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CONTENTS.

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ACCORDING to the New York *Tribune*, a decision has been made in Washington which is of great importance to architects. For many years it has been customary among architects and students to send and receive photographs from abroad by mail. In old times, any one who wanted photographs of particular buildings could enclose a postal order to the local photographer, or to Braun, Lévy, the London Stereoscopic Company, or any other of the great foreign dealers, and receive the prints he wanted with little delay, through the mails, free from duties; or an architect travelling abroad could send photographs home to his office, or to his friends, in the same way. After a time, the customs laws received a different interpretation, and photographs were held to be dutiable, but they could still be sent in the same way, and delivered to the person to whom they were addressed, on payment of the duties. Within a few days, however, the privilege of sending photographs by mail, which has existed in every civilized country ever since photography was invented, has been taken away from the citizens of the United States, so far as foreign photographs are concerned; and such photographs are declared to be unmailable, and orders are said to have been sent to all post-offices to confiscate them. It is impossible to conceive that this new regulation should have any object, and the case seems to be simply one where the officials were obliged to conform themselves to a different and authoritative interpretation of the meaning of a law which, of course, they did not make, and which may not have been intended to have such a meaning. If so, Congress will probably set the matter right next winter, but, in the meantime, architects and students must abstain from sending foreign photographs by mail. While the necessary preparations are being made for having this subject brought to the attention of Congress, we wish that the allied one of the establishment of a parcel-post might be revived. The United States is now at least twenty-five years behind the rest of the civilized world in postal facilities of this sort. An Englishman can send a good-sized package from the remotest part of Great Britain to the farthest post-office in New Zealand for thirty cents, and, we believe, to any part of India for twenty cents, while we have ourselves paid five dollars expressage for the transportation of a book, enclosed in a small wooden box, from Boston to the Mississippi River. Six or eight years ago, a Postmaster-General, in his report to Congress, ingenuously stated that he had made some effort toward the establishment of a domestic parcel-post, but had been obliged to abandon the plan, "on account of the opposition of the express companies." It is not likely that the express companies would look any more favorably on the idea now than they did then; but, after having had the reform delayed through two administrations to suit them, it seems only fair that they should let the people have their turn; and the present Postmaster-General, who is a thorough business man, and can understand the immense importance to the internal commerce of the country of cheap transportation of parcels, and who, we venture to say, is not afraid of all the express companies that ever existed, could do nothing which would gain for him so much popular gratitude as to make a beginning at furnishing us the facilities which the English, French, Germans, Swiss, Austrians and Italians, and even the Russians, have so long enjoyed.

THE annual competition in the Paris School of Fine Arts, for the prize of Rome, has just been decided by the award of the Grand Prize to M. Eustache; while M. Normand has the "first Second Grand Prize," and M. Chausseniche, who distinguished himself in last year's competition, wins the "second Second Grand Prize." The subject this year was "A Central Railway Station." M. Normand, according to *La Construction Moderne*, presented a very striking and interesting design, but he had what seems to us the rather unhappy idea of making his building entirely of iron; and it is not very surprising that the judges gave him the second place.

NOTWITHSTANDING the great value of iron as a material of construction for certain purposes, we think that in this country, where more iron buildings, perhaps, have been erected than in all other countries put together, there is a strong feeling among architects that they have had their day; and that a better, safer, and more durable structure can be made by combining masonry with iron, than by using the metal as the only, or even the principal constructive material. In other countries, and especially in France, where iron construction is now applied to all sorts of new uses, it has the charm of novelty, and is often spoken of as the universal material of the future; but most experienced American architects have seen too many iron columns honey-combed with rust, and girders with half the thickness of the webs separating in flakes, to wish to entrust their reputation to such perishable material; while our fire-engineers have thoroughly satisfied themselves that an iron building of the ordinary sort is less capable of resisting a severe fire than one of almost any other material. Among the engineers, a similar distrust of iron for construction exposed to the weather has become very general. Two serious accidents have shown that the life of a suspension bridge, with either wire or chain cables, is only about forty years; and some recent examinations of plate-girder bridges have shown that, in about the same length of time, the web plates, notwithstanding careful and often repeated painting, are eaten nearly or quite through, by corrosion, which works unobserved beneath the paint. The contrast between bridges which perish in a generation, and those which, like several of the masonry bridges built by the Romans, have been in use for nearly two thousand years, and are still in excellent condition, is too striking not to attract the attention of intelligent engineers, and the next decade is likely to see brick and stone extensively used for railway bridges, to the great advantage of the landscape in the neighborhood. Already, it is said that the officials of the Pennsylvania Railroad, which has always led in scientific engineering, have given orders that no more iron bridges shall be built on the road, and the children of the present stockholders will probably have reason to rejoice at the decision.

THOSE persons who wish to know a little of the science of forestry should send to the Department of Agriculture at Washington for a copy of Bulletin No. 5, by Mr. B. E. Fernow, Chief of the Division of Forestry. This extremely interesting little tract contains the substance of some public addresses, delivered before State Boards of Agriculture, and other similar bodies, by Mr. Fernow, as representative of the Department of Agriculture, together with practical observations upon experiments now in progress in forest-planting on the plains. By this time, nearly every prudent American who reads the newspapers, has begun to feel the serious necessity of providing timber for future generations; while the people of the older States, who see themselves surrounded by myriads of

acres of hilly, stony or swampy land, which can never be profitably used for anything but tree-growing, as well as by myriads of acres more of abandoned or worthless farms, once fertile, but now exhausted, which, if converted into timber lands, would pay a good profit while being restored to their ancient fruitfulness, are still more forcibly impressed with the importance of prompt and intelligent action; but, while the disposition exists, the knowledge necessary for successfully reclaiming our waste lands is absent. Most persons imagine that forest management consists in cutting down the mature trees, a conception which, as Mr. Fernow says, is about as childlike as one which would represent the banking business as consisting in paying out money; whereas the profitable management of woodland looks rather to the rapid growth of the most valuable timber as its primary object, and regulates cutting in such a way as not only to get the largest immediate returns from the land, but to provide at the same time for future abundant harvests. Any one can see that a farmer who managed a potato field in such a way that, after securing a few hills of the largest potatoes, most of the immature ones rotted, and weeds sprang up all over the ground, would not meet with great financial success; yet this is practically the system under which our lumbering is carried on.

WE will not enter further into the curious details of scientific forestry which Mr. Fernow gives, but may content ourselves with saying that no owner of unproductive land can read the pamphlet without feeling that he has gained some notion of the principles involved in timber culture, and wishing to try the application of those principles for himself. In regard, however, to the problem of tree-planting on our dry Western plains, Mr. Fernow's observations have a general interest. It is encouraging to find that he thinks it quite possible to cover the plains with forests without artificial irrigation. It is certain that the present treeless region was once well wooded. Even now, pine timber is mined in the sand-hills of Nebraska, much as cypress is dug out of the mud of the Dismal Swamp, and there are few districts which do not support at least a few cottonwood groves. Moreover, the rainfall on the plains is not so very much less than that of the Eastern States, and it is probably quite equal to that of some parts of England, and of other countries which are richly wooded. The difficulty is, that the rain which falls in Dakota and Nebraska and Western Kansas is quickly dried up again, by the fierce sun, and, still more, by the almost unceasing winds. It is ascertained that the evaporation from the ground in a wooded country is only one-sixth of that from land open to the sun; and if the dryest Dakota prairies were shaded by forests, and the winds which blow over them checked by the powerful influence of the trees, they would furnish ample moisture for continued growth of timber. Here, however, as in so many other things, effects are also causes. The destruction of a portion of the trees has exposed the ground between them to the sun, and allowed the wind a freer sweep; and the sun and wind have blighted the young saplings, destroying their shade also, and still further exposing the ground to the destructive influence of excessive evaporation. Naturally, each clearing of this sort becomes a focus of aridity, constantly enlarging itself, and offering increased opportunity for the winds to gather strength, until an entire district is laid bare. This has probably been the history of our treeless plains, and the most important problem with which the people of the United States have to deal is that of the reversal of the process, so that our children and grandchildren may find riches and fertility in the place which we call the Desert, notwithstanding the fact that its soil is a rich loam, needing nothing but moisture to produce abundantly. It must be confessed that the isolated experiments which have been made by individual settlers under the Timber Culture Act, in raising groves in Nebraska, have not been very successful; but Mr. Fernow thinks that a beginning might possibly be made with such trees as the tamarisk, which grows freely in the Persian deserts, and is quite content with rain once in several years. In any case, however, he thinks that the plantations should be made much more closely than has been the case hitherto. Shade is the first requisite, and must be secured by dense plantations, of mixed growth, and by the judicious encouragement of undergrowth. In a soil thus rendered cool and moist, the seeds naturally or artificially scattered have a chance to germinate, and the forest is perpetuated and improved, while the sowing of seeds of our ordinary trees on an unprotected prairie is almost useless. Whether private individuals, or great corporations, or the government, should undertake such operations on the large scale which would be most favorable to success is uncertain, but that something of the kind may be tried soon is greatly to be wished. Mr. Fernow thinks the State Governments might take up the task with advantage, and, as a suggestion which has not, so far as we know, been made before, it might, we think, be possible for railways with land grants, either now belonging to them, or to be given on suitable conditions, in coöperation with the State Governments, to carry out operations very advantageous to the community.

AN enormous locomotive has just been placed on the Saint-Gothard railway, which differs a little from any others now in use. Like many locomotives now in use abroad, it is compounded, having a high-pressure cylinder, sixteen inches in diameter, into which steam is admitted at a tension of one hundred and eighty pounds to the square inch, and a low-pressure cylinder, about twenty-three inches in diameter, into which the steam passes as it exhausts from the smaller one. As it is intended for heavy grades, the driving-wheels are very small, being only four feet in diameter, but there are twelve of them, the largest number, we think, yet given to a locomotive. The whole length of the machine, from end to end of the buffers, is about forty-five feet, and its weight, ready for service, is something over one hundred tons. This includes the weight of a supply of coal and water, which is carried on the locomotive itself, instead of in a tender, to increase the weight directly upon the driving-wheels, and prevent the slipping, which has hitherto been found very troublesome on the Saint-Gothard Railway. So far, the new locomotive has answered very well the requirements which the builder, Maffei, of Munich, undertook to fulfill. There is no slipping, even on the heaviest grades, and a load of two hundred tons, exclusive of the weight of the locomotive, is easily drawn up a grade of twenty-six in one thousand.

A NEW alloy, of one hundred parts copper to six of antimony, is said to have been made, which has a beautiful gold color, unchangeable by ammonia or by acid vapors in the atmosphere. The alloy is made by melting the copper in a crucible, and adding the antimony, with a flux of wood ashes, magnesia, and carbonate of lime, which removes the porosity natural to copper castings. As both copper and antimony are abundantly produced here, it might be worth while to experiment with the new metal, to see whether it possesses any advantages over ordinary brass.

SOME important explorations have been going on under the direction of a German Committee at Sendschirli, in Asia Minor, not very far from Smyrna. The ruins are situated on a hill, which seems to have been levelled at the top, and occupied by the fortified palace of the rulers of the district, while the hill itself was fortified by walls, within which, probably, the shepherds and peasants from the surrounding country took refuge in times of danger. The remains of the palace at the top of the hill shows that several successive buildings have existed there, the most recent of which is thought to date from about 730 B. C. The wall which defended the lower part of the hill is exactly circular, and seems to have been strengthened by about one hundred towers; the whole corresponding closely in arrangement with the ancient Assyrian fortresses. Some sculptured bas-reliefs have been found, which originally adorned the lower part of the gateways, in the Assyrian fashion; besides more than three thousand smaller objects, some of which closely resemble those found at Hissarlik by Dr. Schliemann. As Sendschirli is supposed to have been a Hittite town, this resemblance has had much historical, or rather, ethnological importance. It is known that the town was totally destroyed about 550 B. C. by enemies who may perhaps have been the builders of a Cyclopean fortress which still remains, not far away, and which has no resemblance to any Oriental type of building. The members of the committee in charge on the ground are Messrs. Hermann, Von Leschan, Winter and Koldeway, and during the next season, which it is intended to devote to further investigations, many interesting discoveries are likely to be made.

GERMAN ARCHITECTURE.[1] — V.

SOUTH GERMANY. — (*Continued.*)

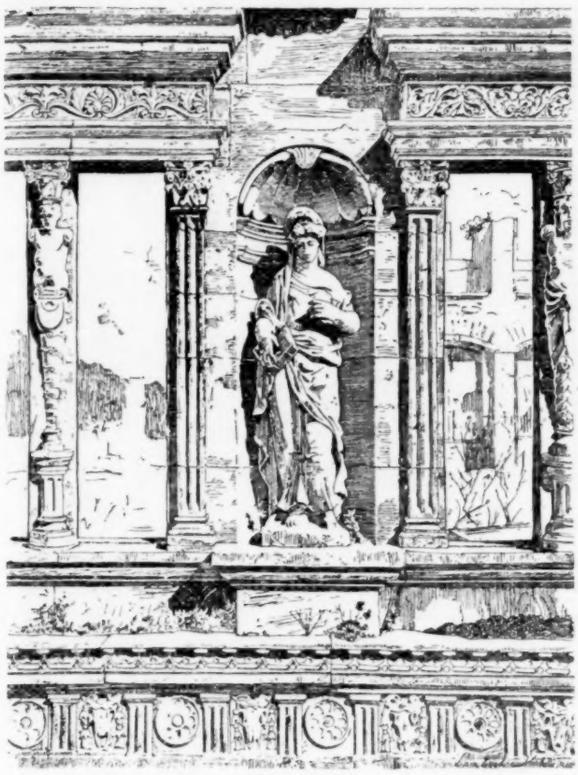


Fig. 24. Motive from Heidelberg Castle.

THE Palatinate possesses three edifices reared by its princes, the castles of Amberg, Neuburg and Heidelberg. The first two offer nothing of especial moment. The last is too well known to make a detailed description of it necessary. We will merely recall the principal dates of its construction. During the sixteenth century, Frederick II (1544–1556) built a wing with arcades which marks the appearance of the Renaissance at Heidelberg. Otto Henry (1556–1559) erected a portion of the castle which constitutes one of the finest fragments of the German Renaissance (Figure 24). In 1661, Frederick IV constructed the part which bears his name, as well as the adjoining terrace and pavilions. Frederick V afterward added the last wing of this immense palace, which was destroyed in 1689 and 1690 by the troops of Louis XIV, and to-day forms the noblest and most picturesque of ruins.

There is also a pretty house at Heidelberg of the second half of the sixteenth century, which has something in common with the architecture of the Otto Henry palace. It is known as the house "Zum Ritter."

The country skirting the Main and bearing the name of Franconia has been from early times an intellectual and artistic centre of Germany. Like Swabia, it has a large number of noteworthy edifices which can be divided into two categories, those built by the lay and cleric princes and those due to the initiative of the burghers of the free cities.

Beginning with the archiepiscopal city of Mayence, we find here one of the oldest of the Renaissance monuments of Germany, namely, the fountain erected in 1526 by the Archbishop Albert to commemorate the battle of Pavia (Figure 25). The gymnasium, a picturesque construction in which a gable and an oriel window constitute the only decorative factors — a characteristic peculiarity of a great many German buildings — dates from the second half of the sixteenth century (Figure 26). The archiepiscopal palace is a stately structure of the first part of the seventeenth century.

The castle of Offenbach near Frankfort, built in 1572 by a count of Isenburg, is not without interest; we give a fragment of the southern façade with its beautiful arches (Figure 27).

[1] From the French of Lambert and Stahl, in Planat's *Encyclopédie de l' Architecture et de la Construction.* Continued from No. 818, page 129.

We call attention also to the castle of Darmstadt, several parts of which date from the end of the sixteenth century, and especially to the imposing Schloss of Aschaffenburg, constructed early in the seventeenth century, as a residence for the archbishops of Mayence. Figure 28 shows one of the gables.

