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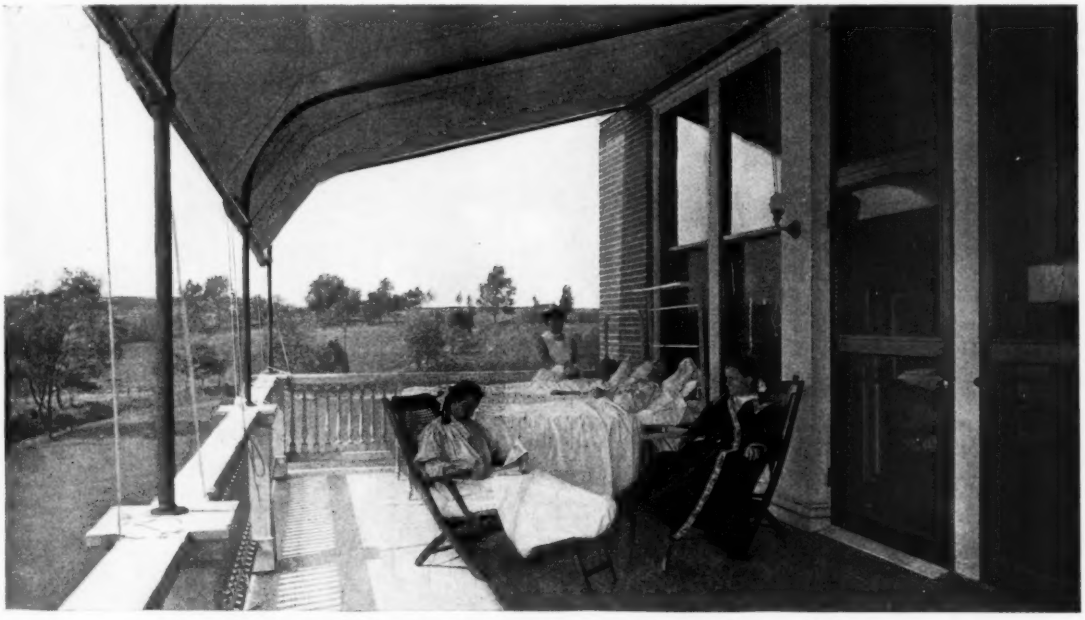

AIRING BALCONY AT BEVERLY HOSPITAL, BEVERLY, MASS.

DETAILS AND EQUIPMENT OF HOSPITALS*

By EDWARD F. STEVENS, A.A.I.A.

HAVE read over the reports of the last three years, as well as the reports of other papers on hospital planning and construction which have been given, and I find that the field has been pretty well covered from every point. It may be that the writer of one paper has insisted that no ward should be larger than six beds, while another states that a twenty-bed ward is the best to administer; that one thinks the utilities should be placed in a corner toilet tower while another believes these utilities should be placed in a less prominent position. In studying these problems of hospital planning with many superintendents in all parts of the world, I am led to the belief that what may be perfect and complete in Northern Canada would be simply ridiculous in Florida; that what would be complete in Germany would be lacking in detail in America; and I believe that the planning of the hospital is unlike the planning of any other building for it must be developed for the climate and the environment in which it is to be built, and no rules can be laid down which would apply equally well to all parts of the country.

*Résumé of an address entitled "Details and Equipment of the Hospital." Delivered by Mr. Edward F. Stevens, A.A.I.A., Before the American Hospital Association at its Thirteenth Annual Conference, held in New York, September 19, 1911. Being a Report of the Hospital Construction Committee.

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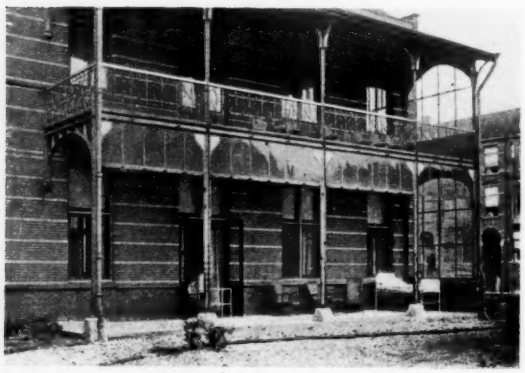
INTERIOR DOOR FINISH

So I shall not discuss at this time the construction and planning of the hospital, but shall take for my subject the "Details and Equipment of the Hospital"—comparing the American with the European work, and, in taking this branch of the subject, I will not be trespassing so much on the field already covered by my predecessors.

I think it was our own Dr. Emerson who said, in a paper presented a few years ago: "A hospital building is a piece of medical apparatus for use in the treatment of patients." If that is true about the hospital building, is it not more true about the interior details, the equipment and furnishing of the hospital?

By presenting some of the things which I have been able to photograph myself, or to secure from other sources, it will give you some idea of the way other hospital men in other countries, as well as this, have solved some of their problems.



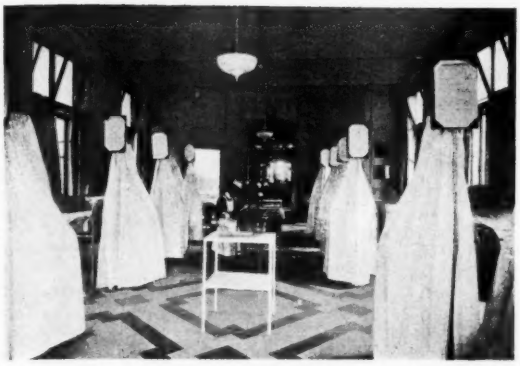
AIRING BALCONY, UTRECHT

AMBULANCE ENTRANCE, BROCKTON HOSPITAL, BROCKTON, MASS.

Construction

The interior finish and details of a hospital are of considerable importance when the economic and hygienic side is considered, whether finish is to project with edges and mouldings to catch dust or to have a smooth surface. In the modern German hospital one rarely sees any projecting member, and I am speaking now of the portion of the hospital set apart for the care of the patients.

The door jamb may be of iron or wood, but it is sure to be of the simplest detail. The iron jamb is quite likely to be continued through the wall and around the opening in tiles as is well illustrated in the private hospital of the "Merchant" in



MATERNITY WARD, UTRECHT

Vienna, or in the plain finish at St. Georg's in Hamburg.

But while this finish above the floor in the foreign hospitals is well-nigh perfect, the joining of the door jamb to the floor in nearly every hospital which I visited in Europe is, to my mind, very bad, as it leaves an untidy angle impossible to clean. If this door jamb is cut away and the base carried through as is shown in the illustration, which was taken in Grace Hospital at Detroit, it is almost impossible for any dirt to collect. This base and jamb is set before plastering, so that every part of the finish is smooth with the wall. This same character of finish should also be applied to the windows. The American door manufacturers certainly make better and more sanitary doors than in any country I have visited. The one-panel or no-panel "slab" doors now being used in the modern American hospitals are to be preferred to those used abroad. The hardware is a small item but should always be selected for its suitability. The angle door knob or handle as seen in the German hospitals has many advantages over the glass knob. Invisible hinges, boxed strikers and non-projecting hardware can be used to advantage.

REVOLVING BALCONY UTRECHT

The ever present question, "What is the best floor?" is often met with and is hard to answer. This question I asked of the leading architects and hospital men in Europe and the almost universal preference seemed to be for tile, a light grey pebble finish vitreous tile; the next favorite for a hard or dense floor was terrazzo, while one would see everywhere on the Continent the Battleship linoleum. This, cemented as it was to the construction and laid against a tile base, made a very hygienic, noiseless floor. One would hardly ever see wood used for floors, while linoleum was used not only for floors but for table tops, stair treads, screens and even for door panels. In my own practice I have found that linoleum is the best all-around ward or private room floor because of its noiseless and sanitary qualities.

SOLARIUM, COREY HILL HOSPITAL, BROOKLINE, MASS.

The exterior details of the hospital are important but should be made subservient to and expressive of the plan and to fulfill the mission of the hospital. The entrance should be dignified and express its use as far as possible.

The prevailing idea of surgeons and physicians that the patients should be in the open air as much as possible makes it necessary for us to design airing balconies and roof wards. The hospital at Utrecht, in Holland, had many excellent features,

GENERAL WARD AT BEVERLY HOSPITAL, BEVERLY, MASS.

one of them being the extensive airing balconies. These airing balconies are used very extensively wherever they are provided. The roof wards are used extensively in this country. Provision should be made in those roof wards for diet kitchen and toilets the same as for regular wards so that the patients could be cared for night and day if necessary. The airing balcony, however, cannot always be in the sun and the clever director of the Utrecht Hospital has had a

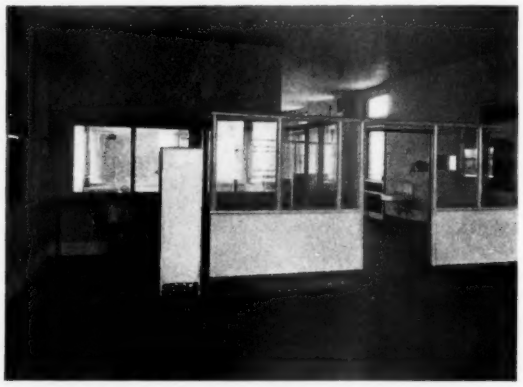
MALE WARD, HEYWOOD HOSPITAL, GARDNER, MASS.

revolving balcony built, which follows the sun or can be placed to shield the patient from the wind.

The solarium is, of course, useful as a day room, but unless well ventilated is apt to get pretty stuffy. It can be made attractive with palms and flowers.

Why not make the whole ward a solarium, as was done at the Beverly Hospital? The windows made large, extending low enough so that the patient could look out while lying in bed, and high enough to secure the maximum of sunlight. In the European hospitals, casement windows are used, as well as transoms, but one hardly ever sees the unsanitary roll shades. The washable linen curtains are used and make the ward much more homelike.

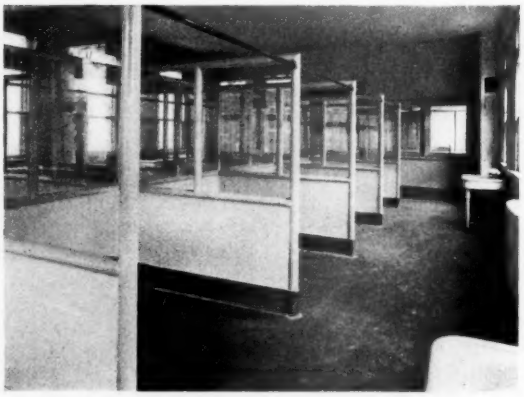
Artificial lighting for the general illumination of the ward, using a reflecting light, is much less trying for the patient.



GLAZED DIVIDING PARTITIONS, ISOLATING DEPARTMENT, JOHNS HOPKINS HOSPITAL

Note in the illustration of the Heywood hospital that the ward is flooded with sunshine, as each bed is near a window.

In the German and Holland maternity hospitals, the babies are always kept in the same room with the mothers and the draping of the bassinets is sometimes quite grotesque. This hospital at Utrecht was



OBSERVATION WARD, CHILDREN'S BUILDING, JOHNS HOPKINS HOSPITAL

HEATED FOOD WAGON, AMSTERDAM HOSPITAL

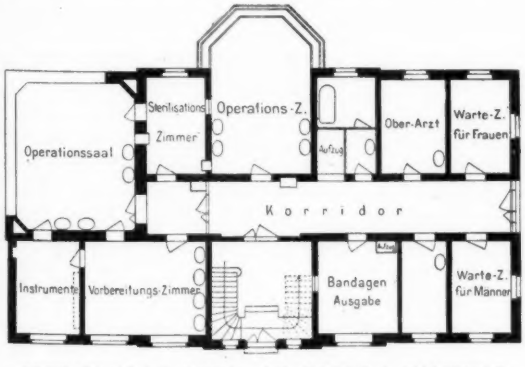
one of the best equipped that we saw. (Note here again the reflected light.)

In the illustration of the interior of Johns Hopkins Hospital, it will be noted that Mr. Butler has used the glazed dividing partitions for the rooms in the isolating department, similar to that seen in the Pasteur at Paris.

