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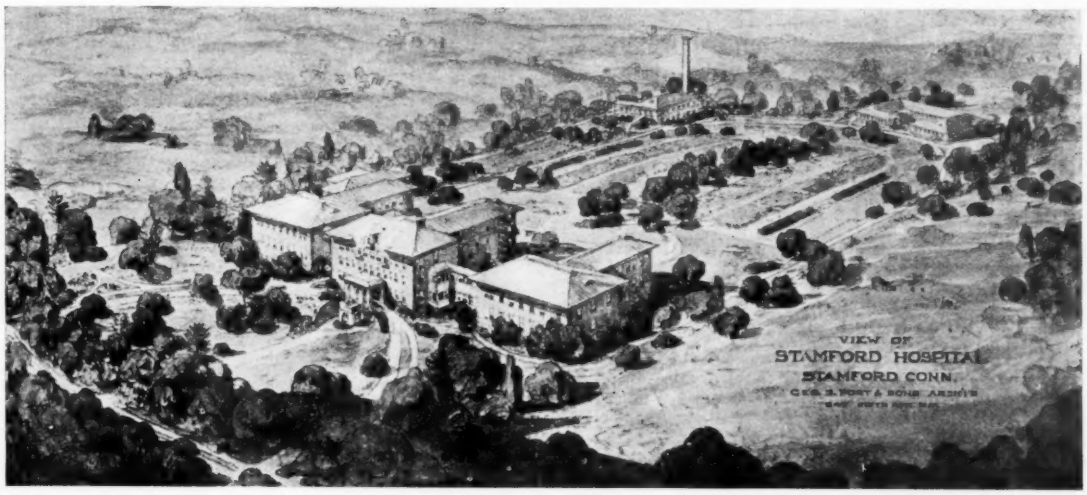
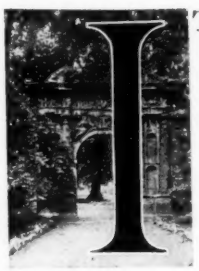


STAMFORD HOSPITAL, STAMFORD, CONN.

MESSRS. GEORGE B. POST & SONS, ARCHITECTS

SOME ESSENTIALS OF HOSPITAL HEATING AND VENTILATION

By D. D. KIMBALL



IT is noteworthy that the many years of hospital construction in this country have entirely failed to produce an accepted standard or method of hospital heating and ventilating. This is not so strange as it may seem if consideration be given to the almost infinite variety of physical conditions and needs of hospital patients and of the nature of the buildings and their surroundings. Manifestly a method of treatment for a hospital for the ruptured and crippled who, in a general sense are not ill, is not suitable for a hospital for contagious diseases or for a surgical ward. Nor is the method suitable for a hospital in the open country adaptable to a hospital built within the city limits, particularly if the city in question be one with an atmosphere like that of Pittsburgh.

There is still a wide difference of opinion as to the merits of artificial ventilation as applied to hospitals. A prominent hospital expert recently made the statement that there was no such thing as a ventilating system for hospitals, that clinical records in one of the largest hospitals of New York City proved that the best results were obtained in the wards in which no artificial ventilating system was used, free use being made of the windows. The statement was also made that the air was "roasted" in passing through the heaters to a temperature of 400 degrees, the absurdity of which statement becomes apparent when it is recalled that the temperature of the steam used for heating rarely exceeds 225

degrees, while to reach a temperature of 400 degrees a steam pressure of over 300 pounds per square inch would be required. Investigation led the writer to the conclusion that the opinion expressed was based upon an experience with an antiquated, inefficient and insufficient system of ventilation. The windows, in some cases, were not only shut at all times, but screwed fast or locked, the key in the latter case, being in the hands of the Superintendent.

Recently a hospital building has been built without a system of artificial ventilation, entire dependence for ventilation being placed upon the windows. An unfortunate experience may safely be predicted for this building.

It is granted that under many conditions no better ventilation may be had than natural ventilation through properly constructed windows, a fact too little appreciated by many designing heating and ventilating engineers. But there are many conditions within the wards under which it is desirable to close the windows, many days when inclement weather makes opening of the windows undesirable or impossible, and many more days when, because of the direction of the wind, absence thereof, or because of a sultry atmosphere, no ventilation may be had through the windows.

Artificial ventilation, as an adjunct to natural ventilation, is an absolute necessity if the best results are desired, as is well evidenced by the increased numbers of cures and lessened time required for recovery in ventilated hospitals.

Actual examples or proofs of the value of hospital ventilation are comparatively rare because of the difficulty of obtaining like conditions for comparison, time element, etc., but in school and commercial circles illustrations are abundant.

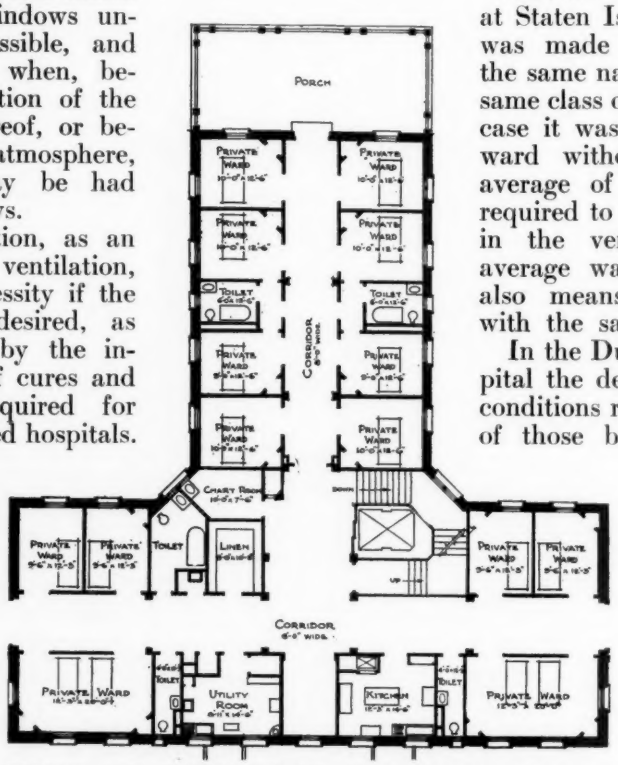
In no place is thorough ventilation so truly a requisite as in hospitals. Shocks due to accidents or a collapse sometimes attending surgical operations reduce the vitality and render the patient unusually susceptible to improper surroundings. The vital resistance is diminished, or in some cases apparently lost, by disease, making necessary the most helpful of surrounding conditions. The patient is acutely susceptible to the effect of improper hygienic surroundings. Pure air, proper medicine, the best of food and skilled attendants are of equal importance.

The reports of the Boston City Hospital show that improved general sanitary conditions in that institution changed the death rate from forty-four per cent. to thirteen per cent. In the general wards of the same hospital the sanitary improvements effected changed the death rate from twenty-three to six per cent., or nearly in the same ratio as in the surgical wards.

At the S. R. Smith Infirmary at Staten Island a comparison was made in two wards of the same nature containing the same class of patients, in which case it was found that in the ward without ventilation an average of sixteen days was required to effect a cure, while in the ventilated ward the average was ten days. This also means a greater work with the same equipment.

In the Dublin Lying-in Hospital the death rate under old conditions reached 50 per cent. of those born, while for an equal period with improved sanitary conditions, including ventilation, drainage, lighting and disinfection, the death rate fell to five per cent.

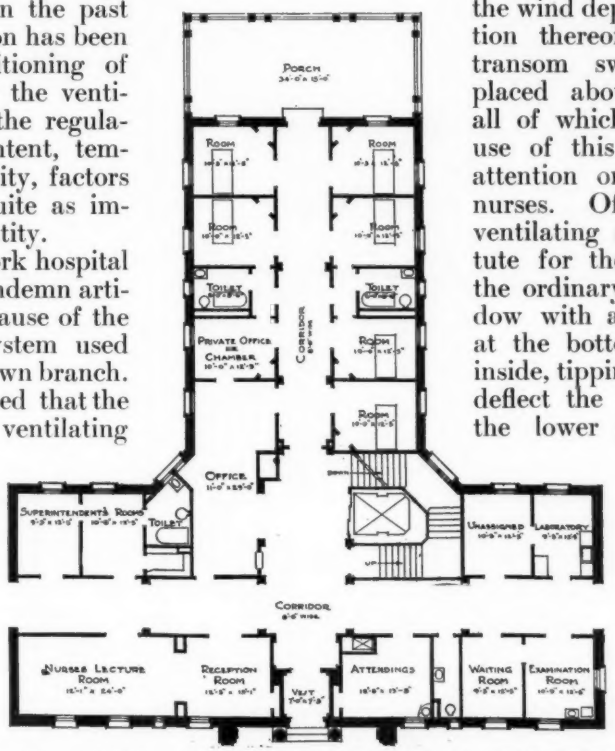
Certain it is that the hospital



SECOND AND THIRD FLOORS, ADMINISTRATION BUILDING, STAMFORD HOSPITAL, STAMFORD, CONN.

patient with his weakened vitality should be provided with the best possible surrounding conditions. Every possible care is exercised in selecting the patient's food and drink. Inasmuch as the amount of air a normally healthy person breathes is 3,000 times by volume and twenty-five times by weight, the dry food eaten, should not the greatest possible care be exercised in providing suitable air for breathing? It is probable that in the past too little consideration has been given to the conditioning of the air provided by the ventilating system, *i.e.*, the regulation of its dust content, temperature and humidity, factors now regarded as quite as important as air quantity.

A certain New York hospital board was led to condemn artificial ventilation because of the results with the system used in their large downtown branch. Investigation disclosed that the air intake of the ventilating system was through an area at the sidewalk level on one of the busiest thoroughfares in the city, no means of filtering the air were provided, humidification was absolutely neglected, no system of temperature regulation was installed, and the size of the ducts and location of registers indicated that the volume of air had been too small, its temperature too high and its diffusion nil. The heating apparatus was crowded into a space altogether too small, thus permitting of no additions or improvements. And be it noted that cramped spaces and failures of ventilating systems are intimately related. A cloud of dangerous dust reached the rooms with the operation of the system rather than a stream of revivifying air. Small wonder, therefore, that the system was condemned. It is unfortunate, however, that such samples of artificial ventilating systems should be quoted as objections to the installation of modern and efficient systems.



FIRST FLOOR, ADMINISTRATION BUILDING, STAMFORD HOSPITAL, STAMFORD, CONN.

The first essential of hospital ventilation is ample provision for natural ventilation, that is, plenty of window openings with properly arranged windows. An arrangement of the windows frequently advocated by hospital experts is the casement window opening out in halves, half of the window to be thrown out to catch the wind depending upon direction thereof, a top light or transom swinging in, being placed above for night use, all of which is good, but the use of this requires constant attention on the part of the nurses. Of itself it is not a ventilating system. A substitute for the above window is the ordinary double-hung window with a plate glass shield at the bottom of the window inside, tipping in at an angle to deflect the air upward when the lower sash of the window is raised.

Open air balconies may hardly be considered as a part of, or essential to, a ventilating system, but they are doubtless essential to the equipment of a modern hospital, some experts maintaining that at least fifty per cent. of the floor area of a hospital should be out of doors.

Quite as important as this provision for natural ventilation is the provision of a system for the positive supply of fresh air when the natural supply must be shut off or is not dependable. This may take the form of a fan system, and usually should for a large building or a building within a city, or it may consist of a gravity system in the case of a small building, the latter lacking the advantages of positiveness and the difficulty of applying filters or satisfactory humidifying devices thereto.

Essential to the full success of either the

ADMINISTRATION AND WARD BUILDING, STAMFORD HOSPITAL, STAMFORD, CONN.

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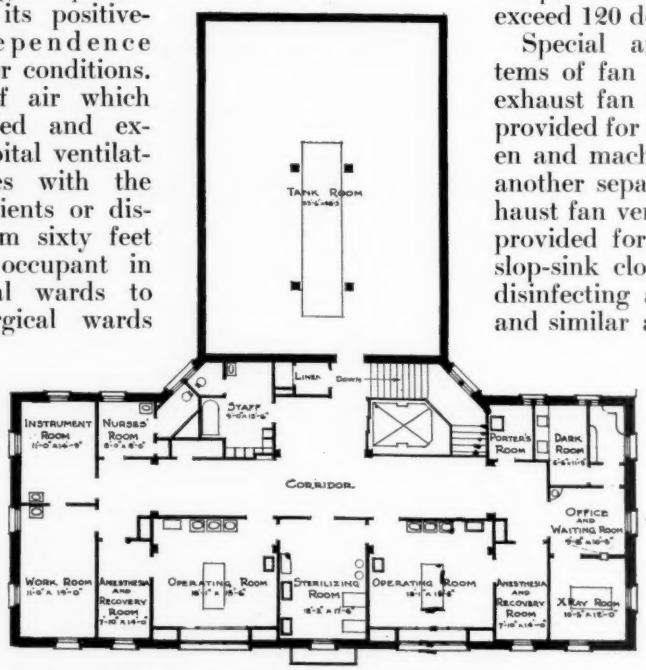
natural (window) or artificial ventilating system is a system for exhausting the vitiated or foul air. This, too, may take the form of either a gravity or fan system, the latter system being far preferable because of its positiveness and independence of varying weather conditions.

The amount of air which should be supplied and exhausted by a hospital ventilating system varies with the nature of the patients or diseases treated, from sixty feet per minute per occupant in general medical wards to 100 feet in surgical wards and wards ministering to severe cases, and 130 to 150 feet in operating rooms and in wards for contagious diseases, the aim in the latter case being not alone to give the patient the maximum of help but to protect those not inoculated.

