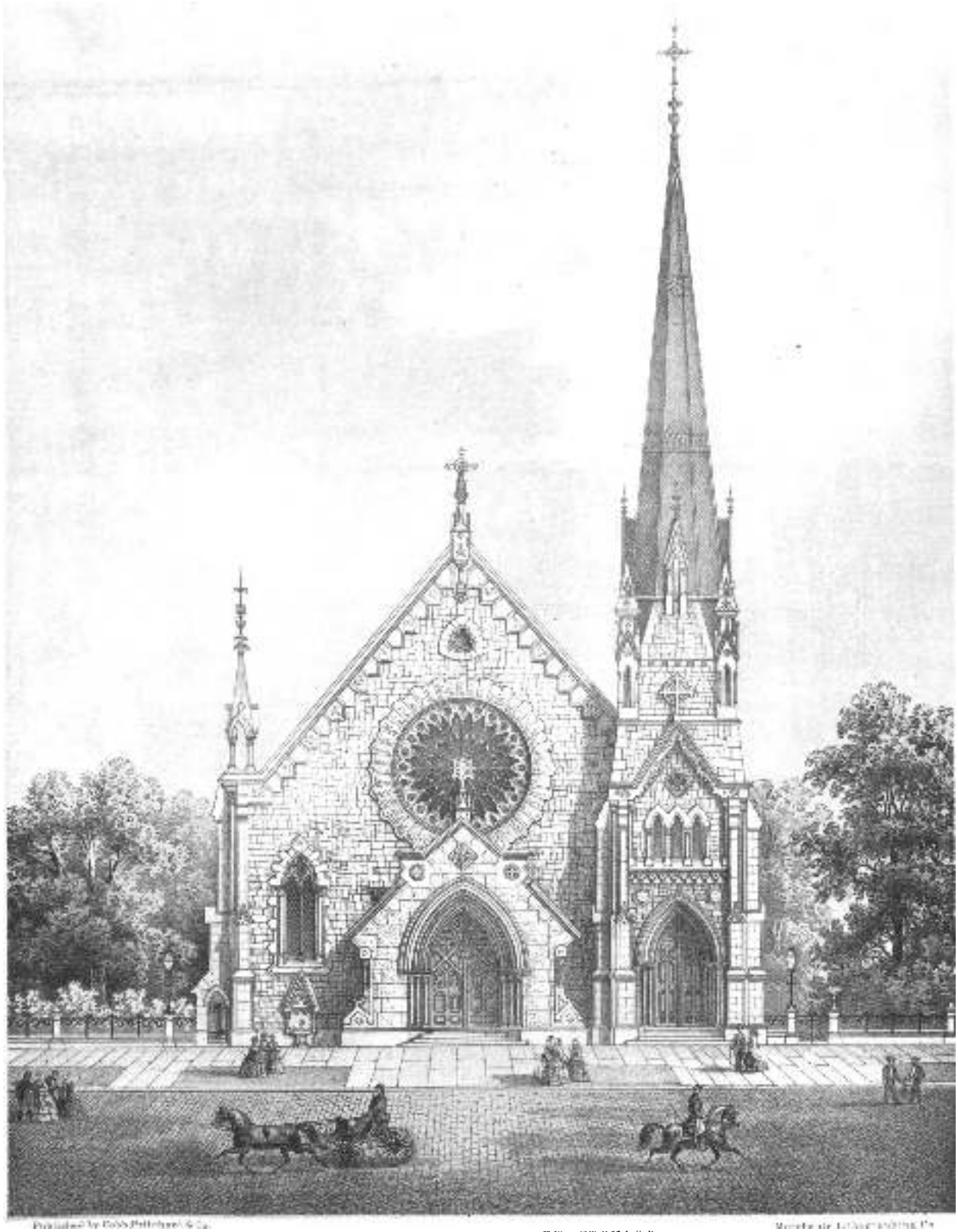

GRACE EPISCOPAL CHURCH, CHICAGO.

Sanford E. Loring & W. L. B. Jenney, Architects

Principles and Practice

OF

Architecture

COMPRISING

FORTY-SIX FOLIO PLATES

OF PLANS, ELEVATIONS AND DETAILS OF

Churches, Dwellings and Stores

CONSTRUCTED BY THE AUTHORS.

ALSO,

AN EXPLANATION AND ILLUSTRATIONS OF THE

French System of Apartment Houses,

AND

DWELLINGS FOR THE LABORING CLASSES,

TOGETHER WITH COPIOUS TEXT,

BY

SANFORD E. LORING,
Architect,
CHICAGO.

W. L. B. JENNEY, *Architect, Chicago,*
Graduate of the ECOLE CENTRALE DES ARTS ET MANUFACTURES, Paris; formerly Engineer Officer, Staffs of Generals Grant and Sherman.

CHICAGO:
COBB, PRITCHARD & CO.

CLEVELAND: COBB, ANDREWS & CO.
PHILADELPHIA: CLAXTON, REMSON & HAFFELFINGER.
CINCINNATI: ROBERT CLARKE & CO.

1869.

BOUND BY
THE WESTERN BOOK MANUF'G CO.,
CHICAGO.

Contents.

Preface.

NO APOLOGY is needed for any effort, however feeble, to improve the taste for art, or the character or convenience of our architecture. Our old friend Aguecheek, by whose dying bed one of us watched, while a student at Paris, tells us with that characteristic truthfulness of observation that marks his works: "Buildings are the books that every body unconsciously reads; and if they are a libel on the laws of architecture, they will surely vitiate, in time, the taste of those who become familiarized to their deformity. Dr. Johnson said, that 'if a man's hands were dirty, his thoughts would be dirty;' and it may be declared with much more reason, that those who are obliged to look, day after day, at ungraceful, mean, and unsubstantial objects, lose, by degrees, their sense of the beautiful and the harmonious, and set forth, in the poverty of their minds, the meanness of their surroundings."

In our text, especially in the "Review of the History of the most Important Styles," we have endeavored to be correct rather than original. In the part devoted to French Gothic, we must acknowledge a just tribute to Viollet Le Duc, whose researches and opportunities exceed those of any other writer.

Many of the examples given in the plates are from buildings that we have constructed, or are in the process of constructing, and are reduced from the working drawings. Every architect well knows that such drawings possess far more value than the first plans and elevations, for they have gone through a long and careful study in detail. No one who has not experienced it himself is aware of the difficulty in obtaining accurate engravings of architectural drawings. Notwithstanding the interest and care taken by the lithographers, and the praiseworthy results that they have in most instances produced, we are obliged, while thanking them for the zeal with which they have co-operated with us, to regret that numerous little errors have crept in, that escaped detection until too late for correction. We do not see any way to surely avoid such errors, unless the engravers are experienced architects; a combination of talent not often found. These errors, however, are of such a nature, (a little too much projection in a cor-

nice, a little deformity in a window cap, etc.,) that an experienced eye will easily detect them.

We have endeavored, as far as possible, to give details of the most important of the buildings represented, at a scale sufficiently large to render them easily understood. These have been reduced from the one-inch scale, and the full-sized drawings.

We have spared no labor in the preparation of this book, and have gone over our work many times; still we do not doubt but that our brethren in the profession will detect many short-comings, and if they will but do us the kindness to call our attention to them, we will, if the encouragement we meet with should warrant a second edition, endeavor to correct them.

THE AUTHORS.

CHICAGO, Feb'y 10, 1869.

TEXT.

Chapter I.

FIRST PRINCIPLES.

ARCHITECTURE is the art of *plain and ornamented construction.* In the first is included the anatomy of the design, all that relates to the laying out of the work, the general forms and proportions, the disposition of the solids and openings.

This is what one calls in a painting the composition, and in a novel or play the plot; it is the appearance a building presents when seen from so great a distance as to obscure or conceal the detail.

Here the architect should spare no amount of labor or study, nor consider his work finished, until he can truthfully say: "*This is the best I can do.*" Architects are so often poorly paid, that they are strongly tempted to think: "That might be better, but then I cannot afford to spend any more time over it; I guess it will do." When an architect's time is *all* the means he has of supporting himself and family, he is obliged to do this, be it never so repugnant to the honest desires of his heart. Every architect knows, that by tracing paper, the forms of the openings, the sky-line and other important features are changed readily, and a satisfactory plan or elevation secured with comparative rapidity.

By plain construction, we wish to be understood in an architectural, or what is the same, an artistic sense; a construction in which all proportions are just; it is what is often termed *ornamental construction,* without which, it is true, a building can, by judicious and elegant ornament, present to the near observer a fair appearance; still, this is always a difficult and disagreeable task, and in the best periods was never attempted. It is an old and well-established principle in architecture, *to ornament construction, never to construct for the sake of ornament.* Decoration should arise naturally from the construction, and the constructive idea be carried out in every detail.

Owen Jones defines true beauty in architecture to be "that repose which the mind feels when the eye, the intellect and the affections are satisfied by the absence of any want."

Faulty construction or seeming weakness, however secure in reality, never gives this repose. The Beauvais cathedral, although some six hundred years have elapsed since its dedication, has a painful appearance of instability; parts of its construction seem like props to prevent its falling, and although it excites the wonder of the many, it lacks that repose and solidity so necessary to grandeur.

The old adage: "*De gustibus non est disputandum,*" so often and so injuriously mis-quoted, is true only in a limited sense; taste in art can always be accounted for.

One is astonished at the amount of study that has been expended on a piece of arabesque or diaper work of the best period. The work is first laid out into general forms, which are made to contrast and to balance; these are sub-divided and enriched, the intersections ornamented, and the principle carried out even to the surface of the smallest details, which never interfere with the general effect, so that the work can be admired from every point of view.

The beauty of Greek art is exclusively due to the great care and refinement of taste exhibited in the drawing of every line; many, seemingly straight are not so, but arcs of hyperbolas; many, seemingly horizontal are flat arches.

The general effect of a building depends upon the forms and proportions of its leading features; its power to continually excite our admiration, and satisfy every wish, can only be obtained by a judicious application of varied, artistic details.

The plot of a play or novel would excite but little interest, unless enriched by the study of character and details of incident. A painting will produce its general effects, by putting in a few broad masses of light, and rubbing in the shadows; but then it must always be seen from a sufficient distance to conceal the absence of detail and the monotony of color.

A building presents to the distant observer, its sky-line and broad masses of light and shade; as he approaches nearer, the large details are made out, and add to the interest of the design; these details are further enriched by details within details, the interest increasing as the observer advances, until we have such a whole as we find in the works of the old Gothic architects, surprising us at every turn by their picturesque play of light and shade. Along every string-course, under the hanging tracery, or in the mouldings over every doorway, are to be seen portraits of eminent persons, or bas-reliefs illustrating the history of the times or the teachings of the Bible; or enriched with geometrical tracery or foliated forms.

Harmony of form appears to consist in the proper balancing of the straight, (horizontal or vertical) the inclined or the curved.

Garbett* has made a very careful study of this subject; his remarks are so valuable, and exhibit so much thought, that we do not hesitate to quote them in large part.

"Forms may be divided as regards their inherent or essential expression (apart from association) into at least five classes, according to their degrees of contrast

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* Principles of Design in Architecture. Garbett, London.

or gradation, from the most grand, severe and forcible; to the most elegant, fanciful and delicate. Thus we may arrange:

" I. Rectilinear and rectangular forms.

" II. Rectilinear but oblique-angled forms.

" III. Curvilinear forms without contrary flexures.

" IV. Curvilinear forms with artificial contrary flexures (or those composed of two curves).

" V. Curvilinear forms with natural contrary flexures (or those in which the same curve, with the same equation, continues throughout).

" In most complicated productions of nature or art we find several, or even all of these classes of form united.

" Let us inquire, then, to what different parts of such a composition the different classes of form are naturally best adapted.

" Alison has the following remarks on this subject: 'The great constituent parts of every building require direct and angular lines, because in such parts we require the expression of stability and strength. * * * A balustrade might be finished in waving lines, but certainly would not be beautiful. A twisted column, though affording very pleasing curves to the eye, is acknowledged to be less beautiful than the common and regular one.' * * *

" It deserves to be remarked, that the form of the great constituent parts of all vegetables, whether strong or delicate, is nearly the same; the growth of the stem and the direction of the branches being in both alike, and in both, also, either in straight or in angular lines. It is principally in the more delicate parts of the first, in the young shoots, and in the foliage, that they deviate from this form and assume winding or curvilinear directions.

" It may be taken, then, as a principle hardly admitting of question, that, as in nature, so in art, the graver and more forcible varieties of form should in every case prevail most in the ruling and structural parts of a work; and that the more elegant varieties should find their place chiefly in the ornamental details.

" In all the most approved work, of whatever style, this will be found an inviolable rule. Whether a portion only, or all the five classes of form be employed, the class nearest the beginning of the above list will be found in the ruling forms and divisions; and that placed latest in our list will be confined to the smallest and most ornamented parts; the intermediate class or classes being found in features of an intermediate degree of importance.

" It is impossible, however, to cite cases of the operation of this principle by itself, because it is always, or always ought to be, modified by the introduction of another, which is perhaps equally (or almost equally) important: viz, that the same gradations of qualities observed between the principal and the subordinate features should always (as in trees) be maintained between the supporting and the supported parts, so that the classes of forms standing nearest the beginning of our list, should prevail more in the lower parts of a building than (in features of the same degree of magnitude and importance) higher up; and the classes

employed only for the nearest ornaments near the ground, may be applied to more important features in the upper parts, and even to principal members, at the top of all.

"The allotment of the class of forms proper to principal, subordinate and ornamental parts, will not be the same in all the stories of a building, but must be modified according to the height above the ground.

"In deciding to which of the five classes of form a given feature should belong, we may consider this to be dependent on three elements jointly: First, the graver or lighter character of the destination of a building; Secondly, the greater or lesser importance of the feature itself; and Thirdly, its height above the ground.

"By regarding each of these elements apart from the others, we may deduce these three rules:

"I. That in buildings of different destinations, features which are of the same importance, and placed at the same heights relatively to the whole building to which they belong, should never be found belonging to a graver class of form in the building of the lighter destination, and *vice versa*.

"II. That in the same building, and at the same height above the ground, principal and structural members should never belong to a lighter class of form than subordinate features, nor these to a lighter class than the ornamental features.

"III. That in the same building, features of the same degree of importance, but situated at different levels, should never belong to a graver class of form at the higher level than at the lower."

These principles are of much importance. They were studiously followed in the best Grecian and Gothic work, and will explain our likes and dislikes in much modern work. They cannot be violated without injury to the design.

For further discussion of these principles, and for much valuable information on the principles of design in architecture, we would refer the reader to the little volume already named.

The use of architecture is to provide proper buildings for the infinite varieties of uses developed by the wants of the human race. The world and all that therein is, was formed for the service of man, and the degree in which it is properly used is the measure of the resulting delights. He is truly an architect, who knows every want and can provide the means of satisfying it. An architect is a building artist. It is his office to use building materials as the musician uses sounds; the two arts are nearly allied; both appeal to the imagination and feelings.

It is claimed by some writers that the province of an architect is to design sculpture to fill the frame-work of constructions. Should he attempt this, the sculptor will excel him, for he has devoted a lifetime to the exclusive study of one branch of art. Other writers insist that architectural beauty consists in polychromatic decorations, to use their own expressions: "throbbing with color,"—"suffused with all the tints of the rainbow." Mr. Audsley claims that the real office of the architect begins with the colored decorations of the interior, after he

has completed the "mere shell or foundation for artistic display." If this is true there is no place for the architect at all; for the sculptor, the landscape and figure painter can surpass him. We would suggest that some artistic taste as well as an extensive practical knowledge of almost every subject is required to design these "frame-works," these "mere shells," in arranging the plans so as to properly dispose the light and shade without sacrificing the convenience and use of the building, in designing the exterior, arranging the forms of the sky-line, general disposition of the great features, properly balancing the light and shade, in designing constructive ornamentation, in accenting the work and giving expression and meaning to the whole. An architect in every other point of view than a building artist, finds some one to excel him in a specialty peculiarly their own, but in his own special province, that of combining in one harmonious whole the details of all, he stands alone and without a rival. He has the field to himself; a field broad enough for the highest talents, the greatest genius, and the most protracted study.

The architect labors under many difficulties, and they are the same the world over.

Art is dependent upon public feeling, and the public, as a whole, are not well-informed in architecture. It is but seldom that the means of patronage in their hands are accompanied by that knowledge, so necessary to give value to that patronage. Hence it is, to use the words of one of our own architects: "that we are often placed in that peculiarly trying position, of endeavoring to do our best before an uninformed and perfectly irresponsible tribunal, when we know perfectly well, that the best is not what will be best appreciated,—in fact not what is wanted,—and stands no possible chance of meeting with success." Every architect, in practice, is often placed in that position. Competition designs are frequently being asked for, and sums offered for the best design, that would not pay the expenses of making a single one of them. The building committees are often chosen from men who have obtained their positions through occupations totally foreign to the question at issue, and upon which they are constituted the judges. They know little or nothing of architecture as a fine art, and very little of the purely practical side of adaptability to the wants and requirements. Some are totally indifferent, and have been known to snooze in their chairs, while the architects are explaining their plans. They are confused by the number and variety of the designs presented. In all branches of art, ignorance is incapable of appreciating the highest efforts. How often have we wandered through the galleries of the Louvre and the Luxembourg with parties of our traveling friends or acquaintances, and been vexed at the utter indifference which they manifested to our efforts to produce even a faint expression of admiration for some of the grandest works of art the world has ever seen, and afterwards, while hurrying through the rooms filled with the works of the French painters of the last century, have them stop and give vent to extravagant expressions of admiration for a crude, highly colored, mannered picture, that holds its place in the galleries, not from any artistic value it possesses, but because it is the representative of a school or period of art. It is not

surprising that at general competitions, before a committee of politicians, that the prize should not be awarded to the best, nor even the second or third best, but to the very worst. Bribes are offered to dishonesty in estimates; a good design is often discarded on the plea of cost, and a poor one is chosen because it has been under-estimated.

This is why our best and well-established architects seldom compete.

One cannot take up an architectural journal of any country without seeing an article or two on the injustice shown in general competitions, which seem to have culminated and reached an acme in the one for the English Law Courts. These journals are all doing their best, by exposing the ignorance, stupidity or partiality of the committees, to lessen their occurrence. The evil does not wholly lie in the committees; a part at least, of the responsibility rests with those that appointed them. Why is it that so many feel themselves capable of judging on art matters, while they would instantly decline, on the plea of total incapacity, were it a question of medicine, chemistry, or the merits of a sonata.

What we require is a more universal art education. Private, public and sale galleries of paintings in all of our cities are doing much. Writers on art, such as Ruskin and our own Jarvis, by teaching their readers what is correct taste and what is bad; what to admire, and why; and what to condemn, and the reason therefor; by teaching one to look at nature as nature should be seen, with the intellect and affections as well as with the eye; are increasing the taste and desire for art, and an interest in drawing. Every one should know how to draw at least sufficiently well to enable them to make pleasing sketches from nature. One of the hopeful signs of a better future is in the greatly improved forms of manufactured articles, and the artistic taste displayed in their ornamentation. A large share of this is due to the influence of the universal exhibitions, by bringing together the works of the world, that each nation may see the merits of their neighbors, and their own short-comings. Until within a few years very little furniture, paper hangings, mirror-frames and articles of silver-ware and jewelry were well designed; there is now a great change for the better. There is no quicker or surer way to educate the taste of a people, than by means of their social surroundings.

Occasionally an architect is so fortunate as to meet with a patron who possesses a true taste for art, and a genuine appreciation of the beautiful.

One of these brilliant exceptions is the Bishop of Cork, from whose address at the opening of a new church in his diocese, we beg leave to quote:

"The Almighty Creator Himself, we may say without irreverence, delights in beauty. All the forms of nature are beautiful; the shape of the heavens is beautiful; the midnight sky is beautiful; the moon walking in her brightness is beautiful; the sun rises and sets in beauty; all creation is formed in beauty; and my Christian friends, there is no reason why we should not use beautiful forms too. What is architecture? Nothing but the beauty of order, the beauty of shape, the beauty of size, the beauty of proportion. What is music? Nothing but

the beauty of sound. What is painting? The beauty of color. What is oratory? The beauty of speech. What are the higher sciences? The beauty of reason. It is contrary to God's design, and contrary to our nature that weshould not make use of those things that God seems to delight in. * * * *

"If we desire to have, as we have, our homes not only sufficient to protect us from the weather, and convenient, but well furnished in every part, and beautifully arranged, are we to except the house of God? If we could build a house to God with stupendous architecture, we ought to do so—with the loveliest shapes and forms and colors. I would I could have all our churches beautiful, and I would I could have in them all beauty of sound. The house is for God's honor, and the benefit of His people; and the pleasant sounds within it, whether formed by instruments or that most exquisite of all instruments, the human tongue—are dedicated alike to the service of God. I think it exceedingly desirable that we should have such churches as this."

This, and every manifestation that an architect's labors are appreciated and enjoyed are like oases in a desert; it is an encouragement to us all to study, to labor, to hope. Were such patrons only more numerous, (and just in the degree that they are so, will architecture and all the arts advance,) we would live amidst a luxurious profusion of elegant things.

Art would then occupy a place in the thoughts of the people as a co-laborer and equal with her sisters, Agriculture, Commerce and Manufacture.

Chapter II.

A REVIEW OF THE HISTORY OF THE MOST IMPORTANT STYLES OF ARCHITECTURE.*

IT is not our purpose to enter into a detailed discussion of the numerous styles of architecture that have flourished since the days of the Pharaohs. Almost the entire field has been gone over by Fergusson, and many authors have treated at greater length, the styles of particular countries, or periods. We propose simply to give a few generalities, that will enable the reader to know something of the origin, progress and transitions of the principal styles which to-day exert an influence upon our architecture.

The several styles have uniformly resulted from the social, religious and commercial wants of the people that produced them; climate and materials exerting a local influence. In many countries religion was the controlling power, the priests the architects. Art was in the hands of the learned few. The masses, ignorant, superstitious, and easily controlled by the priesthood; contributed largely both in labor and money. In the Gothic period some liberty was given to the artisan, and we find an individuality stamped upon the details; but in the other styles, especially the classic, we see but one controlling spirit; unless it may be in the sculpture, for which the architect has arranged only the space and the frame-work.

Every style had its slow, timid beginning, its days of vigorous youth and rapid growth, its gradual improvement in elegance of design, and in the refinement of detail, its maturity—and then its decay, gradual and scarcely perceptible at first, but finally rapid and headlong, until it disappeared to make room for a new style, which, in its turn, passed through the different phases. The study of any style necessarily includes many points in the history of the nation that produces it. The Romans in their conquests carried their architecture with them; built temples and practiced their religion. The institutions of the conquered gave way before those of the conqueror, and Roman architecture became the style of the province.

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* We prepared from our notes, two articles on this subject for the American Builder, Volume I., Numbers 1 and 2.

Egyptian.

Of all the architectural objects still existing or known only to history, the oldest are the Pyramids of Egypt. There is a great difference of opinion with regard to their date, a difference which in the case of the Great Pyramid (Cheops) extends over a period of no less than 2,400 years. These pyramids mark the first of the two periods of Egyptian architecture; they are found, with few minor exceptions, in the vicinity of Memphis, the capital of lower Egypt.

Our knowledge of Egyptian architecture begins at its highest point of excellence. Of its early beginnings we know nothing. We first find it when in full maturity, strong and intelligent; and having accomplished, in its way, many things that have never been surpassed.

Those enormous blocks of granite, elevated to a wonderful height, were transported from Syene (some five hundred miles); they are cut with a precision that modern stone-cutters would not excel, and are smoothly polished.

The early Egyptians built for all time, and to this end they sacrificed every other feeling. We do not find much beauty, nor great usefulness; but instead, simplicity, largeness of material and stability of construction, that gives to their works an eternity of duration only excelled by that of the everlasting hills. No nation has ever taken such pains to preserve their dead, from the hand of time or sacrilegious man. To these efforts we owe our knowledge of the early history of Egypt from the time of the Pharaohs.. For a long time the history of Greece and Rome was considered the ancient history of the world, but a far earlier has since been decyphered from the hieroglyphics of Egypt and the arrow-headed characters of Assyria. In these two countries we find the origin of not only almost every architectural feature of the Greeks, but of many things in their civilization that for a long time were thought to be of their own invention.

The Egyptians used the arch as early as the Fourth dynasty, and erected Peristylar Temples and Proto-Doric columns, centuries before the oldest known specimens in Greece. Were our knowledge greater we might be forced to give to these ancients the credit of rough-hewing the foundations upon which our modern civilization is erected.

Temples and obelisks are the characteristics of the second period of Egyptian art. These were erected by the Theban kings, a later dynasty than the Pyramid builders.

It is during this period that the great palace Temple of Karnac was commenced; a temple remarkable alike for its grandeur and its extent, covering some 430,000 square feet. No description unaccompanied by illustrations could be intelligible; like many others, it is an accumulation, during several centuries, of

parts around a sacred center, with no uniformity of style or plan. This is the first temple of which any record remains.

The prosperity of Egypt was for a while checked by the Shepherd invasion. Who they were is unknown, but their subjugation of Egypt was complete; their reign was tyrannical and oppressive. Finally the Shepherd race was so weakened that the Egyptians rose up, and under the leadership of the descendants of their old kings, drove them from the country. The old style of architecture was then restored, and Egypt soon attained a power and greatness that made her the first nation of the ancient world.

After the Nineteenth dynasty, and for a long period, there is but little to interest the architect until the reign of the Ptolemies. Here we find a more enlightened policy, and art was again in the ascendant. Some of the temples of this age are beautifully picturesque and rich in decorations; one class in particular is especially interesting, being undoubtedly the original of the Greek peristylar forms.

The Egyptians well understood the use of three of the elements of architectural grandeur and effect: mass, stability and largeness of material; nor were they insensible to the value of detail. They successfully combined sculpture and painting with architecture. Their decorations are the expression of a symbolic mythology. We find richly colored bas-reliefs representing religious ceremonies, the history of their divinities, offerings and instruments of worship; their sculpture fading by insensible degrees through historical painting to hieroglyphics.

The explorer is astonished at every step, and pauses in admiration of the wonderful works of this wonderful people. He is impressed with the expression of power, and the enduring nature of all that he beholds. The paintings on the walls of the rock-cut tombs, and the hieroglyphics on each sarcophagus are as brilliant as if fresh from the brush of the artist. Loaves of bread are found that were baked from wheat that grew on the banks of the Nile before the Christian era, and articles of toilet that served to decorate a Theban belle at the courts of the Pharaohs.

Grecian.

In Greece we find a new civilization, a new style and a new religion. Notwithstanding that we can trace the whole back to Egypt and Assyria, we cannot cease to wonder and admire. Whatever the Greeks touched they clothed with so much elegant refinement, and displayed such a knowledge of the most abstruse and subtle principles of art as almost to exhaust the subject, and defy a further advance in that direction; and although many centuries have elapsed, and our knowledge of physics and science greatly increased, still we can turn back to this ancient civilization and read many a profitable lesson in sculpture and architecture, and never cease to wonder that in so many things in art, the ancients should have excelled the modern copyists.

Their art possessed in the highest degree, beauty of proportion, beauty of detail, a subtle and intellectual elegance of design that seems to have originated and disappeared with the ancient Greek civilization.

Greece was inhabited by two distinct races, the Ionic or Pelasgic, the Doric or Dorian, and wherever we find these orders the respective races prevailed.

The Ionic races were allied to the Tartar or Celtic, and had their headquarters in Arcadia. The Doric were Teutonic in origin, and seem to have preferred the "art of war" to the peaceful arts for which the Ionic were more remarkable. Sparta was their principal city. In Athens the two races happily united, and founded a city, proverbial for its elegant refinement and artistic taste, its science and philosophy. The fame of ancient Athens is as great in the Nineteenth century as it was at the completion of the Parthenon, and we cannot cease to wonder that so much exquisite taste, such just appreciation of the true and beautiful in art, such elegance of detail and proportion should have existed at so early a date, or that having once existed and been perpetuated in marble, it should ever have been forgotten, and all art for a time seemingly lost.

The Ionic order is of Assyrian origin. One of its prototypes is found in the Great Hall of Xerxes, at Persepolis, and indeed almost every detail can be traced back to this city or to Nineveh. Notwithstanding this, the Greeks were such true artists that they soon so improved and refined the models of their old masters as to produce an order far more beautiful than any to be found in the country that gave it birth.

The order depends less upon sculpture than the Doric, still many parts that are painted in the latter are carved in the Ionic. Its principal characteristic features are the Volute and the Honeysuckle moulding, both of Asiatic origin. The capital, although composed of these beautiful details, is nevertheless, the least pleasing feature of the order. The base is much simplified from its ancient prototype, which contains a richly carved member entirely omitted in the Grecian. There is good reason to believe that color was used in the order. Fergusson expresses an opinion that the carved parts were gilt or picked out with gold, relieved by colored grounds varied according to the situation in which they were found.

In the Ionic Temples we find all that exquisite drawing, and mathematical accuracy of line that characterizes Greek art. The contours of the columns are hyperbolic curves, but just removed from the straight line. The lintals are flat arches. The axes of the columns slightly incline inwards. These refinements are very slight, it is true, but nevertheless, they are painfully missed in modern copies of Greek work.

Unfortunately most of our knowledge of Ionic architecture is derived from description, illustrated only by the smaller temples; all the largest ones are entirely destroyed; the site of the most remarkable, that of Diana at Ephesus, is still a matter of dispute.

The Ionic civilization was at its height at the time of the Trojan war; it existed on, however, for some eighty years longer, when it disappeared, as so many styles have done, before that day and since, to make place for a new civilization, the Doric, which appeared during the palmiest days of Grecian art.

The opinion has often been advanced that this order originated from a wooden original; a more careful study would destroy all the evidence produced by the advocates of this theory, which is based upon a fancied resemblance of a Doric column to a wooden post. Unfortunately for these theorists, the earlier the example, the more heavy and massive is the column, leading one rather to the belief that it originated from the modifications of a stone pier, rather than a trunk of a tree. Be this as it may, the Greeks borrowed the order from the Proto-Doric columns of Egypt, and cultivated it so carefully, treating it with all the true artistic skill for which they are so eminently remarkable, that in the Parthenon, their most celebrated temple, we find it clothed with the highest and most abstruse principles of art, the most delicate refinement of detail, and the most elegant proportions.

Nothing can be more just than the celebrity of this temple; it was built when the art was at its acme, and in a city whose renown for taste, elegance, philosophy, refinement, the most perfect and complete, will be remembered long after many of our present great centers of civilization shall have passed away and been forgotten.

For the origin of their third order we return again to Egypt, and find a bell-shaped capital that we are able to trace through Asia Minor to Greece. The volutes are borrowed from the Ionic; the acanthus leaf is wholly Grecian. The old tale of the basket and the Corinthian maiden, is scarcely worthy of belief, unless it may be in relation to some use of the acanthus leaf prior to its introduction as a part of the Corinthian capital.

Here, as in the Ionic, we are forced to judge of the larger temples by descriptions, and the examples of the smaller ones that remain. This elegant, highly luxurious order is too well known to need description. All the refinement of the other orders is here assisted by elaborate detail, so extensive as almost to cover the entire work, and even to err on the side of overloading; still, even if we admit this as a fault, the order is so rich and elegant, and above all so appropriate for interior work, that in our admiration we forget to criticise.

Considering these three orders as the "Grecian style," we cannot fail to admit that it possesses all the requirements of a true and noble one. It was invented by a refined and intelligent, art-loving and industrious people, for the requirements of their religion, and to this end it was as admirably adapted as it is unfit for modern wants; and yet how many copies of Greek temples disfigure our cities, under the name of state and court houses, banks, churches, national public buildings, and even private residences—copies of the very worst kind; all the refinements that the Greeks labored so earnestly to perfect, ignored and neglected. The contours of the columns instead of being arcs of hyperbola, are straight lines;

the lintals are horizontals instead of being flat arches. These are slight differences, it is true, but in such slight differences lie the refinements in all art; they constitute the difference between good design and bad; they indicate a true artistic feeling of the highest order; they are so subtle as almost to escape detection, and yet in them lie the cause of the just celebrity of many a work of art.

In the ancient examples, the pediments were filled with sculpture that would do honor to artists of any time; in the modern copies these are often left like so many empty, unmeaning frames; the mechanical work without the intellectual adornments.

In Greek architecture the greatest care is taken to prevent two or more apartments, destined to different uses, seeming like one, while in the modern copies, offices, court-rooms and dependencies look like one great temple.

We often find three rows of windows behind a gigantic order, that only serves to darken the rooms and render them as unfit as possible for the use for which they were intended.

This improper use of precedent; industrious labor to save thought; copying the peculiarities without the spirit; endeavoring to be artists without the necessary knowledge; using forms invented for a purpose to which they were admirably adapted, to satisfy requirements for which they are totally unfit; is the cause of the thousands of lamentable failures that have disfigured the cities of both hemispheres.

Roman.

Again we must turn back over the pages of ancient history, even into obscurity, for traces of the early beginnings of Roman architecture.

All previous history tends towards Rome. Within her dominions Christianity took its origin, and at her fall the last volume of ancient history is completed. Until about the Fifth century before Christ the architecture of Rome was Etruscan, and it is to that country that we must turn for the origin of many of the features of her early architecture.

Etruria was a federal union of twelve states, situated between the valleys of the Tiber and the Arno, colonized some twelve centuries before Christ, by Asiatics from Syria; from her the Romans borrowed the circular arcs, and both the square and circular form of temple.

About five hundred years before Christ the Romans expelled their Etruscan kings, established their independence, and after two centuries of contest, subdued the parent nation, and commenced that long-continued series of conquests and colonizations, the most brilliant the world ever saw. Rome became the capital of the civilized world, and the center of art, literature and science. Greece was one of her most important neighbors, and from her she borrowed the rectangular peristylar temple, and the three orders.

Throughout the entire Roman period her architecture was always in a state of transition; often the mere juxtaposition of the features of several styles. Their fusion took place long after the power of Rome had fallen, and a new civilization arisen with the different characteristics.

Beauty, the most refined, had characterized Greek art; her several importations she had so cultivated as to make them her own. In Rome architecture became the expression of the love of luxury, magnificence and ostentation. Characterized by such monuments as the Coliseum, baths, theatres and triumphal arches. It is only in such works as these that she can lay claim to any originality.

In Greece, architecture is represented by her temples; in Rome by every class of construction that her love of display or luxurious desires could suggest.

In the early part of the Christian era, the ancient civilization was at its height. Every city of the Mediterranean seemed to vie with each other in the number and magnificence of their constructions; unfortunately they are more often remarkable for their magnitude and costliness than for artistic taste.

In their engineer works, however, the Romans excelled the Greeks, who were never careful of the cleanliness of their cities, or the condition of their streets. The Romans built aqueducts, bridges and public roads, the remains of which exist to-day, sufficiently perfect to show the excellence of their construction.

The Grecian orders, in a modified form, were used by the Romans. The Doric and Ionic had reached perfection in the hands of the Greeks, while the Corinthian was a recent invention when it passed to the hands of the Romans. The result is a natural one; every change they made in the first two resulted to their injury, while they so improved the latter as to make an elegant and highly ornamental order. It is not generally known that there are, at least, some fifty varieties of the Corinthian Capital to be found within the limits of the ancient Roman Empire; among these is the well-known composite formed by removing the whole upper part of the Greek Corinthian and substituting an entire Ionic—much to the injury of both. The junction never was hidden, and the capital never met with much favor.

The true Roman order was not a column and entablature, but a Composite Arcade; a feature that was extensively used throughout the Renaissance period, and in much modern work. It went through many modifications, from the Etruscan segmental arch, mounted on piers behind a Grecian screen of columns placed on pedestals and surmounted by an entablature, to the later simplification discarding the piers and entablature, and resting the arches directly on the columns, taken down from their pedestals. This served an excellent purpose for interior work, towards which all Roman architecture seemed to tend.

Another modification, better adapted for exterior work, has been extensively used by the moderns, if not by the Romans; consisting of the removal of the screen entirely, and leaving the simple Etruscan arcade.

The finest architectural work of the Romans is probably the interior of the Pantheon. Its great dome, with its single large opening at the top, producing a

grandeur of effect that, notwithstanding many defects in design, and its uninteresting exterior, has attained a celebrity equal to any temple in the world.

It was in engineering that the Romans truly excelled. Their familiarity with large dimensions, and practice in vaulting large spaces, introduced the dome into their architecture. Here was a new feature that required new details; these they lacked the artistic taste and ingenuity to insert. Had Rome existed until their architects had been able to sufficiently experiment, and the style had had time to fuse together harmoniously the borrowed features, and their own inventions, and to have passed from its continued state of transition to a settled and definite style, the architecture of Rome would possess an interest for itself greater than that which it now possesses as an introduction to a later style, or as filling the intermediate chapters between the history of Pagan and Christian art. We find in it the germ of that glorious architecture that after centuries of darkness, re-appeared in the Eleventh century, and before the end of the Thirteenth had developed into the noblest style the world has ever seen.

Gothic.

[FRANCE.]

The history of Gothic Architecture and the introduction of modern art into France commenced with the reign of Charlemagne, Emperor of the West. He was partial to all that was Roman. From her he borrowed the details of his administration. From Bysantium and Damascus he imported professors to teach drawing to his painters and mathematics to his architects. This importation into the West, among a population who had their own special talents, produced an art that was neither Roman nor Eastern, but which divided its origin between them both, producing a style, pure and true, harmonious and elegant, and, above all, so vigorous that after several centuries it extended its influence over the civilized world; even back to the countries that gave it birth.

The Feudal System, a new political organization, likewise influenced architecture. Each Feudal lord, isolating himself within his own dominions, gave to the art of building a local modification, caused by the requirements and materials at command. These are shown on the monuments of the Ninth and Tenth centuries; the diversities of style becoming still more marked during the Tenth and Eleventh; until in the Twelfth, when the influence of Popery and the uniting of the government under one head, united all these spirits which for so long had worked apart.