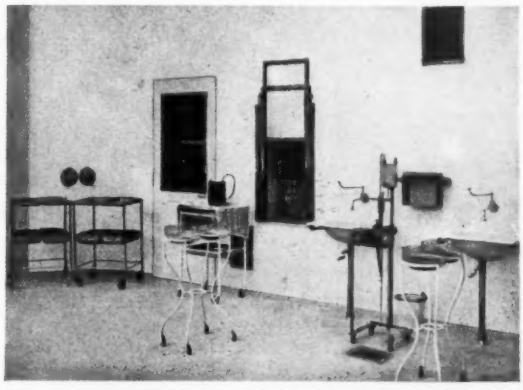
The observation ward of this institution has the unique feature of having in the same room children infected with different diseases, for observation purposes, dividing the cases only by a glass partition some eight or nine feet high. Scrub-up bowls occur along the outside wall. There is a free circulation of air everywhere and why is this not a simple solution of a small contagious hospital? Perhaps the cubicals like the Pasteur, where one room is absolutely cut off from another, would be a little safer; but I believe that for the small contagious hospital, there is no necessity for separate buildings for the different diseases; for with proper isolation of the buildings and precaution by everyone visiting, and the observance of the laws of antisepsis, these cases should be as safely cared for without danger from cross infection as in separate buildings.

Of course, all utensils, china, and everything about the patients should be sterilized and in this way there would be no necessity for keeping the china of the different cases separate.

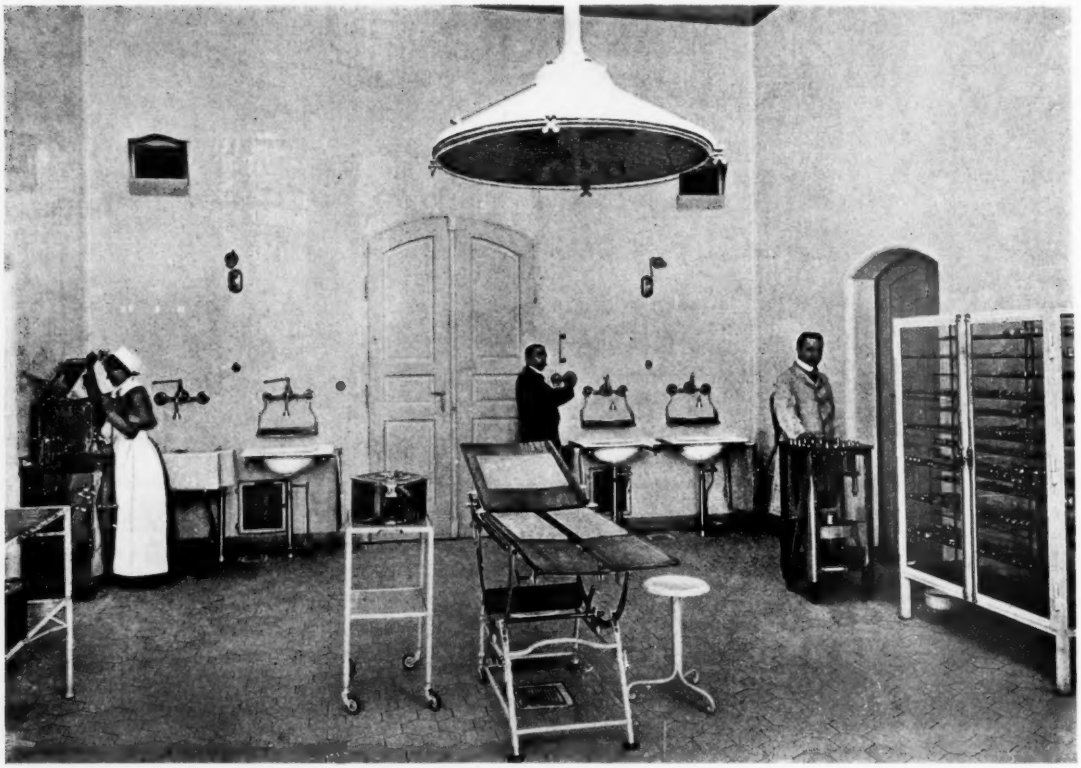
On the Continent one sees very few nurses bed-side calls—either bells or otherwise. The patient must wait until the nurse makes her rounds. In an American hospital, however, nurses' calls from the patient's bed seem a necessity. I cannot recommend too strongly the doing away with the noisy clamor of the ordinary calling system for the nurse and doctor. I think the bell system should be relegated to the shop and factory where noise is expected, as noise begets noise, and no matter how many "*Silence*" signs there are, if the electric call bell is rung whenever a patient wants to turn in bed, there will be other noises to drown the sound of the bell. With the simple devices of electric light calls now on the market, the working of which is simpler than the electric bell itself, I think that the system should be so arranged that the patient after once pressing the button could not cancel the call, and, at the same time the nurse should only have to go to the patient and not to the wall behind the bed to cancel it. A system of this nature has just been installed in the Grace Hospital at Detroit. A simi-



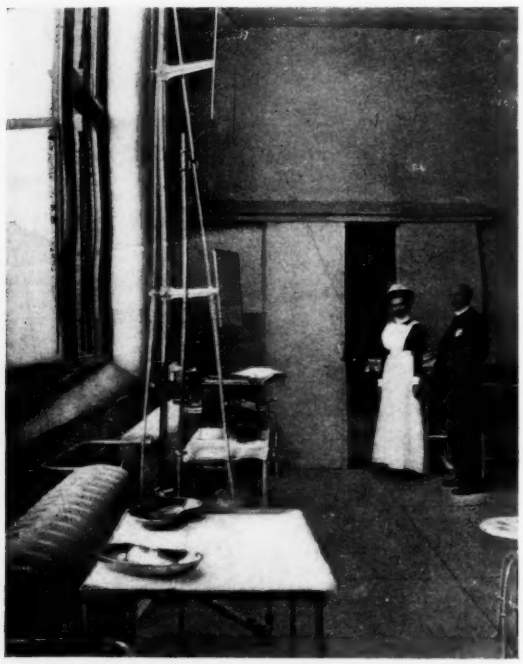
OPERATING BUILDING, ST. GEORG'S, HAMBURG



STERILIZING ROOM, BETWEEN ASEPTIC AND CLEAN ROOMS, ST. GEORG'S, HAMBURG



OPERATING ROOM DRESDEN HOSPITAL. SINGLE LARGE REFLECTORS ARE USED IN MANY OF THESE ROOMS

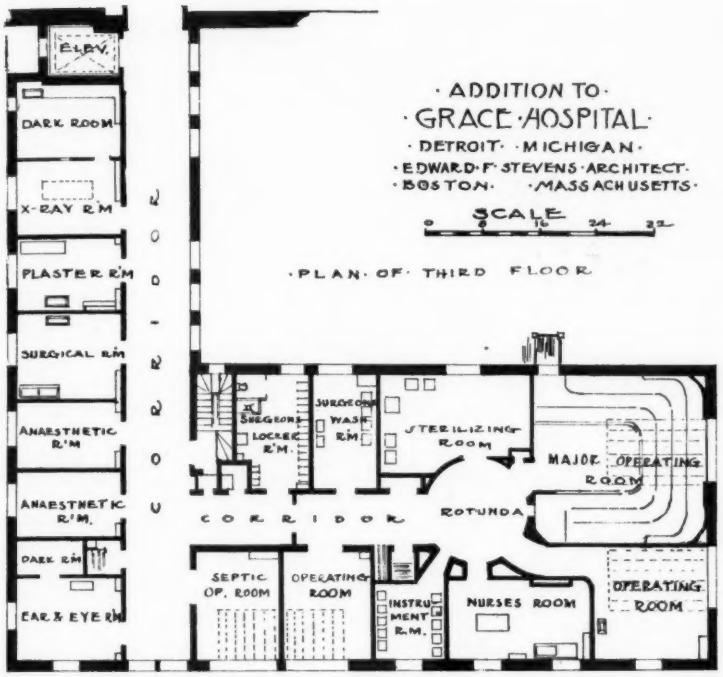


REFLECTED LIGHT UTRECHT

lar system for calling the internes was also installed; the signals are set from the main office and by different colors and positions of electric bulbs the different doctors are signalled to answer. They go to the nearest house 'phone and call the office for instructions, then the call is cancelled.

The carrying of food from kitchen to patients is a very important item in hospital economics. In the great Steinhof at Vienna, where 3,000 patients are scattered over 350 acres of land, the food is carried in electric cars and in an incredibly short time is in the various serving rooms. In the smaller hospitals, push cars are used. At Utrecht, this was a heated car, while in some of the German hospitals the two-wheel cart with cans hung upon the high rails were used, while the simple open carrier is sufficient for short distances. I believe that a food carrier made on the principle of the fireless cooker should be used for long distance transportation.

The equipment of the sink room is growing in importance with every new hos-



pital. Less is made of this room in the European hospitals than with our own. The sink room becomes the work room, the laboratory, the repository for all dirty ward work. In this room there should be the sterilizers for stools and bed pans; these with the automatic lifts make the work of absolute cleanliness much easier, also the ward incinerator (and this I consider almost a necessity in the modern hospital); and the sinks, the blanket warmers, the bed-pan warmers, the mops and brooms for cleaning are all essential. This room should have large doors and above all things should be well ventilated, lighted and heated.

Operating Building

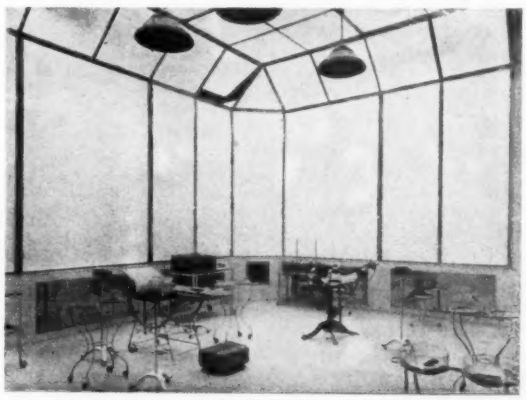
It was a very noticeable fact that even in the large German hospitals there were but few operating rooms as compared with the number of patients. Even in the great Virchow there were but four. In the St. Georg Hospital there are but two—a clean and a septic. In the clean operating room the walls on two sides and ceiling are of glass and double, with spaces between for heating of these rooms. The sterilizing room is placed between the septic and clean rooms entering from the clean and from the corridor, there being windows, however, into both rooms, and at those windows are the instrument sterilizers, which can be reached without leaving the operating rooms. The anæsthetic room also joins. The artificial lighting is accomplished by means of three dome-shaped ceiling fixtures with numerous high candle-power lamps.

In other German hospitals single large reflectors were used in the operating room.

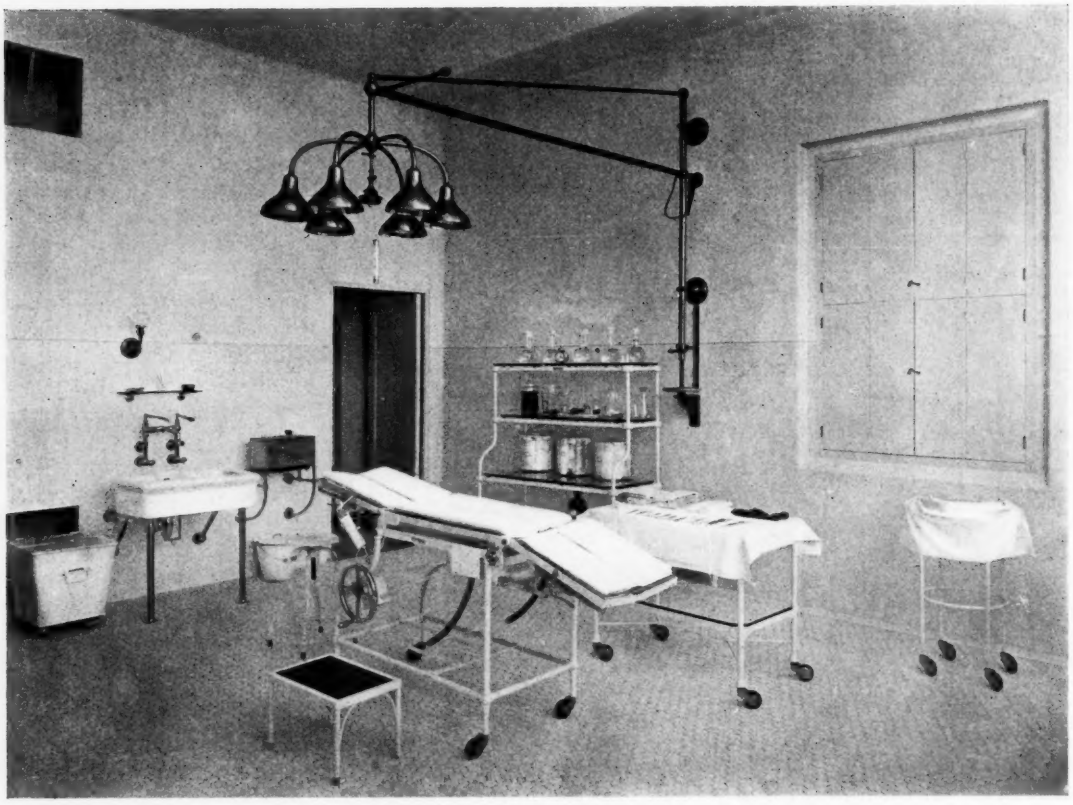
I have used the type of fixture shown in the illustration with good success. This shows a crane swinging to the centre of an eighteen-foot room; this fixture at the Beverly Hospital has the advantage of being swung back out of the way and leaves no dust-retaining surfaces above the operating table, and can be raised or lowered at will.

