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THE Librarian of the Boston Public Library makes an earnest appeal to the public for contributions of photographs of works of art, including works of architecture, and of money to purchase such photographs. It is found that students and classes of students, for whose assistance the library selects and lays out, at times agreed upon beforehand, the books needed for the work in hand, would derive great benefit from photographs. Even students of literature, as, for example, Dante's poems, would, as Mr. Putnam suggests, find great advantage and interest in referring to photographs of Florence and Venice, and of some of Giotto's pictures; while to classes in history, photographs of Roman ruins, or of mediæval buildings in Italy, France and Holland, would be invaluable; and the utility of photographs of pictures and statues and buildings to students of art is obvious. Unfortunately for the students, the Public Library, although it possesses an excellent corps of assistants for placing suitable material within their reach, is obliged to spend its income for books, and has little or nothing left for photographs to supplement the books. It will, however, bear the expense of mounting such photographs as the generosity of the public may provide. If five thousand dollars in money can be raised by the first of May, Mr. Putnam hopes to be able to secure with it about twenty thousand photographs, suitable for class work, but adequate in size to show plainly the details of the objects represented; and it may be imagined how valuable these will be to next winter's students, and to the public generally.

COLONEL WARING'S characteristic energy and ingenuity have been used during the past year in trying a rather novel experiment, entered upon with the idea of increasing the efficiency of the Street Cleaning Department of New York, of which he is the head. As was to be expected in New York, Colonel Waring found that many of the men employed in his department owed their appointment to political influence, while some of them were experienced leaders in labor-unions and similar organizations. Notwithstanding these unfavorable circumstances, he resolved to try to establish some sort of coöperation among the members of the Department, and, in January, 1896, he addressed an unofficial communication to them, suggesting that an organization should be formed among the men for the discussion of all matters of common

interest; that a General Committee, consisting of one delegate from each of the thirty-two section-stations, and nine stables, connected with the Department, should meet every Thursday, except the third Thursday of each month, and discuss in private all matters of interest relating to their duties, and the affairs of the Department generally; and that this Committee of Forty-one should choose five representatives, who should, on the third Thursday of the month, meet, as a Board of Conference, with the General Superintendent, the Chief Clerk, one of the District Superintendents, to be designated by the Commissioner, one Section Foreman and one Stable Foreman, and consider with them such matters as might be referred to the Board by the Committee of Forty-one. It was proposed also that the Board of Conference, after due deliberation on each case, should report the facts, and its conclusions, to the Commissioner for final action.

SOME opposition was made to this scheme by the men of socialistic inclinations, but the great majority of the members of the Department adopted it with hearty good will, and with, as Colonel Waring thinks, a remarkably intelligent appreciation of its intended purpose. Within a month, the organization was complete, and the Committee of Forty-one was chosen, and ready for business. It found a good deal to do during the year, as the report made to the Mayor by the Secretary of the Board of Conference shows. Three hundred and forty-five complaints were lodged with the Committee of Forty-one, and investigated by it. Two hundred and twenty-one of these were satisfactorily adjusted, without going farther; and one hundred and twenty-four were referred, with a statement of the facts, to the Board of Conference. All these related to dismissals and fines, or were suggestions made for the good of the Department, and in twenty-four cases, these suggestions were approved and adopted by the Commissioner. In fourteen instances, matters sent up by the Committee of Forty-one were considered, but not acted upon; in fifteen more, the mutual explanations made in the discussion by the Board proved satisfactory to all parties; twenty-two fines were remitted or reduced, and thirteen sustained; eight men who had been dismissed were reinstated, the Board being satisfied, from the evidence, that the dismissal was unjust, and in seventeen cases, where men who had been dismissed had applied for reinstatement, the order of dismissal was sustained by the Board. During the year, the plan has worked to the satisfaction of officers and men. The latter were, at first, suspicious, and their suspicions were encouraged by the socialist element; but, by degrees, the better men became converted, and either brought over the others to their way of thinking, or outvoted them, and the Secretary of the Board, who is also the Chief Clerk of the Department, speaks in the warmest terms of the "earnest and honest" coöperation and "mutual confidence," which have sprung up between the officers of the Department and the men.

THE description of this experiment is like a ray of sunshine through the gloomy atmosphere of strikes and lock-outs, of threats and tyranny, which has so long pervaded industrial matters in New York. Colonel Waring had a certain advantage in that the men in his department receive high wages, and would listen to reason before they would abandon their positions; but this was probably much more than counterbalanced by the obstinacy and insubordination which prevail among men who count on outside influence to sustain them; and the success of his plan shows in a most encouraging manner how firm is the foundation of good feeling and good sense upon which dealings with American workmen may be based, provided such dealings are carried on with the workmen themselves, and not with the unscrupulous tyrants who claim to be their leaders.

MANY architects, who have been brought into professional relation with Mr. William E. Worthen, of New York, will hear with regret of his death, which took place recently. Mr. Worthen was a native of Amesbury, Mass., and a graduate of Harvard University. On the completion of his college course, he studied engineering under George R. Baldwin, and, later, under the late James B. Francis, devoting himself at that time particularly to hydraulic work. In 1849, he

went to New York, and was appointed engineer of the New York and New Haven Railroad, becoming Vice-President of the corporation five years later. His reputation as a most accomplished engineer soon became wide-spread, and he was consulted on problems of the most diverse character. From 1866 to 1869, he was Sanitary Engineer of the Metropolitan Board of Health of New York; he was engineer to the first Rapid Transit Commission for the Annexed District, and himself the author of a plan for rapid transit for the whole city. He was also consulting engineer in the preparation of the plans for draining the City of Chicago to the Mississippi River, and in many sewerage and water-supply undertakings.

WE have had our attention called to the fact that in writing of the exhibition of architectural drawings in Boston, last week, we quite unintentionally gave to the promoters of the Arts and Crafts portion of the combined exhibitions credit which should have been given to the Boston Architectural Club. The fact being that the two exhibitions, though coterminous and held in adjacent rooms, were absolutely independent affairs, we can easily sympathize with the disappointment the hardworking Committee of the Architectural Club naturally felt at finding their labors seemingly unappreciated and the Club itself deprived of the record of having managed an interesting exhibition in this year of grace. We trust that this "retroactive clause" will set both matters straight, and remove all suspicion that we intentionally sought to wound any one's susceptibility.

WE imagine that some of the people in this country who have been accustomed to make disparaging remarks about the degeneracy of the French people, and the rapidity with which, notwithstanding the efforts of the French Government to encourage large families, the race is disappearing from the earth, will be surprised to learn that the French economists are consoling themselves for the gradual depopulation of their country by pointing out that many of the American States, including the whole of New England, are still worse off. At the beginning of the present century, the annual birth-rate in France was 33 per 1,000. It has now fallen to 22 per 1,000, and is less than the death-rate; so that, in about two hundred years, if the present conditions continue, the French race will have become extinct. In many of the United States, however, the case is far worse. The birth-rate in Nevada is 16.30 per 1,000, so that, even if no more people should emigrate from that State, its population would die out completely in less than a hundred years. Maine comes next, with a birth-rate of 17.99 per 1,000, which indicates that just about a century will elapse before the total extinction of the race which now inhabits it; and New Hampshire is third, with 18.4 per 1,000. Vermont is fourth, with 18.5; and, singularly enough, California, the land of exuberant fertility in everything else, has a birth-rate of only 19.4 per 1,000, or nearly twelve per cent less than that of France. This is the more striking, as California is no longer a camp of rough miners, like Nevada, but is a long-established community, in the very prime of life, with a favorable climate, ample area, and sufficient diversity of interest and employment for a very large population.

CONNECTICUT comes next to California, but stands considerably higher, having a birth-rate of 21.3 per 1,000; Massachusetts has 21.5, or a little smaller rate than that of France, and Rhode Island 22.5, a somewhat higher rate than the French, but still insufficient to prevent the extinction of the present race of inhabitants within two or three centuries. Wyoming, with 21.8, comes between Massachusetts and Rhode Island; while Oregon has a rate of 22.5, or about one-half of one per cent higher than Rhode Island. This is certainly a sorry outlook for this country. In most of the States, even among those which have a low birth-rate, the population is kept up, and even increases, but the new blood comes from immigration, and the conclusion to be drawn from the statistics is simply that, within a period varying from sixty to two hundred years, according to circumstances, the Anglo-Saxon race of inhabitants of New England and the Pacific coast will be replaced by another. The *Revue Industrielle* observes that this decadence of the present race of inhabitants of New England and the Far West cannot be attributed, like that of the

French, to a compulsory military service, or to the enforced division of inheritances, or to excessive alcoholism, or an unfavorable climate, for in these respects the circumstances in the United States are almost all that could be desired.

