

A. C. FRASER.
CENTRIFUGAL FAN OR PUMP.
APPLICATION FILED MAR. 10, 1908.

976,795.

Patented Nov. 22, 1910.

2 SHEETS—SHEET 1.

FIG. 1.

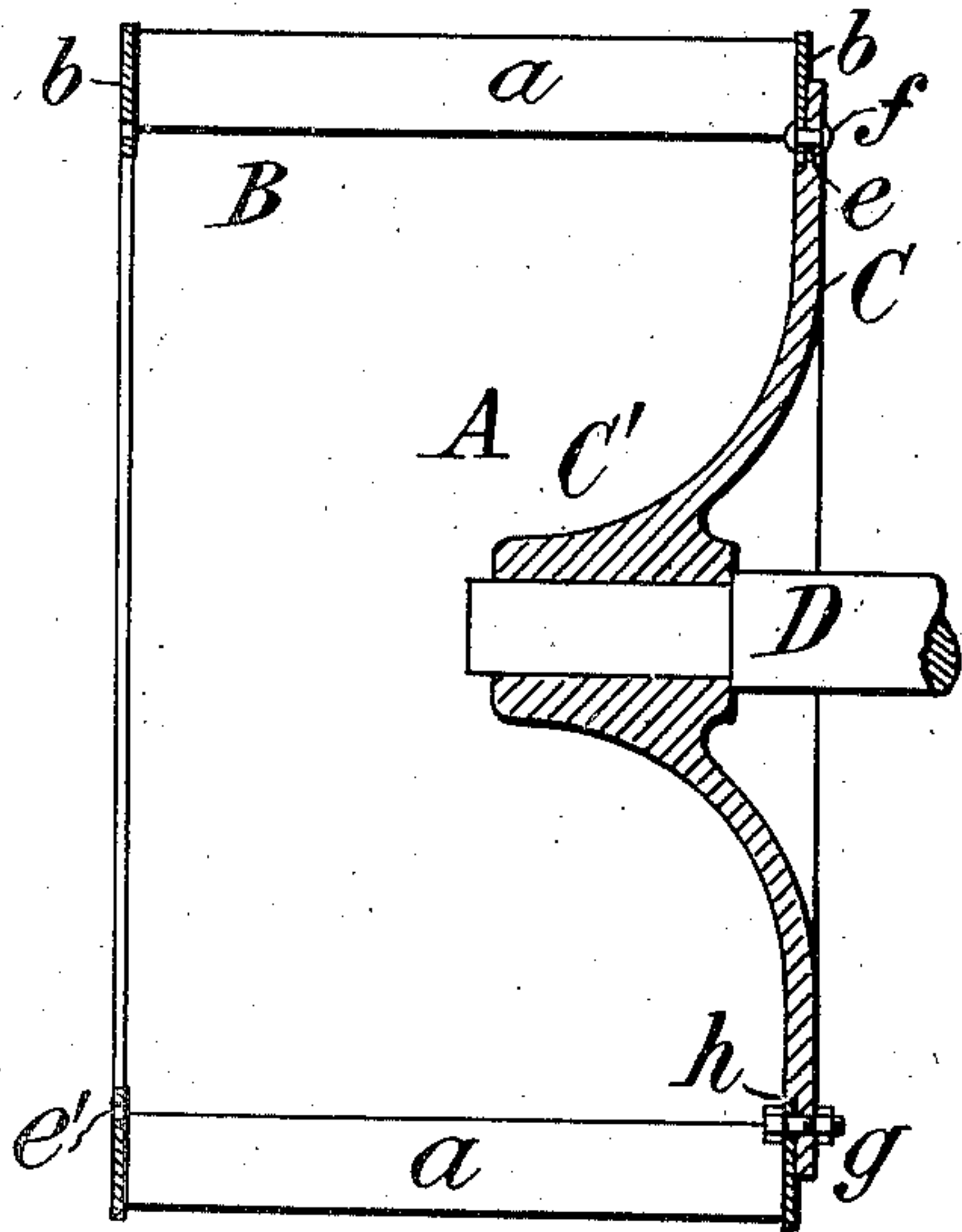


FIG. 5.

