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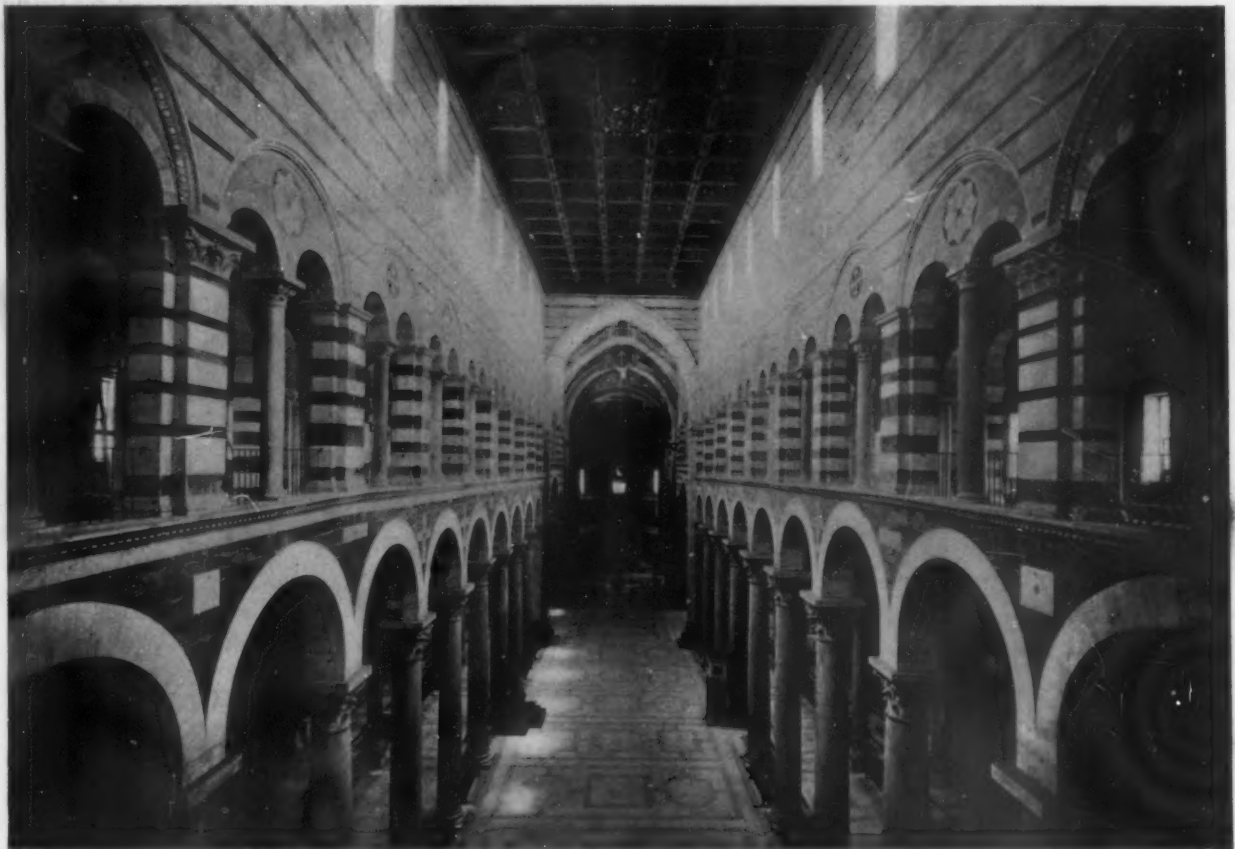


FIG. 1.—PISA CATHEDRAL. THE NAVE FROM THE WEST GALLERY.

View discounting effects of the gallery bends and other perspective illusions described with Figs. 2 and 3. The second arch at the crossing is three feet lower than the first crossing arch, which is an additional factor in the perspective illusion, but operating more effectively from the pavement than from the galleries.

The Architectural Exhibition at the Brooklyn Museum

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SECOND PAPER

The preliminary description of the newly installed Brooklyn Museum architectural exhibition* may logically be followed by an account of the origin of the research which it represents.

This research dates from 1870. It was inspired by the observation of the obliquities in elevation of the middle stringcourse on the north and south walls of the Pisa Cathedral. These obliquities are generally either attributed by the eye to the ordinary descending line of

perspective; as in views of the Cathedral looking east, along either side; or else, from other points of view opposite the side walls, they are attributed to a slanting position of the observer, or to a slanting position of the wall, in which an obliquity in elevation would be a normal perspective effect. Consequently, either an increase, or a diminution of the normal perspective obliquity, when looking in a slanting position, is naturally also attributed to the perspective effect.

It appears, for instance, from a passage in the *Seven*

**American Architect* of August 4th.

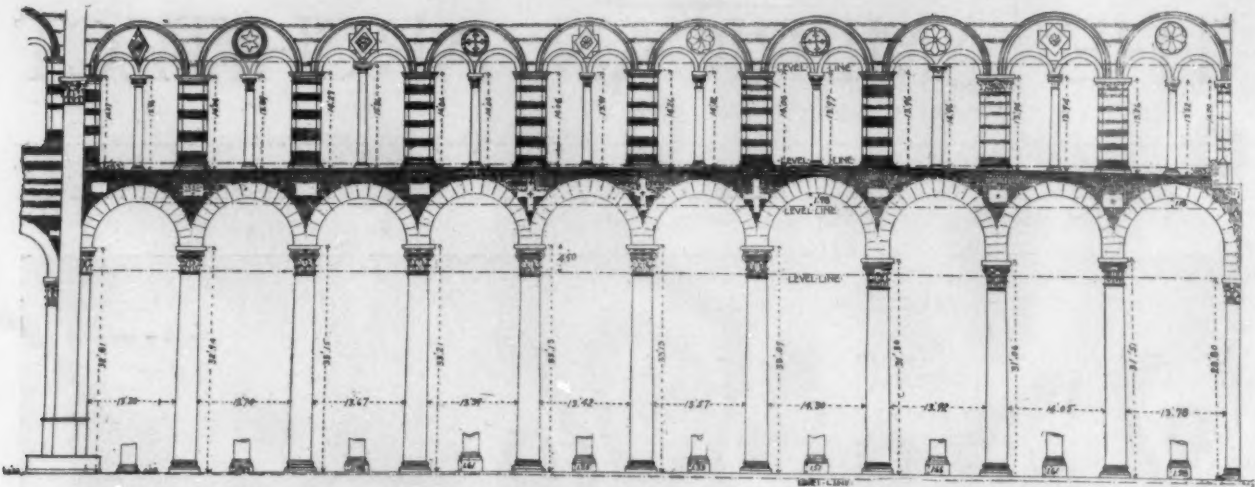
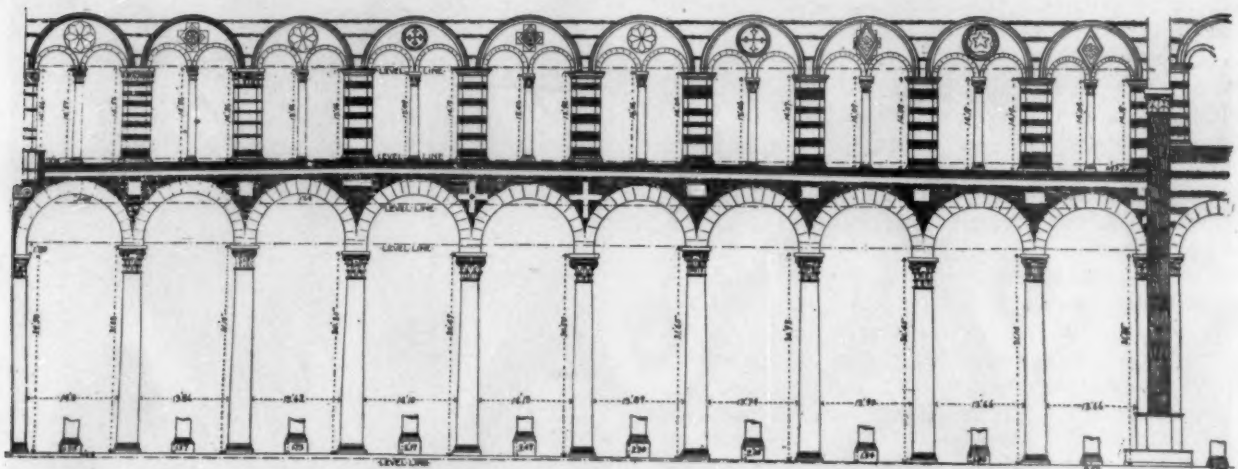


FIG. 2.—THE SOUTH GALLERY.



FIGS. 2 and 3.—PISA CATHEDRAL. SURVEYS OF THE GALLERY BENDS IN ELEVATION AS CONSTRUCTIONS PRODUCING PERSPECTIVE ILLUSION. FIG. 3 SHOWS THE NORTH GALLERY.

