

Nov. 11, 1947.

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2,430,523

INLET VANES AND CONTROL

Filed Aug. 24, 1945

4 Sheets-Sheet 1

FIG. 1.

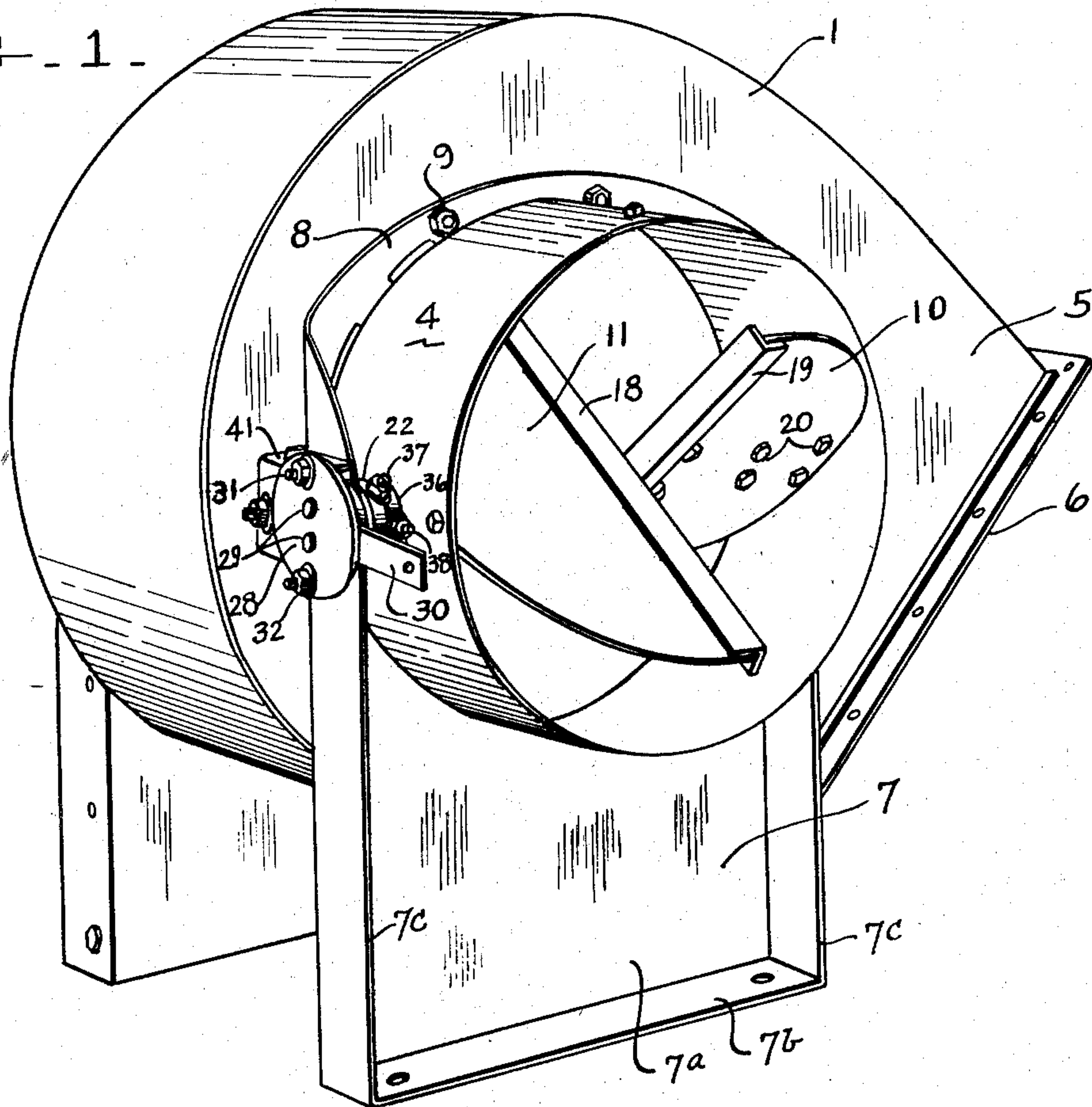
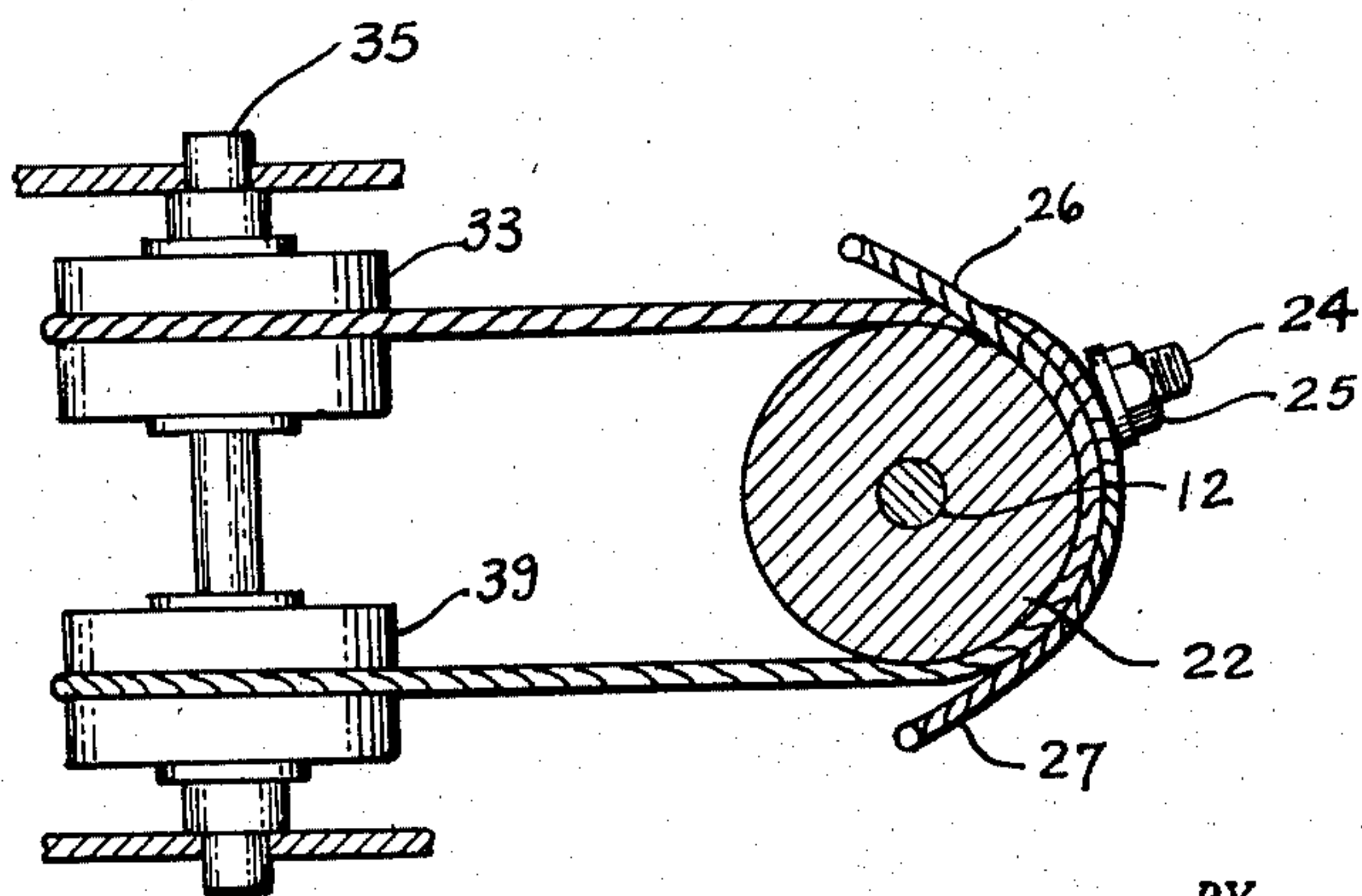


