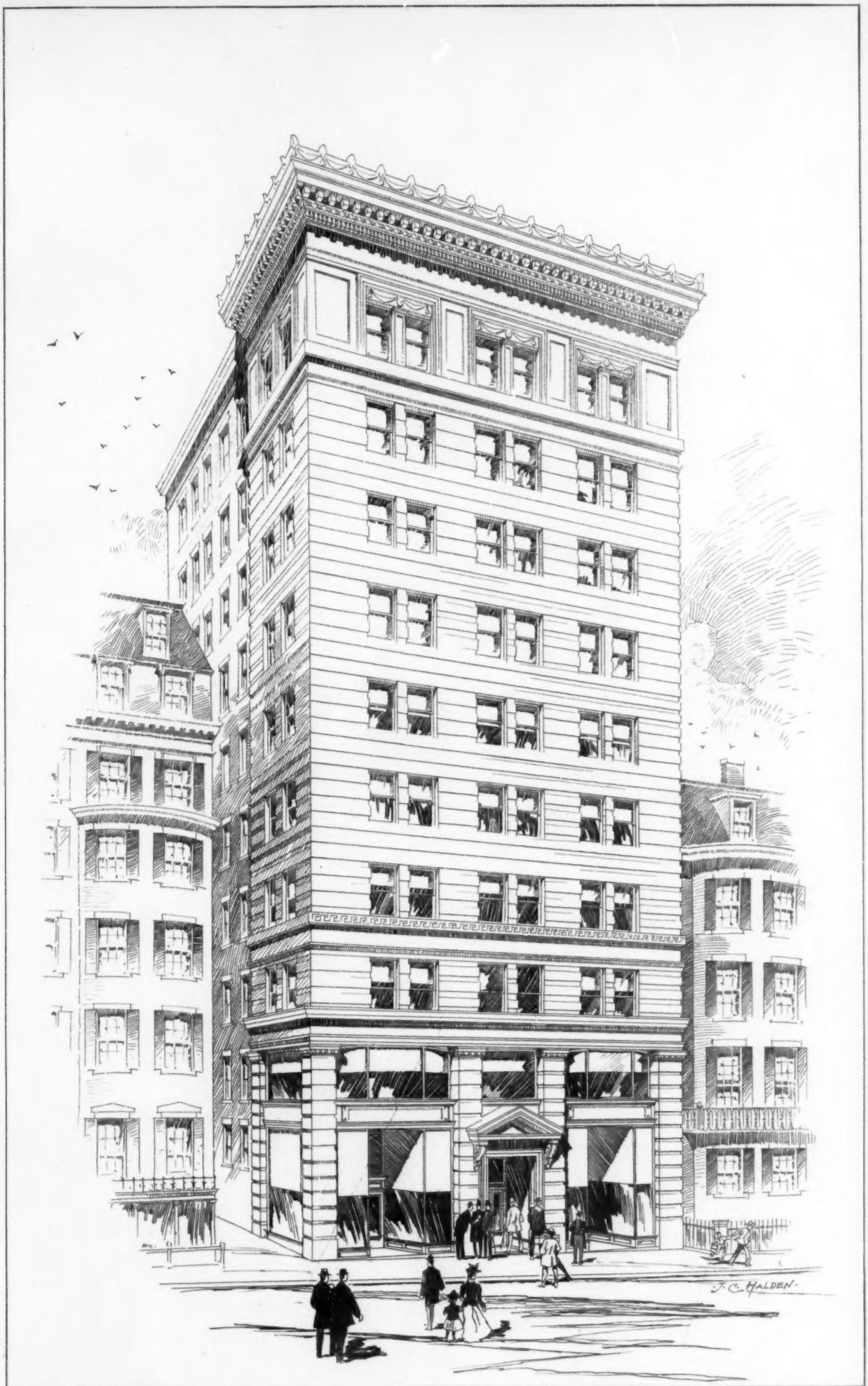
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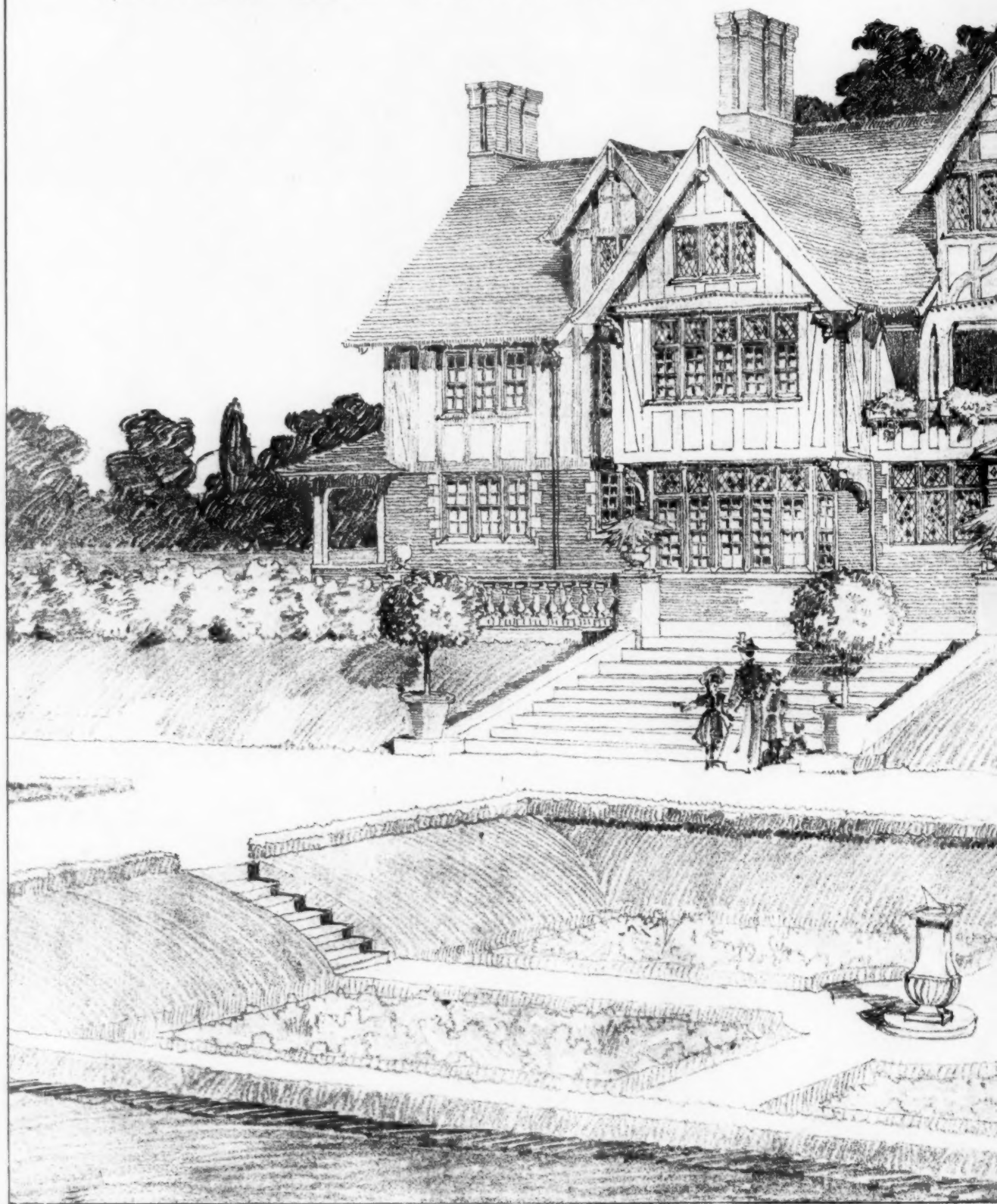
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The American Architect
Oct. 25, 1902.
No. 1400.

