

THE HARVARD CLUB—HOUSE, NEW YORK, N. Y.

JULY 20, 1895.

THE AMERICAN ARCHITECT
AND BUILDING NEWS

VOL. XLIX.

* REGULAR EDITION *

NO. 1021.

ARCHITECTURE

ENGINEERING

DECORATION

CONSTRUCTION

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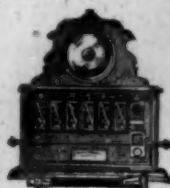
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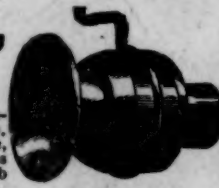
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THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XLIX.

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No. 1021.

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

JULY 20, 1895.



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THE tenement-houses belonging to Trinity Church, in New York, have for years been a favorite object of attack by newspaper reporters, especially during the dull summer season, when it is difficult to find interesting matter to fill the columns of a daily journal. By force of circumstances, the parish has come into possession of eighty-three tenement-houses, inhabited by nearly seventeen hundred people. A large part of these houses are old, and not provided with what are supposed to be modern conveniences, and the Vestry has not thought it necessary to take the advice of newspaper reporters as to how it should manage its property, so long as its tenants did not appear to be suffering from any neglect. Quite recently, however, the President of the New York Board of Health has made an official statement, in which he asserts that the mean death-rate in the Trinity tenements is about one-third larger than the average death-rate throughout the city. It is needless to say that this statement has been made the text for a fresh onslaught on the Trinity Vestry, to the distress of so many people, anxious for the reputation of the Corporation of the principal Episcopal Church in New York, that the Vestry has published a pamphlet in its own defence, giving a short history of the controversies in regard to its tenements, and, so far as we can judge, completely refuting the statement of the Board of Health. The historical part of the pamphlet is written by Dr. Morgan Dix, and bears evidence of that truthfulness and sincerity which characterizes everything that Dr. Dix says on any subject. As he says, most of the so-called "tenements," owned by the Church, are small structures, generally two or three stories high, built for private residences, and altered over to accommodate three or four families. The parish has built ten large model tenement-houses, which seem to be above criticism, and, as its eighty-three houses have, in all, less than seventeen hundred inhabitants, it is evident that the number of occupants of the older houses must be small, probably not more than fifteen people in each. These people are of a very poor class. The houses are old, and can be rented at low rates to people who cannot afford to pay anything more than the lowest rents. The New York statutes give the Board of Health great powers over tenement-houses, this term, under the law, applying to every building occupied by three or more families, and they have not hesitated to exercise them in regard to the Trinity houses. Every order that the Board has issued in regard to the Trinity houses has been obeyed, except one, under which, license given by a special statute, the Corporation was directed to furnish Croton water on every floor of its houses. This order was resisted, on the ground that to introduce a water-supply in this way would

not contribute to the health of the inmates of the houses, and the position of the Corporation was sustained by the Court of Common Pleas, which held that the statute was unconstitutional, no sanitary necessity having been shown for such a provision. Experts in sanitation will be quite inclined to agree with the Corporation, that the introduction of water and drain-pipes on each floor of these old buildings, only two or three stories high, would not tend to improve the health of the people living in them. Very recently, however, the Court of Appeals has reversed the decision of the Common Pleas, on the ground that the statute might have been intended to promote protection against fire, and would be constitutional on that ground.

MEANWHILE, the Corporation has looked after its houses with reasonable care, at least. More than twenty years ago, the Vestry passed an order requiring that all new leases should contain a clause prohibiting the sale of wine, ale, beer or spirituous liquors by any tenant, or under-tenant, or occupant of the leased premises. This order has been strictly enforced, so that there are now but seven places on the Trinity property, all held under leases made before the passage of the order, or under renewals, provided for in the lease, on the same terms of the original lease, where liquor is sold; and it was recently brought up as a grievance against the church, that it would not allow liquor sold in its houses on a certain street, on which it held a good deal of property, and thus depreciated the value of other property on the street; yet the daily papers amuse their readers, as Dr. Dix says, with such headlines as "Trinity's Saloon Income"; "Trinity Worse than Tammany," and so on. As to the death-rate, Dr. Dix would naturally be unable to speak with authority, so the Vestry has had an investigation made by experts, the results of which are given at length in the pamphlet. Although the expert, Mr. Hoffman, says, early in his report, that the statement of the Board of Health, in regard to the Trinity death-rate, contains "the most astounding abuse of statistical method ever employed by a writer on statistics, or the official of a Board of Health," the rest of the report is in a cooler vein. He not only shows that the comparison of the vital statistics for a population of seventeen hundred with those for a community of a million and a half is unscientific and misleading, but proves that the figures taken as representing the average city death-rate were erroneous. Studying the mortality, as given in the Board of Health's own statistics, of a single district, of about eleven thousand inhabitants, more than eleven hundred of whom are occupants of Trinity tenements, he finds that the death-rate throughout the district, in the last year in which the figures are given, was 28.45 per thousand, while in the Trinity tenements, taken by themselves, it was 21.66, showing, not only that the Trinity population enjoyed health about twenty-five per cent better than their neighbors, but that their good health materially improved the average showing for the district. We will not follow these figures further, except to say that Mr. Hoffman's position, that the Trinity tenements are, at least, as wholesome as the neighboring houses, is confirmed by the statistics of causes of death in them, as taken from the city records, as compared with those of the city at large, which show that the characteristic zymotic or tenement-house diseases, such as croup, scarlet fever, diphtheria, typhoid fever and intestinal diseases, cause fewer deaths in the Trinity houses, in proportion to the number of their inhabitants, than in the city at large. Curiously enough, the balance is made up, in the Trinity tenements, by a preponderance of nervous diseases, consumption and pneumonia. Why these should flourish on the Trinity lands it would be interesting to inquire, but it is quite certain that they do not come from overcrowding, filth, or any other cause within the control of the Trinity Vestry.

THE *Engineering Record* makes a good point in a recent editorial, in which it calls attention to the curious way in which public work of an engineering character is almost always put under the charge of a Commission which does not contain a single member with any knowledge of such work. It says that the ordinary excuse made by public authorities for this eccentricity is that professional men do not know enough about business matters to be entrusted with the expenditure of large sums of public money, but it points out that

enormous amounts of private capital are successfully invested under the care of engineers, and, we may add, of architects, while the monstrous robberies perpetrated during the earlier construction of the Croton Aqueduct, under a Commission of laymen, which were stopped when the work was put in charge of an engineer, show that, at least in one case, the engineer understood the business part of engineering quite as well as the laymen. Moreover, as it says, the Pennsylvania Railroad, perhaps the best managed railroad corporation in the world, and certainly the best in this country, has had three civil engineers successively as Presidents, and these gentlemen have managed the finances of the great corporation with as much skill as they have directed the work of construction and maintenance of the road and rolling-stock. In fact, to older readers, the contrast between the Pennsylvania Railroad of twenty-five years ago, with its constant broils with competing roads, its financial losses, and depreciated stock, and the same road under engineer management, peaceful, solid and prosperous, affords a striking lesson in favor of having property managed by people who know something about that sort of property, rather than by "financiers" whose sole distinction lies in their ability to float new issues of bonds.

IN regard to the general matter, we have always thought that the pretence that architects and engineers could not be entrusted, as representatives of the public, with the expenditure of public money, because, as professional men, they would not be likely to possess the necessary "executive" or "business" qualifications, was a mere formula that no one believed, and least of all those that used it. Every one knows that commissioners are, in point of fact, usually appointed in return for political service, or on account of their bland smile, or because they have in some way ingratiated themselves with individual statesmen, and that their business qualifications, as shown by their management of their own finances, are very rarely of an exceptional character; while such executive ability as they may have is, in most cases, hopelessly swamped from the moment that they undertook to carry out operations of a kind unfamiliar to them, in such a way that the unctuous amiability of their relations with the world in general may not be disturbed. Even where such appointments have not been reserved as "plums" for "magnetic" politicians, they have, hitherto, generally been given, even in good faith, to people who knew nothing about the work assigned them, in preference to those that do, simply through that singular jealousy of professional men that has been so marked a trait of the average American character. Until within a few years, it has seemed as if an ordinary American could not abide the thought that any one knew more about any subject than he did, and systematically slighted and ignored every one who laid claim to superior knowledge. Latterly, this feeling has been passing away, owing, no doubt, as much to the increasing civilization and "differentiation," as Herbert Spencer would say, of our people as to the increasing difficulty of the problems in construction which must be solved; and professional men are more and more employed to serve the public in matters within their own province. Within a few days, the Governor's Council of Massachusetts has taken upon itself to reject one of the Governor's nominations for the extremely important post of member of the Metropolitan Water Commission, with the result that an engineer of high distinction, and exceptional knowledge of hydraulic work, was appointed instead. This is a step in the right direction, and it is the more gratifying, in that it has been taken by the Council, a small body of men, who are annually elected by popular vote, and therefore representing accurately the more intelligent public opinion of their respective districts. The applause with which the recent appointments to Commissionships in New York have been received, although primarily due to rejoicing at the purification of the public service which they were intended to effect, seems to have included a feeling of satisfaction that the work was to be done by people who knew how to do it; and it may be hoped that this feeling has secured a good footing among us.

CHARLES READE in his "*Put Yourself in His Place*" introduces a character who keeps in his dining-room the portrait of his sister turned faced to the wall and bearing on the back—because the original had married a manufacturer—the inscription, "Gone into trade!" a species of decoration well calculated to excite the wonderment of a guest. It is with a similar feeling of wonderment that we receive notice

that Mr. Dankmar Adler, of Chicago, has terminated his partnership with Mr. Sullivan and has "gone into trade." Without attempting to discern the causes which have led to this change of pursuit, we may express the hope that sooner or later he may find his new calling less satisfying than the practice of architecture and so may return to his normal occupation. It is so commonly known a fact that the burdens of architectural practice are so grievous that melancholia and madness are often the fate of the devotee, that no one can be surprised that Mr. Adler abandons it for a calling which, if not more exhilarating, is certainly more elevating. One consequence of this step is deplorable and that is, that in consequence of it Mr. Adler's connection with the American Institute of Architects must, according to custom, be terminated. As he has always been an active and influential member, whether as ordinary member or as Secretary, the loss will be a very appreciable one to the organization. He has the happy faculty of being able to think upon his feet, and many a time this has enabled him to divert at the last moment the stampede that was threatening to result in some undesirable piece of legislation, and yet while capable of acting as brake and governor, he was at proper times both aggressive and progressive.

THE beautiful trees which adorn the boulevards of Paris have, of late, shown such signs of illness that an inquiry has been ordered into their condition. M. Mangin, Professor of Chemistry at the Lycée Louis-le-Grand, has been commissioned to test the soil in which they grow, and has just presented a report, in which he shows that sufficient cause exists for their sickly appearance. The worst evil from which they suffer is, he finds, the saturation of the soil with salt. Curiously enough, while the use of the salt for removing snow from the streets in winter is forbidden in our cities, on account of the injurious effect of the melting snow and salt on the feet of horses, it is very popular in Paris, and the boulevards flow with brine after heavy snows. This brine, as M. Mangin finds, soaks into the soil, especially around the trees, as the surface elsewhere is protected by the asphalt pavement, so that in some places he has found the proportion of chlorides to be many times greater than the limit considered allowable in cultivated soil. Besides this, he finds, as has often been found before, with trees growing in the midst of asphalt pavements, that their health suffers from want of air in the soil. It is hardly necessary to say that the roots of trees are nourished by moist air, the air being quite as necessary for them as the moisture, and that an adequate circulation of air in the soil is an important factor in vegetable growth. This circulation must be checked to a considerable degree by the asphalt coating over the soil surrounding the open "*cuvettes*" in which the trees stand, and M. Mangin finds that, while the trees put forth rootlets in the usual abundance, a large part of the rootlets die, so that, as he says, around some of the trees the soil is still further choked with these dead and decaying fibres. What the Parisians will do to save their trees, of which they are justly proud, remains to be seen, but they are quite sure to make some well-considered attempt to restore them to health, and we shall find profit in watching their proceedings.

A NEW sort of plaster-work is coming into use in Paris. There, as here, plaster relief-work for ceilings is fashionable, but, as commonly executed, is very expensive, besides being heavy, and very likely to cause cracks in the ceiling on account of the wooden furrings which are required to support it, and which form a mass of woodwork, first wet and then dry. To overcome the practical difficulties of such work, and lessen the cost of it, a practice has arisen of casting enriched cornices, beams, panels, centre-pieces, rosettes and so on, in staff, furnished with a facing of fine material. The staff is light and cheap, and the cornices and ribs can be bought in lengths, cut off in a mitre box, and attached to the ceiling with plaster-of-Paris. Of course, for good work an architect would wish to design all such details himself, but even then there would be great economy in having the ceiling, ribs and rosettes, as well as the cornices, made under his supervision in the shop, and put up afterward, instead of running the mouldings in place, and sticking on the enrichments subsequently. Our ancestors, in the time of Queen Elizabeth, although they are said to have made their beautiful ceilings in place, used a coarse material, fibrous and light, very much like the modern staff, and they certainly produced admirable effects with it.

STREET PAVEMENTS.¹

Old Tavern, Sackett's Harbor, N. Y.

ALL roads and streets serve for purposes of intercommunication and traffic; city streets, however, are planned with the further object of providing light and air to the adjacent houses, and, incidentally, are utilized as receptacles for a network of underground pipes, conduits and wires which afford drainage and sewerage facilities, and furnish water, gas, heat, light, steam and electric power, etc., to the buildings. When we demand, even of our country roads, that they should not be dusty in dry weather, nor muddy and impassable in wet seasons, it is obvious that city streets, in which our habitations, offices and places of work are located, should be subject to much stricter requirements. We are, as far as this paper is concerned, interested chiefly in the sanitary aspects of street construction or the paving of its surface. The essential requirements of a good city street pavement are quick surface-drainage, good foundations, impermeability and hardness of surface, avoidance of slipperiness, least resistance to traffic, cleanliness and noiselessness. Impermeability and noiselessness are the chief desiderata from a sanitary point-of-view. There is plenty of medical testimony available tending to prove that the ceaseless noise, from early morning till late at night, due to vehicles passing over rough stone pavements, affects the nervous system and reduces the duration of life.

A street surface should be as watertight as possible, to prevent a downward soakage into the ground of liquids, or the retention of filth in the joints and cracks of the paving stones. The street surface should drain off quickly, and there must be no depressions or inequalities where water can stagnate and become offensive. A street pavement should not be slippery, as this not only causes horses to fall, but is equally dangerous to life and limb of pedestrians. Cleanliness of pavements is essential to prevent dangerous exhalations, and illness due to polluted air. Finally, paved streets should be noiseless, for the continuous jarring and rumbling of heavy vehicles, the shaking of the foundations and the accompanying vibrations of window-panes, doubtless affect the nerves of town-dwellers, disturb sleep, aggravate the suffering and retard the recovery of the sick.

For these and similar reasons the selection and construction of a good street pavement is a sanitary problem of much importance. Leaving out of consideration some kind of pavements which are not used to any great extent, the choice lies between macadam, wood, cobblestone, granite block, and asphalt pavements.

