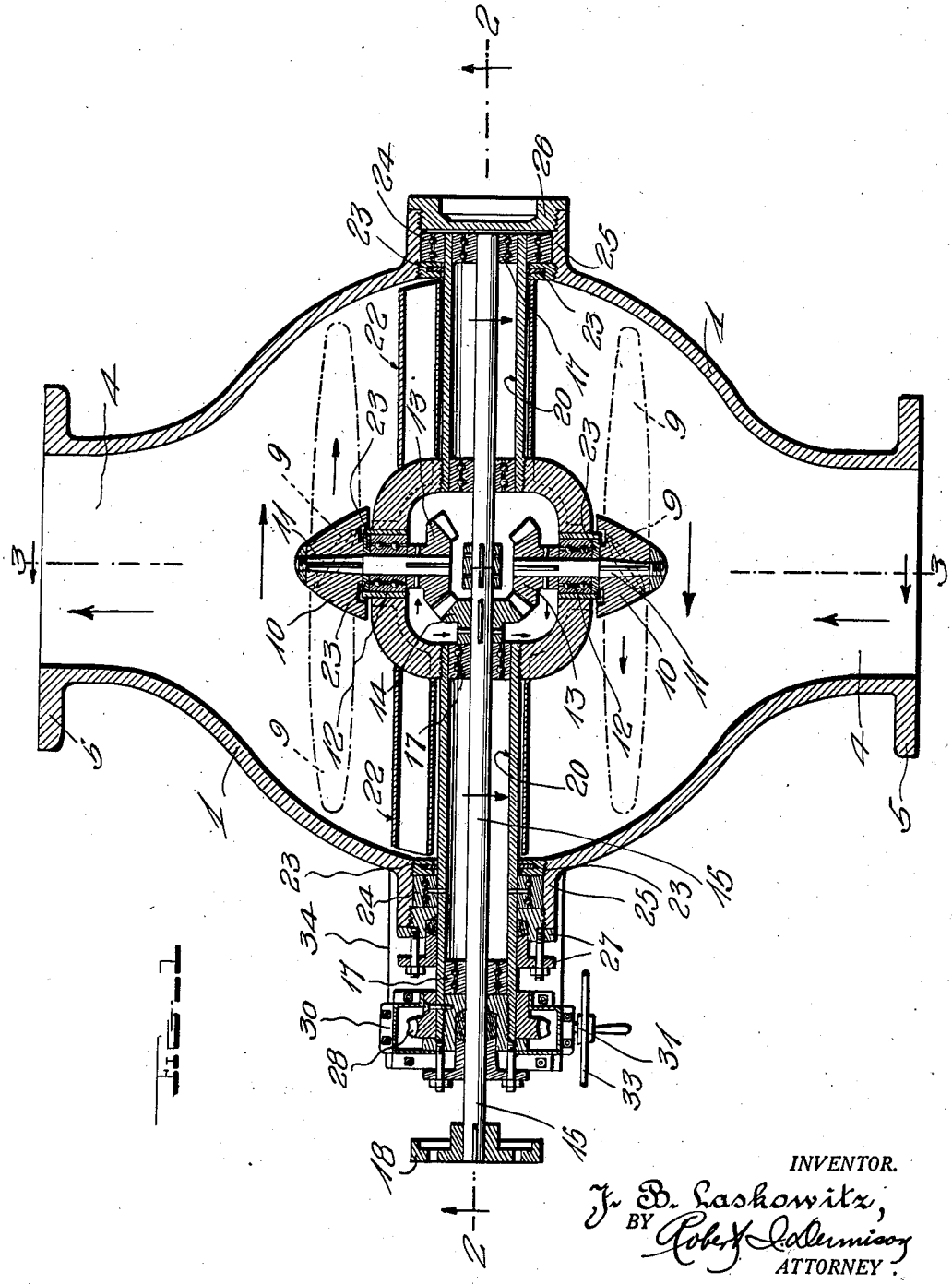
Sept. 4, 1934. I. B. LASKOWITZ 1,972,780

