IMPROVED STEAM APPARATUS FOR HEATING AND VENTILATING.

THE house of B. F. Sturtevant, Boston, Mass., has just brought out a new design of its steam hot-blast apparatus, which is now well known. This apparatus, first placed upon the market a quarter of a century ago, has been gradually improved and rapidly introduced, until about 5,500 are now in use for various purposes.

The apparatus is a practical embodiment of the principle that a positive circulation of air is necessary to secure rapid and perfect ventilation, heating, or drying. Although constructed in a great variety of styles, to suit all conditions and requirements, it always combines the essential elements, — a fan and a heater. It is furthermore usually constructed with an engine directly connected to the fan-shaft, as shown in Fig. 1. The fan is designed especially for handling large volumes of air with a minimum expenditure of power. The advantage of a special engine, for the sole purpose of driving the fan, is evident. The fan may then be run at any time and speed, independent of any other source of power. The engines are of Mr. Sturtevant's design and construction, and are equal to the trying duty of fan-propulsion and continuous running.

Radical changes have been recently made in the heater. As now constructed, the heater proper consists of a series of hollow sectional bases, shown clearly in Figs. 2 and 3. Their sides are corrugated so as to fit closely together and allow of no alternate expansion and contraction of the air passing between the pipes. At one end of each section is a circular head (see Fig. 2) divided horizontally by a diaphragm, so that the upper portion is in communication with the steam inlet, and the lower with the drip. Steam, admitted at the left through the steam inlet, passes up the series of pipes, through the horizontal pipes, and down into the space connecting with the drips. By this time it has condensed, and leaves the heater in the form of water of condensation.

The sides of these heads are planed and fitted, and joints made by copper gaskets; so that, when drawn together by the through bolts, there is no possibility of leakage. In connection with the sections is bolted on, at one end of the group, a header for steam inlet (*A*), and drip (*B*). Both of these are large, and allow of the use of exhaust steam without placing back pressure upon the engine. The pipes *C* and *D* are respectively exhaust-steam inlet and drip, communicating with the outermost section, which has no head, and is entirely independent of the remainder of the group. It is designed to utilize the exhaust from the fan-engine. The head end of each section rests upon the wrought-angle-iron foundation of the heater, while the opposite ends are supported by cast-iron balls (*E*) so as to allow for expansion.

