July 12, 1938. J. W. GALLAGHER 2,123,651

SELF PRIMING CENTRIFUGAL PUMP

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Fig. 1.

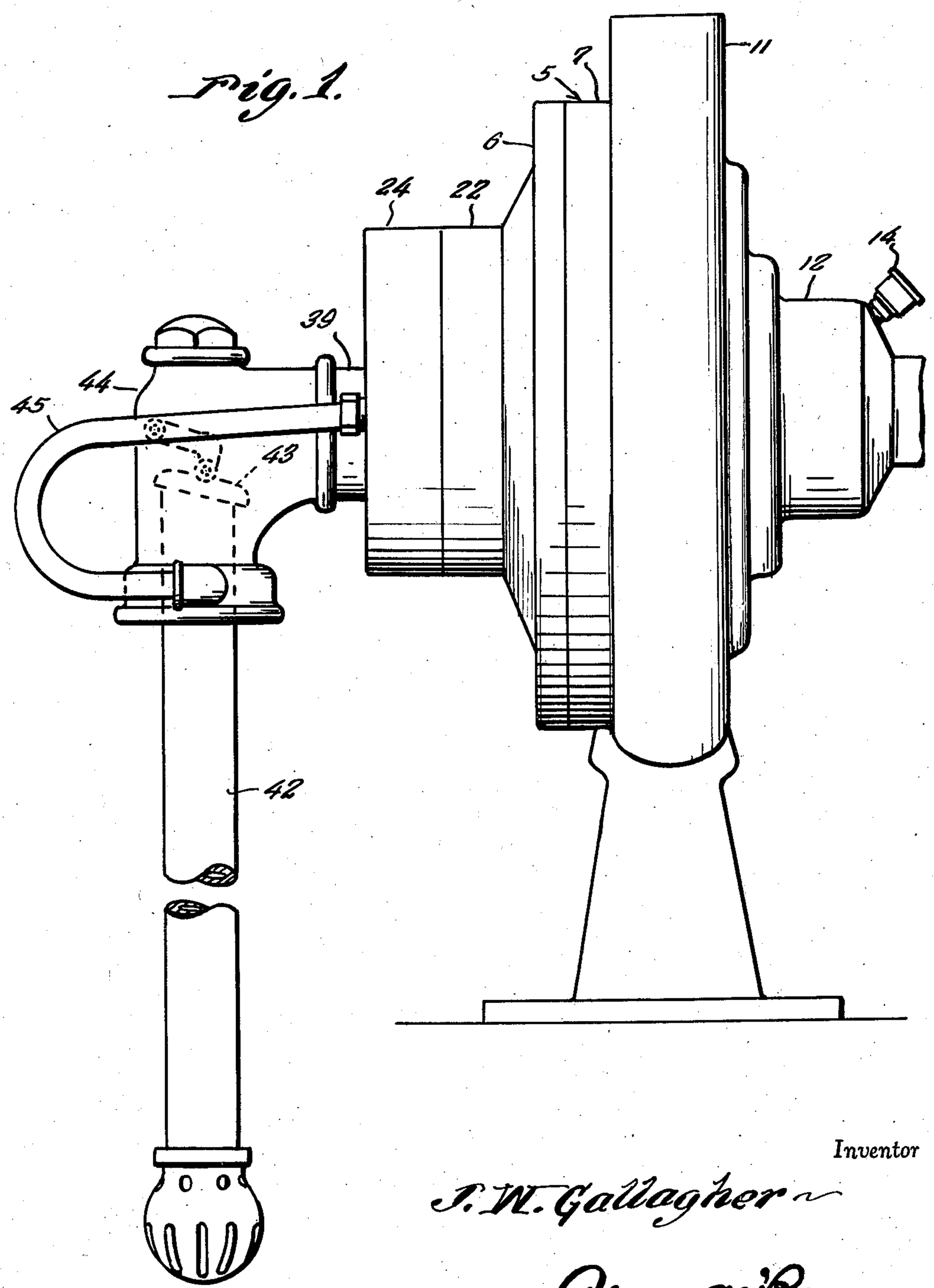

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Fig. 2.

