PRICE 15 CENTS.

OCTOBER 27, 1894.

THE AMERICAN ARCHITECT AND BUILDING NEWS

VOL. XLVI. * REGULAR EDITION * NO. 983.

ARCHITECTURE ENGINEERING

DECORATION CONSTRUCTION

211 TREMONT ST.

BOSTON MASS.

CONTENTS.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XLVI. No. 983.

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

OCTOBER 27, 1894.

CONTENTS

ALTHOUGH the conventions of the American Institute of Architects are not, as a rule, very stirring affairs, and it is by no means desirable that they should be, they represent the profession with fairness, and the dignity and good taste with which their proceedings are conducted reflects honor on the whole body of architects throughout the country. Looking back to the time when the Institute was organized, the subsequent growth of the profession in credit and influence is something extraordinary, and every one must acknowledge that the Institute has had a large part in this development. What share it may have in the future history of architects and architecture in this country remains to be seen, but it certainly shows no signs at present of any probable failure to represent and defend professional interests, complex as these have grown to be.

AN interesting improvement has been made in the water-supply of the city of Lawrence, Mass. This city, which has a population of about fifty thousand, takes its water-supply from the Merrimac River, at a point nine miles below the outfall of the sewers of the still larger city of Lowell. The practice of pumping up the sewage of one town, for the inhabitants of another town to drink, had produced its natural result, in the shape of endemic typhoid fever, until the Massachusetts State Board of Health, or rather, we suppose, Mr. H. F. Mills, the Chairman of the Committee of the Board on Water-supply and Drainage, who is, or has been, a resident of Lawrence, took the matter in hand, and Mr. Mills designed a sand filter, for the purpose of filtering the Merrimac water before it was pumped up to the city reservoir. The experiments of Mr. Mills and his associates in the cultivation and isolation of the bacteria of nitrification are already famous, and the knowledge of the conditions of filtration and purification gained at the Lawrence Experiment Station of the Board of Health have undoubtedly been utilized for the benefit of the citizens.

MR. MILLS'S filtering field is about two and one-half acres in area, and is covered with sand to an average depth of about four and one-half feet. The field borders the Merrimac River, and is separated from it by an embankment. Water from the river is allowed to run over it for about sixteen hours each day. The water-gates are then shut, and for the remaining eight hours the sand is allowed to drain itself, the pores becoming filled with air as the water sinks away. At the bottom of the sand are laid under drains, by which the water is collected and conveyed to a pump well, and is thence pumped to the distributing reservoir, which is open to the air. From the distributing reservoir it passes by gravitation into the city mains. Two million gallons per day are taken from the river, filtered, and pumped into the reservoir. Very severe tests, made by throwing on an experimental filter-bed of this sort bacteria, similar to the typhoid bacillus, cultivated for the purpose, showed that, with a depth of sand equal to that used in the city filter-bed, ninety-nine and eighty-one one-hundredths, on an average, of the bacilli thrown on the filter were removed by the filtration. As the proportion of bacilli in the culture-liquid applied to the filter corresponded to what would be the character of the Merrimac water at Lawrence if all the inhabitants of Lowell should have typhoid fever at once, the filtration test was certainly exacting enough to satisfy all doubts; and the practical trial of the filter-bed, under actual conditions, for the past year, has fully borne out the expectations of its designer. During the five years preceding the use of the filter-bed, the average annual number of deaths from typhoid fever in Lawrence was sixty-three. During the past year, although a severe epidemic of typhoid fever has raged in Lowell, there have been only twenty-six deaths from the disease in Lawrence. Moreover, of those who died, twelve were mill-operatives who were known to have drunk water from the mill-canals, instead of the purified water from the city mains, and it is reasonable to suppose that some of the other cases were of foreign origin; so that the sand filter-beds may fairly be said to have already almost extirpated typhoid fever from Lawrence. This interesting account we gather from a paper read at the meeting of the American Public Health Association, held at Montreal last month, by Mr. George W. Fuller, Biologist in charge of the Lawrence Experiment Station of the Massachusetts State Board of Health; which, we hope, will be attentively studied in a good many places outside of Massachusetts. To say nothing of Paris, with its chronic typhoid-fever epidemic, Philadelphia, Savannah, Jersey City, Newark, and a host of smaller places, suffer greatly from the filthiness of their drinking-water; and if so simple a process can effect for their inhabitants what it has for the people of Lawrence, it should be adopted without a moment's delay.

INDIAN ENGINEERING gives an account of the laying of the foundations of the new Law College, at Madras. The building stands on a foundation of black mud, fourteen feet deep, overlying sand, the level of the ground water being six feet below the surface. To get a suitable foundation, about four hundred wells were dug, mostly by native well-diggers, and filled with sand, and over these a sheet of concrete, four-and-one-half feet thick, was spread. As the water stood eight feet above the sand, it was necessary to curb the wells, which was done, after a familiar manner, by laying a ring of plank, building four feet of brick wall on it, excavating under it, so as to let it sink, and then building four feet more of brickwork, and so on until the well had descended far enough. Octagonal wells were found the cheapest and best, as they could be sunk close together, and yet resisted efficiently the pressure of the ground.

LADY BURDETT-COUTTS has had a small encounter with the trades-unions, which had the result of eliciting from her an expression of opinion on the subject of personal liberty which is worth quoting. It seems that two of the stable-hands employed by her were set at work to paint the stables in their spare time. The English seem to find in their lords and princes a sufficient substitute for the walking-delegates of our more favored country; so it was the Secretary of the Painters' Union who addressed to Lady Burdett-Coutts a letter, remonstrating against stable-men being allowed to do painters' work. The Baroness, who, besides being one of the most amiable and charitable persons in Europe, has a mind of her own, replied to the letter, saying, among other things, "That you, or your society, if you write under its direction, should in effect assert a jurisdiction interfering with other working-men outside your trade, and endeavor to hinder them in the exercise of praiseworthy industry, and the effort to better their position by such labor as they are glad to undertake, and fortunate to find, is, to my mind, a monstrous and intolerable oppression. It would deprive every working-man and woman in the country of the right to work out their own advancement by their own energy, and it would rob them of what the good old Radical principles in which I was brought up taught me to cherish through life — that birthright of personal liberty, under the law, inherent in every Englishman, inalienable by king or commoner."

WE almost tremble as we read these bold words. In England, as here, every election day sees the whole herd of politicians, of both great parties, galloping on their hands and knees to see who shall be the first to lick the feet of "Organized Labor"; and, although the penalty for offending the walking-delegates is not there, as it is here, starvation or assassination, the union officials are able to make anybody very uncomfortable who dares to mention Liberty in their presence. In France, where the goddess is worshipped sincerely, if, at times, rather eccentrically, a strong party, under the lead of M. Yves-Guyot, is beginning to question whether a social order in which the privilege of working for a living is confined to the members of certain organizations constitutes the highest ideal of human freedom; but in England and this country no one of any political distinction has been found bold enough to stand up against the unions, although, among us, men of the stamp of the regretted Colonel Auchmuty, and, to their honor be it said, most of the judges before whom the question has been laid, have defended bravely the good old principles of freedom; and if Lady Burdett-Coutts, or her accomplished American husband, should take a fancy to do something to resuscitate the Anglo-Saxon birthright, they can find plenty of inspiration by inquiring into the experiences of the "scabs" in their encounters with "organized labor."

A NEW sort of phonograph, invented by M. Koitzow, is described in the *Revue Industrielle.* Like all phonographs, the new machine is extremely simple. As in the Edison phonograph, a cylinder is used, mounted in journals, and actuated by clockwork, but, instead of the wax covering of the Edison phonograph, M. Koitzow uses a hard kind of soap, cast in brass moulds. The soap has the advantage of retaining the impression longer than wax, and of not being subject to softening in hot weather. The sound to be impressed on the cylinder is recorded by a sort of ear-trumpet, of hard rubber, and the impression is reconverted into sound by means of a lever, with arms of unequal length, the short arm of which carries a point, in contact with the cylinder, while the other is attached to the membrane, the vibrations of which reproduce the sound. The soap cylinders last a long time. When the surface is covered with impressions, it may be washed off, and a fresh surface exposed. The impression need not be more than a thousandth of an inch in depth, so that one cylinder can be used to receive and transmit two hundred and fifty thousand words.

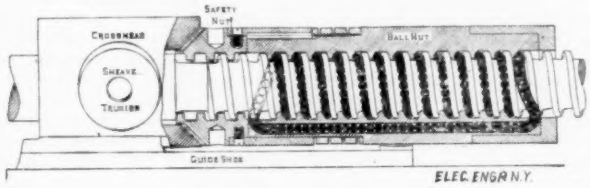
FOR many reasons, it is to be desired that the phonograph should be developed into an instrument of practical utility, and any improvement is to be welcomed that will make it so. To say nothing of the moral effect that would be produced on people by having their own hasty words preserved and repeated to them, by the unerring cylinder, such a machine would be of great use in business. Some very rich men keep a stenographer concealed behind a screen in their offices, within hearing of what may be said to them, or what they may say in reply; and their conversations with strangers are reported and the notes preserved, for use in case of attempts to pervert such conversations for blackmailing purposes. Where it is inconvenient to employ a special stenographer, a good and silently-acting phonograph would make an excellent substitute, and its testimony might, in many cases, effectively frustrate the schemes of knaves. In fact, so dramatic might be the effect of the unexpected reproduction, in court, of a dialogue which one of the parties thought had taken place without witnesses, in the trial, perhaps, of a probate case, or of an action for breach of promise of marriage, or for some great and well-concealed fraud, that we have often wondered why some playwright did not introduce a phonograph in the most exciting scene of a realistic drama. It would not be easy to imagine an effect more novel and absorbing than that which might be secured by bringing the wily villain of the piece triumphantly to the last act, showing him there victorious and exultant in the middle of his fellow rascals, while unfortunate virtue sobbed in the background, and, just as woe had nearly overwhelmed the audience, having the junior counsel for the defendant, (in love with the oppressed heroine), arrive with a little box under his arm, and elicit from it, by turning the crank, a series of buzzings and squawks, on hearing which the villain should turn pale, pull from his pocket bundles of stocks, bonds, "title-deeds" and so on, fling them at the heroine's feet, and seek safety in flight with his companions, only to be caught and dragged cursing back by the police, while the good people joined hands all around, uttering, as the curtain fell, the inarticulate murmurs expressive of virtuous joy.

SO much is said about the advantages enjoyed by foreign cities in not having their streets encumbered by electric wires that it is interesting to note that the city of Havre has just been furnished with an extensive network of electric railways, constructed and equipped by the Thomson-Houston Company, using the trolley-wire system which that Company has made so familiar here. In the Havre railway, while five hundred and sixty posts are used to carry the wires, the latter are, in many cases, supported from rosettes, bolted to the walls of the houses. There is probably no real danger in this arrangement, but we doubt whether it would be tolerated in any American city, notwithstanding our reputed carelessness in such matters. In the widest streets, the posts are surrounded by the little "refuges" which form so excellent a feature of French street-engineering, and many of them carry arc-lamps. The effect of these is very good, and the posts are found to make good supports for them, so that all the streets through which the electric roads run are likely to be, in the end, lighted in this way.

MANY years ago, the example of an international exhibition of manufactures and industries was set, by the successful carrying out of the World's Fair in London. It was not long before the example was imitated in Paris, and shortly afterward, the exhibition in, what would now seem the little, Crystal Palace in New York made a creditable beginning for the series of American undertakings of the kind. Another World's Fair in Paris, and one in Vienna, followed by the Centennial Exhibition in Philadelphia, brought the fever to its culmination, and it began to decline. France, which carries the financial analysis of such enterprises to great detail, found it profitable to continue the series, at intervals of about eleven years; but, with these exceptions, and that of the Chicago Fair, the great exhibitions of the past twenty years have been mostly local, or devoted to specialties, like the great Electrical Exhibition at Frankfort, and the Colonial and Fisheries Exhibitions in London. Now, notwithstanding the oft-repeated demonstrations of the pecuniary unprofitableness of general fairs, the fever for them seems to have set in once more. France is already arranging for one on an immense scale, to be held in Paris in 1900; Berlin is to have one in 1896; Japan has one in 1895, and smaller ones are announced in various places.

THE *British Journal of Photography* gives a description of a process which is certainly curious, and may, in some cases, be of value to the architect who does not care to show his photographic memoranda to all the world. A sheet of ordinary white, unsized printing-paper, or blotting-paper, is to be immersed in a liquid made by dissolving twenty grains of gelatine in an ounce of water. When the paper is thoroughly saturated, it is to be hung up to dry. After thorough drying, it is to be floated for three or four minutes on a mixture of one part saturated solution of bichromate of potash to two parts water, and again dried. The paper is now sensitive to light, and must be kept in a dark place. By exposure to the sun under a negative, for a sufficient time, a brownish print is produced, which is first to be soaked in cold water, until the unaltered bichromate of potash is dissolved out, and then in warm water, which removes all the gelatine that has not been rendered insoluble by the combined action of bichromate of potash and light. On the completion of this operation, the picture is still visible, in a faint, brown color, but, by immersion in a solution of sulphurous acid, this color is bleached out, and, on drying, the paper appears perfectly white all over, without the faintest trace of an image. In order, however, to bring out the image, all that is necessary is to immerse the paper in what the *British Journal* calls "hydroxyl monohydride," in other words, clean water, whereupon the picture plainly appears, in white on a dark ground. On drying, it disappears again, and the process may be repeated as often as desired.

ELECTRIC ELEVATORS.[1]



THE designing of a modern office-building has become quite as much a question of engineering and mechanics as of architecture. This fact may be unfortunate from an æsthetic point-of-view, but it is one which, however reluctantly, must be accepted by the architect of to-day. The change in the character of the buildings, the decreasing ratio of ground-dimensions to height, the new character of foundations, the introduction of steel framing, the great advances made in machinery, the increasing demands of tenants, the cost of maintaining an adequate building-service, the lowering in return on investments, all are forcing the architect to give more and more attention, not only to the engineering problems involved in construction, but to the various problems relating to the service of a building in all the variety of present practice and demands.

That many advances have been possible and are being made is evident. Roof-tanks are disappearing, gas is eliminated, compound direct coupled engines and dynamos are making obsolete for these purposes slow-moving engines, shafting and belts, and steam-pressures are being raised.

Provision for one service, however, and perhaps now become the most important, has always handicapped the architect, who has until recently been at the mercy of the hydraulic elevator, not so much in the matter of cost, but in the internal arrangements of the building as well as in the lay-out of the basement, neither of which could be finally and satisfactorily determined, until the particular type of machine had been accepted by the owner, and the contract finally made for it, if even then.

