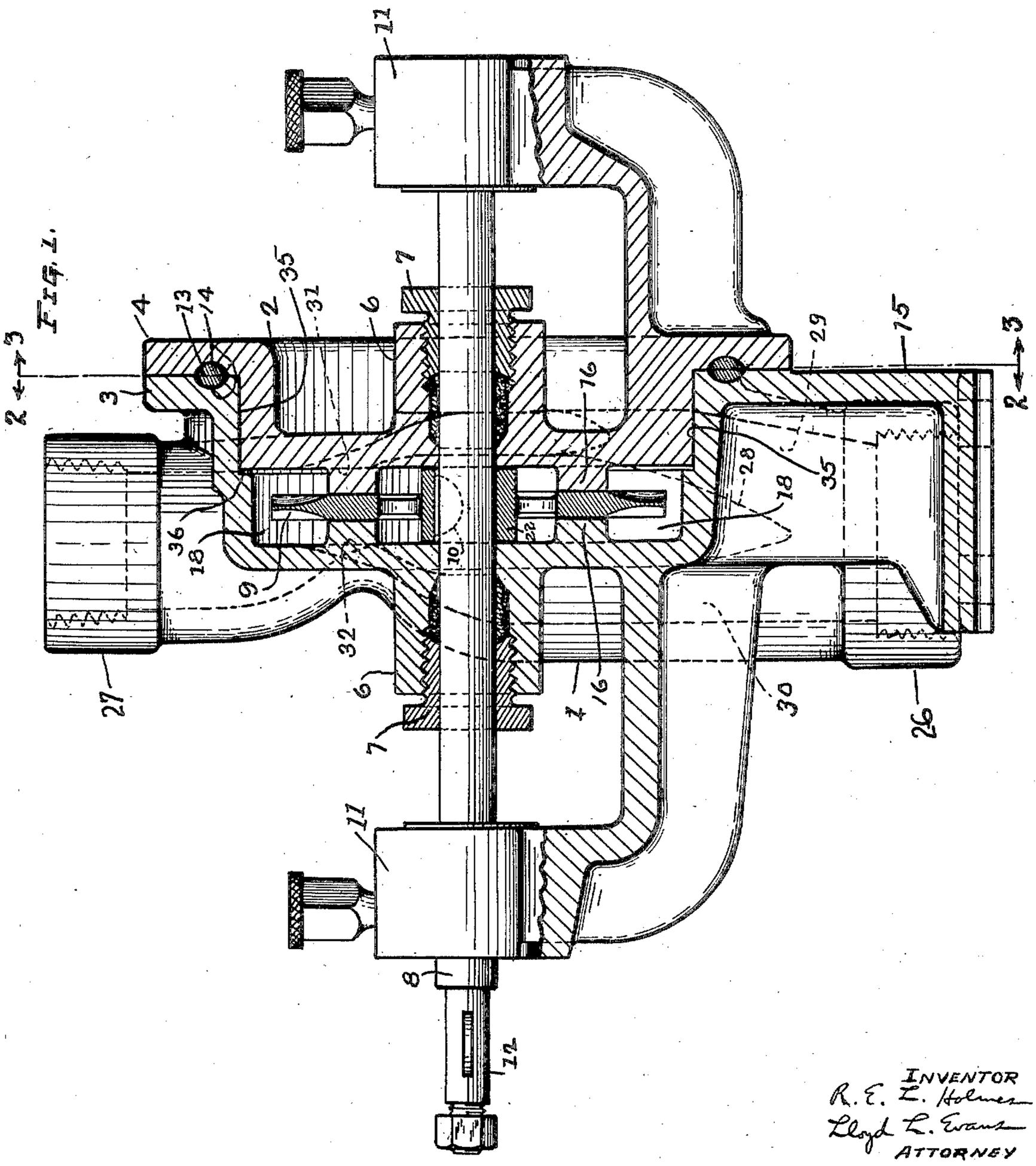
Sept. 4, 1928. 1,682,756

R. E. L. HOLMES

ROTARY PUMP CASING

Filed Sept. 11, 1925 3 Sheets-Sheet 1



INVENTOR
R. E. L. Holmes
Lloyd L. Evans
ATTORNEY

Sept. 4, 1928. 1,682,756

R. E. L. HOLMES

ROTARY PUMP CASING

Filed Sept. 11, 1925 3 Sheets-Sheet 2

FIG. 3.