THE foreign journals this week contain nothing of importance in the way of architectural news, but *la Revue Industrielle* mentions a fact of considerable economic interest, saying that the importations of American iron into England, in the shape of pig-iron, steel billets, and other forms, have reached such proportions that the Carnegie Company has already established an agency in London for the sale of its manufactured products; and it mentions also a fact which we imagine to be little known here, outside the trade, that American iron has been sold in Belgium and Germany, as well as in England. As most architects know, Belgian iron has been until recently the cheapest in the world. Rolled beams for building, from La Providence and other Belgian mills, have long been quoted at less than one cent a pound, and it is only a few years since these beams were imported to this country, and, after paying freight, insurance, consular fees and other charges, and a duty of one hundred and forty per cent, were sold in our seaport towns at less than the price demanded for domestic beams; and immense quantities of Belgian manufactured iron have been sold in England, in competition with the English product. German iron has been nearly as cheap as the Belgian, but, of course, the cost of transportation has been greater. If, now, American manufactured iron, the quality and finish of which is superior to that made on the Continent, can be transported by land and sea four thousand miles to Belgium, and sold there for less than the cost of the native product, it is obvious that great commercial changes are impending in the iron industry. Apart from the metal itself, it is reported that a Pennsylvania bridge company is at work on a large number of iron railway bridges, which are to be set up in Japan; and any prospect of a cessation of legislative interference with industry in this country would undoubtedly lead to an immense development of the iron manufacture and the branches of business connected with it.

THE steamboat which has been building in France, consisting of a platform, with hollow wheels on each side, appears, in practice, to have been a deplorable failure. The principal trouble seems to be that water adheres to the rollers, so that a large part of the propelling power is wasted in lifting water uselessly. After a few trials, scrapers were set, so as to scrape the water off the wheels, but they acted as brakes, applied at the most effective point, and did quite as much harm as good. The power of the engines was increased, but the additional weight made the wheels sink below their centres, so that a part of the force was exerted in the wrong direction. Whether the affair will be entirely abandoned or not, remains to be seen, but there is no apparent way of overcoming the proved defects of the system.

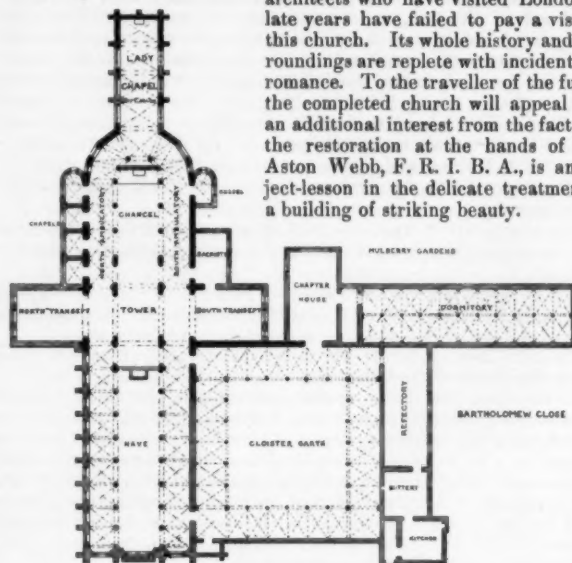
A QUESTION of interest to practical men, as well as to archaeologists, is raised by the *Builder* in regard to lead for roofing. Mr. W. R. Lethaby, who is good authority on such subjects, said in a lecture not long ago that it would be desirable to use lead cast in flat sheets for roofing, in place of rolled sheet-lead, which he considered a "wretched substitute." The *Builder* admits that cast-lead has some advantages in color and texture, but asks whether, with its chance for small holes in casting, it is as safe a material for roofing as milled or rolled lead. If we remember rightly, Mr. Lethaby's opinion coincides with that of Viollet-le-Duc, who found that the cast-lead of mediæval buildings was far more durable, when exposed to the weather, than modern sheet-lead; but this may be due to the fact that old lead generally contains a little silver, or to other circumstances not connected with the manner in which the sheets are made; and the testimony of modern roofers on the subject would be valuable. The Chinese, as is well-known, make sheet-lead by pouring out the melted metal on a flat stone, and lowering another stone into it, so as to press it out, while still liquid, into a thin sheet. Whether this process would remove the air-holes which the *Builder* fears, or whether the air-holes in ordinary cast-lead constitute a more serious defect than those found in the rolled sheets, are questions of interest.

THE CHURCH OF ST. BARTHOLOMEW THE GREAT,
SMITHFIELD, LONDON, E. C.

THE

English Press recently gave prominence to the announcement that the restoration of the Church of St. Bartholomew the Great, Smithfield, was entirely complete. In point of fact, the statement was premature, though perhaps the anticipation is practically justified. Little more remains to be done either in the way of purchase or restoration to complete the rescue of the entire remains of the foundation from secular use, or to render the buildings structurally sound and useful. The history of the restoration, which has extended over a period exceeding ten years, throws a remarkable light upon the generosity and energy of the many lovers of mediæval beauty to whom the case of this church has appealed. A letter from the Rev. W. Panckridge appeared in our columns as far back as July 18, 1885, and was not without effect. It is probable that few American

architects who have visited London in late years have failed to pay a visit to this church. Its whole history and surroundings are replete with incident and romance. To the traveller of the future the completed church will appeal with an additional interest from the fact that the restoration at the hands of Mr. Aston Webb, F. R. I. B. A., is an object-lesson in the delicate treatment of a building of striking beauty.



The history of the church is a curious one, and one, from the very fact, probably well known. The founder of the Augustinian Priory, of which the existing church formed the chancel, was a man named Rahere, an ecclesiastic and courtier of King Henry I, a man of witty conversation, but of a shallow moral sense, with no great appreciation for the serenities of virtue and self-control. During a pilgrimage to Rome, however, he was seized with Roman fever and the affliction wrought a lasting change in him. He made a vow that if he should recover he would, upon his return, build a hospital for the poor of London. A strange vision occurred to him during his convalescence — St. Bartholomew appeared to him, so the story goes, and gave him instructions to build a church in the suburbs of London, in the neighborhood of Smithfield, an enterprise which should be attended with the Divine blessing and support. On his return to England, about 1120, he obtained a grant of some land in the neighborhood of Smithfield, waste land, marshy and unproductive, a locality devoted to the capital punishment of those days. Here he carried out his vows and orders, founding the hospital and building the church. Upon the part completion of the scheme, he was installed as prior of the monastery and master of the hospital. As was customary in monastic building, the chancel was the first work attempted, and this, together with its appurtenances, the tower and some of the secular offices, appear to have been completed before Rahere's death in 1143. His tomb, which still exists, is of later date, — early fifteenth-century work. His successors carried on his work, building the nave and transepts and finishing the domestic buildings of the monastery. Extensive alterations and additions were made in 1410 in the early Perpendicular style which at that time obtained. A Lady Chapel, sixty feet long, was added at the east end, together with a crypt below. These works practically completed the church, the plan at that time approximating, as near as may be ascertained, to the attached sketch-plan. It should be noted that in preparing this plan no attempt has been made to differentiate between parts of the building of varying dates, nor is any exact indication afforded of the lines which the existing church, as restored, follows. The hatched parts represent those portions of the fabric which have been destroyed, while the parts shown in solid black are portions of the original work still *in situ*. In 1540 came the dissolution of the monastery and the destruction of the church. The chancel was retained for parochial purposes, but the nave was destroyed, while the transepts, Lady Chapel, crypts and the multitudinous domestic buildings attaching were devoted to secular uses or destroyed for the sake of the materials and site. The tower which stood over the section of the quarters of the cross was taken down in the early part of the seventeenth century, and the present tower erected over the last

bay, eastward of the south aisle of the nave. Fire and decay and the passing centuries have taxed the church, and when, in 1863, the then vicar, the Rev. J. Abbiss, commenced the work of restoration, he had to deal with the church as he received it, the chancel alone of the original building. At this time the floor line was several feet above its natural level, bringing the tops of the high pews nearly on a level with the capitals of the piers. An artificial square east end was lighted by large round-headed Georgian windows. The whole of the interior was whitewashed and the internal aspect of the building presented a dismal scene of neglect not far removed from total ruin. The south transept was almost totally destroyed, one bay only remaining to form the vestry. The north transept, of the original of which there is little remaining, was in part given up to form a dwelling-house, while the ground floor, to a great extent perfectly open to the church, was occupied by a blacksmith's forge. The north triforium formed the parochial boys' school, and that on the south had been in the eighteenth century partitioned off and occupied by a non-conformist school in connection with a neighboring chapel. This triforium included the internal oriel window which appears in one of our illustrations, so that to all intents and purposes the church was under the inspection of a non-conformist chapel. The eastern part of this same triforium became at a later date a fringe factory, and the Lady Chapel was also given up to this use. These latter premises even extended so far westwards into the church that they overhung the altar to a considerable extent, the "party-wall" being carried over on a girder. This, it should be said, was a modern arrangement due to a difficulty in determining the actual east boundary of the chancel proper. The original form was undoubtedly apsidal. At a later date, during the alterations in 1410, the apse was in part removed and a square end substituted. The position was again reversed in 1865, when the apse was restored. It was, however, impossible to obtain permission from the fringe factory to carry up the apse to the roof, as it originally existed, so that for a while the factory premises overlapped the actual church. The crypt was almost filled with earth and was used as a coal and wine cellar.