We, in our investigations abroad, found that the reflected light from a high power arc lamp in an adjoining room, shining through an opening in the wall and reflected from one mirror to another and thence to the seat of operation, was very successful.

I believe the day of the large amphi-



ASEPTIC OPERATING ROOM, ST. GEORG'S, HAMBURG



OPERATING ROOM, SHOWING CRANE, BEVERLY HOSPITAL, BEVERLY, MASS.

theatre for major operations is over and the smaller rooms with movable observation stands, where the student or observer can get near the patient, should take its place. The view of the Douglas Operating Building at Brockton shows a room which I believe is the most compact and serviceable I have ever seen on this continent or the other.

No hospital nowadays is quite complete without its Roentgen or X-Ray room and apparatus. The styles and sizes of the apparatus and character of the work done varies with the institution. The Roentgen Institute, as this department is called in the German hospitals, is made much of—occupying in the case of St. Georg's the entire second story of the operating building.

Bath House

Occupying a position of equal importance with the operating department in the German hospitals is the bath house, this building occupying the same relative position on the medical side that the operating building does on the surgical. In this building are located the various baths as will be seen by the plan, with its electric, steam, sand, douche, brine, CO_2 (carbon dioxide), hydro-electric, etc.

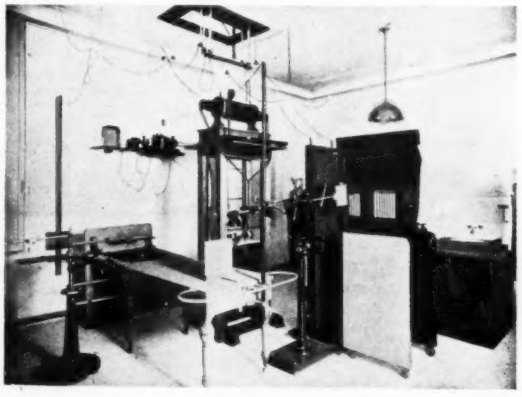
I thoroughly believe that in America we should do more for the medical side of our staff in the way of special rooms and equipment for baths, muscular development and exercise of various forms. It is not uncommon on the Continent to see a well-equipped gymnasium and mechanical massage room in the hospital.

The method of sterilizing and tempering the air in the St. Georg operating room was most interesting. In the section shown through the major operating room you will notice that the outer sash is double and air is conducted entirely around this hollow space—warming in winter and cooling in summer, the floor, the walls and the ceil-

ing. Additional heat in winter is secured from direct radiators behind thin nickel plates in the walls as shown in photograph,

OPERATING ROOM, BROCKTON HOSPITAL, BROCKTON, MASS.

but allowing no air from this source to enter the rooms. The air for the operating rooms is first brought into a clean chamber where it is passed through ground coke, thence over heated coils in winter and ice in summer, through into the fan where it is driven through a filtering substance of fine sand and gravel and thence taken to the operating rooms practically free from all bacteria. The ceiling vents in the operating rooms are closed and there is a



X-RAY ROOM, ST. GEORG'S, HAMBURG

sufficient pressure outward so that the opening of any door would not admit any foul air. This may have been carried to a refinement beyond what would be necessary to follow, but it certainly was a well developed plan.

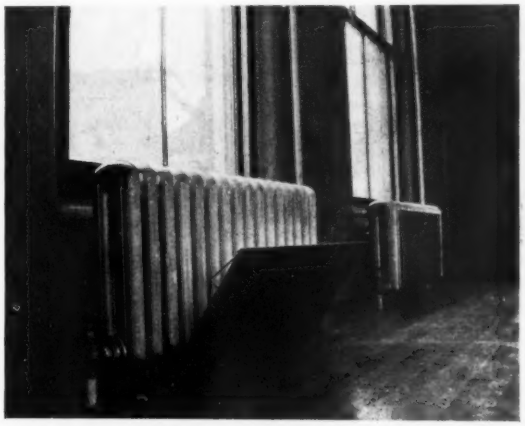
Heating

While it is not my intention to go into the subject of heating and ventilation of hospitals, as that is too broad a subject to take up here at this time, still I want to present a few simple ways which have been called to my attention.

At the Franz Josef hospital at Vienna the combination shown in the illustration

PRIVATE ROOM WASH BASIN, GRACE HOSPITAL DETROIT, MICH.

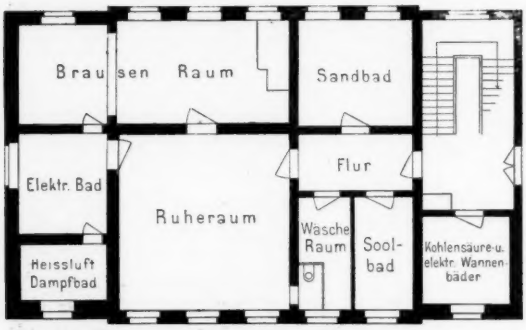
is used. This section seems self-explanatory; either the air comes from ducts below —passing over the radiators, or, by manipulating the valves, the air of the room is circulated. I noticed that in the General Hospital at Vienna a system of "direct-



DIRECT-INDIRECT RADIATION, QUINCY HOSPITAL QUINCY, MASS.

XUM

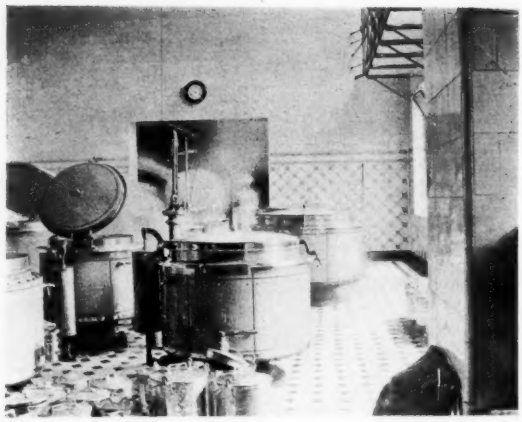
indirect" heating was adopted for nearly all the rooms and corridors, introducing the fresh air from outside at the top of the direct radiator, depending on the natural tendency for cold air to drop. Let me say that I am for simple forms of heating and ventilation for hospitals, for who wants to breathe air at a certain even temperature all day? The patient in bed, covered



PLAN OF BATH HOUSE, ST. GEORG'S, HAMBURG

with blankets, does not need the temperature at seventy degrees or seventy-five degrees and is not comfortable with it. My old professor of ventilation used to say the ideal temperature was that of a beautiful June day in a pine forest in New England; but this would not be at just sixty-five degrees or sixty-eight degrees for the twelve hours, as it would be varied with the movement of the air. A system should be used which would be as near "fool-proof" as possible and not depending on mechanical means altogether.

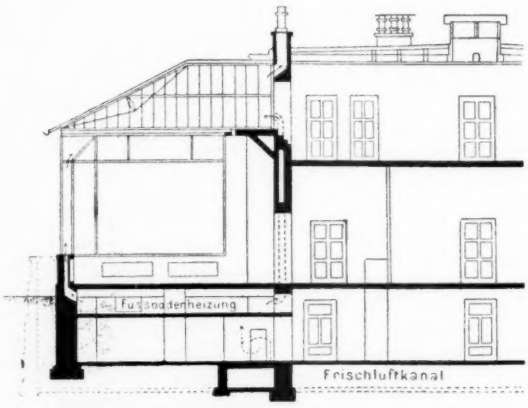
WHEEL STRETCHERS, UTRECHT



STOCK KETTLES IN KITCHEN OF ST. GEORG'S HOSPITAL, HAMBURG

Plumbing

There is perhaps nothing more important in the equipment of a hospital than the plumbing, for through the plumbing pipes go all of the filth and product of disease and it is most important that this work be done well and that all pipes and fixtures on the room side of the trap at least be get-at-able for cleaning not only the outside, but the inside as well, that



ASEPTIC OPERATING ROOM, ST. GEORG'S, HAMBURG

enough space around the fixtures should be allowed for cleaning and the simplest form of brackets and supports be used.

The bath tub for the patient should, I think, be so constructed as to allow the possibility of filling in the shortest possible time. The large inlet like the ocean steamship tubs appeals to me. The over-flow

(if there must be one) should be such that it can be easily cleaned; if the trap is set above the floor the water line is within easy reach of the hand and the pipes can all be cleaned inside. This tub should be set high—making it easy for the nurse to assist if necessary in the bath. With the "bug-a-boo" of sewer gas exploded, there is no reason why the private room, at least, should not have a wash basin. In a type I have used in the Grace Hospital, the bowl and even the shelf and towel rack are away from the wall.

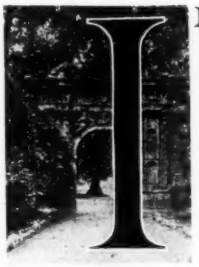
The simpler form of surgeons' scrub-up sinks appeals to me, doing away with the complicated foot and knee valve which has come into popularity within the last ten years and having the simpler elbow valves for the non-hand-touching valve is only wanted after the surgeon has done his scrubbing-up. A page from the catalogue of a German instrument maker shows the development of the elbow valves and the simple brackets and supports. The surgeon can turn on the water to the desired temperature, scrub his ten or fifteen minutes, then with a push of the elbow or shoulder the water is shut off.

I have referred many times to the St. Georg Hospital at Hamburg. I have done this for two reasons: first, that the available material was better, and second, that the St. Georg embodies the great number of new and "up-to-date" ideas that I found in my visits to over thirty-five hospitals in Europe.

I want to make acknowledgment to the architect, the man whose study and knowledge of the hospital problems has developed some of the finest things in this line in Germany, and, I believe, in the world, Baurat Dr. F. Ruppel.

MODERN PRACTICE IN HOSPITAL HEATING AND VENTILATION*

By CLARENCE W. WILLIAMS



IN this article it is the purpose of the writer to describe, in general, various types of heating systems which have been adopted in modern hospital practice and where they should or should not be used. Only such systems as are applicable to the larger institutions will be considered, as those in the smaller class of buildings depend more upon the resources of the institution than upon their capability of economical operation.

It is unfortunate that the economical side of the selection and design of heating and ventilating apparatus has not been given greater thought and study; but it is the prevalent idea that so long as it is possible to use the exhaust steam from an engine in a heating system, further economy is impossible and if that condition is fulfilled, then the only thing that remains is to install the system that costs the least, regardless of the operating cost.

Considering first the compact or single block hospital, the system generally installed is that using low-pressure steam through the building. In this type of heating, exhaust steam is used with a back pressure on the engines, varying according to the merits of design. The deficiency in the exhaust steam is supplemented by live steam, delivered through a pressure-reducing valve. We have learned by experience that for this type of building such a system, if well designed, with mains of ample size so proportioned as to provide a perfect circulation with one pound pressure and to heat the entire building in the very coldest weather with not more than five pounds pressure, gives good results with a smaller initial cost than any other type of heating system. There is the same fault with this as with every other steam system—namely, that of heat regulation, which is practically impossible except by

*An address delivered before the National Hospital Association.

the addition of a temperature control. This, as it relates to fuel economy, will be considered later.

Where there is more than one main hospital building and the buildings are widely separated, the low-pressure steam system is not so well adapted to these conditions if true economy and first cost be consid-

SERVICE BUILDING, STAMFORD HOSPITAL, STAMFORD, CONN.

MESSRS. GEORGE B. POST & SONS, ARCHITECTS

ered; for if it is desired to keep the back pressure on the engines within reasonable limits, the heating mains must be very large. On the other hand, if the mains are not properly proportioned for load friction and condensation losses, or if made too small, then the back pressure on the engine is increased, with a consequent reduction in power and increase in steam consumption.

