

Feb. 14, 1933.

A. S. HOWELL

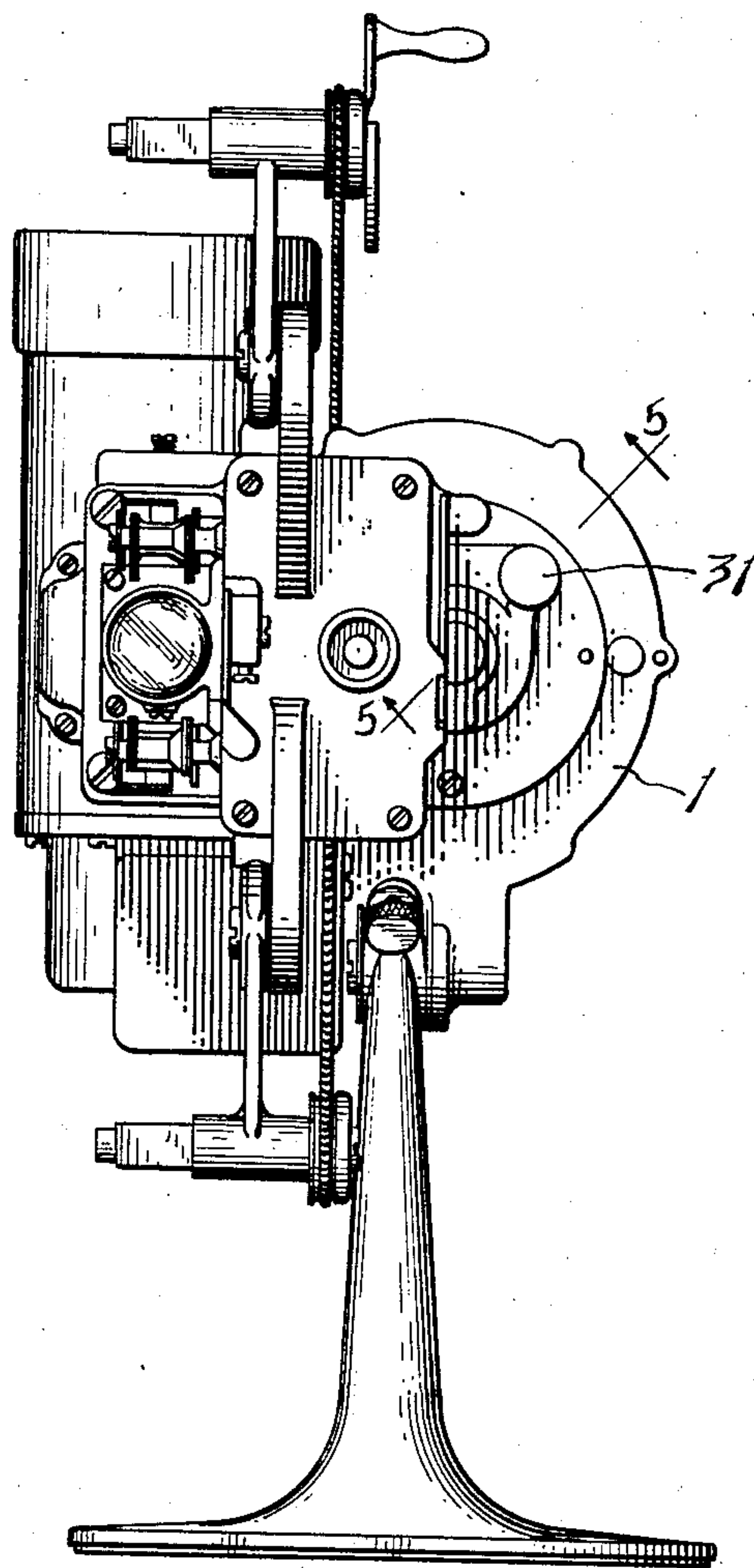
1,897,947

FAN STRUCTURE

