Dec. 10, 1929. E. M. SCOVILLE 1,738,735

MULTIFEED PUMP

Filed May 5, 1927 3 Sheets-Sheet 1

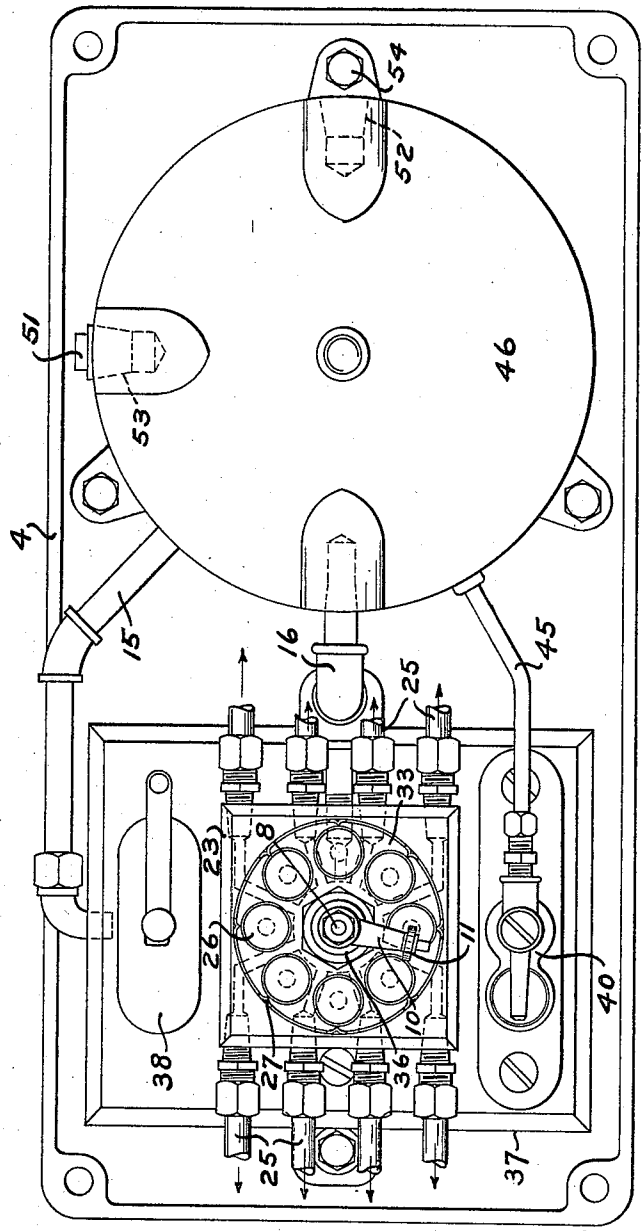


Fig. 1

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