FIG. 2.



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FIG-4-

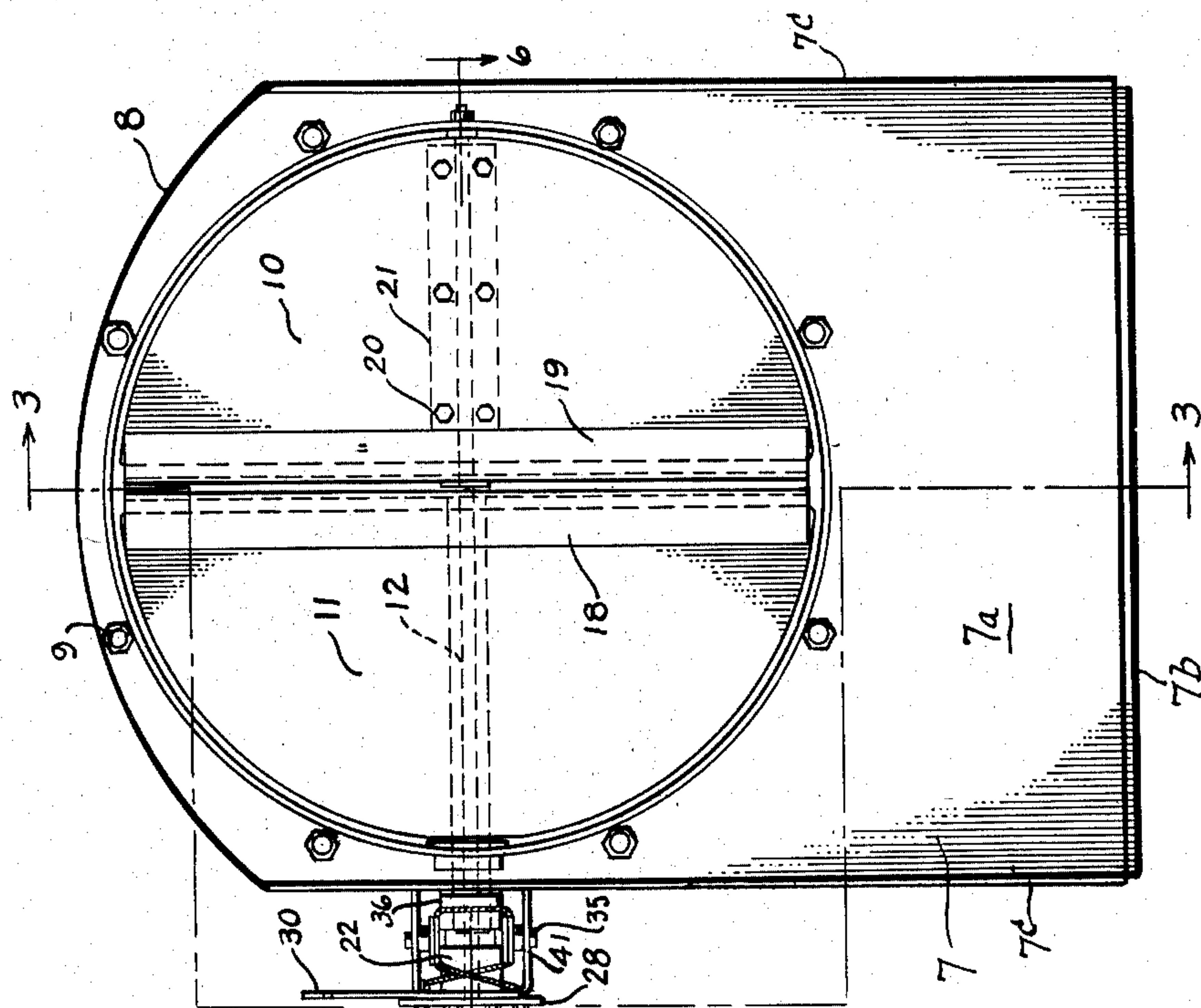
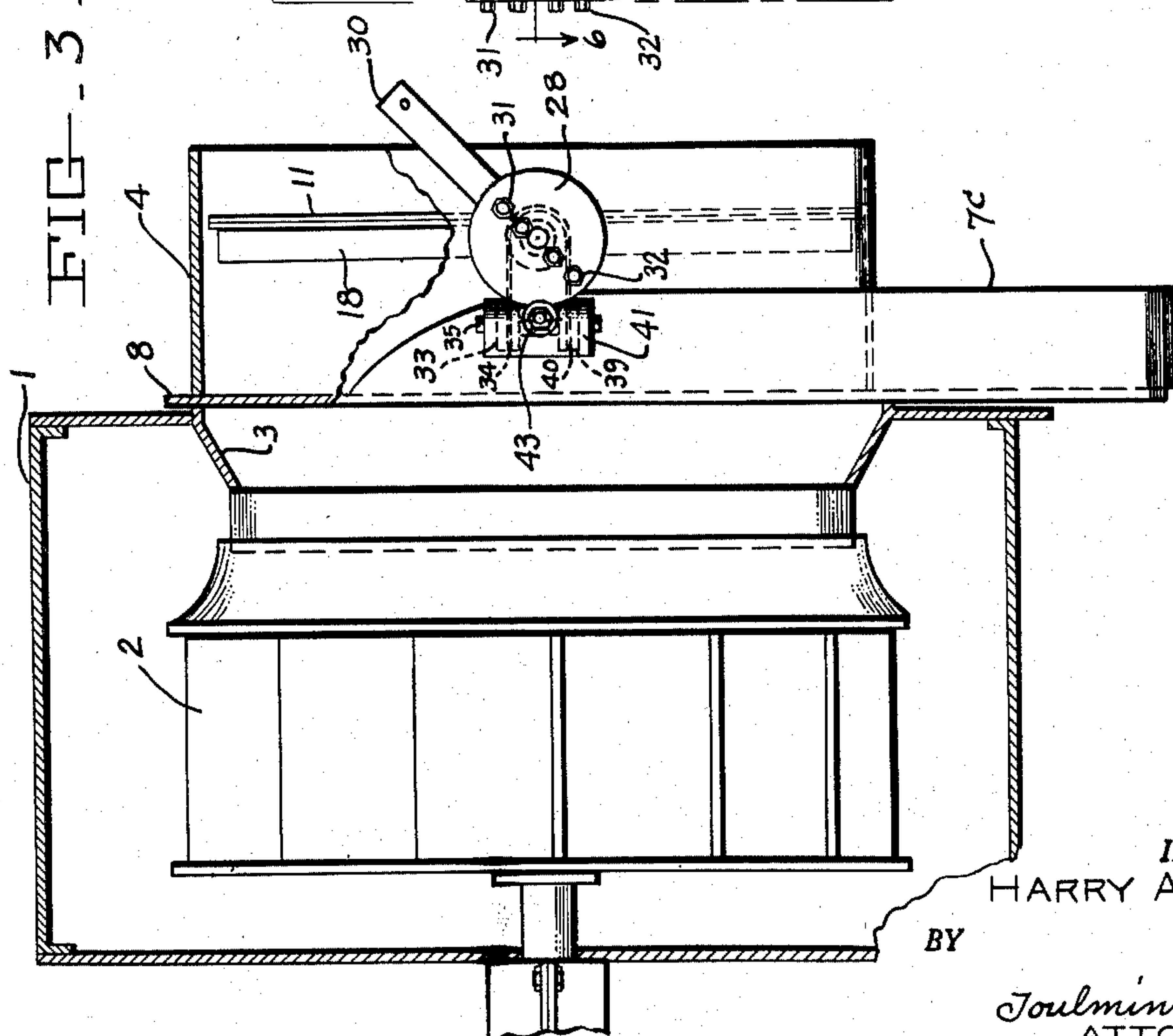