Nor has there been either singleness of design or unity of plan of operation. Each maker has had his own form of construction, his special method of control. Every building has brought up a problem more or less new or, at least, conditions which had to be seriously considered in determining the elevator-service. Horizontal and vertical machines in basement or shaft, high or low multiplications, long and short, single and jointed cylinders, big and little diameters, large and small sheaves, free and suspended counterweights, pulling and pushing machines, direct and differential pistons, roof-tanks, stand-pipes, accumulators and compression-tanks, high and low pressures, hand-rope, wheel or pilot-valve control, simple or compound pumps, all have made a nightmare of complications giving more initial and continuing source of complaint and dispute than all other engineering questions.

Feeling the pressure of these facts, and believing the natural tendency was to consolidate power-generation as completely as possible into like units, at the time of planning the Postal Telegraph Building, I turned to electricity for emancipation, in the hope of being untrammelled in my arrangement of the building, and received the very natural support of the President of the Postal Telegraph Company, who was desirous of having the service of the building, as much as possible, electric.

Half a decade has seen the trolley-system become preëminent, triple electric-motor cranes succeed square-shaft and wire-rope transmission, distributed stationary motors, supplied from a central station, in point of convenience and economy distancing every other form of transmission of energy for mill-work.

Electric elevators were not exactly a novelty, but as applied to fast passenger work they were unknown. The character of the Postal Telegraph Building, and the *personnel* and ambitions of the building-committee were such as to warrant the most careful investigation into the possibilities of electric-elevator service and the history of its development.

It seems that for about ten years electric-motors have been used in one form or another for elevators. Among the earliest applications in this country were the driving of ordinary worm or spur gear freight-elevators by cross-belts from a counter-shaft, which was, in turn, driven by a constant-speed electric-motor, as, for example, at the Pemberton Mills, Lawrence, Mass., in 1884, by Mr. Frank J. Sprague (reference to which was made by Edward Atkinson in one of his insurance circulars) and shortly afterwards by the same inventor in New York City. This sort of application marked the limit of advance until some four or five years after, when the use of motors directly geared to street-car axles and run in reverse directions with fixed brushes had been demonstrated to be a success. The next step then, naturally, was to attach to the driving-shaft of a worm or spur gear elevator a motor armature, and to operate it without any intermediate devices. This form has now become a standard for certain classes of work, but it is not recognized by any company as doing more than replacing by a much more convenient apparatus, especially when supplied from the street system, the steam-machine of like type. They are not, and never have been, recognized as applicable to first-class passenger service, because of the low efficiency of the sliding friction, the limited number of ropes which can be used, shifting of the lead of the ropes, the liability of the ropes jumping the grooves, the high speed of the screw, and the consequent limited capacity and speed of the car.

Four or five years ago, Mr. Charles R. Pratt made an experiment at the Tremont House in Boston, in which he adopted the sheave movement of the hydraulic horizontal elevator, driving the crosshead with an ordinary nut and screw revolved by a motor. The experiment itself was not a success, but there was the germ of the future elevator in it, which was subsequently taken up by Mr. Sprague, in connection with Mr. Pratt, and by the application of certain specific mechanical features, and by bringing to bear upon the problem the knowledge which Mr. Sprague had acquired as a pioneer of the trolley system, a type of machine has been developed which, in my opinion, will replace the hydraulic elevator.

Just here I may point out that there is a natural division in elevator service which will of itself make distinctive the type of elevators used, and that is the required rate of speed. So long as a car is to make a maximum of 250 feet a minute, there is no particular necessity of being able to run it at variable speeds, and it can be stopped under either a dynamic or mechanical brake. Such a machine does not represent battery work, but is more for isolated service. When, however, speeds from 300 feet to 600 feet a minute are required, it becomes vital that there shall be absolute control of the speed of the car by the motor, independent of the brake, and that it should be able to be run at variable speed, not alone for comfort and accuracy in starting and stopping, but for the satisfactory operation of a battery of elevators on schedule time, in other words, to meet the conditions of office practice.

This division, it seems to me, fixes the uses of the drum elevator for what may be termed "second-class" and "isolated" service. It makes necessary a distinct type of high-class service.

It is some satisfaction to recall the fact that some twenty years ago, while the junior partner of Arthur Gilman, I advocated the hydraulic elevator in a plant at the Westmoreland apartment-house, and stated to Mr. Otis that the hydraulic machine would replace the steam machine then favored by him. I was met at the time with ridicule, but only a short interval elapsed before active steps were taken by him in the direction of hydraulic elevators with results now familiar.

In recent years, however, we advance more rapidly, and I unhesitatingly assert from the experience which I have had in the past year that the hydraulic elevator has finally met its rival, that it is a passing system, and that in the comparatively near future the electric elevator for the highest class of service will prove as much of an advance over the hydraulic as the latter has proved better than the steam machine. I feel warranted in making this declaration, for having taken in a large measure the responsibility of the decision in favor of electric elevators in a building where a mistake would not only have seriously injured my clients, but inflicted a blow on myself, of the very gravest character, a decision which met ridicule and disbelief. I have had an unequalled opportunity for seeing under every possible condition of hard service and adverse circumstances the development of this type of elevator.

Previous to the time when the question of elevators was to be finally determined at the Postal Telegraph Building, my attention had been called to an experimental machine which was being developed by Mr. Sprague. This experiment, by reason of his professional standing, and because of my engineering experience, attracted more attention than I would ordinarily have given it, and seemed to promise the solution of many grave difficulties. A favorable opinion was arrived at by the building-committee, and when Mr. Sprague offered to put in a perfectly satisfactory elevator-service under a heavy daily penalty, with an agreement, while still under penalty, to replace the plant by any selected hydraulic-elevator system in case the electric results were not satisfactory, it was decided to give him the contract, as much, perhaps, on his past record as a successful electrical engineer, as for what he had already accomplished in this particular adaptation to elevator service.

The result has verified the wisdom of our decision, for Mr. Sprague has developed a system which is running most satisfactorily on one of the most continuous services in any city. He has proved, first of all, that the machine is absolutely safe, and that by most unusual tests. It occupies less room, and does not require the cutting up of the building with consequent loss of space. It has tremendous lifting capacity, and any required speed. The motion is true and the usual unpleasant features of starting and stopping are eliminated. Like parts of the machine are interchangeable. The current can be taken from the street or from a private plant. It has materially aided in the completion of the building, having been put into operation at an early date. Finally, the coal consumption is certainly not over one-half and I think less than that, of the hydraulic-elevator system. Of this I will speak later.

It should be remembered that not one of the least advantages of an electric system, considered from the standpoint of the builder and the owner, is the fact that every machine is an independent unit, and if there is a street supply, any machine can be put into operation as soon as its hoistway is ready, facilitating in a marked degree the early completion and occupancy of a building.

One of the most remarkable examples of the ease of installation is

[1] A paper read at the Twenty-eighth Annual Convention of the American Institute of Architects by George Edward Harding, Architect, on October 17, 1894.

the record just made at McCoy Hall in Baltimore, where two machines were put into operation three days after their delivery, the power being supplied from a station a mile-and-a-half away. Another example illustrating the accessibility of a machine was the slinging of a car at any point of the hoistway, and taking off of the ropes and general dismantling of the hoisting machine, its restoration and the putting of the car into operation in considerably less than an hour. The fact that a car can be slung by its ropes at any point of the hoistway, and the multiplying machine relieved from all strain so as to be entirely free for any repair by one man in ten minutes, is suggestive.

GENERAL DESCRIPTION.

The machine may be described as the combination of two old with one new element, with its specific safeties and methods of control. Briefly, it is of the horizontal multiple-sheave type with a travelling crosshead and frictionless nut driven by a screw revolved by a motor directly connected and governed by a pilot motor and rheostat.

The general construction consists of a heavy main beam carrying the travelling crosshead and lower screw-bearing, with special castings bolted at each end, one carrying the fixed set of sheaves and the other the thrust-bearing, brake and motor. The regulating apparatus is independent and self-contained, and is placed on the wall. From the car to the system of multiplying sheaves, this machine and the horizontal hydraulic elevator are practically the same. The crosshead, however, marks the point of departure in the two types.

In the hydraulic machine this crosshead is rigidly attached to the end of a rod which terminates in a piston moving in a cylinder having an inside length equal to the lineal movement of the crosshead. This cylinder in the vertical type of hydraulic, varies from thirty to fifty-five feet in length, with from two to ten sheave multiplications, and in the horizontal types the multiplication runs as high as fourteen, with corresponding diminution of length of cylinder and increase in cross-section. Whatever the gearing, however, the length of cylinder is a function of the car travel. In this electric elevator, the crosshead being moved along a screw, stationary so far as lineal movement is concerned, there is, with any given number of sheaves, only one variable — the length of screw, and, for all heights above about ninety feet, the electric machine has an advantage in matter of length which, with increased rises, becomes of great importance.

Looking to the future need of office-buildings, and with a foresight for which architects may be thankful, there has been adopted two methods of rope multiplication, determined by the height of building, and so selected that the length of machine overal shall not exceed about thirty feet for rises as high even as three hundred feet actual car-travel. From this the length grades down to about twenty-one feet, so that all rises between sixty and three hundred feet can be taken care of with an extreme variation of nine feet in the length of machine, and there is thus provided limiting dimension data of great convenience and utility.

These systems of multiplication I may term direct and indirect. In the former, the entire multiplication, varying from six to twelve, is done at the machine, and the ropes lead from the end sheaves over the shaft sheaves direct to the car. A free counterweight is used, the ropes being fastened to the car frame. In this method, which is that common to all horizontal and to many vertical hydraulic machines, the hoisting and counterweight ropes have unequal duty; furthermore, the ropes having the maximum bending travel on the outboard sheaves at the same speed as the car. This last is the case, also, with all vertical hydraulics. In some of the latter the counterweight is carried in the cylinder on the piston, or in the strap, or both, its weight being as many times that of a free counterweight as there are multiplications. Sometimes both methods are used.

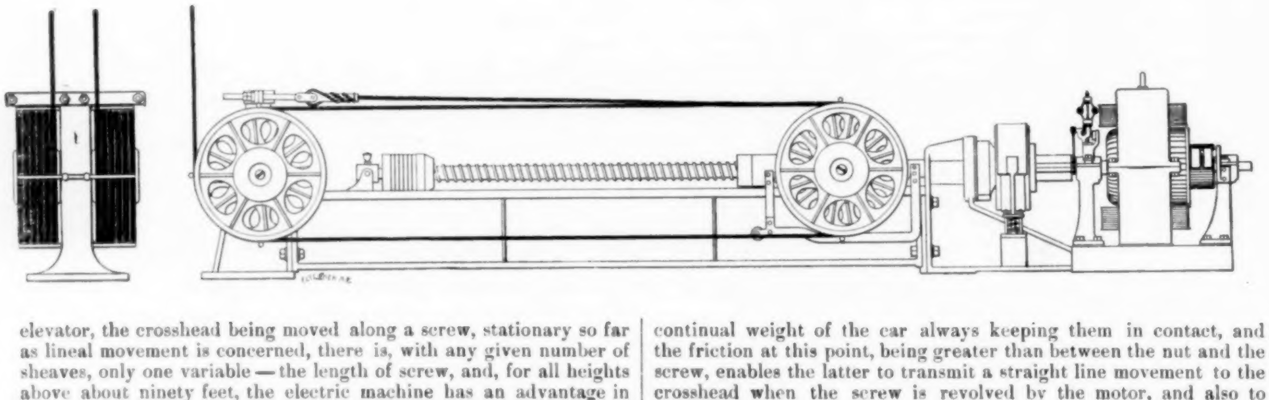
Economy of operation and smoothness of movement, however, are antagonistic in their relations to the amount of counterweight carried. The best method is probably that used when there is a single multiplication in the shaft, giving a two-to-one counterweight travelling at half-speed and carried by all the car-hoisting ropes, as is done for short-rise vertical hydraulic elevators.

Mr. Sprague has adopted for long rises what I think is a very happy combination practice, and one destined not alone to give the most compact machine, but the greatest life of ropes and the best counterweight results. In this indirect system, there is a division of multiplication which, while having the same effect so far as speed of car and length of machine is concerned as a high direct multiplication, has an entirely different result in the wear on the ropes and the amount of counterweight which can be carried without jumping. This is accomplished by making one-half the multiplication (six, eight or ten) on the machine; the ropes, properly proportioned, going thence to the bottom of the counterweight frame, which has a single multiplying sheave on top. The car-ropes go over the shaft-sheaves, under the counterweight multiplier, and back, up to the top of the hoistway, where they are anchored, giving a car-speed twice that of the counterweight; the equalizing chains, used to make the pull of the car with any given load constant at all points of the hoistway, are fastened to the bottom of the counterweight frame and anchored in the hoistway. The space occupied by this multiplier is only two or three inches more than by ordinary form of counterweight. A larger screw, fewer revolutions, and sheaves of greater diameter characterize this type of multiplying machine. This system seems to be the best yet devised for long rises, for not only do all the car ropes do equal duty, both with relation to the hoisting-strain and the counterweight, but the rope wear must be less because of the division of speed and multiplication, the necessity of changing only one-half of the ropes at a time, and the possibility of reversal of the ropes on the multiplying machine to get a new wear.

DETAILS.

Turning now to the detail construction and operation of this machine, there are a number of features claiming special attention, each unique in character and marking a radical departure from all other elevator practice. These are the nut, screw and thrust bearing, the brake, the motor and the regulator apparatus.

One of the most interesting as well as important features, and perhaps the one which has been most frequently attacked, is the nut system. It joins the crosshead of the travelling sheaves by a conical seat. There is no fastening between the nut and the crosshead, the continual weight of the car always keeping them in contact, and the friction at this point, being greater than between the nut and the screw, enables the latter to transmit a straight line movement to the crosshead when the screw is revolved by the motor, and also to revolve the screw and drive the motor as a dynamo when the mechanical brake releases the screw to allow the car to descend. These are the normal functions of hoisting and lowering. There are several other distinct functions of this nut which will be described in considering the "safeties."