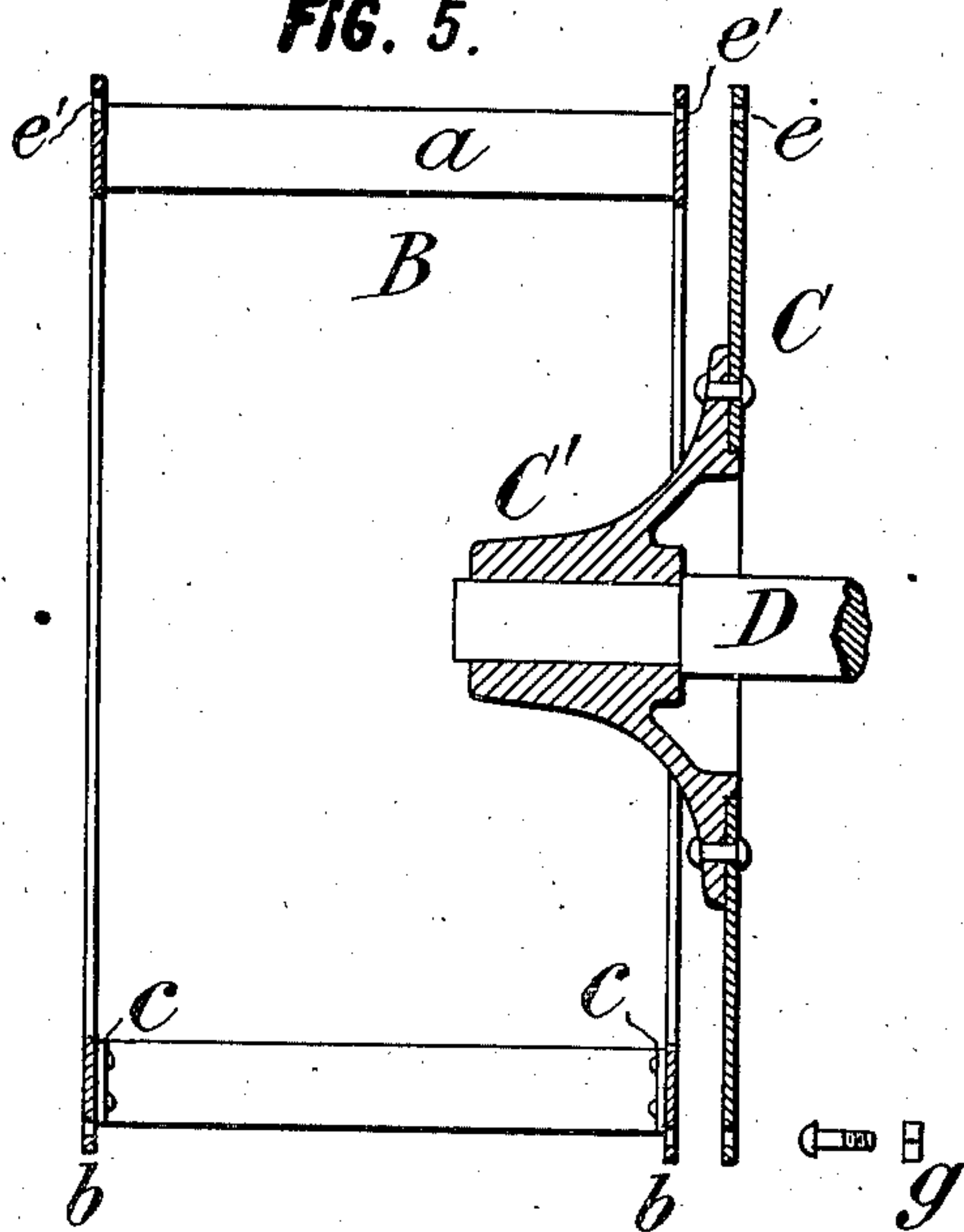


FIG. 4.

