Sept. 25, 1923. 1,468,897

J. P. BEAUPRÉ

PUMP

Filed Nov. 4, 1920 3 Sheets-Sheet 1

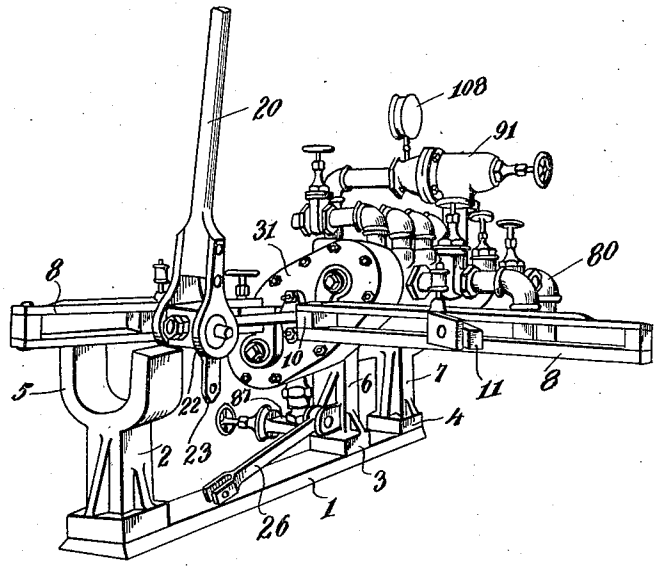


FIG. 1.

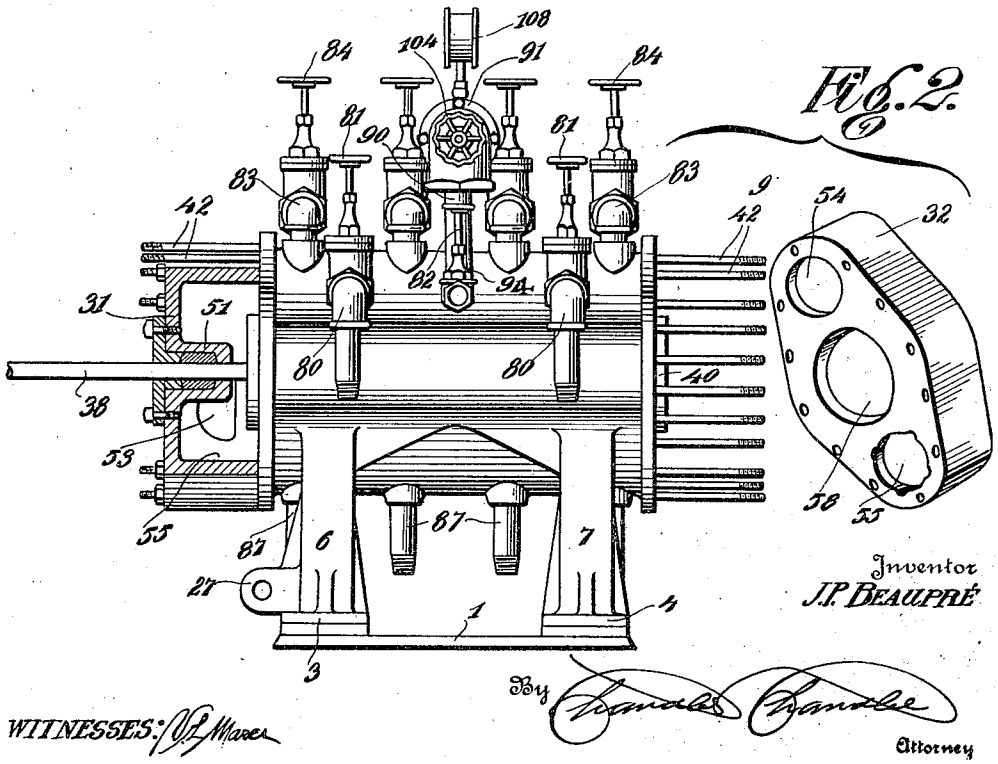


FIG. 2.

