

Benjamin Franklin Sturtevant

B F STURTEVANT COMPANY

*A selective compilation by Brian Roberts, Chairman CIBSE Heritage Group,
from two significant Sturtevant publications on fan engineering:*

Ventilation and Heating, Principles and Application
Catalogue No.86, 1896, 6th edition, Boston, 1906

Mechanical Draft
Catalogue No.98, 2nd edition, Boston, 1899

[62] Benjamin Franklin STURTEVANT

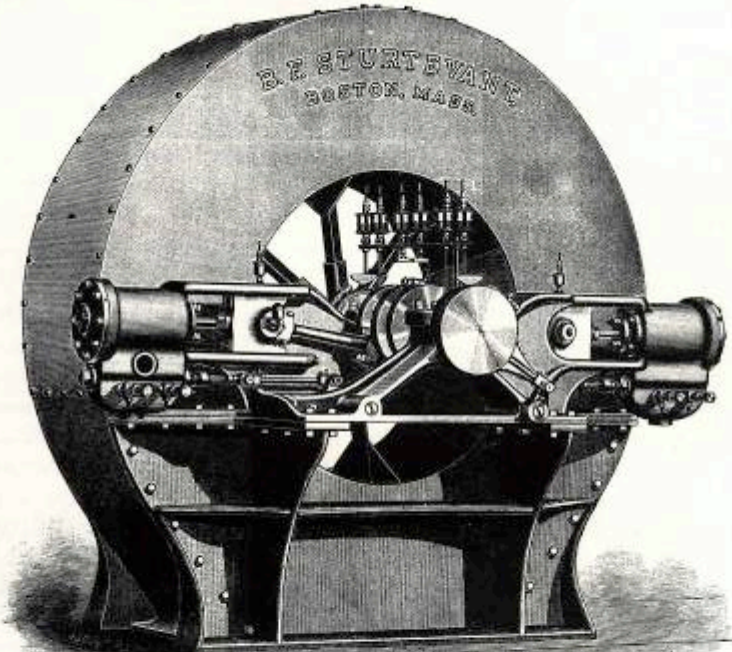
born c. 1824

American fan engineer, possibly the most important name in ventilation during the second half of the 19th century. "Started out as a shoemaker and cobbler. Being a very large man, he was greatly bothered with the heat....so he rigged up, (in) about 1850, a stand with a disc (4 blade) fan run by a belt on an eccentric pulley to a pedal which he worked with his foot." Invented a pressure blower (1861), patented a hot-air furnace blower (1869), and patented a compound air heater and steam condenser (1870). Started commercial fan manufacturing (1855) and formed the Sturtevant Blower Co. in Boston. Later known as B.F. Sturtevant Co., the firm produced steam fan drives and then electric fan drives, a wide variety of types and sizes of fans, including the *Cone-Wheel Fan* (c. 1896, a type of plug fan) and dual-duct fan apparatus. Also, devised a combination fan and heat exchanger for heating or cooling (USP 92460: 1869). Company publications, such as *Ventilation & Heating* (c. 1886) were widely used in both the USA and Europe.

99, Donaldson and Nagengast, pp. 109-112 and 269. See also 105, Roberts, figs. 49, 53, 61, and 62.

From "The Comfort Makers," Brian Roberts, ASHRAE 2000

B. F. STURTEVANT CO., — Boston, Mass.



THE STURTEVANT SPECIAL STEAM FAN.
DOUBLE HORIZONTAL ENGINE.