• SOUTHWEST VIEW OF HOUSE •
• FOR ARTHUR W. POPE ESQ. •
• GEORGE HUNT INGRAHAM ARCHITECT •
• 2A PARK STREET BOSTON, MASS. •



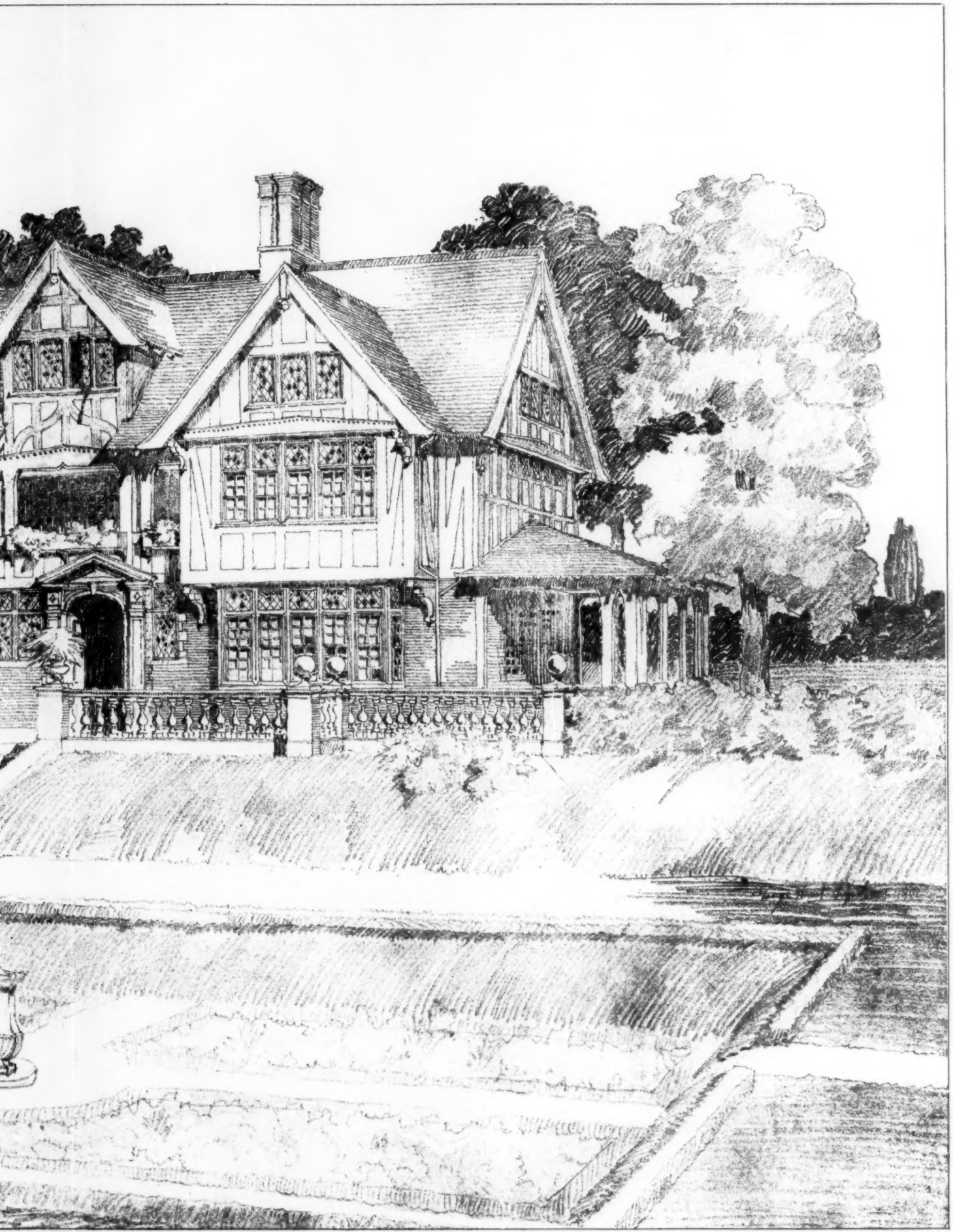


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