Macadamized roads are not well suited for city pavements. Under a heavy street traffic, the broken stones, particularly if the softer limestones are used, are quickly ground to powder, causing clouds of disease-breeding and irritating dust in dry weather, while in wet weather the dust is quickly changed into the worst kind of soft mud. The surface of macadamized roads wears out very quickly, and almost the only advantages worth mentioning are that such roads are noiseless and that they afford a firm footing for horses.

Wooden pavements have formerly been employed to a large extent in American cities, but of recent years they have been given up, partly, no doubt, on account of the growing scarcity of timber, due to the barbarous destruction of our forests. From a hygienic point-of-view, wooden pavements, unless the blocks are impregnated to prevent decay, offer several important objections. In the first place, wood absorbs not only dampness, but likewise putrefying matter, and exhales bad odors, and being alternately wet and dry, the surface soon rots. It is a well-known fact that decaying wood is detrimental to health. Wooden pavements, on account of their elasticity, are more noiseless than stone pavements, but they are expensive to maintain, and soon their surface becomes quite unequal, except when the precaution is taken to lay the blocks on a concrete or sand foundation.

Cobblestone pavements are of a very inferior character, on account of the uneven surface, due to absence of proper foundation, and the rough joints and numerous pockets, due to the irregularity of the stones. The joints of such pavements soon fill up with putrefying street filth, and create obnoxious odors. Such pavements are

very difficult to maintain in a clean condition and, taken altogether, they are unfit for the thoroughfares of large cities.

Granite pavement, if composed of stones of regular size, evenly laid, well bedded on a good concrete foundation, and with the joints carefully filled with sand, or cement, or tar and gravel, is a good city pavement for heavy traffic. The stone blocks should not be too hard, as they otherwise become quite slippery from abrasion, and the evenness of the pavement is usually disturbed by the frequent tearing up required for underground pipe-connections. The improved stone pavements with well-filled joints have the one disadvantage of causing increased vibration of buildings.

The best pavement, from a sanitary point-of-view, is, without doubt, the asphalt pavement, and it is destined to become the favorite pavement for streets with light traffic. It is watertight, quite impermeable and prevents soakage into the subsoil; it is free from the noxious odors so often found on pavements with joints; it is durable and smooth, very readily cleaned; it renders all traffic noiseless, does not cause jarring or vibration of buildings, and creates no dust due to abrasion and wear. Almost its only disadvantage is its liability to become slippery when the pavement is damp or greasy, as during foggy weather, or where soft mud is carried to it from adjoining stone pavements, by horses' hoofs, pedestrians' shoes and carriage-wheels. It is principally adapted to the residential parts of cities, where there is no heavy traffic; owing to its noiselessness, it is also preferred in the neighborhood of court-houses, schools, hospitals, etc.

Other durable pavements are the vitrified paving-blocks, the asphalt blocks and brick pavements, in the laying of which, particular care should be given to the filling-in of the joint spaces.

Footpaths and sidewalks are paved with flagstones, or with artificial stone, with bricks laid flat, or with asphalt, and these should also be laid so as to afford good drainage into the gutters and must be maintained so as not to become slippery. Gutters must be constructed with care, to avoid leakage of storm-water into the subsoil and the cellars of houses.

I have already alluded to the fact that city streets serve also the purpose of receptacles for many pipe conduits. In our large cities the number of different pipe-lines buried under the street surface is constantly growing. We have not only one or several street water-mains, gas-mains, sometimes separate mains for fuel-gas and lighting-gas, sewers for rain-water and house-wastes, and in the "separate" system two lines of sewers, but also electric-light conduits, telegraph wires for commercial uses, for fire-alarm system and for police telegraph; telephone wires, pneumatic conduits for mail, parcel delivery and telegraph messages; electric or pneumatic conduits for synchronized clocks; compressed-air mains, cables and trolley-line wires, steam conduits, hot-water pipes, pipes for cooling purposes and what not. At street intersections the network of pipes is particularly crowded, for here we find, in addition to the above, the sewer manholes, the catch-basins, the shut-off valves for water and gas and the man-holes on subways for electric and telegraph wires.

In order to avoid the endless tearing-up of streets and pavements, and the incidental disturbance of traffic, caused by repairs or connections to the various conduits, it has been frequently suggested to build subways in the more important streets, and to place all the above-named complicated network of engineering conduits and pipes in the same. While this would, doubtless, tend to secure a more permanent street surface, it involves a very large outlay of money for construction, and the remedy suggested is by no means free from objections. Some of the most experienced municipal engineers have been opposed to the construction of subways. Much may be said on both sides of the question, but it would lead us too far to discuss the subject in detail. It is, doubtless, true that the maintenance of a permanent street surface is rendered difficult owing to the continued and repeated breaking-up of the pavement for connection of water, sewer, gas and electric conduits.

STREET-CLEANING AND STREET-SPRINKLING.

We have learned how necessary good street pavements are, not only from the traffic point-of-view, but more especially from a sanitary standpoint, for the maintenance of the health of a city. But the advantages of well-paved streets count for nothing, if the pavements are not thoroughly cleaned at regular and frequent intervals.

Street-cleaning, in the widest sense of the term, includes the sweeping of roadways, sidewalks and gutters, the collection and removal of the road-dirt, the sprinkling of streets, the removal of snow, the cleaning and disinfection of public conveniences, the cleaning and flushing of sewer catch-basins and the removal of house-refuse. I shall leave the latter out of present consideration—as it will be referred to farther on, when speaking of scavenging—and shall restrict my remarks to a discussion of street-dirt. The maintenance of city streets, and the scientific administration of street-cleaning in large cities require a great deal of engineering knowledge, practical skill and judgment, besides not a little executive ability. It is not often, however, that the matter is considered in this way. Many instances could be quoted where, in municipal departments, mere politicians are placed in charge of the street-cleaning bureau, no doubt because street-cleaning—like the construction of a State capitol—often involves the employment of a large force of laborers whose political vote may thus be controlled at election time. Street-cleaning may legitimately be considered one of the important problems of sanitary municipal engineering.

¹ Abstract from lecture on "Sanitary Engineering," by Wm. Paul Gerhard, C. E., delivered before the Franklin Institute, February 15, 1895, and published in the *Journal of the Franklin Institute*, for June and July, 1895.

Viewed in this light, the recent appointment, by a reform mayor, of an able civil and sanitary engineer, of high reputation, to the position of street-cleaning commissioner in the City of New York, cannot be too highly commended.

The quantity and the composition of street-dirt depend upon a great many points, such as the character and material of the pavement, the width of the street, the density and class of population, the nature and size of the traffic, the condition of the weather, etc. Road detritus is composed chiefly of abraded particles of stone, wood, iron and shoe-leather, gravel, sand or mud from the sub-surface, the horse-dung and urine of animals, mixed together with house-refuse, ashes, street and yard sweepings, more or less garbage, dead leaves and other vegetable matters. Some of this dirt, and particularly that of animal origin, becomes absorbed in the joints or cracks of ill-laid or ill-kept pavements, where it keeps the subsoil damp and contaminated, putrefies and causes noxious smells and disease-breeding emanations. A part of the street-dirt is breathed directly into our lungs, or enters the alimentary canal, and may cause internal diseases. When the March winds blow, and in dry seasons generally, the dust and dirt of streets is wafted about in the air, becomes injurious to the eyes of pedestrians, and is driven or blown into our houses, where it soon settles on the skin and the clothes of persons, on furniture, draperies, curtains and carpets. To avoid this, windows are kept closed and thus the rooms of our houses do not receive the necessary change of air. The street-dust is also highly injurious to tradesmen's and shopkeepers' goods. When wet, the dirt is changed into street mud, which is destructive to people's clothing, shoes and to carriages. Muddy and greasy streets also become a source of trouble by being slippery, and causing on sidewalks, street-crossings and in the carriage-ways numerous accidents to life and limb, to men and horses. As a rule, street-dirt or mud is particularly bad about public hack-stands, on open squares, near hotels, theatres and railway stations. Regarding the comparative quantity of street-dirt from different pavements, an English engineer is authority for the statement that one cart-load of street mud is, on the average, removed from 344 square yards of macadam, from 500 square yards of granite, 1,666 square yards of wood and from 4,000 square yards of asphalt pavement.

It is well known that streets in a bad condition are an obstruction to traffic, and that they necessitate a waste of energy and tractive force. We are accustomed to consider muddy streets as an annoyance, and condemn unclean streets principally on account of untidiness of appearance. Very few people, however, take into consideration that owing to air and soil pollution, caused by accumulation of dirt and refuse matter and soakage of liquid impurities, there is a powerful influence on public health which by far outweighs all other disadvantages. It is a fact that clean and well-kept streets cause a marked reduction in the death-rate of large cities, particularly as regards malarial and pulmonary ailments. Children playing in unclean streets are more or less affected, being often much more susceptible than adults; the same is true of invalids, and people not in robust health. Sanitary science, therefore, requires that the street surfaces be impermeable, and that all thoroughfares should be kept scrupulously clean. Near children's schools, near institutions and near hospitals, the streets should, for obvious reasons, be swept with particular care, and be arranged with a view to perfect drainage. In all advanced schemes for the ventilation of buildings, the fact that street-dirt is injurious to health is taken into consideration, by providing special means for screening and filtering the air-supply from out-doors, or by washing out its impurities. Dirty and dusty streets exercise, at all times, indirectly, a baneful influence upon the salubrity of habitations, because they prevent the free ventilation of living or sleeping apartments by the opening of windows.

We have yet much to learn from Continental cities, which are far ahead of ours in the matter of street-cleaning. This fact is generally conceded by all Americans who have travelled with open eyes through Europe, and who have admired the tidy and well-kept streets of some of its capitals. It is a matter beyond comprehension to me how the mayor of a large American city, after returning from a trip to England and the Continent, could have stated, as the newspapers reported, that in the matter of street-cleaning American cities had nothing to learn from cities like Paris, London, Berlin or Vienna.

The work of street-cleaning presents difficulties which are not easily surmounted, chiefly on account of the enormous quantities of street-refuse to be removed daily. It is accomplished by scraping, sweeping, washing and flushing. The sweeping may be done by hand labor, with brooms, or else by the use of special machinery. Owing to the greater rapidity with which work is done, there is economy in using the best machinery, implements and tools available. Mechanical sweepers should displace hand labor, for street-cleaning by hand is from three to six times as expensive as cleaning by the aid of machines. It is a curious fact that the first street-cleaning machine, devised by Sir Joseph Whitworth, was rejected "as interfering with the labor for poor people." Street-sweeping should always be done without stirring up dust and dirt. Hence water is needed in street-cleaning operations, and all streets should be sprinkled before sweeping.

Carelessness in street-sweeping should not be tolerated. In all large cities, street-cleaning should preferably be done at night. The method of cleaning streets by washing the filth and dirt into

the gutters and catch-basins, and thence into the street sewers, cannot be approved, except in special instances, as it simply transfers the dirt from the street surface to the catch-basin and the sewer. Dry removal of street-dirt in large, well-built covered carts is much to be preferred. Horse-droppings on important thoroughfares should always be picked up at once and removed with brushes into hand-bags. The fact should be noted that the extensive application of steam and electricity to replace horse traction on surface roads tends to reduce the amount of organic street-dirt. The ultimate disposal of the collected street-refuse is another problem which may present difficulties in large cities with many miles of pavements.

REMOVAL OF ICE AND SNOW.

A problem which in winter-time taxes the ingenuity of the engineer of a street-cleaning department to the utmost, is the removal of a sudden fall of snow, particularly when the snow-storm is accompanied by high winds, causing the snow to collect in drifts. The snow, accumulating on sidewalks and footpaths, must be swept off by the adjacent householders, and fines should be enforced for non-compliance with the city ordinances. The snow is best removed as soon as the storm subsides, for when hard trodden, the mass is more difficult to handle. Sidewalks in front of vacant lots or unoccupied houses should be, under all circumstances, included in the city regulations, and if their owners are negligent, the cleaning should be done by the city, and the cost assessed upon the property.

The removal of snow from the carriage-way is difficult to accomplish when the fall is heavy. Few persons realize the enormous quantities to be removed. Street-railroad companies, after using the snow-plough to clear their tracks, should, by city ordinance, be required to remove that portion which they pile up outside of the tracks.

The mode of disposing of the snow varies according to the location of a city. In districts which adjoin a river, or canal, or a harbor, the snow may be dumped from the carts into the water. In some cases it is thrown into the sewer man-holes. Owing to the fact that snow from frequented thoroughfares is generally mixed with street-mud and road scrapings, the former method is often objectionable, as it causes the harbor or water-course to silt up and necessitates dredging, and the second method should only be adopted if the sewers are simultaneously flushed with large quantities of water, otherwise it leads to deposits of mud on the sewer inverts. Melting the snow by fires, or by steam-jets has been tried, but it is a slow and expensive proceeding. The use of salt to hasten the melting of snow is quite objectionable, as it causes a deep slush, and should only be tolerated when the slush is at once swept into the street gutters. Salting sidewalks, or car-tracks, is very objectionable from a health point-of-view, as the mixture causes much cold dampness, ruins pedestrian's clothing and shoes, is injurious to horses' hoofs and causes the feet to be severely chilled, inducing colds, pneumonia or the grippe.

STREET-SPRINKLING.

In summer-time, and in dry weather generally, city streets should be sprinkled, to cool the air in hot weather, and to keep down the street dust with its many annoyances and inconveniences. Street-sprinkling is accomplished largely by means of watering carts or vans, but sometimes hose-jets are used, or the street is watered by means of perforated pipes on wheels, attached directly to the street-hydrants. The latter method is particularly adapted to well-kept impermeable asphalt pavements. The beneficial effect of street-sprinkling upon the air is very marked; the air is washed of impurities, it becomes refreshed and a feeling of relief is experienced similar to that after a thunder-shower. It is a mooted point whether street-sprinkling should be done by the city from the general-improvement fund, or by private firms or corporations paid by the property-owners of streets. I cannot see why street-sprinkling should not be looked upon as a part of the general street-cleaning system. The general traffic and pedestrians are certainly benefited by it quite as much as the owners of the property bordering on the street. It has been suggested in sea-board towns, to water the streets with sea-water, and the matter seems well worth trying, as it reduces the demand made upon the general city water-supply in periods of drought, and also because salt water keeps the street surface damp for a greater length of time.

CLEANSING FOOTWAYS AND SIDEWALKS, STREET-CROSSINGS, GUTTERS.

The sidewalks of streets should be kept scrupulously neat and clean. All accumulation of mud should be avoided, because it tends to make the sidewalks slippery. In winter, snow should be regularly removed, and when ice forms, it should be covered by the householders with sand or ashes, to prevent accidents and to avoid damage suits.

All street-crossings need the particular attention of the street-cleaners. They should be cleaned, swept and the mud raked off, and during snowfalls they ought to receive attention first, so as to reestablish the regular street traffic with as little delay as possible.

