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CONTENTS

IT is rather consoling to find such economical and sober-minded men as most of the civil engineers really are indulging at their annual meetings in the same bootless discussion and wasteful verbiage that we have found so irritating at the annual gatherings of architects. The recently issued *Proceedings* of the American Society of Civil Engineers reveals that at the last annual meeting, at Detroit, many members insisted on their right to ask irrelevant questions and delay the proceedings until they had made it quite plain to all save themselves that they were apparently incapable of understanding "English as she is spoke," while in reality every one understood that their understanding of the speaker's meaning was sufficiently exact and that they were only yielding to that common vanity which leads many men to love to listen to the sound of their own voices. Apparently engineers are quite as willing as architects are to waste time in tinkering the constitution and by-laws of the organization in which they hold membership, and it is especially at these functions that the merely wordy man delights to make himself heard, while he remains discreetly silent when there is under discussion some matter which can be treated only by those of real mental force and professional ability. At this meeting of the civil engineers a matter was presented which has an interest for architects, because questions of the same kind have come before them, and it is interesting to note that engineers hold as widely differing views on the matter and handle it with an equal indecision. Two reports were offered by the Board of Directors, one recommending the appointment of a committee to examine and report on the best form of rail-joint for standard steam railroads, and the other asking for a similar committee to report on the best paint or protective coating to use for the preservation of structural metal-work. Seemingly the two matters were similar, if not identical, in their scope and purpose, and it was as professionally appropriate to appoint one committee as the other, and yet the convention took dissimilar action on the two reports. The discussion of the appointment of the committee on joints was hampered in the usual way by *soi-disant* parliamentarians who constantly argued that such and such action was impossible under the by-laws or constitution, and once more proved the unwisdom of an association limiting its freedom of action by inelastic rules. Nevertheless the rail-joint committee was finally appointed.

THE kernel of the opposition to the appointment of this or any similar committee lay in the allegation that it was improper for the Society to "do any engineering work that is expected of the individual engineer," that is, competition between the intelligent individual and the possibly more intelligent collective body was undesirable; and it was asserted that when clients knew they could get questions decided by the Society they would not employ the individual. One of the supporters of this theory accidentally proved its untenability by referring to some engineering body which had labored for two years over the matter of elevating tracks in Chicago and had finally recommended a certain method, but when the work was actually undertaken the society's recommendations were wholly ignored. This view of the matter was combated by Mr. Walter G. Berg, who showed that, under the constitution, one of the objects of the Society was the "advancement of engineering knowledge," and held that the most important work done by the organization was that done by its committees, after that came the discussions in open meeting and last of all the papers, which so many are apt to hold to be the most important accomplishment of all. He felt that when the Society had been invited by a similar body, the Roadmasters' Association, to take the desired action, the request could clearly be assented to in the firm conviction that the step would be in the direction of the advancement of engineering knowledge and practice, one of the objects for which the Society was organized. Although this argument and others like it finally prevailed, yet when the appointment of the committee to investigate protective paints came up for discussion it was found that the idea that collective action was inimical to individual interests had gained ground, and the hostile feeling was reinforced by the plea that an examination of the protective coatings in the market must, seemingly, inevitably result in finding that one was superior to all others, and consequently such a report would commercially benefit the manufacturer of that one article in a high degree; while it certainly was no part of the functions of the Society to help any individual to gain greater wealth. This argument prevailed, the motion to appoint the committee was lost and engineers and architects must stumble along, using that coating for structural metal-work which is advertised most shrewdly and persistently, all because the Society of Civil Engineers voted, in essence, that it was no longer its duty to promote "the advancement of engineering knowledge and practice."

WE have no patience with such a short-sighted small-minded policy as this. It is the duty of every conscientious practitioner, whether engineer or architect, to acquire in his client's behalf knowledge in its most complete and extended form, and it is his duty to himself to acquire that knowledge in the form and by the means which will require the least wear and tear of his own mental forces, none too strong for the ordinary routine work of his daily life. Even if it were possible for each individual member to make for himself the needful investigations, the aggregate loss of time would be immense. It would be obviously unfair that a single individual should be expected to make the investigation and then impart the result as a free gift to his fellows. This, to be sure, is done now in the shape of papers read in convention, but they are accepted merely as individual statements and their probable value is gauged solely by the reputation of the author; but we fancy that if such societies adopt the selfish policy and refuse to authorize committees to make investigations because such a course may help a manufacturer or may antagonize an individual practitioner, it will not be long before the individual members see the light and learn to keep the knowledge they have gained for their own selfish profit, and decline to bring it before their fellows in the shape of papers. With committee-work eliminated and individual papers no longer procurable, the work at the annual gatherings would resolve itself into the fruitless and puerile discussion of by-laws and constitutions which so afflict all organizations, in this country at least. Besides, a great many interesting and valuable committee reports have been made, on cement for instance, and no one can feel that these investigations were improperly made. They may have temporarily benefited the manufacturer of some one brand, but they did not compel all other makers to withdraw from the market; rather they caused them to improve their methods and output so as to equal or excel the favored brand, so that the average quality of all the cement in the market has been improved and constructors and owners have had, in consequence, their operations greatly facilitated and the value of the result greatly enhanced. Such results as these, it would seem, are precisely what an organization formed to promote the advancement of engineering knowledge should aim to achieve.

ARCHITECTS are afflicted with the same spirit of selfishness, which is really a lack of manliness, when it comes to the writing of their specifications. No client is so unreasonable as to suppose that his selected architect can place at his service the whole of the vast sum of human knowledge, so far as it relates to buildings and their fittings; but he has a right to expect that his architect shall give him the full benefit of the degree of knowledge and information which he possesses, and that, if his architect has reason for believing, because of acquired knowledge or actual experience, that a certain material or a given fixture will acceptably meet the requirements of the problem in hand, he should unhesitatingly specify that material or fixture — by name and catalogue number, if that be possible — no matter how good a reason he might have for believing that others substantially as good could be found in the market. The client has a right to demand the fullest exercise of his architect's acquired knowledge, and has no reason for suspecting that because X's lock or Y's faucet is specified by name such particularity is an indication of accepted bribe, offered by the maker of these articles. Neither has a client just grounds for complaint, if eventually he learn that some better fixture was in the market, though unknown to the architect. There is no practice which causes more ill-feeling and loss than the common practice of specifying a certain article by name and then adding "or some other equally good." In justice to the contractors who figure in competition with one another, the elements of their problems should be identical, and it is easy for the architect to reserve the right to substitute, after the contract is awarded, another fixture or material for the one originally named in the specification, and so gain for his client any advantages which fuller study may bring and enable him to profit by the experience of the builder who has finally secured the contract. Adjustment of accounts can be easily made under the present practice as regards added or omitted work.

THE cable brings news that the first of the competitions for the Phebe Hearst Architectural Plan of the University of California has resulted in the selection of eleven designs, the authors of which are to take part in the final competition. Of these eleven designs six were of American origin, one Swiss, one Austrian, and three French, the authors of the American designs being Messrs. Whitney Warren, J. H. Freedlander, Howard & Cauldwell, Howell, Stokes & Hornbostel, and Lord, Hewlett & Hull, all of New York City, and Messrs. Despradelle & Codman of Boston. As the foreign names have possibly been bejuggled during transmission over the wire we forbear from stating them now. The award was made under the presidency of M. J. L. Pascal, who represented France, and Messrs. Paul Wallot representing Germany, R. Norman Shaw representing England and Walter Cook representing the United States, all being well-known architects, while the lay representative who acted for the University was Mr. J. B. Reinstein, the Regent.

IN view of the kind and amount of pleasure experienced by Americans when it was known that Messrs. Abbey and Sargent had been elected to membership in the Royal Academy, it is fair to suppose that similar feelings were experienced by an earlier generation when it was learned that greater honor had befallen an American artist through the election of Benjamin West to the presidency of the then youthful Royal Academy. It is, therefore, somewhat strange that out of the more than four hundred historical and religious paintings West is known to have painted so few should have found a resting-place in this country. Interesting as West's paintings undoubtedly are, although ultra-classic in conception and treatment, as they appear to us moderns, his work must have been pleasing to the men of his generation, and in the early part of this century there were enough wealthy amateurs of art to have secured more examples of his work than seems actually to be the case. The Pennsylvania Academy has two paintings, one the "Death on the Pale Horse," saved with much risk to the savers when the old Academy was burned; "Penn's Treaty with the Indians" forms an appropriate decoration for Independence Hall, and a copy of "Christ healing the Sick" is in the Pennsylvania Hospital; the New York Historical Society has several not very important canvases, and the "King Lear," known to the habitués of the Boston Athenæum, now hangs in the Boston Museum of Fine Arts. Possibly private owners may have other examples, but as West's work was generally on a large scale this is doubtful. We speak of this because an opportunity has arisen for some public gallery to procure another example of West's religious paintings, for the restoration of the altar-screen in Winchester Cathedral makes it necessary to remove from the wall above it, where it has hung for nearly a hundred years, West's "Raising of Lazarus." The color is said to be still admirable, the canvas well preserved and the fact that the painting has so long held so honored a position is testimony to its worth. The painting is about nine feet by eleven feet and so is more fitted for a public than a private gallery, and can be procured, it is said, for about twelve thousand dollars. Possibly the painting may be known to American tourists, though, as we recall the lighting of Winchester Cathedral, we think this is rather doubtful. It is, too, interesting to recall, apropos of Sargent's magnificent work in the Boston Public Library, that West in 1780 conceived a series of paintings illustrating the "Progress of Revealed Religion" and actually painted twenty-eight out of the thirty-six paintings which his scheme embraced.

