Aug. 9, 1960 W. S. PINE 2,948,222

PUMP

Filed Aug. 4, 1958 2 Sheets-Sheet 1

Fig. 1.

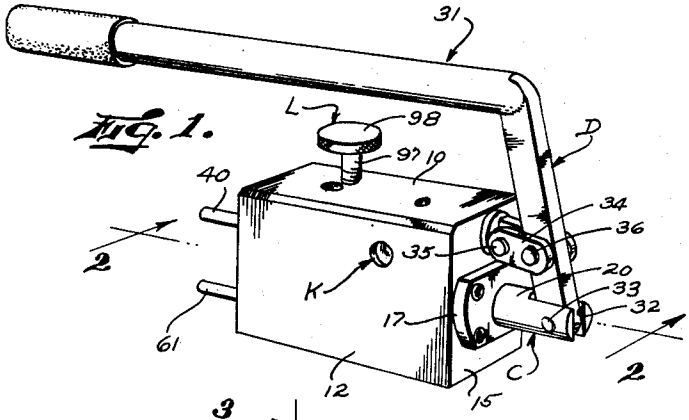


Fig. 2.

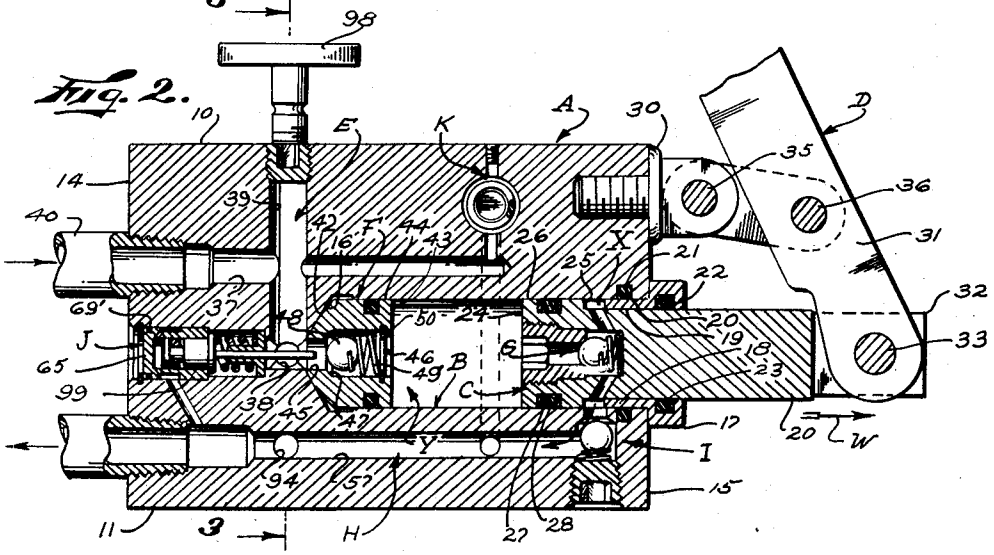
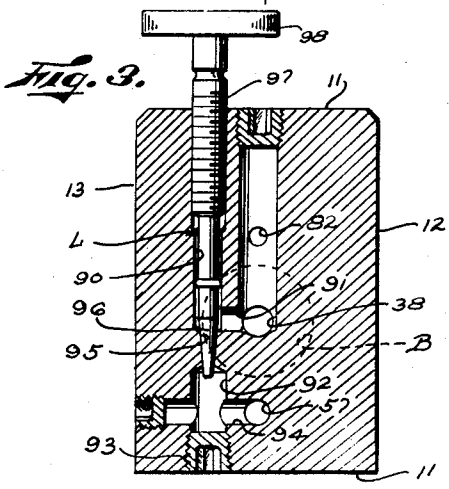


Fig. 3.



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Aug. 9, 1960 W. S. PINE 2,948,222

PUMP

Filed Aug. 4, 1958 2 Sheets-Sheet 2

Fig. 4.