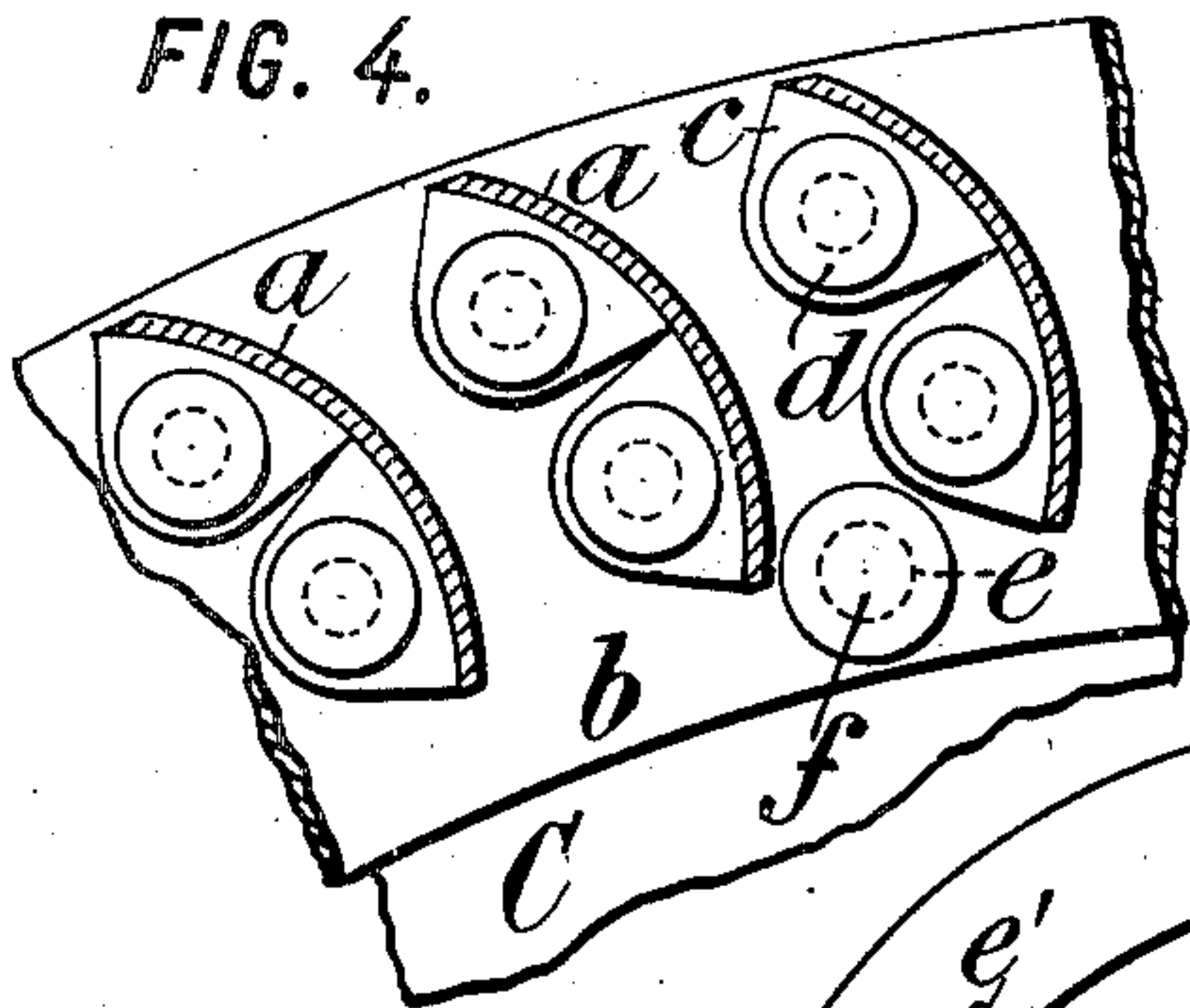


FIG. 6.

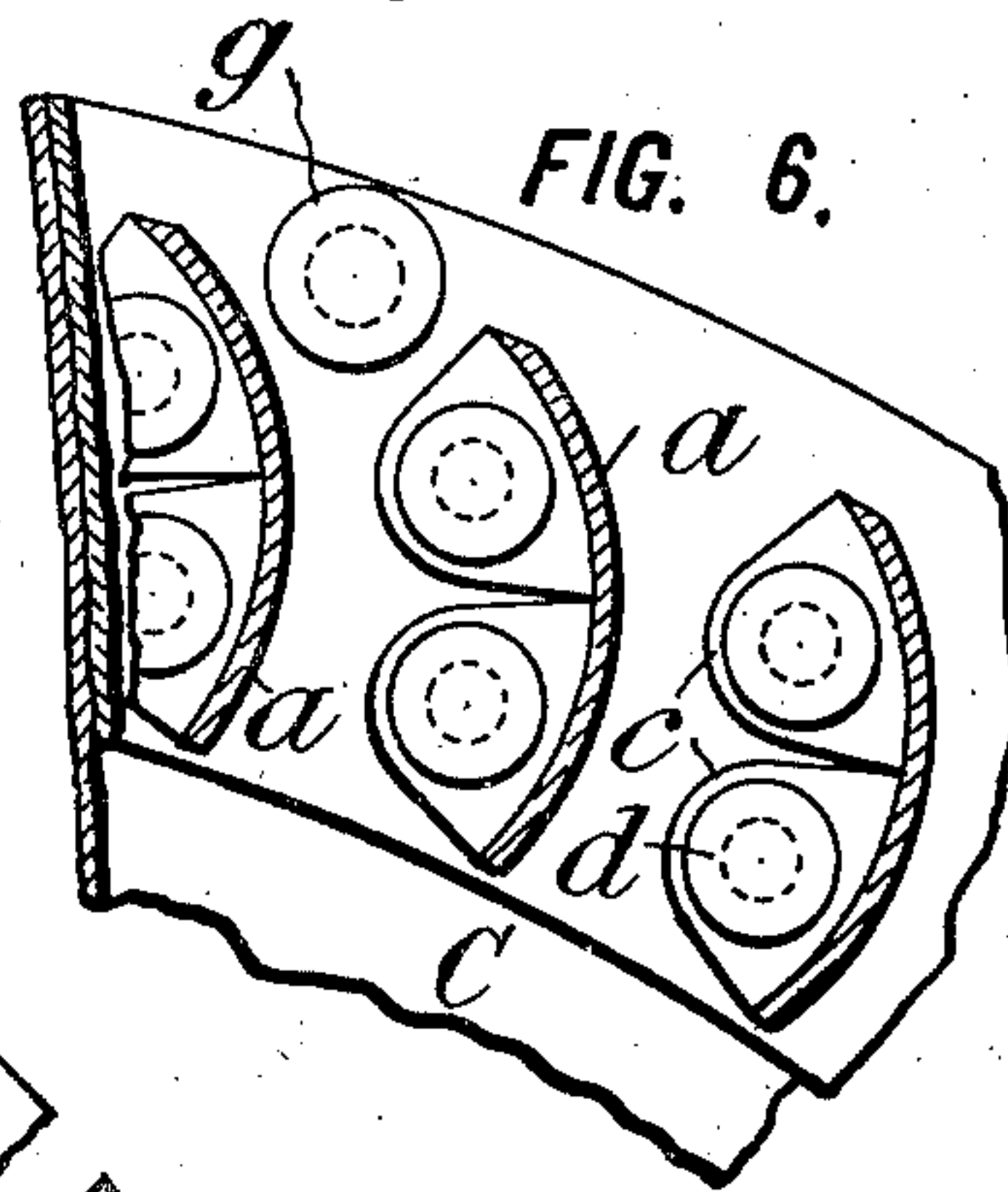


FIG. 2.