THE ranks of the architects who were in practice in this country before the technical schools found it desirable to maintain departments of architecture are now being thinned with increasing rapidity, and we have now to record the death, in his seventy-seventh year, of Mr. Levi Newcomb, who once practised in Boston, but who in recent years had devoted himself to mining ventures. In addition to the usual run of dwelling-house and commercial work, Mr. Newcomb built dormitories for Tufts College and Dartmouth College, the First Universalist Church and the Causeway-street Station of the Boston & Lowell Railroad in Boston. Earlier in his career he was actively employed in northern New England.

IT is said that the number of students now enrolled at the many colleges in this country is now, in proportion to the entire population at both epochs, more than one hundred per cent greater than it was twenty-five years ago. There is little reason for questioning the statement, for the interest in liberal education has grown enormously during the period named; but so, too, and even in a greater degree, has the interest in industrial education grown, and as a quarter of a century ago there were few industrial schools, the ratio of progress must be much greater than it has been in the case of the colleges. Some of the institutions which have undertaken to foster progress in the industrial arts are well known everywhere, while there are others which have only a local fame but which do the work they undertake so admirably that they deserve to be better known in order that more pupils can avail themselves of the advantages they offer. One of these less-known institutions is the Rochester Athenæum and Mechanics Institute, which, in opening its fourteenth year, sends out an admirable circular of information. It opens with a most portentous array of boards of directors, standing committees and instructors whose names fill half a dozen pages, but when it is observed that the institution covers the ground between millinery and chemistry, between dressmaking (by two systems) and telegraphy, between cooking and architecture, it is easy to understand why so many committees are needed. The real value of the work being done by this institution in Rochester is indicated by the fact that, although it maintains day classes and night classes, the average attendance at the latter was nearly thrice as great as that during the day, the pupils, as in all such cases, being drawn from the ranks of a score of different trades. As the average daily attendance, all sessions, was nearly eight hundred, it can be seen that a vast amount of good is being accomplished, and the good citizens of the town are so well satisfied of this that they do not hesitate to make up by subscription the difference between the income from the modest tuition-fees and the actual running expenses. Besides the day and night classes, special "Saturday classes" are maintained, mainly for the benefit of teachers, who, it is amusing to note, do not win as high a ratio of "certificates" as do their non-pedagogic fellow pupils.

PARKWAYS AND BOULEVARDS IN AMERICAN CITIES. — I.

WORTHY and agreeable approaches, pleasant ways of going about in a city that also provide attractive routes to and from the public pleasure-grounds and to and from the outside country — these rank among the important problems that engage the attention of many municipalities. A few of our great American cities have dealt with this problem very comprehensively, and have undertaken schemes of parkway and boulevard improvement that meet the requirements of site and attendant conditions in a remarkably satisfactory manner. The example of what has been done, or what is projected, has incited other municipalities to give favorable consideration to similar projects. Yet other cities, while they have not carried out any comprehensive scheme, possess notable instances of such improvements — grand, and even magnificent, in character, though detached, or isolated, in their relation to the community as a whole. A review of what has been done along these lines of modern municipal development will be instructive and should prove of service in drawing more general attention to the value of such works.

In European capitals and large cities improvements of this sort are almost universal and have for many years been considered essential features in the equipment of a modern municipality. The most celebrated example in Europe is that of the Avenue du Bois de Boulogne, in Paris, laid out by Napoleon as the Avenue de l'Impératrice, from the Champs Elysées to the Bois de Boulogne, thus forming a magnificent thoroughfare from the heart of the city to the great park. This avenue has a width of 390 feet, with a broad driveway, a saddle-path and promenades, and is adorned with trees, shrubbery and turf. Elegant houses and gardens face the avenue, but are approached chiefly by streets from the outside. In twenty years, ending with 1875, Paris added over eighty miles of pleasure-ways to its system of thoroughfares within the walls and in the immediate environs. These varied in width from 100 to 400 feet, bordered with malls, and including drives, walks, seats, etc. While especially designed for pleasure purposes, in part they also were utilized for ordinary traffic.

The Prado at Madrid is similar in character to the Avenue du Bois de Boulogne, leading from a main street of the city to a park in the suburbs. It is bordered by handsome public and private buildings and gardens, and, like the great avenue in Paris, presents a brilliant spectacle afternoons and evenings with its throngs of carriages, equestrians and promenaders, including a host of notables on dress parade. Vienna has its Prater, with a length of five miles, a broad driveway, and foot and saddle paths on either side. Berlin has its magnificent Unter den Linden, continuing, beyond the Sieges-Thor, in the great Thiergarten Allee through the park of that name to Charlottenburg. Buda-Pesth has a grand example in its magnificent Andrassystrasse.

The boulevards of Paris have given a generic name to this class of pleasure-ways in American cities. When the ancient fortifications, or boulevards, were demolished, these ways were laid out on their sites, the generous width allowing the devotion of the central parts to reserved spaces, with trees and promenades. The name has an interesting origin. The Germans supplied the French with a considerable portion of their military vocabulary, and among the words that of "boulevard" was the result of a phonetization of the German *Bollwerk*, or "bulwark," in English. The celebrated Ringstrasse in Vienna is similar to the boulevards of Paris and, like them, occupies the site of the ancient fortifications.

In not a few German cities the demolition of the old walls has resulted in improvements that are charming variations from the boulevard idea. Possibly because the city beyond the walls had not grown up so densely, at the time of demolition, as to give land an extreme value, more open space than was available in Paris has been left, and this has been utilized in the creation of pleasure-grounds more varied and ample than the Parisian boulevards afford in their formal reserved spaces. Two of the finest examples in Germany are presented by the "*Anlagen*" — as these grounds are called — of Bremen and Leipsic. In both cities the demolished walls have been utilized by giving the surface, here and there, natural-looking variations. Since both Bremen and Leipsic are surrounded by monotonous levels the effect of these diversities of surface is particularly pleasing. The ancient moats have been partially filled and portions have been left to form pleasant pieces of water. The "Bremer Wall" is the name of the pleasure-grounds in Bremen, thus preserving the memory of their origin. These grounds have an extraordinarily natural charm. Strolling here one finds it difficult to imagine that he is in the midst of a large city, with busy streets within a few rods on either side. The abundance of water from the Weser has made it feasible to retain the greater part of the ancient moat, from which a chain of beautiful lagoons has been formed. Masses of great trees screen out the urban surroundings and the lawn spaces have been so disposed by Altmann, the landscape architect who designed the improvement, as to give the impression of indefinite space. Picturesque accents are given to the scenery by two ancient windmills, rising from the trees on high ground in the park.

The Leipsic Stadt-Anlagen are likewise of a picturesque character, in part, but in places they are marked by important formal features and again they contract to limits where they have a boulevard form. These grounds make an irregular ring entirely around the ancient city, the Altstadt, that stood within the old walls, and form a continuous promenade that offers an excellent opportunity for a moderate daily constitutional. The great central point of the city, the Augustus Platz, a very large open square, is surrounded by monumental public buildings, — the Stadt-Theater, the Museum, and the principal building of the University. On the side of the theatre towards the Anlagen is a magnificent terrace, rising from a beautiful piece of water amidst trees and shrubbery. Opposite the theatre stands the Museum, beyond which the grounds also assume a picturesque aspect. This Leipsic improvement presents a particularly fine instance of the combination of the naturally picturesque and the monumentally formal in municipal planning.

In the Parisian boulevards and the stately great pleasure-avenues of European capitals on the one hand, and in the German Anlagen, on the other, we have the prototypes of our American boulevards and parkways, — boulevard having become our accepted term for the formal type of parkway.

New York, the pioneer of American cities in the work of park development, is naturally the first to which we turn for examples of what may have been done in this important department of that work. While the metropolis of the New World has not given the attention to this part of the field that would be looked for, it yet possesses some very notable parkway features, including one of the noblest parkways in the world. The shore of the Hudson should have been the site of the great park of the city. But the next best thing was done when it was reserved for the Riverside Drive — a superb example of the picturesque type of parkway. It commands prospects of scenery so grand as to deserve the appellation imperial. The Drive and its accompanying promenades have a metropolitan stateliness, and the slopes between the road and the river have charming landscape character, with pleasant secluded rambles extending for miles. The panorama of the great river has an unceasing interest — the movements of commerce, the play of light on the broad and far-reaching waters, the Palisades, and the distant landscape. The connections with Central and Morningside Parks are by broad, smooth and pleasant streets, — a fair substitute for the lines of parkway communication which should have been provided. The groups of monumental buildings on Morningside Heights, near by, lend interest to the parkway. The same may be said of the monumental tomb of General Grant, but it must also be observed that it is a most unfortunate kind of interest which the latter arouses. The location of this work was chosen in spite of a most emphatic protest from Mr. Frederick Law Olmsted, the designer of the Riverside Drive. Mr. Olmsted rightly said that associations of a funereal or sepulchral sort were wholly out of keeping with the purpose of the parkway. The festival character of the place is marred by the intrusion of such a structure, and the solemn character of a monumental tomb is likewise impaired by making it an element of a holiday spectacle, with gay throngs and pleasure-seeking multitudes constantly about it. Moreover the site is the point where the scenic interest of the drive culminates, with the glorious view far up the river, and nothing should have been permitted to intrude itself here as a diversion from that interest.