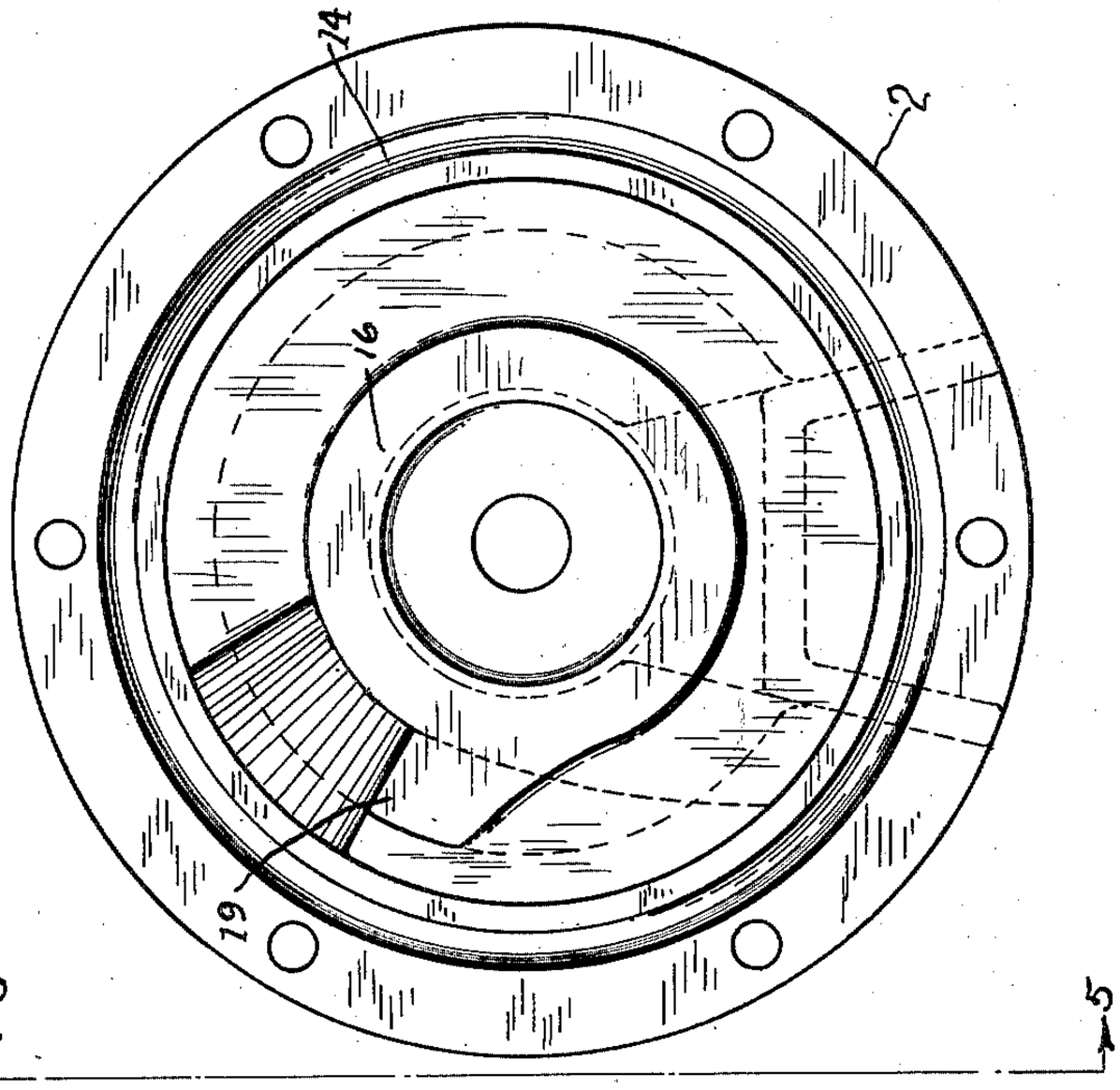