Filed Nov. 10, 1928

3 Sheets-Sheet 1

Fig-1



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Fig-2

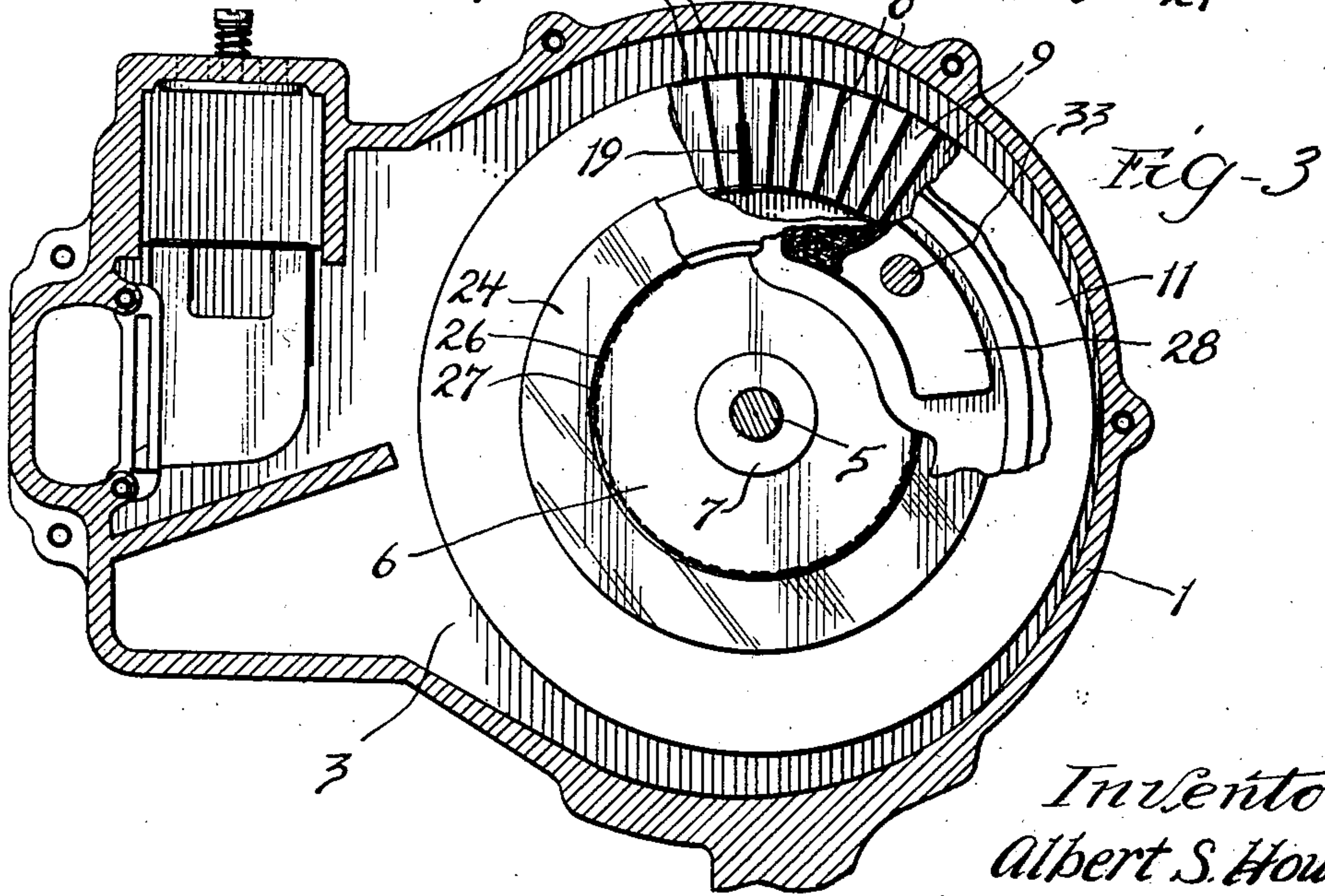
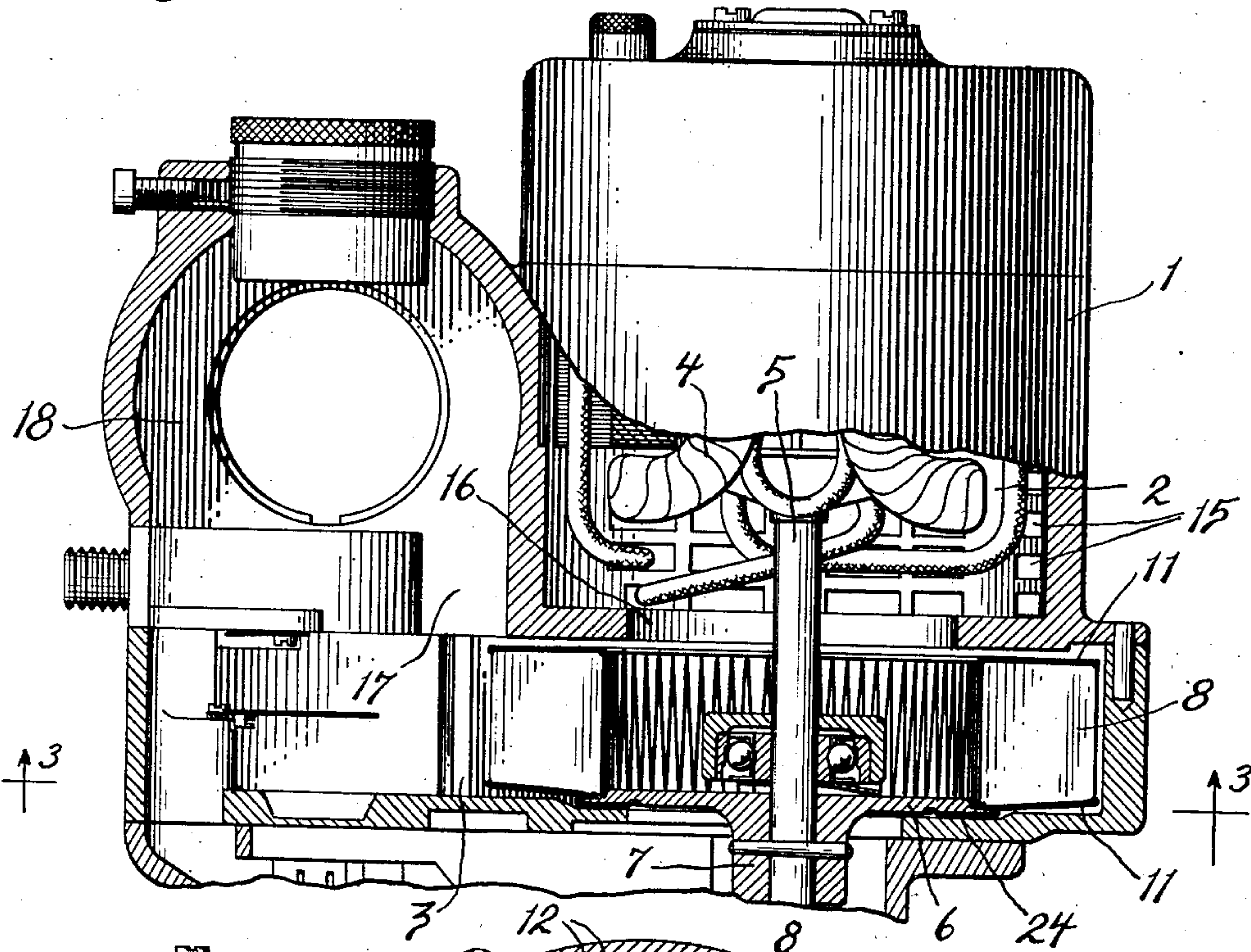