We now find one of those bright periods, so few of which exist in architectural history, when every thing seemed to conspire to produce a style of the highest excellence. The throne of France was filled by monarchs remarkable alike for their piety and magnificence. The religious enthusiasm of the times, fanned by the

spirit of the crusades, was at its height. The architects and artisans were a numerous and privileged body. United in a society or brotherhood, they had long worked together with one great object in view. Art was practiced for the love of art. No amount of study was thought too great, even for a single detail. The taste of the time was a correct one; Art looked to Nature for her models, and followed her teachings in their true spirit, and adapted them to the nature of the materials she employed. Great churches were now rising all over the kingdom; among them the two most beautiful that the world has ever seen, Amiens and the Sainte Chapelle.

Among all the arts, architecture is the most influenced by the wants, ideas, habits and progress of the people by whom it is developed. It is, therefore, difficult to understand its results, except by a knowledge of them.

Since the Seventeenth century the personality of the people of France has been absorbed by the government. The arts have become official. In the Twelfth century such was not the case, and a careful study of the history of the times is necessary to fully comprehend the history of their arts.

The political and administrative system that Charlemagne borrowed from the Romans, arrested many of the disorders heretofore existing, without removing the cause; still the seed sown took so firm a root that it was impossible to destroy it.

The clergy were an educated and privileged class; they were not held to bear arms, nor till the soil; they were proprietors of large estates, and in them was concentrated all the education, both theoretical and practical, of the century. They were possessed by a spirit of charity, and soon acquired a moral power over both nobles and people.

It was among these men, and under shelter of the convent walls, that all the most enlightened, delicate and reflecting spirits of the age took refuge.

Previous to the Twelfth century their workings were slow and obscure; nevertheless, within these religious establishments were assembled the elements of a future civilization. Nothing, however, was as yet established. The contest of civilization against barbarism, absorbed the entire power and attention of the clergy. In such a state of uncertainty the arts could not thrive, and made but little progress. The invasion of the Normans rendered the condition of the country still more miserable. Architecture can only progress through practice, and could not develope amidst ruin and disorder. The cloister-work of the monks, quiet, and almost unknown to the epoch, at a later day burst the walls that enclosed it, and produced the results that have elicited the admiration of the world.

During the Eleventh, and the commencement of the Twelfth centuries, the clergy were the center of all knowledge, and all progress; they founded schools where were taught philosophy, theology, science and the arts. The activity, interior and exterior, of the monasteries, gave a great impetus to art. Among the monks were found the first architects; they, with one exception, as early as the end of the Twelfth century, called to their aid all the resources of painting and sculpture. This single exception, St. Bernard, a Clunist, contended against the

luxury of the church. The monasteries built under his direction possess in their style all the severity of his character; they are without ornament, and contrast strangely with the richness of the period; they stand an isolated witness of the protests of a single man against the tastes of a nation.

The early part of the twelfth century marks an important epoch in the history of architecture. Most of the cities of France, formed into communities, fortified themselves and made municipal lords. Parallel with this great movement of the "Freedom of the cities," was the Crusades, which weakened the power of the Nobles, who joined in great numbers this religious war movement, embarrassing themselves with the expenses of equipment, which together with their absence and unsuccessful return gave a blow to the secular and religious feudal system, from which it never recovered. From this moment the great religious centers ceased to possess the exclusive control of the arts.

The advantages of this comparative liberty were soon manifest; the arts, industry and commerce were rapidly developed.

Heretofore when a monastery, like Cluny, sent its monks to build an edifice at a place more or less distant, they sent with them exact drawings of the work they were to execute, which they were not allowed to deviate from. Thus they reproduced everywhere the same forms without endeavoring to progress; but when by the side of these clerical schools there were raised secular corporations, assembling new spirits imbued with a more modern civilization, their influence soon extended even to the Catholic Clergy, who never opposed a progress that tended to give more pomp and *eclat* to their religious ceremonies. The influence of the laymen was quickly felt in the construction of cathedrals, parish churches, feudal castles and city buildings, but slow in influencing a change in the construction of the monasteries. The high clergy were however too enlightened not to appreciate the advantages they could draw from the new and bold genius of the laymen architects; they soon became their chief patrons.

At the end of the twelfth century, architecture, while possessing a portion of its Roman origin, took a character which in a manner foretold what it was to become fifty years later; occasionally it showed that boldness, in experiment, which afterwards became the rule. Philip Augustus occupied the throne of France; his ability in politics and prudent habits, raised royalty to a degree of power unknown since the days of Charlemagne. He was the first to occupy the nobles with patriotic enterprises. The feudal system now underwent a change and became a part of the nation. Unity of government was established and under its influence architecture advanced rapidly; vast edifices were built in every province; old forms disappeared and new ones were taken from every source to form the materials for a new and national art, which, before the end of the thirteenth century, assumed that true grandeur that does not admit of exaggeration; sober and rich, clear and logical, it bent to every requirement without ever losing the style. It was the art of the educated, who knew how to say just what was necessary in order to be understood, there was economy in material but none in

thought. Every part was studied and enriched, the workmen were free and gave an individual character to their work. Every resource was exploited; the subjects of their sculpture were taken from every source,—the Bible and the field,—instruments of husbandry and household utensils,—eminent men of the times and those past and gone; truth was cherished for the love of truth; no amount of intellectual labor was considered too great for even the smallest detail of ornament; there was little repetition, each workman had a part to perform and did it with an earnestness and intelligence worthy of the highest praise. Not only is every capital throughout a vast cathedral of a special design, differing from all its fellows, but often this same variety of detail is found in the four sides of the same capital. We talk much of the five orders, and it is even stated by one author "that the ingenuity and intelligence of the world has never been able to invent a sixth." There are many times five orders in every thirteenth century cathedral, quite as beautiful and often differing quite as much, the one from the other, as the old classic ones, that have been repeated an incalculable number of times, often to the injury alike of the architects, workmen and the tastes of the people. In literature we spare no pains to avoid a repetition of the same phrase or even words, however fine, and yet we go on carving the same capital or modillion all around a building and expect the public to admire it. We talk of the great nineteenth century, and justly in many things, but in our general architecture we fall far below the thirteenth. We are better educated, in science at least, and are certainly not less intelligent, but our best labors are otherwise directed; Mammon is now King,—we work early and late, and spend a life of toil and anxiety to accumulate wealth, and die leaving little else behind us; a dissipated son squanders the fortune inherited from his fathers, and others from low beginnings become the wealthy and worthy citizens of our money making communities. There is but one way to revive a true and correct taste in art,—educate the people. This is fortunately now being done, by making them familiar with good design, the fruits of the labor of the old world, which has extended across the waters,—the architecture of the new already feels the good influence.

Many other styles have arisen, flourished and passed away; they were all the results of the same causes; the requirements of the people that practiced them, modified by their social and political condition, their intercourse with other nations, and the policy which gave a character to their civilization. They advanced steadily towards perfection, when practiced for the love of the art they represented, when truth was sought for the love of truth, when the principle that directed their ornamentation was the ornamenting of construction, and not the construction of ornament; they were never stationary; they declined, whenever practiced for the sake of display and ostentation, when falsehood took the place of truth, whenever the object sought was incompatible with the nature of the material used, and whenever one material was made to look like some other.

It has been sometimes stated that Gothic architecture was destroyed by the classic, that the revival of the one caused the neglect of the other; such was not

however the case: Gothic art had the field to itself and perished from causes of its own creating, and left the world for a time without art; it fairly wore itself out, forgot its own long practiced principles of good taste, for the sake of display. The works of the late period are marvels of stone cutting, if you will, but that is not art. The Transepts of Beauvais with their long slender pipe-like shafts, cause a feeling of insecurity and want of repose, rather than admiration. The architects tried to outdo the world and build a second Babel,—a tower higher than Amiens, from no other motive than vanity—the result was a disastrous one, it fell and crushed the church that it was intended to adorn.

One often hears expressions of astonishment that we have at present no national styles of architecture, that the nineteenth century, so infinitely in advance of the thirteenth, in literature, science and universal knowledge, should be so far behind in architecture. The reason is clear, the styles of old were not national; they were of the Priesthood, of the learned few. The masses had little or nothing to do with them.

It is somewhat remarkable that the fall of Gothic architecture occurred about the time of the discovery of printing; not that they had then any influence, one upon the other; for forgetfulness of truth, seeking after novelty, a vain display of mechanical skill, and such like internal weakness, would have destroyed any style at any time; still the long period of debased architecture can be traced to the influence of the printing press. Before its discovery art was entirely in the hands of the few educated persons who worked with one accord towards a single object. As long as that object was truth in its broadest sense, the style advanced rapidly, at first, affecting both large and important features, later affecting the smaller features and the refinement of detail alone. It declined the moment the love of display took the place of love of truth. The masses were in profound ignorance of the history of the past as well as of the century in which they lived; they could neither read nor write; the manuscripts that existed were most emphatically sealed books to them; traveling was difficult and but seldom indulged in; their knowledge of architecture was scarcely less than their knowledge of literature, they influenced it only by their contributions, the expenditure of which was entirely controlled by the priesthood. To-day the whole matter is reversed; the people read and write, the books and publications are numbered by millions; a daily paper is in every man's hands, all are partially educated, and constitute themselves critics, and whenever their money or the money of the public is to be expended, control or greatly influence the art of architecture. The misfortune is that they are not sufficiently educated, that they have never given the subject the thought and study it requires; true art of the highest character is beyond their comprehension and they do not like it, or at best pass it indifferently by.

There is now a change working for the better, art knowledge is being more universally diffused; art is better appreciated, fine buildings are helping the taste of the people, and to such a degree that it is far easier for the architect to get a good design accepted to-day than it was a few years ago. Art writers have done much, the oft unjustly abused Mr. Ruskin perhaps most of all; and what is surprising, those

who in their conversation or writings have abused him the most, seem to have profited most by his teachings. They are true books, for they are full of pains-taking, thoughtful labor, and we have never heard any one talk disparagingly of them without showing that they were ignorant of the subject, or that they had entirely misunderstood the author. It is much to be lamented that the American editions of his books contain only a few of his admirable illustrations and those few so indifferently executed.

Chapter III.

TRUTH IN ART.

TRUTH IN ART is of such vital importance that one might be excused for writing a volume, if thereby he could correct a single error, "Keep truth and pursue it," is a commandment absolutely essential in art, and just in the degree that it is obeyed, will it be correctly developed. Our great familiarity with artistic and architectural deceptions, may lead us to consider them as necessities or beauties. If the interior wood work of a church is of pine, it must be painted to imitate oak. If a communion table has a wooden top, it must be marbled. We build stone fronts and put wooden cornices above them, and instead of painting them a darker color that would contrast pleasantly with the stone below, we attempt to imitate the stone. Church entrances often have the outer columns of fine stone, and the inner ones wooden imitations.

These errors are degrading to art, and whenever widely tolerated have marked its downfall. They lead to the mistaking of mechanical skill for art, which Sir Joshua Reynolds observes "has filled the world with false criticisms; Raffælle is praised for naturalness and deception, which he certainly has not accomplished, and as certainly never intended."

It is the same error which leads many to think it a beauty when the figures of a picture stand out to an exaggerated degree, "as if you could walk around them," or to stand, with enthusiastic admiration before a large canvas covered with miniature details; a macaw perched on a dead branch—or an insect on a blade of foreground grass, or the fringe on the robe of an Indian princess; painted to be seen at two feet distance, while the size of the canvas requires the spectator to be away at least twenty feet, to see the general effect of the picture. Such paintings as these are common, they have been exhibited all over the country, their faults extravagantly praised; and their merits passed over in silence. They have been sold for enormous sums, and made both reputations and fortunes for their authors. These men show that they are capable of greater things, and were it not that their patrons demanded it and they well paid for it, this littleness of detail would be discarded and the foregrounds treated with an artistic largeness, more in harmony

with the subject and the size of the canvas. The objections to this pandering to a vitiated taste are not only that they nourish an error, but they injure the picture, the strokes of high light and dark shade necessary to show the details, with the distinctness that this class of the public demand, become so many unmeaning spots of light and dark that destroy the general effect. It is the sacrifice of good taste for the wonderment of the many, like the building of tall slender shafts, strung like beads on iron rods, and other devices approaching the verge of the impossible, that hastened the downfall of Gothic architecture.

Garbett says of his own country, that "the object of all real art, as of all science, is to elicit TRUTH; but any one who, fresh from nature, or from the works of other ages, or nations, should arrive among the works of modern English architecture, would suppose its whole aim, and that of every detail in it, to be DECEPTION." The same is, unfortunately, only too true in America. Visit a country church; the pastor or deacon that lends you the key, or shows you in, remarks that it is a modest, unpretending little church, and yet we find that this modesty and unpretension consists of walls divided into blocks, and colored to imitate stone; a painted cornice, ribs, and a vaulted roof, that, were it what it would have you believe it to be, its execution would have tried the skill of the old Gothic architects. The plain surface behind the pulpit is painted, and shaded and shadowed to seem a gigantic niche; the pews, gallery, and even the pulpit are painted to imitate old English oak; the windows are filled with cheap stencil painted glass, in imitation of more honest but more costly handiwork.

There are several ways to be false in architecture, but we propose only to consider here that most contemptible of them all, *the misrepresentation of the nature of materials or the quantity of labor.*

Architects are often requested, by their clients, to practice these deceptions, and are unable to produce in their minds even a symptom of that contempt which they themselves, if they have any love for the art they practice, feel for all such falsities and degradations. These same men would not tolerate the slightest equivocation in any matter relating to their own business, or even in the most trivial matters of life.

False diamonds are made so perfect that the jeweler is often deceived; yet no true woman would desire to wear one. We can do well enough without ornaments, but we can not do at all without integrity.

When we give a note promising to pay money on a certain day, either that note is a true one or our reputation suffers. Should we testify falsely, we would be hooted from the community, and not tolerated in respectable society; but we may write all over our church walls, *this is stone*, when we know it is not; yet no one questions our veracity, or thinks the less of us.

Notwithstanding the light in which these falsehoods are held, they are of incalculable injury to every thinking person. The steps of the British Museum are of granite; the landing at the top is of wood, painted in imitation. One is at first deceived, the moment the trick is discovered, he wants to turn back to see if

the steps themselves are not imitation also. Introduce a doubt in a thinking mind and it spreads like a contagion.

In the little chapel at Woolwich, below London, at the Marine Hospital; the entrance is under a portico within the auditorium, supported by two columns, the shafts of which are of porphyry, and of a single stone casting, as the guide informs the visitor, a thousand pounds each. They are very beautiful. One naturally turns his eyes upwards to see what such elegant and costly columns could support; one can scarcely credit their senses, and appeals to the guide, who informs the doubting spectator that the ceiling of the portico is of stucco, painted to imitate white marble. The gallery front is of carved oak, an hundred years old; unfortunately its rich tones did not contrast well with the white stucco ceiling, and some *artistic* official caused it to be painted white. This kind of work is quite common.

Architecture in America.

We are a new people. No where is it so keenly felt as in architecture. The glorious thirteenth century, so rich in architectural art, was unknown to America. The history of architecture, as it is usually written, was almost finished when Columbus returned triumphant to Spain, announcing to the old world that a sister hemisphere, large, beautiful and rich (an El Dorado even), existed beyond the sea. The stately classical period, born under Paganism, nourished that it might do homage to her deities, had passed away with the religion that gave it birth; but its influence was felt long after, even through the twelfth century. During this long transition period in the North, a healthier, nobler feeling was exerting itself; a love of truth in art, long, careful, zealous study, and study, too, in the right direction, was yearly producing better and better results; until in the thirteenth century it burst forth, full grown and beautiful. The English wars, factions and divisions of the French nobility; vanity and vain glory; sacrifice of truth, for the praise of the many rather than of the learned few, destroyed the most beautiful and rational style of architecture that the ingenuity of men and nations has yet invented. From its ashes, Phœnix-like, rose the Renaissance, and conquered the world and pervaded all things; literature, painting, sculpture, architecture, even collegiate instruction. It destroyed art in the last century, until Gros and Gericault burst its bonds. Its influences are strongly felt to-day; we see copies of heathen temples, pierced with three rows of windows, from which the light is half excluded by broad colonnades, and a thousand awkward devices, to adapt a rigid style, invented to protect a Pagan deity, to modern requirements.

Taines, in his "*Philosophy of Art*," tells us that "an artist and his works are the fruit of his social surroundings, the general character of which, physically and morally, determines the nature of his productions. It is in this respect that the European architects, surrounded as they are by the beautiful monuments of the

middle ages, possess advantages that, until recently, Americans could not enjoy. Photography and the publication of numerous foreign architectural works, now offer us some of these advantages. Unfortunately but few architects can afford to own many of them, and our public libraries are sadly deficient in such works.

Another disadvantage the American architects must labor under for a great while to come, is the temporary character of most of the buildings they are called upon to build. We are so new and are changing so fast that buildings built but a few years ago, and were then considered better than the locality or wants demanded, to-day must be remodeled or removed; residences and churches must make way for business houses, and country villas find themselves inside of city limits, their grounds sub-divided and sold in lots. Fortunately Americans are full of resources (Europeans give us credit for this), and, notwithstanding these and very many other disadvantages, progress rapidly; and when called upon to build for all time, show themselves equal to the situation. The New York Central Park surpasses anything of the kind in the old world.

Too many buildings are erected without the assistance of an architect,—every carpenter considers himself capable of designing a building, although he would not undertake any of the other trades. Proprietors encourage this, thinking that they save money,—and often plan their residences themselves. If an architect cannot save double his fees to his client, in economy of space and construction alone, he is but a sorry architect. We once knew a merchant that undertook the designing and superintending of his own residence, and gave his own business over to his clerks for several months that he might have time to do so. He was at the building from morn till night; until one noon, the last piece of flooring in the second story was securely nailed, and he discovered for the first time that he had forgotten to provide a place for the stairs. A passer-by put a ladder up to one of the windows that he and his men might go home to dinner. Neither he nor his master carpenter could ever contrive any other place for the staircase, than through a chamber window down the outside of the house.

Besides the convenience of arrangement and economy in dollars and cents, there is perhaps an equally strong reason why the best architect within reach should be employed for even a cottage residence; it is that the money spent in decoration should produce the best possible artistic results. A modern door or window, a bracket or rafter end, a bay window or a chimney top, if ever so simple, can be well or poorly designed.

There is a great want of intelligence in matters of art in American country villages, especially in the West; such books as Downing's have done much to supply this want, and should be more generally read. A few trees from the forest, a few vines and flowers from the nearest nursery, would render picturesque many an unattractive residence.

There has been too much bad copying, an improper use of precedent. *The highest beauty is fitness.* How totally unfit is a heathen temple to modern requirements, yet how often we see costly copies of them, for public offices and even for

suburban residences. The temple was for the worship of a single deity. The light entered from above. The priesthood only, used the interior; the broad colonnades were for the use of the populace who gathered without. They were as well adapted to the use for which they were invented, as they are foreign to the use to which moderns have assigned their degraded copies.

Some of the Means of Architectural Effect.

MASS.

The simplest and surest method of obtaining architectural effect is by using large dimensions.

In two buildings of equal artistic merit, but of different dimensions, the effect will be in direct proportion to their size. How many buildings we see that are really imposing, that owe the effect entirely to their size. The pyramids of Egypt, the topes of the Buddhists, the mounds of the Etruscans, derive their effect wholly from this cause.

STABILITY.

Next in order to Mass, is apparent as well as actual stability; an excess of strength to satisfy the mind. Apparent insecurity, however strong in reality, is always unsatisfactory. A stone front perched upon iron columns, as we are often forced to build city stores, in order that they may have the greatest quantity of light, always present an unarchitectural appearance, and cause the architect to regret the necessity that forced him to use iron columns instead of stone piers.

The Egyptians understood this principle well. The Great Hall at Karnac excites admiration more by its great strength than any other element of design. The massiveness of the Norman and Early Gothic work, although arising from want of mechanical skill in construction, is very effective.

*"Even when we descend to the lowest walks of architecture we find this principle prevailing. It would require an immense amount of design and good taste to make the thin walls and thinner roof of a brick and slated cottage look so picturesque or so well as one built of rubble-stone, or even mud walls, with a thatched roof; the thickness and apparent solidity of the one will always be more satisfactory than the other. Here as in most cases, necessity controls the architect; but when fettered by no utilitarian exigencies, there is no safer or readier means of obtaining an effect than this, and when effect alone is sought it is almost impossible for an architect to err in giving too much solidity to his building. Size and stability are alone sufficient to produce grandeur in architectural design, and when sublimity is aimed at, they are the two elements most essential to its production, and are indeed the two, without which it cannot possibly be attained."

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* Fergusson. Hand-book of Architecture.

MATERIALS.

Another very obvious method of obtaining architectural effect is by largeness of material. Many a design that is very elegant when composed of large stones would lose much of its beauty if composed of smaller ones. The fashion of dividing the face of large stone into smaller parallelograms by rustic joints, is not a good one, the only excuse that can be offered is that the stone can be rubbed as it comes from the saw, without taking it out of wind. This practice has given rise to a style that might be called, *the order of the ornamental key stones;* it indicates at once a want of thought and lack of ingenuity; the same material and expenditure of money with more mental labor would produce a far better result. This practice is so common in many of our cities, that the eye from long familiarity, has come to consider them as fine looking buildings.

Much of the difficulty in producing architectural effects in brick is due to smallness of the material, they are so out of proportion to the dimensions of the building that littleness can only be avoided by painting them some uniform color to partially conceal the joints. What can be more injurious to architectural effect than to paint a brick building red, and line off the joints in white.

The Egyptians understood this principle and carried it to its utmost extent on their obelisks and pyramids. In Baalbec stones of sixty or ninety feet in length were used as the coping of a terrace wall.

The Gothic architects denied themselves the advantage of large material, and endeavored to replace it by the display of constructive skill.

Value and fineness of material is another cause of architectural effect. We admire a building of marble more than one of granite, as we admire a vase of gold more than one of silver, or a diamond more than an agate.

Wood should only be used externally for small and unimportant buildings. It has many disadvantages; is combustible, soon decays, is liable to warp, shrink, split, and requires frequent painting. Cast iron is a valuable material, it is too often used to counterfeit stone. The use of *Terra-cotta*, an old and very valuable building material, is again being revised. Its antiquity dates from the earliest times. The earliest building mentioned in history was constructed of burnt clay. (See twelfth chapter of Genesis). Four thousand years ago, baked, cooked or burnt earth—*terra-cotta*—was common enough in Egypt, and was the building material of that people. It was used by the Greeks, by the Romans, and by various European countries in the Middle Ages, and recently in the Paris Exhibition proof was afforded in all parts, that Modern Europe is largely reviving the use of terra-cotta.

In durability it far exceeds all other known materials. The clay cylinders of Ninevah, still preserve in characters, clear and sharp, as when they were first produced, the names and acts of rulers who flourished three thousand years ago. An excellent opportunity is afforded for comparing the durability of terra-cotta with stone, under the influence of the moist and smoky atmosphere of London, in the exterior of St. Pancras Church. This church was roofed in 1820, and finally com-

pleted in 1822. The whole exterior is faced with Portland stone ashlar work, one of the best English building stones; the capitals of the columns, and all the external ornaments, enriched mouldings, etc., are of terra cotta; while the stone is worn, bleached and often disintegrated, the terra cotta is still sharp in outline and fresh in color.

The manufacture of terra cotta may be described in few words. A fine fire-clay, free from lime or iron deposits, is moulded or carved into the desired form, allowed to dry in rooms heated for the purpose, and there burnt in air-tight kilns. While in the kilns from thirty to forty hours, it is subjected to a heat sufficient to melt steel.

Terra cotta contracts in burning, and proper allowance must be made by the architect for this contraction, which reaches one-tenth or one-twelfth. The blocks should be of convenient size for handling and baking, but not so small as to resemble brick. It should be so hard as to resist an iron point.

Terra cotta is admirably adapted to receive a glaze, and in that state is termed *majolica ware*. Some very beautiful specimens were exhibited in the recent Paris Exhibition, built into the numerous beautiful pavilions that adorned the Park. In good terra cotta we have a material which defies time and the most destructive elements of any climate, and which, while it answers all the requirements of the architect for building purposes, has also the merit of possessing in itself good rich color, and of admitting of the application of a glaze of any desired tint. With such qualities as these it has a most brilliant future. When manufacturers have learned to produce an article of uniform excellence and at a cheap rate, it will be extensively employed.

The attention of all the leading British architects is now attracted to this material. Upon one point all are agreed, that when of a good quality and well burned it is capable of serving many excellent purposes, it is cheap and very durable and is capable of producing any excellence in design that the sculptor or architect has the talents to execute. It is by no means necessary that it should be moulded; when in the plastic state, it can be modeled or carved as readily as the sculptor's clay, while on the other hand, for cheap work and for parts that will bear repetition, the mould once made, it can be reproduced an infinite number of times at small cost. It is to terra cotta that the English architects are now looking for a material that will resist their destructive atmosphere, and that while being beautiful in color, varied in tint to suit the requirements, is susceptible of being cleaned as readily as window glass.

There are manufacturers in America, and of these one in Chicago, that promise, with the assistance of the architects and the enterprise and industry of their directors and superintendents, to produce a building material from which we have

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NOTE.—For a more extended discussion of terra cotta we would refer, among others, to an admirable paper read before the Architectural Association, London, January 31st, 1868, by Gilbert R. Redgrave, published in the Building News of February 7th and 14th, 1868, to which we are indebted for a part of what we have written on this subject.

hopes of drawing the same benefits that the London architects anticipate from theirs. It is true that there can be bad terra cotta as well as bad brick or bad stone, but of the quality architects can easily judge. It is true that there have been some vexatious results from its use, but these were owing to its bad quality. Now that both architects and manufacturers know when it is good and when bad, and the causes therefor, there is no longer any excuse for a repetition of them.

In conclusion: all materials are good, when used honestly, each for the purpose to which it is best adapted, and bad when used for purposes to which it is not adapted, or to counterfeit some other material. Although grandeur and sublimity can only be obtained by using durable and massive materials, beauty and elegance are attainable in all.

Chapter IV.

THEORIES OF CONSTRUCTION.

[ARCHES AND STAIRCASES.]

ARCHES.—Occasionally an architect is required to design an arch of sufficient span to require a careful study of its proportions that he may feel confident of its stability, and at the same time avoid any unnecessary expenditure of material. For this purpose we prefer the graphic method given by Méry, *ingénieur des ponts et chaussées*. This method is much used by the French engineers, but we are not aware that it is given in any English books.

By this very practical method, we can obtain the several principal elements necessary to determine the thickness of cylindrical arches of all forms, and of their piers.

When the arch is in equilibrium, from whatsoever cause, upon each joint, the pressure is distributed upon the different points; the sum of these partial pressures give a single resultant applied at one point of the joint; for example, upon the joint *a b*, *Fig. 1* of Plate ExQ, Pl. 4, this resultant, that we will designate as *p*, will be applied at the point *g*, and the arch should be held in equilibrium by this pressure *p*, and by the horizontal thrust P, that acts at the summit of the arch. Upon each of the other joints *a' b'*, *a'' b''*, etc., there exists the points *g' g''*, etc., analogous to *g*. All these points determine a curve, that Mr. Méry calls the *curve of pressure*, which is very useful in studying the equilibrium of the arch.

If this curve passes at the summit C of the arch, at the point *b* of the intrados and at the point exterior A, it indicates that the arch tends to open at the joint C, at the intrados; at the joint *a b*, at the extrados, and that the pier tends to turn around the exterior edge, A.

If the curve of pressure does not reach the points C, *b* and A, but approaches them, as is indicated in the figure, it demonstrates that these points are the most feeble of the arch.

The resultant of all the pressures that are exerted upon the joint *a b*, pass by the point *g*, where the curve of pressure intersects this joint. The half of the

composants of *p* will act upon the portion *b g*, which should resist it without crushing; it is the same with each of the portions *e* A, *b' g'*, *b'' g''*, C *g'''*.

We say that *b g* should be capable of supporting the half of the pressure that is exerted upon the joint *b a*; but observe that the pressure continues to augment from the point *g* to *b*, the edge *b* will be crushed if we take for *b g* the limit required by the half-pressure supposed uniformly distributed.

We have no positive knowledge of the manner of the distribution of the pressure upon a joint; but we generally admit that it is at its maximum at *b*, and that it decreases proportionally to its distance from that point, its mean being at *g*, and zero at the point *h*, which gives $hg = \frac{2}{3}gb$ (the total pressure being represented by the surface of a triangle of which the height is *h b*, *g* the center of gravity, and of which the base, which we represent by *k*, is proportionate to the maximum pressure *b*; at all other points the pressure is represented by the parallel drawn from that point to the base of the triangle. As it is evident that at the point *b* the pressure *k* should not exceed the limit that the stone will endure, it therefore results that the part *bg* should be capable of supporting a charge represented by $k \times bg$, and as the pressure upon the joint *a b* is $k \times \frac{2}{3} bg$, it follows that *bg* should be capable of supporting the two-thirds of the total charge upon the joint, and not the half.

The pressure is exerted in the direction of the tangent of the curve of pressure; this curve, by its inclination upon the different joints, serves to show the joints where slipping is to be feared; *a* being the angle made by the direction of the pressure with the joint of the *voussoir*, the force that acts along the direction of the joint to produce slipping is *p cos a*; the force, normal to the joint is *p sin a*, and 0,76 being the co-efficient of friction ordinarily adopted, we should have, to secure stability, $p \cos a < p \sin a \times 0.76$ or $\cos a < \sin a \times 0.76$.

Drawing of the Curve of Pressure.—An arch requires for its stability that its thickness and that of its piers should be greater than that required for a statical equilibrium, the curve of pressure can take an infinite number of different positions, without the possibility of precisely stating which will be realized, this position depending upon the settling, that cannot be precisely foretold, and also upon the accidental loads upon the arch.

Taking Fig. 2—the point *m*, that appears by its distance from the points *b* and *a* to belong to the curve of pressure (the parts *bm* and *am* should each be capable of supporting the two-thirds of the charge on the point *ab*); taking also upon the vertical joint *cd* the point *n*, that appears by its distance from the point *c* to belong to the curve of pressure, we propose to draw this curve passing by the points *m* and *n*, that is to say, to find the points in which the curve intersects the joints *ef*, *hi*, etc.

We calculate the weight of the arch stone (or if of other material, of a convenient portion,) *cdba*, and determine geometrically the position of its center of gravity, (which is usually the geometrical center of the quadrilateral *cdba*) suppose *KG* the vertical passing by the centre of gravity; prolong this vertical until it intersects the horizontal *nX*, join *Km*, take *KS* proportional to the weight of the portion of

the arch *cdba*, and terminate the parallelogram *KSRP*. KP is proportional to the horizontal thrust, and the diagonal KR to the total pressure *p* upon the joint *ab*. This horizontal thrust, KP, is constant. This done, let *kg* be the vertical, passing by the center of gravity of the arch stone *cdfe*; taking *ks* proportional to the weight of this arch stone, and *kp* equal to the horizontal thrust KP, and construct the parallelogram *ksrp*; the diagonal *kr* represents the intensity and the direction of the pressure upon the joint *ef*, and the point *o*, where it intersects the joint, is one of the points of the curve of pressure. Operating upon the arch stone *cdih* as upon *cdef*, we determine the point *q*, where the curve intersects the joint *hi*, and by the same method we determine the other point of this curve. The pier is treated as a part of the arch.

Suppose that the arch is constructed of material sufficiently resistant to allow the pressure to act upon the edges of the arch stone without crushing, it is evident that there will be equilibrium as long as the curve of pressure does not pass in any point the limits of the arch; but as soon as this limit is passed, there will be a rupture of the arch, unless it is consolidated by iron or by cement of sufficient resistance, superior to the effort to break the equilibrium. With the materials ordinarily employed, the distance of the curve from the extremities of each joint should be such that each one of these should be capable of supporting a charge, acting uniformily over the surface, equal to two-thirds of the total charge acting upon the joint.

When the two arches opposite rest upon the same pier, we can be secure with the static thickness, that is, the curve of pressure may pass at the extremities of the joints of the key stone, of the swell and of the springing line, because the thrust from the opposite arch renders impossible any movement of the pier, while the masonry that unites the two arches above the springing line, renders impossible the sliding or overturning of the part of the arch comprised between the springing line and the swell. It is evident that the masonry that unites the two arches should be constructed, at least above the joints of rupture of the arches, before the centers are started or any load is placed upon the arches. A special test should be made in each case, to determine the pressure the material will support per square inch of surface, without crushing; in practice it is not well to exceed the one-sixth of this limit.

In this method, the thickness of the arch at the key is supposed in advance. In order to have an approximate guide for this choice, the empirical formula that Perronnet deduced from his observations is often used:

$$e=0{,}0347\,d+1{,}0662.$$

e—Thickness of the arch at the key, in feet and decimals.

d—Distance between the piers, if the arch is full center; in the segmental arch, *d* expresses the double of radius of the intrados; in curves of several centers, *d* expresses the double of the radius of intrados at the center.

When *d* is above ninety feet, this formula gives *e* somewhat too large.

After laying out the proposed arch, on a large scale (not less than one inch to

the foot), and tracing the curve of pressure by the above methods, examine each point where the curve approaches the limits of the arch, and calculate if the surface of the joint contained between the curve and the intrados or extrados, expressed in square inches, and multiplied by one-sixth of the pressure that the material will bear per square inch without crushing, exceeds the two-thirds of the total pressure, resulting from the nature of the arch, the masonry above and the accidental loads that may come upon it. If the capacity for resistance exceeds the two-thirds of this pressure, then the arch may be considered a safe one, and capable of securely doing the work required of it. If the excess is considered too great, or if, on the contrary, the capacity for resistance falls below the two-thirds of the pressure, a new supposition should be made, and the work gone over, until the desired result is obtained.

STAIRCASES.

In order to avoid too much fatigue in going up a staircase, the vertical distance between the successive landings should not exceed nine or ten feet.

The height of the railing varies from 2′ 8″ to 3′. The length of the steps, or width of the staircase, varies from 5′ to 6′ 6″ for grand stairways, from 4′ 6″ to 4′ 10″ for medium, and from 3′ to 3′ 10″ for those of ordinary dwelling-houses. The *rise* or height of the steps should be nearly one-half of the width or *tread* For a grand staircase in public buildings, it varies from five inches to 6½ inches. The above dimensions are those given by Claudel, and are in general use in Europe. From the same author we derive the following formula, which comes very nearly to the best examples, and can be used even to the extremes:

$$2h+l=25\tfrac{1}{2} \text{ inches.}$$

h=Height of step or *rise.*

l=Width " " or *tread.*

If h=o—we have $l=25\frac{1}{2}$ inches; the French infantry step.

If l=o—we have $h=12\frac{3}{4}$ inches; the distance between the rounds of a ladder.

Making successively, in the formula, l equal to 10″—12″—13″—14″—15″, we find respectively for h—$7\frac{3}{4}$″—$6\frac{3}{4}$″—$6\frac{1}{4}$″—$5\frac{3}{4}$—$5\frac{1}{4}$. Values that it is convenient to adopt in practice.

In the *Building News* of April 24, 1868, we find the following paper by GILBERT R. REDGRAVE:

" Those who have had occasion to prepare drawings for stone spandrel steps, have doubtless noticed the absence of any definite rule by which to ascertain their thickness, in the works of architectural writers on the subject. In default of such a rule, I have been recently endeavoring, by the measurement of executed examples, to discover some general standard on which to found a theory of proportion.

" By so doing I have obtained the following limitations:—The width across the thinnest part of the step, measured at right angles to the line of rake, as at A, B, in the diagram, [Example C, Plate 5, Fig. 1,] must never be less than 2⅜ inches, or more than three inches. When this width is exceeded, there is, I find, a look of clumsiness; and as surveyors measure the step to the extremity of the acute

angle, as at C, all unnecessary thickness adds considerably to the cost. Again, it is evident that a thickness of less than 2⅜ inches would be detrimental, not only to the strength, but also to the appearance of the step; for with a nosing of the customary size, this dimension is the smallest in which a proper return can be worked clear of the rake.

"In trying to found on these measurements a rule for the sizes of steps, I was first led, from seeing the important part the return nosing plays, to make the nosing fix the width; *i. e.*, the position of the raking line H C. Thus, the intersection of the bottom line of the nosing D E, with the face line of the riser F G, would give the point through which to draw the raking line H C. I abandoned this method, however, as (although otherwise very satisfactory in its results) it depends upon the width of the nosing, which has also not been settled by law. While trying next to get some solution from a subdivision of the riser and tread, I came upon the following construction, which seems to satisfy the conditions for steps of every proportion. Bisect the solid portion of the step I K in L, and from L, let fall a perpendicular, L M, to the face line of the lower tread, O P, produced toward G. The intersection of these two lines in M, gives the point through which to draw the raking line H C.

"While on the subject of proportion, I think that it is impossible to have anything better for the relation that the riser should bear to the tread than the well known rule, that their product, when multiplied together, should be equal to sixty-six (66). I am not aware that any proportion has been laid down for the nosing. From the examples that I have measured, we may assume that its projection, R I, should be one-eighth of the width of the tread, I K, and its total depth, I D, about twice its projection. The horizontal bearing of one step on the other, as at P Q, should be equal to the projection of the nosing, the raking joint K E, being of course at right angles to the line of rake H C."

With regard to the ratio of the riser to the tread, we prefer the old formula given by most of the French writers; moreover, it accords nearer with the American practice.

Chapter V.

MODERN FRENCH ARCHITECTURE.

FRENCH APARTMENT HOUSES AND WORKING MEN'S COTTAGES.