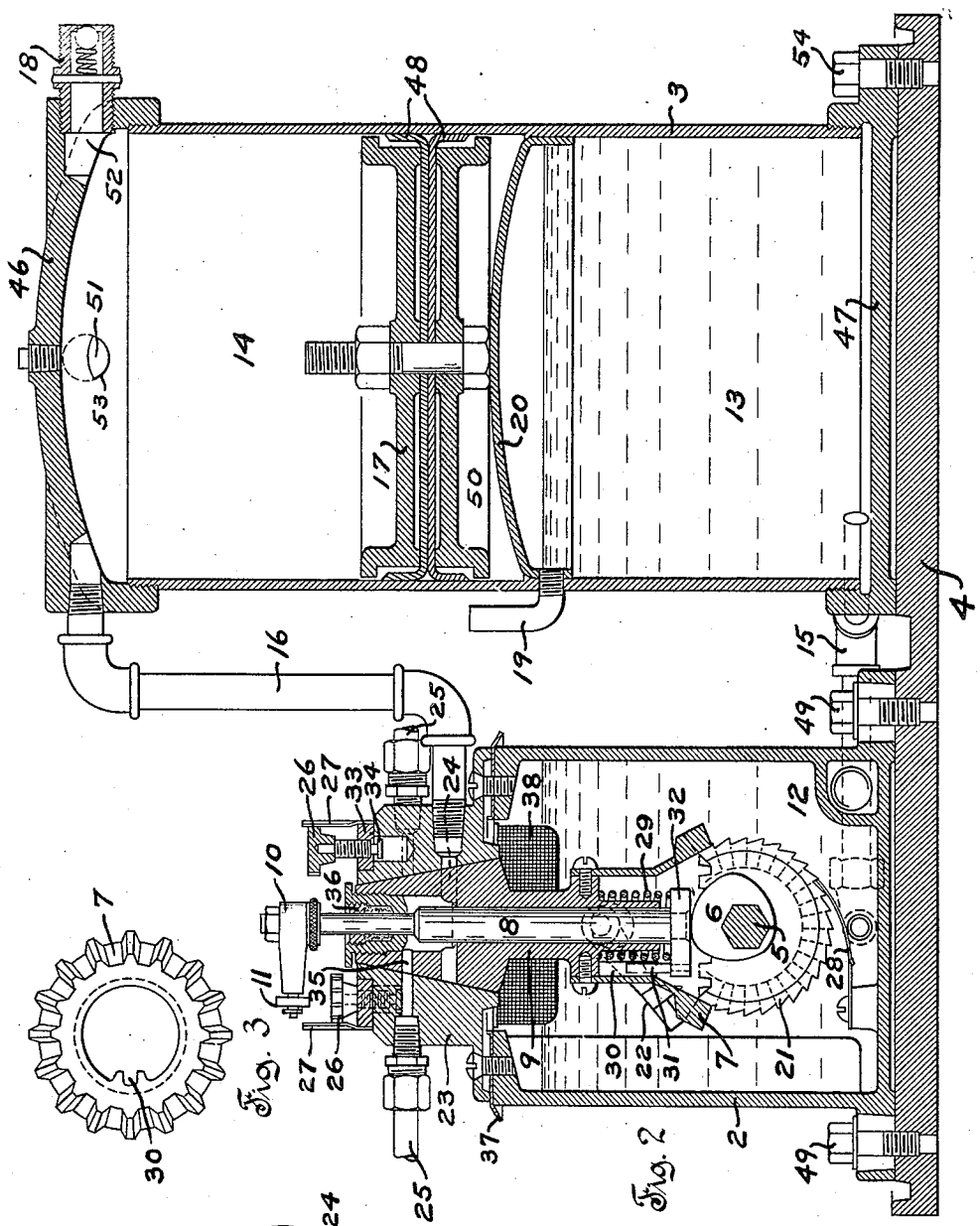


Fig. 3

Fig. 2

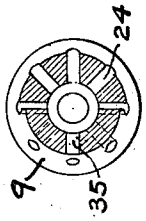


Fig. 4

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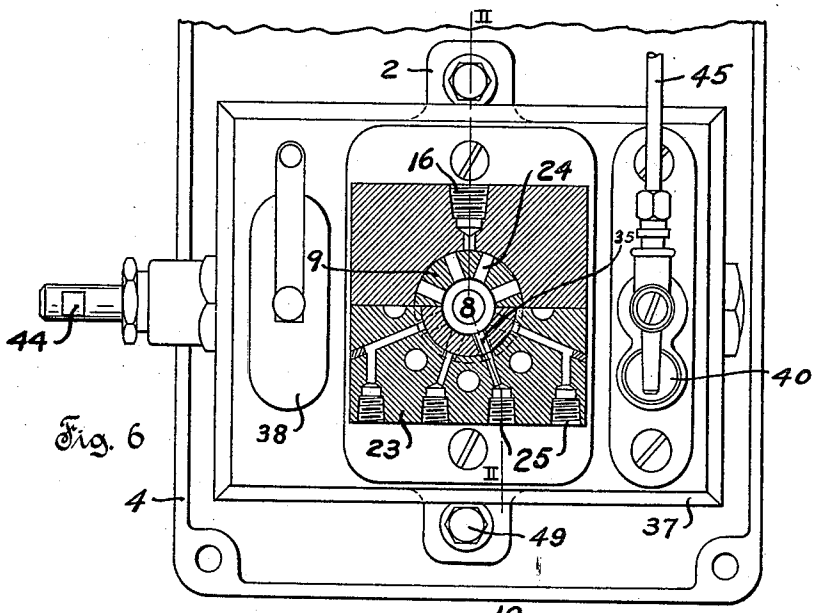