The student is presumed to be familiar with the fact that such bends in elevation produce a perspective illusion. The purpose is not, however, debated in this article. The constructive facts demonstrate intention. The results are those of perspective illusion. Whether the demonstrated intention reveals a purpose which coincides with the optical results is not debated. Conclusions are left to the student. The measurements show that the north gallery parapet rises from the entrance, in three bays, 0.78, and then falls to the transept, 0.93. The south gallery parapet rises to the third bay, 0.83, and falls to the transept, 0.83. The arches, north side, rise 0.24 to the third bay, inclusive, and fall toward the transept 1.64. The arches, south side, rise to the third bay, inclusive, 0.80, and fall toward the transept, 1.98. The caps of the gallery piers, north side, decrease in height to the fourth gallery bay, inclusive, 0.53, and thus rise with the parapet 0.25, to the same point. They fall uniformly with the parapet beyond that point 0.88 (or only 0.05 variation). The caps of the gallery piers, south side, rise with the parapet (with a variation of only 0.04). They fall with it to the transept (with a variation of only 0.09). The columns of the north gallery (between the piers), of slightly varying heights, correspond generally to the heights of the adjacent piers. The columns of the south gallery, varying in height (with extreme variation of 1.54) are arranged in a wave line, but also in such manner that the rise of the parapet, to the third bay, is exaggerated by 1.00. The columns of the nave were obtained from various temples in Sicily and are of irregular height. They are so arranged that the caps on the north side are in wave line. The columns of the nave, south side, are so arranged that the three shortest columns are next the facade, with extreme variation between highest and lowest in the entire line of 2.15. The respond at the entrance is shortened an additional 2.71, as against the adjacent column. The variation in height between this respond and the fourth column is 4.29. The respond at the entrance on the north side is lowered 1.53 as against the adjacent column. In spite of the relative shortness of the shortest columns on the south side (first three bays), they are higher than the average on the north side. There are five columns over 33 ft. high on the south side, and the four highest columns on the north side are only slightly over 31 ft. The average height is 1.65 greater on the south side. Thus the arches are all higher on the south side (the course of white masonry under the parapet being omitted on that side; see Fig. 1). These variations of height thoroughly decenter the church. Optically speaking, it has no central axis, and the effects in this respect are those of optical mystery and confusion from every position. The intercolumniations, as shown between surfaces, decrease, from the fourth bay to the transept, north side, 0.44, and on the south side, 1.10. Owing to the great discrepancies in size of the columns of the nave, the most satisfactory intercolumniations are those taken to centers (survey in exhibition). As measured to centers, the bays decrease from the fourth to the transept 2.16 on the north side, and 2.37 on the south side. They decrease from the fourth bay to the facade 1.85 on the north side, and 2.37 on the south side. These arrangements, like the gallery bends, are of a character to promote a perspective illusion, from many points of view, in either direction. A still more apparent result than that of direct increase of apparent size in any given direction is the mystification of the eye as obtained by a studied variety in effects of line and dimension. The Pisa Cathedral is, however, notable among churches exhibiting perspective illusions, for not treating the choir as the sole objective point. It is also evident that nothing is sacrificed for the spectator at the main entrance, in beginning these effects at the third bay in arrangements of spacing. For line effects the bends in elevation operate in both directions from start to finish at either end, or at any intermediate point, as will be immediately apparent to all optical experts.

*Lamps of Architecture** that Mr. Ruskin did not perceive the obliquity of the stringcourse when looking directly at the south Cathedral wall, and describing the line of the stringcourse in comparison with the line of the arcades, which are directly under it. An eminent French art historian, M. Charles Weiss, distinguished

*The Lamp of Life, 10th Section.

for his French translation of Vasari's "Lives," spent a week in the hotel in Pisa where I was stopping in 1895. Although we had frequent conversations, the work in which I was engaged was not mentioned nor were my views of the peculiarities of the Cathedral made known. Toward the close of the week M. Weiss asked me whether or no there was an obliquity in the Cathedral

stringcourse, saying that he thought he had observed one, but was in doubt if it really existed. As a matter of fact, the obliquity amounts to a drop of 2 feet between the façade and the transept, on both sides of the building.

These instances of the oversights of Mr. Ruskin and of M. Charles Weiss are quoted as proofs that the obliquities are rarely noticed, unless special attention has been called to them, although they appear to be conspicuous in photographs, when made from certain points of view, and although they appear to be conspicuous in the Brooklyn Museum surveys.

Thus we may understand why this stringcourse is represented to be level in the survey of Rohault de Fleury.* In 1870 my attention had never been drawn to such subjects, and Pisa happened to be the first Italian town visited, on the way from Livorno to Florence. It is not quite easy to say, therefore, why these stringcourses should have so fixed my attention at the first moment of my arrival, but as I entered the Cathedral square, my first glance went to the Tower; my second glance went to the south wall of the Cathedral and then and there the present study began.

In those days the Pisa Cathedral looked to me like a ship under sail, when viewed from beyond the north wall of the town. It appeared to be in motion. The sophistication which comes with an over-consciousness of special facts might prevent such an impression now, but I still question whether an effect of "life," of movement, or of optical vibration, caused by contradictory optical effects, may not be the soul of the philosophy which underlies this remarkable construction.

As pointed out for obliquities of plan in the last article, it is again evident here that contradictory, and consequently confusing, optical effects, must be involved in such construction, because some normal optical effects must persist, from every point of view, while others are changed from every point of view. For instance, the second story roof line is normal to the pavement.

It appears doubtful that the architects would have tolerated an effect of decreased dimension in one direction for the sake of an increased effect from another. This latter effect probably holds for views slanting toward the east, in spite of the fact that there is full recovery of the obliquity in the second story. Such a perspective illusion is promoted by the fact that the transept stringcourses descend on the west sides, toward those of the north and south walls, from 5 to 6 inches to a side, and that the transept second story roof lines do not recover. My own concern is, however, with the constructive facts and the fact that they are constructive. Theories will never have quite the same form or expression in different minds. Our great difficulty as moderns is to realize the freedom and daring of masons and builders who were also architects. That this freedom and daring existed at Pisa is sufficiently proven by the Leaning Tower, even if it was completed after a settlement had occurred. That a study of optical effects was made at Pisa can also be proven in many cases.

*It is represented as oblique by Taylor and Cresy (1829) *Architecture in the Middle Ages in Italy*, and with some measurements of great interest, taken at opposite ends of the building. There are no individual measurements, however, for the north and south walls of the nave, or for any other individual sections of the stringcourse. The absence of levels for either the plinth course or stringcourse makes the survey of little value, and there is no mention of the matter in the text.

(One follows immediately.) Whether we call other effects vibratory, or simply free-hand design in masonry, makes little difference, and it has been often

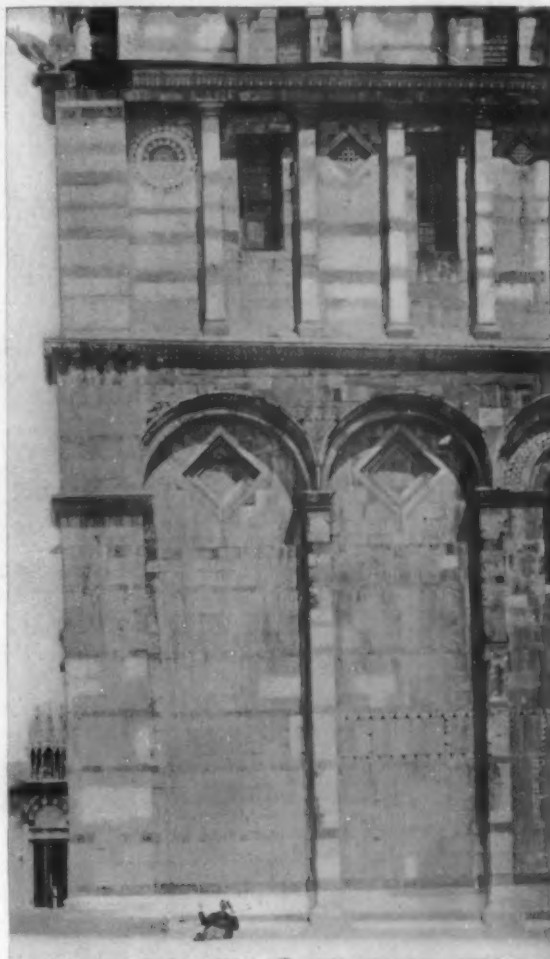


FIG. 4.—PISA CATHEDRAL. SOUTHWEST ANGLE OF THE LEANING FACADE.

Showing the rising stringcourse and the downward bend of the masonry stripes in the south wall. The blocks of the angle pilaster which continue these stripes are seen to be normal to the lean, and, therefore, rectangular. The cutting of the blocks in wedge fashion under the oblique cornice proves it to be constructive. The masonry courses above the stringcourse gradually correct its obliquity, so that in the angle pilasters the blocks which continue the stripes are rectangular, and, therefore, again normal to the lean. This recovery from the obliquity in the second story is especially apparent in the width of the space between the two lower black stripes between the windows, when compared with the corresponding space between the same stripes close to the angle pilaster. Up to the stringcourse the angle pilaster leans (feet) 0.97 in a height of 39.25. In the second story, the angle pilaster leans 0.41 in a height of 18.42 (but steps back exactly as much as it leans). The third story leans 0.10 in a height of 16.84. The two upper stories are perpendicular (see Fig. 6). Thus, on the theory of subsidence, one settlement must have taken place after the second story was finished and before the third story was begun, and a second settlement must have taken place after the third story was finished and before the two upper stories were begun. The question of subsidence may now be considered for the first two stories, which must have settled together, if at all, the rate of inclination being practically uniform for these two stories. (If the second story were as high as the first, the variation on the quoted measures would be less than an inch.) The measurements (from elevation in the exhibition) show that if subsidence took place, beginning at the fifth arcade, it was when measured at the angle, 1.20 at the plinth, 2.88 at the caps, 1.53 at the arches, and (minus) — 0.93 at the string, which rises 0.93. No farther argument is necessary at the southwest angle, unless it be to mention that, if settlement took place, the present facade must have been amputated at the base, 1.20, and consequently must have been wholly rebuilt after the second story was finished. No evidence of such a reconstruction is apparent.

pointed out by those who have been interested in this investigation that the difference between a mediæval and a modern building is the difference between a free-