THE French have a national school of Fine Arts, from which a large number of her artists graduated, and where they received their first impressions in art. This school, in architecture and painting at least, is eminently classic; to such an extent even that the name *Beaux Arts* is used to designate an entire school of painting—the one that recognized Ingres as its leader. In architecture its teachings are scarcely less marked; *Renaissance* is stamped in its own peculiar forms upon all its work. For a long time the French architects seemed to follow in the beaten track of their early education; but the great men among them find in Napoleon III. a patron that enables them to give full scope to all the ability and originality they possess. In their rapid progress towards Truth and Unity, we can see the advantages of a national school; the architects are well educated, work together, and are rapidly perfecting a new style of architecture, of which the new Opera House and the Church of the Holy Trinity in Paris are the latest and perhaps most complete types. If we are again to have a style of architecture, we may look for it here; the conditions that produced the old styles are nearer realized than we can expect to find them elsewhere; the present Emperor spends enormous sums in beautifying his capital and provincial cities; old quarters have been demolished, new boulevards have been cut through, streets widened and extended, elegant and costly residences replace those torn down, the Louvre extended and connected with the Tuileries, a Grand Hotel, a new Grand Opera House, churches, and public offices; all upon a scale of magnificence heretofore unknown, astonish the visitor at every turn. The patrons of art are more numerous and are men of a higher art culture than are found, to the same extent, elsewhere. The numerous art galleries, the great exhibitions of '55 and '67, the yearly exhibition of paintings, the art displayed in manufactured articles that fill the shop-windows; all assist in developing in the people a correct judgment in art matters. The Building Committees of Public Works are art educated men; every fine building erected contributes its

part to the universal art education; the architects and their clients work in harmony, each anxious for elegance and refinement. To all these advantages is added one of the most desirable as well as beautiful building stones, light and delicate in color, easily wrought, firm and uniform in texture, and found in great abundance in the immediate vicinity. The leading features of this new style are closely allied to the Venetian Renaissance; the character of the columns and openings is classic, with however more variety and freedom of design, while many of the details of the cornices and string courses show a Gothic feeling.

The style is doubtless still in transition; that it is already capable of great things is shown by the examples already mentioned; that it is capable of still greater things, the rapid progress of the last fifteen years would seem to guarantee. In monumental architecture it is grand and elegant; delights in sculpture, and offers every advantage for its display. That it readily adapts itself to the wants of domestic architecture, can be seen by a drive along the numerous new *Boulevards*, out on the *Champs Elysées*, or by looking over the numerous photographic views of the new Parisian dwellings.

After we have examined and admired the exterior, let us look within and see if something useful cannot be learned there as well, that can be readily adapted to the wants of our American cities, where each twenty-five feet front along our fashionable streets and avenues represents a stone front and the apartments of a single family; but how very often is this appearance no deeper than the front wall. The land costs so much that the proprietor is forced to erect a costly three-story dwelling in order that the rent should pay the interest on the combined cost of house and land; one extravagance leads directly to others; furniture, servants, dress, etc., etc., and soon the occupant often discovers that he cannot afford to live in the house he has built or rented. Only two courses seem open to him; either to move out of town, away from his friends, and to an inconvenient distance from his business, or to take one or more boarders to help pay expenses. The latter is often resorted to; the privacy and independence of the family is destroyed, and numerous other annoyances creep in. Thus it is, too often, with persons in what is termed easy circumstances, while those with moderate means have no course left them if they wish to live in a pleasant house in a desirable quarter of the city, but to board; they soon find out its inconveniences, and longingly look forward to the time when they shall be able to keep house for themselves.

It is a popular saying that the French language has no word for *home;* this may be true, but they have two words that express it very well; and what is better, thousands of persons that in large American cities would be forced to board, in Paris have a home, and live better and more comfortable than we do, and all for considerable less money. Let us see how they manage it, and if we cannot profit thereby.

In Paris the apartment house is the rule; the isolated dwelling (distinguished by the name of hotel) is decidedly the exception. These houses are of several classes. Those of the first class are built on a wide lot, say seventy-five feet, with

wings extending back into the court. In the center is a broad carriage entrance, and across the court in the rear, are the stables. Upon one side of the carriage entrance, and within the house, is the lower hall, communicating by a sash door, with the Porter's Lodge. A fine broad, well-lighted, marble or carpeted staircase extends to the upper story. This staircase and the several landings, together with the entrance way and court-yard, are in charge of the porter, who is employed and paid by the proprietor; either he or his wife are constantly on duty, and see every person who enters the house, receives the letters and answers inquiries. The basement or lower story is used for carriage houses, stables, store-rooms for fuel, etc., the porter's rooms, and sometimes two or three lodgings. The first and second stories are the elegant apartments, each complete in itself, containing all that a large family of ample means can require. The third and fourth floors are usually divided into two complete apartments with entrances, each on its respective side of the staircase landing. The fifth story and the Mansard roof are divided into small apartments for small families and bachelors, with and without kitchens.

The houses of the second and third class are less elegant in their finish, situated generally in less fashionable quarters of the city; the apartments are smaller, sometimes four on the same floor, two in the front and two in the rear; those in the rear are served by a special staircase, and are lighted either from the court and back street, or from the court alone. The advantages of this system are numerous; the proprietor obtains a much larger rent from the several families than could be obtained from houses built in the ordinary way, covering the same ground; and, what is better still, it furnishes convenient houses, in good localities, within easy distance of the places of business, of the markets, shops and amusements; in short, so situated and arranged as to permit the enjoyment of all the advantages of the city, with the least possible inconvenience and especially suited to the wants and means of those who rely for support upon moderate incomes.

It is sometimes stated as an objection to this system, that one does not like to live in a house with other families, and especially up several flights of stairs. These objections are rather imaginary than real, each apartment has its front door, door-plate, bell-pull and hall, as distinct as the several houses in a block. The staircase is broad, light, elegant and easy to mount, and far more private than the sidewalk which it really represents. The porter is 'on guard' below, and only those that are known to him or ask for those living in the apartments are allowed to go up the stairway. It is far less laborious, and consumes much less time to mount three, four or even five flights of stairs, than to ride a mile or two on a crowded horse-car and then walk a block or two. Living in the third story of an apartment house is very different from living all over a three-story house, and far less laborious to the female occupants.

In Paris the contrary objections are made, and it is considered the height of luxury and inconvenience to live in an isolated dwelling. The question of building apartment houses in American cities, should be seriously considered. Those who have lived in such while abroad can fully appreciate their advantages. We believe

they would be a profitable investment and a lasting benefit, to the city, the builders, and to those who should occupy them.

A description of the examples we have given of this class of houses will be found in Chapter VI.

Dwellings for the Laboring Classes.*

[LES CITÉS OUVRIÈRS.]

Proper dwellings for the laboring classes have become one of the most urgent necessities of our century.

Nearly every branch of industry finds it advantageous to concentrate into large establishments, for only under these circumstances can the greatest progress and economy be obtained; therefore, in every country, we see a numerous population grouping themselves at certain points, where regular and remunerative work can be obtained, and it is well for us to occupy ourselves in the good work of promoting their well-being.

Because these populations are condensed and tend constantly, by continued emigrations, to increase, lodgings and the necessaries of life are held at a higher price than in the neighboring localities. It is therefore necessary to offer them the means to derive the greatest benefits from their salary, and to help them to procure a comfortable and happy existence; and as the habitation holds an important place in their considerations, it will be making a considerable advance towards the solution of this thorny question, to offer them larger and more healthy houses at a price that is within their means.

If afterwards we are enabled, by a happy combination, to give to the workmen the means of becoming the proprietors, by paying for them on long time, and by small payments, we shall have solved an essential part of the grand problem of cheap living. This will explain the brilliant success of the workmen's cities on the Rhine at Mulhouse and vicinity.

This success is now extensively known, and has drawn to Mulhouse numerous visitors, both French and foreigners; economists, manufacturers, city magistrates; who wished to study, on the spot, all the details of this magnificent creation. Others, and by far the most numerous, have addressed letters to the industrial society, or to the administration of the cities, asking statistics sufficiently detailed to permit them to seriously study the question.

A brief history of the Industrial Society of Mulhouse will render more clear what has been done, and the good results that have attended their efforts.

In September, 1851, Mr. Zuber, a member of the society, presented to the society a paper, accompanied by a plan of a model house erected in England by

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* NOTE.—Compiled from the voluminous reports of the Directors of the Workingmen's Cities on the Rhine at Mulhouse and vicinity.

Prince Albert, and a volume entitled *The Dwellings of the Laboring Classes.* containing the descriptions of several constructions erected in London with this special object. Mr. Zuber proposed that a committee should examine the question, and report to the society a method for furnishing cheap, comfortable and healthy dwellings, to the large number of workmen employed in the extensive manufacturies of Mulhouse.

Louis Napoleon, while President of the Republic, caused to be translated into French the remarkable work of Henry Roberts, entitled *The Dwellings of the Laboring Classes*, and published under the direction of the Minister of Commerce. Notwithstanding the incontestable value of the book, it could scarcely serve as a guide to the committee. Each people have their habits, each climate its requirements; what was good in England could not be equally appropriate at Mulhouse.

For nine months the committee were occupied in studying what had been done in the numerous localities where large numbers of workmen were assembled. The advantages and disadvantages of the methods that had been adopted for their habitations, and in studying the numerous plans, resulting often from contradictory ideas. In September, 1852, they presented their report.

Of the numerous plans that had been presented, the one that seemed to the committee to offer the greatest advantages was that of Mr. Zuber, the originator of the proposition.

Mr. Zuber's plan presented the advantage of convenient arrangement, as well as substantial and cheap construction, permitting them to be sold or rented at a moderate sum; each family live by themselves, and have a small garden attached to their habitation.

These plans were especially designed for the workmen of the paper manufactories at *Ile Napoléon*; slight modifications would adapt them to the Mulhouse requirements.

The grand object the committee wished to attain in the selection of plans was the improvement of the condition of the working classes, and they perfectly understood the vast importance of the character of the dwellings furnished for them. Cleanliness, light, healthy air, and sufficient room, have much more influence on the morality and general happiness of a family than is generally conceded. The workman, who, after a day of hard labor, returns to his "home," consisting, perhaps, of a single, miserable, dirty room; certainly finds little conducive to his enjoyment in it. If he has a family, they are all grouped in that single room; live there, eat, cook, work, wash and sleep there; and the wife certainly finds little chance to arrange it in order that the husband may find in it a comfortable place to enjoy a pleasant evening, and the frequent consequence is, that he spends his evenings in drinking-shops, forms unfortunate and expensive habits thereby, which almost invariably end in misery.

The Mulhouse plan makes every workman "lord of his own castle," gives the wife an opportunity to have different rooms for different uses, and creates an ambition to have a pleasant home, which, by a little frugality, they can own in a few years.

They can make their house pleasant in a thousand little ways, and work their garden as best suits their fancy, as they can feel that they are permanently situated and actually have a place, however small, in the world.

Under the able direction of the skillful architect, Emile Muller, several models were adopted, which were executed at Mulhouse and the neighboring cities of Guebwiller and Beaucourt, which fully demonstrated the fact that houses could be built, the rental of which would be less than what was exacted of the workmen for their miserable lodgements. This was a great point gained, but the result was not fully satisfactory. They wished to sell these houses to the workmen, and the first consideration toward this end was, how to accommodate the price of the houses to the means of the workman. To make him a proprietor with a fixed residence, was a very difficult problem in social economy; they had the ambition and hope of happily attaining their end; remarkable and brilliant results have crowned their efforts.

A civil society was inaugurated in June, 1853, called the "*Société Mulhousienne des Cités Ouvrières*," with a capital of 300,000 francs, represented by sixty shares of 5,000 francs each. They chose as their President, M. Jean Dollfus, perhaps the most active man among them. Afterwards the capital was increased to 355,000 francs, besides which, the Emperor contributed 300,000 francs, to be entirely employed to cover the expenses for the establishment of streets, sidewalks, sewers, fountains, a bath-house, public washing establishment, bake-house and a restaurant, for planting trees, and other improvements for the public good.

The object proposed by this society was to construct houses designed for single families, to sell them to workmen at the original cost, and allow them a long time in which to pay for them (fourteen to sixteen years was the time agreed upon); the houses to be rented until purchasers are found. The sales were made only under certain conditions, viz.: Order, cleanliness, certain uniformity of exterior not inconveniencing the purchaser; he could not sell his house before ten years from the date of contract, nor sub-let any part of his house to any other party, without the express authorization of the council of administration. This last condition they considered necessary in order to prevent the crowding of many families in too small a space, which was the principal objection to the old lodging apartment system.

The advantages of this system of workmen's houses, it is supposed, will be enjoyed in part by the proprietors of the factories; the workmen will live cheaper, and thereby be able to work cheaper with perfect content; they will take an interest in the general establishment, being part owners, and from which they derive their sole employment. The whole plan, it is supposed, will make "strikes" much less frequent, if indeed they ever occur; these strikes being probably caused as much by the miserable social state of the workmen as the idea of insufficient compensation.

The first dwellings were constructed in 1854; before the end of 1856, their number reached 800 at Mulhouse alone. They were mostly constructed in groups of four, upon two different modes, one with a ground floor and chamber floor, the

other with a ground floor only. They had cellars under the entire house, and an attic, and were surrounded by a garden. Each house of two stories has a large chamber on the ground floor, (which can, if necessary, be divided into two,) and a kitchen; on the second floor are two chambers and a closet. Those of one story have a living room and a chamber, with an additional chamber in the attic. The ground occupied by each house and garden is 180 square metres; a neat fence surrounds the garden. The cost of these houses to-day is 2,650 francs for those of one story, and 3,300 francs for those of two stories; 200 to 300 francs are paid on the execution of the contract; further payments are made monthly, at the rate of 20 francs for the one-story houses and 25 francs for those of two stories, thus completing the payment in fifteen years. This is only from six to seven francs per month more than they formerly paid rental for their miserable lodgings. Of the eight hundred houses now constructed, seven hundred were sold by the end of March, 1867. The payments, thus far, have been made with the utmost promptness. The society consents to retake the houses, when, by peculiar circumstances, the purchaser is not able to continue the payments, the society refunding what has been paid, over and above the ordinary rental during the whole time of possession. The society intends to construct from fifty to sixty houses each year.

The workmen of Mulhouse seeing clearly the advantages of the possession of a pretty little home, well built, with a little garden, where the necessary vegetables, fruit trees and flowers can be cultivated, are desirous of becoming proprietors.

The workman once a proprietor abandons the drinking saloons, all his savings go towards paying for his homestead, he cultivates his garden and remains at home.

A bakery and a restaurant of the society have been established, selling without profits. For thirty-five centimes (seven cents), a meal is furnished, consisting of soup, vegetables and meat.

A store has been established where clothing, groceries, and other articles of absolute necessity are sold at the lowest possible price, always for cash.

A large bath house and washing establishment renders a great service; a bath, including towels, (very comfortable) costs fifteen centimes (three cents); for five centimes (one cent) one can wash clothes for two hours and dry them in a hot air chamber.

A large nursery, capable of accommodating two hundred and fifty to three hundred children, receives those of the ages of from three to six years.

Two large primary schools have been established by the corporation of Mulhouse in the immediate vicinity of the working-men's houses.

A house containing furnished chambers for bachelors has also been built, six-and-a-half francs is the charge per month for a neatly furnished room.

Medical attendance is furnished without charge, and Sisters of Charity give their attention to the sick.

Houses are rented or sold only to those who engage to send their children to school.

Prizes are distributed to the meritorious, both scholars and workmen.

A free circulating library has been established in the center of the city. More than seventy thousand books were read in 1858.

The last census gives to this workingmen's city a population of five thousand five hundred souls.

Up to the present time the expenditures made by the society, in purchasing grounds and for constructions, has reached the sum of 2,400,000 francs; no difficulty has been experienced in making these large payments with their comparatively insignificant capital.

When ground is purchased or constructions made, the society makes a mortgage loan for three-quarters of their value; they borrow on twenty years time, at an interest of four and one-half per cent.; during the first five years they simply pay the interest, afterwards the principal is reduced one-fifteenth annually; as sales are made on fifteen years time, the sums accruing therefrom easily liquidate the debt.

The current payments received from purchasers already largely exceed the current expenditures of the society. They are now able to make the greater part of their constructions and purchases of ground, without further loans.

The society at the outset purchased a large amount of ground, then of small value; since then they have sold a portion of it to new manufactories at a considerable advance; this fund has been used to pay the expenses of the administration.

The workingmen's city at Mulhouse is a success, so complete and satisfactory as to have become the model to numerous cities of like character that have since been established in numerous industrial centers in Central Europe. England is also working in the same direction. America should not be long behind them all. They are no more needed in Europe than they are here. If we could have such a system at our large eastern coal fields, and at our large manufacturing centers, the laboring classes would be greatly improved, the manufactories would derive an equal benefit; steady labor at uniform prices would be secured, and our numerous, and often ruinous, strikes would be avoided; order would be better preserved; less drunkenness would exist; the workmen would be better educated and consequently more intelligent; skilled labor would become more plenty; capital would meet with more secure investment, and we would be better able to compete with European manufactures. Only one thing is wanted to establish such an existence of things, a few enterprising industrial capitalists, whose interests lie in its success, to inaugurate and direct. One city of this kind once established and many others would soon follow.

Note.—See Chapter VI—Description of plates—Workingmen's Cottages.

Chapter IX.

DESCRIPTION OF PLATES.

IN DESCRIBING the following plates, we have not attempted to give the cost of the work, because we do not think that it would be of any practical value. Although many of the designs have been executed, and the exact cost known, still it is not probable that they will ever be executed again with the same details of finish, even should the general design be adopted; moreover, the cost of material and labor varies from year to year, and with every locality. No one can give a correct estimate of the cost of a building until the character and quality of every detail has been fully settled. Until this is done all attempts to estimate the cost of work is a mere guess and very often leads to serious misunderstandings between architects, owners and contractors. It is as absurd to expect architects, after receiving the general ideas of one's wants, to give an idea of the cost, as it is to expect a tailor to supply just what is wanted and name the price, if one simply says, "I want a coat," without describing the style of the garment, quality of the cloth, the trimmings, and the character of the workmanship.

The first steps towards building should be to send for an architect, and explain to him, as completely as possible, the numerous requirements, and rely upon his ability to work them together into a tangible shape. After the first sketch is made, study it long and carefully. Imagine one's self going through the daily habits of life; the man coming in from his business—going to dinner, then to his library where he may spend his evenings and receive his friends; the woman superintending the cleaning of the rooms, receiving her callers, looking after the children, etc.; nor must the servants be neglected; see that the kitchen is as large as is required, the closets conveniently arranged, that the cellar and rear chamber stairs are in the desired place—for each family have certain habits, peculiar to themselves, and unless the architect should be a member of the family he can hardly be expected to have provided for them all without special instruction. Always keep in mind the fact that this is the time to experiment; partitions, doors and windows can be promenaded about with little trouble and at no cost. When a plan and elevation is finally decided upon then have a memorandum specification prepared, describing the materials and the details of finish, then obtain estimates. Should the figures

go beyond what the proprietor feels that he is willing to pay, then modify the size of the building, the character of the details and the materials, until a final design is obtained that can be executed for the proposed sum. All extra work is the result of a lack of care in the preparation of the designs and specifications, resulting in most cases from carelessness on the part of owners in failing to make known, at the proper time, all their wants, or from their not knowing in the beginning what they do want, and expecting that this thing or that can be changed during the progress of the work, without involving any additional expense. It pays to pay an architect for spending time in developing one's wants on paper before the work is commenced.

EXAMPLE A.—PLATES 1, 2, 3, 4, 5 AND 6.

GRACE EPISCOPAL CHURCH, CHICAGO, ILL.

Plate 1. Frontispiece. Elevation.

STYLE OF ARCHITECTURE—XIII. Century, French Gothic. MATERIAL—Front and Tower—Broken Ashlar, of Athens Marble. The Porch and the Carved Work of Iowa Marble, from Marshalltown, Iowa.

This marble is well adapted to ornamental work, it is close in texture, cuts as easily as the famous Caen stone, that has contributed so much to beautify the city of Paris; is of a pleasing, neutral, fawn color, and readily takes a polish.

A very characteristic peculiarity is the great variety and number of the veins, often as wavy and beautiful (except in color) as that of porphyry. The following is from an analysis by Mariner:

"Specific gravity 2,634, which would give 162½ lbs. for the weight of a cubic foot.

"Carbonate of Lime	74.10
Carbonate of Magnesia	23.35
Alumina and Per-Oxide of Iron	1.20
Silica	0.95
Moisture	0.40
* * * * *	100.00

"It contains no Iron Pyrites, its color is caused by iron in its highest state of oxidation. I find nothing in this stone that seems capable of producing discoloration or disintegration by exposure." * * * * *

This is the first use, as far as we know, of this stone for the ornamental portions of an important edifice; the experiment thus far has been highly successful. The cost of the work was less and the sculpture better executed than if the Athens stone had been used, besides which there is another advantage; in several instances where the design passed over several stones, as was the case with the fine work in the hollows of the doorway moldings, the softness of the material enabled us to have the sculpture work cut after the stones were in place, giving a perfect accuracy of workmanship that could not otherwise have been attained. The spire is covered with ornamental slate work; lead covered beads at the angles. The finial, and the two ornamented bands are of galvanized iron. A gilded iron

cross terminating the whole. The pinnacle at the north-west corner, the cross above the gable, and the spire windows are of stone. Being on an interior lot and occupying the entire street front, the sides are of brick without ornament.

PLATE 2.—Plan. The dimensions of the lot are one hundred and seventy-two feet by eighty-five feet; of the auditorium, ninety-eight feet six inches by sixty-six feet four inches, exclusive of vestibule, gallery and chancel; total length, including these, one hundred and thirty feet. Center aisle is six feet wide, side aisles four feet wide. There are one hundred and seventy-four pews; seating capacity, including gallery over vestibule, one thousand persons. We regret that it was thought necessary to place the lecture room at the rear of the church, and would have preferred to set the church back from the street and given greater length to the auditorium and greater depth to the chancel.

PLATE 3.—Cross section of the church, showing the truss roof, and an elevation of the chancel end. The truss is supported by the hammer beams resting on buttresses, and by the side posts, sustained by marble corbels, which pass almost entirely through the buttresses. These trusses are six in number, placed fourteen feet from centers. The ceiling joists are placed between the purlines. The gas pipes pass through the pendants under the pendant posts, and the chandeliers hang directly over the center of the side aisles. All the interior finish is of hard wood, (black walnut and butternut,) and finished in wax and oil.

Since the engraving was printed a balcony has been added in front of the organ room for the choir, and the organ pipes brought out to the plaster line, and a highly ornamental organ front designed.

POLY-CHROMATIC DECORATIONS.—The ceiling is colored Verditer blue. The trusses have the panels painted neutral orange, with vermillion edges, the timbers are painted chocolate with gold colored chamfers. The side walls are a soft, light, violet grey; the plaster moldings, cornice, etc., are salmon, with purple hollows, relieved by a line of gold. The chancel is similar in color to the auditorium, except that the colors are darker, and the work more highly ornamented. The chancel ceiling is studded with gold stars. The side walls are decorated with colored banners. Illuminated texts are placed in appropriate places, considerably enriching the work. The chancel window represents the Crucifixion, St. John and St. Mary.

PLATE 4.—Plan, elevation and details of front porch. The coping is of Athens marble, the remainder of the work of Iowa marble. The shafts of all columns are polished. In Fig. 2 the engraver has omitted the line showing the crest of the porch roof. The portion in section is the front wall of the church. Fig. 4 is a section through the arch moldings.

PLATE 5.—Plan, elevations and section of a mural drinking fountain in the front of the church, under the vestibule window; it is of Iowa marble. On the same plate are given two of the designs for capitals, and one of the flower stones under the coping of the front wall. Throughout the entire church it has been the endeavor of the architects to avoid repetition—special designs have been made for each capital.

PLATE 6.—Finials, crosses, etc. The great stone cross over front gable is sustained by an iron rod six feet six inches long passing up through the several parts. The total cost of the church, including chancel furniture and architect's fees, will be (as near as can at present be estimated) $100,000. This does not include cost of lot, carpets, gas fixtures, nor flagging for sidewalk.

EXAMPLE B.

PLATE 1.—Elevation, designed for a Presbyterian church. Material: brick, cut stone and terra cotta. The plain walls are brick. The base course, corners of buttress and string course of cut stone. The arch stones of the rose window and side windows and all the ornamental portions were designed to be in *Terra Cotta;* an article on the nature and value of this material will be found in the body of the work. As this design has not been executed we have only given the elevation.

EXAMPLE C.

PLATE 1.—Elevation. Residence of John Forsythe, Esq., Douglas Grove, Chicago. Material: The entire main building on all sides cut stone. The rear extension of brick, with cut stone trimmings, verandas and porches of wood, the roof covered with slate.

PLATE 2.—Plans. The house fronts to the south. The sitting room, library, and bed room are on the east side and look out upon the lake. The plans explain themselves.*

PLATE 3.—Elevations, plans and sections of front vestibules, drawn to a scale of ½ inch to the foot. The figures on the right show the front door from the outside, including the stone-work and one-half of the vestibule door between the vestibule and front hall. The figures on the left show the plan of the vestibule with an horizontal projection of the ceiling. The right hand front door is shown twice, to illustrate its position when closed and when open. The section by A B shows the front door open and the vestibule door closed.

PLATE 4.—Details of front porch and steps drawn to a scale of ½ inch to the foot.

PLATE 5.—Details of bay window from the library on the east side of the house. The blinds to this and all other windows in the main building have boxes to receive them when open. Fig. 1 is an illustration to the article on stairs.

PLATE 6.—Details of the roof windows, cornice, and the west piazza. This house is in process of construction.

EXAMPLE D.

Residence of W. G. Hibbard, Esq., Prairie avenue, Chicago.

PLATE 1.—Front elevation. The entire basement story is of cut stone, the front steps of the same material; the walls above the basement are of brick. The window caps and pilasters are of cut stone; the verandas, bay windows and cornice of wood.

PLATE 2.—Plans of first and second stories. The entire interior finish is

* NOTE.—The steps of stairways are badly engraved and the newels are much too large.

in black walnut and butternut. The windows in the principal rooms have box shutters. The house fronts west. From a large veranda and balcony in the rear one looks out upon Lake Michigan; sheltered as it is from the afternoon sun, and offering an unobstructed view of the lake, it will be a pleasant resort during warm summer afternoons and evenings. The rectangular bay window from the nursery gives a view of the lake from that room.

PLATE 3.—Elevations, plans, section and details of vestibule and front doors. The casing of the front door is of cut stone, the jambs and doors of walnut. The front doors are so constructed that when open they will fill a place made to receive them and complete the finish of the side of the vestibule, as shown in the upper right hand figure, representing side view of vestibule, with the front door open. The ceiling of the vestibule, shown in plan and section, is of hard wood.

PLATE 4.—Details of staircase. The upper left hand figure shows the finish on the landing and the doorway at end of hall. The lower right hand figure is a view taken from the landing looking toward the newel post; this newel is partially supported by a column shown on the side elevation. The staircase and hall finish are of walnut.

PLATE 5.—Details of front veranda, bay windows and cornice. The platform and corner posts of the veranda are of stone, the remainder of the details are of wood. The ornaments shown in black, are cut in square into the face of the work.

PLATE 6.—Details of side bay windows, rear veranda, capitals of the columns of front bay window and front veranda, and of the cornice of front veranda.

EXAMPLE E.

PLATE 1.—Residence of Moses W. Powell, Esq., Prairie avenue, Chicago. Brick with cut stone trimmings. The caps of the lower windows are so distorted by the engraver that they scarcely suggest their original form; there are several errors of this kind on the plate that escaped detection until too late to admit of correction. The cornice veranda and bay window are of wood. While this building was under construction a Mansard roof was substituted for the one shown on the plate.

PLATE 2.—Plans and details. In the plan of ground floor, the rear room, connecting across the rear hall with the dining room, should be the kitchen, and the room connecting with the sitting room through closet should be the bed room; these names are transposed on some of the plates.

The interior finish is of pine. The figure at right of plate marked "Plan and Elevation of Arch in Hall," shows the finish of the rear end of front hall, the left hand panel is a partition covering the stairway. In the second floor transoms are placed over all chamber doors.

EXAMPLE F.

PLATE 1.—Elevation. Residence of Thomas Bassett, Esq., at Winetka, Ill. A frame dwelling with concrete basement. Many of the details on this elevation have been much injured by the engraver. The lithographers are not architects.

and do not always understand the meaning of a dot or the twist of the point of the pen, that to a professional indicates clearly the form intended. In this elevation many of the projections are too great, the passage, by means of an *ogee* from the sharp edge, to the chamfer on the brackets above the veranda columns, is not well drawn, and the blocks in the center of the two second story window caps are too large. A practised eye will not fail to detect these errors and class them as such; this, together with the fact that the general effect is a correct one, has decided us to use the plate.

PLATE 2.—Plans and details. The parlor is a very large one. The staircase is placed upon one side of the hall, leaving the full width of eight feet from the library and parlor to the dining room. The dining room communicates with the kitchen, across the rear hall and by means of a small slide door between the two lower shelves, in the china and pantry. There is a good cellar beneath the entire house. The house is well adapted for the country residence of a gentleman doing business in the city; a place where he can receive his friends and conveniently entertain them.

EXAMPLE G.

PLATE 1.—Elevation. A country house, in the picturesque Swiss style, designed for Col. James H. Bowen, to be erected at Hyde Park, on the lake shore, near Chicago. The building is modeled after the Chalet erected in the Park of the Paris Exhibition, 1867, for the use of the General Commissioners.

The frame, verandas, and tracery are all designed to be of wood. The filling, in between the timbers, to be a four inch brick wall; the red and the Milwaukee (neutral yellow) to be used. The brick are to be laid flush with the face of the timbers and a double ogee strip nailed on outside, lapping one-half inch on the brick, this will allow common rough timbers to be used, lessen the cost and make a neater finish than if the timbers were dressed to show. In the Paris example, instead of brick, slabs of stone and marble, one inch thick, were set in between the timbers and fastened with a stop, as glass is set in a sash. This makes a very elegant finish, and when two or more colors are used and tastefully arranged, adds much to the picturesque beauty of the building.

PLATE 2.—Plans. On the principal floor the entrance is into a hall fifteen feet six inches by eleven feet six inches, with sliding doors opening into the conservatory. The panels in these doors are of glass. This hall communicates with the parlor and dining room, which latter communicates by glass paneled sliding doors with the conservatory, and across the back entry with the kitchen. The floor of the conservatory is on a level with the floors of the hall and dining room; it has a southeast exposure, a metallic roof, a glass front and side. By having neat flower stands, and the plants arranged with good taste, it can be made to contribute greatly to the beauty and cheerfulness of the hall and dining room. The staircase is in the tower, opening from the front hall. The best chamber is arranged with an alcove for a bed, a dressing room and a wardrobe closet. There are two

large linen closets from the hall, and a store room closet at the head of the back stairs. In the attic are two good sleeping rooms.

Below these plans is a perspective design for an office of a lumber merchant or a cottage in some gentleman's grounds. It is from a photograph of one erected in the Park of the Paris Exhibition of 1867—loaned to us for publication by Col. James H. Bowen. All the cut wood work should be heavy, the tracery in the gable ends should be four inches thick. The design is very picturesque and can be easily executed.

EXAMPLE H.

PLATE 1.—Perspective view of a cottage designed for a picturesque site on the slope of a long hill in the vicinity of Cincinnati. Material: The basement of rough stone, the walls above of brick, stone window casings, the verandas of wood.

PLATE 2.—Plans and details. The slope of the hill toward the street, necessitated the high flight of steps. The hall passes through the house and communicates with the yard in the rear by a single step. The rear door is protected by a porch. The kitchen communicates across the rear hall with a summer kitchen formed by a shingle roof, and broad rolling slat blinds. The doors are made of lattice work. There should be a flue for this kitchen in the rear of the house.

On the chamber floor are four large bed rooms, with a closet to each, and a bath room communicating with the northwest bed room and the rear hall, from this hall is a staircase leading to the attic, where are four bed rooms.

PLATE 3.—Details. The railings of the balconies and verandas are formed by inserting seven-eighths inch boards of the proper width with the designs cut in the edge.

EXAMPLE I.

PLATE 1.—A cheap cottage erected several times in the suburbs of Chicago. Some of the details of the elevation are very faulty, the general effect, however, is correct. The roof window over the stairway gives head room and allows the hall to be reduced to very small dimensions. This design is a favorite one and has gone through several modifications; in its present form it was erected, without plumbing, for $2,250.

EXAMPLE J.

PLATE 1.—Elevation and plans of a dwelling erected near Chicago.

EXAMPLE K.

PLATE 1.—Elevations and plans of a frame dwelling erected on Wabash avenue, Chicago.

EXAMPLE L.

PLATE 1.—Sketch for a story-and-a-half brick dwelling.

EXAMPLE M.

PLATE 1.—Sketch for a frame dwelling.

EXAMPLE N.

PLATE 1.—Sketch for a brick dwelling.

EXAMPLE O.

PLATE 1.—Design for a frame dwelling erected in the suburbs of Chicago.

EXAMPLE P.

PLATE 1.—Sketch for a frame dwelling.

EXAMPLE Q.

PLATES 1, 2, 3.—Elevations, plans and details for a frame dwelling house for Edwin Walker, Esq., to be erected at Athens, Illinois. As this dwelling can be seen from all sides, care has been taken to make all the elevations attractive and to have all the openings well arranged even in the rear elevation.

PLATE 4.—The figs. 1 and 2 illustrate the article in the text on the stability of arches.

PLATES 5 AND 6.—Details.

EXAMPLE R.

PLATE 1.—Two elevations, plans and details for a block of thirty-two frame houses now being erected on North La Salle street, Chicago. The partitions between the houses are all double, with a four inch space between the studs; this will enable the proprietors to remove them or any one of them. In case of fire by removing the battern, covering the separation, either in the front or rear, and directing a stream of water into this space, the department might be able to prevent the fire from passing. Both elevations are used. The brackets of the cornice and some of the more ornamental portions are of terra cotta.

EXAMPLE S.

PLATE 1.—Plans and elevation for a store and offices erected on Dearborn street, Chicago, cut stone front, galvanized iron cornice. Between the second floor and the fourth floor are three stories of water closets and coal rooms. The entrances are from the landings on the staircases. The elevation on the right was for a store on South Water street. The building was finished as a warehouse, and the plans are without interest.

EXAMPLE T.

WORKINGMEN'S COTTAGES.

PLATE 1.—We have given three illustrations, one of a two-story house from the *Cités Ouvrières de Guebwiller*, the others on the same sheet are English from the Building News of September 18, 1868.

The first (occupying the right of the sheet) is one of a block of four houses, each built in the corner of its lot, the most distant from the street. Two of the walls of each house are party walls. On the first floor are the living room and kitchen, above these are two chambers and a water closet, and below is a fine cellar where vegetables can be kept through the winter, and which can be fitted up by the owner during his leisure moments, with closets, shelving, or other conveniences that readily suggest themselves; closets can also be easily made behind the staircase in the rooms above. On the left of the sheet are the English examples, designed for a locality where the land is more valuable. They are built in long

blocks, with small yards, surrounded by brick or stone walls, extending to an alley. In these yards are water closets, and places for ashes and coal.

The question of furnishing good, convenient and cheap houses to the laboring classes is not one of art, but of engineering and political economy; involving alike a careful and proper administration, a skillfully drawn plan, a substantial and cheap construction. The problem that the architect is required to solve is—to give the cheapest and most convenient, well constructed house, suitable for a workingman with a family of a given number of persons. The problem requires a different solution, more or less varied, in each locality; it will depend upon the nature of the employment, the wages the family receive, and the nature of the materials that could be furnished at the least expense. It is not expected that either of the examples given will be the best suited to any American locality; they simply show what has been executed or proposed at other places. As a rule, throughout the United States, a balloon frame, with batterned sides, shingle roof, and chimneys, arranged for stoves, would best answer the requirements. Simple as the problem seems, it requires and deserves the most pains-taking study, on the part of any architect who may have the work in charge. It is no less important to secure a successful result, that the administration should be conducted by earnest, zealous, practical business men, not far away in some large city or scattered about at their several homes, each with a private business that engrosses all his attention; but those living in the immediate vicinity, who are pecuniarily, as well as philanthropically, interested in the result. The Mulhouse Society devoted as much care, time and talents upon this as upon any part of their great manufacturing establishment, and hence the result,—complete success, profitable, alike to themselves, their stockholders, their employees and the families of their workmen. The same result will attend the same efforts, if equally well directed, at any of our manufacturing or mining centers. The work will be great, but the result will be correspondingly beneficial.

EXAMPLE U.

PLATE 1.—Plans and elevation for an apartment house on the French plan. The lot is one hundred and thirty-two by thirty-five feet. Through the large doorway is a carriage drive ten feet wide to the court-yard, and then under an arch through the carriage house into the alley. In the front of the basement is an apartment for a bachelor, consisting of parlor, chamber and closet. To the rear of the grand staircase is the apartment for the porter and family, he takes charge of the court, the stairway and halls; his wife will do any extra work the families may require, and take charge of any bachelor apartments. To the rear of these rooms are the stables. There is a back stairway for the use of servants, and a grand stairway communicating with all the halls for the occupants of the several apartments and their visitors. On each landing is the front door of the apartment, which opens into a hall lighted from the stairway by glass panels in the doors, and by stained glass windows. On the first and second floors are parlors connecting with a library and bed room. To the rear of the staircase are chambers, a dining room and

kitchen, closets and servants' bed room. The third and fourth stories can be leased entire or divided in two apartments, one in front, to use the front stairway, and one in the rear to use the back stairway. The Mansard roof is divided into single apartments of one or two rooms each.

For a full discussion of the French system the reader is referred to the chapter on Apartment Houses, in the body of this work.