Fig. 6

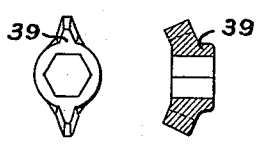


Fig. 8 Fig. 7

Fig. 5

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UNITED STATES PATENT OFFICE

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MULTIFEED PUMP

Application filed May 5, 1927. Serial No. 188,947.

This invention relates in general to improvements in the art of pumping and of distributing fluent materials to sources of utilization, and relates more specifically to improvements in the construction and operation of mechanism for delivering fluent substances such as grease or oil in regulated quantities to one or more distribution lines.

An object of the invention is to provide an improved variable capacity pump which is capable of effectively handling semi-fluids such as grease or relatively heavy oil. Another object of the invention is to provide a simple and compact mechanism especially adapted to deliver variable but accurately measured quantities of fluent material, to a plurality of independent sources of utilization. A further object of the invention is to provide a new and useful pump structure which is capable of automatically delivering grease or the like to several independent distribution lines, from a common source of supply. Still another object of the invention is to provide conveniently manipulable and accurately functioning means for independently adjusting the quantity of fluent substance delivered to each of several sources of utilization. Another object of the invention is to provide improved pumping mechanism all parts of which may be readily manufactured, assembled and dismantled, and the various elements of which are conveniently accessible for inspection, manipulation and adjustment. These and other objects and advantages of the present improvement will be apparent from the following description.

Some of the novel features of fluid pumping and distributing mechanism disclosed but not specifically claimed herein, form the subject of copending applications S. N. 747,697, filed November 3, 1924, and Serial No. 59,766 filed October 1, 1925.

A clear conception of embodiments of the various novel features of the present improvement, and of the mode of manufacturing, assembling and operating devices construtcted in accordance therewith, may be had by referring to the drawings accompanying and forming a part of this specification in which like reference characters designate the same or similar parts in the various views.

Fig. 1 is a top view of an improved multi-feed grease pump and of the grease supply mechanism thereof.

Fig. 2 is a longitudinal vertical section through the improved multi-feed grease pump and its supply mechanism.

Fig. 3 is a bottom view of the cylinder and plunger rotating gear of the multi-feed grease pump.

Fig. 4 is an irregular horizontal section through the pump cylinder of the multi-feed pump.

Fig. 5 is a transverse vertical section through the multi-feed pump supporting base plate and casing.

Fig. 6 is a fragmentary part sectional top view of the multi-feed pump, one part of the section being taken in the horizontal plane of the grease inlet, and the other part of the section being taken in the horizontal plane of the discharge lines.

Fig. 7 is a vertical section through the toothed element which rotates the pump cylinder and plunger.

Fig. 8 is an end elevation of the toothed element shown in section in Fig. 7.

The improved multi-feed grease pumping mechanism specifically illustrated in the drawings, comprises in general a grease and oil supply reservoir; a multi-feed grease pump and an oil pump 40 mounted upon a common pump supporting casing 2; and a common base plate 4 providing a support for the supply reservoir and for the pump casing.

The grease and oil supply reservoir consists of a cylindrical tubular casing 3 secured to a bottom plate 47 and having its upper end closed by means of a cap 46. A stationary transverse partition 20 divides the casing 3 into a lower reserve oil supply chamber 13, and an upper compartment, the latter being sub-divided by means of a vertically movable piston 17. into a grease supply chamber 14 and an oil pressure chamber 50. The bottom plate 47 is detachably associated with the base plate 4 by means of cap screws 54, and has an oil discharge pipe 15 associated therewith and connecting the supply cham-

ber 13 with the interior chamber 12 of the pump casing 2. The upper portion of the chamber 13 is provided with a vent 19, and the piston 17 comprises a pair of cup shaped packings 48 clamped between top and bottom plates. The upper cap 46 has a grease delivery pipe 16 associated therewith, and is provided with several threaded openings 52, 53, either one of which may be normally sealed by means of a pipe plug 51 and the other of which has a valved grease supply fitting 18 associated therewith.

