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THE Chicago papers have been filled of late with stories of investigations into the cost of stone-cutting on the Custom House there. The contractor is Mr. John M. Mueller, of Cincinnati, under one of the percentage contracts which have come down from an older administration of the supervising architect's office, and of which the office has been trying of late to rid itself. By it Mr. Mueller agrees to furnish dimension stone from his quarries—the Buena Vista quarries—for a fixed sum, from \$1.30 to \$1.47½ per cubic foot, according to size, we presume. He is allowed for sawing 35 cents per superficial foot, but for the cutting is paid the actual cost, plus fifteen per cent commission to cover the use of sheds, tools, and other plant, the cost of supervision, and profit. This would not be an unreasonable arrangement if the work were done economically by the contractor; and it tends in favor of good workmanship. But, unfortunately, it makes it the interest of the contractor to do the work as expensively as possible, by letting his men spend as much time as they can on it, while it provides no way for the Government to control or check him except by seeing that the days' work charged on the pay-rolls is actually spent over the work. The Government provides a timekeeper, who sees that the men are actually on hand and at work as the contractor claims, but they are hired and the foremen provided by the contractor himself. This puts a premium on "soldiering," and unites everybody by a common interest in making the work hold out as long as possible, leaving the Government without remedy except by proof of absolute fraud, a thing which in the nature of the case it is difficult to establish. In fact, fraud is unnecessary when simple negligence and slackness can be made just as profitable.

If the reports furnished the Chicago papers are to be trusted, Mr. Mueller has used his opportunities with assiduity. For instance, we are told that there are sixteen chimneys on the building, the stone toppings-out of which are twenty-two feet high. There are four large ones with shafts about eight and one half by four and one half feet; the rest are about five and a half by four and a half. These sixteen chimneys, containing 450 cubic feet and 320 cubic feet each of cut stone, cost the Government sixty thousand dollars. They are capped with courses 21 inches high, carved rather plainly with a leaf moulding. Each cap is a single stone, the flues being cut through it. Upon these caps were charged, for the large ones from 72 to 74 days for stone-cutters' work, and from 264 to 268 days of carvers' work, the cutters being charged at three dollars, and the carvers at \$3.75 per day. On the smaller caps were charged from 52 to 54 days of stone-cutting, and from 180 to 184 of carving. This with the cost of the stone and the contractor's commission brought the cost up to from \$1,640 to \$1,798 for the larger caps, and from \$1,232 to \$1,298 for the smaller. The corona of the main cornice, which is a not elaborately moulded course of sixteen inches high, is found to have cost twenty-five dollars per running foot, and the urns put upon the pedestals of the balustrade are set down at \$325 each. The government su-

petintendent, Mr. Burling, complained that it was impossible to get a fair day's work out of the men employed under such a system, which we should think very likely to be true; though when asked if he had reported the matter at Washington, he said that he had not, assuming that the accounts would sufficiently explain it. He had at one time himself set a gang of stone-cutters at work recutting some stone to suit the changes that were made in the design of the building, but said that the contractor had interposed with a claim that the work belonged to him under his contract, a claim to which the authorities at Washington acceded. It is further reported that the carvers on Mueller's pay-roll, when there was not stone enough on hand to keep them busy, and while their work was actually charged to the Government, were occupied in carving sleeve-buttons and small knick-knacks which were given to various superintendents, foremen, and timekeepers. These things are reported on the authority of the collector's office, where the accounts are under examination. It remains to see how far they will be substantiated, and what remedy it will be found practicable to apply.

THE attack of the disappointed architects upon the Commissioners for the Indiana capitol seems to be subsiding, as it appears that there is no likelihood of their finding redress in the courts. The suit brought by Mr. York in the name of the architects has apparently fallen to pieces, and within a few days the court has decided against the injunction claimed by Mr. Tibbetts in his capacity of a defrauded tax-payer. The judge ruled that since the cost of the State House was fixed by law at a definite limit, Mr. Tibbetts would be equally taxed whichever plan was adopted, and so could not be injured by the choice of any plan, which declares in effect that a tax-payer can be injured, in the view of the court, only by the amount that is collected of him, and not by the way in which it is spent. If, as alleged, the Commissioners did not examine all the plans, which it certainly was their duty to do, a person who was not a competitor could have no showing in court as a tax-payer. As to the examination of the plans and the treatment of the experts, the report of the Commissioners, which we have received, shows the view they took of their duties or powers. They requested the experts to report concerning the plans—whether they would come within the cost required; whether the foundations, material, and construction were what they ought to be; whether there was proper provision for light, heating, water, gas, and drainage; and finally their opinion was requested in a general way "as to architectural symmetry, beauty, and harmony of parts." As a preliminary, the plans were examined separately by Commissioners and experts, and roughly divided without dissent, it is said, into two classes, seven in the first and seventeen in the second, and two of them being taken as examples, the engineer and builder among the experts were set to make a minute verification of the estimates in them. The average cost per cubic foot of these two was taken as a measure for making approximate estimates of the rest. Then all the experts were directed to examine the designs, and make a written report on the characteristics of each. What the Commissioners meant by this is to be inferred from their saying that "to avoid all uncertainty as to what data determined their opinion in each case, it was thought to be more satisfactory that they should state the facts shown by the plans and specifications, thus permitting the Commissioners to form their own conclusions from the facts presented." This we take to be a polite way of saying that the Commissioners desired the experts merely to explain the plans to them, but wanted none of their opinions, preferring their own. It does not appear then that it was of any advantage to them to have an architect among their advisers. Without attempting to decide what was the real intent of the legislature, and setting aside the question of collusion, of which we know nothing, we do not see any indication that the Commissioners exceeded their powers. If they made a bad choice of plan, as it was very likely they would, this was one of the risks which belong to such a way of selecting. Their method of examination, if it was applied with skill, seems to have been sufficient for getting such an approximate estimate as the limits of the appropriation required, and as close as it was reasonable to expect. If it kept the experts busy for two months to estimate on two of the plans, it may be assumed that the twenty-four would, at the same rate, have occupied them for two years, which would have been intolerable. The

Commission will settle its own account with the legislature. The obvious criticisms on the whole business are, that it was a delegation of irresponsible authority to a board which might or might not be fit for its work; that the work was made unnecessarily laborious for both Commissioners and competitors, and unnecessarily vexatious for the architects; and that the Commissioners apparently cut themselves off from the benefit they might have got from their expert advisers. As for the architects, if they did not go into the competition with their eyes open, it was their own fault.

THE New York *Tribune* contained a few days ago a long and rather startling letter from Mr. Augustus Maverick, in which he traces the history of the Socialist movement, as represented by the International Society, through the last fifty years, from its rise in London and its banishment from most European states, and the transfer of its headquarters to New York, down to the present day, and declares its close affiliation throughout with the trades-unions, as well as its deliberate purpose to make them an instrument for accomplishing in this country what it has failed thus far to accomplish in Europe, except momentarily,—the subversion of established government and the substitution of a Commune. The condition of things at Chicago as we write gives point to such a letter. We have not the means of verifying Mr. Maverick's conclusions, and it may be that the doings of the Socialists impress him with an exaggerated sense of their importance. Nevertheless we believe that his prominent idea, that the Socialist leaders are struggling hard and successfully to identify the workmen of the country with themselves, is true, and that the movement is much more important than is commonly realized. The effort of the Socialists to turn all the labor-movements to their own uses, and to make cat's-paws of the trades-unions everywhere, is too marked to be overlooked, if one pays any heed to it. The connection is not so visible, nor the Communist element so active, in the Eastern cities, where society is better poised; but in the Middle States and at the West, as far as San Francisco, they are, we believe, a source of serious danger. The astonishing suddenness with which the railroad riots of last summer, beginning in the strike of a trades-union of so great pretension to respectability as the Brotherhood of Locomotive Engineers, spread into a great communistic uprising, which only a military force could quell, is proof enough of the wide grasp of the Socialist influence, its confidence, and its efficiency. The wild talk and threatenings of Kearney and the demagogues that headed the workmen's meetings at San Francisco a while ago, and the alarm with which they filled the city, are a confirmation of it, as is the present condition of things at Chicago. And in the soberest concerted movements of the workmen, wherever they set forth their purposes in platforms or manifestoes, at their congress at Newark in December last, or in the meeting of the unemployed at Boston in January, the hand of the Socialists is unmistakably to be seen. The fact that their hope of securing any actual control in the community in its present condition is idle, by no means proves that their efforts are innocent. That a great city should be given over to violence for a single day is not a light misfortune. It means the loss of a good many lives and the destruction of a vast amount of property; and so much may happen on any day. But the real danger is to our minds a more permanent and serious one than this. It is the gradual demoralization of the working classes, their growing discontent with work, and unwillingness to identify themselves with the communities in which they live. This is a condition which it is the essential occupation of Socialism to aggravate, and which, whether or not it leads to political or social convulsions, tends directly to the disorder and degradation of all industries.

In Chicago the movement has become so threatening as to excite serious alarm. It is not easy to judge how much of what we hear is truth and how much exaggeration, but it is undoubted that the Socialists have a compact organization which is pretty extensive, which puts its men under arms and drills them into military order. The police report no less than nine halls in the city where the men are regularly drilled. They are said to be supplied with Springfield rifles, and to number two or three thousand. The continued depression of business in Chicago has made many idlers who, joined with the ruffianly population always to be found, may be depended on to lend a hand to any violence that is set going. It is said that the Communists can

poll eight thousand votes in the city. The leaders disclaim at present any intention of violence, but so much arming and drilling is not undertaken for nothing, and while the citizens are trying by private subscription to arm their police force, cut down in its equipment by the hard-times policy of the city government, there is a whisper of an intended outbreak in June. Here, too, there is the significant alliance with the workmen; and we are told that preparation is making for a general strike among the trades-unions, of which a strong fraction is the various trades in the seventy or more furniture manufactories. The audacity with which the thing is done is certainly a singular phenomenon. Whether it breeds open disorder or not, it is an ill omen for the workmen of Chicago.

THE English building papers give accounts of the funeral of Sir Gilbert Scott, which was celebrated in state in Westminster Abbey on April 10th. It was attended by deputations from the Royal Academy, the Royal Institute of British Architects, the Architectural Association, the Archaeological Institute, and other societies, with a large number of notables. On Sunday afternoon following Dean Stanley preached a funeral sermon in the Abbey. This building had been long under Scott's care, who had restored it in part, and left designs for further work on it, of which the most important parts are a restoration of the northern porch, and a new cloister. He had published a book on its archaeology ("Gleanings from Westminster Abbey"). The Dean anticipated the request of the Institute by intimating to Scott's family a desire that he should be buried in the Abbey. He was laid in the nave, by the side of Sir Charles Barry, and in front of the pulpit which he himself designed.