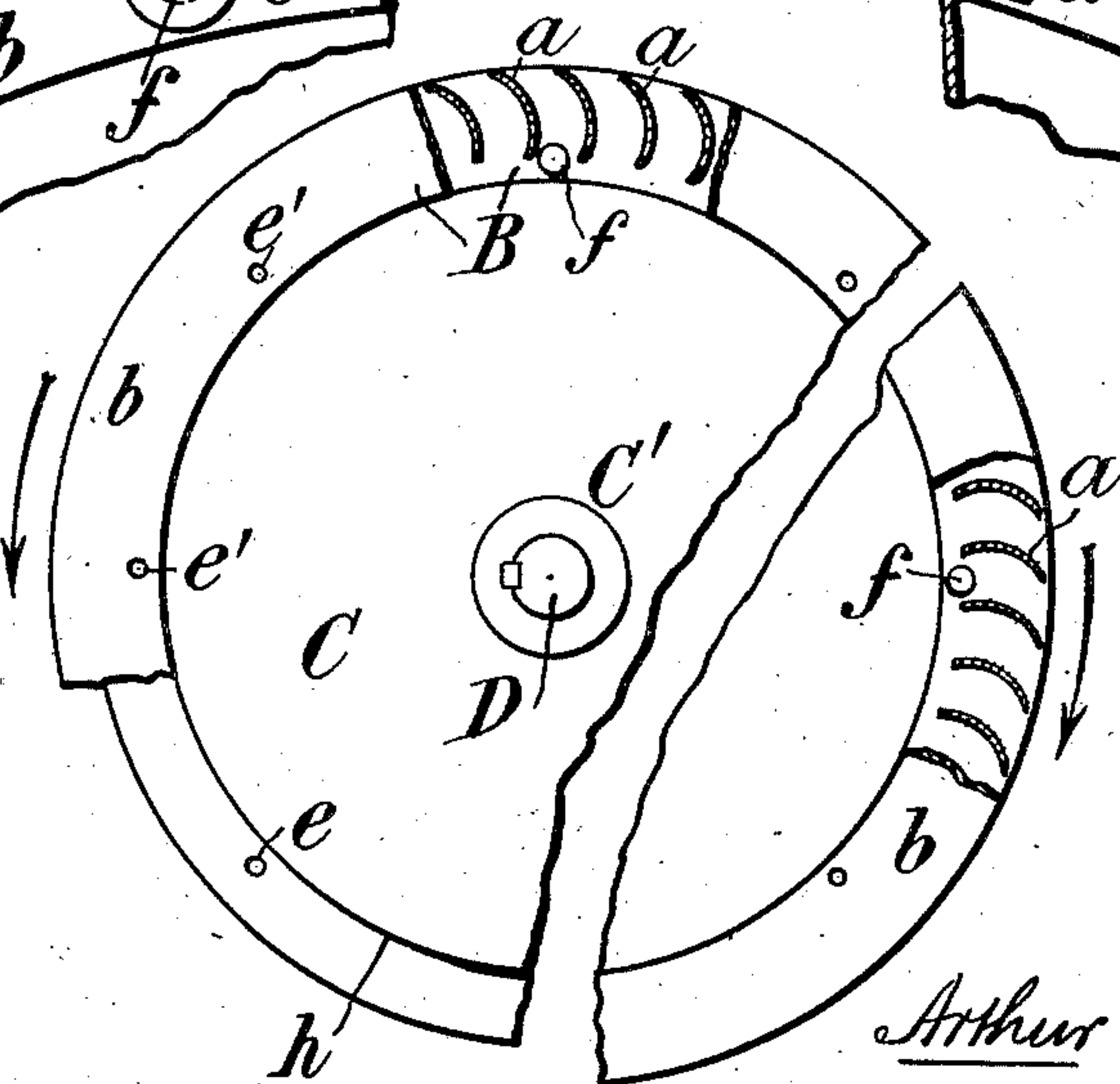


FIG. 3.



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2 SHEETS—SHEET 2.

FIG. 7.