The maintenance of the street gutters is particularly important from a sanitary point-of-view. Filthy gutters in hot weather are a source of danger and cause noxious odors. They should be daily swept and kept unobstructed, to secure a rapid drainage of the street surface; there should be no pools of stagnant offensive liquids in the gutters; they should be kept impervious to avoid leakage into

the subsoil or into cellars, and they should have a continuous grade to the nearest sewer inlet. After snowfalls, gutters and inlets of catch-basins must be kept clear, so that when a thaw occurs there will be no flooding, rendering street-crossings impassable.

REMOVAL OF REFUSE, GARBAGE DISPOSAL, SCAVENGING.

While sewers are intended to remove from habitations all liquid and semi-liquid organic matters, the solid refuse of a city, of its houses and streets, comprising ashes, offal, garbage, house-sweepings and street-refuse must be removed by cartage. Sir Robert Rawlinson, one of the foremost sanitary engineers of England, calls scavenging one of the important features of city sanitary engineering. In dealing with this problem, distinction is often made between regular and special refuse. It would be tedious to you, doubtless, if I were to enter into the subject fully, enumerating at length what constitutes ordinary house-refuse. I shall, therefore, merely state that all house-refuse should be divided into two distinct kinds, viz, garbage and ashes, the former largely organic, the latter inorganic masses.

Besides house-refuse, scavenging deals with street-refuse, with stable, garden and trade refuse, with market refuse, builders' rubbish and with the mud accumulating in street catch-basins. House-refuse, paper and litter should never be deposited in the roadway, nor should it be thrown into sewer man-holes or catch-basins. Pending removal, house garbage and rubbish should be stored in dust-bins, or in barrels and ash-cans, and it is essential, and by no means difficult to enforce, that separate vessels be provided by householders for the garbage or swill, and the ashes and sweepings. Large fixed receptacles for temporary retention are not as desirable as small portable pails or cans, except possibly for large tenement-houses.

The garbage pails should be of non-absorbent material, and ash-cans should not be of wood, but of iron, to avoid danger of fire from hot ashes. All receptacles should be provided with tight-fitting covers, so that when they are placed on the sidewalk, near the curb, just before the scavenging cart arrives, the ashes may not be scattered by the wind, and the swill and offal may not offend the senses of passers-by when exposed to the rays of a hot July sun. I cannot discuss the details of the removal, except to say that it should be done at regular hours at all times, and that garbage must be more frequently removed in summer than in winter to avoid the emanations due to rapid decay.

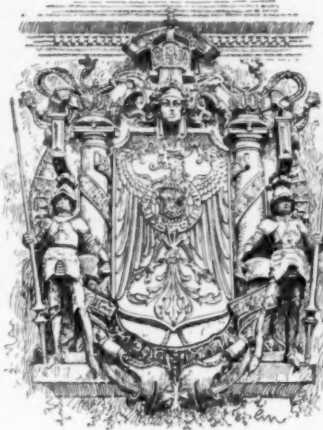
The city should, of course, provide separate garbage and ash carts, of solid construction and fitted with covers to avoid a street-nuisance during transportation. In summer-time, householders may help to reduce the amount of offal to be disposed by burning some of the house garbage in the kitchen range.

Regarding the ultimate disposal of city refuse, it is found by experience that much of it may be utilized after sifting and separating the coarser from the finer materials. This sorting of the contents of ash and garbage barrels should never be permitted to be done in the streets. The city-refuse dumps are the places to which rag-pickers should be relegated. All dirt, as Lord Palmerston said, is merely matter in the wrong place. While ashes, cinders and clinkers may be utilized for the filling-up of sunken lots or for making river banks, or roads and pathways, no garbage should be so used, or mixed in any way with ashes. Horse-droppings from streets are salable as manure, and some part of the house offal can be disposed to farmers for like uses. But whatever cannot be utilized in some way must be removed by rail or by water. In harbor towns, city refuse is taken in specially constructed hopper-barges far out to sea, and dumped into deep water. This mode of disposal is not always desirable or feasible, as it may lead to a defilement of the beaches and bathing resorts near the city. There is little doubt that destruction of garbage by the all-purifying element, fire, is one of the best, if not the best, method from a sanitary point-of-view. Various refuse-crematators have been contrived which are operated successfully without causing a nuisance by the smoke and gases from the furnace. The ashes resulting from cremation have some value as fertilizers, particularly where sewage sludge or night-soil is mixed with the refuse.

The cleaning of earth-closets, privies, ash-pits, cesspools, vaults and sewer catch-basins is also a part of the city scavenging, but it would lead me too far to discuss the same.

THE SHAPE OF CHIMNEY-FLUES.—Some chimneys are made smaller at the top than at the base of the flue; others are larger at the top; and still others are of uniform size throughout, according to the fancy of those who designed them, writes W. H. Wakeman. Those who advocate the first claim that it is the most natural way to build a chimney, and as the products of combustion ascend they become cooler, consequently contract, and do not need as much space as when they commenced their ascent. Advocates of the second, while they admit that the gases contract on cooling, call attention to the fact that as the chimney is higher, the friction of the contents increases rapidly, and so deem it advisable to enlarge the area of the chimney or stack, as the draught is materially increased thereby. Those who are in favor of the third tell us that the contraction of the gases and other products of combustion counterbalances the friction, and so a flue of uniform size is correct. Each can show chimneys built according to their ideas which are doing good work, but it is a hard matter to show that the same draught could not be obtained with a chimney built according to another design, and until this is done the matter of which is the best must remain an open question. — *Illustrated Carpenter and Builder.*

THE DECORATION OF ST. PAUL'S.¹



From the Reichstaghaus, Berlin. W. Widemann, Sculptor.

WHEN I was asked to read a paper before the Society of Arts upon mosaic, my first inclination was to decline to do so, because, like all other arts, the art of mosaic is involved with technicalities which, to a mixed audience, can claim but very limited interest. Upon second thoughts, however, it occurred to me that it would be wise to set aside all doubts as to the interest or the reverse of the subject of my discourse, and to remember only the object of it — a noble one, at least — the decoration of our great metropolitan church of St. Paul.

It will be needless for me to enter into an historical treatise upon mosaic, though I shall have to say something about its growth and decline, because books provide such information, and, moreover, the historical side of the question was very fully set before us not long ago from this desk.

It is left, then, for me, with as little egotism as possible, to set before you the history of my experience, which has by this time become very considerable in a difficult and beautiful art, which the longer I study the more enchanting I find its possibilities and the more ennobling its limitations and restrictions.

It will be impossible to avoid technicalities, which will only commend themselves to experts; they are of necessity dull matter, excepting to those who are more or less craftsmen.

It must be remembered that an artist speaks to you primarily and almost entirely through his special language of form and color; his pen may be a useful adjunct, but it will never instil a comprehension of the language of aesthetics unless the artistic sense is already present in the minds of his audience. Color and form can no more be described in words than notes of music. If eloquence and a mastery of language could have succeeded in making English people an artistic nation, the writings of John Ruskin would have done so years ago. We are, in this latter half of the nineteenth century, in a desperate hurry; life is so complicated, so full, so strenuous, and leisure is so rare, that the arts of peace, which demand quiet and study, have but a slender chance of assuming that importance in our lives which they undoubtedly assumed in simpler and less-distracted civilizations. We are to a certain extent the slaves of fashion, ever shifting, ever changing with a rapidity truly appalling, by which restlessness art must suffer more or less, and especially that form of it which is known by the title "monumental."

Monumental art claims no fashion; it is not the result of a moment's exhilaration; it is not the mark of a clique, nor is it the common property of the sale-room; it is essentially non-commercial. To induce a taste for monumental art in England, excepting in a very spasmodic fashion, has always proved to be difficult, indeed it would appear to be well nigh impossible. It was difficult a century ago, when James Barry painted these walls whilst he lived mainly upon bread and apples, and Sir Joshua Reynolds was filling the learned with amazement by his profound discourses upon "the grand style," and his eloquent eulogiums upon that greatest of all modern artists, Michael Angelo. The art of Fuseli, Barry, Haydon and other enthusiasts left but little mark upon the buildings of England. Tom Thumb, the famous dwarf, attracted crowds, while the collection of pictures by Haydon was visited by ones and twos. The particular constitution of the English mind is practical; its predilections are more Roman than Greek; it is more sensible than poetical, more commercial than imaginative.

The Reformation set ablaze whole piles of prejudices: the dread of idolatry, the fear lest matter should be worshipped in place of spirit, strangled every artistic effort in the direction of church decoration. Such violent feelings were national, so that when the Bishop of London was approached in regard to the decoration of St. Paul's a century ago, he not only spoke his own feelings, but probably he expressed also the feelings of the majority when he made answer to a deputation, "that nothing would induce him to sanction the conversion of Protestant St. Paul's into a Popish church."

So the "grand style" of Reynolds, Barry, Fuseli and other considerable artists never came off. Hence, our cathedral remained an example of the dulness of Protestantism, an evidence that England was not ready to re-marry religion and art, which since the sixteenth century had been divorced, to the serious detriment of one as of the other.

Time has, however, wrought change in the aspect with which such matters are regarded. The Oxford movement, greater facilities of travel, and a generally broader and healthier view of religion, and

¹ A paper read by Mr. W. B. Richmond, A. R. A., before the Applied Art Section of the Society of Arts on May 28.

its consequent emancipation from many narrow crudities, have one and all conduced towards a possibility of that reunion of religion and art which cannot fail to promote vitality and reality to both causes.

So, when the atmosphere of thought was cleared of prejudice and narrowness, it got into the air that St. Paul's Cathedral could not be allowed any longer to remain a standing protest against progress, whilst even the Nonconformists were finding that they must travel a bit with the times, and shed some of the dull feathers of their mournful plumage, and break into song accompanied even by that dreadful instrument, the "devil's box of whistles." And so it came to be again seriously considered that St. Paul's should be decorated in an appropriate manner in accordance with the wish of Sir Christopher Wren, and this time there was no veto put upon the enterprise by a narrow-minded prelate.

Once more that precious votive offering of man's highest intelligence, and his power to create and to dedicate his gifts to God's house, were to be offered in an Anglican cathedral, and which had been for three centuries almost wholly absorbed by that branch of the Christian church belonging to Rome.

That great artist, Alfred Stevens, whose monument to Wellington is worthy of the great general, as it is worthy of this nation, made designs for some of those spaces known as the spandrels below the great dome of St. Paul's.

Another great artist, happily still with us in the possession of his great faculties at an advanced age, George Frederick Watts, designed for two of the spandrels. We now see the result in mosaics executed by Dr. Salviati, of Venice.

Various experiments were tried for the decoration of the choir and the great dome, which, for one reason or another, failed to receive a cordial recognition, notwithstanding the marked ability of Sir Frederic Leighton's and Mr. Poynter's designs, and for a time matters came to a standstill.

The reredos, erected from Messrs. Bodley & Garner's design, demonstrated the absolute necessity for proceeding with the decoration; and it was through Mr. Bodley's advice that I had the honor of being called in to render my assistance. And let me here take this opportunity to express my gratitude to my friend, Mr. Bodley, for his having been the first cause which brought to me a labor that has been, is, and will be, I trust, for some years to come, fraught with the highest pleasure and deepest satisfaction, which entirely outweigh the anxieties and responsibilities of my work. And this is a fitting time and opportunity for me to record my everlasting obligation to the distinguished Dean who has so kindly taken the chair this evening, and to his colleagues for their touchingly loyal confidence granted to me by one and all of them.

In an undertaking so difficult and so full of possible pitfalls, I must here affirm that it would have been impossible for me to have carried out my work as far as I have done with a comparative sense of ease had not I felt at every turn, and under every difficulty, that I was environed by an atmosphere of sympathy and perfect confidence, which increased my energy and desire to worthily carry out the wishes of my friends. I question if in the whole history of art any man has been so happily circumstanced as I have been, or ever worked under conditions more favorable to himself.

One more pleasant recognition before I start upon the egotistic track: My thanks are due to Mr. Harry Powell for his unremitting labor to give me what I wanted in the glass *tesserae*, as well as in the glass for such windows as I have designed and executed for St. Paul's.

I venture to think that in all respects the materials supplied by Messrs. Powell for my work are first-rate—equal, indeed, to any which were supplied to the mosaic artists of the best periods, Greek or Italian.

To my workmen, whom I regard as brother artists, both those who assist me in my studio as well as those who work so carefully and so steadily in the cathedral, I tender my heartfelt thanks. Instead of increasing my difficulties, one and all of my co-workers have aided me unselfishly and kindly.

When the Dean and Chapter desired me to submit designs for the decoration of the choir, I was fully determined upon certain points. That the only material for such decoration was mosaic, because it can be washed without injury, an absolutely necessary precaution under the condition of London smoke-laden atmosphere. However delightful may be the methods of fresco and tempera painting in the clear air of Italy, or even in country places in England, while London air continues to be charged with every destructive acid, they are out of the question there. And, further, the advantage of mosaic over all other material for decoration lies in the free use of gold and silver which is demanded by the nature of the design that is applicable to the material.

Against pictorial mosaic I resolved to set my face, and to adhere to the principles of design and execution which prevailed in Italy, Greece and Asia Minor during the Classical times of the Byzantine Empire. And while adhering in principle to severe methods of design and simplicity of coloring, to accept and make use of the modern spirit of antiquarian research I determined to follow the precepts of the great masters, by being accurate in drawing and, according to my lights, noble in my choice of form.

But perhaps my most important point, as it appeared to me to be, was that our Metropolitan Church must be decorated by English and not by Italian labor. I am bound to say that if England found herself unable to provide genius and talent for the adornment of

her great church, better that it were left alone, to prove once more that we are not an artistic people, but only a race of shopkeepers.

As far as my workmen are concerned, the aphorism of Napoleon has been contradicted. Quite leaving out any estimate of the qualities of my design from the question, of which I am no judge, in fairness it can be said that the mosaic-work in St. Paul's laid by English workmen, the materials for it made in England, proves that, however rash it might have appeared to be at first sight to employ them, there need be nothing but congratulation as regards the choice.

The workmen under me have proved themselves able to compete with and beat their co-workers upon the Continent, a matter of the utmost importance at a time fraught with commercial difficulties and stagnation in the labor market.

Another point upon which some determination upon my part had to be exercised. Whether from false ideas of economy, or, what is more likely, a certain listlessness, modern mosaic-workers have thrown aside the well-tried principles of mosaic manipulation, substituting a method illegitimate, lifeless and unreal. I allude to the practice of fixing the cubes by means of gum upon canvas away in a workshop, far removed from the building that is to receive them.

The process I will not waste my time in describing. Yet, broadly speaking, one aphorism that applies to all decorative art may be permitted me. "Just as a building is erected where it is to stand, so every portion of the decoration of that building, wherever it has relationship to the walls or to the structure, should be executed where it is to remain, in the light and under the conditions of its environment."

If one lesson can be learned which is absolutely sustained throughout the churches of Italy, it is the important fact that an harmonious spirit seems to pervade these churches of every century's labor, even to the seventeenth century; because what we see there, from Lombardy to Naples, are conceptions, conceived as a whole, executed as a whole, and perhaps carried out unconsciously harmoniously with their surroundings; because they were carried out *in situ*, under the ruling of the dominating influence of architecture.