The multi-feed grease pump consists of a stationary frame 23 having a central tapered bore and a plurality of independent distribution lines 25 communicating radially with the bore and detachably associated with the frame 23. A pump cylinder 9 is rotatably associated with the tapered bore of the frame 23, and has a central displacement chamber or bore within which a pump plunger 8 is reciprocable. The cylinder 9 is provided with an annular series of radially disposed suction passages 24 which are successively communicable with the grease supply pipe 16 through a common port in the frame 23, and also has a single radially disposed discharge port 35 which is successively communicable with the distribution lines 25. An annular toothed member or gear 7 is detachably attached to the medial portion of the cylinder 9 and has an internal recess 30 therein. The lower end of the plunger 8 is secured to an actuating shoe 32 which carries a pin 31 cooperable with the recess 30 to positively prevent relative rotation of the cylinder 9 and plunger 8. A helical spring 29 coacts with the cylinder 9 and with the plunger shoe 32, and tends to urge the cylinder 9 upwardly into the bore of the frame 23 and to simultaneously urge the plunger 8 downwardly within the cylinder. The upper reduced portion of the plunger 8 slidably engages a stuffing box or packing 36, and carries a laterally extending arm 10 having a roller 11 rotatably associated with the outer end thereof. The roller 11 is revolvable and reciprocable with the plunger 8, and is capable of cooperating with the successive adjustable stops 26 of an annular series, there being a stop 26 corresponding to each of the distribution lines 25. The stops 26 are mounted upon adjusting screws 34 having threaded engagement with a fixed top plate 33 secured to the pump frame 23, and the notched periphery of each stop 26 is cooperable with a graduated resilient indicator 27 to indicate the setting of the corresponding stop 26 and to lock the stop in adjusted position.

The oil pump 40 has suction pipe 41 communicable through a strainer 55 with the bottom of the oil chamber 12 located within the casing 2 and communicating with the chamber 13 through the pipe 15. The oil pump discharge communicates with the pressure chamber 50 below the piston 17 through a pipe 45, see Figs. 1 and 6. Both the grease pump frame 23 and the oil pump 40 coact with the top of the pump casing 2 through a closure plate 37, and this plate provides a support for a strainer 38 through which oil may be introduced into the chambers 12, 13. The pump supporting casing 2 is adjustably secured to the base plate 4 by means of cap screws 49 as shown in Figs. 2 and 6.

Mounted within the pump casing 2 is a common pump driving shaft 5 for both the grease and the oil pump. The drive shaft 5 has a cam 6 secured thereto and cooperable with the plunger shoe 32 to move the plunger 8 upwardly in opposition to the spring 29. A toothed element 39 shown in detail in Figs. 7 and 8, is also secured to the drive shaft 5 and has two teeth which are intermittently engageable with the successive teeth of the gear 7. A ratchet wheel 21 secured to the drive shaft 5 has teeth formed for engagement with an actuating pawl 22 and with a leaf spring 28, the latter functioning to prevent reverse rotation of the shaft 5. The actuating pawl 22 is carried by the eccentric end 42 of a power shaft 43, the outer opposite end 44 of which is formed for the application of a driving pulley or lever. The driving shaft 5 is enclosed entirely within the casing 2, and the point of penetration of the casing by the power shaft is sealed with a suitable packing. It should be noted that the grease pump as well as the oil pump 40, are freely vertically removable from the casing 2 without disturbing the shafts 5, 43 and the elements carried thereby.