In the case of wards heated entirely by indirect heat the quantity of air supplied should, in any case, be so great that the temperature thereof need not exceed 120 degrees at any time.

Special and separate systems of fan ventilation by the exhaust fan method should be provided for the laundry, kitchen and machinery rooms. Also another separate system of exhaust fan ventilation should be provided for all toilets, baths, slop-sink closets, mop closets, disinfecting and refuse rooms, and similar apartments. It is especially important that this be made a separate system of ducts with its own fan and motor. It will thus be a smaller system which should be kept runningtwenty-four hours a day and 365

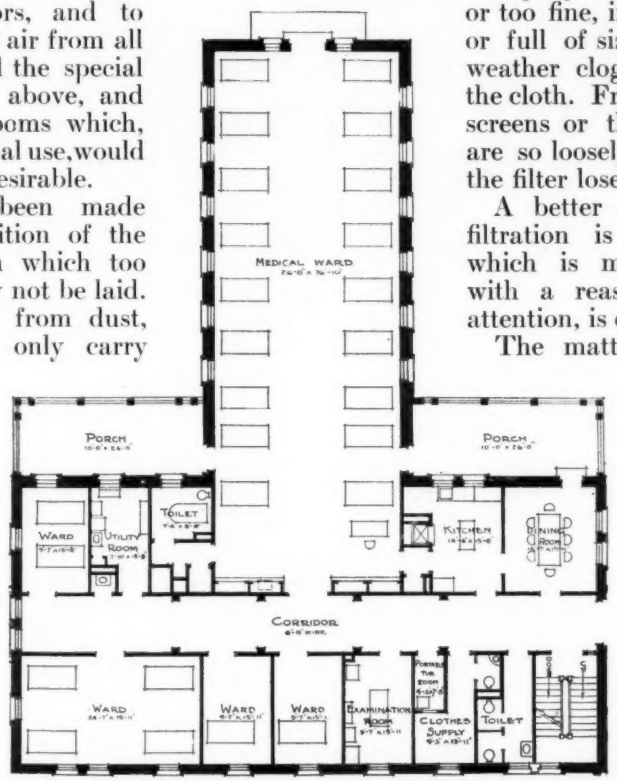


FOURTH FLOOR, ADMINISTRATION BUILDING (OPERATING PLANT) STAMFORD HOSPITAL, STAMFORD, CONN.

days a year, whereas in but few cases are the main exhaust fans operated during the summer, although it is frequently desirable that they should be. The proper rate of air changes in the rooms connected to this special system will vary from twelve to twenty per hour.

A general rule for air supply and exhaust is to supply air to all rooms into which patients may enter, and also to the corridors, and to exhaust the vitiated air from all such rooms, from all the special rooms referred to above, and from any other rooms which, because of their special use, would make ventilation desirable.

Reference has been made above to the condition of the air, a subject upon which too much emphasis may not be laid. It should be free from dust, for dust may not only carry disease germs but it is a serious irritant, and if it reaches the respiratory systems of the patients it may inflict injury therein, and render the patient liable to further disease because of its physical and germicidal properties. Also, it is believed by some scientists that the dust contains much vegetable matter from which, when coming into contact with heating surfaces at a high temperature, there may be distilled harmful gases. Trouble from these sources may be obviated by removing the dust from the air used for ventilation by means of filters.



FIRST AND SECOND FLOORS, WARD BUILDING, STAMFORD HOSPITAL, STAMFORD, CONN.

It is most desirable that the air intake should be high, as high as the roof line if possible. Actual tests by Dr. Graham Rogers, of the New York Department of Labor, demonstrated that there is but about one-seventh to one-tenth as much dust fifty feet above the street as at one foot above the sidewalk. He also found that there was a lessened proportion of oxidizable matter and of carbon dioxide in the air at the greater height.

Regardless of the location of the air intake all air entering the hospital through the ventilating system should be passed through air filters. These may be of the cloth type, although much of the cloth used for this purpose is either too coarse or too fine, insufficiently strong, or full of sizing which in damp weather clogs the openings in the cloth. Frequently these cloth screens or the frames therefor are so loosely put together that the filter loses its value as such.

A better apparatus for air filtration is the air washer, which is more thorough and, with a reasonable amount of attention, is easily kept in order.

The matter of dust suggests the importance of proper construction of air chambers and air passages. All sides thereof should be finished perfectly smooth and should be as accessible as possible, that the interior surfaces may be occasionally cleaned, and that they may not become culture tubes for the propagation of germs. To this end sheet metal flues are desirable, but where masonry chambers, ducts or flues are used they should be finished perfectly smooth.

It is desirable also that air chambers should be subjected to as much daylight as possible, especially sunlight, because of the germicidal properties thereof.

Humidity has been referred to as one of the essentials of good ventilation. Relative humidity and temperature are most intimately associated. It is true that a temperature of sixty or sixty-five degrees with a relative humidity of fifty or sixty

per cent. is more comfortable and healthful than a temperature of seventy or seventy-five degrees with a relative humidity of twenty per cent., the latter condition being frequently observed in our homes, schools and hospitals during the winter. This dry atmosphere is trying to the eyes, nasal passages and skin, it produces nervousness and sleeplessness, and because of the evaporation of moisture from the body, which rapidly absorbs heat, it causes a feeling of cold despite the high temperature. In marked contrast is a reasonably humid atmosphere of the lower temperature, say fifty to sixty per cent. and sixty to sixty-five degrees, in which freedom is had from the above annoyances and restfulness prevails.

It is not true, however, that the temperature may be lowered and the humidity raised with a resulting saving in fuel, for it takes vastly more fuel to evaporate into the air the amount of water required to raise the humidity than is saved in the five, or even ten, degrees less to which the air is heated. In determining the capacity of the boiler and in considering the fuel consumption allowance must be made for humidification. Inasmuch, however, as it means the difference between healthful and trying surroundings, between bright cheeks and eyes or sallow cheeks and dull eyes, between wide-awake minds or dull minds, and even between preservation or destruction of furniture, it is urged that humidification is well worth its cost. Doubtless within five years, or ten at the most, a hospital or school without provision for humidification will be regarded as inefficiently equipped.

The moisture for humidification may be introduced into the air-supply system by means of steam jets blowing directly into the air, by means of vaporizing pans containing steam coils, or by means of the air washer to which reference has already been made.

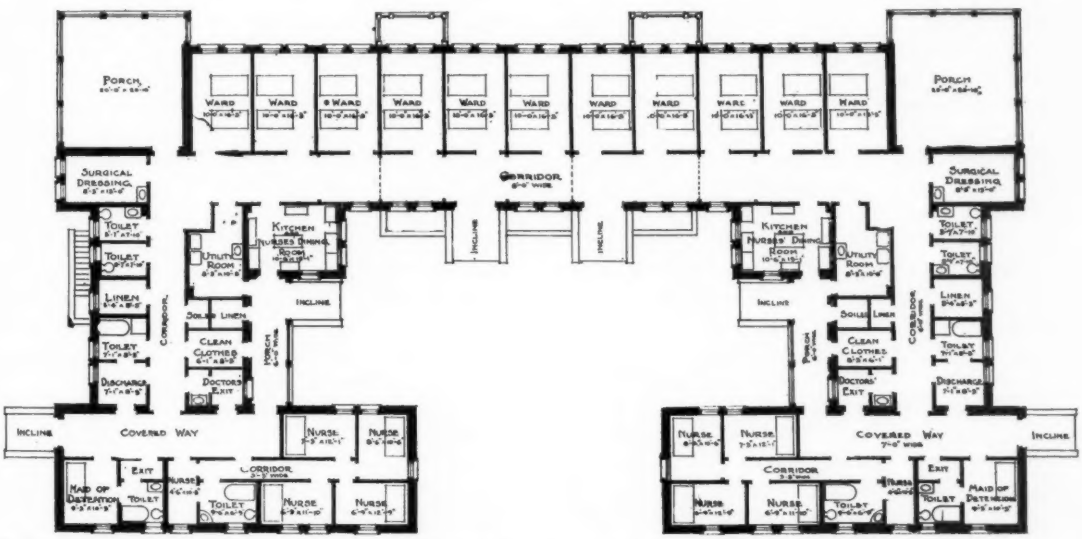
The first method has many objections, the second serves but the single purpose of humidification and is not so well adapted for large installations, while the third method serves the double purpose of humidification and air filtration, and in the most convenient manner, especially for large installations. Nor is the cost of the air washer greatly in excess of that of a really well constructed cloth air filter. Its manipulation is easier and expense of upkeep little different. Discrimination should be exercised in selecting the type and make of air washer, as not all of them are entirely successful.

The relative humidity may be automatically regulated by means of the humidostat in much the same manner as temperature is automatically regulated.

We are much less apt to suffer willingly from a temperature too low than from a

temperature too high, but as a matter of fact an excessively high temperature, especially if accompanied by a high humidity, may cause a rise in bodily temperature and even serious functional disturbances. Inasmuch as sufficient radiation must be provided for the coldest but most infrequent day of the year it is not strange that the complaint is frequently, and usually unjustifiably, made of too much radiation. Manual control is almost impossible of success and an automatic temperature regulating system therefore becomes an essential part of a complete hospital heating and ventilating system, and it is an economical device as well.

The subject of direct versus indirect heat for hospitals is much discussed. The direct radiators have the advantage of making possible the quicker and less expensive warming up of the rooms upon the closing of the windows and of giving the patients a place to warm feet or hands at such times, the absence of which in rooms without



WARD FLOOR, CONTAGIOUS WARD BUILDING, STAMFORD HOSPITAL, STAMFORD, CONN.

direct radiators, is often criticized by doctors.

The amount of direct radiation used in rooms occupied by patients may well be limited to an amount sufficient to counterbalance the heat losses through wall and glass areas. It should not be used in operating and similar rooms. If amply supplemented with a fresh air supply and foul air exhaust by means of the ventilating system, and if they can be so placed as not to be too close to patients, their presence is usually regarded as desirable, but in such cases several small radiators generally distributed are preferable to a less number of large radiators which concentrate the heat. The radiators should be plain and smooth and should be supported from the walls without legs with a space of two inches back of them so that they may be kept clean as well as the wall and floor areas in the vicinity.

Concealed piping for the heating system is regarded as preferable in that it lessens available places for the deposit of dust.

Some consideration is being given by the medical fraternity to the subject of artificial cooling of hospital wards. In view of the results of recent investigations as to the effect of excessive temperature and humidity it is reasonable to expect that much good may be accomplished in severe cases by lessening the temperature and humidity within the wards in hot weather. There is little available data, however, as to the clinical value of such an arrangement. A combination of a mechanical refrigerating system with an indirect heating and ventilating system for cooling purposes is quite possible.

Recapitulating, the essential features of a hospital ventilating system may be said to be:

Ample natural or window ventilation.

Supplementary thereto an ample supply of fresh air at a low temperature to all rooms used by patients.

System of exhausting the vitiated air from all such rooms.

Special exhaust fan systems for toilets, baths, slop sink and mop closets, etc.

Separate exhaust fan systems for laundry, kitchens, machinery rooms, etc.

The operating rooms may well be separately treated.

Air intake should be located as high as possible.

All air supplied to the hospital should be freed from dust by means of filters, preferably of the washer type.

Air chambers and ducts should be finished smooth, and so far as possible be subjected to light.

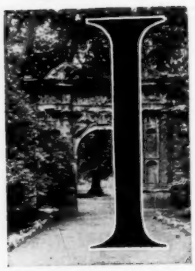
Humidification is desirable, and even essential.

Temperature regulation is desirable and a source of economy.

Direct radiation, of a limited amount is regarded as desirable.

HOSPITAL LIGHTING

By E. H. BOSTOCK



IT is, of course, rather trite and commonplace to say that here is a subject to which, considering its importance, the architect has not given sufficient study, and yet if it is of the next greatest importance to sanitation in hospital building as it should rank, then it is about the most neglected subject; for the light problems of a hospital are rather peculiar, and cannot be met by the usual methods of simply providing enough windows or lighting outlets.

It is the unusual hospital that is located where it may obtain full and unrestricted light; rather, of necessity, are they in such locations in urban districts where light is cut off by surrounding buildings, by smoke or dust, and sometimes forfeited to avoid publicity. Every hospital, of necessity, carries lighting problems of its own.

In hospital lighting one great help, of course, is that it is the wise custom to keep all interiors finished in white enamel, almost altogether, thus giving about the best reflecting surface, and, while undoubtedly this has come to stay, if architects had before them the readings of light efficiency of rooms finished in white and in other colors, they would be glad of the greater efficiency shown as proving their wisdom.

Daylight lighting of hospitals is probably just now in a transitory period, inasmuch as, for the feeling of safety gained by its use, wire glass is being used as a means of fire protection. In hospitals in cities, probably before long, building codes will require its use, and in grouped or connected buildings it surely must be adopted, and if such a possibility is admitted to exist, then we had better plan to meet it.

One is apt to think of wire glass as the grade usually used in fireproofing warehouses, etc., forgetting that polished wire glass as clear as plate except for the mesh of the wire is procurable. and, if he knows of the latter, judges its price as being as high as when first introduced a few years ago. It is, however, very much lower in price recently, and can be used to great advantage in glazing.

It would seem that, in the case of a wing with windows on three faces, that ordinary rough wire glass would give all the desired light and fire protection at the least cost.