This being duly considered, I had to look around. It was not unnatural that my first thoughts should travel in the direction of Whitefriars Glass Works, where the Powells have been laboring to improve the manufacture of ornamental glass for more than a century. And I was rewarded.

Mr. Harry Powell, as I have said, took infinite pains to supply me with *tesserae* as good in color as any I have seen; indeed, upon placing them side by side with cubes of Greek and Italian manufacture of the best period of the mosaic art, I am bound to say that they were hardly distinguishable one from the other, either in quality of material or in brilliancy of color.

To start with, I thought a palette of thirty colors, or rather shades of color, was sufficient, and there I was right; that number is much more than sufficient. As my experience increases, eight or ten tones of color are ample if used with art and knowledge as to their relative action. And this limitation of the number of colors is one of the great powers of mosaic, which I will later on briefly explain.

Well, if we were to recede from modern technique and re-adopt the old style, how were we to proceed? You know that there are two cements, water and mastic, in which the cubes are inserted. It is beside our intention this evening to follow to earth every detail of my great enterprise; suffice it to say that, after many experiments, I found a mastic cement answering in every detail to a cement employed in the fourteenth century in the restoration of Andrea Tafi's mosaics upon the dome of the baptistery at Florence. Its advantages are many; it does not dry too rapidly, and it retains a certain modicum of elasticity for a long period.

Those members of the public who have so generously opened their purses for the decoration of their cathedral need not fear that time will prove cruel towards the object of their donations. My cement in time becomes so hard, and the cubes are so firmly embedded with it, that it may in time be said to be like stone. Thus one very grave difficulty was with patience surmounted.

Now came the testing-point of my rash promise to obtain English workmen. Again I applied to Mr. Powell. Two of his young men had already executed a mosaic panel, after a design of Mr. Holman Hunt's. But as their work had been entirely the modern picture mosaic, executed with thin plates of glass in place of cubes, the method which I had determined to employ was to them an entirely new one.

Now, at the outset of my work—seeing that I was to initiate the recovery of a lost art—much as I desired at once to work upon the wall of the church, upon consideration it appeared to me important that the initiative should be made as easy and convenient as possible, seeing what the difficulties of the problems before us must of necessity be. Therefore I built in my garden a shed and a studio, the one for my use, the other for the use of the mosaic workers, who, as time went on, gathered strength in numbers recruited from various sources, till we finally for the moment reached nine workers, and here we worked for four months.

If we were not yet to work upon the wall, what were we to do? I had large slabs of slate cut, well scored with diamond shapes, so that the intonaco to be laid upon them would find a grip; and upon these slabs were executed the first two spandrel mosaics, those which you can see upon the north side of the sanctuary above the arch, between the cornice and the capitals. But I must go back a moment.

The sketches prepared upon a small scale, the full-sized cartoons, were executed. I chose to make my first essays upon the parts of the church lying midway between the vault and the floor, so that they might offer me a fair chance of trying the strengths of light and dark at a, comparatively speaking, moderate altitude. Thus, I should have a guide for future work by which I could reason what strength would be required at a greater height. These cartoons I made in charcoal for the following reasons: I wished not to compromise myself with elaborate coloring at the outset, for I feared that my practice as a painter might lead me, however carefully I guarded against it, to disregard the peculiar nature of the material I had to use; also it would enforce my being present during the whole proceedings, and oblige me to overlook every bit of work, and in point of fact to do a great deal of it with my own hands; this I did, not only executing a considerable portion, but also learning how to cut up the material so that I might prove to my own satisfaction what could and could not be done in shaping the cubes. I believe in only four shapes as the result of this experience, namely, the cube, the double cube, the equilateral triangle, and elongated cut forms finishing in sharp points. In order to be exact in the shape of the slabs, which had ultimately to be fitted together and to make a perfect joint when fixed, I cut my cartoons up into the necessary number of shapes, of such a size that each shape could be given to one or two men to work upon.

I made a rule to begin with the outlines, whether in the flesh or the drapery, of working from the shadow, through the half-tint, and so up to the light. A difficulty sometimes occurred in that, as the space became filled up, the cement overlapped and pushed the outlines out of shape; this difficulty was easily met by pressure from the outside of the outlines until they assumed their proper curves. It was no small difficulty at first to persuade my workmen to leave a good margin of cement showing between one cube and another, naturally, for the three of my workmen who had had some experience in paper mosaic, two having worked with Messrs. Powell and one with Salvati, had acquired that evil habit of jamming the cubes closely side by side, thereby quite ruining the legitimate effects of signs of building, so important to mosaic as to architecture, and making, instead of structural design, an indifferent imitation of a picture. I endeavored to beat into their brains the fact that the worst mosaic is most like a picture, and the best mosaic has all the structural qualities belonging to architecture—the one entirely out of place in a building, while the other seems to grow naturally out of architectural forms. After a time I found my men taking a keen interest in the work—intelligently—proving, after all, that Englishmen only need to have sound principles taught them, and insisted upon, to render them as serviceable craftsmen as the world can now produce. Upon more than one occasion they have said to me that they no longer felt mosaic work to be monotonous, mechanical and uninteresting; whereas under the system of cutting the thin slabs of the flash mosaic of Messrs. Powell's into complicated shapes—more complicated than geographical puzzles which we used to put together as children—they wearied of it. I made it a rule never to leave my men in doubt as to my meaning. When I criticised, no work was taken out to be re-done without careful explanation why it was done. I drew diagrams to show what I meant as to the simple principles of building the cubes, worked with them, raised the enthusiasm of those who were to be my prime helpers in a most difficult and responsible work.

For more than three—nearer four—months, day by day, we worked together. At the end of that time I am bound to say that I was much wiser than at the beginning, and I venture to think that all the anger which had exploded and the labor expended during that period were not in vain. I had got my staff into good working trim, as I believe anybody could do if they would never trust to a middle man, that most fatal invention of modern commerce and successful destroyer of enthusiasm, and consequently of life in work and everything that makes art in immediate touch with our most delicate sympathies. Until that incubus is got rid of, and architects as well as decorators limit themselves mercilessly to what they can personally oversee, delegating nothing to a subordinate, and are day by day in immediate relation to their craftsmen, there is nothing to expect for the future but death and sterility for art. At last the two spandrels were completed and carted away to be put up in their place. The wall to receive them was cut back, and the slabs were fixed with bronze screws into leaden sockets inserted into the stone, being bound to the wall with red lead.

And now, with regard to these two spandrels, permit me to be at once frank and brief. I did not use sufficient strength in my outlines—I used my white too liberally—the consequence being that the half-tones are too narrow, on account of the liberal expansion of white. I erred upon the side of light, and neglected broad shades. I hope, however, to have this put right by-and-by, and I feel sure that the same faults have not again been committed. In the meantime, my men being in full working trim, I resolved to attack the small easternmost dome. This dome, saucer-shaped, happily obliged us to begin to work upon the wall at once, and I thought it a good opportunity to put my men into a position of responsibility, as they had just come out of a severe and personal training.

It was not without some difficulty that I persuaded Messrs. Powell, who had never executed anything in mosaic directly upon a wall, that the principle of paper mosaic was not the best and the cheapest; they imagined that their system was quicker, and therefore more

profitable. I, on the contrary, held the opinion that upon the economical question they were wrong, and that I was right; but in order to prove my point I had an eagle worked upon their principle. They were convinced, not only upon the important point of economy, but, secondarily, upon the result. My principle took about half the time, and was infinitely more satisfactory when done; indeed, the man who, after having worked with me, lamented that he should have been employed again to go through the deadening drudgery of the modern system.

It is wonderful how quickly the modern mind is accessible to art when it has once grasped the fact of its relation to profit, but you must indubitably prove the profit before the artistic sense is touched. Whatever may be the results of my work, *qua* design, that I have nothing to do with. I am willing to wait a century for an estimation of its value; but one thing I trust to have done, I trust I have forever killed paper mosaic in England, for financial as well as artistic reasons. I hope to have re-established the old plan, which is quicker, cheaper and better than the new; it leads to finer work; it is more certain in its results; it is legitimate in principle, and first and foremost it is infinitely more amusing to the workman, for it stands to reason, if the workman is not amused by his work, it will be lifeless, inarticulate and dead. Drudgery we all have to pass through, but the drudgery that is slavish and leaves nothing for spontaneous expression, and which makes the workman into a shackled slave, can be no more humanizing to him than it can be interesting or touching to the minds of those who review its results.

I have been very careful to retain work which, while it did not come up to my standard of completeness, displayed at the same time a vitality and character which I should have been very sorry to lose. Uniformity of execution of such great magnitude would end in dullness without variety of execution, and the faults of its merits that help to give it life.

No better illustration can I think of than the frieze of the Parthenon, evidently the work of one designer, though executed by several different hands. One recognizes the failure of expression here and there among the triumphs of perfect successes—the halting incompleteness by the side of gem-like finish. We feel the pulse of the workman in the touch of failure, and the work is human; the shadow, as well as the light of the human mind, is there: our sympathies are aroused for the duplex nature of man. A dead level of perfection, a cold accuracy of science, and a perfection to be reached only in such a small thing as a Greek gem, would be quite insufferable when exhibited upon an enormous scale, which naturally demands the exhibition of many and very various phases of thought.

For four months we worked upon the dome. Before commencing the mosaic I offered up my charcoal design. Afterwards I colored it, and again offered up a portion of the colored cartoon. The first was with the object of ascertaining the strength of outline, the second the strength of color. As I see my work now completed in mosaics, I see reasons for certain regrets. My cartoons having been executed in pastel did not receive any reflection upon their surfaces from the nature of the material adopted. The mosaic, however, does receive reflection. The lesson I learned here was to make my outlines and masses far more distinct in the cartoon than I intend them to appear when transposed to another and reflecting medium, because the reflecting surface eats into all the dark surfaces. I also made too many details; in point of fact, in a sense, I put in more work than was really needed. Upon the other hand, one must remember (to compare great things with small) that Phidias completed every figure upon the pediment of the Parthenon *ad unguem*. Some of the most delicious portions of the work were forever hidden from view from the time they left the workshop of Phidias to the time when they were taken down by Lord Elgin. This, to the commercial mind, is labor thrown away, but to the dedicatory spirit of the great Greek artist, his labors meant religious offering to the virgin goddess; his sacrifice through his art was to her; he gave her his best, his truest and noblest self; disregarding the labor he expended he disregarded applause or blame. Sentiment apart, it is my firm conviction that the influence of delicate details, even upon a height, is never wholly lost: it gives a play of color, a mystery, and an interest which breadth alone cannot achieve; it is possible to overdo detail, but it is far worse to underdo it. To overdo breadth ends in baldness, a far greater sin, to my thinking, than an excess in the other direction.

Every portion of a building requires a different treatment, owing, of course, to the manifold effects of light to which surfaces are subjected. In the case of the dome it was desirable to heighten it in effect, rather than to lower it. A dome we can hardly call it, in that its elevation, at the apex of the curve, is not more than 3 feet, so that in point of fact it is more like an inverted saucer than a cup.

As soon as the plaster was stripped and revealed the extremely beautiful brick face—better brick building I have never seen—I at once became aware of the heightened appearance which the eccentric circles of the white-mortar lines between the courses of bricks gave. Oddly enough I had already designed for the dome upon such principles of concentrating circles—to my mind a far finer treatment of a domical surface than by breaking it up in ribs. Fearing that I might miss my intention to add rather than diminish height, the outlines of my form I kept thin, not more than a quarter or an eighth in width, and I made use of brown instead of black. Upon all the interior forms of birds and trees, I permitted myself

neither brown nor black, and kept all the drawing of the wings, feathers, etc. very bright in color, making use of red, amber, green, blue, gray, both warm and cool, and the high lights of white or a pale lemon-yellow. In many instances, notably in the birds which I wanted to appear whitish, I outlined the more delicate parts of their plumage with silver, so that those outlines, when the silver was not shining, might appear to be light and dark off the white when the silver shone. In the leaves of all the trees I drew the veins with silver, and touched the edges of the leaves with gold. The gold background of the whole design is made of burned gold and the *tesserae* are laid in circles, concentrating at the apex and widening as they descend and curve. But white I found to spread excessively, dark blue to tell as black, amber color to become quite unreasonably dark, pale cool pinks even grayed very much at a distance, and required to be outlined with a strong red to give their value. Both warm and cool grays can be altered as to their appearance very markedly by the color of the outline by which they are surrounded; outlined with blue, the whole mass by which the outline is surrounded appears to be influenced in a very distinct manner by its environment; so also does the same method hold good when the outline is red. Blue round white intensifies the blue as light, whereas outlined with red, the white appears pink. Strong yellow-greens tell extremely well, but they must be outlined with a thick line of red or burnt sienna brown to give them their proper value. White lines in light green are very disastrous except at rare intervals; either a toned grey or a dull yellow breaks the green best. A black outline to blue is only necessary to divide the blue from gold, or to draw the folds of drapery where the lights of the blue are heightened with gold; the black outlining seems to preserve the integrity of the blue, whereas a red outline turns the blue into purple. A dark outline of blue on green gives a very mysterious effect, but, in that case, the blue must be a very clear one, and of a middle tint quality, otherwise the blue will tend to make the green appear muddy.

I have said I made use of a good deal of silver, notably in the two spandrels and in the dome; I should not use so much silver upon another occasion: it has a great tendency to gray its surroundings. It looks very dark when not illumined. Upon the other hand, when flashing, silver has a greater power of light and of expansion than gold. A line of silver the sixteenth of an inch in width will eat through the lines of black almost as light eats into the lead lines of a window. The appearance of silver is easily attained without disadvantage by drawing a thin line of white and outlining it upon either side with a still thinner line of gold. The experiences in working out the dome were most interesting and instructive; the faults I committed were chiefly due to weak outlines, especially upon those parts of the design which have a golden background. The *tesserae* which I employed were, on the whole, too small, and from this fact there arose an excess of detail, because I could use a greater number of small *tesserae*, and so put in more detail in a given space than I should have been able to accomplish with larger cubes.

The gold background to the design I think I may claim as a success. There is no burnished gold used whatever; the more cracked portions of the burnt cake were invariably chosen, lit here and there with brighter portions cut from same cake; and the gold was mixed, that is to say, red, green and blue gold were laid side by side. One reason for the brassy and unpleasant appearance of modern golden backgrounds is due to two causes: the first where the *tesserae* have been laid too flatly, and too closely together; secondly, only one quality of gold, instead of many, has been adopted. Probably, of the two, the more disagreeable effect is obtained by the too close proximity of the *tesserae*, but also by the color of the intonaco upon which they are laid. One need never be afraid of letting the ground show the 1-16th or even a 1/4 of an inch in width round each cube. I would even go so far, under certain circumstances of light, to expand even that width. One is far more likely to err upon the thin than the thick joint. Gold set into a white ground never looks so well as when it is set into a red one, the white outline having a tendency to gray the gold excessively, in point of fact, to silver it; it is better to add white curves among the gold, wherever it is desirable to gray the gold.