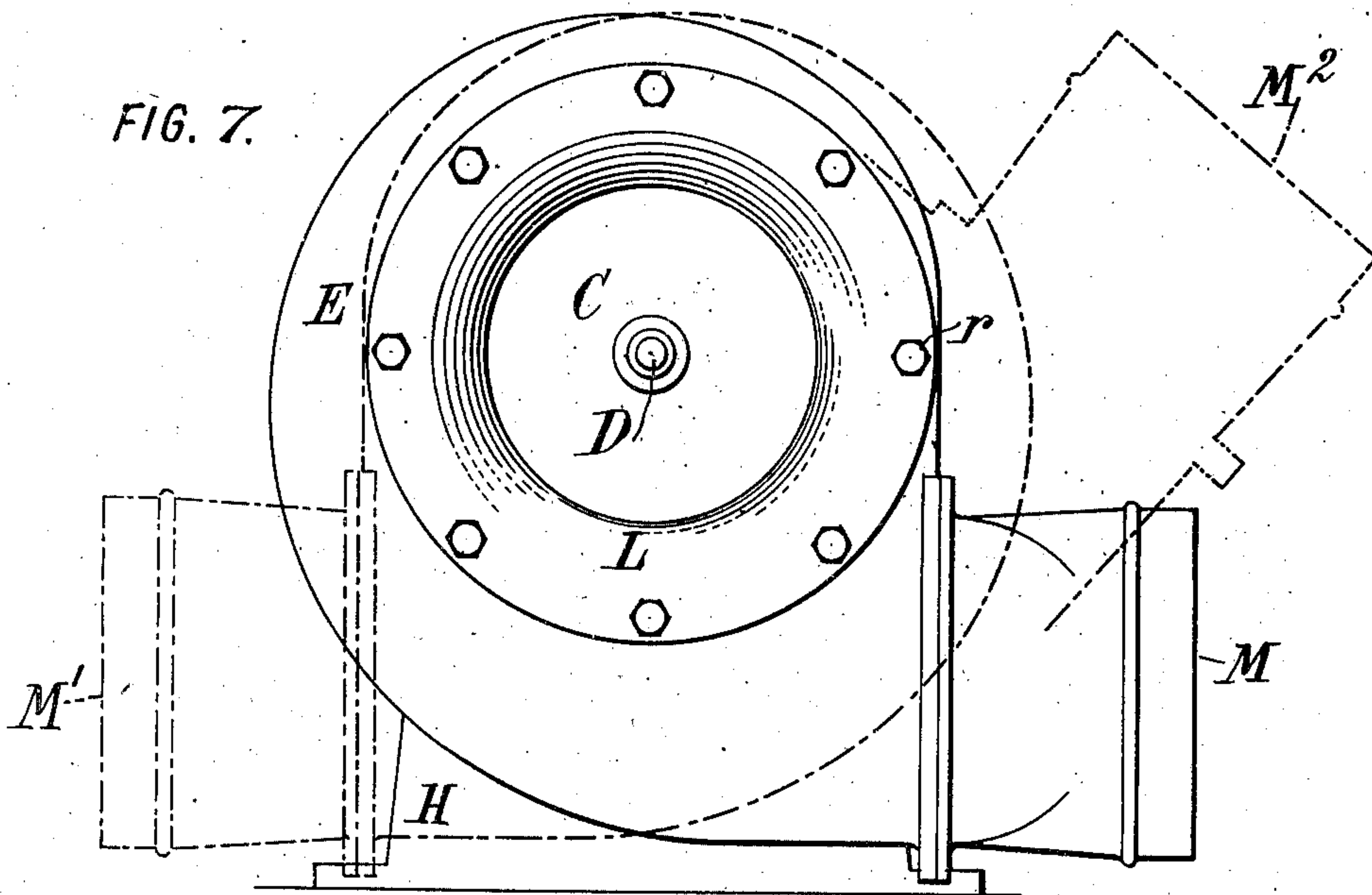


FIG. 8.