The Boulevard, as the continuation of Broadway northward from Fifty-ninth Street is called, is a notable example of the formal type of pleasure-way. It was an admirable idea to give this character to that portion of the great central thoroughfare of Manhattan Island at a time when it was but a suburban and rural highway, a section of the old post-road to Albany. For years after the reconstruction was effected it seemed to give slight promise of what it was to become — its condition neglected, its environment entirely and dishearteningly shabby. But now, with its trees fairly grown, lined with handsome buildings, paved smoothly with asphalt, and the favorite resort for bicycling, it has become a magnificent avenue, typically metropolitan in aspect, and worthy of its rank as the chief highway of the second in population of the world's cities. Its plan is that of the Parisian boulevards — a broad avenue with a central planted space, and in its general air it recalls its prototypes more closely than any urban avenue of similar character in this country. Now that electricity takes the place of animal traction, it would be an improvement were the street-railway transferred from the roadway to the central planted space, — or, what is probably better, if the planted space were widened so as to include the railway tracks. It is to be hoped that the civic spirit of New York will be sufficient to defeat all schemes for the ruin of this avenue — the Greater Broadway of Greater New York — by an elevated railway. It would be better to suffer indefinitely the inconveniences of inadequate local transit than to permit the sacrifice of this splendid thoroughfare.

A third form of urban parkway improvement is that of Park Avenue, in which the occupation of the thoroughfare by the tracks of great railway lines has been combined with garden-like features in a way that materially allays the nuisance caused by the smoke and noise of rushing trains, making the avenue sightly and, to a certain extent, agreeably habitable. That portion of the avenue to the south of Forty-second Street is more familiar to the public at large. Like the remaining portion, it was designed for the use of the steam-railway, but since the terminal was removed from Madison Square the tunnel has been utilized for street-railway purposes. The improvement of the avenue to the northward of the Grand Central Station is similar in plan, though made more elaborate by the much greater width of the railway space that had to be covered-in. The area over the railway is occupied by a central garden space, and the large openings for ventilation and light that occur at every block are pleasantly screened by shrubbery, that appears to flourish in spite of copious smoke from the trains below. In all probability electric locomotives will eventually take the place of steam in this tunnel, as they have at Baltimore under similar conditions. In that event it will be possible to close-in these openings entirely and thus suppress the noise as well abolish the smoke nuisance. This would make Park Avenue, almost throughout, one of the most agreeable residence streets in New York.

Crossing the East River, Brooklyn Borough is found to be more fortunate than Manhattan in its provisions for a comprehensive system of pleasure-ways. Prospect Park is the centre from which radiate three magnificent parkways — to the southward, to the eastward and to the westward. When that beautiful park was established the municipal authorities had the good sense to adopt Mr. Olmsted's suggestions in regard to two of these parkways, and the third was laid out many years after in accordance with his recommendations. In connecting Prospect Park with the shore at Coney Island by means of the grand Ocean Parkway, Brooklyn was the first American city to establish a recreative route between the interior and the sea. Had this step been accompanied by commensurate reservation of the shore at Coney Island, Greater New York would to-day be in possession of a priceless ocean frontage rivalling that enjoyed by the people of Greater Boston at Revere Beach. The Ocean Parkway of Brooklyn is a magnificent avenue with a broad central drive separated from traffic roads on either side by wide planted spaces, with turf and rows of treees. The centre of these spaces was originally occupied by walks. These walks were lately converted into bicycle-paths which are immensely popular with the multitude of wheel-folk, who find thereon a delightful route to the sea.

The Eastern Parkway was designed to supply a pleasant route between Prospect Park and the rural regions to the eastward of Brooklyn, with the idea of eventually continuing in such a way as to make a loop around the city, reaching East River at some convenient point opposite the upper part of Manhattan. In a modified way this project is yet feasible. This parkway was built for a considerable distance in accordance with the original design, similar in plan and scale to the Ocean Parkway. After many years it was continued in inadequate fashion, reduced to the form of an ordinary broad avenue, to Highland Park, on the central ridge of Long Island.

The third of these Brooklyn pleasure-ways is the Bay Ridge Parkway, now under construction. This is a really superb improvement, and is destined to become one of the most notable landscape features of Greater New York. It forms a beautiful route from Prospect Park to Fort Hamilton. This parkway was projected and undertaken by a different authority from the Brooklyn Park Board, a separate Kings County Parkway Commission having been authorized for the purpose. The Bay Ridge Parkway runs westerly from Fort Hamilton Avenue — a wide thoroughfare in charge of the Park Department, beginning at Prospect Park — to the shore of New York Bay. This portion has a formal character — a wide planted space bordered by a road on either side. At the bay it turns abruptly to the southward and follows the line of the shore along Bay Ridge, the road occupying the brow of the bluff. The treatment here is picturesque, the slopes of the bluff planted with trees and shrubbery, and coursed by rambling paths. The views of the bay and its commerce are glorious. The general character is that of Riverside Parkway, with which it is comparable; a worthy sequel, as it were, continuing the improvement — after the long interruption by the commercial frontage of the metropolis — to the entrance of the harbor, with the Battery and Governor's Island as pleasant interludes in the shore landscape. Here and there wharves project from the shore-line, interrupting its graceful continuity, but imparting, with their shipping, not unpleasing accents to the scene. Traffic roads, with easy grades, descend the bluff to these wharves. The parkway terminates in a fine concourse at Fort Hamilton. From Fort Hamilton a ferry runs throughout the summer across to Staten Island, the host of bicyclers desiring to cross at this point furnishing remunerative patronage. The cost of the land for the Bay Ridge Parkway has been so great — something like four million dollars — that the original appropriation will have to be considerably increased before the entire plan can be carried out.

North of the Harlem, in Bronx Borough, there have been some attempts at parkway connections between the several parks. These have been undertaken without expert advice and are so atrocious in grade and so generally unworthy a place in the metropolitan scheme as to be beneath consideration. A general system of pleasure routes for this section of the metropolis, still largely rural in character and undeveloped, should be carefully studied.

On the New Jersey side of the Hudson, within the metropolitan sphere, but, of course, beyond the political bounds of Greater New York, a comprehensive and far-sighted scheme of park development has been undertaken. The work of the Essex County Park Commission is a result of the example set in the great Metropolitan Park improvements of Boston. Essex County covers a very important portion of the ultra-State, or New Jersey section of the great metropolis. The population is dense, and largely urban in character, containing the important cities of Newark and Orange, and a number of good-sized towns. The needs of this aggregation of municipalities in the way of parks could not well be met without treating it as one great community. The county organization was the only existing instrumentality by which this could be done.

Essex County contains charming and picturesque landscape features, chief of which are the pleasant streams, the Passaic River and its tributaries, and the Orange Mountains, so called, the hills that form the outlying spurs of the great Appalachian chain in its passage across northerly New Jersey. The opportunities this presented have been availed of to a commendable extent in the park system that has been formulated. Several large parks and park reservations have been established in various parts of the county, and the scheme adopted provides for connecting these with one another, and with the centres of population, by a series of parkways.

To a considerable extent several of the admirable rural roads, for which Essex County has been celebrated, have served as a basis for these parkway routes. Care has been taken to preserve and enhance the natural character of their scenery, so far as possible, in adapting them to the new purposes. The entire scheme has not yet been fully determined. The proposed lines, however, call for a north and south parkway about midway between the Passaic River and the First Mountain, going directly through the central part of East Orange. Southerly there is an extension from Westside Park, in Newark, to Weequahic Park. There is also contemplated an extension through Irvington and South Orange to a southerly portion of the great South Mountain reservation. This parkway connects with the Second River at the north — a strikingly beautiful stream, with cascades and wild, rocky shores, offering a rare opportunity for picturesque development. This Second River parkway extends from the heart of Bloomfield to the Passaic, with here and there an expansion into a small park. From a point near Soho there is a connection from the Second River to Branch Brook Park in Newark. From the confluence of the Second River with the Passaic there is a short riverside parkway along the latter, as a part of a circuit drive connecting with Branch Brook Park. Parts of Park, Central and South Orange Avenues are to be converted into parkways, a proposed extension connecting Central Avenue with the South Mountain reservation. In the northern part of the county an important east and west parkway is proposed, connecting Branch Brook Park, the Second and Third Rivers, with the First Mountain at Van Giesen's Gap, thence running southerly along the crest of the mountain to the Eagle Rock reservation and from here to the South Mountain reservation — the final link in a complete chain of parkway communication throughout the country.

The realization of this great work has begun with the construction of that part of the system in East Orange between Central and Park Avenues. This is designed, by Messrs. John Bogart and Nathan F. Barrett, as a broad central drive with a cycle-path on each side and a narrow service-road running outside each cycle-path. The several roads and paths are separated from each other by planted strips, with turf and trees.

This Essex County system suggests what should be done by Greater New York on a grandly comprehensive scale for the worthy development of its metropolitan territory. All around, within the great city's limits, there are large areas of yet unspoiled landscape, and much besides that is not yet hopelessly beyond reclamation. Lines for a grand chain of parks and parkways surrounding the metropolis are still practicable. On Staten Island; in the Long Island country, back of Brooklyn, near the ocean, along East River and the beautiful bays making in from Long Island Sound; and in the suburbs beyond the Harlem, there is much beautiful scenery that can be perpetuated and for all time to come made available for the millions who will need it. In New Jersey the enormous trans-Hudson population that is essentially a part of Greater New York should be consolidated into one great federalized city. This would enable the work instituted by Essex County to be developed still more comprehensively and include in its scope the preservation of the Palisades. State lines cannot forever be allowed to remain a bar to metropolitan unity. There are needs that transcend such limitations — needs felt in common, east and west of the Hudson, and demanding satisfaction from some central jurisdiction. Possibly national authority may supply this by the creation of some interstate metropolitan commission, if State lines cannot be revised in conformity with natural requirements.

SYLVESTER PAXTER.

[To be continued.]

THE HEATING AND VENTILATING OF COLUMBIA UNIVERSITY.[1]

IT would be very difficult to give an intelligible description of the various blowers, motors, heaters and other appurtenances which comprise the heating and ventilating apparatus of the Columbia University Buildings without the use of photographs or stereopticon, which are not at hand. . . .

