

BENJAMIN FRANKLIN STURTEVANT

By EurIng Brian Roberts, CIBSE Heritage Group



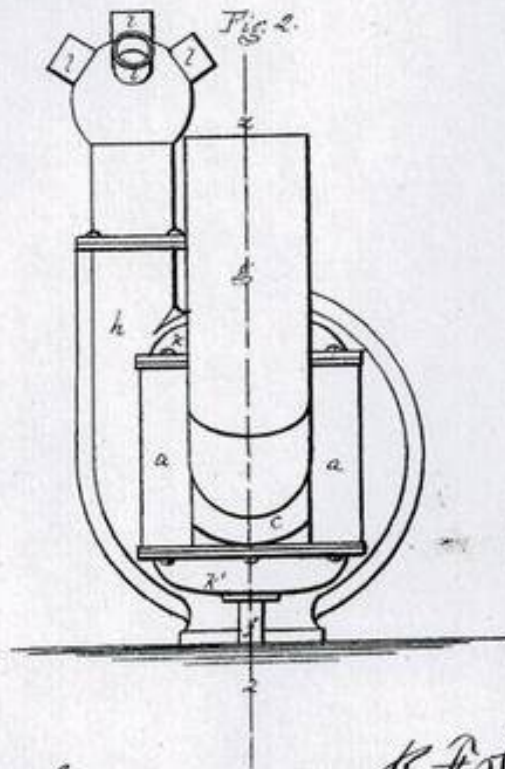
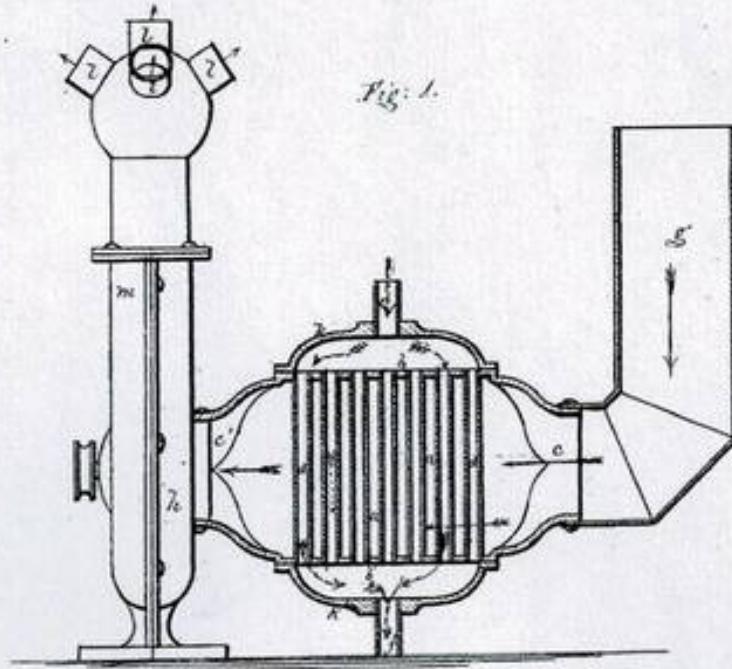
Benjamin Franklin Sturtevant, 1833-1890

American fan engineer, who was possibly the most important name in ventilation during the second half of the 19th century. He was borne in Norridgewock, Maine, on 18 January, 1833 (though one report says 1824), where he learned the trade of shoemaking and repair before moving to Boston in 1856. Having an inventive mind, in about 1850 Sturtevant built a crude fan to relieve the summer heat. Around 1861 he designed a centrifugal fan to suck dust and leather clippings away from his work area. Soon other shoemakers wanted one, leading Sturtevant to set up a shop on Sudbury Street in Boston where he employed 8 men to build centrifugal fans, creating the centrifugal fan industry in the USA.

B. F. STURTEVANT.
 COMPOUND AIR HEATER AND STEAM CONDENSER.

No. 100,241.

Patented Feb. 22, 1870.



Witnesses } W. B. Crosby
 } C. Warren Brown

B. F. Sturtevant

THE MORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

United States Patent Office.

B. F. STURTEVANT, OF JAMAICA PLAIN, MASSACHUSETTS.

Letters Patent No. 100,241, dated February 22, 1870.

IMPROVEMENT IN COMPOUND AIR-HEATERS AND STEAM-CONDENSERS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, B. F. STURTEVANT, of Jamaica Plain, in the county of Norfolk, and State of Massachusetts, have invented an Improvement in Air-Surface Condensers; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

In that class of apparatus in which air moved rapidly under the action of a rotary blower is used to condense steam, it is necessary that the metal used to separate the air and steam-currents should be made very thin, in order to conduct heat rapidly, and it is further necessary, to give sufficient strength to the metal, that it should be used in the form of small tubes, through which the steam passes, the air surrounding and passing along the outside of the tubes.

To produce the best results, it may be desirable that the tubes should be arranged in a vertical or inclined position, instead of in a horizontal position, as shown in my patent for blast-apparatus, dated July 13, 1869, numbered 92,490, and in my patent for a compound air-heater and condenser, of even date herewith, so that the water of condensation will drain rapidly from them, and not remain therein as it will in horizontal tubes, lessening materially the effective conducting-surface of the tubes with which the steam is in contact.

My invention consists in the combination of a rotary blower with a condenser made with vertical or inclined tubes, through which steam is made to pass, the tubes being inclosed in a case, and the top and bottom ends of the tubes opening out of and emptying into chambers separate from the air-space in which the tubes are contained, one of said chambers receiving the steam from a conducting-pipe, and the other or bottom chamber receiving the water of condensation and the uncondensed steam, which then flow off through a suitable conducting-pipe, when the blower is arranged to force or to draw air rapidly through the air-space surrounding the tubes, the operation causing the steam to condense by giving up its heat to the air, which heated air may be impelled by the blower to any location for any desired purpose.

The drawings represent, in Figure 1, a vertical sectional elevation of my improved air-surface condenser, the section being taken in the plane of the line $x x$, Figure 2.

a denotes the condenser-case, made with tube-heads b and air-entering and delivery nozzles $c c'$.

Tubes d are secured in the tube-heads b either in a vertical or in an inclined position, with their open ends communicating with spaces made by the covering-bonnets $k k$.

The inlet-steam pipe e enters the space under bonnet k , and the outlet-pipe f proceeds from the space above bonnet k , the direction of the currents of steam and the water of condensation being shown by the dotted arrows seen in the sectional part of fig. 1.

To the nozzle c , an air-inlet pipe, g , is attached, and the suction-entrance of the blower h is attached to the other nozzle c' , so that the action of the blower will obviously be to draw air through pipe g , and cause it to pass around the outside of the tubes d , through nozzle c' , to and through the series of delivery or distributing-pipes, l , attached to the blower-outlet m .

The steam, in passing through the tubes d , is condensed against the tube-surfaces, which are cooled by abstraction of heat into and by the air-current caused by the operation of the blower, and the water of condensation flows down the tubes as rapidly as it is formed, and without accumulation therein, and is conducted off through pipe f .

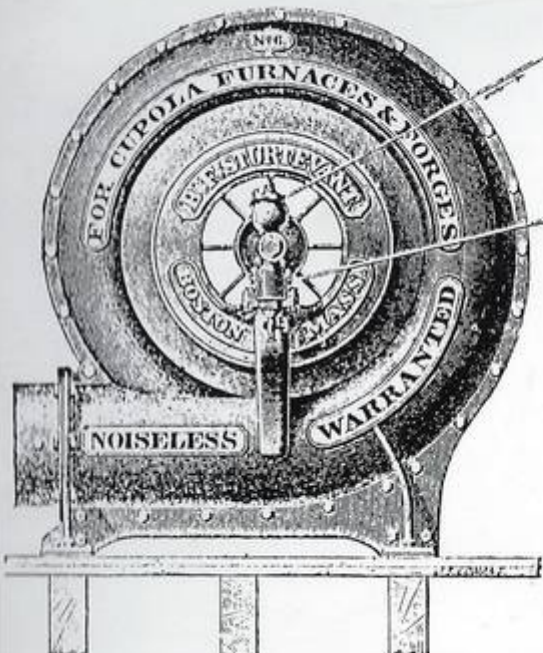
It will be apparent that the blower may be arranged to force air through the space containing tubes d , instead of drawing it through, in which case the delivery-pipes l would be attached to one of the nozzles c or c' , the outlet of the blower being then attached to the other nozzle, and the air-inlet pipe to the suction-entrance of the blower.

I claim the combination and arrangement of a rotary blower and compound heater and cooler, having vertical or nearly vertical tubes for the steam, and transverse passages for the air, all substantially as shown and described.

B. F. STURTEVANT.

Witnesses:

J. B. CROSBY,
FRANCIS GOULD.



STURTEVANT STEEL PRESSURE BLOWER,
 For Cupola Furnaces and Forges.
The Blower which excels all others, producing maximum results with minimum power. Used in the largest establishments in the country, where the strongest blast is required.