There are many types of vacuum systems—so many that it is hard even for heating engineers to keep informed,—and of these there are but two types which are in general use. One type does nothing but remove the air from the radiators through a system of air pipes, they in turn being connected to a vacuum pump or an injector. Its advantages consist of the removal of air from the radiators, thus increasing their efficiency, the reduction in size of the piping and the reduction of the back pressure on the engines because of the vacuum in the air line system. In a well-designed low-pressure steam plant the addition of such a system is really unnecessary, according to the writer's opinion, especially if the automatic air valves are connected to air lines which are connected together and discharge into a convenient receptacle in the basement, thus doing away with unpleasant odors and discharge of steam and water from leaky air valves. In justice to this system, however, there is no doubt that it works well, gives satisfaction, and could be installed in many heating plants with profit to the institution and comfort to the occupants.

The other type is that in which vacuum valves are placed on the return or condensation ends of the radiators or coils, the bottom of risers, and wherever it is necessary to drain the supply mains; and these valves are connected to the return mains which, in turn are connected to the vacuum pump. This pump handles all the water of condensation in the system and places a vacuum on the whole, thereby making it especially adapted to large installations where otherwise there would be unduly large mains. This system is of value in the remodelling of old steam heating plants, where, through improper design or growth by piecemeal, the piping is too small, thus necessitating the use of live steam at a high pressure to force a circulation. Under such conditions it can make a good showing in economy and justifies its use. Large claims for economy are made for this type of system because of the vacuum, but while undoubtedly, in theory, it ought to be more economical than low-pressure steam, in practice leaky vacuum valves often nullify all the advantages claimed for it. This type of system is found to be of greatest value in large installations where steam is necessary for other uses and where, there-

POWER PLANT, STAMFORD HOSPITAL, STAMFORD, CONN.

MESSRS. GEORGE B. POST & SONS, ARCHITECTS

fore, the one set of mains can serve all purposes. The last feature has often been the deciding point in favor of wholly steam systems over other types and has been made much of—entirely too much, in the writer's opinion.

Another system which is in general use in many large hospitals is the hot blast or so-called Plenum system. This consists of a series of fans or blowers forcing heated air through ducts of brick or galvanized iron into the wards and other parts of the buildings, the air being heated by coils placed alongside the blower, or by radiation at the base of the heat flues. This system has many advantages and has been more generally adopted for large institutional work than perhaps any other, though the cost of maintenance is, no doubt, the greatest. The advantages of this system are the concentration of the heating apparatus at one point, the elimination of all steam piping throughout the buildings, and the ventilation or air changes given. The disadvantages are the cost of operation, the power required to drive the fans, and that, if the air is re-circulated (as is sometimes done to save expense), it then has no advantages over any direct system, but an additional drawback of the extra cost of operating the fan day and night in very cold weather.

In nearly all hospital buildings where ventilation is actually required the method now adopted by the most progressive engineers is to have the ventilation system entirely free from heating; that is, in the rooms and wards is placed sufficient direct radiation to take care of the heat losses through windows and exposed walls and a certain amount of air leakage, the air for ventilation being delivered into the rooms as tempered air at about seventy degrees and in such quantity as is required by the number of occupants and the purpose for which the room is used. By this method the temperature of the room can be regulated to any degree desired, and on pleasant days, when windows or doors may be opened, the fan introducing tempered air for ventilation can be stopped and cost of operation saved, while sufficient heat will be maintained by the direct radiation to keep the building comfortable.

Another type of heating which has recently been introduced by a large manufacturing concern in New York State is that which inserts lines of steam pipes in the construction under the floors and thus warms the rooms by heating the floors only. This is quite a daring departure from any of the so-called "tested and tried" systems, and the writer does not agree that it could be successfully used in modern hospital practice. It may apply to such buildings as factories, where the occupants are on the floors for only a few hours a day, but I do not think a nurse or attendant could work on such a floor the hours required of them in most of our hospitals. The high temperature to which the floors must be heated in order to maintain an even temperature in exposed rooms does not warrant the recommendation of this system for hospital practice, and it will not, therefore, further be discussed.

A type of heating system that is gaining much favor in large institutions as its advantages are becoming better known is the hot-water heating by forced circulation. By this is meant a system of hot water heating in which a circulation is induced by means of a pump placed in the circuit of the mains, the water being heated by either exhaust or live steam or by both. The advantages of this system are economy in steam consumption, ease of control, the maintenance of a constant temperature in the wards, and the ability to run the mains anywhere, regardless of the grades, thereby making possible the location of the power house at a desirable point, which is often not possible with a wholly steam system unless pumps or other devices are installed to return the water of condensation to the boilers or expensive pipe tunnels are built. Some of the disadvantages of this system are that it is necessary to have an independent steam system, as steam is required for other purposes in nearly all hospital buildings; that it requires a greater amount of radiation than a steam system and a consequent greater cost of installation; that it requires greater engineering ability or knowledge of design; and that it must be installed in a more careful and better manner than the usual type of steam systems. One of the great advantages and one that should not be overlooked, is the ability to control the temperature in the buildings

by controlling the temperature of the water and the flow at the power house, besides the individual control of the radiators or coils. That this means much will be conceded when we consider the great variation in temperatures to which we who live in the east are subjected. In the New England States, for example, the temperature varies during the heating season from zero to fifty degrees, and even more. As sufficient radiation must be installed to heat the rooms to seventy degrees in zero weather, and as the average temperature for the heating season in New England is approximately thirty-five degrees, with a steam system of 100 per cent. more steam is used for heating than is actually required. If proper attention could be given and the radiation shut off when the temperature gets above seventy degrees, this would not occur, but, unfortunately, this is not possible where there are a great many radiators or coils and, besides it is much easier to open a window and let the surplus heat escape. In some of the better class of hospital buildings, thermostatic valves are installed on the heat sources, which regulate the temperature of the building by regulation of the supply of steam to the radiation. Such devices are not only an expense to install, but are often found troublesome to maintain. Their installation the writer would recommend only to the better class of buildings and large wards and clinics where first cost is not to be considered. It may be claimed that it is possible to obtain a degree of regulation with steam by varying the pressure, but, even so, the best that can be obtained by such a method is by the use of high pressure steam direct from the boilers, which is not good practice.

A hot water system is especially adapted to the heating of many widely separated buildings. Where ventilation or rapid air changes are required, fans supplying fresh air or exhausting vitiated air are driven by electric motors. The hot water for all domestic purposes, also for the heating system, is heated at the central plant and all apparatus centralized in the power house.

In summing up the different systems above described, as applicable to modern hospital practice, many, no doubt, will ask the question, "Which is the best of the several recommended?" You will agree with me, I think, when I say that it is seldom, if ever, that a patient is admitted to our hospitals and treated by our physicians or surgeons without a very careful study or diagnosis of the case. The treatment that would apply to one probably would not apply to another. Just so in the question of modern heating and ventilating systems. A study of all conditions must be made and if a competent and reliable engineer is consulted, he will value his reputation as much as the physician and surgeon, and would design a system best adapted to the needs and locality of the institution.

A recent design for a large system of hospital heating and ventilating in the Dominion of Canada where extreme temperatures had to be considered may be referred to. After months of very careful study a combination system was adopted; namely, a forced hot water system for all direct heating and a steam system for all tempering coils. Practically every room in the group of a dozen or more buildings is to be warmed by direct radiation. Tempered air will be introduced to all large wards and operating rooms and such other rooms as require rapid air changes. The ventilation will be entirely independent of the heating system and will be largely by exhaust fans on the roofs controlled by electric motors.

The writer thoroughly believes in natural ventilation as far as possible. There are but very few days during the heating season that the well-trained nurse will not have the windows partly open to admit the health-giving fresh air just as it is provided by the Creator. At such times, the direct hot water heat will probably care for the temperature of the rooms and the tempered air will not be required. Therefore, the fans introducing this air can be shut down and the expense of operation saved.

I have often found entire systems where the wards were wholly dependent upon the introduction of air by fans or under pressure, where, owing to the great expense of operation, the same are not used or only partly so, and, therefore, no air is admitted to the rooms if doors and windows are closed, except what enters by wall or window leakage. In designing the Plenum cham-

(*Continued on page 148*)

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MODERN HOSPITALS (16 pages).

FRONTISPIECE:—

GOETHE MONUMENT, ROME, ITALY.

THE MODERN HOSPITAL

THE statement has been made that the building of hospitals is a practical expression of man's sense of responsibility for the physical well-being of his fellow creatures. If we accept this definition, the work should command our sympathies, as well as our most profound study. Perhaps there is no class of buildings that demands so thorough an understanding, on the part of the architect, of the various uses to which the different rooms and departments of a building are to be put, as does that to which hospitals belong. In order to design and equip a hospital building in a manner that will render it of greatest value to the community in which it is erected, an architect must combine with the ability of an artistic designer, a knowledge not only of sanitation, heating, ventilation and the various structural requirements of the average building, but also a considerable degree of familiarity with the practice of medicine and surgery. He must by reading and study keep abreast with the progress made in the care and treatment of the sick and diseased, as well as that made in the science of building.

The importance of a full understanding of the essentials in hospital design is realized when we consider that if an error occurs due to an imperfect knowledge of acoustics the architect of a theatre or hall has at worst simply failed to secure for his client the maximum of satisfaction in operation and hence revenue obtainable from his investment. The same might be said in the case of failure to provide adequate facilities for the successful operation of a commercial building. Moreover, these defects would be obvious and probably readily remedied, but in the case of an improperly ventilated hospital or one not provided with proper and adequate sanitary equipment, the lack while perhaps unapparent would nevertheless endanger if it did not cause the positive sacrifice of human life. In view therefore of the complex nature which characterizes hospital planning, and the serious results which must in a measure at least follow any failure to fully realize and amply provide for the various requirements, it would seem to be a duty which the members of the profession owe humanity to thoroughly acquaint themselves with the problems presented, and the solutions already furnished before attempting to meet the needs of any particular situation.

HASTE IN MODERN ART

IN a recent issue of a weekly periodical there appeared a reference to American art, in which it was held that, contrary to popular belief, the width of the Atlantic Ocean and the lack of centuries of history were not entirely accountable for the state of art in this country. This writer believes that bad taste is no more prevalent in America than in Europe, and that art is suffering abroad as well as at home, due to modern demands for haste, whether applied to the construction of buildings, the painting of pictures, or the writing of poetry or music. It is of course undeniable that there is insufficient time allowed the modern designer in which to develop and perfect his conception, before it must be

executed in enduring materials and made to fulfill, however imperfectly, the mission for which it was intended. The art of comparative antiquity to which we still turn for inspiration was not spontaneous. Years upon years amounting to almost a lifetime were often devoted to a single work of art. Even Michael Angelo is said to have lain upon his back for nineteen years while painting the Sistine ceiling. Such patience, such study and contemplation are unknown to modern art, but until we recognize the futility of attempting to increase the rate of artistic production beyond that dictated by the artist's own personality demanding expression, we shall be obliged to content ourselves with mediocre results. Time must be allowed for brooding, for meditation, for the critical examination of an idea before its embodiment, and even for its entire abandonment after months of work if it is felt that it does not after all completely fulfill either the original or developed conception. When the element of time is given full value in the popular mind, we shall probably have less occasion to bemoan the decline of art either in America or abroad.

Modern Practice in Hospital Heating and Ventilation

(Continued from page 146)

bers and ducts, in this instance, they are so arranged as to introduce constantly tempered air by gravity, should the fans be closed; also, the system of ventilation will be open upon the same general plan by the introduction of aspirating coils either in the flues themselves or at the point of assembly on the roof. In this way, I maintain that while we shall be able constantly to care for our room temperatures by direct radiation, we shall also have a natural gravity ventilating system that will give us from two to three changes of air per hour, even though the exhaust fans be closed down. There are many interesting phases of this combination hot water and steam system that I should like very much to discuss if the time permitted. I will only add, however, that as far as I have been able to learn, this is the first combination hot water and steam system of this nature applied to hospital practice and, no doubt, will be watched with a great deal of interest. I thoroughly believe that for a largely scattered institution located in a cold section of the country, what is now being planned for this modern hospital will prove the simplest, most economical and satisfactory of all systems.

Vacuum Cleaning Systems a Desirable Feature in Modern Hospitals

The prevailing idea now among the leading hospital authorities is that every hospital of fifty beds or over, where power is available, should be provided with a vacuum cleaning plant. The original piping can be very simply done and should have a sufficient number of outlets to make the work easily accomplished by the attendants. Each outlet should be valved so that the applying of the hose would be done with as little noise as possible so as to avoid disturbing the patients when this work is going on.