Such was the church thirty years ago. The work of restoration has steadily progressed since; and for the past ten years it has almost continually gone on and now there remains but little to do.

It is satisfactory to note that the restoration-committee is thus well within view of the end of its labors. It is stated that the few minor works which yet remain to be done are to be proceeded with without delay, and, as far as it is possible to calculate, the whole of the work which the committee had set itself to carry out will be completed by the beginning of the summer. The most notable work that is now proceeding is the fitting and furnishing of the Lady Chapel, and it is with the re-opening of this part of the church that the final public function will be connected. The debt that will remain outstanding at the completion of the work is estimated at between £200 and £300. Though forming no part of the actual church, there are a few bays of the cloisters still existing, now used as stables. The purchase of these premises, though not included in the programme of the present restoration-committee, is not unlikely to be accomplished at some future date, should the financial position permit of it. Of the views which we publish there is little to be said, except that they perhaps express the detail of the building rather than the general effect, but the character of the arcading and triforium is apparent and something of the proportion. The

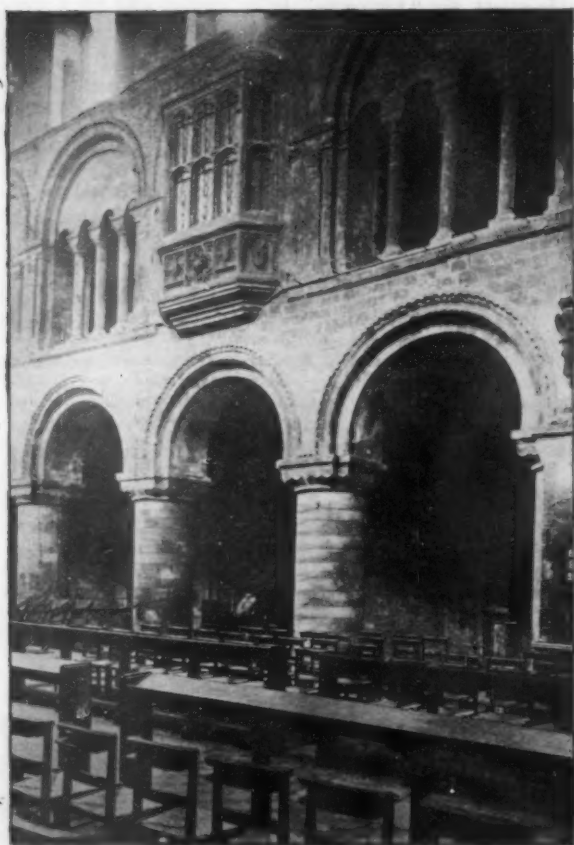


View from South Ambulatory, looking East.

object of the late oriel window visible in the triforium is a matter of some doubt. But in all probability it was either the pew of some distinguished personage or was devised for the purpose of watching the church and guarding from theft the valuable ornaments bestowed there.

The restoration has proceeded much as follows: In 1863, the floor was lowered to its original level and the existing high pews removed in favor of chairs. The apse was restored to its original condition, so far as the ground story was concerned, by the insertion of the two central pieces which had been removed at the formation of a square end to the church. The character and detail of this work

was, of course, dictated by the remaining portions of the original apse. This, in all, represented an expenditure of £5,000. In 1884, the fringe factory was bought out, together with adjacent land, restoring the south triforium and the Lady Chapel to church hands. This purchase permitted the removal of the unsightly girder and the wall over the altar, and consequently it became possible to restore the apse in its entirety from floor to roof. The work, following as it does upon the position of the old apse, reproduces the original size and general proportion. The triforium has been continued around according to the data of the portions existing. But in dealing with the clerestory Mr. Aston Webb has struck a note new to the piece, though in perfect harmony with the whole. There is no attempt to lay upon the modern piece of work any artificial glamour of mediævalism; the work is light, graceful and individual. The strong area of light afforded by the five new clerestory windows of the apse effectually checks any tendency in the ponderous Norman work below to appear by sheer weight depressing, rather by contrast adding to the sense of mystery conveyed by the intensely black shadows of the stilted apsidal arcade and triforium. This, with the treatment of the vaulting and the broad arch spanning the chord of the apse, affords a most instructive study in restoration. In addition to these works the church was re-roofed and the freehold of the blacksmith's forge was secured. Since this portion of



View of South Arcade to Chancel.

the restoration was completed in 1886, the work has been steadily continued. The north and south transepts have been rebuilt, retaining all the interesting work that existed, of which much remained to be discovered during the actual process of restoration. The triforia have been cleared of their scholastic occupants and put into sound repair. The Lady Chapel is being restored for use in parochial mission-work, and the crypt has been excavated and re-vaulted, on the lines of the original, with a very effective low, single-span vault: this chamber is now used as a Parish Mortuary Chapel. Porches have been built and much has been expended on stalls for the priests, organ-gallery and organ, and other internal fittings, and finally a large amount of structural repair has restored the fabric to a good condition. In all, something like £35,000 has been expended, towards which sum the Charity Commissioners allowed some £8,000 from the Ecclesiastical portion of the City of London Parochial Charities. It may appear a considerable sum to expend upon the restoration of a church of comparatively small dimensions, but in point of fact, those who are acquainted with the poor and crowded district in which the church stands consider the expense to have been thoroughly justified by the needs of the parish. To the archaeologist and the student of history and beauty, the considerations are without this local character; and the work that has been done and the manner of its doing can only arouse feelings of the warmest satisfaction. That so large a work could have been possible in so

short a period is a notable reflection on the public spirit of to-day, and a cheering contrast to the commercialism of which we hear so much. In fine, a church, unique in character and history, has been restored under a cunning direction to a suggestion of its original beauty and service, and though it is unnecessary to compare the nature of the work carried on here with that at the huge establishment over the way, "St. Bartholomew's Hospital," it is pleasant to feel that old Rahere's twin foundations not only survive but are guided with an energy and zeal favorable to be compared with that of mediæval days.

REFRIGERATION.¹

UNTIL recently ice has been used in houses, hotels, hospitals, business houses and public institutions exclusively to obtain the necessary refrigeration for preserving food, for making ice-water, and for preserving perishable goods. The ice was mostly applied direct, and, therefore, temperatures lower than 38° to 40° could not be obtained, and furthermore, the rooms and food thus refrigerated was always moist, there being no way to abstract the moisture necessarily produced by the condensation of the water-vapor in the air. Later, the ice was mixed with common salt in large tanks, a strong brine resulting, of a temperature of about 10° Fahr. This brine was then circulated by a pump through coils located in the rooms to be refrigerated. In this manner temperatures of 15° Fahr. and a dry atmosphere in the boxes could be obtained, but the process was expensive, as the salt once used had to be wasted.

The refrigerating machines used at present furnish low temperatures and dry atmosphere at little expense where power can readily be had. . . .

The refrigerating machines are used for the cooling of rooms, the making of ice, the freezing of water in carafes, the making of ice cream, and the cooling of air to be injected into living-rooms.

We have now to decide which system of refrigeration we shall adopt, the direct or the indirect.

In the first, the direct system, ammonia is circulated through pipes located directly in the rooms to be refrigerated, while in the second case, the indirect system, the ammonia is circulated in pipes located in a brine tank, cooling the brine, which then in turn cools the rooms, it being circulated through pipes provided in the rooms.

Ice-making, carafe freezing, and ice-cream freezing are always done by the indirect system, while the cooling of the air is more economically done by the indirect system, but can be done by the direct system when blown into rooms.

The cooling of rooms direct should be done by the direct system, if possible, or (when it is found necessary to stop the machine over night to save attendance, and when the boxes are small and will be used over night) by a combination system.