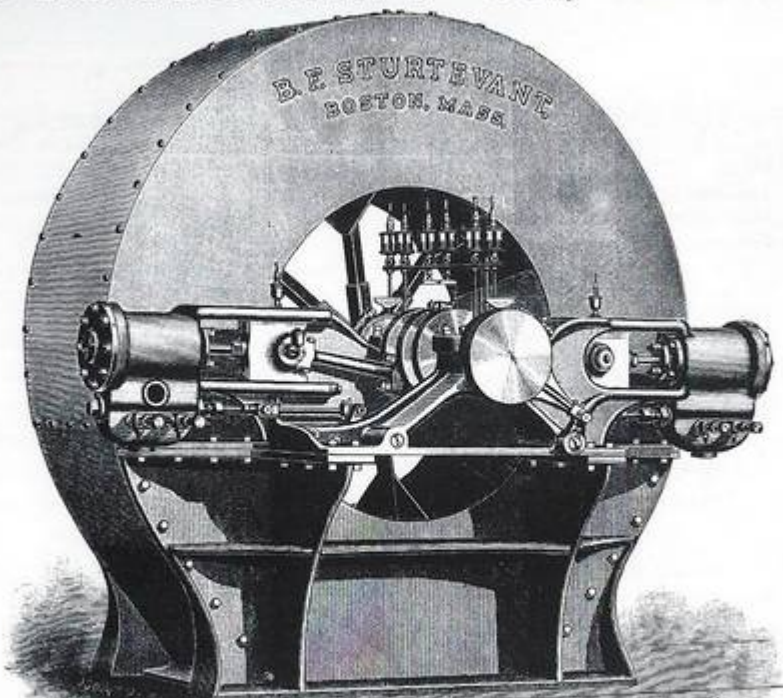
STURTEVANT PATENT IMPROVED FAN BLOWER,
 For Steam Boilers, Puddling and Heating Furnaces.

STURTEVANT PATENT EXHAUST FAN,
 For removing Shavings and Dust from Wood-working Machines, Dust from Sand and Emery Wheels, and for Ventilation.
 Send for Illustrated Catalogue.

B. F. STURTEVANT, Patentee and Sole Manufacturer,
 70 & 72 Sudbury St., Boston, Mass.

Advertisement of 1872

B. F. STURTEVANT CO., Boston, Mass.



THE STURTEVANT SPECIAL STEAM FAN.
DOUBLE HORIZONTAL ENGINE.

34 Oliver St., BOSTON, MASS.
 131 Liberty St., NEW YORK, N. Y.
 135 North Third St., PHILADELPHIA, PA.

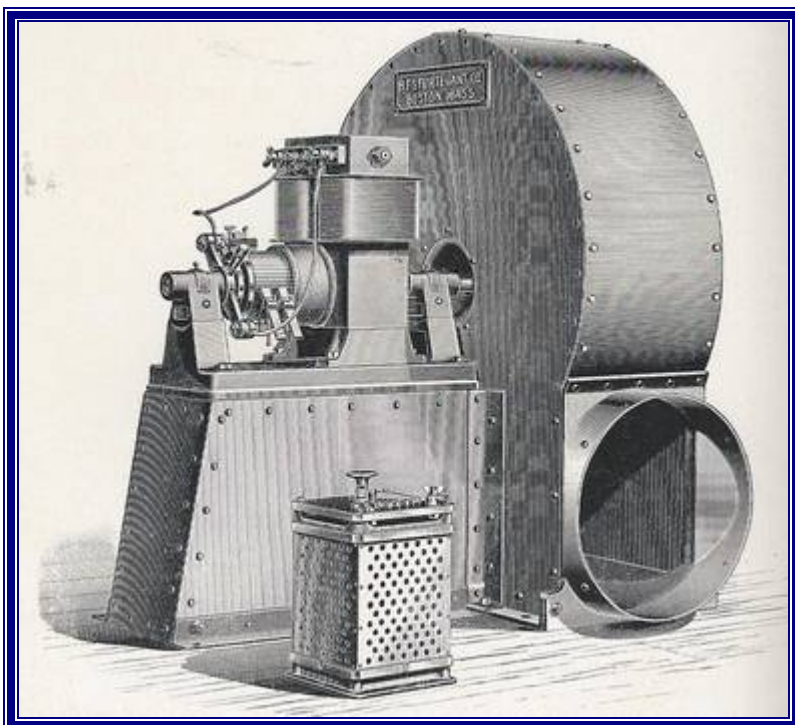
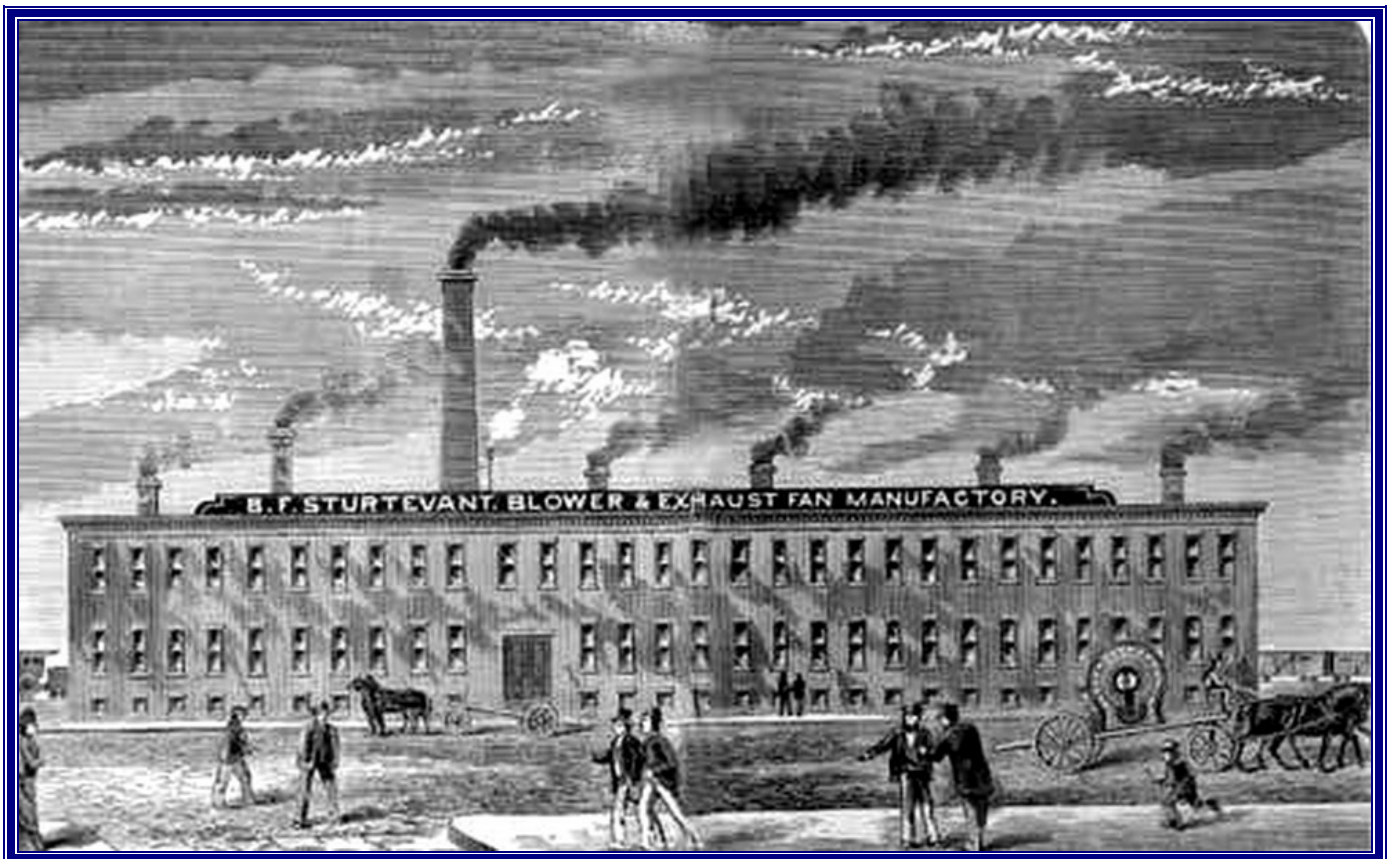
BRANCH STORES.