A GENTLEMAN writes to us saying that his son, seventeen years old, has served three years in an architect's office, and is a fair draughtsman, and asks us to advise him through the *Architect* whether he had now better send him to an architectural school, or to some large office; and whether he cannot take a school-course in connection with work in an office. We think it decidedly best in such cases that a pupil should attend a professional school. There are many things essential to an architect's practice which must be and are learned by study in offices; but there are others which he can learn to much better advantage in a well appointed school. The architect's highest need and his greatest difficulty is to learn to design, and this he can study to the best advantage in a school, for the simple reason that it is there made his chief business, and nothing else is allowed to interfere with it, while in an office the opportunities for it are few until he has learned it, and everything interferes with it. He also needs a good knowledge of geometrical processes and forms, a need which is much more important than most persons are aware of; and up to a certain point a knowledge of the theory of construction, a thing which grows more important for him every day. There is practically no opportunity for him to learn these last things in an office. No architect has time to teach them, if he has any work to do, and the routine of work does not lead to them. As a matter of fact the men who study only in offices almost never learn these things well, and are so far inferior to those who do learn them. In designing and drawing, on the other hand, progress is in an office necessarily slow, for it is impeded by a multitude of practical duties which are endlessly repeated and are best learned separately. The same reasons which make it an advantage to study in a school make it important to give one's whole time to it while doing so, and we should advise no one to attempt to carry on the two kinds of study simultaneously. Finally, a thing not to be neglected is the companionship of many other students engaged in the same pursuit, which, in a well managed school where students are old enough and interested enough to have some independent activity of mind, is a most invaluable stimulus. The best school-training in architecture that can be had is probably that of the School of Fine Arts at Paris, to which many Americans go, but to which many cannot. There are unfortunately no English architectural schools. In the United States there are three in running order,—that at the Massachusetts Institute of Technology at Boston, which is the oldest, one at Cornell University, and one in the Illinois Industrial University, that at the University of Michigan having been, we are sorry to say, discontinued. We have spoken before on this subject, and at greater length, in a series of articles addressed to architectural students more directly, in our numbers of September 30 and October 7, 1876.

A CORRESPONDENT, whose communication we should publish if it were not anonymous, writes to ask for information concerning the proper fees for an architect's work in making alterations or additions to buildings which, as he says, demand considerably more labor from the architect than new buildings of the same cost, and to inquire whether there are any rules to meet the case. The fact that the labor and difficulty of planning and carrying out alterations is exceptional, and so much greater in proportion to their cost than is the case with new buildings as to make the ordinary rate of payment inadequate for it, is recognized by the profession generally, and allowed for in its usages. No precise rules have been fixed for it, but it is provided for in a rough way by the custom which prevails of charging a higher fee than the ordinary five per cent, as is done also in the other exceptional cases of furniture, and monumental or purely decorative work. Just how great this fee ought to be it is not easy to decide by a general rule, and it is one of the things which it is left for the architect to determine for himself in each case. It is customary to make a separate charge for measuring old work, and for making the necessary plans of it. The indefiniteness of the rule in these cases is a thing to be regretted, but not easy to remedy. The fact that it is an exceptional one makes it naturally desirable that the client should be warned of it in the beginning.

HEAT AND VENTILATION.¹ I.

It may have appeared rather fanciful, and arising more from æsthetic than practical considerations, when Mr. George A. Shove, a couple of years ago, proposed, in substance, the erection of glass (or at least mainly glass) dwellings for all those of our race who live on "the shady side of the fortieth parallel of latitude," — though I am not quite certain whether the same principle of constructing glass dwellings might not be applied to the people who live on "the sunny side" of that parallel with the same results, if proper cognizance be taken of the various colors of light. In other words, since glass transmits light, — and Mr. Shove's ingenious conception is based altogether on that power of transmission, — it might very probably be possible to erect a certain class of glass dwellings for the more northern climate of the earth, which would transmit, in gradation proportionate to particularly temperate locations on the globe, the heat rays of light; and another class of glass dwellings for the southern climates, which would rather exclude in the same proportion those heat rays. At any rate, the main idea of Mr. Shove's proposition is one which all architects must recognize as valid, namely, that in order to secure a healthy and comfortable existence for the human race it is necessary to construct, or at least make possible "the construction of, an artificial climate" in every part of the globe.

For controlling the immediate effect of the temperature of the air upon our bodies, and for effecting a proper relation between the out-door temperature and ourselves, we must rely, of course, upon the tailor, who chooses the quality of the garments we wear and their special construction; but for our in-door life it is incumbent upon the architect, considered from a purely practical point of view, apart from his special character as an artist. It is on him that we must rely for the quality of the material wherewith we erect our houses no less than for their proper construction. The Esquimaux very properly dresses in furs and lives in snow houses; in our climate we live in houses of brick or wood, and dress differently with every change of temperature; and for the equatorial regions there is as yet no proper style of clothing, — absence of clothing being purely negative, — and no adequate style of buildings has as yet been invented for those regions, so far as I know. As for the fanning by slaves which is practised in the tropics of the West India Islands, or the fanning by machines in East India, it is, after all, a very unsatisfactory contrivance to produce an artificial ventilation, and has, moreover, no relation to the science of architecture. And yet I am very sure that in course of time the inhabitants of the tropic regions will also be able to obtain an artificial climate as well as we of the temperate zone, or as the inhabitants of the arctic zone.

We architects, however, of the temperate zone have, as I have before suggested, a most difficult problem of our own to solve, in that we have to determine the best construction for a special locality. We must therefore know the temperature of the climate, the geology of the place upon which the building is to be erected, the composition of the materials near at hand for the construction of the building, the changes of weather likely to take place; and all this not as architects proper, not as creators of works of purely artistic beauty, but in that character of architects which unites our profession so closely to that of public health. To a large extent, every architect should look upon himself as a physician. This, from obvious reasons, applies especially to cities, where architects are most in requisition, and where many cooperating causes demand from them not only the creation of an artificial climate, but along with it the furnishing of a perpetual current of pure air tempered to that climate. He must see to it that the house which he builds be so ar-

ranged that not only the temperature of the air in it can always be regulated, — at least to such a degree as advancing science enables us to do, — but also that the air be always fresh and pure. In its sanitary character architecture must, therefore, look to the combination of heat with pure air or ventilation; and the problem is: By what means can we best obtain in our variable climate a constant supply of pure air heated or cooled to the necessary temperature? We architects are responsible for the solution of this problem, and this responsibility increases in proportion as men in these days have to live more of their day in dwellings, — a mode of living which must always increase with the increase of manufactures, commerce, and other industries.

Let me illustrate the vastness of this responsibility of architects as sanitarians in the construction of every kind of building, whether made for human beings or for beasts, and whether it be a private dwelling or a public building, a court-room, a hospital, an insane asylum, a church, a jail, or a prison, by an old but unhappily o'ertrue tale, — The Black Hole of Calcutta.

The most noted instance of the deadly character of impure air, resulting from a deficiency of ventilation, is known in history as the Black Hole of Calcutta, but the mere horridness of that example has obscured the lesson it might and should have taught. It occurred in the year 1756, during the rebellion of the East Indians against British rule, which was finally suppressed by the great Clive, and it may not be improper to recount the terrible tale before you on this occasion and in connection with the subject on which I am speaking.

Calcutta had been compelled to surrender to the native rebel troops, on the 19th of June, 1756, and its small garrison of five hundred and fourteen men, of whom only one hundred and seventy-four were Europeans, had been taken prisoners. One hundred and forty-six of these prisoners had been driven into one of the dungeons of the garrison, known as the Black Hole, a room of only twenty feet square or one thousand six hundred cubic feet, and with only two small windows, and these obstructed by the veranda. It was the hottest time of the year, and the night was uncommonly sultry even for that season. The excessive pressure of their bodies against one another, and the intolerable heat which prevailed as soon as the door was shut, convinced the prisoners that it was impossible to live through the night in this horrible confinement, and violent attempts were immediately made to force the door, but without effect, for it opened inwardly; upon which many became violent. Mr. Holwell, who placed himself at one of the windows, exhorted them to remain composed in both body and mind, as the only means of surviving the night; and his remonstrance produced a short interval of quiet, during which he applied to an old Jemantdar, who bore some marks of humanity about him, promising him one thousand rupees in the morning if he would separate the prisoners in two chambers. The old man went to try, but returning in a few minutes said it was impossible, when Mr. Holwell offered him a larger sum, on which he retired once more, and returned with the fatal sentence that no relief could be expected, because "*the Nabob was asleep, and no one dared to wake him.*" In the mean time every minute had increased their sufferings. The first effect of their confinement was a continued sweat, which soon produced intolerable thirst, succeeded by excruciating pains in the chest, with a difficulty in breathing little short of suffocation. Various means were tried to obtain more room and air. Every one stripped off his clothes, every hat was put in motion; and, these methods affording no relief, it was proposed that they all should sit down at the same time, and, after remaining a little while in this posture, rise all together. This fatal expedient was thrice repeated before they had been confined an hour, and every time several, unable to raise themselves up again, fell and were trampled to death by their companions. Attempts were again made to force the door, which failing as before redoubled their rage; but the thirst increasing, nothing but "*Water! Water!*" became soon after the general cry. The good Jemantdar immediately ordered some skins of water to be brought to the windows; but instead of relief his benevolence became a more dreadful cause of destruction, for the sight of the water threw every one into such excessive agitations and ravings that, unable to be regularly served, each man battled with the utmost ferocity against those who were likely to get before him; and in these conflicts many were either pressed to death by the efforts of others, or suffocated by their own. This scene, instead of exciting compassion in the guard without, only awakened their mirth, and they held up lights to the bars in order to have the diabolical satisfaction of seeing the deplorable contention of the sufferers within, who, finding it impossible to get any water whilst it was thus furiously disputed, at length suffered those who were nearest the windows to convey it in their hats to those behind them. It proved no relief to their thirst or other sufferings, for the fever increased every moment with the increasing depravity of the air of the dungeon, which had been so often respired and was saturated with the hot and deleterious effluvia of putrefying bodies, of which the stench was little less than mortal. Before midnight, all who were alive and had not inhaled air at the windows were either in lethargic stupefaction or raving with delirium. Every kind of invective and abuse was uttered, in hope of provoking the guard to put an end to their miseries by firing into the dungeon; and whilst some were blaspheming their Creator with frantic execrations of torment and despair, Heaven was implored by others with wild and incoherent prayers, until the weaker, exhausted by these agitations,

¹ A paper read at the Eleventh Annual Convention of the American Institute of Architects, by Carl Pfeiffer, F. A. I. A.

at length lay down quietly and expired on the bodies of their dead and dying friends. Those who still survived in the inward part of the dungeon, finding that the water had afforded them no relief, made a last effort to obtain air by endeavoring to scramble over the heads of those who stood between them and the windows, where the utmost strength of every one was employed for two hours, either in maintaining his own ground, or in endeavoring to get that of which others were in possession. All regards for compassion and affection were lost, and no one would recede or give way for the relief of another. Faintness sometimes gave short pauses of quiet, but the first motion of any one renewed the struggle through all, under which ever and anon some one sunk to rise no more. At two o'clock not more than fifty remained alive; but even this number was too many to partake of the saving air, the contest for which and life continued until the morn, long implored, began to break, and with the hope of relief gave the survivors a view of the dead. The survivors then at the window, seeing that their entreaties could not prevail on the guard to open the door, it occurred to Mr. Cook, the secretary to the council, that Mr. Holwell, if alive, might have more influence to obtain their relief; and two of the company undertaking the search discovered him having still some signs of life, but when they brought him near the window every one refused to quit his place, excepting Captain Wilks, who, with rare generosity, offered to resign his, on which the rest likewise agreed to make room. He had scarcely begun to recover his senses before an officer, sent by the Nabob, came and inquired if the English chief survived, and soon after the same man returned with an order to open the prison. The dead were so thronged, and the survivors had so little strength remaining, that they were employed nearly half an hour in removing the bodies which lay against the door before they could clear a passage to get out one by one, when, of one hundred and forty-six who went in, no more than twenty-three came out alive, — the ghastliest forms that ever were seen on the earth. The Nabob's troops beheld them and the havoc of death from which they had escaped with perfect indifference, but did not prevent them from removing to a distance, and were immediately obliged, by the intolerable stench, to clear the dungeon, whilst others dug a ditch on the outside of the fort, into which all the dead bodies were promiscuously thrown.

