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A CASE of some importance touching the construction of buildings has lately been decided in Philadelphia, as we learn from the *Real Estate Reporter*. In last February an Act of Assembly was passed, ordering that the building of all schoolhouses for which appropriations should be made by the city of Philadelphia should be under the direction of the Board of Public Education of the city, who were to provide proper plans and specifications, and advertise for proposals for the work. In May the City Councils passed an ordinance that no permits should be issued by the Building Inspectors for the erection of places of worship, hotels, public halls, theatres, or schools, unless plans were submitted to the Inspectors, and the modes of ingress and egress shown were approved by them. The Board of Inspectors then passed the wise resolution that the stairways of all public schoolhouses should be built of non-inflammable materials, and enclosed in stone or brick walls. Soon after, the Board applied to Court for an injunction upon the contractor for a new schoolhouse, alleging that he had submitted plans and applied for a permit; that they had found the means of egress insufficient, and staircases dangerous, and had refused to give a permit for the building, notwithstanding which the contractor had persisted in carrying it on without modifying the plans. They then prayed that he should be ordered to construct the stairs and entrances in such ways as they should approve, and be enjoined from continuing as he had begun. The builder's answer was that he had contracted with the city to build a schoolhouse according to the plans and specifications of the architect of the Board of Public Education, and to finish it by a specified day under penalty of ten dollars forfeiture for every day's delay, and had given bonds to the city for the performance of his contract; that he was acting under the authority of the Board of Public Education, in whom, he was advised, the entire control of the building was vested by the Act of Assembly, subject to no authority of the Board of Inspectors.

THE Court, at a preliminary hearing, granted a temporary injunction restraining the builder from putting up his stairway, according to the first plan, and ordering him to submit a plan that should be approved by the Inspectors. Now, after a full hearing, it has decided in favor of the Inspectors, declares its first order "peremptory, mandatory, and final," and continues the injunction. The real quarrel is, of course, between the two Boards, the contractor being only the scapegoat; and since one claims its powers by virtue of a city ordinance, and the other of an Act of Assembly, we are led to suppose that it is a phase of the continued quarrel between the authorities of the State and City, of which the muddle over the Public Buildings is the chief event. The legal question involved is local, and not a subject for lay criticism; but it is a matter of general interest and of great importance in the interest of a good system of building, that wherever

building laws exist, no one should have the power to override them. There is no part of such a system that is more important than proper restrictions on the stairways and exits of public buildings and schools. The rule laid down by the Board of Inspectors is one that ought to be enforced in every city; and to have it contumaciously set aside by the authorities anywhere in the first conspicuous attempt to enforce it would be a serious blow at an important reform. If there is likelihood of conflict of authority in such matters, it would seem to suggest to other States the desirability of providing for safety by the interposition of the higher authority, and the enactment of building laws by State Legislatures, of which Ohio has already set an example, and of which there has been some discussion in other States.

GOV. HARTTRANFT's message to the Pennsylvania Legislature last week contained a great many sound and sensible remarks on the condition and present tendencies of working-men. His position as governor of the chief industrial State in the Union makes it natural for him to recognize and declare the paramount importance of the labor question in our day. He steers dispassionately between favor for capitalists or for working-men, and sets forth in a few clear words the errors and mischiefs of the present policy of labor agitations and trades-unions. We have not space to do justice here to what he says on this subject, but may have occasion to return to it hereafter. A large portion of the message is naturally given to an account of the riot of last summer, for which he fairly and very moderately sets forth the responsibility of the strikers thus:—

"While it is true that the working-men, who began it, contemplated no such terrible results, it cannot be denied that the manner in which they proceeded to enforce their demands, by stopping inland commerce and seizing the property of corporations and individuals, and driving citizens from their usual occupations, in defiance of law, made the breach through which the lawless elements of society poured to plunder and destroy. By thus inconsiderately inviting the co-operation of the criminal classes, labor did itself a great and grievous injury; and it will be long before it can remove the suspicion and distrust with which the people will view its strikes and organizations."

It is only three or four years since London finished her very expensive system of sewers. By them she delivered that part of the Thames which lies within her territory from the pestilential condition to which her old system of direct drainage had brought it, and supposed she had permanently relieved herself from embarrassment. Huge sewers were built on the north bank, and, intercepting the sewage, carried it some miles down the river, delivering it at Barking Creek, below the docks and Woolwich, where it was thought that it would be beyond making trouble at the reflux of the tide. But the Conservators of the Thames have already found reason to be alarmed at accumulations in the river-bed, and have lately been studying the actual operation of the sewers. It appears that the sewage is by no means carried by the ebb-tide beyond the danger of returning. Capt. Calvert, who has made the observations, reports that there is in the river a permanent body of polluted water "eight miles long, seven hundred and fifty yards wide, and four and a half feet deep," which he calls a sewage-section; and which, "charged with offensive matter, both fluid and solid, moves up and down the channel four times daily between Gravesend and Blackwall," and deposits its suspended matter wherever slack water favors it. By this deposit, it was found, the channel of the river had lost a quarter of its capacity at low water opposite the southern outfall; the creeks near it are said to be filling up, and banks are forming in the river as far up as Battersea, on the western edge of the city, and miles above the point where the sewage is delivered. The evidence of the senses was enough to show that the deposits were of matter from the sewers, without the careful analysis by which this was proved. The rapidity with which they have formed gives reason for serious fear that the present sewerage of London is spoiling the river-bed.

THESE deposits indicate that the concentration of all the wash of a great city at one point of delivery makes a burden

that the current of an ordinary tidal river like the Thames cannot carry away. On the other hand, the distributed delivery of it had for many years before grown to be intolerable, and it looks as if all the difficulty of the problem were to return upon the Londoners. The Boston papers have been led by this experience to talk more anxiously about the new plan of sewerage which has been adopted for their city. In this case, however, the great object is to keep the sewage out of the small tidal rivers that flow into Boston Harbor; and much money is to be spent in carrying it by a tunnel to an island, where it may be delivered well out in the harbor into a free tideway, and by being discharged on the ebb will, it is hoped, be carried out of harm's way. The probability of success depends here upon the accuracy of the experiments that have been made on the flow of the tide, and the security of the deductions from them; the trustworthiness of which we presume there is no reason to doubt. Unfortunately it is inevitable to regard any system of city sewerage that may be proposed as in some degree tentative, for the whole question is a new one. What people call sanitary science is but in its infancy, and all its methods are still experimental. Yet its problems must be solved, and can only be solved by experiments. Costly as these may be, and are, there is no substitute for them: the only choice is of those which promise best, and at least cost in proportion to the results they promise. Mr. Mansfield, F.R.S., of Glasgow, is cited as saying that engineers would be driven to excluding from the sewers every thing but the street-sweepings. These, however, are just the accumulations of which it is possible to get rid without using the sewers; and also the part of sewage which from containing most inorganic dust makes the heaviest deposit. A point to be remembered is that when sewage is discharged into a current or basin that dilutes it till it ceases to be poisonous to the animal and vegetable scavengers that inhabit water, it is rapidly taken up by them. Every piece of water that is not stagnant can in this way dispose of a certain amount of refuse-matter. One of the questions to be determined in the system of water-carriage is, how great an access of water is necessary to produce this result. If it proves that for a large city nothing less than an outfall into the Gulf Stream will suffice, we shall be driven in most cases to abandon water-carriage, or at least to follow the example of Paris in excluding from sewers the most mischievous part of city refuse, and to find some other way of disposing of it.

SOME interest and feeling have been excited among a number of French architects by a competition for a town hall at Evreux, under circumstances somewhat peculiar. The brothers Delhomme had bequeathed to the town 375,000 francs (\$75,000) to build a town-hall; and the municipality, we are told by *La Semaine des Constructeurs*, advertised last spring for designs in competition, publishing a list of requirements, one of which was that the estimated cost of the building should not exceed the sum bequeathed. Three prizes were offered, — a gold medal and the execution of the work, and two premiums of 2,000 and 1,200 francs. The municipal commission were wise enough to call in professional advisers, and invited MM. Viollet-le-Duc, Trelat, and Bourdais to examine the designs, and award the prizes. When the three experts had made their selection, a member of the commission interposed the objection that no one of the premiated designs could be carried out for the stipulated sum. The experts in their report referred to this question, and gave their opinion that it was impossible to satisfy the requirements of the programme for that sum, saying that these requirements exacted at least nine hundred superficial metres of building, and that such a structure as was called for could not be built for less than 600 francs the metre, which would raise the cost to 540,000 francs. They, however, awarded the prizes to three designs, each of which exceeded the area they named. Upon this the *maire*, accepting this statement of the necessary cost, declared the competition null, and the prizes not awarded, on account of the impossibility of the problem. The experts nevertheless declared, while adhering to their position that the limit set was an impracticable one, that the plans having been accompanied by estimates which fulfilled the condition of being below the limit, it was not equitable, and therefore not possible, to refuse to award the

prizes to them; and the commission, after deliberation, accepting the report of the experts, awarded the prizes accordingly.

Then followed a variety of recriminations from disappointed competitors, and accusations that premiums had been given to designs whose estimates were 165,000 francs beyond the cost appointed, without regard to the fact that this excess was simply the guess of the experts. *La Semaine* in commenting upon the matter, reminds the competitors that there is no evidence that the cost of the accepted design would pass the limit, and that the guess of the experts is not lightly to be preferred to the carefully prepared estimates received with the projects; and then goes on to read a lecture to MM. Viollet-le-Duc, Trelat, and Bourdais, for exceeding the limit of their duties. Which way the matter will finally turn, does not appear. The principle of expert adjudication upon architectural competitions is one so important to uphold that we can only regret every embarrassment that seems to threaten it with disparagement.

WE notice in the English building-journals an advertisement by the Irish Institute, of prizes to students for an essay on the objects of architectural interest in or near Dublin. This is the carrying out of a policy of the English professional associations which has borne good fruit, and reminds us of the judicious suggestions of Mr. McKim at a late meeting of the New York Chapter of the American Institute, reported by our New York correspondent in our number of the 29th ult., which were followed by the appointment of an Antiquarian Committee. The careful study of old work which is necessary in making drawings of it is one of the best possible means of discipline for students. It is an essential part, wherever it is practicable, of every course of instruction in architecture. One of the duties of the prize students from the *École des Beaux-Arts*, who are maintained in the French Academy at Rome and on their travels, is to send home thorough studies and restorations of ancient buildings. The system is good in another way, for it is a means by which students may increase the world's store of historical information from which they draw. Much valuable work has been done by the French by this means, and by the English students encouraged through the prizes of the English Institute and Association. Our fellow journal, the *Building News*, has done excellent service in this way. Hitherto there has not been much done for American architecture, partly because there has not been till lately any regular instruction or any stimulus for students here; partly because no one has thought old American buildings worth notice. This is to be regretted, for though there is no great work, or very old work, to look back to, there is a good deal that is interesting enough to be worth making a record of. Now that the English have drawn attention to the work of the mother country in our colonial times, there is a new interest in our own, which is going so fast nowadays, that it is worth while to put it on record as promptly as may be. We shall be glad to publish any well-executed drawings of interesting work of the kind which are sent to us. This study, however, is emphatically of the kind which is justified only by being well done. The value of such drawings depends on the faithfulness, precision, and understanding with which they are made. There is a kind of refinement in the best of the Continental work, which altogether eludes a careless or unsympathetic representation, but which is an admirable corrective for the slashing and rather coarse kind of work to which Americans have tended of late years.

