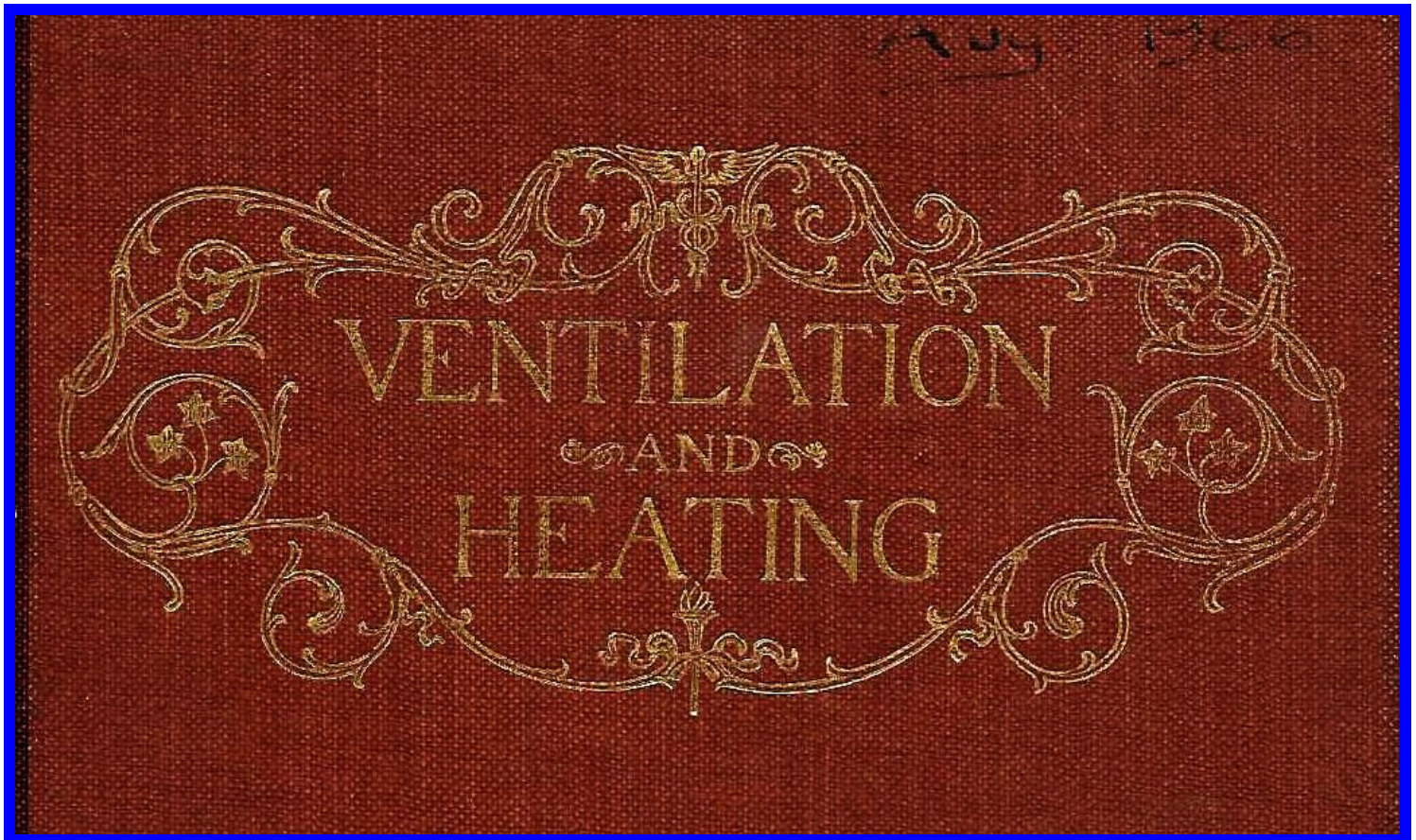


B F STURTEVANT COMPANY PART-3
Boston, Massachusetts
Extracts from Catalogue of 1906

**Centrifugal Fans &
Systems**



No.84 Sixth Edition

VENTILATION

AND

HEATING

PRINCIPLES AND APPLICATION



A TREATISE



B. F. STURTEVANT CO.

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STURTEVANT ENGINEERING CO., LTD

147, QUEEN VICTORIA ST,

LONDON, E.C.



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.

