Oct. 25, 1960 L. G. NAEF 2,957,430

CEMENT PUMP UNIT

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Fig. 1

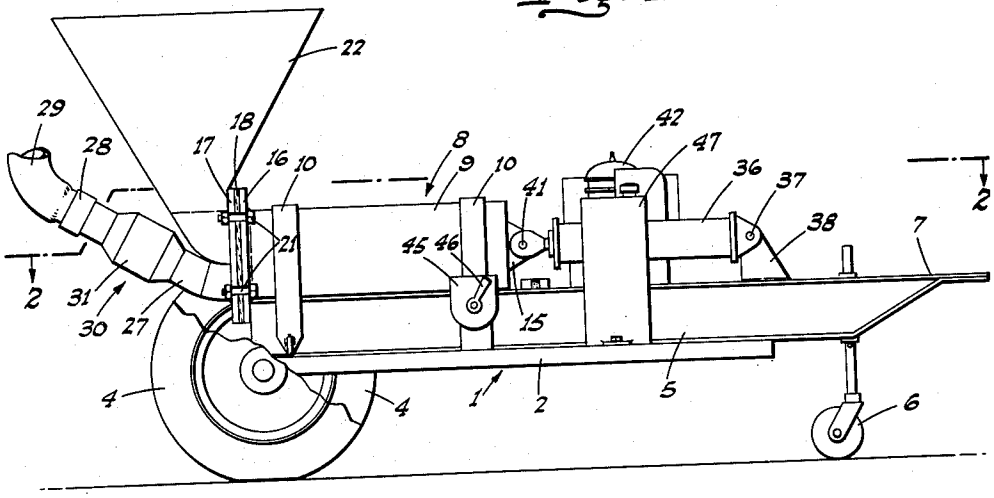
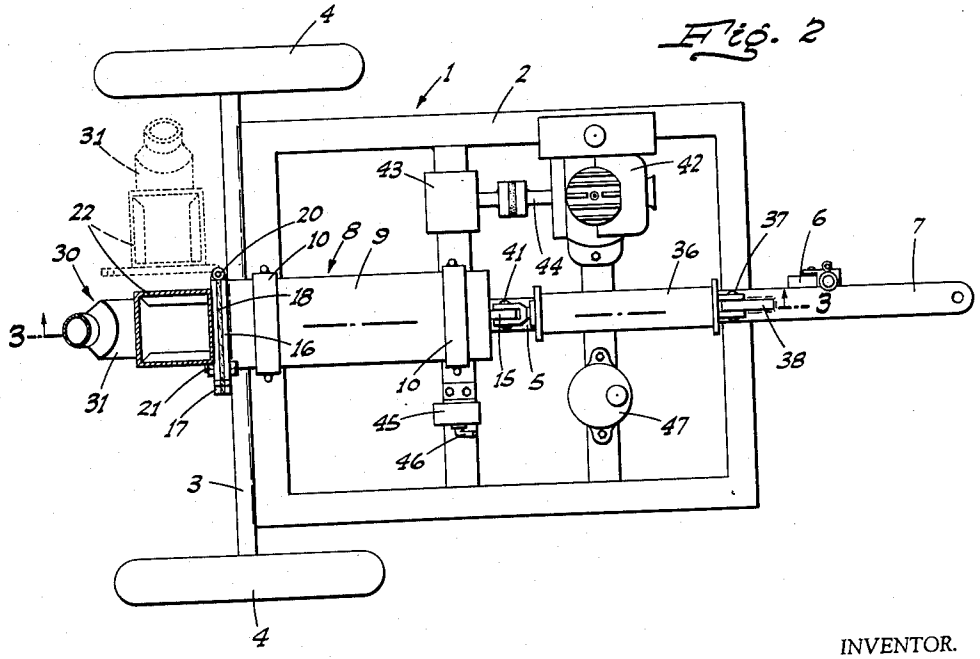