THE CHURCH ARCHITECTURE THAT WE NEED.

[A paper read at the Fourth Church Congress held at New York, Oct. 30, 1877, by Emlen T. Littell, F.A.I.A.]

A CHURCH is indeed the temple of God; but it is not for Him alone that it should be built. The temple is the place where the people assemble to be in His presence: and hence it follows that proper provision must be made for such assembly, that all things may be done decently and in order. The architecture of a church, then, must take special note, *first*, of the rites to be performed therein; *second*, of the proper accommodation of the people who come to witness and to join in the ceremonies.

In considering the kind of church architecture that we need, it is necessary to start from the ground that underlies all architecture; namely, that we must build upon the works of those who

have gone before us. It is in art as in speech, a language has grown up through invention, accretion, modification, which meets the wants of the people who use it, furnishing a medium of communication flexible to all requirements, whether of the homely needs of every-day intercourse, or the highest flights of oratory, poetry, or science. This great scope and pliability cannot be the work of any one mind, or any one combination of minds: it is the outgrowth of generations. And so we must dismiss once and forever the idea that we need a new architecture; and leaving out all attempts to create a new style, letting originality take care of itself, we should endeavor so to use the styles which form a traditional architectural language as to expand them into new forms and modifications which shall express our progress and light. We must progress in art-work: there is no such thing as standing still; and if we do not bring to bear upon church architecture all the light which experience and intellect can give, we shall inevitably retrograde through mannerism into imbecility. The cause of art decay is as evident as the result. It needs little skill to discern the reason why the pure French Gothic declined into the Flamboyant, or why the English Gothic degenerated into the Perpendicular,—it was the substitution of formula and copyism for brain-work.

It is hardly to be presumed, that in the selection of the true style to form a basis for our future church architecture, many will seriously maintain that we have a choice other than the English Gothic. It is the work of the English Church and the English nation; and we, as successors to both, would scarcely be wise to seek another, even if better were to be found: new departures are perilous. But it has claims upon us other than these: it is rich and simple, strong and flexible, adapted equally to the cathedral, the parish church, the castle, the cottage, in its own country, and it easily and naturally moulds itself to any climatic requirements. Given, then, the English Gothic as our general style, we should seek to discover at what time it had fully developed its characteristics, while preserving its purity; and this we find to have been the early part of the fourteenth century, a period generally known as that of the "early geometrical" or "decorated." We can do no better than to work from this standard, allowing occasional wanderings into the period of "Early English," and, when a round-arched style is necessary, into a modification of the later "Norman" or "Romanesque." Moreover, it would be well not to confine our study to the examples on English soil, but to extend it to the architecture of the North of France, a very important and well-developed branch of the same style. And our style thus adopted should not be merely followed: it should be embraced, assimilated, made in all things a part of ourselves. There should be brain and heart visible in all its workings; there should be no slavish submission to precedent, merely because it is precedent, but the spirit of the mediæval times should be the guide rather than the letter. The men of those days built in the true spirit; trained fully in the works of those who had gone before them, they allowed those works to give direction to their own, while hungrily availing themselves of all improvements which science offered or study educed, and of the examples of their contemporaries in their own or foreign lands.

We must do the same: it would be folly to tie ourselves down to mere imitation, to refuse the innumerable advantages given to us and denied to them. Such refusal would cause our churches to be mainly lifeless reproductions in place of living architecture, mediævalism in place of art; and although mediæval work was admirable, and is admirable, yet for modern days it is not to be desired, except in those cases where the needs of the two ages, the past and the present, run closely parallel or exactly coincide. We must exercise, then, the broadest, the wisest, the most conservative eclecticism. Our architecture must above all things be truthful. Every thing that is used therein must be exactly what it seems to be, and nothing else. Plaster when used must not imitate stone. Cheap lumber must not masquerade as precious wood. Veneers and shams of all kinds must be contemptuously discarded. And this principle of veracity must apply not only to material but to methods, whether of construction or design. The science of architectural engineering, for example, has developed a character of general construction very different from that with which our predecessors were acquainted; and this added knowledge should be shown in our work, or it will be fairly liable to the imputation of untruthfulness. The same remark will apply as well to joinery, locksmithing, and the majority of the minor arts; the simulation of ignorance and rudeness therein is an evident deceit. Our architecture must be comfortable; the uneasiness of the body necessarily distracts the mind from worship, and every ancient or modern appliance which provides fresh air, full light, gentle heat, *et cetera*, should be faithfully used to the end that the congregation shall not undergo unwilling penance. Then, as a natural sequence of true comfort, our churches will be healthful, and hereafter darkness, dampness, and foul air will not depress the vital powers and sow the seeds of disease. Our architecture must be symbolical. Why should great masses of masonry, timber, and iron be heaped together and made complete for the body, if the mind is not provided for? To rear a pile which shall not speak to the intellect and soul from every nook and corner, would be as if we were to make a pulpit where there was no

preacher. True symbols will fill the soul with devotional thought, even when by chance the pulpit sermon only "preacheth patience." And in the young the object-teaching given by them will remain firmly fixed, when spoken words might have been too deep for their understanding. In the application of our principles to the production of such church architecture as we need we are painfully conscious that owing to the constant changes of the population of the country, and to the small means generally available, churches are in most cases provisional in their character, few being likely to remain for more than three or four generations at the longest. It is during this provisional period, however, that the transition is to be made from Anglican church architecture to American church architecture; and our processes if not correct during this time will lead us to a lamentable result.

The plan, the ground plan, of a church, should in a great measure control the exterior; or rather they should be thought out together, with mutual dependence, so that from the exterior the plan can be approximately understood. In the making of the plan the rule of orientation, as an expedient of art, deserves more consideration than it generally obtains; more especially in the building of city churches, for it compels them to a greater individuality by preventing the adoption of the simplest method of enclosing a rectangular space, and gives an infinite scope to variety in grouping, the more desirable where all buildings around tend towards showing mere façades. And the building should declare its nature at first sight, not only showing that it is intended for a place of worship, it should distinctly impress upon the minds of beholders that it is a church, belonging to the lineage of the Anglican Church, and could by no possibility have been designed for any other use. And by its solemnity, beauty, and grandeur it should urge upon the merest passer-by the importance and mystery of the great ceremonies performed within its walls; and it should invite the stranger to enter, to worship, and to feel that it is a home. And it should be a landmark, so set and built that even in the midst of a crowded city it cannot be passed by unwittingly. In the city or undulating country, the lofty spires should mark its location, breaking the sky-line with their sharp, cross-surmounted peaks. In level meadow-land, or on abrupt bluffs, the massive towers should suggest the thought of a refuge and a stronghold.

There seems to be small reason to doubt that in the architecture of future churches the chancel will hold, and develop more greatly than in years just past, its rightful superiority. It is evident that being the visual focus of all assembled in the building, it should have proportions sufficient to redeem it from any appearance of meanness. Being the place where numerous offices are performed, it should have more than enough space for the proper conduct of them all, that crowding or confusion therein should be an impossible event. Breadth and height all will agree to give to it; and if for no other reason than ease to the eyes of the congregation, and artistic effect, it should have ample depth. Its space should then be properly apportioned, giving in a chancel of ordinary depth, one-third to the sanctuary, and two-thirds to the choir. The organ should be placed in a choir transept or chapel, opening widely where practicable both into nave and chancel. The font belongs by right to an entrance porch or baptistery, preferably to one near the chancel and opening into it as well as to the nave. With regard to the conflicting claims of the square end and apse as chancel terminations, the Anglican traditions point to the former; but perhaps it would be better to allow the use of both on equal footing, making only this distinction, that the square end is preferable when the depth of the chancel is limited, the apse when the depth is great. Except in small churches the most effective series of elevations for the different parts of the chancel is, three steps from nave to choir, one or more from choir to sanctuary, but generally three, and three steps from the floor of the sanctuary to the footpace of the altar. The chancel, being the head of the church, should be its crown, its glory, and should be so recognized within and without. Whatever of treasure, or thought, or art, there may be, here is the place where it must first be disposed; let the rest of the building go bare, but make the chancel rich. And make it so in gradation: let the sanctuary be richer than the choir, the reredos the richest part of the sanctuary, and above all other things let the altar predominate, the most glorious point of all the edifice, of the most precious material, most carefully worked.

The most obvious plan for the body of the church is the simple nave; this has the advantage of economy when the span is moderate, and also that of an unobstructed passage for sight and sound. On the other hand it is difficult, especially in a large nave, to avoid monotony of effect; and further, the congregation collected in a mass has very much the appearance of a crowd, and individuality is in a measure lost. There is a natural instinct to adhere to the traditional plan handed down from the basilica of Rome, through all changes of architecture, to the present time. And in truth it is difficult to find one nearly so beautiful in its subdivision of nave, aisles, and clere-story supported by arcades, making constantly changing effects of light and shade and color. The objections urged against this plan are very strong in the minds of some, especially among the laity, who feel that the interference of the supports with sight and hearing is a very serious one, and renders worship difficult. In a measure this interference can be

avoided by using for the shafts of the interposing columns either granite or iron, whose great strength allows a reduction of the thickness of the pillars to a few inches, so that a slight motion removes the eye from behind the obstacle. Or again, it can be entirely avoided by relegating the aisles to their original use as ambulatories, and, in order not to waste room, diminishing their width almost to that of ordinary passages. This will also allow an overflow from the nave when a special occasion brings together a large congregation. Supposing either of these methods of relief to be adopted, there is no apparent reason why this plan should not remain a favorite one in the future as in the past, evenly dividing supremacy with the simple nave.

The cruciform plan has great beauty, but has also decided defects. Unless the transepts are of but very slight projection, or unless they are modified above the floor line into aisles or chapels, the sound will probably be unpleasantly confused and broken; and to fill with the voice a cruciform building of any size, will almost invariably require painful exertion to the speaker, and even then with an unsatisfactory result to his hearers.