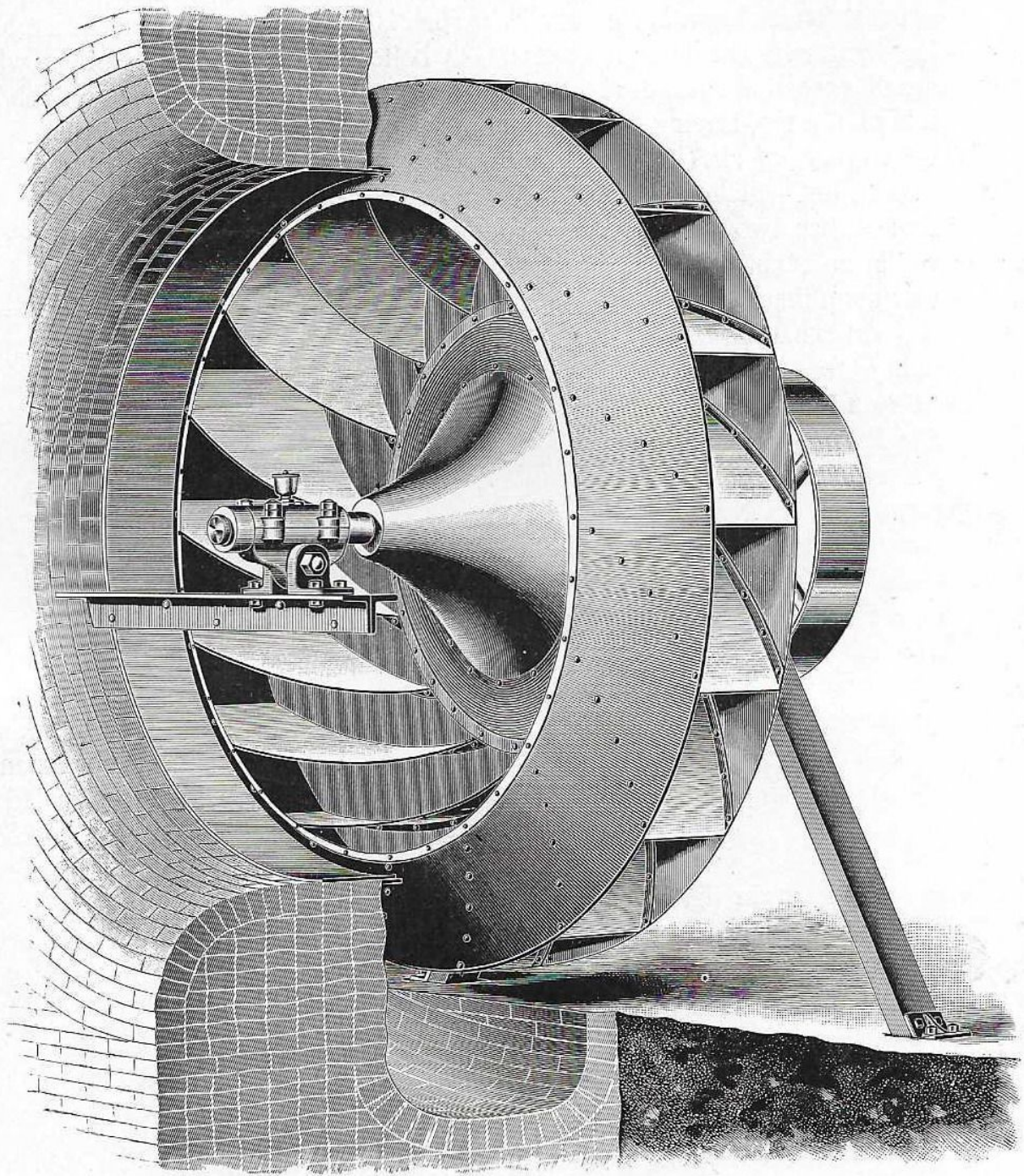


FIG. 18. CONE WHEEL.

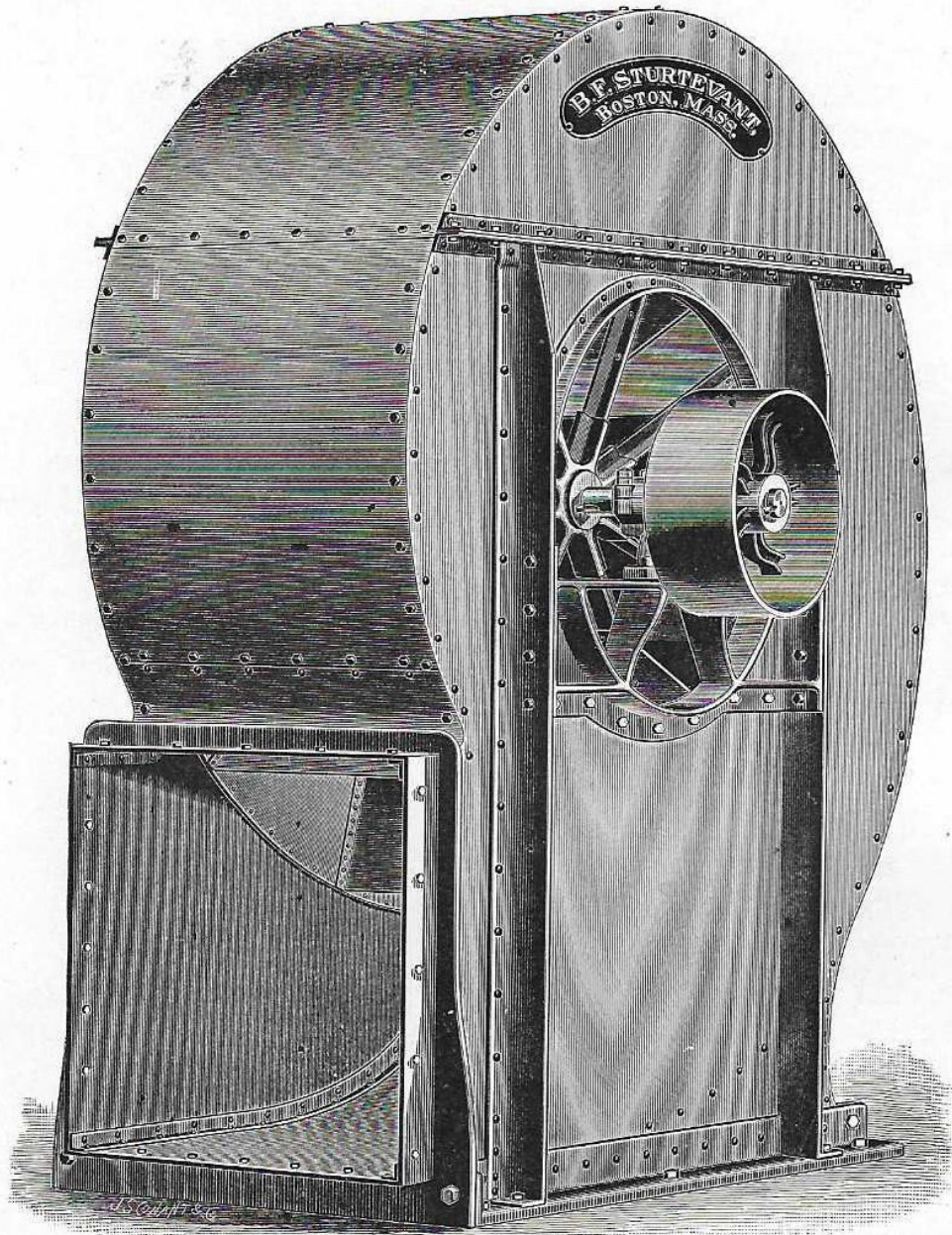


FIG. 21. STEEL PLATE BLOWER,
WITH OVERHUNG PULLEY.

VENTILATION AND HEATING

ELECTRIC FAN. The rapidly-increasing adoption of electricity as a motive power renders possible the introduction of the electric fan with every assurance of success. Whereas, heretofore, it has usually been necessary to provide a steam engine for the propulsion of a fan, it is now a simple matter to install a fan with either direct-connected or independent motor.

For convenience and economy, the electric fan with motor directly attached presents itself as most desirable. It is thus rendered compact and portable, may be located in any position, and occupies the minimum of space.

In the smaller sizes—able for the ventilation of apartments—a specially constructed motor is attached directly to the side of an exhaust fan of the “Monogram” type as indicated in Fig. 22. The motor thus becomes an integral part of the entire machine, to be adapted to any given location.