FIG-3-



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FIG-5-

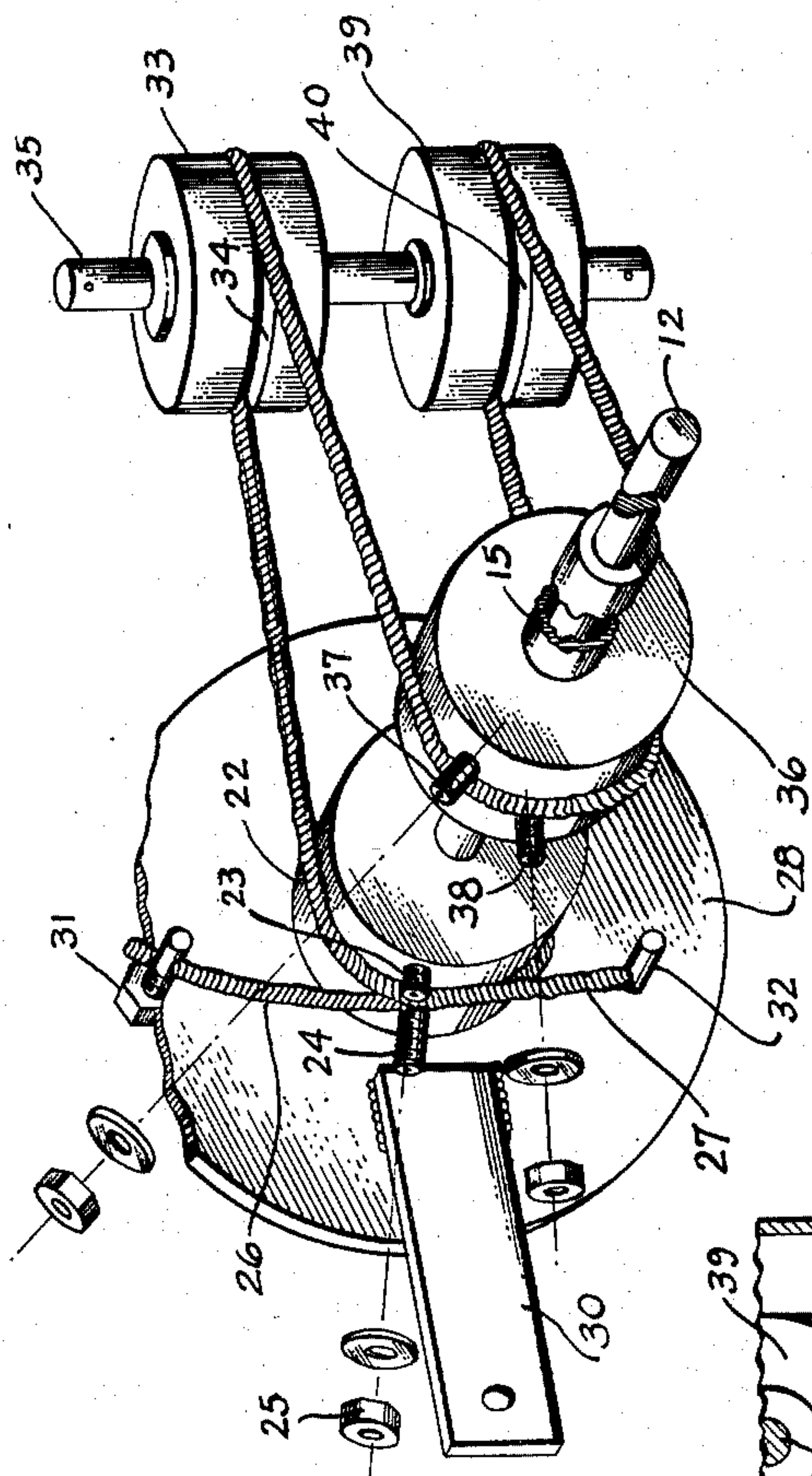
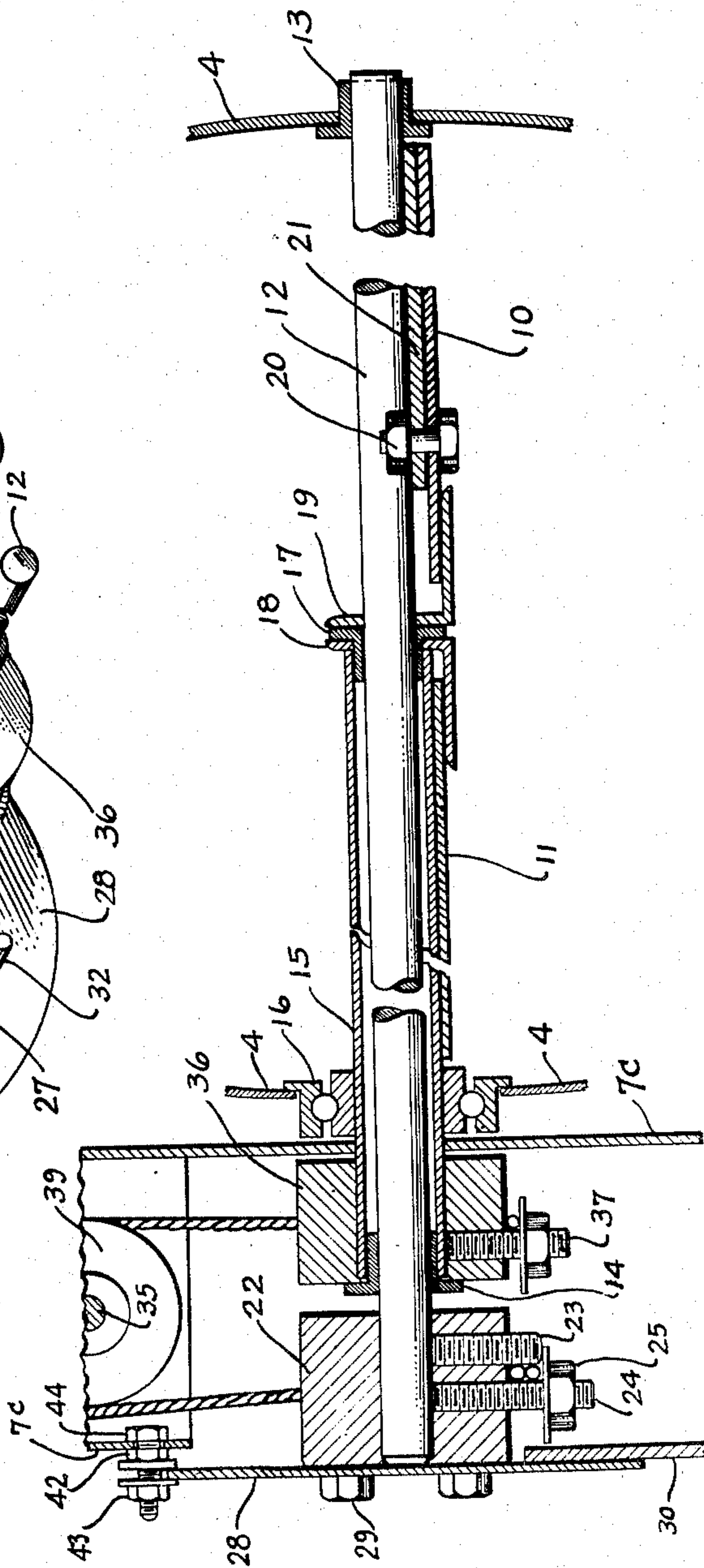