No matter what system of planning may be the favored one, the treatment of the nave, as being the chief place of the gathering of the people, demands most careful consideration. A nave of two to two and a half diameters in length gives the best combined results as to capacity, convenience, and appearance; and the natural limit of the power of the human voice in public speaking gives ninety feet as a length beyond which it is not well to go, except in churches where a musical or semi-musical service is contemplated. Of course it is not to be supposed that galleries would, in any case be erected; they interfere with light, heat, ventilation, and hearing, they are unsightly, and they are unnecessary; as many persons can be accommodated upon one plane, within sound and sight of the chancel, as the most energetic priest with the amplest assistance would desire to have in his parish.

The acoustic qualities of the nave are favored when the apex of the roof is not too high above the floor, perhaps not more than one and a half diameters; when the pitch of the roof is not excessive, running from fifty to fifty-five degrees; when the walls are covered with rough-surfaced plaster; and when both roof and walls are frequently broken by panels, projections, or timbers. A wooden ceiling following the lines of the braces, collars, etc., of the principal framing, so as to form a semi-polygon, without concealing the important parts of the roof construction, is of great assistance to the quality of the sound, as well as to the comfort of the building. In a full open-timbered roof, which is of such exquisite beauty, care should be taken that the roof *skin*, as it may be called, should be double, enclosing an air-chamber of a few inches in thickness, sufficiently ventilated. Without this precaution, the heat of summer, the cold of winter, and the noise of heavy rain and wind, would be each intolerable.

But the details crowd in so rapidly upon us, if an entrance is once given to them, that we are debarred from their consideration; therefore it will suffice to say in general, that our desired church architecture must lay under tribute *all* the resources of art, painting, carving, sculpture, and polychromatic decoration, whether produced by pigments or in construction. All these are to be used constantly; they are aids to the purposes for which churches are built, which cannot be slighted without serious loss to the æsthetic qualities of the buildings, and to religion. And they must be used in pursuance of carefully-laid plans; the finest carvings, paintings, and mosaics should be placed nearest to the eye, so that their effect shall be fully gained, their stories plainly told. The farther the work recedes from the spectator, the more abstract and conventional it should become; but at no point should it ever be careless or unconsidered: the crockets climbing the side of the lofty spire deserve their fair proportion of study, as well as the capitals which greet us at the entrance to the porch. We are such a practical people, and so full of economy, that we are especially apt to slight æsthetics in our buildings; and churches suffer in common with the others from this national peculiarity. When, therefore, we undertake church building, we should, knowing this danger, take all precautions against it. The æsthetic qualities of a church do not depend upon its money value; a fair amount thereof are within the reach of the poorest mission chapel; and a glance at this or any other city will show that vast expense may be incurred without offering a single glimpse of religious or devotional art feeling.

It is beyond the power of any one to prophesy with reasonable hope of accuracy what shall be the final result of our attempts to elaborate a church architecture of our own, fitted to our needs now, and expanding with them hereafter. But starting with a pure style, reverently treated, not slavishly followed, with minds devoted to the study of church architecture as historically set before us, and as the mental and physical conditions of our country and our times demand, and with the principle always in view that churches are built for the glory of God as well as for the use of man, the church architecture that we need will come to us, of itself, in the very form which is the most to be desired; but it will come step by step, and not by a sudden inspiration.

A COSTLY STAIRCASE. — The staircase of the Merchants' Exchange at St. Louis, Mo., is said to have cost \$38,000.

COLONIAL HOUSES, AND THEIR USES TO ART.

WHAT has distinguished the eclecticism of American architects from that of all others in the profession elsewhere is the fact that hitherto it has received no conscious influence from local antiquarianism. In choice of style we have been cosmopolitan. Our architecture has borrowed inspiration from all countries and ages but our own, and has for the most part contented itself with acclimating the revivals, the transitions, and the archaeological enthusiasms of the older nations as they have occurred in the history of contemporary art. It so happens, however, that the new Georgian revival in England refers back to a period coincident with much of our own earlier colonial history, and we find that our brethren in England do not disdain to look even so far off as this country for authentic details of the revived art (see *Building News* of Sept. 21, 1877: "Sketches from Mount Vernon"). Thus at last we also are led to look for models of style nearer home, and to find certain æsthetic virtues in the colonial mansions. This movement introduces us into a new atmosphere, and supplies us with a new motive for architectural composition, a motive of patriotism, which, if we rightly improve it, may lead us to more distinctive local expressions in art, and relieve us from such unflattering imputations as those of our English contemporary, the *Architect*.

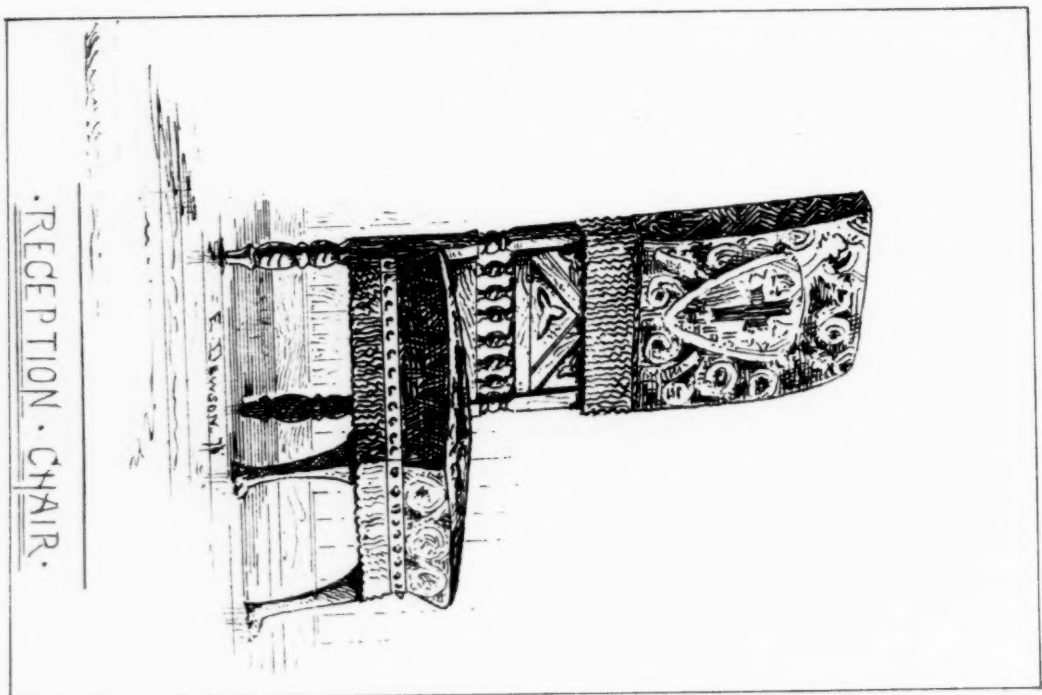
To the healthy development of this new style among us there is first needed knowledge of local precedent, such as we may hope to receive from the well-known antiquarian fervor of Mr. McKim, the new Secretary of the Institute, and such as Mr. Arthur Little has contributed in his "Early New England Interiors."¹

This book contains thirty-eight sketches of interiors of the eighteenth century, from some of the older seaport towns of the New England colonies. Mr. Little modestly states in his brief preface, that they "are the results of a summer's work, undertaken for his own pleasure and instruction, and also with the desire to preserve the relics of a style fast disappearing; this disappearance owing partly to the perishable materials of the work, but chiefly to the national love of new things in preference to old." The subjects are well selected, and, though drawn with a heavy hand, not too well, and with a want of appreciation of the value of detail, which is to be regretted, preserve the essential features of the characteristic staircases, chimney-pieces, doorways, and corner buffets of our ancestors. Such examples are precious, not only for their associations and for their technical qualities, but because they are the genuine, unaffected, and unsophisticated productions of a certain phase of antiquity. Thus the parlor chimney-piece in the Devereux House, the doorway in the east parlor of the Nichols House, the Cabot House staircase, all in Salem, which perhaps are better preserved in Mr. Little's drawings than the other contents of his volume, are fair indications of a style so disciplined and ordered as to be capable of a certain degree of elegant expression, even in the hands of an uneducated carpenter. The chimney-piece, in especial, is full of the flavor of polite colonial life, restrained, fastidious, formal, and to our eyes quaint and somewhat pathetic in its unconscious innocence of the quips and cranks of modern art. The delicately panelled pilasters on the sides, with their precise strings of buds dropped from a correct bow-knot at the top, the frieze with its delicate conventional festoons and vases, and the lyre and leafage in the centre panel enclosed in a thin oval wreath of buds, the shelf with its fine subdivisions of mouldings, and its careful detail of dentils,—all these features enable us to realize the well-ordered households of the Madam Esmonds of the colony, and, combined, seem to give to history the very essence of the epoch.