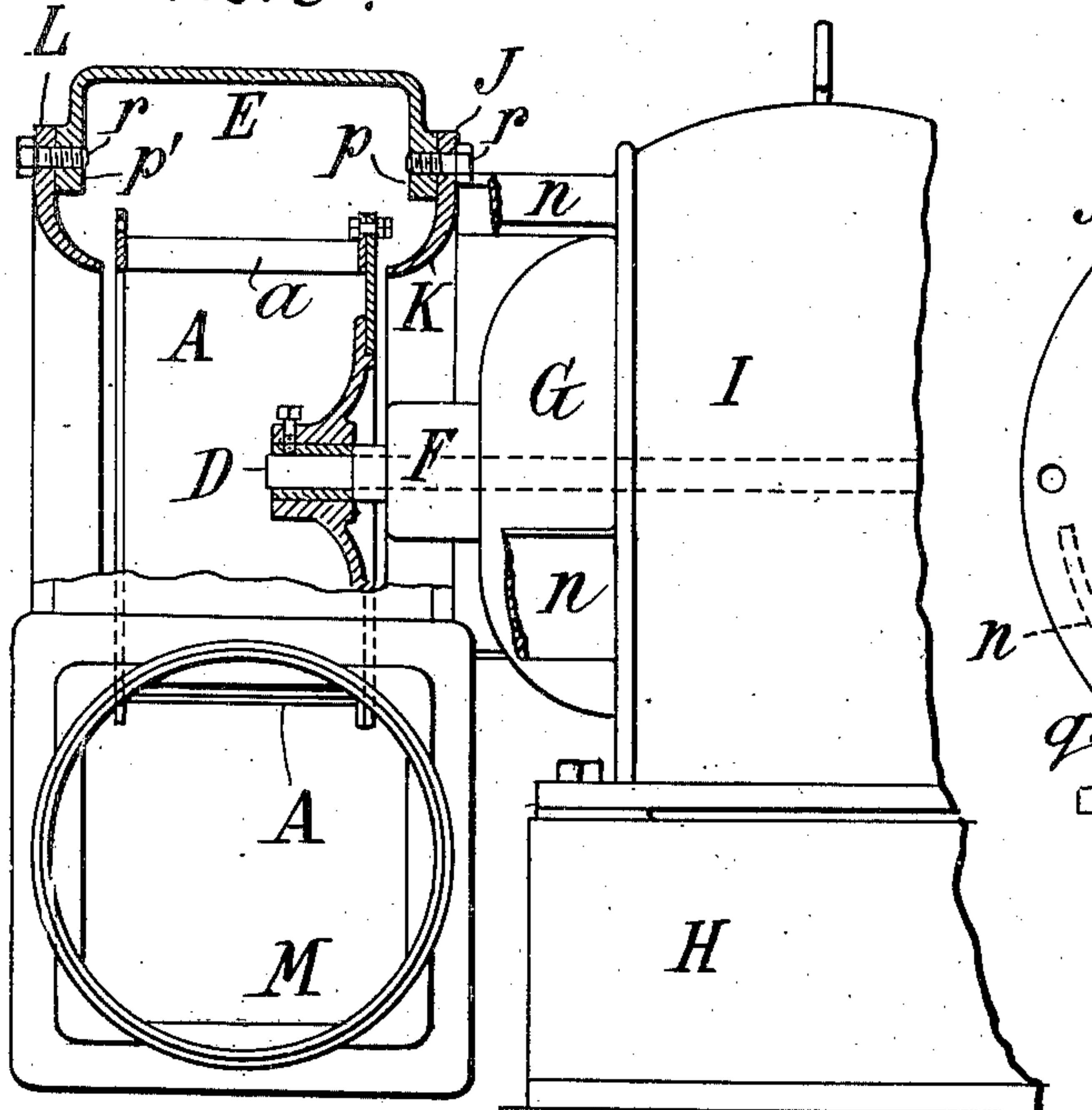
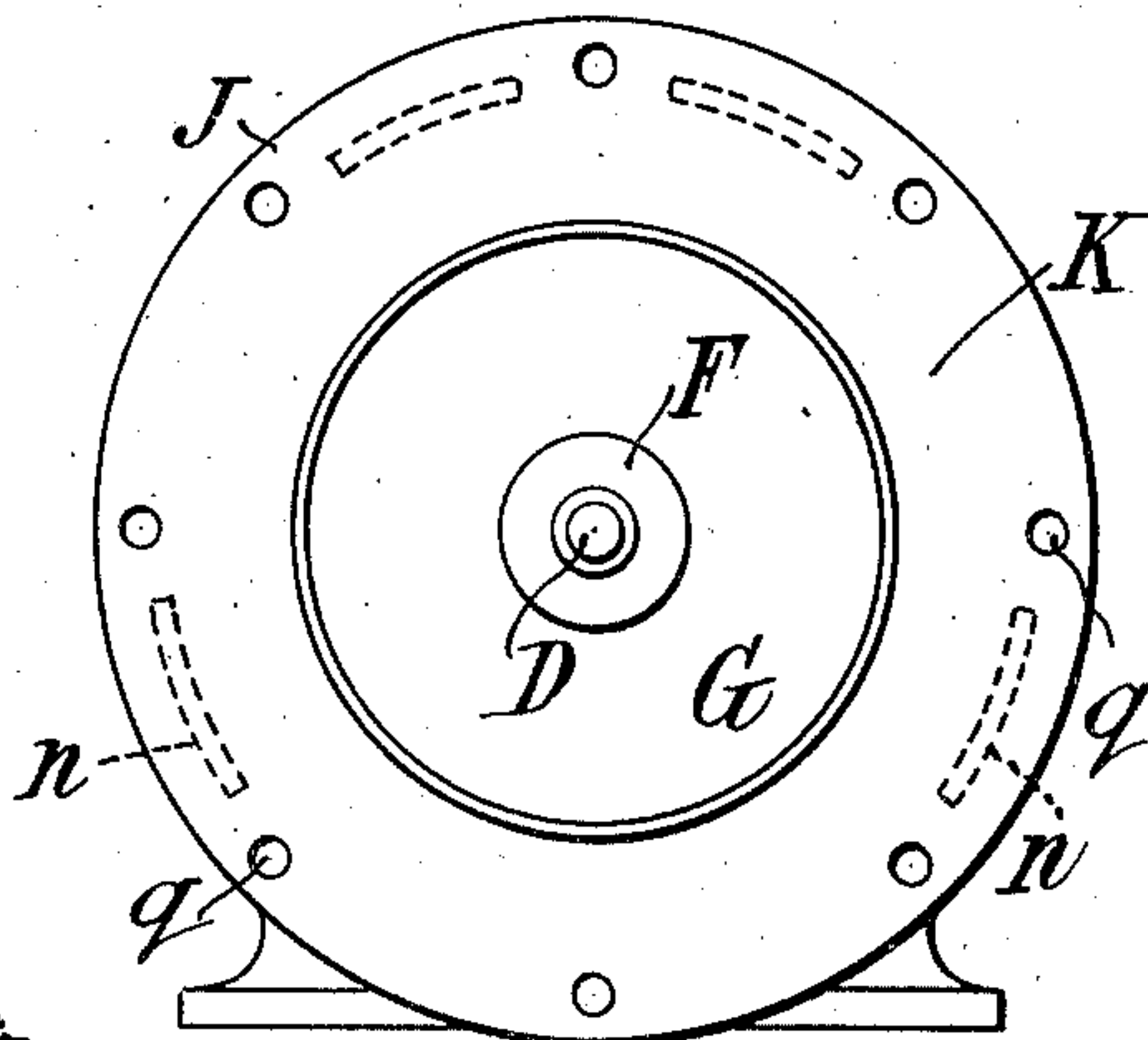


FIG. 9.