FIG-6-



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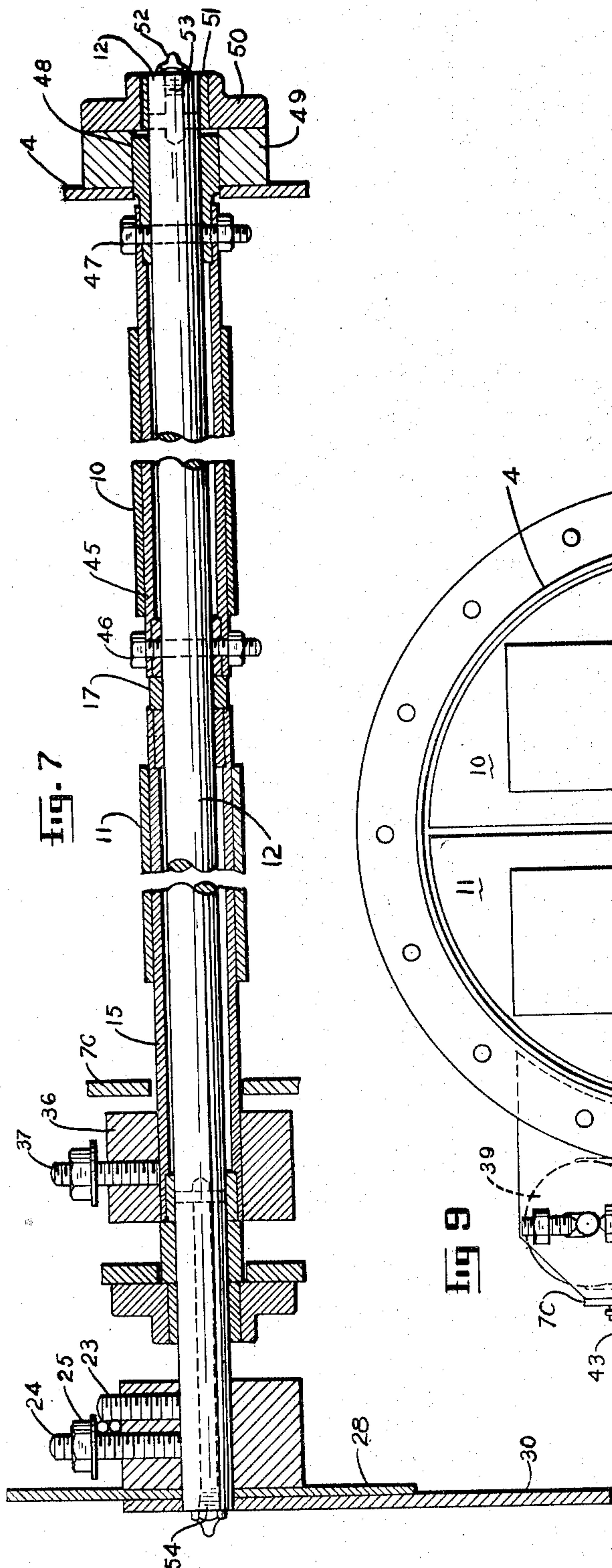
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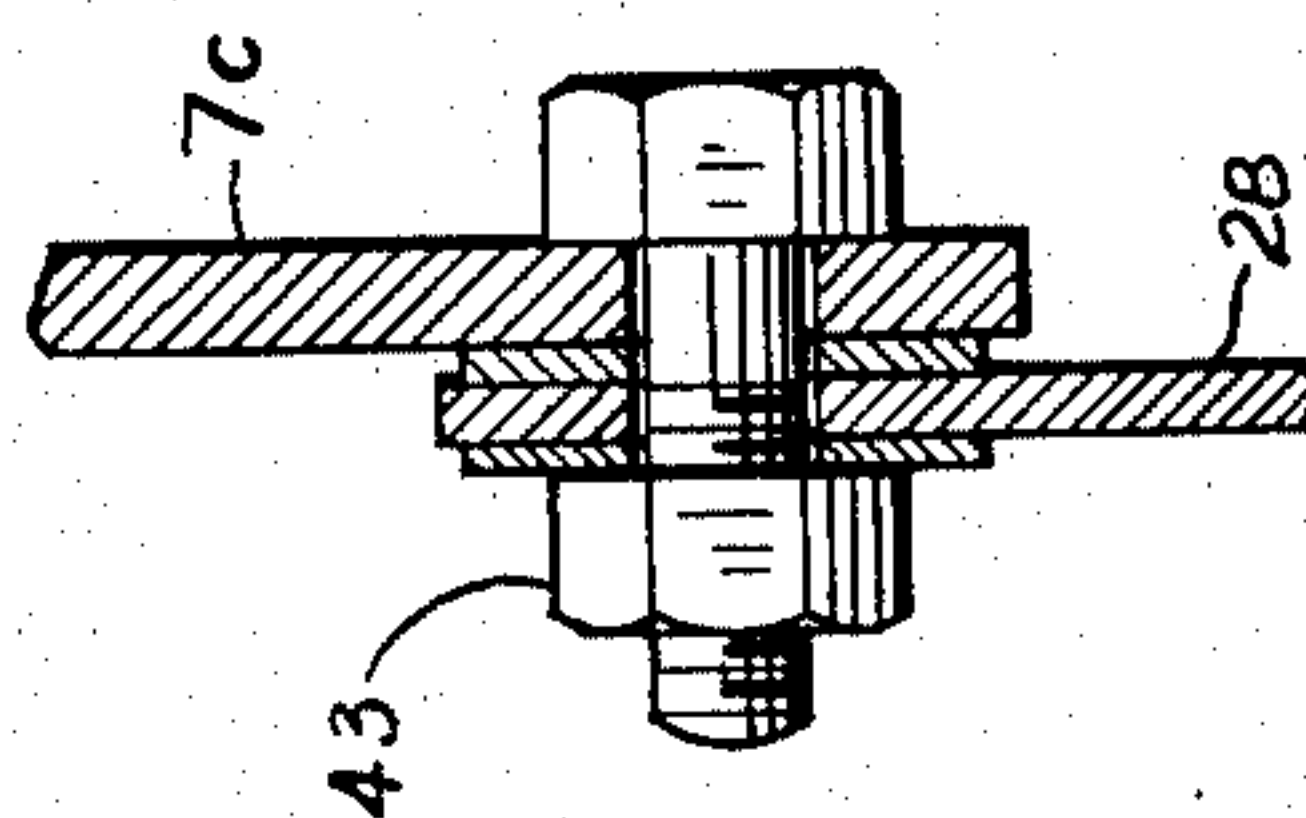
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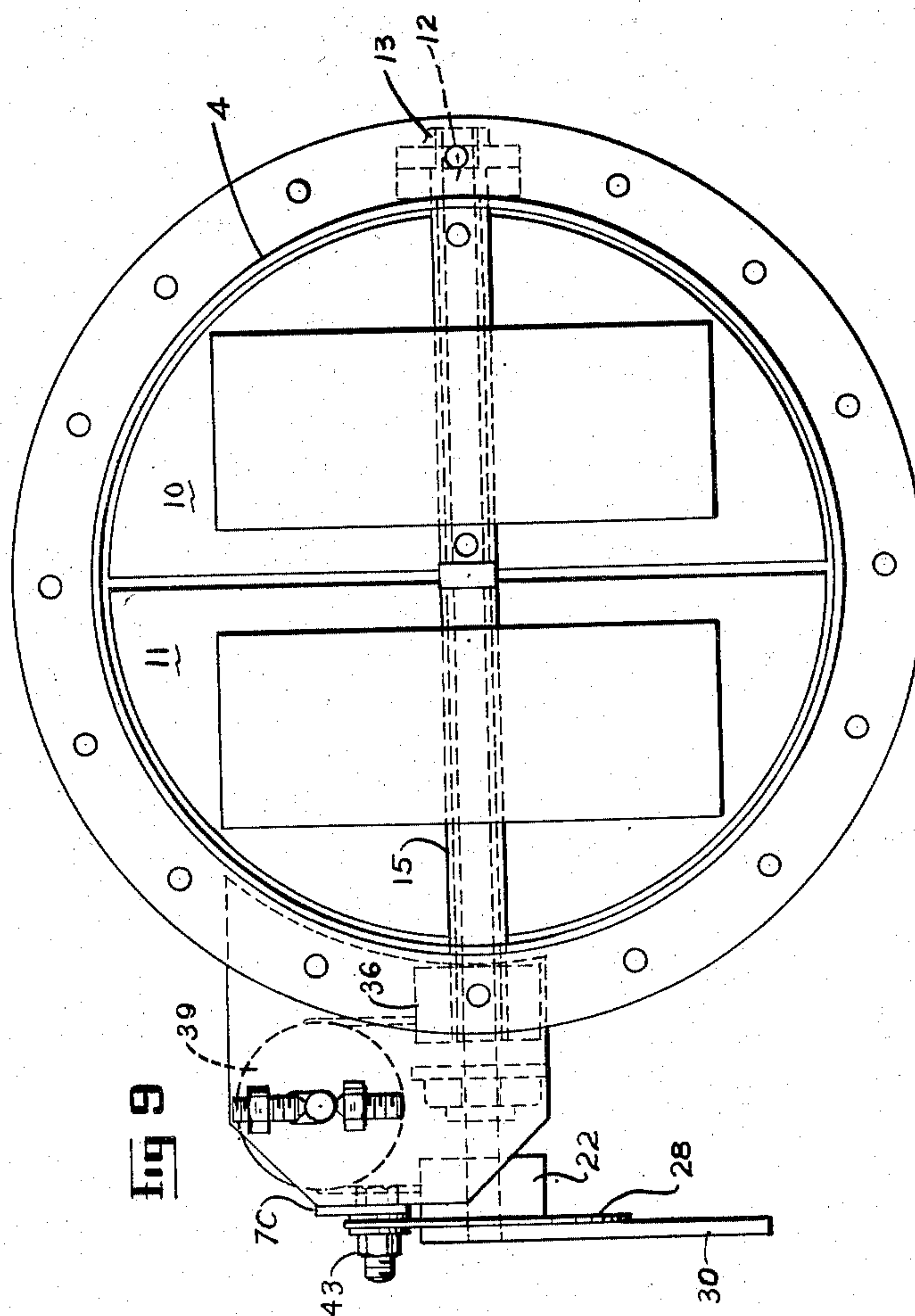
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UNITED STATES PATENT OFFICE

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INLET VANES AND CONTROL

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6 Claims. (Cl. 230-114)

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This invention relates to inlet vanes and controls therefor in connection with fans.