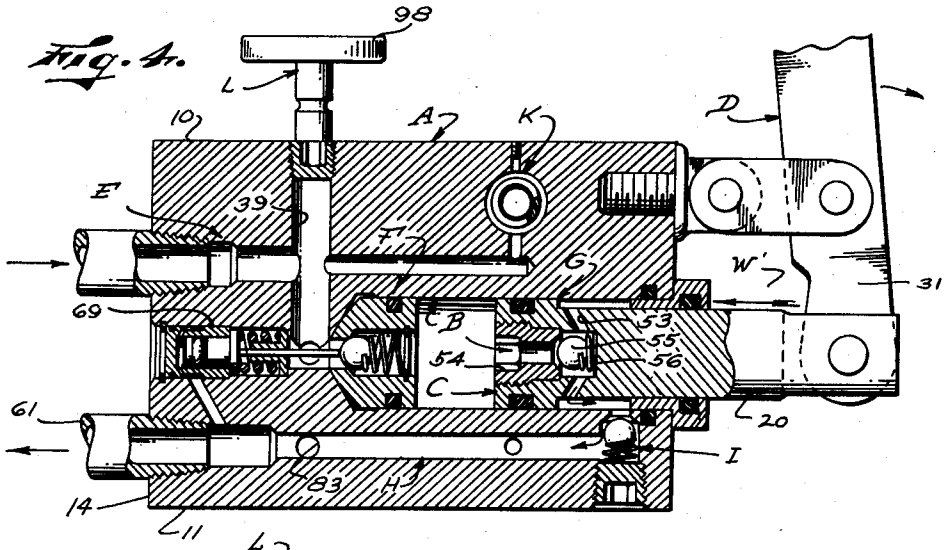


Fig. 5.

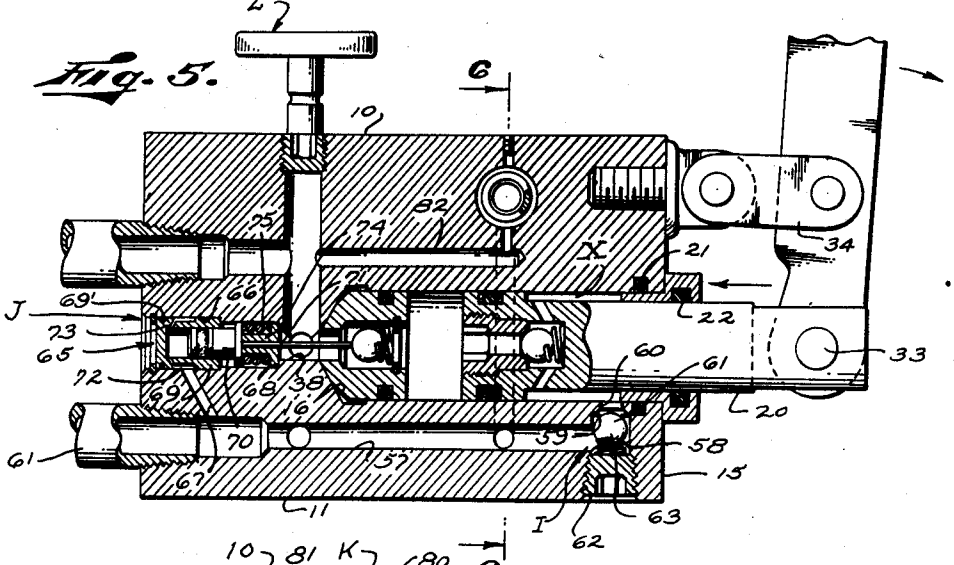
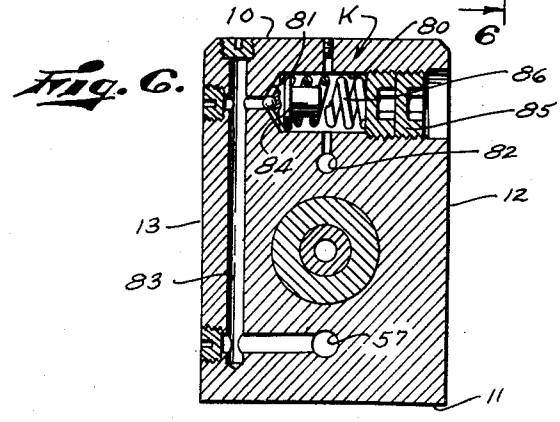


Fig. 6.