When rooms can only receive light from one exposure, however, or if overshadowed by buildings across the street to the exclusion of light, we must find a means to utilize all the available light flux and resort to polished wire or prismatic wire glass.

Prism glass and wire glass are of course known to architects generally, but possibly it is not known to all that a combination

of them—prismatic wire glass—has recently been marketed.

For use in locations facing streets or light wells the manufacturers make prism glass with different angles calculated to turn light into buildings at approximately a right angle, and by reference to their data the glass with correct angle to suit any situation may be procured, and a double sash window, the upper sash glazed with the proper prismatic wire glass, and the lower with polished wire, would seem appropriate, if cost permits.

It has become the custom of recent years to equip each hospital with a sun parlor. These usually are built upon the roof so as to catch all possible sun and light, and built with an insulating space sufficiently supplied with heat between the outer and inner glass, and are well planned for their purpose, but it occurs to the writer that advantage is not taken of an opportunity here in using the therapeutic qualities of light.

For instance, certain green and blue-toned lights are depressing in effect, and, on the contrary, some amber and rose tone lights are cheering. Now, in the treatment of certain forms of melancholia or those where low spirits retard convalescence, a corner of the sun parlor glazed with light amber (champagne) tinted glass would be of great value it would seem, in bringing back brighter spirits.

The sash could be made to fit the inner casing and movable, so that they could replace the clear glass at will, or even be changed for other glasses having known therapeutic values for the sunlight to bring out.

Wherever a hospital is fortunate enough to possess detached operating rooms, or rooms with skylights, advantage should be taken of this fact to procure light by having a dome constructed, not of ground glass as has been frequently done, but by a dome of the new diffusive glasses in sheet form.

In the question of artificial light the first inquiry is what shall be the medium, and it seems, too, that there can be only one answer, as electricity so nearly fills all our requirements. The question rather seems to be, is it worth while to use combination fixtures or pipe for gas at all?

It will, of course, be admitted that great danger ensues upon the use of gas in wards and operating rooms, first from the use of light fabrics and lints, and also from the dangers that slight leakages might have upon weak and susceptible patients.

Gas is, of course, impossible where sulphuric ether is handled largely, and in the days when chloroform was of more frequent use doctors remember vividly the acrid odor of burning chloroform vapors.

No electric plant, however, is infallible, and, as a matter of insurance against its failure, perhaps the majority of architects will think it wise to have the buildings fitted for gas, and provide the necessary gas outlets to tide over such a possibility.

Whatever fixtures may be provided should be of the simplest type, with no more ornamentation or angles to catch dust than can be avoided, utterly plain spinnings and tubing, if they can be used with an enamel finish that may be washed if necessary, without harm, are best.

The lights provided for halls, stairways and corridors should be as far as possible ceiling dishes, this being the form easiest kept clean, and the glass bowl, if to be used with a ground or acid finish to soften light, should be specified "ground or finished on the *inside*."

Wall brackets should be avoided if possible. They are harder to keep clean and sanitary, and there are known instances of patients turning on gas outlets and leaving them undiscovered for a long period.

The color values of light in relation to hospital work deserve a few words, for the nurse or surgeon must of necessity decide sometimes as to what is healthy or unhealthy tissue by its color, so that if its color value is changed very much from that of its daylight color they may be a little at fault. The yellow color of the carbon filament lamp, sometimes intensified by long use, can surely be improved on by the use of the tungsten filament, and, while we have considered other sources, we are inclined to advocate the more general use of the tungsten lamp as being the most practical white light that we can use, having in mind also its low cost per candlepower-hour.

The lighting of the hospital wards is one point on which it is hard to come to a decision, as there are so many factors to be considered: the color, the amount, the

localizing, the mobility of units, all seem to pull against each other.

The first thought arising probably is that some one of the concealed lighting schemes would be of great value, but after considering it in connection with other features, we fear it does not apply. Even if it were only a matter of enough light, the strain upon the eye

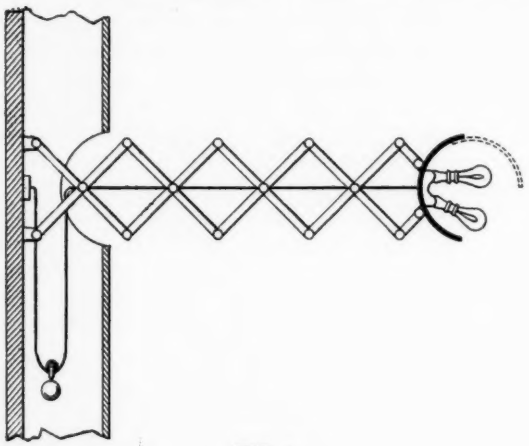


FIG. 1

of a patient who must for many hours keep the tension of the eye muscles set, by reason of the absence of restful variations of light, would cause its abandonment. Small candlepower units are often needed as night lights, and again high-powered lights are needed for some attentions that must be given and a plug and cord necessitating two nurses' care is surely a disadvantage. If a high-powered lamp is used under these conditions its light may annoy other patients unduly, and again it seems wise to arrange units that can be brought in use at any bed where needed as quickly as possible.

As a matter of general ward night lighting, the installing of two or three ceiling clusters with ground dishes is probably as good as can be done.

But for general purposes, after studying all conditions, perhaps a fixture built from the suggestion in the accompanying illustration might act as a guide.

If the "tongs" feature were not thought feasible, this might be replaced by telescopic tubes.

It is designed to carry an eight-candlepower carbon and a forty-candlepower tungsten light, and for ordinary use to fit into recess in wall as if it were a stationary sconce, and used with the eight-candlepower lamp as a night light or nurses' aid for general purposes.

When for examination or attention a good light is required, the light which would be installed over every bed is pulled out to any position where it will stay without attention, being tight-riveted in every joint of the extension tongs and the swivel joint with which it is fastened to the studding; the rider weight is used to keep wiring always in order. The shade used could be built double as shown in cut, and if light is to be used any length of time, the upper part be slid out to serve as a screen to keep light from annoying other patients; the shades would be of light sheet metal with white enamel finish, thereby acting as reflectors and when pushed back into wall as sconce being in touch with wall finish and almost unnoticeable.

While not really in topic, it would seem best to provide a push socket outlet below this in wall for use if electrically operated instruments may be used.

In operating rooms care must be taken to provide enough light in all portions of room so that nurses may never be at a loss in reading labels, etc., but the question of proper lighting for the operator is a matter of graver discussion.

The usual procedure has been to provide a cluster of carbon filament lamps of supposedly sufficient power at a height of about twenty-four inches above the level of operating table. The candlepower usually installed was from 120 to 200, and yet, while this would seem to be ample, surgeons are continually complaining as to light, and either require nurses to hold a portable light close to the point of operation or wearing a head lamp with a reflector to help them.

One mistake has been that, the light having usually been from a relatively small area, whenever the hand of the surgeon was interposed of necessity between the area of light source and the point of operation, a shadow was cast that was inconvenient.

Perhaps this question could best be solved by the use of a circular or rather hexagonal fixture built up of say six three-foot units of reflecting trough as shown, carrying lamps of forty-candlepower tung-

sten type fitted with a fluted glass reflector designed at angles to throw all the light within a circle of two feet diameter at the height of an operating table. This fixture

FIG. 2

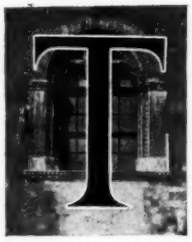
might be hung at height completely out of way of surgeons, and yet throw easily two or three times the light available under present systems upon the work, and if diameter of circle is kept at about six feet the surgeon cannot create a shadow that will trouble him.

The color of light has also been considered in recommending tungsten lamps; the slow-starting lights might at times waste valuable seconds, and the tube lights might indeed by the breaking of a unit cause trouble; whereas the breaking of a filament lamp or two would in a circle of such lights be no great inconvenience.

In the matter of the lighting of clinical amphitheatres as attached to most hospitals we think a fixture of this type desirable, also, except that it had probably be better suspended by chain so as to give as few lines as possible to obstruct vision.

CONTAGIOUS GROUP OF THE PROVIDENCE CITY HOSPITAL

MESSRS. MARTIN & HALL, ARCHITECTS



HIS particular hospital is unique in construction and in its administration because it is probably the first hospital to be established in this country where contagious diseases are treated on the theory of contact infection, which means, when defined, that such diseases are not carried by the air but by something or somebody coming in contact with patients suffering from a disease and transmitting it to the healthy individual. Heretofore contagious diseases have usually been combated on the theory that diseases are carried by the air and it is only very recently that physicians and hospitals have begun to adopt the theories of Pasteur on the subject of contact infection. He established a ward in Paris, in which a variety of diseases were treated in the same building, under definite rules and requirements as to care on the part of nurses and others coming in contact with the patients, and secured definite results. Eighteen months of practice of these theories in the Providence City Hospital has indicated that they are sound.

The following extract from the report of Dr. Dennet L. Richardson, Superintendent, clearly explains the method employed in securing the very best results from the building as designed and planned.

"The opening year of the hospital has presented many problems. It has not been easy to bring together efficient help (for many of the employees had never had any previous hospital experience), and establish a routine based on the principles and practices of other hospitals and adapt them to our own needs. We have had to make changes and expect to make more to improve the service. The peculiar problems relate to the method by which we have started out to handle contagious diseases. It is based on the theory of contact infection, which, defined, means that these diseases are not carried by the air but by something or somebody which has come in contact by touch with a patient suffering from one disease and transferred it to the healthy individual. As a working basis, contact infection is made to include possible infection by coughing upon anything or anyone at short range. While perhaps this is the first time this practice has been employed in this country, it has been successful in certain hospitals in England, France and Germany.

In the treatment of all the contagious diseases contact infection is avoided by

GENERAL VIEW OF GROUP, PROVIDENCE CITY HOSPITAL, PROVIDENCE, R. I.

strict asepsis, and air infection has been disregarded. Nurses, orderlies, maids and all the help are carefully instructed, first, how to protect themselves, and, secondly, how to avoid transmitting infection from one ward to another, or from one patient to another. The following set of rules is given to everyone:

"Keep finger, pencils, pens, labels and everything out of your mouth.

"Keep and use your own drinking glass.

"Do not kiss a patient.

"Wash hands often and always before eating.

"Keep out of doors as much as possible and always sleep with your window open.

"Do not touch face or head after handling a patient until hands are washed.

"Do not allow patient to cough or sneeze in your face.

"Do not eat anything that patient may wish to give you.

"If taking a drink or lunch be sure and use the nurses' dishes.

"Put on gown or change uniform when going into the ward.

"On leaving ward always wash hands.

"Always remember that infectious diseases are carried by contact and not by air infection."

The nurses all occupy the same dormitory and eat in the same dining-room. When ready for duty they go to a dressing-room where they put on a ward uniform. Each nurse is provided with two lockers, one for her ward clothes and the other for the uniform worn when off duty. On leaving the ward she changes again, washes her face and hands and dries them on an individual towel.

The ward maids live with the other female help and eat in the help's dining-room. They observe the same rules as do the nurses, with the exception of wearing a long gown instead of removing the outer garments.

The resident physicians, when making their visits, wear white suits and put on a gown in each separate ward. This is not always done unless they are likely to examine patients. No caps are worn. Great care is taken in washing their hands.

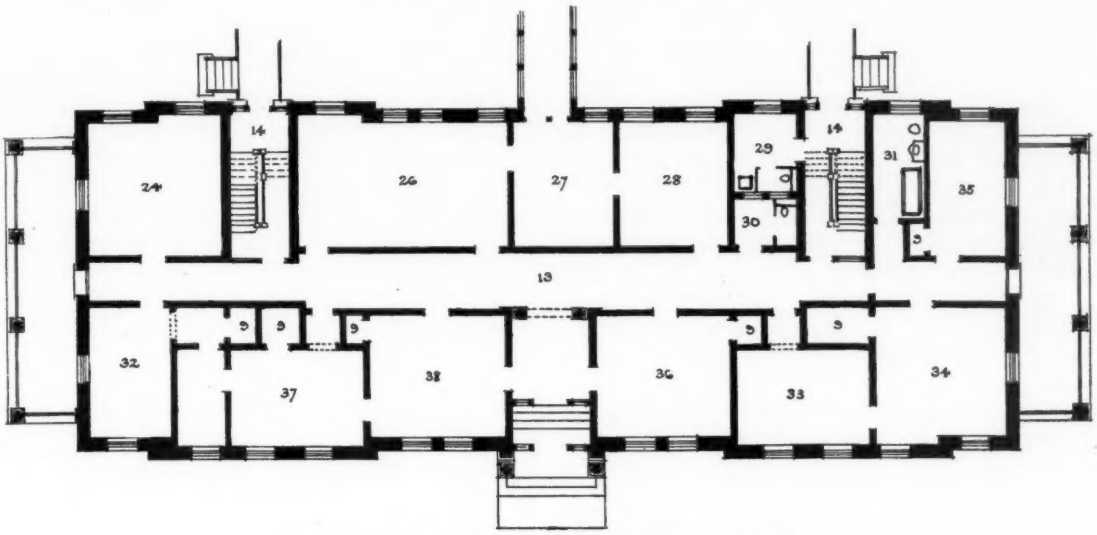
Soiled clothing is thrown down a chute and falls into canvas bags which are regularly collected. One man is delegated to take the clothing to the laundry, where it is put directly into the ordinary washers and washed in boiling water from forty to sixty minutes. The man wears a gown and washes his hands thoroughly after handling the infected clothing. The clean clothing is delivered to the wards in bundles tied up in cloth.