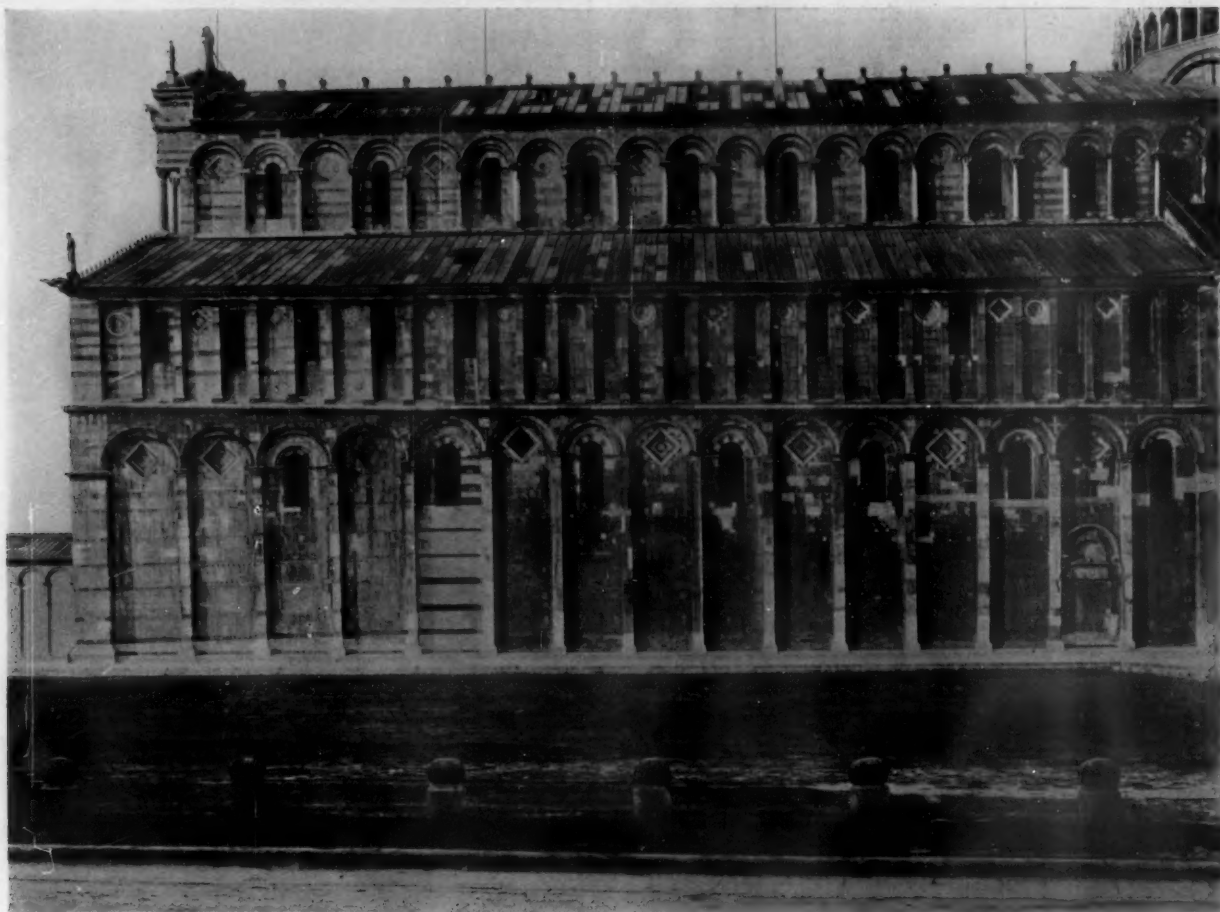


FIG. 5.—SOUTH WALL, PISA CATHEDRAL, IN PARALLEL PERSPECTIVE.

Showing the oblique stringcourse and the recovery from this obliquity in the second story. The stringcourse is oblique in relation to the pavement 1.94, and in relation to the true level 2.15 (i. e., the plinth course and pavement slope eastward with the earth's surface, 0.21). The photograph shows, below the stringcourse and near the façade, a downward bend of the masonry stripes, beginning at the fifth arcade from the façade. Since these stripes enter the southwest angle pilaster with rectangular blocks, it follows that the obtuse angle in the stripes at the fifth arcade is related to the lean of the façade, and that measures bearing on the possibility of subsidence must be figured from the fifth arcade. These measures prove, as in Figs. 4 (south side) and 7 (north side), that subsidence has not occurred. The stripes bend downward to avoid oblique cutting of blocks in the angle pilaster, which would involve an immediate detection of the leaning construction. Front views of the façade (Fig. 6) show that the caps of the angle pilasters are of uniform height with the caps of the façade arcades. The views of the north and south walls show that the caps of the wall arcades are gradually lowered in the adjacent five arcades, so as to conform to the same height at the angles. If the builder had then stilted his arches near the façade in narrow arcades, like those beyond the fifth arcade, and had continued to build them to the height of the oblique and rising stringcourse, this obliquity would have become conspicuous. Therefore, he dropped the arches and widened the span from 9.40 (sixth arcade) to 11.18 (first arcade). On the north side the corresponding arcades widen from 9.06 to 11.16. From the fifth arcade on each wall toward the east, the arches follow the line of the string in its descent toward the transept, but the caps of the south wall gradually descend from the sixth arcade to the transept, 3.12, while the arches drop only 1.76 in the corresponding arcades. Thus the caps drop 1.36 more than arches to which they belong, which is one more proof that accidental settlement will not explain these asymmetries. From the sixth arcade, toward the façade, the arches drop 1.68 and the caps drop 2.88, or 1.20 more than the arches. See Fig. 7 for north wall.

hand architectural sketch and a formal drawing in elevation.*

To return to the matter-of-fact course of events, it may be mentioned that my interest in the oblique stringcourses, on the given day at Pisa, prevented, for the time being, even an examination of the Cathedral interior. As the Campo Santo interferes with a general view of the north side of the Cathedral, inside the town, I went outside the walls to obtain a more distant view, still intent on the stringcourse. It was on my return from this tour, and outside the Lucca Gate, that I stumbled on the little Romanesque church of S. Stefano and its remarkably pronounced and consequently not very

subtle interior construction for perspective illusion. In a length of 58 feet, with six bays, the bays diminish 10 feet and the arches drop 5 feet from entrance to choir.

At that date the mediæval perspective illusions, which are now admitted to exist by every writer who mentions the subject, were unrecognized. It was the Brooklyn Museum research which first established the existence of the widespread facts which are now on all sides admitted.* Consequently the measurements then taken in this church may rank as the initial discovery of these observations in Italy. As the standard German architectural compendiums, of that day, were part of my traveling kit, including both of Kugler's important works and Burckhardt's *Cicerone*, it was easy to ascer-

*"Every modern architect, indeed, complains that he can never get in his finished buildings the charm that they showed in the first free-hand sketch; and it is easy to see that the superior attraction of the sketch lies in the almost imperceptible curvature of the lines, and the slight irregularities, due to the method of drawing. Norman Shaw's work offers many striking examples of this, houses which, in his beautiful pen-and-ink drawings, were filled with homelike charm, being often quite commonplace in execution."—*American Architect*, Jan. 30, 1904.

*For instance, Prof. Simpson's *History of Architectural Development*, vol. II, p. 179 (1909), and A. Kingsley Porter's *Mediæval Architecture*, vol. II, p. 14 (1909). See also *The Builder*, Aug. 13, 1904. A later footnote quotes Choisy and Enlart on perspective illusions. In 1879 they were supposed by the highest authorities, e. g., Burckhardt's *Cicerone*, to be only characteristic of the 17th Century Renaissance.

tain that a hitherto unexplored field of research was in question. Thus, on the first day in Pisa, the little church of S. Stefano led to observations of the more subtle perspective illusions in the interior of the Cathedral and also suggested the explanation for the lines of the exterior stringcourse, that they were intended for optical, or vibratory, effect.

The sojourn of one day in Pisa which had been planned, according to the usual guide book itinerary, was lengthened to a week and most of the asymmetries which were photographed and measured, by accurate surveyor's methods in 1895, for the first time in modern architectural research, were then observed and catalogued. The observations proving that the leaning façade of the Cathedral is not an accident were made at this time.

In 1874, these Pisan observations were published in *Scribner's Magazine* (the August Number, under the title "A Lost Art"). A few weeks ago I had the pleasure of showing Mr. Gilder and Mr. Drake the architectural gallery which had grown from that article and of receiving their congratulations.* Professor Charles Eliot Norton dignified this article, in 1880, with the remark that it was "the most important contribution to the topic since Mr. Ruskin wrote" *The Seven Lamps of Architecture*,† and in later years and up to the date of his death he was outspoken in his interest in, and in his approval of, the results of the later research.‡ Up to 1895, a lapse of twenty-five years since the original observations, nothing more on this subject appeared from my pen. It seemed useless to reiterate the facts already published, and I had not been able to carry out the plans formed in 1870 for an immediate continuation of the observations. In the autumn of 1870 I had offered to pay the expenses of Jacob Burckhardt, the most celebrated German expert of that day in Italian architecture, if he would go with me to Pisa, but the plan fell through on account of the Franco-Prussian war and my finances took a bad turn soon after, so that it was impossible to go abroad for the next twenty years.

However, in 1891, I made the observation of the horizontal curves in plan in the entablatures and cornice on the flanks of the *Maison Carrée* at Nîmes, which were formally certified to be constructive by the official architect in charge of the monument, as well as by his predecessor in office.§

It was in the same year that I made the hasty observations for horizontal curves in plan in the courts of Egyptian temples at Thebes and Edfou, which supplemented, for the first time, those which were made by Pennethorne at Medinet Habou in 1832.¶

*The present *Century Magazine* is the continuation of the older *Scribner's*, which was then edited by Mr. Gilder.

†*Church Building in the Middle Ages*, p. 321.

‡Your article brings together a series of facts which cannot but change our conclusions in many respects in regard to the principles and methods of mediæval building. You have opened a vast field for discussion and you have provided a mass of material so exact and so well selected as to furnish a solid basis for the work of future investigators. * * * I hope also that your interest in the subject is such that you will carry on your investigations in other regions than Italy, for there is no one who understands so well as you the various points which are to be regarded and the risks of overlooking some of the matters which require closest attention. Indeed, one of the most instructive general results of your investigations is the conclusion which one is forced to draw regarding the fallibility of human perceptions, and the carelessness of our common observations of the objects which present themselves to our sight."—From a letter published in the *N. Y. Evening Post* of May 3d, 1897.

§Certificates published in the *Architectural Record*, Vol. IV, No. 4, in the *Smithsonian Report* for 1894, and in the *American Journal of Archaeology*, Vol. X, No. 1.

¶Described in publication just quoted.



FIG. 6.—PISA CATHEDRAL. LEANING FAÇADE.

Owing to the variety of profiles in cornices and base mouldings and the varied projections of wall surface connected with the arcade decoration, it is not possible to offer connected measurements for the façade, on one perpendicular line, outside of the angle pilasters. These measures are given with Fig. 4. If the entire façade be considered as a unit, from the apex to the angle pilasters, including the heavily projected plinths at the angles, it does not overhang at all, for a plumb-line dropped from the apex at the center strikes the pavement on the line of the forward sides of the plinths at the angles. It is also to be noted that, although the inclination of the angle pilasters is uniform in the first two stories, the overhang is 0.41 less than the combined inclinations; because the angle pilaster steps back 0.41 above the string. Thus, as it also leans 0.41, the overhang of the angle pilaster at the top of the second story is not greater than the overhang of the angle pilaster at the top of the first story (viz.: 0.97). In other words, the surface of the façade appears to overhang 1.38 at the top of the second story, whereas the angle pilasters at the top of the second story only overhang 0.97. We now recur to the measurements of Fig. 4, giving the overhang of the third story as only 0.10, in a height of 16.84, and also specifying the two upper stories to be perpendicular. These various arrangements indicate that careful attention was paid to the stability of the leaning façade. Its purpose is not debated in this article. Reference is made to the Exhibition Catalogue for this subject.



FIG. 7.—PISA CATHEDRAL. NORTHWEST ANGLE OF THE LEANING FACADE AND ADJACENT ARCADES OF THE NORTH WALL.