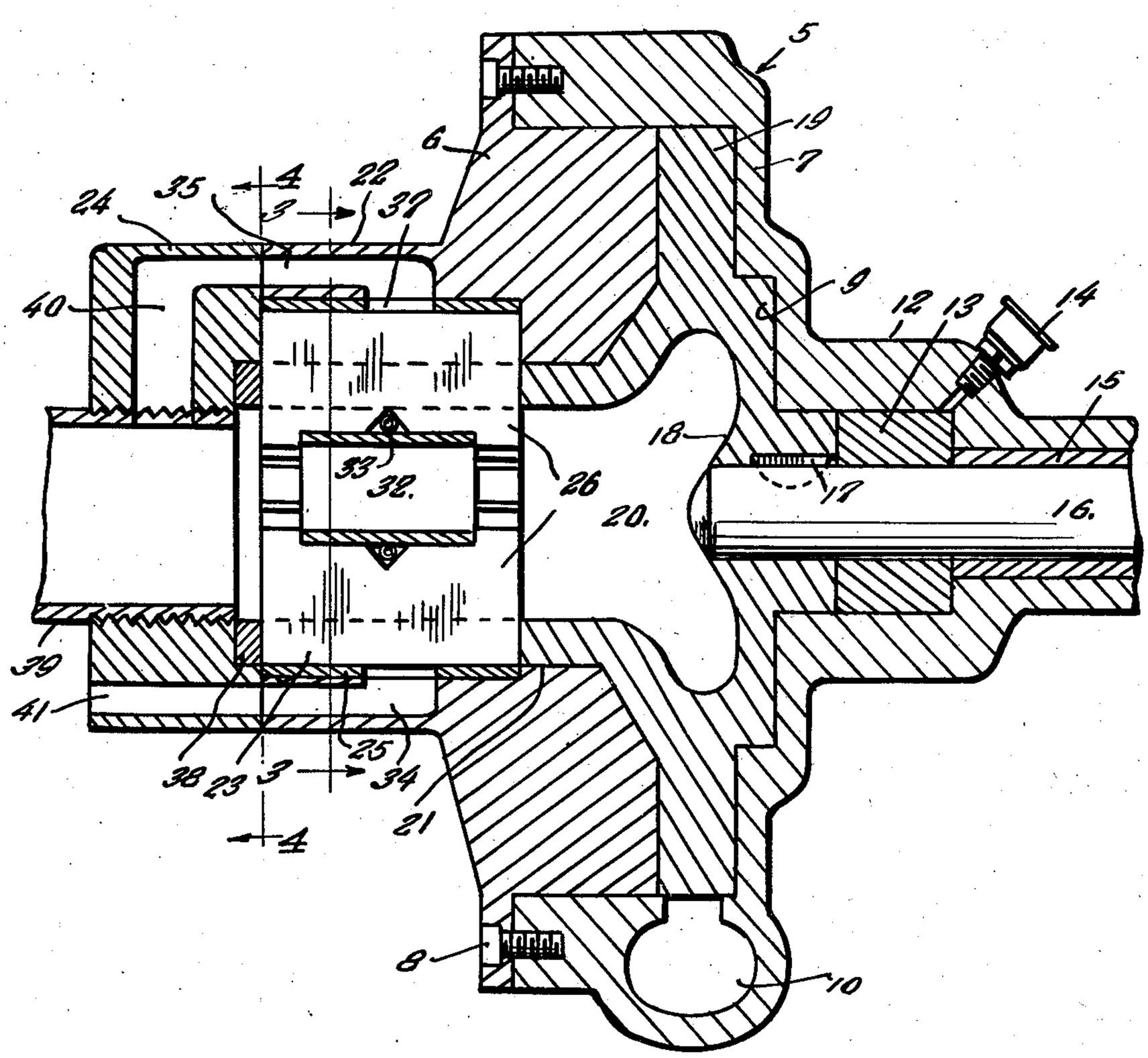

Fig. 4.