To use the indirect system for small boxes when the machine stops over night is no advantage; first, the brine tank must be made considerably larger, in order to store sufficient cold brine, which can be circulated through the cooling-pipes in the rooms while the machines are stopped. And, second, in order to circulate the brine, a pump must be kept going, which needs attention and power, so that either a boiler must be kept going or a motor of some kind, which also need attention.

The indirect system for rooms to be refrigerated is really an advantage only when the rooms are very small and the machine runs continually, since it is difficult to regulate the temperature of such boxes by the direct system, the number of running feet of pipe in boxes being so small that the liquid inlet cock cannot be adjusted accurately enough, and either too much liquid or none will enter the pipes.

In the direct system no brine tank, nor brine pump is required, and, while the brine pipes are somewhat cheaper than the ammonia pipes, the price of the brine tank and pumps more than counteracts this difference. While the life of ammonia pipes is infinite, the life of brine pipes is about three years. The pipes themselves would last longer, but the threaded ends give out, and this necessitates the removal of the pipes just the same. Further, it is not always easy to provide space for the brine tank and brine pump, and then the eventual leaking of the brine tank and the adding of brine are undesirable features. In other words, there are only very rare occasions where the indirect system should be used.

The combination system, however, is admirably suited to the cooling of small rooms or boxes. It consists of ammonia pipes, which are partly exposed to the air of the box and partly submerged in weak brine.

A galvanized-iron trough is suspended from the ceiling and filled with weak brine, and, in the space between ceiling and trough, one, two, or more horizontal rows of pipe are suspended. In the case of one row, the pipes may be one-half submerged, and in the case of two rows, one row may be submerged and one row exposed to the air. The trough must, of course, be so arranged that the air can reach the space above it on one side, pass over the pipes, become cooled and descend on the side opposite to that from which it started. This is done by making the trough narrower than the boxes, leaving a passage for the air on each side. If the box is

¹ Portions of a paper by Albert Siebert, C. E., read before the Engineers' Club of St. Louis, and published in the *Journal of the Association of Engineering Societies*

wider than about three feet, it is better to provide two troughs, leaving a double passage between the two troughs and a single passage on each side. The warm air will then ascend through the central double passage, and divide, one-half passing over each trough and descending through one of the single side passages. Of course, sufficient spaces must be left for the free passage of the air.

The advantages derived by the use of the combination system (Richmond Patent) are the following:

First. Easy regulation of the liquid. When it is the intention to run the machine only twelve hours per day, sufficient pipes must be provided to do in twelve hours the cooling required for twenty-four hours, and, therefore, twice the amount of pipes must be erected, consequently the range for the liquid to act upon is increased.

But, since a part of the pipes (the part farther away from the inlet) is submerged, the contact with the medium to be cooled is better, and considerably more heat can be transmitted by each foot of pipe, hence there is little chance for the liquid to leave the coils as such, and accumulation of refrigeration by the cooling, and much more by the freezing of the weak brine, is obtained. The brine is made weak, so that it will freeze at about 28°. It can then easily keep a box at 34° as long as it is melting, and, even melted—the brine itself, as a liquid, can absorb heat until its temperature reaches 34°.

It will be seen that in this manner a storage of refrigeration is obtained, which is very convenient, takes up very little room, and works automatically, storing whenever there is surplus refrigeration.

The making of ice is rather a cumbersome affair, and does not pay in small quantities. Ice made of raw water has a snowy appearance, and the water must be carefully filtered in order to avoid coloring.

A distilling apparatus takes up much room and is expensive. Besides, the vapor rising from the steam condensers and reboiling tanks must be carried off, and this is seldom convenient in a dwelling-house. For hotels, however, where it is easy to obtain distilled water, there being quite a large quantity of surplus exhaust steam on hand, it pays to make ice. In dwelling-houses, freezing the water in carafes can easily be accomplished, no distilling appliance being necessary, since the appearance of the ice formed in the carafes is not objectionable; and, if a little opaque ice is wanted, small ice-cans can be placed in the pockets provided for the carafes and the water therein frozen.

A small place can be reserved for the ice-cream freezer, which need be of no special construction, and the motor which is used to circulate the brine in the carafe tank can be connected to the stirring apparatus of the ice-cream freezer.

The cooling of the air for living-rooms, fever-rooms, hospitals, libraries, etc., is another useful and important application.

There the condition of the atmosphere in regard to moisture plays an important part. It is well known that air and water vapor exist together in our atmosphere, the percentage of water-vapor varying from 35 to 100. According to Dalton's law, two gases or vapors like the above exist together, just as if the other was not there, the temperature of the mixture determining the pressures, and in consequence the weights of the water-vapor, provided the percentage of the moisture has been obtained by a hygrometer of some kind. In one cubic foot of air there exists, therefore, one cubic foot of water-vapor. Assuming the temperature of the air to be 85°, we find the pressure 0.592 pounds and the weight of one part of it 0.00182 pounds. If, now, the percentage of moisture is 60, we know that this cubic foot of mixture contains $0.00182 \times \frac{60}{100} = 0.00109$ pounds of water-vapor.

From the above and by the use of a steam table it will be readily seen that if we cool air, we increase rapidly the percentage of moisture, finally condensing part of it, which is, however, a very objectionable occurrence in a living-room or a fever-room. If, therefore, we do not want to abstract the moisture by heating the air after having cooled it below the desired temperature and lost water-vapor by condensation, we must be satisfied with a reduction of about 10° Fahr. in the temperature of the air. For instance, if we take the previous example and fix 75 as a limit for the percentage of moisture permissible, we find that taking 0.00109 as being 75 per cent. of the weight of one cubic foot, that one cubic foot would weigh 0.001336 pounds, which would correspond to a temperature of the cooled air of 75° (see steam tables). If we should cool the air any further, the percentage of moisture would exceed 75, and this is not permissible.

Taking, now, the case that we are required to furnish air at 60° Fahr., containing only 50 per cent. moisture, the air to be cooled having a temperature of 95° and a maximum percentage of moisture of 75, the question is, how low must we cool the air in order to condense sufficient water-vapor to obtain the proper amount of moisture when the air is heated again to the temperature desired.

We have air at 95° and 75 per cent. moisture, consequently each cubic foot of air contains (see tables) $0.00245 \times \frac{75}{100} = 0.00184$ pounds.

We have air at 60° and 50 per cent. moisture. Each cubic foot of air contains, then (see tables), $0.00082 \times \frac{50}{100} = 0.00041$ pounds of moisture, or we have condensed $0.00184 - 0.00041 = 0.00143$ pounds.

Since we want to retain only 0.00041 pounds of water-vapor, we must cool the air to such a temperature that, when saturated, it contains 0.00041 pounds. Consulting the tables, we find that this takes place at 40° Fahr.

To recapitulate, we have first to cool the air of 95° to 40°, and then to heat it again to 60°, in order to obtain the desired conditions.

The work of refrigeration required for this is as follows:

Neglecting the fact, that owing to the presence of the water-vapor (about one-half pound), the pressure of the air itself is not quite atmospheric pressure, the sum of the pressures of the water-vapor and the dry air being equal to the pressure of the atmospheric air.

We can divide the work into four parts:

1. To cool the dry air.
2. To cool the water-vapor.
3. To condense the water-vapor.
4. To freeze the water-vapor when the direct system of cooling is used.

1. AIR COOLING.

Weight of cubic foot of dry air at 95° = 0.0728.

Specific heat of dry air at 95° = 0.2377.

One cubic foot requires $0.0728 \times (95° - 40°) \times 0.2377 = 0.941$.

2. WATER-VAPOR COOLING.

Specific heat of water-vapor about 0.5.

One cubic foot requires $0.00041 \times (95° - 40°) \times 0.5 = 0.012$ th. u.

3. WATER-VAPOR CONDENSATION.

Average latent heat = 1,000 th. u.

One cubic foot requires $0.00143 \times 1,000 = 1.43$ th. u.

4. WATER FREEZING.

Latent heat of congealing 1.42 th. u. $0.00143 \times 143 = \frac{0.203 \text{ th. u.}}{2.586 \text{ th. u.}}$

It will be seen how small is the amount of work required to cool the air direct, and what an important rôle the water-vapor plays. It will be further seen that the indirect cooling system is preferable for air cooling, and that only water should be used as the circulating medium, because then there can never be obtained a temperature of air below 32°, and no freezing of the condensed vapor can take place.