Where greater capacity is required, the steel plate fan is fitted with a motor after the manner of Fig. 23. Evidently, as in all steel plate design in the shape and dimensions, the motor remains the same. Such a fan fulfills all the requirements for heating and ventilating, and may be readily installed in connection with a heater, thus forming a steam hot blast apparatus.

But the use of such a fan is necessarily largely in locations where a movement of air is desired at its natural temperature, that is, independent of the heating system. If the fan is to be used where steam of any reasonable pressure is employed for heating, it must be obvious that the simplest and most economical arrangement would call for an engine to drive the fan, for the exhaust steam could all be utilized for heating purposes.

For use in the form of an exhaust fan, as an adjunct to a plenum system

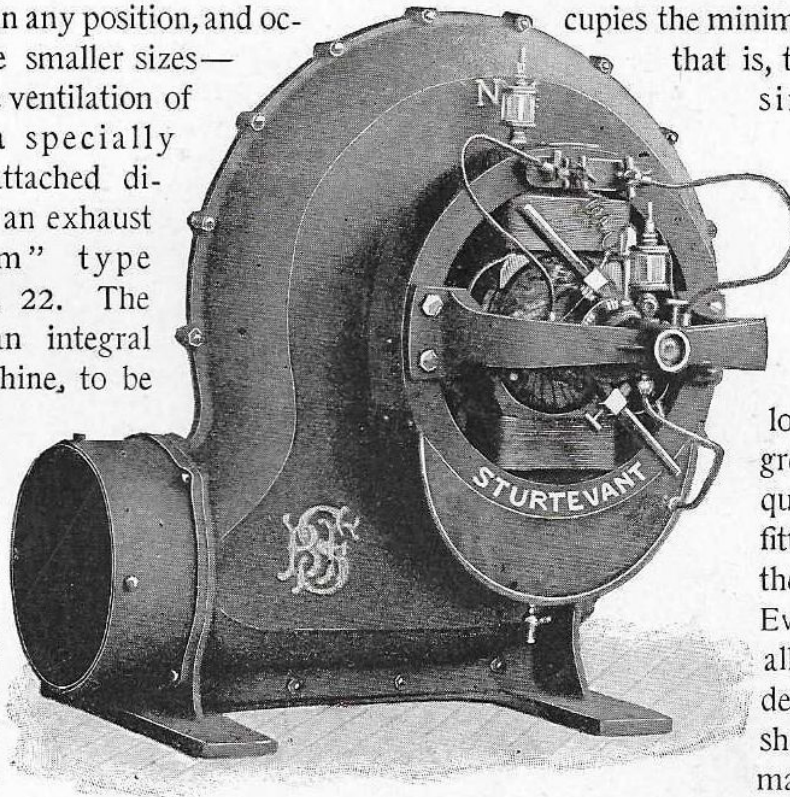


FIG. 22. “MONOGRAM” ELECTRIC EXHAUSTER.

that is, those service-single apart-constructed directly to fan of the as indicator thus part of the adapted to location.

greater capacity required, the steel fitted with a the manner of Evidently, as in all steel plate design in the shape and dimensions, the motor remains the same. Such a fan fulfills all the requirements for heating and ventilating, and may be readily installed in connection with a heater, thus forming a steam hot blast apparatus.

VENTILATION AND HEATING

of heating, the electric fan is, however, frequently of great service. It may be easily installed and operated in an out-of-the-way position as in any other, and can be arranged to be started and stopped from a switchboard in a much more convenient location, so that the attendant will seldom have to visit the fan.

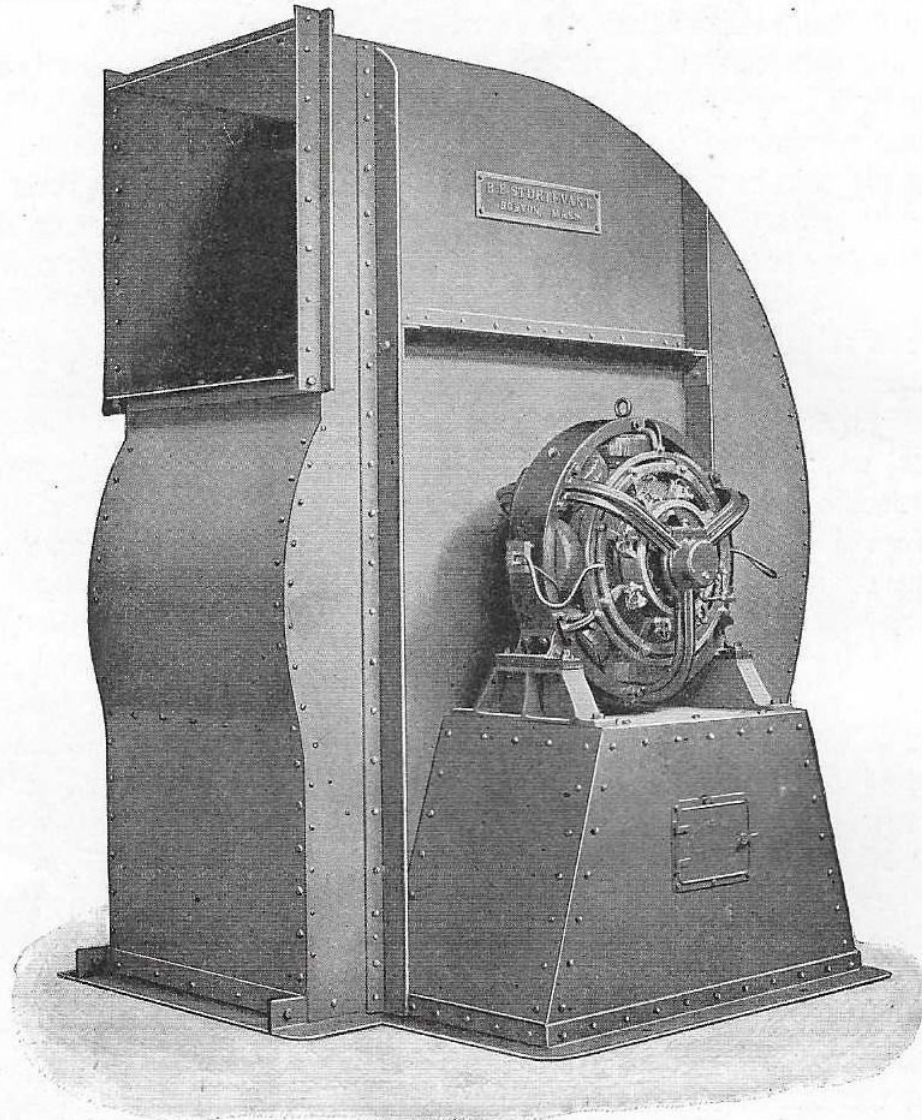


FIG. 23. STEEL PLATE ELECTRIC EXHAUSTER.