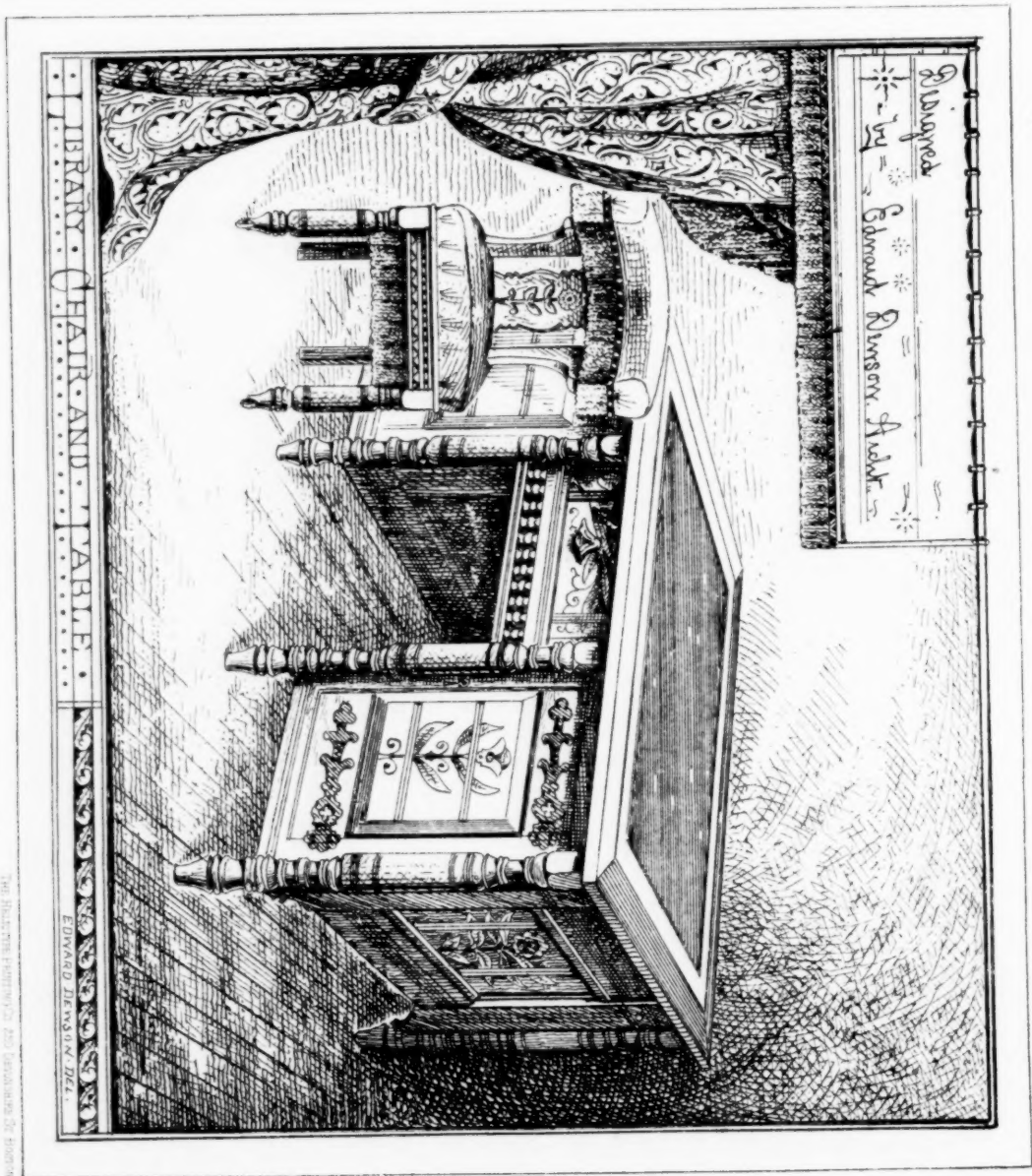
An architecture possessing such capacities of expression in its details, and standing but a little distance aside from the traffic and bustle of modern life, is worthy of a more careful setting forth than it gets in the work before us. If the studious measuring and careful drawing of such bits of antiquity as the panelling, the mouldings, the twisted balusters, three different patterns to a tread, the carved newel-posts, and the workmanlike string-pieces of the staircases in the Ladd and Langdon Mansions at Portsmouth, the Hooper House and Lee House at Marblehead, the Cabot House at Salem,—if the study of such honest details as these were made a necessary part of the education of our young architects, the architecture of the future would profit by it, and history would receive a new and notable illustration.

For these reasons, although applauding the idea and the intention of Mr. Little's volume, and although thankful to him for what he has done, we regret the absence of a more elegant and exact execution, and more especially of such measured profiles and details as are essential to the full understanding and realization of the subject. In fact, the details are the essence of the style; but to an un instructed mind, they cannot be predicated from these sketches, to the proper interpretation of which the modern imagination is a perilous assistant. It seems to us that the pictures, as pictures appealing to the popular eye, would have lost none of their interest if the enlarged details had been properly set forth, as a margin perhaps upon each page; certainly not if the pictures had been treated more graphically, and if the old-fashioned accessories of furniture, old china, and bric-à-brac had been added to

¹ Early New England Interiors: Sketches in Salem, Marblehead, Portsmouth, and Kittery. By Arthur Little. Published by A. Williams & Co., 283 Washington Street, Boston, 1878.



RECEPTION CHAIR.



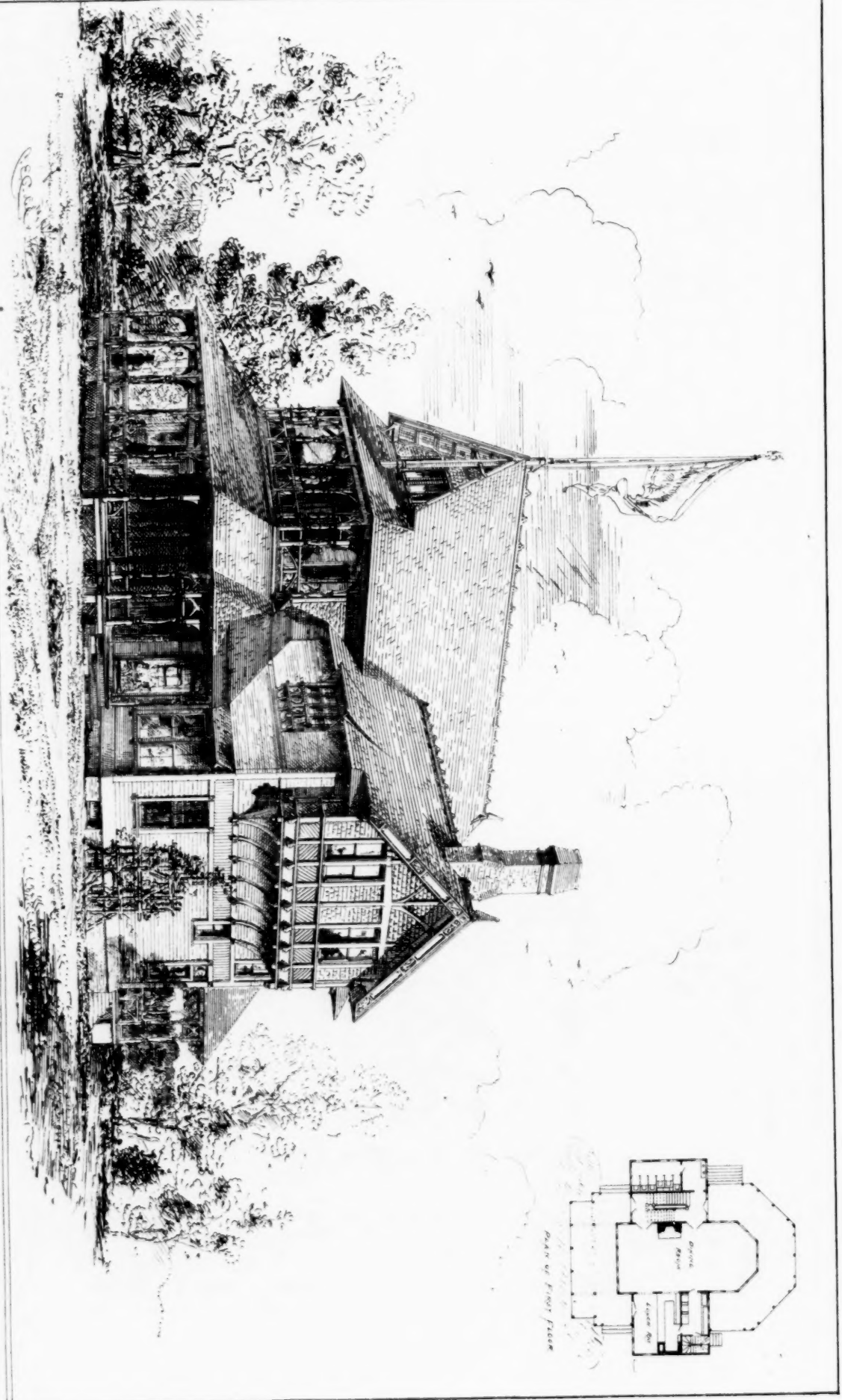
THE HOLLAND PATENT CO. AND DESIGNERS OF HOLLAND

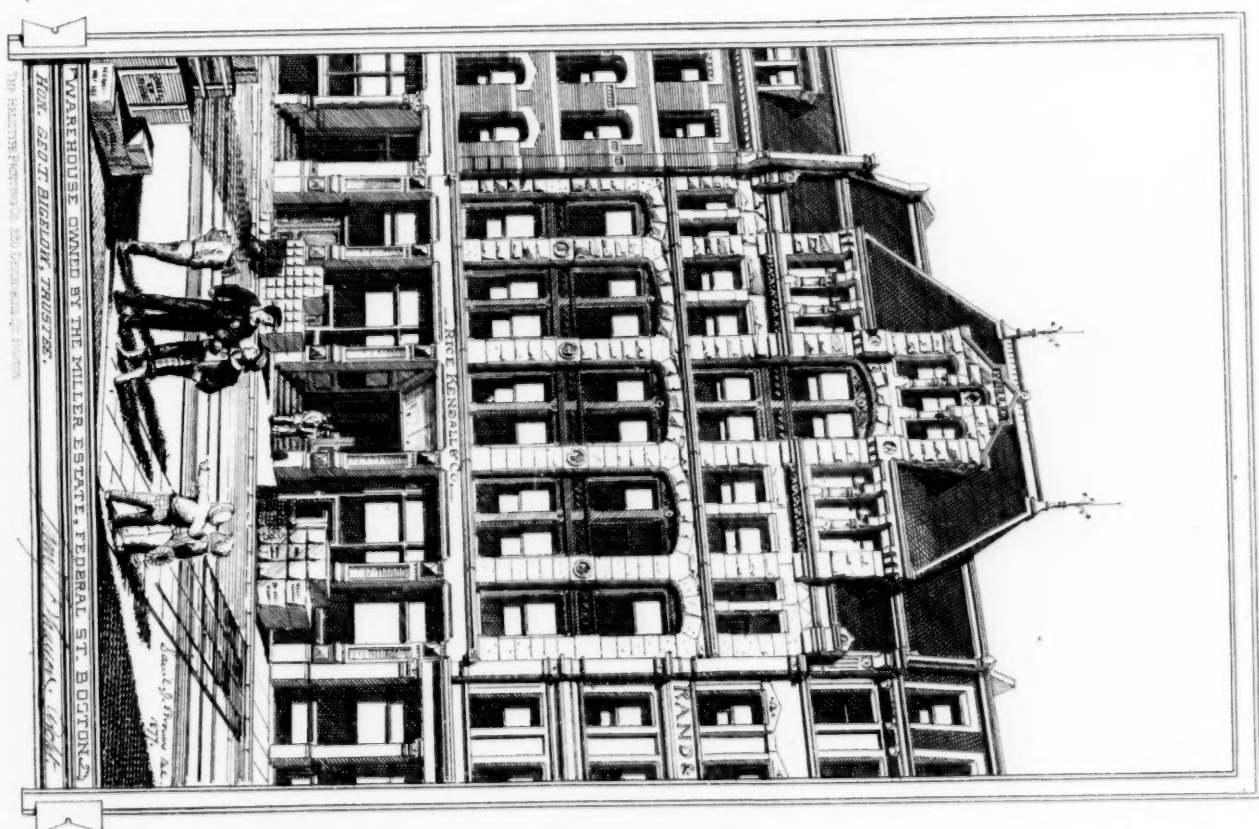
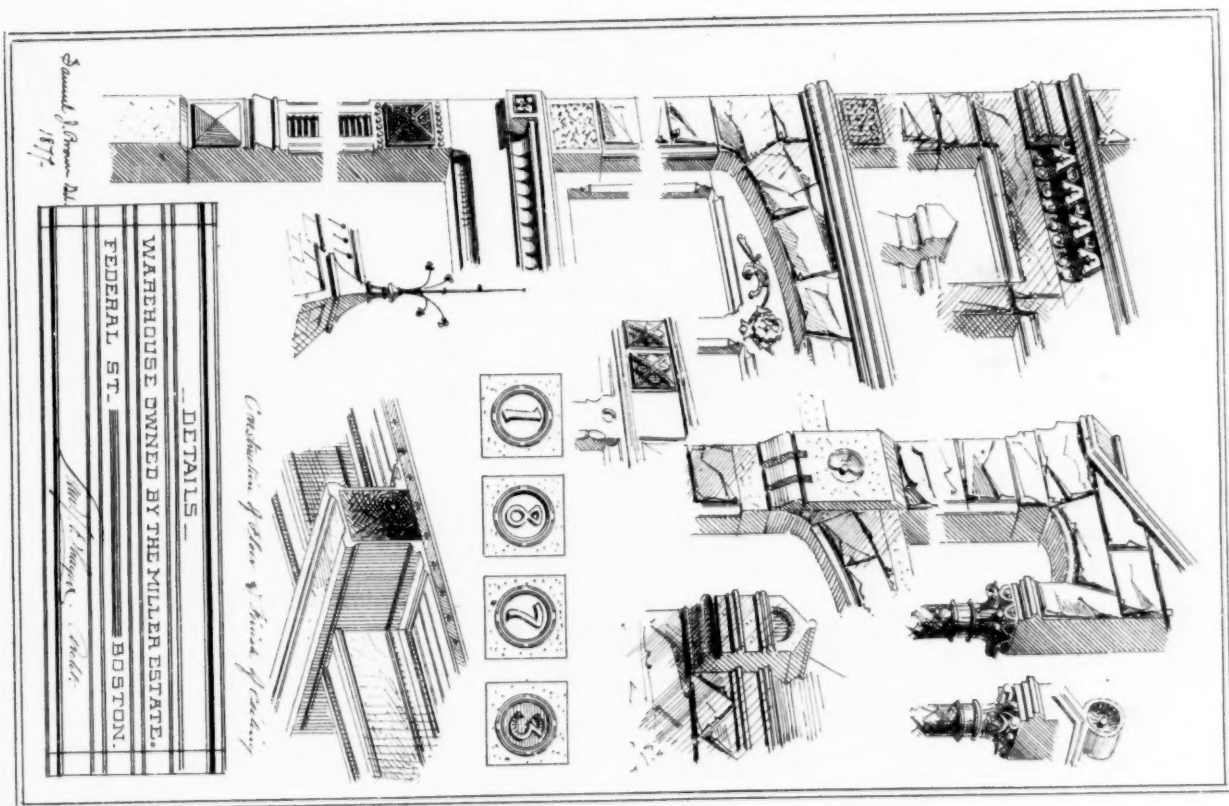
EDWARD BENSON, DEL.