16 South Canal St., CHICAGO, ILL.
 75 Queen Victoria St., LONDON, E. C., ENG.

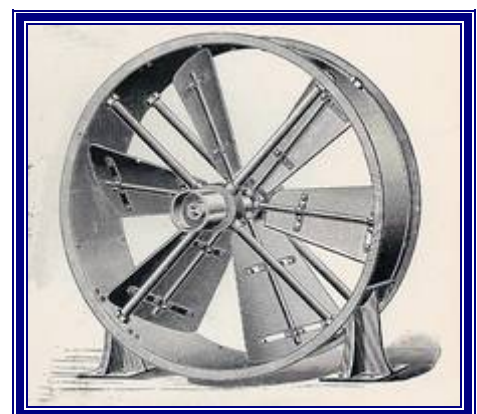
21 West Nile St., GLASGOW, SCOTLAND.
 38 Wilhelmstrasse, BERLIN, GERMANY.
 2 Kungsholmstorg, STOCKHOLM, SWEDEN.

Advertisement of 1895

His business expanded rapidly. One report says that in 1866, he provided fans with “wheels 16 feet in diameter” for the US Capitol building (if so these would have been replacements for the originals of 1857). Sturtevant was now selling fans throughout America and soon in England and Europe. In 1878 he set up a larger factory in the Boston suburb of Jamaica Plain where he tested his fans and produced performance data. At the turn of the century his most significant fan installation was that provided for the New York Stock Exchange.



Sturtevant centrifugal fan with direct-drive electric motor 1899



Sturtevant disk fan 1906

VENTILATION

AND

HEATING

PRINCIPLES AND APPLICATION



A TREATISE



B. F. STURTEVANT CO.

BOSTON, MASS.

NEW YORK.

PHILADELPHIA.

CHICAGO.

STURTEVANT ENGINEERING CO.

LONDON.

GLASGOW.

STOCKHOLM.

BERLIN.

PARIS.

STURTEVANT ENGINEERING CO., LTD

147, QUEEN VICTORIA ST,

LONDON, E.C.

VENTILATION AND HEATING

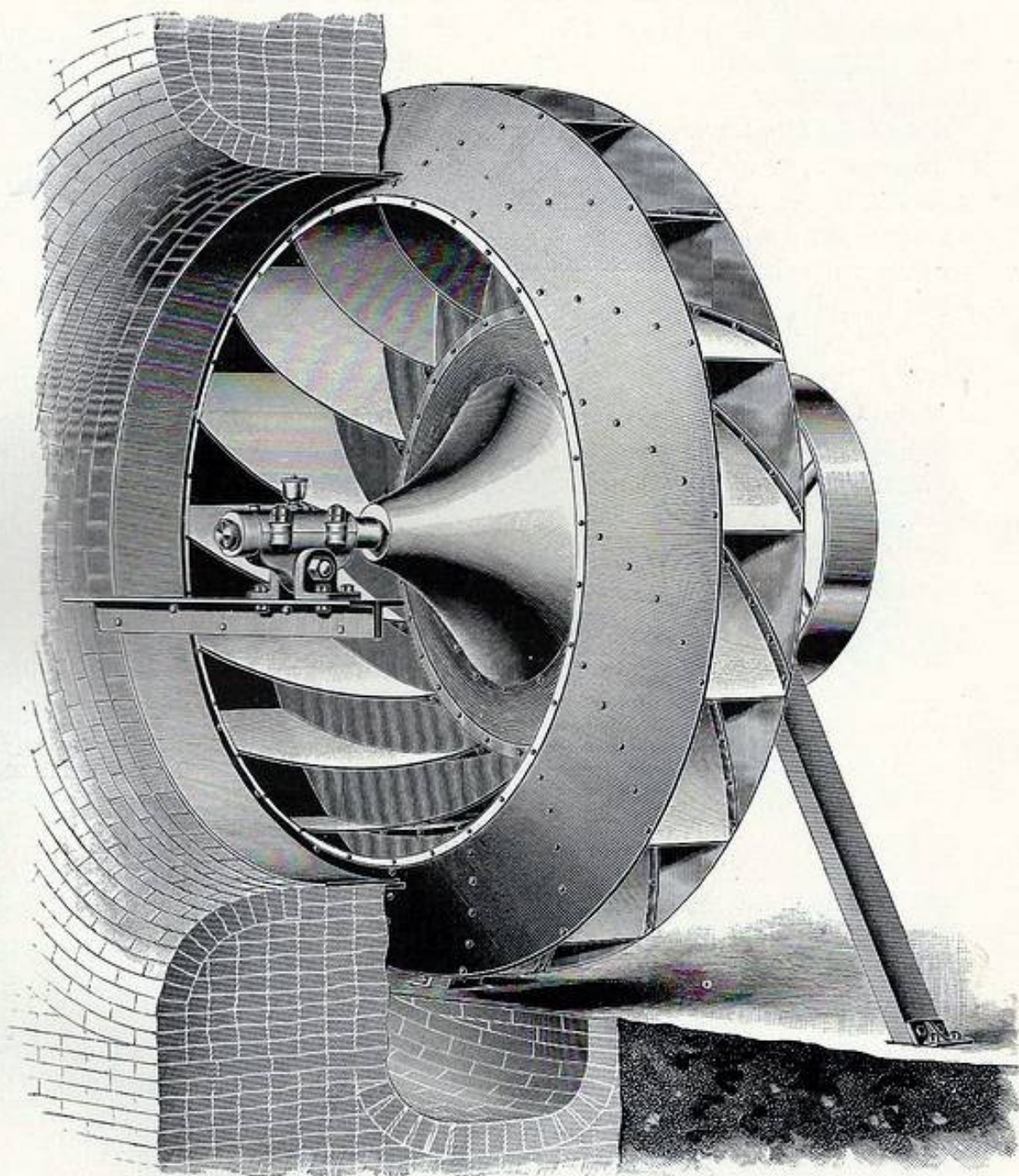


FIG. 18. CONE WHEEL.

VENTILATION AND HEATING

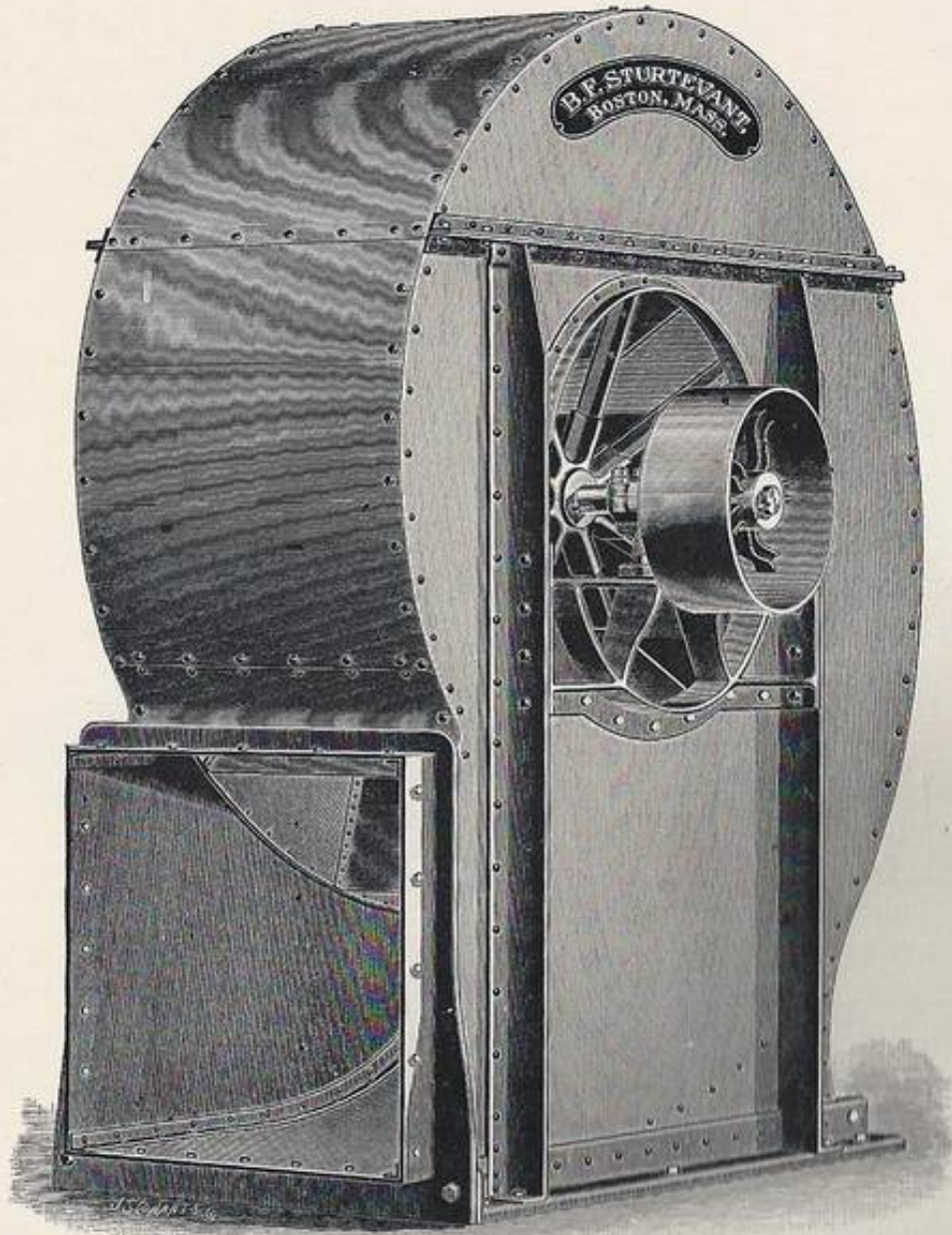


FIG. 21. STEEL PLATE BLOWER,
WITH OVERHUNG PULLEY.