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2,948,222

PUMP

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Filed Aug. 4, 1958, Ser. No. 753,063

15 Claims. (Cl. 103—40)

This invention relates to a pump and is more particularly concerned with a two stage hydraulic pump.

An object of the present invention is to provide a hydraulic pump for use in connection with hydraulic jacks and the like.

An object of the present invention is to provide a manually operable pump of the character referred to which is adapted to deliver a large volume of fluid at low pressure until such time as the pressure reaches a predetermined point, whereupon the pump automatically converts to deliver fluid under higher pressure, but at a lesser volume.

Another object of the present invention is to provide a double acting pump having a cylinder with a manually operable reciprocating piston engaged therein and adapted to deliver a large volume of fluid at low pressure when shifted in one direction and a lesser volume of fluid at high pressure when shifted in the other direction.

It is an object of the present invention to provide a double acting pump of the character referred to including a novel fluid pressure responsive valve means adapted to automatically bleed or relieve the cylinder at the lower pressure side of the piston when the pressure in the apparatus in which the pump is engaged reaches a predetermined amount.

Another object of the present invention is to provide a pump of the character referred to having valve control means adapted to relieve pressure from the pump and the apparatus in which it is engaged and a safety pressure release means adapted to relieve pressure from the pump and the apparatus when it exceeds a predetermined amount.

It is an object of this invention to provide a pump of the character referred to which is easy and economical to manufacture and which is both highly effective and dependable in operation.

The various objects and features of my invention will be fully understood from the following detailed description of a typical preferred form and application of my invention throughout which description reference is made to the accompanying in drawings, in which:

Fig. 1 is a perspective view of the pump provided by the present invention.

Fig. 2 is a detached sectional view of my new pump taken as indicated by line 2—2 on Fig. 1.

Fig. 3 is a sectional view taken as indicated by line 3—3 on Fig. 2.

Fig. 4 is a view similar to Fig. 2 showing the construction provided in a different position.

Fig. 5 is a view similar to Figs. 2 and 3 showing the construction in still another position.

Fig. 6 is a sectional view taken as indicated by line 6—6 on Fig. 5.

The pump construction that I provide is a manually operated fluid pump and is adapted for use wherever it is desired to deliver or move fluid under pressure. The pump is particularly adapted for use in connection with hydraulic jacks and the like.

The pump construction provided by the present invention, which construction is illustrated throughout the accompanying drawings, is a piston-type pump and is shown as including, an elongate, block-like body A having a cylinder bore B therein, a piston C slidably engaged in the bore B, actuating means D adapted to shift the piston C longitudinally in the bore, inlet means E conducting fluid into the cylinder bore B, valve means F related to the cylinder bore and the inlet means E and normally preventing the flow of fluid back or out through the inlet means E, valve means G carried by the piston C adapted to conduct fluid from one side or end of the piston to the other, delivery means H adapted to conduct fluid from the bore and to connect with a suitable jack, or the like (not shown), and valve means I related to the delivery means H and preventing the flow of fluid back through the means H and into the bore.

The contsruction further includes a novel fluid pressure actuating release means J related to the valve means F and adapted to open said valve means F when the pressure in the delivery means H reaches a predetermined amount, pressure release means K adapted to relieve pressure from the pump when it reaches a predetermined amount and manually operable bleed means L adapted to relieve all pressure from the unit and conduct fluid from the delivery means out through the inlet means.

The body A that I provide is an elongate, unitary block with flat top and bottom surfaces **10** and **11**, flat, front and rear surfaces **12** and **13** and flat left and right ends **14** and **15**. The bore B is a simple, straight, cylindrical bore and enters the body A at the right end thereof and terminates in the body at a bottom **16**. The bore B is closed by means of a suitable head **17** secured to the right end of the body.

