

# Ventilation in Mental Hospitals

Posted 21 May 2009 - 11:57am

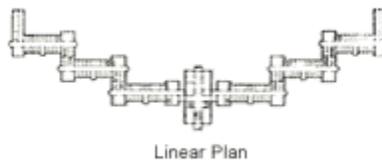
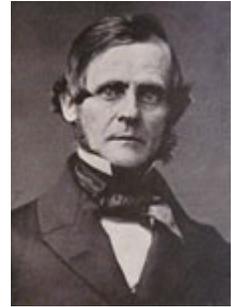
Thomas Story Kirkbride  
rev 1880

From [kirkbridebuildings.com](http://kirkbridebuildings.com)

## CHAPTER L

### HEATING AND VENTILATION.

THERE seems to be little diversity of opinion among those who have the charge of American hospitals for the insane, in reference to the proper mode of warming and ventilating these institutions; the "Association of Medical Superintendents" having as long ago as 1851 unanimously resolved that "all hospitals should be warmed by passing an abundance of pure fresh air from the external atmosphere, over pipes or plates containing steam under low pressure, or hot water, the temperature of which at the boiler does not exceed 212° F., and placed in the basement or cellar of the building to be heated," and that "the boilers for generating steam should be in a detached structure;" while they also agreed with equal unanimity, that "a complete system of forced ventilation in connection with the heating, is indispensable to give purity to the air of a hospital for the insane, and that no expense that is required to effect this object thoroughly, can be deemed either misplaced or injudicious." These propositions were adopted in 1851, and no change has ever been suggested in them. After twenty-nine years' very extended experience, by highly intelligent men, in various climates, it is quite safe to say that these declarations are unquestionably true.



In the improved linear plan recommended in the present essay, it is proposed to place the detached structure alluded to, at a distance of not less than one hundred feet in the rear of the centre building. The precise position of this building, however, will vary according to the character of the ground, and other circumstances connected with the different uses to which it will be applied, it often being most desirable to have these arrangements placed at one end of the hospital, as has been done in that shown in the frontispiece. If at the rear of the centre building, it may be at the distance of five hundred feet without inconvenience or disadvantage, if the pipe conveying the steam is under ground and surrounded by some non-conducting substance. The boilers, of which it will be necessary to have three or four, according to their size and form, unless they are very large, are to be placed under a shed with a slate roof and good skylights, adjoining the basement of the detached building, and, if possible, sunk so deep that the condensed steam may return to them by simple gravity. If this cannot be effected, the boilers must be kept supplied with water by a force-pump driven by the engine, or preferably by a direct acting steam pump. This whole building should be thoroughly fireproof. These boilers may be either tubular, having the advantage of being easily put in place, requiring little space and generating steam very rapidly, or plain cylinder boilers, which are rather less costly, quite as safe, and not so likely to need repairs. Safety is a specially important matter in adopting a style of boiler for hospitals, and on

this account, in coming to a decision on this point, this feature should be carefully investigated, as there are some that have within a few years been thoroughly tested in this respect, and seem to be absolutely safe from destructive explosions. It is always, too, of great importance to have an abundance of boiler room and to use the steam under comparatively low pressure. The vaults for coal should be immediately adjoining the boiler room, and so arranged that the coal may be dropped into them directly from the carts or cars, while the ashes can be raised by a crane and windlass, or better, when the ground admits of it, they should be hauled nearly every day directly from the fire room.

The steam is to be conveyed from the boilers through an eight-inch iron pipe, till it reaches the air chambers under or near the centre building, and from this point a smaller pipe diverges to each extremity of the hospital. If the boilers are placed at one end of the hospital building this arrangement must be changed. The radiating surfaces may be either made of large cast iron or of small wrought iron pipes. Of the two, the latter are to be preferred on account of the greater facility with which they can be taken down or put up, turned at corners, and repaired in every way, while their cost is no greater. Several different forms of cast-iron radiators are now in use, which are believed to have many advantages, especially as regards durability.

The radiating pipes should be prepared in two or three distinct sets, one or all of which, can be used at pleasure. In the cool mornings and evenings which occasionally occur even in the summer months, and during the mild weather of spring and autumn, one series of pipes will be sufficient. With the ordinary winter weather, two will be required, and when the temperature is very low, especially if accompanied by much wind, the whole of the three ranges, if so many are used, must be put in operation. This arrangement will be found very economical, and do away with all the difficulties sometimes experienced in the proper distribution of heat from a steam apparatus. So easy is it to control steam as a heating agent in the mode proposed, that there is no reason why heat should not be purchased in large cities or for long ranges of buildings, as light and water now are. Such a suggestion was made by the writer more than thirty years since, and an entirely responsible firm was subsequently prepared to contract for the warming of the whole block of buildings on Girard Square, owned by the city of Philadelphia, from one central apparatus entirely under ground. With such an arrangement, the occupant of a dwelling could have just as much heat admitted as desired, or as much ventilation, by simply turning the stopcock which controlled the admission of steam into the radiating pipes in his cellar, and the fresh air into his dwelling. The neatness, comfort, and efficiency of such a plan, if once properly tried, would soon lead to its being extensively adopted. What has recently been suggested for some of our large towns is only an application of the same principle.

For supplying steam to the hospital kitchens and drying rooms, for forcing ventilation, pumping water, driving washing machinery, and heating water for all purposes, the different boilers may be used alternately in summer, and the pipe conveying the steam for the purposes indicated, should be protected by appropriate wrappings, so that no heat can be lost or be given out in the air chambers, to the annoyance of those in the rooms above. The steam arrangements used in summer should always be distinct from those used for heating in winter. Boilers and radiating pipe suffer much more from want of use in summer than when the fires and steam are kept up in winter.

It is recommended that the space under the corridors of the wings, should be made the fresh air reservoirs from the fans. The fresh air should be taken to the fans from a sufficient elevation to make it entirely clear of all unpleasant or noxious surface exhalations, and the amount to be admitted, will depend somewhat on the severity of the weather, the prevalence or absence of strong winds and their direction, as well as upon the general efficiency of the apparatus. On these accounts, controlling windows or fixtures are necessary. A full supply of fresh air, however, is indispensable to the proper working of any apparatus, and this should not be left to the discretion of any subordinate. The air chambers may extend the whole length of a wing, or be divided into shorter sections; but very short air

chambers, and especially radiators with a good descent, are always most desirable.

In this work, as originally written, reference was made to an arrangement where a fan is not used, but at this day it can hardly be deemed possible that any hospital will be constructed without provision for the constant use of a fan, which removes all the ordinary difficulties in the distribution of air and heat, and secures a perfect ventilation.

In arranging the radiating pipes, it must not be forgotten that a large amount of ventilation is required in every hospital, and that all ventilation in winter is loss of heat. A building not ventilated, may be thoroughly warmed by one-half the fuel required for one that is, but nothing can be more destructive to health than a residence in the former, or be further from true economy.

A common cause of failure in the experiments for heating in the manner recommended, has resulted from an attempt to effect the desired object with too little radiating surface, and with less fuel than is absolutely indispensable. There can be only a certain amount of heat obtained from a ton of coal or a cord of wood, and the use of the fuel for the generation of steam, cannot alter the principle.

Philadelphia