The ideal system of heating and ventilating is that in which both the Plenum and Exhaust Systems are combined, fans or blowers forcing fresh air into the building and exhaust-fans drawing the vitiated air out of the building.

In order to secure economy of fuel and attendance in heating, ventilating and lighting a group of buildings like the Columbia University buildings, it is necessary, first, to generate all the steam for heating, ventilating, lighting, pumping and for other purposes, at

[1] Portion of a lecture by G. A. Suter delivered before the Engineering Society of Columbia University and published in the *School of Mines Quarterly*.

one central point from which it may be distributed to the various buildings where it is to be used. It would not do to have a separate boiler or generating plant in each building. The power-house in the University Hall contains the boiler plant, the electric-lighting machinery, the pumping machinery, and from this power-house the steam for heating and for ventilating, and the electricity for lighting and power, and the compressed air for other purposes are distributed to the various buildings through a system of tunnels connecting the buildings with the power-house. The total present boiler-capacity in the power-house is about 2,000-horse power. It is intended that the total power in the future shall be upwards of 4,000-horse power.

In selecting a method of heating and ventilating the various buildings it was necessary to select one that would be both economical and efficient while in use. The heating of the buildings is a necessity during the entire week, including nights and Sundays. It would not be proper to allow a large group of buildings like these to cool off at night because of the apparatus and other things which would be injured by cold and dampness. It is the intention to keep the buildings warm day and night and also on Sundays, and to secure economy, therefore, it was necessary to heat the buildings by direct radiation, that being, as I have told you before, the most economical method; on the other hand, the ventilation is required only at such times as the buildings are occupied by a considerable number of people, usually during only about eight hours per day, and not at all on Sundays, so that the requirements of the heating system and the ventilating system are quite separate and distinct. It should be possible to shut off or stop the ventilation in any building or room and still maintain that building or room at a proper temperature, and it should likewise be possible to shut off the heating-apparatus entirely without in any way affecting the ventilation. The ventilating-apparatus is started in the morning and shut down in the afternoon, while the heating-apparatus continues its work without interruption at all times. Radiators have been placed throughout the various buildings under the windows, because the windows are the most considerable sources of cold. In a room like this, in which the window-area is considerably smaller than the wall-area, it is, nevertheless, a fact that the amount of heat passing out through the windows is more than twice as great as the amount of heat passing out through the walls. Placing the radiators in front of windows places the source of heat immediately at the source of cold, and, therefore, increases the efficiency, as the cold is counteracted before it passes into the room.

The ventilation is furnished by a Plenum System of fans, which forces the air through various ducts and flues into each of the rooms, and a corresponding system of Exhaust ventilation, which extracts the air from the various rooms and discharges it at the roof. The blowers and exhaust-fans are driven by electric motors; the incoming air is warmed by means of indirect-heating stacks to 70°, which is the temperature of the rooms, or slightly above that temperature in very cold weather, but the intention is that the air entering the rooms shall be heated to a sufficient degree only to avoid the unpleasantness of draughts and at the same time not produce an appreciable effect on the heating. It is intended that it should never be necessary to shut off the ventilation in order to prevent excessive heating, the regulation of the heating being accomplished solely by means of an automatic system of heat regulation which controls the direct radiators.

In the Library Building the fresh air is brought down from the roof of the building through a fresh-air shaft and is then forced by four Sturtevant blowers, each eight feet in diameter, through four heating-stacks or coils which warm the air to the required temperature and are controlled by an automatic heat-regulating system. From these heated coils the air is forced into the underground conduit, fresh-air duct or plenum chamber, which entirely surrounds the central portion of the Library Building, and from this conduit the various ducts and underground branches convey the air to the vertical fresh-air flues, which deliver the air through registers in the various rooms. The underground conduits in the Library Building are made so large that a uniform pressure of air is maintained throughout, while the connections between the underground conduits and the vertical flues are reduced in area to a sufficient extent to make these connections the principal resistance to the flow of air, and in this way an absolutely uniform distribution of air through all the flues is secured and maintained at all times. The exhaust ventilation in the Library Building is effected through vertical ventilating flues extending from the various ventilating registers down to the cellar, where the ventilating flues are all joined together by a system of conduits and ducts corresponding generally in size and distribution to the conduits and ducts for the fresh-air supply, already described, and out of these conduits four Sturtevant exhaust-fans, which are seven feet in diameter, exhaust the air and force it up through the foul-air shaft to the roof. The method of regulating the flow of air so as to make it uniform in all the flues is the same for the exhaust system as that described for the fresh-air-supply system, by a reduction of area in the connections between the underground conduits and the vertical flues. The four eight-foot-diameter fresh-air fans and the four seven-foot-diameter exhaust-fans are arranged in four groups, each group containing a fresh-air fan and an exhaust-fan and each group being driven by a 25-horse-power electric motor, Crocker-Wheeler pattern, arranged so that the fans may be run at several speeds. As the speeds of the fresh-air fans and the foul-air fans are thus the same, and as the former are of greater capacity than the latter, at the same number of revolutions the amount of fresh air forced into the building is in excess of the amount of air exhausted, and the purpose of this is to secure a slightly greater internal pressure of air, so that any leakage of air through doors or windows shall be outward rather than inward.

The systems in the other buildings are very much the same as that in the Library Building. In each building there are at least two fans, driven by one or two motors, which force the air into the building through underground or overhead ducts to the various vertical flues and registers and into the different rooms, the same as in the Library Building, using Sturtevant blowers or fans and Crocker-Wheeler motors. The exhaust ventilation is accomplished in a slightly different manner: instead of bringing all the foul air down to the cellar to exhaust-fans and then forcing it up again through shafts to the roof, all the ventilating flues from the various rooms are taken directly to the attic of the buildings and there carried through a system of sheet-metal ventilating ducts to exhaust or disc fans, of the Blackman pattern, driven by direct-connected C. & C. electric motors, these fans discharging the foul air direct through openings in the roof out of doors.

What I have stated regarding the excess of fresh air forced in over the amount of foul air exhausted holds true of all the buildings, excepting the Chemistry Building, in which it was necessary to provide not only for the usual amount of exhaust ventilation but also for the ventilating of numerous hoods or rooms in which odors and noxious gases are generated; this necessitated a proportionately larger amount of exhaust ventilation than that required in the other buildings.

In the University Hall Building there is also a separate system of fresh-air supply for the power-house, which differs from that in the other buildings in that the air supplied to the power-house is supplied at the outside temperature without being warmed, the object of this air supply being to cool the power-house.

You will notice in this lecture-room and throughout these buildings that the fresh-air-supply registers are located at a distance of eight feet or more above the floor-level. This location is selected for the purpose of avoiding direct draughts upon persons sitting or standing in front of them, such as would be experienced if the supply-registers were at a lower level.

On the other hand, the exhaust-registers are placed near the floor, and we are permitted to do this because an outward movement of air through a register is almost imperceptible at a very short distance from it. It was at one time a general belief that the carbonic-acid gas, which is one of the principal products of respiration and which is heavier than air, settled in a layer or stratum at the bottom of the room, and, therefore, it was the custom to place the exhaust-registers at the floor in order to take out the carbonic-acid gas and leave the purer air in the room. Although this theory resulted in the correct placing of the registers, the object sought for was not obtained because the carbonic-acid gas was diffused uniformly through the air in the room. On account of the principle of the diffusion of gases, carbonic-acid gas and the other products of respiration are present in almost uniform quantities throughout any room, and not more at the floor than at the ceiling. The ventilation of a room consists in keeping the percentage of impurities in the air at as low a point as possible, not in eliminating them altogether, so that, from the standpoint of ventilation, the exhaust-registers may be located at any level required by other conditions, architectural or otherwise. One motive for locating them near the floor, or the condition which requires this location, is the satisfactory heating of the room. If the exhaust-registers were near the ceiling, then the heated air, as quickly as it comes from the radiators, would be drawn out of the room, and the heating of the room would not only be unsatisfactory but might even be a failure, and these registers are, therefore, placed near the floor, not because that position best suits the ventilation but because the satisfactory and economical heating of the room requires it.

The steam supply for these buildings comes from the power-house through a system of high-pressure pipes, and at this pressure it is used for operating the pumps which return the water of condensation from the heating apparatus to the power-house. In each building there are separate pumps, always in duplicate, for pumping back the water from the indirect stacks and from the direct-heating system. These pumps are automatically controlled by pump governors, which are floats operating steam-valves on the steam-supply pipes of the pumps, so that the speed of the pumps is automatically regulated by the amount of steam condensed by the heating and ventilating systems, and both are kept free of an undue accumulation of water, which is pumped back to the power-house as fast as it is condensed.

The steam used for heating in the Library and in the University Hall is the exhaust steam from the electric engines and pumps in the power-house, which, at a pressure of about five pounds per square inch, is supplied to both buildings from these engines. The exhaust steam coming from an engine has given up only that small portion of its total heat which is the equivalent of the mechanical work performed by the engine, and still possesses very great value for heating. There is sufficient exhaust steam, which would otherwise be wasted, available for heating these buildings, so that the Library and the University Hall are heated practically without cost of fuel. Assuming that the cost of fuel is chargeable to the electric plant for the generation of light and power, the heating and ventilating of these two buildings are secured without cost; or if we charge the heating and ventilating apparatus with the cost of fuel, then the electric current and pumping of water, etc., are secured without cost. In any case, when all the exhaust steam is condensed in heating or ventilating apparatus, we have the greatest possible economy of fuel, as there is then absolutely no waste.