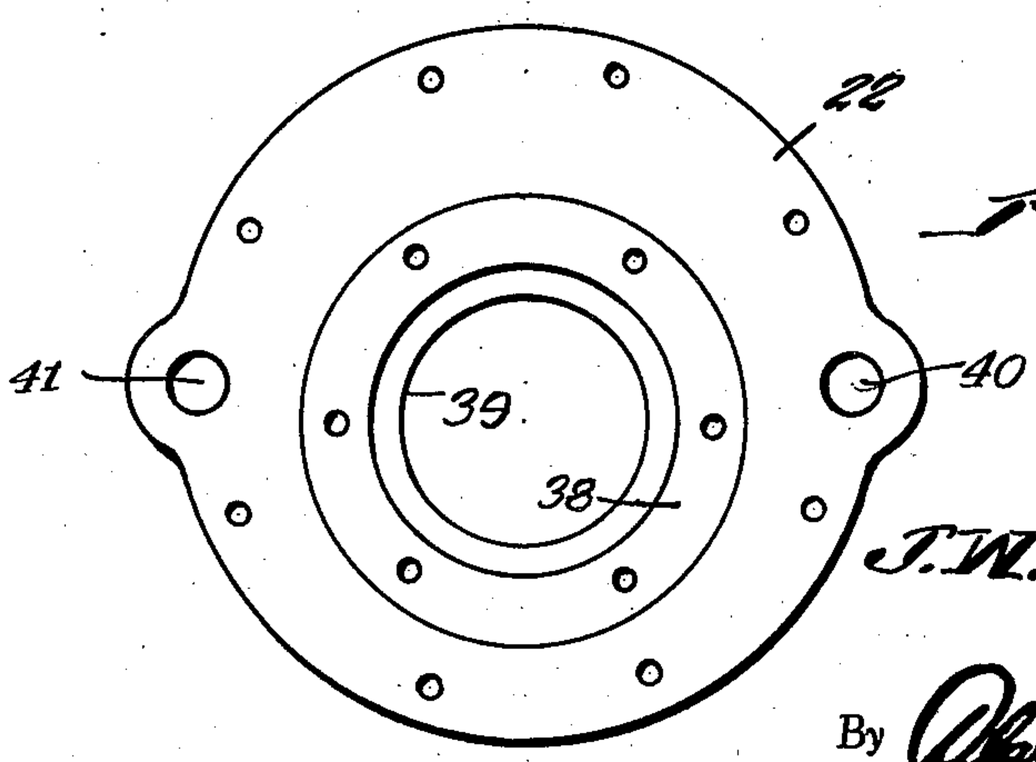

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Fig. 3.