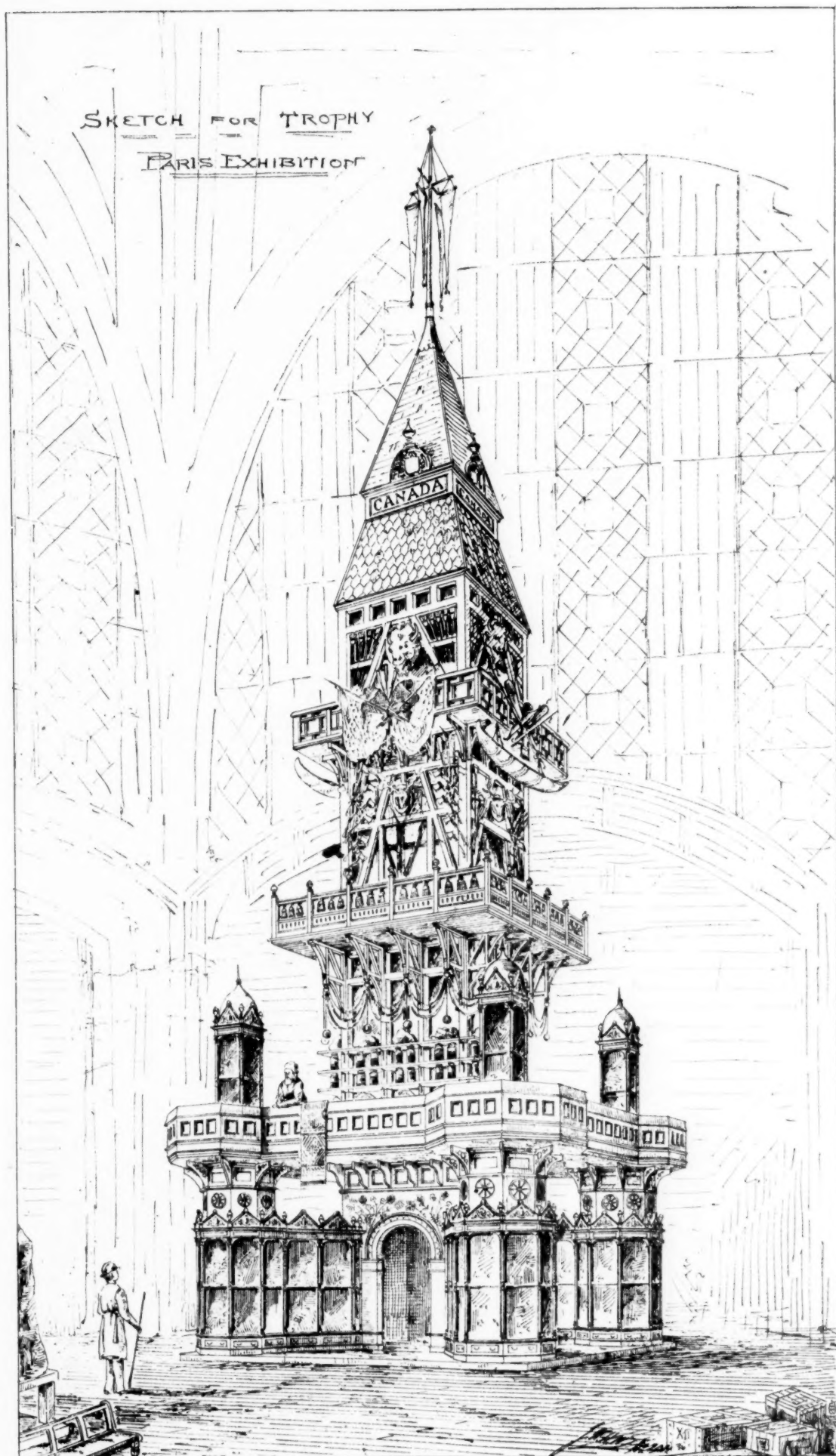
THE BUILDING PHOTOGRAPHIC CO. AND ENGRAVERS OF NEW YORK

Shaw's Green, New York

"The Cottage" at Regis Williams Park, New York







heighten the peculiar charm of the scene. Andirons, logs, hearth-rugs, and fire-irons, for instance, would better set forth the old chimneys than the painfully-drawn summer blinds or screens which fill the void of the fireplace in many of these sketches, and deny its cheerful suggestions.

Now that Mr. Little has been enterprising and ingenious enough to begin for us the work of preserving our antiquities with his pencil, we trust that others may be tempted to carry it on to a more complete and satisfactory conclusion. The materials are ample in all the older parts of the country, the lessons to be drawn from them are much needed, and the demand for them will increase with our civilization.

THE ILLUSTRATIONS.

THE CANADIAN TROPHY FOR THE PARIS EXHIBITION, 1878.

This structure will be erected in one of the towers of the Exhibition Building at Paris. The design, after being prepared by the Chief Architect, Mr. Scott, was submitted to the French Legation in London, by whom it was highly approved. It is now being framed at Ottawa, from whence all the necessary materials for its completion will be sent. The trophy will be of wood, one hundred feet in height, in four stages, the lowest of which will cover a superficial area of nine hundred square feet. It is difficult to give a complete description of the trophy as it will appear at the exhibition, but the following articles have been provided for: Canadian wild flowers, exhibits of wheels, gas fittings, and such small articles as do not need to be covered, around the front of the gallery. The shelving upon the second stage will be occupied by geological specimens and such agricultural produce as may be contained in bottles. Festoons of rope, etc., are to be hung from the gallery above. The third stage will be devoted to lumbermen's tools and agricultural implements. Over the doorway on each side of the tower specimens of moose and elk heads will be placed. Suspended from the gallery above are to be some good specimens of Indian canoes; and in the centre of each side of the gallery, groupings of fishing-nets, spears, paddles, buffalo-robos, and Indian work. Four large buffalo-heads will surmount the doorways, and larger kinds of corn brooms and miscellaneous articles will decorate the sides of the tower. The roofing will exhibit specimens of Canadian slates and shingles.

"THE COTTAGE," ROGER WILLIAMS PARK, PROVIDENCE, R.I. MESSRS. STONE AND CARPENTER, ARCHITECTS.

This cottage is now building in Roger Williams Park, by the Union Railroad Company, and is to be used as a restaurant and for the accommodation of visitors to the Park. The octagonal end overlooks the pond, the piazza commanding a fine view of the same. The piazza at the other end is two stories high, the second story being intended for a band stand.

WAREHOUSE NOS. 91 AND 93 FEDERAL ST., BOSTON. MR. S. J. F. THAYER, ARCHITECT.

This building was built in 1873, and with some effort to make it safe against danger from fire. The floors throughout are built with heavy girders from 4' 4" on centres, covered with 3" plank doweled together, with an upper floor for finish. Believing that the upper part of a building is most vulnerable, it was a part of the purpose to omit windows near the adjoining estate in the upper stories. The roof is wholly of incombustible materials, iron rafters, with the Cornell lath-iron plastered underneath and covered with concrete, hollow tiles, tar and gravel. The building covers 11,000 feet of ground.

CHAIRS AND TABLE DESIGNED BY MR. EDWARD DEWSON FOR LAWRENCE, WILDE, & CO.

NEW BOOKS.

CEMENT AND IRON.

Not long ago, a builder distinguished for his thoughtful interest in the details of his profession called our attention to the tenacity with which Portland cement adhered to iron, and expressed his conviction that before long some way would be found of using the two substances together.