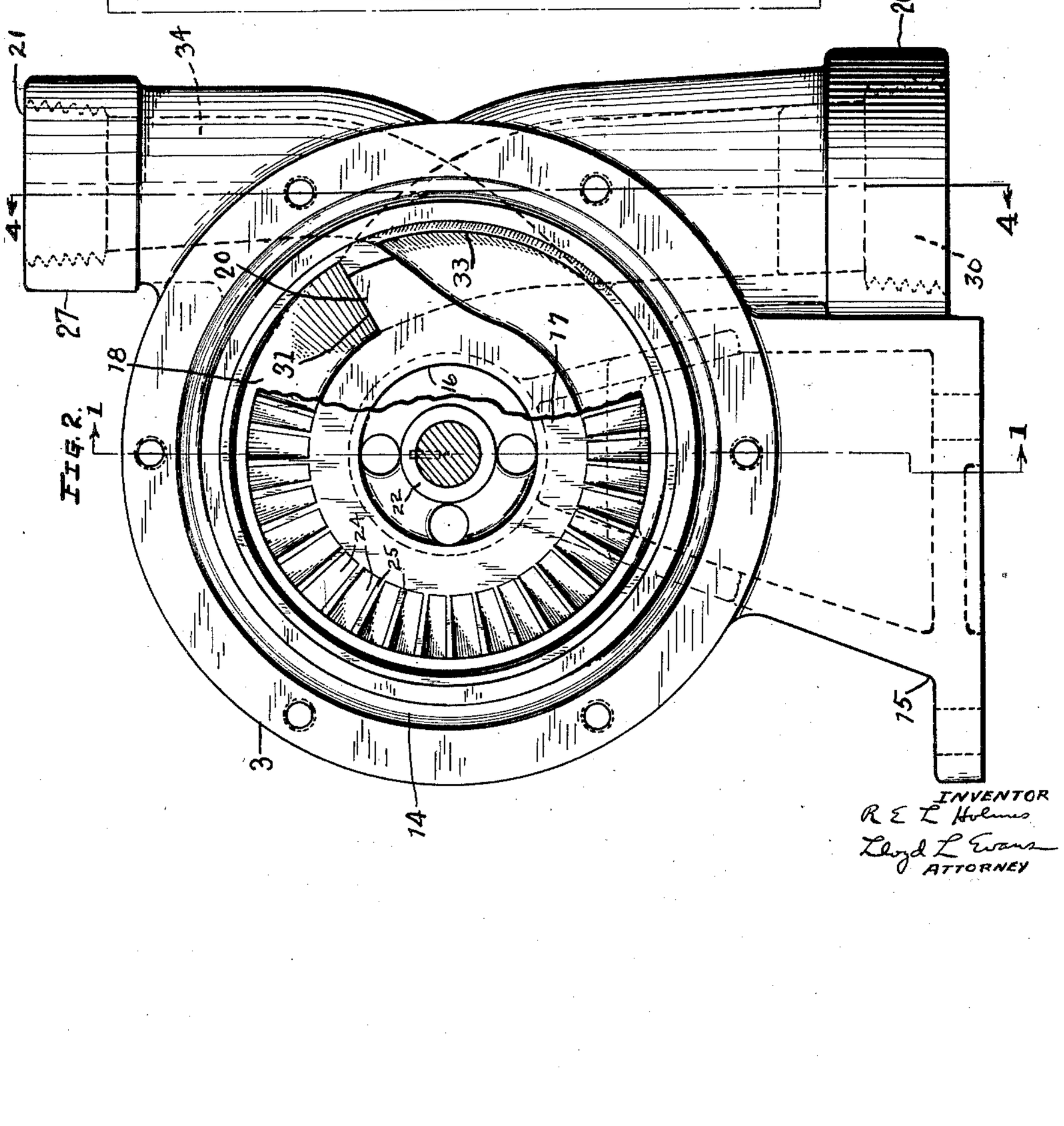