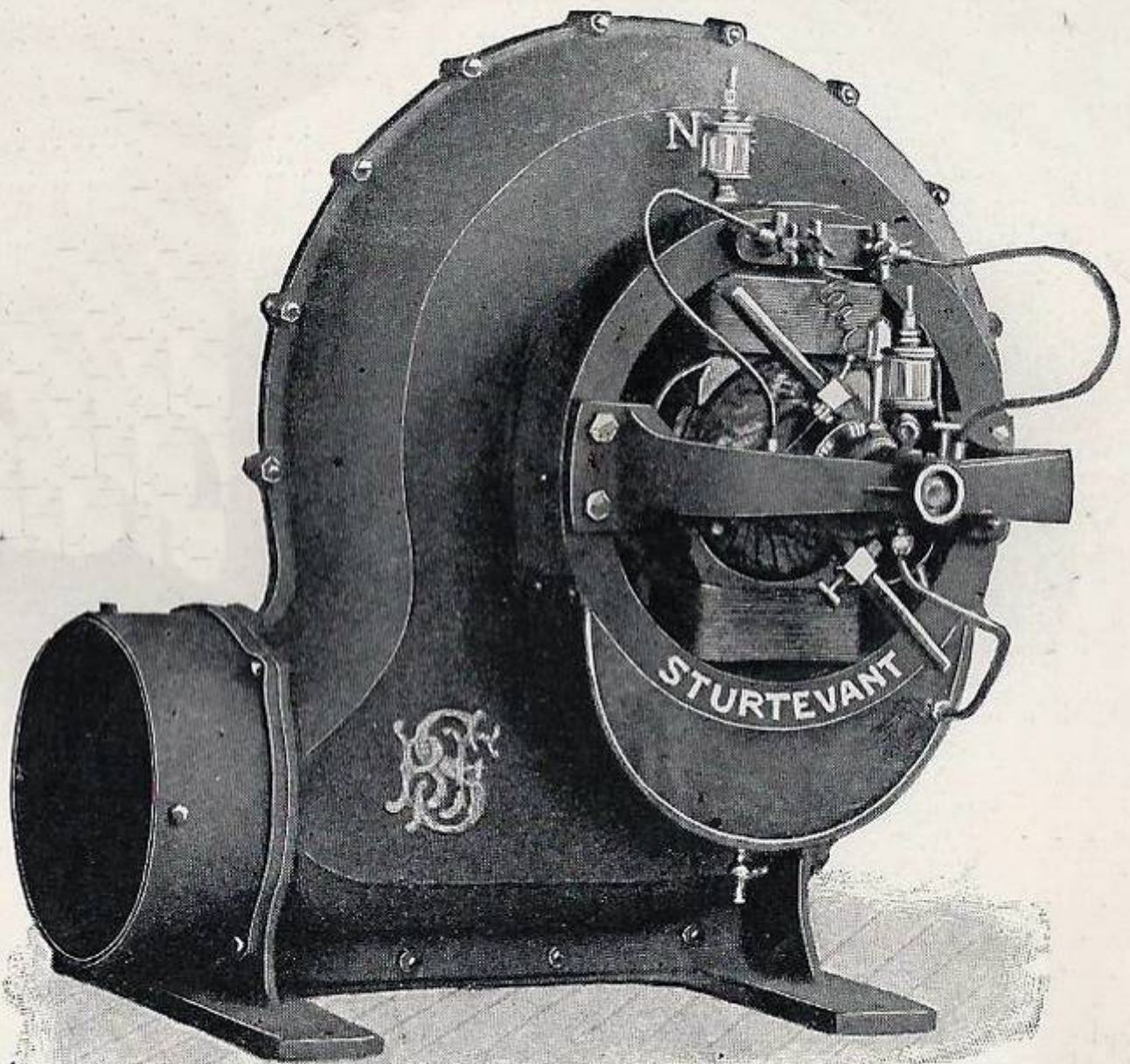


FIG. 22. "MONOGRAM" ELECTRIC EXHAUSTER.

VENTILATION AND HEATING

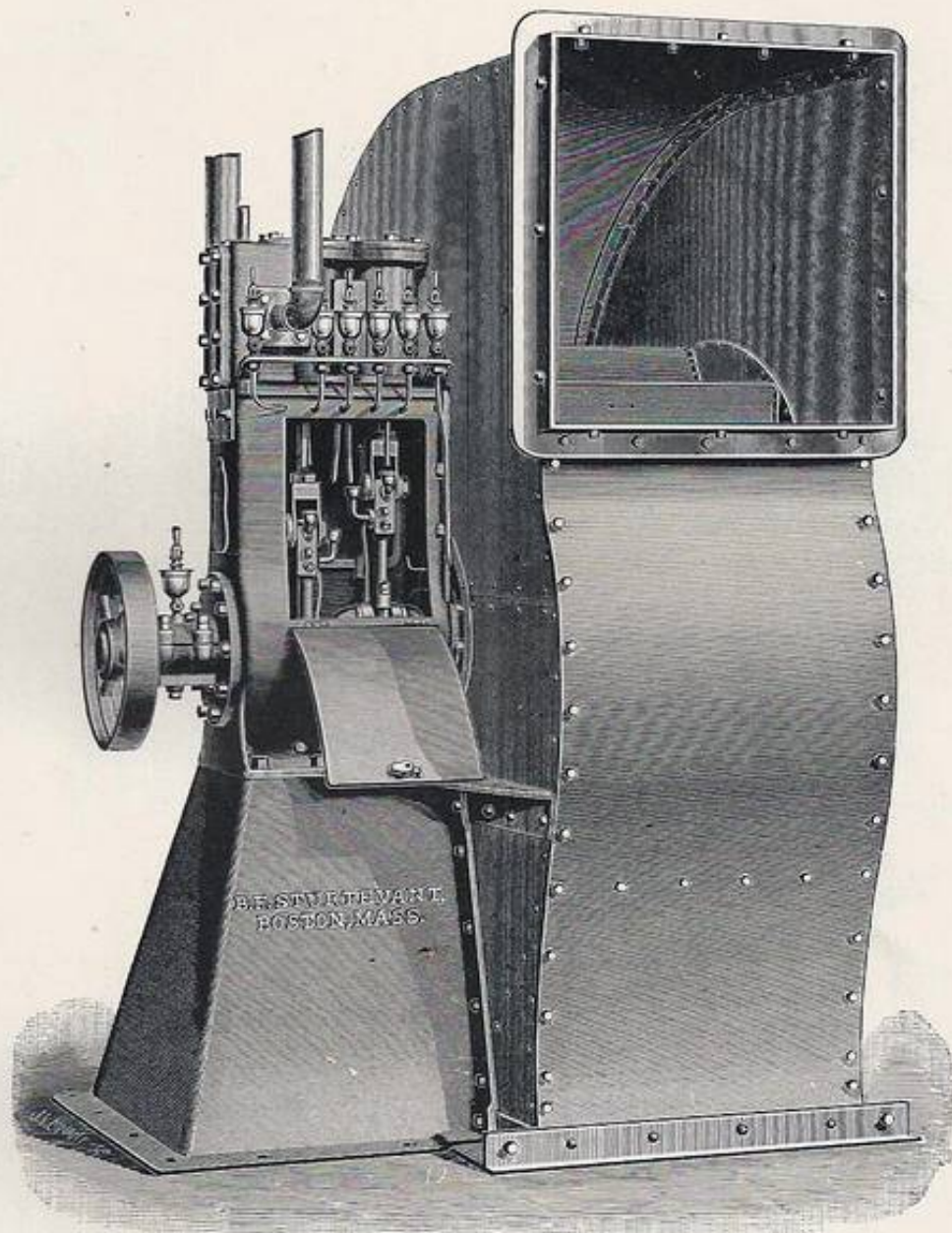


FIG. 26. SPECIAL STEEL PLATE STEAM FAN,
WITH DOUBLE ENCLOSED ENGINE.