Fig. 2



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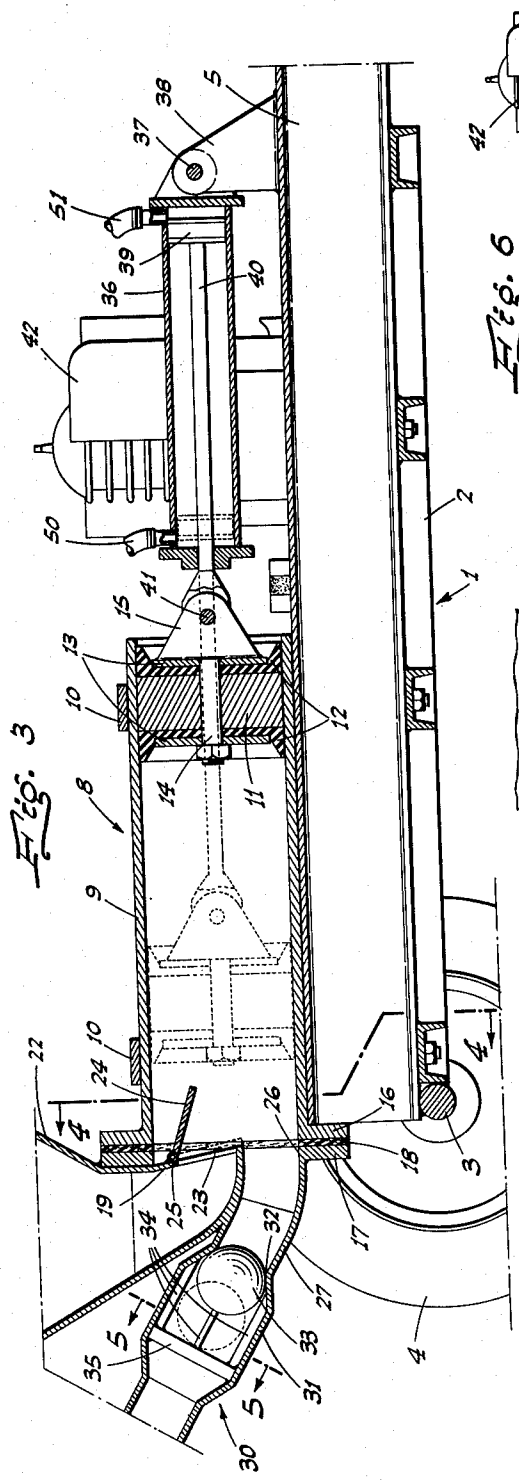


Fig. 3

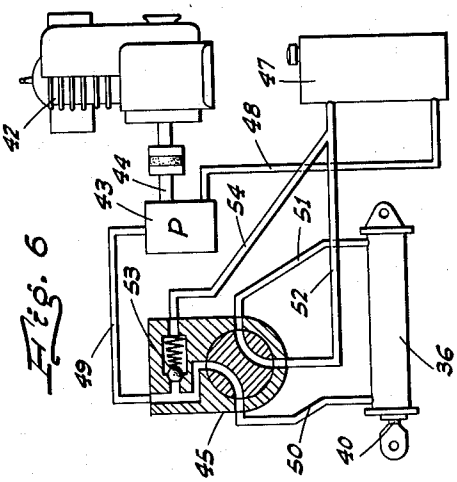


Fig. 6

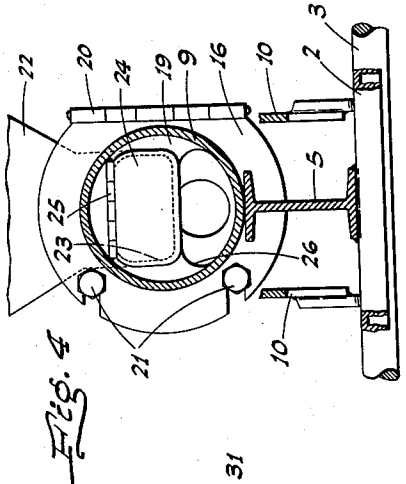


Fig. 4

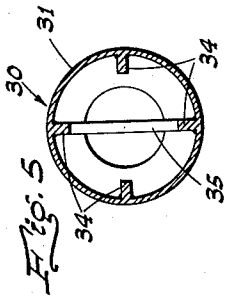


Fig. 5

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CEMENT PUMP UNIT

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5 Claims. (Cl. 103—153)

The present invention is directed to, and it is a major object to provide, a novel power actuated pump unit adapted to feed fluid—but relatively heavy—material from a supply hopper to a delivery hose; the apparatus being especially designed—but not limited—for pumping grout-type cement mix.

In certain instances the cement mix must be poured from a point a substantial distance above ground, as—for example—when filling, from above, the cells of a wall constructed of hollow concrete blocks. Under such circumstance direct pouring from the cement mixer is not possible, and heretofore the mix has commonly been elevated to the pouring point by a bucket or the like; obviously a slow, impractical, and uneconomic operation.