The number of dishes which must pass between the main kitchen and the ward kitchen has been reduced to a minimum, but such as do are carefully boiled. All garbage is burned.

I believe that the most fertile source of infection is the patient himself. It is very important to make a correct entrance diagnosis, to rule out mixed infections and if there is any doubt, to isolate the case until a decision is reached. New patients are taken to the admitting room in each ward, where they are carefully examined, the

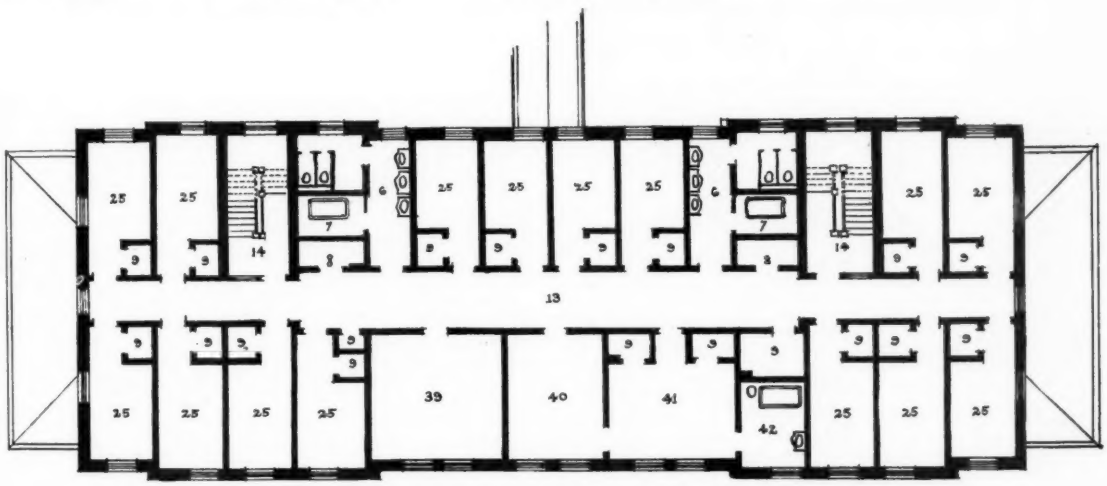
history and physician's examination carefully recorded and then are sent either to detention rooms, guarded by a red card if necessary, or sent to the isolation ward.

We have already found our isolation ward insufficient and have been obliged to isolate some mixed cases in the diphtheria and scarlet fever wards. To fulfill



FIRST FLOOR PLAN, ADMINISTRATION BUILDING

4. Room.
6. Lavatory.
7. Bath.
8. Linen Closet.
9. Closet.
13. Corridor.
14. Stair Hall.
23. Tunnel.
24. Sewing Room.
25. Chamber.
26. Nurses' Dining Room.
27. Serving Room.
28. Doctors' Dining Room.
19. Women's Lavatory.
30. Men's Lavatory.
31. Doctors' Bath.
32. Internes Chamber.
33. Superintendent's Parlor.
34. Superintendent's Living Room.
35. Superintendent's Chamber.
36. Superintendent's Office.
37. Matron's Office.
38. Waiting Room.
39. Nurses' Sitting Room.
40. Matron's Sitting Room.
41. Matron's Chamber.
42. Matron's Bath.
43. Nurses' Laundry.
44. Servants' Dining Room.
45. Pharmacy.
46. Trunk Room.



SECOND FLOOR PLAN, ADMINISTRATION BUILDING

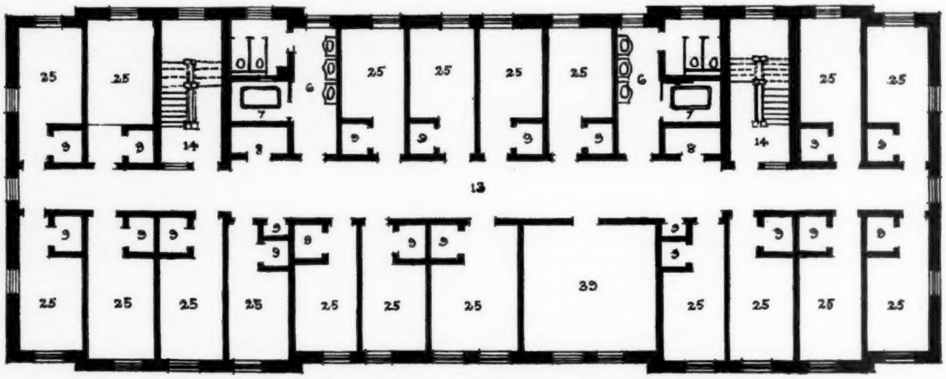
Even if the diagnosis seems plain, all patients are placed in detention rooms for several days, where they are meanwhile treated as suspicious cases.

the same purpose of the barrier system of the English, we hang on the bed, or put on the door, a red card on which is printed "Special Case." Hands are washed before

and after handling the patient and a gown is worn. Every such patient has his own bed pan, urinal, thermometer, and all his dishes are sterilized. Every patient has cultures on the first two days of his hospital residence, and one is taken in the admitting room before he comes in contact with any other patient. If the cultures are positive in any but the diphtheria wards, the case is isolated. Soap and water alone are used for cleaning hands, floors, walls and furniture. Mattresses are sterilized by steam. Rubber goods and glass goods are treated with carbolic acid 1-20. Fumigation is never done.

I wish now to speak of the results of the treatment of cases in the isolation ward, where are carried on the same precautions as will be used constantly and can be kept in the room as long as the patient occupies it. Utensils, dishes and trays after being taken from the room are put directly into a large utensil sterilizer in the ward kitchen and sterilized by steam and hot air before they are washed. The ward kitchen is thus kept uninfected, and the trays of food are made up and taken directly to the different rooms. All rubber goods, glassware, bed pans and urinals are sterilized in 1-20 carbolic solution.

Only physicians and nurses are allowed in these rooms. If they simply go in and do not touch anything in the room no precautions are taken. If the patient, or anything in the room is touched, the hands are washed with soap in running water and



THIRD FLOOR PLAN, ADMINISTRATION BUILDING

as are practiced on the red card cases, but more effectively. On the first floor of the isolation building are ten rooms, five on each side of a common corridor. The doors are opposite to each other, and beside each and opening into the same room is a full window, so that a nurse may pass along the corridor and note what is going on in each room without entering the door. Each is provided with running water, controlled by levers, which are operated by the forearm, to avoid contact by hands. The furniture consists of a chair, a metal bed, and bedside table, so constructed that they can be easily and thoroughly cleansed. The patient once placed in a room is not allowed out of it unless taken out of doors, and seated by himself. He is provided with a thermometer, pus basin, hand basin, ice bag and so forth, such things dried on individual towels. If the patient is handled much or examined, gowns which hang in the rooms are put on. The care of the hands is rigidly insisted on. Toys, books, etc., are either sterilized or burned after the patient goes home. On discharge of a patient the bed and furniture, floors, door knobs, wash basin and walls within reach are washed with soap and water. Dirty clothing is sent to the laundry. The mattress is sterilized by steam. The room is aired as long as possible until there is another patient to occupy it.

The second story of the isolation ward, consisting of one, two and three-bedded rooms, has been provided with running water, sterilizer, etc., such as the first story is provided with. This was opened early in January, 1911, and we now have ample

(*Continued on page 164*)

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CONTENTS

A NEEDED REFORM

TO anyone who has given thought and attention to the subject, it is lamentably apparent that sufficient heed is not given by architects in general, represented by their accredited organizations, to public opinion and the causes which mold it. Instances of almost weekly occurrence seem to demand some action, either in the form of a disavowal on the part of the profession of much that has appeared in public prints, or correction of false impressions by the publication of authoritative information on subjects related to architecture. One week, the chairman of a school board gives misinformation to the daily press concerning the conditions under which plans may successfully be obtained in competition, for a proposed new high school building. The next, some putative member of the profession, from motives of personal spite or perhaps due to disappointed ambition, seeks to discredit the work of men and firms of good repute, by means of letters to journals that while slightly allied in their fields to that of architecture, are not sufficiently informed regarding the subjects discussed to intelligently exercise the usual editorial function in connection with them. Immediately following the widest publicity is given to the fact that the plans for certain large work will be prepared by such and such a well-known firm of architects, who will receive as their commission a sum much less than the established rate, but one that the public official having charge of the matter nevertheless in his omniscience considers ample compensation. Soon after the above information is given to the public, the statement is widely circulated that another architect of some reputation and prominence has prepared plans for one or more suburban residences to be erected in connection with a development scheme, the promoters of which are notoriously opposed to the payment of full professional fees and who, as is well known in professional circles, have been unsuccessful in attempts to induce numerous firms, of higher ethical ideals, to undertake their work for the small remuneration offered, together with promised publicity and other possible perquisites.

These are not hypothetical cases nor are they, as typical instances, of rare or even infrequent occurrence. They are the cause of unquestionable and positive injury to the profession both by reason of the erroneous impressions created in the public mind, and the demoralizing effect produced on younger members by the spectacle of architects of some years' experience and of position in the profession, departing from the standards of practice advocated in the councils and generally accepted as fair and equitable.

The situation certainly demands action on the part of those whose duty it is, by reason of their office, to uphold the dignity and advance the interests of the profession. That much is clear. As to the most efficient means that can be employed to accomplish the desired results, there may be some question. Alertness on the part of the proper officers of organizations of architects

in detecting, and promptness in correcting misleading published statements would undoubtedly be of much benefit. This plan has already been adopted by one of the most active organizations in the profession in more than one instance. It is hoped others will follow the example set. Some measure of disciplinary power exercised over members who are lax in principle or unmindful of their obligations to their fellow members would also seem necessary.

Of course it is realized that to make correction of all the ills and evils from which the profession suffers is probably not immediately possible, as their cure apparently involves a uniform license law and more or less complicated legal machinery co-operating with duly authorized bodies in the profession, but there is much that can be done to improve conditions now, all of which will serve to hasten the day of greater things.

Contagious Group, Providence City Hospital

(*Continued from page 162*)

facilities for isolating twenty-five cases.

These aseptic principles are laborious and require thought and great care. Most of the credit and success of satisfactorily treating cases in this way belongs to the nursing force.

The doors are left wide open and the wind sweeps freely through the rooms in warm weather, when the windows are opened also.

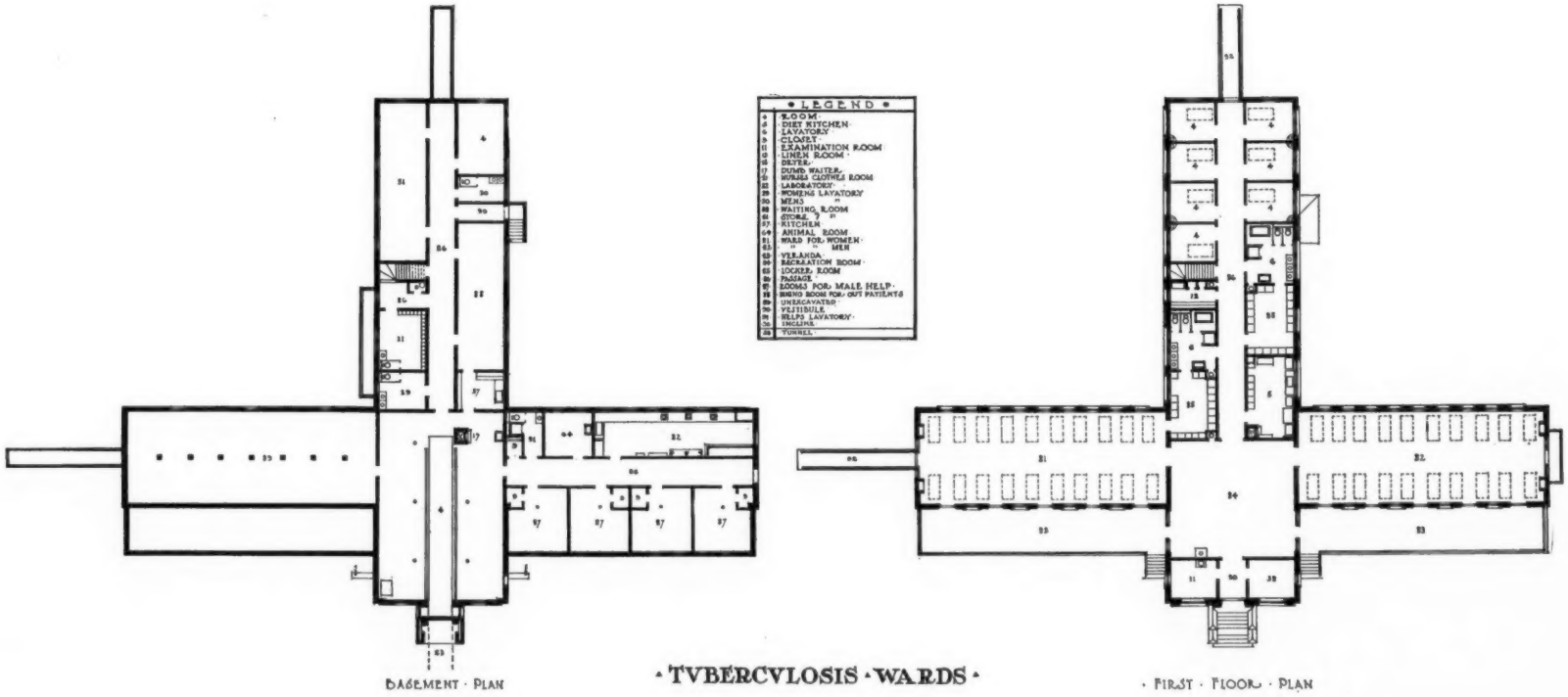
From the opening of the hospital March 1st, to the cost of the hospital year December 31st, there were treated in this ward 140 cases, representing 190 different diseases. These diseases were divided as follows:

Scarlet Fever	38
Diphtheria	18
Measles	38
Chicken-pox	6
Whooping Cough	29
Mumps	5
Positive Diphtheria Cultures	21
Gonorrheal Vaginitis	7
Rubella	2
Erysipelas	1
Non-contagious Diseases	25
Total	190

At all times there have been varying combinations of the above diseases in the ward at the same time. When there are only a few cases of chicken-pox, measles and whooping cough, they are put directly into this ward and kept there until discharged, because it saves on nursing force and it has seemed safe to treat them there. One case of measles and one case of chicken-pox have developed among the 140 persons treated in this ward, although they are practically in the same ward, and nurses pass from one to another, observing the necessary precautions. No case of cross infection has arisen in eight months.