As it is expected that all the exhaust steam from the power-house can be condensed in these two buildings, the other buildings are supplied with steam for heating and ventilating directly from the high-pressure pipes coming to them from the power-house. But this high-pressure steam is also reduced to low-pressure, — less than ten pounds per square inch.

We use low-pressure steam in preference to high-pressure steam in heating. It has a lower temperature, thus making the heating surface or radiator less dangerous when we happen to come in contact with it; it is less dangerous in case of a break or explosion; it imparts a milder temperature to the air; it gives up a greater quantity of its total heat and is, therefore, more economical; and it also permits the admixture of the exhaust steam from engines and pumps.

The high pressure of the steam is reduced to low pressure in each building by means of automatic reducing valves or pressure regulators, which are valves that throttle the steam by compelling its passage through small openings, the area, and the opening and closing of which are controlled by the pressure of the steam in the low-pressure pipes. These reducing valves are capable of adjustment, so that any desired pressure may be automatically maintained.

The automatic control of the steam pressures, the automatic return of the water-of-condensation to the power-house, the automatic control of the electric motors which drive the blowers and fans, and the automatic control of the temperature of the fresh air and of the separate rooms, all reduce the cost of attendance to a minimum. All pipes, throughout the tunnels, throughout the cellars, in all recesses, in all walls and everywhere, as well as all fresh-air ducts made of sheet-metal, are covered with non-conducting material to save heat and fuel. These factors, coupled with the saving resulting from the use of the exhaust steam, produce a heating and ventilating apparatus which is as economical as it is possible to make it. But notwithstanding all these precautions to secure economy, it is nevertheless expensive to operate this heating and ventilating apparatus, because, as I have told you before, any attempt at ventilation means a corresponding waste of heat, and much ventilation means much waste of heat, and this waste is inseparable from ventilation.

I have prepared a table to illustrate what I have already told you, as follows: —

1	2	3	4	5	6	7	8
Buildings.	Cubic Contents in Cubic Feet.	Direct - heating Surface in Square Feet.	Quantity of Steam condensed in Direct-heating System in Zero Weather expressed in Standard Horse-powers.	Fresh-air Supply per Hour in Cubic Feet.	Quantity of Steam condensed in Ventilating System in Zero Weather expressed in Standard Horse-powers.	Power of Electric Motors expressed in Standard Horse-powers.	Total Power in Zero Weather.
Library.	2,100,000	12,000	120	8,220,000	400	100	620
Physics.	600,000	4,600	45	2,580,000	125	40	210
Nat. Science.	1,250,000	8,500	85	6,000 000	300	80	465
Chemistry.	1,400,000	10,400	105	5 760,000	300	95	500
Engineering.	600,000	5,500	55	3,000,000	150	40	245
Univ. Hall.	3,750,000	15,000	150	21,600,000	930	280	1,510
Totals.	9,700,000	56,000	560	47,160,000	2,205	635	3,550
Room No. 3.	30,000	350	3½	180,000	9	2½	15

Column 1 gives the names of the buildings.

Column 2 gives the cubical contents of each building expressed in cubic feet.

Column 3 gives the direct-heating surface in radiators, coils, etc., in each building, which is calculated to be sufficient for warming it to 70° F., in zero weather.

Column 4 gives the quantity of steam which this direct radiating surface will condense in zero weather, expressed in standard horse-powers. When the outside temperature is higher the quantity of steam condensed will be correspondingly less. This saving of steam when the weather is milder is secured only by reason of the automatic temperature-regulating system.

Column 5 gives the total quantity of fresh air supplied to each building in cubic feet per hour.

Column 6 gives the quantity of steam expressed in standard horse-powers, condensed in the indirect heater-stacks in zero weather, necessary for heating the above quantity of fresh air per hour from zero to 70° F. When the outside temperature is higher the quantity of steam condensed will be correspondingly less.

Column 7 gives the power consumed by electric-motors, in driving the blowers and exhaust-fans by which this air-supply is secured, in horse-powers.

Column 8 gives the total power employed for all purposes in zero weather; for direct heating, for ventilating and for motors, when the specified results are obtained.

This table is approximate only, but sufficiently accurate for our purpose. You will notice, that, by comparing Columns 3 and 4, for each 100 feet of radiating-surface we require the equivalent of one horse-power of steam, or, in other words, each 100 square feet of radiation will condense that much steam in zero weather. This affords you an easy and rapid method of estimating the required boiler-capacity for a direct steam-heating apparatus, making, of course, due allowance for other contingencies. Likewise, by comparing Columns 5 and 6, you will notice that for each 20,000 cubic feet of fresh air supplied per hour we require one horse-power of steam to heat that quantity of air from zero to 70° F., the temperature at which it is introduced into the room. Further, by comparing Columns 5 and 7, you will notice, for each 75,000 cubic feet of fresh air supplied and exhausted per hour we require in motive power or mechanical energy approximately one horse-power. Now, in order to give you a tangible measure by which you can get at an idea of what these figures mean, I have given in the last line of the table the data relating to this lecture-room. The total cubical contents of this room are 30,000 cubic feet; the total direct radiating-surface in the room is 350 square feet, and the total steam consumption or proportionate boiler-capacity required for the heating of this room in zero weather is 3½ horse-powers. The moment, however, that you ventilate this room, renewing or replacing the air six times each hour, supplying 180,000 cubic feet of fresh air per hour, we require not less than 9 horse power of steam, when the outside temperature is at zero, to warm this quantity of air from zero to 70° F., or room temperature, and in addition thereto, 2½ horse-power for the mechanical effort required to move this quantity of air in and out of the room. Therefore, out of the total of 15 horse-power that are required for the heating and ventilating of this room, only 3½ horse-power are required for heating, while 11½ horse-power are required for ventilation. Similarly, out of a total of 3,550 horse-power required for warming and ventilating these buildings in zero weather only 560 horse-power are required for the direct heating, while 2,990 horse-power are needed for the ventilation. When the outside temperature is higher these quantities are correspondingly less, except that the motor-power, of course, remains constant. For example, at 35° outside temperature, out of a total power of 2,017 horse-power, the direct heating requires 280 horse-power, the ventilation 1,102 horse-power for heating the air, and 635 horse-power for motive-power, or 1,737 horse-power for both. The proportionate amount of power for the ventilation, as compared with the total power, increases as the outside temperature increases, and, as our average temperature during the heating-season is not far from 35°, it is fair to conclude that the ventilation of these buildings costs about six times as much as the heating.

This gives us a clear illustration of the cost of ventilation, and an explanation of why, even when the apparatus is provided, the ventilation is somewhat curtailed. We sometimes wonder why our public buildings are not better ventilated, but the explanation, when it is not due to ignorance or incapacity, is found in the expense of the apparatus and in the expense of operation.

In these six buildings we have a total cubical contents of nearly 10,000,000 cubic feet; we furnish and remove each hour nearly 50,000,000 cubic feet of air, and require in zero weather about 3,500 horse-power for heating and ventilating. As I have told you before, the total boiler-capacity now in the boiler-house is about 2,000 horse-power, so that even here the ventilation may have to be curtailed in extremely cold weather. Fortunately, however, zero weather is quite rare in New York, and when it does come we usually do not notice slightly deficient ventilation; we are more anxious to get heat, and for the want of this you will never suffer.

I have brought with me a model of the Johnson temperature-regulating apparatus, which is employed throughout these buildings to maintain a constant temperature in the fresh-air supply and also in each individual room. If you will look at the radiators you will notice that each one is provided with peculiar valves which cannot be controlled by hand. They are controlled by compressed air, the application of pressure closing the valves and the relief of the pressure permitting their being opened by metallic springs. The pressure is applied to a flexible rubber diaphragm which presses on the stem of the valve, and when this pressure is released the metallic spring raises the stem and brings the flexible disc back to its original position.

The so-called thermostat which you see on the wall is a device for controlling the supply of compressed air, connected by piping with a compressed-air tank in the power-house, and with the steam-valves on the radiators. The thermostat, by means of a three-way valve, admits the pressure to the radiator-valves when the temperature of the room rises to the desired point, and thereby shuts off the steam-supply, while, when the temperature falls, it releases the pressure and steam is turned on again.

The motive-power for the three-way valve is also furnished by compressed air. There is a small air-chamber, one side of which is an elastic diaphragm. To this air chamber there is a minute air-supply from the compressed-air piping and also a minute air-escape to the atmosphere. There is also a U-shaped thermostatic strip, made of two metals, brass and steel, practically a metallic thermometer, which is so sensitive to variation of temperature that when the temperature falls less than one degree below the normal this thermostatic strip closes the minute air-escape, the air-chamber is inflated, and the elastic diaphragm moves the three-way valve, so that the compressed air escapes from the radiator-valves and steam is turned on. Similarly, if the temperature rises above the normal less than one degree the thermostatic strip opens the minute air-escape, which permits a set of springs to move the three-way valve into the other position, which admits compressed air to the radiator valve and shuts off the steam. These thermostats may be set at any desired temperature, and the maximum variation from the desired temperature, when the thermostatic apparatus is well adjusted, is one degree.

In the Columbia University buildings they are used for turning on and shutting off steam at the indirect-heating stacks, so that the air-supply to the buildings shall be of uniform temperature, and also for turning on and shutting off steam at the radiators, so that a uniform temperature is maintained in each room.

They may also be used for controlling dampers in air-ducts, as, for example, where there are two ducts, one supplying warm air and the other supplying cold air, both connected to the same vertical flue and room.

The thermostats can be employed to control dampers in these ducts, so that either warm air or cold air is admitted to the room according to its temperature, which is maintained at a constant point. Such a system may dispense with the use of radiators entirely, but it is not so well adapted to buildings like these. It is uneconomical when heat alone is desired, and is useful, therefore, only when ventilation is required at all times, or where the need for heat and ventilation always occurs simultaneously.

