Dec. 16, 1947. C. I. LONGENECKER 2,432,671

GROUTING ATTACHMENT FOR CONCRETE PUMPS

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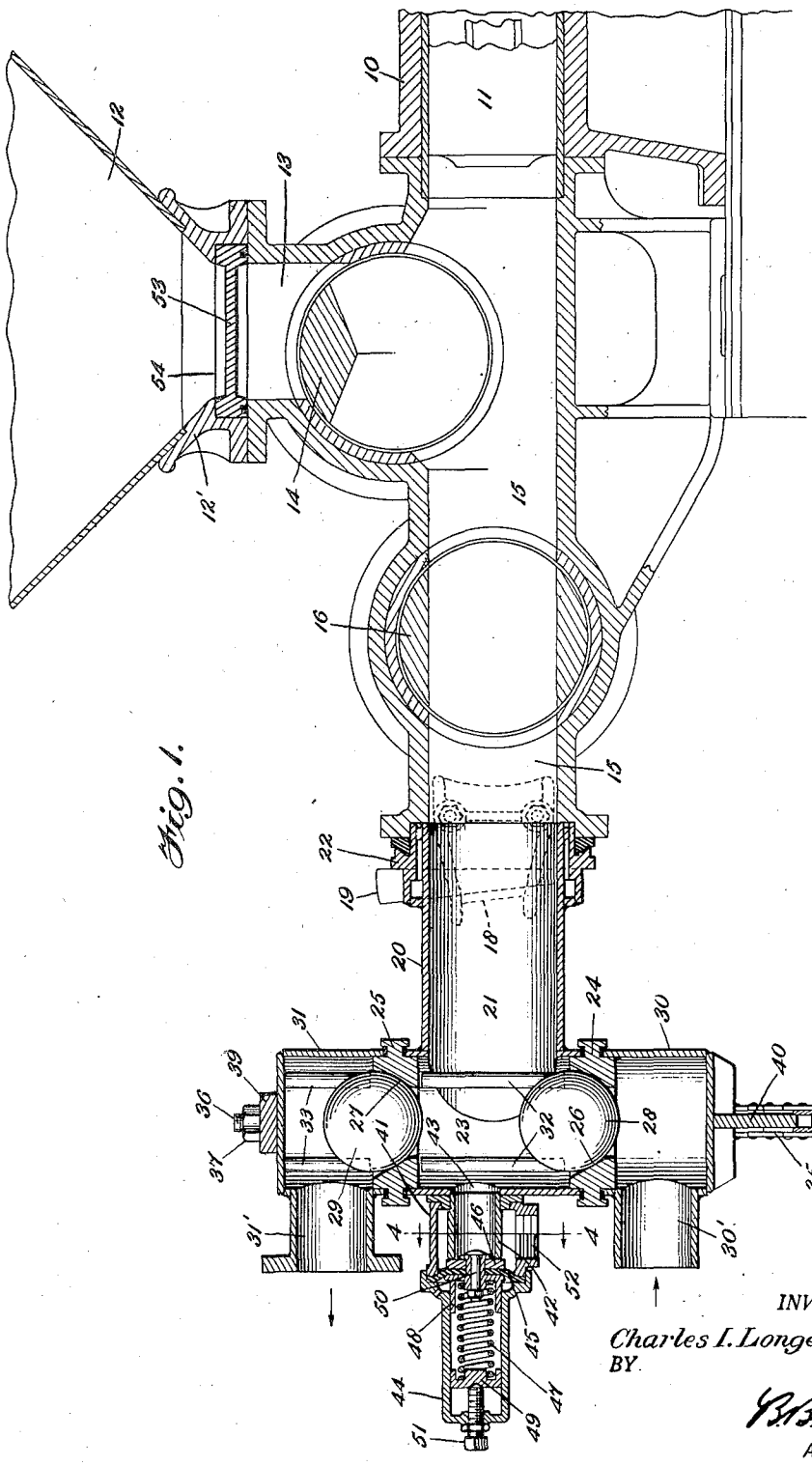

Fig. 1.

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Fig. 2.

