

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. VII.]

Copyright, 1880, HOUGHTON, OSGOOD & CO.

[No. 218.]

FEBRUARY 28, 1880.

Entered at the Post Office at Boston as second-class matter.

CONTENTS.

SUMMARY:—

The Death of Signor Brumidi. — The Decoration of the Capitol. — Semper's Museum and the Collection of his Writings. — Death of M. Reynaud. — Building Associations in Cincinnati. — The Sweepings of New York. — Circular of the Legislative Committee. — A Liverpool Refuse Steamer	77
THE ACOUSTICAL IMPROVEMENT OF LARGE HALLS	78
A SIMPLE TEST TO ASCERTAIN THE PURITY OF THE AIR	80
THE WATER-COLOR EXHIBITION	80
THE ILLUSTRATIONS:—	
House at Brookline, Mass. — Details of the Same. — Church of St. Denis, Lockport, Ill. — Sketches in Normandy	82
CORRESPONDENCE:—	
Letter from Florence	82
EDWARD MIDDLETON BARRY, R. A.	83
AN OLD T-SQUARE'S VIEWS ON VENTILATION	84
THE LIGHTING OF PULPITS	84
THE DURABILITY OF GUTTA-PERCHA	85
THE TIDES AS A MOTIVE POWER	85
COMMUNICATION:—	
The Liverpool Corporation Test for Cement	85
NOTES AND CLIPPINGS	85

ALL question of carrying on the designs of Brumidi for the rotunda of the Capitol is now, so far as the work of his own hands is concerned, forever at rest, with himself. Brumidi died in Washington on the day on which our last paragraph concerning him was printed. He was born in Rome seventy-three years ago. He had been at his profession full threescore years, if the accounts we hear of his history are true, for he entered the Roman Academy of Arts as a student at thirteen years, and began painting frescoes at once. He helped in the decoration of many Roman palaces, working with three other young artists, Podesti, Coghaetti, and Capalti, who were associated with him again in restoring the Raphael frescoes of the Loggie of the Vatican, during the pontificate of Gregory VI., predecessor of Pius IX. After the accession of Pius IX., Brumidi painted his portrait, and was made a captain in the National Guard. He took part in the popular revolution in Italy, in 1848, and after its collapse left the country and came to the United States. He made a short visit to Mexico in 1856, where he did some work as a decorator, and, coming back to Washington in the same year, was engaged to decorate the "Capitol Extension," and has ever since been employed on the building. He ornamented the vaulted corridors of the lower story of the Capitol skilfully in arabesques, after the manner of the Vatican Loggie; and covered the walls of the committee rooms and Representatives Hall, and the interior of the great dome, with historical paintings, beginning with the room of the Committee on Agriculture, where he did what is thought to be his most successful work. In the freshness of his strength and repute he was liberally paid for his work, and received forty thousand dollars for his paintings on the Cupola. But as his strength and vogue declined his compensation was reduced; while an unfortunate disposal of the money that he had received left him in poverty, which the small allowance he received from the Government for his last work did not effectually relieve. He was an industrious worker. His heart was in his last undertaking, the decoration of the great frieze of which we have spoken, and two days before his death he was still laboring with single-minded zeal, in spite of his infirmities, at his unfinished cartoons.

THE question, therefore, who is to take up the decoration of the Capitol, unfinished by Brumidi, is now more apposite than when we wrote before, and here the government officers have a serious responsibility on their hands, of which, we may trust, they will not hastily acquit themselves. A great deal of labor and money has been spent to adorn the Capitol with works of art, but except in a very few instances the art has not added glory to the building. In the undeveloped condition of American art a generation ago it was natural that a clever and experienced foreigner who chanced to be at hand should be chosen without question, for there were no Americans whose experience showed them to be the right men for such work. The presumption was in favor of the imported artist over the native. To-day the presumption is the other way. Brumidi's desire to have his own

designs carried out, and by an artist of his own selection, was a desire which it would have been painful to put aside during his life: now that he cannot be wounded by it, the question is open for decision on its own merits alone, and with it comes the question whether it is desirable to carry out Brumidi's decoration at all or not. This, we have already said, is in our opinion not to be desired; nor do we believe that a painter who is of the right power to undertake a work of such magnitude as the decoration of the rotunda will be content to simply follow in Brumidi's footsteps. If, however, this were generally understood and accepted as a temporary makeshift, it would not be a point of great importance. We may fairly say that, considering the progressive condition of decorative art in the United States, and the fact that our artists are but lately beginning their experience of mural decoration, to which many of them are turning their attention with great interest, we cannot see that harm would be done if a work which offers such exceptional opportunities and hazards should be deferred for another decade.

As supplementary to the notice of Gottfried Semper in a former number, it may be interesting to note that his papers are collecting in the hands of the persons who have charge of his estate. The collection consists of thousands of drawings, designs for his executed and projected buildings, studies of other architectural works, and sketches from the years of his extended wanderings. Besides these there is much literary material. A large part of the missing third volume of *Der Stil* was fortunately found in a condition which will allow its publication with the new edition of that work prepared by the son of the author, Professor Hans Semper, of Innsbrück. There are extensive notes and suggestions concerning the competitions, for so many of which Semper was a member of the jury of awards. His reports on these occasions were often elaborated to real monographs, which cannot fail to be of great interest and value. One of the latest of these was upon the sculptural decoration of the new museums of Vienna. The desirable collection of Semper's already published writings is also said to be under consideration. In the mean while a number of former scholars and appreciators of his genius have agreed to found in Zurich a Semper Museum, on a plan similar to that of the Schinkel Museum in Berlin. This institution is to contain a great part of Semper's own drawings, the designs and models of all his buildings, and will present a comprehensive view of the work of the great architect. A committee has been chosen for the execution of this plan; it is to be hoped that they will carry it out with every success. Perhaps even a greater honor is offered to the memory of Semper by the city of Dresden. The question what would be the most worthy tribute to the architect, who thirty years ago fled from the Dresden streets and was exiled from Saxony, was discussed, officially in the city council and publicly in the local press. A recent number of the *Dresdener Zeitung* proposes that the municipality, thus desirous of expressing its sense of Semper's preëminent abilities, should undertake an adequate publication of his works, that is, of his buildings and designs. As a museum is already planned for Zurich, and to set up a public statue is known to be contrary to Semper's desires, this suggestion seems to be eminently suitable. Such a publication would be of great general value and much more than a merely local expression of admiration.

WE read of the death of M. François Léonce Reynaud, a French architect and engineer, Inspector-General of Roads and Bridges, who is widely known outside of France for his treatise on architecture. He was born at Lyons in 1803. At eighteen years he entered the École Polytechnique; but certain political manifestations in which he took part obliged him to leave it in a year. He then turned to architecture, entered the École des Beaux-Arts, and on leaving it studied in Italy. After the accession of Louis Philippe he was recalled to the government service, and he was appointed a government engineer in 1835. He was appointed professor of architecture at the École Polytechnique two years later, and at the École des Ponts et Chaussées in 1840. His special duty was the construction of light-houses, of which he had the general direction, building the noted light-house of Brehat, which stands, like that of Eddystone, on a rock barely uncovered at low water and exposed to all the force of the sea. He was at one time also a diocesan architect. In 1856 he was

made Inspector-General of Roads and Bridges; and after three years was appointed director of the *École des Ponts et Chaussées*. He was made a member of the Legion of Honor in 1839, and afterwards promoted to the grades of Officer and Commander. His *Traité d'Architecture*, in two quarto volumes of text and two folios of plates, is the standard work on the subject in the French schools. The first half of it is devoted to the mechanical construction of buildings, the second part to their design, illustrated by a generous selection of historical examples. Among treatises of equal range there is probably none that is of equal value to the student.

THE Building Associations of Cincinnati, of which there are many, do not seem to be exempt from the difficulties and dangers of mismanagement to which other commercial ventures are liable. The laws of Ohio require that the division of the dividends and profits in such associations shall be deferred till the shares are fully paid up. This restriction, being naturally somewhat irksome to persons who are anxious for speedy dividends, has apparently been forgotten in the management of some of the associations, which have in consequence been summarily brought to account in the courts. The case of the Irish Building Association No. 2, lately decided in the Superior Court, is an example of some of the difficulties into which such organizations are liable to fall. The association was established in 1871 under a constitution which provided that the payments on shares should continue, and the mortgages for money advanced the members should remain uncanceled, until the accumulations of the association should be sufficient to pay each shareholder, on division, the full par value (\$300) of his shares. After a few years of apparent prosperity, however, the directors passed an order allowing members to withdraw with a given division of profits, or cancel their mortgages on given payments after a date fixed in advance, it being assumed that the condition of the association would allow of closing up its affairs at that time. When the time arrived, however, the greater part of the members having withdrawn, it appeared that there was a deficit in the accounts of the association, which the remaining members would be called upon to make up, while those who had taken advantage of the opportunity to withdraw beforehand had gone off with a profit. A case made on the question of the management of the association brought out the decision that the permission to members to withdraw in advance of the final settlement was illegal, that all the discharged members must be held to their membership, and the affairs of the association be put into the hands of a receiver until the payments and losses should be readjusted. In view of the restrictions which the law imposes on the associations, a convention of them was called a short time ago which proposed so to amend the statutes as to allow the associations to distribute eighty per cent of their earnings as they go, reserving only twenty per cent as a security fund. On the other side, a bill has been introduced into the legislature which repeals all the statutes under which the associations are chartered. This would prevent the formation of any new ones, and they would disappear from the State as the existing ones were gradually extinguished.

The perennial question of the cleansing of the city of New York is now before the legislature of the State, three bills to reform the street-cleaning system having been brought forward in this session. The committee of the Assembly on the Affairs of Cities has therefore sent out circulars asking for information, while it has guarded itself against intrusive wisdom by declaring that no unasked testimony will be received. The present system of street-cleaning by a bureau of the Police Department, substituted some time ago for the contract system when that became intolerable, has not proved a success. The "cremation" scheme of two or three years ago was not long persisted in, nor has the habit of dumping the refuse into the mouth of the harbor from scows within the reflux of the tide been managed in a way to commend itself. Hence the questions of the circular: Whether the duty of street cleaning should be left with the Police Department, or a separate department should be established for it; whether it shall be put upon a special Board of Supervision, composed of the Commissioner of Public Works and the Presidents of the Board of Health and the Police Board, or shall be transferred to the Department of Public Works; or finally, whether it is better to return to the contract system. The committee further inquires whether it is not possible to simplify matters by separating the garbage of the city from the street sweepings and ashes, and whether in that case the garbage could not be sold to farmers, the street sweepings and ashes be used for filling, and the dump-

ing grounds be made therefore unnecessary; or, if this is not practicable, where new dumping grounds can be provided, and whether it is worth while to construct large scows, after the example of Liverpool, to take the dumpings out to sea.

THERE is no knowing what response experience may give to these suggestions of method, but there are some that it is safe to say will not or should not be carried out. The garbage might perhaps be separated in a considerable degree from the street sweepings, and so also the ashes, in the better parts of the city, where the inhabitants themselves make the separation, though in the poorer parts it would be difficult to enforce it. We doubt whether a steady market could be found which would relieve any great city from its garbage, a material which ought to be got out of the way regularly, as fast as it is delivered. The ashes, if it could be kept undefiled, might very well be used for filling; but to sell the street sweepings for the same purpose is a thing which should not for a moment be thought of, even though it were found possible to prevent refuse from houses from being mixed with it. Containing probably one half its bulk or more of animal refuse, it is only one degree less unwholesome than the garbage itself, and the proposal to make such a use of it shows a curious want of knowledge of the conditions. The placing of the dumping grounds is certainly an embarrassing difficulty; but this is not the Utopian way to get rid of them. A considerable embarrassment will be relieved when the authorities and the public have learned to face the fact that the proper disposal of the refuse of cities is after all an expensive matter, and that inasmuch as sanitary science furnishes no way yet of doing it cheaply, it is better for the present to make a liberal allowance and do it thoroughly.

THE present plan of carrying the refuse out into salt water in scows has not, as we have said, worked very satisfactorily. The scows are not seaworthy, and in rough weather they do not go out at all; in good weather they drop their deposit where a great deal of it comes back to plague the shore. A proposition was made some two or three years ago to build large steam barges which should be seaworthy in all weathers, and could deposit the refuse twenty-five miles out to sea, but it has not been done. Just now we read that a steamer has been built on the Clyde for the corporation of Liverpool for this very use. The hopper-barges which were before used, and which it has been suggested should be adopted in New York, being found not to deliver their freight with sufficient readiness, the new steamer has been built with a long well widening downward and divided into ten compartments, with doors to open simultaneously, and a powerful steam pump to wash the contents thoroughly from the tanks. The steamer is built to carry three hundred and fifty tons of dead weight, says a correspondent of the *Chicago Tribune*, and will make nine miles an hour. It might take more than one such steamer to relieve New York of her superfluous matter, but if, as it is said, the cost of carrying out her refuse amounts already to five hundred dollars a day, she could afford it. The suggestion is made that the whole sewage of a city might be carried well out to sea in similar vessels, and doubtless it would be a relief of a great difficulty if it could be done; but when we consider that the liquid sewage of Liverpool, amounting on the average to thirty gallons per head, is upwards of sixty thousand tons daily, and that of New York probably twice as much, it looks like a rather appalling undertaking to provide a fleet adequate for it.

THE ACOUSTICAL IMPROVEMENT OF LARGE HALLS.

THE acoustic defects of large buildings are brought about by one or more of the following acoustic phenomena, and in some cases by all combined. (1.) Dispersion, by which in large and lofty buildings, such as many of the magnificent Gothic cathedrals, the greater part of the sound waves produced by the human voice are free to wander away through great distances, until they expend themselves among the arches and galleries of the roof, and in the cavernous recesses of the chapels and transepts, leaving but a small proportion to reach the ears of the people in the body of the hall. (2.) Resonance, by which discordant reverberations are produced, commencing nearly simultaneously with the note or sound by which they were originally induced, but continuing for some time after the original sound has ceased, and, therefore, interfering with the notes that follow. This is a common defect of domed and vaulted buildings, and the phenomenon may be observed in empty houses, and very often in tunnels, in which it is combined with reflection or echo, with which it must not be confounded, although the two are seldom, if ever, found apart. Resonance is chiefly attributable to the sympathetic vibration of the air held within the vaults of the roof, or

within a dome or gallery, set up whenever a note is sounded whose period of vibration corresponds with that of the space in which the resonance is produced. But what is perhaps the most serious cause of defect in moderate-sized buildings is (3) the acoustical phenomenon of reflection or echo. It is by acoustical reflection that the sound-waves travelling away from the speaker in all directions are arrested in their course by walls, ceilings, arches, and other reflecting surfaces, and are thereby prevented from exhausting themselves in space by being turned back in directions determined by the nature of the reflecting surfaces, and their positions with regard to the original source of sound; and were it not for the comparatively slow speed with which sonorous vibrations travel, reflecting surfaces would improve and intensify the original sound in both large and small buildings, much in the same way as a number of mirrors in a room improves its illumination by reflecting back a large proportion of the light which would otherwise be dispersed or absorbed.

It is generally considered that the quickest speed of talking which can be articulated clearly and heard distinctly is five syllables per second, and as the velocity of sound is only 1,125 feet per second, it follows that in the time which elapses in quick talking between the articulation of one syllable and that of the next, the same sound could travel 225 feet, so that if a reflecting surface be $112\frac{1}{2}$ feet distant, the reflection or echo of the first syllable should be heard at the moment the second syllable was being articulated, and would therefore clash with it as would the second with the third, and so on, and if there were other reflecting surfaces at distances two, three, and four times the distance of the first, their reflections or echoes would interfere with the second, third, and fourth syllable respectively from the first spoken syllable; and this clashing or interference of sounds, so destructive to the audibility of a speaker, is almost more serious for a singer, as notes are introduced at the wrong time, giving rise to discords and false combinations, and producing what has been called a "wooliness of outline" in the music which is being performed.

Reflecting surfaces in close proximity to the source of sound improve and strengthen it, as a reflector behind a source of light intensifies its front beams; it is only when the distance of the reflecting surface from the source of sound is such that the time occupied by a sound-wave in traversing that distance and returning again occupies, say, the fifth of a second of time or more, that the reflection becomes an echo and is injurious to the acoustical properties of the building. In fact, the difference between what is called a useful reflection and an injurious echo is merely one of distance. The common sounding-board above a pulpit—which in this country is too often a disfigurement and an outrage upon architectural taste, and in Belgium and some other Continental cathedrals is made an exquisite piece of æsthetic ornament—is an instance of the use of a reflecting surface close to the source of sound, not only for directing the sound-waves on the audience, but for shielding them from two of the evils to which we have just alluded, namely, dispersion and echo. If sounding-boards of the same angular dimensions with respect to the speaker were placed at distances from him greater than 112 feet, they would do nothing but harm, injuring by so many more sources of echo the acoustics of the structure in which they were fixed.

Closely allied to and associated with the phenomena of reflection and echo is that of (4) interference, whereby sound-waves are neutralized or intensified, according as the return or reflected waves meet others advancing in such a manner as to destroy or to coincide with them respectively; in other words, as they meet crest to trough or crest to crest, the former producing more or less a silencing of the sound, and the latter an augmentation of it; and as these silencings and augmentations, from the very varied wave-lengths of the sounds constituting either musical compositions or articulate speech, are altogether promiscuous in their occurrence, it follows that audition is, by the phenomenon of interference, confused to a very serious extent.