STEAM FAN. It is always desirable that the means of propulsion for a fan should be rendered as independent as possible of any other source of power; in other words, that the motor adopted should be devoted solely to the driving of the fan. Although the electric motor, as already pointed out, is being very

VENTILATION AND HEATING

generally introduced, the steam engine stands as the almost universal agent for fan propulsion, the combination of fan and engine being designated a steam fan.

As constructed of steel plate in the smaller sizes, the shell and wheel are identical with those used for a pulley fan. In place of the pulley and its hanger, however, there is provided a special type of centre-crank upright engine,

with its cylinder above the shaft, supported upon a substantial base and carrying the fan wheel overhung upon the end of its shaft, all as illustrated in Fig. 24.

In the larger sizes of full housing steam fans, the engine is of an entirely different form, as shown in Fig. 25, having its cylinder beneath the shaft, the opposite end of which is supported by a box in the inlet of the fan. Both types of engines are particularly designed for this work, are of a high grade of workmanship, and are capable of sustained operation at high speed.

Where exceptional durability or steadiness in running is de-

sired, or where it is necessary to drive the fan above the ordinary speed, the type of steam fan shown in Fig. 26 is very efficient, the engine being double-cylindere and of the very highest grade. The running parts are entirely enclosed, thus protecting from dust and preventing the throwing of oil. Special continuous oiling arrangements are provided for all bearings. The outline cuts, Figs. 27 to 34, are self-explanatory of the standard forms in which all steel plate fans are constructed.

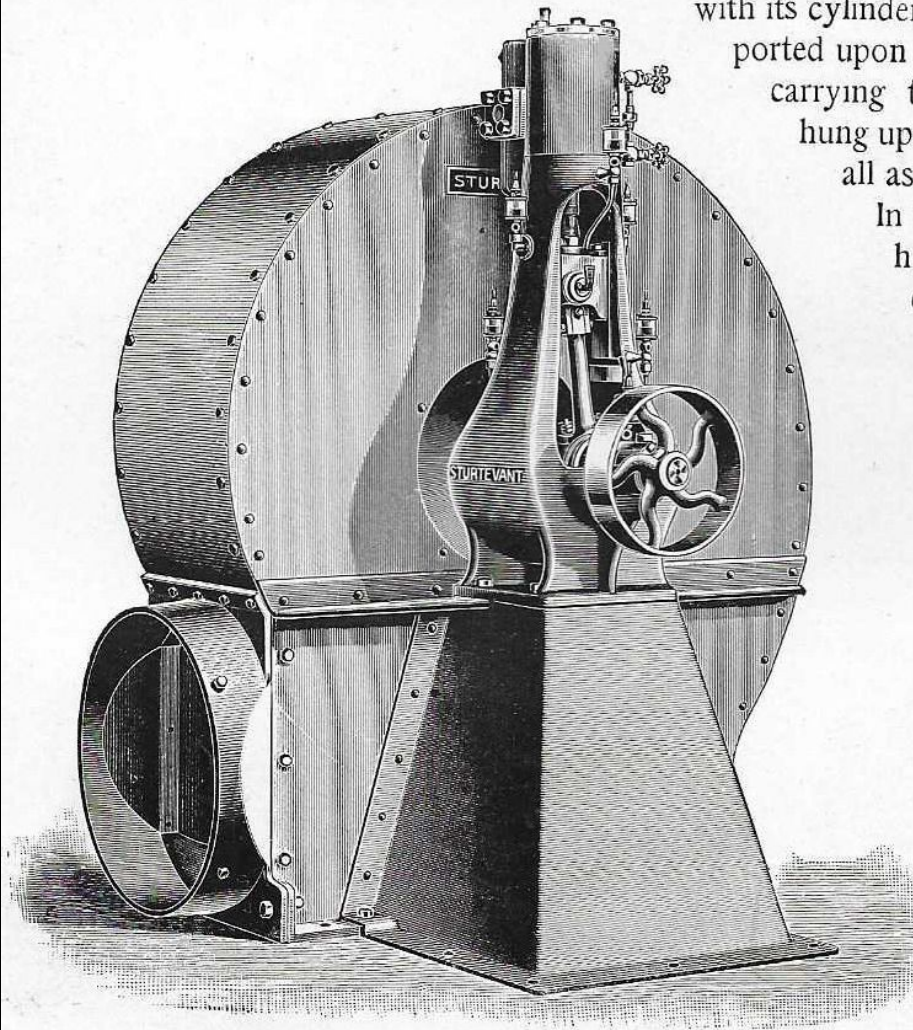


FIG. 24. STEEL PLATE STEAM FAN.