This horrible tale, gentlemen, told by Mr. Holwell himself, and which at the time of the occurrence of the terrible tragedy and ever since, whenever it has been repeated, has made the human heart shudder at the notion of the ferocity and cruelty whereof the human heart is capable, — is it not, in point of fact, merely a counterpart to the (though it be unconscious) cruelty of the men and women of our time, who shut each other up, in most city dwellings at least, in rooms that are Calcutta Holes, and who, which is saying still more, shut out with special wilfulness from every new-born child the pure air of God? Almost every nursery in the land is a miniature Black Hole of Calcutta, as the tables of infant mortality but too commonly show. We take away from these little infants light and air, — that is to say, heat and ventilation. Light is heat and combined with air creates ventilation; and yet we wonder why infants should die at such a fearful rate, — about five to one, I believe, as compared with adults. We carefully curtain thickly every window of the room wherein the infant passes its first weeks, which is almost as cruel as was the action of the British government in imposing a window tax, whereby the poor and penurious were induced to close up as many windows as possible in their houses, thus killing themselves in order to escape a ridiculous tax. We place our prisoners in cells from which air is as carefully excluded as light, allowing each prisoner, as an average throughout the United States, I believe, from three hundred to four hundred cubic feet of air in his cell, with almost no ventilation and with no light, but gracefully pay the hospital bills which are the results of this treatment. If a prisoner, moreover, proves refractory, or makes himself objectionable in some way or other to his superior, we do still worse: we shut him up with seven or eight others in a cell of the same dimensions, namely, one containing from three hundred to four hundred cubic feet, — a cell carefully guarded against the admission of light or air by thick iron doors, — and keep them there standing, since they cannot possibly lie down, for twenty-four hours and sometimes forty-eight hours, often, I believe, for even a longer time. This cruel, pernicious, and at the same time — while we consider it economically — expensive system of keeping out heat and ventilation from rooms bears not only upon the criminal or unfortunate classes of our society, but bears equally upon the condition of our poor. Whole families of our poor often have to stay in one room, eating, sleeping, cooking, in the same place many times for a whole winter, without receiving any ventilation through the windows. And the door of the room must not on any account be opened, since people suppose that with the passing out of the foul air of the room the warmth will also pass out. The fallaciousness of this proposition I have already shown in a former paper. It is the *fresh cold air* from the outside which has the *elements of heat* in it, whilst the *foul air of the inside* turns into a *deadly coldness* after a short time. It is true that the inmates of these rooms are not always found suffocated next morning, but the whole process is like unto one of gradual strangulation; and if it does not result in immediate death, it results at least in the probably far more hideous phenomenon of perpetual weakness and physical unfitness for life. It may be very poetical when our great German poet Schiller sings, —

"Room is in the smallest cottage
For a happy, loving pair,"

but, gentlemen, it is not the fact. There is not room enough in a cottage of say from five hundred to even one thousand cubic feet for two grown persons; much less, I should say, for "a happy, loving pair." Hence it was a great progress, in regard to this special matter, for the people of Germany when the Prussian income tax was extended all over the German states, for in some of those states it had been the law before to tax people according to the size of their rooms or habitations, judging from them the wealth of the inhabitant. This law was quite as obnoxious as the English window-tax law, and had indeed the same effect, since, while the latter compelled, or, if you please, induced people to reduce the number of their windows, and thus made habitations less wholesome by excluding light, the former tended to make people build their rooms and dwellings generally smaller, and thus made habitations less wholesome by excluding the possibility of ventilation. We may congratulate ourselves that the laws of our country throw no such difficulties in our way, and that, therefore, we architects have only to deal with the irrational objection current amongst so many people to pure air in general, and the necessity of supplying pure air to all people in some form or other.

In regard to this irrational objection, let me quote from a somewhat celebrated work, "Liberty and Law," by the Hon. Britton A. Hill, of St. Louis. He says: —

"Every species of intoxication imparts a fondness for the condition, a desire to recur to the sensations excited by it; and the intoxication produced by foul air is not without this dangerous element, which, indeed, alone can make it possible that men shut out from their dwelling-places God's pure air, as if it were their worst enemy, and yield themselves and their children up to those sensations of drowsiness and stupor which air impregnated with carbonic acid gas invariably excites. Legislation on this subject will, therefore, meet a deep-rooted opposition from the frequenters of dens, cellars, etc.; but in proportion as this opposition has its origin in that same foul air, the law should protect the up-growing generation from similar results, and make possible the raising of a new generation of children, whose bodies shall be free from the fearful taint."

Permit me also to call your attention to these memorable words, wherein he enwraps, as it were, his whole system of public hygiene: —

"It is the duty of the government to provide pure air for every person, and thus protect each from the contaminating influences of all kinds of miasmatic and other impurities."

"The legislative power in each State must regulate: —

"(1.) The laying out of cities and villages in such a manner as to make possible the needful ventilation of their buildings, and providing public drainage.

"(2.) The construction of all private as well as public buildings in such a manner as to make accessible to every inmate the necessary quantity of pure air, and the establishing of private drainage.

"(3.) Personal cleanliness.

"(4.) The laying out of counties and townships.

"To provide, furthermore, all other kinds of food and drink for the human body in the natural condition of healthful purity, the legislative power in each State must regulate: —

"(1.) The sale of all food and drinks consumed by man, so as to secure them to the consumer in their unadulterated purity.

"(2.) The preservation of the health of all animals, birds, fishes, and the soundness of all vegetables consumed by man."

This is surely going all the length of sanitary science, and hence we do not need to follow it up, merely reciting it to point out the many and intimate relations that constantly occur in life between the architect and the physician; just as such connection occurs so frequently between the artist and the architect, and the landscape gardener and the architect. In reading closely works of ancient architecture it seems almost as if some of the most treasured of its characteristics had arisen purely from hygienic considerations.

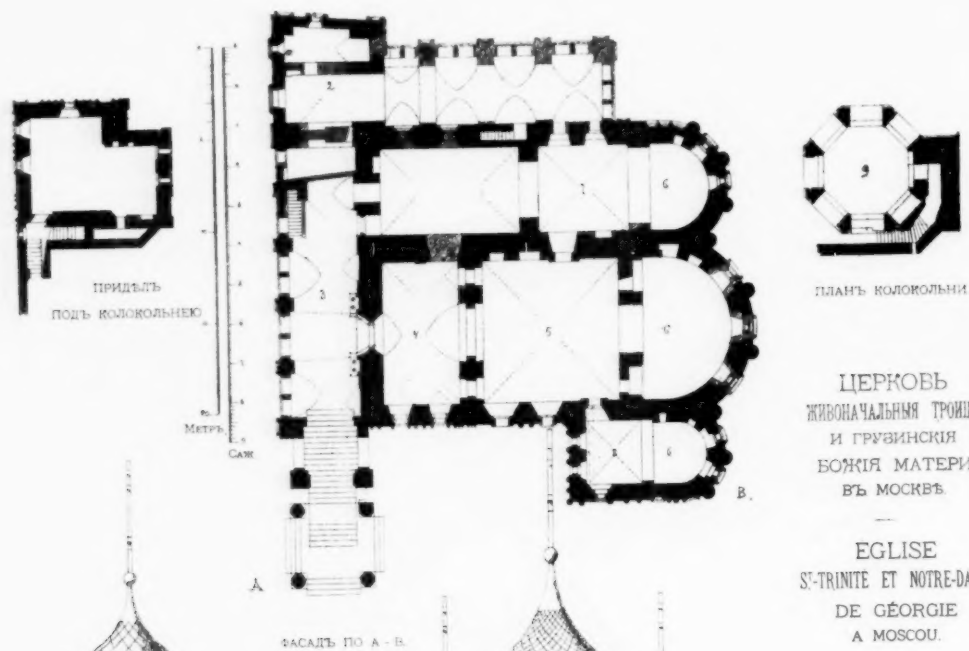
RELIGIOUS ARCHITECTURE.¹

In all countries, in all ages, religious devotion has found its expression in magnificent buildings.

In our own day, in our own country, the desire to be original, the desire to develop a new style, has produced anything but satisfactory results. In the last few years our architects have devoted much time to the study of the theatre, but little to the study of the best ecclesiastical architecture. In their desire to make our churches comfortable they have devoted all their energies to the perfection of the plumbing and the softness of the cushions, and so have left themselves but little time to think of the beauty of holiness. I do not wish to undervalue the importance of light and fresh air, of seeing and hearing, but I do think that important as these things are there are other matters connected with church building that we ought not to leave undone.

Our churches are almost universally built in what is popularly known as the Gothic style of architecture. It is much to be regretted that there is such a thing as bad Gothic, and that it appears with us to be such a universal complaint. In the city of New York we have only one church to which we look with pride, — one church that stands without rival as the embodiment, the expression of religious sentiment; and yet Trinity Church is but an imperfect reproduction of a type common to many of the beautiful parish churches of England. Accepting this as a fact, — and I think few good judges will be found who can deny that this church, built thirty

¹ Papers read at the Eleventh Annual Convention of the American Institute of Architecture, by Mr. C. C. Haight, F. A. I., and the Rev. J. H. Hopkins.



ЦЕРКОВЬ
ЖИВОНАЧАЛЬНЫЯ ТРОИЦЫ
И ГРУЗИНСКІЯ
БОЖІЯ МАТЕРИ
ВЪ МОСКВѢ.