I have noticed in old mosaics, notably those at the baptistery at Florence, that the ancients recognized the disagreeable appearance of the white line, for they have taken pains to color the white division with red. It used to seem to me that the Greek mosaicists, employed at St. Mark's, Venice, purposely put spots of black, green, or red among their gold, but I have been obliged to give up that idea upon more minute investigation, and to account for the presence of those black, green and red spots, from the fact that the upper layer of protecting glass has corroded where it has been thinly applied, the gold-leaf going with it. Thus the color of the ground upon which it has been laid has been revealed. These dark spots, doubtless, have a pleasant effect, but I think greater advantage is to be obtained by mixing with the brighter *tesserae* those which have been exposed to heat, and whose dappled surfaces reveal in thin lines all over the surface the color of their grounds, and so they imbibe both the color and the brilliancy of the metal. Burnished gold must only be used very moderately; it makes a garish effect, except in very thin lines.

In modern Italian restoration of ancient mosaic, bright burnished gold has been set up in the place of dull and broken gold; hence, the old work has been rendered vulgar and garish that was only

rich and solemn. The mosaic in the apse of San. Ambrogio, at Milan, has been almost spoiled by coarse restoration in the time of my memory. Red disappears when white gold is used to heighten it in thick lines; it is blackened in the shadow and destroyed in the light, for while the gold shines excessively in full light, and consequently acts through the edges of every neighboring color, so in shadow does it become relatively dark, and an extremely powerful deflector of darks; whereas the modified or cracked gold does not shine so brightly, nor does it reflect and refract dark to the same extent when in shadow. You will probably remember how thin the spiked gold lines are which lighten the draperies of most of the earlier mosaics; how, when the gold flashes, they only seem to illumine the color with which they are mixed, and when they are in shade only gives splendor to that local color. That is the right way to use gold. The black pigment made use of by the old mosaicists, Greek and Italian, as far as I have been able to ascertain, upon close inspection, was of a kind of cinder color, or the gray-black of coke, quite dull and unglazed on surface, and excessively corroded by the heat of the kiln. They had not a good strong black, so, as a rule, they adopted dark brown as an outline that told darker than the indifferent black at their command. It must be admitted that the brilliant light of the Italian skies does not oblige the outlines of forms to be so manifestly insisted upon as in our dark climate; there dark tells with much greater force than here; where, in Italy, a thin outline of brown would be quite sufficient to detach one color from another, and to mark the form, here to achieve the same result, double the thickness of outline and double its depth in color is necessary.

Messrs. Powell have supplied me with a splendid black, quite invaluable; in shadow it tells really black and becomes a deep and pleasant gray when the light falls directly upon it; in reflected light it assumes a sufficiently neutral dark to serve all purposes of a strong outline, so when the work is in full light the black outlines do not cut too sharply — a very unpleasant effect it is when they do — and in the shade they tell out with full force of tone and accentuate the color-ports which are for the time-being in shadow.

I take it that we all learn more by our own mistakes than by what success we may now and then attain, and I apprehend that you, my audience, will gather more good from a detailed account of the growth of my work and of its shortcomings than by a catalogue of my winnings. Not unnaturally one was led into certain mistakes to start with, and these mistakes have gradually taught one right principles — principles not founded upon theory, but upon practice and experience.

To revert to the progress of the work, after the completion of the small dome: As winter was coming on and the scaffolding was not completed, I decided to try two more panels upon slate; these two panels were executed in the workshop at Whitefriars. When these were put in place, I saw the utter futility, once and for all, of such a practice. My cartoons had been made previously, and set in place they looked strong and light, because of the non-lustrous quality of their surfaces. The mosaics, when seen bit by bit, side by side with the cartoons in the workshop, looked right, and unmistakably they are wonderful fac-similes of my drawings, but the moment I saw them placed among their surroundings — deep undercutting of mouldings and darkness — it was quite evident that they must be gone over and considerably strengthened, not so much in regard to their local color as in emphasis of white and black. My dark outlines were thin, and my white lines too much toned, and we set at once to work to correct these defects, inserting outlines of half an inch in width, with the new black among the dark colors; and among the light colors we inserted very pure white drawing lines, or separating lines, especially where a blue and a red of the same tone were in juxtaposition. We also withdrew a great deal of bright gold and inserted dull. The effect was magical and fully rewarded the labor it obliged — for a labor, indeed, it was — and you will understand it when I tell you that so hard had the intonaco become that a mallet and chisel had to be made use of to remove each single *tessera* which had been laid into the wet intonaco, now, after the lapse of time of a little over a month, become as hard as flint.

I made up my mind, once and for all, that during winter as well as summer we would work *in situ* and not any more fumble away at such child's play as executing a decorative work away from its conditions of environment, a practice I believe to be quite fatal to successful decoration, and involving considerable loss of time and expenditure of energy, because, if the artist is conscientious, he is quite certain to feel himself bound, practically-speaking, to re-execute the greater portion of his work, so that it may take its relative place among the objects, of which it should be one, and to which it must bear relation. The practice of painting the decoration in the studio and clapping it upon a wall, differently lighted and differently influenced by the character of architectural mouldings and surroundings is a mistake. I defy any artist, even of the greatest experience of decoration, to calculate his effects so minutely in a well-lighted studio so that his work shall appear in its proper relation to the objects which should be at once a part of it when placed in an entirely different lighting, and all the conditions of its environment are totally changed; nor do I think that anything but the roughest sketch for color is desirable for the cartoon. Although every boundary line between shadow and shade, shade and light, should be very clearly defined, because the transposing from one

material to another involves changes that can only be made under the eye of the artist himself. It is true that he can calculate roughly for the modifications a necessary part of transposition, but the more delicate modifications, which are the life and soul of success, he can only make when actually working in the material that is ultimately to produce his design; and for this reason it is necessary that the artist should be constantly upon the spot, watching the translation of his design from one material into another, whenever he cannot himself execute it. If he is not inclined to do this his work is sure to suffer, for, however clever the workmen may be, not one of them knows really what is the effect the artist has in his mind and which he desires clearly to render. We know by experience how, in a small way, pictures painted in a well-lighted studio totally change in appearance even when exhibited in a well-lighted gallery from what they were in the studio. And if this be true of an isolated picture, that it receives such a curious impression from its surroundings as to be scarcely recognizable as the same work under different conditions, how much more must the same law apply to a large scheme of decoration.

In the work which has been recently uncovered I believe that most of the faults which I have confessed to exist in my previous efforts have been overcome. At the same time we are all learning: every day of experience brings new light upon our beautiful art; and while one can never expect to attain perfection, I have no doubt that every fresh adventure will be more successful than the last. The confidence of the public, as well as the kind manner with which our labors have been received by the press, stimulate us to fresh exertions for the public's instruction and delight.

So we have gone on from space to space, learning and, I hope, improving, until now more than two-thirds of the choir are complete; and if all goes well I shall have the honor next Easter year to show to the English public a complete scheme of decoration, carried out and fulfilled by English workmen upon a scale second to none in Europe. A new art acquired, a new craft learned and its difficulties conquered.

And now a word from the ethical point-of-view.

In a moment of decadence in literature and in certain forms of art, we are told that art for art's sake is alone to be permitted. Surely that is a very dangerous axiom. In the best times of art, whether in early or recent pagan times, or early or recent Christian times, religion has been glad to accept the services of art to give substance and reality to her mysteries.

The morality of art, the impulses which draw her to choose the noblest events in the history of the world as texts wherein to lay her gold and silver, her color and her jewels, are aided and strengthened by that consecutive stream of sacred thought upon immortal themes that have exercised man's intellect and feeling even from the prehistoric ages until now.

It is not for us to lay aside such restraints upon our fancies, and such purifying motives which are induced, by illustrating upon the walls of our churches for the use and service of all, in a moment when materialism of many gross kinds is poisoning literature, art and the drama.

Let us have the best art in our churches that can be obtained, and let the walls of the houses of God be the sacred picture-galleries, free for our people, where they can learn nothing but good, by seeing beauty and purity attired; where they can read the old stories of the childhood of the world; where they can be refreshed, mind and body, by the study of the beautiful; that beautiful, which, to be perfect, must unite the material and the spiritual.



WOOD-PAVING IN SYDNEY. — ELECTRIC CAR-LIGHTING. — STAGNATION OF BUILDING. — DEATH OF E. A. JOHNSON, PRESIDENT R. V. I. A. — THE GOVERNMENT HOUSE AT MELBOURNE.

SYDNEY, N. S. W.

COLONEL BELL, the United States Consul here, has just published a pamphlet for distribution in Europe and America, on the "Street-Paving of Sydney." He considers that our streets are better paved than those of any city in the United States, except Washington. "The chief streets of Sydney," he writes, "are paved with blocks cut from Australian timber, and they excite the surprise and admiration of all strangers, especially Americans." Their excellence he attributes almost entirely to the merits of the material used in their construction, and he thinks they combine nearly all the qualities requisite in a perfect street, viz, noiselessness, healthfulness, cleanliness, easy traction, cheapness and durability. Colonel Bell has travelled much, and he is evidently keenly observant. Such praise, therefore, coming from one who holds such a high official position should carry conviction, even if it should seem to have a leaning towards flattery. If the pamphlet only tends to bring about some reciprocity in the timber trade between Australia and America, it will have served an admirable purpose, and the

result will mutually benefit both countries. Despite the very depressed state of industries generally and of the building trades in particular, in 1893 — the statistics for last year are not available — nearly £350,000 worth of timber was imported into New South Wales alone, and it is safe to say that a large proportion of this amount went into the pockets of American timber-merchants. On the other hand, the total value of the timber exported from the whole of Australia, during the same year, amounted to something less than £200,000, and this amount, too, principally the result of the intercolonial trade, very little timber at that time being exported to foreign countries. The Australian hardwoods are, nevertheless, among the finest in the world, and the supply is practically unlimited. They are now, evidently, becoming better known in England, as an order for 600,000 feet, to be delivered monthly, was lately received by a large shipping firm in Sydney.

But it would seem that it is not only in the matter of pavements that Australia is ahead of America; and, strange to say, an American again proclaims our superiority. Major Pangborn, President of the World's Transportation Committee, on being interviewed lately in Melbourne, expressed his admiration for the manner in which the South Australian Government had succeeded in applying electricity to the requirements of their railway system. He said: "On the South Australian railways they have got a system of electric lighting that is better than anything we have seen anywhere else in the world. They have succeeded in working their electric lighting on the cars by means of a dynamo run from the axle. We, in America, do it by a dynamo run from the engine, and worked by steam. But our plan, you see, takes steam from the engine, and so lessens its power for actual work. In South Australia this is avoided, and the motive power of the revolving axles, which would otherwise be lost, is employed to work the dynamo. It is simply splendid. And that is not all we learned about electric lighting on trains in South Australia. It is a wonderful system of electric accumulation they have there. On the train from Adelaide to Broken Hill, for instance, the journey being at night, the electric lights are on all the time. Well, on the way back from Broken Hill to Adelaide, this journey being in the day, electrical energy is being stored up, and enough is stored to light the train on its return journey from Adelaide to Broken Hill, without any electrician being in attendance to look after it, so that they save the expense of an electrician every second journey they make. Lighting by electricity on this system is actually less expensive than kerosene, and the light they get is the best light I ever saw on a car."

Generally the enterprising American when he honors Australia with a visit, has hitherto only applied himself to the discovery of our failings; it is, therefore, soothing to think that in some things, at least, we are now able to compel his admiration.

The building of the Mutual Life Insurance Co., of New York, is approaching completion, but beyond this there is nothing of any importance in the architectural way being done here. This building and that of the Equitable Life, recently completed, are magnificent monuments to American enterprise, for they are without doubt the finest office-buildings yet erected in Australia. In Melbourne there is absolute stagnation in the building trade, and the same state of things exists in all the other colonies. Architects have little else to do but live — or rather exist — in hope; and they do not find the occupation lucrative.

A proposal has lately been made by the South Australian Society of Arts to bring about the Federation of Australian artists — including architects. The project is being taken up warmly, and is likely to be soon brought to a successful issue. The idea was probably suggested by the arrangement which has lately been effected by the Trustees of the New South Wales, Victorian and South Australian Art Galleries with reference to the periodical interchange of pictures. The arrangement is such that each colony lends twelve of its representative works to the other two colonies for a period of six months, and receives twelve pictures from them in return. The second interchange has just taken place, and the system, so far, has proved wonderfully popular.

The death of Mr. A. E. Johnson, F. R. I. B. A., President of the Royal Victorian Institute of Architects, took place very suddenly at the end of last May. He read an interesting paper before the members of the Institute on the evening of the 28th, and the following morning he dropped dead as he was about to enter a tram-car on his way to his office. Mr. Johnson was for a long time Architect to the Public Works Department of Victoria, and he afterwards became a member of one of the principal architectural firms in Melbourne, who are favorably known in connection with the erection of some of the most important buildings in the Victorian capital.

I am reminded in speaking of Victoria of a somewhat humorous paragraph which appeared under the head of "Notes and Clippings" in the *American Architect* of April 25, 1895, the paragraph in question being taken from the *Philadelphia Press* and is to the effect that Government House, Melbourne, is the counterpart of the Queen's residence at Osborne. The similarity is accounted for by the *Times'* titled correspondent in this way: The Secretary of State for the colonies in London disapproved of the architect's original design, and asked for something like Osborne, which happened to be the first picture his eye lighted on when the aforesaid architect submitted "a book of designs." There are only a few trifling errors in this paragraph. The building was designed in the Public Works office, Melbourne, when the Architectural Department was presided

over by W. W. Wardell, F. R. I. B. A. The Secretary of State for the colonies could never have seen the design; at any rate, he had no more to do with it than he might have with the selection of a design for the Capitol at Washington. The rest of the paragraph is true.

JOHN BARLOW.

TWO SPANISH PHILANTHROPISTS AND THEIR WORK.



Statue of the Marquis of Ponteños, Madrid. San Martí, Sculptor.

WHERE is in Madrid an institution, called "Monte de Piedad" and "Caja de ahorros," that has a double object; on one side it lends money to those who are in want of it, and who leave as a warranty, jewels, clothes, etc., and on the other side, pays an interest to those who deposit in it the money that is thus loaned. That is to say, with one hand it takes money, and with the other lends it to needy persons.

This institution was the result of the fusion of two component parts; the first was established by a priest, named Piquer, at the commencement of the seventeenth century, and the other at the beginning of the present century, by the Marquis of Ponteños.

The priest Piquer was born on October 4, 1666, at Valborne, in the province of Teruel, and died at Madrid, September 13, 1739.

Having read and heard much about the Italian "Monte de pieté," he conceived the idea of establishing one in Spain, that would surpass those he knew of by reference, wishing to conciliate many difficult extremes, such as succoring public necessities and combating usury.

He gave ostensible commencement to the practice of his purposes on December 3, 1702, that is to say, on Saint Francis Xavier's saint-day—he had a profound esteem for this saint—he fixed on the wall of his room and at the feet of an image of the Virgin, a little box; he called all the persons that lived with him, and putting a silver piece of money into the box, he said to them, "Be witness that this small silver money that I place to-day in this box will be the beginning and the base of a 'Monte de Piedad,' that God will protect for the suffrage of souls and help of living."