EXAMPLE V.

PLATE 1.—Design for a marble monument for a gentleman in Chicago, to the memory of his little boy. The plan is a square. In the center of the base stands a cross of white marble, plain and uninteresting of itself, but the ideas which we may associate with it are so precious that no amount of elegance or cost is too great for its preservation. Four marble columns support a dome, surmounted by a finial representing a bunch of leaves and flowers. Cost of the work, executed in New York, about $3,000.

Appendix.

THE AMERICAN INSTITUTE OF ARCHITECTS.

This Institution, which should include among its members all American Architects as well as all lovers of the Art, was incorporated in 1857. Its headquarters are at New York city. Its object cannot be better expressed than in the circular of their President:

"The American Institute of Architects is intended to include every architect in America, who may be in sympathy with its purpose. Its purpose is to bring the profession of architecture into a reputable, recognized and influential position.

"It is assumed that the professional business of an architect consists in rendering to his employer certain well-defined, important and confidential services, for which he is to be paid according to a generally received scale of charges.

"It is assumed that the proper discharge of his duty to his client forbids the acceptance of any fee, commission or remuneration of any kind, from any person interested in the work, other than his client. The whole weight of the influence of the Institute is thrown, and will always be thrown, upon the side of strictly professional practice in this respect.

"It is assumed, furthermore, that a general agreement among the architects of America, as to proper ways of conducting business, definitions of professional duties, amounts of professional charges, and the like, would tend to advance the interests of all parties engaged in building. Employers will be more sure of faithful service and proper charges; mechanics will get more easily and completely the instruction and supervision of which they stand in need, and which the best of them desire, and architects will find their authority as experts more readily admitted, their influence for good greater and more easily exercised, and their professional independence secured as the Institute becomes more powerful as a bond of union. To a very great degree this has been the case already. In the matter of architects' commissions, for instance, the publication of the Institute's schedule of charges has made it generally easy for architects to obtain proper payment for services rendered. During the past seven years the standing of architects in this respect has been almost entirely changed.

"As regards the interchange of technical information, of knowledge gained by actual experience, and of opinions founded upon observation and study, the value of association in securing this is at once evident. These matters are of necessity

left to the several chapters; but those spoken of are the affair of the whole Institute.

"This letter, ordered by the Institute and approved by the Board of Trustees, is sent to you to introduce the subject to your attention. You are requested to enter into correspondence with the Secretary. You will be informed, in the course of such correspondence, of the purposes of the Institute in detail, of the manner of its organization, of the relations of the chapters to the federal body and of individual members to both. Your co-operation with the leading architects of the whole country is requested, in a carefully planned and resolutely undertaken movement to improve our position as architects.

"RICHARD UPJOHN, *President.*

"RUSSELL STURGIS, JR., *Secretary.*

"Room 34, No. 57 Broadway."

Some of the Articles of its Constitution should be strictly observed by every member of the profession, for instance:

"Sec. IV. 3. *No member shall accept direct or indirect compensation for services rendered in the practice of his profession, other than the fees received from his client.*"

In order that there should be a uniform schedule of charges throughout the country, the Institute, after mature deliberation, decided upon the following

SCHEDULE OF CHARGES,

ADOPTED BY THE AMERICAN INSTITUTE OF ARCHITECTS, JUNE 4TH, 1866.

For full professional services (including superintendence) 5 per cent on the cost of the work.

For preliminary studies, 1 per cent.

For preliminary studies, general drawings and specifications, 2½ per cent.

For preliminary studies, general drawing, details of specification, 3½ per cent.

For stores, 3 per cent. upon the cost, dividend in the above ratio.

For works that cost less than $5,000, or for monumental or decorative work and designs for furniture—a special rate in excess of the above.

For alterations and additions—an additional charge to be made for surveys and measurements.

Necessary traveling expenses to be paid by the client.

The architect's payments are successively due as his work is completed, in the order of the above classifications.

Until an actual estimate is received, the charges are based upon the proposed cost of the works, and the payments are received as installments of the entire fee, which is based upon the actual cost.

Drawings as instruments of service are the property of the architect.

They do not differ materially from those adopted by the Institute of British Architects; and in the *per cent.*, for full professional services, are the same as the French. We would respectfully suggest that they be adopted by all.

PLATES.

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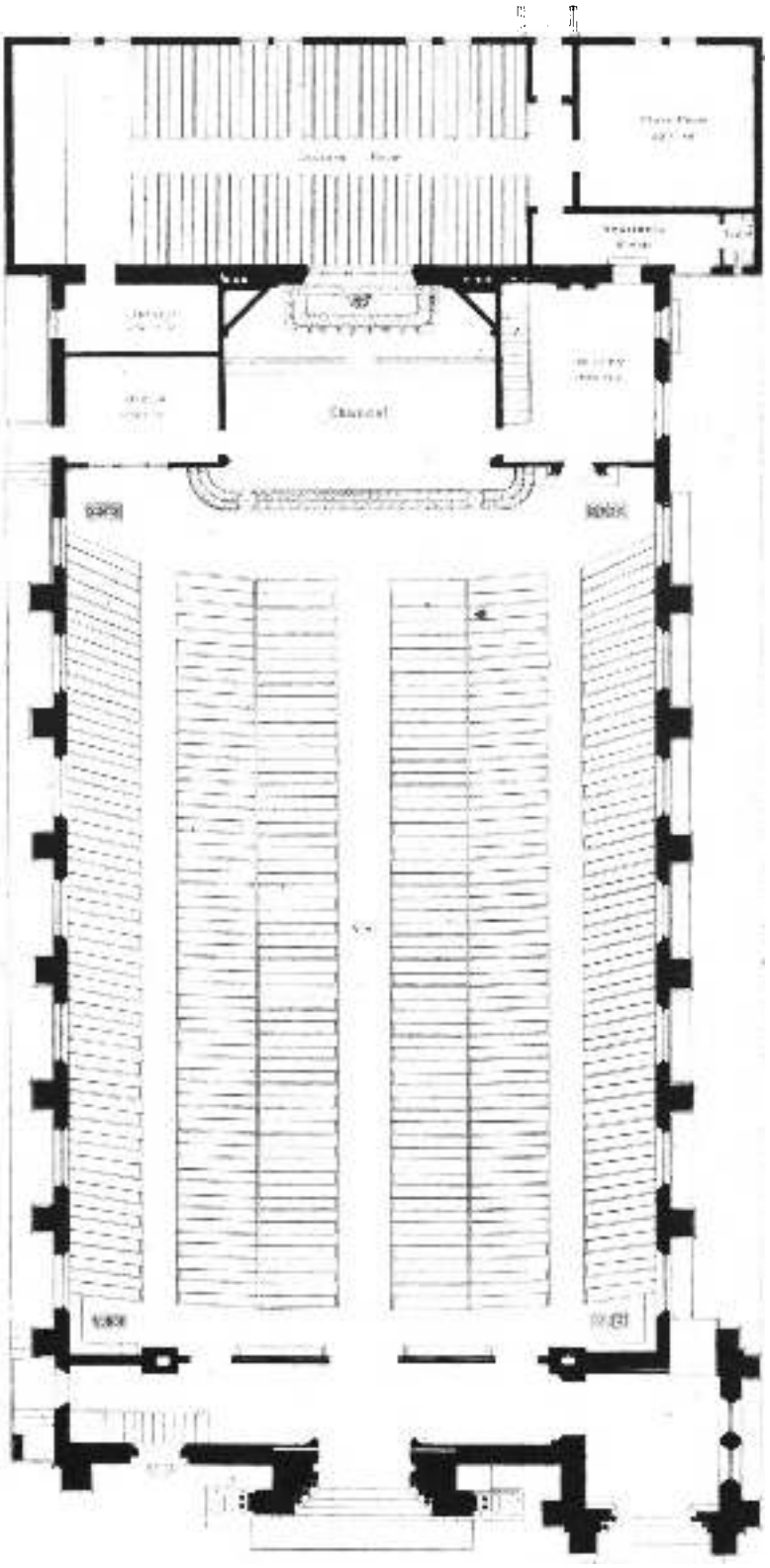

PLAN OF AUDITORIUM

WALL OF TYPE

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Example A Plate 2
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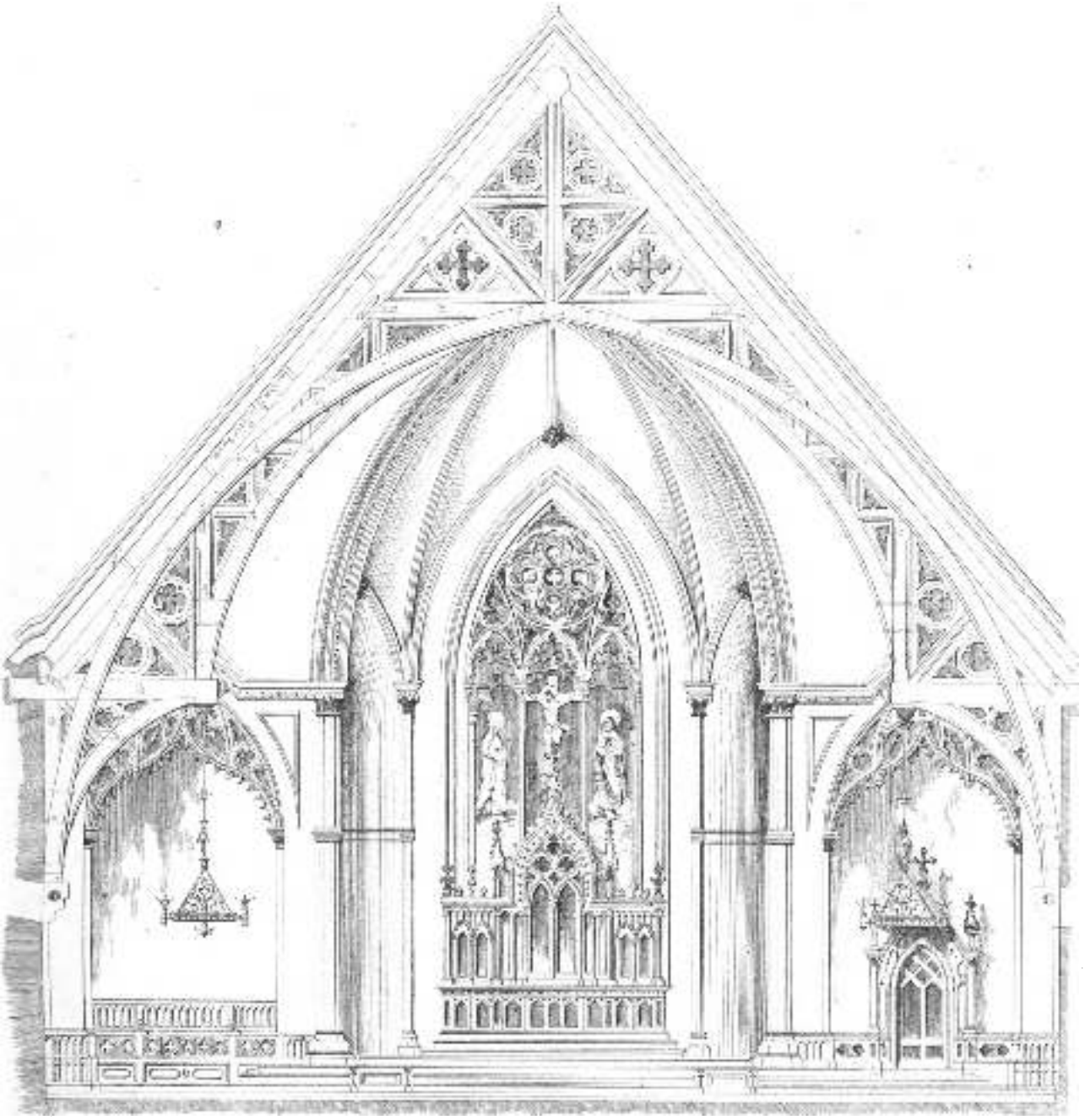

SCALE 1/8" PER FOOT

Loring & Jenney Architects
Example A Plate 3
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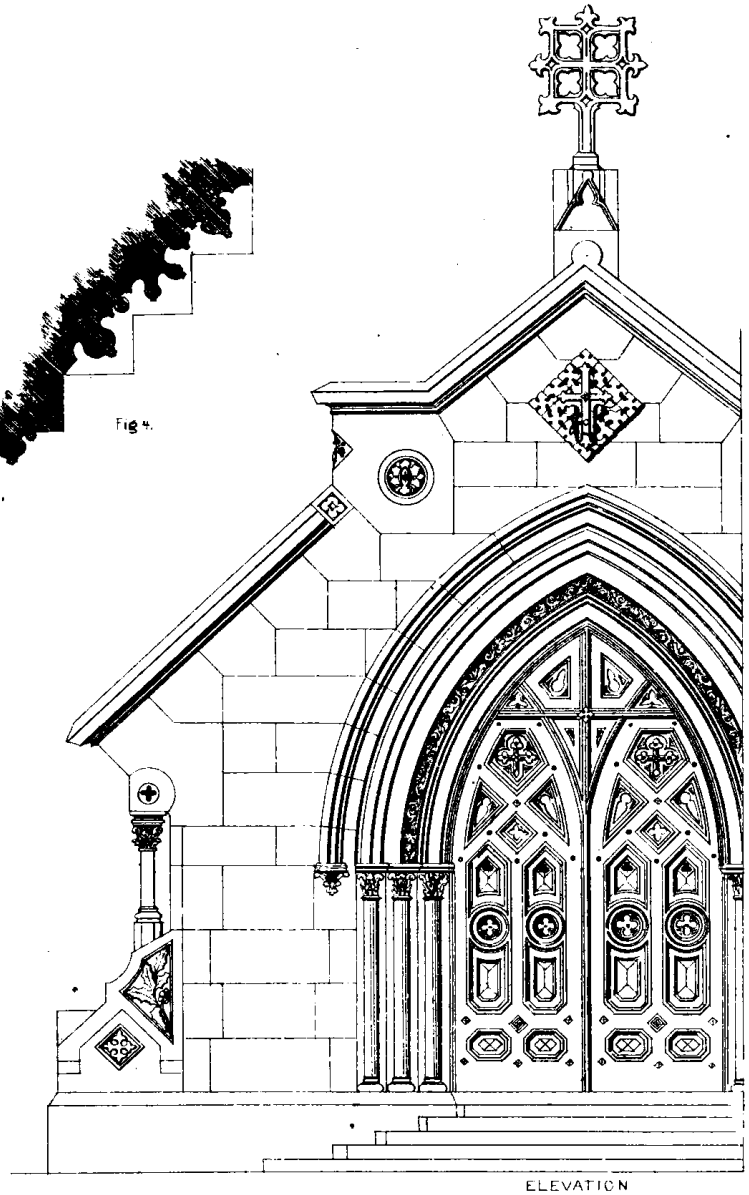
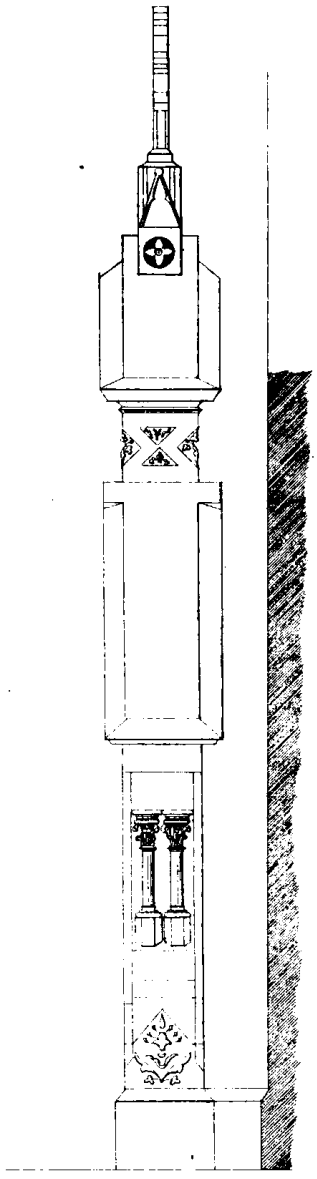
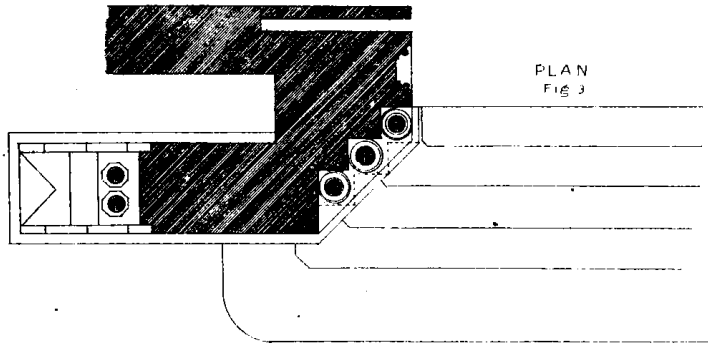
Fig 4.



ELEVATION
Fig 1



SIDE
Fig 2



PLAN
Fig 3

DETAILS OF FRONT PORCH

SCALE OF FEET Fig 1.2 3

Scale Fig+

Loring & Jenney Architects
Example A Plate 4
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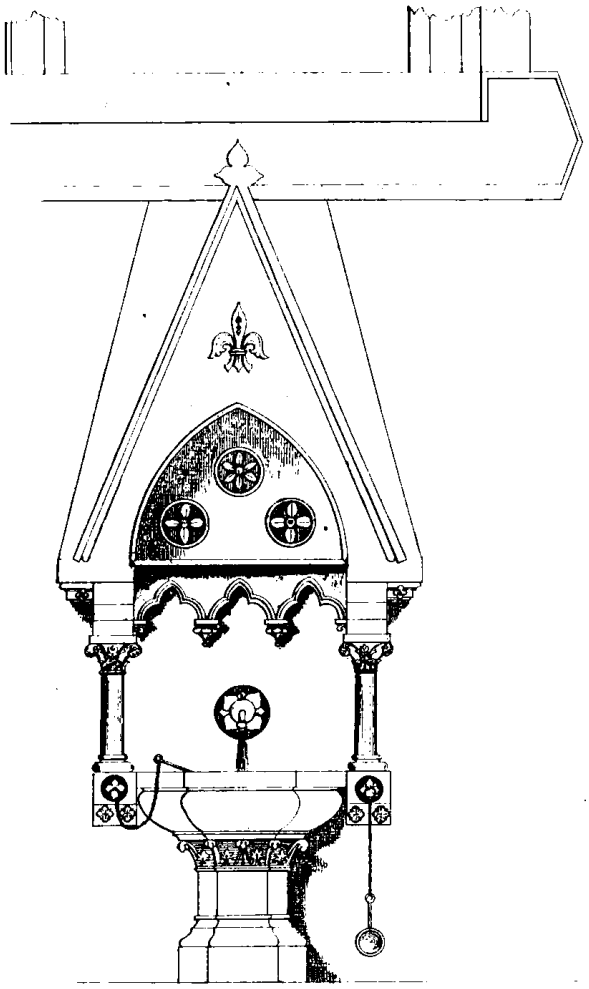

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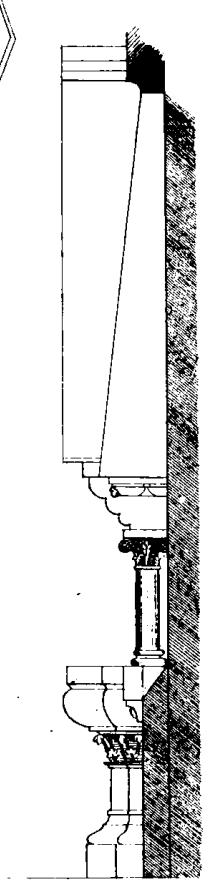
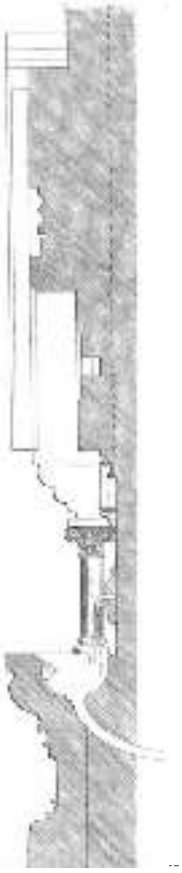


SIDE



SECTION

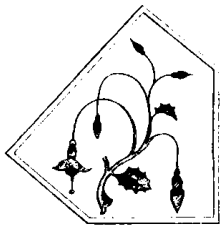
PLAN

DETAILS OF DRINKING FOUNTAIN

SCALE OF FEET

IN ROSE WINDOW.

IN N.W. CORNER PINACLE.



UNDER PORCH WEST GABLE.

Loring & Jenney Architects
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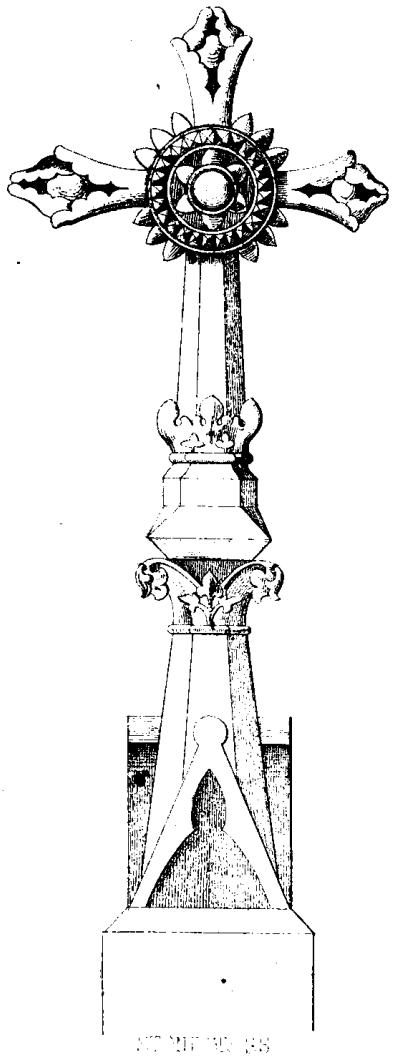

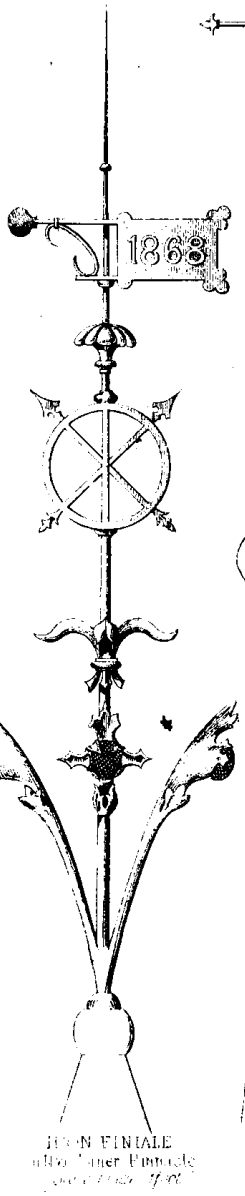

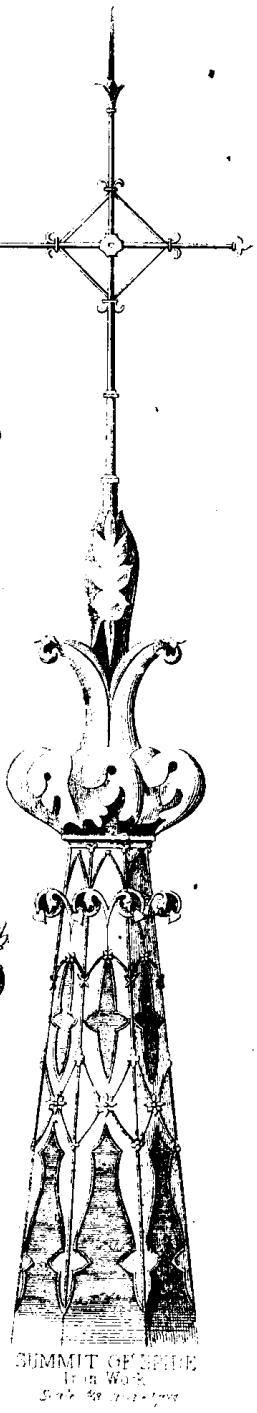

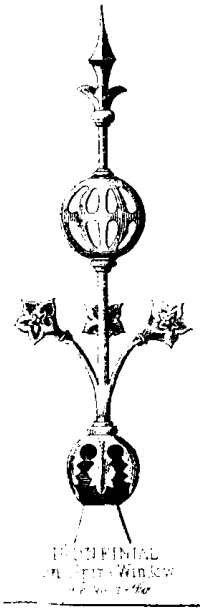

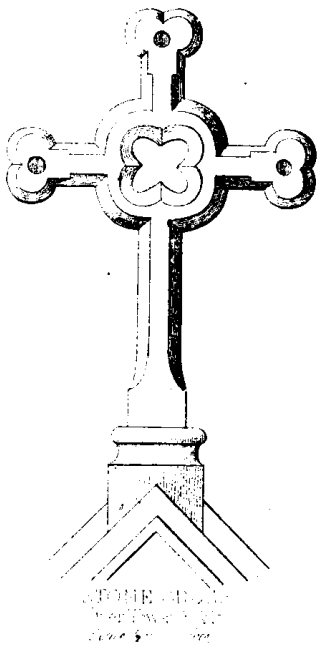

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Example A Plate 6

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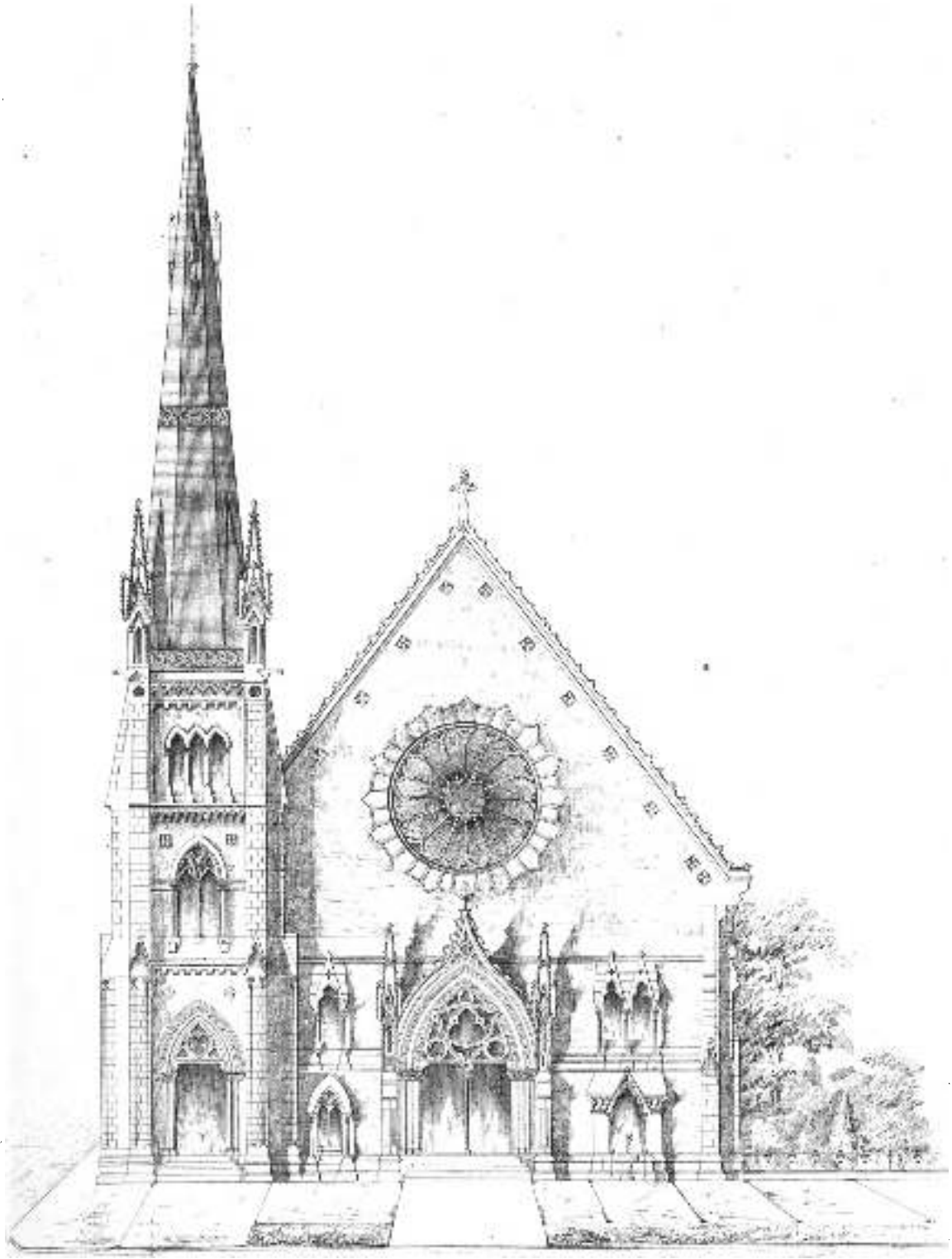

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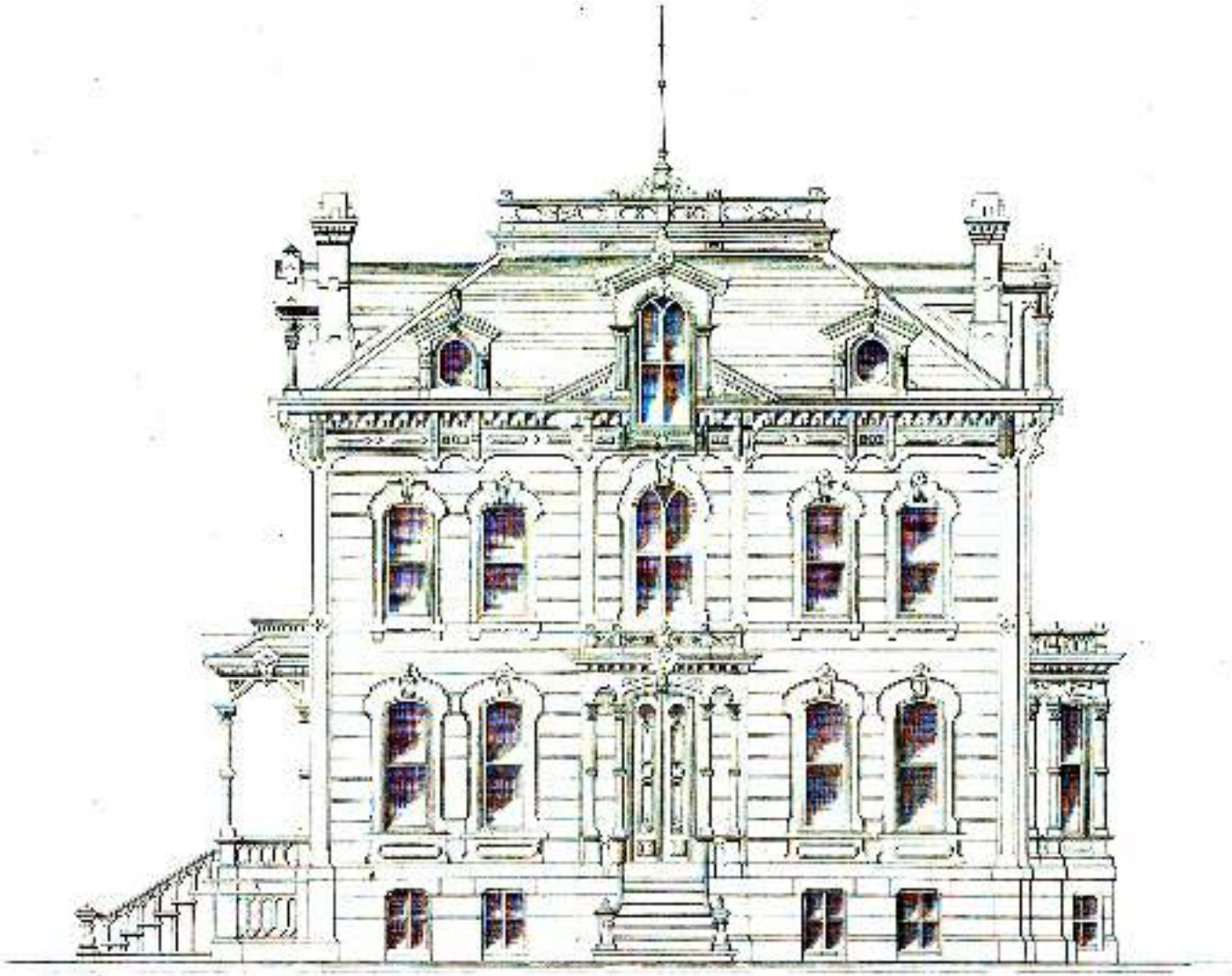

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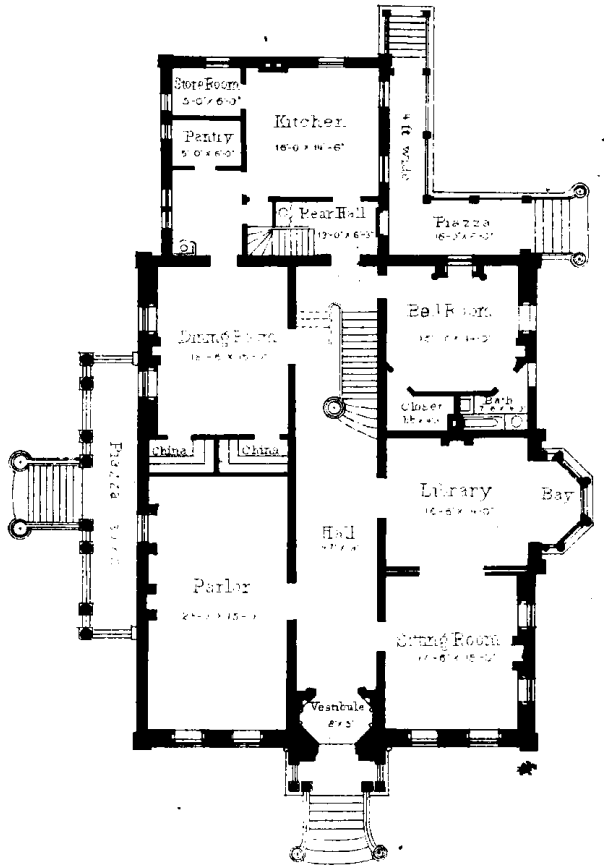

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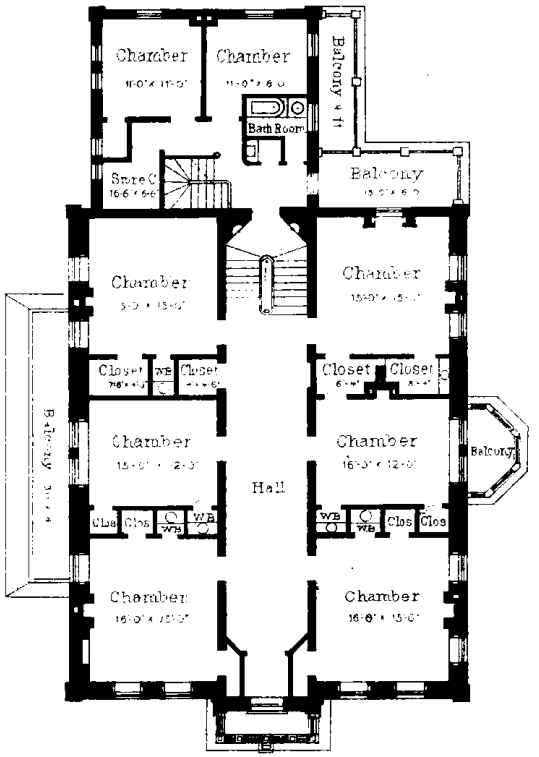

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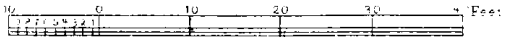