FIG. 2.



INVENTOR
R E L Holmes
Lloyd L Evans
ATTORNEY

Sept. 4, 1928.

1,682,756

R. E. L. HOLMES

ROTARY PUMP CASING

Filed Sept. 11, 1925

3 Sheets-Sheet 3

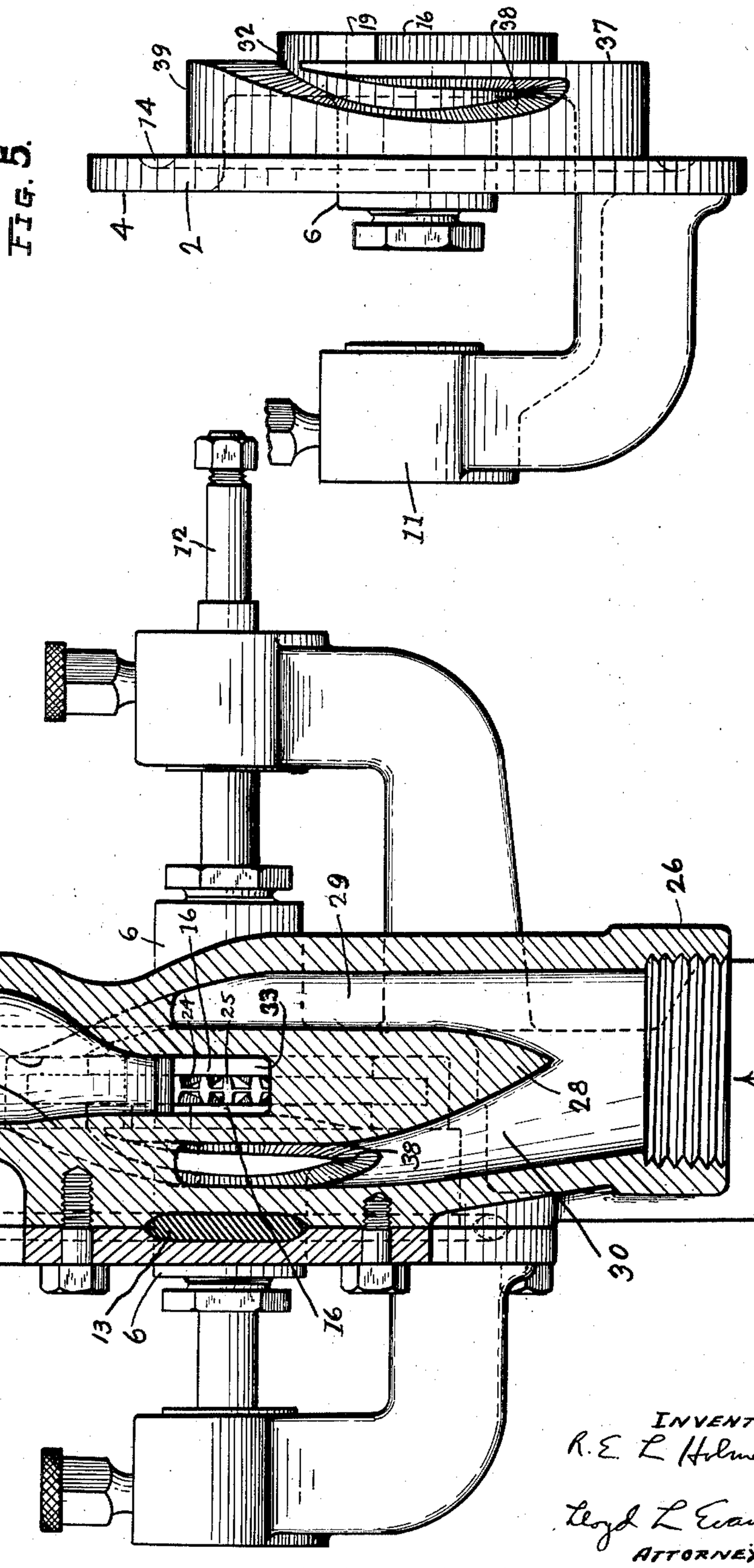


FIG. 5.

FIG. 4.

INVENTOR
R. E. L. Holmes

Lloyd L. Evans
ATTORNEY

Patented Sept. 4, 1928. 1,682,756

UNITED STATES PATENT OFFICE.

ROBERT E. L. HOLMES, OF DAVENPORT, IOWA, ASSIGNOR TO WESTCO-CHIPPEWA PUMP COMPANY, OF DAVENPORT, IOWA, A CORPORATION OF DELAWARE.