There is only one thing more I want to say to you, and that is, I want to tell you who is the author of the heating and ventilating system in the Columbia University buildings. I think we have demonstrated that the system does what we claim for it. I think it will work well and satisfactorily, and I have no hesitation in saying so, because it is not my system. The system of heating and ventilation in these buildings was designed and planned by Mr. Alfred R. Wolff, who, as a heating and ventilating engineer, is at the head of his profession, and it has been my privilege to execute practically as perfect a system of heating and ventilating as can be secured in a group of buildings of this character; and I mention Mr. Wolff, because it is only just that I should give to him the credit of having planned what I think will be of so much benefit to you as you go through your college course. I think you will be enabled to do so now without seriously imperilling your health, which was not the case in my time, and the credit for whatever good you will derive from it will belong to Mr. Wolff. I think the College authorities, too, should be credited with having been liberal in the expenditure of money for this purpose. The cost of the heating and ventilating apparatus in these buildings represents a large proportion of the total outlay of money expended on this block, so that to President Low and to Mr. Darling, who had the general supervision of these matters, credit is also due for the appreciation of the importance of this branch of the work.

SOCIETIES

BROOKLYN CHAPTER, AMERICAN INSTITUTE OF ARCHITECTS.

THE following is a list of Officers and Committees of the Brooklyn Chapter of the A. I. A., elected at the annual meeting, held in St. George Hotel, Brooklyn, N. Y., September 24, 1898, for the year 1898–99: —

President, Isaac E. Ditmars; *Vice-President,* J. M. Hewlett; *Treasurer,* H. P. Fowler; *Secretary,* A. G. Thomson; *Board of Directors,* Messrs. Dickson, Berg, Quinby, Hull and Deuell; *Exhibition Committee,* Messrs. Fowler, Mott and Hewlett; *Current Work Committee,* Messrs. Hough, Dickson and Dodge; *Membership Committee,* Messrs. Porter, Morse and Daus; *Professional Practice Committee,* Messrs. Berg, Quinby and Hewlett; *Social Intercourse Committee,* Messrs. Mott, Hull and Griffith.

A. G. THOMSON, *Secretary.*

THE ILLUSTRATIONS

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

AMBULATORY CORRIDOR: LIBRARY OF COLUMBIA UNIVERSITY, NEW YORK, N. Y. MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y.

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

THE LIBRARY: COLUMBIA UNIVERSITY, NEW YORK, N. Y.

MAIN READING-ROOM: LIBRARY OF COLUMBIA UNIVERSITY, NEW YORK, N. Y.

IN his annual report President Low gives these facts relating to the new buildings on Morningside Heights: —

"With the completion of the gymnasium the work of immediately necessary construction at the new site is finished. When it was determined to transfer the University to this place, it was evidently essential that the grounds should be suitably prepared for occupancy, and that enough buildings should be erected to permit the work of the University to be carried on efficiently. This work is now ended, and it is possible to show both what it has cost and its effect upon the finances of the University.

"The cost of the various improvements is shown under the heads following. The items of construction include in each case not only the amount of the contracts for construction, but also all commissions and everything not properly chargeable to furniture and fixtures. The items of equipment include not only the usual items of furniture and fixtures, but such scientific equipment as the use to be made of the various buildings demanded.

Cost of land	$2,000,000.00	
Legal expenses	3,637.95	
		$2,003,637.95
Library:		
Construction	1,100,542.09	
Equipment	97,037.38	
		1,197,579.47
Schermerhorn Hall:		
Construction	457,658.17	
Equipment	35,786.35	
		493,444.52
Fayerweather Hall:		
Construction	274,113.67	
Equipment	14,645.43	
		288,759.10
Havermeyer Hall:		
Construction	516,488.62	
Equipment	53,474.86	
		569,963.48
Engineering Building:		
Construction	284,075.50	
Equipment	20,325.47	
		304,400.97
University Building:		
Construction	842,887.85	
Equipment of power-house and connections	115,578.52	
Equipment of Gymnasium	39,399.24	
		997,865.61
Vaults:		
East	30,382.79	
West	37,316.40	
		67,699.19
Old buildings — Repairs and equipment:		
West Building	10,252.67	
College Hall	5,113.34	
		15,366.01
Insurance		3,754.40
Outside street work		133,367.81
Improvement of grounds and incidentals		403,373.75
Expenses of removal		59,987.56
Interest		339,812.08
Total		$6,879,011.90

"On June 30, 1898, the net debt against the new site was a trifle less than $3,750,000. . . .

"The buildings still needed, in order to provide in a permanent and worthy way for functions now carried on under temporary conditions, are a chapel, a building for the College, a dining-hall, an academic theatre, and a building that shall be the headquarters of the social life of the students. A place has been allotted upon the plans for each of these structures. It is hoped that the dining-hall will be erected as a memorial hall by the alumni of the University. The sum of $59,178.25 has been already subscribed for this purpose."

In regard to dormitories the report says: —

"The time is at hand when the trustees must determine their policy in regard to dormitories upon the new site. The demand for them, as the sentiment reaches me, is almost universal, both among young and old. Some want them for the sake of what they call 'college life,' others, for the sake of securing that effect in education that is born of the community of scholars. In my own thought, the problem divides itself into two parts. Columbia offers in its new home opportunities, in many directions, that are not excelled anywhere. Its material plant, being the newest, is, in many respects, the best. Its body of teachers is the largest, in proportion to the numbers taught, to be found in the country; and there are in the ranks of its teachers not a few men who are masters in their own field. Beyond all this, Columbia is in the City of New York. Such a university, so located, needs only to add cheapness and comfortableness of living to what it already has in order to be thronged with students from all over the land. It is precisely at this point that Columbia's location in New York City confronts it with a difficult problem. Cheapness of living is not unattainable in New York; but cheapness combined with convenience of access to the University and reasonably pleasant conditions of life upon a scale commensurate to the demand remains still to be provided. From this point-of-view, the conditions of the problem can be adequately met, in my judgment, only as all other parallel problems are met in New York City — by the erection of a large building designed especially for this purpose. The wants of the student are few and simple. He is well content with a small room, if it be clean. Neither does he need costly finish, nor luxuriousness of furniture in any building which he is to occupy. What he does want is convenience to the University, a clean and well-kept room, plain but good food, and surroundings that lend themselves to study. Approached upon these lines, the problem is much less difficult of solution than that which Mr. Mills has successfully solved for homeless men. I think also, after very careful investigation, that such a building can readily be made to pay a reasonable interest upon the investment. In my view, everything ought to be done that can be done to make it possible for the young men of the country, after finishing their college course near home, to profit by the university privileges which Columbia and the City of New York afford. I hope, therefore, that the erection of such a building will appeal to the public spirit of men who are glad to unite the accomplishment of a good object with the acquisition of a safe investment."

CASINO, RIVERSIDE PARK, PORTLAND, ME., FOR THE PORTLAND RAILWAY CO. MR. ARTHUR F. GRAY, ARCHITECT, BOSTON, MASS.

HOUSE FOR FRANK R. BARBER, ESQ., WEST NEWTON, MASS. MR. EUGENE L. CLARK, ARCHITECT, BOSTON, MASS.

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

A GROUP OF CHURCH INTERIORS.

NOS. 76–79 S. PAUL'S CHURCHYARD, LONDON, ENG. PROF. BANISTER FLETCHER AND BANISTER F. FLETCHER, ARCHITECTS.

THIS plate, copied from *The Builder*, is interesting because it occupies the site of the old buildings which were torn down solely to provide seats during the few hours of the Queen's Jubilee procession.

[Additional Illustrations in the International Edition.]

APPROACHES AND PORTICO OF THE LIBRARY OF COLUMBIA UNIVERSITY, NEW YORK, N. Y. MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y.

[Gelatine Print.]

ADDITIONS TO A HOUSE AT WEST FINCHLEY, ENG.

A DECORATIVE PANEL.

SOUTHWELL MINSTER, ENG.

COMMUNICATIONS

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

TYPHOID-FEVER DEATH-RATE AND WATER SUPPLIES.

NEW YORK, N. Y., October 4, 1898.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I noticed in your issue of September 17th a short extract from Dr. A. N. Bell's discussion on the sanitary advances made in the past twenty-five years, and the quotation of the typhoid-fever death-rates in several towns using different kinds of drinking water.

The writer, in 1896, published a compilation of a large amount of similar data, showing, in addition to this, the equally interesting effects of sewerage, drainage and rainfall, on the typhoid-fever death-rates in cities. From the writer's data, derived from the statistics of seventy-seven large cities in all parts of the world, and representing a population of 33,000,000 people, the following deductions were drawn:

TYPHOID-FEVER DEATH-RATES PER 100,000.

77	per cent of	the cities	using	filtered water . . .	3 to 20
75	"	"	"	ground " . . .	5 " 32
77	"	"	"	impounded water . .	15 " 35
75	"	"	"	normal river-water .	17 " 38
73	"	"	"	water from great lakes	18 " 54
72	"	"	"	upland waters . . .	29 " 58
95	"	"	"	polluted " exceeding	40

But 65% of the latter class had death-rates falling between 50 and 100, and frequently the upper limit exceeded 300.

The progressive increase in the death-rate with the increase in the pollution of the water is very instructive, and makes a strong argument in favor of the protection of our water-sheds, and water-supply sources generally, as well as for the purification of waters that are drawn from sources which are subject to pollution.

Very respectfully, JAMES H. FUERTES.