There is one more source of acoustical defect in large rooms, and that is (5) sympathetic vibration of sonorous bodies within it; this phenomenon is closely related to that of resonance mentioned above, but it differs from it in the manner in which it is produced. It is well known that a piano or a harp placed in a room in which a concert is being performed, although not being played upon, gives out a large proportion of the music being performed, and a person sitting near it can hear the music coming from it, as if some ethereal hand were playing upon it with the lightest possible touch. This very interesting effect is nothing more than the taking up by each string the vibrations of the air surrounding it which was thrown into tremor by notes emitted by other instruments whose period bore a harmonious relation to that of the string so affected. But it is not only strings that are so influenced—metal plates of various sizes and thicknesses, membranes, such as a drum-head or a tambourine, are all influenced by sympathetic vibration, and give out corresponding notes. It must be familiar to many persons that even a common hat held in the hand in the presence of loud music is thrown into a state of vibration when certain notes are sounded, which vibration is distinctly sensible as a tremor to the hand holding it, and we may say generally that anything capable of being thrown into vibration with sufficient rapidity to constitute a sound may be thrown into sympathetic vibration by corresponding sounds produced with sufficient force in their neighborhood.

We think we may safely say that all the above phenomena, with the exception, perhaps, of the first, *i. e.*, dispersion, are, with respect to their acoustic influence upon a building, either decidedly useful, harmless, or positively detrimental, according as the distance of the disturbing body from the source of sound be small or great. Thus the cavity of the human mouth, as well as the important parts of most musical instruments, are resonators, which not only greatly improve the sound, but to which their quality, value, and character are chiefly due. Again, reflectors, such as pulpit sounding-boards and walls in close proximity to the speaker or singer, augment and intensify the effect as a mirror augments a light, and to the resonance and sympathetic vibration of solid bodies is due the reinforcement and enrichment of sound produced by instrumental sounding-boards, such as that of a piano-forte, or those of other stringed instruments, such as the violin, violoncello, and double bass, and of which no more striking illustration can be given than the familiar one of placing the stem of a vibrating tuning-fork against a resonating body, such as a table or hollow wooden box.

Mr. Engert's invention is the utilization of the phenomenon of the sympathetic vibration of metallic plates placed in the neighborhood of the performers, for taking up the notes as they are sounded, and giving them out again so as to mingle their synchronous sound-waves with those produced by the original notes, and thus to intensify them and give them more body. With this object he places behind and about the platform a number of sets of sheets of steel of various thicknesses and areas, suspended to framework and attached to one another by spiral springs, so that they are free to move within certain limits in every direction, and being of very different thicknesses and size, each plate can pick out, as it were, its own set of notes, which it reinforces, and those notes by which any particular plate is uninfluenced are taken up by other and different-sized plates, whose periods of vibration correspond to a different set of sounds. At a trial concert, recently, Mr. Engert had placed behind the performers five sets of suspended steel plates, one set being at the back-centre of the platform, and the other being in two pairs, one on each side of the centre, the whole being arranged more or less in an arc of a circle embracing the platform; and in front of the platform in the middle were three smaller sets of plates, behind which and close to them was placed the piano-forte. Each set consisted of five steel plates of different sizes, suspended in a vertical position parallel to one another, about an inch apart, by spiral springs, and having a second set of spiral springs which acted as distance pieces between them. The five sets at the back of the platform were enclosed in flat vertical cases, the fronts of which consisted of a set of louvre boards, which could all be opened or shut together exactly like the opening or closing apparatus of the swell of an organ, and by closing any one set of louvres that particular set of plates could, for experimental purposes, be thrown out of use, and with a similar object the smaller sets in the front of the platform were provided with curtains which could all be simultaneously drawn aside or closed up by means of strings.

During the performance of the concert there was unfortunately but one opportunity of testing the effect of the music, first with the apparatus in use, and then with the louvres and curtains closed up, and this was afforded by one of Signor Foli's songs being "encored" and repeated, the apparatus being in use during the first performance, but shut off during the repetition. That there was a difference between the two, no one with any pretence to a discriminating ear could be insensible, but we venture to think that the question whether the one was an improvement on the other or not was a matter purely of imagination, and from the opinions of others with whom we compared notes, we think that if a poll had been called of the impressions of those present as to whether the apparatus improved the effect or not, the ayes would have been about equal to the noes. It is only fair, however, to state that it was announced by the inventor that the apparatus was far from being in good order, and in fact that some of the suspension wires had been broken altogether through not being of sufficient strength to support the weight of the plates. We must confess that we do not see the applicability on any extended scale of such a system to the improvement of large halls, for the reason cited above, namely, that sympathetic vibrations, reflections, and resonances, in order to be of any use for the improvement of sound, must be close to its source, and therefore the amount of apparatus for the production of such phenomena must be very limited, and can, in large buildings, bear but an insignificant proportion to the size of the chamber, and to the many sources of defect which vastness of size introduces. We can readily believe that if the velocity of sound were equal to that of light, the multiplication of sets of Mr. Engert's vibrating plates placed all over and above the interior of a building, in the roof and around the galleries, might greatly augment and perhaps improve the sound, but as it takes a decidedly appreciable time for a sound to travel a distance which can lie within a moderate-sized concert-hall, we cannot but think that every set of apparatus placed within the building, except in the immediate vicinity of the platform, would add to the discordant reverberation, add to the echoes produced, and would, in short, be a remedy far worse than the disease it is intended to cure. Passing from general principles to matters of detail, we fail to see the advantage of mounting the plates upon springs. If we understand the phenomena correctly we are under the impression that the sort of vibration of the plates which is de-

sired is a membranous one, and not a bodily swing of the whole plate as a mass, which could hardly be rapid enough, or be in a condition to be imparted to the air so as to reproduce a musical note; and if this view of the case be the correct one, the plates might be rigidly fixed by their upper edges, or even all round, like the head of a drum, and their membranous vibration would not thereby be destroyed, but rather improved.

We are the more sorry to take this view of Mr. Engert's invention (to which the name Orpheophone might not be inaptly applied) from the fact that we understand it is the result of an experimental research extending over more than forty years; it may be, however, that we have not properly appreciated the reasoning by which he was led to his conclusions, or by which he anticipates being able by his invention to impart the most admirable acoustical properties to buildings of the worst acoustical construction. If we have misunderstood him we shall be only too glad to rectify the error by affording him an opportunity for the explanation of his undoubtedly ingenious apparatus. — *Engineering*.

A SIMPLE TEST TO ASCERTAIN THE PURITY OF THE AIR.¹

LANGE² gives a simple method of measuring the amount of carbonic acid in the air. It depends upon the fact that carbonic acid in lime or baryta water produces a precipitate of carbonate of lime or baryta which shows itself by clouding the previously clear solution. To make the test he used six glass bottles of different capacities.

No. 1, of 450 cubic centimeters capacity.

" 2, " 350 " " "
 " 3, " 300 " " "
 " 4, " 250 " " "
 " 5, " 200 " " "
 " 6, " 150 " " "

When these are quite dry and clean some clear fresh limewater is made, fifteen cubic centimeters of the solution measured out, and poured into the smallest of the bottles, containing the air of the room to be tested. The bottle is stopped up and thoroughly shaken. If no cloudiness results therefrom the same experiment is tried with bottle No. 5, and so on, until a distinct cloudiness is discernible. A cloudiness obtained with the sixth bottle indicates at least 16 parts of carbonic acid in 10,000 of the air, an impurity altogether inadmissible, so that no smaller bottle need be used. The fifth shows 12 in 10,000, the fourth about 10 in 10,000, the third 8 in 10,000, or a satisfactory condition of the air. The third shows 7 in 10,000, the second 6 in 10,000, an unusually pure indoor atmosphere; the first indicates from 4 to 5, certainly under 6, in 10,000, a condition rarely obtained except in the open air. In order to distinguish with greater ease and certainty when the cloudiness is sufficiently strong, small pieces of white paper with a cross marked on each in pencil may be pasted on the outside of the bottles below the water level, with the cross mark turned inwards. When this cross-mark can no longer be seen through the solution it may be assumed that the cloudiness is sufficient.

From the experiments of Eresmann³ it is found that from the consumption of 1,000 liters (about 35 cubic feet) 681 liters of carbonic acid are produced. A burner consuming 140 liters per hour (an ordinary 5 foot burner) generates in this time 92.8 liters of carbonic acid, about equal to that produced by four grown-up persons, and in respect to organic substances it corrupts the air as much as five grown-up persons.

According to Pettenkofer, a strong workman, weighing 75 kilograms, and 28 years old, produces hourly 22.6 liters of carbonic acid by day while at rest, and 36.3 when at work. A "feeble tailor," weighing 53 kilograms, and 26 years old, produces 16.8 liters while at rest during the day, and 12.7 during the night.

Scharling's⁴ observations give the following table: —

	Age.	Weight in Kilos.	Hourly Production of Carbonic Acid in Liters.
Boy.....	9½	22.00	10.3
Girl.....	10	23.00	9.7
Youth.....	16	57.75	17.4
Maiden.....	17	55.75	12.9
Man.....	23	82.00	18.6
Woman.....	35	65.50	17.0

AMOUNT OF FRESH AIR REQUIRED PER HEAD PER MINUTE.

To calculate the amount of fresh air required per minute by each occupant of a room we will assume the number of respirations per minute to be 17 (average obtained by the writer from five different persons at rest). At each breath the volume of air respired amounts to about one half liter, and contains, say, 43 parts of carbonic acid to 1,000 of air. If we suppose the outside air to contain

0.5 parts per 1,000, and we wish the limit of impurity in the room to be 0.7 parts per 1,000, then each half liter of outside air introduced will add a volume containing $0.7 - 0.5 = 0.2$ parts in 1,000 less carbonic acid than is required. The half liter respired contains 43 parts, and as this breath cannot be removed instantly (unless each occupant breathes through a tube communicating directly with a ventilating flue), it must be diluted with as many volumes of the incoming air as are sufficient to raise it to the required purity; i. e., $\frac{43}{0.7 - 0.5} = 216$ volumes of one half liter each for each respiration. For 17 respirations we have 3,672 half-liters = 1,837 liters, or 1.8 cubic meters. General Morin gives for hospitals from 1 to 2.5 cubic meters per head per minute; for theatres from 0.7 to 0.8 per minute; for assembly rooms, long sittings, 1.0 per minute; for short sittings, 0.5 per minute; schools for grown-up pupils, from 0.4 to 0.5; schools for children, from 0.2 to 0.3. A simple rule is to allow for each individual one cubic meter and for each unventilated gas-burner three cubic meters per minute.

ALLOWANCE TO BE MADE FOR NATURAL VENTILATION, OR VENTILATION THROUGH THE PORES AND FISSURES IN THE BUILDING MATERIALS.

The supply of this quantity of air is, in ordinary buildings, partly obtained by natural ventilation, though to what extent is at present unknown, as the matter has been but little studied. It is extremely important, therefore, to investigate the subject, and to ascertain, if possible, what allowance should be made in our calculations for this air supply, and either to regulate its quantity at pleasure or to repress it altogether.

Natural ventilation is directly dependent upon the permeability of the building materials, and upon the amount of air pressure upon the surfaces of the external walls.

Many of us have observed, especially in unfinished houses, while standing near a bare brick wall on the windward side of the house, that a strong breeze passes easily through the brickwork and produces a perceptible draught in the interior. This pressure is dependent upon three considerations, which are given by Lange as follows: —

1. The difference of temperature between the air within and without the place to be ventilated.

2. The diffusive tendency of the two masses of air separated by the walls of the house.

3. The strength and direction of the wind.

Lange shows that the difference of temperature has but little influence upon the amount of natural ventilation compared with that produced by the wind. It is impossible by any experiments which can be made on an actual building to determine accurately the part played by the temperature alone as distinct from the wind and diffusive tendency of gases. But experiments may be made to advantage on a small scale and with apparatus especially designed for the purpose.

THE WATER-COLOR EXHIBITION, NEW YORK.

THIS, the thirteenth, may certainly be noted as the most successful of the Water-Color Society's annual exhibitions. The public throngs to it, the critics are pleased by a general excellence never before equalled, and the artists must be gratified by sales that have been great from the very beginning.

There are but few ambitious works in the collection, and those few are far from the best. But the average merit is so high that it amply consoles for the lack of any one thing that could be called very impressive or very fascinating. Here and there hang samples of the detailed, conscientious, utterly mistaken and inartistic work that formed the staple of the society's first exhibition. But to-day, such drawings are scattered amid a mass of truer work that half obliterates their effect upon the memory. When I speak, however, of a high average in the work, I do not so much mean that the results are in most cases very valuable, as that methods and manners have improved, that the true aims of the art have come to be better understood, and that the efforts of the majority of workers are tending in the right direction. It is not necessary to discuss what the total effect of the exhibition would be on a foreign critic whose mind had not been prepared by a previous knowledge of American work, though I believe such an effect would be far better than we could have anticipated a few years since. Criticism, to be useful here, must consider our past a great deal for comparison, and our present chiefly as the earnest of a like, but ever-improving future. That we are right in so considering it — in cherishing each bit of individual and clever work as a first fruit prophetic of far richer yields from its own or kindred stems, rather than as the final result of a complete development — is attested by the fact that it is year by year the newer and ever newer names that first attract our interest, and that sign the most distinctive work. I believe it is not alone the vivid impression which a novelty is apt to make upon the mind that inclines one to cite first this year Mr. Muhrmann, Mr. Blum, Mr. Kappes, Mr. Dewey, and one or two others whose names, like these, we had heard for a year or two, perhaps, and hints of whose ability we had already seen, but who have now come out more decisively than we could have anticipated.

There is no more difficult task of the kind than to write intelligibly of water-color drawings. By as much as they are slighter and

¹ This paper by the writer of the Open Fire-Place articles will be incorporated with those articles in their separate form.

² C. Lange, Ueber Natürliche Ventilation und die Porosität von Baumaterialien. Stuttgart, 1877.

³ Untersuchungen über die Verunreinigung der Luft durch künstliche Beleuchtung und über die Verteilung der Kohlensäure in geschlossenen Räumen. Zeitschrift für Biologie, vol. xii.

⁴ C. G. Lehmann, Handbuch der physiologischen Chemie. Leipzig, 1854.

more intangible than paintings, and more fitted to represent transitory moods and quickly seized impressions, by so much are they harder to characterize, by so much more they refuse to transmit the spirit of their excellence, the essence of their diversities, into critical phrases. Moreover, their close juxtaposition in a gallery is worse for them than for work in oils, so much more solid and definite and self-asserting. In *aquarelle* the most fragile work, if I may use such a word, is usually the most artistic, and is just the work, of course, which suffers by close contact with uncongenial things. When I saw Mr. Frank Currier's drawings, for instance, last year, it was impossible to mistake the value of most of them. But it was just as impossible to imagine how great that value would show itself to be when they were removed from their deadly surroundings at the Academy. I afterwards saw some of them well hung in a large room and marvelled at their increase of beauty, at their complete and charming intelligibility. The Academy rooms, moreover, are, for shape, the worst in the city. Long and narrow, with encumbered centres, it is very often almost impossible to get the right point of view at all. When the rooms are full, the impossibility becomes absolute. One must run counter to the main stream of visitors to get even a fair look at the best things. Any place more discouraging than the corridor, with its three feet of breadth, and its heavy shadow on the upper wall, I cannot imagine.

Mr. Currier sends nothing this year himself; but either his influence or the same current that influenced him has been at work, and we see many results of value. Among such are Mr. Muhrmann's drawings, which, strongly as they interest us here, would surely be seen to better advantage in any other place. His eleven numbers show a great diversity of theme. There are two or three portrait studies, a large church interior (No. 199), and a number of out-door scenes. The treatment of all is remarkable for its breadth and airiness, and the resultant effect of atmosphere and suggested space is admirable. These are merely among the things that *aquarelle* is calculated to render with unrivalled success, rather than solidity and detail and elaborate realities of surface and texture. As I have said, the charm and force of such work as Mr. Muhrmann's are alike difficult to characterize. How can one tell in words why his rapidly worked-in turkeys and cabbages and apple-women are so infinitely more artistic, and so much truer as well, than the would-be poetical figures and would-be picturesque landscapes, alike carefully sought and patiently wrought, of the elder school? Mr. Kappes shows figure portraits only, — the most elaborate of them the least admirable, but two of them, Nos. 179 and 537, of great excellence. Here, again, the subjects are most unsought. A street-boy cutting a water-melon is, perhaps, the best. Mr. Dewey's little landscapes show a distinctly poetical temperament, — a thing that even the best work on the walls does not often reveal. The same may be said in a lesser degree of Mr. Francis Murphy, whose Warm November Morning, No. 59, is very good.

Mr. Robert Blum's work is one of the decided attractions of the year. With him, especially, it is promise even more than achievement that interests us, if we except his study of a head (The Grimace, No. 641), which is in itself a capital thing. The great variety of his work is its most hopeful sign. It would, indeed, be a pity if such cleverness as his should, as it so easily might, degenerate into mannerism before the artist finds the true manner that shall suit him best. Mr. Blum paints Japanese scenes, developed, I am told, from his inner consciousness, assisted by Japanese picture-books, for he has never been where he could study them from life. Still, no one who has seen his Fish Stall, No. 222, will greatly blame him for so doing. Then there are some pen-and-ink figure studies of his which the public does not notice, perhaps, very generally, but which those who have some idea of technical accomplishment are apt to pause before. If their comment is most often, "A clever *pastiche* of Fortuny," they must allow that to follow — not copy — Fortuny, even at a considerable distance, is no small feat for a young artist, and no great harm if he do it for sport or exercise, and not with the deliberate intention of resting there forever. If we look finally at Mr. Blum's Connoisseur, No. 88, we see still another style of thing, and as delicate a bit of workmanship as one could covet.