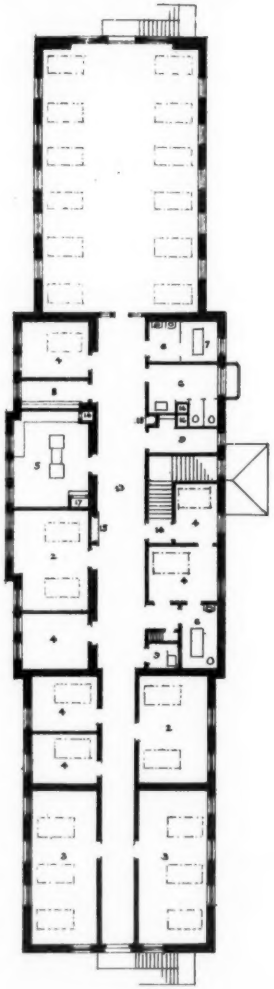
ADMINISTRATION BUILDING, PROVIDENCE CITY HOSPITAL, PROVIDENCE, R. I.

MESSRS. MARTIN & HALL, ARCHITECTS



PROVIDENCE CITY HOSPITAL, PROVIDENCE, R. I.

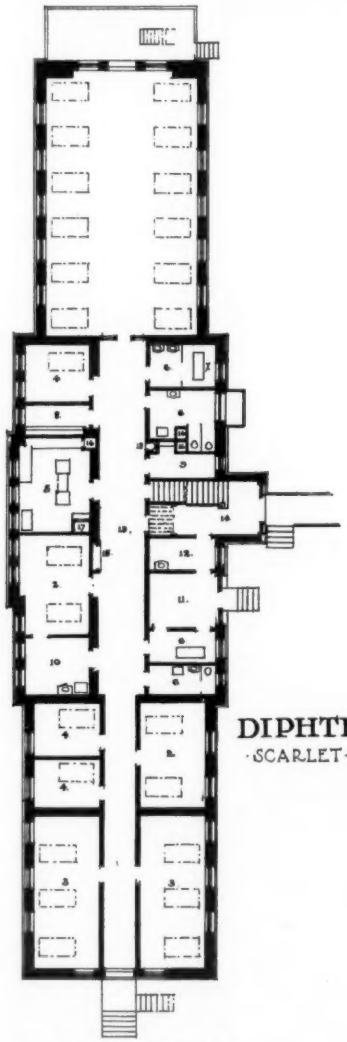
MESSRS. MARTIN & HALL, ARCHITECTS



SECOND FLOOR PLAN

LEGEND

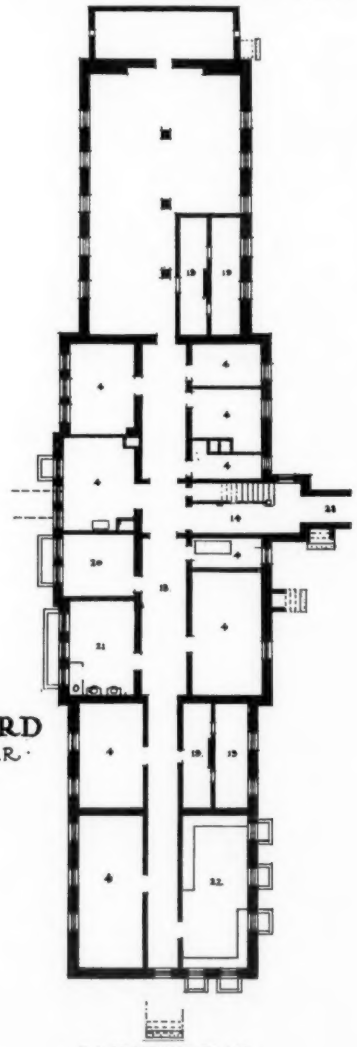
1. TWELVE BED WARD
2. TWO " "
3. THREE " "
4. ROOM
5. DIET KITCHEN
6. LAVATORY
7. BATH
8. LINEN CLOSET
9. CLOSET
10. OPERATING ROOM
11. EXAMINING "
12. ROBING "
13. CORRIDOR
14. STAIR HALL
15. MEDICINE CLOSET
16. DRYER
17. DUMB WAITER
18. CHUTE
19. HEATING CHAMBER
20. PATIENTS' CLOTHES ROOM
21. NURSES' " "
22. LABORATORY
23. TUNNEL



FIRST FLOOR PLAN

DIPHTHERIA · WARD

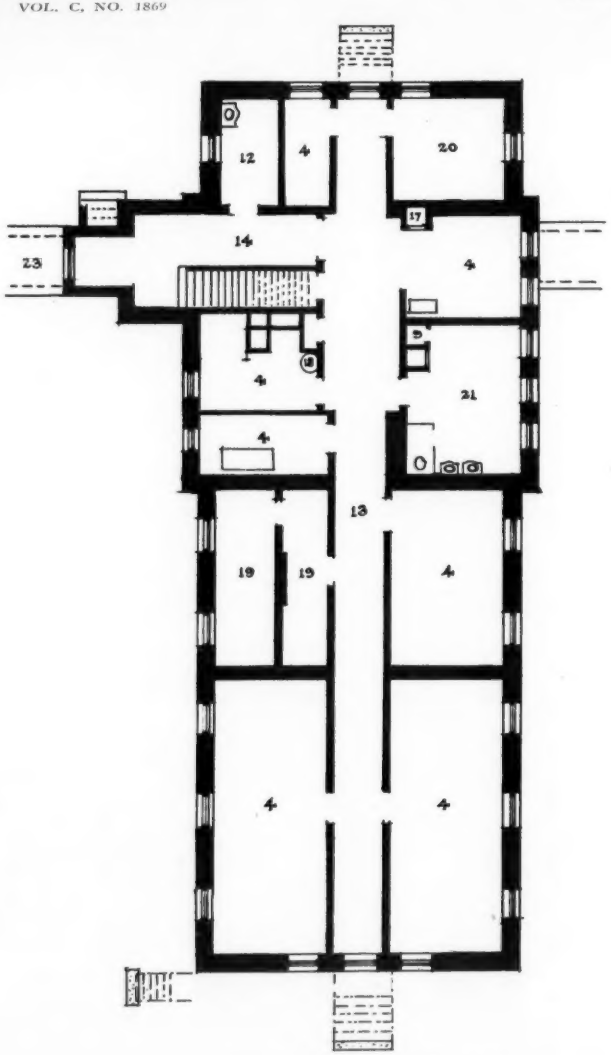
SCARLET FEVER WARD SIMILAR



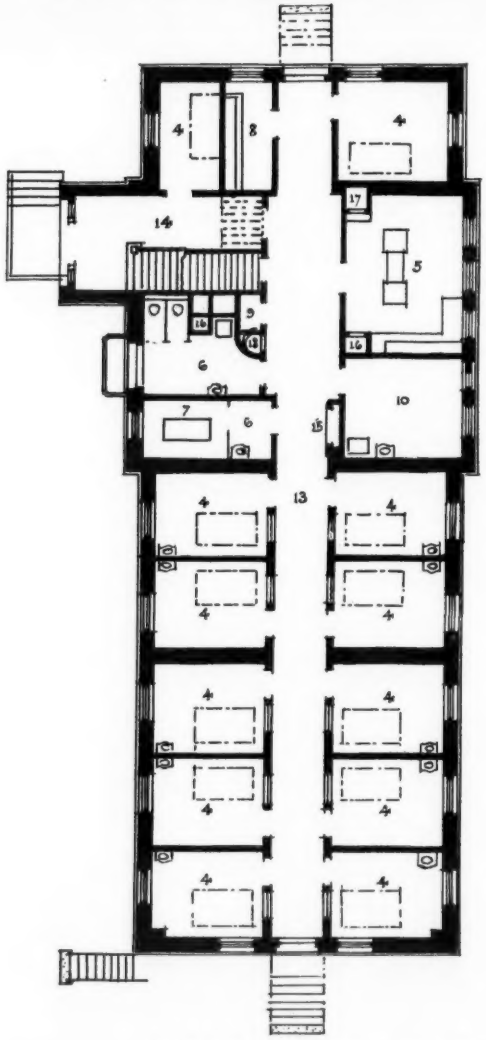
BASEMENT PLAN

PROVIDENCE CITY HOSPITAL, PROVIDENCE, R. I.

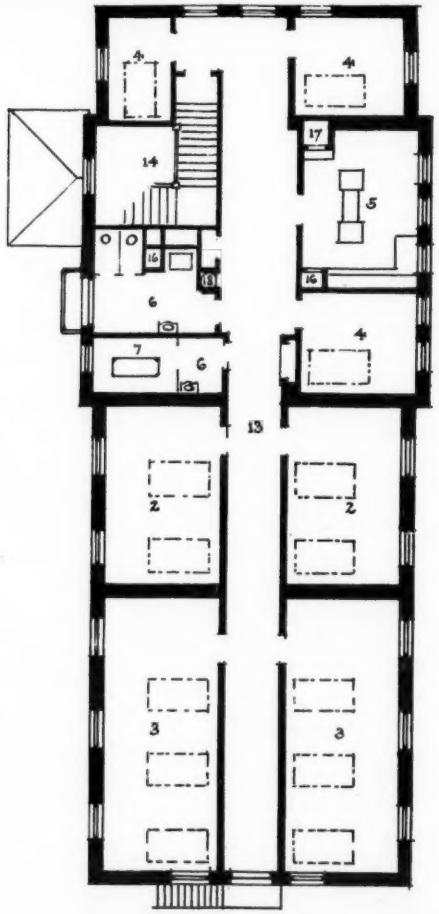
MESSRS. MARTIN & HALL, ARCHITECTS



BASEMENT · PLAN



FIRST · FLOOR · PLAN

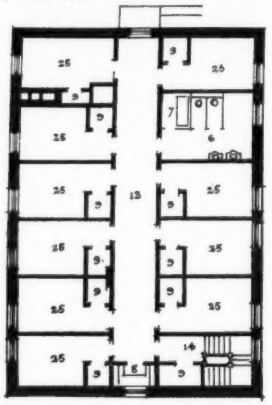


· SECOND · FLOOR · PLAN ·

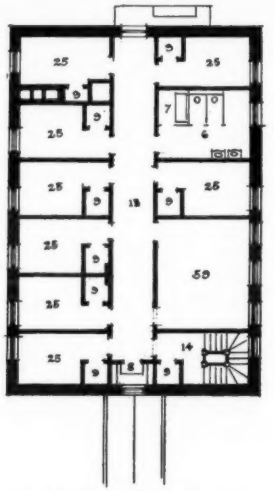
2. Two Bed Ward.
3. Three Bed Ward.
4. Room.
5. Diet Kitchen.
6. Lavatory.
7. Bath.
8. Linen Closet.
9. Closet.
10. Operating Room.
12. Robing Room.
13. Corridor.
14. Stair Hall.
15. Medicine Closet.
16. Dryer.
17. Dumb Waiter.
18. Chute.
19. Heating Chamber.
20. Patients' Clothes Room.
21. Nurses' Clothes Room.
23. Tunnel.