BALANCED VARIABLE DELIVERY PUMP OR BLOWER

Filed Feb. 16, 1931 3 Sheets-Sheet 1

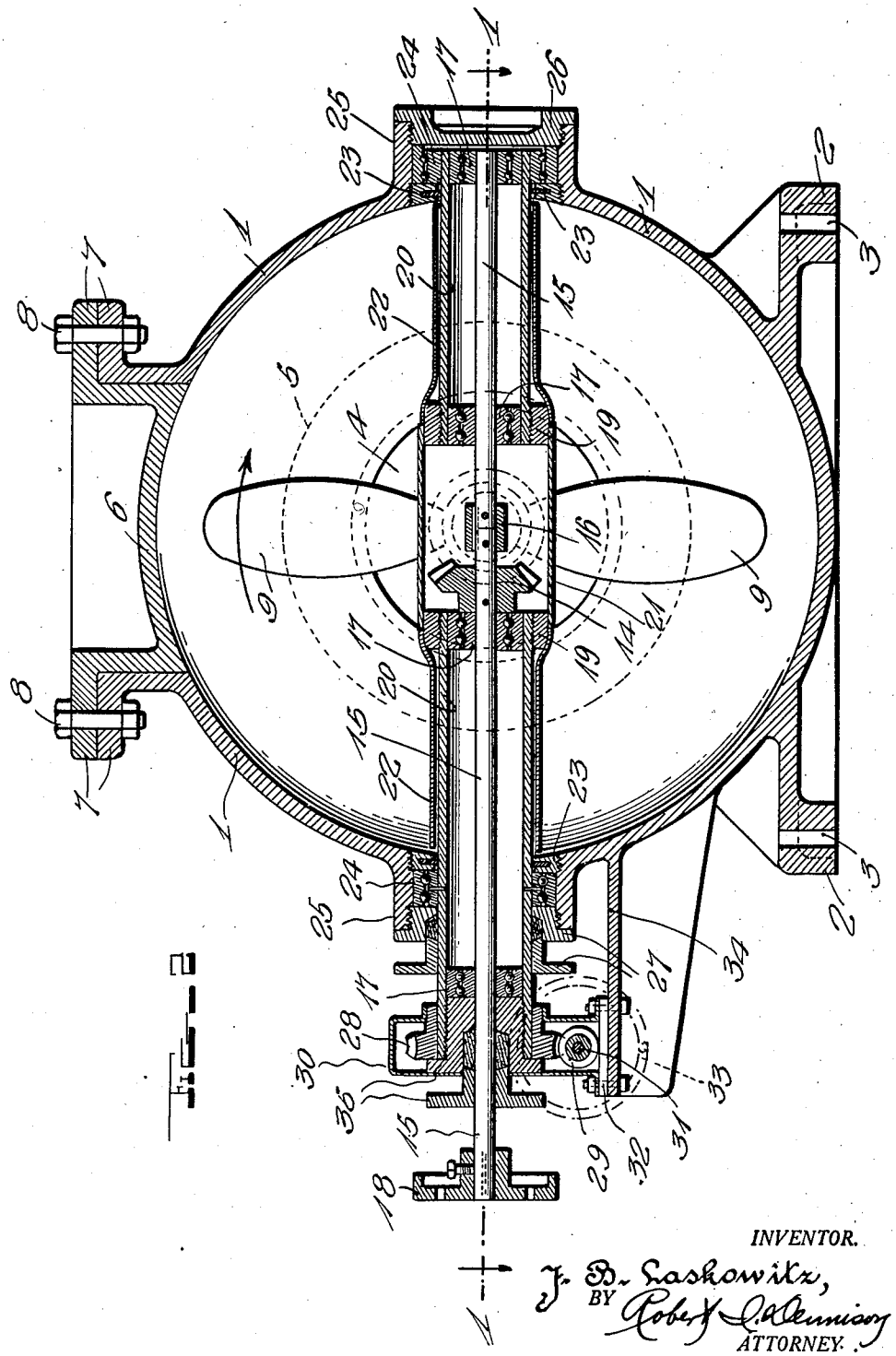


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BALANCED VARIABLE DELIVERY PUMP OR BLOWER

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BALANCED VARIABLE DELIVERY PUMP OR BLOWER

Filed Feb. 16, 1931 3 Sheets-Sheet 3

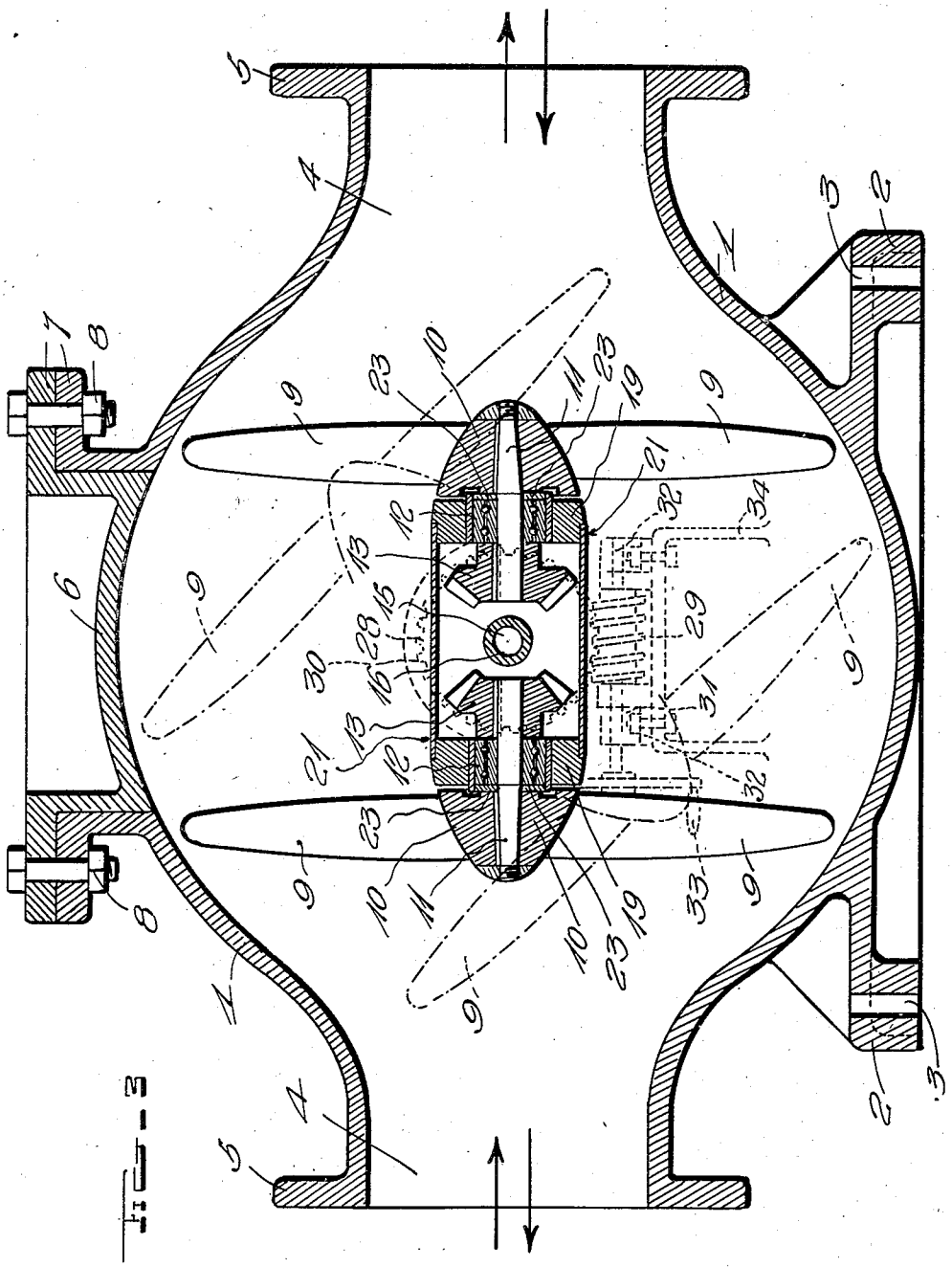


FIG. 3

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1,972,780

BALANCED VARIABLE DELIVERY PUMP OR BLOWER

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Application February 16, 1931, Serial No. 516,251

5 Claims. (Cl. 103—37)

The present invention relates to improvements in pumps or blowers and more particularly to that type of pump or blower wherein the delivery or discharge of the fluid may be varied from a maximum to zero, with the motor, engine or other prime mover operating at a constant speed.