SCALE OF FEET

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Example C Plate 2

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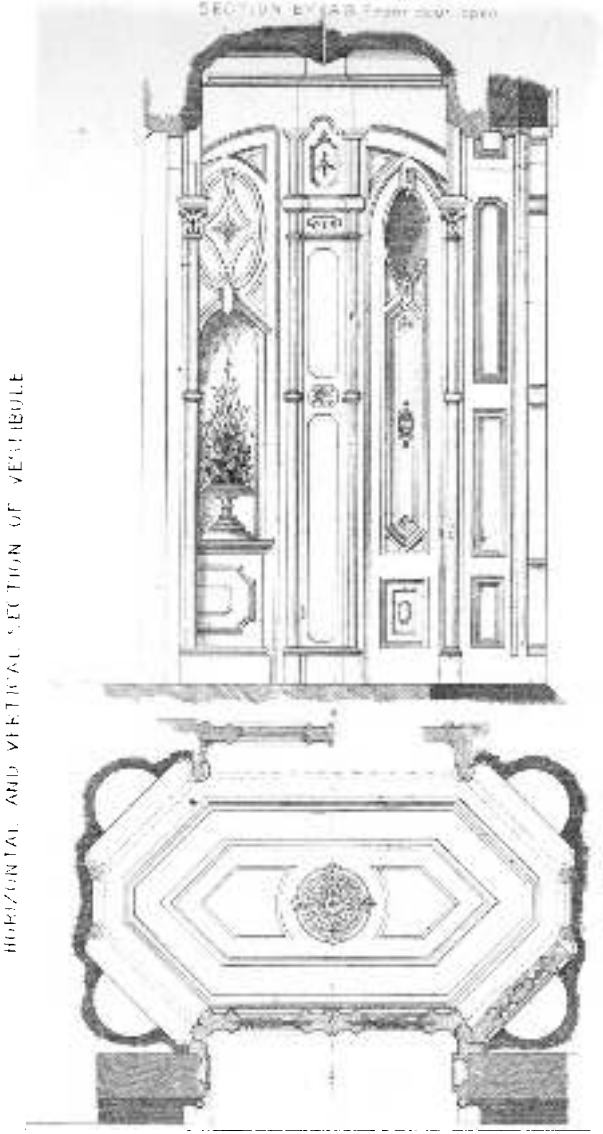
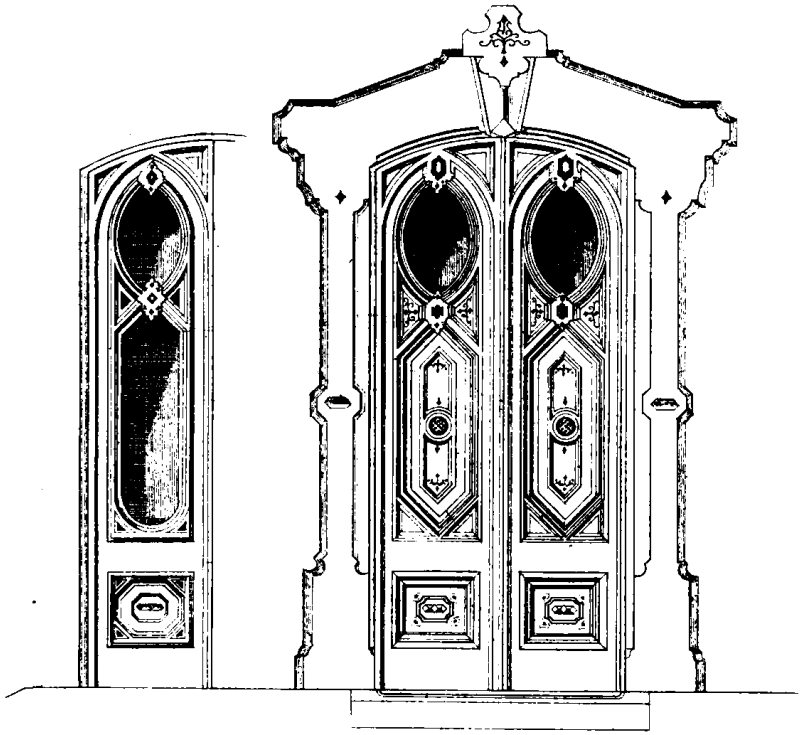


HORIZONTAL AND VERTICAL SECTION OF VESTIBULE

PLAN



VESTIBULE DOOR FRONT DOOR

ELEVATION OF DOORS

SCALE ⅜ INCH TO THE FOOT

Loring & Jenney Architects
Example C Plate 3
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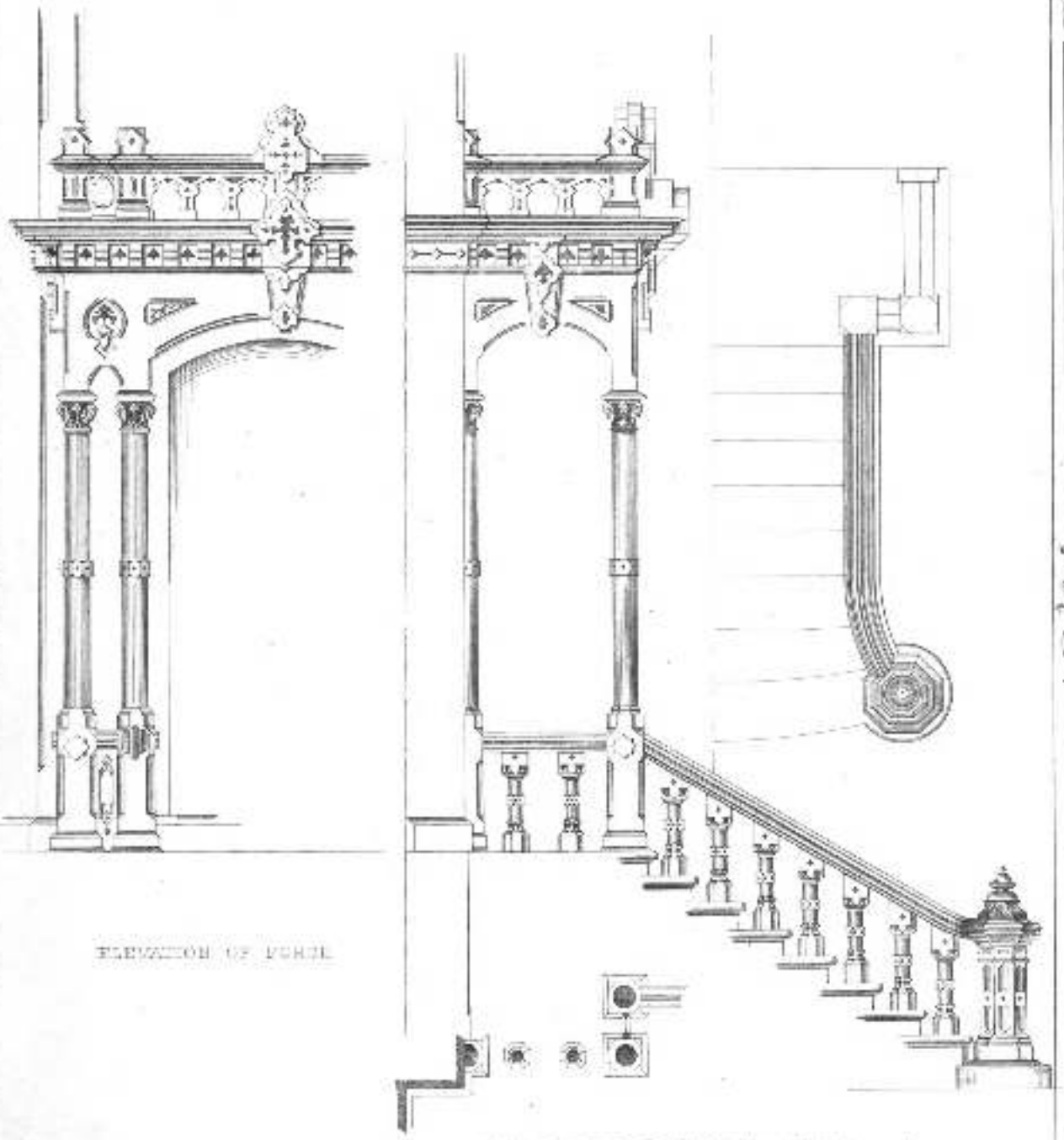

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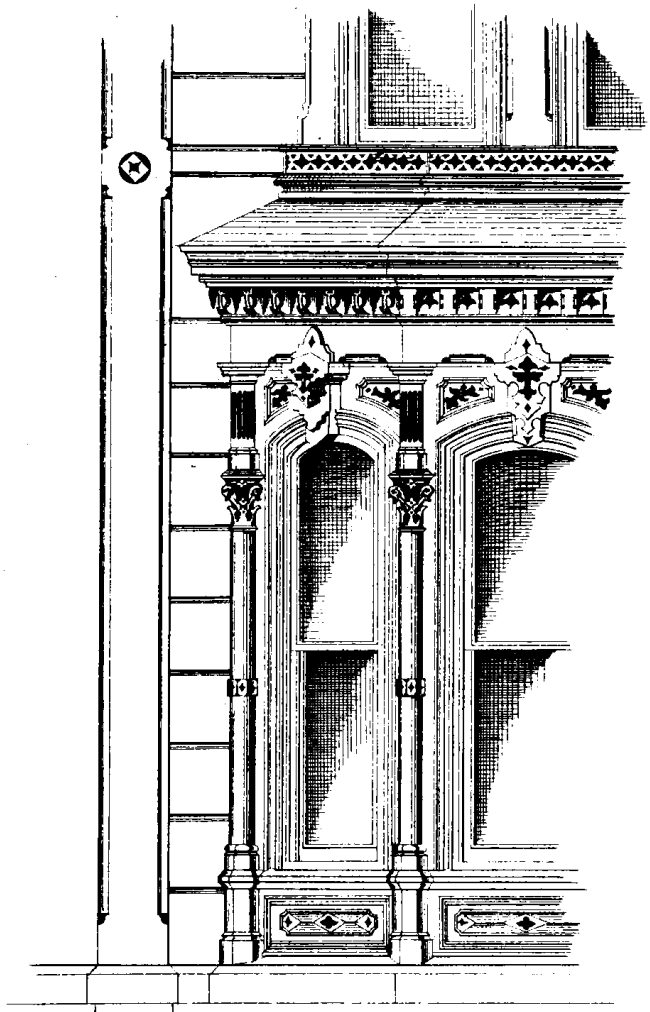
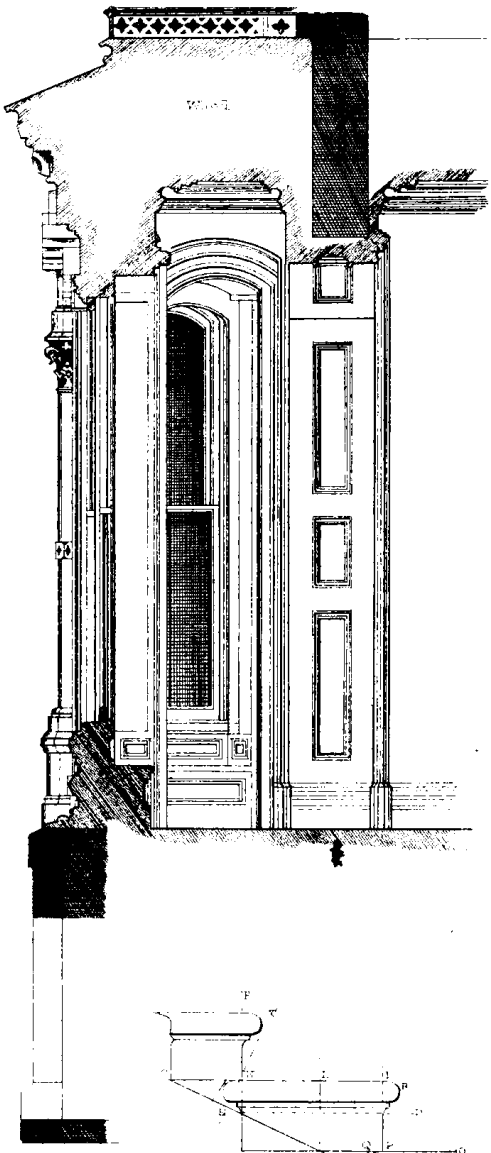
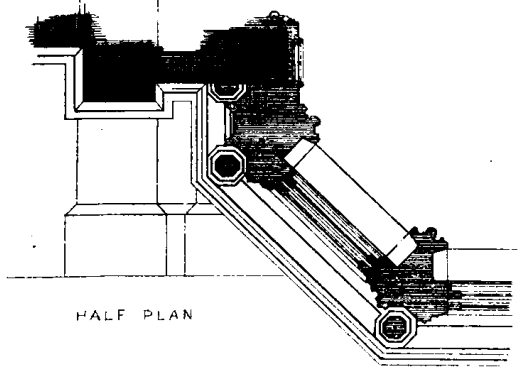
DETAILS OF BAY WINDOW

SCALE OF FELT FOR DETAILS OF WINDOW

SECTION AT AB







HALF PLAN

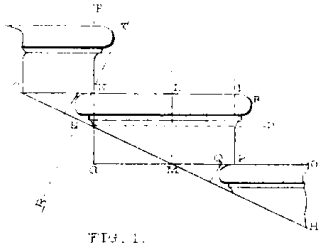


FIG. 1.

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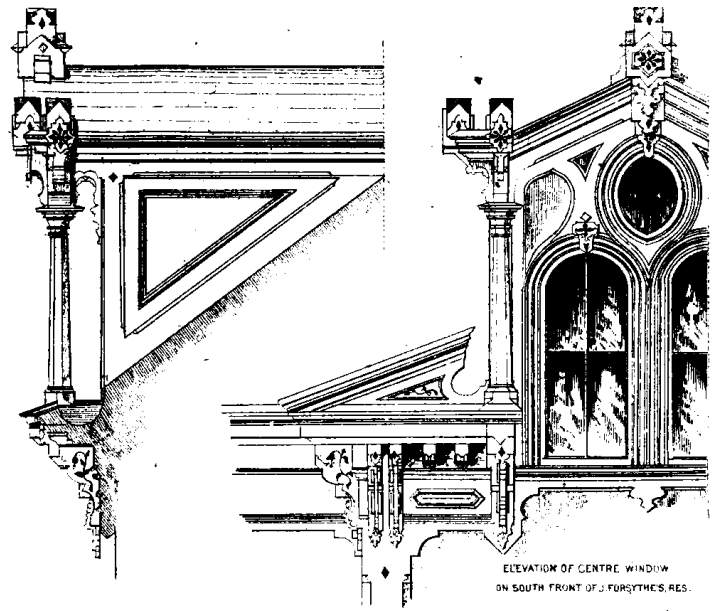

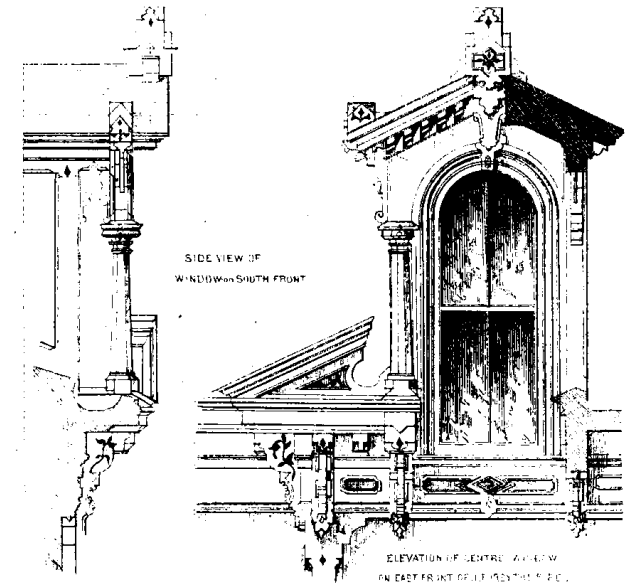

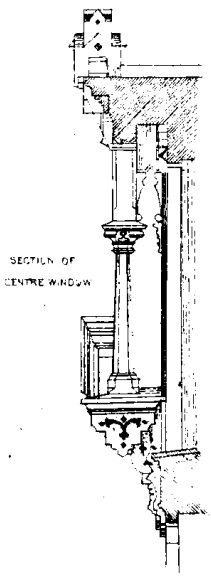

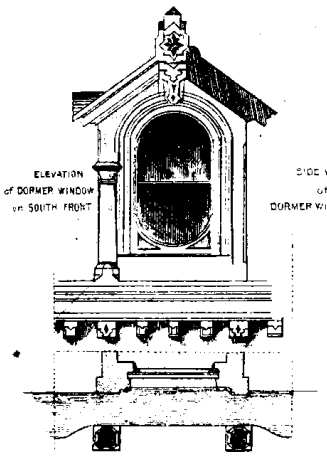

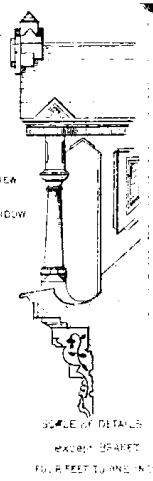

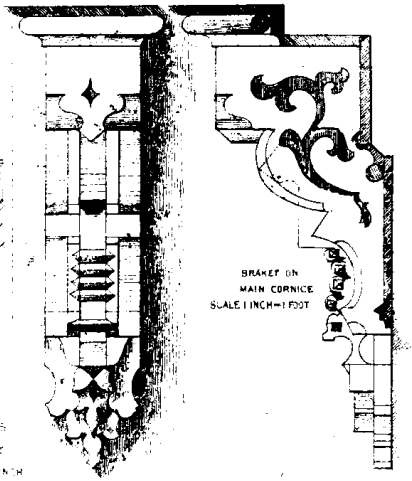

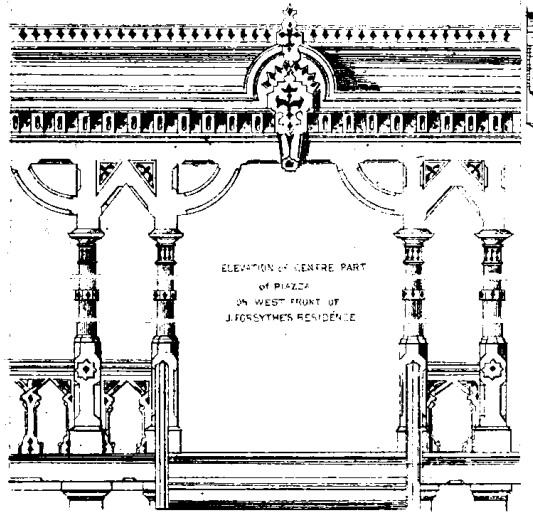

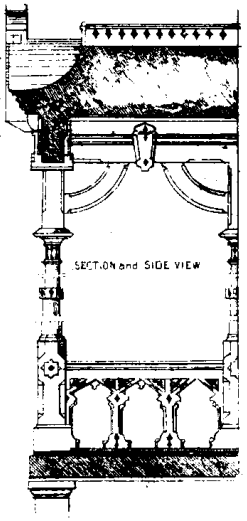

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Example C Plate 6

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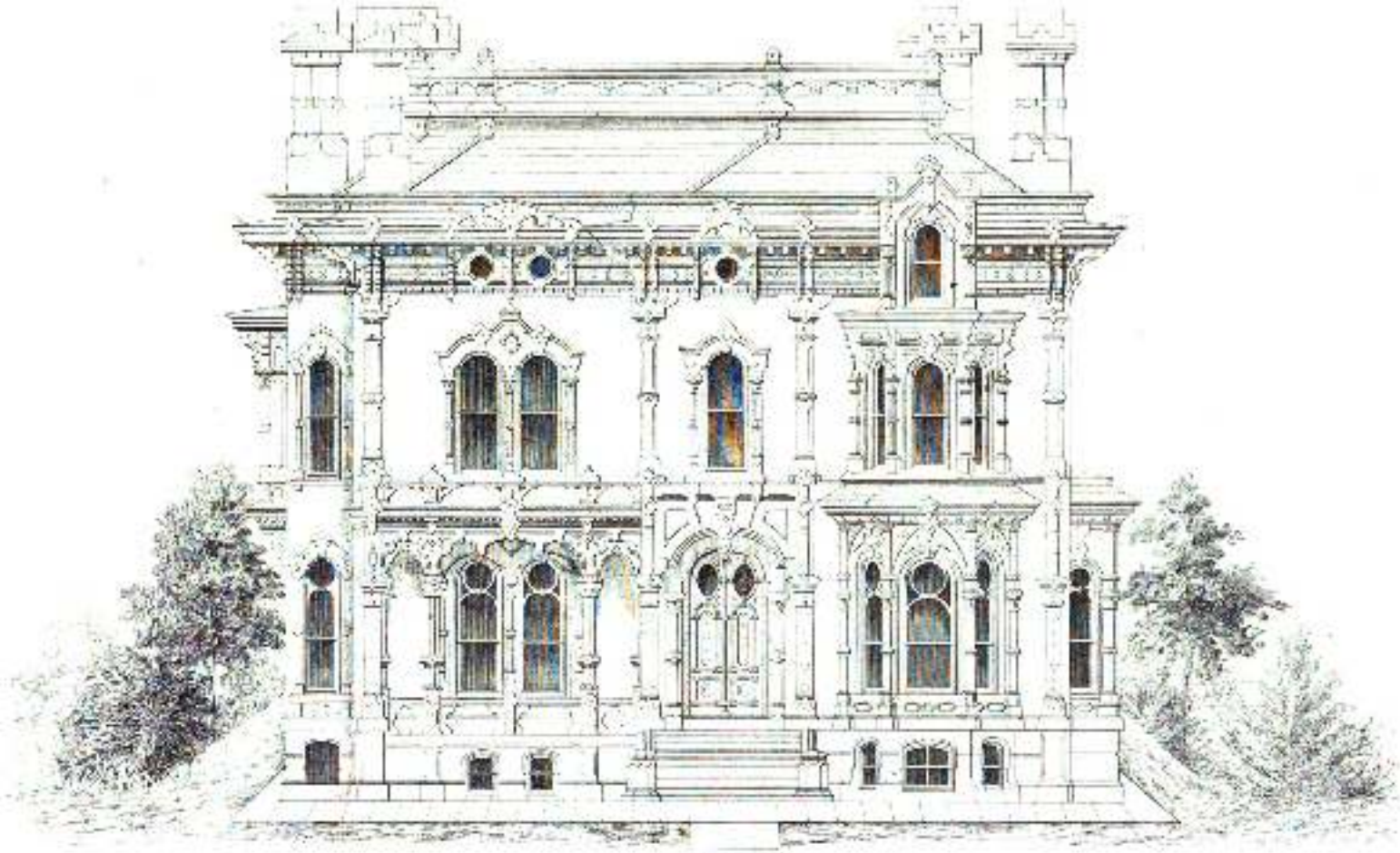

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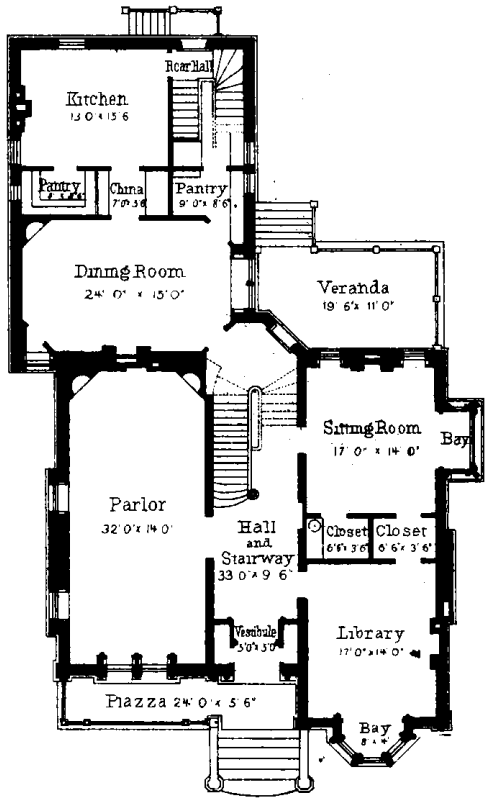

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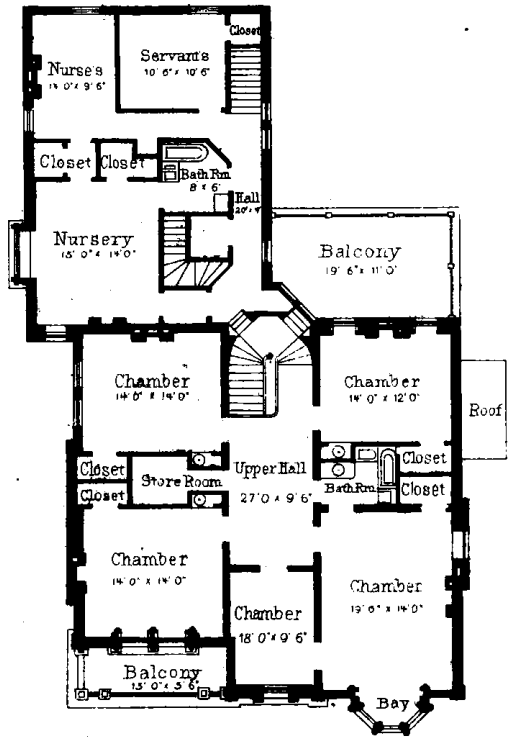

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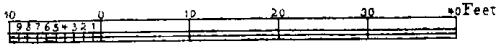

SCALE OF FEET

Loring & Jenney Architects

Example D Plate 2

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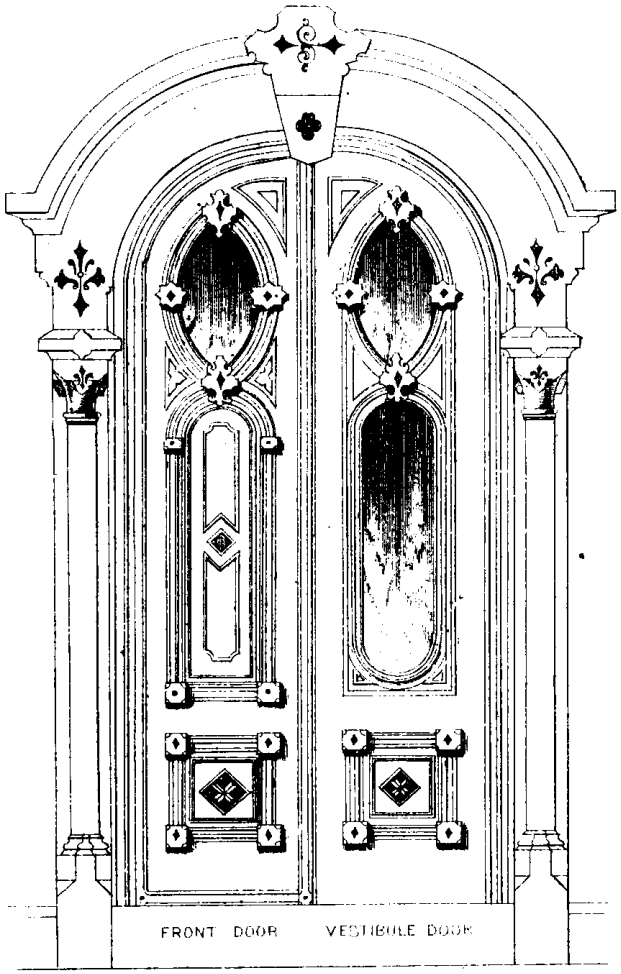
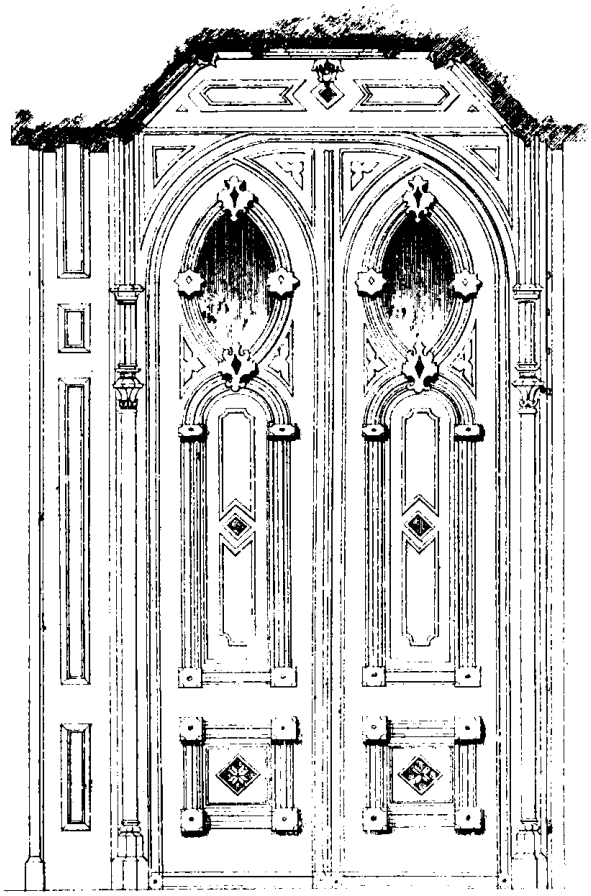
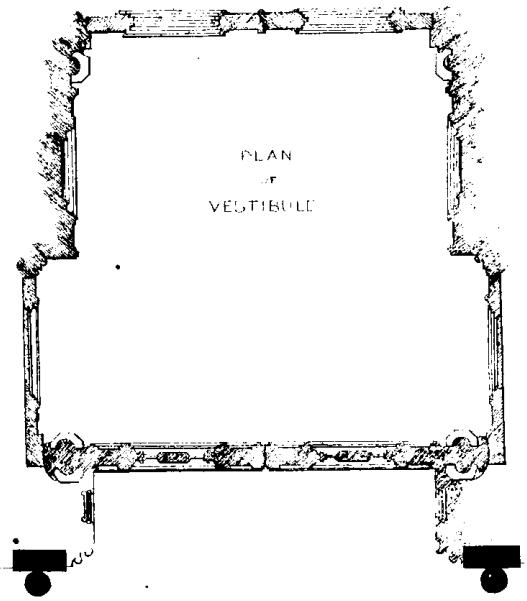
DETAILS OF VESTIBULE

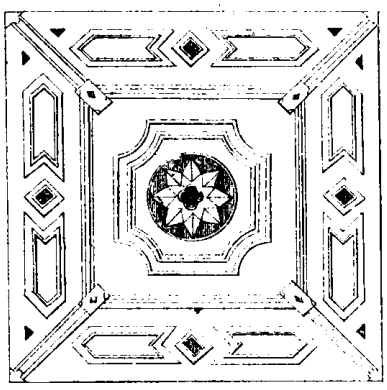


ELEVATIONS OF DOORS



SIDE VIEW OF VESTIBULE
FRONT DOOR OPEN





PLAN OF CEILING

SCALE OF FEET

Loring & Jenney Architects
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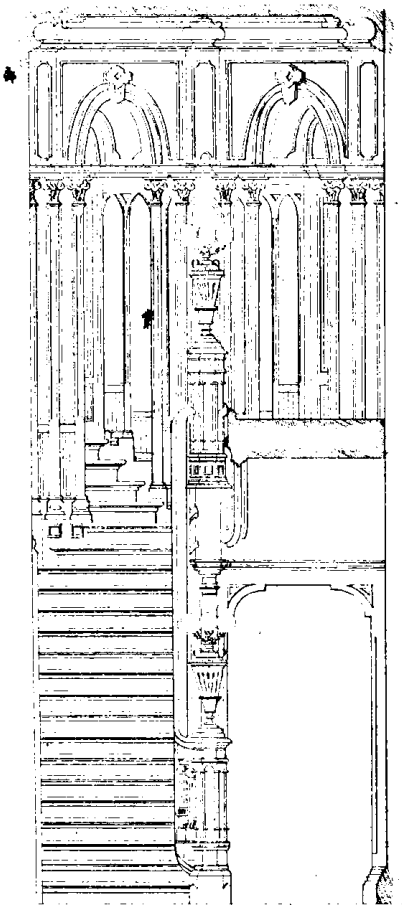

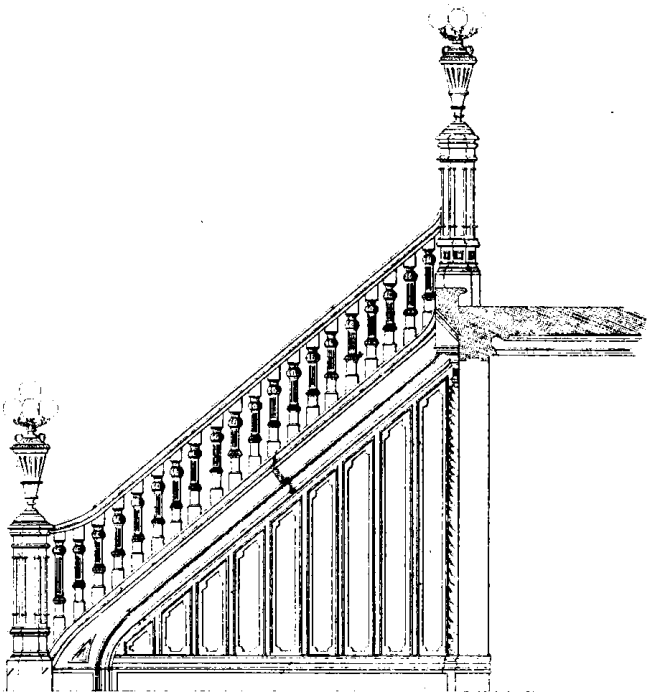

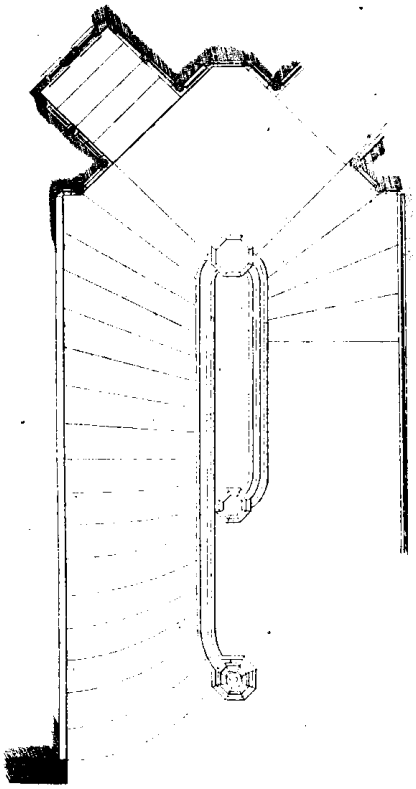

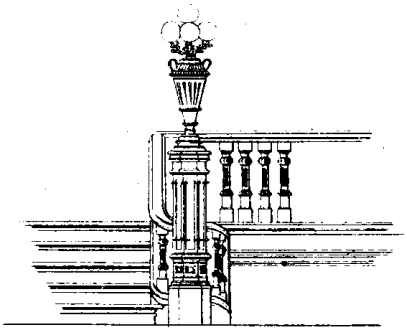

DETAIL OF STAIRCASE

SCALE OF FEET

Loring & Jenney Architects
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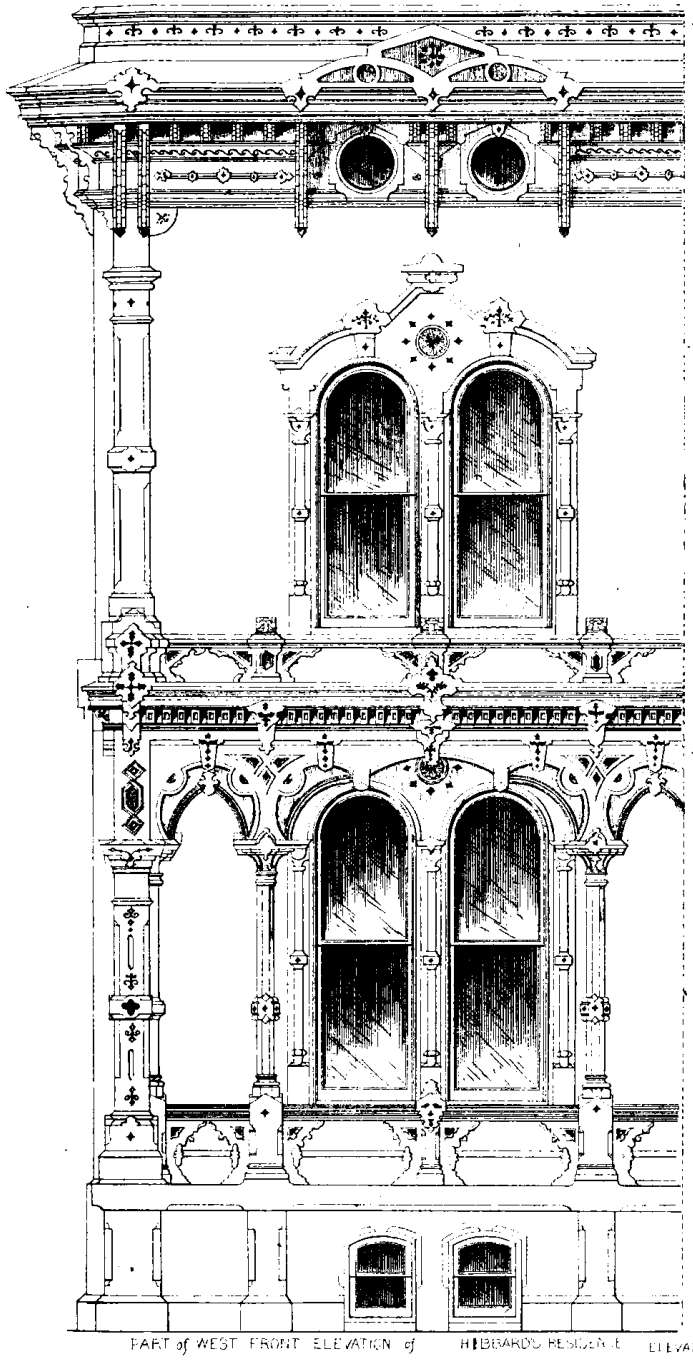
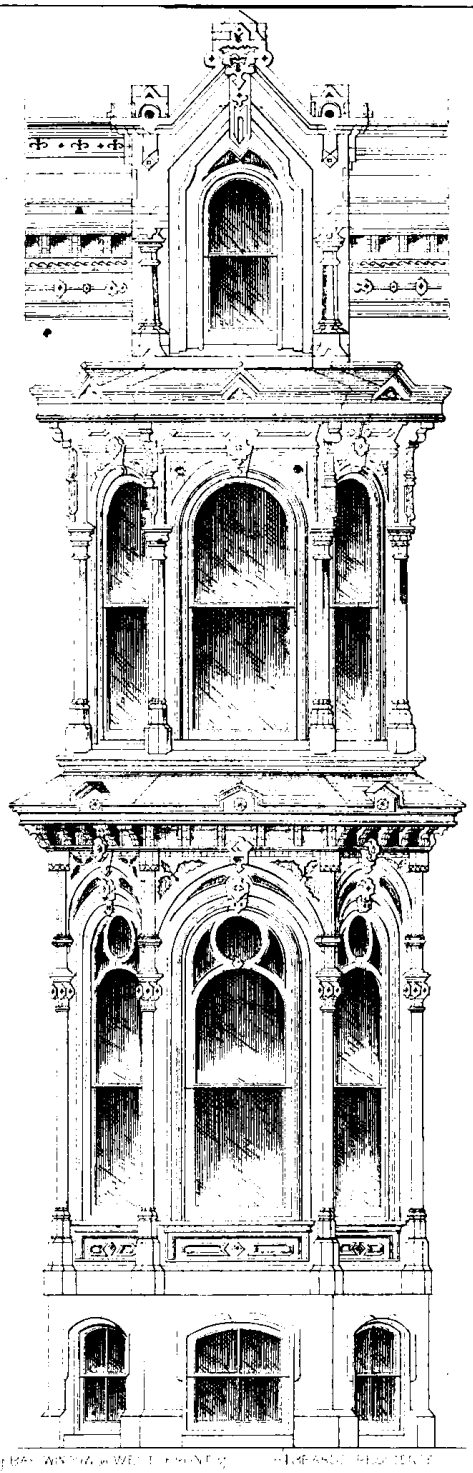
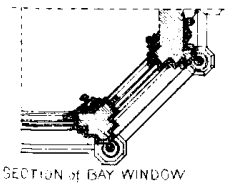


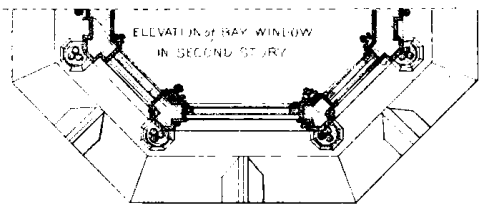
PART of WEST FRONT ELEVATION of HIBBARD'S RESIDENCE



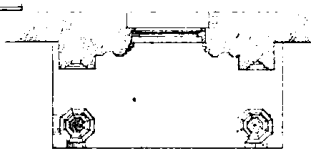
ELEVATION of BAY WINDOW in WEST FRONT of HIBBARD'S RESIDENCE



SECTION of BAY WINDOW IN FIRST STORY



ELEVATION of BAY WINDOW IN SECOND STORY



SECTION of WINDOW IN CORNICE.