ISOLATION WARD, PROVIDENCE CITY HOSPITAL

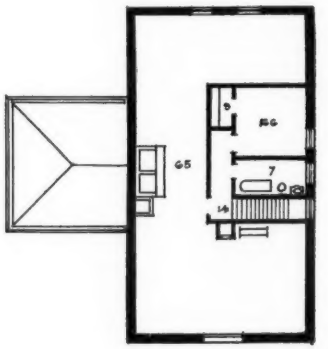
MESSRS. MARTIN & HALL, ARCHITECTS



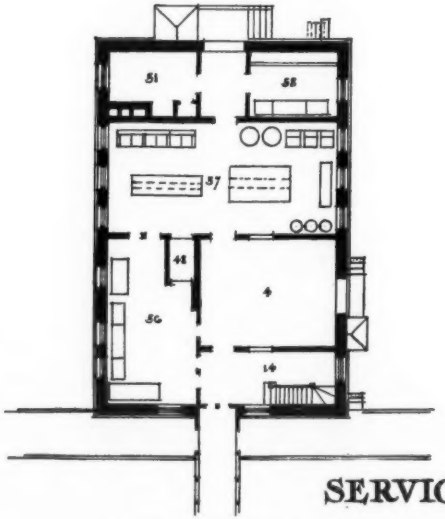
THIRD · FLOOR · PLAN



SECOND · FLOOR · PLAN



SECOND · FLOOR · PLAN



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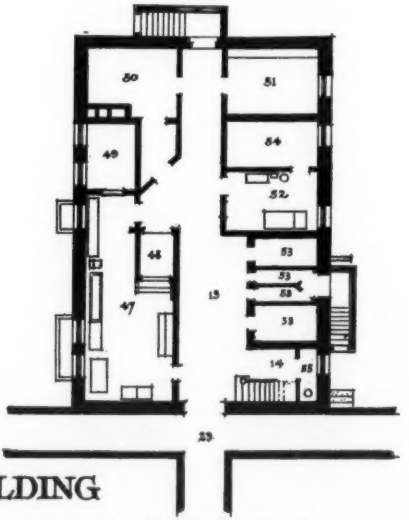
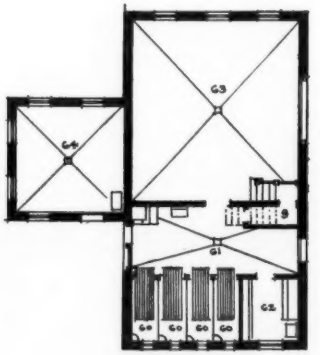


BASEMENT · PLAN



FIRST · FLOOR · PLAN

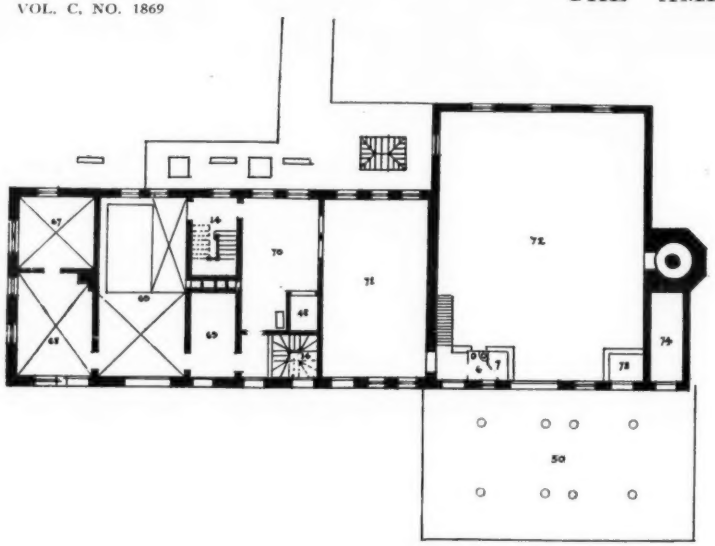
SERVICE · BUILDING

· STABLE ·

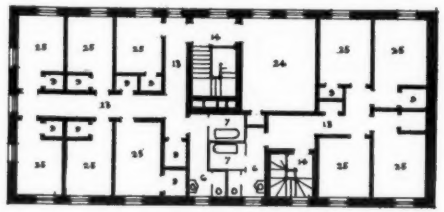
4. Room.
6. Lavatory.
7. Bath.
8. Linen Closet.
9. Closet.
13. Corridor.
14. Stair Hall.
23. Tunnel.
25. Chamber.
47. Bakery.
48. Elevator.
49. Oven. 50. Coal.
51. Storage.
52. Ice Cream Room.
53. Refrigerator.
54. Tank Room.
55. W. C.
56. Dish Washing Room.
57. Kitchen.
58. Scullery.
59. Sitting Room.
60. Stalls.
61. Stable.
62. Harness Case.
63. Ambulance Room.
64. Animal House.
65. Hay and Storage Loft.
66. Man's Room.

PROVIDENCE CITY HOSPITAL

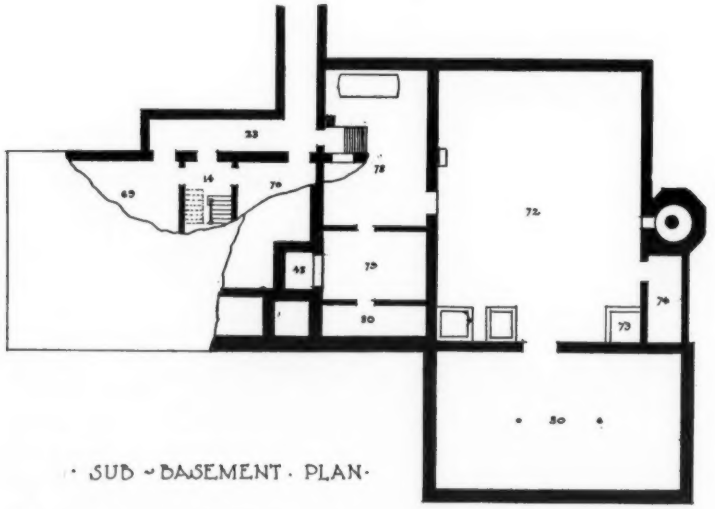
MESSRS. MARTIN & HALL, ARCHITECTS



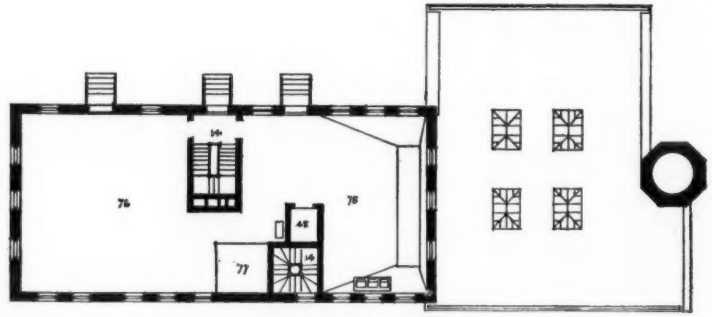
BASEMENT PLAN



SECOND FLOOR PLAN



SUB-BASEMENT PLAN



FIRST FLOOR PLAN

POWER HOUSE AND LAUNDRY

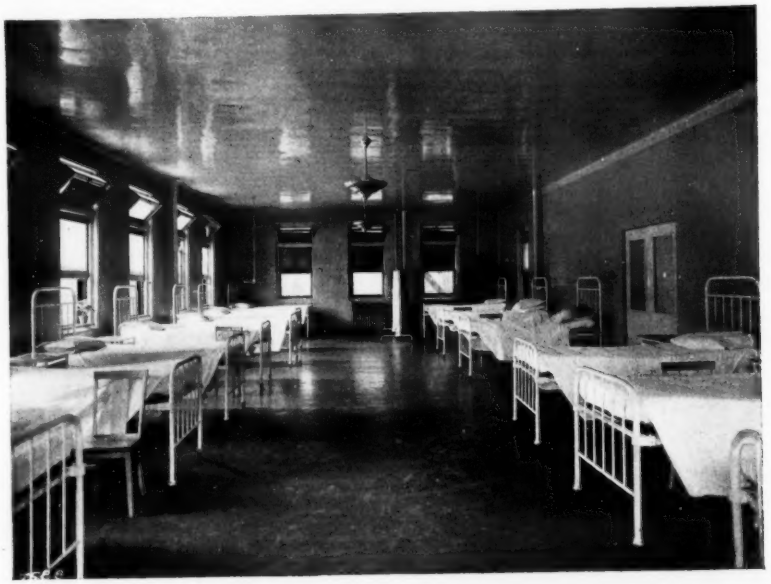
6. Lavatory.
7. Bath.
9. Closet.
14. Stair Hall.
23. Tunnel.
24. Sewing Room.
25. Chamber.
48. Elevator.
50. Coal.
67. Autopsy Room.
68. Morgue.
69. Disinfecting Room.
70. Sorting Room.
71. Carpenter Shop.
72. Boiler Room.
73. Lift.
74. Incinerator.
75. Laundry.
76. Ironing Room.
77. Drying Room.
78. Pump Room.
79. Motor Generator Room.
80. Transformer Room.

POWER HOUSE AND LAUNDRY, PROVIDENCE CITY HOSPITAL

MESSRS. MARTIN & HALL, ARCHITECTS

BARNARD SKIN AND CANCER HOSPITAL, ST. LOUIS, MO.

MESSRS. MAURAN & RUSSELL, ARCHITECTS

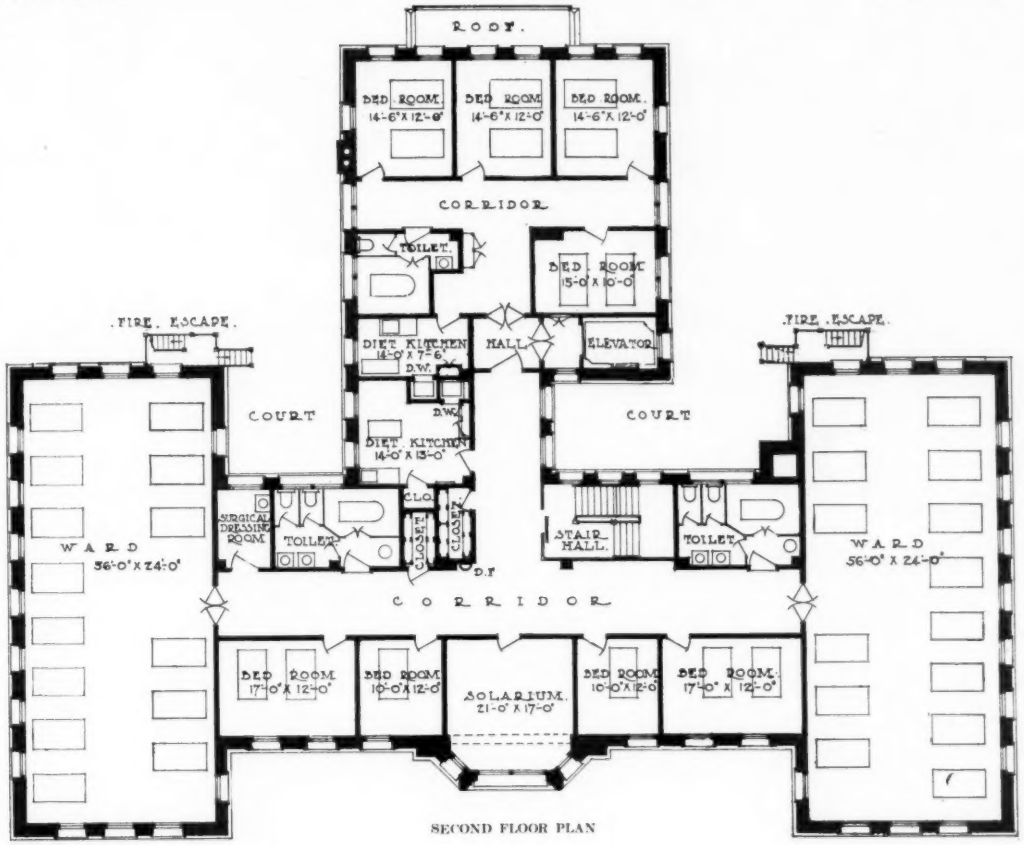


BARNARD SKIN AND CANCER HOSPITAL

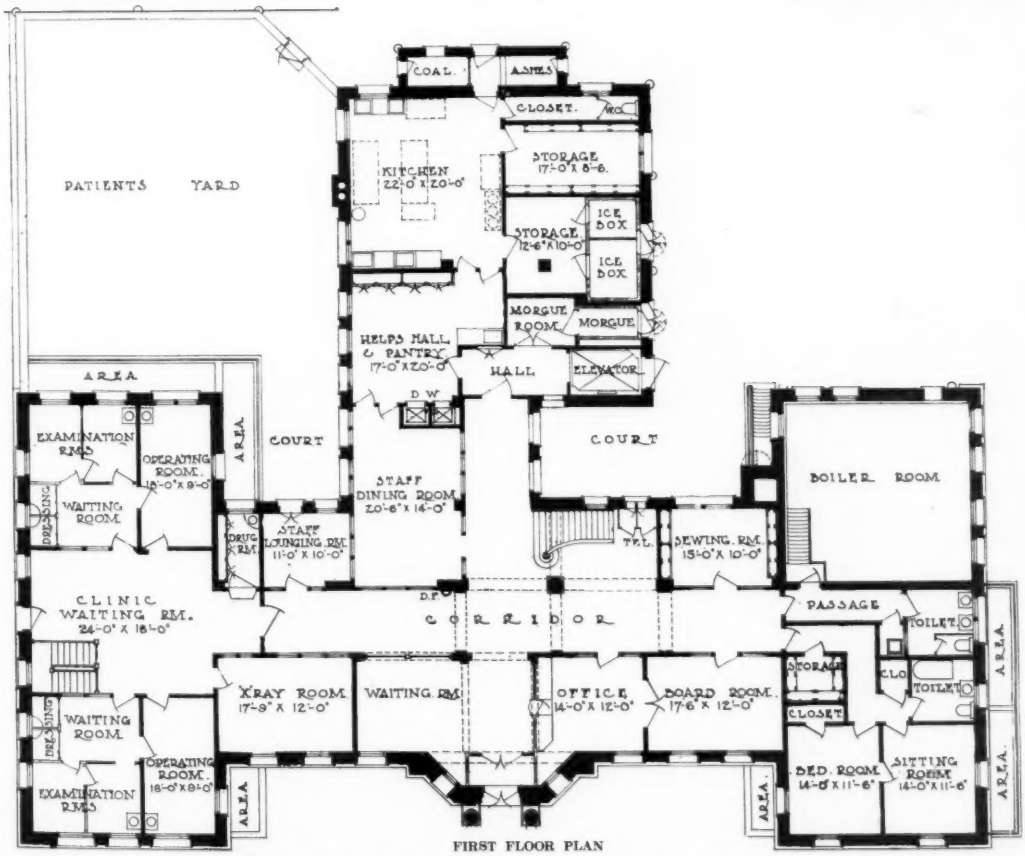
ST. LOUIS, MO.