NOTES AND CLIPPINGS

FOR A MONUMENT TO WASHINGTON. — David Christie Murray, in an English newspaper, revives the suggestion that a monument to George Washington be erected in England. He urges the Anglo-American League to take the matter up. — *N. Y. Tribune.*

MONUMENT TO THE MAKER OF THE NUREMBERG EGG. — At the congress of the German League of Clockmakers, which lately held its annual sessions in Berlin, Professor Reuleaux asked them why they did not erect a memorial to the man to whom the trade and the public owed so great a debt. He referred to Peter Henlein, the Nuremberg locksmith, as the inventor of pocket watches. The suggestion fell on good ground. It was at once adopted by the congress, and it has been as quickly welcomed by the municipal fathers of Nuremberg. A "Henlein-Denkmal" is to be set up in the city of Albrecht Dürer, Peter's contemporary. Henlein is said to have made his first pocket watch, the so-called "Nuremberg egg," in the year 1510. He died in 1542. — *Westminster Gazette.*

TESTING-MACHINES FOR ROCKS. — The Maryland State Geological Survey has just received from France a machine for testing the wearing power of various kinds of rock and stone which has been in use for some time by the French Government. It is composed of duplicate revolving cylinders and is worked in a unique manner. The cylinders are hollow, and allow a good-sized piece of stone to be placed inside of each. The rod of the machine is attached to the motor, and the cylinders revolve rapidly a number of thousand times. They are opened then, and the fine material that has been ground off is gathered up after the stones have been washed, and is weighed. In this way the experience of years can be gathered in a few hours. Calculations can be made from the result to just what extent the stones experimented with would wear if placed in a roadbed or used to build a highway or public building. The machine is a very valuable one, and Prof. William Bullock Clark, State Geologist, superintended its erection. —*Exchange.*

BIRTHPLACES OF COLUMBUS. — The removal from Havana of what are supposed to be the ashes of Christopher Columbus has brought forth the fact that almost as many cities claim the honor of being his birthplace as in the old couplet, "claimed the Homer dead, Through which the living Homer begged his bread." Historians say that the great navigator was born in a village near Genoa — but there are many villages near Genoa. Among the claimants for the honor of giving to the New World a discoverer are Pradello, Finale, Onegalia, Nervi, Savone, Albissola, Bogliasco, Cogoleto, and a dozen others. It is not generally known, however, that the Corsicans of the little town of Calvi claim precedence over all seekers for this particular fame. They have preserved there a record covering the years from 1435 to 1450 which is said to contain the birth register of Columbus. At this time Corsica was under the administration of the Genoese. Not only have the people of Calvi a Colombo Street, where they point out the ruins of the navigator's birthplace, but they have a tablet which was erected there with great ceremony on May 30, 1886. The inscription reads as follows: "Here was born in 1441 Christoforo Colombo, immortalized by the discovery of the New World, while Calvi was under the domination of the Genoese; died in Valladolid, May 20, 1506." — *N. Y. Times.*

A MEXICAN MOSQUITO COMMISSIONER. — The following will be of interest to Venezuelans: "The Mexican Central Railway Company is engaged in a new experiment, which, if it is all that is claimed for it, will be of inestimable value to the residents of this city. To show how earnest they are in the matter, they have created a new office — that of Mosquito Commissioner, and the portfolio was awarded to Capt. George C. Sperry, superintendent of telegraphs for the Company. Experiments in different parts of the United States, and in New Jersey in particular, have demonstrated the fact that the extermination of the mosquito can be successfully accomplished." An exchange, in discussing the matter, says: "Scientific investigation has disclosed the fact that a few grains of permanganate of potash will destroy all the embryo mosquitoes in a very large area of mosquito swamp. At two cents an acre all the mosquitoes can be killed off for a space of thirty days, and as the breeding time is but two months, four cents will assure protection for the entire year. This places it within the possibility of a State, and certainly a city, to entirely rid itself of a great nuisance." April and May are the two months in which the mosquito breeds. They are purely local in their habits, and not migratory, as some suppose, and they seldom move more than a hundred feet from the place of their birth. Hence to exterminate the breed in a certain locality would rid that locality of the pest for that season at least, and the method of extermination is so inexpensive that an entire community may be rid of them at a very small expense. — *The Venezuelan Herald.*

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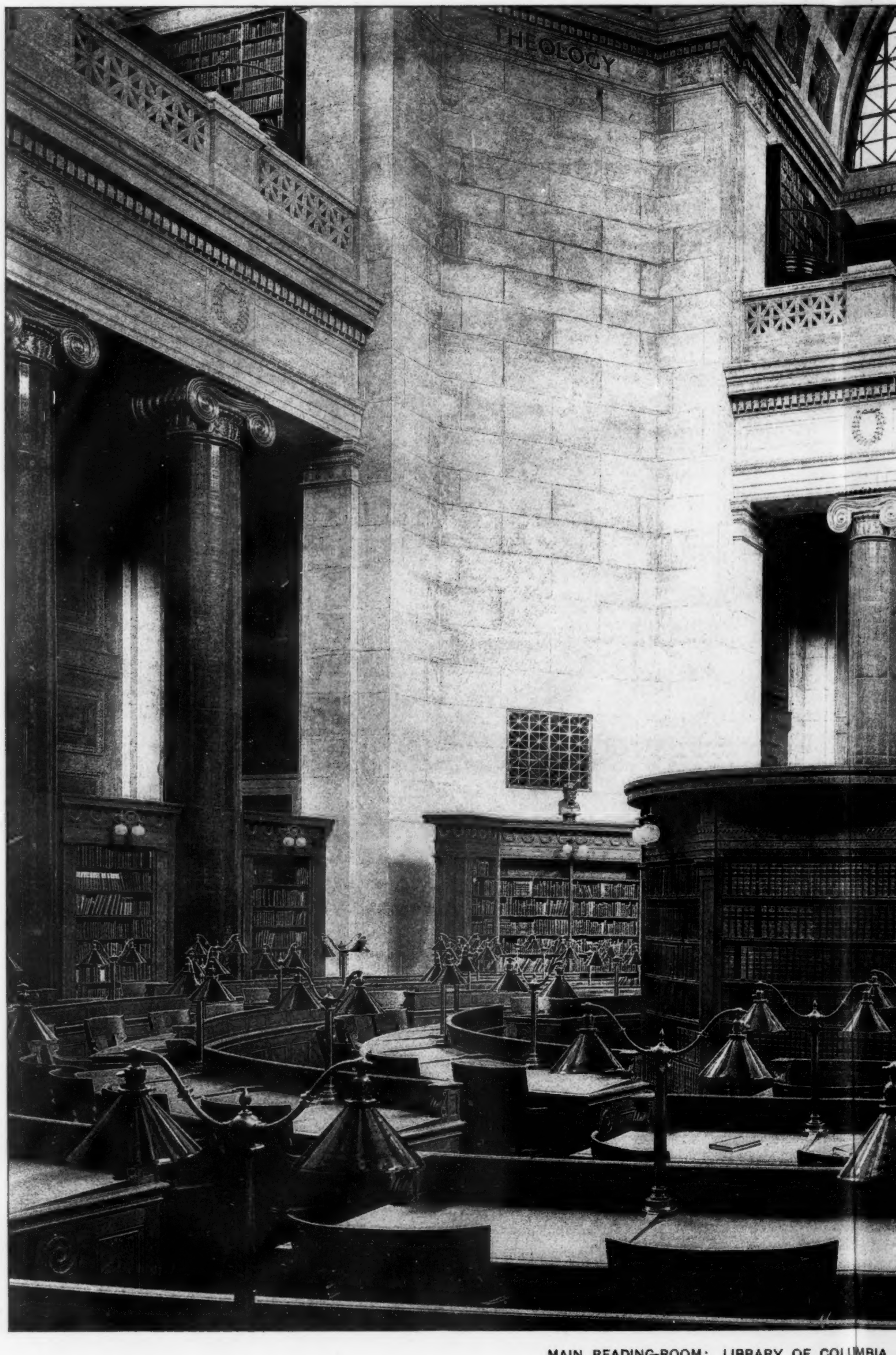