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Filed Nov. 4, 1920 3 Sheets-Sheet 2

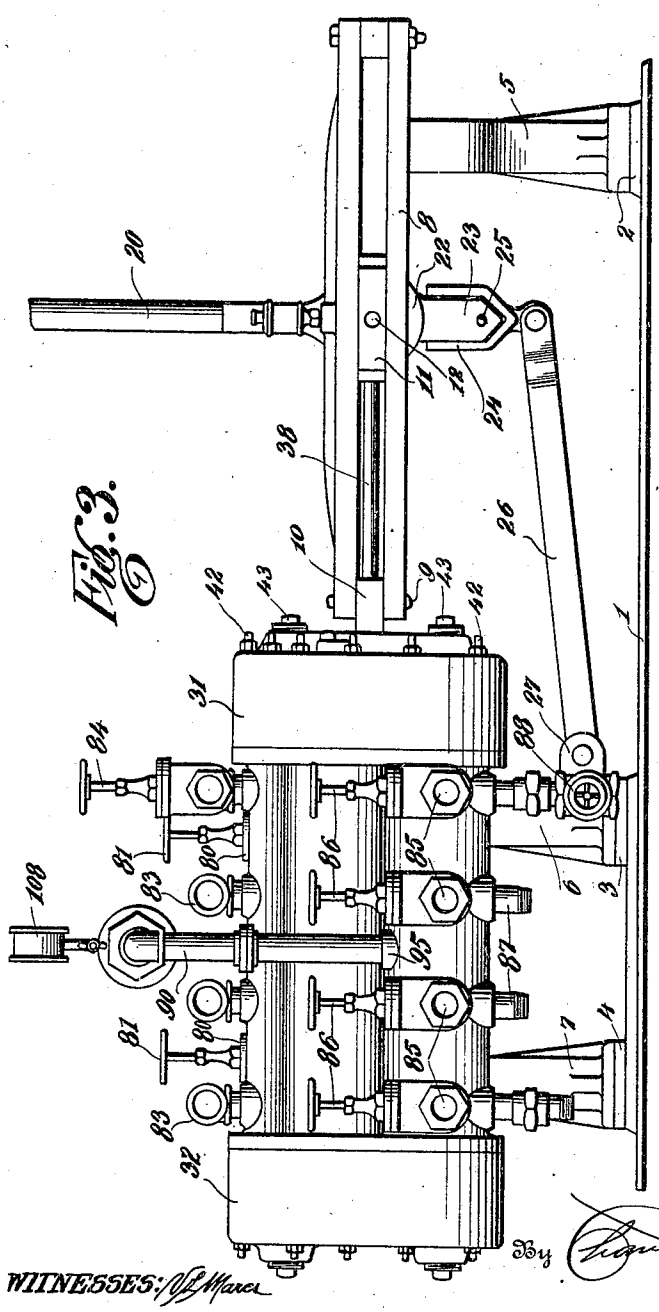


Fig. 3.

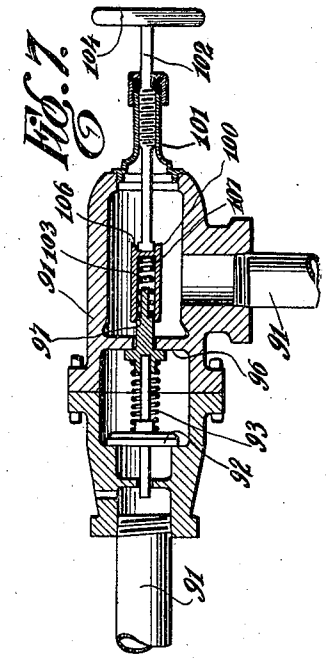


Fig. 7.

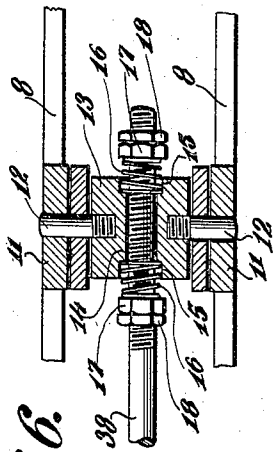


Fig. 6.

