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2 Sheets-Sheet 1

FIG. 2.

FIG. 1.

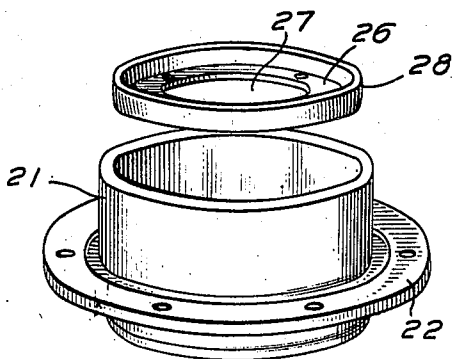
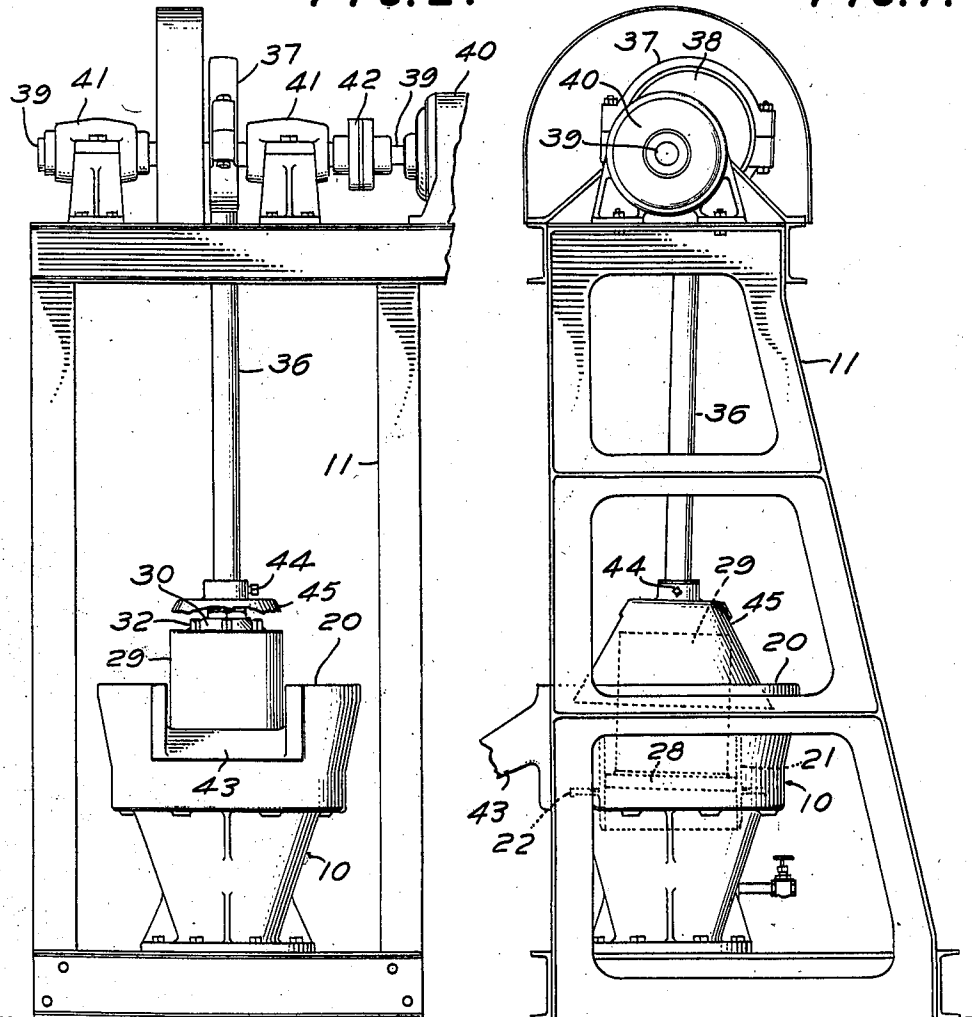


FIG. 3.