The old episcopal city of Würzburg is the gem of the Church in Franconia. It is admirably situated in a country abounding in famous wines; its monuments have a character of strength and magnificence which make it a Rome on a small scale. Dotted over with towers and domes, the city stretches along the Main, which is spanned here by a splendid bridge, adorned with sculptured groups in the style of Bernini. This connects Würzburg with its fortress, an imposing mass of terraces rising above one another, in long horizontal lines. Near this frowning eminence is another of charming aspect. Seen from below, one would say that Venus was smiling here at Mars. The church crowning its summit is not exactly consecrated to Venus, but the artists of the eighteenth century sometimes

Fig. 25. Fountain at Mayence.

gave their most sacred works an equivocal mien: a succession of pretty terraces with shaded shrines and graceless statues conducts us imperceptibly, amid a thousand changes of scenery, to one of those sunny temples, such as the good priests of the last century loved to dedicate to the Virgin. Everything smiles on us here, the gables, the circular windows and, particularly, the senseless balls tipping the turrets and cupola. Viewed from this point the citadel has a pleasing aspect. The Main flows between beautiful vineyards, and the chiming of the bells reminds us of a Roman evening on the terrace of San Pietro in Montorio.

It is difficult to believe that this inviting country, created for enjoyment, was the theatre of the bloody repressions exercised at the beginning of the sixteenth century, by Bishop Conrad von Thungen, against the liberal tendencies of the people in religion and politics. These struggles retarded artistic progress; the principal Renaissance monuments of Würzburg belong to the end of the century. The walls of the court of

the town-hall have a rude strength about them that gives them a physiogonomy of their own (Figure 29). Several of the courts of private residences, with wooden galleries, are quite remarkable. There are also a few elegant dormer-windows of Renaissance times.

Bishop Julius Echter von Mespelbrunn, who ascended the throne in 1573, gave Würzburg its characteristic monuments. He founded an immense hospital, a large number of churches, and, notably, the University (1582), which was to be used by the Jesuits in suppressing the Reformation. The church of the University was consecrated in 1591; Gothic elements appear in it by the side of Renaissance forms.

Few other cities have preserved the character of a church city in a like degree with Bamberg; its bishops, like those of Würzburg, stifled reform and put their seal on the town. The cathedral, one of the marvels of Romanesque architecture, looks proudly down upon the later edifices, most of which date

Fig. 26. Gymnasium at Mayence.

from the eighteenth century. The Renaissance is represented here in the Alte Residenz, a very picturesque structure of good style (Figure 30).

[To be continued.]

ARCHITECT, OWNER & BUILDER BEFORE THE LAW.[1]—VII.

ARCHITECT'S DUTY TO BE ASCERTAINED BY EVIDENCE, NOT BY CAPRICE OF JURY.

THE point that the question of what it is "proper" for an architect to do under given circumstances is not one to be left to the caprice of juries, or, we might add, of judges, but is a matter to be determined by evidence, is a very important one. In a New York case,[2] Petersen, an architect, agreed with one Rawson to draw plans, sections, elevations, etc., and to superintend the progress of a new dwelling-house, which Rawson intended to build in the city of New York, for the sum of $500. The contract with the mason provided that he should "lay out his work himself." The sills of the front first-story windows were set 2¾ inches higher from the floor than those of the rear windows on the same story, although

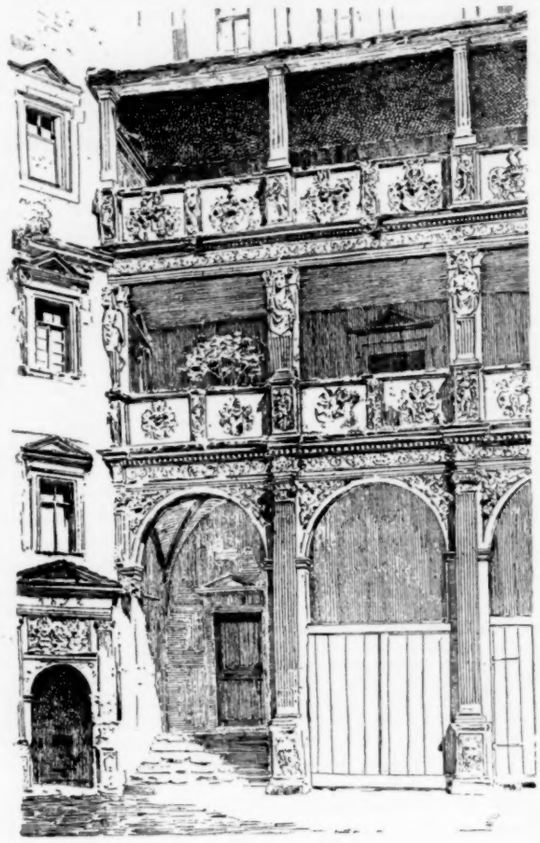


Fig. 27. Castle of Offenbach.

they were intended to be at the same level. The balcony in front of the house, possibly in consequence of the mistake in the sills, was set too high, and the first step to the front door was too low. When the finish was put in, the trim of the front first-story windows cut into the plaster cornice, injuring

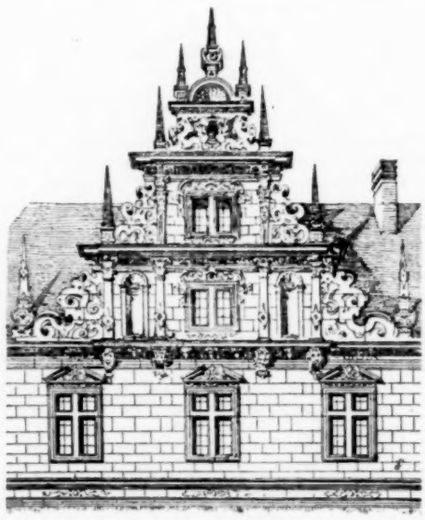


Fig. 28. Gable from the Scholss of Aschaffenburg.

the appearance of the room. Petersen refused to give the mason his final certificate, amounting to $1900, on account of these mistakes, but the owner paid the mason in full without a certificate, and refused, on account of these mistakes, to pay

[1] Continued from No. 818, page 130.
[2] Petersen *v.* Rawson, 34 N. Y. 370.

the balance due the architect, who brought suit for it. The case was turned over first by the court to a referee, who found by the witnesses that the architect was "diligent in his attendance upon the building." Two architects testified that if

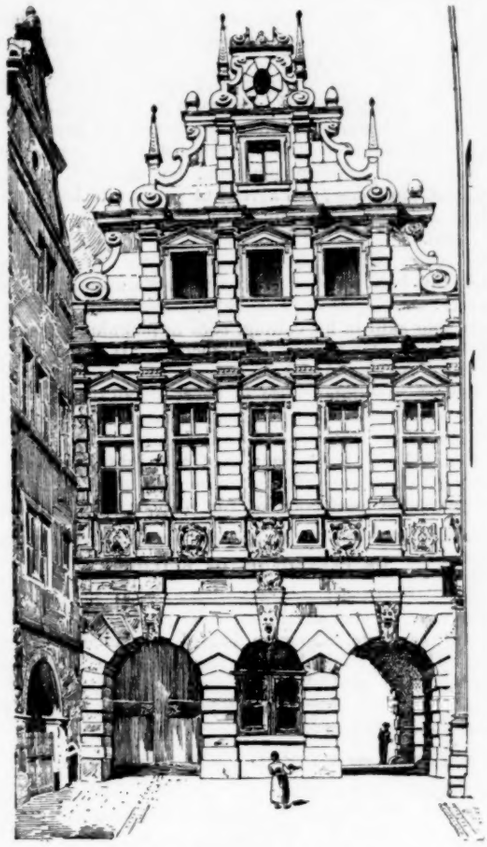


Fig. 29. Court of the Town-hall of Würzburg.

the building had been properly superintended, the mistake in levels of sills would have been discovered "when the second story beams were on," or "when they began to lay the brownstone in front." One architect testified that "it is impossible to say when the error should have been discovered. It might have passed the observation of the architect till the building was completed. It is an error likely to pass any one's observation. It would most likely pass his notice until the cornices were put up."

The referee reported that the plaintiff "had bestowed as much personal attention upon the building as was necessary, and that the variations mentioned were not caused by carelessness, negligence or inattention on his part." The General Term of the Superior Court reversed the judgment of the referee, and found for the defendant. On appeal, the Court of Appeals reversed the judgment of the Superior Court, and ordered judgment for the plaintiff. The Court said, "It," (the defect), "arose from the masons not having accurately conformed to "the specification and plan. Was the plaintiff responsible for "this fault of the masons? The plaintiff agreed to make plans, "sections, elevations, specifications, and to superintend the "progress of the building to be erected. It was not his duty "to do the work. The agreement between the defendant and "his masons provides that the masons shall well and sufficiently "erect and finish the building in question agreeably to drawings and specifications made by Frederick Petersen. It was "not the duty of the plaintiff to lay out the work, as it is "technically termed. This, it was expressly provided, should "be done by the mason, who agrees to 'lay out his work himself.' The plaintiff was bound to furnish the plans, specifications, sections, and elevations, and the mason was bound to "lay out the work. In other, but perhaps not plainer words, "the plaintiff was bound to put down, and to show on paper, "how every part was to be built, and the mason was to stake "it out, measure his lumber, and make actual measurements "on the ground and in the erection for such building. I do "not think it was the duty of the plaintiff to measure the joists

NOT ARCHITECT'S DUTY TO ASCERTAIN ACCURACY OF WORK.

"or timber of which the different stories were to be constructed, "and to determine by actual measurement that the ceiling of "the first story had an elevation of thirteen feet, and the second had an elevation of eleven feet, or to measure the thickness and depths of the brick or stone walls. He furnished "instructions and information in writing on these points, and "it was the duty of the mason or carpenter to furnish the materials, to see that they were of the proper dimensions, and "to put them in their proper places.

"The defendant, however, contends that the obligation of "the plaintiff to superintend the progress of the building bound "him to discover and correct the error committed by the mechanics. The plaintiff did assume the superintendence of "the erection of the building, as I think he was bound to do, "upon a fair construction of his language, and must meet the "obligations of his contract. The plaintiff came from day to "day to superintend the progress of the work, and while thus "superintending, was he bound to have ascertained that the "window-sills in the front parlor were 2¾ inches higher from "the floor than was authorized by the plan? The referee must "have held that the plaintiff was not bound to have discovered "this defect. He found that the plaintiff had bestowed as "much personal attention on the building as was necessary, "and that the variations mentioned were not caused by carelessness, negligence or inattention on his part.

"I do not find it necessary to differ with him.

"The circumstance that the defendant paid the masons the "balance due them for the work, when the plaintiff refused "them a certificate on account of the defects in question, and "which payment he was not bound to make, until the masons "presented such certificate, is not important. If the masons "neglected their duty, the defendant could certainly have made "them respond in damages, and could have withheld the last "payment to apply on such damages. The fact, however, that "they neglected their duty furnishes no evidence that the "plaintiff has discharged his. Each may have been in fault,

Fig. 30. The Alte Residenz at Bamberg.

"and each liable in damages, and a failure to prosecute one, "or to secure an easy remedy against him, does not discharge "the default of the other, nor do I understand that the referee "based his decision upon such a theory. The referee places

"his decision upon the ground that the plaintiff had fully per-"formed his duty, and was entitled to his compensation. The "judgment of the General Term should be reversed, and "final judgment for the plaintiff entered."

DISSENTING OPINION.

Judge Leonard dissented from the opinion of the court, and said: — "The plaintiff was employed by the defendant to draw "the plans and superintend for him the construction of a "dwelling-house in the city of New York. . . The plaintiff "drew the plans and specifications, and the defendant contracted "with the mechanics to perform the work, under the supervision "of the plaintiff, and to be paid for only on his certificate of "approval. It was the duty of the masons to lay out and exe-"cute the work according to the plans and specifications drawn "by the plaintiff, and it was his duty to see to it that the "masons performed the work properly, and in accordance "therewith." "It is also insisted that the error occurred by "the fault of the masons in laying out the work improperly at "the beginning; that it was no part of the plaintiff's duty to "lay out the work, and that he is not to be held to that degree "of diligence which would make him an insurer of the perfec-"tion of the work of the masons." "The plaintiff was em-"ployed for the purpose of detecting and preventing just such "errors and imperfections as have actually occurred. His ser-"vices were of little use if he could not, with reasonable and "ordinary diligence, discover a defect of such importance in "the symmetry and regularity of the edifice as that the front "windows were higher from the beams of the first floor, and "nearer to the beams above, than at the rear windows, as soon "as the beams of the second floor were laid, and long before "the front wall was completed."

The dissenting opinion, it will be observed, is based upon the judge's own ideal, or, as the Illinois court would call it, caprice, in opposition to the testimony of the expert witnesses. They proved, to the satisfaction of the referee and the majority of the court, that an architect might show reasonable care and skill without discovering at once the defects referred to; the dissenting judge thought he could not, and based his dissenting opinion on his own theory, fortifying it by an interpretation of his own of the contract between the plaintiff and defendant. This contract provided that the architect should draw plans, etc., for the house, and "superintend its progress." The dissenting judge said that under the agreements "it was the duty of the masons to lay out and execute their work according to the plans and specifications drawn by the plaintiff, and it was his duty to see to it that the masons performed their work properly, and in accordance therewith." Even under this forced interpretation of the contract between the architect and owner, it is not evident why the architect should have to pay for the masons' violations of their contract, in addition to discovering them; or why the owner, after his attention had been called to the masons' blunder, while he had in his hands the means of making them remedy it, or pay him suitable compensation, should be entitled to condone their error, and make them payment in full, and then bring up the same error as a means for withholding money due the architect; but the whole notion that the architect guarantees the compliance of the contractors with their agreements, which still lingers in the mind of the public, and of some inferior courts, appears to be now rejected, as it was in this earlier case, by the weight of the highest judicial authority.

The architect of the Northern Hospital, a State building in Wisconsin, was discharged by the Commissioners before the building was completed, and brought suit[1] for the balance of pay due him. The case was brought to the Supreme Court, the question before the court being upon the admission of seven amendments to the Commissioners' answer to the claim. Among other things, the amendments alleged: —

1. That the building constructed on the plaintiff's plan was not as represented by the plaintiff, and did not answer the purpose for which it was constructed.

2. That by the plaintiff's contract he agreed to furnish to the Board of Building Commissioners correct and accurate estimates of the materials put into the building by the contractors; that the plaintiff's specification required a certain number of feet of iron coil to be placed in the north wing of the building; that the plaintiff negligently certified to the Building Commissioners that the required quantity of coil had been put in, and that the Commissioners, relying on his certificate, paid for it; that in fact a less quantity of coil had been put in; that it was the plaintiff's duty under his contract to know the quantity actually put in; that the Commissioners did not and could not then know the fact; and that it came to their knowledge after the plaintiff's discharge.

3. That the plaintiff put, or procured to be put, into the building a defective heating apparatus, not such as his contract bound him to see put in.

4. That "by the contract and specifications thereto attached" the plaintiff was to procure to be put into the building certain water-closets ventilating downward, but procured to be put in water-closets ventilating upwards; and agreed to procure to be put in sufficient plumbing, but procured to be put in insufficient plumbing; and agreed to procure to be put on the building a suitable roof, but procured to be put on an insufficient roof.

The court said, in substance, as to the first and second amendments here mentioned, that "the plaintiff made his con-"tract as an architect; and should therefore be held to at least "reasonable skill in his calling, both in planning the building "and in superintending its construction. It may perhaps be "doubted if he should be held responsible for a perfect plan or "for perfect superintendence in every detail of such a build-"ing, if such things be practicable. It may perhaps be doubted "if he should be held responsible in damages for all incidental "failures in detail of foresight or of oversight, consistent with "proper architectural skill and reasonable diligence. He did "not guarantee perfection of the plan or perfection of the

ARCHITECT DOES NOT GUARANTEE PERFECTION OF PLAN OR PERFECTION OF BUILDING.

"building. Under his contract he became an inferior servant "of the State, to perform duties under control of superior ser-"vants of the State, who were, indeed, *pro hac vice*, the State "itself. He prepared plans for the approval of the Commis-"sioners. They might have rejected the plans submitted, and "called for others. They were made the judges of the plans, "and of their sufficiency.

RELATION OF COMMISSIONERS AND ARCHITECT.