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Example D Plate 5

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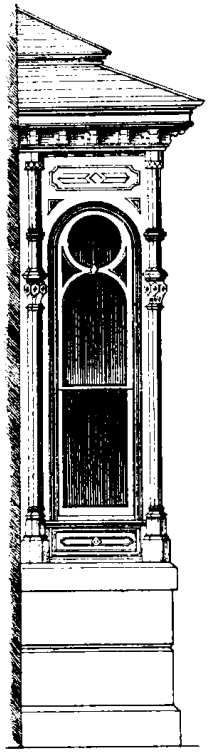
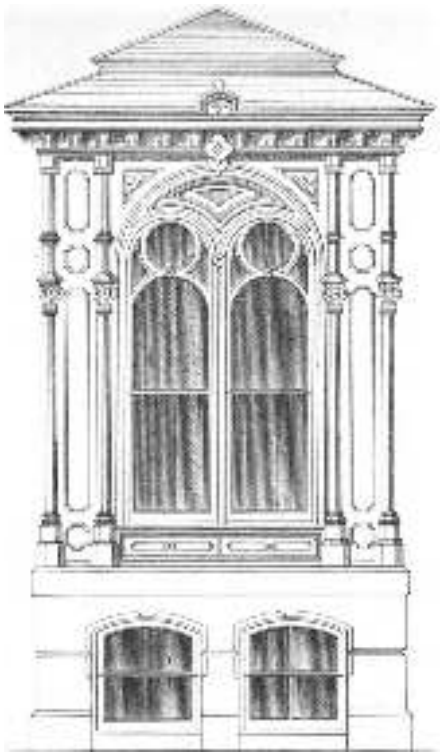
DETAILS of THE RESIDENCE of W. S. HARRIS

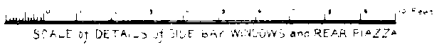


SIDE ELEVATION of BAY WIDOW

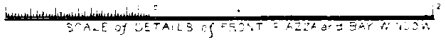
CAPITAL of FIRST STORY of BAY WINDOW WEST FRONT



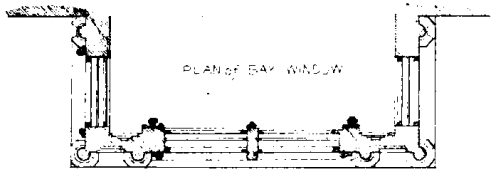
FRONT ELEVATION of BAY WINDOW on SOUTH SIDE



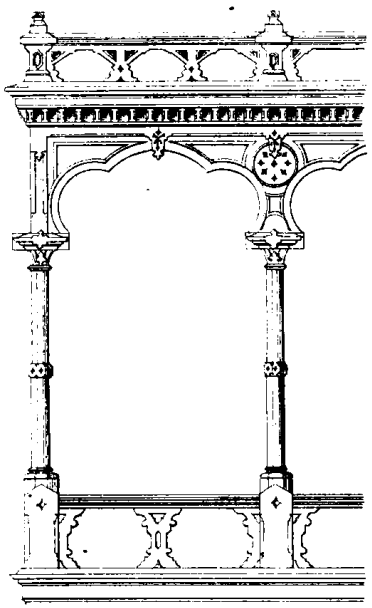
SCALE of DETAILS of SIDE BAY WINDOWS and REAR PIAZZA



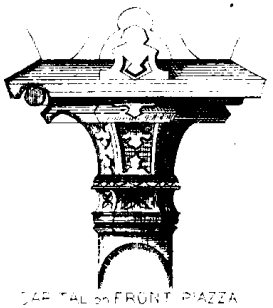
SCALE of DETAILS of FRONT PIAZZA and BAY WINDOW



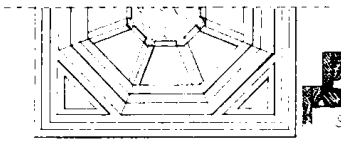
PLAN of BAY WINDOW



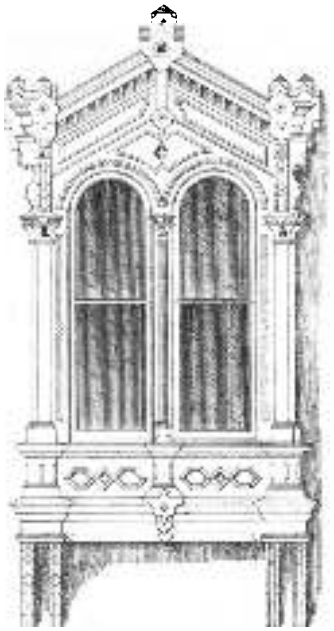
ELEVATION of REAR PIAZZA



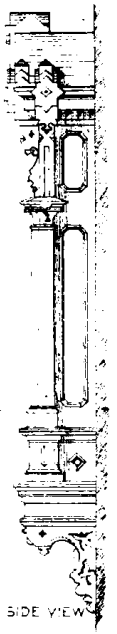
CAPITAL on FRONT PIAZZA



PLAN of CAPITAL

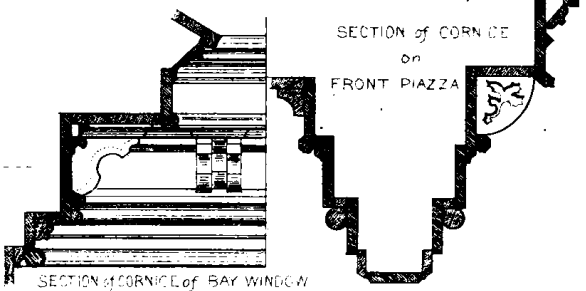


ELEVATION of BAY WINDOW on NORTH SIDE



SIDE VIEW

GROUND PLAN



SECTION of CORNICE on FRONT PIAZZA

SECTION of CORNICE of BAY WINDOW on FIRST STORY of WEST FRONT

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Example D. Plate 6.

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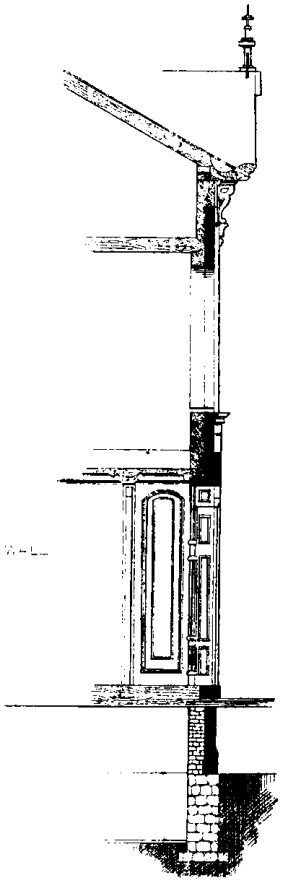
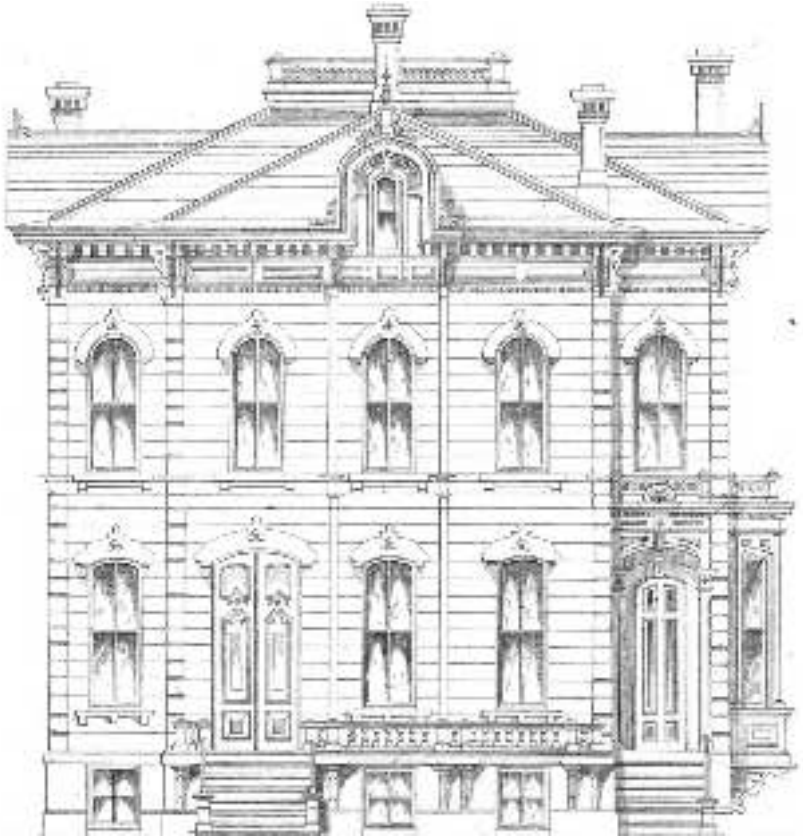


SECTION OF FRONT WALL



FRONT ELEVATION

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Example E. Plate 1

PUBLISHED BY
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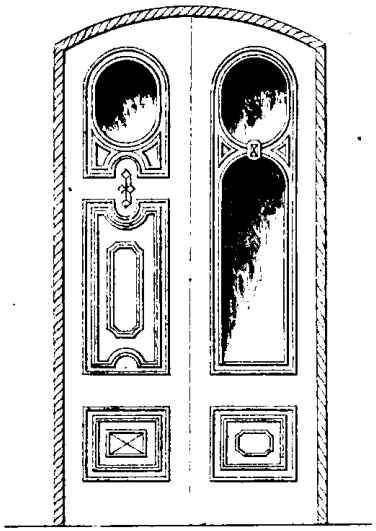
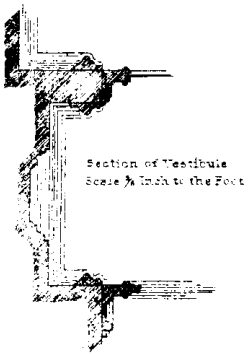
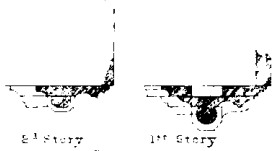


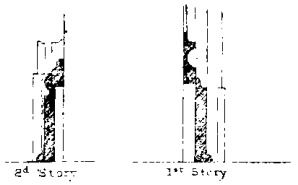
Front Door Vestibule Door
Scale ¾ Inch to the Foot



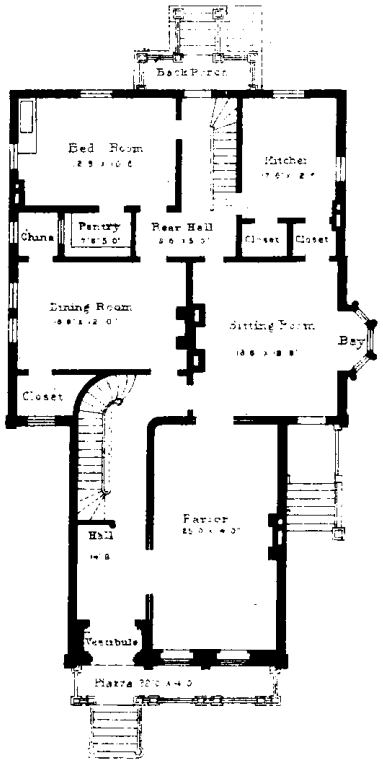
Section of Vestibule
Scale ¾ Inch to the Foot



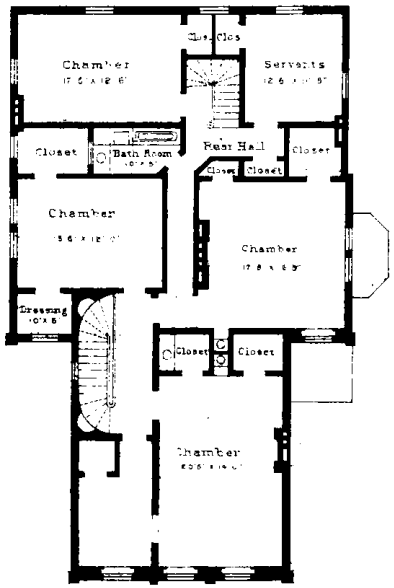
Casings



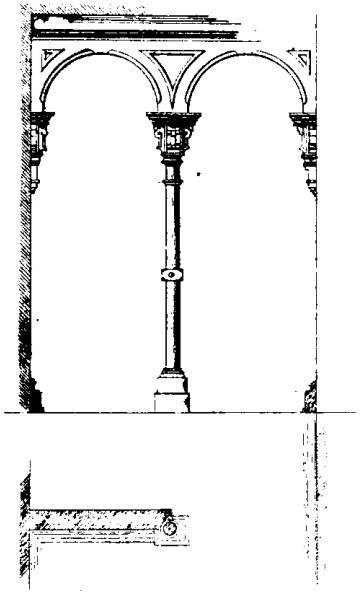
Bases



GROUND FLOOR



SECOND FLOOR



Plan and Elevation of Arch in Hall
Scale ¾ Inch to the Foot

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Example E Plate 2
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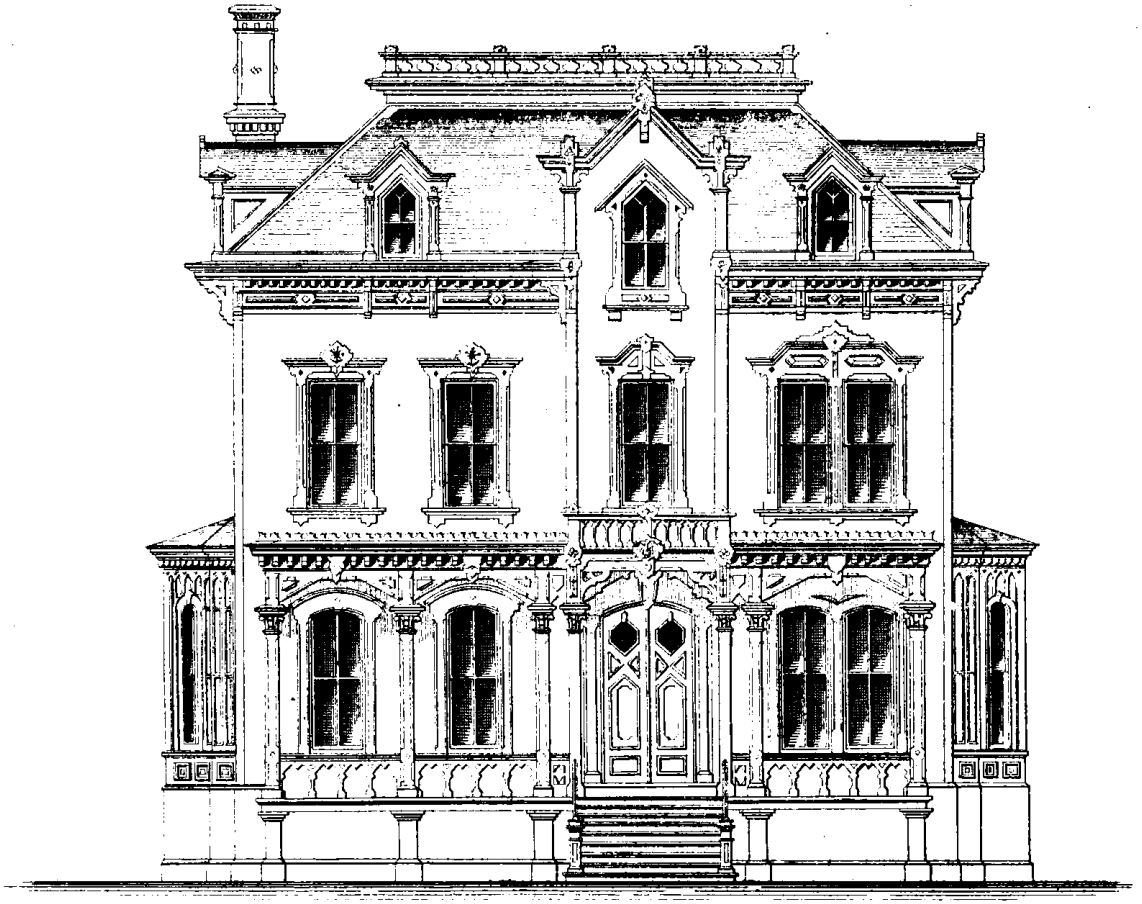

FRONT ELEVATION

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Example F Plate 1

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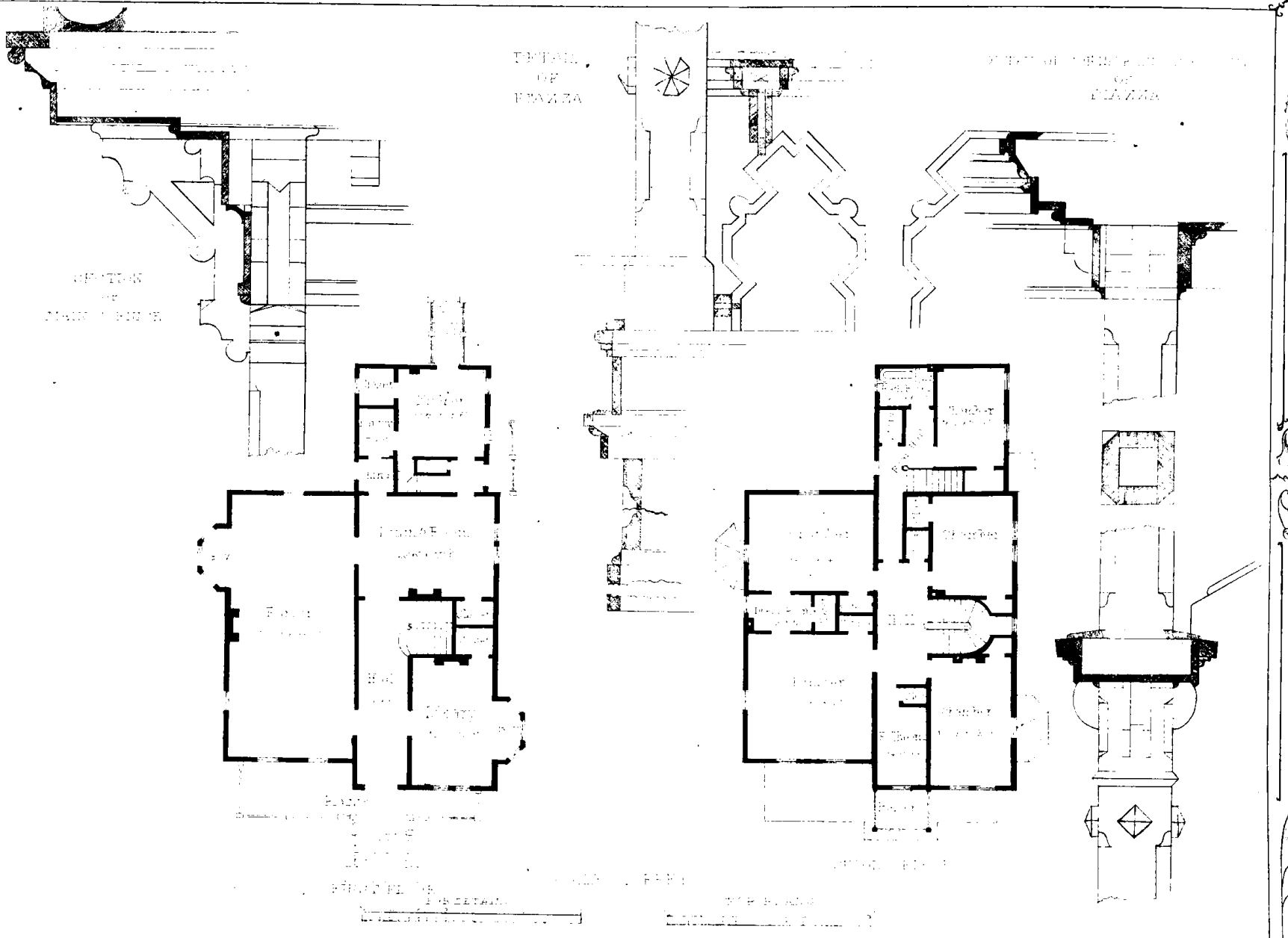

Loring & Jenney Architects Merchants Lithographing Co Chicago

Example F Plate 2

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Example G. Plate I

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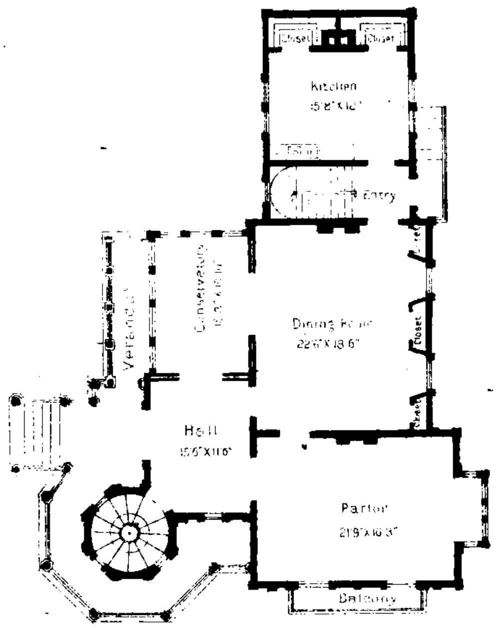
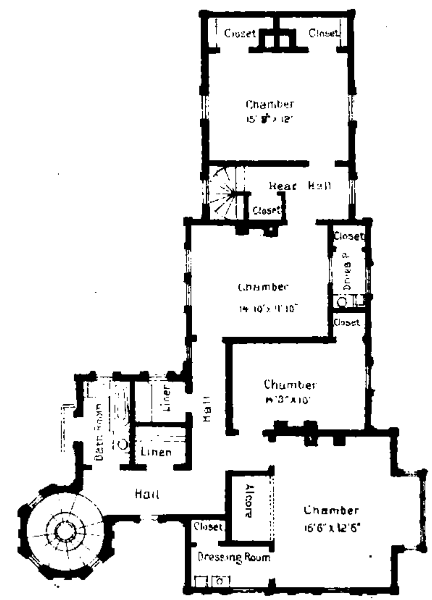
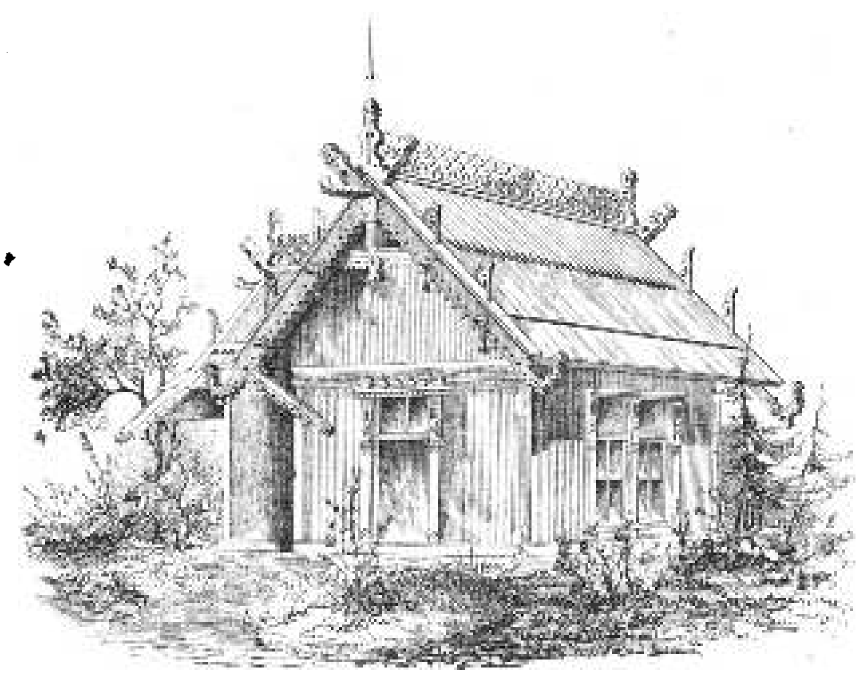


PRINCIPAL FLOOR.

Scale ⅛ inch = 1 Foot



CHAMBER FLOOR



COTTAGE IN THE RUSSIAN STYLE

Loring & Jenney Architects
Merchants Lithographing Co. Chicago.

Example G Plate 2

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Example B Plate 1

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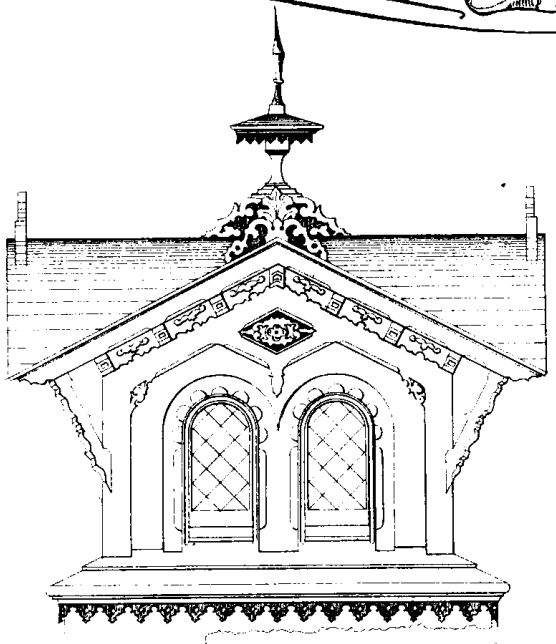
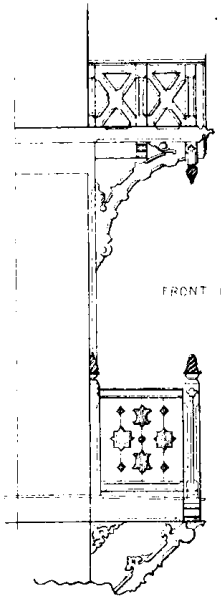
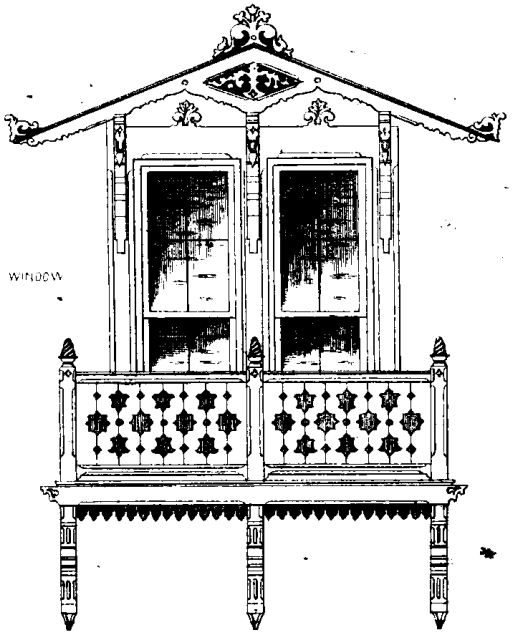
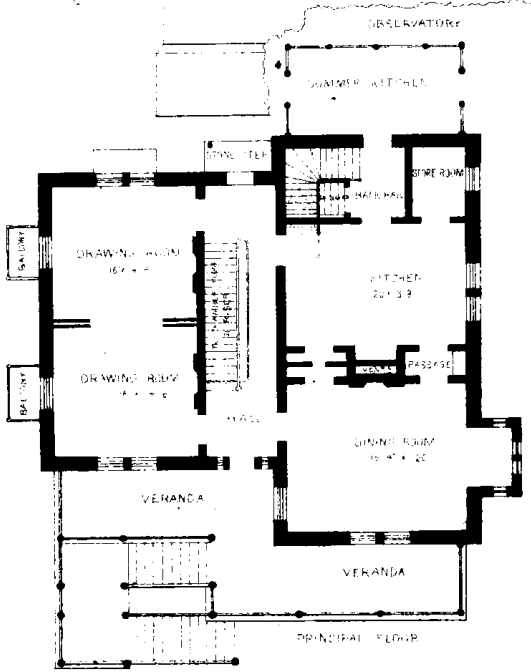
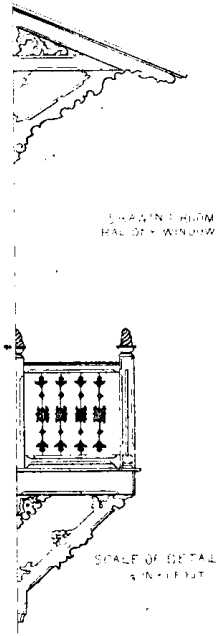


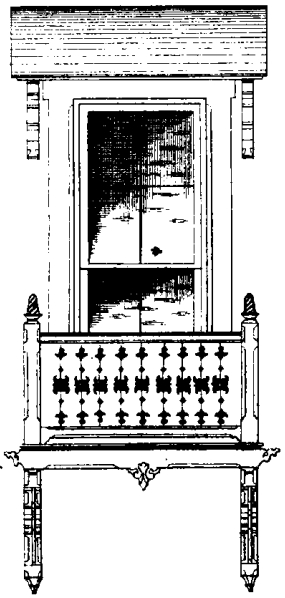


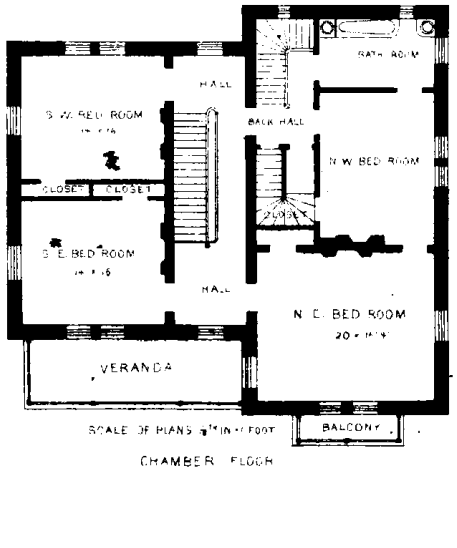
FRONT CHAMBER BALCONY WINDOW











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Example H Plate 2

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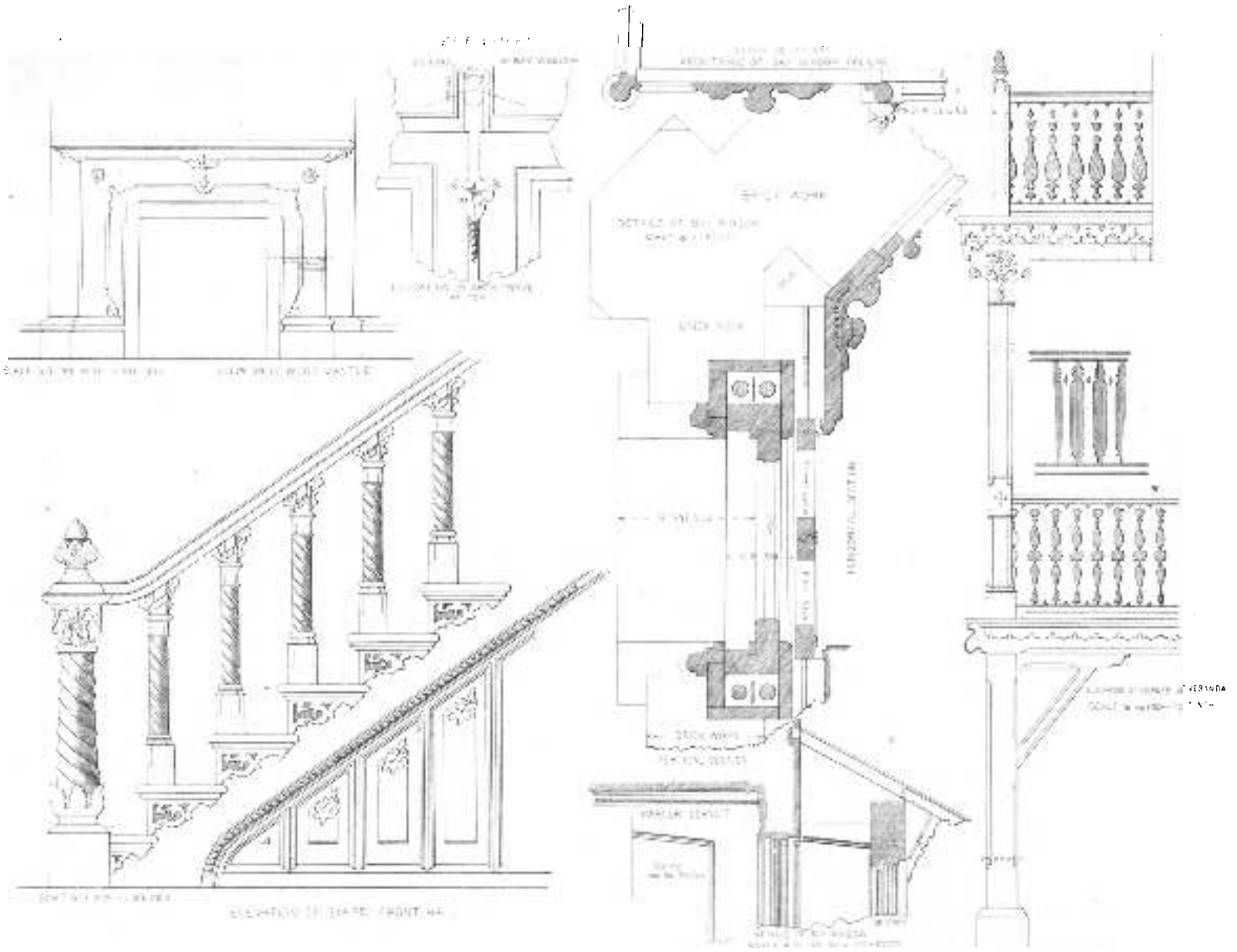

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Merchants Lithographing Co Chicago

Example H. Plate 3

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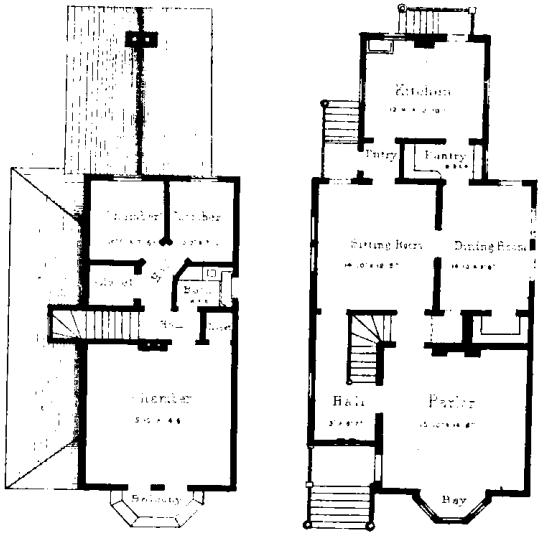

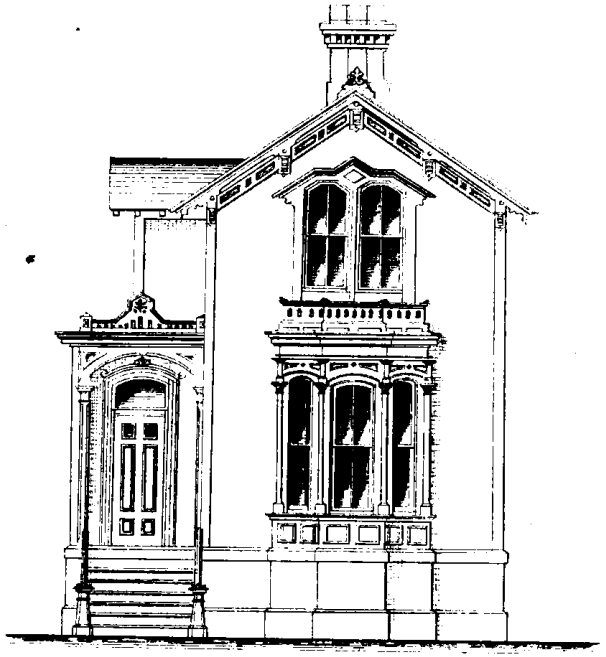

SCALE OF FEET

Loring & Jenney Architects
Example I Plate I
Merchants Lithographing Co Chicago

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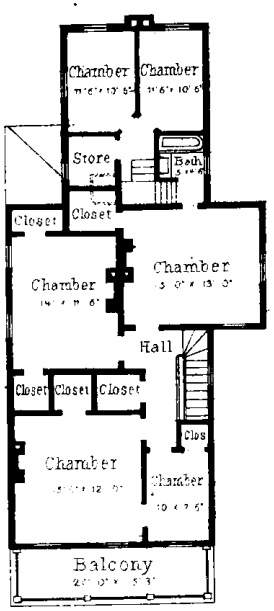
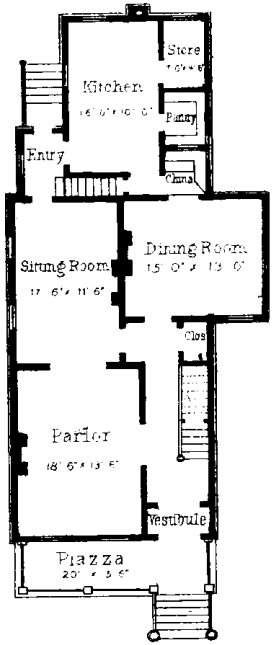


CHAMBER FLOOR



GROUND FLOOR

FRONT ELEVATION

SCALE OF FEET
0 5 10 20 30 40 50 Plans
1 2½ 5 10 15 20 25 Elevation

Loring & Jenney Architects

Example J Plate I

Merchants Lithographing Co. Chicago.