VENTILATION AND HEATING

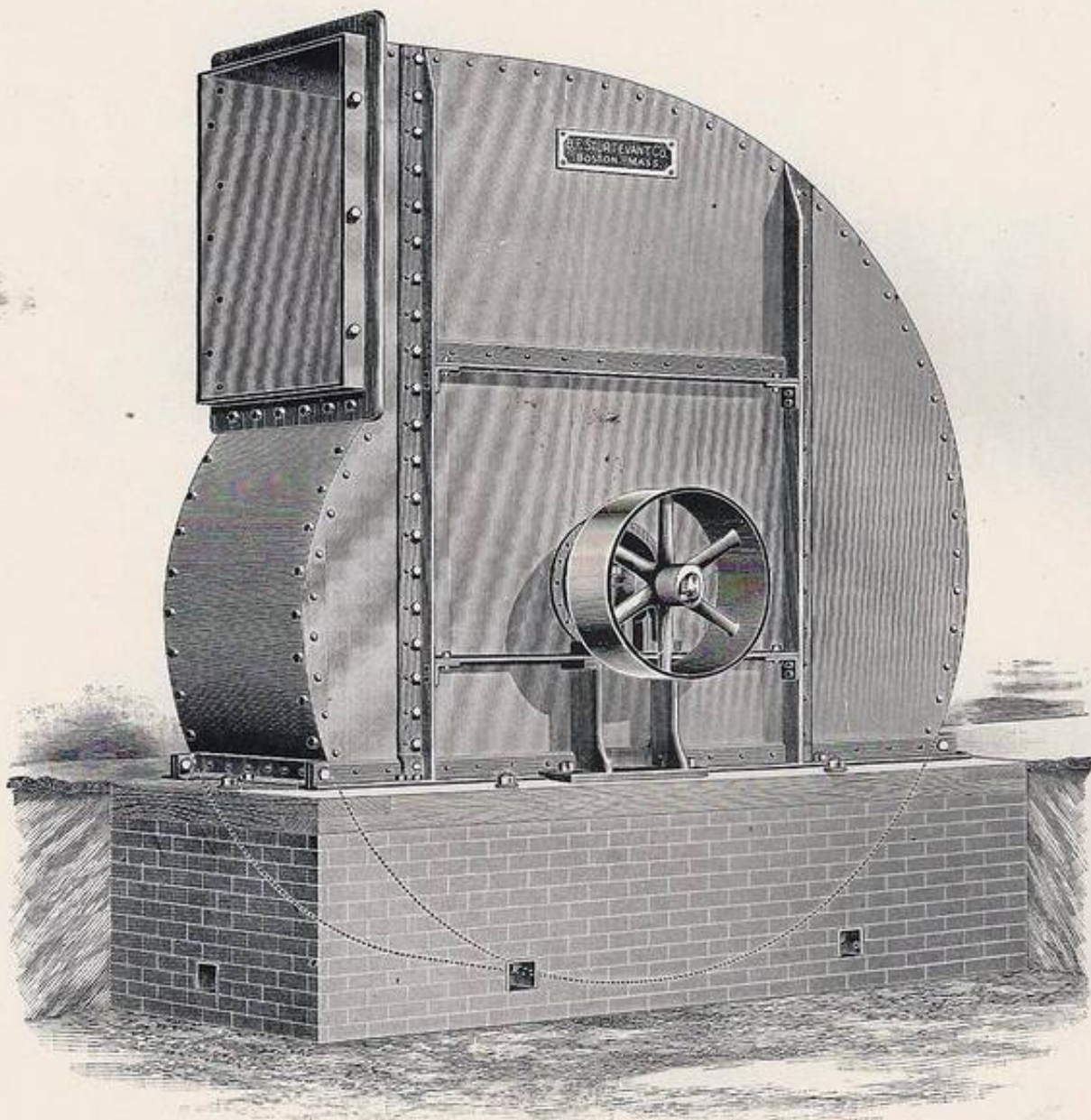


FIG. 35. STEEL PLATE PULLEY FAN,
WITH THREE-QUARTER HOUSING.

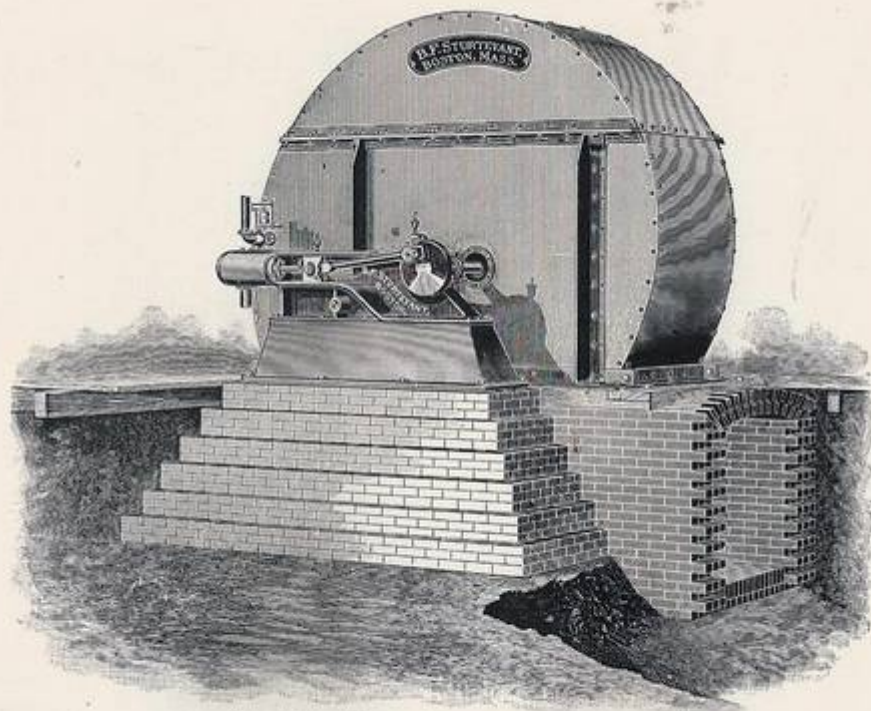


FIG. 36. STEEL PLATE STEAM FAN, WITH THREE-QUARTER HOUSING

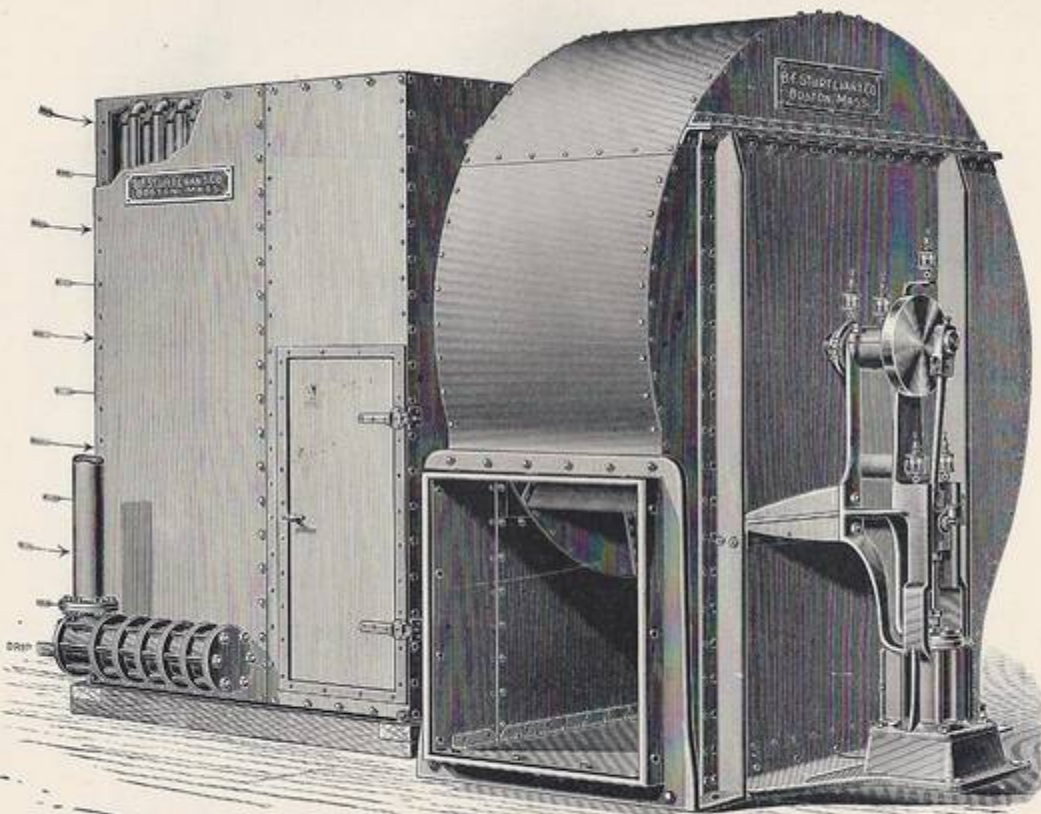


FIG. 49. STANDARD HEATING AND VENTILATING APPARATUS.