Continuing the line of transmission of power, the only points of contact between the interlocking nut and screw are by a chain of balls which occupy a number of threads, and enter and leave the ends of the nut through tubes which are connected together so as to make a continuous conduit. This is one of the most vital points of the elevator apparatus, and herein lies one of the most potent reasons of its success, the reduction of friction by rolling instead of sliding surfaces on almost all parts under pressure, for not only is the nut so constituted, being in fact a developed spiral thrust-bearing, but the thrust-bearing at the motor end of the screw is taken on balls and the sheaves are carried on ball or roller bearings. This nut being a vital part, its development has been most thorough, and a peculiar treatment of steel which has been adopted renders its surface so hard that the wear is very small, and is well within commercial limits. So free is the machine from static friction that it is possible to start the car with a very slight increase of current over the normal hoisting current, provided time be taken so that the work done in acceleration is small to the work of lifting. The balls have an average crushing strain of 25,000 pounds each, but the working pressure varies from only 50 to 125 pounds per ball. The nut system is a compound one, for besides the working-ball nut there is another, called the safety-nut, to which I will make reference later, keyed to it, and between the two is a powerful spring under compression. The screw is a forged bar of high carbon steel with a peculiarly shaped thread. It passes through the clearance hole in the steel trunnion crosshead which carries the travelling sheaves, then through the nut system, and is carried at the other end by a fixed bearing. At the inboard end it terminates in the thrust-bearing, where the pressure is taken by about 200 steel balls carried in a bronze guide-plate and bearings by specially hardened steel discs. The thrust of the screw being thus taken up on the inboard end, the strain on the screw is invariably between that end and the travelling crosshead, never beyond this; hence, it is always under extension strain, never under compression. The action of the balls on the screw, which is untreated, is peculiar. They form a path for themselves, partly by wear, but principally by rolling compression of the steel, which finally becomes exceedingly hard, so hard that the edge of an ordinary machine tool would be turned.

Beyond the thrust-plates is keyed an iron pulley connected by a flexible coupling with the motor shaft. The function of the brake is that of locking the screw when at rest, not by means of varying the speed. In case of accident it has the additional function of helping to stop the screw. It may be described as a compound electro-mechanical brake. The steel brake-band, wood-lined, is anchored at one end the hoisting side on the motor-bed frame, and the other end is continually pulled down by a powerful spring under compression. The mechanical movement in opposition is through the medium of a peculiar magnet. It is operated by a dual circuit, one in hoisting, another in lowering. In the event of failure of current for any reason, or too high a speed on the down run, this magnet releases the brake (in the latter case by a snap switch operated by a Pickering centrifugal governor driven by the main screw), and the brake-band promptly grips the brake-wheel softly, yet powerfully.

MOTOR.

The motor, which is of the multipolar type, is carried on the same casting which contains the thrust-bearing. The field magnets are of steel, and are excited by two circuits, one, known as the shunt circuit, being variable in strength, at will, so as to vary the maximum speed of the machine, and the other, a series circuit, which acts to strongly compound the field. This type of elevator is differentiated from all other electrics by the fact that the action is like that of the hydraulic, for it always acts against gravity. In hoisting, the motor takes current from the line, and the motor, rotating in an opposite direction, is driven as a dynamo by the weight of the car. A strong element of safety exists in the fact that the current in the field-coils is never reversed, and consequently the machine is never demagnetized. Hence, under certain conditions of the operation of the safeties, it has a power of self-excitation which is of importance. The armature which turns in this field is of the iron-clad type, and not liable to injury of any kind. It is connected to the screw by a split coupling which spans a space between the ends of the armature and the screw, of such dimensions that it is possible to remove the thrust-bearing after the coupling is taken off without disturbing the motor. There is certainly nothing in this part of the machine that is not standard, and when it is considered that there are many more motors now built than steam-engines, and that they run under the most varied conditions, no question can be raised as to the absolute reliability of this part of the apparatus.

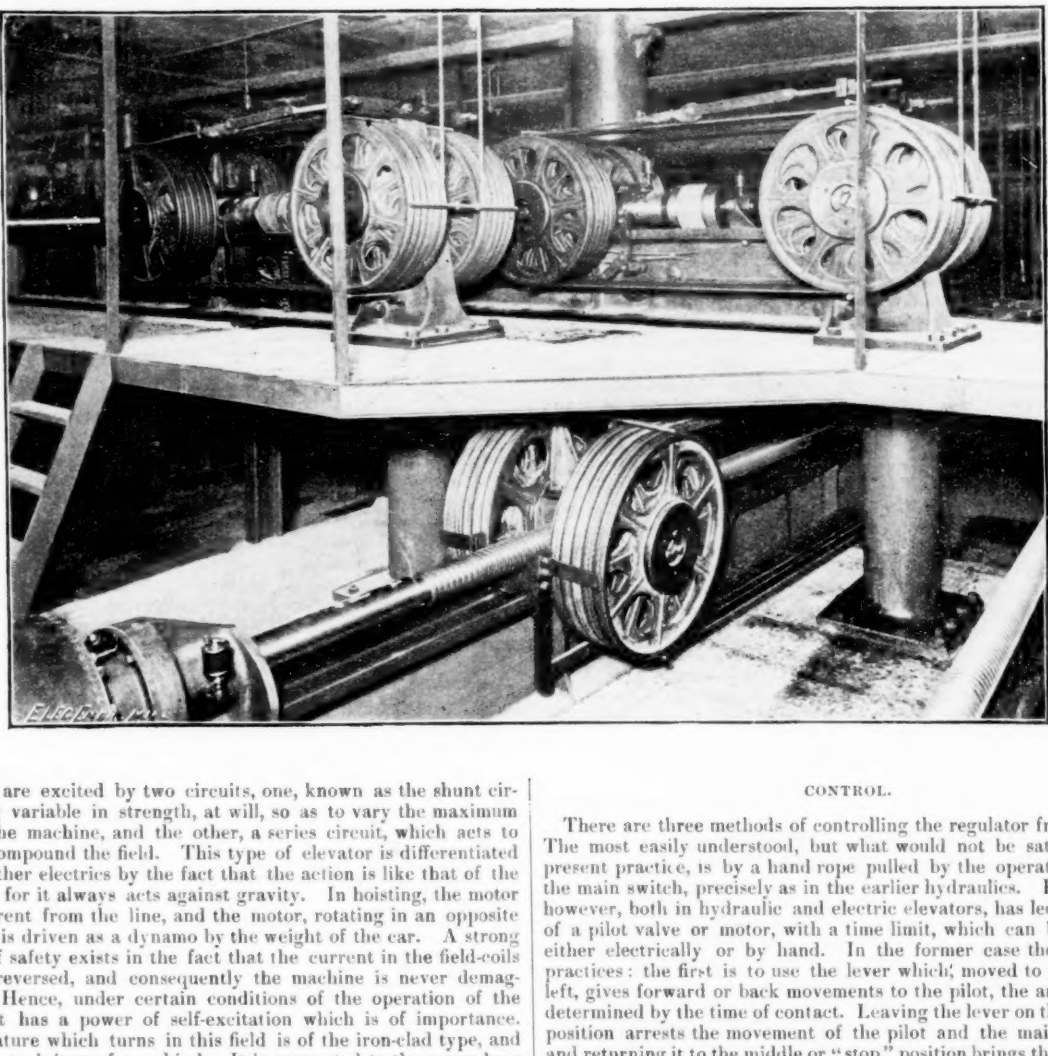
REGULATOR.

Considered in its simplest form, and its connection with its action upon the motor and multiplying machine, without reference to the means of communication between the car and the regulator, this last is a very simple device. It consists briefly of a rheostat made up of a number of peculiarly-shaped iron grids arranged in a circular form connected to copper contacts, over which passes a heavy carbon brush, and a coordinating switch, which, with one direction of movement of the rheostat-arm makes and maintains connection with the line and with the other breaks the line-circuit, and closes the machine around itself. This same rheostat is used in hoisting and lowering. In the former operation, circuit having been made on the line, at first with a high resistance, this last is gradually cut out, the brake at the same time lifted and the torsional effort of the armature is increased until it exceeds the back effort of the car, when the latter moves upward with an acceleration depending on the rate of movement of the rheostat-arm, and with a final velocity determined by the point at which the arm stops.

If, while hoisting, the current is for any reason cut off, the torsional effort ceases, the brake comes into action, and the car will stop.

In lowering, the brake is lifted by an independent circuit, but the armature is first short-circuited on itself, and becomes a most powerful dynamic brake. As the resistance of this circuit is increased, the car runs faster. Should it arrive at the lower limit of movement, an independent retarding circuit is established, and gradually reducing the resistance, brings the car to the slowest movement.

The construction of the rheostat is such that there is no arcing on its face, and hence it is very durable. The final breaking of the circuit is by a very quick-acting switch, which is independent of the rheostat proper.



CONTROL.

There are three methods of controlling the regulator from the car. The most easily understood, but what would not be satisfactory in present practice, is by a hand rope pulled by the operator to move the main switch, precisely as in the earlier hydraulics. Fast service, however, both in hydraulic and electric elevators, has led to the use of a pilot valve or motor, with a time limit, which can be operated either electrically or by hand. In the former case there are two practices: the first is to use the lever which, moved to the right or left, gives forward or back movements to the pilot, the amount being determined by the time of contact. Leaving the lever on the "steady" position arrests the movement of the pilot and the main regulator, and returning it to the middle or "stop" position brings the car to rest.

A modification of this is an electric switch having an "up" and "down" push-button, with a spring-stop handle contact, operating, so far as the pilot movement is concerned, like the lever-switch, which also has a spring return. That is, in either case, variation of control by the operator is made dependent upon the feeling of the movement, and an automatic return to the "stop" position and state of rest for the car is provided in case the operator takes his hand off the switch. This push-button control is that now used by the Postal Telegraph Building.

There is another method which I had an opportunity of seeing a short time ago. In this a simplified rheostat is used, likewise controlled by a small pilot motor, but the operation both as regards angular advance and rate of movement is determined with limiting conditions, absolutely positively, by a dial or lever movement co-ordinating in all respects with the pilot, very much as in the case of certain forms of steam steering-gear. The simplicity and effectiveness of this last-mentioned regulator appears to leave little margin for improvement.

Beside the control from the car there is provided in the basement a unique general controlling switchboard, by means of which the control can be taken from the switch in any car and transferred to the switch on this board. In this way, general inspection, cleaning, testing, or, if needed, replacement of any part of the regulator or machine, whether in the ordinary course of affairs, or in case of accident, the hoisting of safes — all can be carried on from below without an operator in the car; in fact, even while in motion the control can be instantly taken from the operator and the car run from the pilot-board.

SAFETIES.

Of course, the vital question to be considered in any elevator-system is that of safety. This system seems in this respect to be amply provided for. The safety elements may be considered under two heads: first, those on the car, and second, those on the hoisting-machine. On the car there is the usual centrifugal safety which is attached to the crosshead and is operated by a fixed cable at some determined speed. Upon being released it clutches the car-rails with steel wedges. This is a standard practice, and hence involves nothing novel. In the car, moreover, there is, as has already been described, an automatic "stop" contact which operates to bring the regulator to the "stop" position and the car at rest in case the conductor removes his hand from the controller because of crowding, accident or carelessness.

On the hoisting-machine there are a number of safeties. One which is perfectly apparent is due to the fact that the crosshead is moved by a screw with a heavy armature on the end of it, which is driven through the medium of a nut by a car of limited driving capacity. The screw itself is of forged steel, under tension and torsion strains, with a safety-factor of at least twenty to one. Buckling is impossible.

The hoisting-nut, as already described, is hardened by a specific process, which makes its wear very limited in character. In addition to this, there is in the nut system what is called a "safety-nut." Normally this is out of contact with the thread of the screw, but it is secured to the hoisting-nut, and should any accident happen to the latter breaking its hold on the screw, this safety-nut, the threads of which interlock with the screw's threads to a greater depth than the thread of the hoisting-nut, would then take the place of the hoisting-nut and securely grip the screw. This would throw the elevator out of operation, because the friction between the nut and screw would be greater than the friction of the travelling crosshead, and it would act simply as a collar on the screw.

The nut system has in addition another function. Since the hoisting-nut is only held from revolving by its friction against the crosshead, when the nut gets to the upper limit of its travel, the safety-nut meets a solid collar on the screw which stops its travel, causing it and the ball-bearing nut to revolve with the screw, and stopping the travel of the nut, without, however, necessarily stopping the motor, and leaving the travelling sheaves to be stopped simply by the weight of the car.

There is still another function performed by the nut system, that of a slack cable device. If, for any reason, the car in descending, when, of course, the nut is driven along by the screw, meets an obstruction, the pressure on the nut being instantly reduced, it recedes slightly, allowing a spring between it and the safety-nut to expand, throwing the latter into back contact with the screw-thread. The nut system then instantly grips the screw; it revolves as a collar, and, consequently, acts as a check against any marked movement of the crosshead corresponding to a free fall of the car on the ropes.

Assuming, however, the condition of a perfectly free release from all operative safeties, there is a limit to the rate of revolution of the screw, and in any event there is a rubber buffer at the lower end which would cushion the stop, so as to prevent any injury.

Besides the lower-limit switch, which has already been mentioned, which puts an increasing retarding force onto the motor, there is an upper-limit switch for cutting off the current; this is a self-cleaning lock-switch, operating in both directions, and moved by a roll on the crosshead. It cuts off the current in hoisting at the upper limit and allows the brake to come on. On the reverse movement it is automatically closed.

I have already mentioned the centrifugal on the machine, which is happily called a "monitor centrifugal." This is for operating the brake when running down too fast. In hydraulic elevators there is no speed-operating device in case of fast running, except the centrifugal on the car, and this is frequently set so much above the normal speed, on account of the annoyance of having it operated by a temporary excess, as oftentimes to be useless when actually required. This centrifugal does not throw the machine out of operation, but simply slows it up to any desired speed, and then allows the operator to resume control.

The dynamic action of the machine is ingeniously made use of in still another way by the introduction of a choking coil and switch operated by the same circuits governing the main brake. It is in constant play and closes the circuit around the armature and its series-coils through a rheostat under any of the following circumstances: at each stop from up or down; when running down fast enough to work centrifugal on the machine; on failure of the hoisting-current; or on failure of the line-current.

So positive is the control over the motor, no matter whether it be operating to hoist the car or retard it in going down, that the brake-band can actually be removed and the car still controlled, and even with the break in normal position the change from one position to another can be made so promptly that it will remain inactive.

The rope fastenings are of a peculiar type, a very considerable length of rope being passed around a double spiral groove, with the free end fastened to the standing part. It constitutes a friction-grip of great strength.

ECONOMY.

I think it has been well established that there is a manifestly great economy in the matter of power as compared with the hydraulic elevator, the saving in coal being at least half, and probably more. This may be easily understood from a consideration of the following facts:

The hydraulic and this electric elevator are both gravity machines, each using power in ascending and being retarded in descending. The hydraulic elevator, however, must be pressured for the maximum duty it may be called upon to perform, and it should be able to lift a live-load in the car of at least 100 pounds per square foot, besides the excess of car over the counterweight. Statistics show, however, that the average live-load is not over one-fifth of the maximum, yet the standard hydraulic elevator uses precisely the same water energy (that is, the same volume under the same pressure), for every foot of travel, whatever the load, and this amount and pressure is that required when the maximum work is being performed. In average practice, the difference goes into heating the water. The electric elevator, however, is perfectly automatic in the power demanded, and, over and above that necessary to hoist the excess of car over the counterweight and overcome the friction of the machine, the current required is almost directly proportional to the live-load on the car.