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Sept. 25, 1923. 1,468,897

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PUMP

Filed Nov. 4, 1920 3 Sheets-Sheet 3

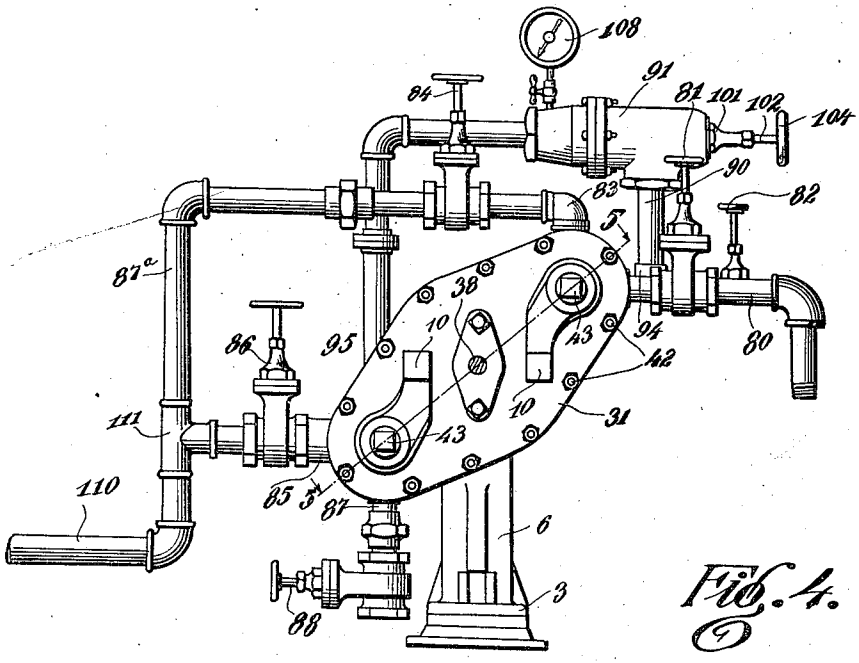


Fig. 4.

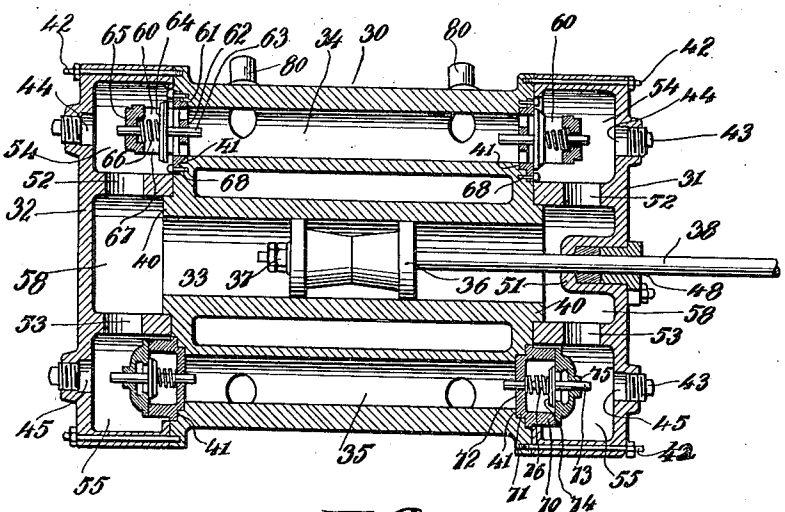


Fig. 5.

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J. P. BEAUPRÉ

By

Attorney

WITNESSES:

Patented Sept. 25, 1923. 1,468,897

UNITED STATES PATENT OFFICE.

JOHN P. BEAUPRÉ, OF BUTTE, MONTANA, ASSIGNOR OF ONE-THIRD TO GEORGE E. SMILEY, OF LA JUNTA, COLORADO, AND ONE-THIRD TO PHILLIP E. BEAUPRÉ, OF BUTTE, MONTANA.

PUMP.

Application filed November 4, 1920. Serial No. 421,738.