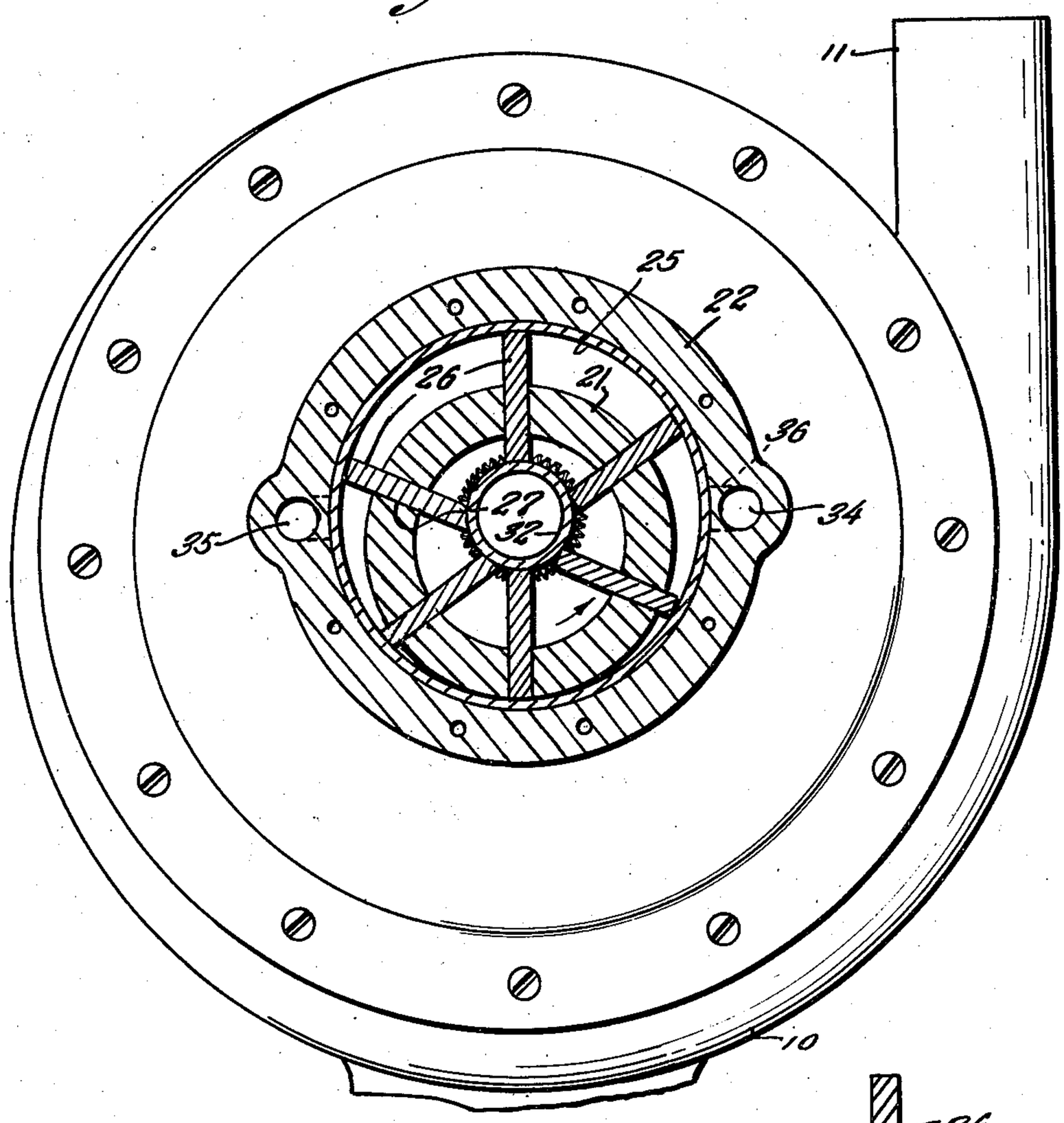
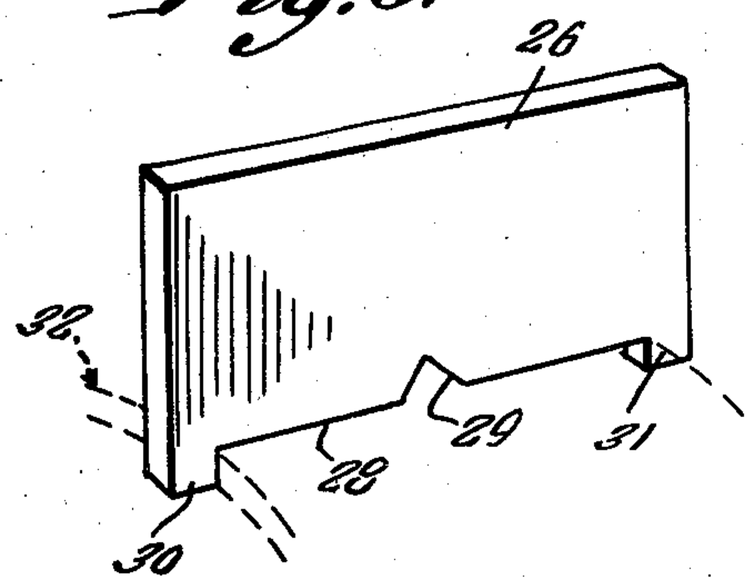


Fig. 5.