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3 Claims. (Cl. 103—178)

This invention relates to pumps of the reciprocating plunger type, especially that kind that have the capacity of pumping a constant volume. Such pumps are used for instance in pumping inorganic metallurgical pulps and slurries as well as organic muds such as those produced in the manufacture of sugar. This type of pump is rather well known in the art and is represented by the Dorrco Pump such as is made by The Dorr Company, Inc., of 570 Lexington Avenue, New York, N. Y. This pump is characterized by having an annular rubber diaphragm that is fixed to the stationary pump casing at its periphery and to the reciprocable connecting rod of the pump at its inner edge, so that reciprocation of the connecting rod flexes and unflexes the rubber diaphragm to cause pumping action. With the coming of war and the restrictions on the use and export of rubber articles, a substitute therefor is to be sought, so this invention comprises the substitution of metallic parts for the rubber diaphragm in said pumps, and especially as replacement parts for such existing pumps.

More particularly, this invention proposes to substitute a fixed cylinder for attachment to that part of the pump casing to which the periphery of the rubber diaphragm was heretofore fixed, and to provide a plunger piston or piston-like plate for attachment to the reciprocable connecting rod to which the rubber diaphragm is usually connected at its inner edge. This plunger, piston or piston plate is characterized by having its edge formed like a flange whose outer edge or skirt is curved arcuately. The purpose of this is to permit the piston to rock or tilt within its cylinder while still maintaining a tight fit thereagainst during its entire period of reciprocation.

With other objects and features of invention in view, the invention is illustrated in the accompanying drawings, in which Figure 1 shows an end view with parts shown in dotted lines, of a pump embodying this invention; Fig. 2 shows a front view thereof; Fig. 3 shows an isometric view of particular features of the invention; and Fig. 4 is a vertical sectional partial view of a pump embodying this invention; and Fig. 5 shows in perspective, with a section thereof broken away, a modified form of a piston plunger ring that may be used.

Similar reference numerals represent similar parts throughout the drawings in which 10 designates a pump casing mounted upon the lower portion of a frame 11. Upon the upper portion of said frame, a driving means is mounted which

will be hereinafter fully described. The pump casing is formed, at its lower end, with an annular attachment flange 12 and an inlet passage 13 extending therethrough. A ledge 14 is formed at the upper end of inlet passage 13 and carries thereon a valve seat or gasket 15 which engages a valve cap 16 along the annular edge 17. Said valve cap is formed with fins or guides 18 which engage through the inlet passage.

The wall of the pump casing extends upwardly and outwardly to form an annular shoulder 19 and a second ledge 19' and a wider opening 20 at its top.

A cylindrical member 21, formed with an annular flange 22, is attached to the pump casing 10 by means of the bolts 23 engaging the flange 22 and shoulder 19 to be secured thereto by the cap nuts 24. Interposed between the flange 22 and the annular shoulder 19, is a gasket or washer 25, which usually can be made from the rubber diaphragm replaced by this invention.

A plunger piston 26, having a central opening or passage 27, engages within the aforesaid cylindrical member 21, that is, with the base thereof, and is formed with a peripheral arcuate surface at 28 to form a tight contact with the side of the cylinder during a tilting movement imparted to the said plunger piston during its operation as is hereinafter explained. This plunger piston is mounted upon the lower ends of legs 29 of a yoke member 30, and is securely attached thereto by the bolts 31 and cap nuts 32.

A washer 33 is secured around the edge of the aforesaid opening 27 and forms a seat for the valve 34 which is provided with fins or guides 35 adapted to engage through the opening 27.

This yoke member 30 is securely attached to a rocking arm or rod 36 which terminates, at its upper end, in a cam yoke 37 which in turn engages a cam 38 eccentrically mounted upon a shaft 39 of a driving unit 40. This said shaft extends through and is carried by bearing blocks 41. A suitable clutch 42 may be provided. The driving unit and bearing blocks are securely attached to the upper portion of the frame 11.