Showing the oblique cornice as constructive. The wedge-shaped blocks of masonry are seen below and above the string. The direction of the wedge cutting is reversed in the blocks above the string to begin the recovery in the second story, so as to bring the stripes of the second story into lines normal to the lean, with rectangular blocks in the angle pilaster. The stripes below the string are seen to enter the angle pilaster with rectangular blocks, and to that end they are bent downward at the fifth arcade. Measurements bearing on the question of subsidence must, therefore, be related to the fifth arcade. These measurements (from elevation in the exhibition) show that, if settlement occurred, it must have been 1.36 at the base, 0.60 at the caps, 0.21 at the arches, and (minus) — 1.00 at the string. The wedge-cutting of the block in the angle pilaster which is directly under the string shows accommodation to the lean on its under joint and accommodation to the rising obliquity in its upper joint. But if settlement occurred, it must have included the two lower stories, since the angle pilaster leans uniformly in both. Therefore, accommodations to the lean could only be called for above the second story, and after its angle was built. No farther argument is needed at the northwest angle.

As no publication on the above matters was made until 1895, my only public activity in the given direction between the years 1870 and 1895, aside from the *Scribner* article, was a lecture before the Century Club in 1879 on "The Illusive Principle in Architecture," which was repeated in the same year before the Boston Society of Architects. This title was selected by Dr. Henry W. Bellows, then pastor of All Souls' Church in Fourth Avenue, whose interest in the *Scribner* article led him to arrange for the Century Club lecture.

The argument of this lecture was limited almost entirely to Pisa, but it contained announcements indicating my belief in a widespread diffusion of similar phenomena, which belief has since been verified. It may, therefore, be mentioned that, from 1870 on, my opinion had been that the constructive asymmetries found at Pisa could not possibly be confined to that one locality, and various corroborative facts supporting this opinion were already known to me. The *Scribner* article of 1874 says, for example: "Close observation and masonry measurements will reveal the fact that perspective illusion was not confined to Pisa, but was practiced on a most extensive scale throughout Italy and the whole of Europe in the Middle Age." This prophecy has been verified many years later, not only by the Brooklyn Museum expeditions, but also by the subsequent announcements of Choisy and of Enlart.*

The dates mentioned in foot-note show M. Choisy to

*Choisy. *Histoire de l'Architecture*, vol. II, pp. 184, 410 (1899). Enlart. *Manuel d'Archéologie Française*, p. 58 (1904).

be the predecessor in this matter, not only as compared with M. Enlart but also as compared with other authors previously cited.* Therefore M. Choisy's expressions to me on this subject have great importance. He wrote me in 1905: "You have thrown complete light on the subject of perspective illusions."† He wrote me in 1906, regarding the article in the (London) *Architectural Review* which contained the first installment of my reply to Mr. Prior: "I have received the article in the *Architectural Review* in which you consider the question of perspective illusions. It fully confirms my own opinions which I published in my treatise on the History of Architecture, and, among instances which I have omitted, might be cited the church of Orbais (Marne) whose plan appears to me to show perspective combinations of the kind which you pointed out long before me."‡

So great was my own confidence in this matter that a circular announcing a book on the subject (still unwritten) was published before sailing for Italy in 1895, mainly on the strength of a week's work at Pisa twenty-five years before.

It had, however, been clear to me, since 1870, that Florence, Milan, Rome and Ravenna, did not offer equally numerous or equally remarkable examples of the characteristic Pisan phenomena. Hence it was evident that a systematic and comprehensive series of careful surveys was necessary

to the elucidation of the subject.

In 1895, such a series of surveys was undertaken under the auspices of the Brooklyn Institute of Arts and Sciences, with the generous support of Mr. and Mrs. August Lewis, of New York, and with reference to an exhibit to be prepared for its future museum, of which I had then been titular Curator of Fine Arts for several years. This Museum was not opened to the public until 1897. It has been mentioned in my first article that the proposed exhibition has only taken systematic and comprehensive shape in the last few weeks, twelve years after the Museum was opened, fourteen years after the most important surveys were made, and thirty-nine years after the original observations which they continue to verify and attest.

Mr. John W. McKecknie was selected as the photographer, surveyor, and engineering expert of the expedition. He was favorably known to me by his work on the illustrations for my *Grammar of the Lotus* and by his employment to arrange and install the Willard Collection of Architectural Casts in the Metropolitan Museum. He had also a record as surveyor in the employment of the State of Ohio, and had been employed

*Mr. G. A. T. Middleton's article in the *Nineteenth Century* on "Deliberate Deception in Ancient Building" is of earlier date (March, 1897), but this article was avowedly founded on my own publications.

†Au sujet des artifices d'illusion perspective vous avez jete la pleine lumière.

‡J'ai reçu l'article de l'*Architectural Review* où vous traitez de la question des illusions perspectives. Il me confirme pleinement dans l'opinion que j'ai émise dans mon traité sur l'Histoire de l'Architecture et, parmi les exemples que j'ai omis, on pourrait citer l'église d'Orbais (Marne) dont le plan me paraît témoigner de combinaisons perspectives du genre de celles que vous avez signalées bien avant moi.

as an expert in engineering in the office of a New York architectural firm. (He is, at present, a practicing architect in Kansas City).

Mr. McKecknie served as my assistant in Italy for five months and after his return drew out the majority of the surveys now on exhibition. He had rare attainments as a scientific photographer and had devised special methods, by a compass attachment to his camera, for taking pictures in accurate parallel perspective, which is of great importance when actual obliquities in elevation, or the effect of such obliquity as produced by obliquity of plan, have to be photographed.*

Since the Pisa Cathedral was the point of departure of my studies in 1870, and of the conclusions reached at that time, it naturally absorbed more time and attention in 1895 than was devoted to any other church; at least five weeks out of twenty-two; and one main purpose of the expedition was to carefully survey that cathedral. Its 51 exhibits, 43 enlargements and 8 surveys, are the backbone and most important individual feature of the Brooklyn exhibition (aside from the demonstrations for the widening refinement) wholly remarkable for their variety of phenomena, for the completeness of their demonstration and the knitting together of evidence which they furnish.

Aside from the evident value of a sequent history of this research, now offered for the first time, which necessarily places the Pisa Cathedral in the foreground, there are additional reasons for putting an account of the origin of the Pisa surveys in the foreground of these articles. In recent years, since 1901, inclusive, the widening refinement (so-called) has mainly absorbed such attention as could be given by me under the pressure of other Museum duties, to mediæval architecture. All publications made since 1898 have been devoted to the widening refinement. All photographs made since 1901, inclusive (with rare exceptions) have been made to illustrate it. Much controversy has also related to it. There has thus been involved in the public view, as well as in my own, a certain loss of perspective, as regards the subject as a whole, which the present exhibition is calculated to restore and I am therefore disposed, also for this reason, to first insist on the importance of the Pisa surveys, in giving an account of it.

Moreover, the constructive facts at Pisa (and I am almost wholly indifferent to the explanations which may be offered for them, because the facts alone are sufficient to revolutionize our attitude toward mediæval architecture, as Professor Norton has said in his quoted letter), have been officially verified by the architect in charge of repairs, by the following certificate, and this certificate ought to disarm preliminary and natural scepticism. It did not appear with the *Architectural Record* articles, having been given, as the date shows, three years later and six years after the surveys.

PISA, August 9, 1901.

Honored Sir:—I have examined your measurements of the monuments of Pisa and am able to say that the proofs are complete for the following facts:

*In later expeditions I have had to rely on my own photographic work. The dating of the enlargements in the Exhibition Catalogue thus specifies Mr. McKecknie's photographs to the number of about 194 exhibited enlargements. The enlargements of 1901, 1903, 1905 and 1907, to the number of about 386, are from negatives taken by me to the number of about 900. The above dates specify the years of later expeditions, averaging about three months each. The entire number of survey negatives and original prints, up to present date, is about 1400.

1st.—That the façade of the Pisa Cathedral was intentionally inclined in the original construction.

2d.—That all the curves of the building, both the horizontal and the vertical, were intentionally made in the original construction.

3d.—That the oblique lines of the interior galleries were built as they now appear.

4th.—That the main exterior stringcourse is oblique by construction.

With assurance of high regard,

ANNIBALE MESSERINI, Engineer.

(Architect in charge of the Pisa Cathedral).*

Not less important is the approval of the Pisa surveys by the architectural editor of Burckhardt's *Cicerone*, Baron Henry de Geymüller, of Baden-Baden, whose distinction as the leading special authority of the world on Italian architecture is sufficiently well known. This unexpected letter, received by me in 1904, follows here and was especially welcome as coming from a life-long friend of the lamented Jacob Burckhardt.

"BADEN-BADEN, January 7, 1904.

"Dear Sir: It was only yesterday that I succeeded in reading your interesting study concerning the Leaning Tower of Pisa, in the *Architectural Record*, Vol. VII, No. 3. Allow me to tell you that you have entirely converted me concerning the cathedral. I had noticed those lines of the aisles outside, but never studied the reasons. I naturally considered it was the bad ground, as I had been taught to believe in the Vasari explanation of the Leaning Tower. The courage of those masons who dared to continue seemed to me quite wonderful. Your study has opened my eyes and I am very grateful for the benefit received. As for the reasons why they did in the Cathedral what we see I am less convinced than as concerning the intentional building so. But you may be right in what you say also on this point.

"Believe me to be, dear sir,

"Yours very truly,

"BARON H. VON GEYMÜLLER,

"Architect."

As the illustrations of this paper largely concern the constructive evidence which relates to the leaning façade of the Pisa Cathedral, it is a matter of interest and of importance to mention that this lean is quite inconspicuous and has been generally unnoticed. The existence of this inclination was unknown in 1895 to the official inspector of historic monuments for the Province of Pisa. It was unknown, in 1901, to the architect in charge of the Cathedral repairs, before he examined the building in the light of the photographs and measurements herewith partially published.

It is the final word of this article that, even within the boundaries of its limitation to Pisa, it only offers a fragment of the evidence which is found in the Brooklyn Museum exhibition. For instance, the levels of the stringcourse *beyond the west sides of the transepts*, so far unpublished, are, in my opinion, the most astounding and the most significant individual feature of the entire investigation.

*Italian original in Brooklyn Museum Memoir No. 1. "A Renaissance Leaning Façade at Genoa."