VENTILATION AND HEATING

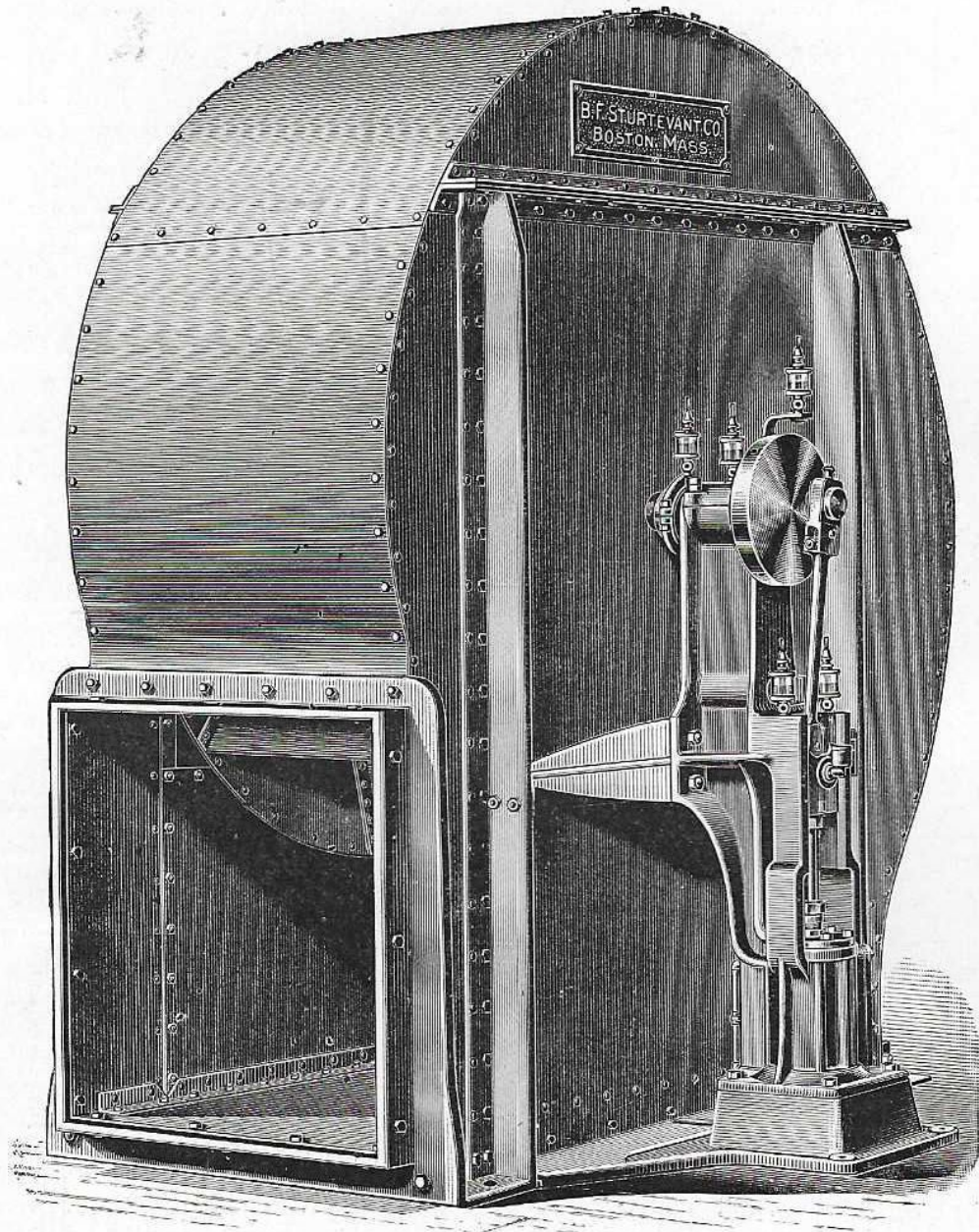


FIG. 25. STEEL PLATE STEAM FAN.
STANDARD TYPE.

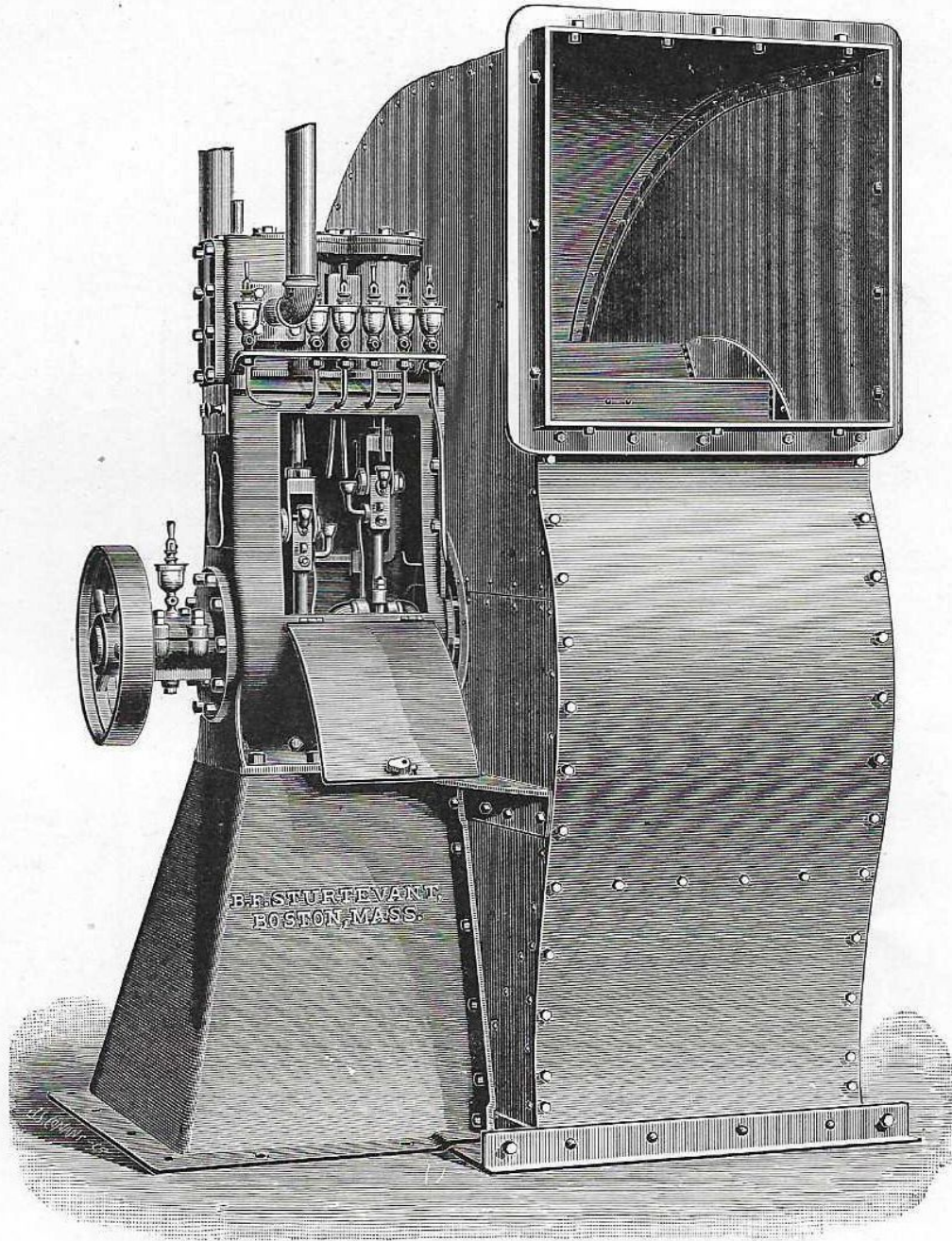


FIG. 26. SPECIAL STEEL PLATE STEAM FAN,
WITH DOUBLE ENCLOSED ENGINE.