EGLISE
ST-TRINITE ET NOTRE-DAME
DE GEORGIE
A MOSCOU.

ОБЪЯСНЕНІЯ ПЛАНА.

1. АЛТАРЬ.
2. КОЛОКОЛЬНЯ.
3. ПАПЕРТЬ.
4. ТРАПЕЗА.
5. ЦЕРКОВЬ.
6. АЛТАРИ.
7. ТЕПЛЫЙ ПРИДѢЛЬ.
8. ХОЛОДНЫЙ ПРИДѢЛЬ.

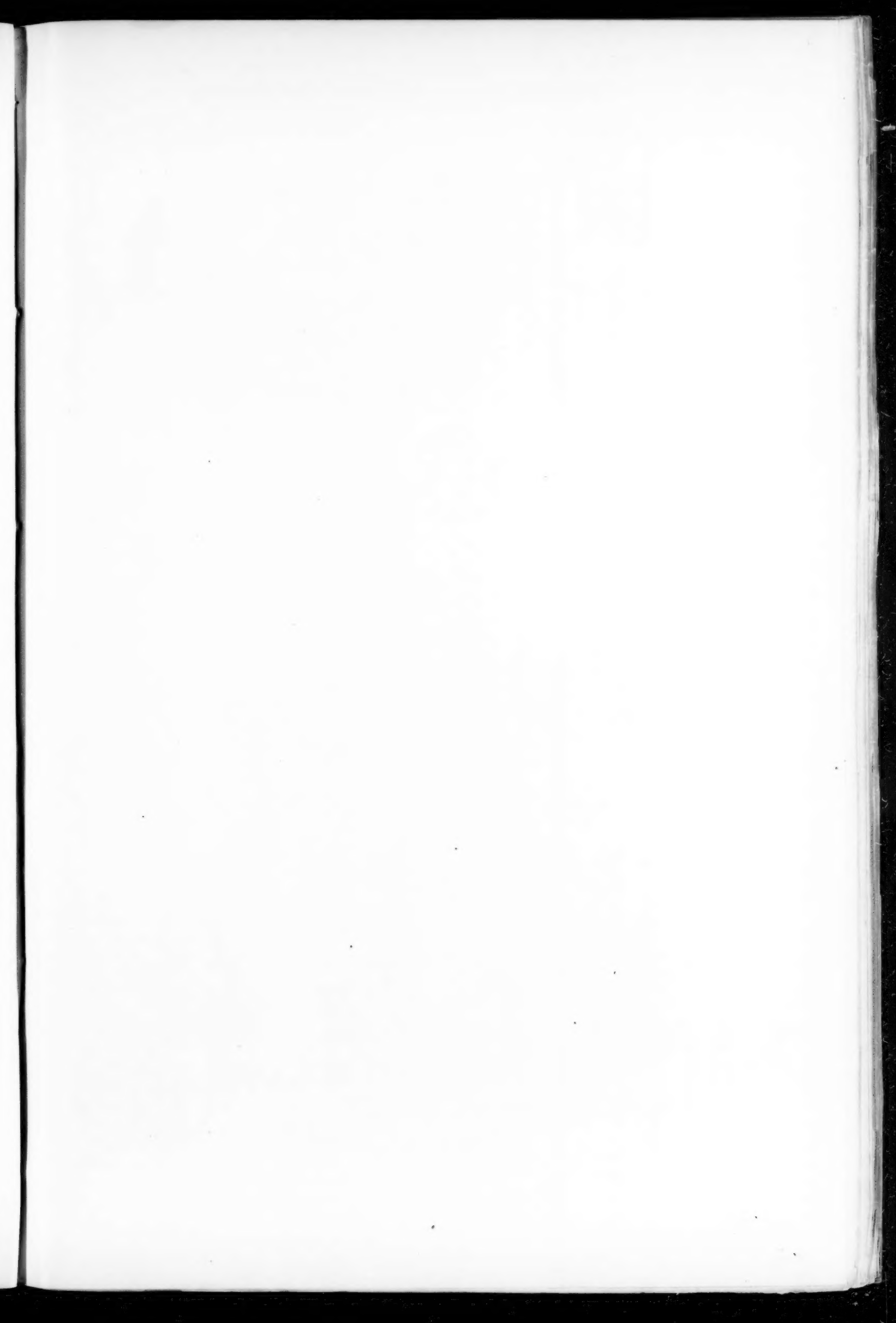
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- ▨ ЧАСТИ СЛОМАННЫЯ.

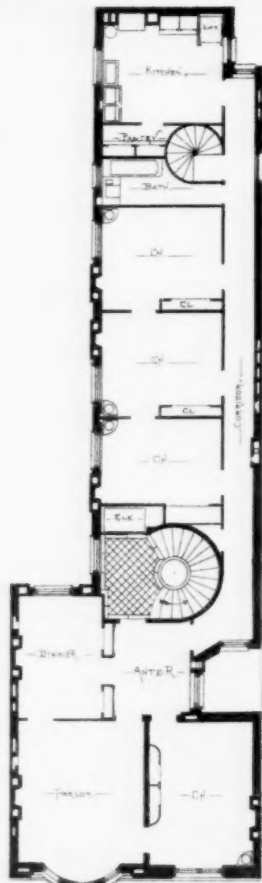
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- PARTIES MODERNES.
- ▨ PARTIES DEMOLIES.

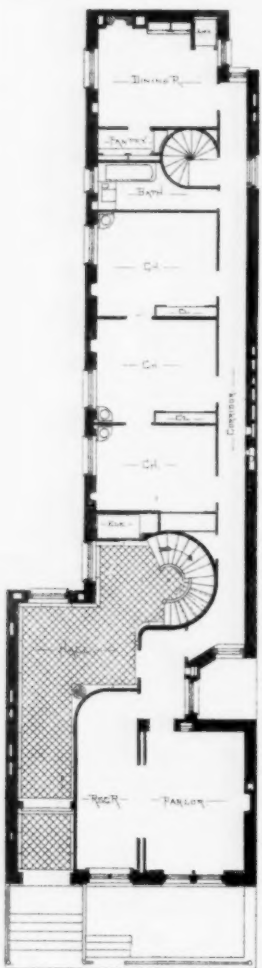
Л. В. ДАЛЬ И В. ЛЕОНОВЪ. L. DAHL ET W. LEONOFF.

CHURCH OF THE TRINITY AND OUR LADY OF GEORGIA. MOSCOW. RUSSIA.