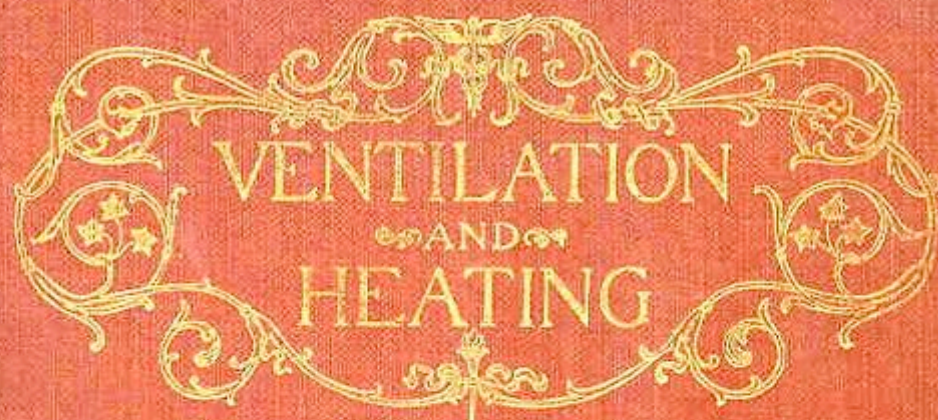
BRANCH STORES.

34 Oliver St., BOSTON, MASS.	16 South Canal St., CHICAGO, ILL.	21 West Nile St., GLASGOW, SCOTLAND.
131 Liberty St., NEW YORK, N. Y.	75 Queen Victoria St., LONDON, E. C., ENG.	38 Wilhelmstrasse, BERLIN, GERMANY.
135 North Third St., PHILADELPHIA, PA.		2 Kungsholmsborg, STOCKHOLM, SWEDEN.

Early steam-driven fan, *Heating and Ventilation*, June 1895

T. Moodie

Aug 1888



VENTILATION
AND
HEATING

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.

J. Moodie.

August 1906

INTRODUCTORY

ALTHOUGH it is nearly twenty years since the first edition of this Treatise was issued, this comparatively brief period has witnessed an almost phenomenal change in public opinion regarding the absolute necessity of good ventilation. That the evil effects of foul air are now generally appreciated is best evidenced by the legal enactments which control the application of ventilating systems in many of our States and municipalities. The growing realization of the necessity of mechanical means to secure positive and reliable results is likewise evident in the extensive and increasing introduction of the Sturtevant System.

Appreciating the value of former editions of this Treatise as a means of advancing the cause of improved ventilation and of increasing the application of the Sturtevant System, it is here presented entirely revised and greatly enlarged, with the sincere desire to place before the reader, as clearly and concisely as possible, the points to be considered and the steps to be taken in deciding upon a system of heating and ventilation. The successful operation of the Sturtevant System in thousands of buildings in this country and in Europe is the best evidence we have to offer as to its efficiency.

B. F. STURTEVANT CO.

VENTILATION AND HEATING

THE STURTEVANT

HEATING AND VENTILATING APPARATUS.

UPON the pages immediately following are presented, in as concise form as possible, descriptions and illustrations of the more important and characteristic types of apparatus manufactured by this house for the purposes of heating and ventilation. Special types and more detailed descriptions will be found in other catalogues published by this Company, and, wherever necessary, special designs will be furnished.

The component parts of the Sturtevant Heating and Ventilating Apparatus are a Fan Wheel, enclosed or not as best suits the circumstances, and arranged to be driven either by belt or by direct connection by means of some form of motor, preferably a Steam Engine or Electric Motor; a Steam Heater, across which the air is forced or drawn; and a Return Water Apparatus, consisting of a steam trap or of a pump and receiver arranged to operate automatically.

FANS.

THE FAN WHEEL. As constructed for ordinary ventilating purposes, the fan wheel consists of a series of T steel arms cast into a hub and carrying the floats or blades, which, together with the side plates of the wheel, are constructed of light but strong steel plate, substantially as shown in Fig. 15. Here, as is the case with all wheels above the smaller sizes, two hubs are used. This construction combines the minimum of weight with the maximum of strength and durability, and is especially designed to meet the requirements of a ventilating fan, namely, ability to handle the largest volumes of air, at low pressure, with the least expenditure of power. The wheel is carried by a stiff steel shaft supported in the Sturtevant patent brush oiler boxes. Constructed with the greatest care, of the best materials, and containing an oil reservoir from which the oil is continuously fed to the journal by the brushes, this box is at once *unheatable*, is capable of universal adjustment, and once filled with oil may be run for weeks without further attention.