Mr. Alden Weir gives us something this year the like of which I have never seen from his hand before, however many such treasures his studio may have been holding in reserve. He, too, has been touched by the spirit that stirred Mr. Currier, and to the very best purpose. His tiny bits of paper are fascinating, and one of them, No. 303, a scene in the forest of Fontainebleau, is certainly, spite of its six inches by four, one of the strongest and best things in the place. To be unreservedly admired are an admirable figure by Mr. Shirlaw, No. 238, a clever little study by Mr. Chase, No. 213, and a landscape by Mr. Macy, No. 587, Beach at Naushon Island. Mr. La Farge is represented by some little drawings on the wood which exhibit all his indefinable charm of sentiment.

Some of Mr. McCutcheon's work is to be commended, notably his High and Dry, No. 289; also Mr. Douglas Polk's Stolen Felicity, No. 572, and Mr. F. S. Church's Fisherman's Home, No. 256. Mr. Hopkinson Smith's drawings are very good this year. He makes a far better show than ever before. I cannot think the treatment of his Seabright, No. 527, very successful, however. To use body color in such a solid mass as this broad white water is surely less effective than to make the paper do its own work, as it does, for instance, in Mr. Reinhart's News from Home, No. 745, which hangs

not far away. Nor is this the only one of Mr. Reinhart's drawings to which one may turn with the greatest pleasure. Mr. Henry Farrar's pictures are numerous and pleasing, but the smallest and least ambitious are surely the best. It is in the foregrounds of Mr. George Smillie's many attractive pictures that we find his greatest skill displayed. A portrait study by Miss Cassatt attracts attention for the cleverly rendered head. The rest of the figure is badly drawn, and the whole by no means equal to her best work. The best flower-piece is, perhaps, Mr. Hugh Newell's Lilacs, No. 80, which possesses a delicate charm of color that is eminently lacking to his figures. Mr. Swain Gifford, Mr. Charles Parsons, Mr. Quartley, Mr. Nichols, and Mr. James Smillie show good work of their average quality. What shall I say of other work, signed, too, by well-known hands, and showing their usual level of achievement, when such a statement cannot be understood to carry any praise with it, except the somewhat doubtful approval that may follow patient application? There is nothing new to be said of Mr. Bellows's figures, or De Luce's, or Mr. Wood's, or of Mr. Edward Gay's landscapes, and it is less necessary, year by year, to repeat the old fault-finding, as it seems less likely that they will exert an influence on the younger generation of artists. The public still cleaves to them, still clusters round Mr. Wood's Pop-Corn Seller, and Mr. Browa's Homeward Bound. For this there is no remedy in preachments. One has no consolation but to be thankful in a selfish way that there is more open space left about the unobtrusive things one cares especially to see. Mr. Satterlee one had formerly some hopes of, but he seems to be steadily retrograding. He is less good than ever to-day, far below his last year's level. Mr. Bruce Crane's landscapes may be properly examined after one has convinced one's self that a ready wrist and free color are desirable things in *aquarelle*, and that an impression quickly caught and given is a thing to be proud of. His drawings point the lesson that it must be a real impression, not a simulated one, and that the color, so careless in appearance, must combine itself truly from the proper point of view. Looking closely at them we hope to find a point of observation whence this may be found to happen for Mr. Crane's pictures. But the further away we get, the more patchy and confused and unreal they are seen to be.

Mr. Tiffany, Mr. Linton, and Mr. Winslow Homer are unrepresented this year.

There is some good foreign work on the walls, notably two landscapes by Anton Maure, which give the sanction of authority to the principles just advocated. Look at the light and out-of-door breeziness on his paper, the atmospheric texture, if I may so say, and then examine his quick and simple and transparent *technique*, even the touches of body-color being laid on with so light a hand as scarcely to look like such. It is truly a magic art that can create so much out of so nearly nothing in the way of pigment and labor. There is, moreover, a Clays, a moonlight water view, which to me is not so satisfactory as his work in oils, an excellent figure by Tezzos, My Kitty, No. 121, and good things by Narira, Detti, Dettalle, Langinetti, and some others. A large Marny is hung so high in the corridor that one cannot see it, and the same may be said of a crayon head, given as an Agostino Carracci. The catalogue leaves one in doubt whether the "Van Laer," opposite the number of some excellent tiny landscapes should mean owner or artist, while the signature upon them seems to be "G. P." They look more like foreign work, Dutch or Flemish, much as one would like to claim them for some countryman.

In the Black and White room the most striking things are by foreign hands, — a very fine large etched portrait of himself by Desbontin, and some of Mr. Haden's magnificent work, notably the Windsor Castle, with the fine foreground figures. It speaks well for the work of our own etchers that it is not entirely killed by contact with such giant's play as this. There are several frames of old etchings by Rembrandt and others which delight those who already care for such things, and must prove instructive to the many who are beginning to learn about them. A large etching by Jules Jacquemart, after Lionardo, is very beautiful, and the expression of the original is almost exactly reproduced. Is not this high praise when the original has been the Mona Lisa? A half-length crayon portrait-study by Mr. Gortelmeyer well deserves notice.

It is impossible just now, when they are the very battle-ground of critics, to touch in a casual way upon the engraver's work (*per se*) that is shown, or upon the drawings done for him by others. One would needs begin by making a full profession of faith on all points of the subject, a task that may well be shied in a paper that professes to treat of very different things. The same consideration makes it difficult to speak of the majority of work shown at the recent Black and White Exhibition held, as before, under the auspices of the Salmagundi Sketch Club. There were some drawings, however, that were interesting from a strictly pictorial point of view, — some sketchy bits of Mr. Shirlaw's, Mr. Lathrop's portrait of Edison, some of Mr. Kappes's numbers, and two heads by Mr. Chase. These last called for simple commendation, with Mr. Blum's work, showing a most healthy diversity of style. Of course the value of such diversity was far greater here, where it was shown in mature work, not in the experiments of one who does not yet feel his footing quite sure beneath him. Mr. Chase's study-head, No. 229, was life-like and excellent, but antipodal in its clear outline and academic style to the dashing pen-and-ink portrait of Wilhelmj. How

had the forms been kept so true, one wondered, where not an outline was followed, and how had the marvellous sweetness of expression been rendered by such broad, reckless strokes? One questioned more than ever in this exhibition what may be the object of painting large canvases in black and white oils, for they had not always been done for engraving's sake. They are of necessity ugly and undecorative in themselves and one cannot imagine their being an especially good medium for expressing any given idea, or representing any given thing.

We had been told that the Artists' Fund Exhibition was to be a good one this year. So it was, perhaps, for an Artists' Fund, as the name has been found synonymous in past times with the worst possible work America could compass. But this year, although there may not have been many pictures to be eagerly coveted, there were some that one need not refuse to hang on one's wall, did one win them, say, in a lottery, or find them in one's Christmas stocking. Among the worst things were Mr. Lang's figure subjects, Mr. Hicks's *Supper Time*, No. 73, Mr. Addison Richard's *Ten-Mile River*, No. 7, and Mr. Grey's *Favorite Pastime*, which represented, apparently, a huge wax doll decorating pottery. Amid the better work was Mr. Quartley's, Mr. Eastman Johnson's, Mr. Wiggins's, Mr. Swain Gifford's, and Mr. Groatorex's. The best thing of all, to my taste, was a little landscape by Mr. Hennessy, *The Old Church at Criquebeuf*; and his *Bonjour Maman* was very good likewise. The prices obtained at the sale averaged high. There were about one hundred pictures, and they sold, including the frames, for \$20,585.

Sales of picture collections here have been rather numerous this winter, but there have been none of very great interest. The Sherwood and Hart collections, which were sold together, contained some very good things of the French and Spanish schools, most of them owned by Mr. Hart. The Duprés were good, and there was a *Slave Market* by Decamps, whom one sees but seldom this side of the water. A Wilhelm van Mieris, which has come several times to the hammer within the last few years, might well have been purchased for some public gallery. It was a good example of the master, and, fourth-rate though he be, in his own school, showed how his textures and surfaces shame, for truth and minuteness, the efforts of the modern microscopists! The Decamps, too, would have been a good purchase on account of the public. Rossi signed a lovely lady's portrait, of the Louis XVI. epoch, and Rico's landscapes were admirable for the out-of-door effect of their clear light greens and blues and whites. The so-called Munich collection, recently sold, contained a capital Kowalski, *The Meet*. His pictures interest one more and more. A large Venetian scene, only "attributed" to Turner, seemed to puzzle the critics. They dared not say yea or nay, apparently, — only "a bad Turner or a very good *pastiche*." In the Nathan collection, which went off a few days since, were sold, among others, at low prices, three Boughtons, a clever little Kowalski, and a capital picture by Otto Piltz, of Weimar, *Stripping Feathers in an Old Woman's Home*. Public taste is a curious thing. This was a fresh and really admirable piece of work, measuring 37 by 24 inches, and containing many figures. It brought only \$400, and very good Clays only \$790. A frightful Baugnet, on the other hand, sold for \$880, a Meyer von Bremen, rather more objectionable than usual, for \$2,100, a Bouguereau for \$2,900, and another, the well-known *Crossing the Stream*, for \$6,600. The only really good picture that ran up to anything like these prices was a Zamacois, 12 inches by 16, that brought \$4,550. The sum was not reported which secured one of the best pictures in the collection, a flower-piece by Mademoiselle Cuno, of Brussels, wonderfully delicate and admirably colored.

M. G. VAN RENSSLAER.

THE ILLUSTRATIONS.

HOUSE FOR E. STANWOOD, ESQ., BROOKLINE, MASS. MR. C. S. LUCE, ARCHITECT, BOSTON, MASS.

DETAILS OF THE SAME.

ST. DENIS'S R. C. CHURCH, LOCKPORT, ILL. MESSRS. EGAN & HILL, ARCHITECTS, CHICAGO, ILL.

LOCKPORT church, about forty miles from the city of Chicago, is built of local limestone, rock-faced ashlar, with a finish of the same material. The interior is finished in stained pine, with open-timbered roof, plastered panels, and stained-glass windows. Cost when complete, about \$22,000. The building is now finished except the spire, which will be built during the present year.

SKETCHES IN NORMANDY, FRANCE. MR. E. K. ROSSITER, ARCHITECT, NEW YORK, N. Y.

CORRESPONDENCE.

DE FABRIS'S NEW FAÇADE OF STA. MARIA DEL FIORE.

FLORENCE, January 21, 1880.

THE controversy concerning the new façade of Sta. Maria del Fiore is a wide one, but we will summarize it as briefly as possible.

Signor de Fabris's design consists of a three-gabled front similar to that of the Cathedral of Siena, and of the world-famous Duomo

of Orvieto. This design has been so furiously attacked that even now, when one fifth of the new façade is completed, the question of its final form still remains an open one.

The admirers of Signor de Fabris's design justify it primarily on the grounds that the Duomo was begun by Arnolfo; that in Arnolfo's time the three-gabled façade was a favorite form of architecture, and that Arnolfo must consequently have intended to adopt it. And in support of this assumption, and on the authority of Vasari, they exultingly point to the frescoes of Simone Memmi in the Spanish Chapel of Sta. Maria Novella. There, they say, may be seen a small picture of the Duomo of Florence, copied by Memmi's own hand from Arnolfo's design. And that picture represents a gabled front.

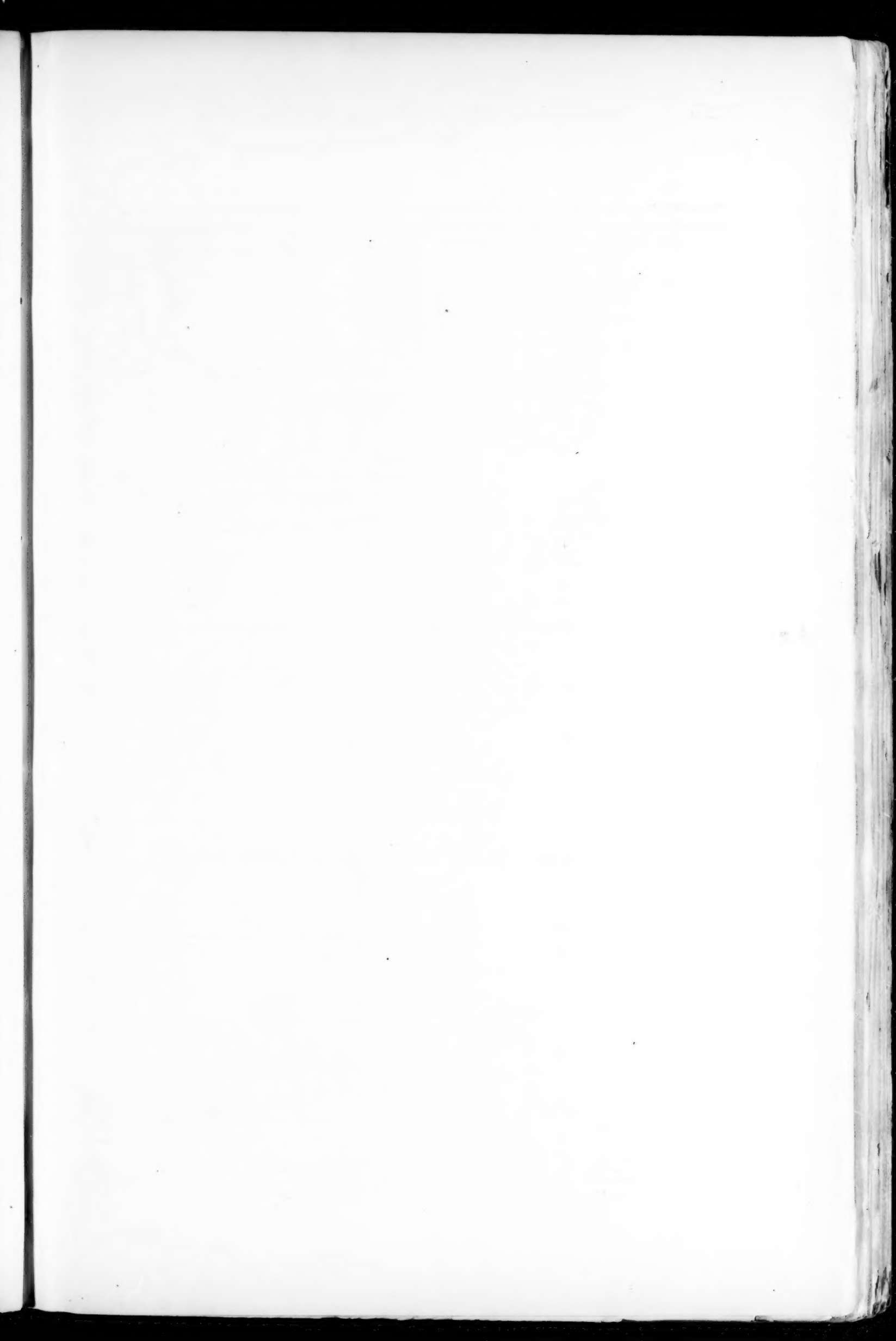
Besides these historical and archaeological reasons, Signor de Fabris advances technical arguments of a more serious value still. He maintains that the façade of a building should be, as it were, the organic outcome of its internal structure, — the flower of its growth. The interior of Sta. Maria del Fiore is Gothic, he says: *ergo*, its façade must be Gothic. Further he contends that the basilical front, being of pagan and profane origin, is in no way adapted to the religious architecture of a Christian people. For the early basilicas were copied from the halls annexed to Roman forums, many of which were even transformed without more ado into churches. Round arches and cupolas being added later there gradually arose the architecture known as Romanesque, and this was fated in its turn to give place to the Gothic. Now Gothic architecture, being a thing *per se*, the product of medievalism and the child of Christian thought, has no more to do with basilicas than the palm-branch of a saint with the thunder-bolts of Jupiter. And the Duomo of Florence, having been commenced only in the year 1294, when pagan influences had wholly died away, should be consistent with the character of its epoch, — and that epoch was Gothic.