During normal use of the multi-feed grease pumping mechanism, a supply of oil is first introduced into the chambers 12, 13 through the strainer 38, and the chamber 14 is filled with grease through the fitting 18. As the power shaft 43 is rotated, the eccentric end 42 thereof causes the pawl 22 to alternately ride over and engage the teeth of the ratchet wheel 21, thereby imparting intermittent rotary motion to the drive shaft 5. The rotating shaft 5 simultaneously actuates the oil pump 40 and rotates the cam 6 and the element 39. This actuation of the pump 40 causes oil to be withdrawn from the chamber 12 through the suction pipe 41 and to be delivered through the discharge pipe 45 into the displacement chamber 50 thereby gradually raising the piston 17 and forcing grease from the chamber 14 through the pipe 16 as demanded by the grease pump. The rotating cam 6 intermittently forces the grease pump plunger 8 upwardly against the spring 29, while the rotating element 39 intermittently angularly advances both the cylinder 9 and the plunger 8, step by step, about the longitudinal central axis of the piston 8. Since the gear 7 has sixteen teeth and the actuating

element 39 has but two teeth, it will require eight complete revolutions of the shaft 5 in order to produce one complete revolution of the cylinder 9. During one complete revolution of the cylinder 9 and plunger 8, these elements are intermittently angularly advanced sixteen times through equal angles. As there are but eight distribution lines 25 which communicate with radial ports in the frame 23 spaced equi-distant about the cylinder axis, the single discharge port 35 will be placed in communication with the successive distribution lines 25 during eight of the sixteen periods of rest constituting a complete revolution of the cylinder 9, and the successive suction passages 24 will be placed in communication with the supply pipe 16 during the intermediate eight periods of rest. The plunger 8 is forced upwardly by the cam 6 during each of the periods of rest of the cylinder 9 while the discharge port 35 is in communication with a distribution line 25; and is being moved downwardly by the spring 29 during each of the intervening periods of rest while the supply pipe 16 is in communication with one of the suctions passages 24, the strokes of the plunger 8 being controlled by the setting of the stops 26. If the stop 26 of one of the distribution lines 25 is in its extreme upper position of adjustment, the roller 11 carried by the arm 10 will quickly engage the said stop and will thus arrest the downward movement of the plunger 8 causing the cam 6 to leave the plunger shoe 32 after the plunger has been arrested. If one of the stops 26 is in extreme lower position, the roller 11 will not engage the said stop at all and the plunger shoe 32 will be permitted to remain in contact with the cam 6 throughout the corresponding plunger stroke. It will thus be apparent that the plunger stroke may be adjusted independently for each distribution line, anywhere from no stroke to full stroke by merely adjusting the stops 26, in accordance with the feed required in each line. It will also be apparent that during the suction stroke of the plunger 8, grease is forced into the displacement chamber of the cylinder 9 through the pipe 16 from the chamber 14 by the oil pressure in the chamber 50 acting upon the piston 17; the discharge of grease from the displacement chamber of the cylinder 9 in turn being effected directly by the plunger 8 advancing upwardly therein.

From the foregoing description, it will be noted that the improved pumping mechanism will effectively handle semifluids such as grease and will deliver variable but accurately measured quantities of the grease to each of the independent distribution lines 25 for a common supply chamber 14. The quantities of grease delivered may be conveniently varied during normal operation of the unit, by adjusting the stops 26 and the indicators 27 readily show the variations in the stroke of the plunger 8. The recess 30 and pin 31 constitute means for simultaneously rotating the cylinder 9 and plunger 8 thereby automatically advancing the arm 10 and roller 11 to positions of coaction with the successive stops 26. The spring 29 constitutes common means for simultaneously urging the plunger 8 downwardly and for pressing the cylinder 9 into the tapered bore of the frame 23, and the packing 36 prevents escape of grease along the reduced portion of the plunger 8. The spring 28 effectively prevents undesirable reverse rotation of the shaft 5, and while this shaft has been described as being intermittently rotated, the shaft 5 may obviously be continuously rotated if desired without departing from the spirit of the invention. The rotation of the shaft 5 may also be effected at any desired speed in order to vary the rate of feed of the grease.