MESSRS. MAURAN & RUSSELL

ARCHITECTS



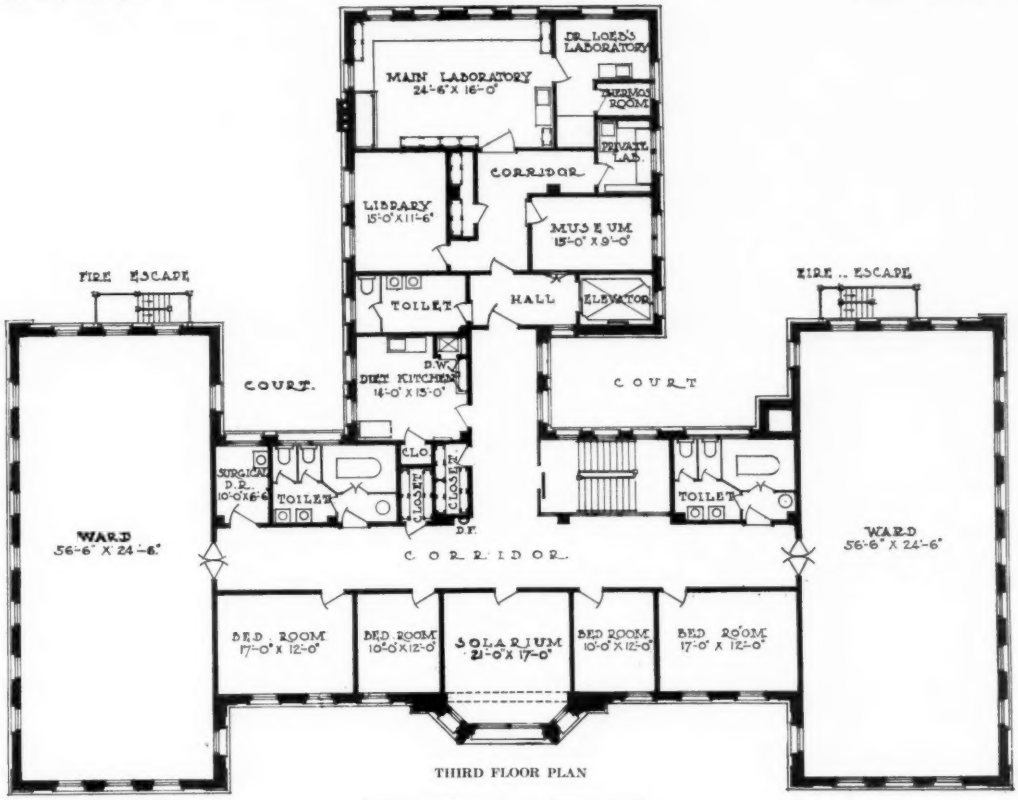
SECOND FLOOR PLAN



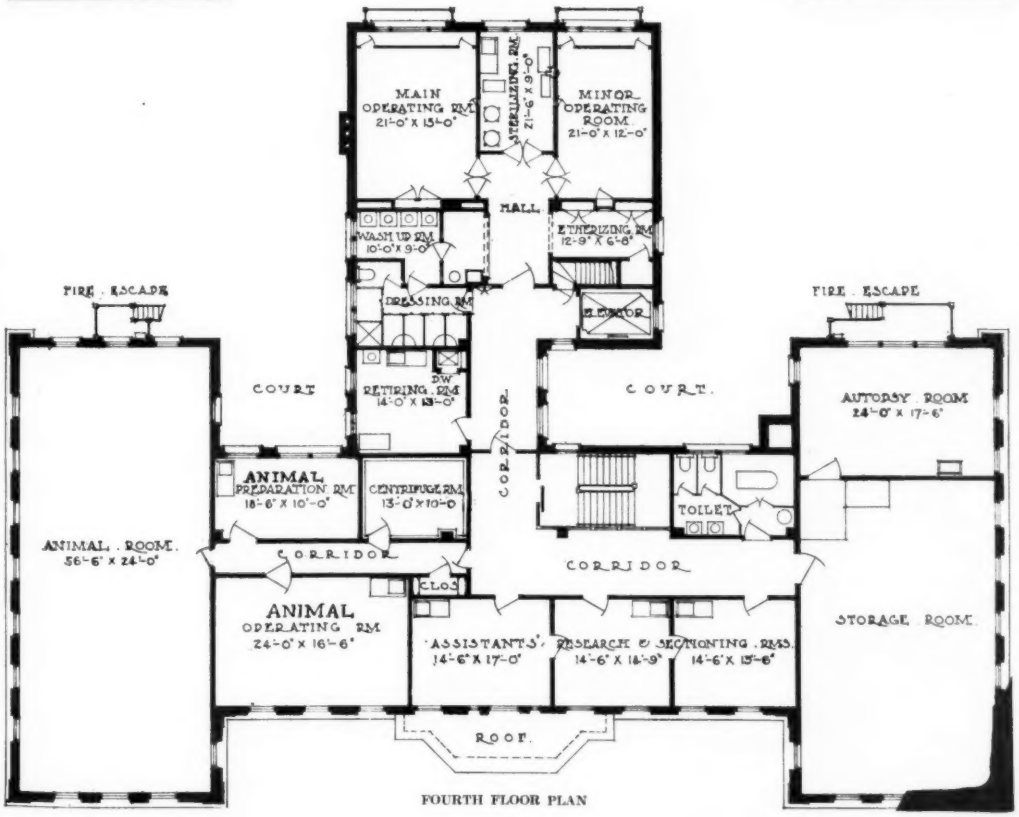
FIRST FLOOR PLAN

BARNARD SKIN AND CANCER HOSPITAL, ST. LOUIS, MO.

MESSRS. MAURAN & RUSSELL, ARCHITECTS



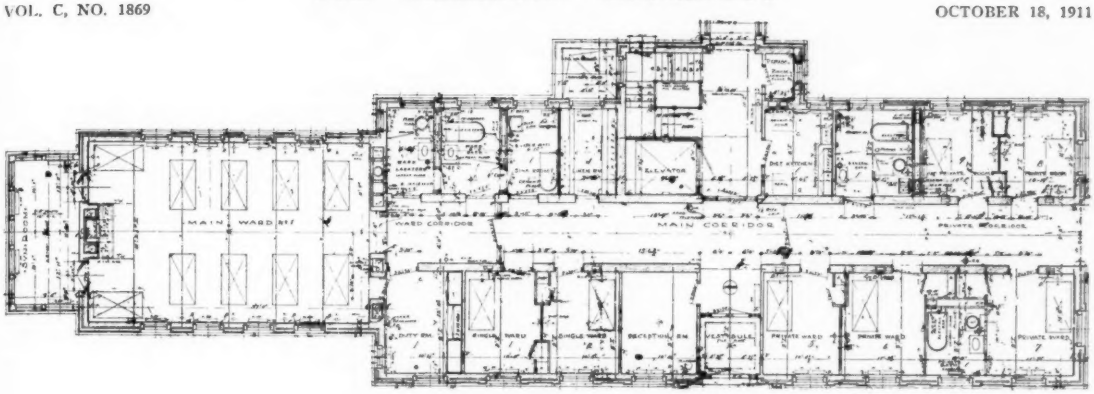
THIRD FLOOR PLAN

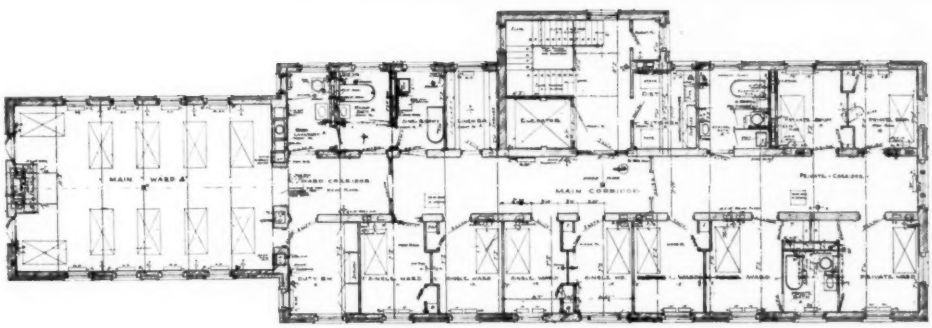


FOURTH FLOOR PLAN

BARNARD SKIN AND CANCER HOSPITAL, ST. LOUIS, MO.

MESSRS. MAURAN & RUSSELL, ARCHITECTS





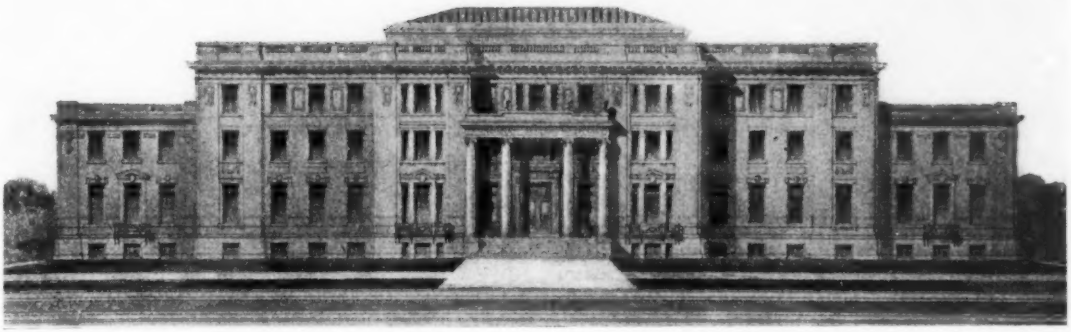
SURGICAL BUILDING, NIAGARA FALLS MEMORIAL HOSPITAL

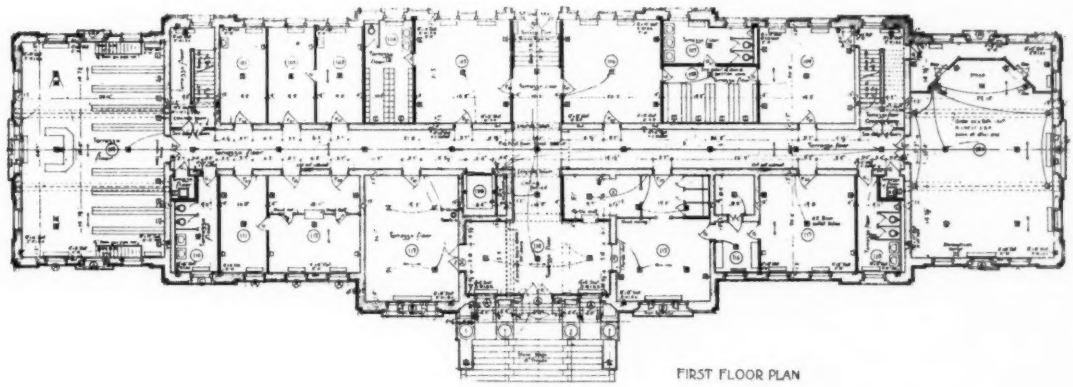
MESSRS. GREEN & WICKS, ARCHITECTS

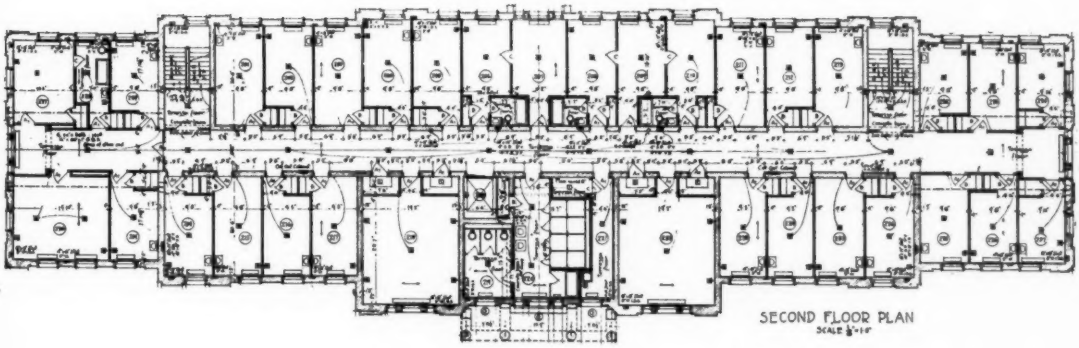
PERSPECTIVE VIEW, PROPOSED GROUP

CINCINNATI GENERAL HOSPITAL, CINCINNATI, O.