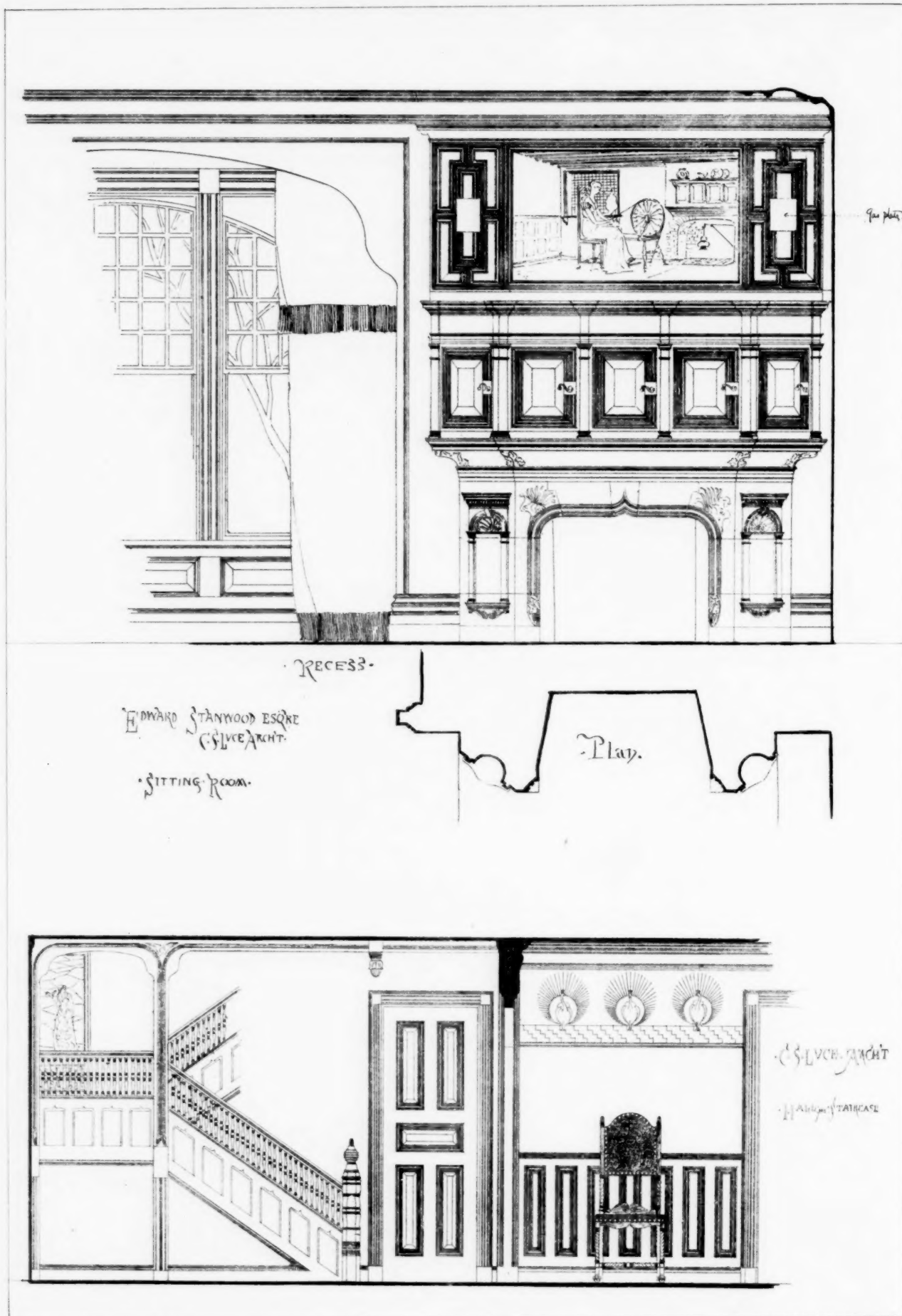
So far Signor de Fabris, whose arguments it will be seen are not unanswerable; and they have been abundantly answered. On the side of the Basilicans is Signor Mospignotti, and he is a most redoubtable champion. With a bristling bayonet line of facts and dates and figures, with a two-edged sword of scorn and ire, he wages war upon the Gothicists, and if he does not altogether overcome them leaves them very prettily wounded indeed. In a pamphlet of 160 pages he attacks first Signor de Fabris's reasons and then his design. He proves (what is, alas! very often and very easily proved nowadays) that Vasari — the dear old gossip! — where facts are concerned is but a broken reed. The story of Simone Memmi's picture of the Duomo is not worth the breath which has been wasted in repeating it. For the Spanish Chapel of Sta. Maria Novella, in which are the frescoes attributed (by Vasari) to Simone Memmi, was only begun in 1350, while Memmi had left Italy forever and gone to Avignon in 1339. So gross an error as this on the part of Vasari leaves one free to suppose that the whole of his story is false, and that consequently the so-called picture of the Duomo does not represent the Duomo at all. And in support of this hypothesis are many technical defects in the said picture which render it highly probable that it was no genuine design of Arnolfo or of anybody else, but simply an imperfect fancy sketch, introduced for the sake of telling a story.

As to the three-gabled façade being in vogue in the days of Arnolfo, that also is an assertion which needs some additional proof; for there are but two façades of the kind in Italy, that, namely, of the Duomo of Orvieto, and that of the Cathedral of Siena. The Duomo of Orvieto was designed by Lorenzo del Maitano, who may be regarded as the inventor of three-gabled fronts in Italy. Before his time there were none, and he began his work only in 1305. Now Arnolfo died in 1310, and four months after his death the façade of the Cathedral of Orvieto was not yet commenced. The Duomo of Siena was designed and begun in 1377 by Bonfredi, who was so pleased with Maitano's idea that he copied it as closely as possible; but he was the master's one disciple, and left no followers. Now Signor Mospignotti contends that if one swallow does not make a summer, neither do two three-gabled façades constitute a national type of architecture. Arguments drawn from the architectural developments of other countries are useless for Italy, which, while it slept the sleep of medievalism, saw but few of its visions and dreamt little of its dreams. The spell laid upon it by pagan traditions was never fairly broken. Corrupt Byzantine and Romanesque canons guided all its earlier artistic effort. If, even in France, churches which form a link between Romanesque and the Gothic are frequent, how much greater and more marked is the jumble in Italy! There the pure Gothic architecture never bore good fruit. Such growth as it had was transformed when not distorted. In Italy all the most celebrated churches, except the two already mentioned, have basilical fronts, and this is as true of those belonging to the original epoch as of all the others.

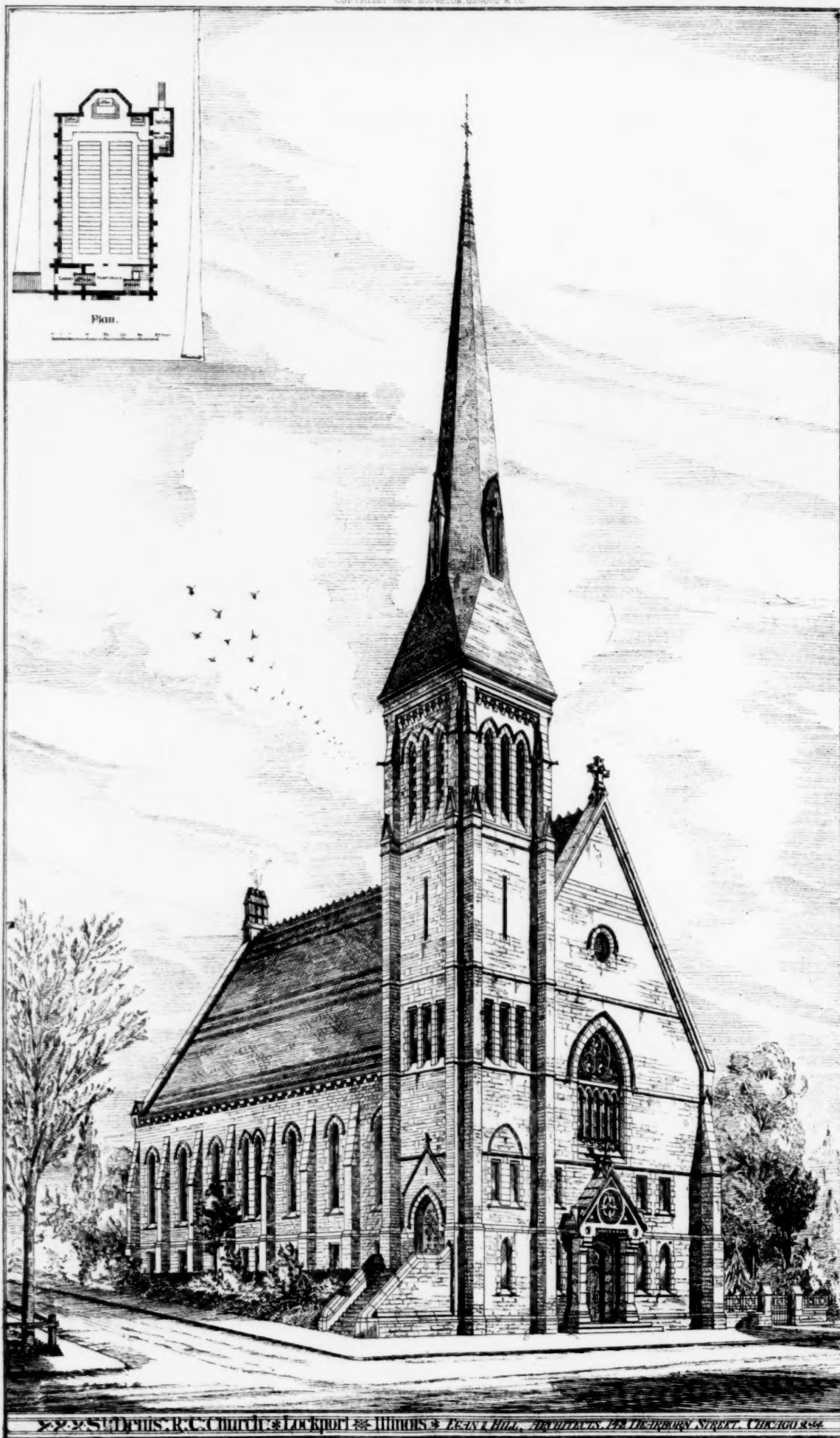
Moreover, the three-gabled façade is looked upon askance even by the devotees of Gothicism. It is regarded more as the changeling than the child of its day. Lorenzo del Maitano succeeded, indeed, in making the façade of the Duomo of Orvieto beautiful, but that was by dint of introducing every element which Signor de Fabris's design lacks.

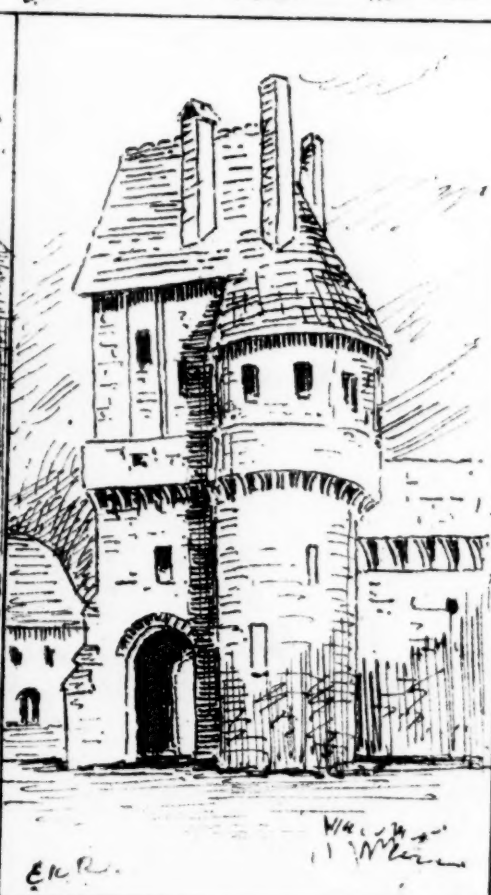
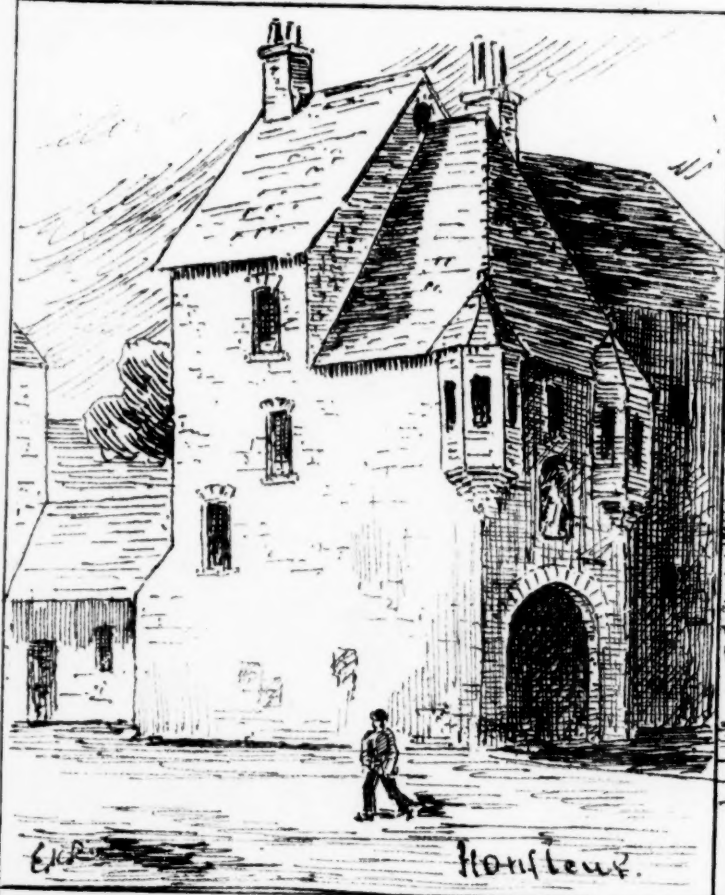
In constructing a three-gabled façade two cardinal principles must always be observed. One is the predominance of vertical over horizontal lines. The other is the disposition of such horizontals as there are in the way best adapted to repose the eye, and to give a



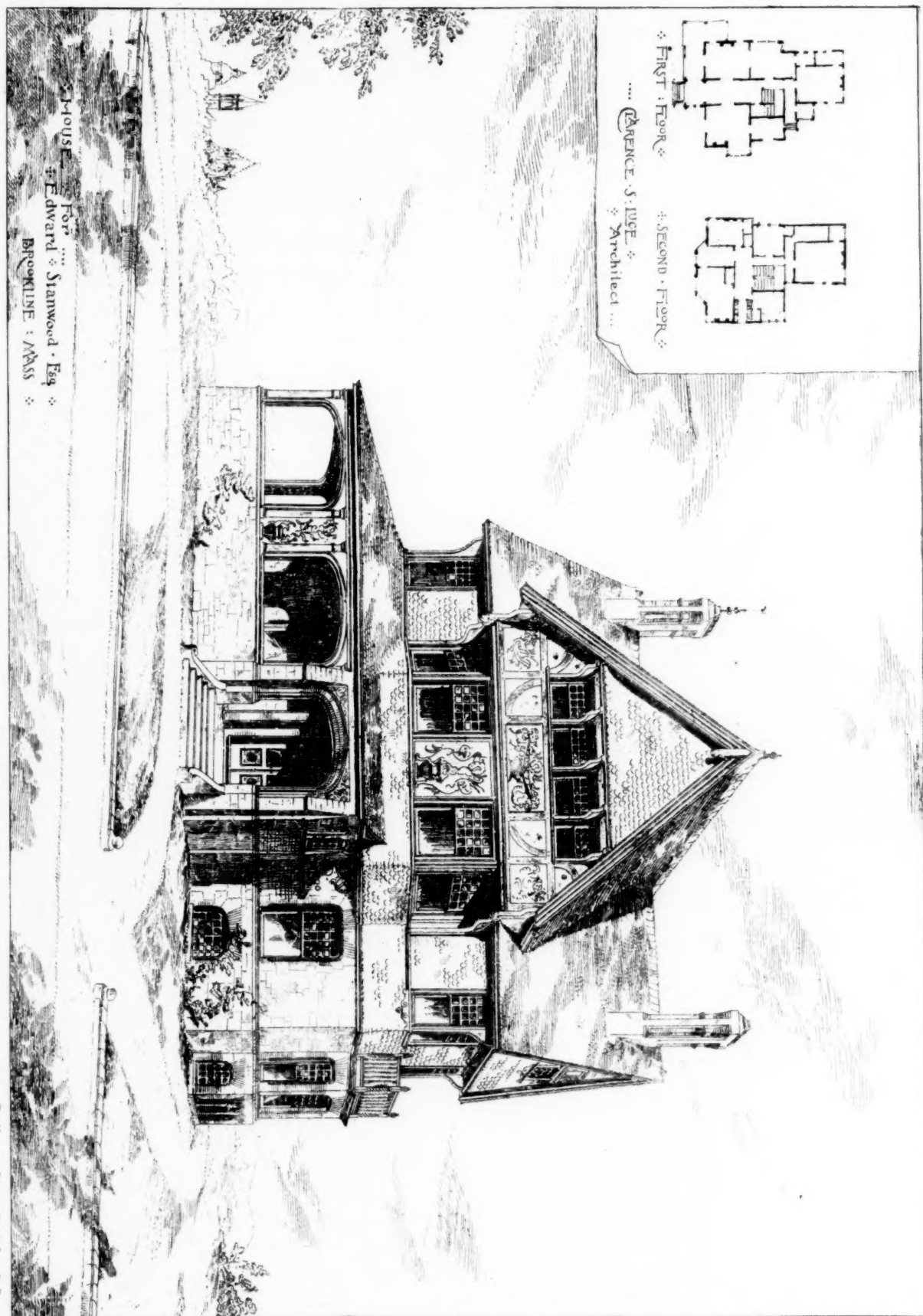








SKETCHES IN NORMANDY
by E.R. Rossiter.



due sense of stability. The three-gabled façade consists of two systems of triangles, the upper and the lower, or those which surmount the church, and those which surmount the doors. The three upper triangles should assume a pyramidal direction, and this is effected by giving to the central and larger triangle a different base from that of the side ones. But the three triangles above the doors should have a common base; thus conferring upon the lower and stronger portion of the façade the necessary horizontality and balancing the aspirant tendencies of the architecture above. Lorenzo del Maitano so fully understood this that he raised the massive buttresses of the doors to a common height and caused all three arches to spring from one line, thus obtaining for the whole structure the utmost possible harmony of strength. Besides this, by prolonging the sides of the lesser upper triangles, he caused them in reality to begin at the line of the gallery, running along the middle of the façade, and thus conferred greater apparent height and breadth upon the central part. Guided by a still finer artistic instinct he also gave to the side pilasters and pinnacles a breadth double that of those flanking the middle gable, thus causing the façade to appear a corporate portion of the building and not a mere decorative crust.

Finally he made the central triangle the double and one twentieth in width of those beside it, and these proportions seemed so good to Bonfredi that he reproduced them later in the façade of the Duomo of Siena.

Accepting Maitano's façade as beautiful, we proceed to ask, In what way has De Fabris departed from it? The ratio between his middle gable and the side ones is as nine to five. These proportions, which are, of course, imposed upon the architect by the internal structure of the cathedral, cause the central portion of the façade to appear far too crowded and narrow, and constitute a defect that may be described as organic, and should be fatal to the design.