The chief advantage of the vacuum cleaning system is that all dust and dirt are taken directly to the receiver without disturbing or distributing the particles of dust or bacteria, which are always a menace where the floor is swept in the ordinary way. For that reason, the portable vacuum cleaner, which exhausts into the air of the room, should be avoided in hospital rooms unless this exhaust is conducted into the open air by a second flexible pipe. The refuse from the cleaner should, of course, be burned and not liberated into the open air. Care should be taken to procure as noiseless a plant as possible for the hospital buildings.—*E. F. Stevens*

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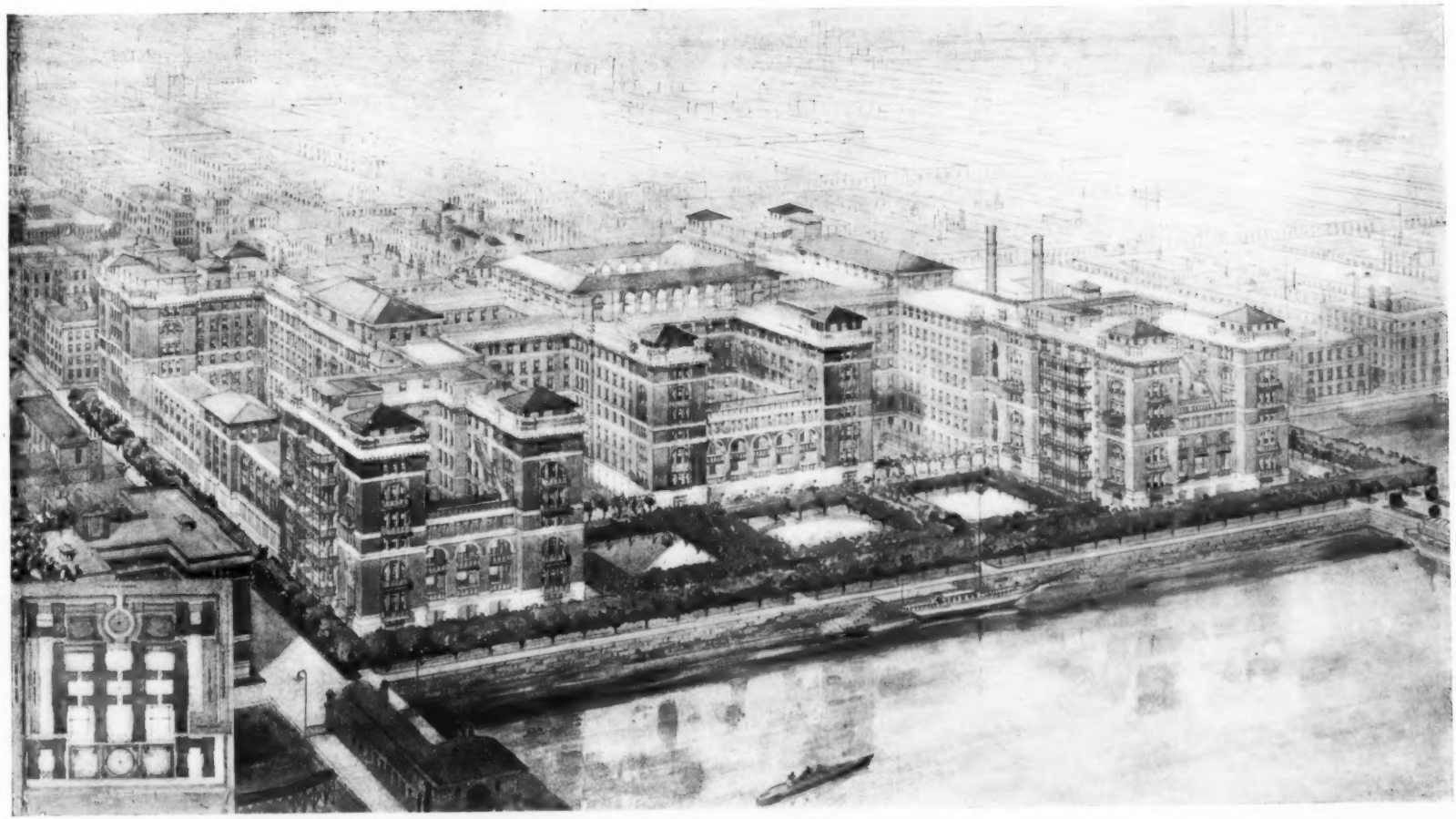

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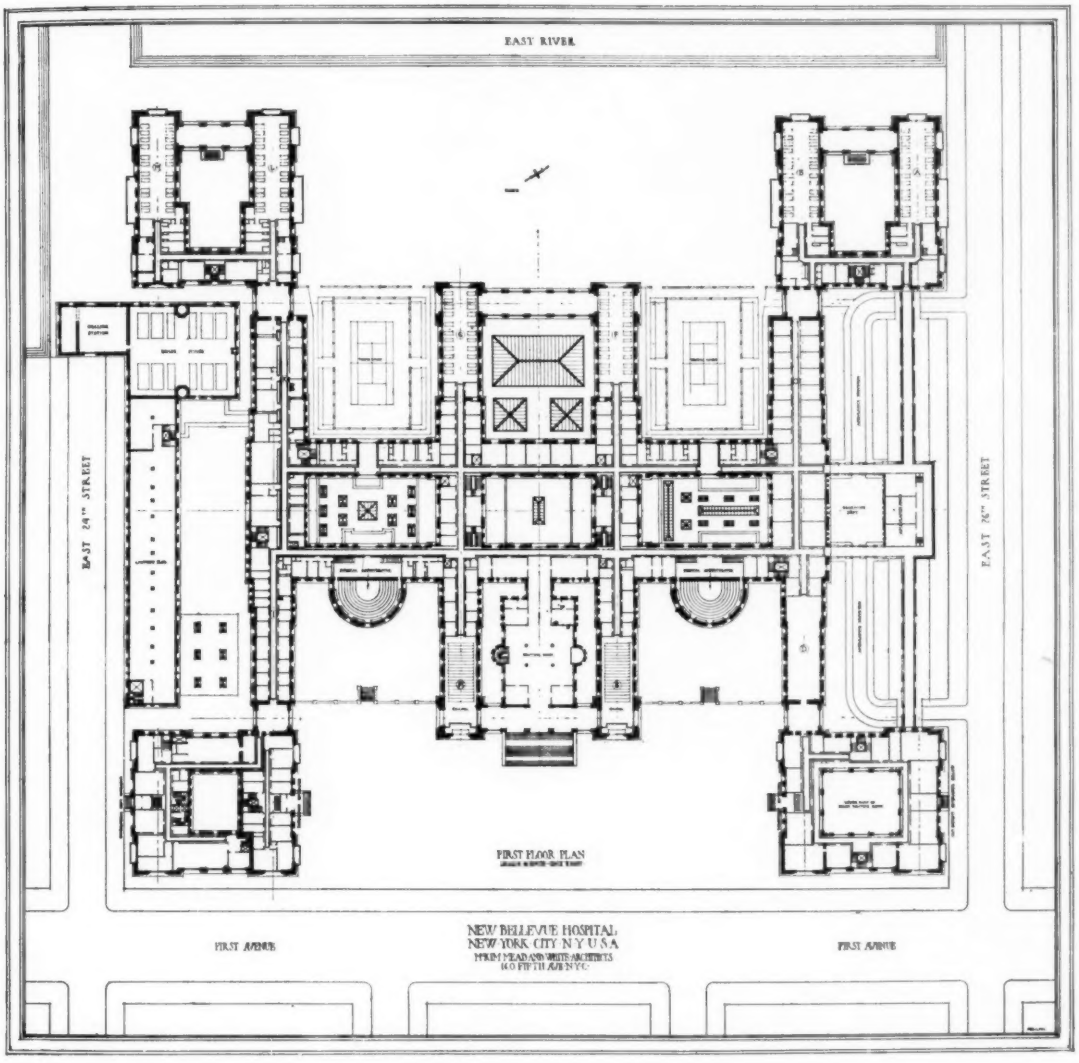

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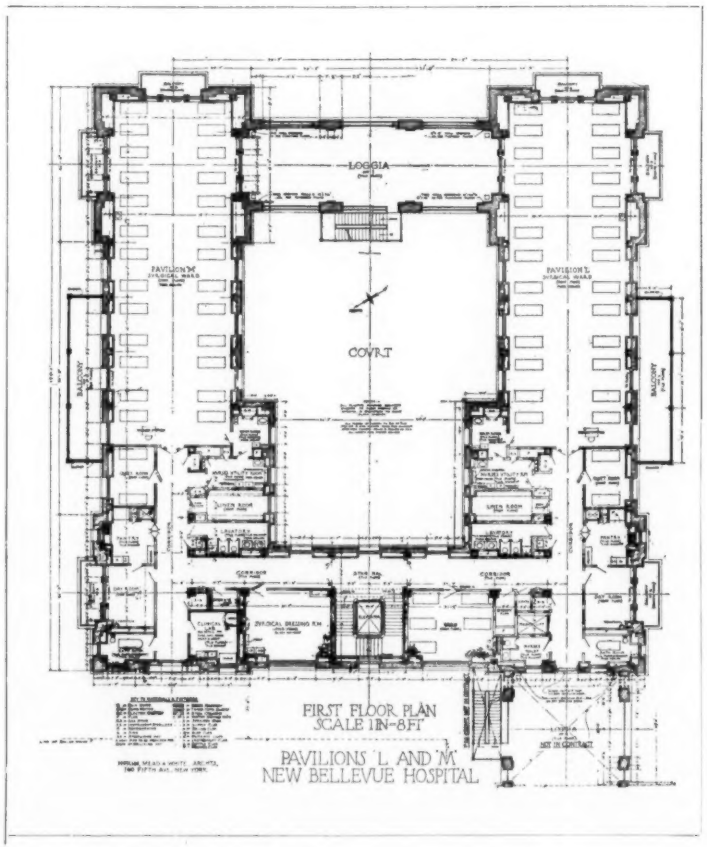