ROTARY-PUMP CASING.

Application filed September 11, 1925. Serial No. 55,704.

This invention relates to rotary pumps and more particularly to an improved casing for pumps having a circumferential pressure developing annular channel that is defined by the cooperating relation of opposed flanges formed on the casing and the web of the rotor of the pump.

The principal object of this invention is to provide a casing for a pump of the character set forth wherein the rotor of the pump may be inspected or removed by first removing a conveniently arranged portion of the pump casing without disturbing the pump mounting or the connections of the pump to the supply and distributing pipe lines.

In previously proposed pumps embodying a circumferential pressure channel connected tangentially with suitable inlet and outlet ports, such, for instance, as the pump shown in my copending application Serial Number 720,253 filed on June 16, 1924, Patent No. 1,635,786, it is inconvenient to inspect, repair or remove the pump rotor or to inspect or repair the interior of the pump casing because it is first necessary to disconnect both the inlet and outlet stubs of the pump before the pump casing can be opened. In certain previously proposed designs it is also necessary to at least loosen the pump mounting.

The present invention contemplates a pump having a pair of inlet passageways leading tangentially from opposite sides of the pressure channel into a single inlet stub that is carried entirely by the main portion of the pump casing. The outlet stub for the pump is also carried by the main portion of the casing. The pump casing is divided in such manner that the removal of a small portion of the casing gives complete access to the rotor of the pump either for its removal or repair. The removable portion of the pump casing is so arranged as to be entirely independent of the inlet and outlet connecting stubs of the pump and also independent of the pump mounting.

Fig. 1 of the accompanying drawing is a vertical sectional view of the pump assembly, taken substantially through the axis of the shaft.

Fig. 2 is a side elevational view of the pump after removal of the supplemental casing element, showing the drive shaft in section and also showing a portion of the rotor broken away to give a detailed view of the inlet and outlet ports opening into the pressure developing passageway of the pump.

Fig. 3 is an inside elevational view of the supplemental portion of the casing, looking in the direction of the axis of the pump.

Fig. 4 is a vertical sectional view of the pump assembly taken through the pump substantially along line 4—4 of Fig. 2 and looking in the direction of the arrows; and

Fig. 5 is a side elevational view of the removal casing element looking in the direction of the arrows applied to the line 5—5 shown in connection with Fig. 3 of the drawings.

The embodiment of the invention that I have chosen to illustrate in the drawings comprises a pump casing formed of mated casing portions 1 and 2 that are connected by means of outwardly extending flanges 3 and 4 that are held together by suitable bolts 5. Each of the casing portions 1 and 2 has an outwardly extending tubular boss 6 that has a suitable adjustable packing gland 7 mounted therein to prevent leakage between the respective casing portions and a shaft 8 upon which a rotor 9 is secured for rotation by a suitable key 10. The shaft 8 is supported in suitable outboard bearings 11 and is provided with suitable driving means, such as a slotted end portion 12 of reduced diameter that is adapted to have a suitable driving pinion (not shown) mounted thereon. A deformable packing ring 13 that is mounted in registered annular grooves 14 which together provide an annular packing groove of elliptical cross section, prevents leakage between the casing parts.

The pump assembly is supported from a pedestal 15 that is formed on portion 1 of the casing. Projecting inwardly from each of the casing portions 1 and 2 are opposed annular ribs or flanges 16 which, in cooperation with the web 17 of the rotor, define the pressure developing passageway 18 of the pump.

A radially extending portion 19 of the flange 16 of the removable casing portion 2 extends as far as the outer edge of the rotor buckets where it meets a correspondingly

extended flange portion 20 of the main casing portion 1 thereby forming a deflecting abutment and restriction in the pressure developing passageway of the pump that directs the flow of liquid from the pressure passageway through an outlet port 21 that will hereafter be described in detail.

The space between the flanges 16 of the mated casing portions is only sufficient to permit unrestricted operation of the rotor web 17 therebetween, thus preventing any substantial radial flow of liquid from the pressure developing passage of the pump inwardly along the web of the rotor. The cooperating extended portions 19 and 20 restrict the pressure developing passageway at the outlet end thereof to substantially the cross-sectional dimension of the pump rotor, only sufficient clearance being provided to permit the unrestricted operation of the rotor buckets between them. Direct flow of liquid from the outlet to the inlet end of the passage is thus prevented.