THE CURRENT ARCHITECTURAL PRESS

The Western Architect for August presents in its illustrations a well-selected series of examples of recent work. The most important feature of this issue is Mr. Cass Gilbert's Civic Plans for St. Paul, Minn. Six plates showing the details of the central approach to the State Capitol are reproduced. Mr. Gilbert's plan presents a dignified and artistic solution of the problem.

The opportunities presented to the architect in the planning of a civic improvement for St. Paul, situated on a high bluff just at the sweeping bend of the Mississippi River, are many and apparently Mr. Gilbert has fully availed of them in the admirable plan he has outlined.

Other illustrations in the issue are a Baptist church at Montclair, N. J., designed by Watson & Huckel, and a good example of the modern country house by the same firm.

The First National Bank at Cleveland, Mr. J. Milton Dyer, architect, is well presented by a series of exterior and interior views. While some features of the design do not appeal strongly, the result has apparently been a building answering well the requirements of the bank.

Mr. W. B. Ittner's well-planned school at Gardenville, Mo., is in keeping with his excellent work in this class of buildings.

A good example of the suburban house is Mr. Albert Kahn's design of a residence at Grosse Pointe, Mich., illustrated in a way that gives a satisfactory idea of the work.

A Y. M. C. A. building at El Paso, Tex., by Trost & Trost, and a series of bungalows at Pasadena, Cal., by Green & Green



Soldiers' Monument Site, Minneapolis, Minn. Mr. Cass Gilbert, Architect.

(From *The Western Architect*)

and Frederick L. Roehrig, respectively, complete the most interesting work in this issue.

In the text is a well-written article describing Mr. Gilbert's civic plan for St. Paul and articles on the "Story of L'Enfant" and "Concrete in Residence Design."

The International Studio for August contains a collection of articles and illustrations that will commend it to a wide class of readers.

The continuation of the series on Architectural Gardens and the illustration and description of "Recent Designs in Domestic Architecture in England" will be of interest to the architect.

The most characteristic and interesting of the examples shown in the latter article is "The Dormers," by Mr. Walter E. Hewitt, a dignified and well-planned type of the English country house.

Other articles describe the collection of Mr. Hugo Reisinger, the work of William McTaggart, R. S. A., the pictures at the Grafton Gallery and some sculpture by Bessie Potter Vonnob.

There is also a delightfully written article on West Cornwall as a sketching ground. The unusual notes of current exhibitions, art matters and criticism complete this number.

Architecture for August is probably an average number as far as character and selection of subjects are concerned, but apparently the number of subjects presented is still considered



House of Mr. Schinasi, New York. Wm. Burnet Tuttle, Architect.

(From *The New York Architect*)

of more importance than the manner or thoroughness of their presentation.

Two houses and a building for Williams College, all by Frank E. Wallis, illustrated in this issue, are good examples of a class of work in which Mr. Wallis has achieved much success, but these are presented without floor plans or details necessary to a thorough knowledge or appreciation of the subject. Such omissions are not only unsatisfactory to the professional reader, but liable to lead to an erroneous impression that the plans and features omitted were not considered worthy of publication, thus doing the contributor an injustice.

Mr. J. Milton Dyer's bank at Cleveland, Ohio, is familiar through repeated illustration in the architectural press.

The exterior views of the addition to the Masonic Temple, New York, by Mr. H. P. Knowles, a dignified bank building at Pittsburg, by Messrs. D. H. Burnham & Co., somewhat reminiscent of a building for a different purpose, that attracted attention a year or two ago, and some tentative work by Messrs. Squier & Wynkoop, are shown, together with two pages of English subjects.

In the text are unsigned articles on Professional Etiquette in Great Britain and Two Buried Indian Cities.

The Architectural Record for August is a readable number. Part III of Claude Bragdon's series, "Architecture in the United States," treats of the "skyscraper." Like everything from the pen of Mr. Bragdon, it is a thoughtful presentation of the subject. Mr. Frothingham continues his discussion of "The Architect in History," the period described in this issue being the "Dark Ages."



"Dormers" Bovington-Herts. Walter E. Hewitt, Architect.

(From *The International Studio*)



In the Garden of Charles A. Platt, Architect.

(From *The Architectural Review*)

An article by Mr. George D. Hall, entitled, "The Future Prince Rupert as Conceived by the Landscape Architect," treats of the probable growth and development of a city to be located on the coast of British Columbia.

The pertinancy of an article of this character in an architectural publication, in spite of the promise contained in the title, is not apparent. "Suggestions in Shop Fronts from Paris" is a series of illustrations, the text being limited to appended notes.

Mr. Peter B. Wright's reminiscences of the late Russell Sturgis are continued. There is an unsigned article on "The Pecuniary Relation Between Architect and Client" and the usual notes and comments on matters of current interest.

Professor Charles S. Hastings' article on "Architectural Refinements in Medieval Churches" is an attempt to compute, using the photographs of Professor Goodyear as a basis, the extent of the deviations pointed out. This article will be read with interest by our readers who are closely following the complete history of this research, published in a series of articles by Prof. Goodyear, which are appearing in the *AMERICAN ARCHITECT*.

The New York residence of Mr. George L. Rives, by Carrere & Hastings, is illustrated and described. The plans and working drawings of this house were published in the *AMERICAN ARCHITECT*, May 6, 1908.

The April issue of *The Architectural Review* is devoted to modern English Gardens, and the accompanying text is from the pen of Mr. Thomas H. Mawson, who presents a number of illustrations of his own work in Landscape Gardening. Supplementing these are some views in the Garden of Mr. Charles A. Platt, architect, at Cornish, N. H., which are so very artistic as to lead the reader to inevitable comparisons by which the American gardens do not suffer.

The usual "Review of Current (?) Periodicals" is presented and illustrated, but its value to the general reader is somewhat lessened on account of the lateness of publication.

The New York Architect for July presents in its text an

article describing the residence of M. Schinasi, of which Mr. William Burnet Tuttle is the Architect, and also a description of the Metropolitan Life Building in New York, Messrs. N. Le Brun & Sons, architects, accompanied by text cuts of interior views.

The illustrations of new work comprise a new terminal station at Paris, exterior and interior views of the Schinasi residence in this city, a double-page reproduction of a retouched photograph of the Metropolitan Tower, together with some views of the executive offices of the Metropolitan Life Insurance Company.

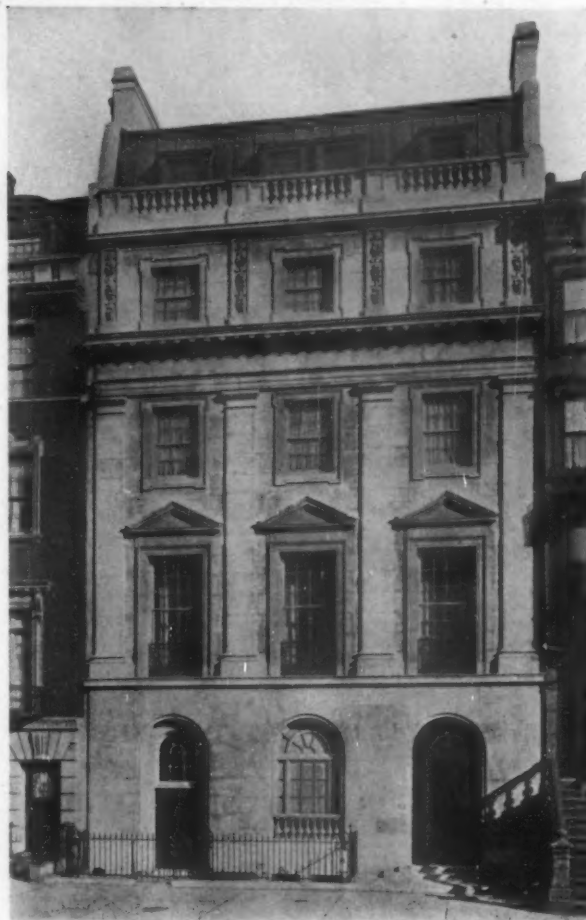
The Schinasi house is a further addition to the collection of transplanted French chateaux, of which there are several examples in New York, and the present instance cannot be regarded as particularly notable in its class.

The August issue of *The Brickbuilder* appears to be a logical exponent of the field to which it is devoted.

The illustrations consist of city and country houses.

Messrs. Alden & Harlow's house at Pittsburg, two houses at St. Louis by Mauran, Russell & Garden, and a house at Lake Forest, Ill., Robert D. Kohn, architect, are perhaps the most noteworthy.

In the text are articles on Interesting Examples of the Use of Burnt Clay in Architecture, by Charles D. Hughes, splendidly illustrated, showing large halftone pictures of the Shelter, Colonnade, and an Arch of the Queensboro Bridge, New York City, and the Elephant House at the Zoological Gardens, New York, by Messrs. Heins & La Forge; Mr. D. D. Kimball's series on Warming and Ventilation, Part IV, and Carved Brick Work—Some English examples, with numerous illustrations.



House of Mr. Geo. L. Rives, New York. Carrere & Hastings, Architects.

(From *The Architectural Record*)



SOME WORK AT BAYBERRY POINT, L.I. BY GROSVENOR ATTERBURY, F.A.I.A.

The houses at Bayberry Point, Islip, Long Island, illustrated in this issue, were built some time ago by Grosvenor Atterbury, architect, of New York City, for the late Henry O. Havemeyer. These houses are of a type rarely found in this section of America, though none the less artistic and picturesque, and well adapted to the locality.

Bayberry Point, prior to the erection of these buildings, was nothing more than a swamp or meadow about on the level with the ocean. The level was raised about four feet by filling in with beach sand, and a canal, terminating in a large circular bay, was cut out from the ocean through the center of the property, thus giving the place the appearance of a great yellow sandy plain divided into two by the blue waters from the ocean.

This, in itself, was picturesque, and it is fortunate that no attempt was made, as is often the case, to cover this vast stretch of sand with lawns and gardens, thus giving it the appearance of a country village; but, fortunately, it has been developed with buildings, walls and a decorative treatment in harmony with the surroundings, and with only enough grass and shrubbery to make the place more interesting and habitable.

The buildings, as will be noted, have been very cleverly designed to obtain this result, and the entire property now presents an artistic ensemble with the houses the same color as the beach sand and with a few red and green spots of tile roof to give sufficient color and make the whole place pleasing and effective.

There are ten houses in all, placed irregularly on the property (as shown on the bird's-eye prospective sketch herein illustrated), some of which are connected with others by walls, boat-houses, trellis porches, etc., and all arranged to obtain breezes from all points of the com-

pass, views in all directions, and to give picturesque skylines from every point of view.