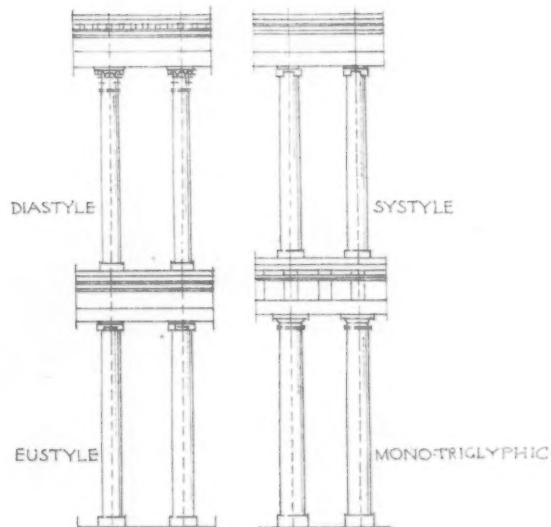
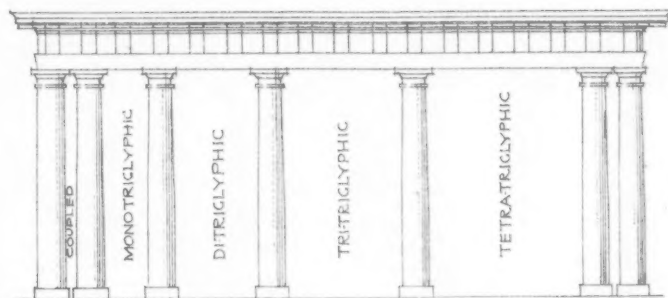
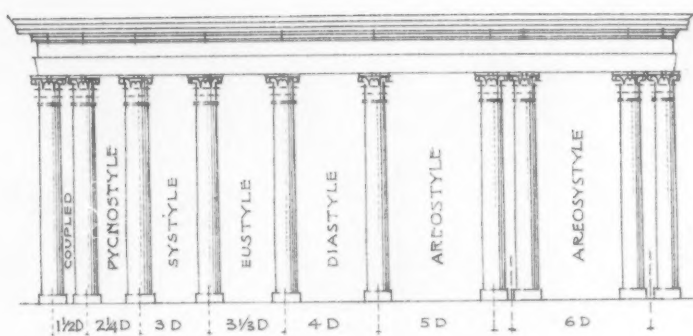
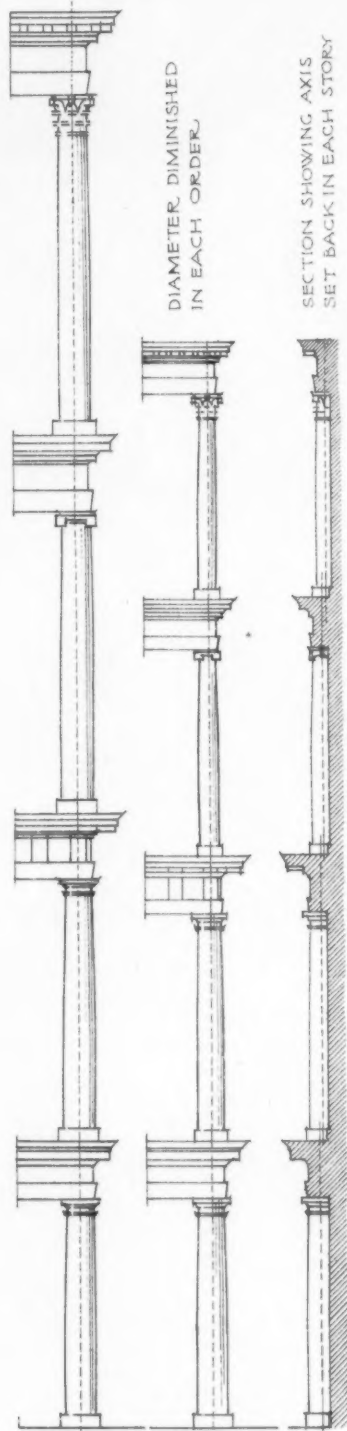


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