The head **17** is provided with cylindrical boss **18** of limited longitudinal extent that slidably enters the outer end of the bore and through which a suitable opening **19** extends to slidably receive a rod **20** on the piston C, as will hereinafter be described.

The bore B is provided with an annular, radially inwardly opening channel **21** in its outer portion, in which a suitable O-ring seal is arranged to seal with the boss **18**.

The opening **19** in the boss and head is provided with an annular, radially inwardly opening channel **22** in which a suitable seal **23** is arranged to seal with the rod **20**.

The piston C is a simple, disc-shaped unit having inner and outer ends **24** and **25** and a cylindrical side wall **26**. The piston C is slidably engaged in the bore B and is provided about its side wall with a radially outwardly opening groove **27** in which a suitable seal **28** is arranged to seal with the wall of the bore.

The piston rod **20** is a simple, elongate, cylindrical member formed integrally with the piston C and projects longitudinally from the outer end **25** of the piston and through the head **17**.

The piston rod **20** is smaller in diametric extent than the bore and cooperates therewith to establish an annular high pressure chamber X between the outer end **25** of the piston and the head **17**.

The actuating means D, adapted to shift the piston C longitudinally in the bore B, involves a bracket **30** fixed to the right end of the body A, above the head **17**, an elongate, substantially vertically disposed handle **31** having its lower end engaged in a slot **32** provided in the outer terminal end of the piston rod **20** and connected therewith by a suitable pivot pin **33**, a pair of links **34** extending between the bracket **30** and the handle, at a point spaced above the lower end thereof, and pivot pins

35 and 36 pivotally connecting the links with the bracket and the handle.

With the means D set forth above, it will be apparent that by shifting the handle 31 in the manner indicated by the arrows in the several figures of the drawings, the piston C can be advantageously shifted in the bore B.

The inlet means E that I provide is shown as involving, an inlet port 37 entering the left end of the body, at a point spaced above the bore B, a cylindrical flow chamber 38 communicating with the inner end of the bore B and a vertical passage 39 establishing open communication between the port 37 and the chamber 38.

In practice, a suitable inlet tube 40 is threadedly engaged in the inlet port 37, which tube extends to a reservoir or other suitable fluid supply (not shown).

The valve means F related to the bore B and the inlet means E is a simple check valve adapted to normally check the flow of fluid from the bore, back through the inlet means.

In the form of the invention illustrated, the valve means F is shown as including, a cylindrical body having inner and outer ends 42 and 43, a cylidrical outer wall 44, a central, longitudinal flow passage 45 and a socket 46 entering it from its outer end, concentric with the flow passage 45 and terminating within the body to establish an outwardly disposed valve seat 47. A spherical valve member or ball 48 is engaged in the socket 46 and is normally held in sealing engagement on the seat 47 by a compression spring 49 arranged within the socket and retained by a suitable snap ring 50.

The body of the valve means F is slidably engaged in the body B to establish seated engagement on the bottom 16 of the bore and so that the flow passage 45 establishes open communication with the flow chamber 38. A suitable seal is carried by the valve body about its outer wall 44 to seal with the bore B.

The piston C and the body of the valve means F cooperate with the bore B to establish a lower pressure chamber Y.

The valve means G carried by the piston C is adapted to allow for the free flow of fluid from the lower pressure chamber Y occurring at the left of the piston to the high pressure chamber X occurring at the right of the piston and to check or prevent a reverse flow therebetween.

The valve means G is a simple check valve construction and is shown as involving, a socket 51 entering the inner end 24 of the piston and extending into the piston rod 20 to terminate at a flat bottom 52, a plurality of radially disposed ports 53 in the piston rod, adjacent the outer end 25 of the piston and communicating with the socket adjacent the bottom thereof, an annular seat insert 54 threadedly engaged in the open end of the socket, a ball 55 engaged in the socket inward of the seat insert and a compression spring 56 between the ball and the bottom of the socket to normally yieldingly maintain the ball in sealing engagement on the insert.