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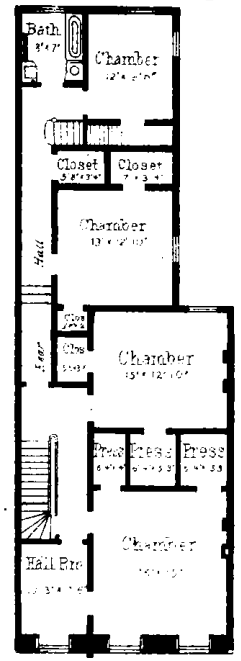

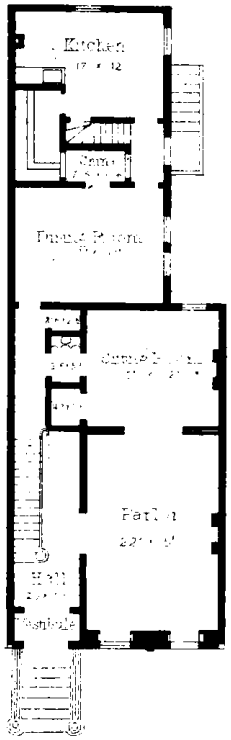

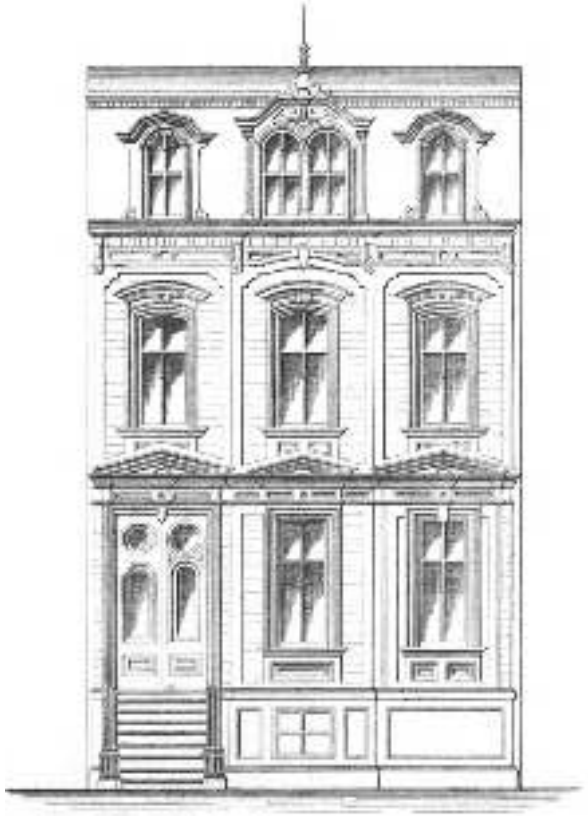

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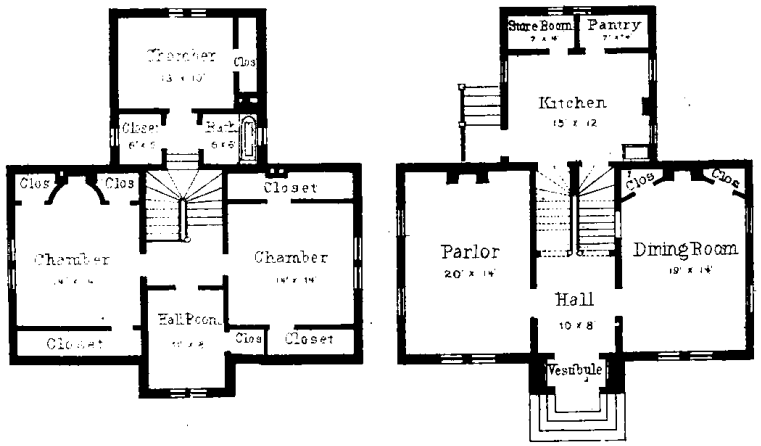
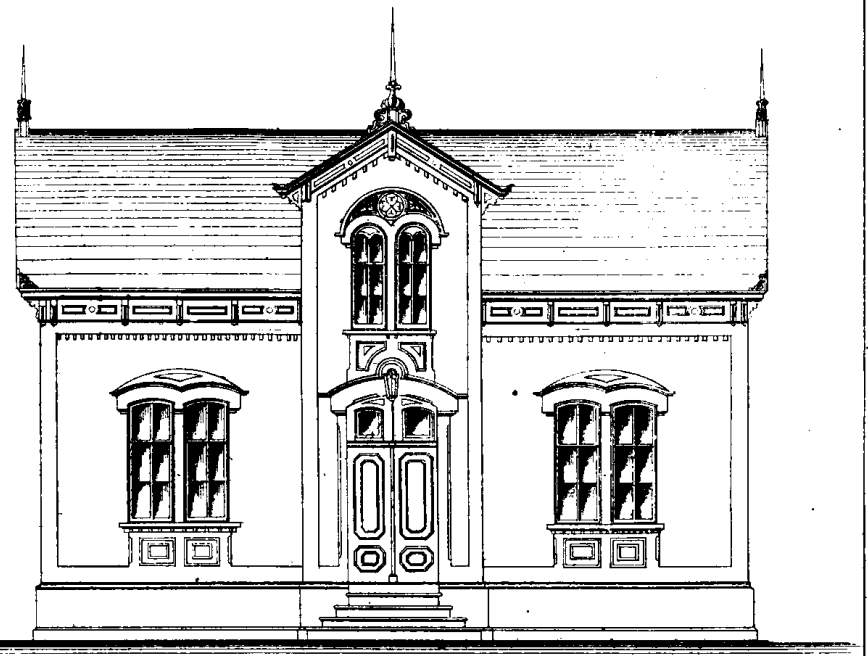


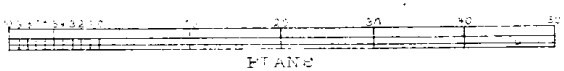
CHAMBER FLOOR

GROUND FLOOR

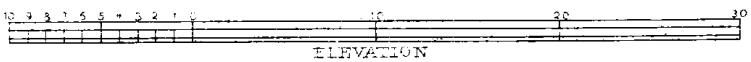


ELEVATION

SCALE OF FEET



PLANS



ELEVATION

Loring & Jenney Architects
Example L Plate 1
Merchants Lithographing Co. Chicago.

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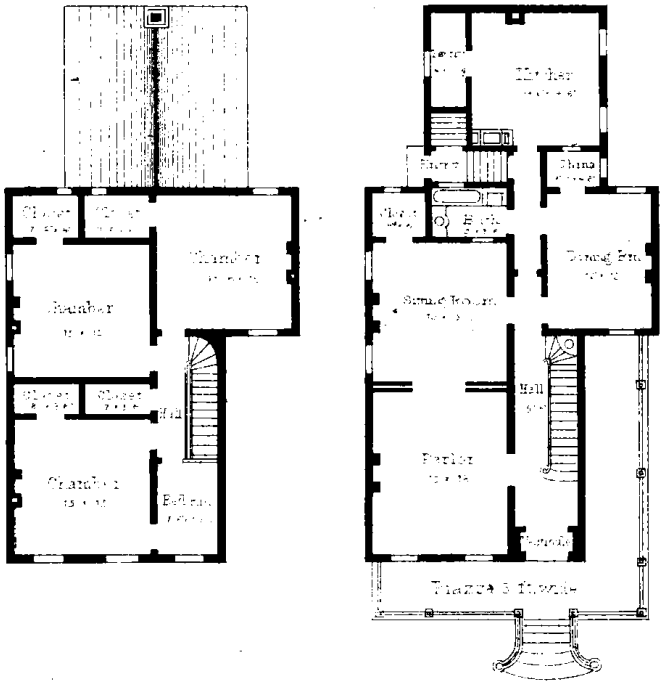

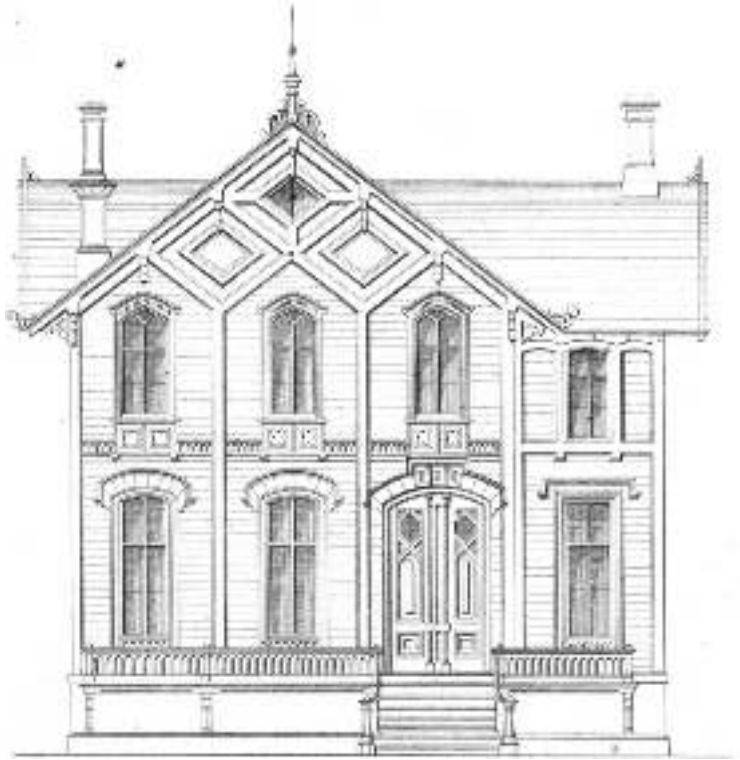

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Merchants Lithographing Co Chicago.
Example M Plate 1

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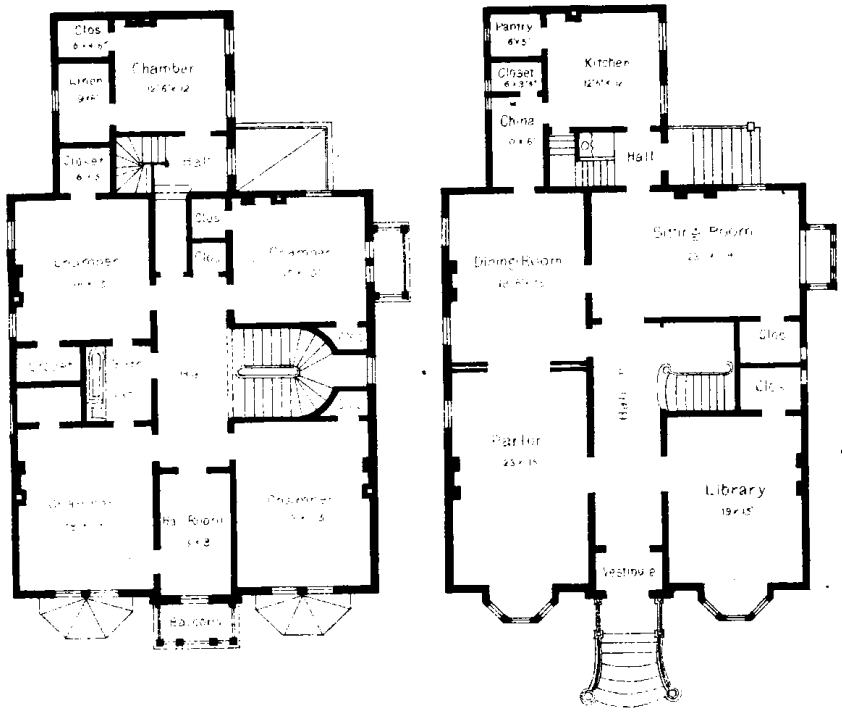
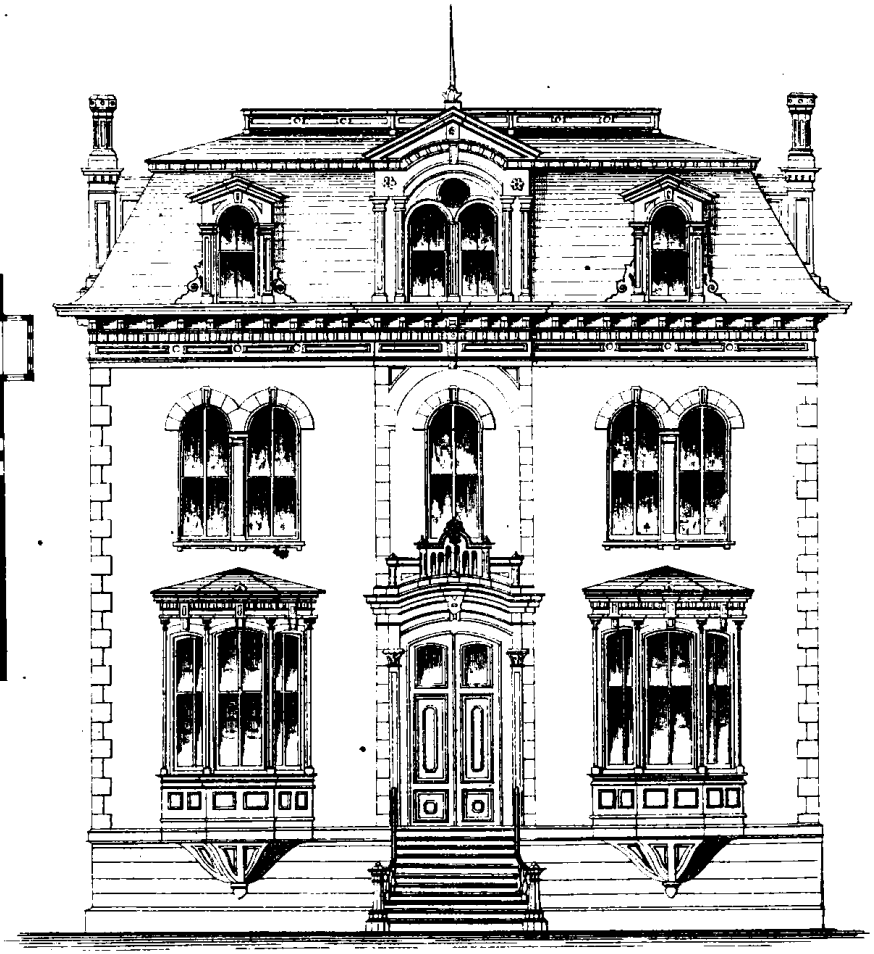


SECOND STORY

GROUND FLOOR



SCALE OF FEET

ELEVATION

Loring & Jenney Architects

Example N Plate I

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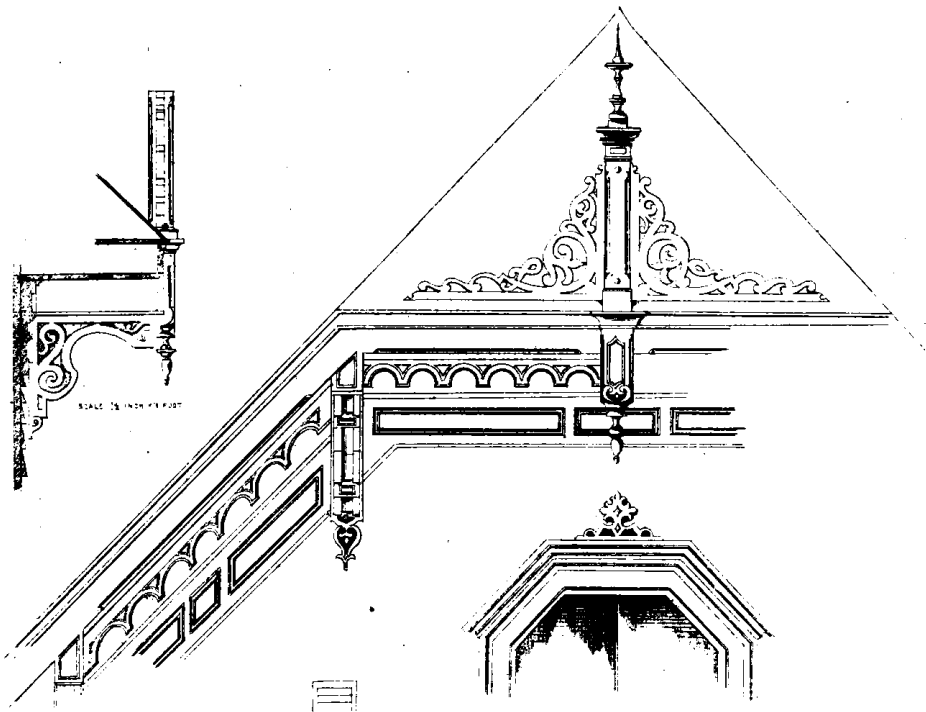

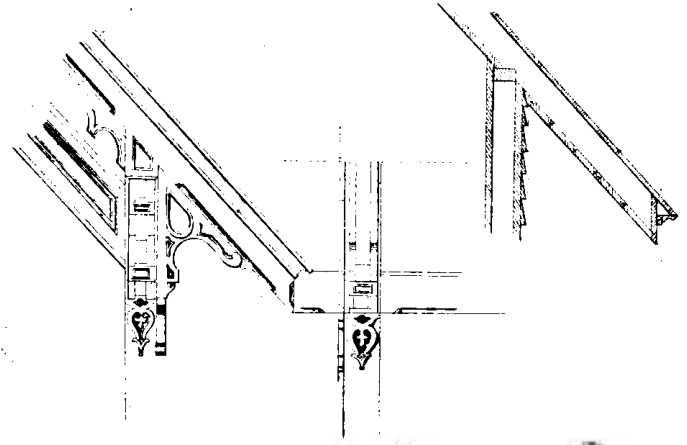

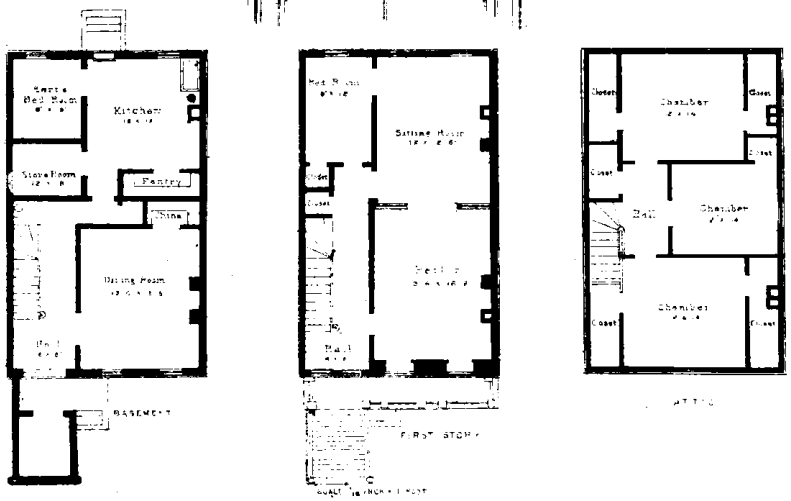

FRONT ELEVATION

Loring & Jenney Architects. Example O Plate 1 Merchants Lithographing Co Chicago.

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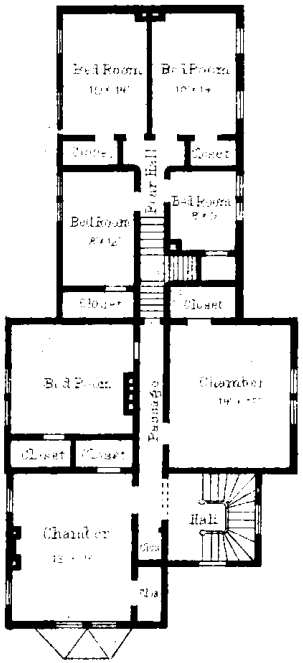
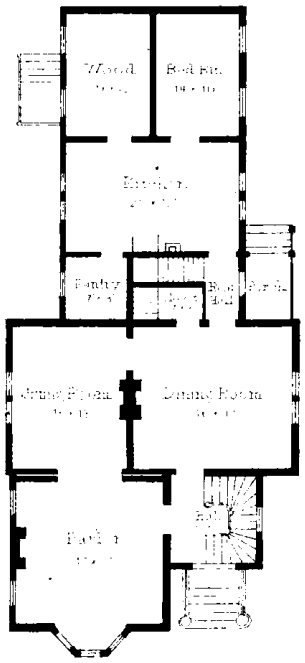
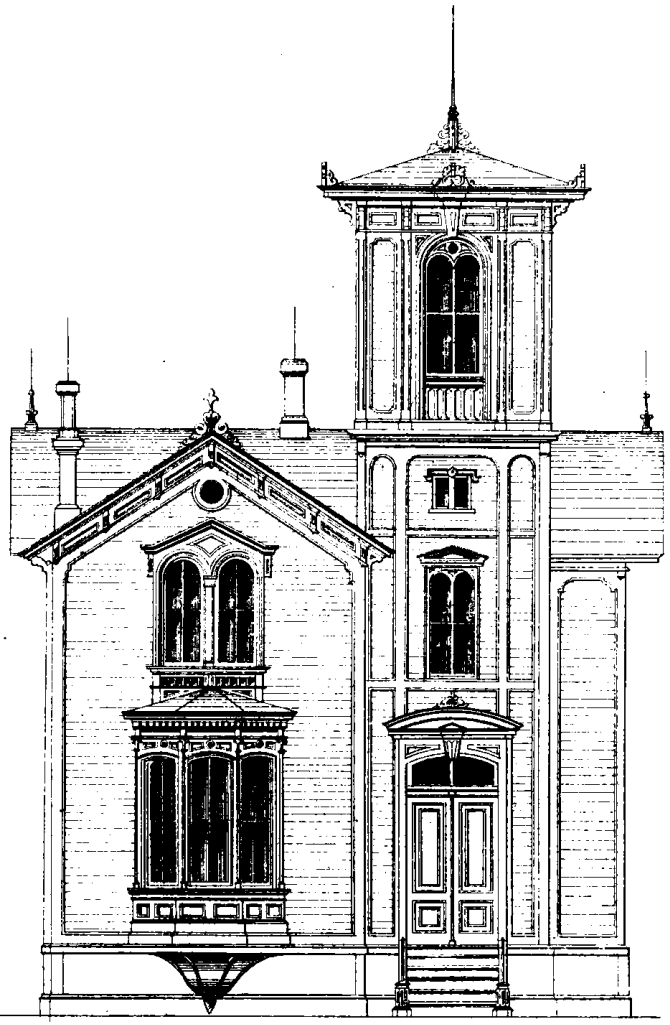


SECOND FLOOR



GROUND FLOOR



SCALE OF FEET

Loring & Jenney Architects

Merchants Lithographing Co. Chicago

Example P Plate 1

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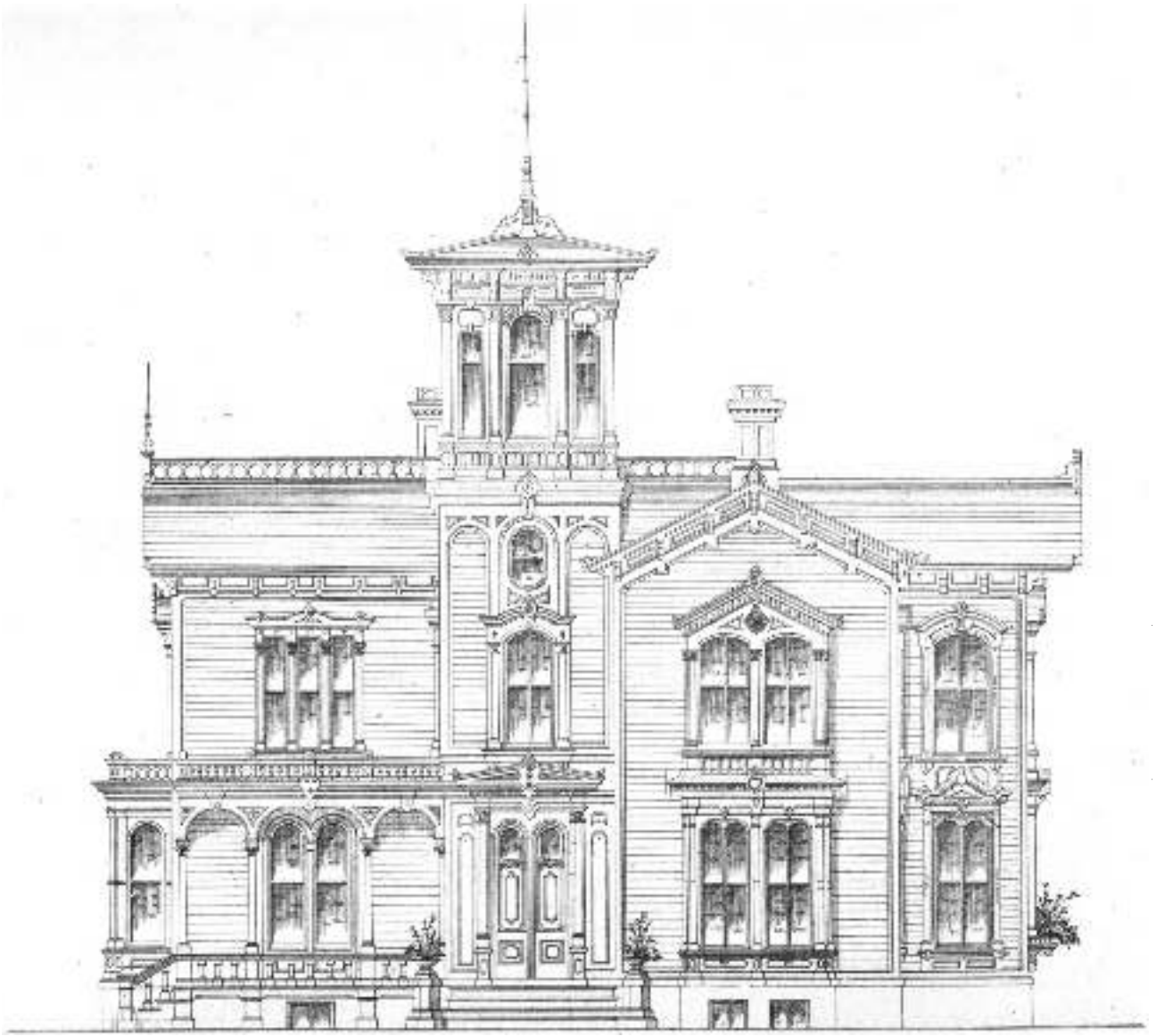

NORTH FRONT

SCALE ⅛ INCH TO FOOT

Loring & Jenney Architects

Example O Plate 1

Merchants Lithographing Co. Chicago.

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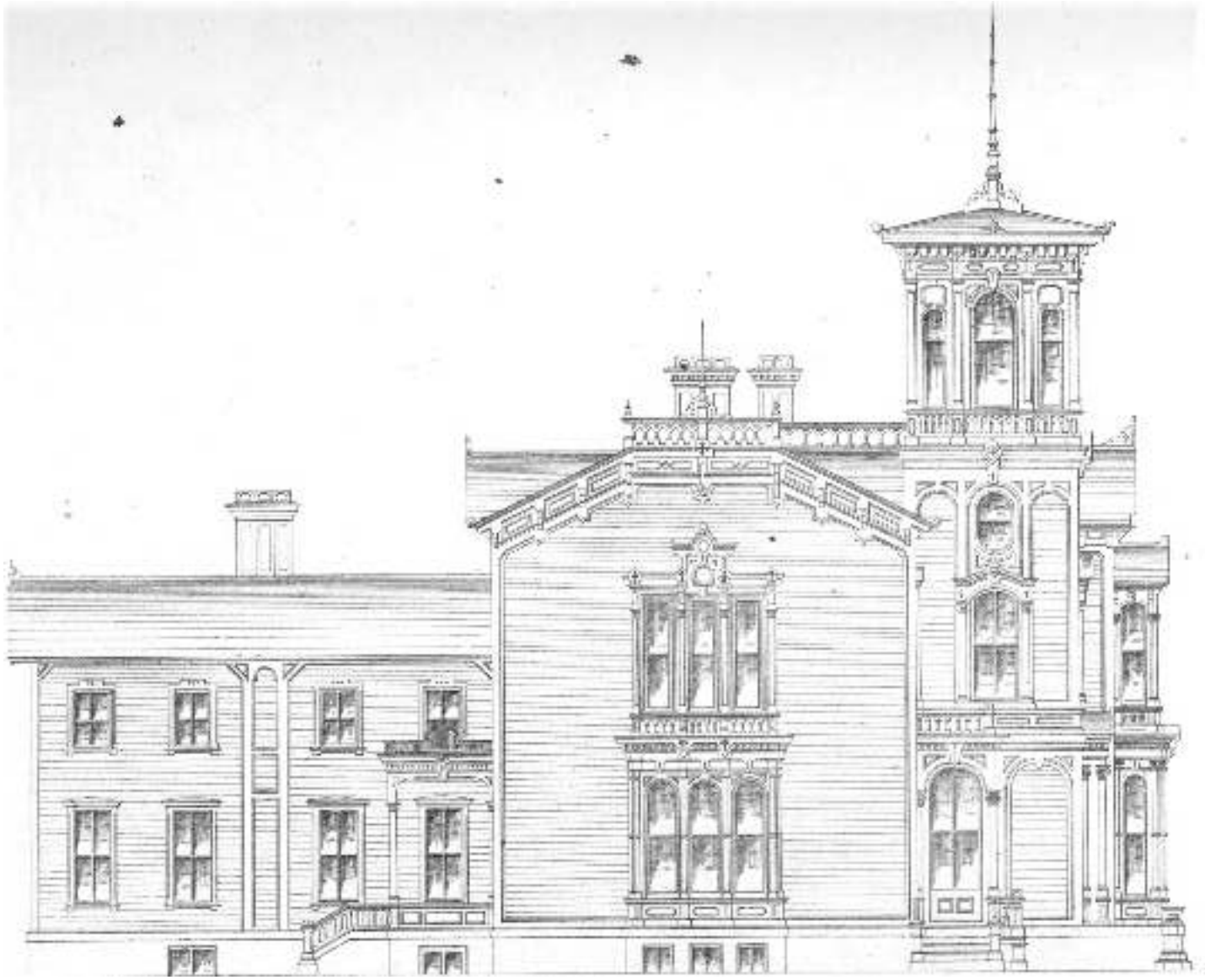

Loring & Jenney Architects

Example Q Plate 2

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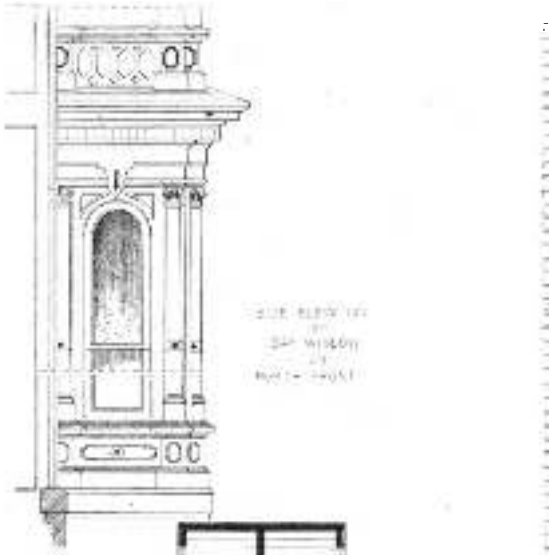
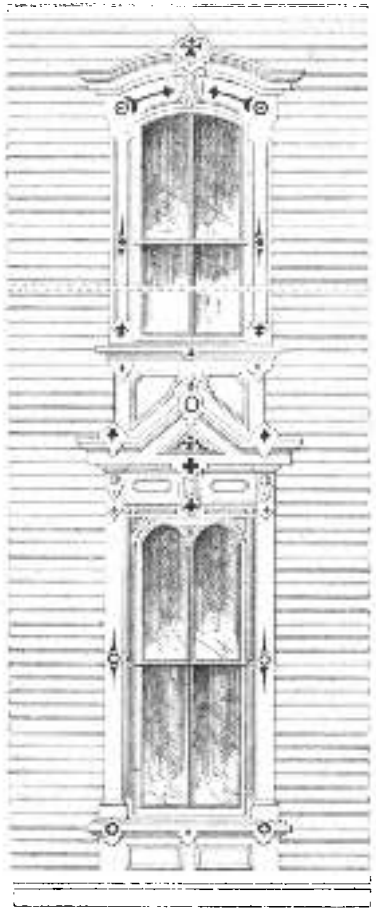
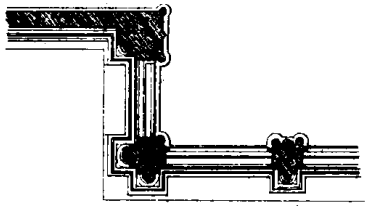
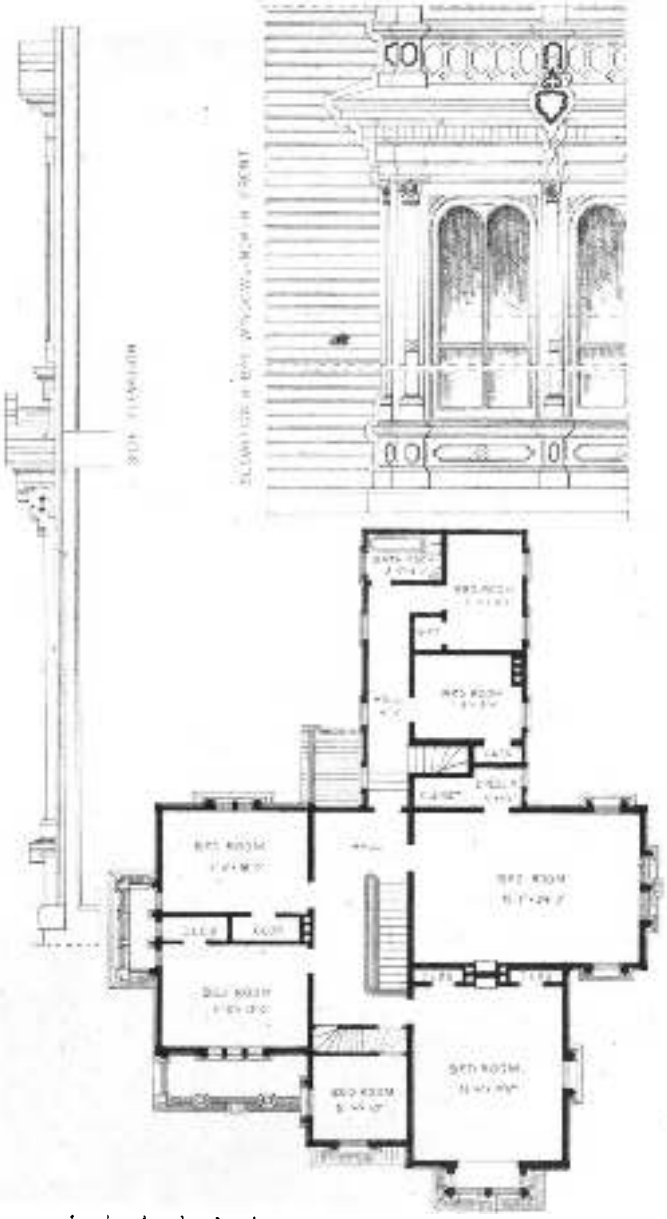




ELEVATION of WINDOW on SIDE WING of NORTH FRONT



SECTION AB of BAY WINDOW



SECOND STORY

Loring & Jenney Architects
Example 9 Plate 3
Merchants Lithographing Co. Chicago.