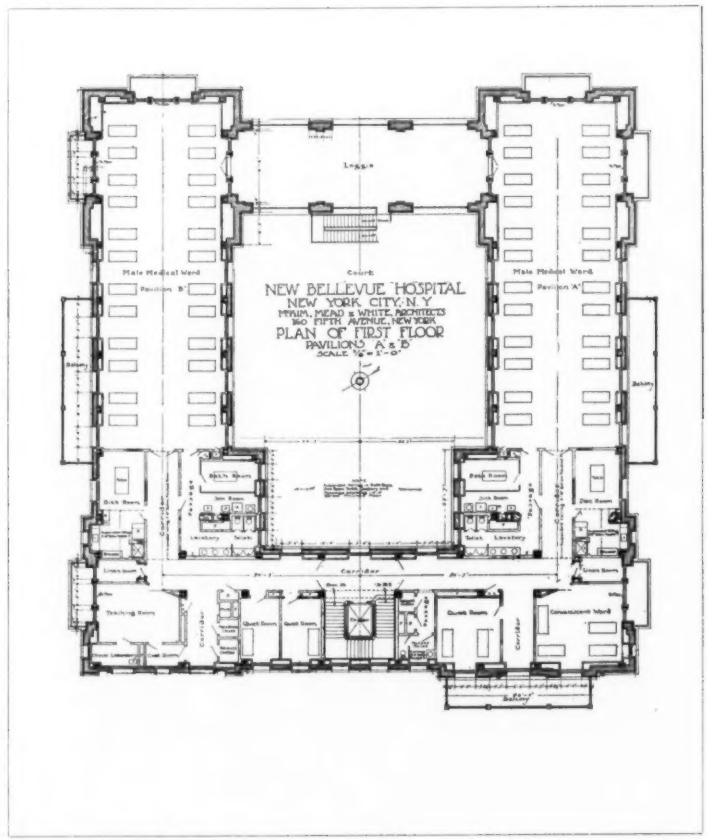

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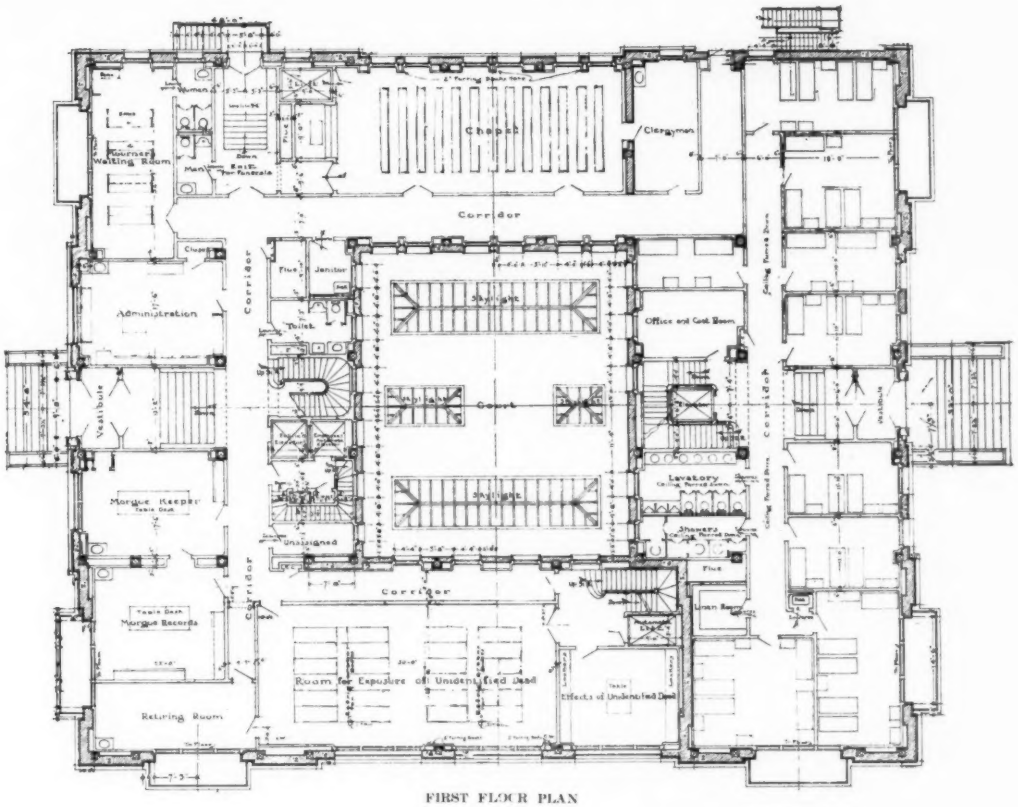
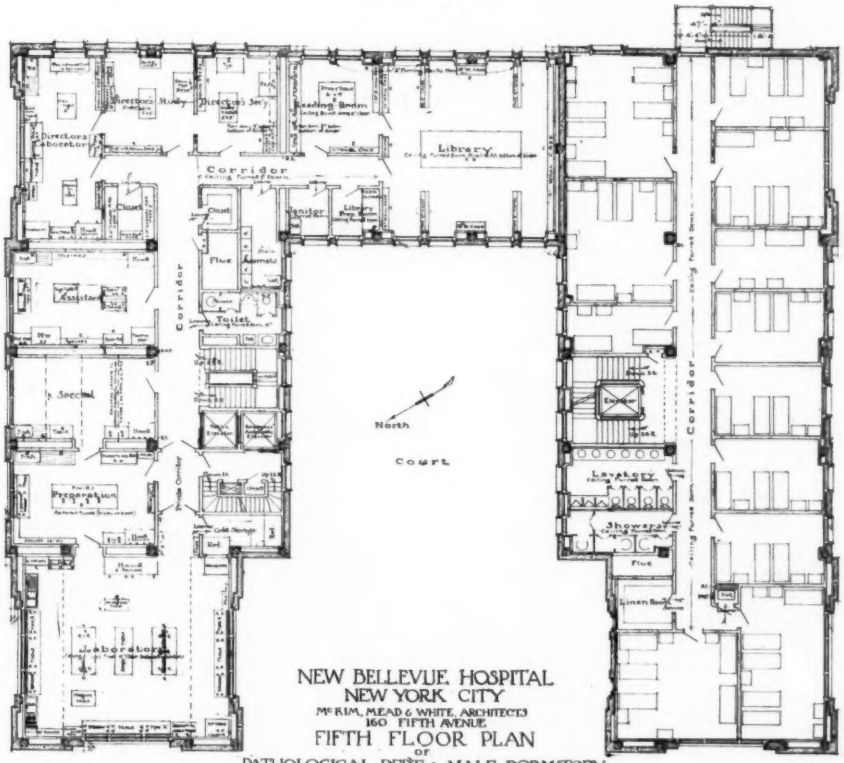


FIRST FLOOR PLAN



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FIFTH FLOOR PLAN
OF
PATHOLOGICAL DEPT & MALE DORMITORY
SCALE 1/8" - 1' - 0"

AT RIGHT—ISOLATION BUILDING AT FOOT—HOSPITAL BUILDING
MESSRS. YORK & SAWYER, ARCHITECTS

IN CENTRE—LABORATORY BUILDING
MESSRS. SHEPLEY, RUTAN & COOLIDGE, ARCHITECTS

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At top is a general view showing the three buildings constituting the group. At left is the laboratory building, of which Messrs. Shepley, Rutan & Coolidge were the architects. In the centre is the isolation building, and at the right the hospital building. These two buildings were designed by Messrs. York & Sawyer, architects. At left is a picturesque view of the hospital building, with a glimpse of the isolation building. This view is taken from the East River.

WARD IN HOSPITAL BUILDING

WARD IN ISOLATION BUILDING

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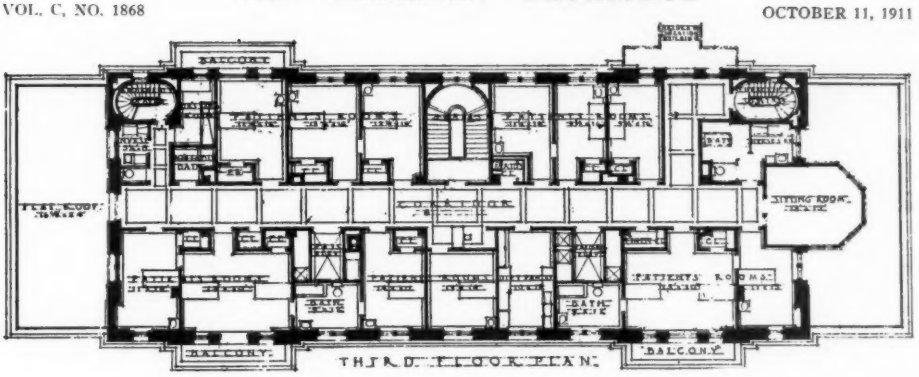
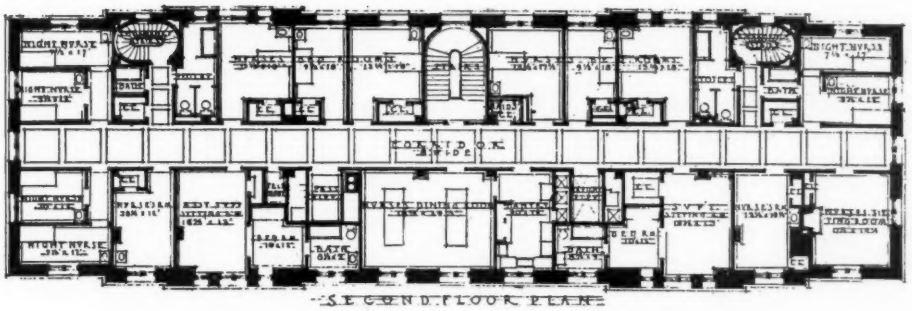


THIRD FLOOR PLAN



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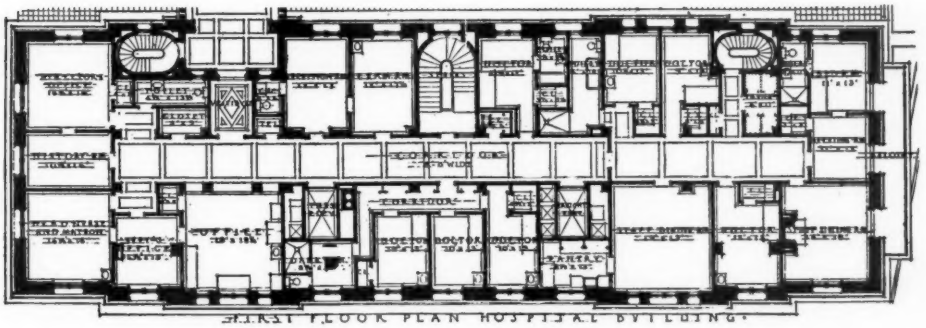
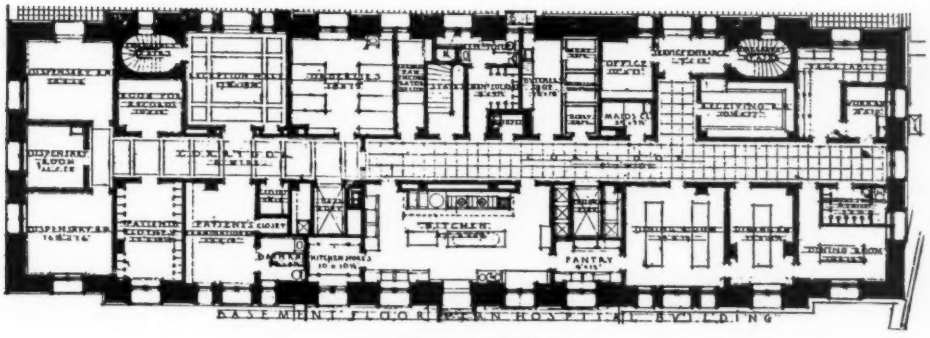


FIRST FLOOR PLAN HOSPITAL BUILDING



BASEMENT FLOOR PLAN HOSPITAL BUILDING

HOSPITAL BUILDING

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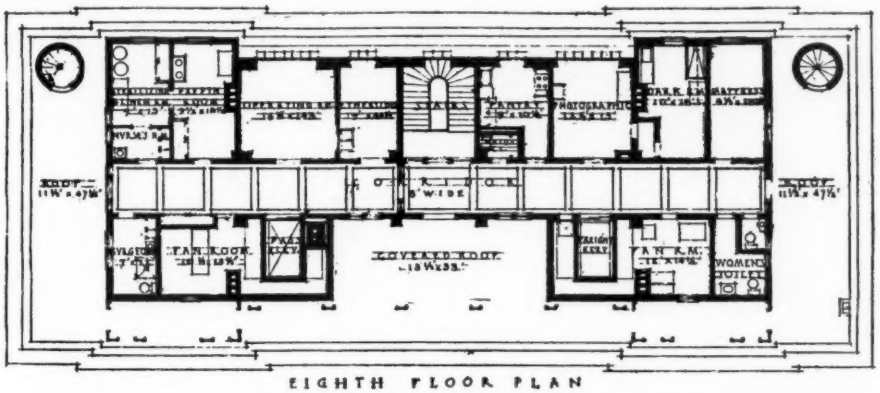

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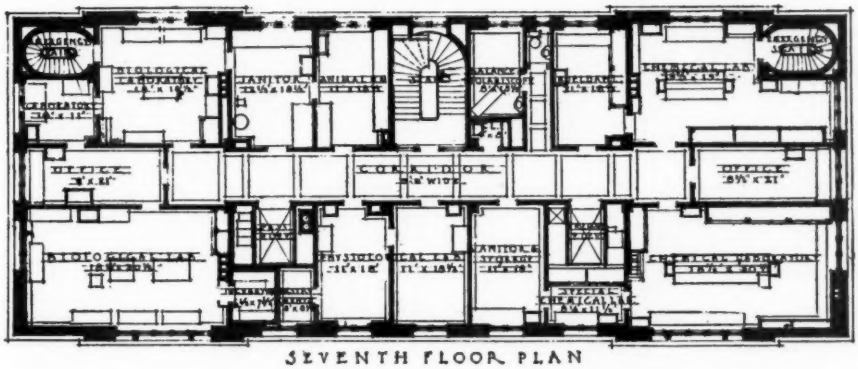