This prophecy seems likely to be fulfilled, to judge from the interesting account just published of certain tests made upon beams of concrete with iron ties embedded in them, the invention of Mr. Thaddeus Hyatt.¹

In studying the theory of a variety of fire-proof floor common in France and used to some extent in other countries, which consists of a tier of rolled iron I-beams supporting, either with or without the help of a network of small rods, a mass of concrete which completely encloses the iron, the idea seems to have occurred to him, that if the lower flange of the iron beam could be con-

joined with the concrete by an adhesion equivalent to that with which it is connected to the web of the beam, the web and the upper flange of the beam could be dispensed with, and the resistance to compression which had been the duty of the upper flange could be supplied by the concrete itself, which would require the help of the iron only in resisting the tensile strain upon the portion below the line of the neutral axis.

If a floor could really be composed in this manner of a monolith of indestructible concrete enclosing iron ties, in which the strains and resistances could be calculated with as much certainty as in a floor of brick arches between iron beams, but requiring only one-third the iron, we might consider that the perfect fire-proof floor had been attained; and these experiments show how nearly Mr. Hyatt has realized this ideal.

A Portland cement was specially prepared, he does not tell us how, for resisting fire; and by a remarkable coincidence the coefficients of expansion by heat of the cement and of wrought-iron, within a range of 180°, were found to be practically identical. How successfully the new cement resisted fire, and how completely the concrete and the iron acted together, is strikingly shown in the experiment described on page 20. A slab of concrete 6 feet long, 2 feet wide and 7½ inches thick, tied with seven flat bars embedded in the concrete, was laid over a furnace, with a clear span of 5 feet, loaded with an average weight of 300 pounds to the square foot over the whole surface, and heated for ten hours, the bottom of the concrete being red-hot for the last five hours. At the end of the ten hours the slab had deflected ¾ of an inch. Cold water was then thrown by a force-pump against the under side of the slab, and the load was removed; when cool, the concrete was found uninjured, and the deflection had disappeared.

A second trial was made; this time the load was left upon the slab, which during the firing deflected as before, but upon cooling returned to its original level, *lifting the load with it*.

In practice, Mr. Hyatt finds it advisable to place the flat iron bars which serve as ties vertically, in which position they are better protected by the concrete, and to connect them by wires passing through holes in the ties. These wires prevent the bars from moving in the concrete when under strain.

This simple gridiron of bars ¼ inch thick, threaded upon wires of ¼ inch diameter, is shown by the tabular results of the tests to be sufficient for concrete floors of great span; but architects will welcome the system especially for its applicability to dwelling-houses, where by the new method a few bundles of light bars and two or three coils of wire, with materials for concrete, may take the place of the unmanageable and costly iron beams, and the brick arches whose soffits are ugly when exposed, and difficult to cover with a level ceiling.

Many other applications of the principle will suggest themselves, and the author promises to give accounts of further experiments. To show the extensive range of future use which he foresees for the combined beam of iron or steel and concrete, he considers that it may serve even in bridge construction. However that may prove, there are many other problems which such a material will help to solve; and we shall look with interest for developments of the system from any quarter.

THE PLUMBER AND SANITARY HOUSES.¹

This is a curious book. It is printed in luxurious style, with several illustrations after the manner of the art-furniture catalogues, — not at all bad illustrations, after their manner. Practically considered, it is rather a good sort of book, if read with sufficient knowledge; and, for American practice, if read with due allowance for the severity of our winter climate. Perhaps it would be fair to say that it is a book which ought to find its place in every sanitary library which pretends to completeness; but it certainly should not be taken as a guide to practice in the important matters of which it treats. It seems quite to ignore two most conspicuous and valuable discoveries of modern sanitary engineering: (1) the freedom with which sewer-gases pass through the water-seal of a trap; (2) the effect of sewer-gases in corroding lead pipes. These two principles may be regarded as fundamental, and Mr. Hellyer's obvious ignorance of them disqualifies him as a public teacher. Instead of "the best means for excluding noxious gases from our houses," he recommends some of the most efficient means of introducing these gases.

The book is very much such an one as might have been written by the educated son of a practical plumber, who had taken his ideas of the work from his father's untutored practice; who had sufficient cultivation to write well, and to give a tasteful dress to his ideas; and who had given his mind to the invention (and patenting) of certain minor appliances of the paternal craft.

Bosc's ARCHITECTURAL DICTIONARY. — The seventh number of Monsieur Bosc's *Dictionnaire Raisonné d'Architecture* has lately been issued. This number carries the work as far as the letter E, and among other subjects treats of Egyptian and Etruscan architecture.

¹ An Account of Some Experiments with Portland Cement Concrete combined with Iron, as a Building Material. Printed for private circulation.

¹ The Plumber and Sanitary Houses: a Practical Treatise on the Principles of Internal Plumbing Work for the Best Means of excluding Noxious Gases from our Houses. By S. Stevens Hellyer. Published by T. B. Batsford, London, 1877.

CORRESPONDENCE.

THE DUTCH ROOM AT HARPERS' PUBLISHING HOUSE.

NEW YORK.

AMONG the new things is one which is not only new but novel; and among the quaint things of the city which visitors bent on seeing its real gems will not omit, the Dutch room at Harpers' may safely be included. It is the outcome of a whim on the part of some of the firm, to surprise certain associate members upon their return from a European tour. The room is also a memorial to the mother of the Harper brothers, whose united effort founded this great publishing house. She was of Dutch descent; and it was resolved to fit up the private office of the firm in true Dutch style. It was to be a room such as might have been found in mansions along the banks of the Scheldt, or in the residences of the rich traders of the Hague. Time pressed, and Mr. J. Cleveland Cady, when given the commission, was urged to all possible speed. No expense was to be spared, but every thing was to be thoroughly honest, without any flashiness or "splurge;" and in this spirit Mr. Cady has given to whoever may be fortunate enough to see the room an opportunity of stepping back to the memory of William and Mary, and of breathing, so far as surroundings go, in a truly Dutch atmosphere. Mr. Cady selected the Flemish type as being more refined in many details and in the general treatment than the pure and simple boer Dutch. The room given him for treatment is on the main business floor of the publishing house, and in plan is about twenty by thirty feet, with a ceiling about thirteen feet high. It has a southern exposure, and its four windows occupy one side almost entirely. An iron column caused some trouble, but when enclosed gave a good corner pier to a couple of closets which fill the offices of sideboard and wardrobe. For not only was the room to be used as a private retreat, but it was especially intended as a place where the members of the firm might meet in friendly chat with the distinguished authors who have always found so hospitable a welcome at the hands of the Harpers. The ceiling is of solid oak timbers placed against the iron-girder and brick-arch construction of the building. This is no treatment of thin panels glued between thin make-believe ribs, but real heavy oak pieces with the ribbed work and covings so dear to the Dutch carpenter's heart. The floor is laid in marquetry. In shape the room is somewhat broken, the closets, some four feet deep, extending down one side about twelve feet, leave a nook into which the chimney is set. In entering the room from the doorway in the corner, the eye falls first and naturally upon this important feature. It may appear strange that the brilliant Dutch tile above the great open fireplace should be wanting; but in omitting this characteristic, Mr. Cady has lost nothing from the spirit of the room, but has been enabled the better to keep to the subdued treatment for which he was striving. The chimney is in red Philadelphia brick, oiled, without conspicuous joints. The arch over the fireplace is a flat segment, with a course of headers in carved brick as *voussours*. This carving was done by chisel, and the work is clean and full of verve, without the flatness of moulded work. A broad heavy black marble mantel has three deep arches of brick,—fitting niches for rare samples of Delft-ware. The whole chimney-breast is about seven feet broad, with a projection of over three feet. Above the arches the face recedes; and about the top run other courses of carved brickwork. Immediately below the mantel runs the legend painted in black upon the red brick,—“My flame expires, but let true hands pass on. An unextinguished torch from sire to son.” The finish of the room is in a high, many-panelled wainscoting of mahogany; (it is all solid), while between the windows and at the door-jambes, also in mahogany, are pilasters with those peculiar Dutch scrolls, which are yet sufficiently toned down to remove any unsightly heaviness. Above the wainscoting the wall is in plaster painted a bluish-green color, well stencilled with a pattern in oil of the same color, but a different shade, while a deep maroon border runs about it. This section of the side walls is some five feet broad, and above it, reaching to the ceiling, the finish is in oak panels containing a series of paintings; this frieze, the panels about eighteen inches deep, extending entirely about the room. On one side the paintings tell a story of the history of America, while upon the other the general subject is the history of printing. These paintings were made by prominent New York artists who were at different times employed by the Harpers. The paintings generally are on a gold or bright background, the figures in black outline filled in with brilliant colors. Over the entrance door, which is in one corner, a panel shows the four Harper brothers—John, James, Fletcher, and Wesley—at their trade. One reads a proof which another has just drawn from a quaint old press; another is carrying two full forms, while the fourth is working at a case. Filling a tall panel on either side are a stork, and a standing figure of Benjamin Franklin. In the next panel a group of monks are busily at work copying manuscripts; next, in narrow panel, the carving on the beech-tree is shown. Gutenberg printing the first Bible occupies the next full panel, while Caxton's standing figure follows in the series, where Albert Dürer is cutting the first blocks for printing from. This fills up one side of the room.

On the opposite side, the first panel next the window has a view of the discovery of America by Columbus, while on the other side

the discovery of the Hudson forms the subject of a panel. Old Peter Stuyvesant on the “Batterie” is next shown stumping along on his wooden leg, while over the doors of the wardrobe and larder are pictures from New York history, one giving the fight in John Street between the citizens and English soldiers.

On the side opposite the windows are five panels. In the central one, Puck, bearing in one hand a flaming torch, and in the other a telegraphic bobbin of wire, girdles the earth. On one side of this is a view of the arrival of the first ocean steamship in New York Harbor, and on the other the view of a modern Walter press, the latest and best of printing devices. The other panels contain, one the city coat-of-arms, and the other a sage-looking owl. The windows are in a mosaic of colored glass for a height of six feet, then comes a space of clear glass, and above in the heads is more colored glass set in mosaic, the principal lines forming the semicircles and radiating lines so often noted in the sash-bars of old Knickerbocker glazing. Although the glass is colored, it is not at all ecclesiastical in appearance. The Dutch curl is again met with, and many of the smaller circles are filled in with the old style “bull's-eyes,” in colored glass, in a quaintly-mixed red and orange tint, which, when the sun shines upon or through them, show out with the brilliancy of gems.

