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MANUFACTURE OF CENTRIFUGAL FANS
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Fig. 1

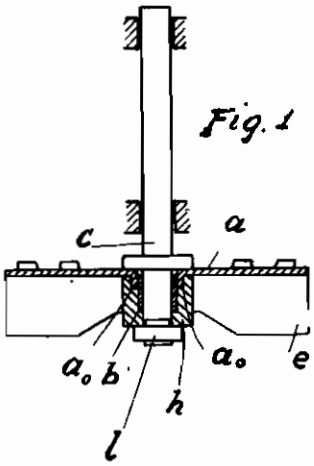


Fig. 2

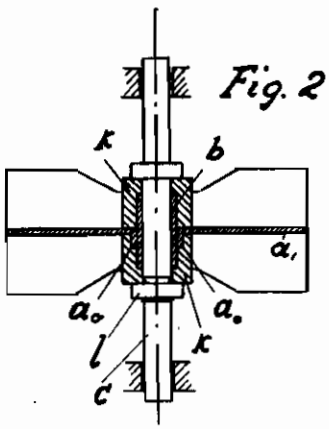


Fig. 3

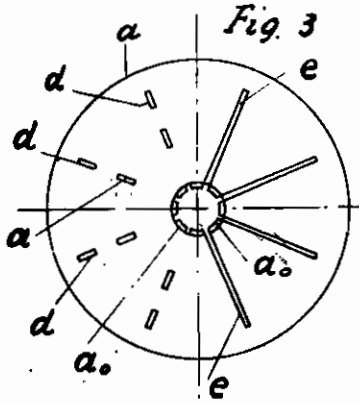


Fig. 3a.

Fig. 4

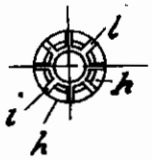


Fig. 5.

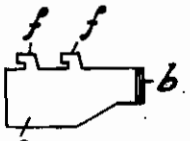


Fig. 5a.

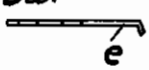


Fig. 6.

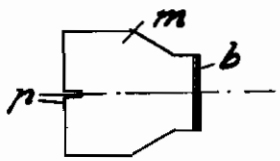
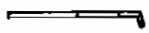


Fig. 6a.



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ALIEN PROPERTY CUSTODIAN

MANUFACTURE OF CENTRIFUGAL FANS

Ferdinando Ferré, Milan, Italy; vested in the Alien Property Custodian

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Centrifugal fans are generally built with a cast rotor or with a metal sheet rotor associated or not with forged or cast parts.

Fans with cast rotors can only be used in such cases in which the speed of rotation is limited, inasmuch as the centrifugal stresses, due to the weight of the cast elements, exceed rapidly the limits of resistance of the material, said rotors being also difficult to be balanced at high speeds.

The sheet fans, with or without forged or cast parts, which generally are reduced to the hub or to a spider (hub with arms), have the various members connected by rivets or with a electric spot welding. The connecting members, or the welds or rivets, cause in the rotor, unbalances which can be removed only by difficult balancing operations.

When rivets are used, the temperature of operation of the fan should have a limit inasmuch as said method of assembly may loosen so that it cannot be adopted as soon as the operating temperature rises appreciably above the usual temperature.

Welds alter very often the nature of the material and increase its brittleness when they have not undergone a proper heat treatment, which is not always possible, due to the warpings it causes.

The applications of centrifugal fans is nowadays extending to always higher operating temperatures, both for forced circulation plants for hot air for various industrial purposes as for heat treatments in which the uniformity of temperature has a particular importance. In fact only with a strong circulation of air it is possible to secure the absolute uniformity of temperature in the chamber of a furnace or of an oven, and this not merely for relatively low temperatures (under 600° C.) in which the heat convection is the greatest, but also for higher temperatures in which the radiation of heat is most important. This because the charges of the materials are very often made in compact bulks and only some of the superficial layers get under the direct action of the radiating heat.

With increased operating temperatures the problem of the construction of the fan is obviously more and more complicated, and to much the more that the resistance of the material decreases.

Having particularly in view the applications to working temperatures above normal, but without limiting the same to the exclusion of usual ventilators, a method of manufacture has been developed, forming the object of the present invention, which removes the drawbacks stated above.

The invention refers to the manufacture of the fan of centrifugal ventilators with pressed parts and with elements in sheet metal or machined from forgings or castings, assembled one to another without welds or rivets, but simply by jointing and fitting in the various parts. This method of construction, besides being extremely simple, allows immediately a very satisfactory balancing of the fan without requiring any special fitting, because the various parts composing the fan are naturally arranged symmetrically with regard to the centre line: such parts being obtained either from dies or with machining operations, with perfectly equal and constant weights.

In the attached drawing are shown the designs adopted both for a fan with a single lateral inlet and for a fan with two axial inlets, without limiting the features of the invention by this particular design:

Fig. 1 shows the general view of a fan with a single suction inlet.

Fig. 2 shows a fan with two inlets, similar in other features to the first.

Fig. 3 shows a front view and a section of the disc on which the fan blades are mounted.

Fig. 4 shows the hub.

Fig. 5 shows in front and side view a fan blade for a single inlet.

Fig. 6 shows in the same way a fan blade for a double axial inlet.

The rotor is formed by a supporting disc in sheet metal *a* (Fig. 1), *a'* (Fig. 2), with a central hole and a series of upset extensions as shown in the figure, which surround the parts *b* applied upon shaft *c* of the fan as will be disclosed hereafter. On said disc *a*, in the manufacture of a fan with a single inlet, are cut the slots *d* (as shown on the left-hand side of Fig. 3) one or more per blade in number. Blades *e* are made in sheet metal (as shown in Fig. 5) and from said sheet are cut-out hooks *f* which enter in the above said slots *d*.

The portion of the blade adjacent to the shaft is upset in *b* so as to follow for a short angle the surface of said shaft.

When the different blades *e* (Fig. 5) are fitted and set into the disc *a*, the hub *h* is shifted in axially, said hub being formed by a cylinder with a central hole of the size of the shaft increased by the double thickness of the plate of the blades and provided also with a series of longitudinal slots *i* wherein enters the foot of each blade. Said slots of course, extend only for a part of

the whole length of the hub, so that the remaining part, extending out of the set of blades, is the resisting portion of the hub.

The three members (disc, blades and hub) are then fitted on the shaft *c* of the fan, (which shaft may have a conical part) and then screwed tight thereon by means of a nut.

In the construction of fans with a double air-inlet, the disc is in the centre and has radial slots *e* starting from the centre and extending outwards towards the rim of said disc. The blades *m* (Fig. 6) which are of course, symmetrically arranged around the axis, have at the outer end a short slot *p* inserting in the peripheral portion of the disc and at the inner end an upset foot *b* similar to the one of the fan with a single inlet. To keep together said blades there are two half-hubs *k* which are connected together by means of two set-rings, screwed on the shaft of the fan (see Fig. 2).

FERDINANDO FERRÉ.