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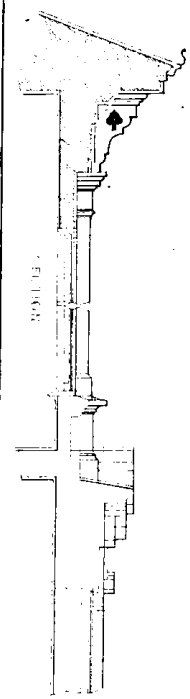

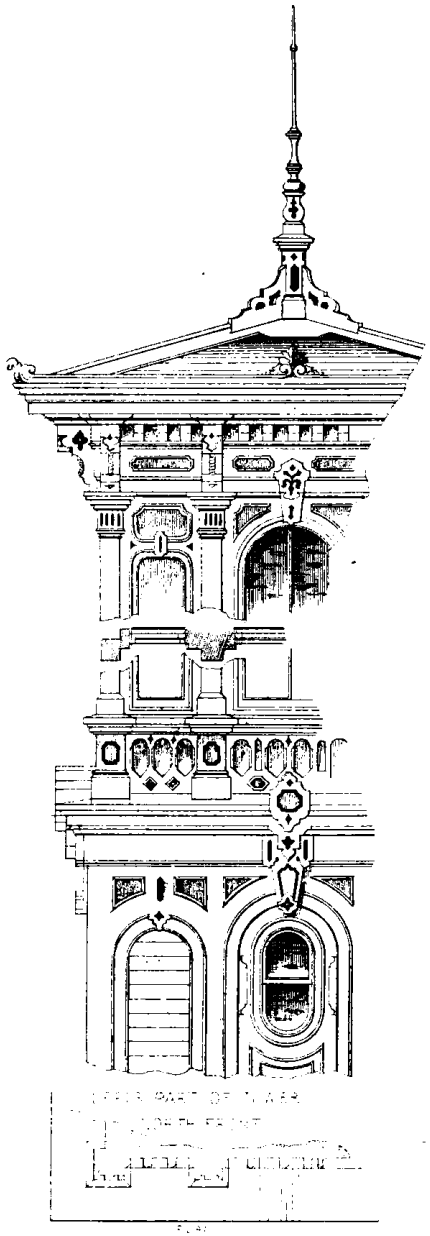

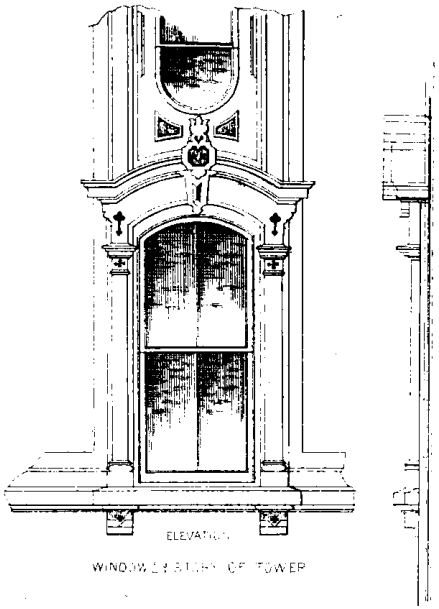

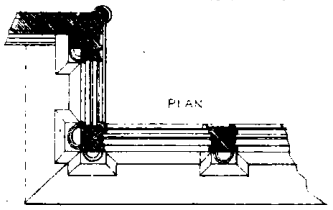

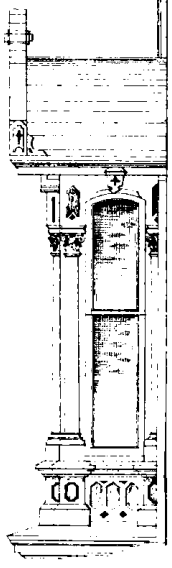

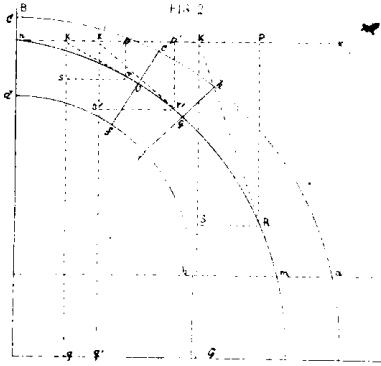

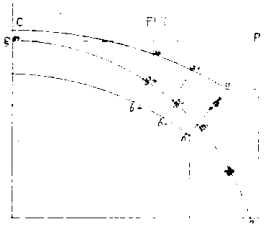

Loring & Jenney Architects — Merchants Lithographing Co Chicago.

Example 9 Plate 4

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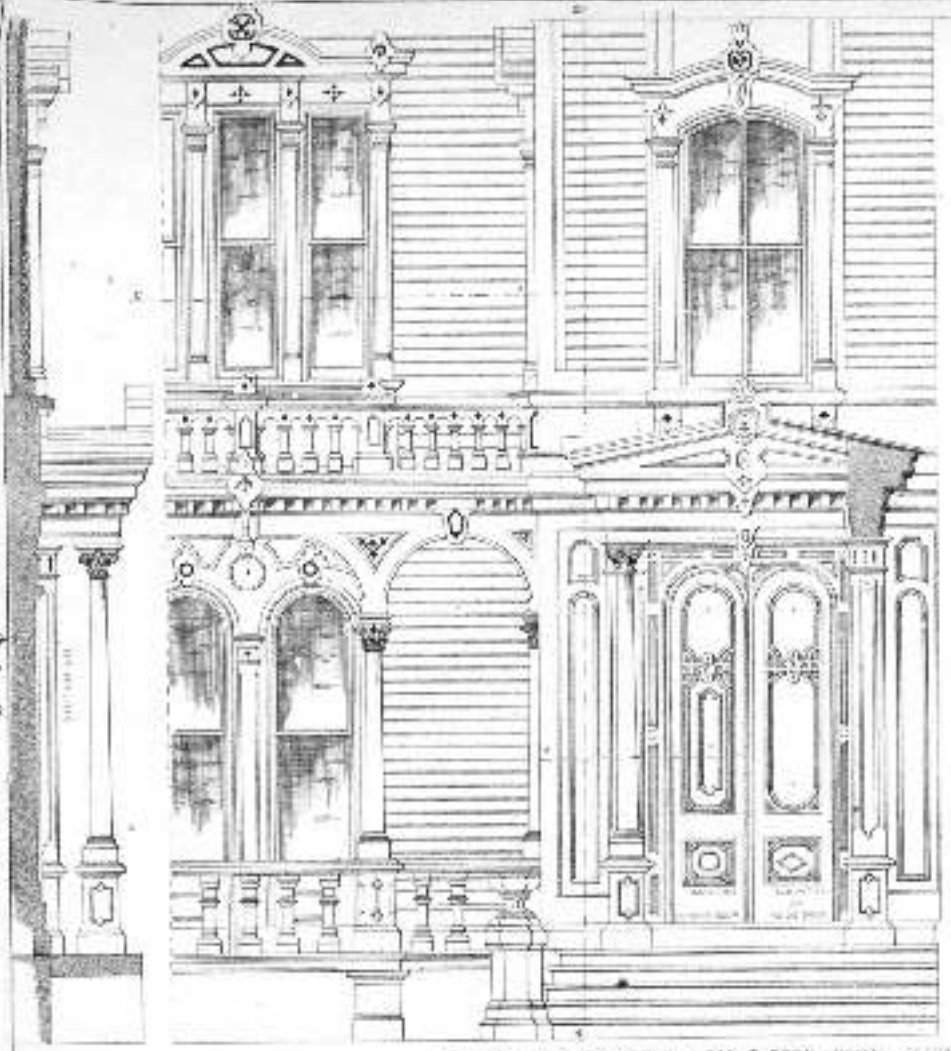
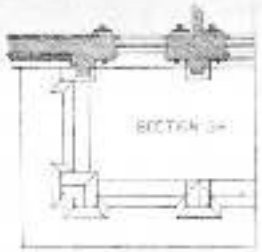
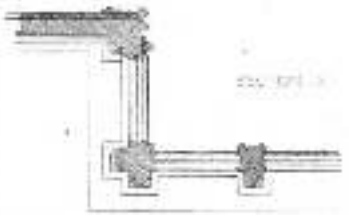
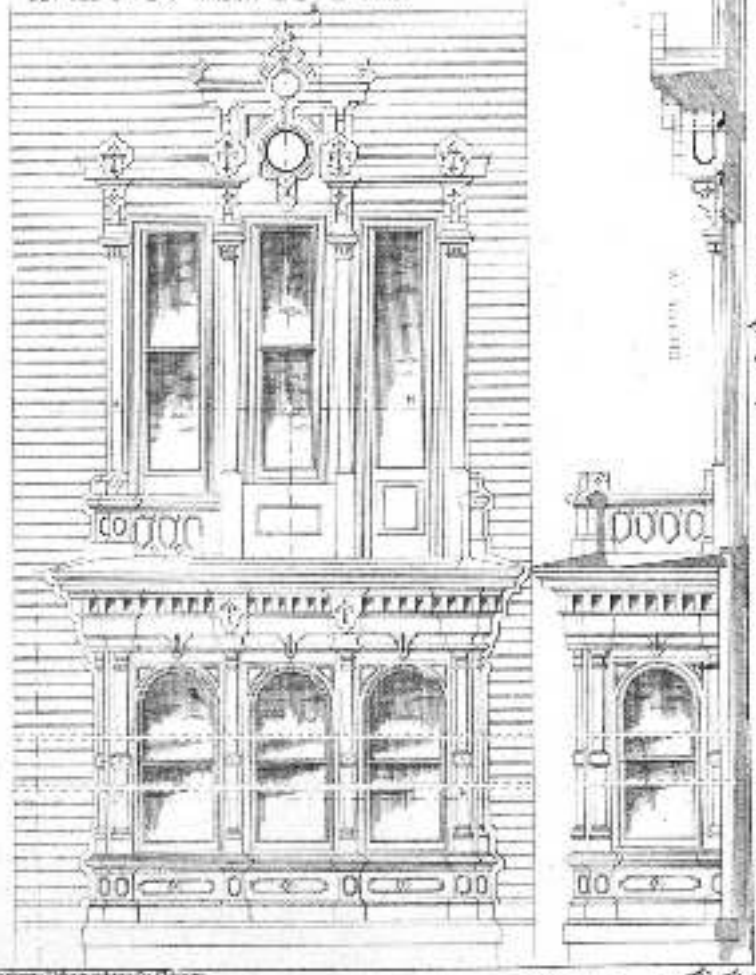






DETAILS OF BAY WINDOW, EAST ELEVATION



DETAILS OF PIAZZA PORCH & FRONT DOOR, NORTH ELEVATION

Example D Plate 5

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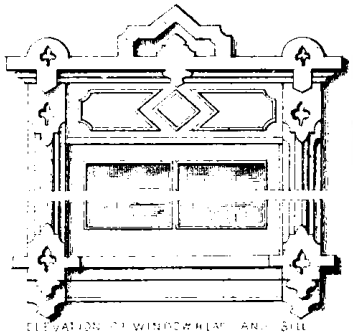
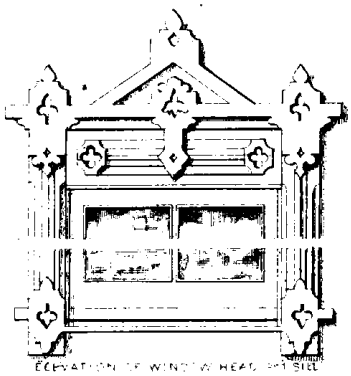
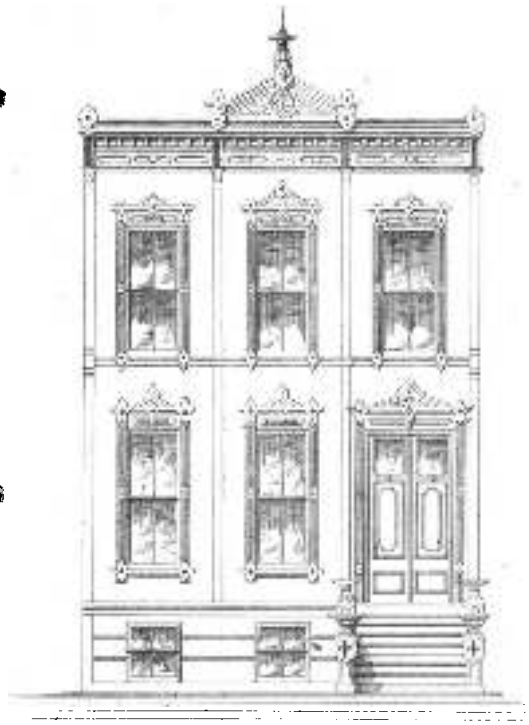


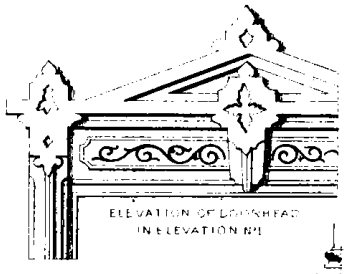
ELEVATION OF WINDOW HEAD AND SILL IN SECOND STORY OF ELEVATION No 1



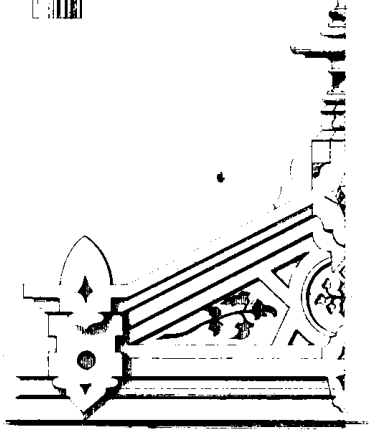
ELEVATION OF WINDOW HEAD AND SILL IN FIRST STORY OF ELEVATION No 1



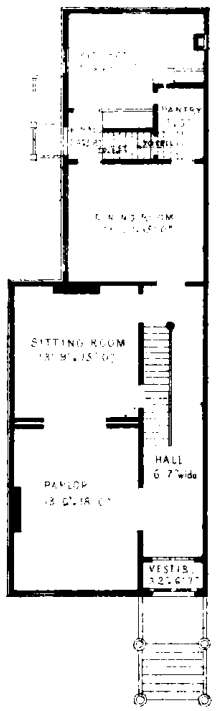
FRONT ELEVATION No 1



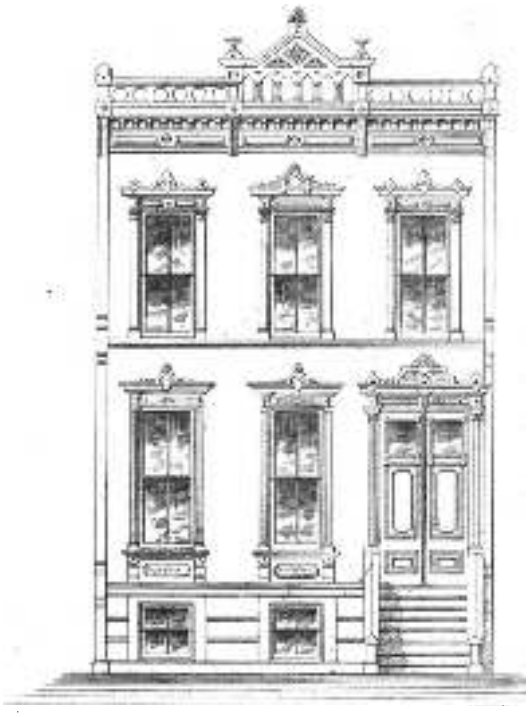
ELEVATION OF DORMER HEAD IN ELEVATION No 1



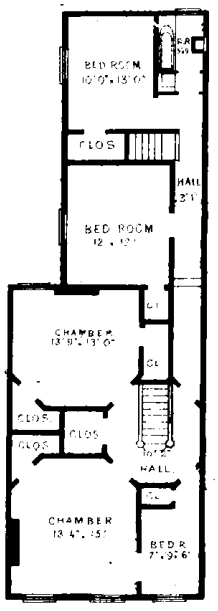
ELEVATION OF PEDIMENT IN ELEVATION No 1



PLAN OF FIRST STORY



FRONT ELEVATION No 1.



PLAN OF SECOND STORY

SCALE OF PLANS

SCALE OF ELEVATIONS

SCALE OF DETAILS

Loring & Jenney Architects
Example R Plate 1
Merchants Lithographing Co. Chicago.

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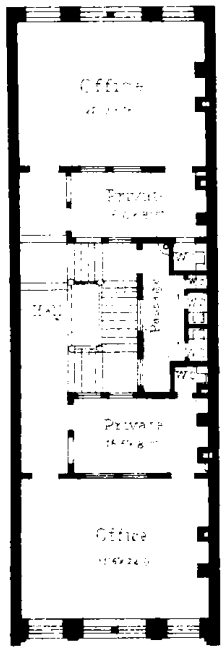
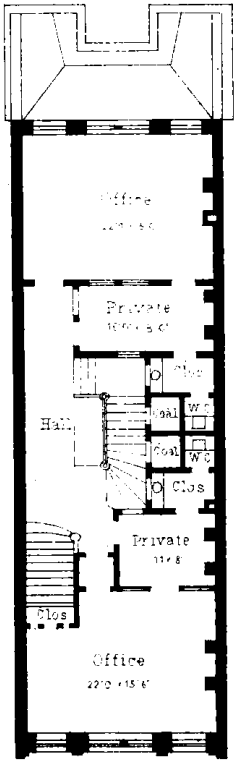
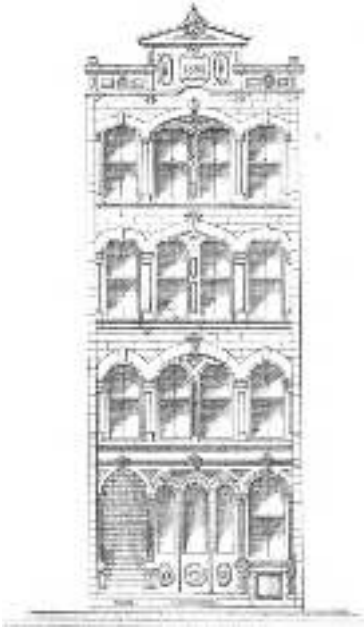
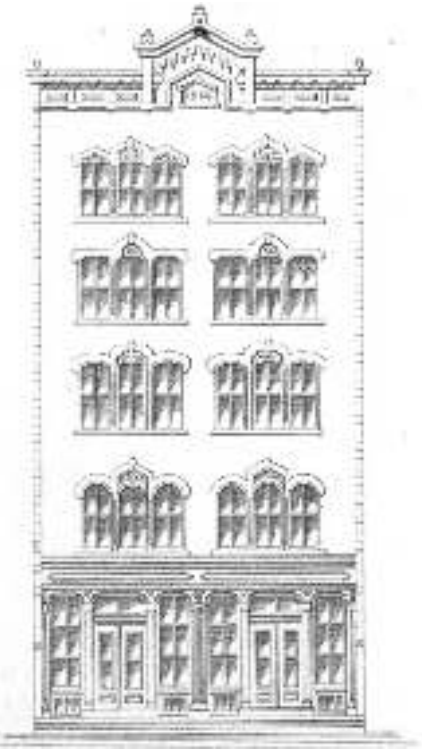


THIRD FLOOR



SECOND FLOOR





ELEVATION

Loring & Jenney Architects
Merchants Lithographing Co Chicago
Example S Plate I

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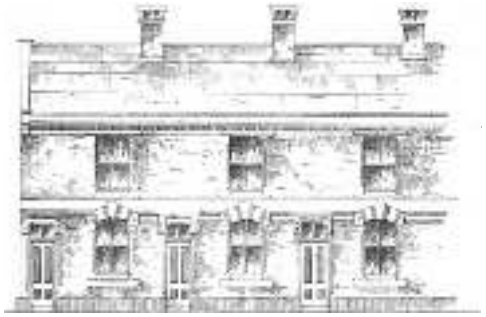
DESIGN Nº 1.

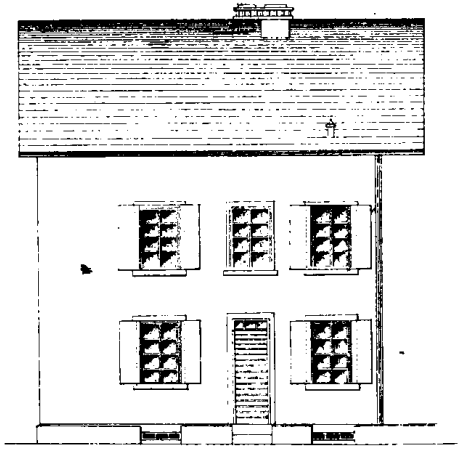


FRONT ELEVATION

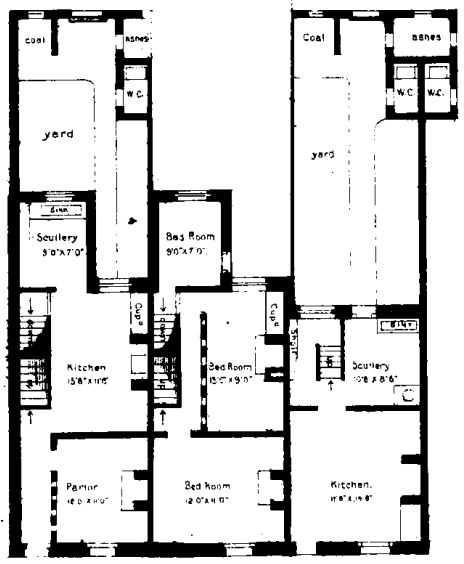
DESIGN Nº 2

FRONT ELEVATION

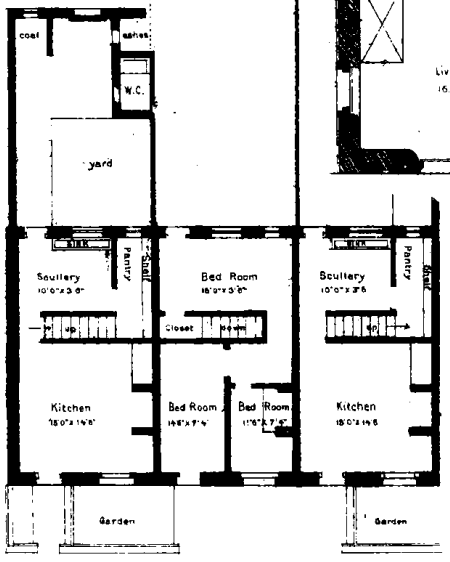
DESIGN Nº 3



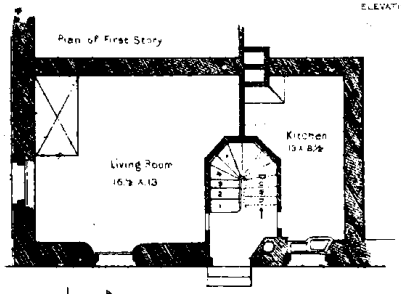
ELEVATION

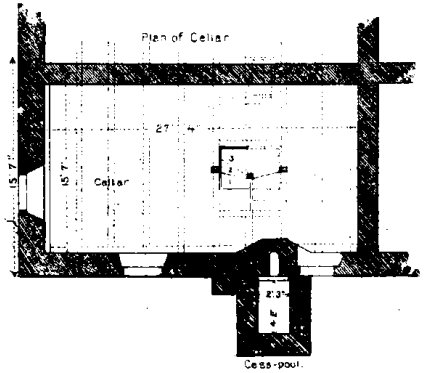


GROUND FLOOR CHAMBER FLOOR GROUND FLOOR PLAN



GROUND FLOOR CHAMBER FLOOR GROUND FLOOR





Loring & Jenney Architects. Example 7 Plate 1 Merchants Lithographing Co Chicago.

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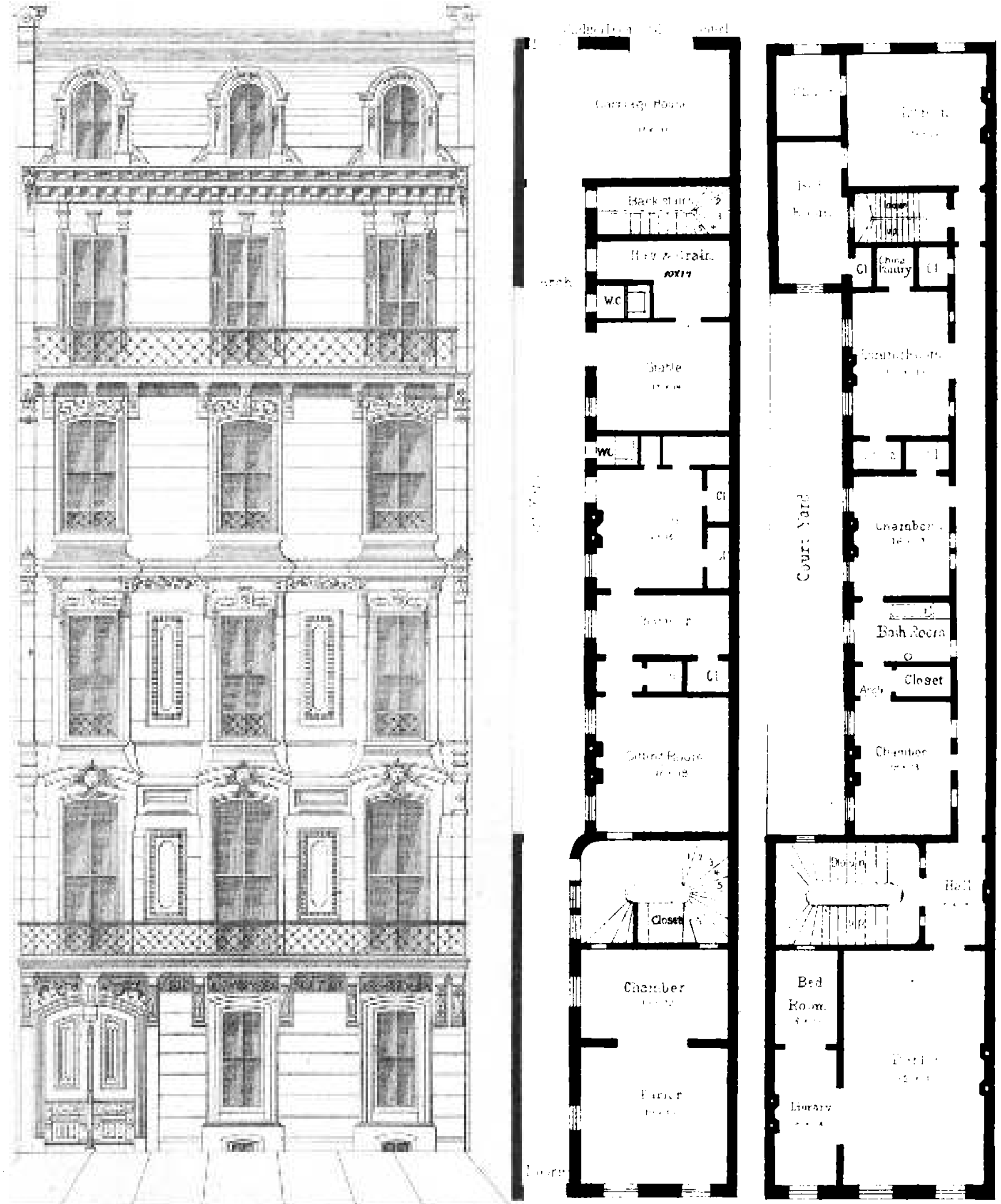

ELEVATION   GROUND FLOOR   FIRST & SECOND FLOOR

SCALE OF FEET

ELEVATION
PLANS

Loring & Jenney Architects   Merchants Lithographing Co Chicago.

Example U Plate 1

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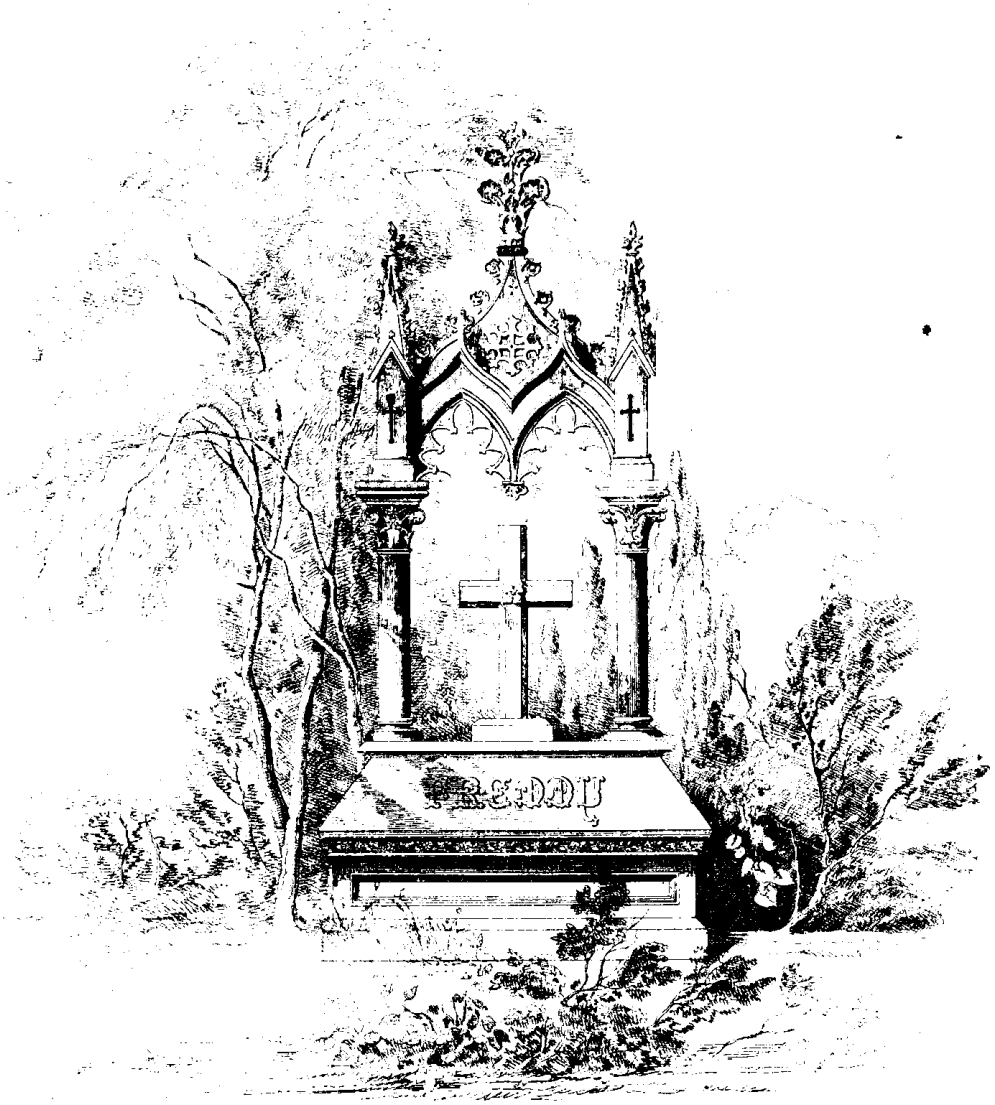


Loring & Jenney Architects. Merchants Lithographing Co. Chicago.

Example V Plate I

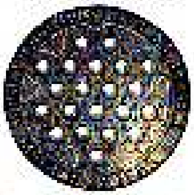
BROWN BROTHERS,

Sole Manufacturers in the North-West of Hyatt's Patent Prismatic

"Lead Band" Side-Walk and Vault Lights,

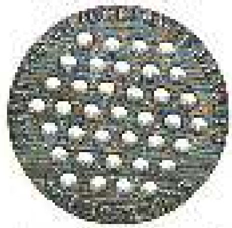
FLOOR, ROOF AND DECK LIGHTS.

No. 1 Vault Light.



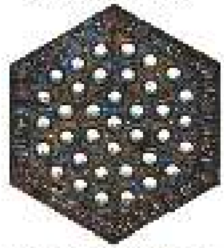
13[illegible] Inches. [illegible] in. thick.

No. 2 Vault Light.



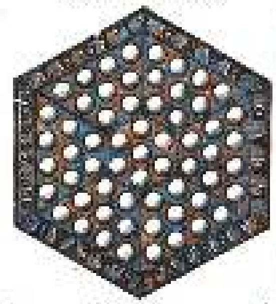
17[illegible] Inches. [illegible] in. thick.

No. 3 Vault Light.



17[illegible] Inches. [illegible] in. thick.

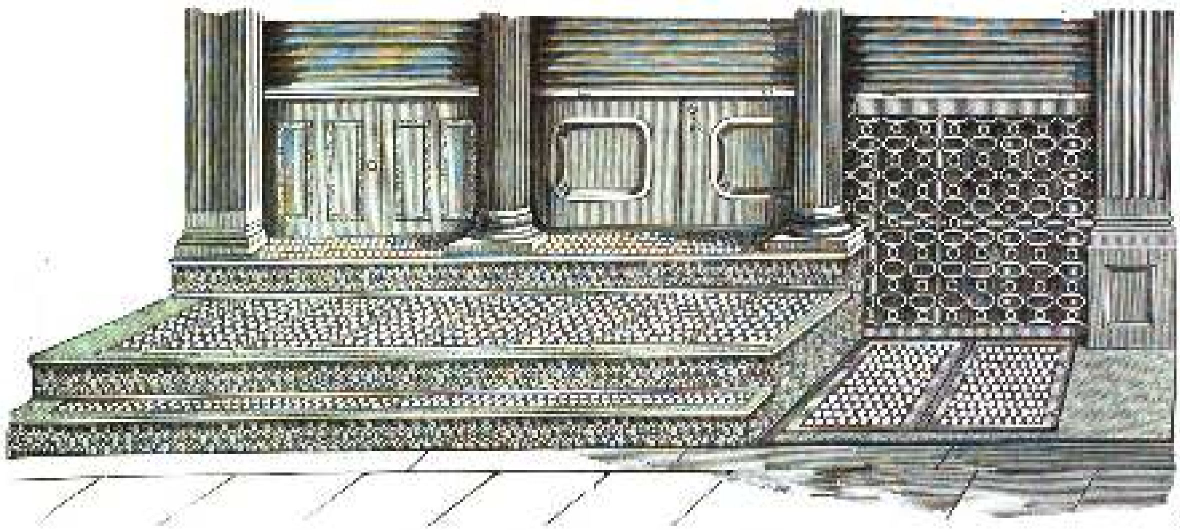
No. 4 Vault Light.



21[illegible] Inches. [illegible] in. thick.

VAULT LIGHTS OF NINE DIFFERENT SIZES,

(The four smallest shown above, kept constantly on hand. Other sizes made to order.)



"SIDE-WALK LIGHT" PLATFORM,

(Photographed on wood from actual work.)

Side-Walk Lights Made to Order,

[illegible]

WE WARRANT THESE LIGHTS TO GIVE AS MUCH LIGHT AS A SHEET OF PLATE GLASS OF THEIR WHOLE SIZE.

During the past eight years we have laid down upwards of [illegible] worth of these Lights, in this city, Milwaukee, Pittsburgh, Philadelphia, St. Louis, Washington, D.C., Toledo, [illegible]

SEND FOR ILLUSTRATED PRICE LIST, TO

BROWN BROTHERS, Nos. 226 & 228 Monroe Street, Chicago.

(BETWEEN WELLS AND MARKET.)

Also, Manufacturers of PATENT CAST IRON CHIMNEYS, PATTERN LETTERS for Machinists and Founderymen, and DEAN'S PATENT SELF-TEMPERING BRICK MACHINES.

Legrand Quarry Company,

PROPRIETORS OF THE

IOWA MARBLE

WOULD RESPECTFULLY ANNOUNCE TO

Architects, Builders, Manufacturers and Artists,

That they are now prepared to furnish Iowa Marble in any quantity that may be desired, on short notice, and at prices *far below* Eastern Marble. In connection with, and located at, the Quarries is a

Manufacturing Establishment,

Where this Marble is worked by Machinery into all desired articles, consisting of

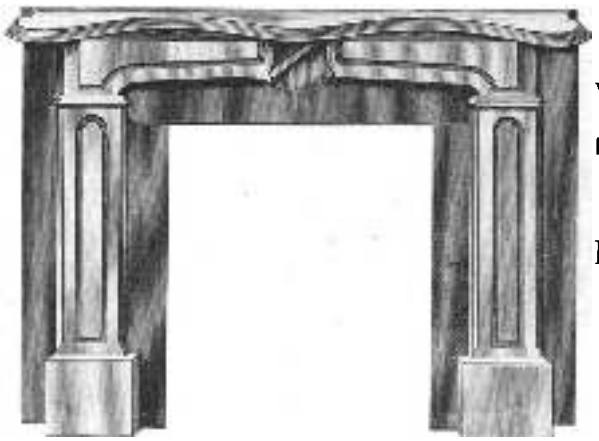
MANTELS, VASES, TABLE, BUREAU, SINK,

WASH-STAND AND COUNTER TOPS,

MONUMENTS, URNS,

HEAD STONES, POSTS, WINDOW CAPS, SILLS AND BASES,

Fronts for Buildings, Columns, &c



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O. F. KIRBY, I. S. HOWE, } Proprietors.

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CHICAGO.

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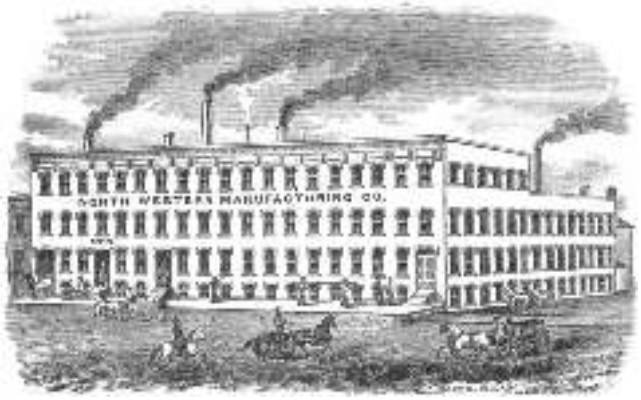

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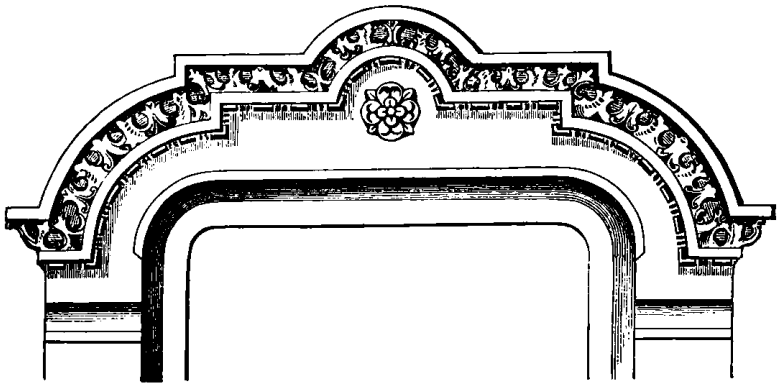

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