"The Commissioners, not the architect, had to determine "the plan. When the Commissioners accepted the plaintiff's "plan, they ratified it. His superintendence was also subject "to their oversight and control. They were made judges of "the competency of the superintendent. They were made "judges of the sufficiency of his superintendence, and could "have dismissed him at pleasure. They must therefore be "held to have been satisfied with his superintendence until his "dismissal. Indeed, they seem to have ratified his superinten-"dence, by accepting the building which he had superintended, "without apparent objection. Doubtless there might be defects "in the plans or the execution of them, patent to an expert, "latent to an inexpert. For such the plaintiff, not the Com-"missioners, might be liable. But so far as the plans were "equally intelligible to the Commissioners and the plaintiff, "and so far as these pleadings disclose, the Commissioners as-"sumed responsibility for the plans when they adopted them. "And so far as defects of construction in the building were "equally open to detection by the Commissioners and the "plaintiff, on the completion of the building, and so far as "these pleadings disclose, the Commissioners assumed responsi-"bility for them when they accepted the building. It is "thought proper to say so much, because this cause bears some "appearance of having grown out of controversy in relation to "their respective duties between the Commissioners and their "superintendent. But what has been said is not to be un-"derstood as an intimation that failure of the Commis-"sioners in their duty would under any or all circumstances "excuse the plaintiff's want of adequate skill or reasonable "diligence in the performance of his duty. He may, notwith-"standing what the Commissioners may have done or left un-"done, be liable to the State for damages resulting from unskil-"fulness or negligence. But there is certainly nothing here "pleaded on which such liability of the plaintiff can be sus-"tained."

ARCHITECT NOT TO BE CONFOUNDED WITH BUILDER.

In regard to the amendments here numbered 3 and 4, the court said, "All this appears to confound the plaintiff's con-"tract to furnish plans for the building, and superintend its

[1] Shipman *vs.* State, 43 Wis. 381.

"construction, with the builder's contract to construct the "building according to the plans. The plaintiff's contract "bound him to furnish plans, specifications and drawings, and "to superintend the construction of the building; not to put "or procure to be put anything into the building. That was "for the builder's contract. The pleading goes on to aver "several defects in the building so constructed, without con- "necting the plaintiff in any way with them; without any "statement whether the fault was in the plaintiff's plans or in "his superintendence; was in either or both. Such pleading "is so loose as to give countenance to a suggestion of the "plaintiff's counsel, that their substance is rather the work of "some querulous layman than an orderly statement of perti- "nent facts by a skilled pleader like the learned Attorney- "General. It is very certain that the (3d and 4th) answers "properly plead no defense or counterclaim. And it is not "irrelevant to express the hope that the court may not again "have to travel through such a barren waste of words."

The motion to amend was overruled.

Mr. William F. Vilas, afterwards Postmaster-General of the United States, was counsel for the plaintiff in this case. The opinion of the Court was delivered by Chief Justice Ryan.

[To be continued.]

THE DOLPHIN IN ORNAMENTATION.[1]— VI.

UNNATURAL DOLPHIN.

Fig. 64.

SINCE the head of the dolphin was employed in the majority of cases with happy results, it would seem only natural that the contrary operation should have been tried; that some day the active and fantastic mind of some artist should try to make use of this waving body and lively tail alone, thus opening a large field to fancy decoration. In fact, this happened at the very time when the dolphin under his numerous different aspects found a place in the compositions of painters and sculptors. To the fertile Renaissance of France and Italy was given the honor of presenting us with this new surprise. However, we must not believe that the posterior part only of the animal contributed to the ornamentation; far from it! In spite of the graceful sinuosities and luxurious embellishments that could have been added to it, it would have become a mere trunk, hardly good enough to form a base, a more or less pleasing end, in short the body alone would have been scarcely worthy of interest. What rendered this mutilation very fortunate, as proved by a great number of examples, was the ardent desire to find something new, and still further to endow the world of ornament, already so rich, with a new creature, unknown in creation, and exciting curiosity by its outlandish appearance and of which no one had yet dreamed. In order to obtain this imaginary production, to this fragment of an animal another fragment was added, conventional sometimes, but most of the time existing and coming from a different species. A head was soldered to the body and this head was embellished with or without ornamentation and leaves, and the result obtained by this odd, original and usually graceful coupling was a sort of cross-breed or mongrel, a kind of compromise between two dissimilar creatures.

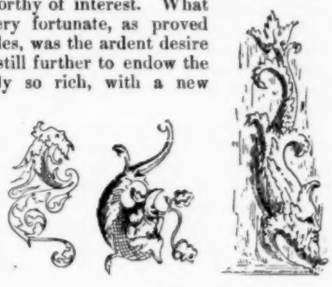


Fig. 65.

Fig. 66.

To the body of the fish were added heads of sheep, dogs, birds, rams, as in the church of the Madonna of Miracles at Venice (Figure 64). But more often were used heads of children, women, men or masks presented in profile, as on a Renaissance pilaster at the Louvre and on a stall of the collection of Récappé (Figure 65). In these grotesque conceptions, the substitution of one head for another must be made, in order to preserve to the whole the aspect of an unknown fish, of a dolphin voluntarily made unnatural by caprice. As soon as one goes beyond the limits, what remains of this well-known cetacean vanishes. If to the head of a beast you add also a portion of its body, hind legs or wings, you immediately find yourself in the presence of transformations similar to the capricious inventions conceived in the East or during the Middle Ages.

If, instead of laughing or grinning faces, you replace them with personages in bust: men with their trunks erect, supple and smiling women with handsome bare bosoms supported by a corset of scales and mingled blossoms, you obtain — maritime deities, robust tritons. enchantresses or sirens, worthy counterparts or beautiful sequels of the mythological conceptions of Greek antiquity.

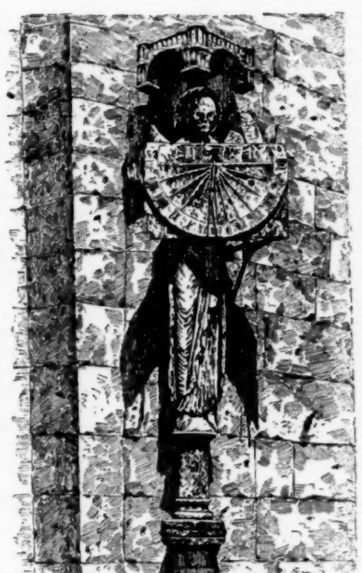
If finally, preserving the head alone, with ornament of hair and beard, in voluted and carved leaves, you replace the body of the dolphin by a thick, round or square trunk, ornamented with grooves, and tapering at the bottom, which grooves are embellished with rings, pearls, frills, leaves, etc., immediately you obtain an ornament which recalls the dolphin's shape, without having anything of him, an ornament of a new style. This was frequently done by artists during the brilliant period of the Renaissance. (Figure 66).

JULES PASSEPONT.

[1] From the *Revue des Arts decoratifs*. Continued from No. 815, page 86.

THE MANAGEMENT OF AN ARCHITECT'S OFFICE.[2]— II.

IV: — METHODS OF DRAWING.



Dial on Chartres Cathedral. From Havard's "*Dictionnaire de l'Ameublement.*"

THE writer feels that this is a subject concerning which every office has a way that it believes to be the best; still the success of the method outlined below is so great that he believes it desirable to mention it.

The plot of ground intended to be built on, is accurately surveyed and, if for a country house, contoured in one-foot contours, and the portion intended to be built on drawn to an eighth-inch scale, say, on muslin-backed paper, which is fastened to a board. Over this is tacked a sheet of thin tracing-paper, on which the principal designer studies the general scheme, using sheet after sheet, and having constantly before him the limitations of the lot.

As soon as a study is decided on as final, it is clearly drawn either in the survey or on a sheet tacked or stretched over it, and the other discarded studies filed; when the final study has been accepted, a new drawing of the lot is made to a quarter-inch scale and inked, and the study produced on it in pencil, roughly, and put into final shape after which all of the other floor plans are made on tracing-linen, if the plans are fairly repetitions in ink, making all doubtful work in pencil or on heavy tracing-paper in pencil, if there is to be much change in the floors.

In this way the limitations of columns, elevators, etc., are kept constantly in mind.

All necessary changes are made as the work progresses, and when the tracings are completed they are ready to print.

By working on the dull side an almost incredible amount of rubbing can be done, and much labor saved, while the originals are in convenient shape for filing, and when signed by owner and contractor the signatures show in the prints and are evidence of their agreement with the original drawings.

V. SUPERINTENDENCE.

From what has already been said, it will be seen that the assistant-superintendent is in immediate charge of certain works. He is placed in a room to himself, and has as many assistants as may be necessary. Practically, he is running an office of his own with free expert professional advice.

He is always called in when anything relating to work in his charge is being discussed, whether it be with client, contractor, or by the heads of departments; should keep copious notes of all decisions, and be familiar with all the history of the work (see "Diaries" following).

[2] Continued from No. 816, page 99.

His visits to the work depend on its importance, and the minimum number should be fixed after consultation with the firm.

He should be accompanied at least every fourth visit by the principal business-man, and when decorative work is going on, or when models are to be examined, by the principal designer. Should constructive difficulties arise, he asks the civil engineer to visit the works with him, and at all times when he feels it desirable, should call in any of the three to aid him with their advice.

The position is one calling for the exercise of great tact, the lack of which nothing can fully supply; a few hints can be given, however, which may be of service: —

Keep your diaries as full as possible.

Read your specifications carefully and critically, asking for explanations of all obscure points, and write them down, so that when the contractor asks similar questions, you may be able to answer them correctly.

Study the construction carefully, so as to be fully familiar with it, and have everything explained that is not fully understood.

Examine everything connected with the works at each visit. Note defects in workmanship and materials.

Note defects in the specification, omissions or obscure sentences, and report, so that the mistakes may be rectified on the next work.

If anything does not seem right, go on the assumption that both contractor and foreman are trying to do good work, and, explaining that the work is not done in the way you are used to, ask for their reasons for doing it in that way, discuss the matter calmly, and then go off where you can quietly think it out and make your decision after carefully studying the whole question.

When the contractor comes to you with a so-called error in the plans, let him fully explain it, and then go off by yourself and think it over, and if you can, let it wait until the next day. The plans are probably right, as they have been carefully studied, and usually it only needs a little thought to see it.

Do not permit any changes without first consulting with the principal business-man, the principal designer, and the civil engineer.

Do not let any additional work be started until a proposal has been made for it, accepted, and a special order issued.

Do not allow reduction in work until after a proposal has been submitted, stating the amount of credit that will be allowed.

Do not try to get the best of the contractor.

Do not interpret "blanket clauses" too freely.

If any contractor has to wait even an hour for any other contractor or for material, note it.

Note the date of starting each new part of the work.

Talk as little as possible with the men and with the foreman, except about matter directly connected with the works, but do not act as if they were inferior beings.

Do not find fault with the foreman or contractor before the men; take them into the office.

Do not permit yourself to quarrel; say what is necessary to say, and then leave.

Study the character of all of the men you have to deal with and handle them accordingly.

If you have fault to find, put it in the plainest possible language, without attempting to gloss it over or palliate it.

Never threaten to do anything that you have the slightest doubt about being able to execute in case of disobedience.

Do not give orders to men; hunt up the foreman and instruct him.[1]

Do not trust to verbal messages; they are nearly always improperly delivered. Write whatever you cannot say personally.

VI. BUSINESS DETAILS.

(*a*). *Diaries.* In order to minimize the strain on the memory, so that nothing may be forgotten, and all disputes regarding orders, drawings, delays by reason of weather, strikes, etc., be settled in an authoritative manner, the civil engineer should keep as full a diary concerning all works as his knowledge of them permits, keeping a record of the temperature, which can be conveniently clipped from the daily paper, of the weather, and of everything relating to the building; this is most easily done by dictating to the stenographer the first thing each morning, who types it on thin specification paper, making two copies, both of which are bound each month and filed in a convenient manner, until a year is accumulated, when one copy is filed among the records, and the other with the principal business man, the filing of the two copies being made alternately each six months.

The assistant-superintendent in charge of the work also keeps a diary of the work from the time he takes charge, in much greater detail, in a book of convenient size for the pocket, so that memoranda can be made at the building of anything which he may consider of importance.

(*b*). *Letters.* All letters as received are placed on the civil engineer's desk, since he should always be in the one place and can immediately examine them, and if they require immediate action, see that it is had, and if not, file them temporarily until a certain time each day when the principal business-man can go over them.

This time should be fixed to suit the convenience of the principal business-man, but may generally be best taken immediately after he has made his first tour of inspection and instruction in the morning. Then all the mail is gone over, each letter as read is initialed and filed in a second file with whatever memoranda are necessary endorsed on it. Explanations concerning each letter are made by the civil engineer and assistant superintendent, and instructions are issued to the assistant superintendent, who makes any memoranda necessary, reads the letter, and puts his initials to it.

When all the letters have been examined, the principal business-man takes the file and dictates answers to all letters of importance, and then the civil engineer takes it and answers all letters of routine, dictates all acceptance of proposals, notifies all clients of proposals received, dictates all certificates for payments, notifies all clients against whom certificates have been issued, etc., and then separates all letters containing acceptances of proposals, or proposals, hanging up the balance where they can be readily reached by the office-boy (No 1).

Any letter concerning matters in suspense are noted on a slip lying on the civil engineer's desk, devoted to matters in suspense or to be attended to.

About noon office-boy No. 1 takes these letters from the file and files them in a "Shipman" letter file, using a book properly labeled for each client. These books are kept in a case in the civil engineer's office where they are accessible to all hands.

Answers to the letters are all manifolded on thin paper and the manifold paged and inserted in a file with an index, or else written with a copying ribbon and copied in letter-books; in either case they are indexed each morning by the office-boy, who enters them in the regular index, and also makes a note of the page of the preceding letter to the same person and the succeeding one, like this, 243–302, for a letter on page 278, which means that the last letter written before writing the one on page 278 is on page 243 and the letter following 278 is on page 302. This enables one to run through all letters to a given person without referring at all to the index after getting the page of the first letter, and effects a great saving of time.

(*c*). *Additional Work:* When changes are desired by the owner the assistant superintendent prepares all necessary drawings, which, with full instructions or specifications, are transmitted to the contractor.

The contractor submits his proposal for the work based on this data, returning all data with the proposal, and then the proposal and data are transmitted to the client with a letter recapitulating the proposal, and making any recommendations thought desirable.

When a decision is reached, it is embodied in a letter to the architects, directing them to accept the proposal.

The civil engineer then files the specification with the other specifications, attaches the proposal and acceptance to the proper contract, or files it in a special place and issues an order[2] therefor; and the assistant superintendent attaches the drawings to the office set, dating them properly.

(*d*). *Specifications:* Specifications should be prepared by the principal business-man or the civil engineer, and should be as full as possible, with every detail carefully studied and made explicit, and when once written should only be departed from after the most careful consideration.

To accomplish this, a form of specification is most useful. With this form and a number of loose sheets, headed with the sub-division of the work into Brick, Stone, Concrete, or Masonry, Terra-cotta, Plastering, Rough and Finished Carpentering, Hardware, Glazing, Painting, Metal Work, Roofing, Fireproofing, Ironwork, Plumbing, etc., the principal business-man and the civil engineer go over the plans carefully, making copious notes regarding the character of the work and materials intended to be used.

When this is completed, the plans are all hung up in the civil engineer's room, and the specification written, using the form and making notes of all changes desired in full, and constantly referring to the notes previously made, crossing out each note as fast as it is embodied in the specification.

When the work is completed, it is typed, five copies usually being made.

Then one copy is grouped and carefully examined in connection with the plans by the principal business-man and civil engineer, so as to eliminate all typographical errors and to see that everything is clear. Then all necessary corrections are made and the parts of the specification referring to each class of work bound with eyelets, and the whole put in a backed cover.

Should it be necessary to make trifling changes in materials to reach the client's limitation regarding price, each paragraph is stamped "Changed, see note," and a memorandum attached to the parts relating to the changes decided on.