Fig-3

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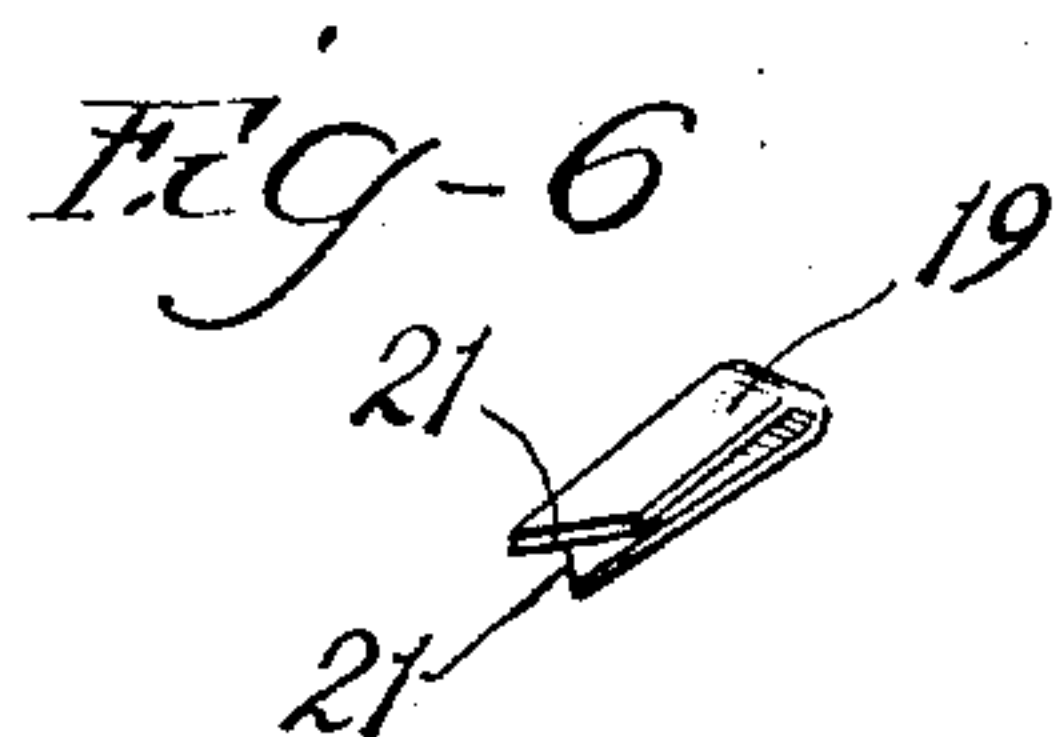
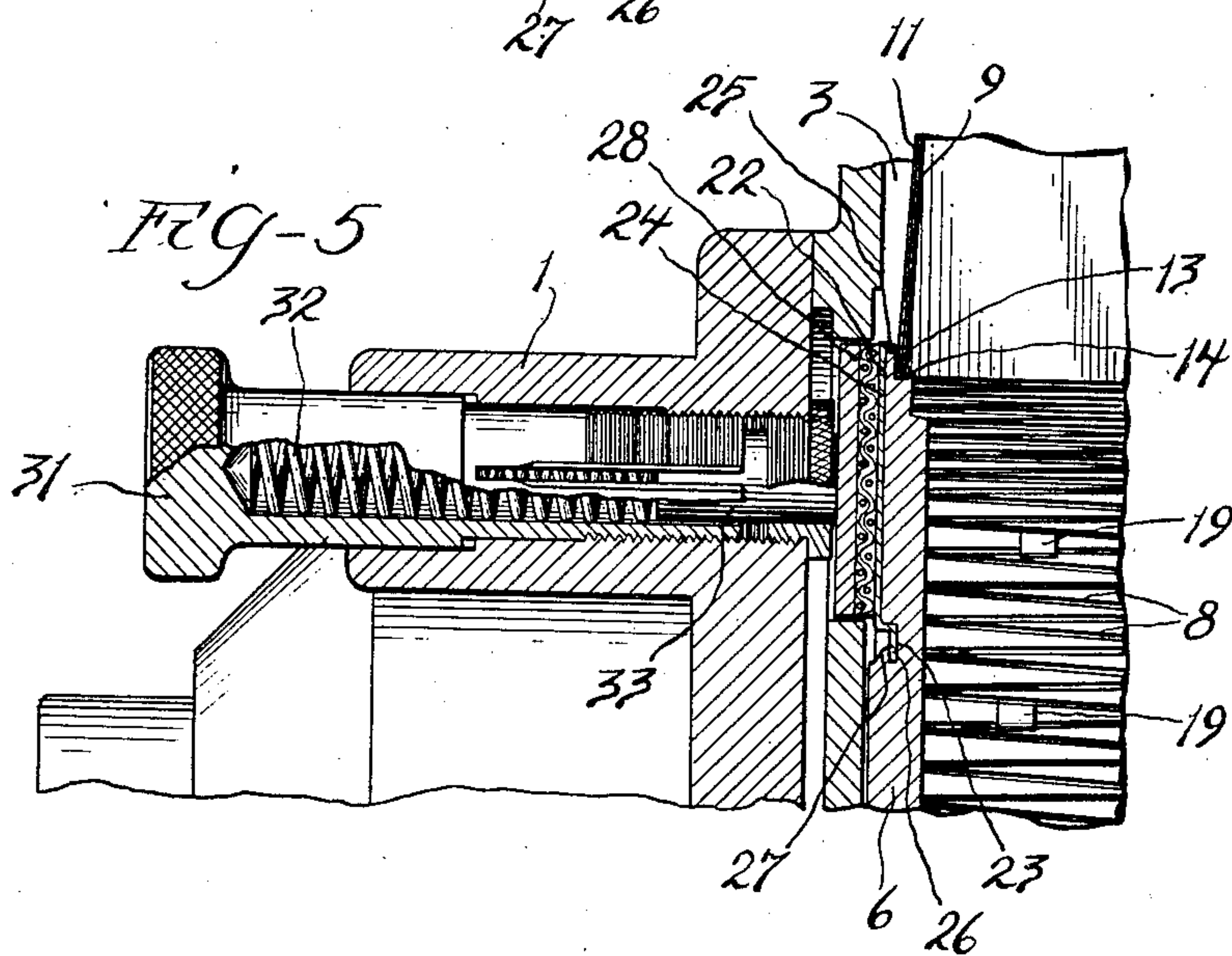