MESSRS. SAMUEL HANNAFORD & SONS, ARCHITECTS



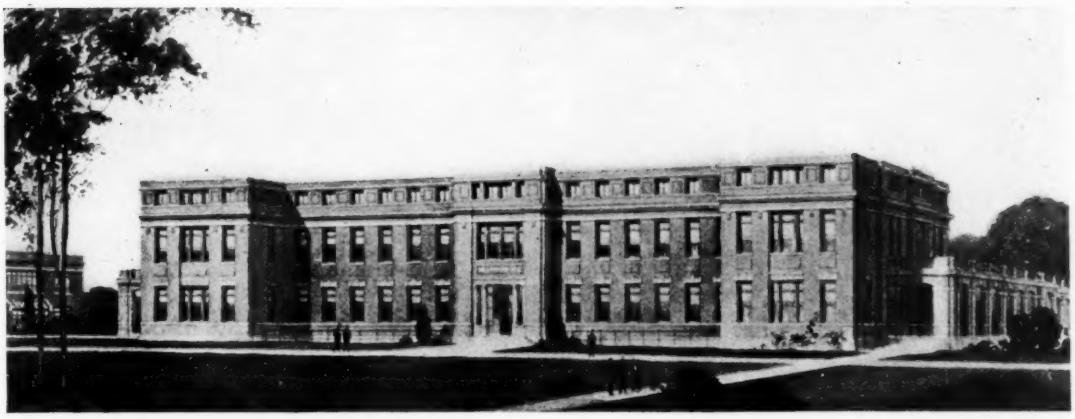




ADMINISTRATION BUILDING

CINCINNATI GENERAL HOSPITAL, CINCINNATI, O.

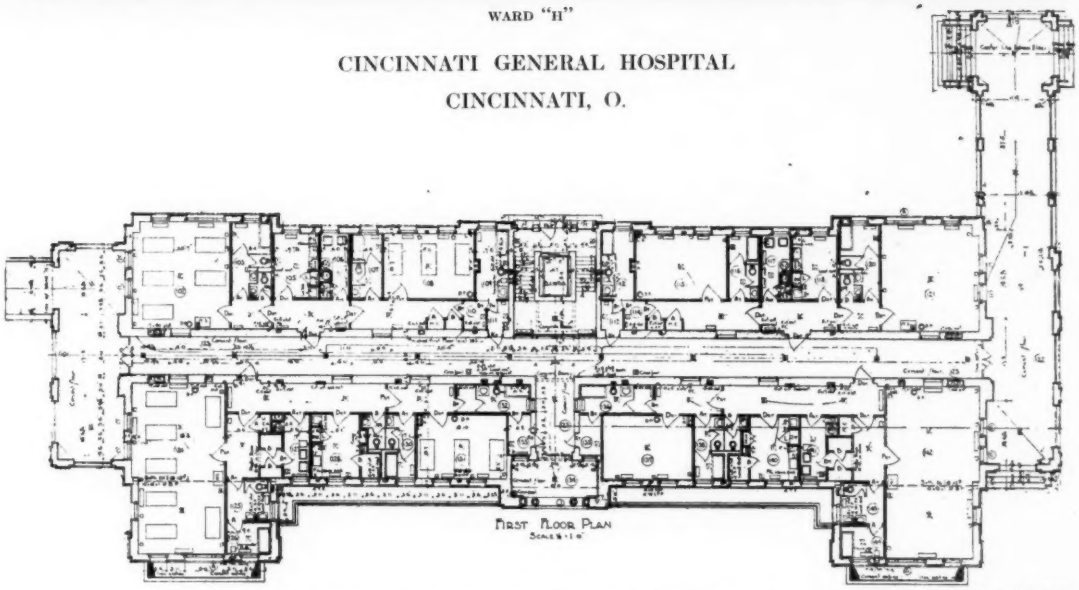
MESSRS. SAMUEL HANNAFORD & SONS, ARCHITECTS



WARD "H"

CINCINNATI GENERAL HOSPITAL

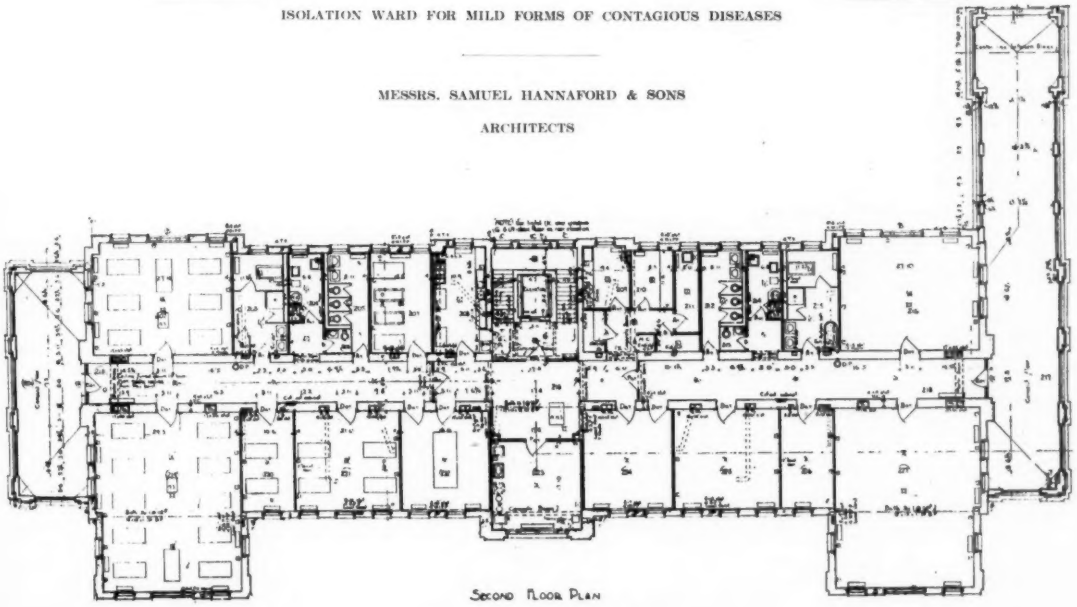
CINCINNATI, O.



ISOLATION WARD FOR MILD FORMS OF CONTAGIOUS DISEASES

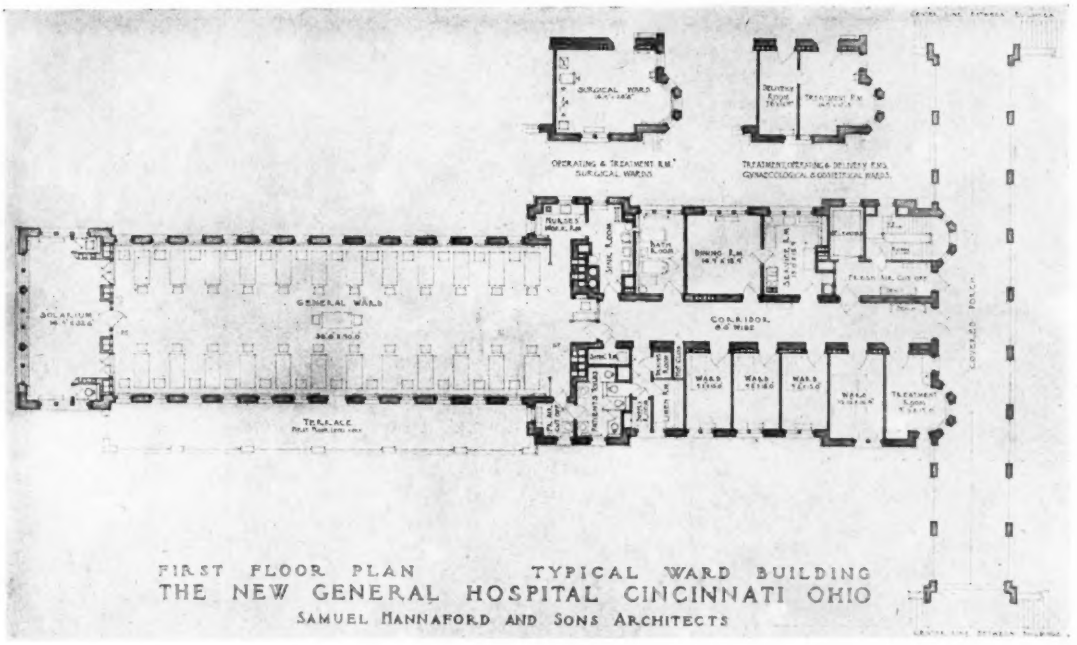
MESSRS. SAMUEL HANNAFORD & SONS

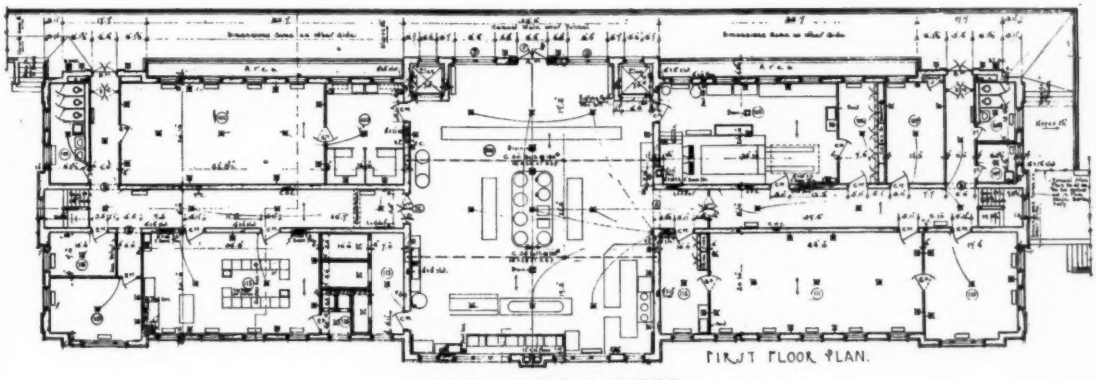
ARCHITECTS



MALE WARD FOR SKIN DISEASES

TYPICAL WARD BUILDINGS

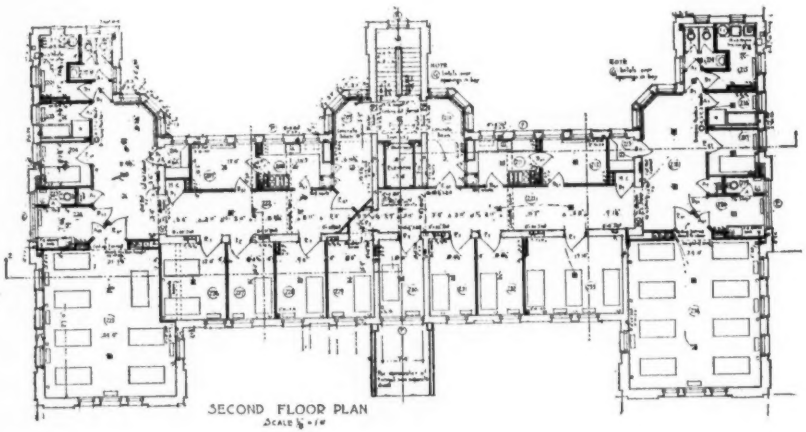


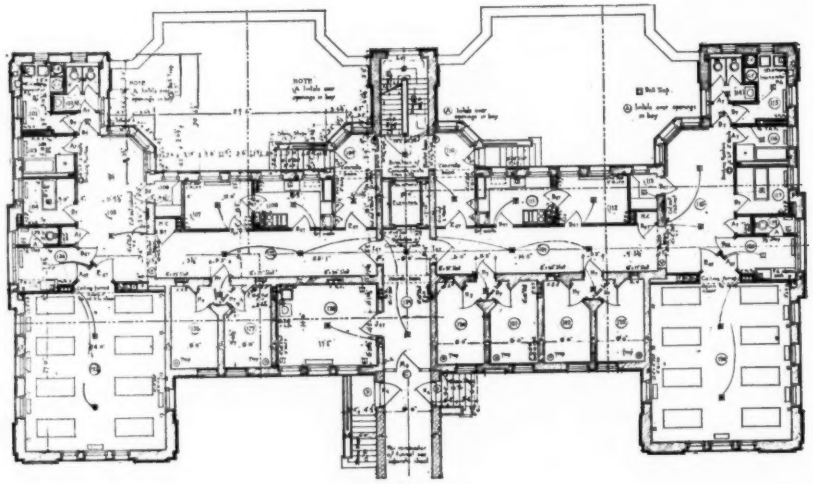


KITCHEN AND SERVICE BUILDING

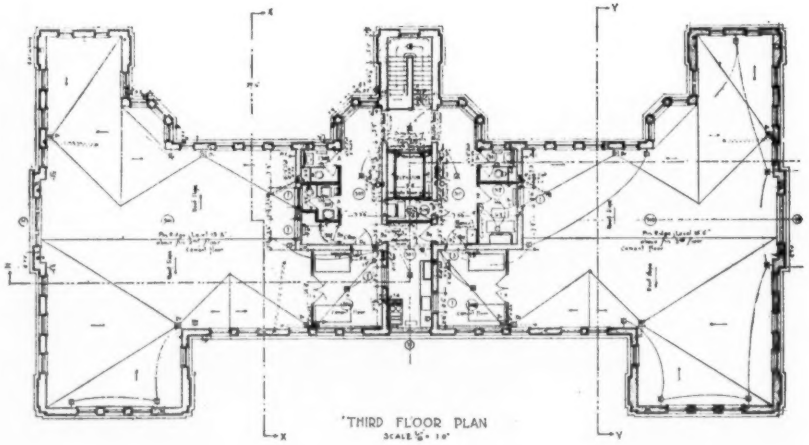
CINCINNATI GENERAL HOSPITAL, CINCINNATI, O.

MESSRS. SAMUEL HANNAFORD & SONS, ARCHITECTS





FIRST FLOOR PLAN



NEUROLOGICAL BUILDING

CINCINNATI GENERAL HOSPITAL
CINCINNATI, O.

MESSRS. SAMUEL HANNAFORD & SONS

ARCHITECTS

RENAISSANCE DOORWAY OF CATHEDRAL, BEAUVAIS, FRANCE