The box began directly to produce many alms, and although there was a great opposition to the placing of these boxes in the parishes, the common people protected them, so much that in 1704 the priest Piquer had placed 137 boxes, which produced 1,195 pesetas, and in 1705, he distributed 212 boxes and gathered 2,055 pesetas.

With these resources always increasing, with the sale of numerous examples of a book that he wrote, entitled "The Screams," and with the profit that accrued from sums of money with which private gentlemen intrusted him in kind of deposit, he not only paid very many offerings for the profit of souls, but also was able to celebrate sumptuous novenas, and to extend loans with sure warranty to needy people, without any other condition than the praying—never compelling—the persons who redeemed the pawned objects, to contribute with some charity in favor of the souls.

Taking jurisconsults, canonists and other learned people as counsellors, he arranged a series of statutes, so as to organize a Monte de Piedad, under the patronage of the King, and although the ecclesiastic government of Toledo was very averse to the priest's idea, he found a true protector in the renowned Cardinal Portocarrero; but unhap-

pily for Piquer, his good protector died on September 13, 1709, before being able to obtain a satisfactory decision.

Nevertheless, he put in practice his project and on January 3, 1719, the first General Council was convoked, and Piquer presented the accounts of deposits and loans from 1711 to 1719. He also solicited and obtained by Royal Schedule, dated October 6, 1723, that 17,500 pesetas per annum should be granted to him out of the revenue from tobacco, so as to be able to pay the indispensable placement.

In the council that took place on February 15, 1724, the proposed nomination of the high commissioners, clerks, etc., was approved, and May 1, of the same year, the offices, completely arranged, were opened to the public, after twenty years of anxiety and sundry vicissitudes.

When these offices were opened in 1724, the Institution, including notes more or less payable, had 139,076 pesetas; in 1730, it surpassed 290,000, and in 1739—the year in which Piquer died—it nearly reached 375,000 pesetas.

On August 4, 1888, the conditions for the erection of a statue in bronze to the memory of Piquer were published, and in February, 1889, the prize for this statue was granted to Mr. Joseph Alcoverre.

Piquer in this statue is clad in his sacerdotal habit; with his left hand he is gathering some papers that represent his series of statutes, and his chin rests on his right hand, as in attitude of pondering on the studies and details that preoccupied him while arranging the establishment of the Monte de Piedad. The idea is in congruence with the lemma that the author of the statue employed when he presented his design: "And God heard him."

In one of the squares of the pedestal, there is a bas-relief that shows Piquer at the moment that he is putting the little silver-piece in the box, on December 3, 1702.

THE MARQUIS OF PONTEÑOS.

Joachim Vizcaino, Marquis of Ponteños, was born in the Province of Corunna, August 21, 1790. He was a very studious man. Having visited the principal capitals of foreign nations, he gathered a great deal of information that enabled him to introduce in his native country the improvements that he thought necessary for its material and intellectual progress, and principally all that could be favorable to the poor.

In 1838, he was appointed Governor of Madrid, and after enormous difficulties he obtained the creation of a *caja de ahorros* (savings-bank) for the benefit of the necessitous, and also the passage of a by-law that resolved that it should be established in the same building that was occupied by the "Monte de Piedad," and should be devoted to money placed on deposit.

This institution was opened to the public February 17, 1839, and immediately the people hurried to it to deposit their money, and thus the Monte de Piedad was enabled to give a great impulse to its business, for while in 1837, it only succored 10,837 persons with 379,000 pesetas, in 1839 it made 18,000 loans with 1,290,000 pesetas.

In 1869, the fusion of the two institutions, "Monte de Piedad" and "Caja de ahorros" took place, so as to constitute a single unique beneficent establishment and thus were obtained so many and such good conclusions, that from that moment it was decided to honor the memory of the Marquis of Ponteños by a raising to him a statue. This was made by the artist, Señor Medord San Martí, and it represents the Marquis in a haughty aspect, grasping with the right hand a book that images his scheme of the care of savings and a commander's staff, symbol of his authority as Governor of Madrid. On the top of various attributes there is a money-box that signifies the savings-bank (*caja de ahorros*) in which the workman, trader, etc., deposit their economies, that in the fullness of time will help them in the vicissitudes of life, when work is not to be found, when an illness happens, for repose in old age, so as to create an independent position, or to endow with a fortune, or to favor in any other way the beloved members of their families.

In the month of December, 1891, 120,242 loans had been made on jewels and clothes, amounting to 8,378,603 pesetas, and 1,066 loans on public values that amounted to 40,369,903 pesetas; the first paying an interest of six per cent per annum, and the second four per cent per annum.

The books of the "Caja de ahorros" showed at the same dates 41,610 depositors, with a capital of 48,741,440 pesetas.

The establishments count a capital of 4,764,892 pesetas, that can be considered as reserve, and 3,328,936 pesetas, which is the value of the three buildings that belong to this beneficent institution.

MARIANO BELMAS.

SWITZERLAND'S BUILDING-MATERIAL STATION.¹

THE federal institution for the testing of building materials is placed under the direct supervision of the Federal school board, which is continually kept *au courant* of the management, the requirements and the results of examinations made at the station by a special commission selected from among the school-board. A technologist, appointed by the Federal Council upon the recommendation of the school-board, is charged with the superintendence of the station, and he performs the respective tests with the assistance of the necessary permanently-employed force.

The object of the institution is to ascertain the general utility of

¹ A branch attached to the Federal Polytechnic School at Zurich.

building materials, especially as to their cohesive power, in compliance with requests made by private parties or authorities; in addition thereto, it makes, of its own accord, tests and examinations of the same nature, which, in a general scientific and economic way, are of public interest.

In this institution, every kind of building and constructive materials is tested, but particularly natural and artificial building-stones, cements, timbers, metals, hemp and wire cables, chains and driving-belts, as well as completed constructions — parts of machinery or bridges — to ascertain the quality of materials, their elasticity and absolute strength. The station furnishes also chemical analyses of all these materials.

Requisitions from private parties, or from authorities desiring building materials tested and examined, are to be addressed in writing to the superintendent of the station. The latter shall immediately respond to the party making the request and execute orders as promptly as possible, according to the date on which the request was received. Should the employes or the machinery of the institution be overtaxed with work and the execution of an order require a period exceeding four weeks, the parties interested shall be so notified. The materials to be tested must be delivered to the station free of all charges. Expenses resulting from improper preparation or damages to materials while in transit are, in all cases, to be borne by the owners. The station provides the necessary tools, implements, etc., free of all charges, except the apparatus which may be necessary for testing exceptional materials, which are only rarely called for. In such case, the party in interest must pay whatever extra outlays are required. If such special apparatus can, thereafter, be of use to the station, the latter may pay part of the expenses, which, however, are not to exceed 50 per cent of the original cost, and it must then become the property of the station. The fee for any test has to be paid in advance. In case the fee has not been previously fixed, an approximate amount must be paid, and, whatever the balance, it can be settled after the test is made. To annual subscribers, a lower fee is charged.

The results of all the tests made are recorded, and a copy of the record, in the form of a certificate, is given to the patrons. This certificate must only state the results of the test, without mention of the purposes the material in question is to be used for. The superintendent is not allowed to give any verbal or written information regarding the tests to outsiders, unless he is specially authorized to do so by the party in interest. Results of tests will, however, be published in the general reports of the station, if the interested party does not object thereto, within four weeks after the receipt of his certificate.

The superintendent of the institution is in duty bound to make full annual reports to the school-board relative to the work done and the results obtained by the station. He shall also, from time to time, publish special reports on the results of special interest, defining the same as "reports of the building-material control station of Switzerland, at the Federal Polytechnic School, Zurich."

The tests of building timbers are:

1. *Complete examination.* — Indication of run of fibres, number and condition of knots in longitudinal cuts, determination of the average width of the annual layers, and of the modification in the width of the annual layers in a latitudinal direction of the structure; composition of the lineal layers, as well as the average proportion between spring and fall woods; determination of the degree of moisture, the density at the time of delivery and after being subjected to a temperature of 105° Celsius, the unit volume weight; determination of elasticity and resistance to traction and to compression, to trimming and to flexion; construction of the diagram of the resistance to flexion, and of the flexion work corresponding with the characteristic modification of the substance. The quality of material and the kind of preparation necessary for the trial pieces are prescribed in special regulations. The fee for one examination is 200 francs (\$38.60).

2. *Restricted quality examination.* — Determination of resistance to compression and flexion, construction of the working diagram of resistance to flexion. The material required for examination are three prisms, with sharp angular edges and planed surfaces, 12 by 12 centimetres (4.72 inches), in sections of 160 centimetres (63 inches) in length. The fee for one examination is 60 francs (\$11.50); the subscription fee for five examinations is 180 francs (\$34.74).

3. *Special examinations according to agreement made in each case.* — Each shipment of wood should as nearly as possible be accompanied by the following description: (a) An exact denomination of the kind of wood; (b) statement of the age and time of felling; (c) statement of origin and the condition of the land on which grown (if on south or north slopes, elevation above the sea, if from the interior of the forest or from the outside borders, etc.); (d) geological condition of the growing land (if moraine, sandstone, lime, argillaceous schist, or slate, etc.).

EUGENE GERMAIN, Consul.

ZURICH, November 9, 1894.

LONGEVITY BY STORIES. — A Hungar, an hygienist, recently investigated the effects of different stories on the length of life and found that the dwellers of cellars lived about 39 years and 11 months; those on the ground floor to 43 years and 3 months; those on the first and second floors lived to 44 years and 2 months, while those on the third and fourth floors only to 42 years. — *Boston Herald.*

ILLUSTRATIONS

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

THE HARVARD CLUB-HOUSE, W. 44TH ST., NEW YORK, N. Y. MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y.

[Gelatin Print issued with International and Imperial Editions only.]

ELEVATION AND PLANS: HARVARD CLUB-HOUSE, W. 44TH ST., NEW YORK, N. Y. MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y.

FIRE-ENGINE HOUSE, BATH BEACH, N. Y. MESSRS. PARFITT BROS., ARCHITECTS, BROOKLYN, N. Y.

A DUPLICATE of this structure is also building at Blytheburne.

DESIGN FOR A VILLAGE CHURCH. MR. J. W. NORTHPROP, ARCHITECT, BRIDGEPORT, CONN.

COMPETITIVE DESIGN FOR CITY-HALL AT COHOES, N. Y. MESSRS. WALKER & QUIMBY, ARCHITECTS, NEW YORK, N. Y.

HOUSE FOR A. L. PLIMPTON, ESQ., WEST ROXBURY, MASS. MR. E. L. CLARK, ARCHITECT, BOSTON, MASS.

[Additional Illustrations in the International Edition.]

ENTRANCE-HALL: HARVARD CLUB-HOUSE, W. 44TH ST., NEW YORK, N. Y. MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y.

[Gelatin Print.]

STAIRCASE OF THE SAME.

[Gelatin Print.]

BILLIARD-ROOM OF THE SAME.

[Gelatin Print.]

DETAIL OF ARCHWAY, TEMPLE GARDENS, LONDON, ENG. E. M. BARRY, ARCHITECT.

PROPOSED COTTAGES, WEST BRIGHTON, ENG. MR. G. M. JAY, ARCHITECT.

VILLA FOR T. G. HEAD, ESQ., STOURWOOD, BOSCOMBE, ENG. MESSRS. DANCATER & TAYLOR, ARCHITECTS.

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.]

THEODORIC OR THEODOSIUS?

1040 DRENEL BUILDING, PHILADELPHIA, PA., July 15, 1895.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—In an editorial in your last issue, in noticing M. Charles Lucas's translation of the instructions given to architects by "Theodoric, King of the Goths," through Cassiodorus, his secretary and counsellor, I find some discrepancies between the version of M. Lucas and that of an earlier writer.

M. Lucas names two architects, Aloisius and Daniel. In the "Architectural Director or Pocket Vignolia," written by John Billington, architect, and published about 1845—the date of publication not being in the edition that I possess—the letter referred to is given entire with the following heading: "Nothing can give us a higher idea of the esteem enjoyed by the architects of antiquity than the letter of the Emperor Theodosius to the Architect Symmachus, which is here given as Cassiodorus has transmitted it to us." The letter is a lengthy one and contains all the quotations that you make use of, together with some brief allusions to the progress of architecture from the "Cyclops who built in Sicily edifices as spacious as the caverns which they had abandoned," down through

their posterity, "rivals of those first architects who profited from their inventions and employed them for their necessities and comforts."

The translation of M. Lucas also shows a discrepancy in the name of the ruler under whose instructions Cassiodorus wrote. He is therein spoken of as "Theodoric, King of the Goths"—temp. c. 454-526. While Billington speaks of the Emperor Theodosius—temp. c. 346-392.

Which of the two versions is the correct one?

Very truly yours, GEORGE C. MASON.



BOSTON, MASS.—*Summer Loan Exhibition; Gobelin Tapestries; Japanese Paintings; Line Engravings, Mezzotints, and Etchings by Rembrandt: at the Museum of Fine Arts.*

NEW YORK, N. Y.—*Twenty-eighth Semi-annual Exhibition: at the Metropolitan Museum of Art.*

Summer Charities Loan Exhibition: at the American Art Association Galleries.