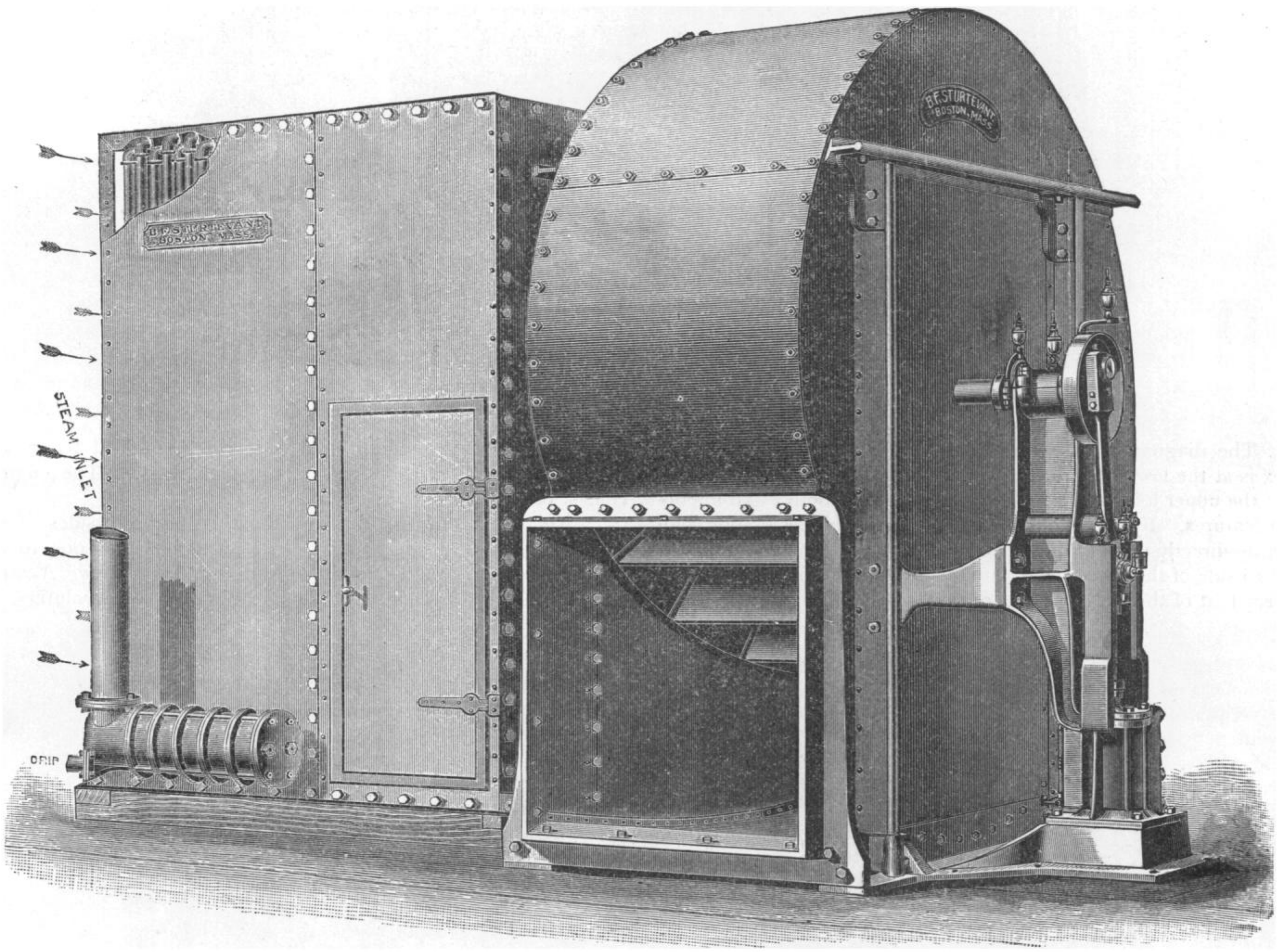

FIG. 1.

After continued use of wrought-iron pipe, Mr. Sturtevant has adopted steel. The adoption of steel pipe marks one of the great improvements in these heaters. The heater is incased in a fire-proof steel-plate jacket communicating with the inlet to the fan, so that air is drawn by the fan equally across all parts of the heater. The pipes in the sections being set staggering, the air is compelled to take a tortuous course, and is brought into intimate contact with every foot of pipe.

In operation for heating and ventilating, the outlet of the fan is connected with a system of ducts or pipes leading to the various parts of the building. In the case of an ordinary manufactory either the distribution takes place through galvanized-iron piping, in the form of upright mains extending to the various floors, and having one or more outlets near the ceiling on each floor, or in other cases horizontal mains extend the entire length of the building just under the ceiling on each floor, and the air is discharged through outlets in these. In schoolhouses, churches, theatres, etc.

the air is generally conveyed through flues built into the interior walls; the volume and rate of discharge being governed by the register through which the air escapes.

The object always is to discharge the air either at or towards the cold outer wall, but it must be admitted that it takes a great deal of experience in this line to enable any one to lay out a perfect working system.

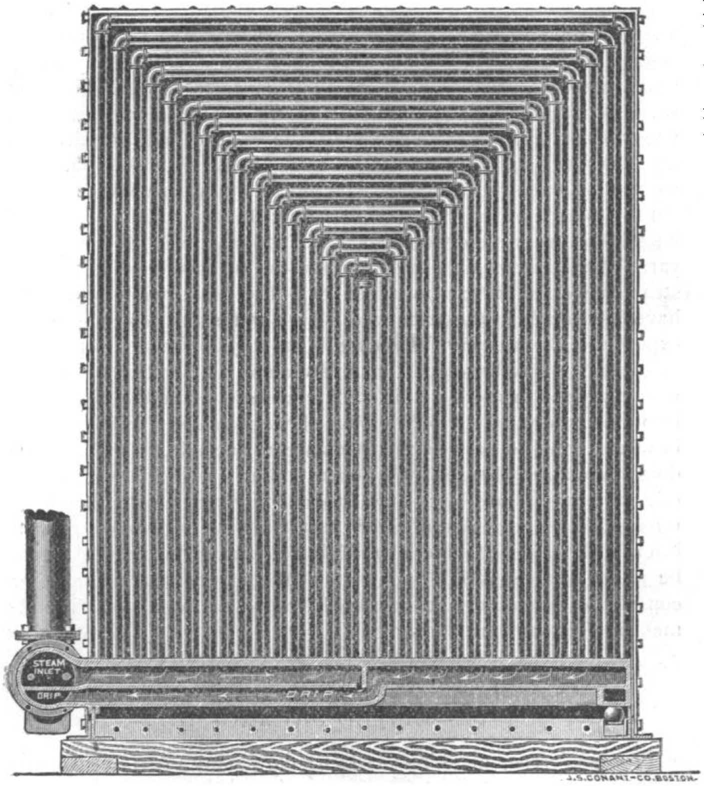

FIG. 2.

This system, known as the "blower system," possesses many advantages. Above all, it is positive. The air, being forced into the building, must of necessity thoroughly circulate through it, creating perfect distribution of heat, and ample ventilation. The source of supply of the air introduced being always under control, there can be no opportunity for the presence of injurious impurities. In any system dependent upon natural agencies to produce ventilation, changes in the weather always have a serious, and in some cases a perfectly nullifying effect. With mechanical ventilation, this can never occur, for the pressure produced by the fan is far in excess of that due to any changes in the atmosphere.