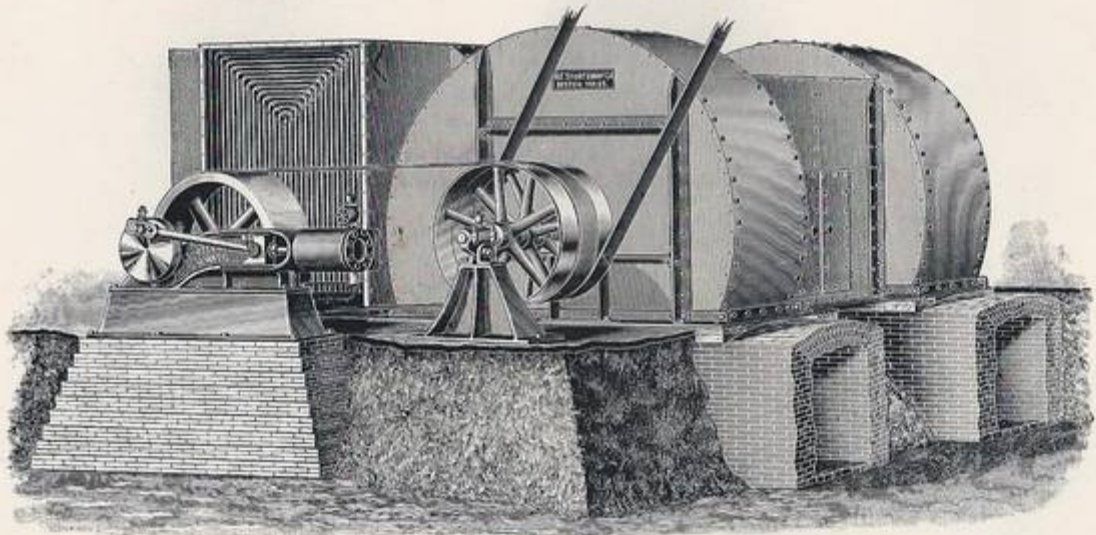


FIG. 53. DUPLEX HEATING AND VENTILATING APPARATUS,
WITH THREE-PULLEY RIG.

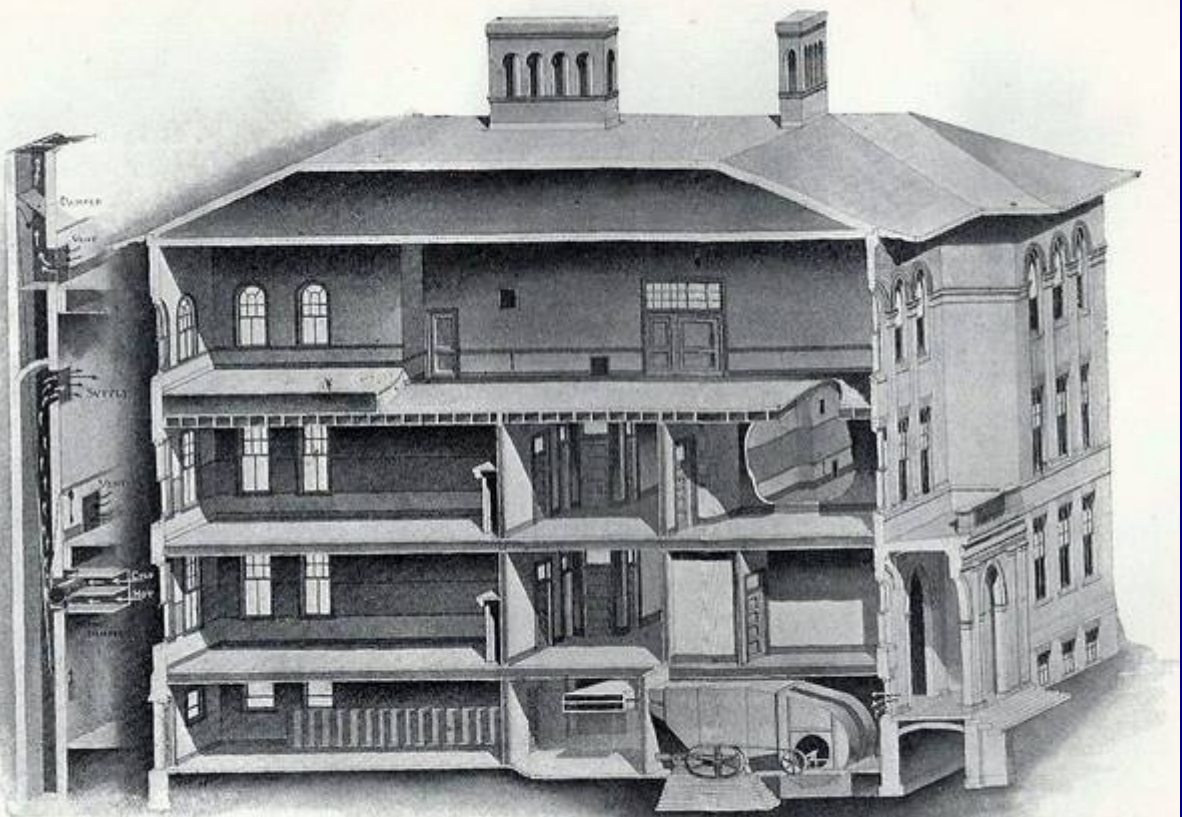


FIG. 84. AGASSIZ SCHOOL, BOSTON, MASS.

SECTION

VENTILATION AND HEATING

PRISONS.

The requirements of a building designed for the imprisonment of criminals are peculiar to itself. In the most advanced construction such a building includes, as its most important feature, the cell room or rooms variously arranged according to the ideas of those in authority, but, under all conditions, containing a series of small rooms for the separate confinement of the occupants.

Owing to the character of the inmates, it is obviously desirable that the heating and ventilating system should provide no advantageous opportunity for escape, while the occupation of the cells, during at least one-half of the twenty-four hours, requires that the maximum of air supply per occupant shall be provided. The separation of the prisoners, however, is such that the supply of

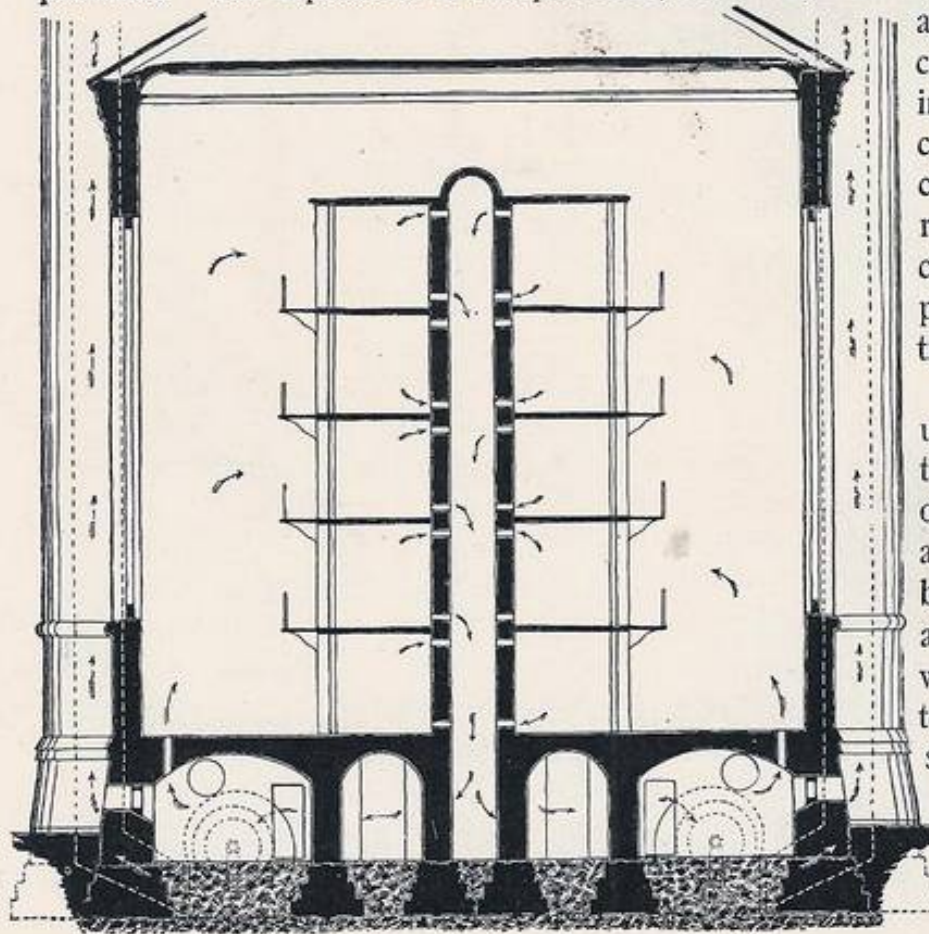


FIG. 77. SECTIONAL ELEVATION.

air necessary to accomplish the heating under ordinary conditions is sufficient to meet all requirements per capita for the purposes of ventilation.