Besides, it is much more economical to have a medium at higher temperature, say about 34°, because then the refrigerating machine can be worked with about 40 pounds suction pressure, while, if the brine of 20° were used, the machine would have to work with about 25 pounds suction pressure, which would mean that in the first place, with an expenditure of about 2 per cent. more fuel, 37 per cent. more refrigeration can be obtained. Twenty-five pounds pressure is the usual suction for machines working on the direct and indirect cooling system, also when freezing water in carafes.

The air cooling is generally combined with the heating of the building, either by steam or water.

The radiators are located in air ducts and air is blown over them. In winter, steam or hot water is circulated through them, and in summer cold water, if necessary. Of course an extra radiator for reheating the air must be placed behind the radiator cooling the air; but, as already explained, this will be necessary only when lower temperatures are wanted.

For ordinary living-rooms, it is considered that furnishing air cooled 10° four times every hour will have a very agreeable effect, and will purify the air in the room.



THE Tenth Annual Exhibition of the Chicago Architectural Club has just been held at the Art Institute. It was one of exceptional merit, and the three galleries which held it were so filled with strong and charming things as to prove attractive to all kinds of visitors, whether professional or otherwise. The usual number of school problems were displayed, showing a great increase in technical ability over the work of preceding years, especially those earlier ones when the school showing was, almost without exception, weak. It is curious to notice how entirely French are the methods which have been adopted in almost all our American schools.

The architectural sketches came out especially strong in the exhibit, some being entirely charming and attractive as pictures, aside from all architectural value they may have. A water-color of the Temple of Agrigentum, by Cass Gilbert, of St. Paul, was very noticeable, as well as sketches by William Churchill Noland, of Richmond, of old houses in Lisieux and Chinon, France. Joseph Pennell's delightful pen-and-inks, of which there were a goodly number, need no word of praise here to bring to mind their charming qualities. A doorway of the Church of Santa Paula, of Seville, came from the Philadelphia T-Square Club, signed by two names, while from the New York Sketch-Club came "Color Sketches from Italy," signed by R. Kendricks, both of which were noticeable for

strong good work. One might continue in the list of sketches which would seem to show how nearly talent touches the work of many of the young architects of to-day in their interpretation of things of beauty.

Much of the rendering of the perspectives from the various architects' offices were delightful, especially noticeable being some by Louis Rasmussen, of houses for Klempell, Borst & Hetherington. Quaint and curious in rendering were two designs for gardens and houses by Wilson Eyre, which, however, would only partially convey to the minds of many the proposed work as it would appear when completed.

Interesting to many, who have not been fortunate enough to see the finished work, were the designs of E. H. Blashfield for his decorations in the Congressional Library.

From time to time at the Art Institute, exhibitions are made of the drawing done by the public school children, which within the last few years have shown as great signs of improvement in their way as has the more advanced work in the technical schools. It is a hopeful sign of a more general spread of art knowledge and appreciation that the question of art in the public schools is taking the prominent place that it is in this section of the country. At the Art Institute a very large normal class is at work. The results already shown in the public schools, though necessarily very limited from the short time devoted to drawing, and from the fact that such work must be correlated with the work of the regular courses, is often very good. Yet, with all these limitations, which the work from a purely artistic standpoint must be subject to, much is accomplished, which is a step in the right direction rather than a hindrance when, in after years, the pupils may wish to take a more technical course. In addition to more correct methods in the actual work, much is gained in a better appreciation of art and things artistic in the work which the Public School Art Leagues are doing here in the West as well as the East. The chief object of the leagues is to place really good works of art in the school-rooms, chiefly reproductions of well-known masterpieces, either by casts or photographs. Mr. William M. R. French, of the Art Institute, is especially interested in this movement. He has delivered several lectures for the benefit of the fund and has recently made the offer, that students who were willing to undertake copying some of the pictures in the galleries, giving such copies into the hands of the League to be used in the school, should receive free instruction in the regular Art Institute classes for as many days as they spent in their copying. This would sound like a dangerous experiment, but probably no very poor copy would be allowed to leave the Institute, and certainly if it were, none of the Art Leagues' committees would place anything unsatisfactory on the walls of the school-houses. Many such leagues are being started not only in the city, but outside as well, and as the movement started in the little "down East" town of Salem, and is gradually sweeping westward, it seems as if it would not be long before it became general over the whole country. If such were the case, a dense ignorance in matters artistic would not be the inheritance of the rising generation, and the well deserved reputation of America, of being the most inartistic of nations, might become a reputation which America had ceased to live up to. Of course the knowledge would at first be superficial, but better art instincts, it would naturally be hoped, would follow.

The Illinois Chapter of the American Institute, in conjunction with other associations, has recently sent out a circular relative to the licensing of architects. Though the bill originated in the Illinois Chapter, other organizations have joined in pushing it through, and the open letter accompanying the circular is signed by the respective officers of the Chicago Architects' Business Association, Building Trades Club of Chicago, Builders' and Traders' Exchange of Chicago, Chicago Masons' and Builders' Association. A brief summary of the bill now pending is as follows:

"SECTION I. Provides for the appointment by the Government of a State Board of Examiners of Architects, to be composed of five members, one from the Faculty of the Illinois State University, and the others from architects who now reside and have practised at least ten years in this State.

"SECT. II. The members of the Board to file with the Secretary of State the constitutional oath of office, then organize and elect officers. The Secretary to receive a salary not to exceed \$1,500 per year and necessary official expenses; and each member to receive \$10 per each day actually engaged in this service, besides actual expenses. No expenses of board to be paid by State Treasury.

"SECT. III. Three members of the Board constitute a quorum, and shall hold examinations at least twice a year, properly advertising time and place of same.

"SECT. IV. Any person over 21 years of age is entitled to an examination on payment of a fee of \$15, to be returned if examination is unsatisfactory; but if approved by the Board, applicants may receive a license to practise on a further payment of \$25. The examination shall have special reference to the construction of buildings, and a test of the knowledge of the candidate of the strength of materials and of his or her ability to make practical application of such knowledge in the ordinary professional work of an architect, and in the duties of a supervisor of mechanical work on buildings, and also the general laws of sanitation as applied to buildings.

"SECT. V. Provides for all persons who may be engaged in the practice of architecture at the time this bill goes into effect, to be entitled to a license to continue said practice without an examination,

provided they prove the facts of their so practising within six months after the passage of this bill, and provided, also, they make payment to the Board of a fee of \$25. All licenses must be recorded in the office of the County Clerk in the county in which the holder thereof shall practise.

"SECT. VI. County Clerks to keep a record of all recorded licenses.

"SECT. VII. Every licensed architect to have a seal to stamp all drawings and specifications for use in this State.

"SECT. VIII. Provides for a fine of \$50 to \$500 for persons who attempt to practise architecture without a license.

"SECT. IX. Definition of an architect: 'Any person who shall be engaged in the planning or supervision of the erection, enlargement or alteration of buildings for others, and to be constructed by other persons than himself, shall be regarded as an architect.' This section also provides for allowing any person to plan or supervise a building for himself without taking out an architect's license. [This clause is absolutely necessary in order to assure the passage of the bill at Springfield. Please note power to revoke licenses in subsequent sections.]

"SECT. X. Provides for revoking licenses granted architects for gross incompetency or recklessness in the construction of buildings, or for dishonest practices and the conditions under which reinstatement may be had.

"SECT. XI. Provides for the annual renewal of license and fee of \$5, which will create a live fund to sustain Board in future.

"SECT. XII. Provides for an annual report of the Board to be made to the Governor of the State."

Chicago, which is always boasting of having the largest this thing or that thing, is now mentioning the fact that she has the largest and most elaborate free bath-house in the United States. New York has a larger one on paper, but in the mean time Chicago urchins are actually getting clean in Lake Michigan water. The bath-house is built in a crowded district of the South Side, where the only bathing accommodations existing heretofore were those afforded by the stagnant water of an occasional clay hole. A large bath-house was erected on the West Side last year, then came this still larger one on the South Side, and next year the North Side, if present plans are carried out, will eclipse all previous efforts in a spacious and commodious house to be erected near Lincoln Park.

This South Side bath-house, situated on Wentworth Avenue, in a district well populated with the very poor and the middle class, has been built by the city at a cost of \$1,200. It was first planned to build it with two wings, one for men and one for women. This, however, being found too expensive, only one wing was put up and it is hoped later to add the other portion. With its present capacity the place can handle ninety persons an hour or seven hundred a day. The front of the building is devoted to waiting-rooms and offices, while the wing already built contains thirty-two compartments. Each of these consists of a small dressing-room, and an interior section with a large shower-nozzle above it. Everything is as clean and durable as can be planned, the floors being of concrete and the sides of slabs of slate. In the basement is a soup-kitchen, where two thirty-five gallon soup-kettles and a coffee-tank with a capacity of thirty-eight gallons, in seasons when it is necessary to give out food, will prove a source of great comfort. Another feature of the basement is the barber-shop.