VENTILATION AND HEATING

Although this type of fan may be used without a casing where properly arranged in connection with a supply opening, it is almost universally employed wherever the wheel is to be encased, whether in sheet metal, brick or wood. Evidently a sheet metal casing may be almost as readily constructed in one form as another, so that all locations of discharge are possible, and complete steel plate housings may be readily made to conform to given and special designs. As ordinarily built, either to be driven by pulley or by direct connected engines, these various shapes of housings are illustrated on subsequent pages.

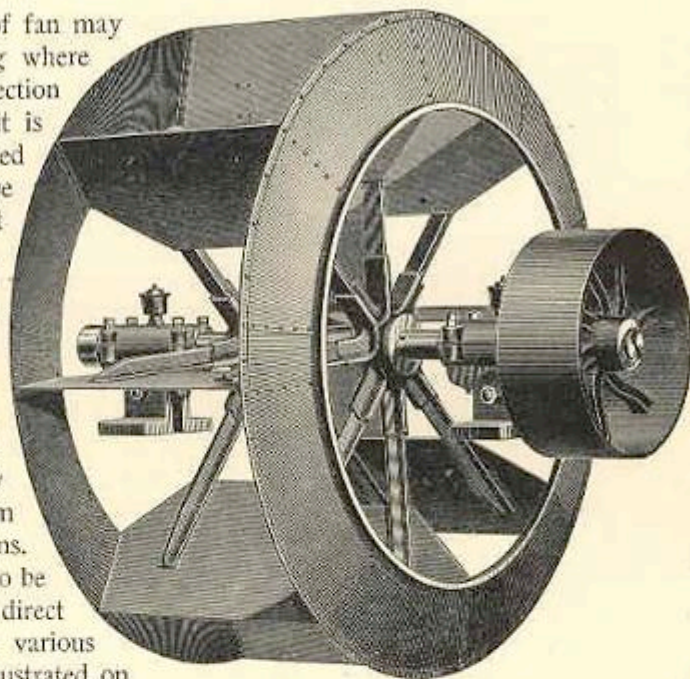


FIG. 15. FAN WHEEL.

DISC AND PROPELLER WHEELS. When air is to be moved against very slight resistance, as is the case where exhaust ventilation is to be accelerated, the disc or propeller form of wheel is of great service. The former is illustrated in Fig. 16, and the latter in Fig. 17. These wheels are light in their construction, consuming but little power at low speeds, and very easily erected. The blades of the disc fan are so set and those of the propeller wheel are so formed as to move the air forward in an axial direction. Either type is exceedingly convenient for introduction in the attic of a building, where it may be driven by a belt from an independent electric motor. An electric fan of the propeller type with direct-connected enclosed motor may be even more conveniently employed to meet the requirements. Under either arrangement, the fan is usually installed at the junction of the connections from the ventilating flues so as to present very little obstruction when not in operation. Great discretion should always be exercised in the introduction of either type of fan under plenum conditions, for it lacks the ability, except at excessive expenditure of power, to force air through a complicated system of distributing ducts.

VENTILATION AND HEATING

CONE FAN. Wherever a fan wheel is to be used without casing and under conditions that require anything above the most moderate air pressure, the cone fan is particularly desirable. As ordinarily installed, it is placed close up to a division wall in which is located an inlet opening concentric with the inlet of the wheel. The air is thus drawn from one side of the wall and delivered into a space of greater or lesser extent upon the other side, where the fan is located. As ordinarily constructed and located, the type of fan is clearly shown in Fig. 18. The base of this wheel is a conoidal iron casting with its apex toward the opening in the wall, so that the air entering the wheel is gradually deflected toward the numerous curved blades which extend outward from the conoid, and are so attached to the back plate as to make a very stiff machine. A bar across the inlet, and a trussed support on the back, carry the necessary journal boxes. Such a cone fan possesses marked advantages over a disc fan in that it will deliver air against resistance; back-lash is impossible, and the centrifugal force of the blades is utilized. At a given peripheral speed the cone fan will give far superior results in volume of air moved and in proportional power expended. Large numbers of these cone wheels have been furnished for prominent buildings throughout the country.