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CENTRIFUGAL FAN OR PUMP.

976,795.

Specification of Letters Patent.

Patented Nov. 22, 1910.

Application filed March 10, 1908. Serial No. 420,179.

To all whom it may concern:

Be it known that I, ARTHUR C. FRASER, a citizen of the United States, residing in the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Centrifugal Fans or Pumps, of which the following is a specification.

This invention relates to centrifugal fans, blowers, pumps, etc., of the multi-blade drum type. Examples of centrifugal fans of this type are found in sundry patents of S. C. Davidson, notably No. 662,395, dated November 27, 1900.

The object of the present invention is to construct the rotary member (variously called the wheel, runner, or rotor) of such fans or pumps so that it may be reversible, that is to say so that it may be driven in either right or left hand direction, that is, either clockwise or counter-clockwise.

In said Patent No. 662,395, there is shown in Figure 13 a form of rotary drum with radial blades (see also Patent No. 662,396); a drum of this construction is revoluble in either direction, being thus applicable to either a right-hand or left-hand casing. The more efficient constructions, however, are those shown in the remaining figures of said Patent No. 662,395, wherein the outer edges of the blades are turned in the direction of rotation, the blades being preferably curved with their outer edges having a lead over their inner edges; a rotor thus constructed is adapted to turn in only one direction, so that for example if built for a right-hand casing it is inapplicable to a left-hand casing. For some purposes it is desirable that the rotor be readily reversible; and in any event it is desirable that like rotors be readily applicable to either right-hand or left-hand casings. To suitably attain these results is the principal object of the present invention.

According to this invention, instead of constructing the rotor with its blades and supporting disk directly and permanently united as heretofore, I construct the drum with two rings, preferably precise counterparts, with the numerous blades permanently fastened between them, and I provide for attaching either ring to the supporting disk so that the drum is reversible relatively to the disk, and may be turned end for end according to the direction in which

it is destined to rotate, the ring thus turned toward the disk being then securely attached thereto. The attaching means consists preferably of rivets or bolts passing through coinciding holes in the ring and disk; by making the holes in each ring to precisely coincide with the holes in the disk, the drum may be turned in either direction and by bringing the respective holes into coincidence, the fastenings may be put through them and the ring and disk thereby united. If it becomes necessary to reverse a rotor thus constructed, it is only necessary to remove the bolts or cut the rivets uniting the drum to the disk, remove the drum and turn it end for end, and reunite its opposite ring to the disk.

In the accompanying drawings, Fig. 1 is a diametrical section of a centrifugal rotor constructed according to my invention; Fig. 2 is a fragmentary end elevation thereof partly in section, the rotor being mounted for left hand (or counter-clockwise) rotation; Fig. 3 is a fragmentary end elevation showing the same drum oppositely mounted, that is, for clockwise rotation; Fig. 4 is an enlarged fragmentary view showing the construction of the blades, ring, disk and fastening; Fig. 5 is a similar view to Fig. 1, but showing a modified construction, and showing the drum partly separated from the disk; Fig. 6 is a fragmentary view corresponding to Fig. 4 but showing the construction of Fig. 5; Fig. 7 is an elevation of a reversible fan casing, of which Fig. 8 is a side elevation partly in vertical section; and Fig. 9 is an elevation of the supporting frame.

Referring first to Figs. 1 to 6 inclusive, let A designate the centrifugal rotor as a whole comprising the drum B and the disk C, which latter has a hub C' and is mounted on the driving shaft D in the usual manner. The drum B comprises the numerous blades *a a* (usually 48 to 64 in number), and rings *b b* between which said blades are fastened. This fastening is essentially permanent, being best made by turning in ears *c* from the ends of the blades and uniting them by rivets *d* to the rings *b* (Fig. 4). The disk C has fastening holes *e* at suitable intervals, preferably equidistant. The rings *b b* have coinciding holes *e'*.

The drum being turned in either direction so that either ring *b* is against the disk

C, the fastening devices are put through the coinciding holes $e e'$. These may be rivets as shown at f , or bolts as shown at g , or may be any other suitable fastening.

5 The disk C may be cast in one piece with its hub C' as shown in Figs. 1 and 2, or they may be made in separate pieces fastened together as shown in Fig. 5. The disk C may have an annular shoulder or offset as shown at h in Figs. 1 and 2 engaging and centering the adjoining disk b , or this may be omitted. The rings $b b$ may project inwardly beyond the inner edges of the blades, as shown in Figs. 1, 2 and 4, or may project outwardly beyond the blades as shown in Figs. 5 and 6. The holes and the fastening devices may be located partly between the blades as shown; these fastenings may be mainly within the series of blades as shown in Figs. 1, 2 and 4, or mainly exterior thereto as shown in Figs. 5 and 6.