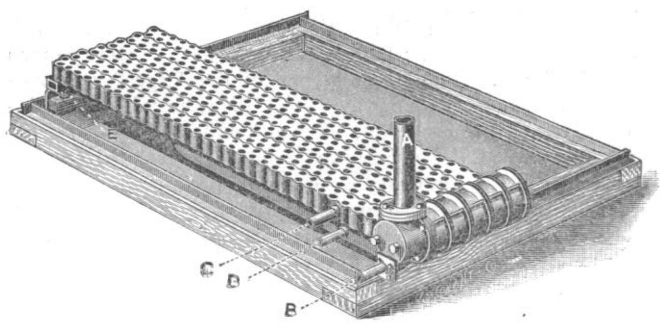

FIG. 3.

In the blower system, a marked saving is made in the amount of heating-surface required. The large amount of air passing through the heater causes such a rapid condensation of steam, that each square foot condenses from three to five times as much steam as will be condensed by the same area in an ordinary coil-radiator; in other words, only one-third to one-fifth the pipe is required to do the same amount of heating. The saving in the heating-surface will usually pay for the fan and engine, so that the system becomes no more expensive than a direct-heating system.

But while in a direct system there is always danger from fire, freezing, and leakage, this is all obviated in the blower system. All the pipe is combined in a single heater, incased in a fire-proof jacket, and all valves are within easy reach, placing the entire control of the apparatus in the hands of a single individual. Furthermore, a much more rapid change in the temperature of the building is possible with the blower system than with any other system, either direct or indirect.

Most assuredly the system is worthy of investigation by any one requiring either heat or ventilation. It is now in use in some of the largest manufactories in the country, such as the Pacific Mills, Lawrence, Mass.; the New O. N. T. Clark Thread Mill at Kearney, N.J.; the Morgan Engineering Company, Alliance, O.; Niles Tool Works, Hamilton, O., etc.

Mr. Sturtevant has recently issued a handsome eighty-page illustrated treatise on ventilation and heating, which we are informed will be sent to any one requesting it.

BRICK FOR STREET-PAVING.

THERE are perhaps fifty cities in the United States using brick pavements. Some have had them over fifteen years. In Decatur, Ill., brick pavements have been in use for six years; in Bloomington they have been used for fifteen years; and in Charleston, W.Va., for a longer time. They are in use in Jacksonville, Peoria, Quincy, and Springfield, Ill., also in Kansas and Nebraska; and a number of cities in Ohio are using them with good results.

All brick pavements have not given satisfaction, as the contrary effect has been produced when common building-brick has been used. They begin to show the effects of wear in a very short time if soft brick is used, but good hard brick gives satisfaction. There is no paving-material equal to hard brick, excepting granite blocks, and it is doubtful if they would last as long were they as small as bricks. There are few cities in the United States where brick could not be laid for one-third the cost of granite blocks.

It may be urged that suitable clay for manufacturing paving-brick is scarce, but there is nothing in this country so plentiful. Of over twenty different samples of clay sent from various portions of Illinois and other States to the Decatur Tile Company, all excepting one have been made into paving-brick, although some kinds are much better for the purpose than others. This company has made about five million bricks per year during the past four years, seventy-five per cent being paving-brick. Over five miles of the streets of Decatur are paved with brick, and the City Council is planning to have more of them thus paved.

The clay used by the tile company mentioned is a common yellow joint clay, having a large percentage of silicate and iron. It is tempered or soaked for twenty-four hours before using, then carried by a belt to a stone-separator and crushers. Dropping from the crushers to an elevator, it is fed to the brick-machine. From this machine it runs in three streams upon a moving table, and is cut by wires, fastened in a frame, into bricks eight and a half inches in length. The die through which the clay is pressed on leaving the machine is 4 by $2\frac{5}{8}$ inches. The bricks are then set upon drying-cars to be dried in hot-air tunnels, or set on slats in a building warmed by steam, or placed on a drying-floor heated from the burning kilns or small furnaces. When dry, they are carried in wheel-barrows and set "skintling," or at angles across each other, to allow the heat to pass between them in the down-draught kilns. Experience has proved that good paving-brick cannot be burned in open, up-draught kilns, if made from the clay described.

While some kinds of clay will stand fire long enough to burn as hard as rock in open kilns, yet even then the bricks would be much better in shape and quality if burned in closed kilns. The bricks are burned from six to seven days, the first three or four days very slowly, called "water smoking." It is necessary to watch very closely when finishing the burning, as there is great danger of running the bricks together and spoiling the whole mass.

The great drawback to using all kinds of clay is owing to the