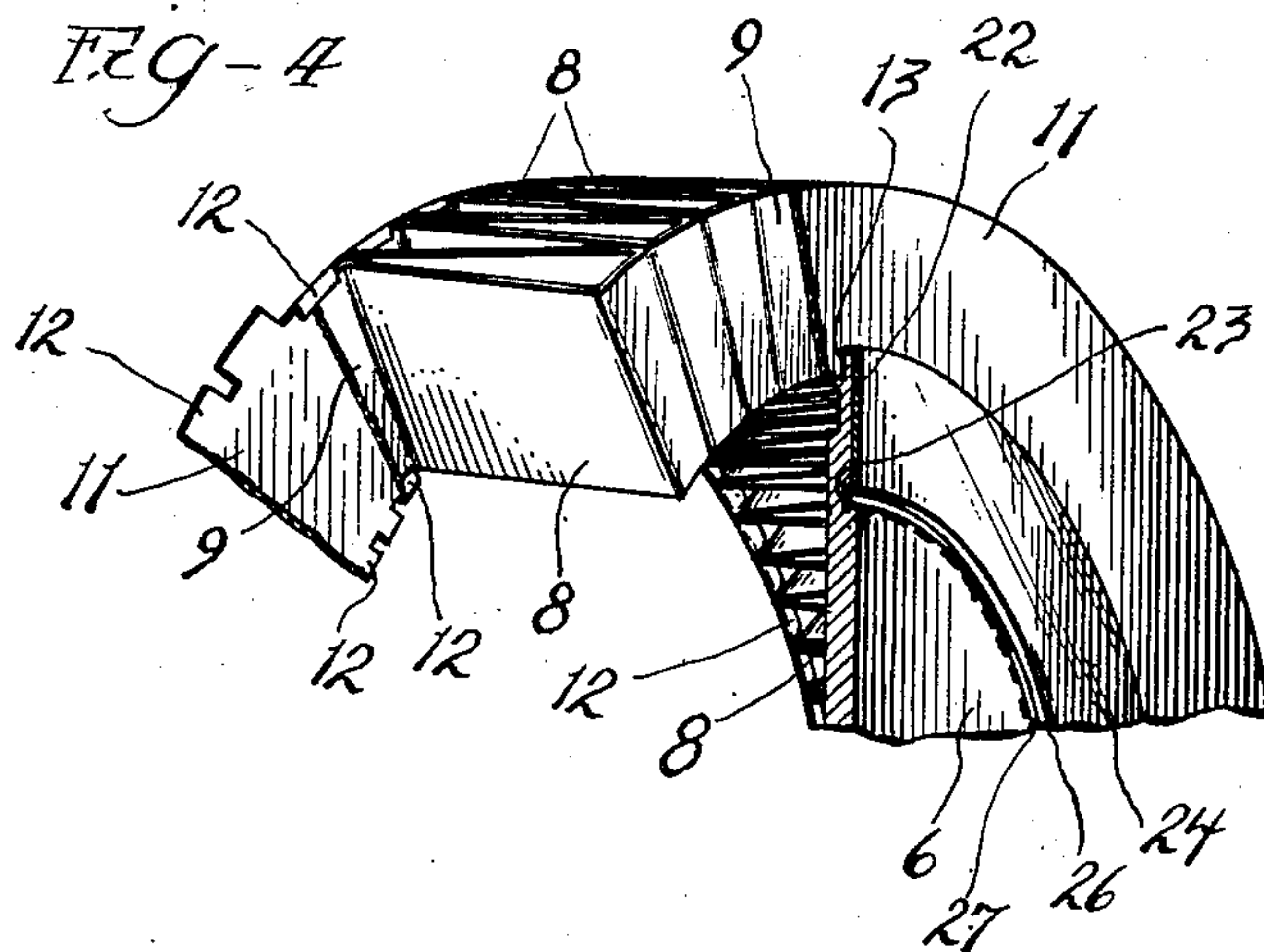
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FAN STRUCTURE