The furnishing of the room is in full accord with the general spirit. Along one side, extending from door to window, runs a low book-case with drawers, supported on those characteristic twisted rope columns, tapering at either end. The metal-work is heavy, and only as much as necessity demanded has been used; thus the general effect is not disturbed by any specially brilliant details. A table in the centre of the floor is as fine a piece of honest carpentry as is often seen. The legs have the ribbed bulbs which are peculiarly Dutch, with the egg-and-dart moulding above the edges of the table-top. The chairs, like the rest of the furniture in solid mahogany, are of various sorts, some heavy, with solid timber legs, others with tall turned backs and low bottoms, while on either side of the fireplace are a pair of wooden-bottomed chairs, with legs and backs reminding one of the parts of old spinning-wheels. An old chest bound in iron, and a pair of polished writing-desks or secretaries, heirlooms in the Harper family, are placed in the room; but except these, every thing is designed by Mr. Cady. A fabric in raw silk, full of mixed, low-toned color, is used in upholstering the furniture, harmonizing very well with the general sombre tone. On the hearth rest a couple of great fire-dogs, quaint enough to weave the most fantastic dreams about as the flames from the logs leap about their feet.

The whole room is the quaintest of the quaint,—a place to linger in. New oddities constantly strike the eye, while the frieze of paintings by such artists as Fredericks, Abbey, Nast, Homer, Reinhart, Parsons, etc., are worth a special visit. To the Harpers the room is full of family suggestions; and in occupying it they may fairly be said to live in the very presence of their sturdy ancestry.

W.

CONCRETE BUILDING IN AUSTRALIA.

At a recent meeting of the Adelaide (South Australia) Philosophical Society, Mr. B. Herschel Babbage read a paper in which he described at considerable length the experiments he had made in the past, and was now making, in the construction of buildings composed of a concrete formed of sand, gravel, common earth, and lime. Amongst other buildings a very slight building was erected in 1863, which is used for a still-house; it is 11 feet 4 inches long, by 9 feet wide. The arch only rises 12 inches, or one-ninth of the span. One side of this building is supported by a cellar wall, the other by a wall 15 inches thick; one-third of the arch is cut away at one end, and a dome of about 8 feet 6 inches external diameter is built partially on the old and partially on the new structure. Though the weight of this dome is about six tons, only one very slight crack has been noticed in the whole structure. Besides buildings, Mr. Babbage has constructed several smaller works, such as cattle-troughs and bridges, all of which answer the purpose for which they were designed.

Mr. Babbage has also constructed an entire house of concrete,—walls, roof, staircases, all being formed of the same material,—of which he says:—

“I have never seen a house of this kind; and I have looked through every page of the volumes of the *Builder* for twenty years back, to see if there is any record of such a building having been made, but can find none. I am justified, therefore, in calling it an experiment, and I believe that I may add, a successful one. By using Portland cement concrete,—that is, concrete in which the lime is replaced by Portland cement,—you would undoubtedly have a material which would set much sooner than lime concrete; but whether it would at the end of a thousand years be—as lime concrete has been found to be at that age—as hard as or harder than rock, remains yet to be proved, our experience of Portland cement extending over only fifty or sixty years. The great objection, however, to using Portland cement in any quantity in this country is its high price as compared with lime. Even in England, where the price is, I believe, less than one third of its price here, they economize by making the walls very thin, a proceeding which does not suit this climate if a cool dwelling is wished for.

On commencing my new house, I determined to make an experiment that should be adapted to ordinary use by its cheapness. I therefore took no pains to wash the gravel, using it as it came from the creeks in my neighborhood. Undoubtedly, by washing the gravel carefully you can make a better concrete; but where manual labor is so expensive as it is here, the extra time employed in the washing would be a consideration. A good deal of the gravel I used was obtained from a gravel-pit in the neighborhood, and verged upon being too dirty to be used. If I have succeeded with such gravel as this, clean gravel cannot fail to be a success. The style which I have adopted is Venetian Gothic, as one which, while sufficiently ornamental, consorts well with flat roofs, and admits of such irregularities as the necessities of my case required. The part to the right of the entrance-porch is built upon the site and partly upon the foundations of the old house. It is two stories in height, each story being arched over, the top of the arches of the ground-floor forming the floor of the rooms above; and, again, the arches of the upper floor form a flat-terraced house-top, such as we read of in the Bible and in accounts of Eastern buildings. Above the top floor is to be an arched corridor, opening into the tower at one end, and facing the terrace roof at the side, so that it will form a pleasant retreat for people to sit in to work or read whilst enjoying the view and the fresh air, thus utilizing in an agreeable manner a part of the house which is entirely unavailable in houses of the ordinary construction. A few iron rings built into the tops of the buttresses will enable an awning to be spread over part of the terrace as a shade when the sun is too hot. The arch of the dining-room is 15 feet in width, with a rise of 2 feet 10½ inches, the rise being nearly one-fifth of the span. The side walls were 1 foot 6 inches inside the house, and 1 foot 10 inches outside, with buttresses at the outer angles. The lime concrete at the crown of the arch is 10 inches thick, and at the springing 3 feet 8½ inches. After the centres were removed, and the concrete was thoroughly set, a layer of 2½ inches of Portland cement concrete—one of Portland cement to seven of fine gravel sand—was spread over it; and finally this was covered with a layer of one of cement to one of sand, ½-inch to ¾-inch thick, which was trowelled to a smooth face to form the floor of the room above. Thus the finished arch was about one foot one inch thick at the crown, and nearly four feet at the haunches. The weight of this arch is about 32½ tons now that it is thoroughly dry, reckoning 1.4 of a ton to the cubic yard. This is about the weight given in architectural text-books, and corresponds with the result of an experiment which I made myself. The weight of the arch of the morning-room is about 23½ tons. The floor of the dining-room is made of 5 inches of lime concrete, with cement concrete and facing above it of the same thickness as those upon the arch. The floor rests upon 18 inches of made earth, it being raised above the natural surface of the ground; and the consequence is that some slight cracks have taken place in the floor owing to its settlement. No cracks are to be seen either in the floor of the room above or on the arch forming the roof of the top room. The weight of the arch of the bedroom above the dining-room is 27 tons, the bow window being confined to the lower story. The wooden centres, upon which the lower arch was built, were left for eleven weeks before being removed, as it is a large arch, and I did not like to risk a settlement; but I am convinced that they might have been removed sooner if it had been wanted. The arch above was not commenced until six months afterwards. As the ribs of the centres are formed with 1½-inch flooring boards, cut to the sweep of the arch, roughly nailed together with ties and struts 1½ inches thick, the chief dependence for supporting the arches during the building is placed upon a considerable number of uprights and raking struts resting upon the arch of the floor below. Thus the whole weight of the upper arch when the concrete was wet (which must have been upwards of 35 tons) was borne by struts resting entirely upon the lower arch; so that the new arch (nine months old) had to undergo a test very much greater than any weight that could ever be put upon it in its use as a habitation. All the arches of the ground floor had to undergo a similar ordeal during the construction of the arches above. In two cases I have had a slight settlement take place whilst the concrete of the arch was quite soft, owing to imperfect strutting; and in a third case I was taking down the centres during very wet weather,—three weeks after the arch had been built,—when we discovered a settlement of the arch beginning to take place from the concrete not being sufficiently set, and we had to put the centres up again. The result was that after leaving the centres up about two weeks longer, when we took them down we discovered a flaw in the crown of the arch. It was the arch over the morning-room, of 11 feet 9 inches span. As the simplest way of remedying this, I cut a hole right through the arch where it was defective,—being about a square yard,—and left the edges of the hole sloping like a keystone; then put up the centres again, and filled in the hole with fresh concrete. All these arches in due time had their cement covering put upon them, which would at once have shown by its cracking if any fresh settlement whatever had taken place. I have now built in this house upwards of sixteen arches of varying size, from 6 feet square to 21 feet by 16 feet 6 inches; and in no one case has any settlement whatsoever shown itself since they had their cement covering put upon them. The only failures—if they

can be called so—that I have met with were, on one occasion, the giving way of a barrel-arch 4 feet span, forming a flight of steps, owing to one of the principal props breaking in half and causing the fall of the centring, and the wet concrete put upon it; and upon another occasion when a horse mistaking the house-door for a stable-door, came in upon a new arch, the concrete of which was yet green, when one of its hind legs broke the crown of the arch and went down through it. This damage was, of course, easily repaired by cutting the breakage out as described in the account of the preceding arch, and putting in a new wedge-shaped mass of concrete. There is a small inner hall, showing a gallery round it, level with the floor of the bedrooms to give access to them. This gallery is arched over at top. The arches I have described above are barrel-arches extending the length of the rooms, and having a flat Gothic arch. The ground and upper floors of this inner hall are built differently, as the arched ceilings rise from all four sides, so that the arches intersect each other in the angles, forming groins, and would meet in a point at the centre if carried out entirely; but an octagonal aperture is cut in the top, thus forming the gallery before mentioned. The upper part of the hall above this gallery is also arched over in a similar manner, but an octagon is cut out of it, upon the margin of which is built a dome, 6 feet 6 inches in diameter inside, 9 feet outside, which, including the drum, is 8 feet high inside. The whole weight of this drum and dome, amounting to 21 tons, rests upon the edge of the octagonal opening. The first flight of stairs in my new building consists of a flying arch, the bottom resting upon the top of the arched landing over the stairs below, and the upper end abutting nearly at right angles against the wall of the staircase. Upon the upper surface of this flying arch the steps are cut out, or rather moulded, when the arch is made. In building this arch channels or holes were cut in the face of the side walls against which it rests, so that the concrete of the arch might unite with that of the side wall. Whenever, from any cause during the building, it became necessary to put new concrete against the face of the old work, channels were cut here and there in the old face, to form a better junction between them. After the concrete steps were well set, they were covered with a layer of two inches of fine cement concrete, and finished over with half an inch of fine cement, consisting of one of cement to one of sand; like the floor, the nosing of the steps was formed in the cement concrete by the help of wooden moulds. The surface of concrete walls is well adapted for receiving plaster, as it offers a good natural key for it, and the plaster incorporates itself with the concrete, forming a solid body. For plastering my house both externally and internally, I use a mortar to which a small quantity of sugar has been added. The mixture I adopt consists of fourteen bushels of sand, four bushels of unslaked lime, and twelve pounds of the coarsest and cheapest sugar I can get. I generally mix these quantities at one time in a 'bay.' The sand is put round in a ring, the lime, slaked and riddled, is put inside in the usual manner, and the twelve pounds of sugar dissolved in a small quantity of hot water poured over it, and the whole well mixed together. The original recipe was obtained from Algiers by Col. Robe, a former governor of this colony, but there was some mistake in the proportions given in it. Those I have given above are the result of a number of experiments that I have made myself. This mortar sets quicker than common mortar, has more adhesive power, and is very much harder; it has, besides, the additional recommendation of being partially waterproof. I have used for lining baths, small tanks, etc., a mortar mixed in the proportion of 1½ sand to one of lime, with ¼ pound of sugar added to each gallon of the mixture, and found it quite waterproof. The theory of it I take to be that the sugar combines with the lime, and forms a saccharide of lime, which is only sparingly soluble in water. The string-course, cornice, and mouldings over the windows are made in concrete by applying wooden moulds of the requisite forms to the place where these ornaments are to be put, and filling these moulds with concrete. I find that by lining the moulds with damped paper I obtain a better surface, and that it is easier to detach the moulds. For the outer surface of the mouldings I use 'sugar-cement concrete' made of four bushels of fine gravel, one bushel of lime, and six pounds of sugar. The moulds are lined with this fine concrete, and then backed up with the ordinary concrete, so that the mouldings form a solid projection of the substance of the wall itself."