To all whom it may concern:

Be it known that I, JOHN P. BEAUPRÉ, a citizen of the United States, residing at Butte, in the county of Silver Bow, State of Montana, have invented certain new and useful Improvements in Pumps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to pumps, and more especially to those which are double-acting; and the broad object of the same is to improve the construction of such a pump so as to adapt it particularly for handling liquids of various kinds by taking them from a tank car or other source and delivering them to points of storage or points where receptacles are to be filled.

One feature of the invention consists in details of construction whereby the pump is adapted to be used for one liquid, and then for another without first cleaning and washing out its interior, and without even stopping the action of the pump. This is accomplished by having the inlet admit the liquid to a manifold which is in a plane higher than the pumping barrel or cylinder, and having the latter deliver the liquid to an outlet manifold which is in a lower plane than said barriel, and providing means whereby connection with the source of supply may be cut off and air admitted so that temporarily the pump works on air while the first liquid is draining out, and then the air is cut off and the second liquid admitted.

Another feature of the invention is its adaptability for repumping. In other words, after having pumped liquid from the source of supply to a storage tank, it is possible with this structure to pump the liquid back from the storage tank and deliver it at the point of filling. Means are provided whereby when the pump is used in this way the liquid still flows in at the high side and out at the low side for draining purposes as mentioned above.

Another feature of the invention lies in the provision of a by-pass pipe and a spring-pressed relief valve therein, establishing connection between the outlet and inlet manifolds so that, in case resistance to the outlet should occur, the relief valve will open and liquid will flow back through the by-pass pipe without injury to the structure. Manifestly this relief takes place whether the device is pumping direct from the tank to storage or filling, or pumping back from storage to filling. Means are present to adjust the tension of the spring which controls the relief valve, so that it may be set to open at various pressures.

The pump described herein and shown in the drawings is of small size capable of being operated by swinging a lever and reciprocating a plunger within the pump barrel in strokes of varying length, and a pump of this size would be equipped with about the number of outlets and inlets here shown. It is obvious, however, that other means for reciprocating the plunger might be employed and that the entire structure could be built on a larger scale without departing from the spirit of the invention. Referring to the said drawings:

Figure 1 is a general perspective view of this pump as seen from its inner end, one of the guides being swung aside and the link being disconnected from the fork-arms at the lower end of the operating lever.

Figure 2 is an elevation of the inlet side of the pump with one head removed and shown in perspective and the other head shown in section.

Figure 3 is an elevation of the outlet side of the pump with the opposite head shown in section, and this view shows the driving mechanism and its connection with the plunger.

Figure 4 is an elevation of the pump looking at its inner end and showing the connections which are employed for repumping.

Figure 5 is a section through the body casting and both heads, on an oblique line as indicated at 5—5 in Figure 4.

Figure 6 is an enlarged sectional detail showing the connection between the cross head and the stem of the plunger.

Figure 7 is a detail longitudinal section through the regulating valve.

A base 1 has seats 2, 3, and 4 upon the first of which is mounted a pedestal 5 while the other two seats 3 and 4 sustain legs or standards 6 and 7 which in turn support the pump. The pedestal supports the outer ends or guides 8, their inner ends being pivoted at 9 to blocks 10 on one head of the pump, and one of these guides being shown in Figure 1 as swung aside. In the guides

are slidably mounted shoes 11 having bearings for trunnions 12 of a block 13 which is bored with a longitudinal passage 14 for the stem of the pump plunger, and the passage is counterbored at its ends as at 15. Within each socket thus produced a coil spring 16 is mounted on the stem, held by a nut 17 and a jam nut 18, and thereby the stem is connected with the cross-head block 13 in such manner as to permit slight movement laterally and longitudinally.

For reciprocating the stem and plunger, any suitable mechanism may be employed to connect the cross-head block with a source of power, mechanically, manually or otherwise. As shown herein a hand lever 20 is forked at its lower end, its fork arms 22 having bearings for the trunnions 12 and extending below them in fingers 23, these fingers passing astride a block 24 to which they are pivoted as at 25, and the block being supported at the outer end of a link 26 whose inner end is pivoted at 27 to the nearest head of the pump. Thus by manually reciprocating the lever 20, the cross-head is moved to and fro within the guides and the stem is reciprocated through a path depending on the extent to which the lever is swung. However, it is quite obvious that other means might be employed for reciprocating the cross-head and driving pump.