BOOKS AND PAPERS

THE growth of popular interest in architecture, both as a fine art and a record of historic development, is well manifested by the multiplicity of books which have been written of late years upon the subject, and by the fact that a number of the more recent publications have been such as, while by no means ignoring the professional aspect of the subject, have appealed more directly to the general reader and observer, and have sought to make the subject of retrospective architecture more readily intelligible to those who look upon it quite as much as a pleasant study and means of self-culture as a means of earning one's living. One of the most recent works of this description¹ is before us. It is popular in the general sense, in that it avoids the complexity of documentary evidence at which the larger histories aim, but, withal, it is comprehensive, carefully written, and is of the kind which can hardly fail to give an excellent and correct idea of the origins and development of architecture all over the world. It is very comprehensive in the general sense that it starts with Egypt and includes such outlying manifestations as Central America and Peru, and it is one of the very few histories of architecture which show the correlation of the various styles and the manner in which they are historically derived from each other, and are, more remotely, developments of the Greek or Roman styles. The book is to be commended as having achieved its manifest object, and in a convenient sized volume of less than five hundred pages, it accomplishes what some of the more technical histories do not compass in volumes of thrice the size.

¹ "The Story of Architecture": An Outline of the Styles in all Countries. By Charles Thomson Mathews, M.A., Fellow of the American Institute of Architects, Author of "The Renaissance under the Valois." New York: D. Appleton & Company. 1896. Price, \$3.

It is the intention of the publisher to continue this series¹ of histories of the cathedrals of England, until the whole of the churches have passed under review; and very useful and cheap guide-books they will be. Some of the illustrations might have been better; but, on the other hand, many are very good, and those reproduced from old engravings, as for instance, the one of Salisbury with its (demolished) bell-tower, are exceedingly interesting.

The compiler has brought together many curious facts connected with the church, and those relating to the spire are particularly interesting at this moment, when serious and important work is being carried on for the strengthening of the tower. It was not in the original plan of the church, as we may gather from the fact that a bell-tower was built some little distance from the west front — probably the architect saw that his foundations were not sufficiently strong to bear such a superstructure, and, moreover, he was probably frightened by the fate of the central tower of Winchester, which had just fallen. But the men who came after were bolder; and so, by putting up some abutments in the triforium, the tower was raised another story, and crowned by a lofty spire. Doubtless the original idea was to have a lantern open to the crossing, as at Ely, for above the groining there are detached marble columns which agree in style with those in other parts of the church. The cathedral is built upon marshy ground, consequently a subsidence occurred at a very early date — indeed, there is scarcely a group of pillars which is not out of the perpendicular. Between 1450–81, Bishop Beauchamp inserted great arches between the piers of each transept to strengthen the tower; and now, once more the beautiful spire is enveloped in scaffolding, and underpinning has been found necessary; indeed, it is said that the ground had actually sunk beneath the foundations, leaving a space, so that the great mass practically was only supported by the roof of the church.

It has the effect of the loftiest spire of its kind, for although it is exceeded by that of Amiens, the nave of the latter is so much higher than Salisbury that the spire of the French cathedral appears a mere *flèche*. The distance between the nave roof and the top of the spire at Salisbury is 289 feet (spire 404 feet, nave 115); at Amiens, 214 feet (spire 422 feet, nave 208); Strassburg is 488 feet; but like those at Antwerp and Mechlin, the spire of Strassburg is so elaborate in ornament that its height is not realized. When in 1762 some repairs were undertaken in this spire, a little wooden box was found at the top, containing a round leaden one, presumably containing some relic of the Blessed Virgin, the patron saint of the church, possibly, as a preventive of danger from lightning.

The number of windows, pillars and doorways is said to equal the hours, days and months of the year, hence, a local rhyme attributed to Daniel Rogers:

"As many days as in one year there be,
So many windows in this church we see;
As many marble pillars here appear
As there are hours throughout the fleeting year;
As many gates as moons one year does view,
Strange tale to tell! yet not more strange than true."

The havoc played in the cathedral by the architect Wyatt, in 1789, equalled that perpetrated by the French Revolutionists about the same time. Effigies were divorced from their tombs, canopies were destroyed, screens removed, and in one case, the tomb of Bishop Beauchamp, after a peaceful rest of three centuries, was "misplaced" and never recovered!

The church contains a very fine cope chest, contemporary with the cathedral. It is semicircular in form. Its lid was lifted originally by a rope and windlass.

The Muniment-room has some curious books and manuscripts, and an immense number of Chapter Registers. The documents which contain the "statutes and ordinances," by which the Cathedral is governed, extend over six centuries, commencing in 1091 and ending in 1697.

In the wall surrounding the Close may be seen several blocks of stone bearing Norman ornament, brought from Old Sarum.

The compiler, speaking of the destruction carried out by Wyatt, as for instance the Bell Tower, on the plea that it did not agree with the cathedral in style, adds a comment in a few wise words: "This plea, specious and even excellent in theory, has probably done more irreparable injury to our ancient buildings than even the iconoclasts of the Reformation" (or Rebellion?). "A shattered ruin may convey a clear idea of its original state, while a smooth, pedantic restoration will obliterate it entirely."

The wholesale and wanton destruction of stained-glass in 1788, is witnessed to by a curious letter from a glazier of Salisbury, John Berry, to Mr. Lloyd, of Conduit Street, London. "Sir — This day I have sent you a Box full of old stained and Painted glass, as you desired me to do, which I hope will suite your Purpos, it his the best that I can get at Present. But I expect to Beate to Peceais a great deal very sune, as it his now use to me, and we do it for the lead. If you want more of the same sorts you may have what thear is, if it will pay for taking out, as it is a Deal of Trouble to what Beating it to Peceais his; you will send me a line as soon as Possole, for we are goain to move our glasing shop to a Nothur plase, and thin we hope to save a great deal more of the like sort, which I ham your most Omble servant — John Berry."

¹ "The Cathedral Church of Salisbury." 32 Illustrations. Edited by Gleeson White. George Bell & Sons. London. 1s. 6d. "Canterbury." Same series.

"Beating to Peceais" thirteenth-century stained-glass! If only the church had it now! The two transepts have been filled within the last few years with *grisaille*, which tones the light somewhat; but no doubt, the large number of windows and the enormous size of them was intended to supply light in a dark land; albeit the glass was colored.

The volume on Canterbury is equally full of quaint matter, and it gives a much fuller account of the monastery, the cathedral and the history of the quarrel between Henry II and Thomas à Becket, than is usual in such small guides. A story relating to the martyred archbishop's remains is worth quoting as characteristic of the religious folk of mediæval times. "Benedict, a monk of Christ Church, was elected Abbot of Peterburgh in 1176. Disappointed to find that his cathedral was very poor in the matter of relics, he returned to Canterbury, took away with him the flagstones immediately surrounding the sacred spot, with which he formed two altars in the conventual church of his new appointment, besides two vases of blood and parts of Becket's clothing."

But a still more characteristic story of monkish thieving in a good cause is the following: the brethren of St. Augustine's Abbey desiring to share in the glory of their rival, the cathedral, offered Roger the *Custos Martyrii*, the position of Abbot of their monastery, on condition that he should purloin for them some part of the remains of the martyr's skull. And not only did this custodian consent to the burglary of what he was specially appointed to safeguard, but he was commended in the chronicles of the abbey for the deed.

At the translation of the archbishop's remains to the splendid shrine in Trinity Chapel, the whole world was represented. The day of the solemnity was announced all over Europe; episcopal manors were ordered to provide provisions, as well as hay and fodder, so that any one could have both for the asking, at any place between London and Canterbury. Tuns of wine were set up from which people could drink without payment, all along the route. Henry III, the Nuncio, Archbishop Laughton, the Archbishop of Reims, headed the procession, and there was a "goodly company" of followers.

It is a pity the author has not given a reproduction of the picture of Becket's shrine, which he speaks of being preserved among the Cottonian manuscript. Its magnificence must have equalled anything of the kind in any country; for kings, princes and churchmen, from far and near, overwhelmed it with the costliest gifts. In 1538, when Madame de Montreuil visited it on her way from Scotland, where she had been with Mary of Guise, she said, "that if she had not seen it, all the men in the world could never 'a made her believe it"; and though she would not kiss the head of St. Thomas, the Prior "did send her a present of coney, capons, chickens, with divers fruits — plenty — insomuch that she said, 'What shall we do with so many capons? Let the Lord Prior come, and eat, and help us to eat them to-morrow at dinner,' and so thanked him heartily for the said present." In 1179, Louis VII of France visited it, and not being desirous of bestowing upon it so valuable a gem as the "Regale of France," the stone despising the King's manners, leaped, of its own will, into the wall of the shrine, and baffled all efforts to be forced out!