A further and important object is to provide a pump or blower construction wherein the delivery or discharge may be reversed and the quantity of flow varied from the maximum to zero in the reverse direction, with the motor, engine or other prime mover operating at a constant speed and in the same direction as before the reversal of the delivery or discharge.

Another important object is to provide a pump or blower construction that is statically and dynamically balanced so as to reduce the effort required to operate the mechanism for varying the delivery or discharge of the pump or blower.

A further object is to provide a structure of the above mentioned character that includes a casing having alined inlet and outlet openings, oppositely rotating propellers being arranged centrally within the casing, the propellers being mounted upon a swingable housing, the actuating means for the latter being located exteriorly of the casing, whereby the propellers may be positioned in any desired angular position so that the thrust may be caused to act in an inclined direction.

A further and salient object of the present invention is to provide a balanced variable delivery pump or blower of the above mentioned character that includes a pair of oppositely rotating propellers or impellers mounted for rotation within the casing and being further adapted to be positioned at any predetermined angle of inclination to vary the quantity of delivery from a maximum to zero and also to effect the reverse directional flow of the fluid, and this with the motor or engine rotating at a constant speed or any other desirable speed.

Another object resides in the provision of a structure of the above mentioned character wherein the parts are so arranged as to permit the same to be readily and easily accessible and also adjustable, the structure being at all times positive and efficient in its operation as well as simple in construction, strong and durable.

Other objects and advantages of the present invention will become apparent from the following description when taken in connection with the accompanying drawings.

In the accompanying drawings, wherein like reference characters designate corresponding parts throughout the several views:

Figure 1 is a horizontal cross sectional view through the balanced variable delivery pump or blower, showing the internal mechanism, as well as a portion of the means for varying the angle at which the propeller unit may be positioned, the section being taken substantially on the line 1—1 of Figure 2;

Figure 2 is a vertical sectional view taken approximately on the line 2—2 of Figure 1, looking in the direction of the arrows; and

Figure 3 is a sectional view taken at right angles to Figure 2 on the line 3—3 of Figure 1.

In the drawings, wherein for the purpose of illustration is shown the preferred embodiment of my invention, the numeral 1 designates a substantially spherical casing that may be of sectional construction. The supporting base for the casing is indicated at 2 and this base is formed with the bolt holes 3 for securing the same upon a suitable support (not shown).

The casing 1 is formed at its opposite ends with the alined inlet and outlet openings 4, and as indicated by the arrows in Figure 3, the respective openings may be utilized either as inlet or outlet openings, depending upon the direction of flow of the liquid or gas. Suitable flanges 5 are formed on the inlet and outlet openings 4 for securing or attaching inlet and outlet pipes or conduits (not shown) to the respective ends of the casing for conveying the liquid or gas.

Upon referring to Figures 2 and 3 of the drawings, it will be observed that the top of the casing 1 is formed with an enlarged opening to permit access to the interior of the casing during construction and assembly as well as after installation of the parts in the casing for inspection, cleaning and repairs. A removable closure 6 is provided for the opening in the top of the casing and a flanged neck extends upwardly from the top of the casing around the opening to receive the closure 6. The top of the closure is formed with a flange complementary with the flange on the neck and suitable bolts 8 extend through registering openings formed in the flanges 7 for removably securing the cover in position on the casing.

The pumping or blower unit that is arranged with the central portion of the casing 1 includes two oppositely pitched or curved propellers or impellers 9 that are arranged to rotate in opposite directions and are further mounted for pivotal movement in the casing so as to be balanced with respect to each other about a common axis

in a manner to be presently described. The hubs 10 of the propellers are mounted on and keyed to the outer ends of the propeller shaft 11 that are journalled for rotation through the opposed sides of the housing 19.

Suitable combined radial and thrust ball or roller bearings 12 are associated with the respective ends of the frame-like housing 19 for cooperation with the propeller shafts 11.

Keyed on the inner opposed ends of these propeller shafts 11 are the bevel gears 13 that mesh with the bevel gear 14 that is keyed on the intermediate portion of the sectional power shaft 15. As clearly illustrated in Figures 1 and 2 of the drawings, the sections of the power shaft 15 are secured together within the central portion of the frame-like housing 19 through the medium of the coupling 16. Suitable combined radial and thrust ball or roller bearings 17 are arranged in the respective ends of the tubular members 20 which members constitute housings for the sections of the power shaft 15. The inner ends of the tubular members 20 are secured in the respective sides of the housing 19 while the outer ends of the tubular members 20 extend through suitable openings provided in the front and rear sides of the casing 1. One tubular member 20 is of greater length than the other as suggested more clearly in Figures 1 and 2.