The pump proper is of the double-acting type, and comprises a body 30 and two heads 31 and 32. The body is bored to produce a pump barrel or cylinder 33 about four inches in diameter, an inlet manifold 34 at one side and an outlet manifold 35 at the other side, these being about three inches in diameter, and the casting which is bored to form these elements is oval as perhaps best seen in Figure 4 and supported upon the standards 6 and 7 with its major axis oblique so that the inlet manifold is higher than the cylinder and the outlet manifold is lower. Within the cylinder or barrel works the piston or plunger 36 which is by preference of double-cone formation appropriately packed and removably held by nuts 37 on the piston rod or stem 38 referred to above, and the movement of the cross-head reciprocates this rod and plunger as will be understood.

Each end of the pump body casting is provided with a boss 40 around the end of its central bore or cylinder, while the ends of the other bores are counter-bored as shown at 41, and the casting also carries a peripheral series of stud bolts 42. The inner head 31 is applied to the inner end of the casting and held by nuts on said bolts, and this head carries the blocks 10 referred to above, and between them is provided with an opening 48 for the passage of the stem. This head is also provided with openings 44 and 45 directly alined with the manifolds 34 and 35 and normally closed by plugs 43 which may be removed to inspect the valves yet to be described. The outer head 32 is mounted on the outer end of the casting by means of similar stud bolts and nuts, but it has only the openings 44 and 45 and the plugs for removably closing them. On their inner sides the heads are provided with chambers 54, 55, and 58 respectively opposite the manifolds 34 and 35 and the cylinder or barrel 33, the chamber 58 in the inner head 31 having a boss 51 which affords packing for the stem 38; and the several chambers are connected by passages 52 and 53. The intermediate chamber 58 is sufficiently large to enclose the boss 40 on the body casting, while each of the other chambers is of sufficient size to enclose a valve which is attached to the body casting before the corresponding head is applied, the valves within the chambers 54 at the ends of the inlet manifold being intake valves opening under suction from the manifold toward the cylinder, and those in the other chambers 55 being discharge valves opening under pressure into the outlet manifold as will appear below; and when a plug 43 is removed, inspection of the valve beneath it is permitted, whereas the valve can be reached for repair or replacement by removing the head which covers it.

The intake or suction valve has a cage-like casing 60 rabbeted at its inner end at 61 to fit the counter-bore 41, and provided at this end with a spider 62 having a central guide opening for the stem 63 which carries the valve disk 64. The outer end of the casing is closed as at 65 except for a central opening in which moves the other end of the stem, and an expansive spring 66 is coiled around the stem between this end 65 and the disk 64, with the result that the valve is normally pressed inward against its seat but may be drawn open when the suction set up by the plunger is sufficient. The inflowing liquid then passes through the spider 62, under the disk 64 which is now off its seat, and out the open side 67 of the casing into the chamber 54 of the head, whence it flows along the passage 52 into the chamber 58, and eventually along the other passage 53 into the chamber 55 and the outlet manifold. The casings of these valves are held in place against the ends of the casting by means of screws 68 whose heads engage their flanges so that the valves may be attached to the casting before the heads 31 and 32 are applied.

The outlet or discharge valve has a cage-like casing 70 rabbeted at its inner end as at 71 and provided with a spider 72 having an opening for guiding the valve stem 73 which carries the disk 74; and the rear end of the casing has another spider 75 with a guide opening for the rear end of said stem.

An expansive spring 76 is coiled around the stem between the disk and the inner spider and normally presses the disk outward against its seat. The wall of the casing 70 is closed, and the liquid flows around the spiders at both ends when the valve is unseated by pressure against its outer side. These valves also are attached by screws to the ends of the casting before the heads 31 and 32 are applied.