Richard Cœur-de-Lion walked to Canterbury from Sandwich, to return thanks for his escape from the Austrian prison. Edward Longshanks presented it with the crown of Scotland, and Henry V returned thanks to St. Thomas for the victory of Agincourt. The last notable visit was in 1520 when Charles V and Henry VIII paid their devotions. Possibly, this visit awakened Henry's love of greed, for eighteen years later he robbed it of all its valuables, destroyed the shrine, and erased St. Thomas's name from the service-books.

The destruction of the entire fabric under the Puritans was as complete a paper preserved in the Chapter library describing it as a mere mass of "bare walls and roof, . . . and these so shattered and defaced, as it was not more serviceable in the way of a cathedral, than scandalous to all who delight to serve God in the beauty of Holiness." Most of the windows were smashed, and "the church's guardians, her faire and strong gates, turned off the hooks and burned." Such was the destruction by the enemy; and the "restoration" by friends has been not much less destructive — for possibly some of the worst specimens of stained-glass may be seen at Canterbury — "incredibly hideous," says our author.

Whether we can endorse the author's remarks upon the tower which was erected in 1840 for the sake of "uniformity," is another matter. The two west-end towers were not originally of equal height; at the northern corner an old Norman tower was the base of a leaden spire, 100 feet high. This the author thinks must have given a "lop-sided effect," and he has no regrets for its removal in 1705. But does he remember the lop-sided effect of the spires of Chartres? Surely uniformity is not always perfection — *vide* Köln. Perhaps the most interesting tomb in the church is the Black Prince's with his helmet, gauntlets, and velvet coat, hanging above, which latter some patient lady has lately been repairing, taking, it is said, three months hard work to finish. The sword is said to have been carried away by Cromwell, and a curious story affirms its possession by a Manchester gentleman in 1794, and its being sold after his death and disappearing! The Black Prince bequeathed by his will, tapestry hangings for four altars: "*l'antier la ou Mons'r Saint Thomas gist — l'antier la ou la teste est — l'antier la ou la poynte de l'espie est*," and it is supposed that the one "where the head is," was situated in what is now called Becket's crown.

As convenient little hand-books of our cathedrals, prettily got up,

with enough architecture of a reliable character for the ordinary traveller who is imbued with a desire to look farther than the mere surface of things, these publications may be commended to the public.

BOOKS RECEIVED.

"Report of the Tests of Metals and other Materials for Industrial Purposes," made with the United States Testing-machine at Watertown Arsenal, Massachusetts, during the Fiscal Year ended June 30, 1895. Washington: Government Printing-office. 1896.



THE NATIONAL SOCIETY OF MURAL PAINTERS.

THE Mural Painters held their March meeting on the 30th ult., the First Vice-President in the chair.

Among the reports from the various committees that from the Educational Committee claimed particular attention, as indicating the interest taken by many of the important art schools in receiving competent instruction regarding mural painting, and the aid of the Society was promised to any school, whether here or in other parts of the United States, which should be desirous of adding this course of instruction to its present curriculum.

The question of exhibitions was also discussed, and the Mural Painters' contribution to the present International Exposition at Nashville was referred to. It was suggested that, if possible, joint action on the part of the various important societies throughout the United States be secured so that the dates of the various exhibits should not conflict, and that arrangements should be made to have the work transferred from one city to another. This would be a very wise and intelligent solution of the question which is brought up constantly by requests from various exhibitions throughout the country.

The relation of the delegates to the Fine-Arts Federation was also discussed, and as the new constitution is now in force, it was arranged to have one delegate dropped each year and one alternate promoted to the rank of delegate, and a new alternate appointed to fill the vacancy.

In regard to the question of the tariff, as it was already being discussed by the Fine-Arts Federation, and as there was such a diversity of opinion among the members, the Society would give no definite instructions to its delegates, but left them to act as they individually thought wisest.

Reference was made to the annual dinner, which is to be held on the evening of April 30th, at the rooms of the "Arena," and the Vice-President expressed a hope that there would be a large attendance of the members, as a number of guests, representatives from other societies in New York, Philadelphia, Boston, Cincinnati, etc., had already been invited.



[Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.]

BRONZE DOOR, "TRADITION": LIBRARY OF CONGRESS, WASHINGTON, D. C.

[Gelatine Print, issued with the International and Imperial Editions only.]

THIS plate shows the left-hand one of the three main entrance doors, the only one of the two entrusted to Mr. Warner which was finished by him. The companion door on the right was taken in hand after Mr. Warner's death by Mr. Herbert Adams. The middle door is entrusted to Mr. MacMonnies.

APSIDAL TREATMENT, NO. 22: SQUARE-ENDED APSES.

THE SENATE READING-ROOM: LIBRARY OF CONGRESS, WASHINGTON, D. C. MESSRS. SMITHMEYER & PELZ; P. J. PELZ; E. P. CASEY, ARCHITECTS.

The fireplace shown in this plate was executed by Mr. Herbert Adams, Sculptor.

DOORS AND DOORWAYS, NO. 1: DOOR OF A HOUSE ON THE PIAZZA S. ANDREA IN THE MERCATO VECCHIO, FLORENCE, ITALY.

DOORS AND DOORWAYS, NO. 2: DOOR OF THE CANCELLARIA, ARCHIEPISCOPAL PALACE, LUCCA, ITALY. JACOPO DELLA QUERCIA, SCULPTOR.

[The following named illustrations may be found by reference to our advertising pages.]

ACCESSORIES OF LANDSCAPE ARCHITECTURE, NO. LIII: CAMPO SANTO, GENOA, ITALY.

ACCESSORIES OF LANDSCAPE ARCHITECTURE, NO. LIV: THE ESPLANADE, CALLED "DELLA MERIDIANA": BOBOLI GARDEN, FLORENCE, ITALY.

[Additional Illustrations in the International Edition.]

THE JACOBKIRCHE, GOETTINGEN, HANOVER.

[Gelatine Print.]

This church edifice is not only the largest, but in many respects the most attractive one in the town. Owing to the narrowness of the surrounding streets, it is impossible to take a satisfactory photographic view of the magnificent west front, so our plate shows a view taken from the southeast. The proportions of the tower at once strike the beholder as peculiar. The heavy cornice, with gargoyles at the corners, girding the tower about the middle, has given rise to the belief that the upper story was not intended in the original design, but owes its existence to an afterthought, and that a stone spire, or open-work pyramid, was originally to be placed directly above the cornice. In view of the intended renewal of the cupola of the tower, which is to complete the work of external restoration that has been going on in recent years, the question of how best to finish off the tower has given rise to considerable discussion of late. As the tower foundations have been found to be unreliable for supporting an increased load, the idea of replacing the old cupola by a stone pyramid, in keeping with the rest of the edifice, cannot be entertained, unless the entire upper story be taken down. This solution is vehemently opposed by those who regard the removal of this venerable landmark as an act of unwarrantable vandalism, and who think that the present wooden dome should be replaced by a cupola in stone not exceeding the present height. The architect of the tower is Hans Rutenstein, of Hildesheim; the time of erection, between 1426 and 1433.

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[Gelatine Print.]

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[The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.]

VIOUET-LE-DUC ON STEEL CAGE CONSTRUCTION.

ALBANY, N. Y., April 20, 1897.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Apropos of the discussion regarding the original inventor of the modern system of encased steel-frame construction (referred to in your editorial columns of April 17th), it should be of interest to recall one of the earlier conceptions of the possibility of such a system.

In the thirteenth of Viollet-le-Duc's "Discourses," published in 1860, the distinguished author, having under consideration the properties of iron, remarks, "A practical architect might not unnaturally conceive the idea of erecting a vast edifice whose frame should be entirely of iron, and clothing that frame—preserving it—by means of a casing of stone." In a foot-note he adds, "This idea is certainly dominant in the construction of the new Church of St. Augustine in Paris. It only wanted working out to be frankly accepted with all its consequences."

Very respectfully yours,

WM. ARTHUR WHEELER.