The actual result, then, is that considerably less power has to be delivered to the electric elevator than to the hydraulic. The difference is so marked that where the current is taken from the street and used on the one hand by the elevator direct, and on the other, through the medium of an electric pump for operating an hydraulic elevator of equal capacity and average duty, there would be a difference in the current metered of not less than two to five in favor of the electric elevator.

Even with a private plant the difference is most marked, because the average pump on elevator service does not deliver a horse-power of energy to the water column of an hydraulic elevator for less than from seventy-five to eighty pounds of water per horse-power hour. On the other hand, a horse-power of electrical energy can be delivered to the mains of the electric-elevator system for not exceeding fifty to sixty pounds of water, even on variable load. The result is that on a plant of any considerable size the water evaporation required from the boilers, and consequently the coal consumption, will not exceed for the electric elevator over thirty-five to forty per cent of that required for a corresponding hydraulic plant.

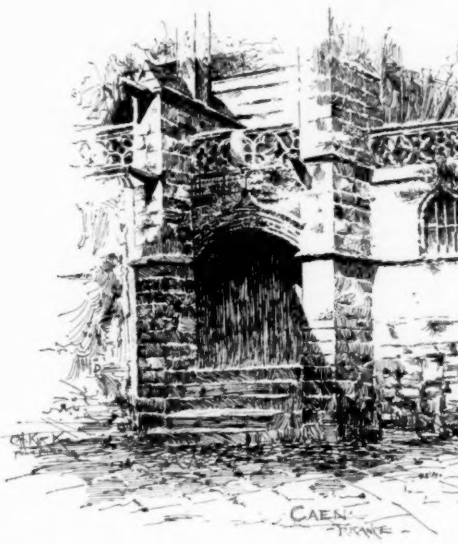
Naturally, the query arises: Since there has been so radical and marked an advance in electric elevators, what warranty is there that another type will not soon replace an existing one, or some new discovery in electricity make it obsolete? My answer is: That in every industrial development there are forms of machines which early become typical and remain so. For instance, there has been no appreciable change in the types of drum elevators in the last thirty years, and the hydraulic elevator has remained constant in general principle for a long time. The electric drum-elevator is a modification of one of the oldest types, and this particular multiple-sheave electric elevator, which I have described, is a combination of the best points of the hydraulic movement, with certain essential mechanical features, the motive power being a machine now in almost universal use and of an efficiency so high as to leave little percentage for improvement.

Electricity itself, whatever its nature, must be regarded in this connection simply as a convenient agent for the transmission of energy, and not as a mechanism. The best electric elevator is simply the best mechanical combination for making use of this agent with the greatest factors-of-safety, speed, efficiency and convenience.

TUNNEL BETWEEN THE CAPITOL AND THE CONGRESSIONAL LIBRARY. — It is known to only a few that a tunnel is to be constructed from the crypt of the Capitol under the East Park to the vaults of the great building for the Congressional Library, now in course of construction. The plans for the tunnel have been completed and work upon it will soon be begun, that it may be finished in season to be used for the transportation of the nearly 1,000,000 books and pamphlets which make up the vast bulk of the library from the old rooms to the new. It is probable that a temporary railway will be laid in the tunnel that cars may be employed to carry a large quantity of books at once. It is possible that when the new building is occupied, a pneumatic tube may be laid through the tunnel that Congressmen may immediately receive books which they desire to consult without the trouble and loss of time which would be entailed in going to the library in person or awaiting a trip by a messenger. It is not expected that the work of removal will begin before the spring of 1896. — *Pittsburgh Dispatch.*

TWENTY-EIGHTH ANNUAL CONVENTION OF THE AMERICAN INSTITUTE OF ARCHITECTS.[1] — II.

EVENING SESSION, OCTOBER 16, 1894.



THE evening session of the second day of the Annual Convention of the American Institute of Architects was, perhaps, the most enjoyable session in the annals of the Institute.

Thanks to the delay, Mr. Fox had a much larger audience for his illustrated paper on "Greek Detail," and there could have been few indeed who did not thoroughly enjoy the series — a lengthy one — of unusual views thrown on the screen. Ordinarily, a lecturer, after he has prepared his paper, in his mind at least, sets out to overhaul the stores of the best print-seller within reach, in the hope of finding such illustration as he needs, and supplements what he does find by appeals to his friends. The result is always unsatisfactory to his audience and still more so to himself, as he is constantly obliged to apologize, saying now that the feature he has just described is such and such infinitesimal spot on a large general view, or that the view on the screen is actually the thing he was speaking about, but taken from the other side, so that it does not illustrate the point he desired to make. But Mr. Fox, working with his own camera, was able not only to secure the subjects he desired, but to take them from such standpoints as would really illustrate his remarks. It was very interesting to note how an architect's posing of his subject varied from that which is habitual with the ordinary photographer, whose aim often seems to be to present an architectural subject in the way to afford as little information as possible.

Mr. Hastings's paper took up the matter of high buildings as they interest the designing architect and not as they appeal to his constructing partner. The point he laid most stress on was that, as the problem is absolutely a new one there is not any great chance of our treating it successfully, if we are to stand in slavish awe of precedent and the rules that we have accepted as governing the designing of classes of buildings absolutely different from this. Roughly speaking, his argument was, briefly, that no matter how unscholastic, daring or unusual a proposed treatment might be, and no matter whether it broke every canon and law of design as accepted up to this time, if the proposed treatment "looked right" it was the right thing to do.

In opening the discussion Mr. Post said that the designing of a "high building" was not essentially different from the designing of a tower — so long as it was practically the only one of its class in its neighborhood, but this was not the case when it had several near neighbors, and still less when several were erected in absolute juxtaposition, and he asked what would become of the beauties of the Tower of St. Mark's if a dozen similar towers, or "high buildings," were placed shoulder to shoulder on one of the thirty-five-foot streets of lower New York. The sanitary effect of these high buildings on the underlying streets and their occupants he did not care to discuss; it was a serious problem and he doubted the advisability of erecting more of these lofty structures, though, as an architect, he would build as many as his clients wished. The question, he thought, ought to be, and inevitably would be, settled by a law, fixing the height of buildings after the fashion of European cities. Taking up the constructive side of the question, Mr. Post created a distinct impression by saying with much impressiveness that it was his deliberate opinion, based on his long practice and experience, that the modern building as now erected with steel-cage construction was doomed to be short-lived, and he felt sure that some of the younger men would live long enough to find themselves compelled to take down the very buildings they were now so eagerly putting up. No one could yet say what would be the life of steel framework enclosed in brickwork or masonry where it was exposed to the percolation of moisture and damp air. Judging from the fact that he had already had to take out certain beams over the boiler-room in the *Times* building and had found them so much deteriorated as almost to be breakable in the hand, he felt sure that time would bear out his prediction. The advantages of the skeleton method of building were undeniable, and yet he was afraid of enclosed steel frames, but advocated the use of cast-iron columns with mechanical connections for the floor-beams and bracing whenever the new method was to be used.

Mr. Jenney, as might be expected, considering his connection with the early use of the steel-framed building, was strenuous in the expression of his belief that Mr. Post's apprehension was not well founded, but he admitted that time alone could tell which was right, although he believed that a steel frame thoroughly painted, the joints carefully protected and all properly enclosed in the masonry would be found, perhaps, as long-lived as some of the bits of iron that had been found in the Egyptian monuments. The greater portion of his remarks, however, was directed to attacking Mr. Post's advocacy of cast-iron columns, and he cited several cases in his own practice where flaws had been discovered in cast-iron work on the job after it had passed the inspector at the foundry.

Mr. Burnham, from the chair, cited a case in his own practice, which led him, years ago, to give up the use of cast-iron columns: in this case a twelve-foot column with a two-inch shell, through careless handling, was most fortunately dropped while being unloaded from the truck, when, slight as the shock was, the column broke in halves; investigation showed the presence of a cinder some two feet long between the inner and outer skins of the shell and of such a consistency that its presence could hardly have been detected by the most delicate sounding.

At the suggestion of Mr. Jenney, Prof. W. H. Burr was invited to speak to the question, and he did so at considerable length, citing case after case where, in his own practice as an engineer, he had encountered defects in cast-iron work which led him to lose all faith in that material. He said that he had frequently heard engineers express surprise at the way in which architects were willing to employ cast-iron as a building-material.

Mr. Post rejoined by admitting the credibility of all the testimony that had been adduced against cast-iron, but asserted his belief again that, in spite of its defects, it was a safer material than steel or wrought-iron to use enclosed in masonry. As an instance of the perils to which enclosed ironwork is subjected, he cited a case, where during a very severe storm he was sent for to come to a building which he had erected, and on reaching the place, found that water was flowing down the inside surface of a brick wall four feet thick! To such exposure as this, he submitted, cast-iron with its practically inalterable skin offered much better resistance than the laminated structure of rolled-steel. In fact, in spite of all the evidence which was brought on the other side, Mr. Post refused to recede from his advocacy of cast-iron and his reprehension of rolled-steel. No other speaker supported Mr. Post and this seems the more unkind seeing that, as we went about the city the next day, we did not find a single instance of skeleton construction where the columns were of rolled-steel, while we did come upon several where cast-iron columns and mechanically attached beams were being used, and we know that all of these buildings were not being built by Mr. Post.

Mr. Robertson, the next speaker, had assumed that the discussion of the question was intended to develop that it was the opinion of the Institute assembled in convention, either that the erection of "high buildings" was undesirable and so should be checked by law, or that they were all that could be desired. He, himself, agreed with Mr. Post in thinking that it was a matter that would settle itself without the architects taking measures to press a settlement. At any rate, there was one practical consideration that had a tendency to prevent the owners of real estate from putting up buildings any higher, at least, than those already in being. He explained that the requirements of the lessees of offices in the matter of elevator service — commodious, frequent and rapid — compelled so great a waste of room for installation of the elevator-shafts and the necessary machinery that the ratio between this waste room and the rentable space was very appreciable. Lessees of offices were daily becoming more exigent in the matter of elevator-service, with the result that more and more space in the lower stories had to be abandoned to the installation of elevators, with a consequent lowering of the interest on the capital invested in the building. To be sure, there seemed to be likelihood that the electric elevators would shortly be so improved as to supersede the more bulky hydraulic elevator, just as that had largely taken the place of the steam elevator, and as electric installation consumed much less space than either of the other kinds, it would, in such event, be possible to carry the high buildings still higher. He spoke regretfully of this approaching possibility, but said that as he had already sinned by building too high buildings he supposed that he, like others, would go on sinning so long as clients tempted them, or until the law set a limit to their soaring ambitions.

Mr. Blackall said that as his practice had not included any specially lofty buildings, he could not add much to the discussion from his personal experience: he considered the problem one of the most enjoyable that an architect could have to consider, and he thought any architect who was called on to solve it ought to feel that he was having "awfully good fun." One point he felt was

[1] Continued from No. 982, page 20.

neglected by the designers of high buildings and that was that they generally overlooked in their treatment the value that lies in sheer size and mass, and from this point-of-view he held that the simpler the treatment, the better would be the result, and in support of his contention expressed the opinion that one of the best solutions had been achieved in the Monadnock Building in Chicago. In this opinion we heartily concur: it is the only one of all the "high buildings" we have seen — and almost all of them have been inspected — that created in our consciousness a real emotion, a perception that here, at last, the designer had not lost sight of the fact that grandeur does not imply lavishness and magnificence.

Previous to the opening of the discussion, Mr. Clark's paper, published in our issue last week, had been read by the Secretary.

THIRD DAY'S SESSION, OCTOBER 17, 1894.

The closing session of a convention is usually a hurried and unsatisfactory one, partly because the members are more dilatory in coming together than on the preceding days, possibly because by this time they have discovered that there is more sawdust in the stuffing of their doll than they had first supposed.

There was very little in the way of unfinished business to be cared for.

Mr. Gibson, on the part of the Committee on the Revision of By-laws, said that their attention had been called to the undesirable effect of the clause which compelled members of Chapters to also become members of the Institute and asked permission to qualify it. Leave was granted, but the proposed change, while an improvement, does not altogether remove the objectionable feature of the measure to which we referred last week.

Mr. Post moved that in the new issue of the schedule of charges Mr. Carrère's sliding scale of charges be adopted in place of the charge of one per cent for preliminary studies, and this was done.

Mr. L. D'C. Berg moved that at the next convention an amendment be submitted for consideration providing for the proportionate representation of the several Chapters in the governing body.

Mr. Van Brunt took the floor to explain that the report of the Committee on Education was really nothing but an inquiry as to the causes of the "disorderly results" of architectural education in this country as evidenced in executed work, and that it was in no sense intended to be a reflection upon the schools or on those who conducted them. He emphasized his point by stating his belief that should a dozen architects be called on at the same time to design each one a separate building in the same block, no one of them would think of consulting with his fellows with the intention of securing for the block as a whole a proper architectural effect.

It seems to us that this deplorable result is due not to imperfect education so much as to vicious practice and immoral and petty selfishness. It is not supposable that most of these twelve men would not know as well as Mr. Van Brunt knows that their course was improper, but each one knowing the effect his fragment of the block would have on the obtaining of future commissions would make most endeavor that his work should shine apart by itself, with the rest of the block as a mere background for its superlative excellence. The twelve men know now that this method is artistically immoral and no amount of ethical training in the schools can prevent those who should have listened to the teaching Mr. Van Brunt advises from discovering that where ethical and bread-and-butter considerations come into conflict in practical life, the latter almost inevitably prevail.

The paper by Mr. E. L. Ransome on "Concrete and Iron Construction," was most interesting and instructive and it is a great pity that it was not included in the programme for one of the earlier sessions, since it was essentially and peculiarly one which not only allowed, but invited, discussion; unfortunately there was not now enough unoccupied time to allow of it.

Practically the same thing could be said of the paper on "Electric Elevators" by Mr. George E. Harding, the reading of which Mr. Burnham had to cut short, in order that the meeting might be closed at the stated hour and allow time for the attendants to take part in the several visits of inspection that had been provided for the afternoon. As to Mr. E. G. Lind's paper on "Acoustics," it can only be said that had there been time, it would have been read.