VENTILATION AND HEATING

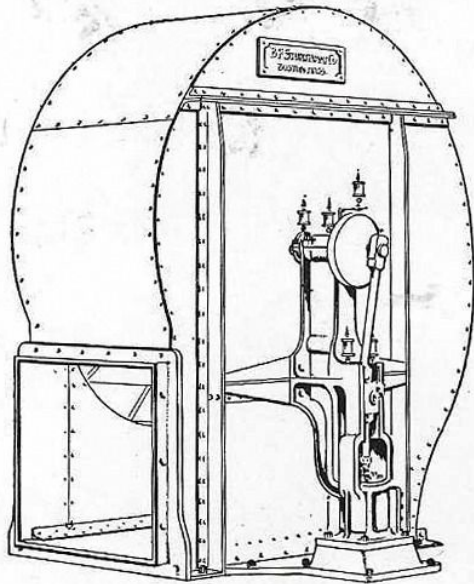


FIG. 27. BOTTOM HORIZONTAL DISCHARGE, RIGHT HAND.

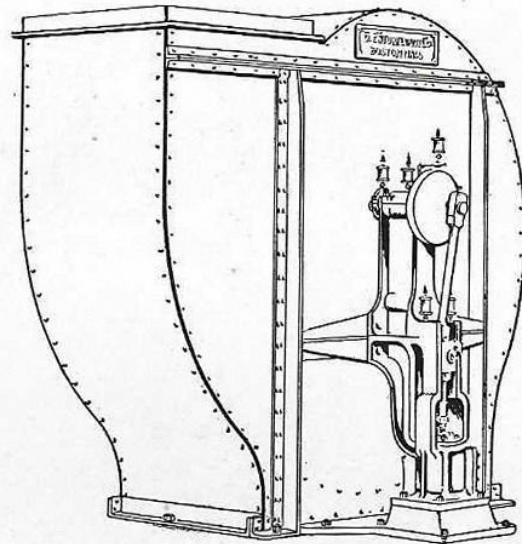


FIG. 28. UP BLAST DISCHARGE, RIGHT HAND.

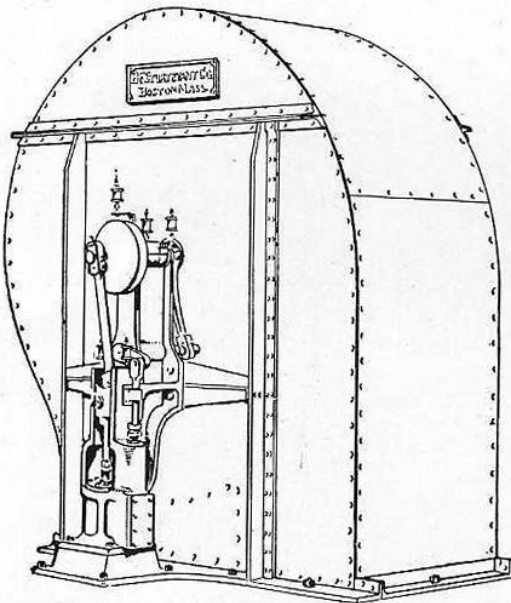


FIG. 29. DOWN BLAST DISCHARGE, LEFT HAND.

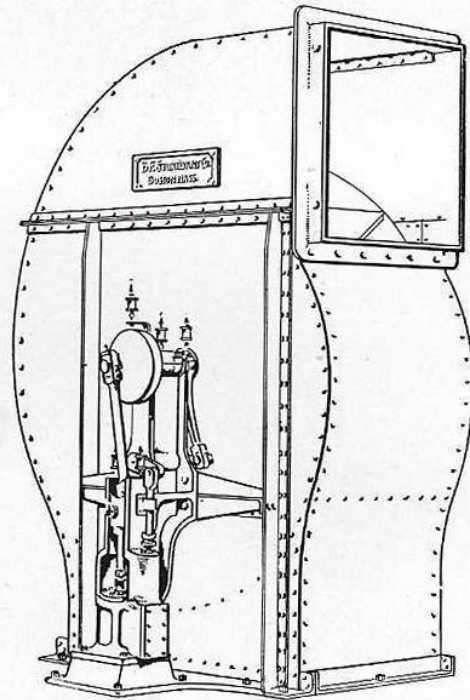


FIG. 30. TOP HORIZONTAL DISCHARGE, LEFT HAND.

FULL HOUSING STEEL PLATE STEAM FANS.

VENTILATION AND HEATING

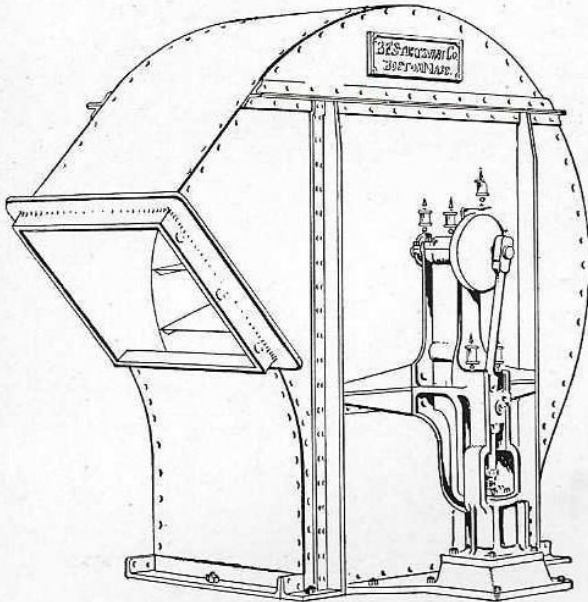


FIG. 31. TOP ANGULAR DOWN DISCHARGE, RIGHT HAND.