The two copies are bound with ribbon, sealed and signed by the owner and contractor, one copy being retained by the architects and one by the contractor, to whom additional sets are issued

[1] He must show his tact in always keeping his temper, being perfectly dignified and collected under the most trying circumstances, and if he cares to meet the contractor and foreman as a gentleman dealing with gentlemen, he will neither swear nor permit them to swear to him. With most men courtesy will accomplish as much as any other method. It is necessary to exercise incessant vigilance lest mistakes be discovered too late for rectifying. If the foreman is capable, the superintendent must keep abreast of the work as it progresses; if the foreman is not capable, the superintendent must keep ahead of the work and think for both. The superintendent should have sole charge on the works, and his orders or authority should never be interfered with by any one from the office, nor should any one issue orders to any foreman or contractor except in his name.

[2] The "Special Order" form will be given subsequently.

for the sub-contractors. The architect's copy is filed in "Filing Cases."

(*e*) *Contracts:* The form of contract which it is believed is the best, is practically that adopted by the Joint Convention of the American Institute of Architects and the Mechanics Exchange; and is usually filled out as follows — the blank left for the description of the works: "All of the works embraced in the proposal signed by the contractor, dated the day of 1891, for the complete erection of the on the property of the owner, at (Street Number City County State), which proposal is annexed hereto, incorporated in and made a part of this contract."

The blank for time of completion, etc., is filled out. The penalty clause omitted, and instead, the words, "with all due diligence" inserted.

The price filled-out — the terms of payment made as follows: — (usual 80 per cent form[1]) or if the works exceed $200,000 make the amount 85 per cent), and the final payment made in thirty days. (See forms at end).

This renders all bonds unnecessary, and is easier for both contractor and architect.

The proposal is written on a separate leaf, and is gummed into the specification and signed by the contractor; it is usually dated the same as the contract and is of the following form: —

NEW YORK, June 4, 1891.

To MESSRS. JACK HORNER, & Co.,
1111 Lucky Ave., Paradise.

Gentlemen, — The undersigned, having carefully examined the drawings, and read the specification for a dwelling for Mr. Blank Noname, northwest corner of Happy-go-lucky and Merry Streets, hereby proposes to execute the work described therein, to your and the owner's entire satisfaction, for the sum of dollars.

Respectfully submitted,
or see form at end]. (Contractor's signature).

The contract is executed in triplicate, and one copy each retained by owner, architect and client.

If the building laws of the State require plans, etc., to be filed, the contract is executed in quadruplicate, and an additional specification written and signed. The contract should be filed as hereinafter noted.

(*f*) *Certificates:* When the contractor's work has advanced sufficiently to warrant a payment, he submits his request, therefor, with a statement of the value of the work done to date in detail. This is checked, as to quantity, by the assistant-superintendent in charge of the work, who hands it to the civil engineer, with a recommendation, favorable, if the work has been done and is going smoothly, and unfavorable if the work has been over-estimated or the contractor has been dilatory or pugnacious. The civil engineer then examines the statement as to prices, and then reports to the principal business-man, who decides on the action to be taken. Should it be favorable a certificate is issued on the form to be given hereafter.

(*g*). *Care of Drawings:* As will be remembered, the record drawings are all kept, the full size, as tracings on the brown paper, and the scale drawings on tracing linen.

All of these drawings should be in the care of the assistant-superintendent in charge of the work. He should be provided with a numbered index-slip, and a number of cards all consecutively numbered with proper blanks like the form given hereafter; a stamp with the name of the building, a plan numbering stamp, a dating stamp, an instruction stamp, and a "Return to" stamp. With these stamps each drawing after completion is stamped in some place, which is the same for all drawings, so that it will show thus—

"EVENING BANNER" BUILDING,
May 25th, 1891. Plan No. 232.
This drawing must be returned
when work is completed to
JACK & JILL, Arch'ts,
400 Broadway, N. Y.

The drawings are all numbered in the order in which they are completed, and then indexed on the slip and described. All prints bear the same number as their original.

The tracings of full-size details should all be kept in boxes or deep drawers in the general draughting-room; each drawer or box being labelled with the name of the work. The scale originals should be kept in shallow drawers, flat or rolled; it being preferable to roll them, bound in sets and labelled. All prints should be kept in a separate drawer, bound in sets, rolled and labelled.

Whenever it is desired to issue drawings one of the cards before spoken of is taken for each drawing, stamped with the builder's name, drawing-number, and date of issue, the name of the party to whom issued is written on it and the bundle of cards turned over to office-boy No. 2, who fills the blanks in the slip for the address, and how sent (by express, mail or messenger), and initials it; then he makes up the bundle of drawings and hands it with the card to office-boy No. 1, who sees that it is sent off.

Office-boy No. 1 has a series of boxes or filing-cases labelled with the name of the several works, arranged alphabetically in tiers in some convenient place, using a portion of one box or several if necessary, for the cards relating to any work, and also a slip labelled "Incoming drawings," divided into two columns, one for the drawing-number and the other for the name of the party returning them.

As soon as a bundle of drawings to be issued is received with the cards by boy No. 1, he puts the cards in a box labelled "suspense," until he has time to file them, when they are placed in one of the regular boxes, all cards being arranged numerically, with the last card on top.

When drawings are returned, boy No. 1 gives one of the "Incoming-drawings" slips to boy No. 2, who opens the bundles and checks-off the number of each drawing in the bundle, puts name of work and sender at head of slip, and returns the slip to boy No. 1, and the drawings to the assistant-superintendent.

Office-boy No. 1 then takes out his cards and stamps each card mentioned on the slip, "returned," with the date, and puts all cards stamped "returned" at the bottom of the pack, still keeping them numerically arranged.

Sets for estimating are usually given but one card, and a memorandum made in the assistant-superintendent's room of what is included in a "complete set;" but all other drawings should be sent out with a card for each drawing.

On the completion of a building all the cards are examined, missing drawings obtained, and then the cards made up in a bundle, and with all drawings (except full-size details), specifications, contracts, and papers, each in a separate bundle, and labelled, are put away in the store-room.

The great advantage of this method lies in its elasticity and the use which can be made of stamps. Usually each office has its work done by certain contractors, and if stamps for their names are used, the only writing necessary is the description of the drawing in the assistant-superintendent's index, and office-boy No. 2's initials.

One thousand drawings can be kept track of in this way as conveniently as one hundred. No books are needed, which are usually filled with the drawings of certain works, and only have a few of others, so that four or five books per annum are needed and have to be kept where they can be readily referred to. The books also take a great deal of time to keep and usually look anything but neat. These cards too are invaluable as a record in case of dispute on account of delays or failure to comply with their requirements.

(*h*). *Files:* All matters relating to the building to which constant reference is necessary should have a place and be kept there; and similar places should be used for similar things in every building. At the same time they should always be at hand when wanted.

This comes largely in the province of the civil engineer, and is probably best done as follows:

Sets of filing-cases in horizontal groups of four should be provided and arranged in tiers say 4′0″ high, with the highest box not more than 7′0″ above the floor line.

Groups of two or four boxes are used for each building, arranged in alphabetical order, and the boxes for each work are labelled with the name of the work, and, in addition, labelled from left to right, "Specifications and accepted proposals," "Work in preparation," "Instructions and statements," "Miscellaneous," or simply the first and last.

In the first go all specifications for work under contract and all accepted proposals.

In the second go all data relating to work on the building in preparation, until everything needed for the completed works is contracted for, when the label is changed and it receives the overflow.

In the third go the instructions and the monthly statements rendered by the contractor, (see "payments") and in the last all matters relating to the building not before provided for, except letters, which last are filed in books.

All papers filed in the boxes should be neatly folded the exact size to go into the box, and endorsed on the back, so that their contents may be told at a glance.

All contracts should be kept in a bundle alphabetically arranged and put in the safe. The ledger, day-book, check-book, certificate-book, and special-order books, should also be kept in the safe.

Special filing-boxes should also be made for current bills, office memoranda, time-tickets, expense-vouchers, express-receipts, pamphlets relating to mason-work, carpenter-work, plumbing, heating, lighting, machinery, ironwork, glazing, hardware, decorations, marble, terra-cotta, suspense, suspense estimates, unclassified clients, forms, instructions, miscellaneous data, monthly bills to clients, monthly statements, time-tables, prices current, draughtsmen's cards and applications.

Contractor's cards, receipts, cancelled checks, stub-books and old account-books should be kept in the safe.

Do not let anything be taken from the civil engineer's office, unless its place is filled with a slip, dated, endorsed with a memorandum of the thing taken, and signed by the person taking it, as this prevents loss of anything. If this method is followed, in the event of a fire, the absolutely essential records are either in the safe, or copies are where they can be procured.

Nothing should be permitted to lie on the desk longer than one day; it should then be filed in its proper place or, pending filing, should be placed in one of two letter-clips so as not to be lost.

Never let an original go out of the office without either a receipt or a voucher in the shape of a letter of transmission which should state the general contents and all prices quoted.

[To be continued.]

[1] This form will be given later.

COMPARATIVE MUNICIPAL BUILDING LAWS.—II.

[*Note:*—In these tables bracketed letters invariably refer to preceding passages in the same column.]

Terms Defined.

[*The following terms chance to be defined in sundry building codes—which are mentioned in each case. The fact that other codes are not mentioned is not necessarily a proof that the term is not also elsewhere in use as defined.*]

Adjoining Owner: The owner of the premises adjoining those on which work is doing or to be done. [*District of Columbia.*]

Alteration: Any change or addition except necessary repairs in, to or upon any building affecting an external, party or partition wall, chimney, floor or stairway, and "to alter" means to make such change or addition. [*Boston and Denver.*]

Appendages: Dormer-windows, cornices, mouldings, bay-windows, towers, spires, ventilators, etc. [*Chicago, Minneapolis.*]

Areas: Sub-surface excavations adjacent to the building-line for lighting or ventilation of cellars or basements. [*District of Columbia.*]

Attic Story: A story situated either in whole or in part in the roof. [*Denver and District of Columbia.*]

Base: "The ***base*** of a brick wall" means the course immediately above the foundation wall. [*Cincinnati and Cleveland.*]

Basement Story: One whose floor is 12″ or more below the sidewalk, and whose height does not exceed 12′ in the clear; all such stories that exceed 12′ high shall be considered as first stories. [*Chicago, Louisville.*]

A story whose floor is 12″ or more below the grade of sidewalk. [*Milwaukee.*]

A story whose floor is 3′ or more below the sidewalk, and whose height does not exceed 11′ in the clear; all such stories that exceed 11′ high shall be considered as first stories. [*Minneapolis.*]

A story suitable for habitation, partially below the level of the adjoining street or ground.[1] [*District of Columbia and Denver.*]

(See "***Cellar.***")

Bay-window: A first-floor projection for a window other than a tower-projection or show-window. [*District of Columbia.*]

Any projection for a window other than a show-window. [*Denver.*]

Bearing Walls: Those on which beams, trusses or girders rest. [*New York and San Francisco.*]

Brick Building: A building, the walls of which are built of brick, stone, iron or other substantial and incombustible materials. [*Boston, Denver and Kansas City.*]

Building: Any construction within the scope and purview of these regulations. [*District of Columbia.*]

Building Line: The line of demarcation between public and private space. [*District of Columbia.*]

Building Owner: The owner of premises on which work is doing or to be done. [*District of Columbia.*]

Business Buildings shall embrace all buildings used principally for business purposes, thus including, among others, hotels, theatres and office-buildings. [*Chicago, Louisville, Milwaukee and Minneapolis.*]

Cellar: Basement or lower story of any building, of which one-half or more of the height from the floor to the ceiling is below the level of the street[2] adjoining.[3] [*Boston, Denver and Kansas City.*]

Portion of building below first floor of joists, if partially or entirely below the level of the adjoining parking, street or ground, and not suitable for habitation. [*District of Columbia.*]

Cement-mortar: A proper proportion of cement and sand without the admixture of lime. [*Kansas City.*]

Division Wall: One that separates part of any building from another part of the same building. [*Cincinnati and Cleveland.*]

Floor-bearing walls extending through buildings from front to rear, and separating stores and tenements in buildings or blocks owned by the same party. [*Minneapolis.*]

(See "***Partition-wall***".)

Dwelling-house Class: All buildings except public buildings and buildings of the warehouse class. [*Cincinnati and Cleveland.*]

Shall not apply to buildings accommodating more than three families. [*San Francisco.*]

External Wall: Every outer wall or vertical enclosure of a building other than a party-wall. [*Boston, Cincinnati, Cleveland, Denver, District of Columbia, Kansas City and Providence.*]

First Story: The story, the floor of which is at or first above the level of the sidewalk or adjoining ground, the other stories to be numbered in regular succession, counting upward. [*Denver and District of Columbia.*]

Footing Course: A projecting course or courses under base of foundation wall. [*Cincinnati and Cleveland.*]

Foundation: That portion of wall below level of street curb,[4] and, where the wall is not on a street, that portion of wall below the level of the highest ground next to the wall. [*Boston, Kansas City, New York and Providence.*]

Portion of exterior wall below surface of adjoining earth or pavement, and portion of partition or party wall below level of basement or cellar floor. [*District of Columbia and Denver.*]

Foundation, Basement or Cellar Walls: That part of walls of building that are below the floor or joists, which are on or next above the grade line. [*Detroit.*]

Portion of the wall below the level of street curb, in front of the central line of building. [*San Francisco.*]

Incombustible scantling partition: One plastered on both sides upon iron lath or wire cloth, and filled-in with brickwork 8″ high from floor, provided the building is not over 80′ high. [*Chicago.*]

Incombustible Roofing: Covered with not less than three (3) thicknesses roofing-felt, and good coat of tar and gravel, or with tin, corrugated-iron or other fire-resisting material with standing-seam or lap-joint. [*Denver.*]

Lengths: Walls are deemed to be divided into distinct ***lengths*** by return walls, and the length of every wall is measured from the centre of one return wall to the centre of another, provided that such return walls are external or party cross-walls of the thickness herein required, and bonded into the walls so deemed to be divided. [*Cincinnati and Cleveland.*]

Inflammable Material: Dry goods, clothing, millinery and the like in stores, flyings or goods in factories, or other substance readily ignited by droppings or flyings from electric-lights. [*Minneapolis.*]

Lodging-house: A building in which persons are temporarily accommodated with sleeping[5] apartments, and includes hotels. [*Boston and Kansas City.*]

Any building or portion thereof in which persons are lodged for hire for less than a week at one time. [*District of Columbia and Providence.*]

Any building or portion thereof in which persons are lodged for hire temporarily, and includes hotels. [*Denver.*]

Mansard Roof: One formed with an upper and under set of rafters, the upper set more inclined to the horizon than the lower set. [*Denver and District of Columbia.*]

Oriel Window: A projection for a window above the first floor. [*District of Columbia.*]

Partition: An interior division constructed of iron, glass, wood, lath and plaster or other destructible natures. [*District of Columbia.*]

Partition Wall: Any interior wall of masonry in a building. [*Boston, Kansas City and Providence.*]

An interior wall of non-combustible material. [*District of Columbia.*]

Any interior division constructed of iron, glass, wood, lath and plaster, or any combination of those materials. [*Denver.*]

(See "***Division Wall***".)

Party-wall: Every wall used, or built in order to be used, as a separation of two or more buildings.[6] [*Boston, Cincinnati, Cleveland, Denver, Kansas City and Providence.*]

A wall built upon dividing line between adjoining premises for their common use. [*District of Columbia.*]

Parking: The space between the sidewalk and the building line. [*District of Columbia.*]

Parking Line: The line separating parking and sidewalk. [*District of Columbia.*]

Public Building: Every building used as church, chapel or other place of public worship: also every building used as a college, school, public hall, hospital, theatre, public concert-room, public ball-room, public lecture-room or for any public assemblage. [*Boston, Chicago, Cincinnati, Cleveland, Denver, Kansas City and Minneapolis.*]

Such buildings as shall be owned and occupied for public purposes for this State, the United States, the corporation of the City of Brooklyn, or other public schools within said city. [*Brooklyn.*]

Public Hall: Every theatre, opera-house, hall, church, school or other building intended to be used for public assemblage. [*Milwaukee and Louisville.*]

Return Wall: No wall subdividing any building shall be deemed a ***return wall***, as before mentioned, unless it is two-thirds the height of the external or party-walls. [*Cincinnati and Cleveland.*]

Shed: A skeleton structure for storage or shelter. [*District of Columbia.*]

Open structure, enclosed only on one side and end, and erected on the ground. [*San Francisco.*]

Open or closed board structure. [*Denver.*]

(See "***Wooden structures allowed***" in another column.)