The election resulted in the re-election of Messrs. Burnham, Stone and Treat as President, Secretary and Treasurer respectively, and the election as Directors for three years of Messrs. L. H. Sullivan and W. L. B. Jenney of Chicago, George C. Mason, Jr. and Wilson Eyre, Jr., of Philadelphia, T. C. Link of St. Louis, Samuel Hannaford of Cincinnati, Charles A. Cummings of Boston and Edward I. Nickerson of Providence. The election of two representatives each from Chicago and Philadelphia was caused by the blunder of the printer who had printed both ballots on the same slip, which made it necessary to use it as an "Australian ballot."

The next Convention will be held in St. Louis.

The reception, or "smoker," which was provided for the visiting architects by the Mechanics' and Traders' Exchange was only less enjoyable than the similar occasion at Boston three years before, because it was held, not at the business rooms of the Exchange, but in the Building Trades Club-house, which was not commodious enough for the occasion. The kindness and courtesy of the hosts, however, went a long way toward discounting the physical discomfort due to heat and overcrowding.

ANNUAL ADDRESS OF THE PRESIDENT OF THE AMERICAN INSTITUTE OF ARCHITECTS.

FELLOWS OF THE AMERICAN INSTITUTE OF ARCHITECTS: —

Gentlemen, — During the last year ten Fellows of the Institute have passed away: J. B. Johnston, Alpheus C. Morse, P. W. Ruehle, George H. Edbrooke, August Bauer, George Walter da Cunha, William Henri Adams, William Worth Carlin, Arthur Rotch and James Douglas.

Mr. Carlin was one of the presidents of the Western Association of Architects and a Director of the American Institute. Mr. Rotch's whole manhood was unselfishly devoted to the higher interests of his profession, to which he not only gave much of his time but also a large part of his fortune. We mourn for those who have gone; their honorable lives have left indelible impressions on our hearts and on the records of the Institute.

Since we met together, thirty-two new members have been elected and three new chapters have been formed, the latter being the South California, the Washington State, the Brooklyn. The organization now contains twenty-six Chapters and about six hundred members.

I congratulate you on the continued usefulness of the Institute; it has been conservative, though positive and progressive.

During the last twenty years the methods of practice of our profession show much improvement, due largely to the moral support of this body, the influence of which has been wise and beneficent; for, while it has from time to time recorded its convictions, it has refrained from insisting too rigidly on the observance of its rules. Through it the beliefs of the architects have been crystallized, while each man has been left quite free to pursue his own course. Though as individuals we have been led or constrained by the consensus of the opinions of the Fellows, we have been moved more by a desire to conform to the established standards of professional life than by any fear of discipline.

It is a good thing for the Institute to publicly express its views concerning vital matters of professional conduct. Until the schedule of fees was published, uniformity of charges did not exist, and there was no authority to back us in our demands for reasonable remuneration. Now, however, both the Federal and State courts, in the absence of agreements to the contrary, accept that document as conclusive. The people have accepted as reasonable and just what the Institute has decided to be proper and right, and thus many abuses have been cured. I believe the converse will be true and that the people will believe those things to be unreasonable and unjust which the Institute stamps as *improper* and *wrong*.

In the long run, men are dealt with according to their estimate of themselves, and if we seek for higher standing among our countrymen, we must live up to the ideals of our more unselfish moments. Let the Institute, therefore, condemn those things which we have all called wrong, but some of which we have continued to do; let this condemnation be printed on the schedule of fees, so that courts, clients and architects hereafter may not fail to understand our views; let the publication continue until custom shall have established laws too rigid to be broken, and until all men have learned to conform. There are clients now who will not deal with architects who are not in good standing among their fellows. This is a growing class of men. We should let them know what is regarded as unprofessional conduct. In his dealings with us I believe the average American will readily conform to the standards that we ourselves set up.

If clients demand and easily obtain preliminary services for little or nothing, it is our fault, not theirs; our own greed and unfairness to each other enables them to use us. We know this well and have often privately spoken of it among ourselves. Let us put a stop to this practice; it has been going on for hundreds of years, but it has always been productive of evil, and the time has come to say so publicly.

A young man, immature, not ready for independent professional life, makes sketches, or goes into a competition, without promise of pay; in an evil day for him his design is accepted and at a bound he springs into full practice; he makes a financial success and an artistic failure, and when the fever of youth is past, if he has the soul of a real architect, he looks back with bitter sorrow to the waste of his best possibilities. As he begins, so must he go on; knowing not enough and no longer having the time for study, his last work is like his first, suggesting talent or mediocrity, according to the nature of the man, but bearing the marks of weakness, due to arrested development, and stamped with the author's sad consciousness of imperfection or conscious insolence.

The custom of showing designs to clients without pay, in the hope of "getting the job," is bad for the architect, worse for the client and worst of all for the suffering public who must be inflicted with the crudities of our youth.

Not so long ago practitioners of the law and of medicine solicited patronage; to do this now would lower the standing of any lawyer or doctor, and he would be called a pettifogger or quack. What is true of them should be true of architects, if we are to keep pace with them. A lawyer or doctor may not go about introducing himself and soliciting business, nor may he take fees materially less than the customary ones. No more should an architect. If the Institute condemns these things, architects must conform and stand squarely on its decision, or lose caste in the eyes of the profession and of the public.

Mr. Carrère has printed and circulated a paper on Preliminary

Fees; the suggestions contained in it are of high value. Let a new schedule of fees be made, containing his modifications and a statement that it is unprofessional to make preliminary drawings, for a competition or otherwise, for less than the regular fees, and I believe the abuses we have so long suffered under will soon disappear. There is great virtue in the formal publication of any truth. On the same document should be printed an expression of our belief, that the best way to obtain satisfactory designs is by employing outright an architect known to be skilled in the special work proposed to be done; that the next best method is by a competition limited to a few experienced designers, and that the poorest is by unlimited competitions.

Extensive amendments to the By-laws are proposed, and are to be acted on at this meeting. I do not wish to discuss them, but only to express the hope that nothing will be done tending to lay us open to the charge of being a trade-union instead of a deliberative society of professional men.

For nearly a generation there has been a constant effort on the part of the Institute to introduce better methods in the designing of Government work. Our committees have been met courteously in Washington. They have always received assurances of sympathy, but have never until now had the active support of the proper officials.

A Bill has now been introduced in both branches of Congress, which has received the endorsement of the Secretary of the Treasury, of the Senate and House Committees on Public Grounds and Buildings, and of the officers and friends of the Institute. There is strong ground for the belief that it will become a law. For this result the Institute owes special thanks to Messrs. Post, Price, Carrère, Kendall, who, together with Messrs. Hunt, McKim, Peabody and others, have brought it about.

The Bill provides for a commission of five men, who shall have charge of the selection of the architects of all public buildings erected by the United States. Three members of it are to be architects appointed by the President. Should the measure become a law, it is evident that its success will depend upon the architects of the commission. The President will, undoubtedly, be inclined to nominate the foremost men of the country, and the question naturally arises whether those selected by him will serve. On this point I wish to say that no one should allow himself to refuse for any cause except ill health. If an American would serve his country in any public capacity, it must nearly always be done at great personal cost. We all understand our duty in this regard, but when it comes to the test we are apt to shirk. Let the architects set an example to their fellow countrymen. Those fitted for the high functions proposed under the Bill are the men who have large business interests. If they be requested to serve, and refuse, their example will result in defeating the very purpose for which the Bill is framed, the commission will fall into the hands of inferior men, and its operations will become a reproach instead of the great benefit we are looking for. I have no doubt that the passage of this Bill will be followed by nominations for the commission, of men who can, at least, afford to give their time to the work. But they must accept, because in their hands will lie the fate of this glorious opportunity. If it be allowed to fall into the realm of perfunctory officialism, because the chief magistrate of the nation cannot induce proper citizens to take the places, the curse of a degraded public architecture will fall on us and we will be justly condemned. The highest expressions of a people's art never rise above that of its public monuments. Remember that the monuments of to-day are the public buildings, and that to start the work on them aright under this Bill the services of the most able men in the profession will be demanded, and that no one may refuse.

ELECTRICAL SCIENCE FOR ARCHITECTS.[1] — VII.

METHODS OF WIRING.

SINCE electricity first came into general use, there has been a constant improvement in the methods of wiring. Partly from an imperfect realization of the needs, and partly from the desire for cheap construction, all the early wiring was little more than a stringing of paths for the electricity to follow. It was soon found, however, that unless special precautions were taken to confine the electricity to these paths, there was danger of fire, and the service was made poor and uncertain.

The first wiring was generally done with an inadequately covered wire, and the conductors were fastened directly against any convenient support by means of wooden cleats. While everything was perfectly dry, and as long as the current was not greater than the wire could carry without excessive heating, little trouble would be found. But, of course, it was not possible to be sure of this dryness. Natural dampness in the atmosphere, leaky roofs, the accidental spilling of water, might at any time so affect the insulation that there would be a considerable leakage of electricity. With this there would be, perhaps, a diminution in the available energy, and probably an arcing and heating that introduced a serious fire-hazard.

There are two ways in which high temperatures are caused by electric-currents. One has been mentioned before in these papers; it is the heating that takes place in any conductor when a current passes through it. A large current passing through a small conductor sometimes even causes fusion. But, ordinarily, much the higher temperature is produced by the formation of an electric-arc, which is familiar from its practical use in the arc-lamp. This arc is formed when a current passes from a conductor, through gases, to a conductor again. At ordinary potentials, the current can "jump across" only a very short space and these arcs are always formed by the gradual separation of the conductors. Suppose that two wires when brought together complete an electric-circuit: if the pressure forcing them together be now diminished, the electrical resistance at the contact is increased, and the current overcoming this resistance creates heat. If the wires are separated, there is at the instant of separation, a great increase in the resistance and a proportionate increase in the heat generated; the air about the contact becomes heated and the ends of the conductors themselves are, to some extent, volatilized. These vapors are conductors of relatively high resistance, and while the current can be forced through the short distance separating the ends of the better conductors, the energy required to do it is comparatively great and is manifested in intense heat and light.

A leaking current is likely to cause these arcs, because when a current passes by means of a partial conductor, it often burns away small particles and is maintained by an arc from one conducting particle to another. When a current is once established it is not easily broken, and a distance that would have at first proved a complete barrier is easily bridged by the arc with its hot, semi-conducting gases. But leakages of this kind are not alone the cause of destructive arcing. One wire may come in direct contact with the other wire of the circuit, or it may come in contact with a pipe or bell-wire in accidental connection with the other side of the circuit; and in this case there may be a "short circuit" with a very heavy flow of current, or there may be a sputter, a burning away of the metal in contact, and a resulting long arc of intense heat.

Excessive currents in multiple systems are provided against, by the use of a small wire or strip made of a fusible alloy, that will melt and break the circuit before the current has had time to dangerously heat the copper wire. These fuses are of sufficient length to make it impossible, when they melt, for the arc to hold across the gap in the circuit, and the fuse itself is enclosed in a non-combustible case that will not be injured by the momentary heat. In series circuits, where the current is of uniform strength, the fuse cannot be used; and even in a multiple system, if the fuse were large or not properly proportioned, a disastrous arc might form and be maintained.

The modern methods of wiring have accordingly been designed to prevent, as much as possible, the leakage of electricity and the formation of "short circuits"; to keep local the effects of these accidents when they happen, and to make it easy to repair defects, the Underwriters now require all wires not encased in approved forms of moulding or in approved makes of conduit, to be supported wholly on non-combustible insulators. It is their intention that wires shall not even come in contact with anything else. They also have made stringent regulations with regard to the insulation that is to cover the copper wire. Manufacturers submit samples of their wire, and it is subjected to severe tests before the Underwriters will approve its use. No wire is allowed in concealed work, or in places exposed to dampness, except of these brands that have been approved; where the wire is entirely exposed, and is in a perfectly dry place, a somewhat inferior insulation is allowed.

It was thought in the early days that wiring would be perfectly safe and satisfactory if it were simply buried in the plaster, or if it were strung through the spaces between floors and ceilings and in hollow walls. Although wire covered with a good insulation was often run in this way, a number of difficulties were soon met with. Carelessness in drawing the wire through confined spaces abraded or stripped the insulating covering; workmen sometimes pierced the insulation or even cut the wire with nails and tools; and there proved to be in the plaster, alkalies and acids that, sooner or later, broke down all resistance to electrical pressures. Besides these methods of wiring left no way of making repairs. In the event of a failure, there was nothing to do but to tear the wire out of the plaster, or to pull it out of the spaces in the walls and ceilings, leaving no way of replacing it.

There are now two approved methods of running wires for low potential circuits: they may be supported on non-combustible insulators, or they may be run in conduits. Wires may be run between floors and ceilings, in the hollow spaces in walls, or in any place one wishes, if the conductors are supported wholly on non-combustible insulators, such as glass or porcelain; if the wire has an approved insulating covering; and if in passing through walls, floors, timbers, ceilings, etc., proper insulating bushings are used. Wiring by this method can be made safe and satisfactory if the work is done conscientiously. Carelessness may, however, leave vulnerable places for the carpenter's nail; there is no certainty after the work is finished that it has been properly done; and it is difficult to replace wiring that from any cause becomes defective. These disadvantages may be largely overcome if the architect will make provisions for the free access to the wires as he sometimes does to pipes. Accessible wire ways on or in the walls should be provided for upright wires, and floors should be arranged so that any part of the horizontal wiring can easily be reached. With these precautions taken, this method of wiring on insulators may be made safe, trustworthy and convenient.

[1] Continued from No. 980, page 6.

The greater part of the concealed wiring in the larger buildings is now done, however, in conduits. The building is first fitted with a system of waterproof, and to some extent fireproof, tubes, much as if a twin system of gas-pipes were being installed. These tubes lead from the mains to the branches, and from the branches to the lamps, and wherever a wire is to be connected to another wire, a junction-box is provided. The wires are then drawn through these tubes and the necessary connections made. The tubes are not depended upon for insulation, but are simply raceways for the wires, protecting their insulating covering from injury, and affording a confined channel through which new wires may, at any time, be drawn. Aside from the accessibility, there is the advantage with this method, that while the conduit is installed at the time the building is erected, the actual wiring may be left until all carpenters and finishers have gone, and when there is no longer danger from carelessly-driven nails or slashing tools. The space required by the conduits is less than that necessary for porcelain insulators, and this becomes of considerable importance in the larger installations.

It seems probable that conduit, in some form, is the last stage in the development of concealed wiring. For some time it has been possible to get wire covered with a virtually-perfect insulation, and the trouble has been that this insulation was not protected from mechanical and chemical injury. A proper conduit will protect it when it is installed; it makes possible a more suitable time for running the wires; it gives compact construction and what may properly be called an electrical *system;* and it makes this system of wires capable of change and renewal at any time.