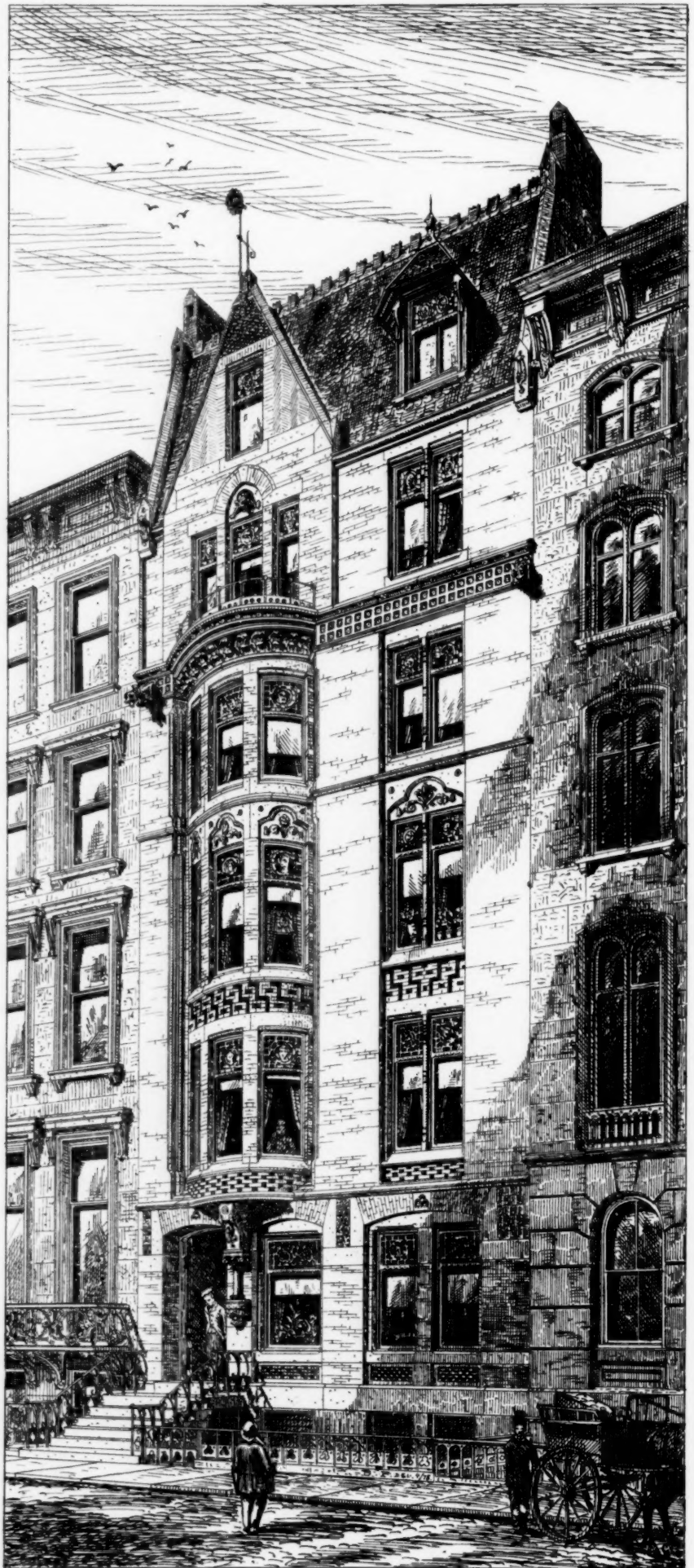




2, 3, 4 & 5TH FLOORS



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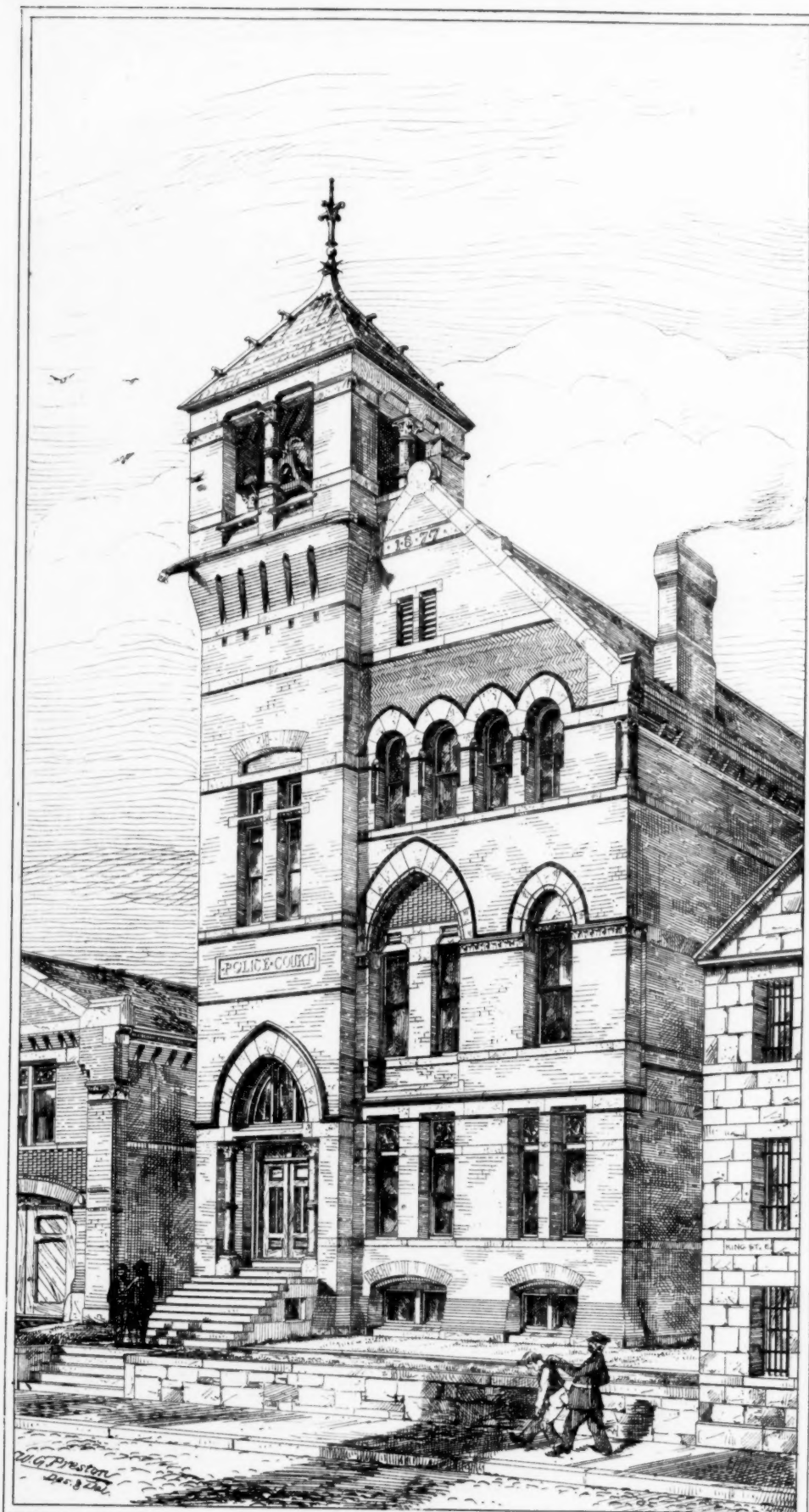
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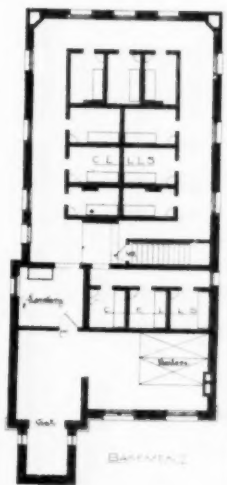
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FIRST FLOW



BAGBY ET AL.

PLATE VII. THREE POINT PERSPECTIVE.

Fig. 24

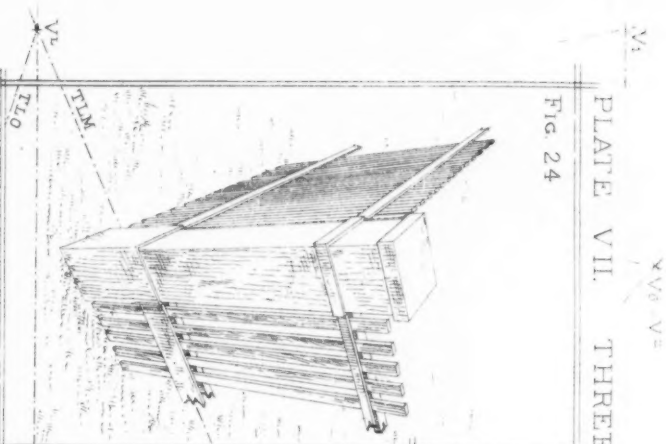


Fig. 25

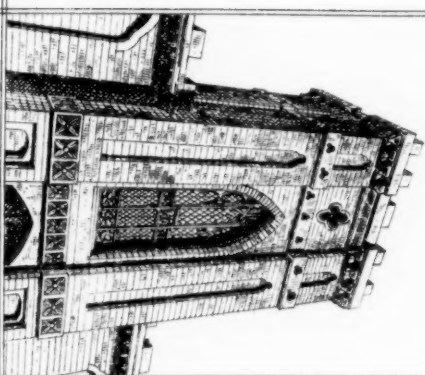


Fig. 30



Fig. 27

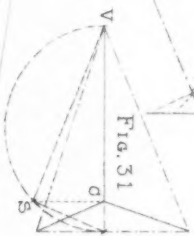


Fig. 28

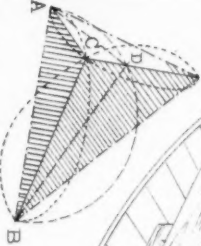


Fig. 29

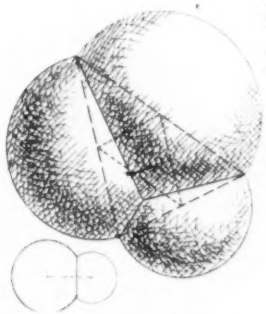


Fig. 32

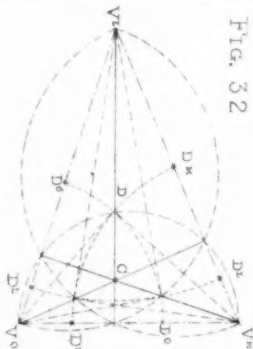
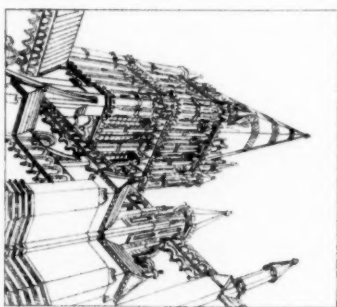


Fig. 26



years ago, has in this country no equal, in spite of its defects, no superior in its architecture and in the impression that it conveys, — we are naturally led to the conclusion, which I would desire to impress as strongly as I can on my fellow architects, and especially on the younger members of our honorable profession, that before entering upon the practice of ecclesiastical architecture we should study carefully, and as far as possible master, the architecture of the churches of England built in the thirteenth and fourteenth centuries. I believe that if we will faithfully follow this plan we shall create in the future churches far more creditable to ourselves, far more satisfactory to others.

I believe, moreover, that before we can succeed in rivalling the religious architecture of past ages we must get rid of the wretched utilitarian idea that our churches are mere preaching houses; and that until we realize that the church is to be built to the glory of God, that it is his temple, where the faithful come together to worship Him, we can hardly hope for success.

CHARLES C. HAIGHT.

SYMBOLISM THE LIFE OF RELIGIOUS ARCHITECTURE.

THERE can be no true architecture without a thorough adaptation to the purpose for which a building is erected. The Colosseum perfectly expresses its object, — the enabling of 80,000 to see the public shows; and the size and costliness of the edifice embodied the vast importance of the *Circenses*, as indispensable to the popularity on which the pagan Roman empire rested. The Quaker meeting-house is equally expressive of a religion which thinks to arrive at pure spirituality by leaving nothing external except what is bald, bare, and (if possible) drab. The old Roman basilicas express perfectly the fact that the forms of pagan architecture were now occupied by a new and conquering spirit, — the spirit of Christianity, — which was moulding the old elements into new forms and meanings. The Byzantine style shows the further progress of this spirit, until the old forms, lifted to their utmost height, could develop no further without losing their identity. Pointed architecture shows the new spirit victorious over the old, and new-forming every detail as well as all the great proportions and outlines into full harmony with itself. The over-luxuriance of the later Pointed expresses the too great wealth and growing corruption of the church, until it found its Nemesis in the Renaissance. And the modern St. Peter's at Rome perfectly expresses modern Romanism, — the imperial dome testifying to the spiritual imperialism which is its essence, and the old pagan ideas of power being once more dominant, notwithstanding all the influence of Christianity in ground plan, elevation, and detail, everywhere ennobling the whole.

All other styles of great architecture show the same: Egyptian, Hindoo, Assyrian, Mexican, — every distinct style is so, because of the distinct ideas in the religion which thus takes on its proper outward expression.

Too many of our modern architects run through all the various styles, and pick out the pretty things, using them to garnish their work, without any reason, except to tickle the eye. We have sometimes such a medley of odds and scraps as deserves only the description of "architectural hash."

The first requisite, therefore, for religious architecture is that the architect should thoroughly embrace, and be devoted to, the religion which he undertakes to express in external form. As that religion is a historical religion and has a marvellous history from the Garden of Eden until now, so its architecture has a history also, from the pillar-stone of Bethel and the tabernacle in the wilderness, down to our own day and country. The knowledge of the past, and the consciousness of the imperious needs of the present, must both enter into the production of true religious architecture.

The wondrous triumphs of mediæval architects are thoroughly alive, in every part, with religious symbolism. They always meant something, in every leading feature, and almost in every detail. It is utterly idle for any one to attempt to master their architecture from the outside, and make it a mere grammar of mouldings and tracery and other ornament. The Christian dogma underlies it all. The Trinity in Unity, the Incarnation, the Cross, the Holy Scriptures, the Apostles, the Church, the Sacraments, Death, the Place of Departed Spirits, the Judgment, the Life Everlasting, — all these, together with smaller matters of every-day life, are found embodied in innumerable varieties of form, in the churches and cathedrals which are the wonder of the world, and draw men's hearts even when they cannot tell why. The church edifice must really be the embodiment, in stone, of the spiritual church of true believers, — the living stones of that sanctuary which is Christ's body. Until it become such, we shall properly have no religious architecture. We shall have only unprincipled architectural quackery. The first requisite for a "religious architecture" is to have a religion.

J. H. HOPKINS.

ILLUSTRATIONS.

APARTMENT HOUSE ON EAST 21ST STREET, NEW YORK. MR. BRUCE PRICE, ARCHITECT, NEW YORK.