It was the intention to erect a tower to mark the beginning of the property from the land side and the ending of the canal, but this detail has for the present been abandoned.

There are four types of houses, all arranged to have the main rooms facing the canal, but so distributed and reversed as to make each one appear entirely different. The houses were constructed on pile foundation driven through the old meadow into hard pan, which was about ten feet below waterline. The extension walls of the buildings proper were constructed of brick, on which the stucco was placed direct. The balance of the walls, around gardens, porches, boat-houses, etc., were constructed of wood and metal lath to receive the stucco.

The stucco used was a mixture of Portland cement, lime, putty and sand taken directly from the premises, so proportioned as to give the stucco the same color as the beach sand. The stucco was finished with a very rough or "slap dash" coat.

The roofs, where flat, were of tar and gravel, and where peaked over boat-houses and summer-houses were of either red or green terra cotta Spanish tile. The woodwork on the exterior is of pine, painted green in some places and stained dark brown in others, adding color to the general effect.

The bridge across the canal near the ocean is built of reinforced concrete, finished with stucco similar to the other parts of the work. This bridge was built but two or three years ago, and added to the interest of the place, as it formed a connecting link to the two shores of the canal at the ocean end of the property.

The buildings have about ten rooms each, arranged in a very simple manner, and finished absolutely plain, with painted trimmings and simple brick or stucco fireplaces, all of which harmonizes with the exterior of the buildings. There are, however, enough of china closets,

(Continued on page 96)

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The increased power and responsibility of architects.

ILLUSTRATIONS:

Houses at Bayberry Point, L. I. (5 pages).

Hotel St. Anthony, San Antonio, Texas (2 pages).

Pottery Building, Newcomb College, New Orleans, La.

Frontispiece:

Dining Hall, University Club, Chicago.

IT seems doubtful if any topic has furnished inspiration for more "copy" suitable to the columns of journals devoted to the interests of art and allied subjects than that of the growing appreciation in America of all that adds to the artistic qualities of every object encountered in the daily routine of our lives. No observant person of even middle age can have failed to note the changed attitude of the masses toward not only what are generally termed "works of art," such as paintings and sculpture, but articles of every-day use possessing some measure of artistic qualities, within the term of his experience. Only a score of years ago the person who professed an appreciation of anything approaching nearer than the picturesque to what might be considered "art" was regarded with a feeling akin to pity by the robust manhood of the day. That situation has been exactly reversed, so that to-day the person who sees no beauty in and derives no pleasure from the artistic as embodied in the product of man's genius and industry, as well as the work of nature, is an object of general commiseration.

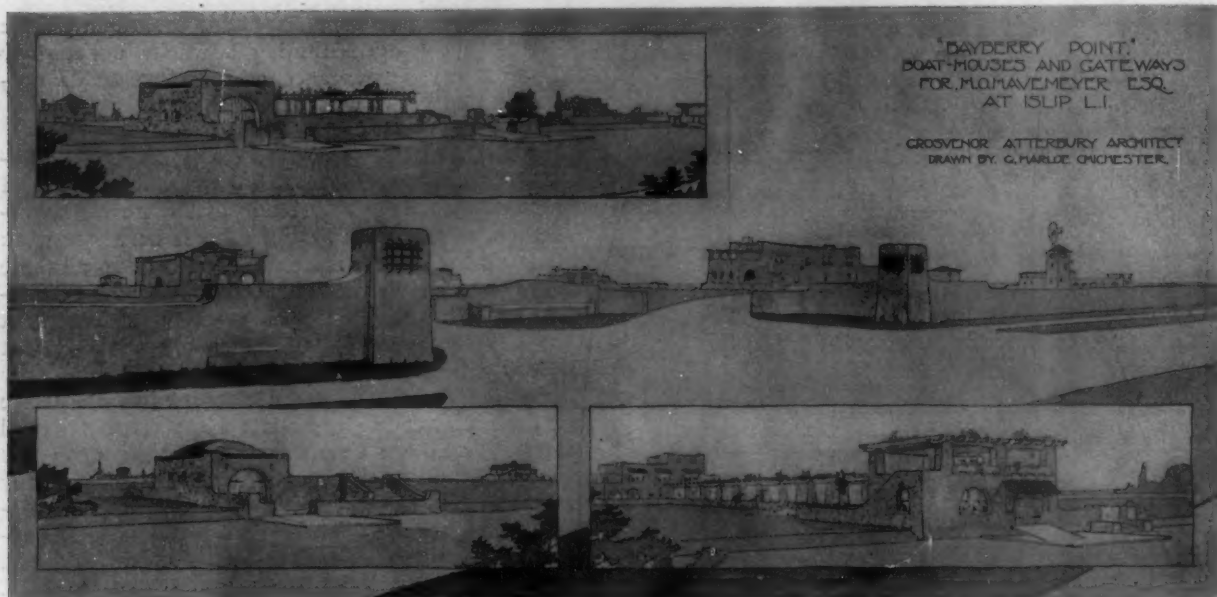
NATURALLY enough, a growing appreciation of his works has brought about an increased regard for the author, and we find the sphere of influence of the painter, sculptor and architect correspondingly broadened. Not so long ago as to have been forgotten by men still active in the affairs of life, an architect was viewed by a large proportion of the population—especially outside a few of the principal cities—very much in the nature of a possible additional expense in connection with buildings, which might perhaps be permissi-

ble in the case of public or large and important private buildings, but one constituting a wholly unnecessary and unjustified extravagance, as far as the major portion of building work was concerned.

GRADUALLY, however, the wisdom and desirability of having one directing head in charge of operations involving the erection of structures has become apparent, and the logical chief is he whose work in the broadest sense comprehends and includes all those features necessary to a building fulfilling the requirements of both utility and beauty—or the architect. It is due to the insistence of an enlightened and fast developing people who have learned to regard beauty of form and detail as an essential part of any structure that the architect has come into his present powerful estate. The at one time prevalent impression in this country, that an architect was incapable of efficiently serving his client in the matter of providing in a building the complex utilitarian equipment and exacting requirements of structure, has practically passed away, and since the growth of culture has, as we have seen, increased the appreciation of those qualities the true architect's possession of which has never been denied, he is transformed into a factor in the building world of almost inestimable power and importance.

THE situation is one that, while unquestionably the result of progress and development in America, intellectual as well as material, has been brought about so rapidly and silently it is scarcely realized even by those who are constantly coming in contact with the architect and his work. Owners realize it to the extent that it is now an exception to general practice if an architect is not placed in charge, complete and absolute, of a building operation of any importance, regardless of its character. To him all matters pertaining to the structure are referred, and he is held responsible for results. No detail of construction, equipment, material, workmanship or finish exists that he is not called to pass upon, and few and unimportant are those that he does not actually select and determine, which only further indicates the unmistakable tendency of the times, and appears in itself quite satisfactory.

OBVIOUSLY the increased authority of the architect brings with it increased responsibilities which he does well to recognize and prepare for. If the structure, equipment, finishing and furnishing devolve upon the architect, it is very apparent that all information on these topics from whatever source becomes not only of interest to him but of greatest value. In fact, it becomes necessary to him if he remains in the front rank of his profession. Manufacturers' and dealers' literature carried in the advertising sections of technical and class journals is only less interesting than the text and illustration forms, and, perhaps, not less important. Manufacturers' exhibits as established in various cities are also of greatest value, and it will be difficult for the architect who neglects to visit and study these impressive object lessons in practical building, as well as give attention to representations of advertisers of building material and equipment, to escape the suspicion that he is failing to make the most of his opportunities.



(Continued from page 94)

seats, bookcases, etc., built in to make the place liveable. The buildings are equipped with steam heat, electric light and plumbing. The sewerage is disposed of in an adjoining lot, thereby keeping the canal and adjacent waters and in good condition for boating and bathing.

SHOP WORK AS A NECESSARY PART OF THE TECHNICAL COLLEGE COURSE—A NOTEWORTHY INSTANCE AS INDICATING THE EFFICIENCY AND EDUCATIONAL VALUE OF SHOP EXPERIENCE IN AMERICAN SHOPS.

The importance of emphasizing the practical side of student work in our leading colleges is becoming better realized. It is conceded that the "book learning," on which our forefathers set so much store, is of little ultimate value in solving the problems that the student will have to meet after graduation unless it is combined with a practical experience based on actual conditions in the various departments of the student's work or the special line of study he may have selected.

It has become the custom of certain colleges where the value of practical experience is thoroughly understood to encourage the students, during the long summer vacations, to form connections with leading shops or foundries of large manufacturing companies, as a proper place for gaining useful experience.

As a further inducement to the student to take up shop work, Sibley College, of Cornell University, has inaugurated a system of credit markings to form part of the term record of the student. The general rule has been to allow one hour's credit for each two hours of shop work actually done, provided the shop or foundry was approved by the faculty.

In a recent issue of the *Hartford Daily Advocate*, it is stated that a student of Cornell University, upon inquiry of the faculty if the usual credit would be allowed him—that is, one hour for every two of shop work, if spent in the works of the Yale & Towne Manufacturing

Company, at Stamford, Conn., received a reply stating double credit would be given for time spent in these works, as, in the opinion of the faculty, it was the full equivalent of the instruction given at the university.

We doubt if there are manufacturing plants among the leading manufacturing plants in this country where a higher state of efficiency can be said to exist, or would warrant the faculties of our educational institutions giving such large inducements to its pupils to engage in practical work.