For certain conditions the wheel may be made double, i. e. with two inlets and conoids, and connection made to both. Or it may be enclosed in a steel plate housing in the same manner as the regular fan wheels.

When a sub-basement is to be kept filled with air under slight pressure, — as in the plenum system already described, — this fan is very economical and convenient, as no connecting ducts are required, the fan simply standing in the sub-basement and delivering directly into it. If desired, the wheel can be fitted with a direct-connected engine placed upon the back side of the wheel; or, if circumstances require it, the wheel may be arranged upon a vertical shaft, with step bearing, and driven by belt.

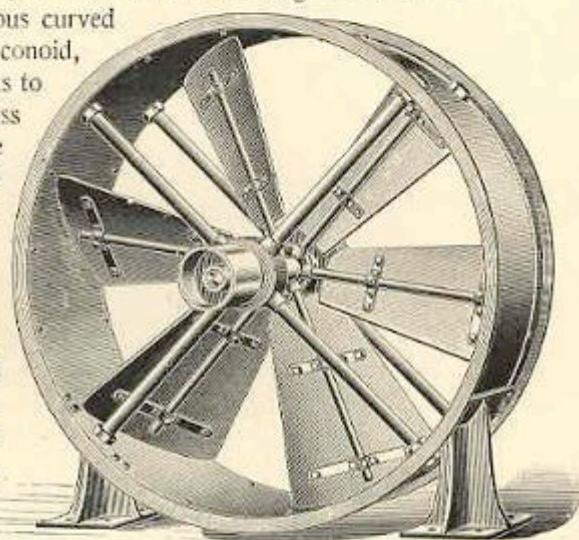


FIG. 16. DISC WHEEL.

VENTILATION AND HEATING

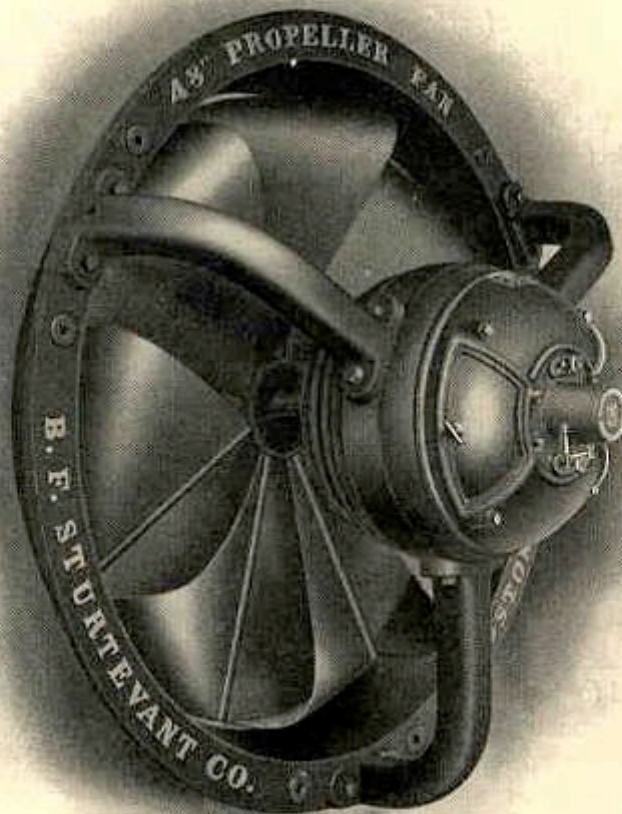


FIG. 17. ELECTRIC PROPELLER FAN,
WITH ENCLOSED MOTOR.