This building is designed to have a complete apartment on each floor, planned in such a way as to give external light to every room. There will be five floors of flats, a top floor for servants, and a basement for the janitor. The structure throughout is fire-proof, with

iron floor beams, and beam fillings, partitions of the N. Y. Fire Proof Building Company's Line of Telford tiling, and iron and slate staircases, front and rear. The front is of Philadelphia pressed brick relieved with Dorchester freestone. The cornice of the bay is enriched with terra-cotta foliated work, and the panels of the first story are filled in with tiles of the same material. The roof tiles and ridge tiles are also of terra cotta. The motive of the plan is essentially that of the French flat, so well known to every American who has lived for any time in Paris. The entrance to each flat is from a landing into an ante-chamber; from this, either directly or by corridor, access is had to all the rooms. D. H. King, Jr., has the general contract. The whole will be finished complete, ready for occupation, by October the first prox., at a cost of something under \$35,000.

POLICE COURT BUILDING, ST. JOHN, N. B. MR. WM. G. PRESTON AND MESSRS. SMITH AND DUNN, ARCHITECTS.

Competitive drawings were asked for, in the summer of 1877, by the city of St. John, providing quarters for the police court, lock-up, and a "Temperance Hall." The building illustrated was begun at once, from the premiated design, and is at this time nearly finished. It is upon the highest ground in the city, adjoining the old jail upon one side and the hook and ladder house, some time since illustrated in these pages, upon the other. The building is almost entirely of selected common brick laid in dark mortar, a popular material, as brick always is in cities immediately subsequent to a great fire, the present reaction in favor of stone not having then set in. The basement, which has an asphalt flooring and vaulted walls, contains the cells and heating apparatus, and is mostly above ground on the sides and rear. A prisoners' stairway runs up from the basement and terminates upon the second floor in the prisoners' dock. The first floor contains the office of the chief of police, guardroom, safe for captured valuables, and, in the rear, bed-rooms for the accommodation of gentlemen criminals, or the *jeunesse dorée* of the Provinces who may be found delinquent, and for whom it is thought desirable to discriminate in regard to lodgings. The second floor is devoted to the court-room proper, the clerk's office, lawyers' consulting room, and judges' private room. On the third floor is the Temperance Hall. In the tower is hung a heavy bell connected with the fire alarm telegraph.

CHURCH OF THE HOLY TRINITY AND OUR LADY OF GEORGIA, MOSCOW, RUSSIA.

We regret that we have been unable to find any description of this evidently interesting church, which we here reproduce from the pages of the Russian architectural journal, the *Zodtchey*.

STUDY IN PERSPECTIVE. PLATE VII.

See the "Paper on Perspective" here following.

PAPERS ON PERSPECTIVE.

VIII. OBLIQUE, OR THREE-POINT, PERSPECTIVE.

151. THE last paper discussed the phenomena of Parallel Perspective, in which, of the three sets of lines that define a rectangular object, two are parallel to the picture and have their vanishing points accordingly at an infinite distance; the third alone has its vanishing point in the plane of the picture. This may be called accordingly "One Point Perspective," since it employs only one vanishing point, V^x at C.

152. In the previous papers only one of the principal sets of lines, namely, the vertical lines, were parallel to the picture, both sets of horizontal lines being inclined to it at an angle, one to the right and one to the left. This may accordingly be called "Angular" or "Two-Point Perspective," two vanishing points being employed, V^x and V^y .

153. We now come to a third case, that in which all three of the principal lines of a rectangular object are inclined to the picture, the object presenting towards the eye a solid corner. In this case all three vanishing points are employed, and the drawing may be said to be made in "Oblique" or "Three-Point Perspective." Plate VII. illustrates this case, Figs. 24, 25, and 26 presenting examples in which, though the object is vertical, the plane of the picture is inclined; while in Fig. 27 the picture is vertical, as usual, but the cubical block on the floor, the two covers of the box in the foreground, and the chair, are all tipped so that all their edges are inclined to the picture. They are accordingly drawn in Three-Point Perspective.

154. Fig. 24 shows a post at the corner of a fence as it appears when one looks down upon it, the plane of the picture being inclined backwards at the top. Fig. 25 is a drawing of the tower of old Trinity Church, in Boston, which was destroyed by the fire in November, 1872, as it appeared when one was looking up at it, the top of the picture being inclined forward. Fig. 26 is a similar view of the tower and spire of Salisbury Cathedral, taken from a photograph. The vanishing points in Fig. 24 are at V_1 , V_2 , and V_3 ; those of Fig. 25 at V_4 , V_5 , and V_6 , and those of Fig. 26 are not shown, but can easily be found.

155. To make these drawings look *natural*, the paper should be held at an angle, below the eye for the first and above the eye for the

other two. The vanishing points of the vertical lines, V_3 and V_6 , should be just above or below the eye.

156. Fig. 27 illustrates all three kinds of perspective, the room being drawn in parallel perspective, with only one vanishing point, at C ; the book-case and the box in angular perspective, with two vanishing points, at V^* and V^* ; and the lids of the box, with the chair and the cubical block, in Three-Point Perspective, with vanishing points at V^* , V^* , and V^* . The three sets of planes, as marked on the cube, are of course $L M$, $L O$, and $M O$; and their traces $T L M$, $T L O$, and $T M O$ form a triangle lying between the three vanishing points.

157. A plane of measures is supposed to pass through the nearest corner of the cube. In this lie three lines of measures, $l m$, $l o$, and $m o$, parallel to the three traces. (79.) On each of these lines the real length of the edge of the cube is measured off, giving the six points l , l , m , m , o , o . These dimensions are transferred to the three edges of the cube, L , M , and O , by means of the points of distance D^* , D^* , and D^* , which indicate the distance of each of these vanishing points from the station point, S , in front of the picture, opposite C . Each of these occurs twice, once on each of the horizons that meet at its vanishing point. (120.)

158. In the same way the width of the box is laid off on a vertical line passing through its front corner, and transferred to its right-hand edge by means of D^* , in the trace $T M O$ or $T R Z$. Half the width of the box, which is the width of each half of the cover, is transferred to the inclined lines of the cover, directed to V^* and to V^* , by means of the points of distance D^* and D^* , on $T M O$.

159. This is all exactly in accordance with what has been done in previous cases, and involves no new principle. The only new question which oblique perspective presents relates to the position of the station point, S , of the centre, C , of the various points of distance, and of the three vanishing points. Their relations are obviously much more strictly defined than in the previous cases. For in One-Point Perspective, the vanishing point, C , being given, the station point may be any where upon the axis, a line passing through it in a direction perpendicular to the plane of the picture. In Two-Point Perspective, the vanishing points V^* and V^* being given, the station point S must be somewhere on the circumference of a semicircle whose diameter lies between those points, and which is, itself, in a horizontal plane perpendicular to the plane of the picture. But any point in this semicircle will do. In Three-Point Perspective it must in like manner lie somewhere in the circumference of each of three semicircles whose diameters are the three sides of the triangle formed by the three vanishing points. For since the three edges of the rectangular object form right angles with each other, the lines drawn from the eye to the vanishing points parallel to those edges must also be at right angles with each other. These three lines in fact, together with the three traces, form a triangular pyramid the vertex of which, at S , is composed of three right angles. This pyramid is of the same shape, obviously, as the small triangular pyramid that would be formed by cutting across the corner of the object represented with a plane parallel to the plane of the picture. The lines of intersection in each plane would of course be parallel to the trace of that plane. (80.) The corner of the cube in Fig. 27 is represented as cut across in this way.

160. Now it is obvious that only one such pyramid can be constructed upon a given triangle as a base; that is to say, given the three vanishing points, the position of the point S is absolutely fixed; there is only one point at which the eye can be placed and find each pair of vanishing points 90° apart. Fig. 28 illustrates this, the semicircles that contain the three right angles being foreshortened into ellipses.

161. Another way of regarding the problem is to consider that, since the plane in which each semicircle lies is not perpendicular to the picture but is inclined to it at an unknown angle, the position of the station point is really limited only by the condition that it must lie somewhere in the surface of a hemisphere of which the given trace is a diameter. As this is true for each of the three traces, the station point must be a point common to the three hemispheres. Now three hemispheres whose diameters form a triangle can have but a single point in common. Two of them will intersect each other in a semicircle perpendicular to the plane of the triangle, and the point where this semicircle is cut by the third hemisphere will be the point in question. Figure 29 illustrates this view of the subject.

162. It is plain from an inspection of the figure, and of the little figure alongside, that the small semicircles in which these hemispheres intersect will be projected as straight lines at right angles to the lines connecting their centres. But as the lines connecting the three centres are obviously parallel to the three diameters, it follows that the three straight lines in which these three semicircles are projected and which meet in the point C , the projection of the apex of the pyramid, are drawn from the corners of the base perpendicular to the opposite sides. This affords an easy method of determining the point C .

163. This proposition, that the projection of each edge of the pyramid is perpendicular to the opposite side of the base, is in fact merely an illustration of the familiar proposition that if a line is normal to a plane, its projection upon a second plane intersecting the first is perpendicular to the line of intersection. Each edge of the pyramid is obviously normal to the opposite face of the pyramid,

and its projection upon the base must accordingly be perpendicular to the opposite side of the base, where the face of the pyramid cuts it.

164. Note. This is not the place to demonstrate the proposition, of which the demonstration is to be sought in the treatises on plane geometry, that perpendiculars let fall from the vertices of a triangle upon the opposite sides will meet at a point. But it is worth while perhaps to observe that this point of symmetry within the triangle is only one of four such points, the others having (a) the centre of the inscribed circle, (b) the centre of the circumscribed circle, and (c) the centre of gravity. Fig. 30 a, b, c, d, exhibits a comparative view of these four points.

165. The point C being thus ascertained, it only remains to determine the height of the pyramid, that is, the distance of the station point S in front of the picture, and the length of the three edges of the pyramid, that is to say, the distance of the station point from the three vanishing points.

Fig. 31 shows how these distances may be determined. A plane perpendicular to the picture is passed through either edge of the pyramid. Its intersection with the opposite face and with the plane of the picture, or base of the pyramid, will form a right-angled triangle. This triangle, when revolved about its hypotenuse into the plane of the picture, will give $V S$, the length of the edge in question, and the height of the pyramid, or distance of the eye from the picture, $C S$. This operation is repeated on a larger scale in Fig. 27, giving S_1 .

166. Fig. 28 shows how the distance of the eye from two vanishing points, that is to say, the length of two edges of the pyramid, can be found at once by revolving one of its triangular faces into the plane of the picture. Each semi-ellipse becomes a semicircle, on the circumference of which is found the station point in its revolved position at D , and $D A$ and $D B$ are the length of two of the edges.