Next, far from the unity of structure so grandly conceived and successfully carried out at Orvieto, the façade of Signor de Fabris is divided into three distinct parts by the two square buttresses running up it, panelled in stories and crowned with a corbelled cornice and a balustrade. The doors are separate tabernacle fronts, flanked by low pilasters bearing insignificant pinnacles, and surmounted by gables which repeat the pyramidal arrangement of the upper parts. Over each door is a rose-window which, existing since Ghiberti's time, had necessarily to be incorporated into the design. But these rose-windows condemn the portions above them to a giddy elevation from whence the middle gable feebly tapers away into space. Fifteen metres of it, when completed, must necessarily tower above the actual roof. The result of this will be that from certain points of the narrow piazza the dome — Brunelleschi's dome, so dear to the Florentines! — will be invisible. Furthermore, the Campanile will be dwarfed to the extent of appearing from some aspects even lower than the façade. And where, asks Signor Mospignotti, is the sense of a bell-tower if it does not rise high above every other portion of the church? And where on the face of the globe do you find a three-gabled front with a lofty tower just beside it? Not at Orvieto, not at Siena, and, excluding these, to what other standards can Italian architects appeal?

In conclusion, Signor Mospignotti and those who think like him hold that a three-gabled façade, even when beautiful beyond the dreams of a De Fabris, is an invention opposed by its essential nature to the architecture of the Duomo. For the lines of that monument have fallen in horizontal places, and its numerous cornices and countless bands of colored marbles clamor for a façade from whose severe basilical majesty all trace of a superfluous point shall be banished!

M.

EDWARD MIDDLETON BARRY, R. A.

It is with deep regret we have to record one of the heaviest losses which the profession of architecture has experienced for many years. By the sudden and quite unexpected death of Mr. Edward Barry, in the prime of life, we lose an architect who occupied the highest personal and professional position; in whom taste, judgment, talent, and ability were all equally conspicuous; and whose friends might reasonably have anticipated for him a course of prosperity and activity prolonged through many years. In more than one respect the calamity which has cut short so fine a career thus suddenly recalls the no less unexpected decease of his friend Mr. F. P. Cockerell. Each was the inheritor of a great name; each worthily bore the hereditary honors that had fallen upon him; each was devoted to the practice of Classic or Renaissance rather than Gothic art; each enjoyed the advantages of good social position; both were conspicuous for charms of manner and a gift of conversation such as could hardly fail to make their mark in any circle; and both were carried off by an early death at a moment's notice. Barry was, however, the older man, and had attained higher professional successes than his younger friend and rival had had time to reach, or would perhaps ever have arrived at; and there can be no hesitation in saying that the shock which has deprived the Royal Academy of its Professor of Architecture and Treasurer, has at the same time robbed that section of the art world which pursued Renaissance art and architecture of its foremost architect.

Edward Middleton Barry was the son of Sir Charles Barry, and

received his professional education partly in the office of Mr. Thomas Henry Wyatt, and partly in his father's office. He ultimately became a kind of chief assistant to Sir Charles after Mr. Banks, who had long held that position, had started in practice on his own account, in partnership with Mr. Charles Barry. The various works in hand at the time of Sir Charles Barry's death in May, 1860, were completed under the superintendence of the subject of this memoir. The most important of these was the Palace of Westminster, in connection with which numerous matters remained to be finished, though, as may be remembered, the flagstaff on the Victoria Tower had been fixed just in time for the flag to be hoisted half-mast high on the day of the funeral in Westminster Abbey. Mr. Barry received the appointment of architect to the building at Westminster in succession to his father, and was proud to hold it, and glad to devote to the maintenance and perfecting of this great work much of his time and powers. Ultimately, however, Mr. Ayrton thought fit to abolish the appointment; and although a deputation from the Institute of Architects, which included almost all the prominent members of the profession, waited upon Mr. Gladstone, and through Sir Digby Wyatt and others remonstrated against the undeserved slight thus put upon an architect of unblemished reputation, and deprecated the policy which would leave the professional care of our foremost public building to the judgment of a mere clerk of works, cheese-paring policy held its own. Mr. Ayrton's desire to humiliate a profession, against which he seemed to have conceived a special spite, was not to be balked, and Mr. Barry, to his no small mortification, found that the post which he had filled was to be regarded as permanently abolished.

A provincial work of great beauty and power, which was only partly built when Sir Charles Barry died, was completed by his son. We allude to the Halifax Town-Hall. The lower portion of this building is remarkable for the grace of its proportions and the fine Italian character of its details, and is but little different from the best work of Vignola or Palladio. A tower, however, was carried up, and Sir Charles's sketches for the completion of it showed that he had intended to terminate it by the addition of some sort of high roof. This was worked out by Edward Barry, and a little more Gothic feeling was infused into it than perhaps his father would have attempted; but the whole was accomplished with much vigor and cleverness. It was the precursor of not a few pointed roofs attached to designs of Renaissance character which its author at various times prepared, and some of which he carried out. We may also refer to the Halifax tower as having furnished a precedent, if not a model, for a very similar feature introduced by Mr. Robson into the Municipal Buildings at Liverpool.

After this beginning Mr. Barry was successful in securing a considerable practice, much of which consisted in public or semi-public buildings, so that he early became prominent. He, for example, rebuilt for Mr. Gye the Covent Garden Opera-House, after it had been destroyed by fire — a work remarkable for the speed with which it was carried out, the solidity of its construction, and the general convenience of all its arrangements. As a work of art, we cannot place this building high. The *porte cochère*, which is formed by a simple bold portico with a pediment, is the one feature that redeems the exterior from complete and uninteresting heaviness. Both vigor and skill are, however, shown in the use made of this hackneyed expedient. Internally the house is as little original as it could well be; but for this Mr. Barry is not altogether to blame. His client was not to be induced to accept improvements or variations; and the somewhat commonplace interior which has become so familiar to the London public is more a monument to Mr. Gye's determination than an embodiment of Mr. Barry's designs. Happier as an architectural work, and far more fortunate in its materials, its site, and its surroundings, the Opera-House at Malta, which Barry designed and erected, may fairly claim to be one of the most effective theatres in Europe, and probably the most successful Italian design which its architect ever carried out.

For the Southeastern Railway Company, Mr. Barry designed and erected the two terminal stations and hotels at Cannon Street and Charing Cross. Both these buildings are executed in brick and cement, and are florid designs of rather nondescript Renaissance character, with towers and high-pitched roofs. The Cannon Street building is a little the more severe and correct of the two, and probably the less successful. It, however, contains a very telling and well decorated public hall of large size. There is every excuse for an architect who is treating a comparatively untried subject if he attempt a somewhat novel combination; and high-pitched roofs, not of French Renaissance but of decided Gothic character, combined with windows, balconies, and other features which possess not a trace of Gothic, form unquestionably a novel and picturesque, and perhaps an excusable combination.

In the open space in front of the Charing Cross Hotel, Mr. Barry executed a very careful archaeological work, which has hardly been appreciated as it deserves. We allude to his reproduction of the old Cross of Charing, which stands in the station yard, strangely out of harmony with the cabs and carriages by which it is surrounded, and too much concealed from view by the close railings enclosing the whole space to be readily noticed by the casual passer-by. This is as careful a restoration as a very painstaking collation of existing prints and views, and a personal examination of the remaining Eleanor Crosses, could make it. The late Mr. Arthur Ashpitel

assisted *con amore* in the search for precedents, and undoubtedly the result was as good a restoration of a monument, every fragment of which had disappeared, as can anywhere be met with.

It may be here convenient to allude to some of the other works of Gothic character which Mr. Barry carried out. The conspicuous group of school buildings in Endell Street, which seems to gain rather than to lose by time, is one which, from the fine accentuation of its principal masses, and the vigorous handling of the main arcade, will always strike the eye as a powerful design and the work of a true artist. Mr. Barry also built for the Leeds Grammar School a Perpendicular school-house, and was architect of various other scholastic buildings of the same class. He, in addition, carried out some excellent Gothic decorative work in the Queen's Robing Room at the House of Lords, and in the interior of St. Stephen's Chapel. The genuine bent of his personal tastes lay, however, in another direction; and though none of his Gothic works can be accused of being inaccurate, the Endell Street school building is the only one personally known to us in which Edward Barry has handled Gothic architecture with the skill of a master. As his practice advanced, his mind seemed to grow more and more out of harmony with everything Gothic, so much so, indeed, that in his greatest competitive effort, his design for the Law Courts, the artistic value of what he proposed was, to tell the truth, painfully low.

The competition for the Law Courts was the occasion of a disappointment which was keenly felt by Mr. Barry. His design was placed foremost by the judges for planning and contrivance, and he was recommended as joint architect with Mr. Street. The ultimate decision in favor of that gentleman as sole architect, which was arrived at by the Government, was not compensated for by Mr. Barry's success in the competition for a new National Gallery, which took place about the same time. In this case, working in the style of Italian Renaissance, in which he was thoroughly at home, he had fairly distanced all his competitors by the art as well as the skill of his project; and he was naturally unable to comprehend that his having fairly won one public competition should be made an excuse for depriving him of his share in the expected fruits of another. The National Gallery design, as our readers know, has only been to a certain extent carried out. The recent enlargement is, it is true, the embodiment of a portion of Mr. Barry's plan, and, as far as it goes, is undoubtedly successful; but none of the important architectural features of the exterior or of the interior have even yet been executed, and Barry has died, as many other eminent architects have before him, with the plans of his *chef-d'œuvre* still in his portfolio.

Much of Mr. Barry's private practice consisted in the erection of mansions, and he early perceived the admirable suitability of the Transitional Renaissance style of France in the time of Francis I. to this purpose. No style that has ever been employed in Europe will lend itself so well as this to the purposes of the builder of noblemen's houses; but it requires the hand of a consummate artist to employ it as happily as did the designers of Chambord and Chenonceaux, Blois or St. Germain. We doubt whether Barry, true artist though he undoubtedly was, really brought to bear upon his use of this charming style as much delicacy of feeling and self-restraint as are requisite in order to render it perfectly successful. The latest and most conspicuous example of his employment of it—the large block of chambers recently erected in the Temple Gardens, looking on to the Thames Embankment—will illustrate our meaning. Here the ornament is too profuse and too large in scale; its effect is consequently obtrusive, and the eye resents its interference with the features of the building. If this design be contrasted with St. Stephen's Club-house, built at the extreme west end of the same embankment, by the present president of the Institute, the effect of a very close conformity to the best precedents will be seen to be superior to that of a perhaps more original but less harmonious treatment of the style. We ought, however, after all to be too grateful to Mr. Barry for the way in which he has contributed to render so charming a phase of architectural design familiar to English taste to quarrel much with his having handled it in a manner of his own.

Elizabethan, perhaps the most thoroughly English style available for modern domestic purposes, was familiar to Edward Barry, and in Crewe Hall, where he executed very large works of restoration and addition, we find it wonderfully well handled and with undoubted success.

Barry was elected a Royal Academician in 1869, having been chosen an Associate soon after the completion of the Covent Garden Opera-House. He succeeded Mr. Sydney Smirke in the position of Treasurer to the Royal Academy, and Sir Gilbert Scott in that of Professor of Architecture. In this capacity he has delivered courses of lectures marked by great learning, highly cultivated taste, and vigorous original thought. Singular to relate, his untimely death leaves the winter course of the present session incomplete, his last lecture, delivered on Thursday, January 22, being only the third of his course. Mr. Barry was a Fellow of the Institute of Architects and one of its vice-presidents, and had received the gold medal. He was a Foreign Honorary Member of the Royal Academy of Arts at Vienna, and enjoyed other distinctions.

Mr. Barry's name was rarely absent from the list of exhibitors in the Architectural Room of the Royal Academy, and most of his best works were illustrated on its walls by powerful colored drawings. He contributed a large number of fine works to the Architectural Room of the late Paris Universal Exhibition, where he obtained a

medal. By these exhibitions the characteristics of his manner when working on buildings for private clients must be as well known to many of our readers as the peculiarities of the public buildings with which he has enriched London.

Edward Barry was original, energetic, decided in his handling of the masses and features of his work, fond of ornament and somewhat reckless in his use of it, but full of true artistic feeling, and profoundly learned in his own and in the sister arts. His personal character was one that commanded respect and invited confidence. Thoughtful and deliberate in manner, thorough in method, fertile in resource, painstaking and yet bold, he united many of the best qualities that an architect should possess. He attracted those who knew him intimately by a fund of varied information, an unflinching brightness and kindliness of disposition, and an unequalled brilliancy in conversation. The best of companions, his large range of knowledge and experience, and the force of his powerful intellect and determined will, were graced, but not concealed, by a constant flow of clear illustration and brilliant wit, not unmixed at times with hearty fun—all which it is indeed sad to think will be heard no more by that large circle of friends among whom his society was prized. —*The Architect.*

AN OLD T-SQUARE'S VIEWS ON VENTILATION.

Good ventilation, like washing one's self, is a matter of personal attention. In these days of machinery and automatic contrivances we dream of a system of ventilation that will carry itself on and regulate itself, and, without any attention from us, attend to the whole matter. So slovens would be willing to go clean, if they could be kept so with no effort of their own, and without knowing how the thing was done, or, in short, anything about it. Unfortunately for our lazy and indulgent selves, "eternal vigilance is the price" of good ventilation, — as much the price of freedom from impurity of atmosphere as of any other kind of freedom. We are too slavish to value any kind of freedom much, this among the number.

But did we value freedom from impurity of atmosphere enough to choose to give attention to the matter, and cultivate a cleanly *habitus*, we have at hand a most effective contrivance with which to carry it out, and to secure what, compared with what is common, must be called good ventilation. Open *all* the windows, *as soon* as the congregation, company, or individuals leave the room, and keep them wide open five or ten or fifteen minutes, according to the size of the place and the number of those leaving it. This is nothing constant or automatic, any more than washing one's face is constant or automatic, but it is cleansing — it is cleansing.

Note: To open all the windows of a room as soon as it is emptied of the company, and so further empty it of other organisms, etc., and to keep these windows open thereafter, is to waste the heat of the house? Yes, just as washing one's face is to waste water and towels. Only the cost of furnishing water and clean towels is something calculable, and so appreciable. The added cost in fuel, if the rooms of a house are aired a few minutes every time the company leaves them, is inappreciable.

But even if it were appreciable in amount, and the cost of it calculable, yet the heat which passes off when windows are open to ventilate a house is *used*, not wasted. When the temperature is different indoors and out, the heat indoors is the power which sets in motion the currents which carry off the vitiated air and create the vacuum which is supplied by fresh air. It is heat well spent, though not to warm our bodies. Like the heat spent, not to warm our bodies, but to cook food for our stomachs, it is not wasted, but used, and well used. P.

THE LIGHTING OF PULPITS.

Is the lighting of churches the problem of how properly to light the pulpit is a very serious one, and has been considered over and over again, with only partial success. The requirements are that it shall be arranged to use either in night or daytime, and efficiently light the rector's manuscript, while at the same time it shall not incommode the rector himself, or his congregation, and in general appearance shall be artistic and in harmony with the architecture and purpose of the building itself. The low reflector lights often used in front of the desk, while not seen by the congregation, throw a very uncomfortable glare and heat on the rector's face, and endanger his manuscript. The side light, with black opaque globe, also used for this purpose, while giving a good light to the preacher, has nothing else to recommend it, being exceedingly commonplace, and positively ugly. They are also very much in the way, and inadvertent gesticulation of the speaker often produces serious consequences. The question has been met in an admirable way at St. James's Protestant Episcopal Church, in this city, whose elaborate memorial pulpit, lately erected by Mr. John Struthers, has been recently noticed. The lamp, invented and designed by Mr. Joseph M. Wilson, is hung over the pulpit, leaving the whole area perfectly free and undisturbed, and placing the source of light in the most natural position for comfort to the speaker's eyes and for the illumination of his manuscript. To protect the congregation the light is surrounded by an opaque screen, which is made sufficiently low even for the pews directly under the pulpit. This is accomplished by reducing the lowest opening to a diameter of only six inches, just large enough for

a circle of light on the desk of the pulpit; and in order not to allow this to diminish the quantity of light on this area, but rather to increase it, the screen or covering has been made in shape an ellipsoid, scientifically and mathematically worked to the proper form, so that the light itself being placed in the upper focus, the rays are concentrated by reflection on to the lower focus, and through it to the desk below, throwing a brilliant light just where required. The interior of the upper half of the ellipsoid is highly polished, while the lower half is blackened to absorb all rays which would be disagreeable to the congregation. The whole is made of polished and chased brass, very beautifully worked up, and entirely appropriate to its position. — *Philadelphia Ledger*.

THE DURABILITY OF GUTTA-PERCHA.

