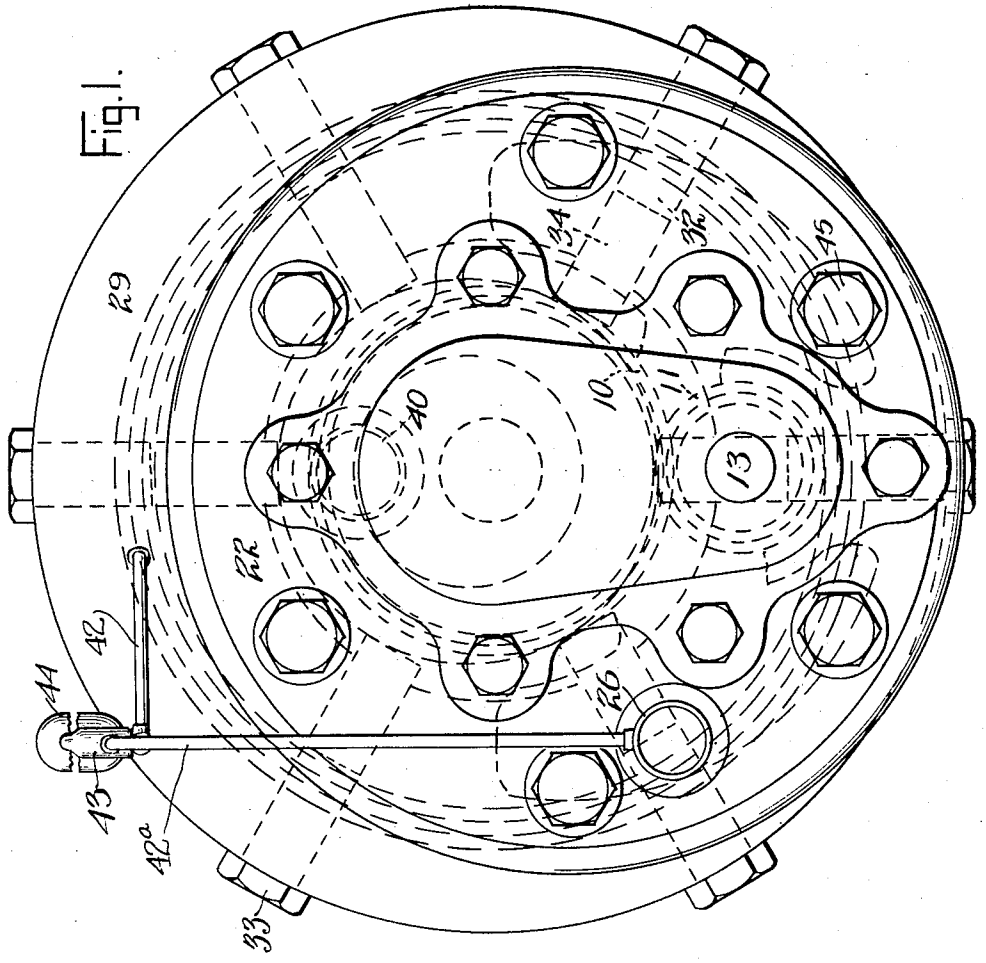
Nov. 28, 1933. H. H. FITCH ET AL 1,936,935

COMBINED ROTARY AND RECIPROCATING PUMP

Original Filed Oct. 2, 1930 2 Sheets-Sheet 1

Fig. 1.