167. Fig. 32 exhibits the curious geometrical relations that result from the application of this process to all three faces at once. It will be noticed that the two semicircles that start from each vanishing point meet and intersect on the opposite trace, just at the point where the perpendicular drawn from the vanishing point in question through the centre, C , strikes it. If now, from each vanishing point as a centre an arc be drawn with a radius equal to the distance of that vanishing point from the station point, each arc will be the locus of its point of distance, and the intersection of these arcs with the traces will give the six points of distance sought. Moreover, each of these arcs will not only pass through two out of the three revolved positions of S , but its points of intersection with the other two arcs will lie in the perpendiculars let fall from the other two vanishing points upon the opposite traces.

168. This last observation gives the means of determining all six points of distance by revolving into the plane of the picture only a single one of the faces of the pyramid, as is illustrated in Fig. 33. If the triangle $V^* S V^*$, right-angled at S , is revolved around $V^* V^*$, S will fall at D , and the points of distance D^* and D^* , two of each, are easily determined, $V^* D^*$ being equal to $V^* D$, and $V^* D^*$ to $V^* D$. But the locus of D^* passes through the point where the arc $D^* D^*$ cuts $V^* C$, and also through the point where $D^* D^*$ cuts $V^* C$. $V^* D^*$, then, is easily determined, and the two points D^* ascertained without further labor.

D , which is D^* , since $D V^*$ is obviously equal to $S V^*$, enables us to determine another D^* just below V^* .

The several points of distance in Fig. 27, to which Fig. 33 is similar, are obtained in this way.

169. The phenomena of intersecting planes, with the vanishing points of their lines of intersection at the intersection of their traces, are the same in Three-Point as in Two Point or in One-Point Perspective, and need not again be illustrated. So also with the problem of finding the vanishing point of a line lying in a given plane and making a known angle with a line in that plane whose vanishing point is known. The two vanishing points will both lie in the trace of the given plane, and if the station point is revolved about that trace till it comes into the plane of the picture, lines from the station point to the two vanishing points will make with each other the angle in question.

The next paper will treat of the perspective of shadows.

CHURCH ARCHITECTURE.

111 BROADWAY, NEW YORK, April 24, 1878.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir, — I have no wish to enter the field of controversy with my professional brethren on the subject of the church architecture that we need, but feel it to be but just to state that the paper prepared by me on that subject was written under a restriction of the time of delivery to twenty minutes, and for a body composed in great part of the members of the Protestant Episcopal Church, whom therefore I chiefly addressed.

I cannot believe that any one is of the opinion that architecture is now or ever will be finished, or that copyism is all that is left to us. Copyism is the elementary school that we must go through in order to gain the knowledge and power necessary to develop our originality.

If we start from a basis of originality, pure and simple, we shall soon find that though a Pegasus may be a good thing, it is infinitely

more useful when harnessed. There is plenty of room within the traces for his original capers, and the world sees with satisfaction that much more real work is done. No doubt it is a grand thing in theory to say that as to the past we will have none of it; that we will be original, — a law unto ourselves. A representative in Congress, when it was said during the early days of the war that all history proved a proposed measure to be impracticable, replied, "What do we care for history? We are *making* history!" So the yearning for originality in our art elicits the cry, What do we care for previous architecture? We are making architecture! True enough, in one sense: we are moving onward, building on the foundations already laid for us; only thus can we progress. We are not copying. Tennyson does not copy Shakespeare, who in his turn did not imitate Chaucer; they developed from a common root. We are doing the same, and those who come after us will develop from our work.

It seems to me that we use, generally without knowing it, the word "originality" in two senses: in one case to express entire emancipation from every rule, in the other to describe the discarding of rules which have become useless from their nature; in one case as synonymous with revolution, in the other with progress and reform. Until a single definition of the term is agreed on, all discussions in which it is obliged to be used will be somewhat complicated.

Yours very truly,

EMLEN T. LITTELL.

THE PROBLEM IN ACOUSTICS.

EDITOR AMERICAN ARCHITECT AND BUILDING NEWS:

Sir, — Regarding W. B. A.'s communication in your issue of the 20th ult., I observe that the proportions of the dimensions of the auditorium are not harmonic, and therefore likely to aggravate any tendency to reverberation, etc., arising from other causes, of which there may be a combination, producing the experience complained of (though not specified). Therefore I would suggest to your correspondent, when he gives you further particulars, to include, amongst others, the following, namely, mention if the walls show dampness; also, if the experience alluded to is observed alike when the auditorium is fully occupied by auditors, or which parts are unoccupied; also, if the pews are solid-backed, the seats cushioned, and if the floor is carpeted; also, the shape of the gallery plan, etc.; also, materials of partitions (if any) on each side of the gallery (which is two thirds of width of auditorium) extending up to the main ceiling (if so); also, the nature of the recess in rear of the pulpit; also, to state the precise nature of the disturbance, as it may afford a clue to the surface producing reflection, etc. It is quite likely that some share of the trouble is aggravated by the cross current caused by ventilation to the side flues, which will, no doubt, disturb the air, — probably most about the centre of the middle tier of pews, — the radial distance there being shortest. The first experiment, as being the readiest, to discover the fault is to try changes of position of the speaker, also of the direction of casting his voice into the auditorium. If the floor is uncarpeted, there may be something in the basement in sympathy with the noise.

ALEX. BLACK.

FLOORS OF STABLES.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Dear Sir, — I have seen it stated in a French paper that in cases where asphalt had been used for the floors of pig-pens, the urine of the pigs very soon caused the asphalt to rot away, while the portions of the floor acted upon by the urine of horses were unaffected. Although the urine of horses is not so strong as that of swine, it may possess properties injurious to cement concrete, and as I am thinking of flooring a barn cellar with either concrete or bricks, it would help me to a decision if those of your readers who have any knowledge of the way in which concrete is affected by the action of the acids and gases of a manure heap, will tell me their experiences, and what precautions can be taken.

Very truly yours, V.

ENGRAVINGS.

It is not sufficient that we paper or tint our walls, grateful as may be the color so employed, for that is but a background, a foil to relieve the pictures or prints we hang there. But we cannot all have pictures, for they are costly, and only those who have ample means can afford such luxuries. Poor pictures, cheap pictures, are worse than none, and if we cannot have the good we had better be without the bad. Fortunately, when we come to this conclusion, we are not wholly without art resources, for there are prints of surpassing beauty at our command, and we have no excuse in these days for not indulging in good specimens of the engraver's art. Prints, once so costly that only the wealthy could own them, are now brought within the reach of all. Photography has come to our aid, and, better still, the heliotype has given us such faithful copies of the finest efforts of the burin as will satisfy the most exacting demands. Chromos, too, are produced with a fidelity and a cheapness that has recommended them, in spite of their abuses, to thousands who, while they appreciate the truthful rendering of light and shade in an engraving, would add to it the charm of color — would make of it the counterfeit presentment of the master they had learned to admire, but whose originals are beyond their reach.

There is a world of enjoyment in a good engraving, and in these latter days we have far greater opportunities to gratify our tastes in this respect than were afforded our forefathers. The engraver's art was to them almost unknown, save in the production of some elaborate work that required years of labor, and which could only be published at great cost. The art of those days was the art of the "Old Masters," and the subjects selected for engraving were drawn from either the sacred or the classic school. Pictures depicting scenes from the ordinary walks of life were never engraved, and if the burin was occasionally withdrawn from the portrait of a saint, or the attributes of some heathen god, it was transferred to a landscape by a Wilson or a Poussin, for which, at best, there was but a limited demand. But when men were brought face to face with the daily events of life in the extraordinary engravings of Hogarth, it was a new revelation, a new development in the world of art. And so when Bewick's wood-cuts first made their appearance. Accustomed as we are to our portfolios of fine engravings, and our profusely illustrated papers, magazines, and novels, we cannot appreciate the value that was set on his cuts of "The Old Hound," in 1790, and the "Birds of Great Britain," in 1804. Wood engraving was then but little known, but it at once assumed the honorable position it has maintained to this day. We may well value it. A fine line engraving we cannot but admire, for it is the highest development of the engraver's art; but while we recognize its worth, and are cognizant of the fact that no other style has been able to compete with it, we cannot forget how much we owe to wood engraving, or how, in one sense, we have in these little blocks of wood more of the spirit, the touch of the artist, than in the labored products of the burin.

The engraver on copper or steel makes his own reduced copy of the picture before him. However faithful he may be, the lines on his plate are essentially his own, and although he is telling the artist's story, he can only do it in his own way. But on the block of wood, or in the heliotype, from the original sketch, the artist tells his own story. It is he who makes the drawing, and it is he who gives it life and spirit. All the lines are his own, all the delicate manipulation comes from his hand, and the skill of the engraver (in the matter of wood engraving) is shown in preserving these lines, that they may be faithfully reproduced when they go to press. It is this individuality in the work of those who draw on wood that enables one to recognize the hand of any leading artist at a glance. Men like Leech, and Meadows, Gilbert, Harvey, Darley, Doré, and Foster come to the front the moment we call to mind the best in their several walks. But while these answer the end for which they were designed, we need something more for our walls, and, fortunately, without going to an extravagant outlay, we can command copies of the finest works that have come from the engraver's burin or the etcher's needle, — copies of the exquisite line engravings of Raphael Morghen and the masterly etchings of Rembrandt and others who have done so much to elevate the art to which they were wedded.

CHAMPLIN.

OUR COMPETITION DRAWINGS.

WE find that some perplexity has been caused by want of correspondence between the award of premiums in our competitions and our choice of the designs for illustrations. This is to be explained by the fact that the editors have thought it best not to take any part in the awards, but to depend on the kindness of architects of experience and standing who are accessible to them. The selection of subjects for publication has therefore been made independently of the award of the committees, and since it is not always convenient for these gentlemen to meet and decide upon the designs at a given moment, it has been made without waiting for the award. Under these circumstances it may easily happen, when the merits of several designs are pretty evenly balanced, that one selected for mention by the committee has been omitted from the illustrations, or that they may fail to honor with a mention some which have been illustrated. Both of these things, in fact, happened at the last competition. We shall make it a point, however, when we are not prevented by want of room, to illustrate those which are mentioned by the committees.

NOTES AND CLIPPINGS.

ELEVATOR ACCIDENT. — The fall of an elevator in the building of the Howe Sewing Machine Company, in Chicago, on the 22d ult., shows how good a thing it would be if each elevator were marked plainly with the weight it could carry safely. Had the elevator in question been so marked, it would have saved ten men a drop through eighty-five feet, and a shock which left only one unhurt.

AN ARCHITECT'S SUIT FOR HIS FEE. — When the Northern Hospital for the Insane was ordered built at Oshkosh, Wis., Col. S. N. Shipman, an architect, then of Madison, Wis., but now of Chicago, prepared plans and specifications for the main building and one of the wings, and was appointed supervising architect of the building, but soon after the work was begun Colonel Shipman was removed, and another architect assumed the superintendence. Colonel Shipman, therefore, sued the State for a percentage on the contract price for the whole building, including all the latest wings. His account with interest footed up about \$10,000. After being twice before the supreme court, which decided he could sue for a percentage on the first contract, it was sent down to the Dane County circuit to be tried on a question of facts. A jury has just returned a verdict for the sum of about \$6,500.