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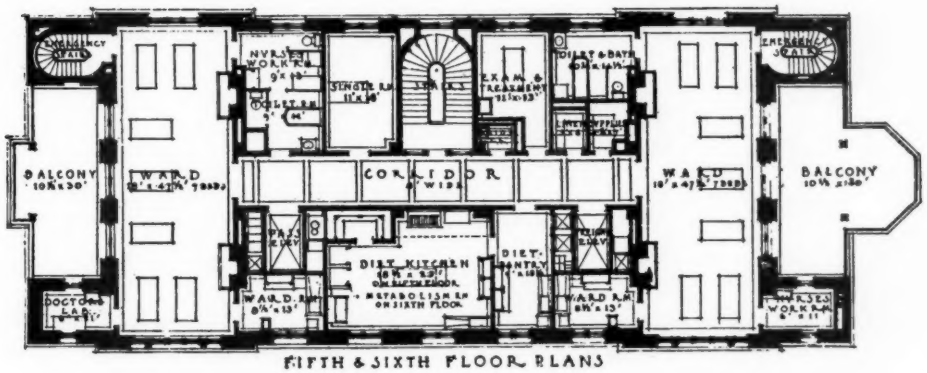
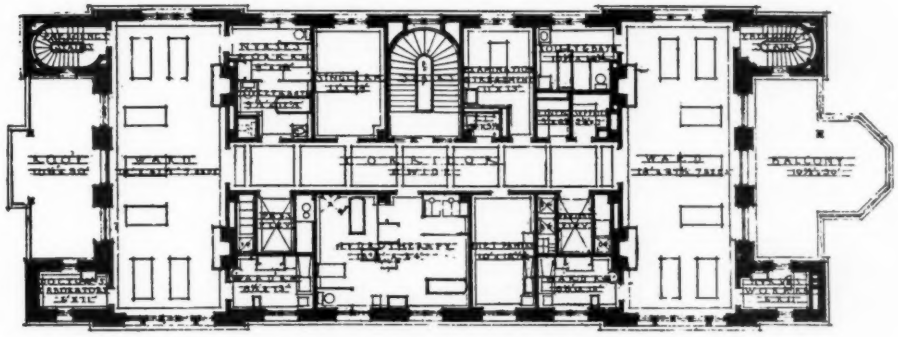


FIFTH & SIXTH FLOOR PLANS



FOURTH FLOOR PLAN

HOSPITAL BUILDING

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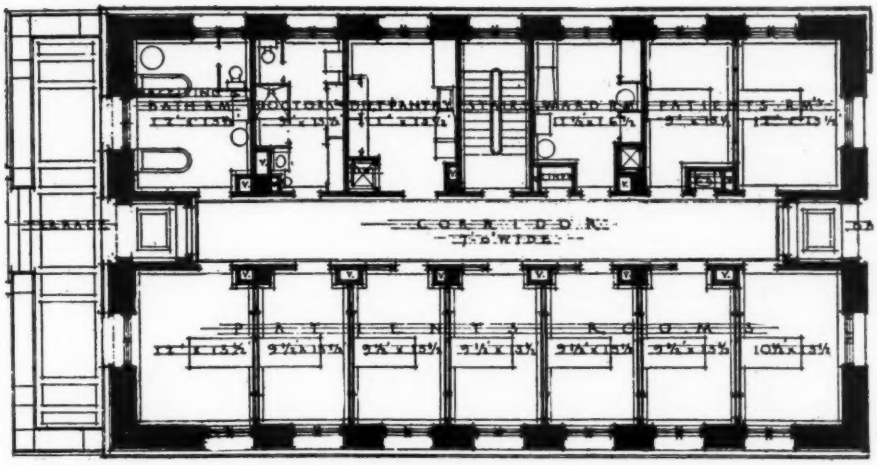

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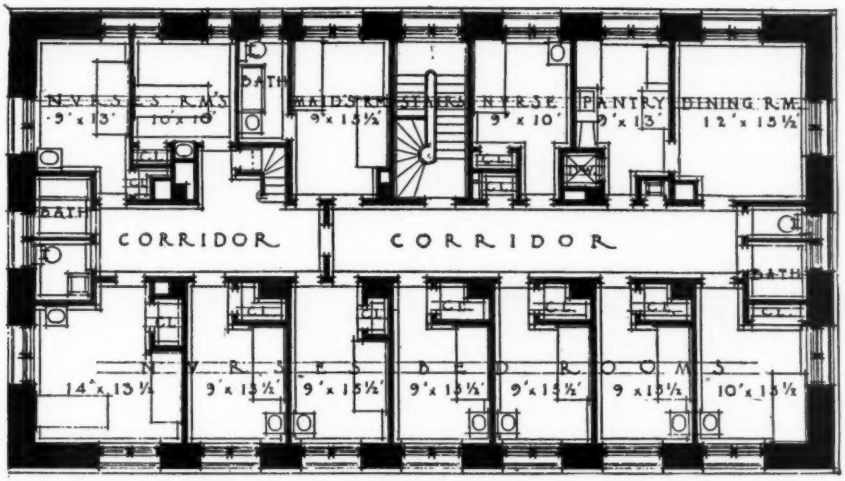

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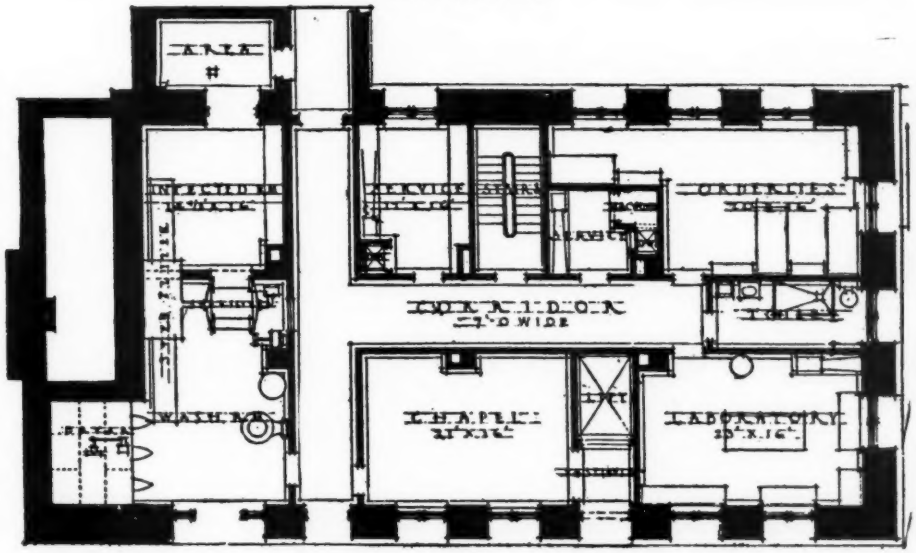

BASEMENT FLOOR PLAN—ISOLATION BUILDING

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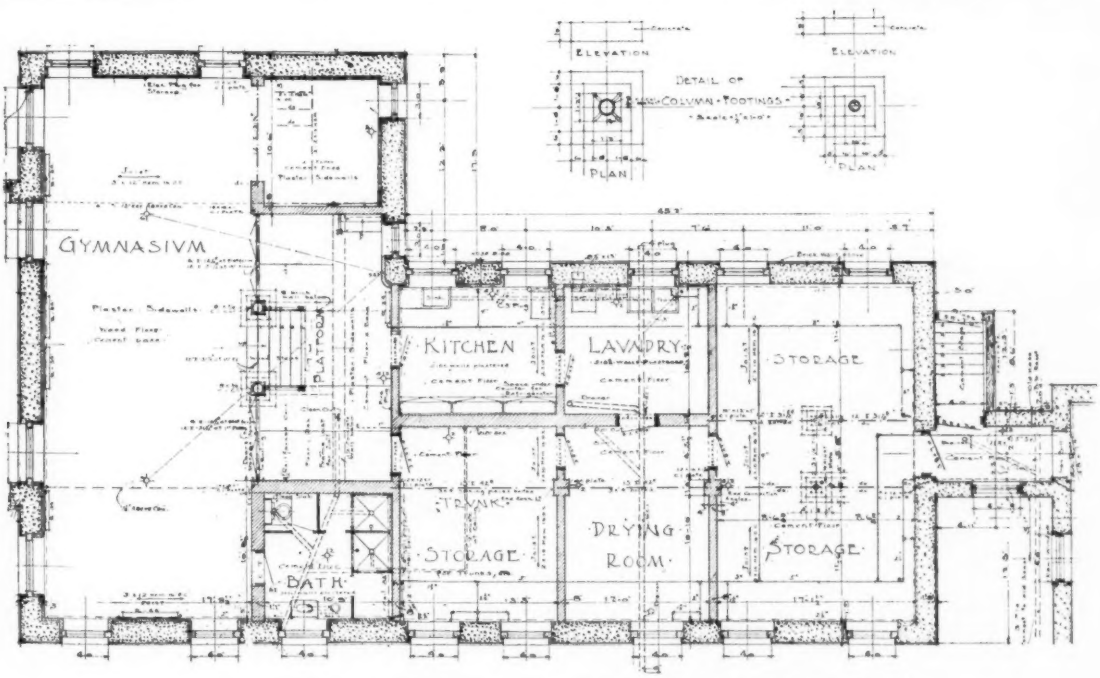

NURSES' HOME, MEMORIAL HOSPITAL, NIAGARA FALLS, N. Y.

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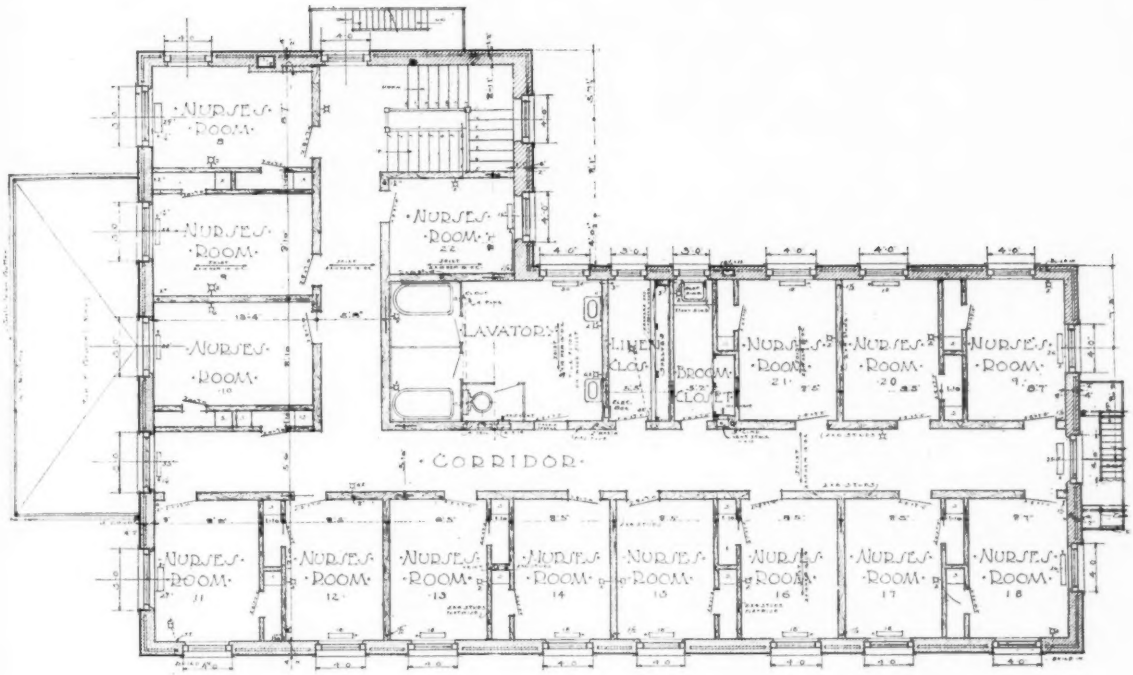

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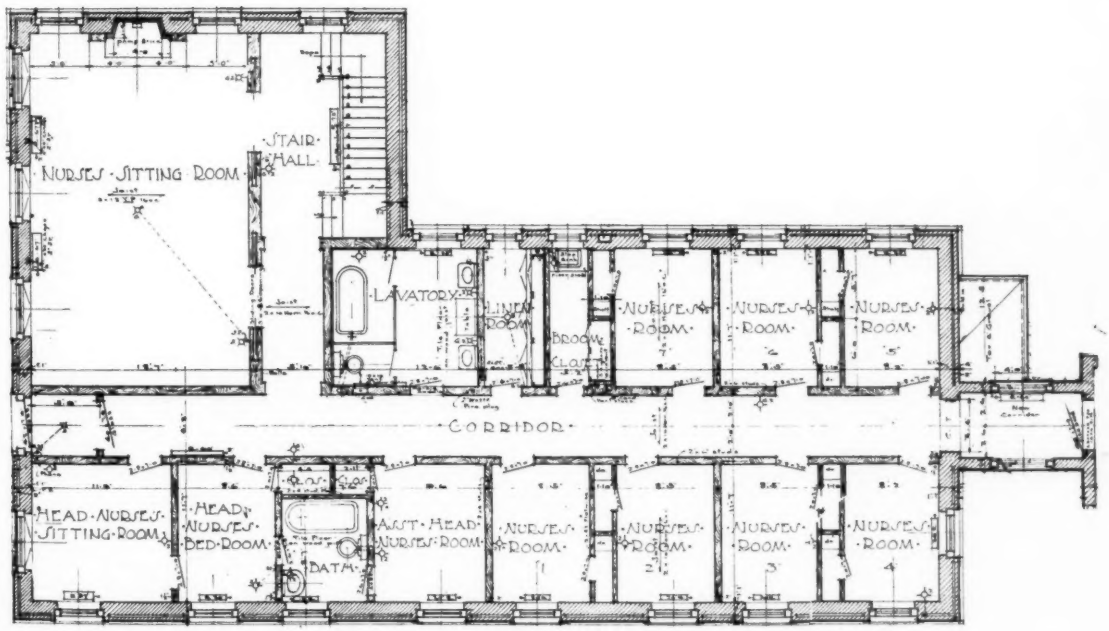