In his lectures before the Society of Arts on the recent advances in telegraphy, Mr. W. H. Preece, the electrician to the British Post-Office Department, pointed out some of the curious accidents to which gutta-percha-covered wires were liable: "Gutta-percha-covered wires," he said, "would be very well if they would last. But, unfortunately, gutta-percha is a gum that only appears to last when in water. In water it apparently is indestructible. Cables that were laid in 1851, and have been brought up within a recent date, are now as good as the day when first put down. But when gutta-percha becomes exposed to the air, to the alternations of climate, especially when exposed to the action of the sun, it decays very rapidly; it oxidizes, and becomes a kind of resin that can easily be crumbled into a snuff-like substance. Many attempts have been made to protect it and to arrest this rapid decay. It has been surrounded by tape soaked with tar. Tar itself has been found to be injurious, and has been supplanted by other materials, but at the present moment we have not yet succeeded in finding anything that renders gutta-percha indestructible. In fact, when exposed to air, as when suspended in tunnels, it seems to have a life of about ten years; when laid down in our iron pipes, under the influence of the variations of temperature and moisture that exist there, it seems to last about twenty years; but in the sea, where it is exposed to equable temperature and equal condition, it apparently seems capable of lasting forever. There are many curious accidents and causes of interruption to working that we meet with in our gutta-percha-covered wires, and one of the strangest is one of the last that we have discovered. We have found in many places that this gutta-percha is apparently gradually eaten away. It seems to go not unlike the way in which open-air wires rust away; and this curious action only occurs in certain places. In certain parts of the country, North Wales, Dublin, Kent, and in one part and another, we have found this curious action going on; and careful examination and inspection under the microscope have led us unmistakably to conclude that it is due to something or other eating away the gutta-percha. Curiously enough, wherever we have detected this action taking place, there also we have found swarms of a very minute insect, a very little thing, belonging to what is called the spring-tail tribe. It is a little white fellow that you can scarcely see, and when you do see him he seems conscious of the fact, for he immediately disappears with a spring. It is the *Templetonia crystallina*. It abounds in swarms in certain soils, and seems to have a great liking for gutta-percha. It does not remain near the wire when it has eaten its way through, but, apparently, immediately retires when it touches the wire, as though it had received a shock, and makes a sudden retreat. It is a curious fact, and until recently it was unknown that any living creature had a taste for gutta-percha."

THE TIDES AS A MOTIVE POWER.

A SUGGESTIVE paper was recently read before the Liverpool Engineering Society on "The Utilization of the Tides," by Mr. Oates, of Bradford. Mr. Oates was of opinion that although the coal supply of England would last for a long time to come, yet that ultimately the power of the tides would outrival all other sources of mechanical power. The ways of taking advantage of the power of the tides he divided into two comprehensive classes—one requiring large permanent construction, such as the various modifications of the tidal dam; this he considered the most efficient and economical for using the vertical motion of the tide, which motion is the most important for mechanical purposes. The other class was the numerous, but comparatively unimportant, utilizers, which do not require such works, such as the tidal cask, but which would only be employed when the power is required intermittently. The former could only be undertaken by large public bodies, but the latter might be employed by small capitalists. He then suggested how the horizontal motion of the tides might be taken advantage of by water-wheels, etc. After pointing out that the ways of utilizing the tides were innumerable, and describing the construction of the tidal dam with suitable converters of the power, such as turbines, in openings of the dam, working air-compressing or magneto-electric machines, he stated that the necessity for large conservators for storing the power between the tides would be the greatest difficulty in utilizing their power. A brief description of how this could be done, and the power rendered constant, was given. The means of conveying the power to a distance was then considered, air and water pressure and electricity being suggested. With regard to the latter, Mr. Oates believed that the "age of steam" had reached its zenith, and that

the "age of electricity" had dawned; but should there be difficulty in conveying the power to a distance, he suggested that manufacturing towns might be built adjacent to suitable sites for utilizing the tides.

THE LIVERPOOL CORPORATION TEST FOR CEMENT.

Boston, February 18, 1880.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir, — In answer to your correspondent's postal card which you send me I would refer you to the following: The Science and Art of the Manufacture of Portland Cement, by Henry Reid, C. E. (London: Spon, 1877), page 316. — Liverpool Corporation Test, the specification of which is as follows: "Samples of pure cement will be gauged with water, and placed in the brass mould used by the corporation, within twenty-four hours: the casts thus made will be immersed in still water in which they will remain until the expiration of the seven days from date of moulding, when they will be taken out of water and tested to ascertain their tensile strength, which must not be less than eight hundred pounds on the sectional area of 2½ square inches." Mr. Deacon, engineer of the corporation, says, "The actual strength of the cement obtained during the last year [about 1876, probably], under this specification, has averaged 871 pounds."

If I am wrong in my conclusion that 355 pounds per square inch is the Liverpool Corporation test, or my authority is not a proper one, I should be glad to be notified of the fact.

Respectfully,

ERNEST W. BOWDITCH.

PUBLICATIONS RECEIVED.

CIRCULARS OF INFORMATION OF THE BUREAU OF EDUCATION. Nos. 1, 2, 3, 4, and 5. Government Printing Office. 1879.

NOTES AND CLIPPINGS.

THE NEW YORK UNDERWRITERS, AND THE OLD RESERVOIR. — The New York Board of Fire Underwriters has sent to the State Legislature resolutions protesting against the removal of the Murray Hill reservoir. It is asserted by the Board to be unsafe to dispense with any provisions for the safety of that city from sweeping conflagrations, in view of the fact that the annual consumption of water is nearly equal to the capacity of the aqueducts, and that the supply is liable at any time to be lessened by the manner in which most of the original aqueduct was constructed. The Board therefore opposes the removal of the reservoir and also the appointment of the proposed commission.

MOIST AIR NOT HEALTHFUL IN DWELLINGS. — The theory is now ingeniously maintained by Professor Briggs that the summer condition of temperature, 62° to 68°, and relative humidity, 80 to 85 per cent, is not desirable or even attainable, at other seasons, in the heating of dwellings. His argument is, that the dry air of America possesses both curative and preventive qualities, of great value, and that moist air, which promotes vegetable growth, is, on sanitary grounds, not desirable for breathing. He states that the dew point is far below the freezing point of water in well warmed and ventilated rooms, where there is nothing of that sensation of dryness which is usually held to accompany the heat of a furnace, when not supplied with water for evaporation. Again, new houses, that are accounted unhealthy in Europe, are not so in America, and gas burned in rooms produces much less unpleasant effects in America than in England; what is needed is an equality in relative humidity between the interior and exterior air; thus if the outer temperature be 0°, and relative humidity 40 per cent, and the interior temperature be 70°, the interior humidity ought to be raised to 70 per cent, by adding a little water.

NON-INFLAMMABLE WOOD. — At a meeting of the British Association recently held at Sheffield, Col. P. P. De la Sala exhibited non-inflammable wood for building purposes, also wood shavings, non-inflammable, for the manufacture of mats, rope, etc. The inventor thus explains his peculiar method, which is already patented: —

"Though all alkaline compounds reveal the property of rendering vegetable matter more or less pliable and non-inflammable, I preferably make use of carbonates of fixed alkalis in the following way: I dissolve in cold or warm clear water carbonates of potash or soda, or I make use of them in a solution of filtered water heated to the boiling point, and add hydrate of lime to this solution, graduating the strength so as not to exceed a specific gravity of 1.060 if potash is used, or 1.050 when soda is used. In the first case, the strength of the solution corresponds to about 30 grains of hydrate of potash to the fluid ounce, or about 20 grains of hydrate of soda to the fluid ounce. Wood to be used in naval construction, and in buildings or structures of wood on land, as well as vessels and land buildings already constructed, can be rendered fire-proof by saturating the floors and decks, and all exposed wood-work, with alkaline lyes, and when dry, the wood may be whitewashed, painted, or varnished in the usual way. For boards, planks, or thicker pieces of timber, I graduate the time of immersion so as to form a coating of from one sixteenth to one eighth of an inch, which can be obtained in from four to twelve hours, according to the more or less porous nature of the wood, or the compactness of its fibre. I consider a coating of about one eighth inch deep to be a sufficient fire protection for all kinds of timber for building purposes, as the spread of fire and great conflagrations generally originate in relatively small causes, such as burning cinders, dropped sparks from fireplaces, matches accidentally ignited, inflamed liquids, candles left burning, etc.; but the fire-proof coating can be made deeper, or even to go through the whole timber, in the event of its being considered desirable to combine great flexibility with absolute non-inflammability. In this case I make use of hydraulic or other pressure, so as to force the alkaline lyes through the wood to the extent desired."

THE FIRE LAWS OF JAPAN.—The severity with which persons in Japan are punished who have the misfortune to be burned out is stated as follows: If the house is unoccupied and is accidentally set on fire, the person through whose carelessness the fire is started receives ten days' imprisonment with hard labor; if it is inhabited and the fire be produced by the proprietor, then he is punished with twenty days; if the fire spreads to other houses the sentence is forty days, and when anybody is killed thereby, one degree heavier; but if the person killed is a relative of the first degree, the punishment is one hundred days; if the house belongs to the government, one hundred days; if a temple, from sixty days to one year, but ten years are inflicted if it happens to be one of the great temples of Isle, or in the precincts of the Imperial Palace. If a robber sets fire unintentionally to a house, he is punished with at least three years' imprisonment with hard labor. Decapitation awaits incendiaries, ten years' penal servitude an attempt at arson; the punishment being mitigated if the would-be incendiary is a servant who has just received a sharp rebuke, or if the attempt be made on an uninhabited dwelling. If a man sets fire to his own house, ninety days, but if the fire spreads to houses in the neighborhood, two years and a half; and penal servitude for life is inflicted if the offender profits by the opportunity of the fire to purloin goods or property.

COST OF ILL-HEALTH.—The following is summarized from a paper lately read by Dr. John Watts (a member of the Society of Arts) before the Manchester and Salford Sanitary Association:—

With respect to the extent to which personal and social suffering was accompanied by pecuniary loss, it looked a small matter that a man should miss a few days' work occasionally because he was not quite well; but when we learned that in the Manchester Unity of Odd Fellows alone there was paid in 1878 for sickness the sum of £347,213, or 13s. 4d. per member, and that that large society only represented about 10 per cent of the heads of families in England and Wales, it was no longer to be called an insignificant affair. The heads of families in England and Wales numbered about 5,111,111, of whom 4,259,259 were working-class families, whose weekly wages would amount to about £5,322,675, or £887,112 per working day. The experience of friendly societies showed an average of sickness varying from 1.94 to 2.45 weeks per annum per member between 21 and 70 years of age. But we had to include, in our calculation, the less prudent men who were not members of friendly societies, and we might safely assume an average sickness of 2½ working weeks per annum, and then we should find that by loss of work through sickness the working men lost no less than £13,306,687 per annum. If we added to that sum 25 per cent for the losses of employers and dealers, we should find a loss to society, the measure of which was £16,632,359, or £1,108,824 for each day of sickness. Here, then, was our additional motive for work as sanitary reformers; for every day that we could lessen the average sickness of the heads of families of England and Wales we should add to the wealth of the country by more than a million sterling. The heads of families in Manchester and Salford numbered about 111,111, the working-class families being 92,593, whose weekly wages amounted to about £115,741. The average sickness of two and a half weeks would in this case, therefore, cost £289,352, or £19,292 per day. For every day that such sickness could be prevented by public sanitary measures the authorities of Manchester and Salford would add to the wages of working men £19,292. With 25 per cent added for profits of employers and dealers, the gain to society would be £24,115 for every day so saved. And if the sickness of the workers were lessened by public improvements in and about their homes, and by the isolation of cases of infectious diseases, the health of the non-workers would also be improved, and money would be saved if not earned. He urged the importance of those who were principally to gain by the results of sanitary reform being got to take an interest in its progress, and spoke of the advantages of provident dispensaries.

SUSPENSION BRIDGE OVER THE FORTH.—The railway suspension bridge over the Forth at Queensferry will be, when completed, the most remarkable application of the suspension principle in the world. The breadth of the Forth at Queensferry is rather more than a mile; but as the viaduct is to be continued overland on the north shore for several hundred yards, the whole length of the bridge will be about one mile and one third. The capital of the Forth Bridge Railway Company is £1,250,000. The interest on the sum, £75,000 a year, has been guaranteed by four railway companies, the largest share being held by the North British, which will be saved by the new route an annual outlay of £40,000 on account of the ferry traffic between Granton and Burntisland. A formal commencement of the work of construction was made in September last, when the foundation was laid of one of the great towers on the Island of Inchgarvie. When the masonry of that tower had been carried up to high-water mark, the work was suspended in anticipation of the contract for the whole undertaking being accepted and entered on. The explanation was that the bridge could not be finished within less time than six or seven years; but it is stated that it is an express stipulation with the contractors that the completed fabric is to be handed over to the company not later than January 1, 1885. — *London Times*.

TULARE LAKE.—Fourteen human skulls, ranged round in a circle, were found on an island in Tulare Lake, California, some time ago. These mysterious reminders of some lost romance were in the middle of the island, a small patch of grass, thick brush, and pigmy cottonwood trees. No other bones could be found near them. Near by, on the shore of the island, were two huts of basket-work, but both were untenanted. Tulare Lake is, probably, one of the most mysterious spots on the continent. It is 300 miles south of San Francisco, in a great plain. As the traveller approaches, the water appears to be higher than the land. The dry land of the plain gives place to damp soil a mile or so before water is reached. When the margin is found at last one may wade out for more than a mile and not get in above the knee. The lake runs forty miles one way, and has a breadth of about thirty miles. The bottom is formed of powdered clam-shells, and there are hundreds of small islands and bunches of tules. Millions of white birds of the gull kind tenant the islands, flock high in the air, or skim the still water. Mounds have been found along the shore, and before many months the whole bottom, it is said, will be inspected, in the belief that it will show traces of a submerged city.

MR. RUSKIN ON PUBLIC ART GALLERIES.—Mr. John Ruskin, having been invited by a gallery promotion committee in Leicester to give his opinion as to how a permanent art gallery can best be formed, writes: "What use is there in my telling you what to do? The mob won't let you do it. It is fatally true that no one nowadays can appreciate pictures by the old masters, and that every one can understand Frith's Derby Day. That is to say, everybody is interested in jockeys, harlots, mountebanks, and men about town; but nobody in saints, heroes, kings, or wise men, either from the East or West. What can you do? If your committee is strong enough to carry such a resolution as the appointment of any singly responsible person, any well-informed gentleman of taste in your neighborhood, to buy for the Leicester public just what he would buy for himself, that is to say, himself and his family, children being the really most important part of the untaught public, and to answer simply to all accusation, 'That is a good and worthy piece of art (past or present, no matter which), make the most and best you can of it, — do so.'"

BOXWOOD IN RUSSIA.—Boxwood grown in the forests on the shores of the Caspian Sea is, says the *Gardener's Chronicle*, a large article of trade with Russia. This wood reaches Astrachan and Nijni-Novgorod in the spring of the year, where it is sold during the fair. Last year the quantity so sold was about 130,000 poods, being about 80,000 poods in excess of other years. It is pointed out in a recent report that the increased demand for this boxwood, which is used for shuttle-blocks, indicates increased prosperity among Russian manufacturers. On the subject of boxwood, the acting British Consul at Tiflis writes: "Bonâ fide Caucasian boxwood may be said to be commercially non-existent, almost every marketable tree having been exported. Such exorbitant terms are demanded by the government for the right of cutting in one or two remaining Abkhasian boxwood forests as virtually to bar their acquisition." He goes on to say that having personally visited these forests he is in a position to assert that their real value has been considerably exaggerated, most of the trees being either hollow or knotted from age, and much of the best wood having been felled by the Abkhasians previous to Russian occupation. The boxwood at present exported from Rostov, and supposed to be Caucasian, comes from the Persian provinces of Mazanderan and Ghilan on the Caspian. What has been said respecting boxwood applies equally to walnut burrs, or "loupes," for which the Caucasus was once famous, 90 per cent of which now come from Persia. The walnut trees of the forest along the Black Sea, which are extraordinarily numerous, and afford excellent material for gunstocks, do not, from some climatic peculiarity, produce burrs, which are only found in the dryer climates of Georgia, Daghestan, Persia, etc. The immense quantity of walnut timber in the forests on the Black Sea is mostly unavailable from the complete absence of roads or means of transport, and the dearth and scarcity of labor.

ONE EFFECT OF ESTABLISHING FIRE-LIMITS IN SMALL TOWNS.—The town of Cohoes, N. Y., is unfortunate in the execution of its new fire-limits law. A manufacturing firm took umbrage at interference with their plans for building a long wooden extension, and are transferring their rolling mills to Albany. The firm already employed 500 men, and disbursed \$15,000 monthly among them.

TOUGHENED GLASS.—When, almost ten years since, De la Bastie made known to the world his process of annealing glass in oil, the value of his discovery was somewhat overrated. Since then his process has gained a firm foothold in certain branches of glass manufacture, and it is therefore that recent experiments on toughened glass, made by Dr. Schott and published in the *Verhandlungen z. Beförd. d. Gewerbl.*, are worthy of attention. The object of the German investigator's trials was to ascertain the best temperature of the glass and oil, and the best composition for the glass. The results may be summarized as follows: 1. The hotter the glass is when thrown into the bath, the better it is suited for toughening. 2. The warmer the bath, the better the results. 3. Soft, half-crystal glass, composed of soda, lead, and lime, gives but little better results than pure soda-lime glass. 4. The cooler the glass when plunged, the hotter must be the temperature of the bath. 5. More hollow spaces are formed in the interior of the glass, if its temperature be high and that of the bath low, than if the temperature of the bath be high also. 6. Bohemian glass is not well suited for toughening. Dr. Schott has also investigated the mechanical properties of ordinary and annealed glass treated in a different manner, his tests embracing the effect of tensional strains. The records of his tests show that annealed glass possesses a tensional strength of 3.48 tons per square inch, which is from two to three and a half times greater than the figure usually given, and that by simply cooling glass in the air its strength may be doubled. As a further result, it may also be stated that the hotter the glass and the colder the bath, the stronger will be the finished ware. The former experiments, however, proved that when the temperature of the glass is lower (and this is necessary in practice in order that the shape of the article may be preserved during toughening) the temperature of the bath must be taken higher; and thus the conditions of manufacture do not, as a rule, permit of the glass being endowed with maximum strength. As a result of this, glass of such a composition should be chosen as will give favorable results with a low temperature of the glass and a moderate temperature of the bath. For this purpose a glass rich in silica and poor in lime appears to be best suited. The average tensional strength of the bars hardened in oil was 17.1 tons per square inch, or about double the strength of cast-iron, and five times the strength of annealed glass; in some instances a strength of 34.2 tons per square inch (equal to that of iron wire) was attained. The process of toughening in oil, as adopted by De la Bastie, is not suited to the production of plate glass, for it invariably warps the plates, injures their quality, and the consumption of oil and cost of cleaning are very considerable. To obviate these disadvantages Herr F. Siemens, of Dresden, introduced the method of toughening plate glass by laying the red-hot plate between two cast-iron blocks, with carefully got up surfaces. The upper block is counterbalanced, so as not to press too heavily on the glass plate. A contact of a few minutes suffices to effect the object in view. The proper temperature of the cast-iron blocks depends, to some extent, on the temperature and composition of the glass. As in the case of oil, the strength of the finished glass increases with the difference of temperature between the glass and the cast-iron.