Filed Nov. 10, 1928

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

ALBERT S. HOWELL, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE BELL & HOWELL COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

FAN STRUCTURE

Application filed November 10, 1928. Serial No. 313,460.

My invention has particular relation to centrifugal fans such as are used in motion picture projecting machines although not limited to this use alone.

5 The main object of the invention resides in the provision of an effective fan structure, the impelling structure of which is formed of suitable sheet material, such as sheet metal, all with a view toward lightness, 10 uniformity and adaptability to quantity production, and which causes comparatively little noise in operation and which is adapted for use on motion picture projecting machines for cooling purposes.

15 With this object in view my invention consists in certain features of novelty in the construction, combination and arrangement of parts by which the said object and certain other objects, hereinafter appearing, are effected, all as fully described with reference 20 to the accompanying drawings and more particularly pointed out in the appended claims.

In the said drawings:—

25 Figure 1 is a front elevation of a motion picture projecting machine embodying my invention;

Figure 2 is an enlarged partial plan view of the same with parts broken away and shown in section;

30 Figure 3 is a section on the line 3—3 of Figure 2 with parts broken away;

Figure 4 is a partial perspective view of the fan structure of my invention with parts broken away and in section;

35 Figure 5 is an enlarged partial section on the line 5—5 of Figure 1; and

Figure 6 is a perspective view of one of the balancing elements of my invention.

40 Like characters of reference indicate like parts in the several views.

45 In the said drawings, 1 designates a composite frame which forms a motor chamber 2 and a fan chamber 3 disposed in a vertical transverse plane in front of the motor chamber. See Figures 1, 2 and 3.

50 An electric motor 4 is arranged within the motor chamber 2 on a forwardly and rearwardly extending axis, and the motor shaft 5 extends forwardly therefrom through the fan chamber 3. See Figure 2.