It is therefore another important object of this invention to provide a power actuated cement pump unit which is adapted to force-feed a cement mix from a supply hopper through a deliver hose, with sufficient pressure in said hose to permit the discharge end thereof to be disposed a considerable distance above ground, without impairing positive flow of the mix through the hose and ultimate discharge therefrom.

An additional object of the invention is to provide a cement pump unit which is constructed in a manner to withstand the heavy working conditions to which it is subjected when in use.

A further object of the invention is to provide a cement pump unit which is readily portable; the apparatus being mounted on a trailer adapted to be coupled to a towing vehicle, such as a pick-up truck.

It is also an object of the invention to provide a cement pump unit which is designed for ease and economy of manufacture, ease of use, and long satisfactory service with a minimum of maintenance being required.

Another object of the invention is to provide a practical and reliable cement pump unit, and one which will be exceedingly effective for the purpose for which it is designed.

These objects are accomplished by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings:

Fig. 1 is a side elevation of the trailer-mounted cement pump unit.

Fig. 2 is a horizontal plan view taken on line 2—2 of Fig. 1; the feed hopper and the delivery hose being in section.

Fig. 3 is a longitudinal enlarged sectional elevation taken on line 3—3 of Fig. 2.

Fig. 4 is a transverse sectional elevation taken on line 4—4 of Fig. 3.

Fig. 5 is a fragmentary transverse section on line 5—5 of Fig. 3.

Fig. 6 is a diagrammatic illustration of the valve controlled, fluid pressure system for the power cylinder.

Referring now more particularly to the drawings, and to the characters of reference marked thereon, the apparatus comprises a trailer, indicated generally at 1, which

includes a substantially horizontally disposed, rectangular frame 2 fitted at the rear with an axle 3 on the ends of which rubber-tire wheels 4 are journaled.

A central heavy-duty, longitudinal beam 5 is fixed on top of the frame 2 and extends from the rear thereof to a front end termination ahead of such frame; the forward portion of said beam 5 being supported by a vertically adjustable front dolly wheel 6, and a tongue 7 projects from the front end of said beam for coupling to a towing vehicle.

A pump, indicated generally at 8, is mounted on the rear portion of the longitudinal beam 5, and such pump comprises a heavy-duty, tubular pump cylinder or body 9 which rests lengthwise on beam 5; being rigidly mounted thereon by hold-down straps 10 anchored at their lower ends to the frame 2.

In addition to the tubular body 9 the pump 8 includes—in said body—a pump plunger or piston 11 fitted on opposite ends with cup-type washers or seals 12 held in place against the piston 11 by washers 13 and a center bolt 14. At the outer end of the piston 11 the center bolt 14 secures a clevis 15 thereto for connection with the power means—hereinafter described—which reciprocates the piston 11 in the tubular body 9.

Such tubular body 9 is formed at its rear end with a continuous, radially outwardly projecting flange 16 which mates with an external mounting or attachment ring 17; there being a sealing gasket 18 between flange 10 and ring 17.

The mounting ring 17 is provided with an end closure plate 19 passaged as hereinafter described; such mounting ring 17 being vertically hinged on one side, as at 20, to the flange 16 for swinging between a closed position and an open position, as shown in full lines and in dotted lines, respectively, in Fig. 2. On the side opposite the hinge 20 the mounting ring 17 is releasably secured to flange 16 by removable bolts 21.

A mix supply hopper 22 upstands at the rear end of the tubular pump body 9, being fixed in connection with the mounting ring 17, and a lower part of the forward wall of said hopper 22 is included in the upper portion of the closure plate 19.

Such upper portion of the closure plate 19 is provided with a relatively large opening 23 which establishes communication between the bottom of the hopper 22 and the inside of the tubular body 9.

A flap-type check valve 24 is horizontally hinged at its upper edge, as at 25, to the closure plate 19, so that such check valve 24 is adapted to open toward or into the tubular body 9 from a dependent or closed position overlying said opening 23.

With the foregoing arrangement the check valve 24 closes upon advance of the piston 11 and opens upon retraction thereof.

Below the opening 23 with which the check valve 24 cooperates, the closure plate 19 is formed with another opening 26 which communicates with a rigid conduit 27 which extends outwardly and upwardly rearwardly of the feed hopper 22. The rigid conduit 27 is relatively short, and at its outer end is adapted to be coupled, as at 28, with a delivery hose, shown in part at 29 but which in practice is of substantial length.