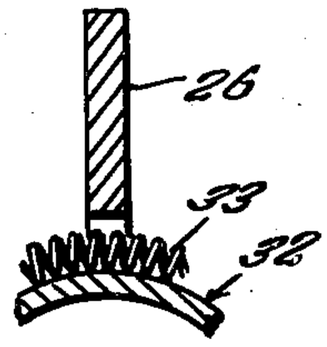


Fig. 6.

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UNITED STATES PATENT OFFICE

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SELF-PRIMING CENTRIFUGAL PUMP

John W. Gallagher, Seneca Falls, N. Y.

Application October 23, 1935, Serial No. 46,374

2 Claims. (Cl. 103—113)

My invention relates generally to centrifugal pumps of the vacuum forming type, and particularly to a centrifugal pump of this character which is self-priming, and an important object of the inyention is to provide an efficient and compact arrangement of this character.

Other important objects of my invention will be apparent from a reading of the following description in connection with the drawings, wherein for purposes of illustration I have shown a preferred embodiment of my invention.

In the drawings:—

Figure 1 is a general end elevational view of an embodiment of the invention.

Figure 2 is a longitudinal horizontal sectional view taken through Figure 1.

Figure 3 is a transverse vertical sectional view taken through Figure 2 approximately on the line 3—3 and looking toward the right in the direction of the arrows.

Figure 4 is an end view of the cover plate taken on line 4—4 of Fig. 2.

Figure 5 is a perspective view of one of the vacuum rotor blades.

Figure 6 is a sectional view through the vacuum rotor showing the mounting of a blade thereon.

In accordance with the present invention the priming or vacuum pump is only made sufficiently large to prime the centrifugal pump itself. Although it is feasible to mount the vacuum priming pump at either side of the main centrifugal pump, the present embodiment of the invention contemplates a most compact and efficient arrangement which establishes a combination of the two functioning features in such a way that each cooperates with the other to the fullest extent so as to provide an efficient centrifugal pump unit of the smallest available size and bulk, consisting of the fewest number of parts, the same being readily accessible for repair or replacement.

Referring in detail to the drawings, the numeral 5 generally designates the centrifugal pump casing or case which includes the body 6 and the body 7 separably connected by suitable connecting means 8 and defining an impeller chamber 9 leading into the discharge chamber 10 which has the discharge neck 11 arranged tangentially.

A cylindrical portion 12 on the body section 7 contains a suitable roller bearing 13 lubricated by an oil cup 14 and in a reduced part of this cylindrical portion is a bushing 15, the bushing 15 and the bearing 13 rotatably mounting the main pump shaft 16 which is keyed as indicated by the numeral 17 in the hub portion 18 of the impeller 19. The impeller has the hollow chamber 20 which is partly defined by the cylindrical extension 21 which extends into the body section 6 and into the chamber forming annulus 22 in which the auxiliary vacuum priming rotor generally designated 23 is located.

The auxiliary pump casing cover 24 is mounted by suitable means on the annulus 22.

A cylindrical shell 25 is mounted in the enlarged interior portion of the annulus 22 and in this cylindrical member 25 work the auxiliary priming blades 26 which work through slots 27 in the sides of the tubular extension 21 of the rotor and have their radially inward ends slotted as indicated by the numeral 28 in Figure 5 and also notched as indicated by the numeral 29. The slots produce shoulders 30 and 31 which ride against the end edges of the bushing 32 which floats and is supported solely by the inner ends of the vanes or blades 26. A helical spring 33 encircles the bushing 32 and is held in place by the notches 29 in the blades 26.

The cylinder 25 is located eccentrically with respect to the axis of the main shaft 16 as is the entire annulus 22, so that the turning of the impeller or main rotor 19 and the portion 21 thereof rotates the blades 26 in a semi-rotary pump effect within the cylinder 25.

Inlet and outlet passages 34 and 35, respectively, extend longitudinally in the annulus 22 and have radial portions 36 which lead through openings 37 through the cylindrical member 25 into the space in which the blades 26 work.