The drum B of this invention is essentially alike at opposite ends, and is preferably symmetrical except for the cross-sectional conformation of the blades. The blades are alike at their opposite ends, and the spaces or ports between the blades are preferably closed at both ends.

To make the reversible centrifugal rotor which forms the leading feature of this invention fully available, it is desirable to provide a reversible casing therefor. A suitable construction of such casing is shown in Figs. 7, 8 and 9. The rotor A shown in these figures is specifically of the construction shown in Figs. 5 and 6. Its shaft D turns in a bearing F formed on a bearing frame G and suitably supported in any desirable manner, as for example upon a base or pedestal H. The casing E, which in this instance is shown as a one-piece casting, is fastened to and supported by a frame J, which also is mounted upon any suitable support such as a pedestal H, and which is fixedly united to the bearing frame G, either by being formed integrally therewith or by being bolted thereto. In the construction shown the supporting frame J is fastened to the main shell or field magnet casting I of an electro-motor which is mounted upon the pedestal H, but any other driving means may be substituted.

The frame J is formed preferably with an annular portion or ring K, which in the construction shown is supported by cross pieces $n n$ at intervals so as to leave an open space for admitting air to the bearings, for the purpose set forth in the patent of S. C. Davidson, No. 681,389 of August 27, 1901. The ring K is made concentric with the axis of rotation, and is constructed to fit a rear flange p formed on the casing E. The casing is made alike on both its front and rear sides, so that its front side has a like flange p' . Against this front flange is fastened a

ring L, which is flanged or bent inwardly to form a contracting mouth or throat for the admission opening or eye of the fan. The rings K and L are preferably substantial counterparts of one another, and both these rings and both the flanges $p p'$ of the casing are formed with interchangeable fastening means by which either flange of the casing may be attached to either ring. The fastening means shown consists of the usual tap-screws which enter coinciding holes in the respective flanges and rings. These holes are preferably equidistant, eight holes q being shown in the ring K (Fig. 9) and eight screws or bolts r being shown in Fig. 7. This construction permits the parts to be so assembled that the casing shall have its outlet or discharge M turned either to the right as shown in full lines in Fig. 7, or to the left as shown in dotted lines at M'. Or when assembled in either position, that is for either right or left discharge, the casing may be disconnected and reassembled in the contrary position.

The described construction in connection with the reversible rotor first described, thus enables any given fan built or assembled for right-hand discharge, to be easily changed at will to left-hand discharge, or vice versa. The described construction of casing also enables the discharge outlet to be directed horizontally, vertically, or at intermediate angles for either right or left discharge. This is accomplished by turning the casing rotatively to the desired angle and until the respective holes coincide, and then passing the fastening bolts through such holes. By the use of eight holes and bolts as shown, the casing may thus be turned for either horizontal bottom or horizontal top discharge, and either vertical upcast or vertical downcast discharge, that is to say to four different positions, and also to the intermediate positions discharging at angles of 45 degrees. As an illustration, one of these latter angles is indicated in dotted lines at M² at the right in Fig. 7. Thus the present construction of casing admits of the same adjustability in direction of discharge as is provided for by the construction set forth in said Davidson Patent No. 681,389, this function being additional to the reversibility of the casing to adapt it for a right-hand or left-hand rotor.

While it is desirable that the ring K should be a counterpart of the ring L, and that it should be supported by arms n so as to permit free admission of air to the bearing F, yet these features are not essential.

The invention is susceptible of various modifications and changes other than those set forth specifically.

Nothing is claimed in the present application which is contained in any of the patents of S. C. Davidson hereinbefore referred

to, or any other patents granted to or applied for by him relating to centrifugal fans or pumps.

I claim as my invention:—

5 1. In a centrifugal fan or pump of the multiblade drum type, the combination with a single inlet casing of a rotor comprising an end support and a reversible drum formed with two substantially like rings
10 with numerous curved blades fastened between them, said blades arranged to inclose a large intake chamber, and said drum being adapted for attachment at either end to
15 said support for driving to either right or left.

2. In a centrifugal fan or pump of the multiblade drum type, the combination with a single inlet casing of a rotor comprising a single supporting disk opposite said inlet
20 and a reversible drum formed with two substantially like rings with numerous curved blades fastened between them, said blades arranged to inclose a large intake chamber, and attaching means adapted for the attach-

ment of either of said rings to said disk for 25 driving to either right or left.

3. In a centrifugal fan or pump of the multiblade drum type, the combination with a single inlet casing of a rotor comprising a single supporting disk opposite said inlet 30 and a reversible drum formed with two like rings with numerous curved blades fastened between them, said blades arranged to inclose a large intake chamber and having their outer edges turned forward, said rings 35 having holes coinciding with holes in said disk, and fastenings engaging said holes to unite either ring to the disk whereby the drum is adapted for attachment at either end to said disk for driving to either right 40 or left.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

ARTHUR C. FRASER.

Witnesses:

DOMINGO A. USINA,
FRED. WHITE.