Show-window: A store-window in which goods are displayed for sale or advertisement. *District of Columbia and Denver.*]

Square thereof: The square or level of the walls before commencing the pitch for roof. [*District of Columbia.*]

Standard Depth for Foundations: For brick and stone buildings, 14′ below curb line. [*San Francisco.*]

Standard Depth of Cellars: 16′, measured down from sidewalk grade at property line. [*Memphis.*]

Standard Iron Door: Made of No. 12 plate-iron, frame or continuous 2″ x 2″ x ¼″ angle-iron, firmly riveted. Two panel doors, to have proper cross-bars, one panel on either side, fastened together with hooks or proper bolts top and bottom, and with not less than two lever-bars. All doors hung on iron frames of ¾″ x 4″ iron, securely bolted together through wall, swung on three hinges, fitting close to frame all around; sill between doors iron, brick or stone, to rise not less than two (2) inches above floor on each side of opening. Lintel over door, brick, iron or stone. Floors of basement, when doors are to swing, stone or cement, in no case wood. [*Denver.*]

Standard Skylight: Constructed of wrought-iron frames, with hammered or desk-light glass not less than 1″ thick; not larger than 10′ by 12′, except by special permission of the Inspector. [*Denver.*]

Storehouse: (See "***Warehouse Class***".)

Street: All streets, avenues and public alleys. [*Minneapolis.*]

Tenement-house: A building which, or any portion of which, is to be occupied, or is occupied, as a dwelling by more than three[7] families living independently of one another, and doing their cooking upon the premises. [*Boston, Denver and Kansas City.*]

Or by more than two families[8] above the second floor, so living and cooking. [*Boston and Kansas City.*]

Building which shall contain more than two rooms in front on each floor, or which shall be built with a passage or arched way between distinct parts of the same building, or which building shall be intended for the separate accommodation of different families or occupants. [*Charleston.*]

Theatre: Public hall containing movable scenery or fixed scenery which is not made of metal, plaster or other incombustible material. [*Chicago, Louisville and Milwaukee.*]

Thickness of a Wall: The minimum thickness of such wall.[9] [*Boston, Cincinnati, Cleveland, Kansas City, Milwaukee and Providence.*]

Tinned Covered Fire-Door: Wood doors or shutters, double thickness of wood, cross or diagonal construction, covered on both sides and all edges with sheet-tin, joints securely clenched and nailed. [*Denver.*]

Tower Projection: A projection designed for an ornamental door-entrance, for ornamental windows or for buttresses. [*District of Columbia.*]

Vault: An underground construction beneath parking or sidewalk. [*District of Columbia.*]

Veneered Building: Frame structure, the walls covered above the sill by a 4″ wall of brick, instead of clapboards. [*Common understanding in Chicago, Milwaukee and Minneapolis, but not defined by law.*]

Warehouse Class: Buildings used for the storage of merchandise, manufactories in which machinery is operated, breweries and distilleries. [*Cincinnati and St. Louis.*]

Width of buildings shall be computed by the way the beams are placed; the lengthwise of the beams shall be considered and taken to be the widthwise of the building. [*New York and San Francisco.*]

Wholesale Store, or storehouse, shall embrace all buildings used (or intended to be used) exclusively for purpose of mercantile business or storage of goods. [*Chicago, Louisville and Milwaukee.*]

Wooden Building: A wooden or frame[10] building. [*Boston, Kansas City and Minneapolis.*]

Any building of which an external or party wall is constructed in whole or in part of wood. [*Denver and District of Columbia.*]

Having more wood on the outside than that required for the door and window frames, doors, shutters, sash-porticos and wooden steps, and all frame buildings or sheds, although the sides and ends are proposed to be covered with corrugated iron or other metal, shall be deemed a wooden building under this law. [*Charleston and Nashville.*]

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[1] And below the first floor of joists. [*District of Columbia.*]
[2] Ground. [*Providence.*]
[3] And not suitable for habitation. [*Denver.*]
[4] "And serve as supports for piers, columns, girders, beams or other walls." [*New York.*]
[5] Staying apartments. [*Kansas City.*]
[6] To be used jointly by separate buildings. [*Cincinnati and Cleveland.*]
[7] *Two*, instead of three. [*District of Columbia and Minneapolis.*]
[8] Upon one floor, but having a common right in the halls, stairways, yards, etc. [*Providence.*]
[9] As applied to solid walls. [*Minneapolis and Providence.*]
[10] Or veneered. [*Minneapolis.*]

General Requirements for other than Wooden Buildings.

Boston : — **a.** External and party-walls shall be of brick, stone, iron or other substantial and incombustible material, and subject to all the requirements of brick building, except as otherwise stated.

Baltimore : — **b.** There shall be no more wood on the outside of the building than is required for door and window frames, roof, eaves, cornices, doors, shutters, sash, porticos and wooden steps to the first floor. Shall not have frames or posts sunk in the earth.

Brooklyn : — *Within the Building Limits:*
All buildings shall be built of no other material than brick, stone or iron.
Within the City:
All buildings shall have front and rear and side walls on both sides, and shall be built upon a foundation of stone or brick.

Charleston : — (b). The roofs of piazzas and porticos and of the building to be covered with an incombustible material.

Chicago : — Circumscribing walls shall be of brick, stone or other incombustible material, with proper foundations of masonry.

Cincinnati : — (c). Inclosed with walls of brick, stone or any other hard incombustible material.

Cleveland : — See (c).

Denver : — **d.** The walls of all buildings, unless otherwise provided, shall be built of brick, stone or iron, properly bonded and solidly put together with close joints.

Detroit : — All buildings and additions within the fire-limits shall be of stone, brick or iron.

District of Columbia : — **e.** The walls of every building, with the exceptions mentioned, shall be built of brick, stone, iron or other hard and incombustible material.

Kansas City : — See (a).

Louisville : — (See ***"Requirements for Masonry Walls"*** in another column.)

Memphis : — See (d).

Milwaukee : — (See ***"Requirements for Masonry Walls"*** etc., in another column.)

Minneapolis : — The walls of every building within the fire limits shall be built of brick, stone, iron or other incombustible material.

Nashville : — Outside or party-walls shall be constructed of stone or brick.

New Orleans : —

Newark : — Outside or party-walls shall be constructed of stone, brick, iron or other fireproof materials.

New York : — See (d).

Omaha : — All walls shall be constructed of stone, brick or other hard, incombustible material, properly bonded and solidly put together with close joints.

Philadelphia : — Walls shall be composed wholly of incombustible material.

Pittsburgh : — Outer walls shall be composed entirely of brick, stone, iron, mortar or other incombustible material.

Providence : — All external sides and ends shall be constructed of brick or stone (except so much as may be necessary for doors and windows).

St. Louis : — (See ***"Requirements for Masonry Walls"*** in another column.)

San Francisco : — All buildings within the fire-limits shall be constructed of brick or stone.

Wilmington : — (See ***"Requirements for Masonry Walls"*** in another column.)

Foundations.

Boston : — Every *brick building* shall be built upon a foundation :
a. Not less than four (4) feet below the surface exposed to frost.
b. On the solid ground. Or,
c. On a levelled surface of solid rock. Or,
d. On piles, concrete or other solid substructure.

Baltimore : — (Not regulated.)

Brooklyn : — All foundations (including piers, etc.,) shall be started :
e. Not less than 3′ below surface of earth.
f. On a good, solid bottom.
g. On a bottom of driven piles or laid timbers of sufficient size to prevent the walls from settling.
All foundations shall be carried up to the first tier of beams.

Charleston : — (Not regulated.)

Chicago : — ***h.*** Proper foundations of masonry shall be prepared, (***a***).
i. In no case rest on "made" ground.
j. Timber on which rest foundations shall be sunk below sewer drainage.
k. *Business buildings fronting on streets having sewers* to have foundations at least 12″ below drainage.
l. The foundations of the several parts of any building shall be proportioned, so that pressure shall be equal on each square foot of foundation.

Cincinnati : — (***h***), or of other suitable material.
(***a***); (***b***), or on concrete or other solid and sufficient substructure.

Cleveland : — (***h***), or of other fit material.
(***a***); (***b***), or on concrete or other solid and sufficient substructure.

Denver : — ***m.*** *Every brick building over one story in height* shall be built upon a foundation resting not less than two (2) feet below the surface of the earth where the nature of the earth will permit.
(***f***); (***g***), as approved by Inspector.

Detroit : — (Not regulated.)

District of Columbia : — Foundation walls of every building must rest :
Not less than 2′ 6″ below surface of ground ; (***b***); or,
On concrete, masonry or other solid substructure.
On filled land, to be of dimensions determined by Inspector.

Kansas City : — *Every brick building over one story in height* shall be built upon a foundation resting not less than three (3) feet below surface exposed to frost.
(***b***); (***c***); (***d***); (***l***) when on sand or solid clay, and not greater than 4 tons to the square foot, exclusive of loads on floors.

Louisville : — (Not regulated).

Memphis : — All foundation walls shall be laid not less than two (2) feet below surface of earth when exposed to frost ; (***f***); (***g***).

Milwaukee : — (***h***); (***i***), without a written permit from the Inspector ; not less than five (5) feet below exposed surface of ground, except where pile foundation is placed, and then not less than 3′ 6″ below ; (***k***); (***l***).

Minneapolis : — *All permanent structures* shall have foundations resting : (***b***) or (***d***).

Nashville : — (Not regulated).

New Orleans : — (Not regulated).

Newark : — All foundation walls (and all piers, etc., resting on the earth) shall be laid not less than 4′ below surface of ground, (***f***), (***g***) or such other foundations as the case may require.

New York : — All foundation walls (and all piers, columns or posts resting on the earth) shall be laid : (***a***), (***f***) or (***g***).
Whenever, the foundation walls or the walls of any building shall be placed on a rock bottom, said rock shall be graded off level, in sections or otherwise, to receive the same.

Omaha : — All foundation walls (and all piers, columns or posts resting on the earth) shall be : (***f***); (***g***); (***l***).

Philadelphia : — ***n.*** Trenches for foundation walls shall be at least 3″ below surface of cellar floor.
o. Before foundations are laid, Inspector shall examine trenches, and be fully satisfied that the soil or substratum is sufficient for the structure, or, at least, the best that could be obtained ; and, should the nature of the soil be such, and the work of sufficient magnitude as to require piling, flagging or legging, the same shall be done, *provided*
p. The Board of Inspectors deem necessary.

Pittsburgh : — (***n***), (***o***), *provided* the Inspector deems necessary.

Providence : — Every permanent building shall have foundations : (***a***); (***b***); (***d***). The breadth of every base course shall be proportioned to the load to be carried and to the softness of the soil beneath it.

St. Louis : — All foundation walls (and piers, columns, posts or pillars resting on the earth) shall be laid not less than two and a half (2½) feet below the surface of the earth ; (***f***); (***g***) (or of broken macadam rock, well rammed in courses).

San Francisco : — All foundation walls shall be laid : (***a***); (***f***); (***g***). Timbers laid below the water line.

Wilmington : — (***a***); as approved by Building Inspector.

Piling.

Boston : — ***a.*** Piles driven for a wall to rest upon : —
b. Shall be not less than five (5) inches in diameter at the smaller end.
c. Shall be spaced not more than three (3) feet on centres in the direction of the length of the wall, and nearer if required by the Inspector.
d. Shall be driven to a solid bearing, to be ascertained by boring, at the expense of the owner, when required by the Inspector.
e. The Inspector shall determine the grade at which piles shall be cut off.
f. *Walls not exceeding twenty (20) feet in height*, where piling is necessary, may rest on a single row of piles, if deemed advisable by the Inspector.
g. Walls exceeding twenty (20) feet in height shall rest on not less than two rows of piles.
h. Extra piles shall be driven when required by the Inspector.

Baltimore : — (Not regulated.)

Brooklyn : — ***i.*** The top of piles or timber bottom to be driven or laid below the water line. (See under ***"Foundations"*** in another column.)

Charleston : — (Not regulated.)

Chicago : — (Not regulated.)

Cincinnati : — (Not regulated.)

Cleveland : — (Not regulated.)

Denver : — (See under ***"Foundations"*** in another column.)

Detroit : — (Not regulated.)

District of Columbia : — (Not regulated).

Kansas City : — (***a***); (***b***); (***c***); (***d***); (***e***); (***f***); (***g***); (***h***). All piles shall be capped with dimension-stone levellers, each stone to have a firm bearing on at least one pile in each row.

Louisville : — (Not regulated.)

Memphis : — (***a***); (***b***); ***j***, they shall be driven to a firm and solid bearing.
m. The top of such pile or timber bottom must be driven or laid below the water line.

Milwaukee : — (Not regulated.) (See under ***"Foundations"*** in another column.)

Minneapolis : — Wherever piles are required to be driven for a foundation to rest upon (***j***).
k. And the tops shall be cut off at an elevation to ensure constant immersion.
l. There shall be not less than two rows under all external and party walls, and they shall be spaced not over 3′ on centres in the direction of the length of the wall.

Nashville : — (Not regulated.)

Newark : — (See under ***"Foundations"*** in another column.)

New Orleans : — (Not regulated.)

New York : — (***a***); (***b***); (***i***); (***j***). (See under ***"Foundations"*** in another column.)

Omaha : — (***a***); (***b***); (***c***); (***d***); (***e***); (***m***).

Philadelphia : — (Not regulated.) (See under ***"Foundations"*** in another column.)

Pittsburgh : — (Not regulated.) (See under ***"Foundations"*** in another column.)

Providence : — Whenever piles are required to be driven for a foundation, they shall be of suitable stock ; (***j***); (***k***); (***l***). If the foundation of piers on columns carrying walls rests upon piles, a sufficient number shall be driven to insure a proper support.

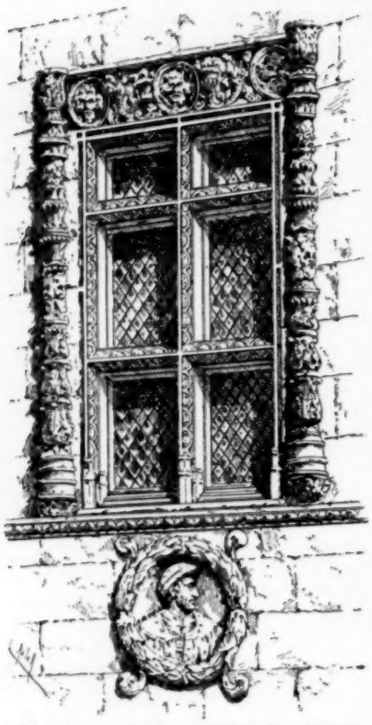
St. Louis : — (See under ***"Foundations"*** in another column.

San Francisco : — (See under ***"Foundations"*** in another column.) The top of piles to be driven below the water line.

Wilmington : — Should the nature of the soil and the magnitude of the work require piling, it shall be done as approved by the Building Inspector.

(To be continued.)

THE ELASTIC LIMIT.