The cells are usually arranged in tiers, one above the other, either within an outer shell or building, or else abutting upon a well or corridor extending up several stories. To secure the requisite constant change of air, it must be evident, therefore, that me-

chanical means should be employed, and that both plenum and exhaust fans should be introduced to secure the necessary equality in distribution.

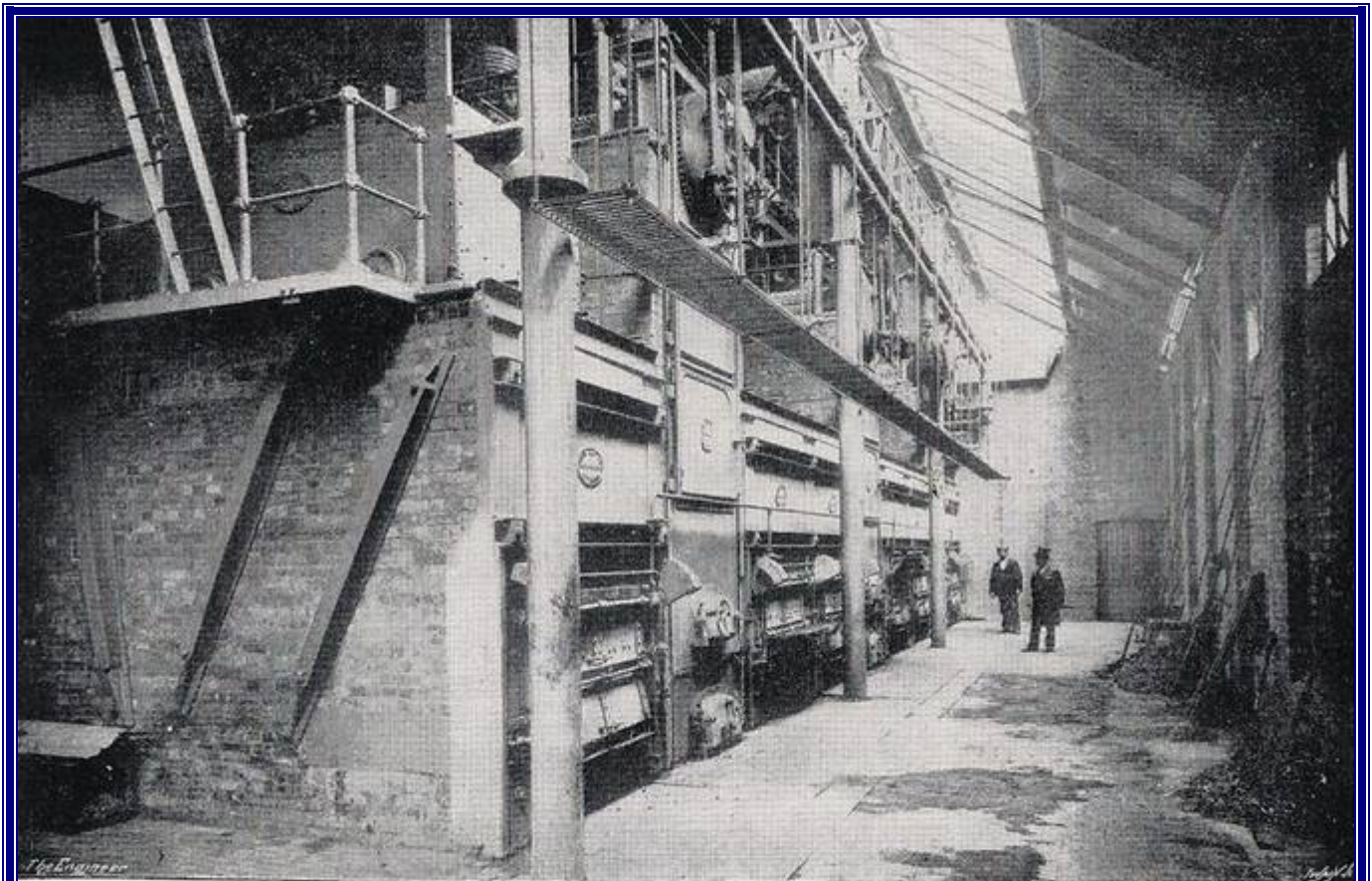
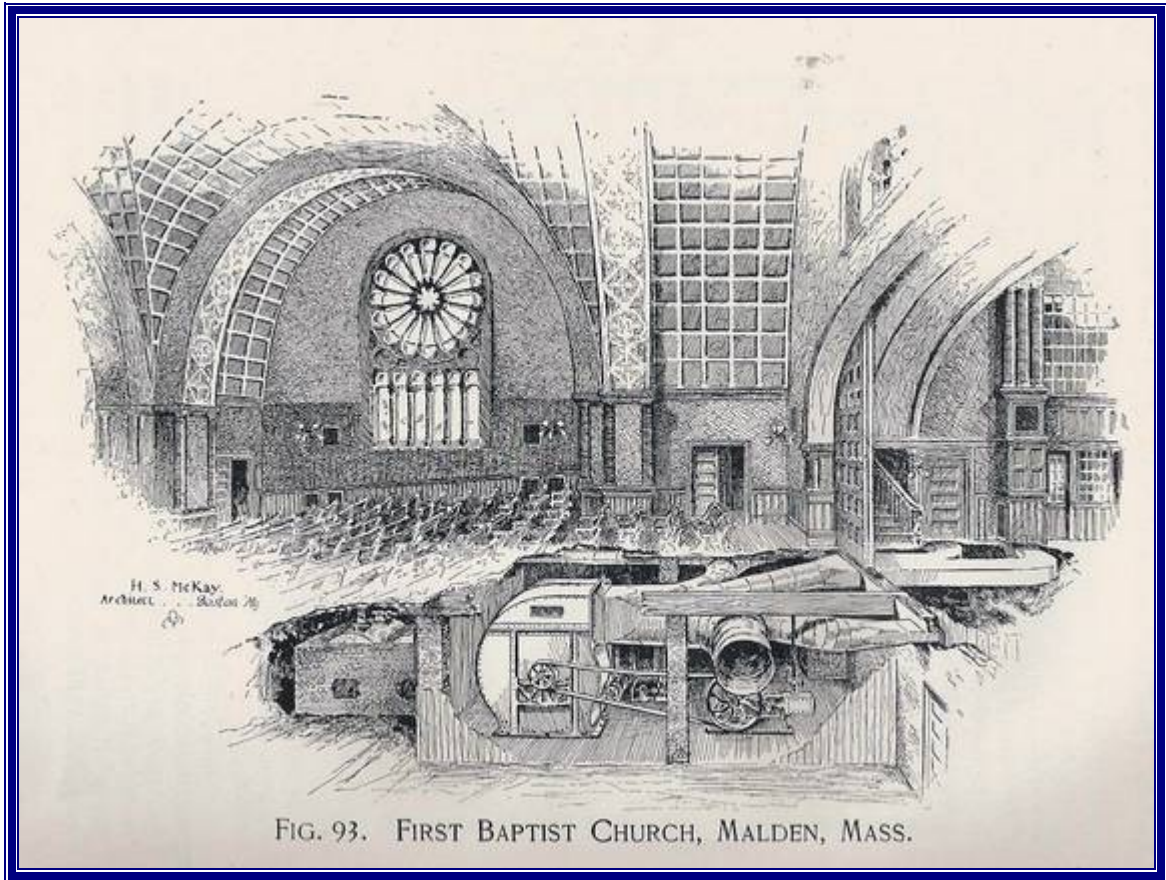
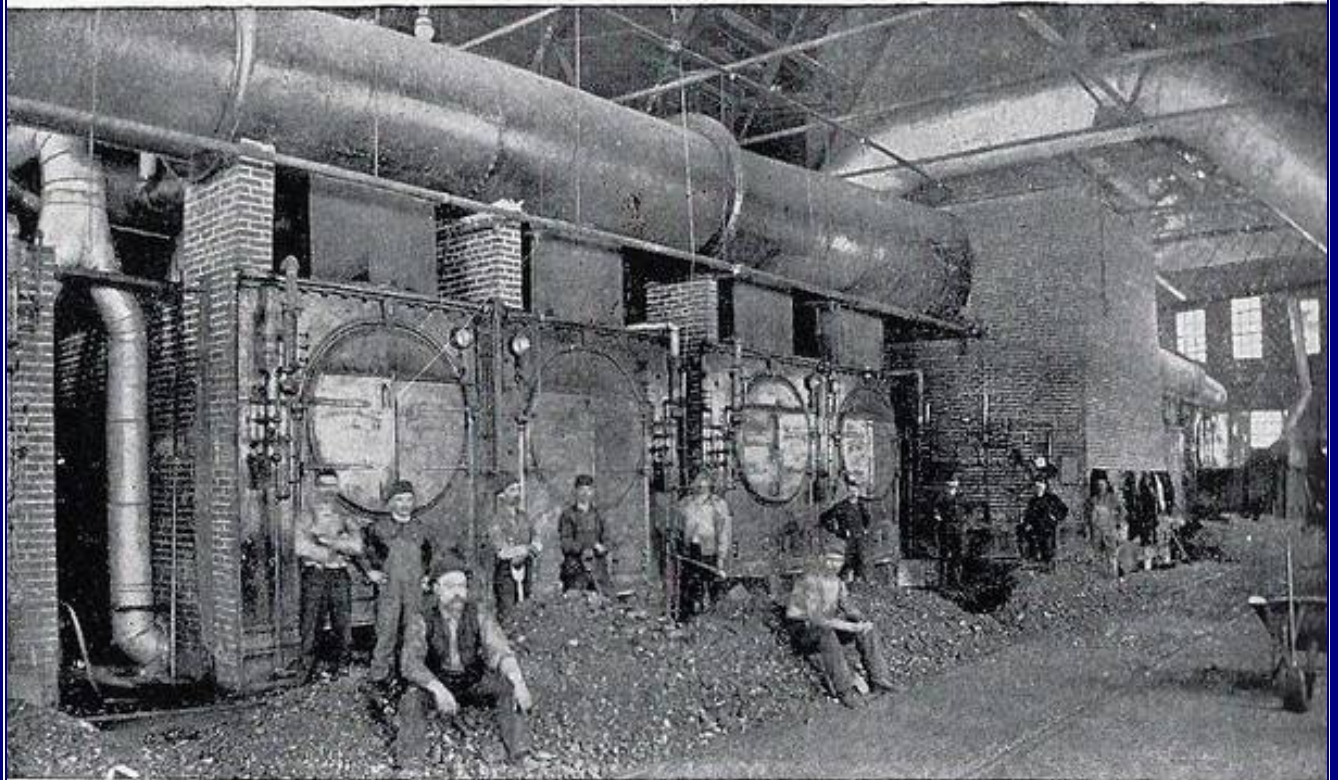
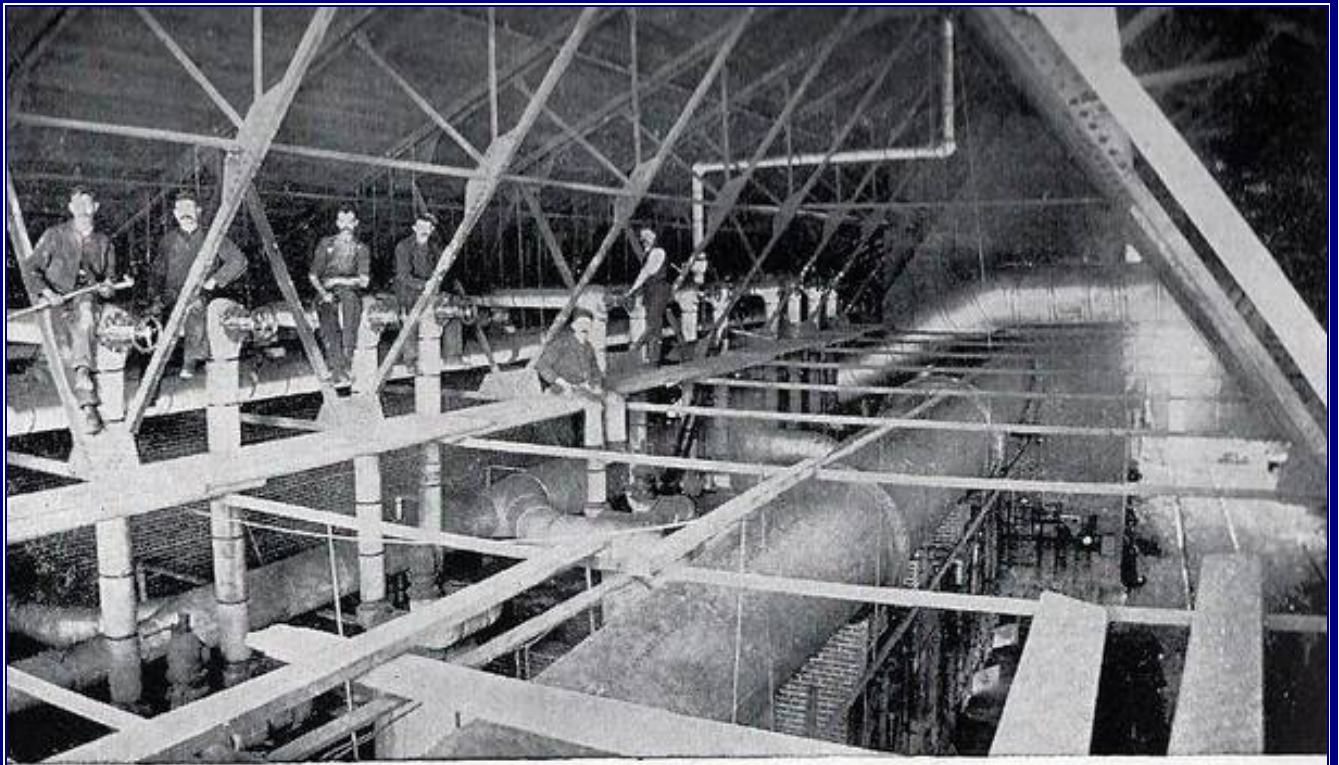