The wall of the inlet manifold is bored with two openings for two and one-half inch pipes 80 serving as unloading lines from tank cars or other source of pumpings, and each pipe is provided with a cock or hand valve 81. Also there is an additional and preferably smaller opening into this manifold from the air, controlled by a valve 82. Through the upper wall of the inlet manifold are four openings for pipes 83, each having a cock or valve 84, and the use of these will be explained later. Through the outer side wall of the outlet manifold 35 are four openings for pipes 85 leading to storage, and respectively controlled by cocks or valves 86; and through the bottom wall of this manifold are four openings for pipes 87 constituting outlets to filling, these being controlled by cocks or valves 88. The pipe lines are not shown which lead from the source of supply to the pump and from the pump to the points where the liquid is to be delivered, and in certain of the views some of the cocks or valves are omitted for the sake of clearness.

A by-pass pipe 90 leads from a point 94 in the upper wall of the inlet manifold 34, through a valve, across the top of the casting, and down to a point 95 where it opens through the upper wall of and into the outlet manifold 35; and the construction of said valve is best seen in Figure 7. It has an L-shaped casing 91 into whose foot the pipe leads from the point 94 upward, and a valve disk 92 borne toward its seat along the shank of the L-shaped casing and toward the pipe leading to the point 91, by a spring 93 coiled on the valve stem between its disk and a spider 96, so that normally the valve closes to prevent the flow of fluid from the inlet to the outlet side of the pump, but it will yield under excess pressure to permit fluid to set back if necessary, the yielding occurring when the back-pressure exceeds the power of the spring 93. A second and stronger spring 103 bears against a shoulder 97 on the valve stem and is seated in a socket 107 in the inner end of a plug 100 which stands along the axis of the shank of said casing near its angle, and into said angle is screwed a gland 101 through which is screwed a stem 102 having a hand wheel 104 on its outer end. By turning this wheel the stem may be advanced into a socket 106 in the outer end of the plug 100, and the latter advanced to put tension on the spring 103 additional to that normally exerted by the spring 93. By this means the resistance to the opening of the by-pass valve may be manually adjusted at will. A pressure gauge 108 communicates with the interior of the casing 91 forward of its valve, to assist the operator in adjusting the point at which the valve may be set to open. The by-pass pipe 90 which puts this valve casing in communication with the two manifolds remains constantly on the pump and needs no cock or hand valve.

With one or more of the inlet pipes 80 connected with a tank car or other source of supply and its or their valves 81 opened and the air valve 82 closed, one or more of the outlets 85 can be connected to storage tanks and their valves opened, or one or more of the outlets 87 can be utilized for filling purposes by opening its or their valves 88. Now when the plunger is reciprocated, it acts as a piston moving within the cylinder 33. On its stroke in one direction, it closes one inlet valve and opens the other by suction, and it opens and closes the corresponding outlet valves. Liquid is thereby drawn into the intake manifold through the inlet pipe or pipes and follows the plunger in its course along the barrel or cylinder, and on its return this liquid is forced into the outlet manifold and from it to the point desired—a similar action taking place at the other side of the plunger as will be clearly understood. If for any reason, such as back-pressure in the outlet pipe, resistance to the flow of liquid from the pump should be set up, the liquid within the outlet manifold will pass up the by-pass pipe and through the by-pass valve, unseating the latter when the back-pressure exceeds the tension to which the spring has been adjusted. Thus if heavy oil is to be pumped to a considerable height and delivered into a storage tank, it will be necessary for the operator to adjust the hand wheel so that the by-pass valve will not open under the pressure set up by the weight of a considerable column of oil.

A highly important feature of this invention is now apparent. Assuming that the pump has been handling one liquid such as oil and it is desired to cause it to handle another liquid such as gasoline, it becomes desirable that all or substantially all the oil within the pump shall be exhausted before any gasoline is let in, and yet in order to save time it is not desirable to wash out the pump or even to interrupt its action. The inlet is cut off by closing the valves 81, and the air valve 82 is opened, so that continued reciprocations of the plunger cause the pump to take air into the intake manifold which is shown and described as on the high side of the casting. This admission of air replaces the oil in the barrel or cylinder, and

then replaces that in the outlet manifold, and in fact drives the oil out of the latter and out of all the outlet pipes—converting the pump temporarily into an air pump. Without even stopping the motion of the structure, one or more of the inlet pipes can now be connected with a source where gasoline will be supplied and the appropriate outlet pipe or pipes with the point or points to which the gasoline is to be delivered.