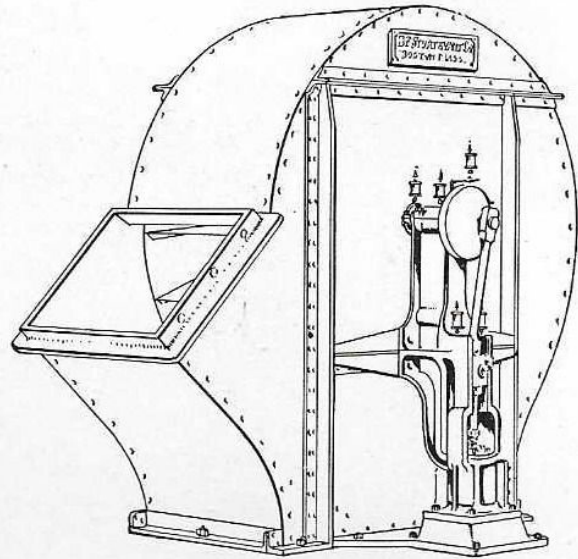


FIG. 32. BOTTOM ANGULAR UP DISCHARGE, RIGHT HAND.

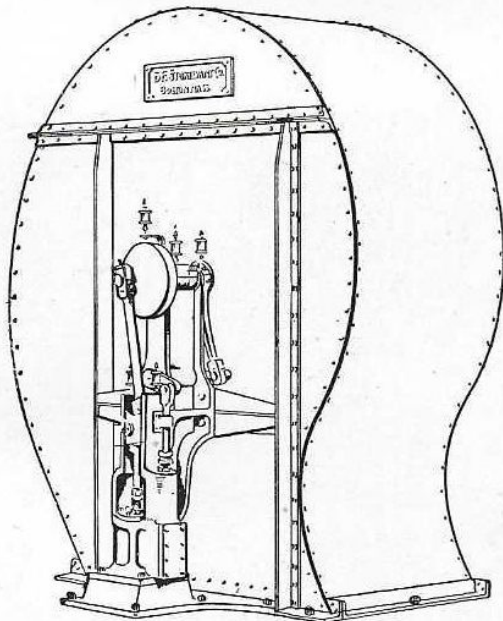


FIG. 33. BOTTOM ANGULAR DOWN DISCHARGE, LEFT HAND.

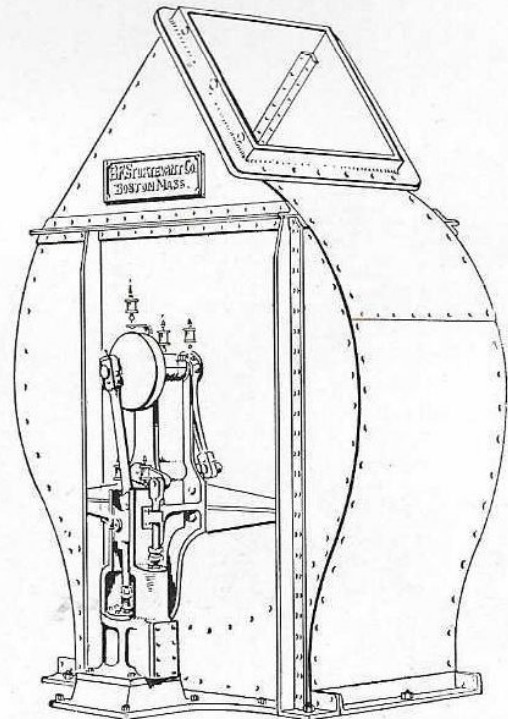


FIG. 34. TOP ANGULAR UP DISCHARGE, LEFT HAND.

FULL HOUSING STEEL PLATE STEAM FANS.