A thrust bearing 38 is arranged in the left hand end of the chamber 21 to receive the thrust of the impeller 19 against the cover 24.

A concentric tube 39 open at its inward end faces immediately the left hand end of the impeller when the cover 24 is in place, and also the auxiliary pump outlet 40 in the cover and the auxiliary pump inlet 41 in the cover are in communication with the respective passages 35 and 34 in the annulus 22.

The auxiliary pump outlet 40 discharges into the tube 39. The outer end of the tube 39 is connected to a casing 44, which casing is connected at its lower end to a supply pipe 42. A check valve 43 in the casing 44 seats on the top of the pipe 42. A pipe 45 connects the pipe 42 below the check valve 43 with the inlet passage 41 of the auxiliary pump.

In operation, and assuming the pump system to be unprimed, rotation of the shaft 16 will

cause both of the rotors to turn. The auxiliary pump rotor will draw air from the pipe 42 through the pipe 45, the passages 41 and 34 into the auxiliary pump chamber and discharge this air through the passages 35 and 40 into the tube 39 and the chamber 20 of the main impeller 19. The check valve 43 prevents the return of this air through the pipe 42. When all of the air is exhausted from the pipe 42 water will be drawn up by the auxiliary pump and discharged into the tube 39 and the chamber 20. This water forces the air in the tube 39 and the chamber 20 through the impeller 19 and into the discharge pipe. When sufficient water has been drawn up to substantially fill the tube 39 and the chamber 20, the impeller 19 becomes operative to discharge this water into the discharge neck 11, creating suction in chamber 20 and the tube 39, so that water from the pipe 42 rises past the check valve 43 into the tube 39 and flows to the impeller 19 which is then fully primed and fully operative to pump water. Both pumps then deliver water. If, for any reason, the impeller 19 should again become unprimed by entry of too much gas or air into the tube 39, the auxiliary pump rotor will again prime it as set out above.

Although I have shown and described herein a preferred embodiment of my invention, it is to be definitely understood that I do not desire to limit the application of the invention thereto, and any change or changes may be made in the materials, and in the structure and arrangement of the parts, within the spirit of the invention and the scope of the subjoined claims.

What is claimed is:—

1. A centrifugal pump of the character described comprising a main impeller casing having a main impeller mounted therein, said impeller having a main shaft supported in said casing, a hollow extension on said main casing and forming an auxiliary priming pump casing, an auxiliary priming pump rotor operating in the auxiliary casing, said main impeller having a tubular inlet portion operatively engaged with the auxiliary rotor, and a cover on the auxiliary rotor casing and having a main fluid supply tube in communication with the open end of the tubular inlet portion of the main impeller, said auxiliary pump casing having an inlet passage and an outlet passage for the auxiliary pump rotor, said passages being extended into the cover, said auxiliary rotor comprising a plurality of radially movable blades mounted in radial openings in the tubular inlet portion of the main impeller, and a tubular bearing engaged and supported by the radially inward ends of said blades and within the tubular extension of the main rotor and means connecting the inlet of said auxiliary pump with said main fluid supply tube.

2. A centrifugal pump of the character described comprising a main impeller casing having a main impeller mounted therein, said impeller having a main shaft supported in said casing, a hollow extension on said main casing and forming an auxiliary priming pump casing, an auxiliary priming pump rotor operating in the auxiliary casing, said main impeller having a tubular inlet portion operatively engaged with the auxiliary rotor, and a cover on the auxiliary rotor casing and having a main fluid supply tube in communication with the open end of the tubular inlet portion of the main impeller, said auxiliary pump casing having an inlet passage and an outlet passage for the auxiliary pump rotor, said passages being extended into the cover, said auxiliary rotor comprising a plurality of radially movable blades mounted in radial openings in the tubular inlet portion of the main impeller, and a tubular bearing engaged and supported by the radially inward ends of said blades and within the tubular extension of the main rotor, said blades being cut out to define shoulders for engaging the opposite ends of the bearing for holding the bearing in place and means connecting the inlet of said auxiliary pump with said main fluid supply tube.

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