But with any method the electrical features should have consideration when the building is designed. It does not, of course, make necessary considerable changes in construction or in arrangement, but a little attention given to advisable provisions makes the wiring installation a part of the whole, rather than simply an adjunct; it gives system, too, to the wiring itself, and makes it better and more convenient. Where conduits are used, the plaster may cover entirely the smaller tubes, but the larger mains require channels in the walls, and, in many cases, it is advisable to have the larger tubes in channels provided with removable covers, for the largest wires are not drawn in and out of the tubes with facility. Provision should also be made for the closets or pockets that are to hold the fuse-blocks and switches. These details are not unfrequently left for the electrical contractor, but there is, of course, a distinct advantage both to him and to the architect, to have cutting avoided where possible, and when it is necessary to have it decided upon and arranged for beforehand. RUSSELL ROBB.

ITALIAN VILLAS.

TO know Rome is to love all of her possessions, but to love Rome is not always to know her villas. They lie chiefly outside her walls — some of them are several miles distant from the city — and although they are not absolutely neglected by travellers, they form, on the whole, one of the least studied portions of the Roman domain. No one who has once become intimately acquainted with their beauties can refrain from revisiting them and idling whole days away in their enchanted labyrinths. The great villas of the Renaissance are the euphonistic, theatrical and spectacular decorations of Rome. They are monumental, because nothing Roman could ever be otherwise, but they give to the surroundings of the great city, first of all, a kind of light, picturesque grace which is the one thing needed in the grand and heroic Italian panorama.

This letter is dated from Viterbo because, as will presently appear, it is in the vicinity of that little town that the Roman art of villa building culminated in an example which still exists and is in a perfect state of preservation. The general history of the art is written in and about Rome, and dates, roughly speaking, from the sixteenth and seventeenth centuries. The Villa d'Este, at Tivoli, one of the earliest and most magnificent villas near Rome, is ascribed to 1549, when Pirro Ligorio planned it for Cardinal Ippolito d'Este. The Falconieri, which is among the principal villas of Frascati, was also projected about the same time. In the eighteenth century, practically nothing on the same scale or in the same style was accomplished. Outside the Porta Salaria, the small Villa Albani, which belongs to this period, is a good specimen of the rigidly formal manner into which the landscape architecture of the time declined. It is well kept up, is delightful of its kind, and is really necessary to see as an illustration of one phase of the art it represents. Curiously enough, the style which would have been expected here — the decorative style of the eighteenth century — is absent. The palace in the Villa d'Este, by Ligorio, is one of the stateliest mansions in Italy. But in the spirit ot their work on the gardens, the designers anticipated the finest spirit of the eighteenth century, giving their elegance a peculiarly dainty and even quaint accent; adorning their productions with the touches of ornate humor, of refined extravagance, which the famous Arcadia introduced into later Italian literature. Perhaps the best equivalent for their mood, in the sphere of pictorial art, is the mood of Watteau, of Fragonard, of Boucher. The reader who recalls the general effect of one of Watteau's fêtes champêtre will have the most suggestive sidelight on the Italian villas.

These villas, however, remain always Italian, and it is here that some of the most essential points in their construction have to be considered. They were built, as a rule, on the sumptuous Roman scale, without stint and without any thought of the difficulties nature might set in the builder's path. The patricians of the epoch were veritable profligates of land, and they were also the masters of it. The Villa d'Este, for instance, extends from the top to the bottom of a long and steep slope. On the apex of the hill is thrown the villa itself, or, as it may be called to avoid confusion, the palace. It is an immense structure, erected on the severest lines, and crowning the hill with a dignity and an austere beauty that suggest, in those relations, some of the celebrated palaces of Bramante. At its feet lies fairyland. Scorning all the irregularities of the site, the builder constructed the precipitous descent with grandiose ramps and staircases that lead from one majestic terrace to another, only to disclose the presence of a third farther down. At every one of these pauses a fountain is encountered, and to the right and left, paths placed at right angles to the central avenue lead through cypresses to other fountains, to little fish ponds enclosed in crumbling marble, or to a bosky exedra, where the sun only filters through the dense foliage above. Straight down from the platform, before the portal in the centre of the palace, the main descent falls, with the ramps and staircases just referred to, marking its divisions from terrace to terrace in large lines. Superb cypresses line the walk, and from the fountains there gush forth innumerable streams, some of them flying to a height of fifteen or twenty feet. Everywhere, in the fountains and enormous basins, in the seats, urns and statues, the most lavish use of stone and marble is noticed. Some of the fountains — like one that plays at the side near the middle of the descent and is surrounded by a colonnade — must have exhausted material sufficient for the construction of a small house. Everywhere the stone is carved in artistic, decorative forms. This was building in the grand style. And what is most remarkable about it is the unity of the design. No matter how vast the estate might be, the designer seems to have conceived his plan with the same feeling for balance and symmetry that might have presided over the invention of a façade.

The Villa d'Este has been touched upon somewhat at length because it is one of the very finest villas extant; but in any of the erections of the time, the aim is found to have the same character. Sometimes, as in the Villa Medici, on the Pincio, which Annibale Lippi constructed in 1540, a very convenient site was available. Here the land is in two distinct levels. On the lower of the two, where the admirable palace was built, the grounds had only to be laid out in formal style. In an early painting which hangs in the gallery at Naples, it is shown that the arrangement was not materially different from what it is now, being principally a matter of flower-beds, fountains, paths and hedges. The upper level was treated freely as a "bosco." Other villas, like the d'Este, and like the Conti and Aldobrandini, at Frascati, were built upon decidedly uneven ground; and then, invariably, there were employed the masterly expedients which have just been pointed out. Some of the remaining villas, where the scale is large and where the site has necessitated especially interesting measures of terracing, may be named for the benefit of the traveller. At Frascati, flung on the side of the mountain as though by some gigantic whim, the Villa Mondragone possesses a terrace, with balustrades, fountains and gigantic flower pots, that is among the splendors of the old villa architecture. The Falconieri, Taverna and Ruffinella, all at Frascati, are also representatives; and nearer Rome, not far from the Porta San Pancrazio, the Doria Pamphili is the best of all the villas in the immediate neighborhood of the city. The extensive Villa Borghese has fine drives, but it was laid out more as a park than as a villa, and just now it is less interesting than it ever was, through the bad management of it as property in the hands of the Government.

There are two interesting villas near Viterbo. At Caprarola, some ten or twelve miles distant, is a palace which Vignola built for the Farnese in the middle of the sixteenth century. The drive over is a long one, the best *carozza* available in Viterbo is apt to be a vehicle of the most uncertain and uncomfortable habits, and Caprarola, a small isolated town, is not especially amusing. But you have the Italian hills about you; you pass, on the way, the exquisitely blue little Lago di Vico, shining like a jewel in the valley, and when you reach the palazzo all your inconveniences are forgotten. The massive edifice overlooks the town, and between it and the latter there is a foretaste of the grandeur of the place, in a series of terraces and ramps that would do credit to an imperial city, to say nothing of a village like Caprarola. Behind the severe façade are spacious rooms embellished with frescos, and beyond those lies a circular court with stone pillars and arches of impressive dimensions. Then quite at the other side comes the garden. It has been modified somewhat by the present keeper of the palace, and fruit-trees abound where formerly there were only paths, hedges and flowers; but the broad lines remain, and a few minutes' walk from the palace, beyond a pretty bosco, there is a palazzina, a little casino also designed by Vignola, which is as fine as anything near Rome. The fact that it is now used as a cow-shed does not rob it of its external beauty. The terracing is as fine, the row of fountains play as picturesquely, the antique statues are as effective against their thick background of green, as they would be were the palazzina still the resort of bewitching Renaissance dames and gallants in the dress of Titian or Carpaccio. It is not easy to obtain access to this villa. It is necessary, I believe, to obtain a permit from the steward of the ex-king Francis of Naples, in Rome, and even that has not recently been instantly forthcoming. But no one bent on entering need despair of passing the gate; and once past, all the labor of the adventure is more than repaid. Even failure would be compensated by the drive back to Viterbo under the stars.

The Villa Lante is always accessible, and happily so, for this is the last, the most ravishing of Italian villas, the one in which all the best qualities of the others are united in a faultless whole. It lies about two miles to the northeast of Viterbo, on the edge of Bagnaia, an insignificant town of few inhabitants. The approach is up a narrow, dingy street, which ends at the entrance to the villa. The latter is comparatively small, and is built on an incline which is a continuation of the grade of the street. In the centre of the first level, a bronze fountain with four upright male figures plays in the middle of a square marble basin. The garden surrounding it, which is itself inclosed by tall hedges, is of the same proportions as the basin. From this level, two ramps, built in the approved Roman fashion, ascend to another on which stood the two little palaces of the estate, both alike and placed one at either side, say, a hundred and fifty, perhaps two hundred, feet of ground between. On the terrace that occupies this central space, a semicircular fountain in three stages abuts, and on either side staircases lead higher up. Another fountain is discovered on this second terrace, another appears on the third, still another adorns the fourth, and, finally, at the top, a wide basin with fountains above it reveals the source of the sparkling water that goes merrily down to the bronzes. It does not go through subterranean passages or through prosaic pipes. It flows from fountain to fountain through richly wrought stone channels; it falls from one basin to another, and what you see as you stand beside the highest of these many receptacles is a perfect arabesque of hoary stone with countless jets of silvery water gleaming in the sun. You see a succession of steps, inclines, balustrades and urns, all heavily decorated, all covered with flowers and vines, all shadowed in spite of the sun, by magnificent oaks, descending with indescribable pomp to the gateway far below. No words could picture the lovely scene. A photograph does it the scantiest justice, and a sketch from a photograph would be a positive misrepresentation. Lamb was the only man who ever knew how to reproduce the atmosphere of antique gardens. Sir Thomas Browne and Bacon wrote in a vein too detached and stately to quite catch the last fine shade of sentiment that broods over the dim, silent walks and the glittering terraces and fountains. It is largely a sentiment that creates their fascination, that dedicates them to a new god, half sylvan, half urban. Rich as they are in the purest architectural beauties, eloquent as they are in lessons as to how houses should be designed with relation to their gardens, and *vice versa*, it is still the harmonious working of art and nature, with time and the magic of historical association, that makes a villa like the Lante a source of unblemished happiness. There is nothing like it anywhere but in Italy. The beauty of Versailles is one thing, the beauty of Haddon Hall, is another, and the beauty of the Alcazar at Seville is a third. The beauty of the villas of Italy is a fourth, and it is unique. — *N. Y. Tribune.*

AMATEUR CONTRACTORS.

A PAPER was read a month or so ago in the section of Economic Science at the meeting of the British Association at Oxford by Mr. Sidney Webb, on "The Alleged Economic Heresies of tha London County Council," of which the *Architect* gives the following abstract. He said: The policy of the London County Council has been intelligently criticised, from the point-of-view of economic science, mainly under three heads. Instead of "buying its labor in the cheapest market," as it was termed, it has from the first striven to adopt as its standard the trade-union rate of wages, and to assert a "moral minimum" of earnings below which it was inexpedient that any London citizen should be allowed to sink. Moreover, not content with proceeding on these lines as regards the workmen whom it directly employs, it has sought throughout to secure that all contractors executing its work should adopt the same principle. Finally, it has endeavored, wherever possible, to dispense with the middleman *entrepreneur*, and to substitute salaried supervision and management directly under public control. On all three points it has been accused of economic heresy by those who believed themselves to be expressing the conclusions of economic orthodoxy. On all three its action is largely influencing public opinion. It seems desirable, therefore, to set forth precisely the facts and to reconsider the economic position.

After prolonged discussions, repeated at intervals during four years, it has become settled policy (*a*) to pay in each trade the recognized standard rate of wages, (*b*) to give no adult male workman less than 6*d*. per hour and no adult woman less than 18*s*. per week. The labor policy of the London County Council, whether with regard to skilled or to unskilled labor, may be explained as the deliberate choice of that form of competition which secures the greatest possible efficiency as compared with the form which secures the greatest apparent cheapness. Public offices may be filled in one of two ways. We may on the one hand practically put the places up to auction, taking those candidates who offer to do the work for the lowest wages; or, on the other hand, we may first fix the emoluments and then pick the best of the candidates coming forward on those terms. The London County Council has learned by long and painful experience that there is so much difference between competence and incompetence that it does not dream of seeking to save money by taking the candidate who offers his services at the lowest rate. Whether the post to be filled be that of an architect or a carpenter, the wage to be paid is first fixed at a rate sufficient to attract the best class of men in the particular occupation. Then the most competent candidate that can be found is chosen. With regard to the lowlier grades of labor a further consideration enters in. The London County Council, responsible as it is for the health of the people of London, declines to use its position as an employer deliberately to degrade that health by paying wages obviously and flagrantly insufficient for maintenance, even if competition drives down rates to that pitch.

So far, indeed, is the Council's action from being economically heretical, as is commonly supposed in West End drawing-rooms, that it is exactly what the instructed economist would nowadays recommend. The economic heretics, in fact, are those who, in flat defiance of Adam Smith, M'Culloch, Mill and Marshall alike, persist in assuming that there is some obligatory "law" that the pressure of competition ought, without interference from man, to be allowed so to act as to degrade the standard of life of the whole community.

Some critics demur to any interference with the freedom of contractors, and denounce as economically heretical the Council's standing order confining the Council's work to such firms as adopt the current standard rate of wages. The very object of industrial competition, they say, is to keep the cost of production down to the lowest possible point, and any interference with the contractor's freedom to do his business in his own way tends to increase that cost. These criticisms confuse cost of production with expenses of production. What the community has at heart is a reduction of the cost of production — that is, of the efforts and sacrifices involved in getting the object desired. It was in order to put a stop to the constant tendency of contractors to nibble at the current standard wages that the London County Council inserted its celebrated fair-wages clauses. These clauses, it will be observed, leave open to contractors every chance of profit which comes from reduction of the cost of production. By concentrating the contractor's energy and attention on this point they presumably increase the fierceness of that part of the competitive struggle which promotes the public good. Here, again, the key-note of the Council's policy is, not the abolition of competition, but the shifting of its plane from mere cheapness to that of industrial efficiency. The speeding up of machinery, the better organizations of labor, the greater competency of manager, clerk, or craftsman, are all stimulated and encouraged by the deliberate closing up to the contractor of other means of making profit.