VENTILATION AND HEATING

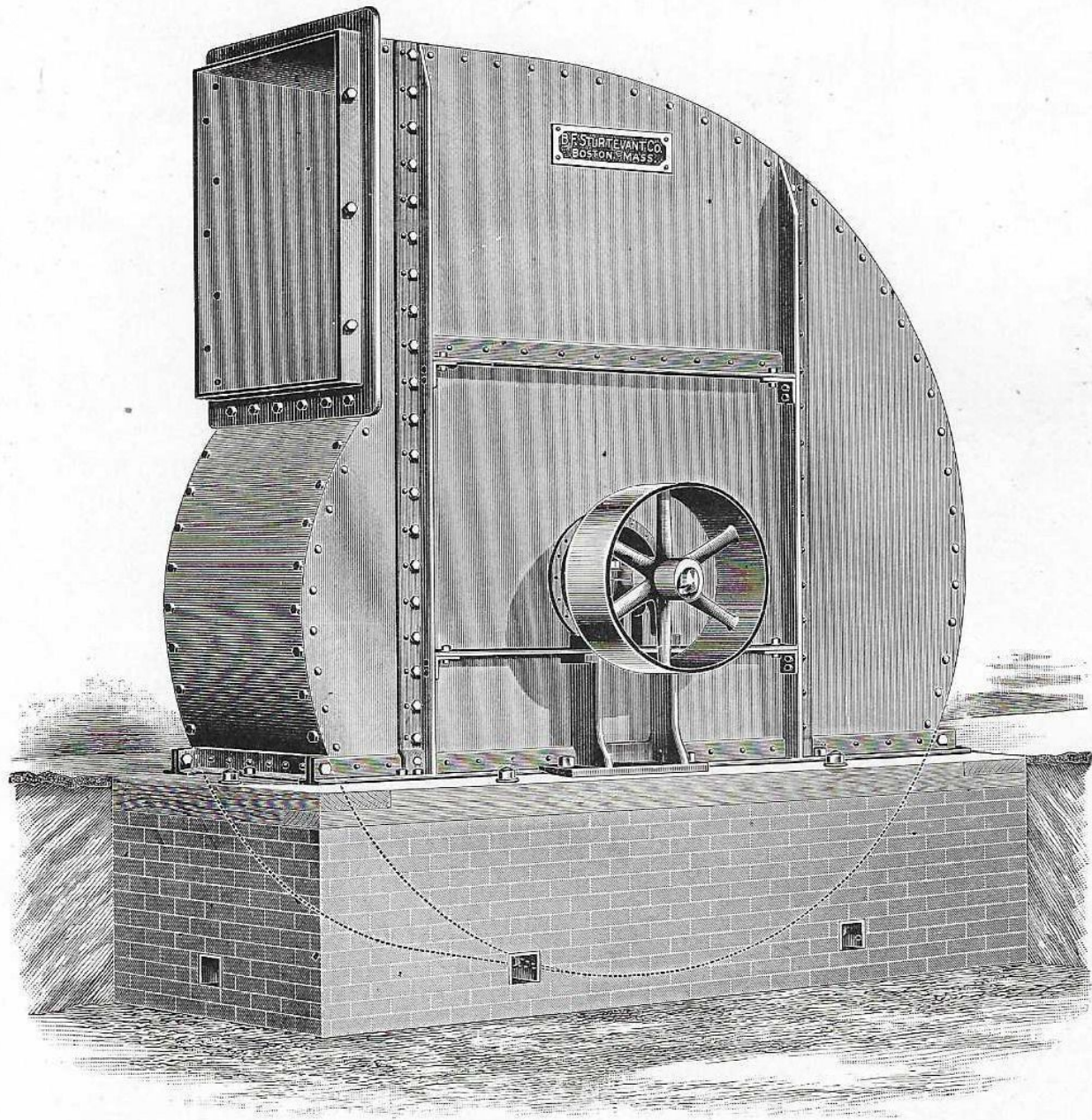


FIG. 35. STEEL PLATE PULLEY FAN,
WITH THREE-QUARTER HOUSING.

VENTILATION AND HEATING

THREE-QUARTER HOUSING FAN. In the case of large, full housing fans, their height frequently becomes a serious obstacle to their introduction. As a means of overcoming this difficulty, fans are, therefore, constructed so that the lower portion of their scroll is formed of brick, which, with its side walls, serves at the same time as a substantial foundation. The general idea of such construction in the case of a top horizontal three-quarter housing pulley fan is presented in Fig. 35. Here the bottom part of the space within the enclosing walls of the foundation is cemented over to correspond to the curve which this portion of the fan scroll would naturally take if the entire structure were of steel plate.

The three-quarter housing is of especial advantage where it is desired to connect with an underground duct through which the air is to be forced. The fan then sets directly over the end of the duct, as in Fig. 36. The duct at its end conforms to a continuance of the curve at the back of the fan. The cut shows a steam fan in which, as is customary, the engine is of the horizontal type. The long cast-iron base of this engine, attached to the substantial brick foundation, furnishes an exceptionally solid support, and renders the entire construction perfectly rigid. The engine proper is identical in construction with the regular independent engines of the same form, is provided with adjustment for all moving parts, is completely equipped with oiling devices, and thoroughly built for continuous operation.

The utility of such a design must be evident; in fact, this is the accepted form for introduction in the case of almost all plants of large size. The underground brick duct permits of the distribution of air to the vertical flues without encroaching on valuable floor space or head room.

The three-quarter housing fans are constructed in the same standard forms of discharge as are the full housing fans illustrated in Figs. 27 to 34 inclusive. From this large assortment may be readily chosen the shape that is best suited to the conditions under which it must be installed. At all events, a fan of this type can be specially constructed to meet almost any conceivable requirements.

The duplex type of three-quarter housing steam fan, illustrated in connection with a heater upon a succeeding page, is frequently of great convenience. Each fan is provided with its individual engine, and the fans set side by side with their shafts in the same line. The shafts, which are extended until they meet, are rigidly connected by a coupling. Under ordinary conditions both engines are operated; but, if under any circumstances, one of these becomes disabled, they may both be driven at only twenty per cent. less speed by the other engine.

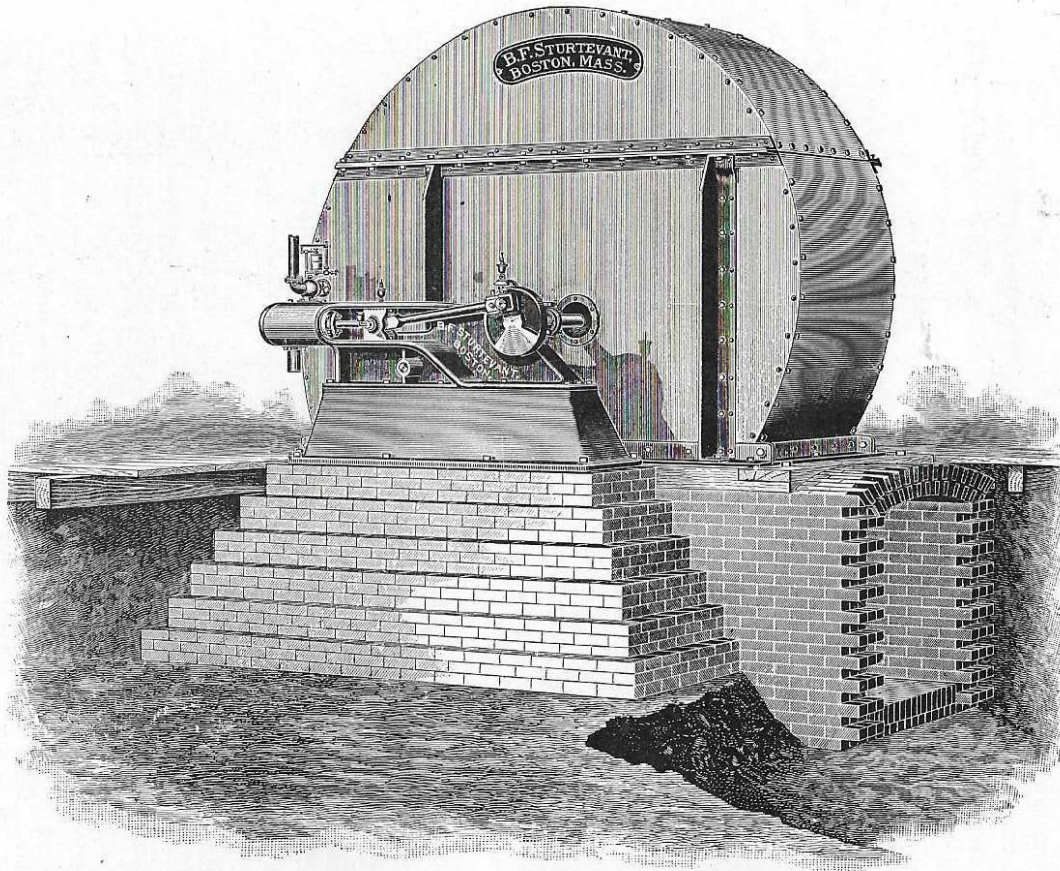


FIG. 36. STEEL PLATE STEAM FAN,
WITH THREE-QUARTER HOUSING.