The rotor of the pump comprises a hub portion 22 that is mounted on the drive shaft 8 by means of the key 10, the web portion 17 that substantially fills the space between the opposed casing flanges 16, and a bucket portion 24 having a series of buckets formed therein by transverse partitions 25. The bottoms of the buckets or liquid engaging pockets are inclined from the rotor web to the center of the peripheral edge of the rotor.

It is desirable, in pumps of this general character, to divide the inlet passageway into two portions, one of which extends to each side of the pressure developing passageway of the pump and each of which opens laterally into the pressure developing passageway of the pump adjacent the channel restricting portions 19 and 20 of the casing in substantially a tangential direction relative to the path of flow of fluid through the pump.

Fig. 4 particularly shows the manner in which the inlet passage is divided. A suitable inlet connecting stub 26 and outlet stub 27 are carried by the casing portion 1, which also carries the pedestal 15. The inlet passageway extending from inlet stub 26 is divided by a partition 28 into passageways 29 and 30 that respectively open into inlet ports 31 and 32 located on opposite sides of the rotor. The passageway 29 which connects the inlet stub 26 with the inlet port 31 is cored out of the casing part 1 and is separated from the pressure developing channel 18 by a suitable partition, thereby laterally offsetting the passageway 29 from the pressure developing channel of the pump and permitting the outlet port 33 of the pump to be formed in the outer wall of the pressure developing passageway and to thereby provide an outlet passageway 34 extending substantially tangentially from the pressure developing passage of the pump, the walls of the passage 34 merging into and substantially forming continuations of the walls of the pressure developing passageway. The outlet passage 34 extends between the branches of the inlet passage.

The other inlet passageway 30 extends from the inlet stub 26 through the main casing portion 1 and the removable casing portion 2 to the inlet port 32 that is formed in the removable portion 2 of the pump casing.

The main portion 1 of the pump casing has a cylindrical sleeve 35 formed therein that terminates at its inner end in an annular shoulder 36. The inlet passage 30 opens into the side wall of the cylindrical sleeve 35 in registered relation with a continuation 38 of the passage that is formed in the main casing 1.

The removable casing part 2 has a cylindrical face 39 that fits snugly within the sleeve 35 of the main casing. The continuation of the passage 30 is fromed by the spirally arranged passage 38 that opens into the cylindrical face 39 of the casing part 2 and also opens laterally into the casing face 37 that constitutes a defining wall of the pressure developing passage. The sleeve 35 of the main casing overlies a portion of the curved passage 38 to thereby form the remaining wall of the passage. The inlet port 32 opens laterally into the pressure developing channel immediately adjacent the extension 19 of the annular flange 16 that defines the inner wall of the pressure developing passage.

From the above description of the elements of the pump it will be seen that liquid flows into the pump through the inlet stub 26 and passageways 29 and 30 to inlet ports 31 and 32 located on opposite sides of the rotor. The passageway 30 is partially defined by the removable part 2 of the casing. After entering the pressure developing channel 18 of the pump, the liquid is engaged by the liquid engaging pockets of the pump rotor and carried completely around the pressure developing channel to the point where it is deflected tangentially from the pressure developing channel of the pump by abutments 19 and 20 that closely fit the bucket portion of the rotor and merge into one wall of the outlet passage 34. The outlet port 33 is formed in the outer peripheral wall of the pressure developing channel and serves to convey the liquid to the outlet stub 27 in substantially a tangential direction relative to the direction of flow through the pressure developing passage of the pump. Unnecessary deflection of the liquid in its passage from the presure side of the pump to the distributing system is thereby avoided.

If access is desired to the interior of the pump for the purpose of removing or repairing the rotor, the supplemental casing part 2, together with the outboard bearing 11 that is carried thereby, is removed by withdrawing the bolts 5 and sliding the casing portion 2 along the shaft to completely expose the interior of the pump. If it is desired to completely remove the pump rotor, such driving pinion as may be mounted on the driving end 12 of the shaft is removed and the pump rotor and the shaft on which it is mounted are drawn laterally through the opening that is provided by the removal of the casing part 2. The complete removal of the rotor is thus accomplished without in any way disturbing the connections of the outlet and inlet stubs 26 and 27 or the mounting of the pedestal 15 on its foundation.