The delivery means H and valve means I that I provide is adapted to conduct and control the flow of fluid from the body B and is shown as including, an elongate discharge passage 57 entering the left end of the body, below the axis of the bore and continuing to the right to terminate adjacent the outer end portion of the bore, a socket 58 entering the bottom of the body to intersect the passage 57 and terminating at an upwardly inclined bottom 59, and a discharge port 60 continuing from the bottom of the socket and establishing open communication with the bore B.

In practice, a suitable tube 61 is threadedly engaged in the open end of the passage 57 to conduct fluid delivered by the pump to a suitable jack, or the like (not shown).

With the construction thus far set forth, it will be apparent that when the pump is primed and is shifted in

the direction indicated by the arrow W, in Fig. 2 of the drawings, fluid is drawn into the chamber Y through the means E and past the valve means F and fluid in the chamber X is urged out through the means H and past the valve means I. It will be apparent that due to the limited effective cross-sectional area of the right hand end of the piston, the fluid thus discharged is under high pressure as it leaves the bore.

Upon shifting the piston in the opposite direction, as indicated by the arrow W'' in Fig. 4 of the drawings, fluid in the chamber Y is displaced into the chamber X through the valve means G in the piston. Due to the greater cross-sectional area of the chamber Y, more fluid is displaced from the chamber Y than can be accommodated by the chamber X, with the result that the excess fluid is urged outwardly through the means H and I.

Due to the relatively large effective cross-sectional area of the left hand end of the piston C, the fluid discharged in the manner just mentioned is at relatively low pressure.

It will be apparent that upon continued operation of the pump, that is, continued reciprocation of the piston C, fluid will continue to be delivered upon each stroke of the piston and until such time as pressures are generated in the delivery end of the construction which are such that the operator cannot exert sufficient forces on the piston in the left direction to displace fluid from the lower pressure chamber Y.

In order to prevent the pump from locking or becoming overloaded so that it cannot be operated as set forth above, I provide the fluid pressure actuated release means J, which means is adapted to put the valve means F out of service when the fluid pressure in the discharge end of the construction reaches a predetermined amount.

The means J that I provide is shown as including a hydraulic ram unit 65 engaged in a socket 66 entering the left end of the body A and a fluid passage 67 extending between the discharge passage and the socket 66 and conducting fluid from the passage to the unit in the socket.

The socket 66 is in axial alignment with the bore B in the body and terminates at a flat bottom 68. The flow chamber 38 establishes opening communication with the bottom of the socket.

The unit 65 includes a cylinder sleeve 69 having an open inner end and a closed outer end. The sleeve is slidably engaged in the socket. A piston 70 is slidably engaged in the socket and is provided with an elongate stem 71 which projects inwardly from the piston through the flow chamber 38 and into the flow passage 45 of the valve F.

The sleeve 69 seats against a suitable outwardly disposed shoulder provided in the socket intermediate its ends and is maintained engaged in the socket by means of a suitable snap ring-type retaining means, as clearly illustrated in the drawings.

The sleeve 69 is provided with an annular fluid handling groove 72 about its exterior to register with the fluid passage 67, and a plurality of ports 73 establishing open communication between the said groove 72 and the interior of the sleeve, inward of the piston 70 therein.

In practice, the sleeve 69 is provided with a second annular groove spaced outwardly of the groove 72 and in which a suitable sealing ring 69' is engaged to seal between the sleeve and the wall of the socket.

The unit 65 further includes a suitable flanged stem and spring guide 74 seated on the bottom of the socket to slidably receive the stem 71 and to carry a compression spring 75, which spring is adapted to occur between the flange on the guide and the piston 70 and to normally yieldingly urge the piston and the stem to the left.

In operation, the means J is normally in the position illustrated in Fig. 2 of the drawings.

When the pressure in the outlet end of the construc-

tion becomes excessive, the unit **65** of the means J is actuated so that the stem is shifted through the flow passage **45** of the means F and engages and urges the ball **48** thereof out of seated engagement, as clearly illustrated in Fig. 5 of the drawings.

With the valve means F rendered ineffective, as set forth above, when the piston C is shifted to the left, certain of the fluid in the chamber Y is displaced to the chamber X through the valve means G and the remainder is bled back through the inlet means E.