Inventors

Hurshel H. Fitch.
Edward L. Frauenfelder

By

Attorney

Nov. 28, 1933. H. H. FITCH ET AL 1,936,935

COMBINED ROTARY AND RECIPROCATING PUMP

Original Filed Oct. 2, 1930 2 Sheets-Sheet 2

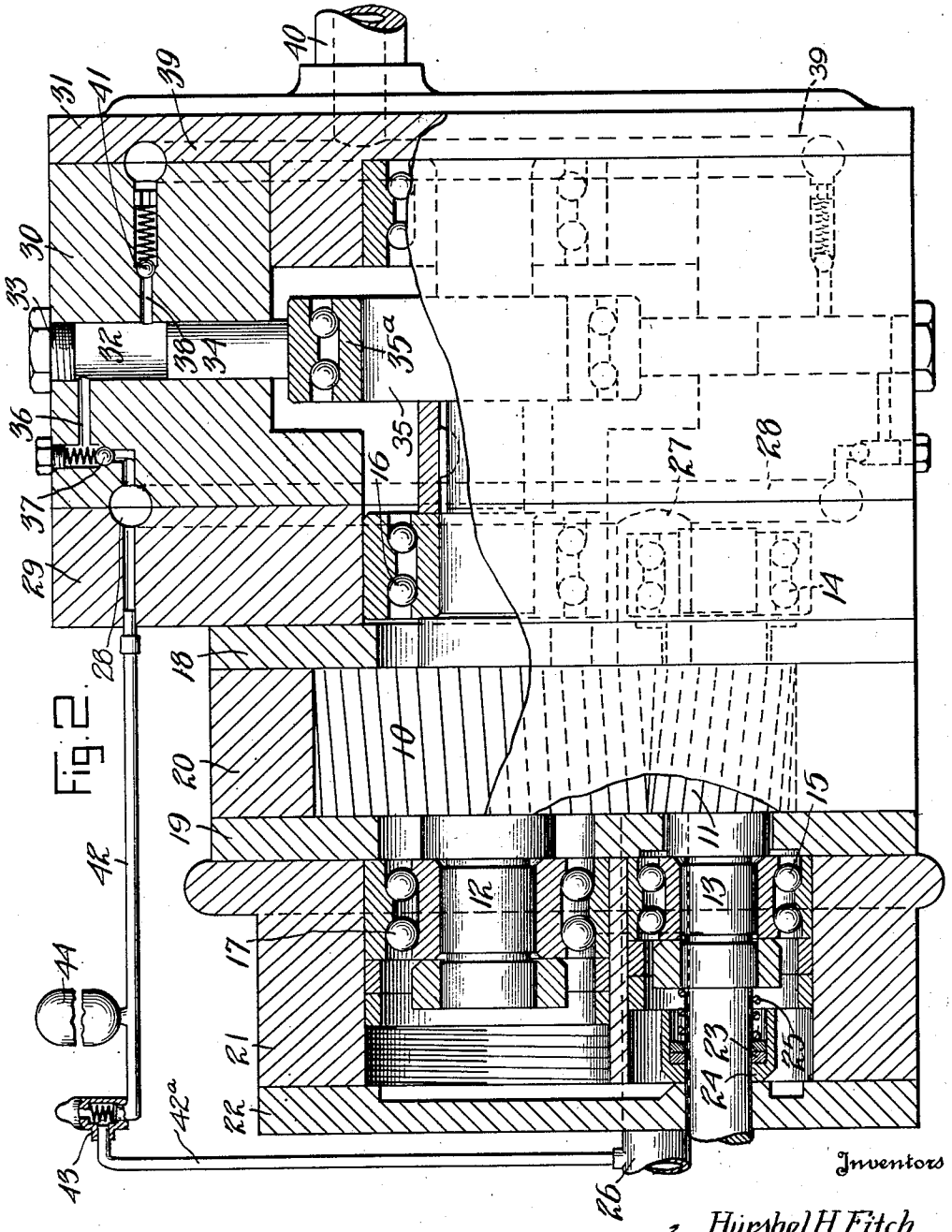


Fig. 2.

Inventors

Hirshel H. Fitch

Edward L. Frauenfelder

By

Attorney

Patented Nov. 28, 1933 1,936,935

UNITED STATES PATENT OFFICE

1,936,935

COMBINED ROTARY AND RECIPROCATING PUMP

Hurshel H. Fitch and Edward L. Frauenfelder, Auburn, Ind., assignors, by mesne assignments, to Auburn Foundry Inc., Auburn, Ind.

Original application October 2, 1930, Serial No. 485,962. Divided and this application December 24, 1931. Serial No. 583,079

3 Claims. (Cl. 103—5)

This invention relates to pumping apparatus and particularly to pumps for developing fluid under high pressure and is a division of our copending application Serial No. 485,962, filed October 2, 1930 for Pumping apparatus.

Referring to the accompanying drawings, which are made a part hereof and on which similar reference characters indicate similar parts,

Figure 1 is an end view of the pump, and

Figure 2, a view in side elevation partly in section of the pump.

The pumping apparatus forming the subject matter of this application consists of a rotary pump of the inter-engaging gear type in combination with a unit made up of a number of reciprocating pumps, the interengaging gear pump serving to develop initial pressure on the fluid and to deliver fluid under this pressure to the intake of the reciprocating pumps from which latter pumps it is delivered under high pressure to the point at which it is used.