Removable cover plates 21 are provided for the frame-like housing 19 to permit access to the interior of the housing and furthermore, these cover plates retain the lubricant placed inside of the housing.

Forming a salient part of the present invention are the stream line sections 22 that encase the portions of the tubular members 20 exposed to the flow of the liquid or gas in the casing 1. These stream line sections will tend to reduce frictional losses.

Lubricant retaining rings 23 are arranged in the openings in the opposite sides of the casing 1 through which the tubular members 20 extend and also at the propeller hubs 10 near the housing 19 and also serve to prevent the admission of foreign matter to the bearings. Combined radial and thrust ball or roller bearings 24 are arranged within the neck portions extending outwardly from the openings in the opposite sides of the casing for cooperation with the respective tubular members 20. A removable bearing plate or cover 26 is provided for one of the extended bearing portions 25, while a stuffing box and gland 27 is provided for the other part of the extended bearing portion.

The outer end of the longer section of the power shaft 15 is connected to and driven by a suitable motor, engine or other prime mover (not shown) through a coupling, one half of which is illustrated at 18. As this particular feature is of conventional construction and forms no important part of this present invention a further detailed illustration and description of the same is believed unnecessary in the present application.

Secured to the outer end of the longer one of the tubular members 20 is a worm-wheel 28 and this worm-wheel has meshing engagement with the worm 29 that is supported in suitable bearings upon the bracket 34 that extends laterally from the casing 1. Both the worm-wheel and the worm arm are encased within the housing 30. The worm 29 is mounted on the shaft 31 and the bearings for this shaft are shown at 32. A hand-wheel 33 is arranged on the outer end of the shaft 31 for actuating the worm and the worm-wheel. A stuffing box and gland structure denoted generally by the numeral 35 is provided for the outer end of the longer section of the tubular member 20 thus affording a better joint between the power shaft 15 and the outer end of the tubular member 20.

The operation of my improved pump or blower may be briefly stated as follows. When the parts are arranged as shown by the full lines in Figure 3, the two propellers or impellers 9 will be disposed vertically for affording a maximum delivery and the flow of the fluid will be in the direction from left to right. In this position, the motor, engine or prime mover that operates the power shaft will, through the medium of the intermeshing bevel gears, impart rotary movement to the respective propellers to cause the same to operate in opposite directions. Maximum delivery is produced because the maximum thrust is generated in the direction of flow and the axes of the propellers 9 coincide with the axes of the inlet and outlet openings 4.

By actuating the hand wheel 33, the direction of thrust of the two propellers can be varied from its normal vertical position to any angular position, that is, the thrust may be made to act in an inclined direction, up or down, or in the opposite direction. This is accomplished through the rotation of the worm 29 and the coacting worm-wheel 28 which rotates the tubular members 20 and the housing 19 by which said members 20 are carried and as the propellers are carried by the housing, they will obviously be caused to assume an angular position as indicated by the dotted lines in Figure 3.

With the motor, engine or other prime mover rotating at a constant speed in one direction, a maximum thrust is produced by the propellers 9 when the propellers are in their normal position. However, by inclining the direction of thrust, the horizontal component of the thrust, producing the flow, may be varied from a maximum to zero with the axes of the propellers 9 in a vertical position. By further rotating the propellers 9, the thrust may be made to act in the opposite direction of the normal flow and thus produce a reverse maximum flow.

Since the quantity of flow depends on the intensity of the horizontal component of this thrust, and the direction of flow depends on the direction of the horizontal component of this thrust, it is possible by rotating the hand wheel 33 to vary the quantity of delivery from a maximum to zero and to also reverse the direction of flow, if desired, with the motor, engine or other prime mover operating at a constant speed or at any other speed that operating conditions may demand.

It will thus be seen from the foregoing description, that I have provided a balanced variable delivery pump or blower that will at all times be positive and efficient in carrying out the purposes for which it is designed, and furthermore, the parts are so arranged as to permit ready and easy access thereto whenever necessary.