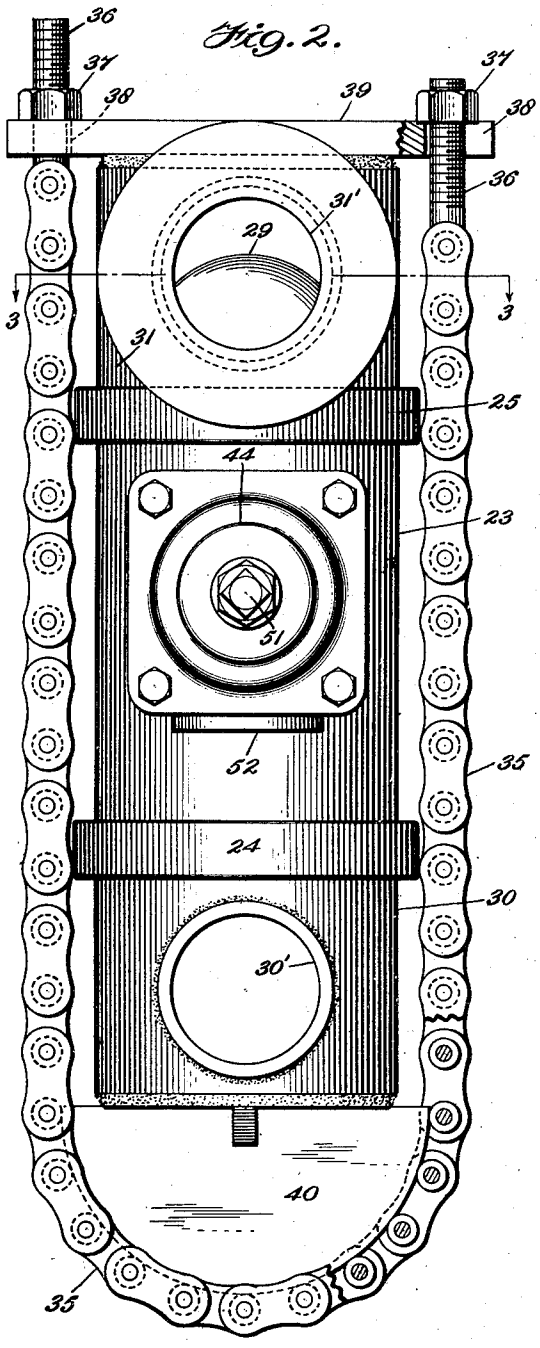


Fig. 3.

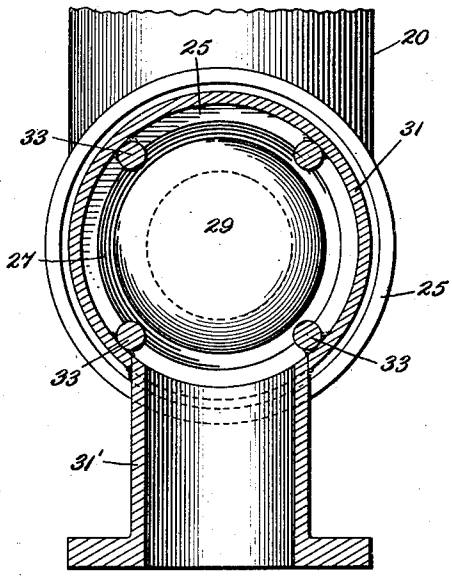
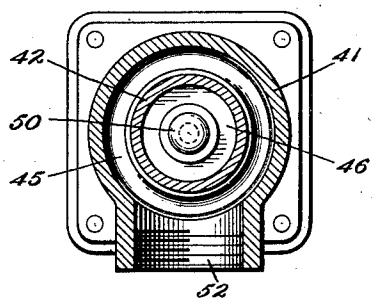


Fig. 4.



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GROUTING ATTACHMENT FOR CONCRETE PUMPS

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3 Claims. (Cl. 103—1)

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The invention relates to concrete pumps, more particularly those of the type disclosed and claimed in U. S. Patent No. 2,017,975 granted October 22, 1935, to Jacobus C. Kooyman, and has for its principal object the provision of an attachment for such a pump whereby it may be efficiently employed for the pumping of grout, mortar or similar materials which are devoid of the coarse aggregate which constitutes an essential constituent of the concrete mixtures which the pumps are primarily designed to handle.