A SANITARY RECORD OF PARIS.—The City of Paris is making a sanitary record of every building in the city. Since March, 1894, 35,000 houses have been described, and it is expected that the register will be completed by 1900. It contains for each house a description of the drains, cesspools and wells, and of the plumbing; a record of whatever deaths from contagious diseases have occurred in it, and of all disinfections and analyses of water, air or dust.—N. Y. Tribune.

A TAJ MAHAL AT AURUNGABAD.—The old town of Aurungabad, twenty miles beyond Ellora, is interesting chiefly because it contains a second Taj Mahal, built in the same century as that at Agra. This mausoleum was erected as a tomb for the daughter of Aurangzib, and though it lacks the lovely inlaid work of its northern rival and has too low an entrance, the dignity and beauty of the Taj are here reproduced in a surprising degree—the same delicate carved marble windows with the subdued light falling upon the tomb, the same picturesque minarets, and the same long garden-walk with the well-known sheet of clear water from the outer gate to the front of the high platform on which rests the shrine.—C. W. Hopkins in the Nation.



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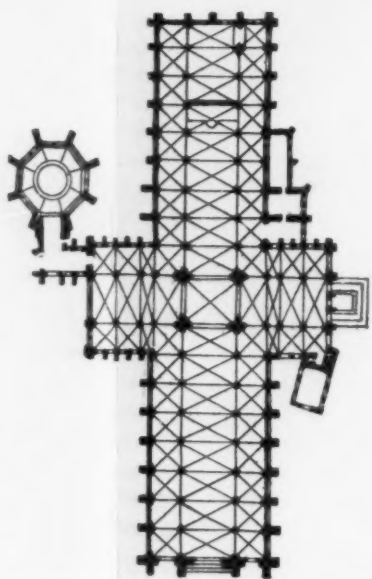
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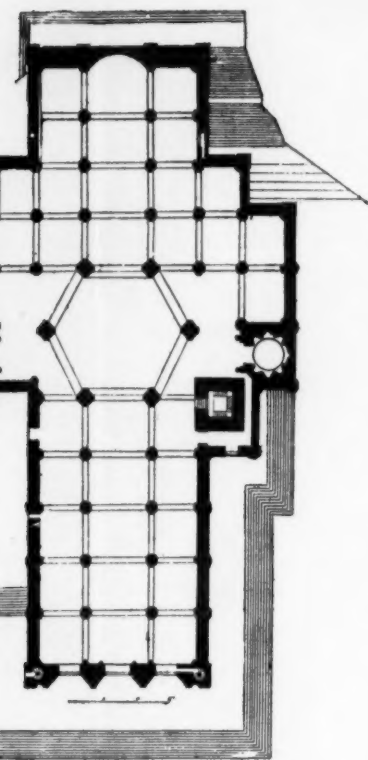


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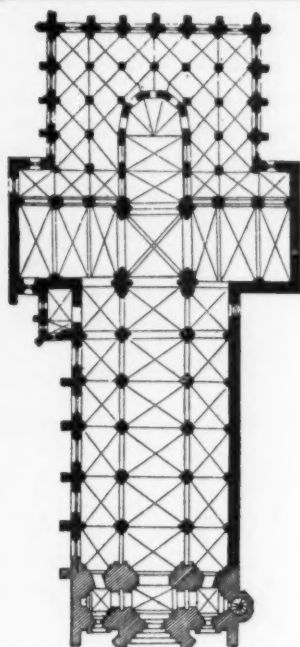
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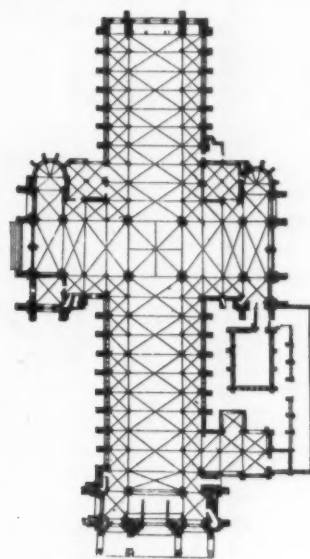




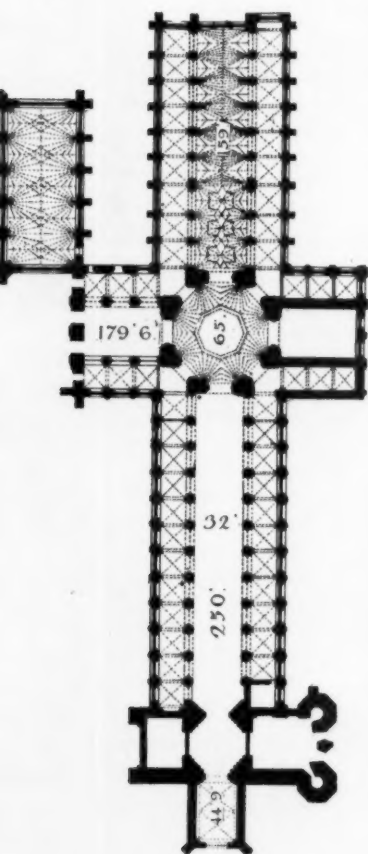
na Cathedral, Italy. [13th Century.]



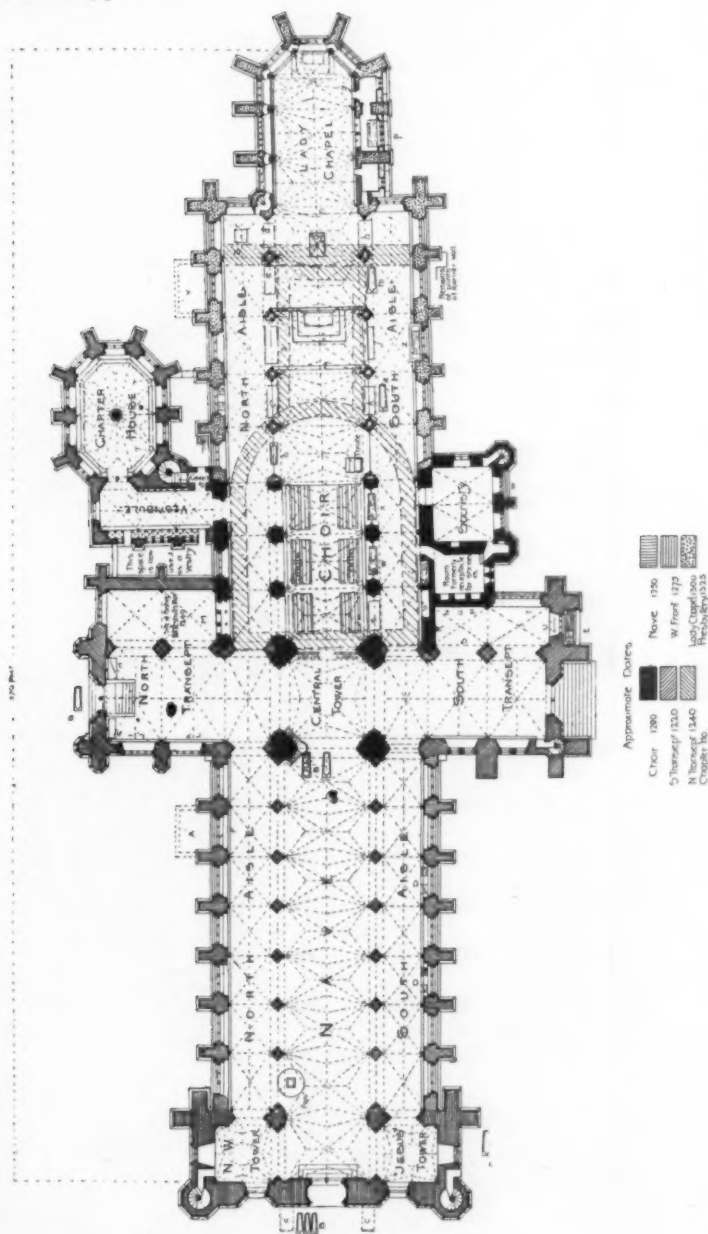
All Saints' Church, Lilienfeld, Austria.
[13th Century.]



Laon Cathedral, France.
[13th Century.]



Ely Cathedral, England.
[12th-14th Centuries.]



Lichfield Cathedral, England. [13th Century.]



DOORS AND DOORWAYS, No. 1:—DOOR OF A HOUSE ON THE PIAZZA S. ANDREA,
IN THE MERCATO VECCHIO, FLORENCE, ITALY.



DOORS AND DOORWAYS, No. 2:— DOOR OF THE CANCELLARIA,
ARCHIEPISCOPAL PALACE, LUCCA, ITALY.

JACOPO DELLA QUERCIA.