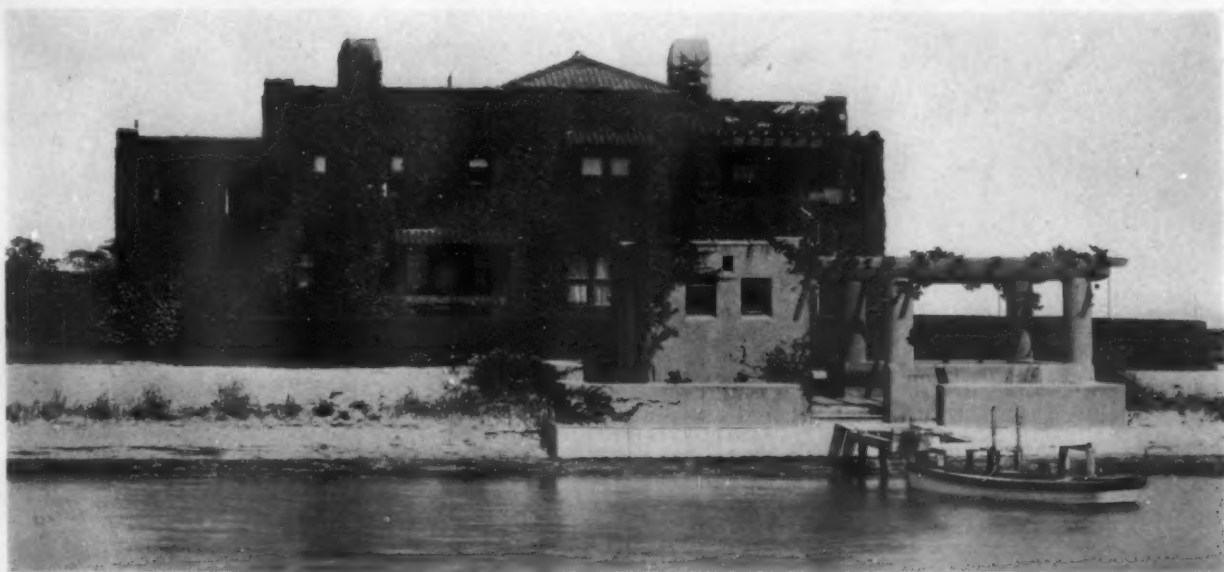
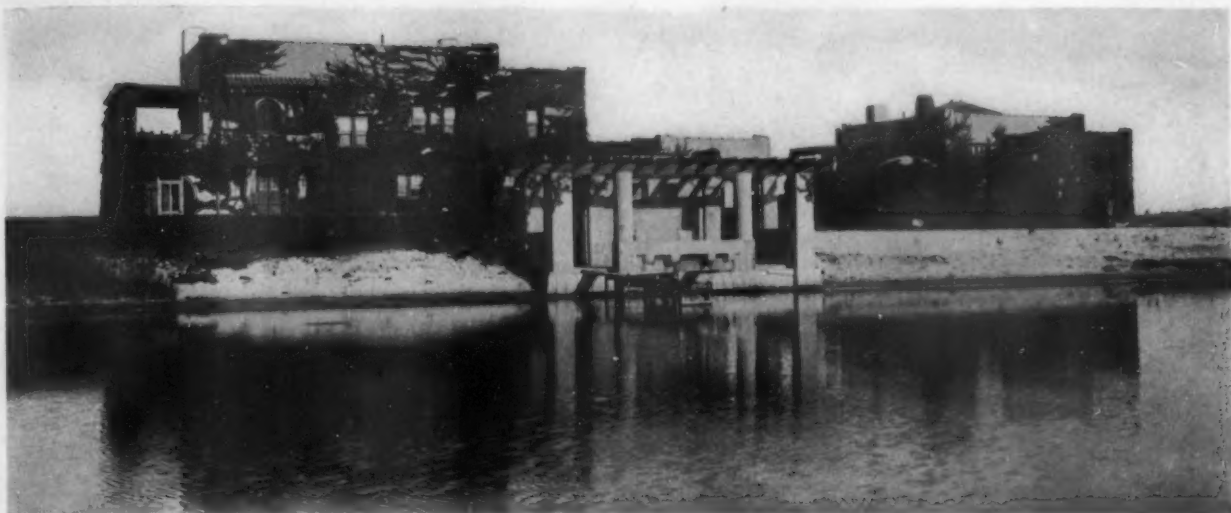
It is a healthy sign of our modern system of education when young men are willing to don the working clothes of the mechanic, and, shoulder to shoulder with the practical man in the shop, work to a sure conclusion the problems of which he has only heretofore had a theoretical knowledge.

A RECENT LEGAL DECISION

EFFECT OF STRIKE CLAUSE IN BUILDING CONTRACT.

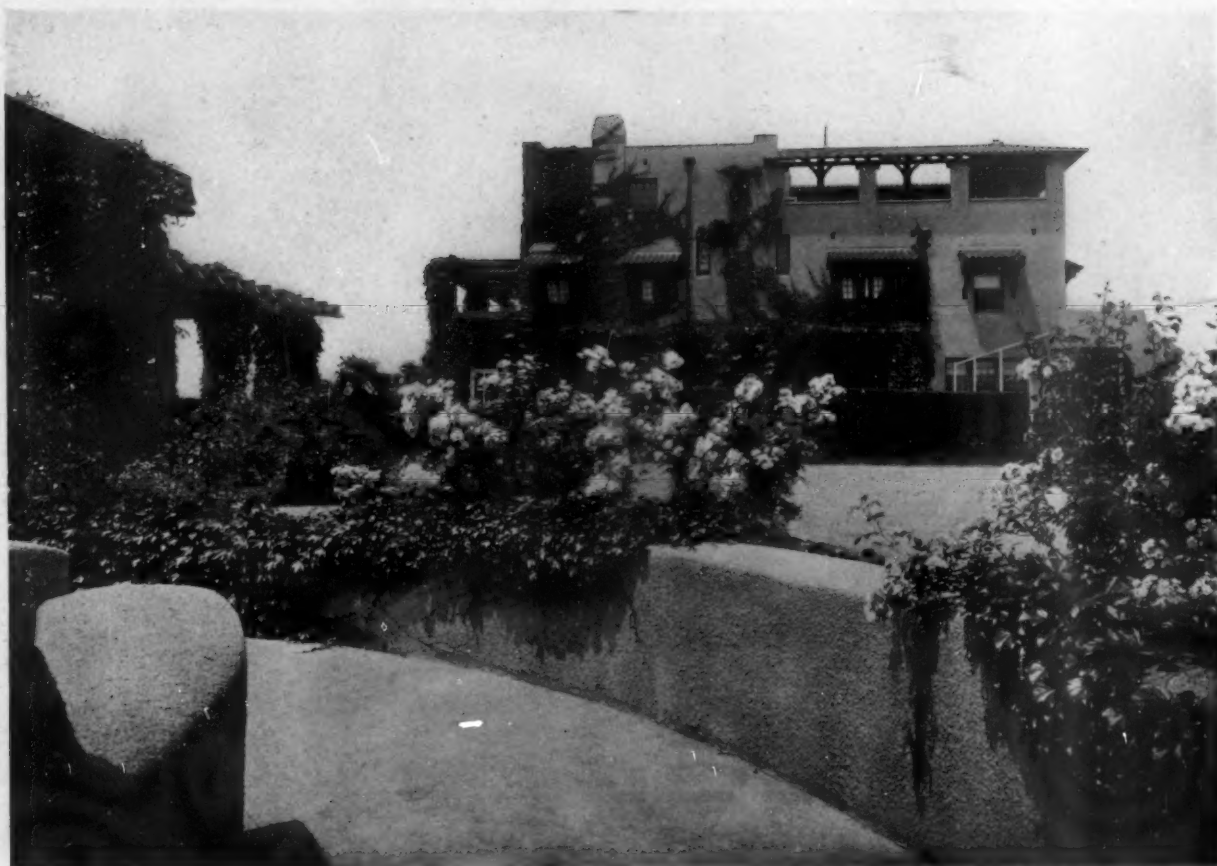
In an action to recover damages for refusal to allow the completion of a building contract, the contractor claimed that the owner refused to permit him to complete, and the owner claimed that there was such an abandonment of the contract as justified him in taking possession and reletting the contract. The contract contained a strike clause, and after the work commenced a strike existed, and the contractor joined an employers' association. The court held that the owner should be allowed to show that the association promulgated an order that members should not employ any more men than they were then employing, nor receive or deliver materials for any building without authority from the association's governing board, because the strike clause in the contractor's contract would not protect him from the consequences of a voluntary lockout on his part.

Mahoney v. Smith (New York Supreme Court, Appellate Division, First Department), 116 New York Supplement, 1091.