Another feature of the invention is the adaptability of the pump for use in drawing liquid back from storage and delivering it out the filling pipes, or "repumping" as perhaps best shown in Figure 4. For this purpose a pipe 110 is shown as connected with a T-coupling 111 mounted on one of the outlet pipes 85, beyond its valve 86, and continued upward as at 87 across the top of the casting, and connected with the valve 84 of one of the pipes 83 opening into the top of the inlet manifold; and, although not so shown, all the pipes 85 could thus be connected with the pipes 83. Now with the valves 86 closed and the valves 88 and 84 opened, the liquid is drawn back through the pipe 110 and admitted into the pipe 83 to be discharged through valve 88 to a point of filling—thus passing back around the pump to the inlet manifold, and thence to the outlet manifold through some or all of these applied pipes under control of the valves mentioned. It will be clear that by this arrangement the liquid follows the same course through the pump as when pumping direct in the manner described above, and therefore the by-pass pipe and its valve will function as above described to overcome back pressure or unusual resistance to the flow of the liquid.

What is claimed is:

1. A pump comprising a substantially horizontal barrel, an inlet chamber at a higher level than the barrel and an outlet chamber at a lower level, valves connecting the respective chambers with the barrel, a valved inlet pipe for liquid leading into the inlet chamber, means for admitting air to this chamber when desired, and a plunger reciprocating within said barrel.

2. A pump whose body casting is formed with a barrel, an inlet manifold alongside and at a higher level than the barrel, and an outlet manifold along the opposite side of and at a lower level than the barrel, valves connecting the manifolds respectively with said barrel, liquid inlet pipes leading into the inlet manifold and provided with control valves, an air inlet pipe also leading into this manifold and provided with a control valve, discharge pipes leading out of the outlet manifold and provided with control valves, and a plunger reciprocated within said barrel.

3. A pump whose body casting is formed with a barrel, an inlet manifold alongside and at a higher level than the barrel and an outlet manifold along the opposite side of and at a lower level than the barrel, inlet and outlet valves connecting both ends of the manifolds respectively with said barrel, liquid inlet pipes leading into the inlet manifold and provided with control valves, an air inlet pipe also leading into this manifold and provided with a control valve, discharge pipes leading out of the outlet manifold and provided with control valves, and a double-acting plunger reciprocated within said barrel.

4. In a pump, the combination with a body casting cored horizontally to produce a barrel, an inlet manifold alongside of and at a higher level than the barrel, and an outlet manifold along the other side of and at a lower level than the barrel, heads mounted on opposite ends of said casting and each containing chambers registering with its respective corings and communicating with each other, valves in the several chambers opening from the inlet manifold toward the barrel and from the barrel toward the outlet manifold, a plunger within the barrel, its stem extending through one head, and driving means for reciprocating the stem; of manually controlled means for selectively admitting liquid or air to the inlet manifold, and manually controlled outlets for delivering liquid to selective points from the outlet manifold.

5. In a pump, the combination with a body casting cored horizontally to produce a barrel, an inlet manifold alongside of and at a higher level than the barrel and an outlet manifold along the other side of and at a lower level than the barrel, heads mounted on opposite ends of said casting and each containing chambers registering with its respective corings and communicating with each other, valves in the several chambers opening from the inlet manifold toward the barrel and from the barrel toward the outlet manifold, a plunger within the barrel, its stem extending through one head, and driving means for reciprocating the stem; of means for admitting liquid to the inlet manifold and delivering it from the outlet control, means for admitting air to the inlet manifold to drain the liquid from the pump, a by-pass pipe connecting the manifolds, and a spring-closed relief valve therein, the whole for action substantially as described.

In testimony whereof, I affix my signature, in the presence of two witnesses.

JOHN P. BEAUPRÉ.

Witnesses:

R. W. BOONE,

GERALDINE SMITH.