A discharging lip 43 may be formed at one side of the said pump casing. Attached to the rod 36 by means of a set screw 44 is a splash guard 45.

In operation, the plunger piston 26 is given a rocking reciprocating motion within the cylinder 21 by means of the attached rod 36 which is in turn actuated by its cam connection 37 with the eccentric cam 38 upon the shaft 39. Rotary motion is imparted to the shaft by its connected driving unit 40. During the reciprocating move-

ment of the connecting rod, an oscillating movement will be imparted to it and this movement will in turn give to the plunger piston during its travel a tilting or rocking motion within the cylinder 21. In order, therefore, to prevent binding and to assure a tight contact of the plunger piston within the cylinder base, the plunger piston is formed with an arcuate contacting surface, as shown.

As heretofore set forth, the invention is designed to act as an interchangeable replacement for a rubber diaphragm which was formerly used in attachment to the lower part of the yoke member 29 and held in place upon the annular shoulder 19 on ledge 19'. The replacement unit therefore comprises the cylinder 21 which is attached by the laterally extending flange 22, and the arcuate piston operating therein, both of which are shown in perspective in Fig. 3.

A modified form of piston plunger ring is shown in Fig. 5. It comprises a structure wherein a ring 46 of leather or other resilient or flexible material is held between clamping rings to complete a piston plunger having a tight contact with the surrounding cylindrical wall. The rings just referred to have holes 49 for receiving the bolts 31 having cap nuts 32. These bolts serve to hold the plunger piston ring of this Fig. 5 securely in position upon the legs 29 of the aforesaid yoke member 30 and at the same time they accomplish a firm clamping of the ring member 46 between the clamping rings 47 and 48 as the bolts draw the piston plunger ring tightly into position upon said yoke member. The rings 47 and 48 serve to sufficiently compress the ring member 46 so as to forcibly cause the outer periphery of the latter to bulge to form an arcuate marginal surface 50 shown in the drawings. The arcuate surface and the resiliency of the ring 46 permit and insure constant contact with the inside surface or cylindrical wall 21 during the rocking motion imparted to the plunger piston by the connected reciprocally moving and oscillating rod 31.

Other modifications may be embodied in this

invention without departing from the spirit and scope thereof.

I claim:

1. In a reciprocable plunger pump having a pump body having an inlet, an outlet, and being chambered to provide a flow passage from the inlet to the outlet, as well as being provided with an intake valve, a discharge lip and an annular shoulder below the lip; a frame for the pump, driving means supported therefrom, an eccentric driven by the driving means, tiltable plunger means, a discharge valve carried thereby and connecting rod means connecting said plunger to said eccentric; the arrangement characterized by an open cylinder having a flange on its exterior, means for securing said flange to said shoulder and an arcuate face on said plunger means coacting with the interior of said cylinder.
2. In a reciprocable plunger pump having a pump body having an inlet, an outlet, and being chambered to provide a flow passage from the inlet to the outlet, as well as being provided with an intake valve and an annular shoulder; a frame for the pump, driving means supported therefrom, an eccentric driven by the driving means, a tiltable reciprocable yoke member, a discharge valve carried thereby, connecting rod means connecting the yoke member to the eccentric, an open cylinder fixedly supported from said shoulder, an annular plunger carried by the yoke member, and an arcuate face on the plunger for tiltably and reciprocally coacting with the bore of the cylinder.
3. A sub-combination of cooperative parts for a reciprocable plunger pump, comprising an open cylinder, a flange integrally carried exteriorly thereof intermediate of its extremities, said flange having bolt holes therethrough, and an annular plunger adapted for rockable reciprocation in said cylinder having its edge portion provided with an arcuate face adapted for contact with the bore of the cylinder during such rockable reciprocation, and a valve seat carried by the plunger.

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