As is now well known to those skilled in the art, and as will be clear from the above mentioned patent, the valves of these pumps are deliberately provided with clearances which, while not sufficiently great to permit passage of the coarse aggregate through them, are still large enough to allow at least the finer portions of the small aggregate, and the water-cement paste which constitutes the binder, to pass or work through them. These clearances may be on the order of $\frac{1}{16}$ of an inch when the parts are new, but the pumps will still handle concrete mixtures effectively even though the clearances may be increased through wear up to say $\frac{3}{16}$ or $\frac{1}{4}$ of an inch.

Clearances of this order are of course quite contrary to accepted practice in valves for liquid or gas pumps, and are permissible in concrete work only because of the presence of the large aggregate in the mixture. However, since grout or mortar contains no such large aggregate, whereby at least an appreciable portion of such a mixture will more or less readily pass or work its way through a clearance of even $\frac{1}{16}$ of an inch, obviously the pumps are not effective for the handling of such grout or mortar mixtures.

The present invention however provides a relatively simple device comprising a valve body or housing which may be quickly and easily attached to and detached from a pump of the above type beyond the outlet valve thereof, which housing is provided with inlet and outlet ports controlled by valves other than those of the pump and which are so constructed and arranged as to be capable of efficiently handling materials that are devoid of stowage-inducing aggregates, whereby the pump may be employed to force grout, mortar or similar materials through the pipe line. The attachment comprises relatively few parts, which are so constructed and arranged as to facilitate their disassembly and reassembly for purposes of cleaning at the conclusion of use or at other times.

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A typical example of the grout handling attachment is illustrated in the accompanying drawings forming a part of this specification, in which:

Figure 1 is a longitudinal sectional view through the valves, charging hopper and a portion of the working cylinder of a concrete pump of the general type mentioned above, with one form of grout handling device in accordance with the invention in operative position relative thereto;

Fig. 2 is an enlarged end elevational view of the device, as seen from the left of Fig. 1;

Fig. 3 is a horizontal sectional view, on approximately the plane indicated by the line 3—3 in Fig. 2, looking down; and

Fig. 4 is a detail cross sectional view on the plane indicated by line 4—4 of Fig. 1, looking in the direction of the arrows.

In the said drawings, 10 indicates the working cylinder of the pump, in which a piston or plunger 11 reciprocates to alternately draw concrete mixture into the cylinder from a hopper 12 through an inlet passage 13 controlled by a valve 14, and to expel such mixture through an outlet passage 15 controlled by valve 16. The valves 14 and 16 are normally oscillated in appropriately timed relation to the movements of the piston 11 by valve actuating mechanism, not here shown but which may be of the same general type as disclosed in said Patent No. 2,017,975. The housing of the outlet valve 16 is normally provided with quick-detachable coupling means comprising a pair of oppositely disposed jaws 18, whereby the pipe line for conveying the mixture to the point of use may be readily attached to and detached from the pump.

The present grout handling attachment is adapted to be readily-detachably connected to and supported by this coupling means in lieu of the first section of the pipe line, and as here shown it comprises a T-shaped body member 20 providing a horizontal chamber or passage 21 adapted to aline with and form a continuation of the passage 15. The inner end portion of the body member 20 is provided with a flange 22 for reception between the opposed jaws 18 of the coupling, where it is detachably retained in position by wedges 19. The outer end of the passage 21 communicates with a transverse passage 23 having annular members 24 and 25 positioned at its respective ends and providing seats 26 and 27 for the inlet and outlet valve balls 28 and 29. An inlet chamber or box 30 is disposed below the valve seat member 24, and a similar mem-

ber 31 surmounts the outlet valve seat annulus 25. A plurality of circumferentially spaced longitudinally extending rods or ribs 32 is provided in the passage or chamber 23 for guiding the inlet valve ball 28, and similar rods or ribs 33 are provided in the outlet chamber 31 for the valve ball 29.

From what has been thus far described, it will be seen that the device comprises five separable elements, viz. the body member 20, the two valve seat members 24 and 25, and the inlet and outlet chambers or boxes 30 and 31. These may be conveniently clamped and retained in operative but readily disassemblable relation by means of a chain 35, the respective ends of which are provided with threaded rods 36 carrying adjusting nuts 37, which rods are receivable in slots or apertures 38 provided in the end portions of a bar 39 which is secured to or positioned on the top of the box 31, all as will be clear from Figs. 1 and 2. A semi-circular guide member 40 may be secured to the inlet box 30 to position and guide the chain about the lower end of the device.