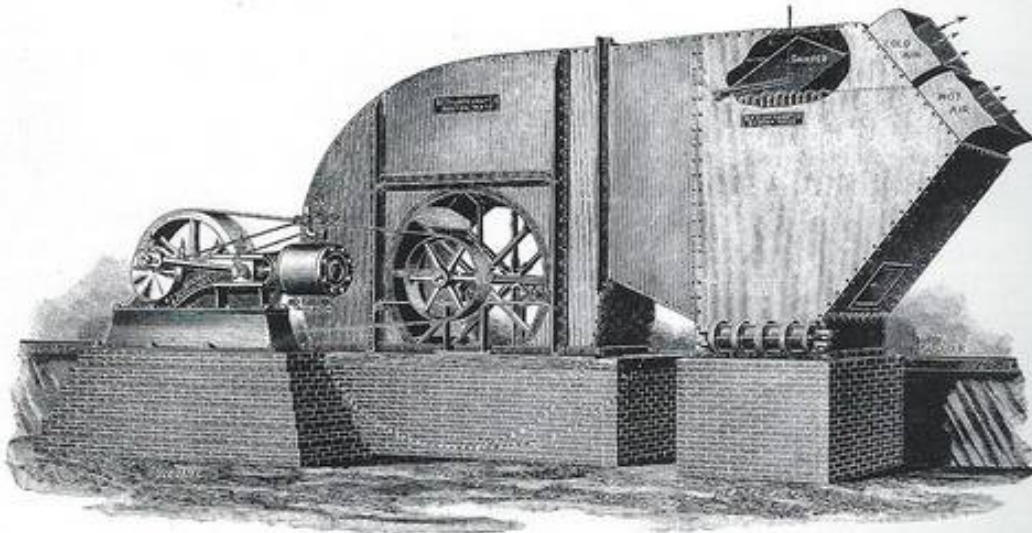
FIG. 76. DUST DESTRUCTORS AT SHOREDITCH, LONDON, ENG.



FIGS. 79 AND 80. FORCED-DRAFT PLANT AT GLENS FALLS PAPER MILL,
FORT EDWARD, N. Y.

The Sturtevant System
OF **HEATING** AND
VENTILATION

By a Forced Circulation of Warm Air
is applicable to all classes of buildings



The Sturtevant System Is Superior to Direct Heating

BECAUSE

The apparatus is centralized and under one man's control.
There is no steam piping scattered around the building.
Consequently no danger of freezing or of damage from leaky joints, valves, or aircocks.
The heater is specially adapted to the use of exhaust steam.
Heating can be accomplished with great rapidity.
Building can be cooled and ventilated in summer.
Humidity can be regulated.

BECAUSE

Ample and positive ventilation is provided.
Quantity and quality of air are under absolute control.
Constant temperature can be maintained and air volume varied when "hot and cold system" is used.
The heating surface is inclosed in a fireproof casing.
The air-ducts are fireproof.
There is no tendency to noise.
Operation is independent of wind and weather.

Send for Catalogue No. 112, describing the system in detail

B. F. Sturtevant Company, Boston, Mass.

NEW YORK:
131 Liberty St.

PHILADELPHIA:
135 No. Third St.

CHICAGO:
16 So. Canal St.

LONDON:
75 Queen Victoria St.

References

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