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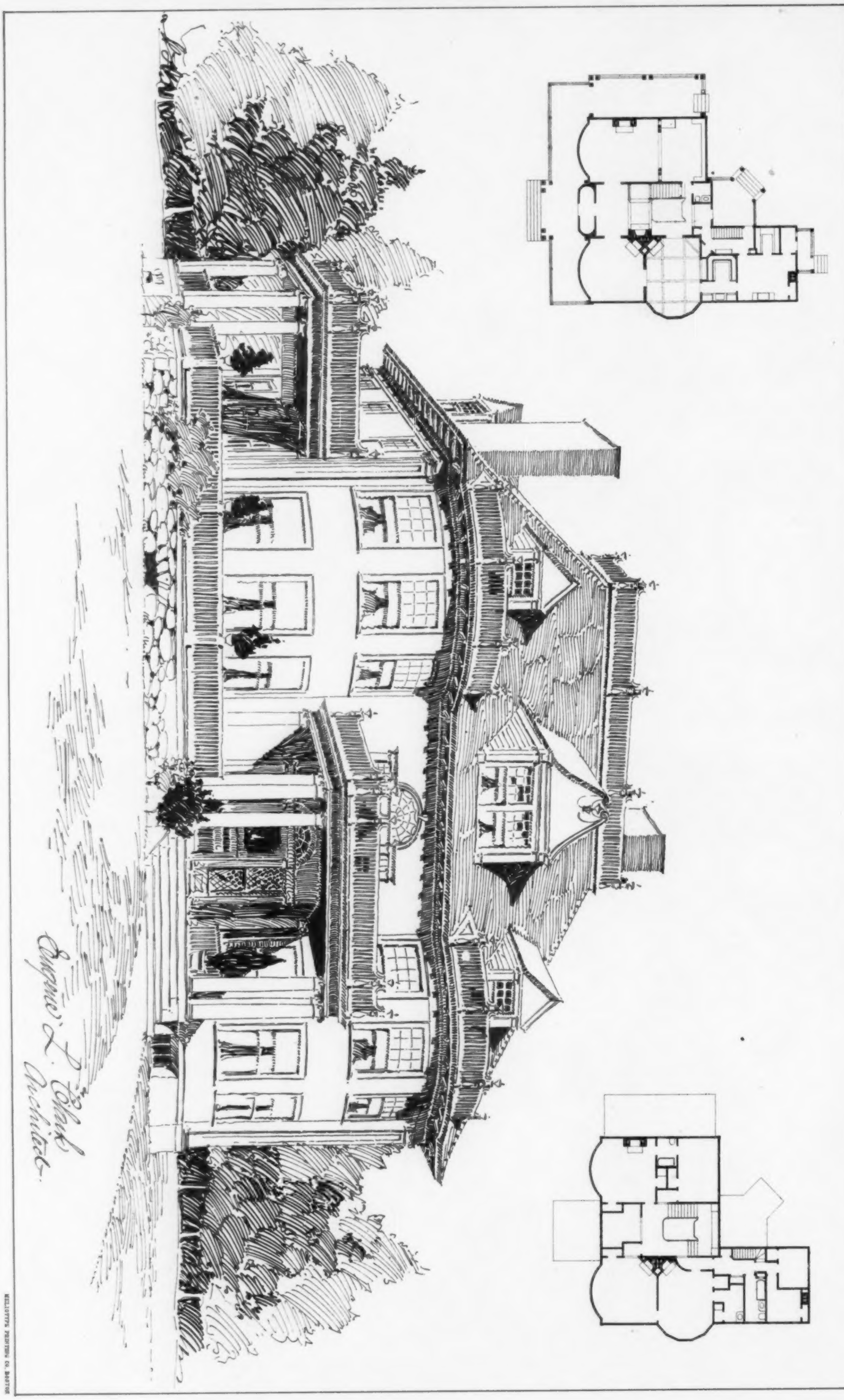

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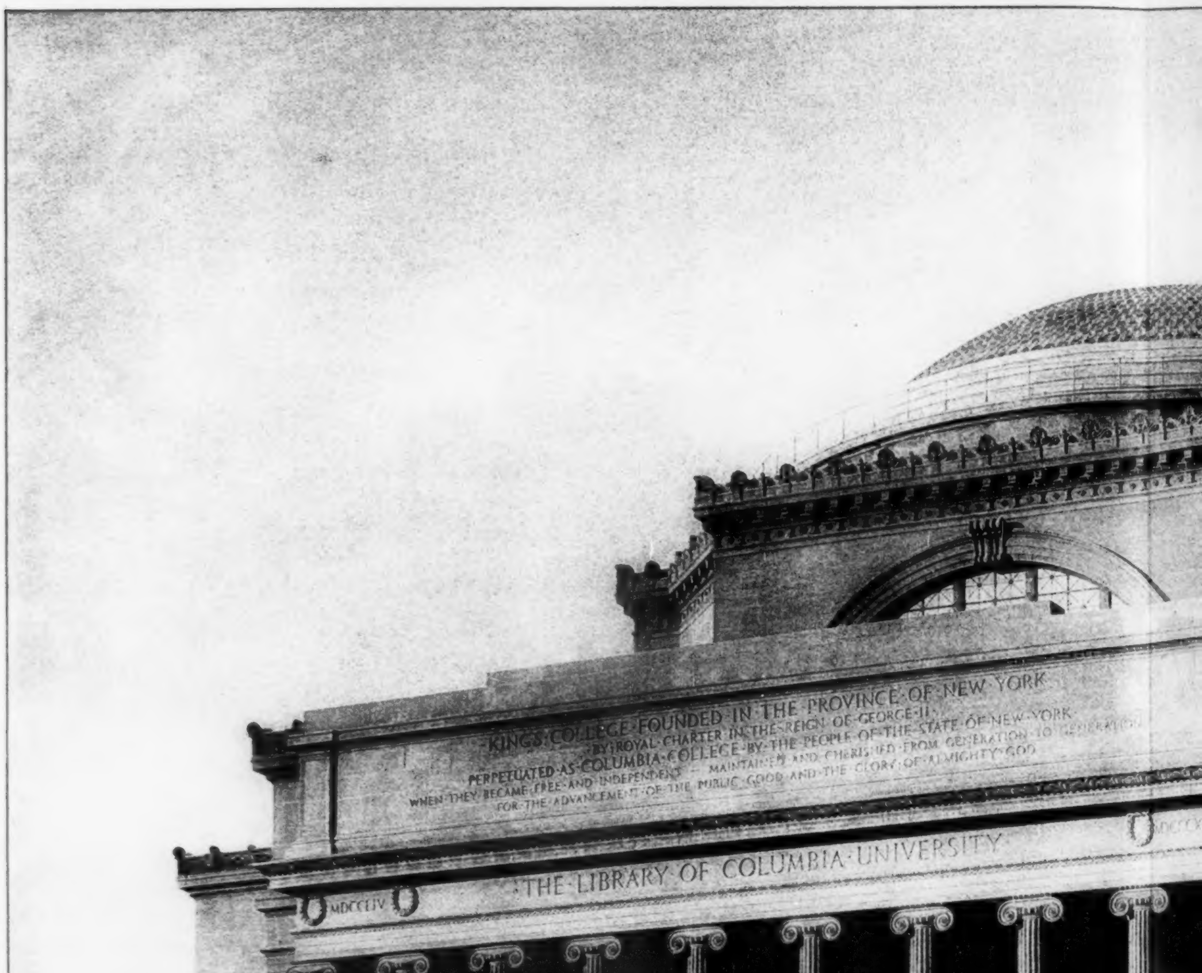

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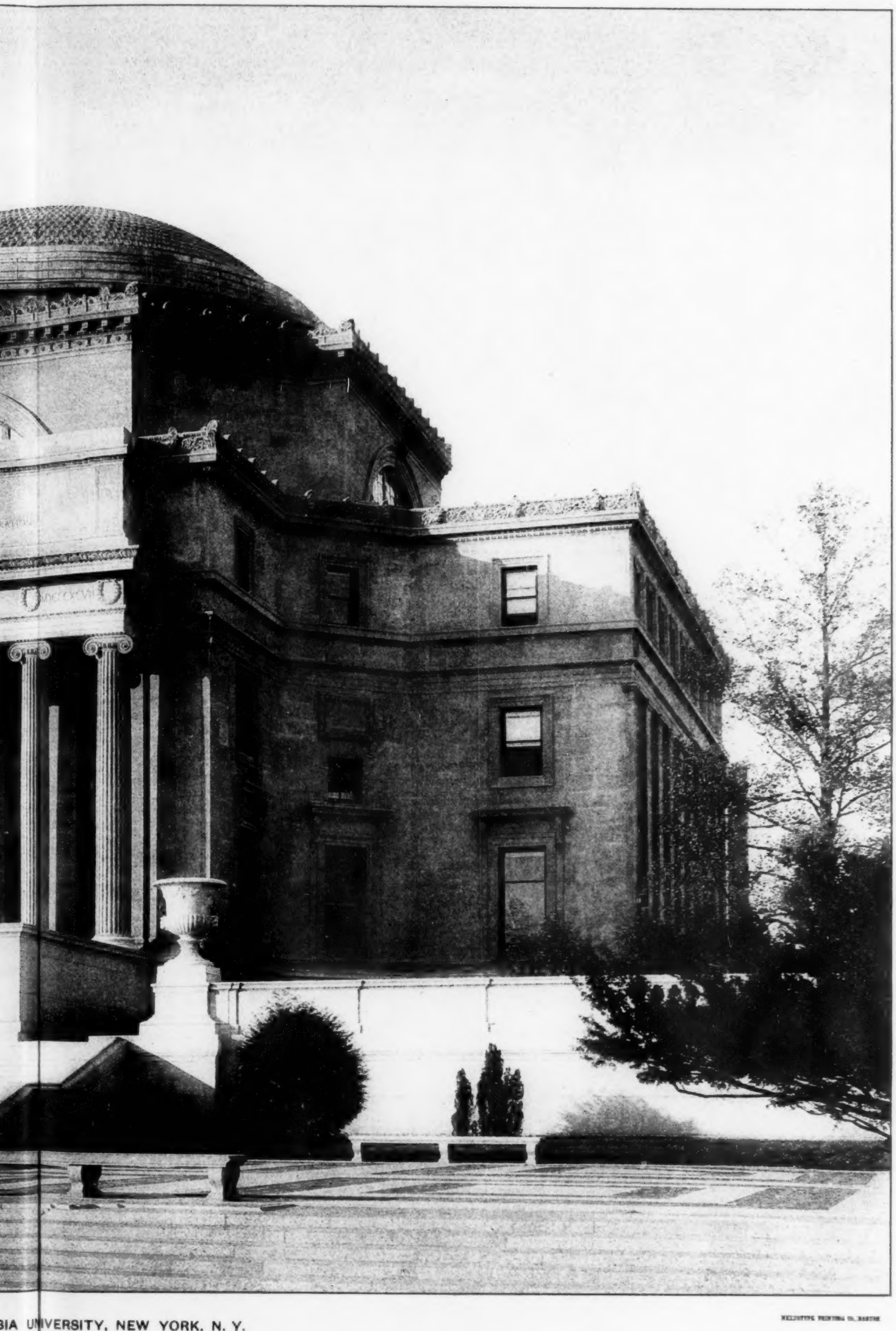

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