AN IMPROVEMENT IN STEEL MANUFACTURING.—The Cleveland Rolling Mill Company has just completed a successful experiment in connection with the manufacture of steel, which will save the Company one dollar on every ton of steel, or about \$200,000 every year, and will, besides, improve the quality of the finished product very materially. The experiment was a novel one and to the uninitiated mind it must seem audacious. It is, in brief, the transportation of immense ladles filled with molten metal over a railroad used by passenger and freight trains for a distance of five miles. Within an hour after the molten mass has streamed through the tapping-hole of the central blast-furnace it may, if necessary, be in the converter, from which it comes out molten steel. The object of the experiment, which was begun less than a month ago, was a triple one, to save money, to save labor and to improve the quality of the steel. All these objects have been attained and the new method will be used henceforth. The Cleveland Rolling Mill is the third to adopt it, as the process is now in use at the Carnegie Works and the South Chicago Mills. The old method of transporting iron from the central blast-furnace on the flats near the Central Viaduct to the rolling-mills in the South End was a tedious and expensive one. Formerly, when the furnace was tapped and the metal in a molten condition poured out, it was conducted in the runners or grooves in the sand, below to the "pig bed." The "pig bed" consists of a main central groove or trough in the sand, through which the metal runs, and hundreds, or thousands, according to the magnitude of the works, of smaller grooves in the sand below the furnace into which it is conducted and where it becomes cold and hard, maintaining the shape of the groove, becoming what is known as a pig of iron—that is, a block about three feet long and weighing about 200 pounds. In the old way, which is that usually followed, when they became hard, these pigs were broken up, loaded in cars and transported in that way to the mills, where they were re-melted, so that they might be ready for the converter. This necessitated the employment of a number of men to break up the pigs, a number to load them, a number to unload them and take them in barrows to the cupola for re-melting, and it was, besides, a slow process. By the new process, the handling of the pigs of iron at the blast-furnace is saved and also their second handling at the mills; the coke used formerly in re-melting is saved; the waste of metal by the second melting in the cupola is saved, and the metal is prevented from acquiring the sulphur from the coke in re-melting, as well as other impurities which would decrease the amount of the ferro-manganese. The total estimate as approximated by Manager Craig of the mills, is \$1 per ton of steel saved, or \$200,000 every year, which is no small item.—*Cleveland Leader.*

A FELICITOUS PHRASE.—Sincere thanks are due to Mr. J. M. Tower not only because he wrote to the Police Commissioners and asked them to prevent certain vandals from robbing the Bowery of its three ancient milestones, and thereby showed his intelligent interest in such relics of the past as the city still has to show, and his praiseworthy desire to have them preserved, but because his letter contained a phrase which, in eight words, gave a most admirable and perfectly adequate explanation why all mankind should, and why a large portion of it does, regard things like these old milestones as of great value and is deeply pained whenever one of them is destroyed. Misguided people are accustomed to bring forward mere age as a reason for guarding antiquities of various kinds long after they have ceased to serve any obviously practical purpose, and often after they have become something of a nuisance. Age in itself, however, is never venerable, and the other arguments of archaeologists in defense of their passion for ugly and musty reminders of the days that are gone are rarely any better founded than this one. Mr. Tower, on the contrary, goes straight to the question's heart when he says of the milestones—and, by implication, of everything else of the same sort—"these give variety to one's thoughts in passing." What finer, or truer or more

concise statement of the case could be made? It both explains and justifies, for the first time perhaps, the whole science of archaeology, and protects forever its votaries from the contempt of Philistines and the sneers of ignoramuses. Whatever gives diversity to thought is of manifest worth, should be tenderly protected from harm, and is entitled to high consideration.—*N. Y. Times.*

BOOK-STACK SHELVING.—By common necessity, any architect in active practice is constantly inventing some method or device for accomplishing some constructive adjustment peculiar to the building he may be at work on. Ordinarily these adjustments are of special and not general applicability, and so the architect rarely thinks of covering his invention with a patent. Yet constant practice certainly does develop the inventive faculty highly and it is a little strange that so few patents are taken out by architects. Now and then, however, some thing is devised that promises to be generally useful and is so simple in its parts and so easy of manufacture as to warrant an attempt to put it on the market. This is the case with a very ingenious device for the support and easy adjustment of shelves in fireproof library stacks which has just been invented by Mr. W. M. Poindexter, architect, of Washington, D. C. In its essence it consists of small balanced cams fixed at short intervals in the side edges of the front uprights of the stack supports. To describe it farther would require so many words as to obscure the real simplicity and workability of the contrivance. It is enough to say that it is simple, unbreakable and more easy of manipulation than any similar device for the intended purpose.

THE SPITZER ART SALE.—Transatlantic dollars have played a very important part in the sale of the great Spitzer art collection, which has just been brought to a close, the most important sale of its kind during the present century. Among the largest purchasers have been Mr. Riggs and the Duc de Dino, whose money comes to him through his American wife, formerly Miss Adele Sampson, of New York. Their principal purchases have been of mediæval weapons and armor, their collections of which rank among the most important in the world. That of Mr. Riggs, I understand, is destined for his native city of Washington, to which he proposes to bequeath it at his death. The Duc de Dino shares with his intimate friend and associate Henri Rochefort the distinction of being rated among the most perfect connoisseurs in Europe of curios of this kind, as well as of art bric-à-brac, and I often think what a pity it is that the State cannot find some means of turning to public account the unrivalled knowledge and genius which they possess in this particular. What Parisians will do, now that the Spitzer collection has been dispersed, it is difficult to tell. The Spitzer mansion, just off the Avenue du Bois de Boulogne, has, ever since I can remember, been one of the sights of Paris, crammed as it was from cellar to garret with a unique collection of works of art, each article a masterpiece of its kind. I cannot help thinking that, had Gambetta lived a little longer, this collection would have remained with us forever, instead of being scattered to the four corners of the earth. For he was never tired of urging upon fat little Mr. Spitzer, who was the son of a cemetery-keeper at Vienna, to present the entire collection as it stood to the nation, as a lasting and glorious memorial of his name, the fame of which would extend permanently throughout the world. If Spitzer had one failing, it was that of vanity and self-glorification, and it was upon this string that the eloquent French statesman used to harp in order to induce the collector to comply with his suggestions, which I am certain he would have done had not Gambetta's life been cut short so prematurely and suddenly.—*Paris Correspondence of the N. Y. Tribune.*

THE DIAMOND SHOALS LIGHTHOUSE.—From observations made by the Lighthouse Board it appears that the second attempt to erect a lighthouse on the dangerous Diamond Shoals off Cape Hatteras, N. C., has failed. Just what steps will be next taken to guard the important coastwise traffic against the perils of this place—a veritable graveyard of ships—has not been determined. The shoals lie off Hatteras about ten miles, and in bad weather when aids to navigation are most necessary, the powerful Hatteras light is unable to cast its warning beams far enough out to sea to guard against disaster to ships. Some years ago the Lighthouse Bureau, obtaining a large appropriation from Congress, made a contract with an experienced firm of lighthouse builders to erect a lighthouse on these shoals. The plan of construction was to sink vast cylinders of heavy boiler-iron down through the water and the many feet of shifting sands below to bed-rock. These cylinders were to be filled with concrete and made practically a solid rock upon which the lighthouse was to be erected. The contractors took the job at their own risk, but after making several expensive attempts they threw up the work. Last year the Lighthouse Bureau undertook the work itself, this time on a new plan. This was based on the use of heavy iron piles driven by hydraulic jets deep down in the sands, through which the seas were to be allowed full sweep, while the lighthouse perched far above the waters on top of the piling. A few weeks of fine weather last Fall enabled them to put in a quadrangular pyramid, upon which a superstructure was erected, and at this point the Fall storms came along and the work was suspended for the year. But when an inspection was had recently, preparatory to resuming the work, it was found that the great waves had played havoc with this structure. Nothing remained of the superstructure and the piling that stood was twisted into cork-screws. The effect of the surges on the ironwork was sufficient to convince the inspectors that no structure of the kind could stand against it. The piles appeared to remain firmly in the sand at the bottom, but at the surface where they received the full force of the waves they were carried away and could not be maintained by any device. So the Diamond Shoals Lighthouse is still a problem for engineers. The difficulties which thus far have been encountered far exceed those overcome in the case of the celebrated Eddystone Light.—*Philadelphia Press.*

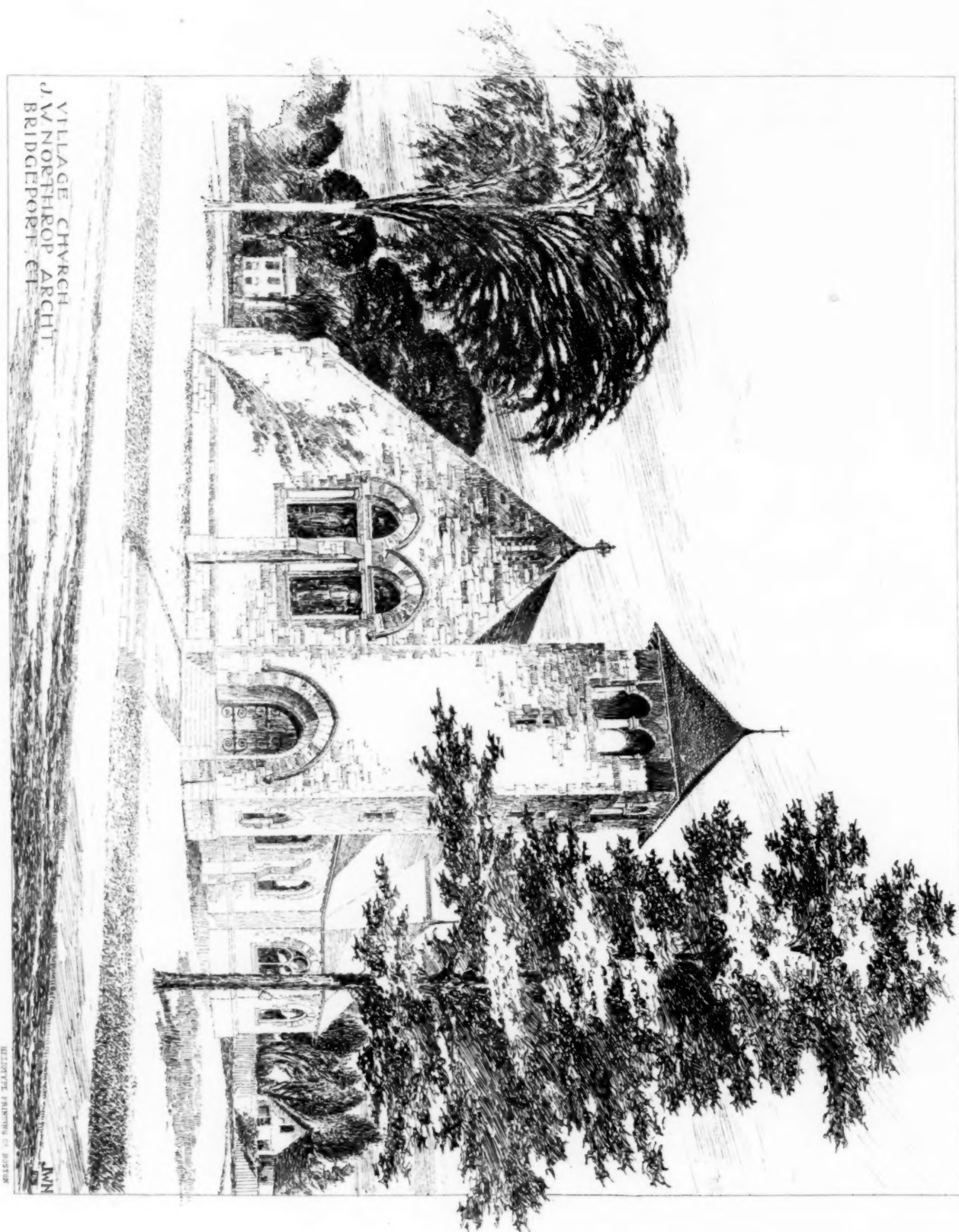
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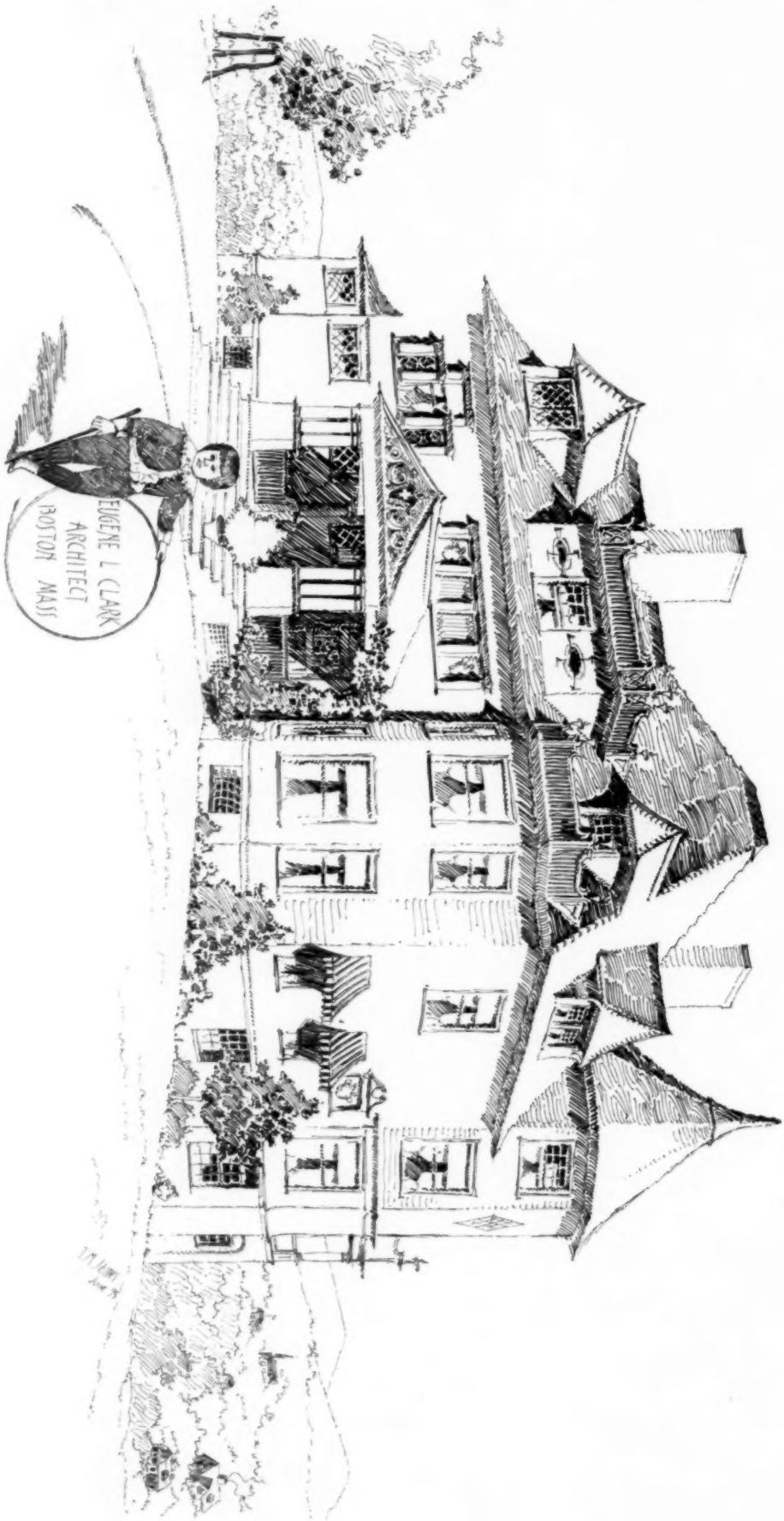
FIRE ENGINE HOUSES
AT BATH BEACH AND
BLYTHEBOURNE

DESIGNED BY A. SCHREINER
PLANNED BY
THE ASSOCIATION
BETHLEHEM, PA.