BUILDING INTELLIGENCE.

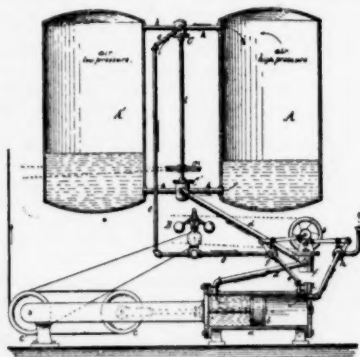
[Reported for the American Architect and Building News.]

[Although a large portion of the building intelligence is provided by their regular correspondents, the editor greatly desires to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

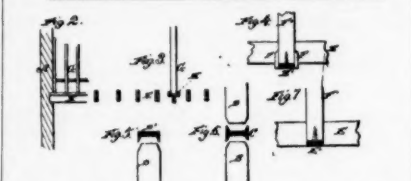
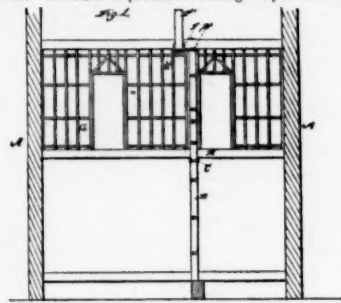
223,464. HYDRAULIC ELEVATOR.—Walter M. Bailey, New York, N. Y. This invention aims to dispense with some of the parts heretofore employed in hydraulic elevators, and to render the action of the apparatus more direct, and to secure greater compactness. *a* indicates the hydraulic lifting cylinder; *b*, the piston; *c*, the movable sheaves to which the piston connects, and *e*, the fixed sheaves over which the cables are wound and extended to the car. *A* indicates the reservoirs, which contain both the supply of compressed air and the charge of water by whose pressure the pneumatic pressure is transmitted to the lifting-piston. The compressed air is thus accumulated directly above the water column, and its pressure is transmitted directly through the water to the piston. Each end of *a* is closed, the front end being connected, by the water-pipe *d*, with the bottoms of the reservoirs, while the rear end is connected by the air-pipe *e*, with the tops of the reservoirs; hence the water may be admitted directly into the front of the cylinder against *a*, under the full pressure in the reservoir, while the compressed air may also be admitted from the reservoir under its full pressure upon the back of *a* to balance the pressure in front. *d* is provided with a valve, *f*, and *e* with a similar valve, *g*, while a third valve, *h*, allows, when opened, a free exhaust



from the rear of the cylinder. These valves are connected, so that they are all operated by the cord extending from the sheave *i*, on the crank-shaft of *f*, and are so arranged that a movement of the sheave in one direction opens *f* and *g*, while the reverse movement shuts both valves; but a continuation of the reverse movement opens *f*, also the exhaust-valve *h*, while *g* remains closed. The apparatus is here shown with *f* and *g* open and the piston performing the descending movement, and it will be observed that the compressed air enters the cylinder behind *a*, under the full pressure from the reservoir, thus balancing the hydro-pneumatic pressure on the front of *a*, so that the descent of the car effects the return movement of the piston, and causes the water in front of the piston to return back to the reservoir, as indicated by the full arrows. To stop the piston and car at any desired point is effected by reversing the sheave *i*, so as to bring the crank to its lower dead-point, thus closing both *f* and *g*. The ascending movement is effected by continuing the reverse movement of the sheave *i*, which will close *f*, but open the exhaust-valve and water-valve, so that the air-pressure behind the piston being thus removed while the water is admitted in front, the full hydro-pneumatic pressure from the reservoir is exerted on the front of *a* to raise the car with a steady movement, which may be checked at any point by reversing the sheave and closing the exhaust and water valves. An ordinary governor, *B*, controlling the flow of air through the air-pipe *e*, and driven from the last of the series of the fixed sheaves *c*, is used to govern the speed of the apparatus. Another feature of the invention is the two reservoirs *A*, one charged to a low pressure and the other to a high pressure, — say, respectively thirty-five and sixty pounds to the square inch, — connected by two-way cocks, *C* and *C'*, with the air and water pipes leading to the cylinder, so that either the low or high pressure may be turned into the cylinder, according as the load on the car is light or heavy. *k* and *k'* are the pipes connecting the two-way cocks with the air and water pipes of the two reservoirs. *C* and *C'* are connected by the shaft *l*, fitted with the sheave *m*, from which an independent cord is carried to the car, so that the valves may be opened in either direction, thus bringing either the high or low pressure into action, according to the requirements of the load.

223,734. WOODEN PARTITION.—Francis G. Himpler, Hoboken, N. J. The object of this invention is to avoid shrinkage. *A* are the walls of a building, and *B* the studs of the basement-partition, which stand on the cellar wall and run up into an iron channel-beam, *C*. The studs *D* of the partition in the next story pass between the joists *E* and set into the channel-beam *C*, which is double-channelled. When the partition does not continue into a higher story single-iron channel-beams are used as heads, as indicated at *D'*. Where a free-spanned wooden partition crosses the joists of the floor, and a deep girder below the joists would be objectionable in the ceiling below, an iron sill, *E'*, which is fastened by screw-bolts into each joist, is used. Wooden strips *F*, secured to the sides of the studs *D*, so as to embrace the sill *E'*, will keep the studs on the sill. Where a free-spanned partition, *G*, runs parallel with the joists the girder-sill *H* is used, the ends of which have their bearings in the walls

A, or on the head of a partition running at right angles underneath. In order to prevent the flanges upon the chan-



nel-beam *C* from pressing into the joists, an iron plate is secured upon the under side of each joist, which fits into the channel.

224,549. LIFTING AND FORCE PUMP.—Emory Barnes, Mount Pleasant, Mich.

224,550. BORING TOOL FOR STONE-WORKING, ETC.—Wm. Hasenbal, Cincinnati, O.

224,534. METAL-PLANING MACHINE.—Samuel E. Hildreth, Worcester, Mass.

224,539. EXTINGUISHER.—William H. Hovey, Springfield, Mass.

224,544. AUTOMATIC DAMPER REGULATOR.—Florentine A. Jones, New York, N. Y.

224,546. BOLT MECHANISM FOR LOCKING RANGES OF CELLS.—Gustaf F. Klundt, Montreal, Canada.

224,553. DISINFECTING APPARATUS FOR WATER-CLOSETS, ETC.—Edward J. Mallett, Jr., New York, N. Y.

224,556. WOOD-CUTTING MACHINE.—Joseph H. Phippe, Fenton, Mich.

224,574. ELEVATOR.—Seth H. Bevin and William H. Phillips, New York, N. Y.

224,584. DOOR-SPRING.—Montgomery R. Davis, Jackson, Mich.

224,596. SPRING SHADE-ROLLER.—Daniel E. Kempster, Boston, Mass.

224,606. COMPOSITION FOR ROOFS.—Dorwin D. Pennoyer, Boston, Mass.

224,608. GLAZED STRUCTURE.—William E. Rendle, Westminster, England.

224,616. MACHINE FOR CUTTING OFF BRICKS AND TILES.—John B. Smith, Jackson, Mich.

224,618. COMBINED SHUTTER-BOWER AND FASTENER.—Peter V. Stewart and Edward A. Price, South Orange, N. J.

224,619. SHUTTER-FASTENER.—Cornelius Tenney and George W. Walton, Brooklyn, N. Y.

224,625. STEAM STOVE.—John Ashcroft, Brooklyn, N. Y.

224,626. FIRE-DOOR FOR FURNACES.—George H. Babcock, Plainfield, N. J.

224,638. FLUSH-BOLT.—Purmort Bradford, New Haven, Conn.

224,646. COMPOSITE PILE.—Henry Case, Brooklyn, N. Y.

224,660. ARTIFICIAL STONE.—J. Phelps Davis, Middletown, Conn.

224,675. WINDOW-SASH.—Alphonse Friedrick, Brooklyn, N. Y.

224,678. FIRE-EXTINGUISHER.—Almon M. Granger, New Orleans, La.

224,723. ELEVATOR.—George H. Pleasance, Cleveland, Ohio.

224,730. DOOR-SPRING.—Thomas Rome, Brooklyn, N. Y.

224,732. ARTIFICIAL WINDOW CORNICE.—Samuel R. Scottron, New York, N. Y.

224,752. TENONING-MACHINE.—Jos. J. White and Wm. S. Kelley, Smithville, N. J.

224,760. MACHINE FOR SAWING STONE.—Hugh Young, New York, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS.—The following building permits have been issued since our last report:—

Wilhelm Hundertmark, two-story brick dwell., 207 Franklin, between Fremont and Pine Sts.

Wm. H. Hoopes, addition and improvement to store at 84 Eutaw St., between Saratoga and Mulberry Sts.

Wm. Bowers, two-story building, rear of 235 Conway St.

John Sigerlin, two-story brick building, 162 Register St.

Boston Fear, 2 two-story dwells., on Woodyear St.

Anna Puming, 4 three-story brick buildings, on Biddle St., near Greenmount Ave.

Physical Culture Association, two-story stone and brick building, on Howard St., between Rose and Franklin Sts.

Church.—The vestry of St. George's P. E. Church has resolved to build a church to the memory of the late Bishop Whittingham, to be called the "Bishop Whittingham Memorial Church," and that a committee of three, of which the rector shall be the chairman, be appointed to take steps towards securing a lot and raising funds for building the proposed church.

RAILROAD CROSSING.—Workmen have commenced operations on the B. & O. R. R. Building. The foundations that were put in some time ago are being uncovered, and the adjoining site, now occupied by the Adams Express Company, has been bought by the B. & O. R. R. Company,

and will be vacated by the 25th inst., when it will be immediately torn down to make room for the new building. **STORES.**—Mr. B. F. Bennett is building two new stores and dwelling-houses on Lexington Street, between Park and Howard Streets, to be of brick, with stone trimmings. Dixon & Carson are the architects.

Boston.

BUILDING PERMITS.—Since our last report the building permits granted are as follows:—

Brick.—374 Marlborough St., for A. E. Harding, 1 dwell., 24' x 44'; S. W. Merrill, builder.

Wood.—Hilburn St., Ward 23, 1 carpenter shop, 20' x 30'; A. Rogers, owner and builder.

Columbia St., Ward 24, Opera-house for M. Merrill 60' x 120'; Wood & Murray, builders.

Repairs and alterations active.

HOUSES.—On Commonwealth Ave., between Fairfield and Exeter Sts., is now building a house for Mr. H. W. Wadleigh, from drawings of Mr. W. W. Lewis, architect; Standish & Woodbury, builders; cost, \$25,000.

Brooklyn.

ALTERATIONS.—Cambridge Place, No. 80, three-story brick extension 16' 8" and 13' x 22', tin roof; cost, \$1,400; owner, J. H. McAuley, 80 Cambridge Place; builder, A. Wilson.

Bedford Ave., cor. Ross St., one-story brick extension, 50' x 51'; cost, \$15,000; owner, James L. Knapp, on premises; architect, A. Crooks; builders, J. H. Burke and J. Thompson.

Raymond St., No. 295, raised two feet; cost, \$1,000; owner, H. Wischmann, 305 Navy St.; architect, Mr. Morrill; builders, E. Boyd and J. Van Saun.

Buffalo.

HOTEL.—Brick hotel; Dr. Cary; R. A. Waite, architect.

HOUSES.—Frame house; F. C. Porter; cost, \$3,000; F. W. Caulkins, architect.

Brick house; Captain Davidson; cost, \$15,000; R. A. Waite, architect.

OFFICE BUILDING.—Seven-story office building; Dr. White; cost, \$85,000; F. W. Caulkins, architect.

STORES.—Four-story brick store, corner Virginia and Main Streets; Geo. Metzger, architect; cost, \$7,000.

Overhauling large store on Pearl Street, near Terrace; F. W. Caulkins, architect; cost, \$5,000.

Four-story building, corner Well and Seneca Streets; Holmes & Little, architects; cost, \$12,000.

Four-story stone building, Main, South of Virginia Street; M. E. Beebe, architect; cost, \$10,000.

Chicago.

BUILDING PERMITS.—South Franklin, No. 38, two-story store and dwell., for M. Unger; cost, \$4,000.

Arnold and Seventy-fourth Sts., three-story factory, for E. Prussing; cost, \$12,000.

North Clark, No. 355, four-story dwell., for L. Brentano; cost, \$6,000.

La Salle St., No. 617, four-story dwell., for Charles Bacharach; cost, \$14,000.

Van Buren and California, two-story store and dwell., for A. Harper; cost, \$2,500.

Bishop Court, near Washington St., 3 two-story dwells., for M. Schell; cost, \$9,000.

Lumber and River, six-story elevator, for Charles W. and George H. Wheeler, George Armour and A. Munger; cost, \$280,000.

Throop, near Zion Place, store for J. Roukui; cost, \$2,700.

Ninth, near Throop, two-story dwell., for James Opata; cost, \$2,600.

Third Ave., Nos. 121 and 123, barn, for P. A. Newton Bros.; cost, \$2,400.

Canal and Clinton, three-story machine shop, for Warren Springer; cost, \$30,000.

Ohio, No. 440, two-story dwell., for M. O'Leary; cost, \$2,000.

Fulton and Diller, 2 two-story dwells., for Leonora Diller; cost, \$4,000.

Wood, near Ambrose St., two-story dwell., for Anton Hammacher; cost, \$12,000.

Wilson, No. 32, two-story building for F. Kolat; cost, \$2,000.

Congress, near Fifth Ave., three-story factory, for John A. Lomax; cost, \$20,000.

Webster and Halsted, three-story dwell., for Charles Knechtler; cost, \$6,000.

West Adams, No. 540, two-story dwell., for A. G. Fisher; cost, \$7,500.

Wood, near Blue Island Ave., planing-mill, for O. D. Weatherell; cost, \$3,000.

West Adams, No. 712, two-story dwell., for Josiah Gray; cost, \$2,700.

State, near Thirty-first, three-story dwell., for G. B. Cook; cost, \$16,000.

Park and Western Aves., 7 two-story dwells., for Asbury Lowrey; cost, \$17,500.

State St., Nos. 419 and 421, three-story store and dwell., for T. H. Biddle; cost, \$14,000.

West Ohio, Nos. 49 and 51, 2 three-story stores and dwells., for Andrew Maden; cost, \$10,000.

Ashland Ave., near Congress St., 4 three-story dwells., with Bedford-stone fronts, for James M. Pyatt; cost, \$55,000.

Dearborn, near Thirty-eighth, 2 two-story dwells., for John Brown; cost, \$5,100.

FLATS.—Mr. Wm. Strippelman is architect of a two-story and basement flat, 22 by 60 feet, on West Twelfth Street, east of Loomis Street, of pressed brick and sandstone; cost, \$5,000; owner, M. Heghorst, Esq.

FOUNDRY.—Mr. Strippelman is also architect of the new foundry and machine shops now building on Canal Street, north of Van Buren Street, for Mr. Warren Springer. It will measure 80 by 320 feet, and be three stories and basement high, of common brick with stone sills, etc.; cost, \$50,000.

HOUSE.—Mr. H. P. Smith is building a house on the corner of Forty-seventh and Greenwood Avenue, 29 by 47 feet, two stories and basement in height, of wood. Hall and dining-room will be finished in red oak; cost, \$6,000. Wm. Strippelman, architect.

STORES.—Mr. Geo. Armour, of the firm of Armour, Dole & Co., grain dealers, is putting up a large block of stores on the corner of Adams and Franklin Streets. Messrs. Furst & Rudolph are the architects. The block will be built of stone throughout, cornice of stone, except upper member, to be of galvanized iron. The contracts are partly let; cost, about \$150,000.

WAREHOUSE.—Douglas & Stewart, owners of the Imperial

Warehouse, corner of Sixteenth and Dearborn Streets, which burst a short time since, have taken out a permit for repairs that will cost \$30,000.

Cincinnati.

SHEEP PENS.—Mr. James W. McLaughlin, architect, has just completed plans for buildings to be occupied as sheep pens. The ground is irregular in shape and covers about 50,000 square feet. The building above the ground is frame. One peculiar feature of the design is that there are no windows—pivot slats being used to afford ventilation. The contract, which was let to J. W. Cottrell & Son, was \$27,000.

DORMITORY.—Mr. McLaughlin has commenced plans for the North Dormitory of the Lane Seminary. The building will accommodate 40 students; each student to have a study and bedroom. The outside walls will be of limestone. Cost, about \$20,000.

HOUSE.—Mr. McLaughlin is also making plans for a frame dwelling for Mrs. Busche, to be built at Avondale. Cost, about \$8,000.

Denver.

COMPETITIONS.—All the architects in the city are busy on competitive designs for the new county court-house, and for the new high school-house.