HOUSES AT "BAYBERRY POINT," ISLIP, L. I., N. Y.
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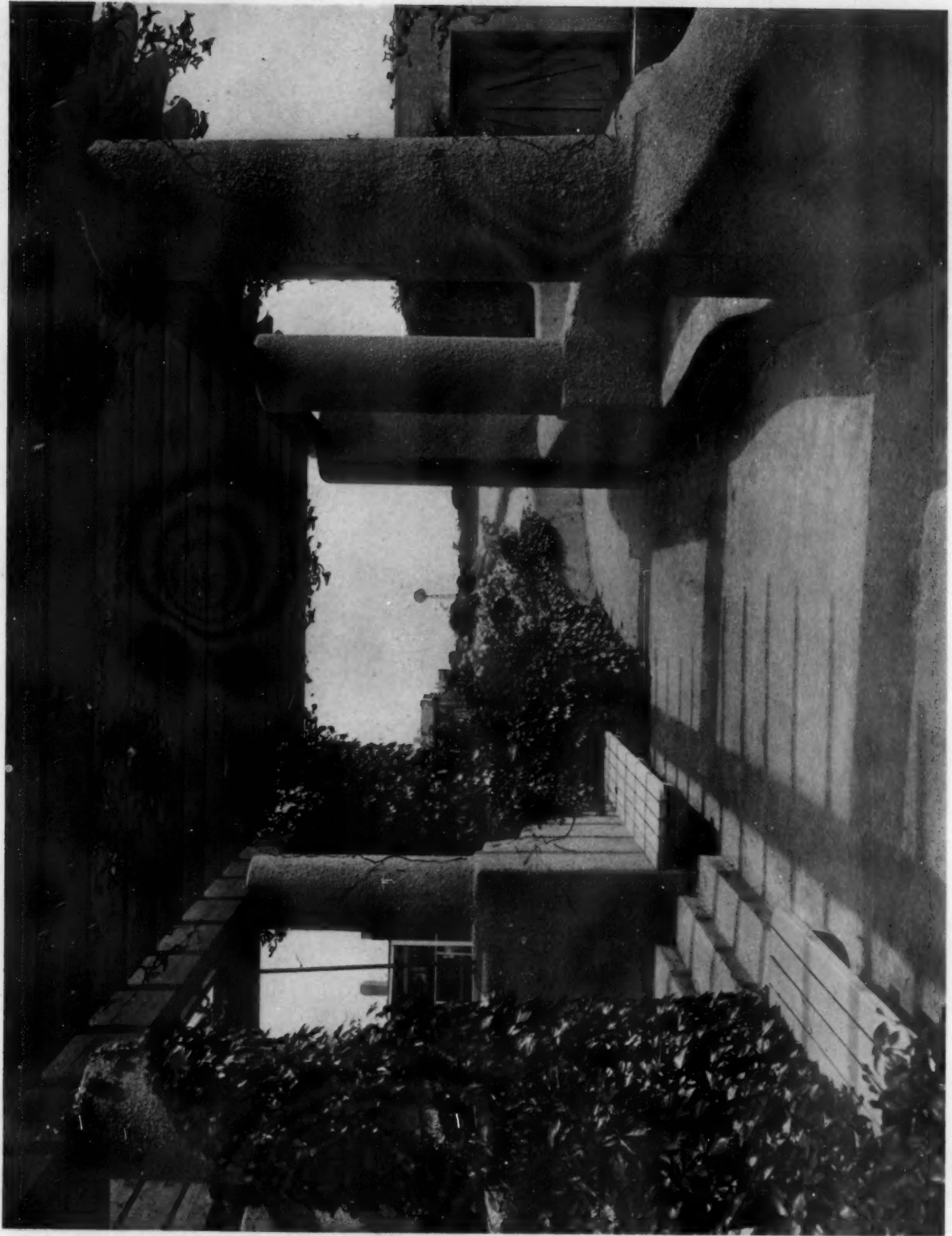
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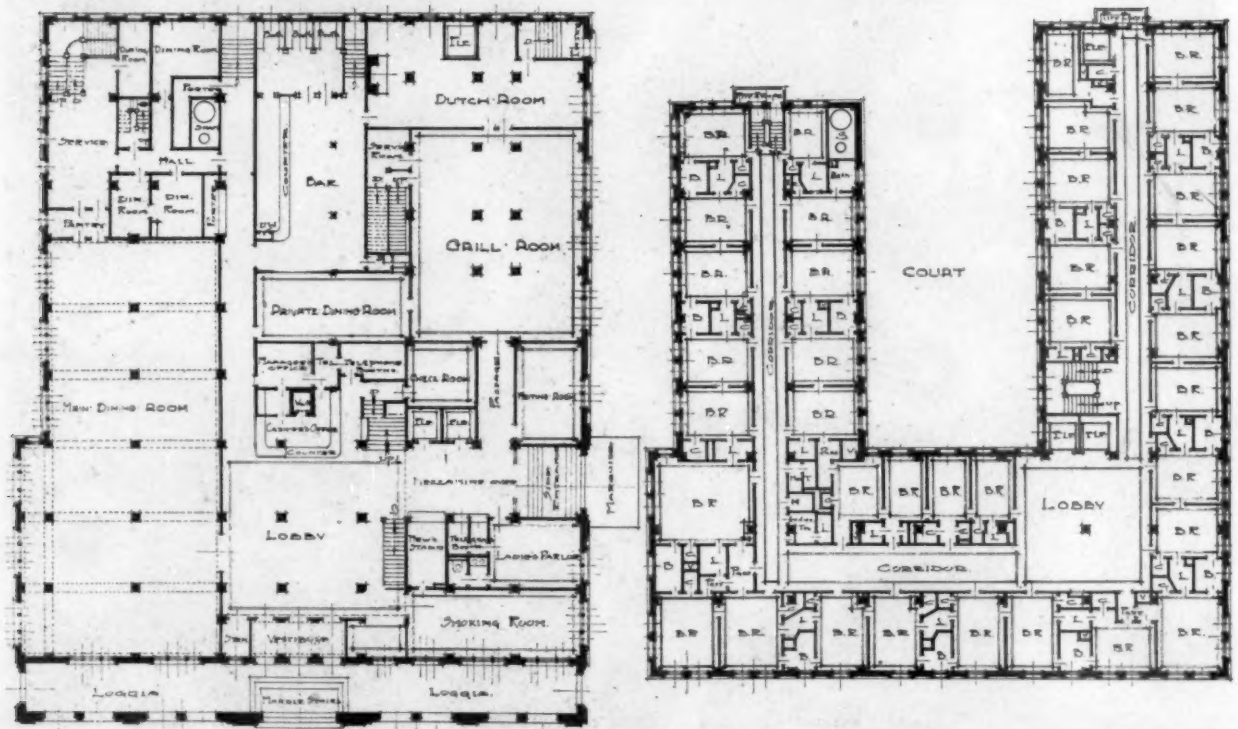
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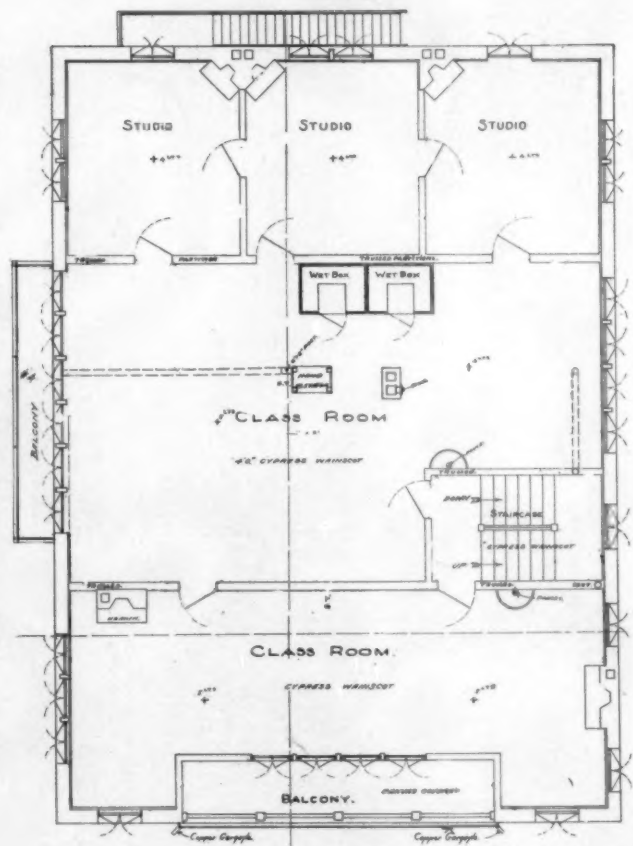
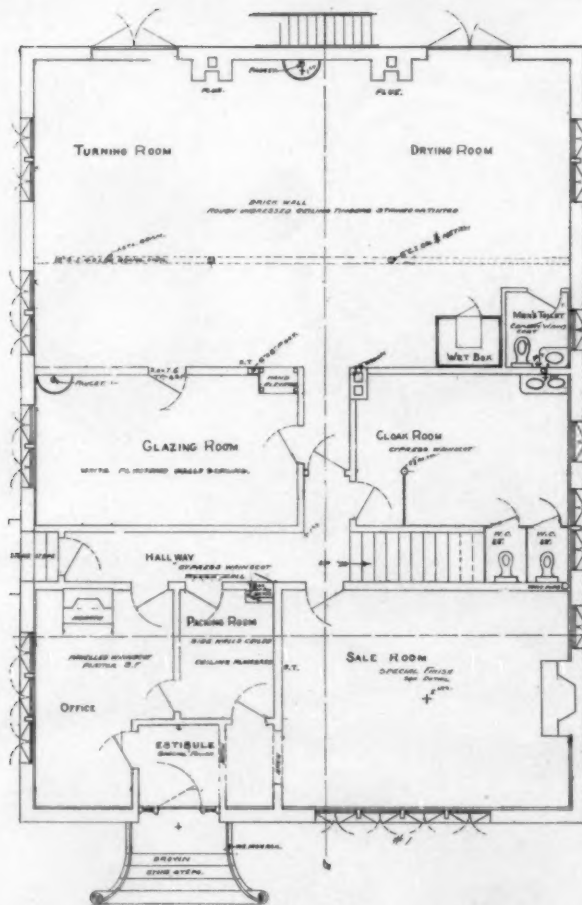
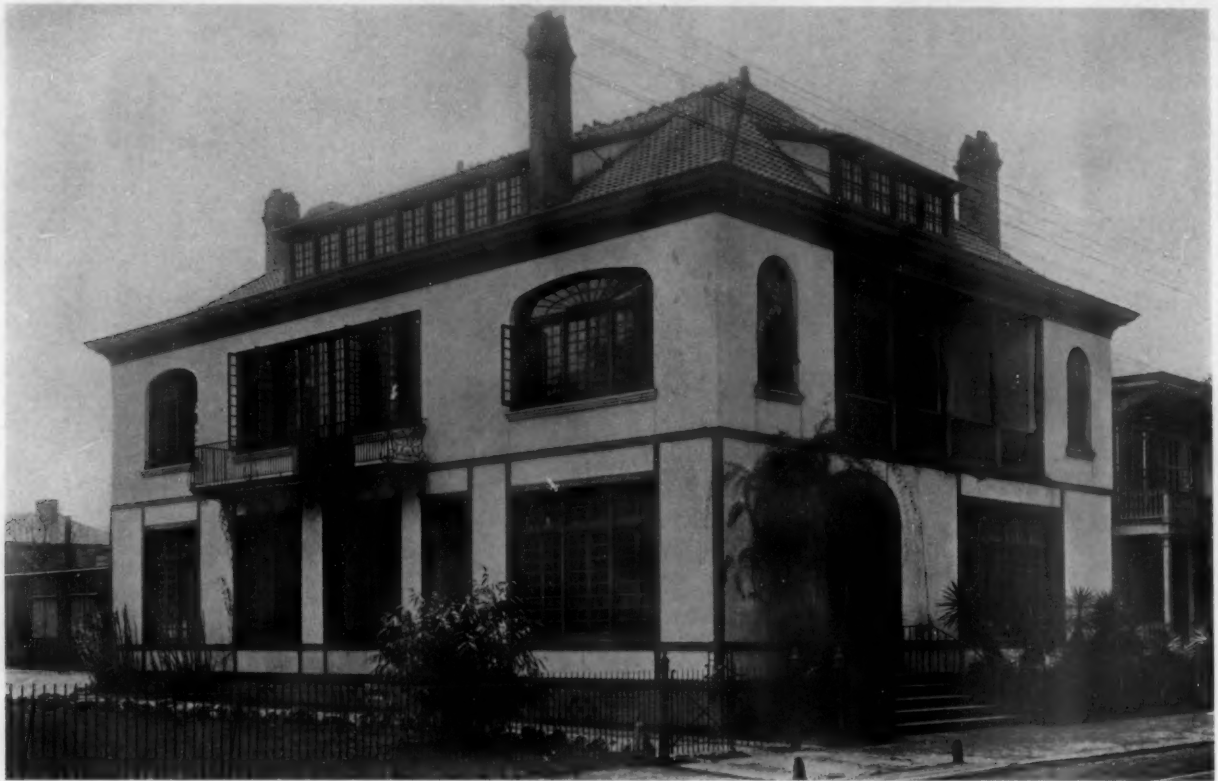
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