PARFITT BROS.
ARCHTS. BROOKLYN

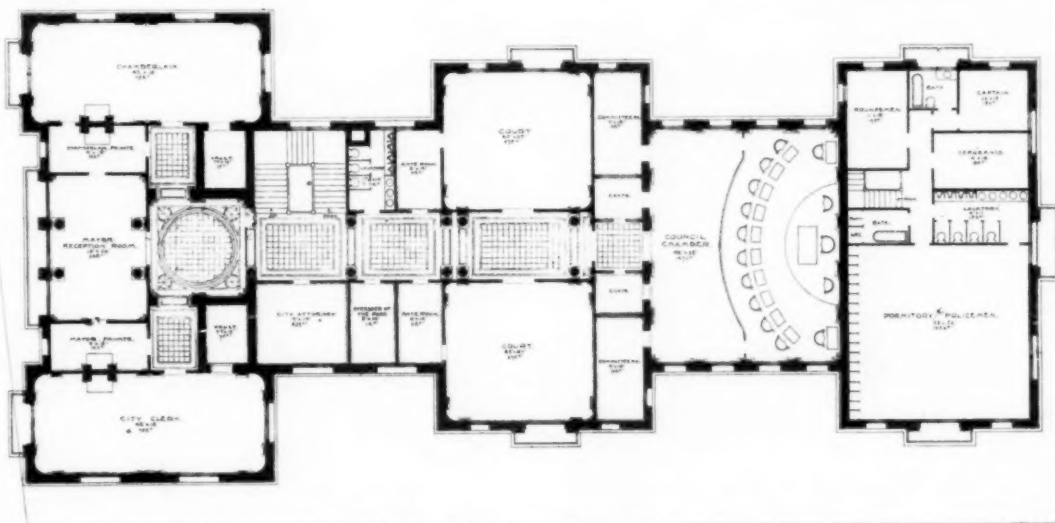
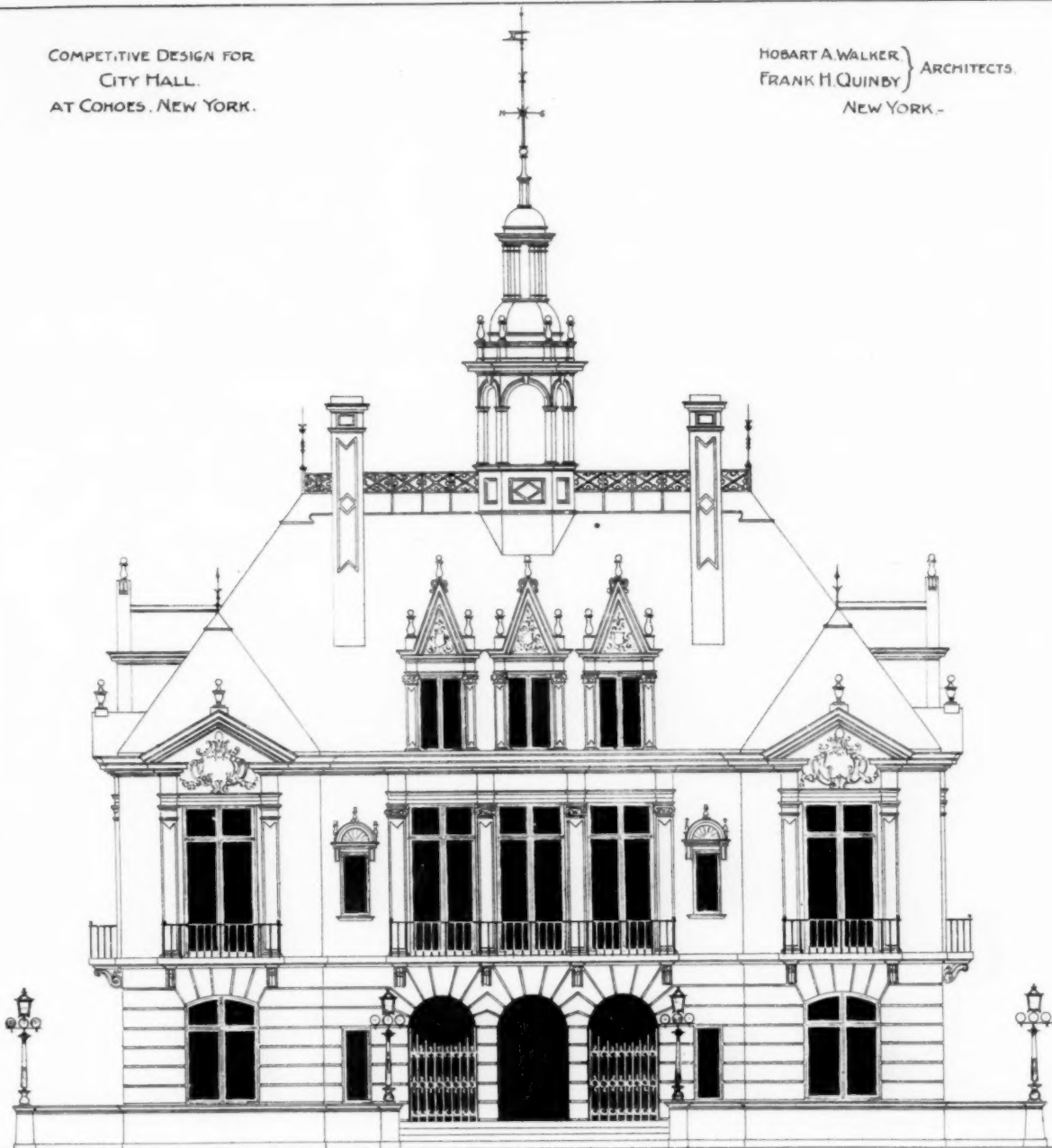
AT WEST ROXBURY
MASSACHUSETTS
HOME FOR A. L. PLIMPTON



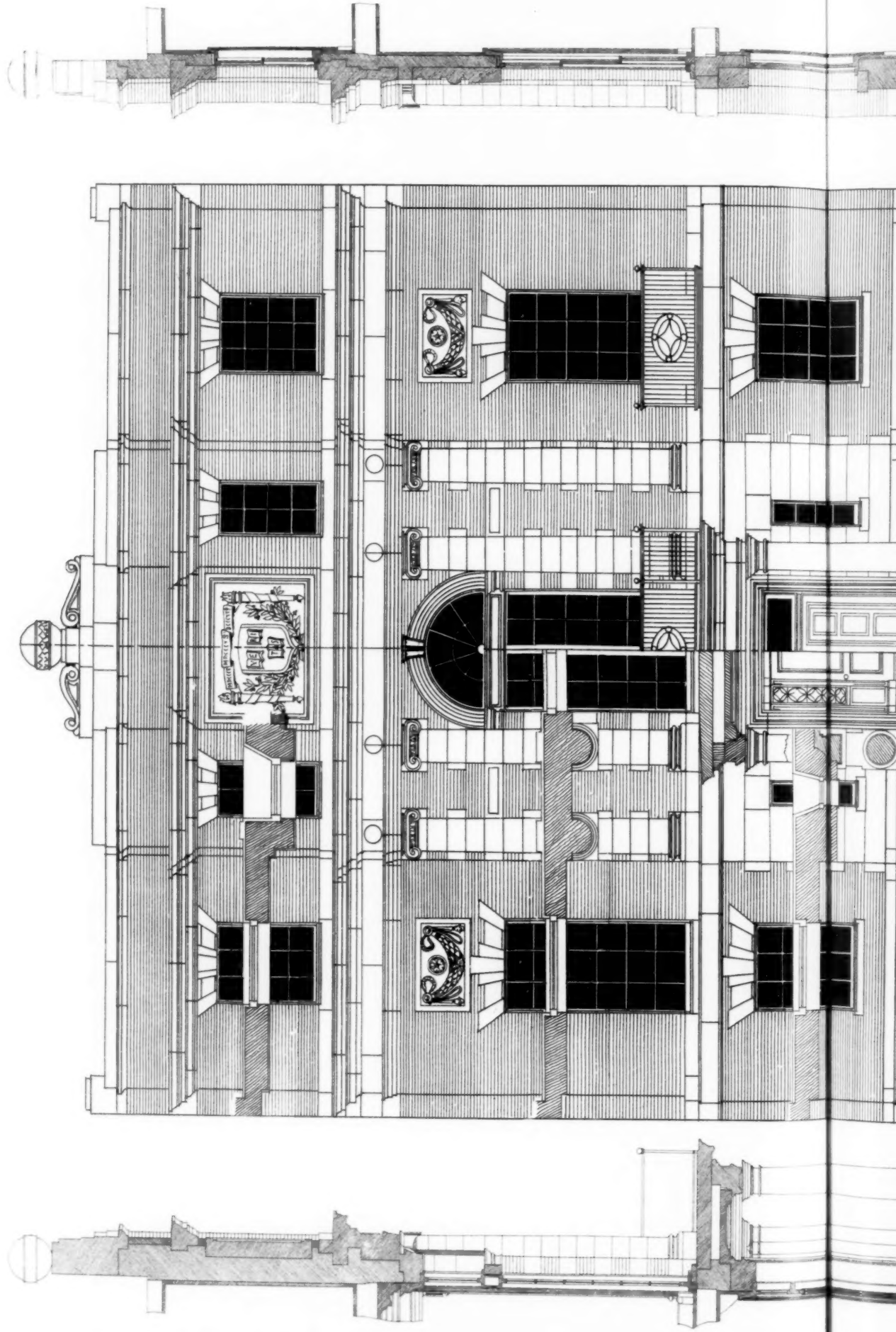
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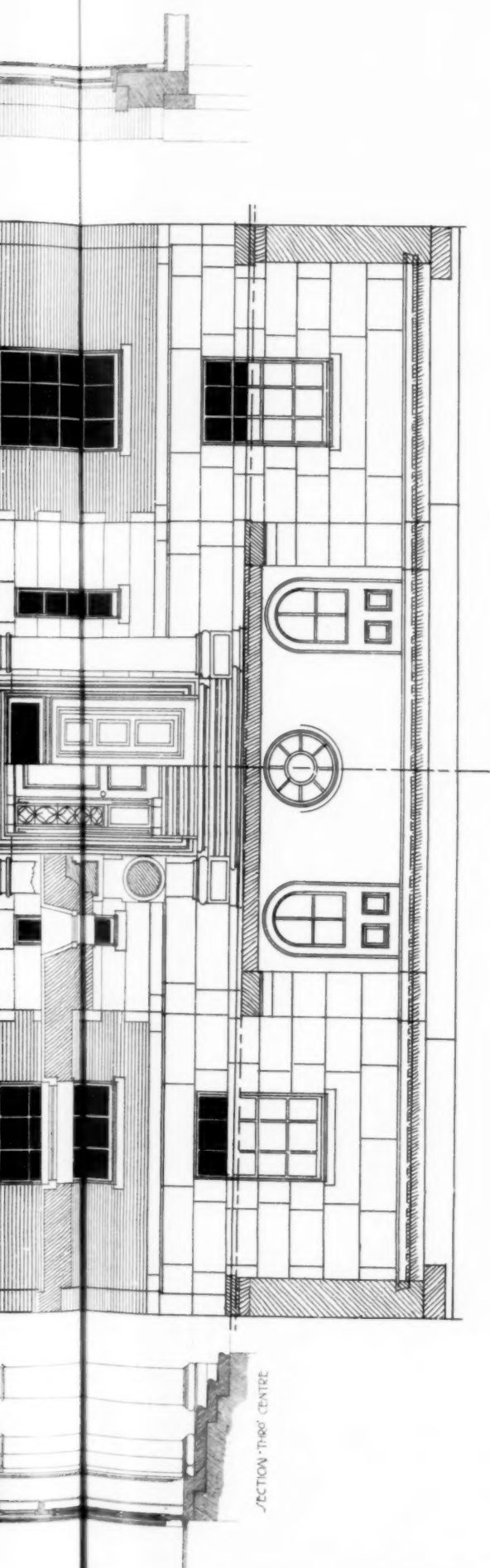
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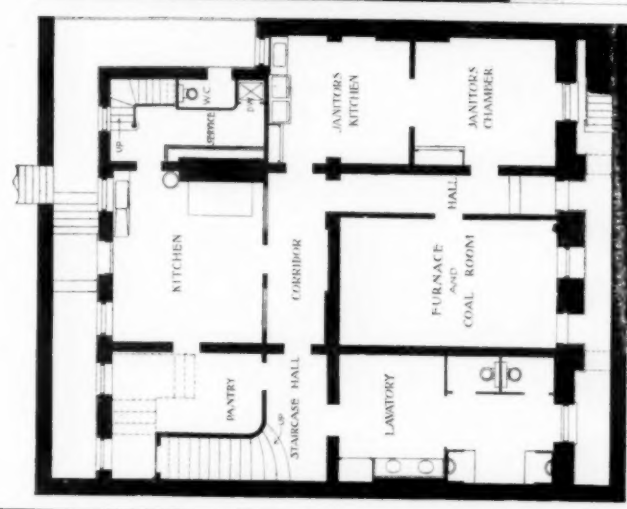


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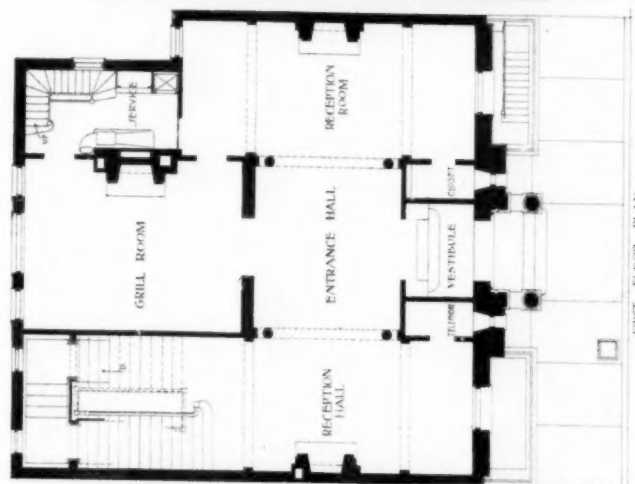




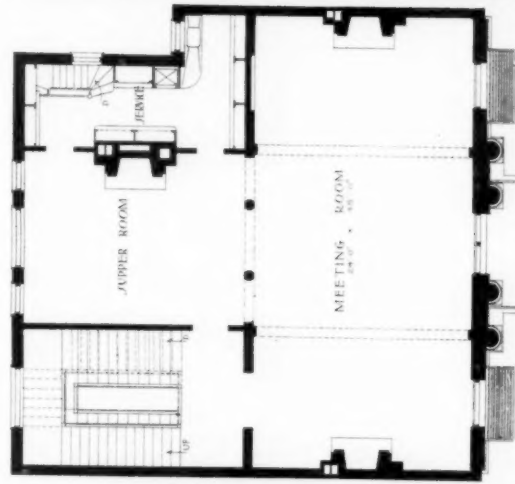
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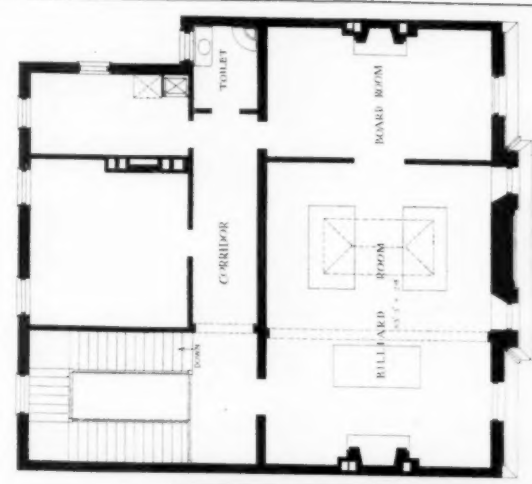
BASEMENT PLAN



FIRST FLOOR PLAN



SECOND FLOOR PLAN



THIRD FLOOR PLAN

HARVARD CLUB-HOUSE, WEST FORTY-FOURTH STREET, NEW YORK, N. Y.

McKIM, MEAD & WHITE, Architects.

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