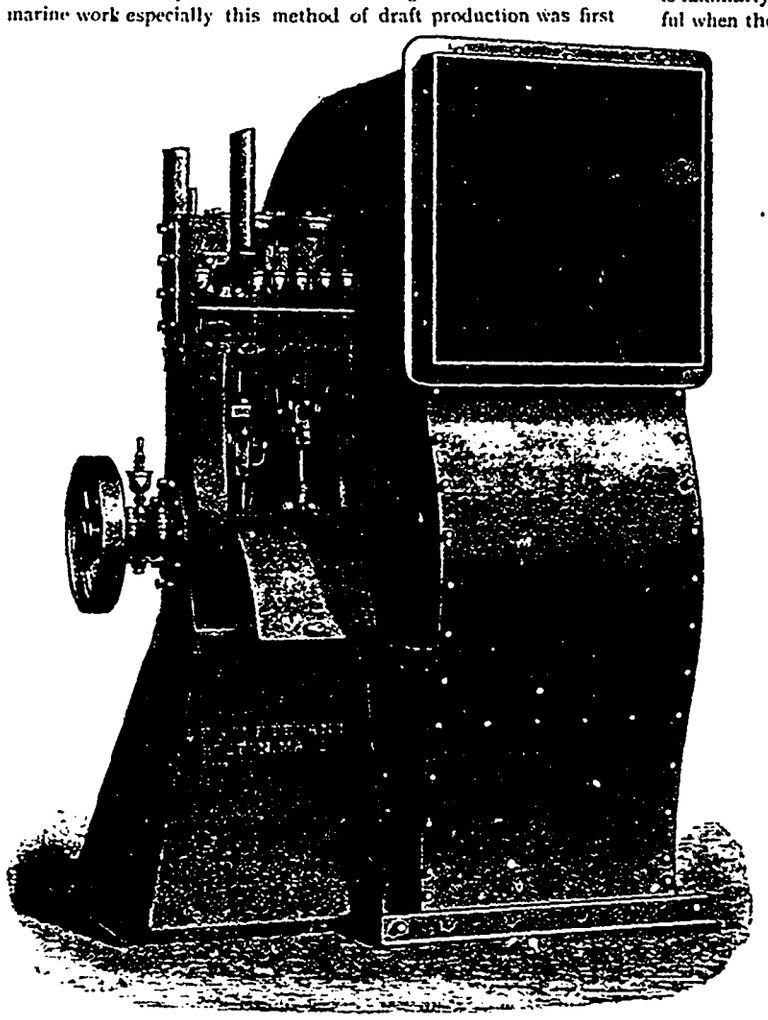
MECHANICAL DRAFT.

Though but little more than a quarter of a century has elapsed since the idea of a mechanical draft for the engine room began to take hold of the minds of engineers and power plant owners, the progress of its adoption as an improvement on chimney draft has been steady and continuous.

The manufacturers of the Sturtevant Blowers appear to have been the pioneers in the introduction of the steam fan for burning slack and otherwise waste fuel, but so great has been the extent of their use, and so varied their present applications, that some special reference to this system will be interesting to the reader. For marine work especially this method of draft production was first



fully developed, and its adoption has been so general that more than three-quarters of the steam vessels in the United States Navy are now equipped with Sturtevant Blowers. The merchant marine, as well, relies on forced draft above all else to make possible its remarkable speed records, and here the Sturtevant Fans have been generally adopted. Their success on ship board has directed the attention of stationary engineers to their advantages on land engines, with the result that they are coming into increasing request for sugar refineries, electric light plants, and for many classes of land work, which reliance was formerly placed on the chimney draft.