Window from the Chateau de Sarcus. From Havard's "*Dictionnaire de l'Ameublement.*"

WHEN engineers first began to test the materials they used in their structures it was very quickly recognized that if a specimen was loaded beyond a certain point it did not recover its original dimensions on removing the load, but took a permanent set. The limiting stress or straining below which no permanent set could be detected on removing the load, was called the elastic limit. Since under these conditions a bar appeared to recover completely its original form and dimensions on removing the load, it appeared obvious to the first experimenters that it had not been injured in any way by the load, and hence the working-load might be deduced from the elastic limit by using a small factor-of-safety. Experience showed, however, that in many cases a bar would not carry safely a stress anywhere near the elastic limit of the material as determined by these experiments, and the whole theory of any connection between the elastic limit of a bar and its working-load became almost entirely discredited, and engineers employed the ultimate strength only in deducing the safe working-load to which their structures might be subjected. Still experience gradually accumulated, and it was observed that a higher factor-of-safety was required for a live load than for a dead one. This was at first attributed to the effect of impact, and to a certain extent this was no doubt true, since if a moving body strike a structure, the work stored up in the body must be taken up by the elastic deformation of the structure, which will be correspondingly greater than if the load were gently laid on it. In 1871, however, Wöhler published the results of a number of experiments on bars of iron and steel subjected to live loads. In these experiments the stresses were put on and removed from the specimens without impact, but it was, nevertheless, found that the breaking stress of the materials was in every case much below the statical breaking-load. Thus a bar of Krupp's axle-steel, having a tenacity of 49 tons per square inch, broke with a stress of 28.6 tons per square inch when the load was completely removed and replaced without impact 170,000 times. These experiments were made on a large number of different brands of iron and steel, and the results were absolutely concordant in showing that a bar would break with an alternating stress of only, say, one-third the statical breaking-strength of the material, if the repetitions of stress were sufficiently numerous. At the same time, however, it appeared from the general trend of the experiments that a bar would stand an indefinite number of alternations of stress, provided the stress was kept below this limit.

These experiments, whilst they showed that the impact was insufficient to account for the peculiarly detrimental action of a live load, and that the statical breaking-strength was not sufficient in itself to properly proportion a structure, did nothing towards rehabilitating the elastic limit as a measure of the safe working-load of a material. For this it now appears there were several reasons. We believe it was Sir Frederick Bramwell who professed to be unable to say what a horse-power was, because, first, there was the true horse-power of about 22,000 foot-pounds per minute, next there was Watts's horse-power of 33,000 foot-pounds per minute, and finally there was nominal horse-power, which was anything the engine-builder liked to make it. A remark of the same nature might be made with reference to the elastic limit. There is first the maker's elastic limit, which is the yield-point of the material as it comes from the rolls; next there is the real primitive elastic limit of the material, which corresponds to the point at which stress ceases to be sensibly proportional to strain, the bar being tested after being brought to a state of ease; finally, there is the elastic limit of the bar after it has been loaded in various ways, which may be anything the experimenter chooses to make it, up to nearly the breaking-point.

It is to Professor Bauschinger, of the Munich Technological Laboratory, that we owe the proof of the fact that the elastic limit has nothing whatever to do with the breaking-down point with which it is so commonly considered as identical. Professor Bauschinger defines the elastic limit as the point at which stress ceases to be sensibly proportional to strain, the latter being measured with a mirror apparatus reading to $\frac{1}{1000}$th of a millimetre, or about $\frac{1}{100000}$ in. This limit is always below the yield-point and may on occasion be zero. On loading a bar above the yield-point, this point rises with the stress, and the rise continues for weeks, months, and possibly for years if the bar is left at rest under its load. On the other hand, when a bar is loaded beyond its true elastic limit, but below its yield point, this limit rises, but reaches a maximum as the yield-point is approached and then falls rapidly, reaching even to zero. On leaving the bar at rest under a stress exceeding that of its primitive breaking-down point, the elastic limit begins to rise again, and may, if left a sufficient time, rise to a point much exceeding its previous value.

This property of the elastic limit of changing with the history of a bar has done more to discredit it than anything else; nevertheless it now seems as if it, owing to this very property, were once more to take its former place in the estimation of engineers, and this time with fixity of tenure. It had long been known that the limit of elasticity might be raised, as we have said, to almost any point within the breaking-load of a bar. Thus in some experiments by Professor Styffe, the elastic limit of a puddled steel bar was raised 16,000 pounds by subjecting the bar to a load exceeding its primitive elastic limit, and similar cases could be multiplied indefinitely. Most experimenters, however, had overlooked the importance of the fact that a bar has two limits of elasticity, one for tension and one for compression, and it was reserved for Professor Bauschinger to determine whether the raising of the elastic limit in tension had any effect on the limit for compression. Taking a number of bars as received from the factory, these bars were first loaded in tension until stress ceased to be sensibly proportional to strain. The load was then removed and the bar tested in compression until the elastic limit in this direction had been exceeded. This process raises the elastic limit in compression, as would be found on testing the bar in compression a second time. In place of this, however, it was now again tested in tension, when it was found that the artificial raising of the limit in compression had lowered that in tension below its previous value. By repeating the process, alternately testing in tension and compression, the two limits took up points at equal distances from the line of no load, both in tension and compression. These limits Bauschinger calls natural elastic limits of the bar, which for wrought-iron correspond to a stress of about eight and one-half tons per square inch, but this is practically the limiting load to which a bar of the same material can be strained alternately in tension and compression, without breaking when the loading is repeated sufficiently often, as determined by Wöhler's method, and it is now possible to explain why the bars break at such unexpectedly low loads when thus subjected to alternating stresses. As received from the rolls the elastic limit of the bar in tension is above the natural elastic limit of the bar as defined by Bauschinger, having been artificially raised by the great deformations to which it has been subjected in the process of manufacture. Hence when subjected to alternating stresses, the limit in tension is immediately lowered, whilst that in compression is raised until they both correspond to equal loads. Hence in Wöhler's experiments, in which the bars broke at loads nominally below the elastic limits of the material, there is every reason for concluding that the loads were really greater than true elastic limits of the material. This is confirmed by tests on the connecting-rods of engines, which of course work under alternating stresses of equal intensity. Careful experiments on old rods show that the elastic limit in compression is the same as that in tension, and that both are far below the tension elastic limit of the material as received from the rolls. It thus appears that those engineers who have discarded the idea of the elastic limit as a measure of the working-strength of a bar, and have proportioned their structures from the results obtained by Wöhler, have really, in spite of themselves, been working on the very assumption they professed to discard. "Thus the whirligig of time brings in his revenges."

Hard steel is so little used, comparatively speaking, in the work of an engineer, that most people are, on first becoming acquainted with the facts, greatly surprised at the high stresses under which such steel is worked in springs. Mr. Hartnell has pointed out that the safe working-load of such springs is often as much as 60,000 pounds to 70,000 pounds per square inch, and in some experiments on a volute buffer-spring Mr. A. E. Young has found that stresses of 59 tons per square inch were safely carried. Specimens of the same steel in an unhardened condition showed an elastic limit of 43 tons per square inch in tension, with a breaking stress of 68.77 tons per square inch. A similar bar, after hardening, broke at a stress of 67.73 tons per square inch with an elastic limit of 67.33 tons, or very nearly equal to the breaking-load of the bar. No experiments were made on the compression elastic limits, but if, as is probable, the effect of the hardening also raised the limit in compression it is easy to see why steel is hardened and tempered before being used for springs, although the modulus of elasticity of the metal is unchanged. The elastic limits being raised by the hardening, greater working-loads can, on Professor Bauschinger's theory, be carried, and experience bears this out.

The opinion has at various times been emitted that straining a

metal beyond its elastic limit injures it, but this appears to be untrue. It is not the mere straining of a metal beyond one elastic limit that injures it, but the straining, many times repeated, beyond its two elastic limits. Sir Benjamin Baker has shown that in bending a shell plate for a boiler the metal is of necessity strained beyond its elastic limit, so that the stresses of as much as 7 tons to 21 tons per square inch may obtain in it, as it comes from the rolls, and unless the plate is annealed, these stresses will still exist after it has been built into the boiler. In such a case, however, when exposed to the additional stress due to the pressure inside the boiler, the over-strained portions of the plate will relieve themselves by stretching and taking a permanent set, so that probably after a year's working very little difference could be detected in the stresses in a plate built into the boiler as it came from the bending rolls, and in one which had been annealed, before riveting into place, and the first, in spite of its having been strained beyond its elastic limits, and not subsequently annealed, would be as strong as the other.

As another instance of the ideas very commonly prevailing, we may note that objection has been raised to the theory of wire-gun construction in that it depends upon the assumption that the wire is not strained beyond its elastic limit, and that as in the very process of being wound in place the wire must of necessity take a permanent set, the foundations of the theory are unstable, and that hence all the algebraic formulæ for the tension of the wire are useless. This objection does not seem to us well founded. No doubt if the wire is wound onto the gun from another roller it is permanently deformed in the process, and owing to its plasticity, stresses of the nature of those due to bending will exist in it after being wound into place, and thus the ring tension will not be uniformly distributed over the section of the wire. As this wire is thin, however, these stresses should not be high, and as, moreover, the over-strained portions will be able to relieve themselves by a plastic yielding, if necessary, thus transferring part of their load to the neighboring understrained fibres, whilst the mean tension remains the same, there is no reason for supposing that this unequal distribution of stress over the section of the wire seriously affects the application of the formulas, or the validity of the theory on which these formulas are based. The conditions indeed are much the same as in the case of the boiler-shell plate discussed above, and as experience proves that such boilers can be constructed successfully without annealing these plates, our conclusions as to the wire gun may be said to be confirmed by experience. The real objection to wire guns appears to be the want of longitudinal stiffness resulting in drooping of the muzzle, but this is a question not entering into the scope of this article. — *Engineering.*

INHUMED ALIVE IN CONCRETE.

THE other day, as I was listening to some old familiar words which have been sounding now for eighteen hundred years and more, my mind travelled back to a fort in Algiers, the Fort des Vingt-quatre Heures, made of huge blocks, which for three hundred years remained immovable and silent. But in 1853 a martyrdom, which some people looked upon as an idle tale, others as a superstitious legend, was brought to light, and the very stones themselves, with undeniable witness, revealed the pathetic figure of the Arab martyr, Geronimo. Just 347 years ago a little Arab baby was taken prisoner by some Spanish soldiers, and brought to Oran to be offered up for sale as a slave. The good Vicar-General, Juan Caro, bought him, and took him to his own house to educate him, and he baptized him under the name of Geronimo. When the child was eight years old a few Arab slaves made their escape from Oran, and believing they were doing the boy a kindness, they took him with them: so for some years he lived with his people as a Mahometan. But the holy faith which Juan Caro had planted in the child's heart had taken such firm root that his relations could not tear it out. He remained with them till he was twenty-five, and then he took a step which he knew no Arab could forgive, and which, if he should be recaptured, would lead him with certainty to suffering or death. He fled from his home and returned to the Vicar-General, and telling him of the dangers of his flight, he said, simply: "It is because I wish to live henceforth in the faith of the divine Saviour."

Juan Caro was so delighted that he received the young Arab like a lost child, and Geronimo, on his side, could not show his benefactor love and gratitude enough. He soon entered the Spanish Guard as a paid soldier, and he performed such brave deeds that he attained very high military honors. But the height of his joy and ambition was gained when he heard that the Vicar-General gave his consent and approval to a marriage between him and a young Arab girl (also a convert) with whom he had fallen in love. For ten years nothing but happiness shone on his life — he won the respect and confidence of all around him, he was Juan Caro's right hand, and his wife was as a daughter to his adopted father. No shadows seemed to cross their path; no troubles seemed drawing near them.

But one bright May day in 1569 news came to Oran that a small Arab encampment had been noticed a short distance off. The rumor did not seem of importance; a handful of Spaniards could easily manage the Arabs; at least, so Geronimo must have imagined, for he only took nine soldiers, and manned a little boat, intending to land on the coast, where the Arabs had assembled. They rowed out of the safe harbor with the sun shining on them, and sailed along the blue sea past the coral-fishery of Mers-el-Kebir, never dreaming of danger, when suddenly two Moorish brigantines, which had been lying secretly in wait for them, chased them and ran them down. The nine soldiers escaped, but Geronimo, who was too marked a man, was seized upon at once, and carried off to Euldj Ali, the Calabrian renegade. A great cry spread like wildfire among the Arabs throughout Algeria that the apostate was captured; that he, the traitor, who had abandoned his own people, denied his own faith, was lying a prisoner in the fortress, the "Bagno." The Moors, who knew his history, made a solemn vow that they would restore him to his old religion; so they began by sending Marabouts to convert him with arguments and fair promises. But they returned discomfited to Euldj Ali; their fine words had availed nothing, the apostate remained immovable.

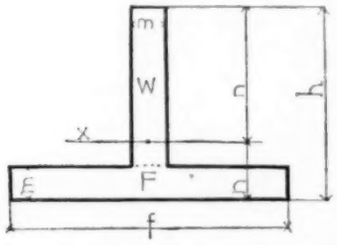
A fresh treatment was next tried; he was loaded with chains, and treated with the utmost cruelty, and when he was faint from torture and scarcely able to speak, the Marabouts stood around him, offering him liberty, power, honor, riches. But no offer made him deny his faith, no longing for freedom made him forswear for one single moment his religion. Once, after some most horrible threat, he raised his poor suffering head, and with a voice so weak it could scarcely be heard, he said: "They think they will make me a Mohometan; but that they shall never do, even if they kill me." For four months Euldj Ali gloated over the daily tortures he was inflicting on Geronimo; but at last the very sameness of his cruelty palled upon him, and he was determined to invent a new and more hideous revenge for the "apostate's obstinacy." One morning the idea came to him; he was examining the works of a fort by the gate of Bab-el-Oued, when he saw a block of béton standing by the great stones. This block was a mould in the shape of the immense stones, filled with a kind of concrete; when the concrete was sufficiently hardened, the wall was to be built with it. Here was the height of torture! Here was the most exquisitely painful death man might devise! The dog of a slave should be laid in a similar mould; the liquid plaster should be poured over him; he should be built alive into the wall; the renegade should be turned into very stone! But as Arabs never act hastily, the Pacha deliberated most carefully whether this really could be the most brutal death he could conceive; and then, believing there was no more effectual means of barbarity, he called to a Navarrese mason, who was also a Christian slave. "Michel," he said, "you see this empty mould of béton; for the present leave it; I have a mind to make béton of that dog of Oran who refuses to come back to the faith of Islam." Poor Maitre Michel had to obey, but he finished his day's work with a sad heart. As soon as he entered the "Bagno" (for he also was a prisoner) he found out Geronimo and told him Euldj Ali's command. Geronimo heard the command in perfect silence, and then very calmly he answered: "God's holy will be done. Let not those miserable men think they will frighten me out of the faith of Christ by the idea of this cruel death. May my blessed Saviour only pardon me my sins, and preserve me my soul!"

The whole of that night this brave young Arab spent in prayer and preparation for the death tortures which he knew were awaiting him. Must not the memories of his high military honor and fame, the kindness of Juan Caro, the love of his fair young wife, have flashed through his overstrung mind like some beautiful, glittering dream? Was nothing left? Nothing real? Nothing but death — death so ghastly in its fearful savagery that the very life beyond seemed hidden away? Ah! it was not too late, even now. The sentence could still be recalled, and greater earthly power than Geronimo had ever had was yet within his reach! Every line in that martyr's face, as we stood before his plaster-cast, told us what his cry must have been then; told us silently how his cry for strength was answered. Between 2 and 3 o'clock the next morning a guard summoned him to the Pacha's presence. There he stood, a suffering, patient prisoner in chains, before a great multitude of Turks

and Arabs in all their gorgeous magnificence. Then he was dragged by a hooting crowd, striking him and beating him, to the gate Bab-el-Oued, where he again stood before the Pacha in the midst of his pompous retinue. Euldj Ali then addressed him slowly and clearly; he pointed out every detail of the fearful death; he showed him the block of béton, and every torture of such a death was carefully explained. He then ended his speech with: "Dog! you refuse to return to the faith of Islam?" "I am a Christian, and as a Christian I will die," was the noble Arab's answer. "As you will," replied the Pacha. "Then here," pointing to the béton, "shall you be buried alive." "Do your will. Death shall not make me abandon my faith," were Geronimo's last words. The Pacha raised his hand, some soldiers stepped forward, they removed the chain from the prisoner's leg, they bound his hands behind his back, they crossed his legs and tied them; then they took him up and laid him with his face downward into the mould. The plaster was poured over him, and Tamango, a renegade Spaniard, wanting to show what a fervent Mahometan he was, jumped on Geronimo's body and broke his ribs. This act pleased Euldj Ali so much that others followed his example. For twenty-four hours Geronimo lay bleeding, suffering, dying, in the block of beton; the jeers and oaths of his enemies must have been ringing in his ears, the African sun in its intense power must have poured upon his aching head; but brave, faithful, and unmurmuring, this noble Arab lay there till the weary day and night were over, and another morning broke upon that beautiful Algerian land. But in the land above, we believe the gates of the kingdom of heaven were thrown open, and Geronimo, bearing the palm in his hand, was admitted into the noble army of martyrs.