Although I have described a single preferred form of my invention, it is obviously capable of many modifications, and I desire therefore that only such limitations shall be imposed as are set forth in the accompanying claims.

What I claim is:

1. A rotary pump comprising a rotor having a web portion and a bucket portion, a casing enclosing said rotor and having portions closely cooperating with the web of said rotor to define a circumferential pressure developing channel wherein liquid is engaged by the bucket portion of said rotor, said casing having a peripheral connecting stub connecting with a plurality of passages extending therefrom and opening laterally into opposite sides of the pressure developing channel, and an additional passage extending between the first named passageways to a suitable peripheral connecting stub, said casing comprising a main portion carrying both of said connecting stubs and a supplemental portion removable independently of said connecting stubs and provided with a channel connecting one of the inlet passages and said pressure developing channel.

2. A rotary pump comprising a rotor having a web portion and a bucket portion, a casing enclosing said rotor and having portions closely cooperating with the web of said rotor to define a circumferential pressure developing channel, wherein liquid is engaged by the bucket portion of said rotor, said casing comprising an integral pedestal portion having inlet and outlet stubs carried thereby and a pair of passages connecting one of the stubs with said pressure developing channel on opposite sides of the rotor, the other of said stubs having a passage extending therefrom disposed between said pair of passageways and opening into the peripheral wall of the channel, and a supplemental removable portion secured to said pedestal portion by cooperating flanges disposed laterally of said stubs, said supplemental portion being designed to be removed without disturbing any connections to said stubs, a portion of one of said passages extending through said removable casing portion.

3. A rotary pump comprising a disc-like rotor having a web portion and a bucket portion, said bucket portion being formed in the marginal edge portion of the rotor, and a casing formed of a plurality of parts, one of which is removable, said parts together enclosing said rotor and adapted to define therewith a circumferential passageway of relatively small cross sectional dimension wherein liquid is adapted to be engaged by the bucket portion of the rotor, said casing and rotor having mutually cooperating annular portions that have working fits and that are disposed adjacent the inner sides of the bucket to substantially prevent radial flow of liquid from the passage toward the center of the pump, one portion of said casing being formed with an inlet and an outlet stub that is carried solely thereby and a pair of passages connecting one of said stubs with one lateral side of the pressure developing channel and another passageway that registers with a corresponding passageway in the removable casing portion that leads to the opposite side of the pressure developing channel, said readily removable portion of the casing having a bearing support for the rotor shaft carried thereby and a passageway extending therethrough that registers with the aforesaid passageway from the inlet stub at one end and opens at the other end into one side of the circumferential pressure developing passageway.

4. A rotary pump comprising a disc-like rotor having a web portion and a bucket portion, said bucket portion being formed in the marginal edge portion of the rotor, and a casing formed of a plurality of parts, one of which is removable, said parts together enclosing said rotor and adapted to define therewith a circumferential passageway of relatively small cross sectional dimension wherein liquid is adapted to be engaged by the bucket portion of the rotor, said casing and rotor having mutually cooperating annular portions that have working fits and that are disposed adjacent the inner sides of the bucket to substantially prevent radial flow of liquid from the passage toward the center of the pump, one portion of said casing being formed with an inlet and an outlet stub that is carried solely thereby and a pair of passages connecting one of said stubs with one lateral side of the pressure developing channel and another passageway that registers with a corresponding passageway in the removable casing portion that leads to the opposite side of the

pressure developing channel, said readily removable portion of the casing having an axially extending cylindrical portion adapted to enter a suitable closely fitting pocket formed in the stub carrying portion of said casing, said cylindrical portion having a groove in the cylindrical face thereof that cooperates with the wall of said pocket to provide a passageway having one end that substantially registers with one branch of the passageway extending from the inlet stub and that opens at the other end into one side of the circumferential pressure developing passageway of the pump.

In testimony whereof I affix my signature.

ROBERT E. L. HOLMES.