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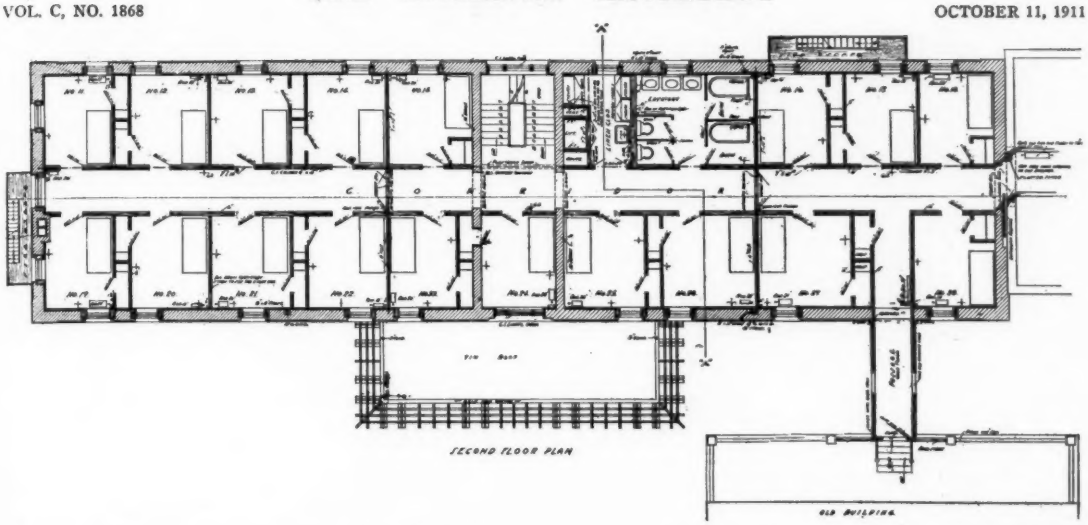

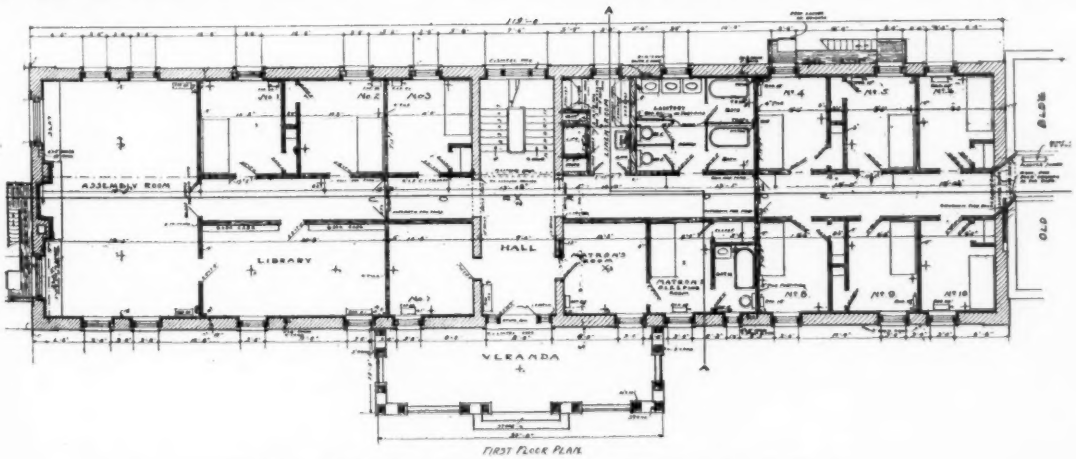

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CHILDREN'S HOSPITAL, BUFFALO, N. Y.

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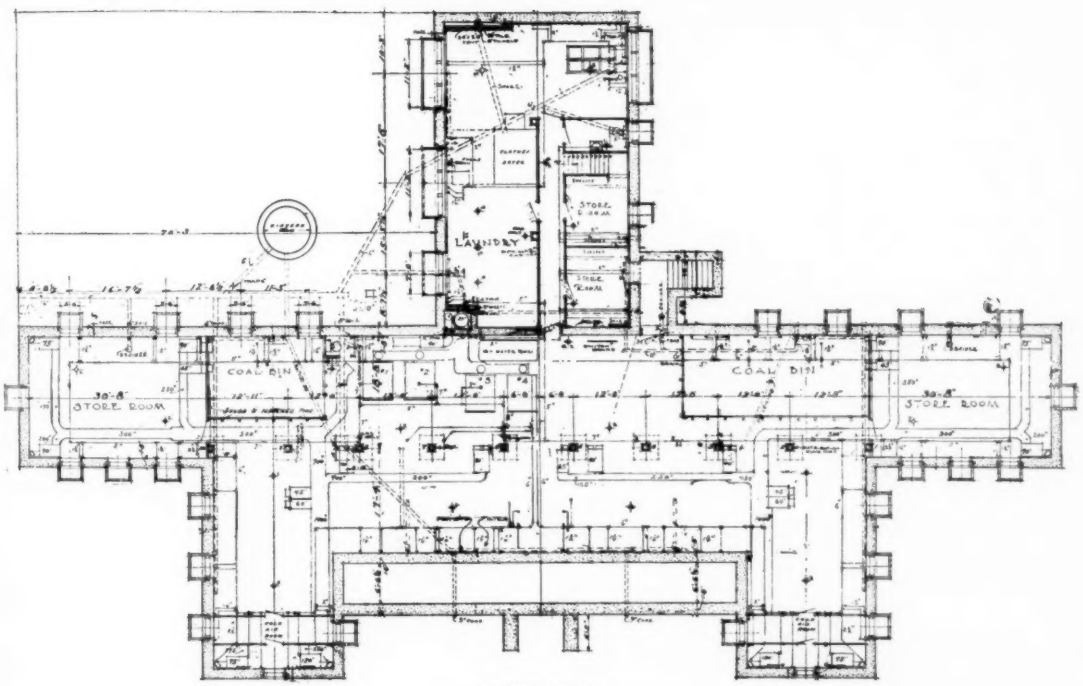

BASEMENT PLAN

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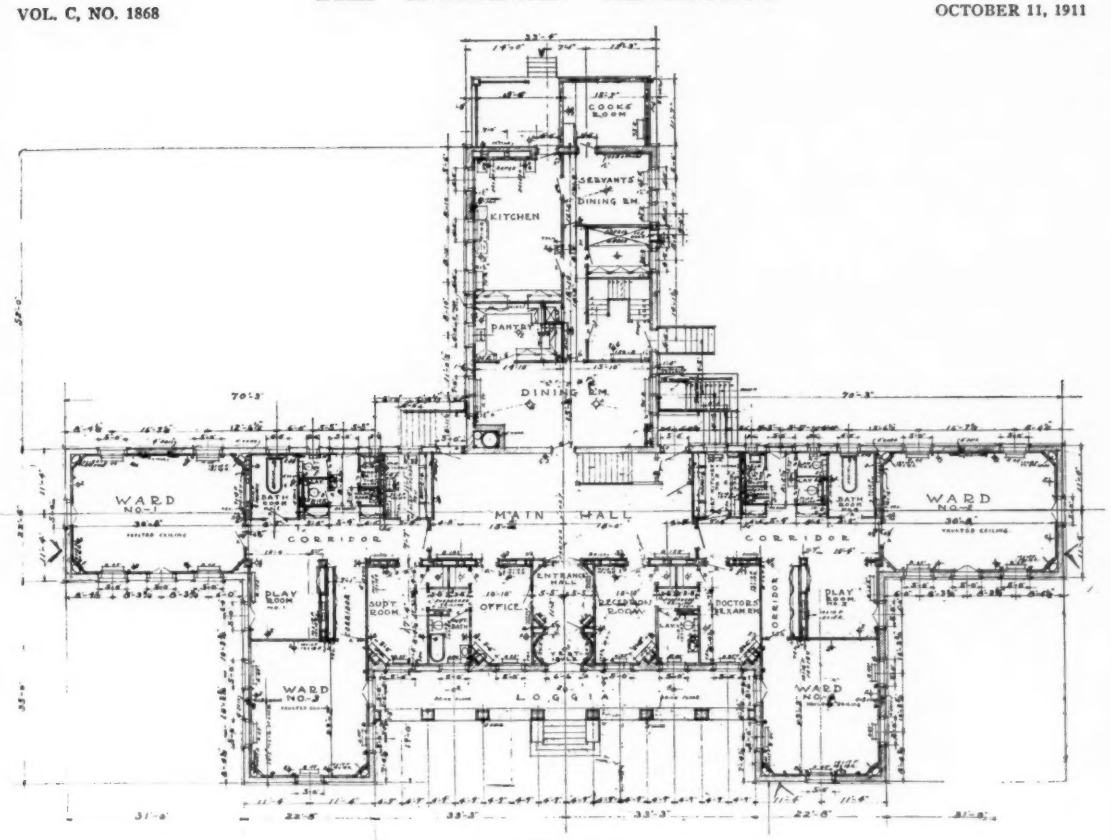

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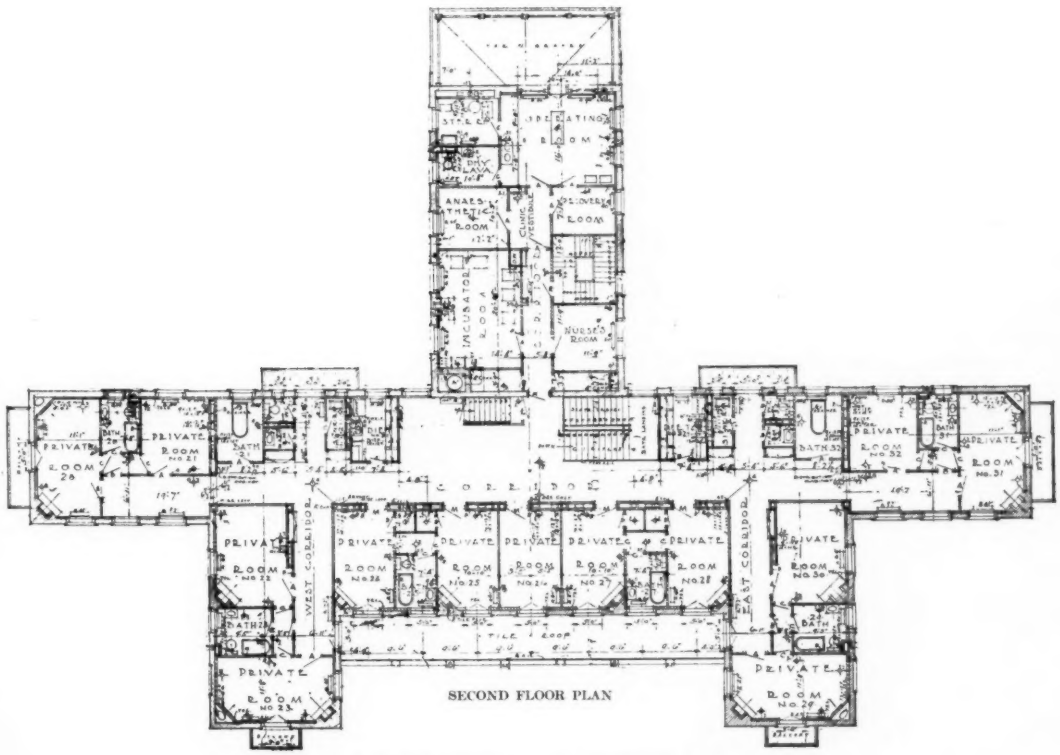

SECOND FLOOR PLAN

CHILDREN'S HOSPITAL, BUFFALO, N. Y.

MESSRS. GREEN & WICKS, ARCHITECTS

MONUMENT TO MARCO MINGHETTI IN THE CORSO VICTOR EMANUEL, ROME

LIO GANGERI, SCULPTOR