Intermediate its ends the rigid conduit 27 is formed with a ball-type check valve unit, indicated generally at 30, and which closes in the direction of the tubular body 9. Such check valve unit 30 is comprised of an enlargement in the conduit 27 which forms a cylindrical valve body 31, the inner reduced-diameter end of which provides a valve seat 32.

A ball check valve 33—of lesser diameter than the inside diameter of the valve body 31, but of greater diameter than the valve seat 32—is disposed in said

valve body 31, being guided for movement lengthwise therein by a plurality of circumferentially spaced longitudinal guide ribs 34 on the inner wall of such body. The ribs 34 receive the ball check valve 33 with an easy running fit, and the parts are dimensioned so that when said ball check valve 33 is off the valve seat 32 and supported by the ribs 34, material can freely pass through the ball check valve unit 30.

In order to prevent the ball check valve 33 from advancing too far and closing against the outer end of the valve body 31, the latter is fitted—adjacent the end opposite the valve seat 34—with a diametral stop bar 35.

With advance of the piston 11 the ball check valve 33 moves forwardly to open position, but is closed against the valve seat 32 upon retraction of said piston 11.

The pump 8 is power actuated as follows:

A longitudinal power cylinder 36 is disposed above the forward portion of the beam 5; such cylinder being pivotally connected at its forward end, as at 37, to an upstanding bracket 38 on beam 5. The power cylinder 36, which is of double acting type, includes a piston 39 and a rearwardly projecting piston rod 40. At the rear end thereof the piston rod 40 is pivotally attached, as at 41, in the clevis 15 on the outer end of the piston 11.

The double acting power cylinder 36 is operated by means of a valve controlled, fluid pressure system—as shown diagrammatically in Fig. 6—which system includes an engine 42 driving a hydraulic pump 43 through the medium of a drive shaft 44; a four-way valve 45 having a position-control handle 46; and an oil reservoir 47. The engine 42, hydraulic pump 43, valve 45, and reservoir 47 are mounted on the frame 2 in the positions clearly shown in Fig. 2, but wherein—just as in Fig. 1—all of the connecting conduits have been omitted for the sake of clarity.

A supply conduit 48 leads from the bottom of reservoir 46 to pump 43, while a pressure feed conduit 49 connects between the pump 43 and the input side of valve 45.

Separate conduits 50 and 51 lead from the valve 45 to opposite ends of the power cylinder 36, while a return conduit 52 extends from said valve back to the reservoir 46 at the top thereof. The four-way valve 45—which is of a substantially conventional type—is operative in one position to connect the pressure feed conduit 49 with the conduit 50, and the conduit 51 with the return conduit 52. In another—or reverse—position the valve 45 is operative to connect the pressure feed conduit 49 with the conduit 51, and the conduit 50 with the return conduit 52.

It will thus be obvious that by alternately positioning the valve 45—by manipulation of the handle 46—the power cylinder 36 is reversibly actuated; the reciprocation of piston 39 and piston rod 40 causing corresponding movement of the piston 11 and operation of the pump 8.

The valve 45 includes a spring-pressed bypass valve 53 between the pressure feed conduit 49 and another return conduit 54 which feeds into conduit 52. The valve 53 acts to bypass excess pressure to the reservoir 47.

With the power cylinder 36 in operation, and reciprocation of piston 11, cement mix—which is initially delivered to the hopper 22—is drawn into the pump body 9 each time that the piston 11 retracts; the flap-type check valve 24 swinging open as the mix passes from said hopper 22 into such pump body 9. Thereafter, upon the next forward stroke or advance of the piston 11, the flap-type check valve 24 is forced closed and the cement mix in the pump body 9 is forced into the conduit 27, opening the ball-type check valve unit 30 and thence flowing therethrough out of the conduit 27 and into the delivery hose 28.

At its outer or free end (not shown) the delivery hose is preferably fitted with a nozzle, and from which nozzle the cement mix discharges. By the simple expedient of manipulating the outer end of the hose 29, the cement mix can be discharged or poured at any selected point, and which may be at substantial elevation.

The check valve unit 30 serves the purpose of preventing back flow of the cement mix from the delivery hose 29, through the conduit 27, and into the pump body 9 during operation of the apparatus, and particularly upon retraction of the piston 11.