The drawbacks to the chimney draft are that its first cost is heavy, its capacity is distinctly limited, and its drafts cannot be regulated to suit all conditions, but it is claimed for the fan draft that it gets over all these difficulties, while with its use cheaper grades of fuel may be used

In a catalogue just issued by the B. F. Sturtevant Co., of Boston, the following points are claimed. The adoption of the fan as a practical substitute for the chimney reduces the expense therefor to that necessary for the stack of low statue, avoiding expensive foundations, and providing a means by which the draft may be instantly changed to suit altered conditions. A means, in fact, which is positive, yet flexible, at all times and absolutely independent of climatic changes This is most evident in electric traction work where the greatest demand for steam is made on those stormy days when the draft of a chimney is at its worst. The chimney is reliable only up to its minimum capacity. The fan meets the maximum requirements instantly.

The temperature of the gases necessary to secure sufficient draft with an ordinary chimney can usually be lowered from 200° to 300° when a fan is substituted, and with resulting economy in coal consumption. Further, the fuel economizer, so advantageous under proper conditions, but so often worse than useless with the ordinary chimney, may be operated at its maximum efficiency when the draft is produced by a properly designed fan. In practice the gases entering the economizer at 500° or 550° are thus enabled to heat the water to about 300°, and yet escape at a temperature of 250° to 300° without impairing the mechanical draft.

In its earlier application for producing draft, the fan was so installed as to force the air beneath the grates, thus producing what is familiarly known as *forced draft*. This arrangement is successful when the air pressure produced within the ash-pit is not excessive; otherwise there is a tendency to blow holes through the fire at certain points and to promote outward leakage of the gases, particularly when the fire doors are opened. This latter trouble has been obviated with some applications of the closed ash-pit system, by an arrangement of doors and dampers such that the draft is shut off as the doors are opened In marine work, the closed stoke-hold system has to a large extent obtained, the air being simply forced into the enclosed boiler-room at a pressure sometimes as high as 2½ ounces per square inch, and thence allowed to escape only through the fire.

Later and more advanced practice is, however, looking very generally to the application of the fan in such a manner that it serves more distinctly as a substitute for the chimney, drawing through it and discharging to the atmosphere the gases as they come from the up-take or the economizer. There are illustrated this month a number of fans of the types requisite for this method. The fans, constructed of steel plate, are thoroughly, yet somewhat flexibly stayed, to allow for expansion without distortion when subjected to the direct heat of the gases passing through them. In all cases the journal boxes supporting the shaft are provided with special chambers through which cooling water may be caused to flow.

For forced draft the simplest arrangement is shown in the last cut, the fan being placed upon the floor and discharging directly into an underground duct which extends in front of the boilers and connects with each ash-pit, wherein is placed a damper, operated from the front of the boilers. For large plants the three-quarter housing fan (as shown in cut) is most convenient High pressures may be best obtained by the use of the double engines for driving the fans.

For induced draft it is necessary that neither bearing of the fan should be exposed to hot gases. Hence the double engine, being self-contained, is particularly adapted, as it permits the fan wheel to be overhung.

In the most complete plants the throttling governor valve on the fan engine is specially designed to regulate the steam admission relatively to the draft requirements, more steam being admitted to the engine as the steam pressure falls, thereby maintaining practically constant pressure on the boilers. Wherever contingent accidents have been considered and provided for in surplus boiler power, duplicate engines and the like, it is advisable that the mechanical draft apparatus be likewise installed in duplicate, but so arranged that both fans operating at moderate speed, or one fan at its maximum speed, will produce the required draft. This duplicate or duplex form of apparatus is shown in several of the illustrations.

In application, such duplex fans are usually so arranged side by side that the gases enter the space between them and pass through one or the other, according to the position of damper. A similar damper should be provided for the outlets of the fans, so that one may be entirely shut off for repairs, if desired.

The B. F. Sturtevant Co., of Boston, who have offices in New York, Philadelphia, Chicago and London, Eng., make designs and lay out plans to suit the special requirements of any power plant or manufacturing establishment. It will be of interest to know that they have already a number of their forced draft and induced draft plants in successful operation in Canada. Among the more prominent of these are the plants at the Canada Sugar Refinery, Montreal, the Montreal Street Railway, the Riordan Paper Co., which has a plant of 400 horse power, and the St. John Street Railway Co., which has a 1,000 h.p. plant.