It is the object of this invention to provide, in conjunction with a fan, inlet vanes of simple and effective construction and an equally simple method of controlling and actuating such vanes. These vanes are adapted to restrict the opening and to spin the air to regulate the effect of the fan upon the air so it is possible to use a substantially constant speed motor and to vary the load and the volume of the air delivery according to the requirements of the apparatus.

In particular, it is the object of this invention to provide two guide vanes each of which spans the air inlet substantially 180°; and is actuated upon axes that are normal to the main axis of the fan.

It is a further object to provide means of rotating the two vanes upon their axes consisting of pulleys and a cable. In this manner the chief and effective but very flexible and self adjusting method of operating such vanes is accomplished.

It is an object to provide two air guide vanes adapted to move in opposite directions and angularly disposed from one another to give when desired a spin component to the air entering the fan rotor to control the pressure developed, the volume handled and the power required by the fan in an efficient way.

Referring to the drawings:

Figure 1 is a perspective of the inlet side of a fan showing the inlet vanes adjusted to admit a portion of the air.

Figure 2 is a detail showing a portion of the cable and drum drive for adjusting the vanes.

Figure 3 is a section on the line 3-3 of Figure 4 looking in the direction of the arrows.

Figure 4 is an elevation of the vane and casing showing the vanes in closed position.

Figure 5 is a perspective partially in section showing the arrangement of cables and pulleys for the actuation of the vanes.

Figure 6 is a section on the line 6-6 of Figure 4 looking in the direction of the arrows showing in detail the arrangement for adjustment of the pulleys and cables and the means of transmitting the effect of the movement of the cables and pulleys to the guide vanes.

Figure 7 is a view similar to Figure 6 illustrating a heavier construction for heavier vanes.

Figure 8 illustrates the method of clamping the disk.

Figure 9 is a view similar to Figure 4 illustrating

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ing the vanes and casing of the heavier construction shown in Fig. 7.

Referring to the drawings in detail, 1 designates a scroll case in which is mounted a fan 2 that is provided through the side of the case with an inlet formed by the inlet passageway 3. This inlet of Venturi shape is connected to a vane supporting inlet consisting of the drum 4. The air entering the drum 4 and through the Venturi passageway 3 enters into the eye of the fan 2 and is thence discharged out through the outlet passageway 5 and the outlet opening 6. The fan may be supported in any desired manner as by the side panels or legs 7. In the present invention the exact configuration and shape of these supporting members 7 is of importance as hereinafter described. The support or leg 7 consists of a back plate 7a, a bottom plate 7b and side plates 7c. The upper portion 8 of the back plate is bolted by the bolts 9 to the scroll casing 1. It is interposed between that casing and the inner end of the inlet drum 4. The side plates 7c are utilized for supporting the actuating mechanism for the inlet vanes as hereinafter described. The arrangement for the actuating shaft for the vanes and the actuating mechanism in such a manner that the actuating mechanism is mounted upon and supported by the support 7 and particularly as flange 7c makes for a rigid arrangement but at the same time provides a very simple method of assembling the entire fan combination.

Inlet vanes and inlet vane actuating mechanism

The inlet vanes 10 and 11 are mounted upon the actuating shaft 12 which is supported at one end in a bearing 13 in the drum 4 and the other end in a bearing 14 mounted within a sleeve 15 which in turn is carried by the ball bearing 16 mounted in the other wall or other side of the drum 4. The sleeve 15 is supported at its end within the drum 4 upon a bearing sleeve 17. The bearing sleeve is engaged on one side by the angular flange member 18 mounted on vane 11 and on the other side by the angular flange member 19 mounted on vane 10. Vane 10 is retained upon the shaft 12 by the bolts 20 and retaining plate 21. Vane 11 is mounted upon the sleeve 15 and turns with it. In this manner the two vanes 10 and 11 may turn in opposite directions.

As these two vanes rotate with respect to one another it will be observed that the bearing member 17 acts as a spacer and the two flanges 18 and 19 bear against the bearing member 17 during the course of this relative rotation of the

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vanes 10 and 11. The shaft 12 is provided at its outer end with a drum or pulley 22 and is affixed to the shaft by the set screws 23 and 24. Mounted between the ends of these screws 23 and 24 and retained in position by the nut and washer 25 are the cable ends 26 and 27. 22 becomes a drive pulley to which is attached the disc at 28 by the bolt 29. The disc 28 is provided with a handle 30 and in this manner the disc 28 can be actuated with its drum or pulley 22. The free end of the cable and 26 is mounted in the anchor bolt 31 and the free end of the cable 27 is mounted in the cable anchor bolt 32, both being mounted upon the disc 28. Thus as the disc rotates these cables will be actuated on the actuating drum or pulley 22. The cable passes thence over an idler pulley 33 in the groove 34. This pulley is mounted on a vertically disposed shaft 35. The cable thence passes over the actuating or driving pulley 36 between the guide studs 37 and 38. This pulley 36 is mounted upon the sleeve 15 and turns with it. This results in the actuation of the sleeve 15 and the vane 11 carried with that sleeve. The cable thence passes over the second idler pulley 39 and works in the groove 40 thereof. From that pulley the cable passes back to the drum 22 and thence to its point of anchorage on the disc 28. The shaft 35 is mounted within a bracket 41. This bracket is mounted on the side flange 7c of the leg support 7. The disc 28 travels between the two nuts 42 and 43 mounted upon the stud bolt 44. This maintains several parts in alignment and acts as a guide. The result of this arrangement is that the semi-circular vanes 10 and 11 are adapted to rotate in opposite directions through a common supporting and actuating mechanism. The arrangement provides a cheap, effective and simple mechanism, easy to manufacture, assemble and adjust. The vanes are interchangeable. The operating mechanism can easily be changed from clockwise to counter-clockwise rotation. The vanes 10 and 11 are adapted to control the volume of entering air by the degree of spin imparted to that air. In this manner it is possible to utilize a constant speed motor and vary the pressure, volume and load according to the position of vanes 10 and 11.