In the drawings numerals 10 and 11 indicate gears of interengaging gear pumps of well known construction, these gears being mounted on shafts 12 and 13. The shaft 13 extends out through the casing 22 and serves as the operating means being operated from any suitable source of power. Shaft 13 is journaled in suitable bearings 14 and 15 and the shaft 12 in similar bearings 16 and 17. The pumping gears 10 and 11 are confined between end plates 18 and 19 which secure between them a pump casing 20. A bearing box 21 closed at its outer end by a plate 22 is held by any suitable means such as bolts to the cover plate 19 and casing 20. Suitable packing washers 23 are positioned within a cup 24 about the shaft 13 and are pressed into fluid sealing engagement about the shaft by means of a spring 25. Pumped fluid enters the suction side of the pump through a pipe 26 and is discharged from the pump through a chamber 27 through which it enters into an annular chamber 28 formed between a side plate 29 and a casing 30 forming part of the reciprocating pump assembly. A plate 31 is secured to the other side of the casing 30. Bolts 45 extend through plates 29 and 31 and casing 30 to secure the same together. The casing 30 is provided with a number of radial chambers 32 serving as pumping cylinders, the outer ends of which may be closed by plugs 33. Pistons 34 are loosely mounted in these radial chambers, the inner ends of the pistons being in engagement with an eccentric 35 mounted on the inner end of the shaft 12 and rotatable thereby. Suitable ball bearing or other frictionless means 35a may be provided between the eccentric and the ends of the pistons. The annular chamber 28 is connected by means of a series of ports 36 with each of the radial chambers 32, the ports each having a check valve 36 therein. Outlet ports 38 connect with an annular chamber 39 which opens into a discharge port 40. Suitable check valves 41 are provided in the outlet ports 38. The annular chamber 28 is connected by means of a pipe 42, a pressure responsive valve 43 and pipe 42a with the inlet 26 to the gear pumps 10 and 11. By means of the connection 42, 43 just described a relief is provided for pressure delivered by the gear pumps to the intake of the system or reciprocating pumps just described. An air chamber 44 may be provided in the line 42. In operation power is applied to the shaft 13 and fluid is drawn in through pipe 26 and discharged by the intermeshing gear pump 10 and 11 into the annular chamber 28. The gear 11 is considerably smaller than the gear 10. This will drive the shaft 12 at a slower speed than shaft 13. Following the compression stroke of each of the free pistons 34, fluid under pressure in the annular chamber 28 will be forced past the check valves 37 into the radial chambers or cylinders 32 and cause the pistons to engage the cam 35. On the discharge stroke the fluid will be forced out through the ports 38 into the annular chamber 39 from which it passes to the outlet port 40.

In the embodiment of the invention as shown and described, the pumped fluid is first put under pressure by a pair of inter-engaging impellers which deliver it to the suction of a pump made up of a number of radial pumping cylinders. From this second pump the fluid is delivered under high pressure to the point of use.

It should be understood, however, that the invention is not limited to the particular kind of pumps shown nor to their arrangement or order in which they operate. For example, the radial cylinder pump might be the first in the series, delivering fluid to an inter-engaging impeller pump. Likewise a centrifugal pump might be substituted for either or both of the pumps shown, or any other suitable pump might be used for either of both of the pumps shown.

From the foregoing description it will be apparent that we have provided a pump of suitable type operating in series with another pump whereby a very high pressure may be developed upon the fluid, the whole assembly being arranged as a single unit and operated from a single source of power.

It will be obvious to those skilled in the art that

various changes may be made in our device without departing from the spirit of the invention and therefore we do not limit ourselves to what is shown in the drawings and described in the specification, but only as indicated by the appended claims.

Having thus fully described our said invention what we claim as new and desire to secure by Letters Patent is:

1. A multiple stage pump comprising a low pressure unit composed of a pair of gears, an inlet leading to one side of said gears, an outlet from the opposite side thereof, a high pressure unit comprising a casing and two end plates, a circular channel communicating with said outlet and included within the high pressure unit between the casing and one end plate, an eccentric included in said high pressure unit and mounted to rotate with one of said gears, radial cylinders in said casing having pistons engaging said eccentric, individual inlet ports leading from each of said cylinders to said channel, check valves in said individual inlet ports, individual outlet ports leading from each of said cylinders, a circular channel between the casing and the other end plate and communicating with the individual outlets, check valves in each individual outlet port, and an outlet leading from said last mentioned channel.

2. A multiple stage pump unit, including a gear pump, and another pump, the outlet from one leading to the inlet of the other, said second mentioned pump including a plurality of cylinders having a common communication, a piston loosely mounted in each cylinder, a cam for actuating all of the pistons, the cylinders having a common discharge, and power means connected to the gear pump, said gear pump including meshing gears of different diameters for effecting a change of speed, said power means being connected to one of the gear pump shafts and the other gear pump shaft being directly connected to the cam.

3. A multiple stage pump unit, including a gear pump, and another pump, the outlet from one leading to the inlet of the other, said second mentioned pump including a plurality of cylinders having a common communication, a piston loosely mounted in each cylinder, a cam for actuating all of the pistons, the cylinders having a common discharge, power means connected to the gear pump, said gear pump including meshing gears of different diameters for effecting a change of speed, said power means being connected to one of the gear pump shafts and the other pump shaft being operatively connected to the cam, and a relief by-pass from the communication between the two pumps to the intake of the low pressure pump.

HURSHEL H. FITCH.
EDWARD L. FRAUENFELDER.