HOUSES.—Mr. W. W. Goodrich, architect, has in hand three houses for G. J. Waburn, Esq., costing respectively \$20,000, \$10,000, and \$5,000.—A house for A. Goodrich; cost, \$5,000.—A house for W. E. G. Hayward; cost, \$3,000.—A house for J. A. Chain; cost, \$3,500.—A house for Dr. W. Smedley; cost, \$6,000.

New York.

ALTERATIONS.—Third Ave., five-and-one-half-story brick brewery, to be raised a full story, etc.; cost, \$15,000; owner, John Eichler, cor. One Hundred and Sixty-ninth St. and Third Ave.; architect, Anthony Pfund.

Read St., Nos. 181, 183, and 185, four-story brick office building, interior alterations; cost, \$1,200; owners, E. R. R. Co., Erie Building.

Ninth St., Nos. 39 and 41, W., 2 four-story brick dwellings, each to have a fifth story added; cost, each, \$6,000; owner, Henry B. Renwick, 29 Park Ave.; architect, Jas. Renwick.

Marion St., No. 54, four-story brick factory building, four-story brick extension on rear; cost, \$8,000; owners, Bradley & Co., Eighteenth St. and Madison Ave.; architect, A. B. Ogden; builder, John Moloy.

Forty-second St., No. 210, W., four-story apartment-house, four-story brick extension on westerly side, 18' x 62'; cost, \$3,000; owners, N. E. Cornwall and others, on premises; builder, Edward Lennon.

Eighth Ave., Nos. 287 and 289, three-story brick extension on rear, 50' x 63' 6"; cost, \$10,000; owners, Ehrlich Bros., 287 Eighth Ave.; architect, J. H. Hardenbergh.

Third Ave., 4 brick tenements and store, to be connected on first floor, one-story brick extension, 25' x 20', on rear; cost, \$2,000; owner, Henry Stenbrig; architect, Fr. S. Barus.

Fifty-fifth St. No. 528, W., two-story frame dwelling, to be raised to three stories; cost, \$1,300; owner and builder, G. Sohr, on premises; architect, G. Holzeit.

The building No. 19 W. Tenth Street is to be altered and remodelled, at a cost of about \$7,000. Mr. Jas. B. Snook is the architect. The dwelling No. 37 Market Street is to be altered and extended, at a cost of about \$6,000. Mr. Jas. B. Snook, architect.

HOUSES.—Mr. W. Wheeler Smith is the architect for the two houses, Nos. 6 and 8 East Fifty-sixth Street, now building for Mr. Henry E. Hawley. They cover 28 by 100 feet, and 122 by 60 feet respectively. Will be of brick and brown-stone, in Renaissance style. They will be finished in mahogany, oak, and other hard woods. The cost will be about \$80,000. The mansion is Marc Edlitz at the carpenter is John Donohue.

OFFICE BUILDING.—The building on the southeast corner of Broadway and Wall Street is to be torn down, and is to be replaced by an office building.

STORE.—It is reported that Arnold, Constable & Co., in addition to the large store they are to have built on Union Square, also think of building one on Madison Square.

Philadelphia.

ASTLEUM.—Forty-eighth St., cor. Woodland Ave., Home for Incurables, 1 two-story and mansard brick and stone building, 44' x 72'. Won in open competition by Mr. Willis G. Hale; cost, about \$18,000; contract not yet awarded.

CHURCHES.—Trenton, cor. Cumberland Ave., St. Michael's German Lutheran Church, 53' 8" x 91', pressed brick, stone finish, steeple 175 feet high; architect, W. H. Geisinger; contractor, W. J. Kenderdine; cost, \$15,000.

Broad, cor. Oxford St., the Oxford Presbyterian Church, lately burned, is about to be rebuilt. It is expected that it will be ready for occupancy about the first of May. Contractor, Lewis Havens.

FACTORIES.—Nineteenth St., between Brown and Parrish Sts., 1 four-story fire-proof brick watch-case factory, 114' 10" x 34' 6". One boiler and engine-house, 1 st'y, 50' x 23'; owners, Hozoff & Thorpe; contractor, W. J. Kenderdine; architect and engineer, W. H. Geisinger; cost, \$15,000.

American, cor. Susquehanna Ave., 1 four-story brick factory, for manufacture of wood tool working machinery, 40' x 115' 4"; owners, E. & F. Gleason; contractor, the owners; architect and engineer, W. H. Geisinger; cost, \$10,000.

Howard, cor. of Huntington St., 1 five-story factory, 137' 10" x 50', with a wing 65' x 50'; to be used for the manufacture of machinery by the owners, Messrs. Campbell & Richards; contractor, W. J. Kenderdine; architect and engineer, W. H. Geisinger; cost, \$26,000.

The game architect is now engaged on plans for another factory, same size, for the same owners.

American, cor. Lehigh Ave., 1 four-story brick factory, 50' 4" x 121' 9", with a wing, 31' 8" x 35'. Also, for the same owners, 1 two-story stable, 42' x 32' 2"; owners, the American Machine Co.; contractor, W. J. Kenderdine; architect and engineer, W. H. Geisinger; cost, \$35,000.

Thrifty File Works, 423 Ireland Street, have commenced to build an addition to their works, which will be 33 by 43 feet, two stories high. They will put in a new engine of 40 horse-power, for grinding only; also 40 new blocks, which will increase their capacity 400 dozen files per week.

The Enterprise Manufacturing Company have commenced their new additions, which will cost them \$75,000.

GRAIN ELEVATOR.—The large Grain Elevator for the Reading R. R. at Richmond is rapidly advancing; the founda-

tion will be completed by April 1, when the frame superstructure will be commenced.

HOUSES.—2006 Sanson St., 1 two-story brick stable and dwell., 18 by 95 feet; owner, A. J. Cassatt; contractor, A. J. Myers; architect, Frank Furness; cost, \$5,000.

At Fox Chase, 1 stone and timber dwell., 50' x 60'; owner, W. H. Rhawn, Esq.; architect, Frank Furness; cost, about \$10,000.

At Chestnut Hills, 1 stone dwell., 62' x 47'; owner, Hon. John Welsh, Philadelphia; architect, Frank Furness; contractor, W. C. Mackie; cost, \$10,000.

At Chestnut Hills, 1 stone and timber dwell., 70' x 56'; owner, John Lober Welsh, Esq., Philadelphia; architect, Frank Furness; contractor, W. C. Mackie; cost, \$14,000.

At Haverford, 1 stone and timber dwell., 60' x 34'; owner, J. H. Williams, Philadelphia; architect, Allen Evans; cost, \$9,000.

At Haverford, 1 dwell. (Flemish style of architecture), 39' x 69'; owner, E. C. Evans, M. D.; architect, Allen Evans; contractor, Anderson Wanner; cost, \$8,000.

BUILDING.—Building improvements are livelier on Chestnut Street now than they have been at this season for many years.

OFFICE BUILDING.—Walnut, cor. Third St., 1 pressed brick and Ohio stone office building, 58' x 75', four stories high (fire-proof throughout); owners, the Union Ins. Co. of Philadelphia; cost, \$30,000. In an open competition Mr. Theophilus P. Chandler, Jr., was the successful architect.

Providence.

FACTORY.—The Nicholson File Company is making extensive improvements at its works in this city. The additions are a new hardening room, packing room, and a two-story building, which is to contain the offices of the company. The materials used are brick and stone. Messrs. P. F. & J. M. Hull are doing the work. The drawings were made by Messrs. Walker & Gould.

HOUSES.—Mrs. Danforth is building a large two-tenement house on Parade Street. The contractor for the work is Mr. Alfred Z. Horton; Mr. C. F. Wilcox is the architect.

On Pine Street, between Lockwood and Pearl Streets, there is a group of houses being put up by Mr. D. Russell Brown, at a cost, in the aggregate, of about \$15,000. Mr. Jenkins Jones is the contractor. The designs were made by Mr. Frank W. Angell, in the office of Walker & Gould.

San Francisco.

CHURCH.—Mr. T. J. Welsh is the architect of the new Catholic church; cost, \$10,000.

HOUSE.—Mr. H. C. Macy is the architect of a two-story house now building on Frost Street for Mr. E. Slosinsky; cost, \$19,000.

STORES.—Mr. Victor Hoffman is the architect of the new two-story brick building for Goldstein & Dreyfus; cost, \$27,000.

Mr. John Marquis is the architect of the three-story brick store building for Mrs. L. E. Waterman; cost, \$20,000.

WAREHOUSE.—Mr. P. R. Schmidt is the architect of the brick warehouse building at the corner of Brainerd and Fifth Streets; cost, \$7,000.

St. Louis.

BUILDING PERMITS.—Thirty-eight permits have been issued since our last report. Of these, eight are for frame structures of slight importance. Of the rest, those worth \$2,500 and over are as follows:—

Owners.	Use.	Stories.	Rooms.	Cost.
D. Signolo.	Dwelling.	3	10	\$3,500
Miss J. Wilgus.	Dwelling.	2	26	11,000
P. Riemer.	Dwelling.	3	15	4,000
J. T. Barth.	Dwelling.	3	17	5,000
H. Shaw.	Store.	5	5	12,000
Southern Bagging Mills Co.	Factory.	1	3	10,000
T. T. Richards.	Dwelling.	3	9	4,800

General Notes.

AKRON, O.—At a meeting of the Music-Hall Association it was decided to build a hall, amphitheatrical in form, to accommodate 3,000 people, at a cost of about \$20,000.

ALAMEDA, CAL.—Messrs. S. & J. C. Newson are the architects of the house building for Mr. Barton, at the corner of Central Street and Broadway; cost, \$25,000.

ALLEGHENY, PENN.—Work has begun upon the new station for the Western Pennsylvania R. R.

ATTLEBORO FALLS, MASS.—Messrs. Walker & Gould, of Providence, R. I., are the architects of a new house which is now being built for Mr. Harvey Clapp, of this place.

CARROLL, IOWA.—Mr. W. Foster, of Des Moines, is the architect of the two-story brick school-house; cost, \$12,000.

CLEVELAND, O.—Messrs. Cuddell & Richardson are the architects of the new seminary building for the Sisters of Notre Dame; cost, \$12,000.

CLINTON, MASS.—The Lancaster Mills, the Carpet Company, and the Wire Works, are all planning additions to their factories.

DES MOINES, IOWA.—Mr. W. Foster is the architect of the block of three two-story stores for E. Good, at the corner of Walnut and Sixth Streets; cost, \$12,000.

DETROIT, MICH.—Jas. E. Scripps, frame church, cor. Myrtle Street and Trumbull Ave.; cost, \$1,000.

Peter Mahoney, frame dwell., No. 60 Spruce St.; cost, \$1,200.

C. S. Cole, frame dwell., Alexandrine Ave., near Third Ave.; cost, \$2,500.

Sullivan & Tennyson, brick store and dwell., Michigan Ave., near Twentieth St.; cost, \$2,000.

W. H. Savory, frame dwell., No. 832 Twenty-fourth St.; cost, \$1,000.

ELKHORN, WIS.—The Roman Catholics of this village and its neighborhood have contracted with Messrs. Moore & Davidson, of Delavan, to build a church, to be finished about July 1; entire cost, about \$4,000; materials, wood "venerated" with Milwaukee brick.

ERIE, PENN.—Mr. D. K. Dean is the architect of the three-story brick block for O. W. De Witt; cost, \$12,000.

GLOUCESTER, MASS.—Mr. J. H. Be-arrick, of Boston, is the architect of the St. Ann's R. C. Church; granite; cost, \$70,000.

GREAT FALLS, N. H.—McClallan & Goodwin, of Chicopee, Mass., contractors and builders, have secured contracts for building a new mill and remodeling two old ones.

GEPSUM, O.—Mr. E. O. Fallis, of Toledo, is the architect of the M. E. church; cost, \$4,000.

HOLYOKE, MASS.—Messrs. D. H. & J. C. Newton, contractors, have commenced the proposed extension of the Chemical Paper Company's Mill, which is to include a rag-engine department, 137 by 39 feet, two stories; a rotary bleach-boiler department, 41 by 40 feet, two stories; a paper-machine room, 130 by 53 feet, one story; and a steam boiler-house, 32 by 21 feet. D. H. & A. B. Tower, of this city, are the architects.

HUDSON, MASS.—Messrs. Lord & Fuller, of Boston, are the architects of two three-story brick stores, one for Mr. Jeffs and the other for Mr. Chase.

HURON, O.—Mr. J. Ireland, of Cleveland, is the architect of the brick dwelling now building for W. J. Wickham; cost, \$10,000.

INDIANAPOLIS, IND.—William H. English proposes, it is said, to build a theatre, with a seating capacity of 3,000 persons.

JACKSONVILLE, ILL.—The Young Men's Christian Association proposes to build a \$10,000 building in the spring. Eight thousand dollars are already subscribed, and as soon as the full amount is raised the work will commence.

LOUISVILLE, KY.—Frank Fehr, two-story brick factory, on Marshall St., between Preston and Jackson; cost, \$3,000. Stitzel Bros., one-story frame warehouse, on Twenty-sixth St., between Broadway and Maple; cost, \$2,000.

LYNN, MASS.—The Messrs. Keene, shoe manufacturers, are soon to build two large shoe manufactories near their present factory on Willow and Oxford Streets. The new buildings will be of brick, and have five stories, exclusive of basement. Each block will be 40 by 138 feet.

Another new shoe manufactory is to be built on the Moses Breed estate, on Oxford Street, between Mulberry and Almont Streets, by Mr. P. A. Chase.

The St. Mary's Church School have the completed plans for the new parish school in hand. The edifice will be 73 by 140 feet, with a 60-foot tower. The building will cost \$50,000.

MONONGAHELA, PENN.—It is stated that Campbell, Duncan & Co., glass manufacturers, will build a manufactory if the citizens will contribute \$18,000 to the enterprise. It is aided \$12,000 have already been raised.

MUNROE, MICH.—A two-story brick house is building at the corner of First and Scott Streets, under the charge of F. B. Luce; cost, \$6,000.

Public Buildings.

APPROPRIATIONS FOR PUBLIC BUILDINGS.—Some days ago the House Committee on Public Buildings and Grounds adopted a resolution not to report to the House for the present any more bills appropriating money for public buildings. At a later meeting they reconsidered their former decision and granted leave to report favorably to the House the bill appropriating \$550,000 for the purchase of a site, at Baltimore, Md., for a post office. The bills introduced in the present Congress, and referred to this committee, provide for appropriations for new public buildings now amounting to \$12,770,500, with six States to be heard from that have not yet put in their claims.

ASHEVILLE, N. C.—Mr. Ransom's Senate Bill to provide for a public building has been referred to the Committee on Public Buildings and Grounds.

CARSON CITY, NEV.—Mr. Daggett's House Bill to provide for building a public building in this place has been referred to the Committee on Public Buildings and Grounds.

COLUMBUS, O.—Mr. Converse's House Bill to provide a fire-proof building has been referred to the Committee on Public Buildings and Grounds.

DANVILLE, VA.—The bill providing for the building of a public building in this place has been signed.

FRANKFORD, KY.—Mr. Blackburn's House Bill to provide for building a public building has been referred to the Committee on Public Buildings and Grounds.

JEFFERSON, MO.—Mr. Phillips's House Bill to provide for building a United States court-house has been referred to the Committee on Public Buildings and Grounds.

MATSVILLE, KY.—The Committee on Public Buildings and Grounds has agreed to recommend the request of Congressman Plister, for \$60,000, for the erection of suitable government buildings in this city.

PEORIA, ILL.—The prospects for securing a government building are very good. An appropriation of \$500,000, exclusive of the site, will no doubt be made.

STURGEON BAT, MICH.—The question of building a light-house has been referred to the Committee on Appropriations.

WINSTON, N. C.—The citizens' petition for a Federal court-house in this city has been referred to the Committee on Public Buildings and Grounds.

Bids and Contracts.

BALTIMORE, MD.—The contract has just been made for a new gateway at entrance to Druid Hill Park on Boundary Avenue, to cost \$9,000. Mr. J. B. Emory has the contract for the stone-work, at \$7,300, and G. F. Pagels the contract for the iron-work, at \$2,300.

CHICAGO, ILL.—E. R. Brainerd & Co., of Joliet and Chicago, have the contract for furnishing the marble wain-cotting for the new government building. The contract will amount to about \$80,000.

CLEVELAND, O.—The following were the lowest bids received for completing the new Armory Building: Carpenter-work, J. C. Steel and P. M. Steel, \$3,457.05; plastering, W. S. Forester, \$125; plumbing, C. C. Dewastoe, \$532; gas-fitting, George Wilshire, \$367.77.

NEW YORK, N. Y.—William J. O'Connor has the contract for carpentry on the new school-house on Lexington Avenue. It amounts to \$20,797.

PHILADELPHIA, PENN.—The Public Building Commission lately received the following bids, the contract in each case being awarded to the lowest bidder, except the bids for bricks, which were ordered to be scheduled: Bricks—Wilbur F. Miller, \$5 per 1,000; Amos Dotterer, \$7.50; Thomas H. Flood, \$8; J. E. Dingee, \$6.97; Excelsior Brick and Stone Company, \$6.73. Brickwork—Alexander Armstrong, \$3.25 per 1,000; Samuel H. Collins, \$3.42; James Armstrong, Jr., \$4.43; Miles King, \$4.92. Dressed stone-work—Wm. Gray, for staircase, etc., \$60,000; Douglas Bros., \$57,250. Brown-stone work—Philip Dougherty, dressed sills to complete interior and ventilating stack, \$5,885; Douglas Bros., \$6,325. Cast-iron work—C. Rittenhouse & Sons, \$2,968; Rover Bros., \$1,880. There was only one bid for lumber, that of Gar-kill & Sons, who received the contract, at \$21 per 1,000 feet. The contract for steam-pipe covering was awarded to the Boyer Steam-Pipe Covering Company.