With regard to the Council's determination to dispense wherever possible with the contractor, and execute its works by engaging a staff of workmen under the supervision of its own salaried officers, this has been fiercely attacked as being palpably and obviously opposed to political economy and business experience. Mr. Webb showed by figures that there had been a saving of 2,420*l*. or 12.33 per cent in the first sixteen operations carried out by the Council without a contractor. It is usually assumed, continued Mr. Webb, by the Council's critics that its policy of eliminating the contractor is an unparalleled innovation unknown outside London. A little knowledge of the action of local governing bodies elsewhere would prevent this mistake. The Corporation of Birmingham is going far beyond the London County Council. When we thus find even the county councils in rural districts giving up the contractor, it ceases to be surprising that the Town Council of Manchester, in the city of Cobden and Bright, now manufactures its own bass-brooms, or even that the ultra-conservative Commissioners of Sewers of the City of London actually set the County Council an example by manufacturing their own carts. The superiority of direct municipal employment under salaried supervision to the system of letting out works to contractors has, in fact, been slowly borne in on the best municipal authorities all over the country by their own administrative experience, quite irrespective of social or political theories. With regard to the integration of processes, Mr. Webb pointed out that within the last twenty years the maxim in large industries was "Never buy from any one else what you can manufacture for yourself."

He concluded by asking, Why is the elimination of the subsidiary *entrepreneur* more practicable now than it was in the last generation? It would take too long to examine the fundamental causes and conditions of this change in industrial organization. Most changes in social structure depend, in the long run, upon individual character; possibly there has been a growth in the number of men who can be trusted to work efficiently and honestly as salaried managers instead of for their own personal profit. Possibly, too, as industrial organization becomes more complex, the advantage to the consumer in directly controlling the production of every article he requires becomes more apparent. All improvements in social organization, too — steam, telegraphy, the free use of the printing-press, and now the telephone — facilitate the massing of workmen under single generals of industry, able efficiently to control larger and more heterogeneous and more complex industrial armies than could be managed by the captains of the past generation. Finally, as regards the substitution of the collective for the individual management of industry, it is evident that this will have been rendered increasingly practicable by the perfecting of democratic organization. All these and other influences are but fragmentary suggestions towards the explanation of a change in industry of which the supposed economic heresy of the London County Council is but one out of many manifestations. Formerly, the best business management was that which itself managed least. Nowadays, the best business management is that which can safely and efficiently administer most. The integration of productive processes under direct control of the consumers may or may not be economic heresy; the business history of England for the past twenty years indicates that it is industrial orthodoxy.

Mr. Edward Atkinson was surprised that Mr. Webb had so completely justified the principle of competition. The County Council had successfully competed with contractors by dispensing with contractors. High wages and cheapness of production was the rule which prevailed in the United States, and was being tried successfully by the Council.

Professor Nicholson observed, with respect to getting rid of the middleman, that this doctrine was not new, but was earnestly supported by Adam Smith as one of his cardinal principles.

General Strachey agreed with what Mr. Webb had said. In days gone by, all the railways were constructed by the contractor. Now, it was hardly ever done.

Professor Foxwell said that the tendency of the aggregation of many businesses in one hand was by no means universal, and there were striking instances of an opposite character. He was afraid that the irritation at the inevitable inequality in human ability and character, and the necessary and justifiable inequality of emolument was one of the most striking and least attractive elements of the modern democracy.

Mr. Bond said there was an impression that the London County Council overpaid their unskilled workmen and underpaid the most highly skilled. The Council might do better than endeavor to master the details of every trade, and he disapproved the rigid adherence to trade unions.

SOCIETIES

THE ENGINEERS' CLUB OF PHILADELPHIA.

AT the business meeting, held October 6, 1894, forty-eight members and visitors were present.

The Secretary read a circular letter and proposition from Mr. E. L. Corthell, for the establishment of an International Institute of Engineers and Architects, the principal objects of which would be:

First. — To unite in closer relations all departments of engineering and architecture.

Second. — To furnish a suitable and convenient channel by which information relating to new discoveries, processes, methods, inventions and works may pass from one country to all other civilized countries of the world for the benefit of the profession and of mankind.

Third. — To conduct, by the assistance of the Fellows of the Institute, individuals and governments, systematic and thorough tests of all classes of materials used in constructive work, and to disseminate through the channel of the Institute the resulting information.

This proposition elicited much discussion, and a motion was made by Mr. Robert A. Cummings, that a committee of three be appointed by the Chair to consider the matter and report at a future meeting of the Club. Carried. L. F. Rondinella, *Secretary.*

ILLUSTRATIONS

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

STAIRCASE IN THE MAIN COURT OF THE CRIMINAL COURTS BUILDING, CORNER CENTRE AND FRANKLIN STREETS, NEW YORK, N. Y. MESSRS. THOM, WILSON & SCHAARSCHMIDT, ARCHITECTS, NEW YORK, N. Y.

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

ATTEMPT AT DIFFERENT STYLES OF RENDERING, BY MR. C. ALOIS HERMAN, ST. LOUIS, MO.

HOUSE FOR PROF. ALEXANDER GRAHAM BELL, BADDECK, C. B. MESSRS. CABOT, EVERETT & MEAD, ARCHITECTS, BOSTON, MASS.

DOORWAY OF ARNOLD'S MANSION, FAIRMOUNT PARK, PHILADELPHIA, PA. SKETCHED BY MR. FRANK A. HAYS, PHILADELPHIA, PA.

PROPOSED ARMORY FOR TROOP A, N. G. S. N. Y. MESSRS. PAULSEN & LAVALLE, ARCHITECTS, BOSTON, MASS.

[Additional Illustrations in the International Edition.]

THE MARINE CAFÉ, WORLD'S COLUMBIAN EXHIBITION, CHICAGO, ILL.

[Gelatine Print.]

STAIRCASE IN THE MAIN COURT OF THE CRIMINAL COURTS BUILDING, NEW YORK, N. Y. MESSRS. THOM, WILSON & SCHAARSCHMIDT, ARCHITECTS, NEW YORK, N. Y.

[Gelatine Print.]

THE figure of "Oratory," on the lower landing, was modelled by a young French sculptor, in Paris, Roiney by name.

P. & O. COMPANY'S NEW OFFICES, LEADENHALL STREET, LONDON, E. C., ENG. MR. T. E. COLLCUTT, ARCHITECT.

THIS illustration shows the building without the sculptured panels, which enhance the effect.

HILL WOOTTON, WARWICKSHIRE, ENG. MR. P. MORLEY HORDER, ARCHITECT.

THIS little Warwickshire house and stabling cost only some 1,500*l.*, including boundary walls — the house itself only 1,000*l.* The principal rooms have been treated with painted panelling, and the house throughout has been treated with the utmost care. A view from the stable yard was exhibited in this year's Royal Academy.

EXHIBITIONS

BOSTON, MASS. — *Exhibition of the Works of Adolf Menzel; also, Drawings by John Trumbull:* at the Museum of Fine Arts, in October and November.

Paintings by Elihu Vedder: at Doll & Richards, 2 Park St., during October.

BRIDGEPORT, CONN. — *Exhibition of the Sella collection of photographs of Alpine and Caucasian scenes:* at the Public Library Art Gallery, September 8 to October 27.

CHICAGO, ILL. — *Seventh Annual Exhibition of American Oil-paintings and Sculpture:* at the Art Institute, October 29 to December 17.

NEW YORK, N. Y. — *Loan Exhibition of Portraits of American Women:* at the National Academy of Design, opens November 1.

Second Annual Summer Exhibition of American Paintings: at the Fifth Avenue Art Galleries.

Twenty-sixth Annual Spring Exhibition: at the Metropolitan Museum of Art, opened May 8.

Group Exhibition by American Painters — William M. Chase, J. Alden Weir, Childe Hassam and others: at the Galleries of the American Fine Arts Society, 215 West 57th Street.

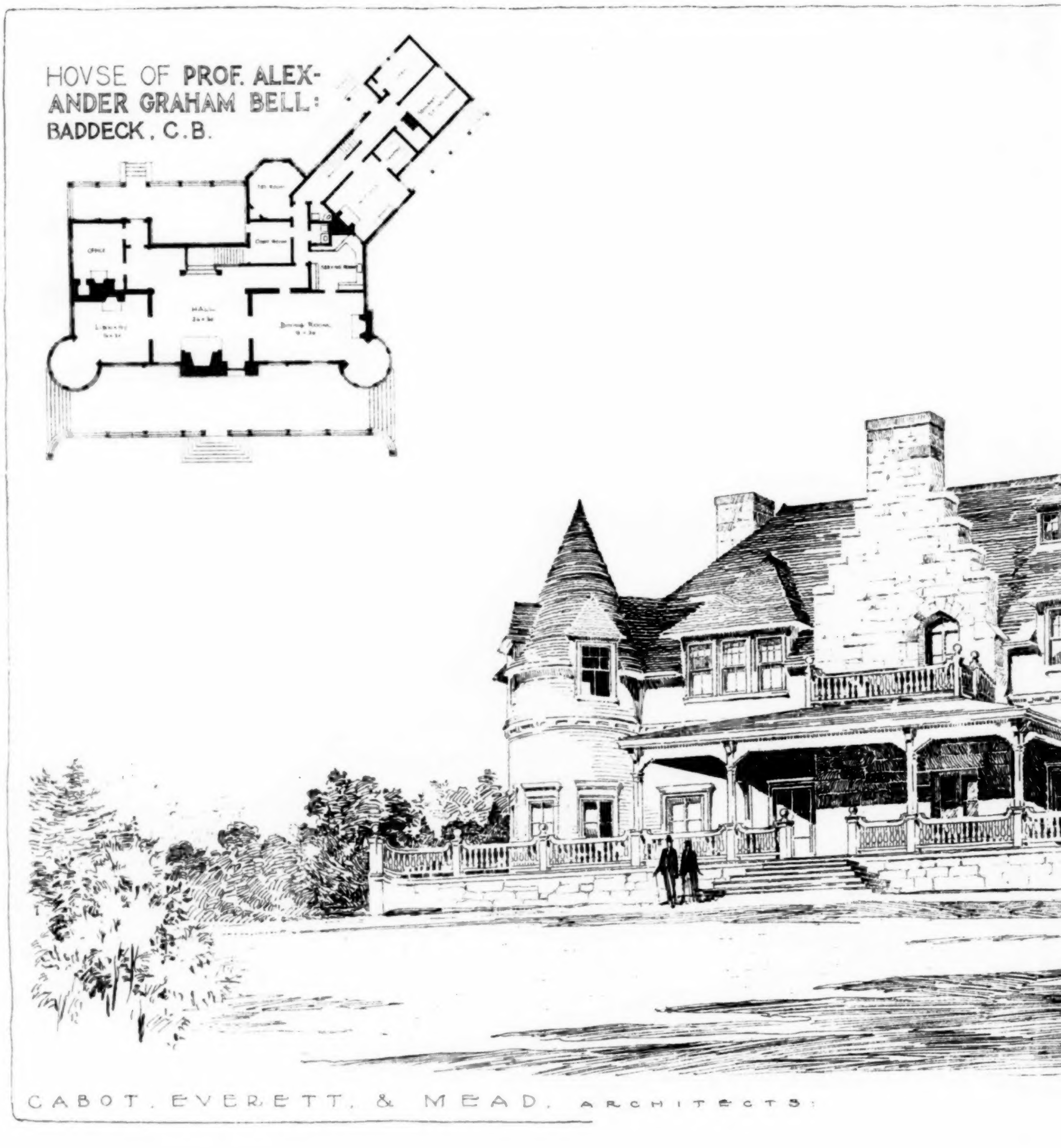
PHILADELPHIA, PA. — *Sixth Annual Exhibition of the Art Club of Philadelphia:* opens November 19, closes December 6.

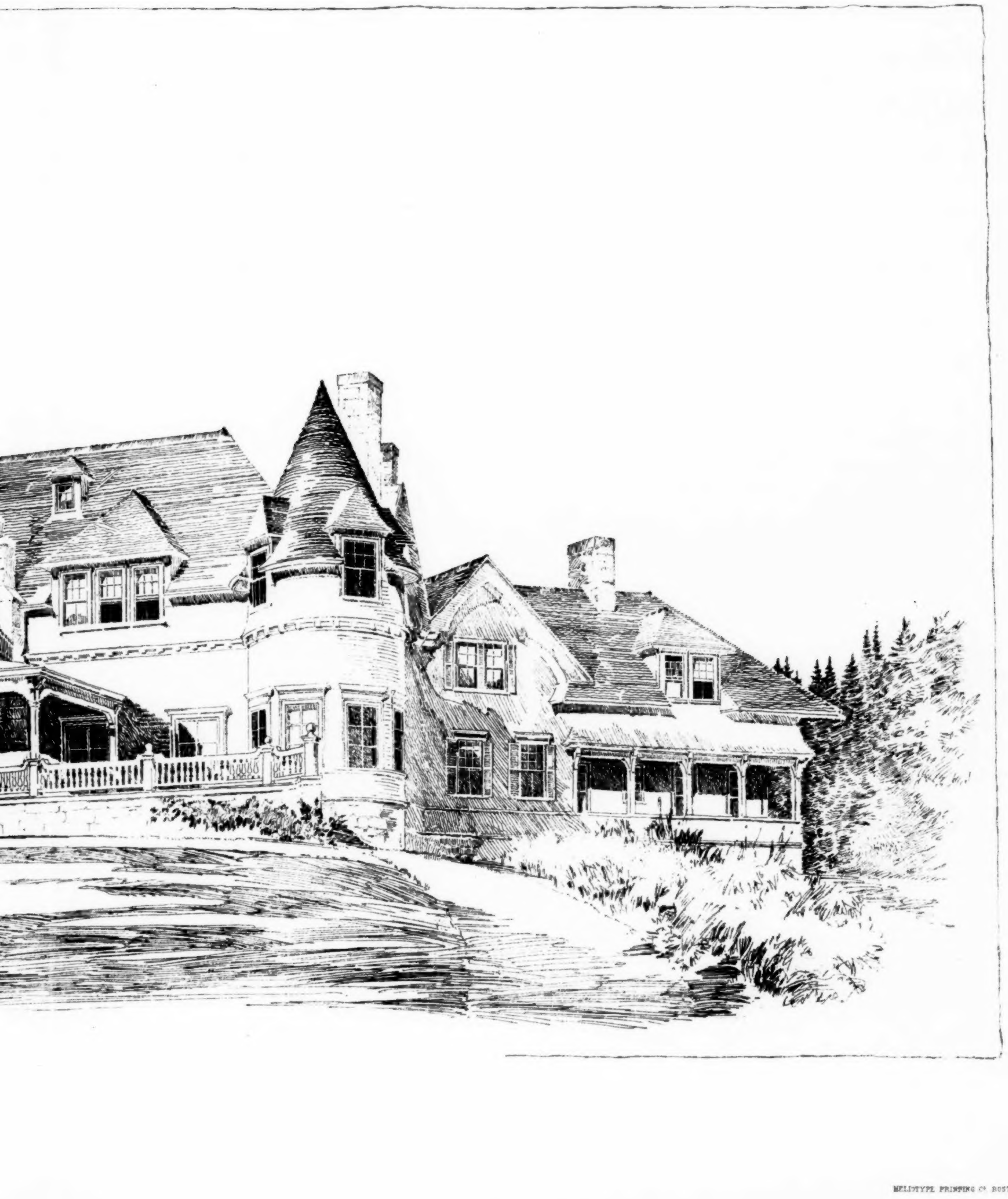
NOTES AND CLIPPINGS

EARLY LONDON DIRECTORIES. — The earliest known directory of people and places seems to be that of London, in 1677, of which only three copies are known — one in the Bodleian Library, one in the Manchester Free Library (which was bought for £5), and one sold at the Rev. Mr. Hunter's sale, which realized £9, although imperfect. The Manchester copy was carefully reprinted in 1878 (by Chatto & Windus) with an interesting introduction; and the next London directory seems to have been one of 300 pages published in 1732. The editor of the reprint in 1878 gives some details of earlier manuscript directories, or "Office of Addresses," by Henry Robinson, in 1650, who had an "office in Threadneedle Street, over against the Castle Tavern, close to the Old Exchange in London," and it was described as "keeping particular registers of all manners of addresses," with a "Catalogue of subjects of inquiry" so copious and so curious as to be a fresh proof that there is nothing new under the sun. Sixpence was the fee, and for this small sum answers to all sorts of questions connected with business could be obtained. — *Notes and Queries.*