While in the present embodiment the valve 45 is manually controlled by the handle 46 to cause reciprocating action of the power cylinder 36, such valve may be mechanically actuated from the pump 9 in order to accomplish automatic alternate reversal of said valve.

With the described apparatus, cement mix initially delivered to the feed hopper 22 is positively and effectively pumped from such hopper to the delivery hose 29.

After each use of the apparatus, and at which time it is necessary to flush out the cement mix from the working parts thereof, the bolts 21 are released, and the mounting ring 17—which carries the hopper 22 and rigid conduit 27—is swung from its closed position—as in full lines—to its open position—as in dotted lines—in Fig. 2. This exposes or opens all of the working parts of the apparatus so that they may be flushed with water in order to remove any remaining cement mix.

When the mounting ring is swung to its open position, the assembly of such ring, hopper 22, and conduit 17, is disposed in the direction but clear of the adjacent trailer wheel 4. Also, at such time, the parts are all readily accessible at the rear of the trailer for flushing with water as described.

From the foregoing description it will be readily seen that there has been produced such an apparatus as will substantially fulfill the objects of the invention, as set forth herein.

While this specification sets forth in detail the present and preferred construction of the apparatus, still in practice such deviations therefrom may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described the invention, the following is claimed as new and useful, and upon which Letters Patent are desired:

1. In a cement pump unit which includes a power actuated pump, a hopper connected in mix feeding relation to the pump, a conduit connected in mix receiving relation to the pump, and check valves mounted on said hopper and conduit arranged to prevent back flow from the pump to the hopper, and from the conduit to the pump, respectively; the pump including a body having an initially open end, an initially separate closure structure at said end of the body, and means mounting said closure structure on the body for movement between a normally closed position and an open position while remaining connected to the body; the hopper, the conduit, and the check valves being supported by and movable with the closure structure.

2. A unit, as in claim 1, in which both check valves are exposed for cleaning action upon the closure structure being moved to said open position.

3. A pump unit, for cement mix, comprising a frame, a pump on the frame, said pump including a tubular body having a closure structure at one end, and a piston in the body reciprocable relative to said end; power means to reciprocate the piston, a hopper connected in mix feeding relation to the pump adjacent said closure structure, a conduit connected in mix receiving relation to the pump adjacent said closure structure, and check valves mounted on said hopper and conduit arranged to prevent back-flow from the pump to the hopper, and from the conduit to the pump, respectively; the closure structure being initially separate and mounted on the pump body for movement between a normally closed position

and an open position; the hopper and the conduit being supported by and movable with the closure structure.

4. A pump unit, for cement mix, comprising a trailer including a frame, a power actuated pump mounted on the frame, the pump including an inlet opening and an outlet opening, a hopper mounted on the pump and communicating in mix feeding relation with the inlet opening, a conduit mounted on the pump and communicating in mix receiving relation with the outlet opening, and check valves mounted on said hopper and conduit arranged to prevent back flow from the pump to the hopper, and from the conduit to the pump, respectively; the trailer including transversely spaced rear wheels and the pump embodying a tubular body mounted on the frame lengthwise thereof and whose rear end is adjacent the corresponding end of the frame between said rear wheels, a closure structure on the rear end of the pump body on which said hopper and conduit are mounted, and means mounting the closure structure on the body for lateral swinging movement together with the hopper and conduit thereon from a normally closed position to an open position laterally inwardly of the corresponding rear wheel of the trailer.

5. In a cement pump unit which includes a tubular pump body initially freely open at its discharge end and having a piston reciprocable therein; an enlarged flange

rigid with and extending about the pump body at said end thereof, a gasketed mounting ring normally engaging the outer face of the flange, a hopper secured on and projecting upwardly from the ring, said hopper terminating at its lower end above the bottom of the pump body and mounting ring and providing an outlet communicating with the discharge end of said pump body, a flap check valve mounted in connection with the hopper to cover said outlet and opening toward the pump body, a delivery conduit leading from and rigid with the mounting ring below the lower end of the hopper and communicating with the discharge end of the pump body, a ball check valve in said conduit adjacent the mounting ring and opening away from the pump body, and a vertical-axis hinge connecting the mounting ring on one side to said body-mounted flange.

References Cited in the file of this patent

UNITED STATES PATENTS

1,697,487	Wright	Jan. 1, 1929
2,384,783	Longenecker	Sept. 11, 1945
2,549,851	Pope	Apr. 24, 1951

FOREIGN PATENTS

597,946	Germany	Jan. 5, 1934