When liquids are employed, the present structure will act as a pump for such liquids while the same structure is also capable of being used as a blower or compressor for handling gases.

While I have shown the preferred embodiment of the invention, it is to be understood that minor changes in the size, shape and arrangement of parts may be resorted to without departing from

the spirit of the invention and the scope of the appended claims.

Having thus described the invention, what I claim is:

1. In a pump or blower structure of the class described, a casing provided with alined fluid inlet and outlet openings, a pumping or blower unit arranged centrally within the casing and including a housing mounted for swingable movement about a horizontal axis, a pair of oppositely pitched propellers mounted on the housing and facing the respective openings in the casing, a drive shaft extending through one side of the casing and into said housing, propeller shafts mounted on the housing for supporting the respective propellers, coacting means between the drive shaft and the propeller shafts for causing the rotation of the propeller shafts in opposite directions, and means for moving the unit about its horizontal axis to position the propeller at any predetermined angle of inclination to vary the discharge of the fluid.

2. In a pump or blower structure of the class described, a casing provided with alined fluid inlet and outlet openings, a pumping or blower unit arranged centrally within the casing and including a housing mounted for swingable movement about a horizontal axis, a pair of oppositely pitched propellers mounted on the housing and facing the respective openings in the casing, a drive shaft extending through one side of the casing and into said housing, propeller shafts mounted on the housing for supporting the respective propellers, coacting means between the drive shaft and the propeller shafts for causing the rotation of the propeller shafts in opposite directions, and means for moving the unit about its horizontal axis to position the propeller at any predetermined angle of inclination to vary the discharge of the fluid, said last mentioned means being arranged exteriorly of the casing and being manually controlled.

3. In a pump or blower structure, a casing provided with alined fluid inlet and outlet openings, a propeller carrying unit arranged centrally within the casing and including a housing, rotatable tubular supporting means for the housing extending through the casing at an angle with respect to the inlet and outlet openings, propeller shafts journalled for rotation in the housing and arranged in alinement with said openings, oppositely pitched propellers carried by the outer ends of said propeller shafts, a rotatable power shaft extending through the tubular supporting means for the housing and into the housing, intermeshing gears arranged on the inner ends of the propeller shafts and the adjacent portion of the power shaft for effecting the rotation of the propellers in the reverse direction, and means for adjusting the housing to position the propellers at any predetermined angle of inclination within the casing to vary the quantity of delivery of the fluid.

4. In a pump or blower structure, a casing provided with alined fluid inlet and outlet openings, a propeller carrying unit arranged centrally within the casing and including a housing, rotatable tubular supporting means for the housing extending through the casing at an angle with respect to the inlet and outlet openings, propeller shafts journaled for rotation in the housing and arranged in alinement with said openings, oppositely pitched propellers carried by the outer ends of said propeller shafts, a rotatable power shaft extending through the tubular supporting means for the housing and into the housing, intermeshing gears arranged on the inner ends of the propeller shafts and the adjacent portion of the power shaft for effecting the rotation of the propellers in the reverse direction, and manually operable means for association with the outer end of the tubular supporting member to rotate the same and the housing whereby the propellers may be positioned at any predetermined angle of inclination to vary the discharge of the fluid.

5. In a pump or blower structure, a casing provided with alined fluid inlet and outlet openings, a propeller carrying unit arranged centrally within the casing and including a housing, rotatable tubular supporting means for the housing extending through the casing at an angle with respect to the inlet and outlet openings, propeller shafts journaled for rotation in the housing and arranged in alinement with said openings, oppositely pitched propellers carried by the outer ends of said propeller shafts, a rotatable power shaft extending through the tubular supporting means for the housing and into the housing, intermeshing gears arranged on the inner ends of the propeller shafts and the adjacent portion of the power shaft for effecting the rotation of the propellers in the reverse direction, and manually operable means for association with the outer end of the tubular supporting member to rotate the same and the housing whereby the propellers may be positioned at any predetermined angle of inclination to vary the discharge of the fluid, said last mentioned means including a worm-wheel carried by the tubular supporting member, a worm engaging the worm-wheel, a shaft carrying said worm, supporting means for the shaft, and a hand-wheel on one end of the worm-shaft.

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