By mounting the casing 2 and the supply reservoir upon a common base 4, the entire mechanism may be transported and installed as a unit. The cap screws 49, 54 permit convenient attachment and removal of the pumps and reservoir, and the pumps may be readily removed or applied relative to the casing 2, without disturbing the driving mechanism. The supply reservoir may be quickly recharged when empty, by supplying grease through the fitting 18 thereby forcing the piston 17 downwardly and returning the oil from the chamber 50 to the chambers 12, 13. The oil pump 40 is preferably of the type disclosed in copending application Serial No. 747,697, filed November 3, 1924, which is capable of returning excess oil delivered by the plunger, past a by-pass valve to the supply chamber 12, and wherein the oil from the pressure chamber 50 may likewise be returned to the chamber 12 past the same by-pass valve. The entire unit is obviously extremely simple and compact in construction and is effectively sealed against entry of air to the grease confining chambers and passages thereby insuring maximum efficiency.

It should be understood that it is not desired to limit the invention to the exact details of construction and operation herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

It is claimed and desired to secure by Letters Patent:—

1. In combination, a frame having a bore and also having a plurality of fluid discharge ports and a single fluid supply port terminating directly at said bore, a cylinder rotatably associated with said bore, said cylinder having a single radial through port communicable with said discharge ports in succession and also having a plurality of radial through ports communicable in succession with said supply port, and a plunger reciprocable within said cylinder.

2. In combination, a frame having a bore and also having a plurality of fluid discharge ports and a single fluid supply port terminating directly at said bore, a cylinder rotatably associated with said bore, said cylinder having a single radial through port communicable with said discharge ports in succession and also having a plurality of radial through ports communicable in succession with said supply port, a plunger reciprocable within said cylinder, and means for moving said plunger relative to said cylinder only while the latter is at rest and when only one of said cylinder ports is in full open communication with a frame port.

3. In combination, a frame having a bore, said frame having a plurality of fluid discharge ports lying in a common plane and also having a single fluid supply port lying in another plane, a cylinder rotatably associated with said bore, said cylinder having a single radial through port disposed in the plane of and communicable directly at said bore with said discharge ports in succession and also having a plurality of radial through ports disposed in the plane of and communicable in succession directly at said bore with said supply port, and a plunger reciprocable within said cylinder.

4. In combination, a frame having a bore, said frame having a plurality of fluid discharge ports lying in a common plane and also having a single fluid supply port lying in another plane, a cylinder rotatably associated with said bore, said cylinder having a single radial through port disposed in the plane of and communicable directly at said bore with said discharge ports in succession and also having a plurality of radial through ports disposed in the plane of and communicable in succession directly at said bore with said supply port, a plunger reciprocable within said cylinder, and means for moving said plunger relative to said cylinder only while the latter is at rest and when only one of said cylinder ports is in full open communication with a frame port.

5. In combination, a frame having a bore and also having a plurality of fluid discharge ports and a single fluid supply port terminating directly at said bore, a cylinder rotatably associated with said bore, said cylinder having a radial through port communicable with said discharge ports in succession and also having a plurality of radial through ports communicable in succession with said supply port, a plunger reciprocable within said cylinder, and independently functioning adjustable means for varying the stroke of said plunger with respect to each of said discharge ports.

6. In combination, a frame having a bore and also having a plurality of fluid discharge ports and a single fluid supply port terminating directly at said bore, a cylinder rotatably associated with said bore, said cylinder having a radial through port communicable with said discharge ports in succession and also having a plurality of radial through ports communicable in succession with said supply port, a plunger reciprocable within said cylinder, independently functioning adjustable means for varying the stroke of said plunger with respect to each of said discharge ports, and means for moving said plunger relative to said cylinder only while the latter is at rest and when only one of said cylinder ports is in full open communication with a frame port.

7. In combination a frame having a tapered bore, said frame having a plurality of fluid discharge ports lying in a plane and terminating directly at said bore and also having a single fluid supply port lying in another plane and terminating directly at a portion of said bore having larger diameter, a cylinder rotatably associated with and snugly fitting said bore, said cylinder having a single through port disposed in the plane of and communicable with said discharge ports in succession and also having a series of radial through ports disposed in the plane of and communicable in succession with said supply port, a plunger reciprocable within said cylinder, and common driving means for rotating said cylinder and for reciprocating said plunger, said frame and said cylinder being freely removable as a unit from said driving means without disturbing the latter.

In testimony whereof, the signature of the inventor is affixed hereto.

EUGENE M. SCOVILLE.