For three hundred years this story was handed from one generation to another, till some people treated it as a romance; but thirty-eight years ago, when alterations were being made, and the wall had to be taken down, the workmen came upon a strange hollow place and some human bones. The Governor, remembering this story, directed plaster-of-Paris to be thrown into the mould, and very soon the life-size figure of Geronimo appeared, proclaiming the truth of the martyrdom. The cast is now kept in the museum at Algiers; it shows a slight figure, a face with the veins all raised, a poor mouth closed with a patient, determined expression; the hands are tied, the legs are swollen, even the very broken ribs are lying there. Three hundred years of history holding its peace; and lo! the very stones, as it were, cry out, and the noble Arab's martyrdom is brought to light. — *London Spectator.*

CAST-IRON LINTELS.



Note: — The lower part of the line *mn* as shown above should be lettered *n'*. The prime mark was accidentally etched away.

CAST-IRON LINTELS being both convenient and economical as used by many architects over wall-openings where the span or load is not too great, it would seem that the hand-books commonly used ought to give the data for computing their strength with at least the same degree of accuracy as in the case of columns.

The draughtsman, however, in searching for such data finds the subject so insufficiently explained that he is obliged to accept on faith the tables given in the various foundry-books (which do not always agree), and if he fail to find therein the exact form required, he must guess at something suitable, which for safety, he will probably make heavier than necessary.

For the aid of those who prefer to calculate the strength of such structural ironwork, the following is submitted, by one of their number.

TERMS USED.

F = Area of flange.
W = Area of web above flange.
x = Line through centre of gravity of section, called the neutral axis.
I = Moment of inertia.
R = Moment of resistance.
s = Fibre strain in pounds per sq. in. at top of section.
s' = Fibre strain in pounds per sq. in. at bottom of section.
C = Coefficient, or safe uniformly distributed load in pounds 1 foot span.
l = Length of clear span in feet.
L = Safe uniformly distributed load in pounds.
P = Concentrated load in pounds.
M = Bending-moment in inch-pounds.

FORMULÆ.

(1) $$n' = \frac{Wh}{2(W+F)} + \frac{m}{2}$$

(a) $$n = h - n'$$

(2) $$I = \frac{mn^3 + fn'^3 - (f-m)(n'-m)^3}{3}$$

(3) $$R = \frac{I}{n'}$$

(4) $$s : s' :: n : n'$$

(a) $$s = \frac{s'\,n}{n'}$$

(b) $$s' = \frac{sn'}{n}$$

(5) $$C = \tfrac{8}{3}\, s'\, R$$

(a) If $s' = 2{,}500$, $C = \frac{10{,}000\,R}{6}$

(b) If $s' = 3{,}000$, $C = 2{,}000\,R$

(c) If $s' = 3{,}500$, $C = \frac{7{,}000\,R}{3}$

(6) $$L = \frac{C}{l}$$

(7) $$M = s'\,R$$

(a) $$C = \tfrac{8}{3}\,M$$

OBSERVATIONS.

(1) For all lintels in which $\frac{n}{n'}$ is not greater than $3\frac{1}{4}$, the following values may be assumed for s':

For $\frac{1}{2}''$ to $\frac{3}{4}''$ metal	3,500	
For $\frac{7}{8}''$ to $1''$ metal	3,000	Factor of safety 6
For $1\frac{1}{4}''$ to $2''$ metal	2,500	

(See Trautwine p 464, foot note.)

(2) It is not economical to use sections in which $\frac{n}{n'}$ is greater than $3\frac{1}{4}$; but the strength of such may be computed as follows:

Let $R = \frac{I}{n}$, and $C = \frac{8}{3}\,s\,R$

For values of s, take $3\frac{1}{4}$ times the corresponding values given for s'. Find s' then by Formula 4 (*b*).

(3) In lintels whose sections are similar figures —
n varies as the analogous dimensions, m, f, or h.
$(F - W)$, area, varies as the square of said dimensions.
R varies as the cube of the same.
I varies as the fourth power of same.

(4) Lintel sections may be described thus: $f \times h \times m$. For example $9 \times 6 \times 1$ means a section in which $f = 9''$; $h = 6''$; $m = 1''$.

APPLICATION.

Example I. Lintel $9 \times 6 \times 1$ $\quad W = 5$, $F = 9$, $A = 14$

(1) $$n' = \frac{5 \times 6}{14 \times 2} + .5 = 1.57$$

$$n = 4.43$$

(2) $$I = \frac{4.43^3 + (1.57^3 \times 9) - (.57^3 \times 8)}{3} = 40.1$$

$4.43^3 =$ 86.938307
$1.57^3 \times 9 =$ 34.830037
121.768344
$.57^3 \times 8 =$ 1.481544
3)120.2868
40.0956

(3) $$R = \frac{40.0956}{1.57} = 25.54$$

(4) $$s' = 3900$$
$$s = \frac{3000 \times 4.43}{1.57} = 8464.$$

(5) $$C = 25.54 \times 2000 = 51080$$

Example II. Lintel $4\frac{1}{2} \times 3 \times \frac{1}{2}$

Obs. (3) $\frac{n}{n'} = 4.43 \times \frac{1}{2} = 2.215$ / .785
$A = 14 \times \frac{1}{4} = 3.5$
$R = 25.54 \times \frac{3}{8} = 3.195$
$I = 40.13 \times \frac{1}{16} = 2.51$

Form. (5), (c) $$C = \frac{3.193 \times 7000}{3} = 7450$$

Example III. Lintel $6 \times 4 \times \frac{3}{8}$

Obs. (3) $\frac{n}{n'} = 4.43 \times \frac{3}{8} = 2.95$ / 1.05
$A = 14 \times \frac{4}{9} = 6\frac{2}{9}$
$R = 24.54 \times \frac{3}{16} = 7.57$
$L = 40.13 \times \frac{1}{16} = 8.$

$$C = \frac{7.57 \times 7000}{3} = 17660$$

J. C. H.

Note: — The results in Examples II and III are approximations obtained from Example I, and are sufficiently accurate for practice.

ILLUSTRATIONS

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

HOUSE IN GRAMMERCY PARK, NEW YORK, N. Y. MESSRS. VAUX & RADFORD, ARCHITECTS, NEW YORK, N. Y.

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

THIS house was built about twenty years ago for the Hon. S. J. Tilden.

HOUSE OF E. D. JORDAN, JR., ESQ., COREY HILL, BROOKLINE, MASS. MESSRS. WINSLOW & WETHERELL, ARCHITECTS, BOSTON, MASS.

COTTAGE FOR NOAH A. WHITNEY, ESQ., TOLEDO, O. MR. A. E. HITCHCOCK, ARCHITECT, TOLEDO, O.

OLD COLONIAL DOORWAYS, TRENTON, N. J. SKETCHED BY MR. RICHARD H. HICKS, TRENTON, N. J.

BUILDING FOR J. E. DOWNING, ESQ., ERIE, PA. MESSRS. D. K. DEAN & SON, ARCHITECTS, ERIE, PA.

COTTAGE, CHESTNUT HILL, MASS. MESSRS. PARKER & MEARS, ARCHITECTS, BOSTON, MASS.

[Additional Illustrations in the International Edition.]

CEILING OF THE CATHEDRAL, MONREALE, SICILY.

[Gelatine Print.]

THE portion of ceiling here shown is at the point where nave and choir merge. It is brilliantly colored in ultramarine blue, emerald green, carmine and gold.

VILLA JAGERSBACHER, GMÜNDEN, AUSTRIA. HERR GLENK, ARCHITECT.

[Gelatine Print.]

FRAGMENTS OF ROCOCO FRAMING IN THE LOUIS XV STYLE.

ST. CHAD'S CHURCH, WYBUNBURY, ENG. MR. JAMES BROOKS, F. R. I. B. A., ARCHITECT.

THE church, illustrated, consisting of nave, chancel and aisles, is to be erected on the site and in place of the old church now being demolished through failure in or rather want of foundations. The new church has cost about 7,000*l.* The old church was rebuilt, and the tower, which dates from the fourteenth century, brought back to its perpendicular in 1832.

SINGING GALLERY BY DONATELLO IN THE MUSEUM OF S. MARIA DEL FIORE, FLORENCE, ITALY.

WESTFIELD COLLEGE, HAMPSTEAD, ENG. MESSRS. READ & MACDONALD, ARCHITECTS.

BUSINESS PREMISES, DOVER, ENG. MR. HENRY WARD, ARCHITECT, HASTINGS, ENG.

THE brewery premises of Messrs. Leney & Co. cover an area of about three acres, and are mostly constructed of rubble walling and stone dressings. The illustration which we give this week shows portion of the buildings used as offices.

COMMUNICATIONS

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

SPECIFYING IN JINGLE.

NEW YORK, August.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Our typewriter is something of a poet as you may see by enclosed specifications in rhyme — giving literally all the specific information conveyed in the usual prosaic style by us. She gets very tired writing the same things over and over again, and hence this attempt to make the art of specification writing more interesting to the general reader. You are at liberty to publish if you wish. Yours, ROSSITER & WRIGHT.

[WITHOUT attempting to mend the sometime halting meter, we hasten to give this effort of the overworked muse a place before the "silly season" for the year has entirely vanished. — EDS. AMERICAN ARCHITECT.]

There is a sameness in these items dull,
There was a rapture — but there is no more!
I know them most by heart, or skimp, or full —
If I don't vary them, I fear I'll roar!
I'll poetize them — they'll be less a bore!
After Byron. (A long way.)

TIMBER AND LUMBER.

Framing timber to be sound
Seasoned hemlock, free all 'round
From defects of every kind
One is liable to find
Likely to impair its strength,
And reduce its age at length.

Floor beams are to be of spruce,
Strong enough to be of use.
Timbers used for the exterior
Are to be somewhat inferior,
That's to say not very fine
But second quality of pine.

Lumber both for in and out
To be white pine, strong and stout,
(Unless we should change our mind
And a better timber find.)

Inside lumber clear and dry,
Pleasant to the gazing eye,
Free from shakes and knots and sap,
(Else it isn't worth a rap.)

Standing finish, first floor hall
And the staircase to be all
Made of sycamore, (No whole tree,
Only quartered, don't you see?)

Parlor is to be white pine;
White oak where they are to dine,
Library in walnut black
And that there shall nothing lack,
All the doors are made to match
Standing finish, — the whole batch.

Second story is to be
Standing finish whitewood. See?

FRAMING.

Frame strongest manner, with girts and braces.
Mortise and tenon all in their places.
16″ centres all timbers to be,
Unless other specification you see.

SIZES TO BE AS FOLLOWS.

Posts and girts and plates and sills,
4 x 6 — the architect wills.

Enclosing studs and furring stone wall,
With partition studs to be 2 x 3, all.

Partition-heads, window studs and door
Also braces to be 4 x 4.

First and second story headers, trimmers, beams,
Make 3 x 10, double, (quite small that seems:)

Make attic floor beams 8 x 3
Trimmers and headers same, double, to be.

Rafters 2 x 6. 16″ centres.
(Please to be careful where each one enters.)

Hips and valleys 8 x 3.
Veranda timbers, less you see,
2 x 3 and 8 x 4,
(Do not make them any more.)

All cross bridging is to be
One and one-half inches by three.

Each single strip to be 5″ centre
That in the making of the roof doth enter:
Also 1 and a third by 2, then
Make the ridge boards 1 x 10.

Chestnut sleepers 2 x 4,
For laundry and billiard room floor,
Make them 24 inches apart,
Of good timber sound at heart.
Any other timber of proper size
That to the builder may seem wise.

Frame sills at corners. Spike beams at bearing,
To studs and each other, (that's good for wearing.)

Bearings over 12 feet, double cross-bridge twice,
Only once, though, elsewhere, (hold's them like a vice).

Partition studs at angles, please to make them double,
Block them half way true and plumb — that will save all trouble.

Bridge bearing partitions just once in their height,
Brace where necessary and truss openings tight.
Foot them on partition-heads safely, when it seems
Feasible, and don't foot them on the top of beams.

Inside furring for stone walls to be reg'lar frame
Made of 2 by 4 inch stuff. Billiard-room the same.

Set grounds for back plastering on the north and west
Of frame exterior walls of house, from stonework up to crest.

SHEATHING.

Cover the entire frame —
"North Carolina Pine?" The same.
Sheathing tight at every point;
Lay diagonal; match each joint.
Under floors made the same way,
In first two stories please to lay.

PAPER.

Cover sheathing with two ply and two thick,
Got from the Standard Paint Co.'s bailiwick,
And with "no noise" felting, heaviest that's made,
The under floor of second story safely shall be laid.
And on attic floor see to it there lies,
Heaviest of papers, but use "Rosin size."

SIDING.

Cover all frame walls with seven-eighths by 3
Clear, dry, matched white pine wood, laid on carefullee.
Laid with all due caution, laid with white lead joints,
Well laid down and smoothed, (Heed well all these points.)

SHINGLES.

On all walls of dormers, and on every roof,
Shingles — "Alligator brand," to make them waterproof.
Make them of sawed cypress, 18 inch by 6,
Or white cedar shingles, (firmly each one fix.)
Lay 5 inch to weather. Hips to have a course
Cut out as per sketches, (E. K. R. their source.)

CORNICE.

As per elevations with moulded brackets bored
On under side and dentil course (see that it's well shored)
Of turned drops, (though what *that* may mean, 'deed I do not know,)
With facia and bead mouldings, as the drawings show.

GUTTERS.

All the main eaves gutters and verandas too,
Line with I. C. Camaret tin — nothing else will do.

TINNING.

In your A-1 manner tin the roofs of bays,
Front and back balconies, well, if you love praise.
Flash and cap all chimneys, flash all valleys too;
And where'er roofs join to walls the same thing do.
Roof decks are tinned also with tin named before,
And with proper fastenings make a scuttle-door.

LEADERS.

Leaders from all gutters — corrugated stuff,
Galvanized-iron: make them large enough
To take all roof-water by the rain drops paid;
Connect them with the drain-pipe by the mason laid.

BELT-COURSE.

Make as shown, with wide facia, and properly flashed
With tin, do it nicely, or you will be — (dashed.)

LATTICE WORK.

Just under veranda and at kitchen porch too,
In frames make the lattice work, plainly in view.

OUTSIDE STEPS.

Seven-eighth white pine risers, one and quarter white pine treads,
Nosing, moulding, lay in strips, also with wide heads.

VERANDA FLOORS.

The veranda flooring, of worked yellow pine is made
Seven-eighth inch by 3 inch, tongued, grooved, well-laid.

WINDOW CASINGS.

With a moulded back-band, one and quarter inch by two.
Elliptical windows have key-blocks. (What *they* are, I wish I knew!)

VERANDA POSTS.

Moulded caps and bases, moulded columns too,
Eight inch in diameter, made all good and true.

VERANDA RAILINGS.

Have a moulded top rail four-and-a-half by three,
One-and-a-half-inch balusters, turned they are, you see.
Cope stone wall of porte cochère, veranda rail to match.
Moulded bottom rail two-and-a-half by three-and-a-half. You catch?
Rail to have a goose-neck ramp as per sketch, altho',
Being straight upon the plans, it is not made so.