Secured on the motor shaft 5 and disposed at the front side of the fan chamber 3 is a carrier member 6 of disk formation provided with a centrally bored and bossed portion 7 by means of which it is secured on the motor 55 shaft.

Mounted on the carrier member 6 is the fan assembly of my invention which will now be described. See Figures 2, 3, 4 and 5.

60 A strip of material, such as sheet metal, is bent at intervals therealong substantially on radii of the axis of the fan to form alternate impelling blades 8 and spacing portions 9 arranged about the axis of the fan with sets of alternate spacing portions 9 disposed on re- 65 spective sides of the blades 8 in adjoining relation. See particularly Figure 4.

70 A pair of annular sheet metal members 11 are disposed at opposite sides of the blades 8 and engage the adjacent sets of alternate spacing portions 9. These annular members 11 are provided with tabs 12 at the inner and outer edges thereof, which tabs are bent about the inner and outer edge portions of the spacing portions 9 to secure the blades 8 75 in assembly in their arrangement about the axis of the fan.

This construction affords lightness and uniformity of the blade structure and permits of a close spacing arrangement for the 80 blades which is conducive to lessening the noise caused by the operation of the fan, and is well adapted for quantity production.

85 In addition, it will be observed that the blades of the fan consist of two sets of alternating blades and that one set thereof is disposed diagonally with respect to the other set transversely of the flow between the blades, and preferably, as shown, each of said first mentioned set extending from the side 90 of one of the second mentioned set to the correspondingly opposite side of the next of said second mentioned set, this arrangement having an effect on the "backwash" to lessen the noise of the fan in operation. 95

100 The carrier member 6 is provided with a peripheral rearwardly facing shoulder 13, and the inner edge portion of one of the annular members 11 is engaged on this shoulder and the carrier member is peaned

over this annular member, as designated at 14, to secure the blade assembly on the carrier member for the driving thereof by the motor 4. See particularly Figure 5.

5 The fan is preferably, as shown, a centrifugal fan, and air is drawn through air openings 15 in the frame 1 into the motor chamber 2 and from there is drawn into the inside of the fan through an opening 16 in a
10 partition wall between the motor chamber 2 and the fan chamber 3. The air is expelled from the periphery of the fan into the fan chamber and is forced out of the fan chamber to perform its functions, such as through a
15 passage 17 into a lamp chamber 18 of the frame 1 where it serves to prevent the lamp chamber and related parts from becoming overheated. See Figure 2.

In order that the fan may be properly
20 balanced the following is provided. Small weights 19 of U-shape, see Figure 6, embrace the inner portion of the proper blades 8 and are clamped thereon, as shown in Figures 3 and 5. These weights are preferably
25 of sheet spring metal which are clamped on the blades by the tension thereof, and the end edges thereof are preferably diagonally disposed in opposite relation, as designated at 21 in Figure 6, to facilitate the engage-
30 ment thereof upon the blades of the fan.

The carrier member 6 has a forwardly facing annular surface 22 adjacent its periphery, the periphery of the carrier member providing a cylindrical surface at the outer
35 edge of this annular surface, and the carrier member being provided with a forwardly facing groove 23 at the inner end of this annular surface. See Figures 3, 4 and 5.

An annular friction member 24 of wear
40 resisting metal, such as steel, overlies the aforementioned annular surface 22 and is provided with a cylindrical flange 25 at its outer edge engaged over the periphery of the member 6 and bent thereagainst. The
45 member 24 is provided at its inner edge with an offset portion 26 engaged in the groove 23 and the inner wall portion of the groove is peened over this offset portion, as designated at 27 in Figure 5.

50 Thus is the friction member 24 securely mounted on the member 6 by means disposed at the inner and outer edges of the member 24 with obvious advantage.

The construction permits of the carrier
55 member 6 being formed of a comparatively soft metal, such as that which is used in the manufacture of die castings, whereby this member may be so formed, thereby further rendering the device conducive to lightness,
60 uniformity and quantity manufacture.