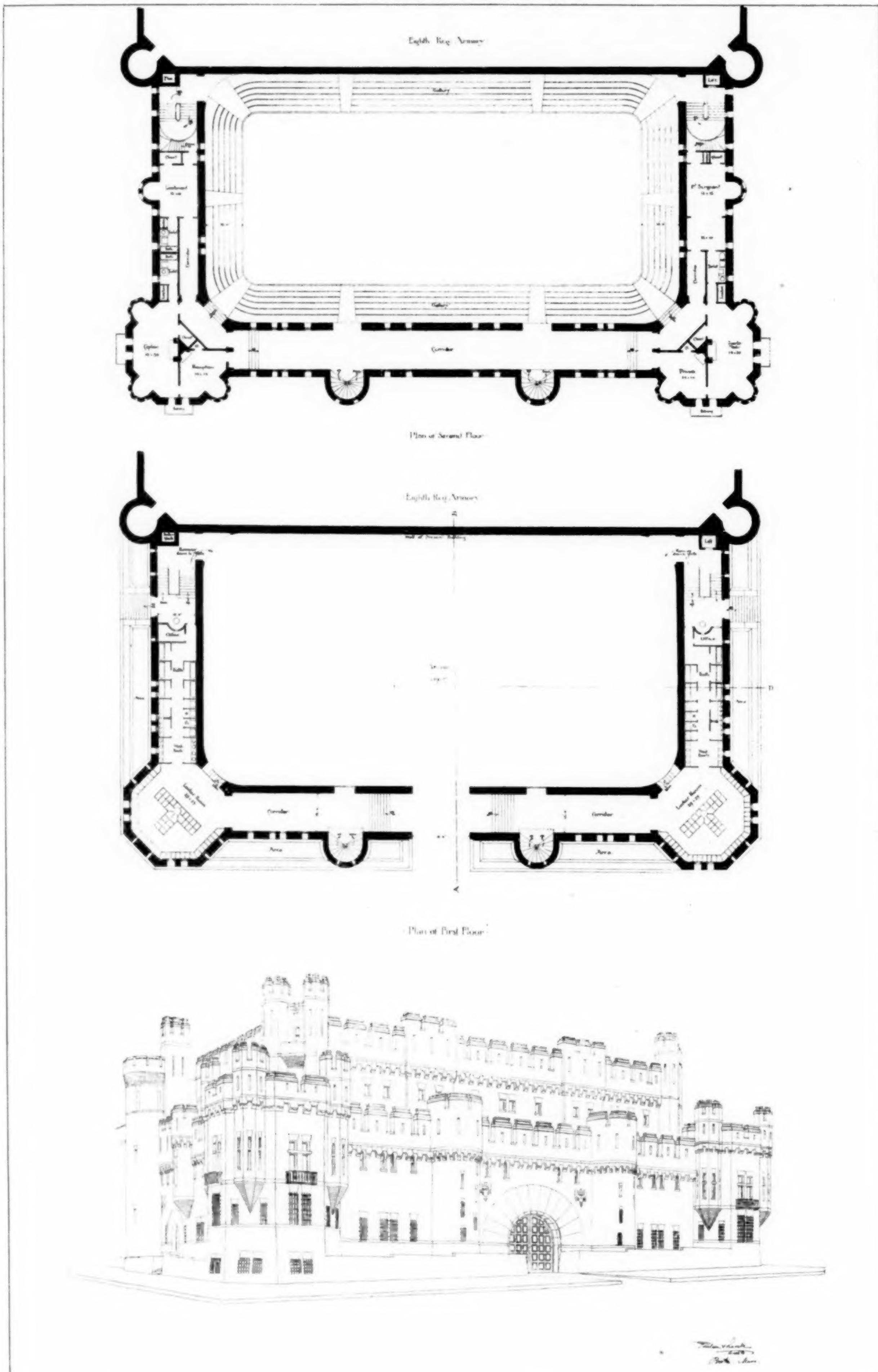
THE SILVER ALTAR AT GUADALUPE, MEXICO. — A despatch from Mexico announces that the erection of the magnificent canopy over the high-altar of Our Lady in the shrine of Gaudalupe has been completed. The pillars to support it are each a solid block of polished Scotch granite, weighing seven tons. The diameter of each pillar is three feet and the height twenty feet. The altar will be ready for dedication December 12 (Guadalupe Day), and will be the most elaborate and costly one in America. The additions to the church edifice will not be completed for nearly two years at the present rate of progress. When finished, the shrine of the Lady of Guadalupe will be one of the most notable Catholic church edifices in the world. The solid silver altar railing weighs twenty-six tons, and many millions of dollars are in other ways represented in the palatial place of worship. — *Philadelphia Press.*

S. J. PARKHILL & Co., Printers, Boston, U. S. A.


HOVSE OF PROF. ALEX-
ANDER GRAHAM BELL:
BADDECK, C.B.
HALL
DINING ROOM
CABOT, EVERETT, & MEAD, ARCHITECTS:



HELIOTYPE PRINTING CO. BOSTON



HELIOTYPE PRINTING Co. BOSTON

·PROPOSED·ARMORY·

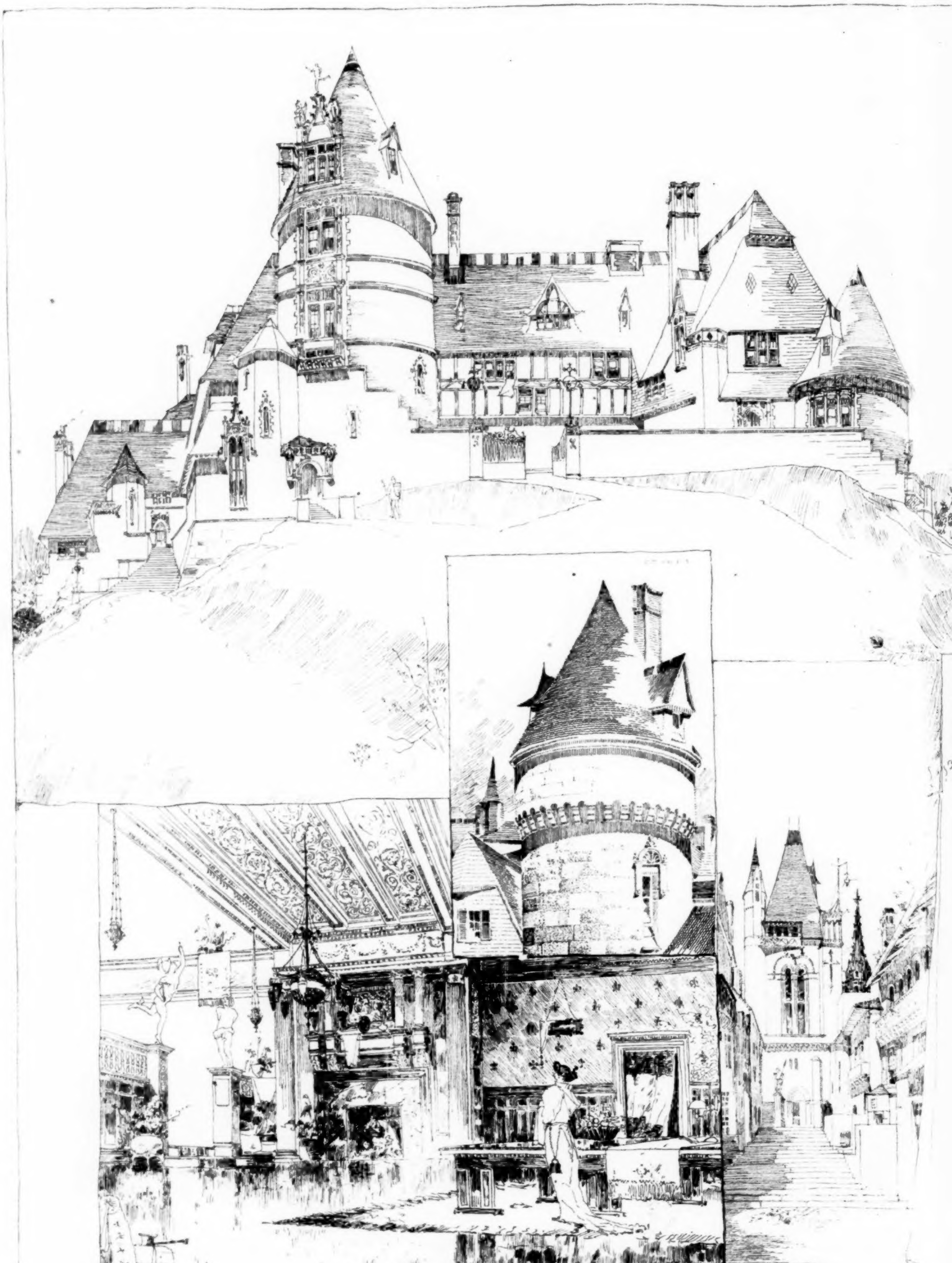
·FOR·TROOP·A·N·G·S·N·Y·

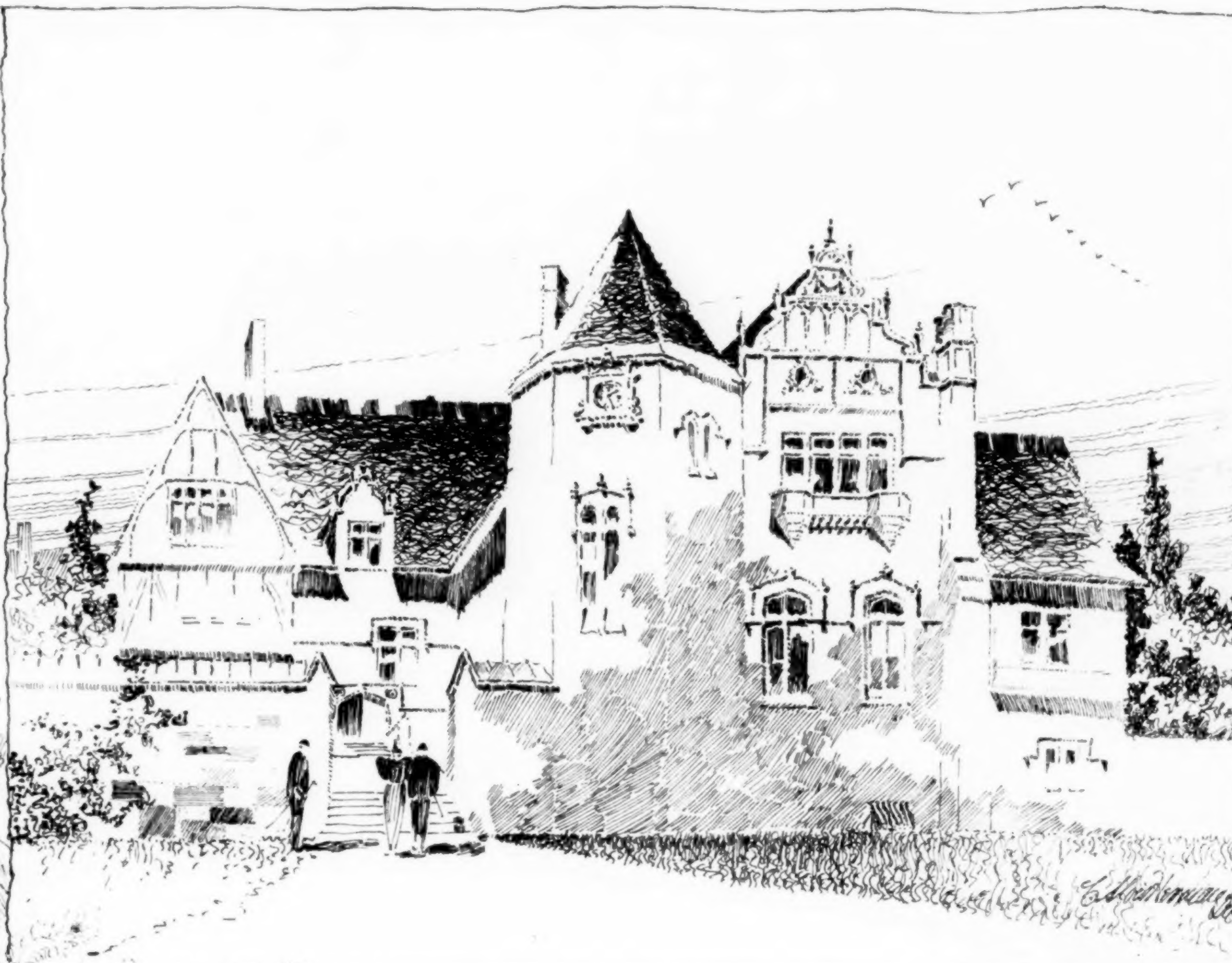
ARNOLDS MANSION
FAIRMOUNT PARK PHILADA

Frank A. Hays June 93

HELIOTYPE PRINTING Co. BOSTON

AMERICAN ARCHITECT AND BUILD





·AN·ATTEMPT·AT·DIFFERENT·STYLES·OF·RENDERING·IN·
PEN·AND·INK · · · · BY·C·ALOIS·HERMAN··ST·LOUIS·MO·

HELIOTYPE PRINTING CO. BOSTON