N. B. I could go on this way, till Doom's Day hove in sight,
Building paper houses, waterproof and tight; — but —

NOTES AND CLIPPINGS

"Sanctus Fabricatus." — A style of prevalent deceit is the finding of coins in special localities. This is peculiarly the case with London, where there is hardly ever an excavation for foundations but coins — often of the most absurdly unlikely description, such as Greek or Alexandrian, and sometimes of quite a modern date — are "found" by clever workmen, sometimes at fabulous depths. Some thirty years ago there was a large manufactory of "old" lead and pewter articles, said to be found during the construction of the docks at Shadwell. Reliquaries and impossible heart-shape vessels were turned out, on which a date was generally stamped of the eleventh or twelfth century; but they blundered in giving the year in Arabic numerals two or three centuries before such numerals were in use. These forgeries were sown almost everywhere, and, notwithstanding their clumsiness (several examples were produced for the benefit of the congress) evidently commanded a good market. The President said that he had even had these things of "cock metal" sent over to him from the diamond fields of South Africa, where it was alleged they had been disinterred at a depth of three feet from the surface. Mr. Reed some years ago laid a trap for these gentlemen. He inquired of some of the workmen in London who were in the habit of producing these things if it was true that they had found one with the figure of a Bishop upon it. No, they had seen nothing of it. Then, producing paper and pencil, he drew the kind of thing he meant with lettering below. Ah, yes, they believed one of their mates had turned up something a bit like it, and they would try to find him. Accordingly, in a day or two, a corroded quasi-reliquary was produced to Mr. Reed with the effigy of a Bishop thereon, and, lo! below the figure they had put his own lettering of "Sanctus Fabricatus"! — *The Athenæum.*

Projected Tubular Tunnel under the Sound. — It may be remembered that the question of a tunnel under the Sound, between Malmö in Sweden and Copenhagen in Zealand, was very much on the tapis a few years ago, and although the scheme eventually fell through, it was admitted that a Sound tunnel would have a considerable practical importance. Another plan has now been brought out, different both as regards the place chosen and as to the nature of the tunnel. The spot now proposed is between Elsinore and Helsingborg, where the Sound is extremely narrow. The tubular iron tunnel will here have a length of only a little above four miles, and it will not, as proposed for the Channel scheme, be anchored, but will rest on pillars, consisting of iron boxes filled with concrete. The tunnel is to be so deep in the water that even vessels of the greatest draught can always pass over it. It is to be constructed of tubular pieces, about 100 feet long, consisting of an outer and interior iron wall, the interval being filled with concrete. The ends of the respective tunnel pieces are to rest on the pillars, the joints being covered with concrete. The cost is calculated at 650,000*l* — 875,000*l*. The entire weight of the tunnel will be about equal to that of the water it displaces, and the pillars will, in consequence, be only slightly loaded. It is also argued in favor of the scheme, that the fixing and maintenance will not offer any very serious difficulties, but one danger seems unavoidable, viz., that of a sinking vessel coming in contact with, and wrecking the tunnel. — *Engineering.*

The Chantrey Bequest. — Mr. De Lisle asked the Chancellor of the Exchequer on Monday whether the new buildings proposed to be added to the South Kensington Museum included "suitable accommodation for the pictures of the Chantrey bequest; what was the number of pictures already purchased under the terms of the Chantrey bequest, and their estimated approximate value: and whether, in case the estimated value of the pictures was greater than the estimated cost of providing suitable accommodation, Her Majesty's Government would take steps at once to carry out the terms of the Chantrey bequest, with the view to acquire a full title to the possession of the pictures as the property of the nation." The Chancellor of the Exchequer: "No special provision has been made in the plans of the new buildings to be added to the South Kensington Museum for the Chantrey bequest pictures; but the additional space which will be at the disposal of the Science and Art Department will enable them, if the pictures remain with them, to hang them to better advantage. Fifty-four pictures and seven works of sculpture have been purchased under the terms of the Chantrey bequest, at a total cost of £39,245. The subject of the last part of the honorable member's question must be considered in connection with the proposed British Art Gallery, and I cannot at present give any undertaking with reference to it."— *The Building News.*

Proposed Observatory on Mt. Blanc. — There is a possibility that M. Janssen's scheme of an observatory upon Mont Blanc may be realized. At a recent meeting of the French Academy of Sciences in Paris he said that M. Bischoffsheim, who established the observatory at Nice, Prince Roland Bonaparte, Baron Alphonse de Rothschild, and M. Eiffel, had offered their assistance. A good deal depends upon the thickness of the ice at the summit of the mountain. It is absolutely essential that the foundations of the proposed observatory should be fast in the solid rock. If the ice should prove to be less than thirty-five feet thick, it seems probable that the structure may be built. M. Eiffel suggests that a horizontal tunnel might be cut through the ice to the rock surface, in which the workmen would be sheltered from the intense cold as well as from storms. But in any event the boring would be a difficult and dangerous work. — *New York Evening Post.*

Dalou's Memorial to Victor Noir. — The inauguration of the memorial to Victor Noir, at Père Lachaise, took place last week. It is the work of Dalou, and, it may be remembered, was exhibited at the Champ de Mars *Salon* in 1890; it represents the deceased in his everyday costume, lying as if dead on the ground. Time has not calmed the feelings which were aroused by the circumstances of Noir's death, and there were some regrettable incidents at the celebration. In the midst of a violent discourse, an actual pugilistic encounter commenced between M. Dalou and a Boulangist orator, and the police had to intervene to restore order. On the other hand, the inauguration of the monument to Danton, on the day of the National Fête, passed off quietly enough, and the public can now contemplate at their leisure the violent and *outré* figure with which M. Auguste Paris has gratified the city. — *The Builder.*

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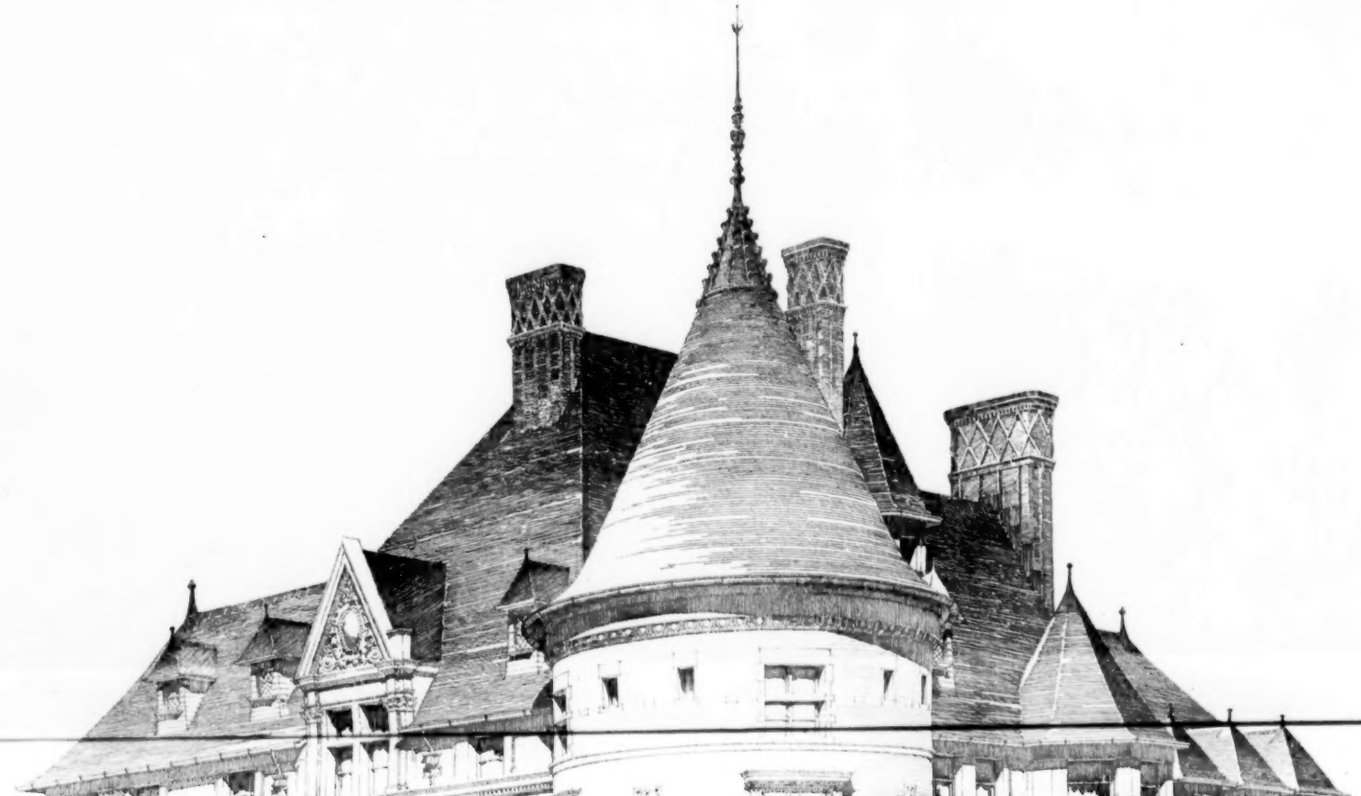

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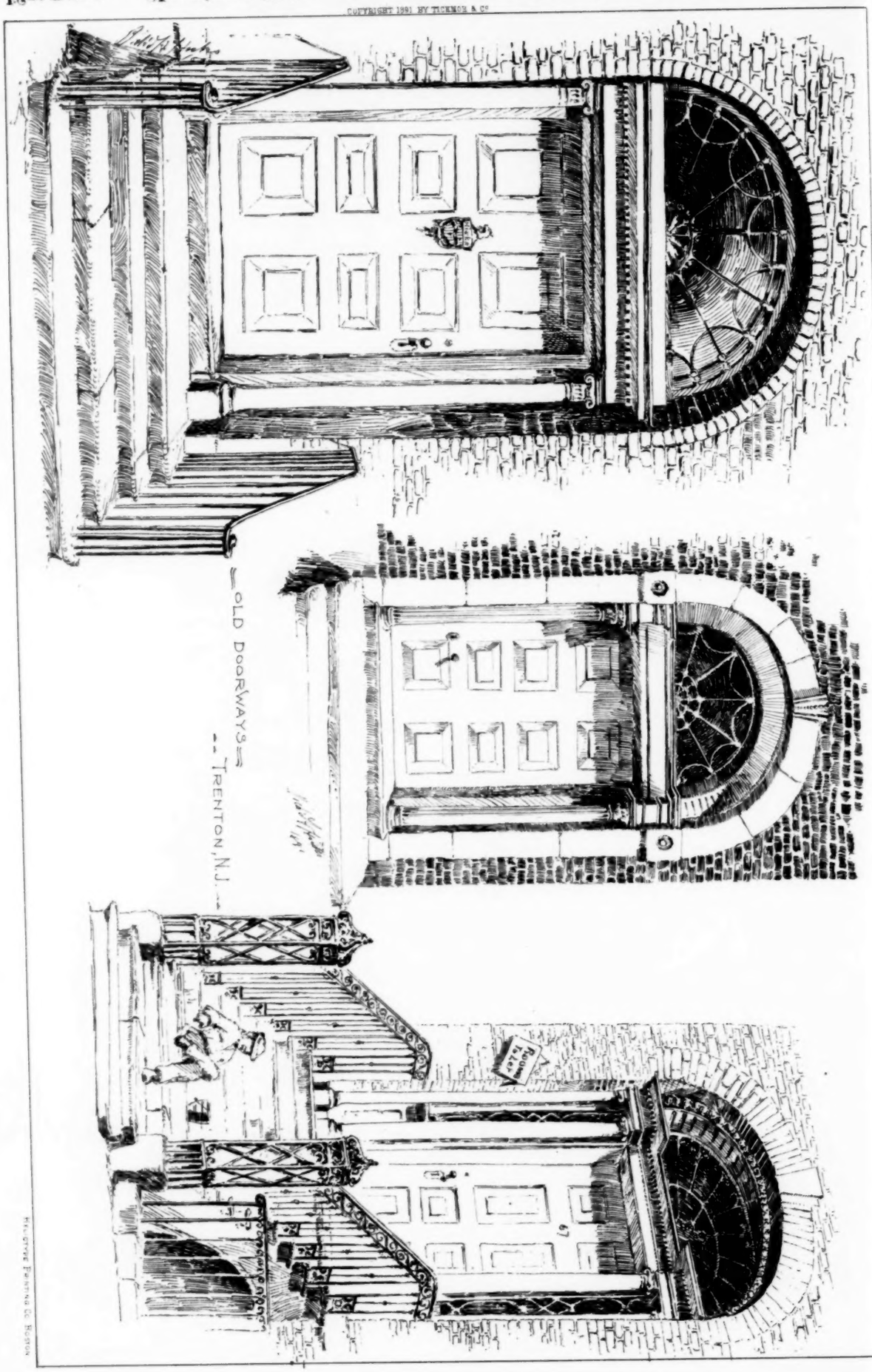

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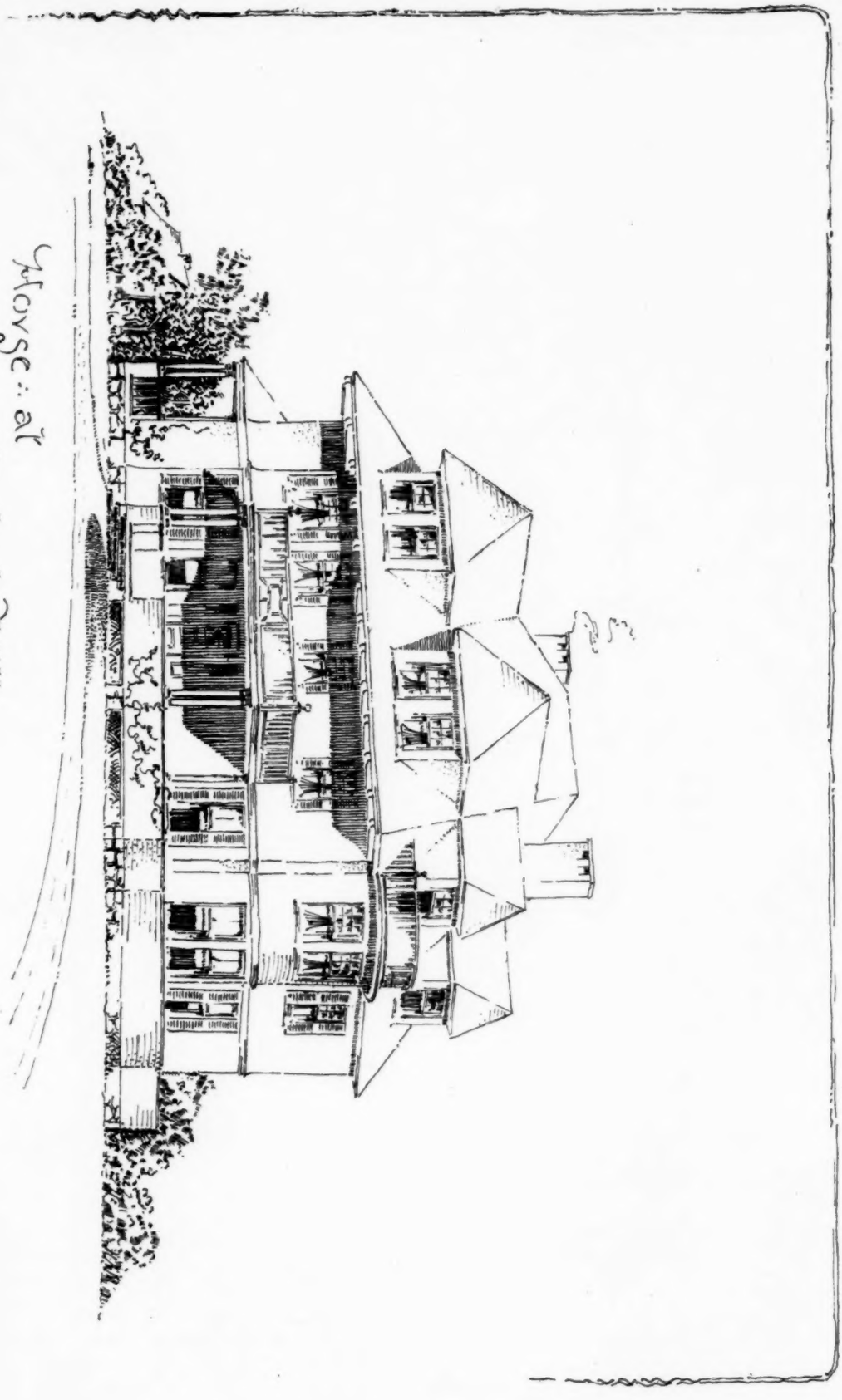

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