Mr. Babbage's paper was illustrated by a number of diagrams.

In answer to questions, Mr. Babbage said that he considered the cost of concrete under ordinary circumstances would be 25 per cent less than stone or brickwork, and even with that decrease in cost much thicker walls might be constructed, which was a great consideration in the climate of Australia. His house was cooler in summer and warmer in winter than most houses. — *The Builder*.

THE ST. LOUIS CUSTOM HOUSE TRIALS.

The construction of the new Custom House at St. Louis has from the start been under the direction of Mr. Thomas Walsh as superintendent, and till recently of William K. Patrick as assistant. The walls are now nearly three stories high above ground.

In the summer of 1876 the Grand Jury of the United States

District Court at St. Louis made a preliminary investigation of certain charges of dishonesty in the construction of the new Custom House, but left the work incomplete. At its November session, 1877, however, three indictments were found, one against Messrs. Walsh and Patrick for conspiracy to defraud the government, and one each against Lyddan the master mason, and Runyan the master carpenter, for perjury in testifying that certain piers built under their direction were solid when they knew them to be otherwise.

By orders from Washington the trial of Lyddan was taken up at once, although the prosecution was not prepared with all its evidence, and had to ask several intermissions until permission could be obtained to cut into the piers and ascertain their construction. Three piers out of over a hundred were tapped, and were found in each case to contain a cavity filled with broken stone and cement. Permission was sought to explore upward in order to determine the vertical extent of this filling; but the superintendent refused, on the ground that the stability of the superstructure would be seriously endangered thereby. Messrs. Henry Flad, chief engineer in charge of the construction of the St. Louis Bridge, and C. Shaler Smith, civil engineer, testified that if this filled hollow were properly capped with large stones above, no harm could come from the proposed exploration; but that if it were not so capped, but the cavity continued up through the height of the pier, further boring would indeed imperil the work above, and that in that case the whole must be styled bad masonry.

Since the required permission was withheld, the prosecution rested here, and the jury gave a verdict of acquittal. The case turned largely upon the question whether or not the kind of work done could properly be styled "solid masonry," as Lyddan had pronounced the piers to be.

Runyan's case followed. He had declared the piers to be of "solid stone," "as solid as the Rock of Gibraltar itself." The judge, however, instructed the jury to acquit Runyan on some legal technicality, although his indictment was identically the same with Lyddan's, save in the name of the accused.

At the request of the United States prosecuting attorney, the case of Messrs. Walsh and Patrick has been transferred from Judge Treat, before whom the above cases were tried, to Judge Dillon, and is set for the January term of 1878.

THE RECENT BUILDING ACCIDENT AT ST. JOHN, N.B.

ST. JOHN, N.B., Jan. 3, 1878.

EDITOR AMERICAN ARCHITECT AND BUILDING NEWS.

Sir:—An article has just been laid before me, published in your issue of Dec. 22, 1877, relating to the recent disaster to the Walker buildings in Prince William Street in this city, of which Mr. John C. Babcock of New York was the architect, and which in their fall damaged seriously the four-story brick store of Messrs. J. and A. McMillan adjoining, of which we, Croff and Camp, are the architects. The article referred to is quite inexact in its inferences, as the statement concerning imperfect construction and weakness of the McMillan building is an absolutely mistaken one. The destruction of the Walker buildings, it is now generally conceded by the leading experts of the city, was caused by the immense volume of water that fell during the last twenty-four hours previous to the accident; the cambered floors being boarded close before the roof was on, forming a complete water-shed that discharged into the central wall, leaching away the lime from the mortar till it ran down the sides of the wall like milk, leaving a mass of wet sand and bricks which caused the central wall to slip and buckle, as was seen by several eye-witnesses; and that portion of one side wall of the McMillan building that fell was wrenched out by the falling of the heavy timbers of the Walker building solidly anchored to it. The statement made by your correspondent concerning Messrs. West and Anderson in the same article is also erroneous. In conclusion I ask you most respectfully to publish this article at the earliest possible date by way of reparation of the possible damage that may result from the article in question.

I am, sir, very respectfully yours,

G. B. CROFF.

NOTES AND CLIPPINGS.

THE STEWART MEMORIAL CATHEDRAL.—Mr. R. H. Park, the sculptor, has made drawings of designs for three statues for the interior of the Stewart Memorial Cathedral at Garden City. They will be of heroic size, and typical of "Everlasting Life," "Religion," and "Hope." Two of them are designed to fill niches over the two Stewart memorial tablets, and the other is to crown the apex of the chancel arch.

A FILTER TO PURIFY AIR.—At a recent meeting of the New York Academy of Useful Arts, attention was called to a simple method of filtering the air of an apartment. The object is to free the air from dust, excessive dampness, and possibly from the germs of malaria. The contrivance consists of a fibrous woven fabric, strengthened by brass wire. It is to be applied to windows and ventilators, and may be of service on railway cars to exclude dust. It has at least the merit of checking draughts, while admitting air.

COLLEGE DORMITORIES.—Our attention has been drawn to the insecurity of college dormitories—that is, if we may generalize from the examples so near at hand—by a statement that long-needed fire-escapes have at length been put upon Matthews Hall at Cambridge. There are few buildings more exposed to the chance of burning, there are few buildings which it would be harder to escape from than some of these lofty buildings of more recent date, and there are few buildings to whose security from fire are intrusted lives more valuable to the country than these same college dormitories throughout the land. Thanks to late students, early risers, and students' servants, the buildings are not left for more than three hours out of the twenty-four without being the object of a certain supervision, superficial though it be. But students have a right to demand something more than this negative security; and it is to be hoped that the authorities of Harvard College at least will no longer overlook a lack which casts discredit on their prevision and their appreciation of the position they hold as the guardians as well as instructors of the young men who are intrusted to their charge.

INDIANA STATE HOUSE.—The State House Commissioners of Indiana have received the following instructions as to the nature of their report:—

1. Can the building be completed according to the plans and specifications within the limit named in the law, namely, \$2,000,000?
 2. Are the foundations in character and extent sufficient to support the superstructure in such manner that no injury is to be apprehended to any point of the work from settling or crushing?
 3. Are the materials of the superstructure in kind and quality such as to insure stability and permanence?
 4. Are the combinations of materials such as to give strength and security to the entire structure, regard being had to the methods of spanning spaces between walls, constructions of roofs, dome, and towers, supporting stairways, or other dependent portions?
 5. Are dangers from fire sufficiently provided against?
 6. Having regard to convenience, adaptability to the purposes required, harmony and dignity of the work, are the arrangements adequate for light to the corridors and rooms and offices, sunlight by day, and gaslight by night? Is the building thoroughly ventilated?
 7. Is ample provision made for safety, heating the building in all its parts, is also the needed supply of water easily and conveniently accessible?
 8. Is drainage amply provided for?
- Your opinion is also requested as to architectural symmetry, beauty and harmony of parts, including ornamentation and general conformity to the dignity, resources and progress of the State.

THE BENNINGTON MONUMENT.—The erection of the battle monument at Bennington, Vt., is still contingent on raising a large sum of money which is to be obtained by private subscription. Until this sum has been raised, the association intends to abstain from all communication with artists, sculptors, or architects. Still it will be well for architects to bear in mind that they may presently have an opportunity of designing a monument for an association which seems to desire to conduct its trust so as to secure the best results. The designs will, when submitted, be examined only in consultation with the governors of Vermont, New Hampshire, and Massachusetts.

THE BROOKLYN ACADEMY OF DESIGN.—The unhewn stone in the tympanum over the doorway of the Academy of Design in Brooklyn, which has so long remained unfinished, is shortly to have carved upon it a bas-relief, which will represent Michael Angelo when, as an old man deprived of sight, he is examining by touch, as was his habit, the works of the sculptors among whom he is seated.

THE PERMEABILITY OF BUILDING MATERIALS. A series of experiments has been making in Paris by Professor Marcker and Dr. Berthold to determine what substances used in building are permeable by gases and vapors. It was found that bricks, sandstone, shelly tufa, mortar, and cement permit vapors to pass freely through them if they are not kept under water. Substances absolutely impermeable are granite, porphyry, slate, alabaster, limestone, and marble. One conclusion to be drawn from this is, that houses built in places where dangerous gases exhale from the ground are not made absolutely safe from this danger by cementing the cellar-floors, or by laying them with brick or tile, though of course these precautions do something to make the building a more sanitary dwelling. Whitewashing a wall does not make it less viable to noxious gases; but two coats of oil-paint will make it practically impermeable. Thin paper-hangings reduce the permeability of mortar seventeen per cent, and thick glazed paper forty per cent. More attention should be paid to making the walls and floors of cellars impermeable by gases, especially those under which a sewer passes; for as shown by these experiments, the bricks of which the sewer is built offer but little resistance to the passage of sewer-gas which in the winter time, at least, will be drawn up into a heated house more readily than it can work up through cold or frozen earth.

AN ENGLISH MONASTERY.—A monastery for a body of Carthusian monks has just been founded in the neighborhood of London. The buildings cover about nine acres of land. The great size of the monastery is due to the laws of the order which compel each monk to live by himself and to keep perpetual silence. To counterbalance the rigor of these rules each monk is allowed three rooms of moderate size, which often form individual houses, and a small garden where he can raise his own vegetables. The order, which was founded by St. Bruno in 1086, has been a powerful one, and to it is due the convent La Grande Chartreuse near Grenoble in France, and the still more famous Certosa near Pavia. In England the name Chartreuse-house, which their first monasteries in England bore, became corrupted to Charter-house, a name which is associated in most persons' minds with the famous religious asylum in London founded by Sir Thomas Sutton, where eighty poor brethren over fifty years of age are supported, and, also, between forty and fifty scholars who must be the sons of poor gentlemen: besides these there is a large number of day scholars and extra boarders. The title of the order was taken from the name of its first monastery in Dauphiny, Chartreux, the Latin Cartusium.