It will be understood that different configurations of vanes and different numbers of vanes may be employed although the form shown is the preferred embodiment. It will also be understood that the actuating mechanism may be controlled either remotely or immediately at the fan and by any type of automatic control. It has been found desirable to limit the number of inlet vanes to two and to provide for a means of adjusting them at an angle to one another. In this particular invention these vanes are distinguished from the prior art in that they are so arranged that they are angularly disposed at an angle to one another and that angle is adjustable to a variety of degrees. They are adjusted in opposite directions and not in the same direction as heretofore practiced in the art. In this way a very much closer control is effected on the spin of the air in connection with the desired speed of the fan.

Referring to Figure 7 showing a modification of the support used when heavier vanes are employed, the modified construction involves the use of the sleeve or short tube 45, which is connected by a bolt 46 and a bolt 47 to the shaft 12. The end of the short tube 45 has also connected to it by the bolt 47, a bearing 48 that is carried

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within the flange pad 49 adjacent to the flange 50 mounted on the bearing 51, which in turn is mounted upon the outer end of the shaft 12. The shaft 12 is provided with an Alemite fitting 52 for the introduction of lubricant into the passage 53 to lubricate the end of the shaft 12 and the bearing 51. A similar lubrication system designated 54 is provided at the other end of the shaft.

It will be understood that it is desired to comprehend within this invention and the hereinafter appended claims, such changes and modifications as may be necessary to adapt this invention to various conditions of uses.

Having thus fully described my invention what I claim as new and desire to secure by Letters Patent is:

1. In combination, a scroll case fan, a fan therein, said case having an inlet and outlet opening, a drum mounted adjacent to and forming an extension of said inlet opening, a pair of semi-circular flat vanes pivotally mounted on an axis transverse to said drum, means of actuating said vanes in opposite directions, means of supporting said casing and associated mechanism, said supporting means comprising side panels forming legs and flanges mounted thereon for reinforcing said legs for serving as additional support for actuating mechanism for said vanes.

2. In combination, a fan and fan casing having inlet and outlet openings, means forming a passageway into said inlet opening, semi-circular oppositely disposed and oppositely actuatable vanes mounted therein, cable means adapted to actuate said vanes, means for actuating said cable means, means of supporting said fan comprising oppositely disposed parallel legs having flanges, a portion of said actuating means for said cables being mounted on at least one of said flanges.

3. In combination, a fan and fan casing having inlet and outlet openings, means forming a circular passageway to said inlet opening, a pair of semi-circular vanes mounted therein on an axis diametral of said passageway, a shaft adapted to support said vanes and one thereof being connected to said shaft, a sleeve rotatably mounted on said shaft and connected to the other of said vanes, a cable and pulley system associated with said sleeve and said shaft at one side of said passageway whereby the sleeve and shaft are caused to move in opposite directions, and means for actuating said pulley and cable mechanism.

4. In combination, in a fan having a casing and fan rotor, said casing having an inlet and outlet opening, means associated with said opening for forming an inlet passageway circular in cross section, oppositely disposed semi-circular vanes mounted within said passageway on an axis extending across a diameter of said opening, a shaft for supporting and pivotally mounting said vanes, means of connecting one of said vanes to said shaft, a sleeve rotatably mounted on said shaft and means of connecting the other vane to said sleeve, a first actuating drum mounted on said shaft, a second actuating drum mounted on said sleeve adjacent said first drum, a system of idler pulleys adjacent with said drums, means of actuating one of said drums, and a cable connected at its opposite ends to said actuating means and passing around said drums and said idler pulleys and being connected with said drums whereby the actuation of said cable will cause said vanes to move in opposite directions.

5. In combination, with a fan and inlet pas-

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sageway, a plurality of inlet vanes, a shaft for supporting said vanes, means of connecting one of the vanes to the shaft, a sleeve on said shaft, means of connecting the other vane to said sleeve, equal sized actuating drums adjacently mounted on said shaft and sleeve respectively, an idler shaft and idler pulleys mounted thereon located adjacent to but at right angles to the main shaft, actuating means connected to the drum on said shaft, a cable having its free ends connected to said actuating means and passing around said pulleys and drums and connected with said drums, whereby the movement of said actuating means will move said sleeve and shaft in opposite directions and through equal angles.

6. In combination, a fan, a scroll casing having an outlet opening and also having an inlet opening extending through the side wall thereof, supporting means for said casing comprising oppositely disposed panels extending up along the sides of said casing and having stiffening flanges turned out from the edges thereof; a circular

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drum secured to the panel on the inlet side of said casing and being co-axial with said inlet opening, semi-circular vanes mounted to rotate in opposite directions about an axis extending across a diameter of said drum, means for simultaneously actuating said vanes to effect rotation thereof in opposite directions and through equal angles, said actuating means comprising mechanism supported by one of the flanges on the adjacent supporting panel.

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