While in handling grout or mortar mixtures the likelihood of the pipe line becoming plugged is not as great as when handling concrete mixtures, nevertheless that danger exists to some extent, and since the pressures developed by these pumps are relatively high, it is desirable to provide for their relief in case plugging should occur, in order that parts of the pump and/or the attachment will not be broken or otherwise damaged. Such relief is also desirable at the time when, in pumping grout into a closed cavity, the cavity becomes filled.

To this end, the present device is preferably provided with a relief valve, comprising a housing 41 secured to the body member 20 and surrounding a sleeve 42 which communicates with the passage 23 through a port 43, into which the said sleeve may be press-fitted. A cap member 44 is secured to the outer end of the housing 41, with a flexible diaphragm 45 having its periphery clamped between these two members, as will be clear from Fig. 1. This diaphragm carries a valve disk 46 which is normally seated against the end of the sleeve 42 by means of a compression spring 47 which is interposed between a pair of spring cups 48 and 49, the former of which is secured to the diaphragm 45 and valve disk 46 by a bolt 50, and the latter of which is adjustable within the cap 44 by means of a set screw 51, whereby the force exerted by the spring may be varied as desired. The housing 41 is provided with a port 52 through which the grout may be discharged when the valve disk 46 is unseated.

When it is desired to pump grout by means of a pump of the type mentioned above, the present device is attached to the discharge passage of the pump by the coupling members 18, 19, 22, the pipe line for conducting the grout to the point of use is connected to the discharge passage 31' of the outlet chamber or box 31, and the inlet passage 30' of the chamber 30 is connected to any appropriate source of grout supply. The valve operating mechanism for the outlet valve 16 of the pump is disconnected or otherwise rendered inoperative, and the said valve is suitably blocked or otherwise held in the open position shown in Fig. 1. The inlet passage 13 leading from the pump hopper 12 to the inlet valve 14 is sealed by an imperforate plate 53 which is introduced into a transverse aperture 54 with which the hopper base 12' is normally provided, as in prior U. S. Patent No. 2,123,583 granted March 12, 1938, on an application filed by Charles F. Ball. Thus, the sucking of air into the working chamber of the pump through the inlet passage 13 and valve 14, and/or the forcing of the grout outwardly therethrough, is prevented.

If the pump piston 11 be now reciprocated in its usual manner, upon its suction stroke it will draw grout into the working chamber of the pump through passage 30', chamber 30, past valve 28, passages 23, 21 and 15, and valve 16, while on its working stroke the piston will force the mixture out past valve 29 and through chamber 31 and passage 31' to the pipe line. Should the latter become plugged, or should a cavity into which the grout is being pumped become filled, the increase in pressure in the passages 21 and 23 of the device will overcome the force exerted by the spring 47, whereupon the relief valve 46 will open and the grout will be discharged through the port 52.

What is claimed is:

1. In a grouting attachment for reciprocating-piston concrete pumps of the type having inlet and discharge passages which are controlled by valves provided with clearances making them unsuitable for grout: the combination of a body member having communicating longitudinal and cross passageways, a separable valve seat member positioned at each end of the cross passageway; a grout chamber readily detachably mounted by each of said seat members; a valve cooperable with each of said seat members, whereby the admission and discharge of grout to and from the passageways may be controlled; and adjustable flexible means passing around and readily separably retaining said chambers, valve seat and body members in assembled relation.

2. A grouting attachment according to claim 1, wherein the means for separably retaining the elements in assembled relation comprises a length of chain passed around the elements and having its ends adjustably and detachably secured to one of them.

3. In apparatus for the pressural transportation of settable plastic mixtures in confined streams, comprising a concrete pump of the type having mixture inlet and outlet passages controlled by valves which are provided with c'earances rendering them unsuitable for handling materials which are devoid of stowage-inducing constituents, an auxiliary mechanism for enabling the pressural movement of grout and the like by said pump, comprising a housing secured to the pump beyond the outlet valve thereof, said housing having grout inlet and outlet passages and a passage providing communication between them and the outlet passage of the pump; valves capable of efficiently handling materials lacking stowage-inducing constituents, disposed in said housing for controlling the inlet and outlet passages thereof; and means for closing the inlet passage of the pump to prevent ingress of air and egress of grout therethrough.

CHARLES I. LONGENECKER.

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