Engaged in a recess in the front wall of the fan chamber 3 is a friction shoe 28, which upon rearward pressure exerted thereon is frictionally engageable with the friction
65 member 24 for the purpose of regulating the

speed of the mechanism. See Figures 3 and 5.

The rearward pressure of the shoe 28 upon the friction member 24 is adjusted for ad-
70 justably controlling the speed of the mechanism by means of a manually actuated screw 31 screwthreaded rearwardly into the frame 1 and operating upon the shoe 28 through a coiled compression spring 32 and a stud 33.
75 See Figures 1 and 5.

While I have described and shown the preferred embodiment of my invention I do not wish to be limited to the precise details of construction as changes may readily be made without departing from the spirit of
80 my invention, but having thus described my invention, I claim as new and desire to secure by Letters Patent the following:

1. In a fan the combination of a strip of material bent at spaced intervals therealong
85 substantially on radii of the axis of the fan to form impelling blades arranged about the axis of the fan, and means for securing said blades in assembly in their said arrangement.

2. In a fan the combination of a strip of material bent at spaced intervals therealong
90 substantially on radii of the axis of the fan to form impelling blades arranged about the axis of the fan and spacing portions therebetween, and means associated with said
95 spacing portions for securing said blades in assembly in their said arrangement.

3. In a fan the combination of a strip of material bent at spaced intervals therealong
100 substantially on radii of the axis of the fan to form alternate impelling blades and spacing portions, and means associated with said spacing portions for securing said blades arranged about the axis of the fan with alter-
105 nate spacing portions adjoining one another.

4. In a centrifugal fan the combination of a strip of material bent at spaced intervals therealong substantially on radii of the axis
110 of the fan to form impelling blades and spacing portions therebetween, and means for securing said blades arranged about the axis of the fan including an annular member engaging said spacing portions disposed at one side of said blades and provided with tabs,
115 at the inner and outer edges thereof, bent about the inner and outer edge portions of these spacing portions.

5. In a centrifugal fan the combination of a strip of material bent at spaced intervals
120 therealong substantially on radii of the axis of the fan to form alternate impelling blades and spacing portions arranged about the axis of the fan with sets of alternate spacing portions disposed on respective sides of said
125 blades in adjoining relation, and a pair of annular members disposed at opposite sides of said blades and engaging the adjacent spacing portions and provided with tabs, at the inner and outer edges thereof, bent about
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the inner and outer edge portions of said spacing portions.

6. In a centrifugal fan the combination of a strip of sheet metal bent at spaced intervals therealong substantially on radii of the axis of the fan to form impelling blades spaced about the axis of the fan, means including an annular sheet metal member at one side of said blades for securing said blades in their said relation, and a revolubly mounted carrier member on which said annular member is secured for the mounting of the blade and annular member assembly on the carrier member.

7. In a centrifugal fan the combination of a strip of sheet metal bent at spaced intervals therealong substantially on radii of the axis of the fan to form impelling blades and spacing portions therebetween, means for securing said blades arranged about the axis of the fan and including an annular member engaging said spacing portions disposed on one side of said blades and provided with tabs, at the inner and outer edges thereof, bent about the inner and outer edge portions of these spacing portions, and a revolubly mounted carrier member provided with a peripheral shoulder engaging the inner edge portion of said annular member and peaned over the same to secure the blade and annular member assembly thereon.

8. In a centrifugal fan the combination of a strip of sheet metal bent at spaced intervals therealong substantially on radii of the axis of the fan to form alternate impelling blades and spacing portions arranged about the axis of the fan with sets of alternate spacing portions disposed on respective sides of said blades in adjoining relation, a pair of annular sheet metal members disposed at opposite sides of said blades and engaging the adjacent spacing portions and provided with tabs, at the inner and outer edges thereof, bent about the inner and outer edge portions of said spacing portions, and a revolubly mounted carrier member provided with a peripheral shoulder engaging the inner edge portion of one of said annular members and peaned over the same to secure the blade and annular member assembly thereon.

In witness whereof I hereunto affix my signature this 15th day of October, 1928.

ALBERT S. HOWELL.

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