THE ARCHITECT OF THE CAPITOL AT WASHINGTON.—The House Committee on Public Buildings and Grounds, before whom charges were presented last month against Mr. Edward Clark, architect of the Capitol, have unanimously dismissed them, after thorough examination, as trivial and unfounded.

HOW GASLIGHT IS LOST.—Computations of the loss of light by shades of different kinds have been brought together by Professor Chandler, and are presented in a pamphlet entitled "How to Burn Gas." The lowest absorption of ground glass is nearly 30 per cent; there is only one specimen at this low figure, other shades of that kind absorbing more than 62 per cent. Opal glass causes a loss of 53 to 56 per cent; green, purple, and ruby glass, 82 to 89 per cent; a porcelain transparency, over 97½.

THE STATUE OF LIBERTY.—M. Charles Blanc, the incumbent of the newly instituted chair of aesthetics at Paris, has written approvingly of the immense statue of Liberty which M. Bartholdi is founding, with the expectation that it will, when finished, be placed on Bedloe's Island, in New York harbor. We had understood that the statue was to be the gift of M. Bartholdi individually; but from the fact that efforts are making to raise the \$16,000 that are needed to finish the statue, it is evident that there are others associated with him in the enterprise. What progress is making in New York towards raising the money for building the pedestal we do not know. It is certain, though, that if New York will not take it, there are other cities which will; for, just as the city of Glasgow was eager to buy the Needle of Cleopatra, if money could not be raised in London to pay the salvage awarded by Sir Robert Phillimore, so Philadelphia has announced herself ready to place the statue of Liberty in Fairmount Park. It is said that M. Viollet-le-Duc is engaged in assembling the pieces of the statue.

NEW GOVERNMENT BUILDINGS.—The House Committee on Public Buildings and Grounds is said to be inclined to take favorable action on several of the many bills asking for appropriations for new public buildings. To make a judicious selection is no easy task, for the favoring of one city to the prejudice of another might, as politics go, endanger the passage of the bill giving final authorization to build. It has hitherto been the custom to appropriate money each year for the building of not more than four new buildings, and as there are more than thirty cities which desire to have new public buildings, it can be only by careful dickering that the selection can be made. Amongst the ones which are most likely to gain their wishes are Quincy, Ill., Kansas City, Mo., Pittsburgh, Penn., Brooklyn, N. Y., Council Bluffs, Iowa, Louisville, Ky., Augusta, Ga., Charleston, W. Va., and Jackson, Miss.

COMMUNISM IN SAN FRANCISCO.—It is said that the agitator Kearney has had a downfall. Archbishop Alemany had exhorted all Catholics to avoid all riotous proceedings and to have nothing to do with fanatical mischief-makers. At the next workingmen's meeting Kearney, after a frenzied tirade against the priests, the creed, and the church itself, declared that he and his followers threw off all allegiance to the Catholic Church. It is thought that he has gone too far, and has sacrificed the adherence of the Irish Catholics, who form the greater part of his following.

AN INTERNATIONAL COURTESY.—The Consul General at Berlin informs the state department that the Prussian minister of commerce has addressed a communication to the director of the School of Mines at New York, to the effect that those American engineers of mining and of smelting works and foundries who may desire to visit the establishments in Germany appertaining to their business, in event of their attending the Paris Exposition, will find arrangements made for their information and guidance at the Royal Academy of Mines at No. 6 Lustgarten, Berlin.

MR. WHISTLER'S HOUSE.—The *Examiner's* remark that the Board of Works is vainly trying to induce Mr. Whistler, the artist, to modify the eccentric design of the house he is building at Chelsea, makes one wish to know what particular whim it is that this supposed-to-be all-powerful body is unable to prevail against.

STRIKE.—Two hundred plumbers of Edinburgh, Scotland, have struck, because the masters have ordered that the men must walk to the jobs, within the city limits, in their own time.

ARCHAEOLOGICAL DISCOVERY AT ROME.—At the corner of the Via Nazionale and the Via Mazavino a well-preserved mural decoration in mosaic has been discovered lately. It represents a large galley under full sail at the moment when it is passing between the jetties of a noble port. The quays are furnished with stairs for debarkation, and on one side is a mole built upon arches and their supporting piers; upon this is a light-house, of which the lower story is rectangular and the upper story cylindrical. The coloring of the mosaic, which measured about seven feet by six feet, is said to be singularly bright.

THE TREASURES OF THE TIBER.—It has been decided at last to begin the examination of the bed of the Tiber with the hope of reclaiming the works of art that are supposed, perhaps not unjustly, to have been cast into the river at the times of the various sieges Rome has sustained. It is not stated what means are to be taken, but it is plain that the task will be no easy one, for not only is it probable that the *débris* of the ruined city may have fallen into the river and choked up its bed in the same way that it has encumbered streets and forums, but it is possible that the course of the river may have been wholly changed by such obstructions and by the wearing of the current. It is, moreover, certain that the deposit that the "yellow" Tiber has formed during the centuries since the treasures were given to its keeping is not to be disregarded in considering the difficulties that lie in the way of the proposed search.

CROSSING THE SAHARA.—We have heard often of more absurd and impracticable engineering schemes than that of M. Paul Soleillet, who proposes to build a railroad across the desert of Sahara to Timbuctoo, at a cost of some \$800,000,000.

IRON-CLAD FORTIFICATIONS.—If M. Viollet-le-Duc should ever see fit to revise and enlarge his *Histoire d'une Forteresse*, he would find a text for a new chapter in the fact that the German government is adopting for some of its forts the system of armor plating, which has proved to be efficient on the fortifications at Metz and Geestemünde on the Weser. The new forts at Strasburg, Cologne, and Ingoldstadt are to have armored turrets and batteries. The armor for each turret consists of six or eight large plates, which are fastened together in a way that employs neither bolts nor rivets. The armor is made of plates of hardened cast-iron, which in the land defences are fifty-five centimetres or about twenty-one inches thick, and in the coast batteries from sixty to ninety centimetres, or about twenty-three to thirty-four inches; while the plates forming the roof of the turret are sufficiently thick to resist the shells fired from twenty-eight centimetre howitzers. Each turret mounts two pieces of ordnance; twenty-six or twenty-eight centimetre guns being used in the coast defences and fifteen or seventeen centimetre guns in the inland fortifications. The embrasures are as small as possible, and the turrets are revolved by manual labor. The cost of each turret in the land fortresses will amount to \$50,000, and in the coast defences to \$75,000. Experiments have been made upon one of the turrets erected on the range at Tegel, near Berlin, and the results were highly satisfactory, more than five hundred projectiles striking the armored tower without doing it any appreciable damage.

THE RICHES OF AFRICA.—Captain Burton, the African explorer, has returned from his trip to the Land of Midian, undertaken at the instance of the Khedive, and has brought with him, in the twenty-five tons of mineral ores, substantial proofs of the fatness of the land. These ores are ores of gold, silver, copper, tin, and lead; besides these he found three deposits of sulphur, three turquoise mines, and extensive deposits of salt, saltpetre, and gypsum. Such discoveries as these enable one to comprehend and believe more readily the stories of Oriental magnificence. They will, too, do more toward opening up Africa than the efforts of any number of missionaries. We hope that either Captain Burton himself or some of his companions has been able to make intelligent notes upon the ruined cities, aqueducts, fortresses, and artificial lakes which they report as existing in the country they have explored, as it would be interesting to compare them with the discoveries Dr. Le Plongeon is making in Central America.

TAPESTRY IN THE VATICAN.—It is said that Leo XIII. has given orders to have the large quantities of tapestry which now lie hid in drawers and cupboards in the Vatican rummaged out, and hung in chronological order along the galleries, where they can be seen. There will be many interesting pieces among them: a quantity of Gobelines, as the French court for a long time made a present of a piece every year to the reigning pontiff; pieces of the Flemish schools of the fourteenth and fifteenth centuries, and several of those designed by Raphael, which were saved in the sack of Rome. It would be a good thing if the Italian government or court would follow the Pope's example; for, hidden away in cellars and back rooms of the Pitti Palace, at Florence, there are known to be piles of old damasks and brocades, falling to pieces for want of looking after and bringing to the light; they cannot be sold—though many artists and others would gladly buy them—without superior orders, and it is said that the only purpose they serve is to be torn up when dusters are required and nothing else is handy. — *Pall Mall Gazette*.

HOW TO CLEAN AN OIL PAINTING.—Herr E. von Bibra describes in the *Journal für praktische Chemie* a method used in cleaning an oil painting. The painting, which was, from various causes, very indistinct, was first dusted with feathers and washed with a sponge wet with water; this was followed by a thick lather of shaving-soap, which, after eight minutes, was washed off and the picture allowed to dry. The next step was a thorough cleaning by a linen cloth soaked in nitro-benzine. The picture at this stage was clean but dull-colored. Olive oil was used to freshen the colors, and a coating of quick drying varnish was applied last of all to fix permanently the restored colors.

AN ENGINEERING CRAZE.—The *Virginia City Enterprise* reports that an Englishman in Nevada proposes, if \$250,000 can be raised, to bore two artesian wells, eighteen inches apart, the one a six and the other a four inch bore, to the depth of 6,000 feet. Then he will drop into one a powder cartridge wrapped in asbestos, so that subterranean heat will not explode it until it reaches the bottom. The explosion then will unite the two wells, and water poured down one will be converted by subterranean heat into steam and sent out through the other, where the power can be transmitted to any required point.

A NEW EXPLOSIVE.—A new explosive agent has been discovered by Professor Emerson Reynolds in the laboratory of Trinity College, Dublin. It is a mixture of seventy-five per cent of chlorate of potassium with twenty-five per cent of a body called sulphurea. It is a white powder which is very easily prepared by the mixture of the materials in the above mentioned proportions. The new powder can be ignited at a rather lower temperature than ordinary gunpowder, while the effects it produces are even more remarkable than those caused by the usual mixture. It has been used with success in small cannon, but its discoverer considered that its chief use would be for blasting, for shells, for torpedoes, and for similar purposes. Professor Reynolds pointed out that one of the advantages this powder possesses is that it can be produced at a moment's notice by a rough mixture of the materials, which can be stored and carried without risk so long as they are separate.

BUILDING ACCIDENT.—At Cincinnati, on the 22d ult., the wall of a stable, which had been known as unsafe, fell and injured three persons. The immediate cause of the fall was that a portion of the wall had been cut away to make way for a new house that was building on the adjoining lot. The remaining wall was shored up, but the bricks of the portion taken down, which were piled against it, seem to have pushed in the foot of the wall, which was only eight inches thick, and caused the wall to fall outward.