With the above relationship of parts and mode of operation, it will be apparent that the pump is automatically converted from a low pressure double acting piston pump into a single action high pressure piston pump.

The pressure release means K that I provide is a safety means adapted to relieve pressure from the pump when the pressures exceeding a predetermined safety factor are reached.

The means K is shown as involving a socket **80** entering the front side **12** of the body A and terminating at an inwardly convergent bottom **81**, which bottom establishes a valve seat, a pressure release passage **82** extending between the socket and the vertical passage **39** of the means F, a pressure conducting passage **83** extending from the passage **57** of the means H and establishing open communication with the socket **80** at the bottom thereof, a valve member **84** in the socket, a suitable plug **85** closing the open end of the socket and a compression spring **86** between the plug and the valve member and adapted to normally yieldingly urge the valve member in seated sealing engagement on the bottom of the socket.

With the above construction it will be apparent that when pressures in the delivery end of the pump reach a predetermined point, fluid is bled from the means H through the means K and back into the means E, with the result that the pressure in the construction is relieved.

The manually operable bleed means L that I provide, which means is adapted to relieve all the pressure from the construction, as when it is desired to drain the fluid from the equipment to which the pump is related, is shown as including an elongate, vertically disposed bore **90** entering the top of the body and terminating at a flat bottom, a port **91** extending between the bore **90** and the flow chamber **38**, a socket entering the bottom of the body A in axial alignment with the bore **90** and establishing a chamber **92**, a plug **93** closing the bottom end of the chamber, a port **94** extending between the passage **57** of the means H and the chamber **92**, a downwardly convergent or tapered port **95** extending between the bottom of the bore **90** and the chamber **92**, and an elongate, downwardly convergent or tapered needle valve **96** engaged in the port **95**. The valve **96** is provided with an upwardly projecting stem **97** threadedly engaged in the upper portion of the bore **90** and projecting from the top of the body A and a handle wheel **98** on the outer end of the stem.

In practice, the valve **96** carries a suitable seal **99** to seal with the bore **90** above the port **91**.

With the means L illustrated in the drawings and described above, it will be apparent that the valve **96** is normally in seated sealing engagement in the port **95**. It will be further apparent that when desired, the valve can be shifted out of seated engagement, in the port, as by rotation of the hand wheel **98**, whereupon fluid is permitted to flow freely from the means H and out through the means E.

From the foregoing description and from a study of the accompanying drawings, it will be apparent that I have provided a novel, highly effective and dependable pump construction and a construction that is both easy and economical to manufacture.

Having described only a typical preferred form and application of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any modifications or variations that may appear to those skilled in the art and fall within the scope of the following claims.

Having described my invention, I claim:

1. A pump of the character referred to including, a body having a cylinder bore therein terminating at a bottom, a head closing the open end of the bore, a porttd piston slidably engaged in the bore and having an elongate rod projecting therefrom and through the head, operating means coupled with the rod and operable to reciproacte the piston in the bore, an inlet duct communicating with the bottom of the bore, a check valve checking the flow of fluid outwardly through the inlet duct, a check valve carried by said ported piston and adapted to allow for the flow of fluid through the piston towards the open end of the bore, a delivery duct communicating with the bore adjacent the open end thereof, a check valve related to said delivery duct to check the flow of fluid from said duct into the bore and a fluid pressure actuated means related to said first mentioned check valve and operable in response to the fluid pressure in the delivery duct to open said first mentioned check valve and render the same ineffective.

2. A pump of the character referred to including, a body having a cylinder bore therein terminating at a bottom, a head closing the open end of the bore, a ported piston slidably engaged in the bore and having an elongate rod projecting therefrom and through the head, operating means coupled with the rod and operable to reciprocate the piston in the bore, an inlet duct communicating with the bottom of the bore, a check valve checking the flow of fluid outwardly through the inlet duct, a check valve carried by said ported piston and adapted to allow for the flow of fluid through the piston towards the open end of the bore, a delivery duct communicating with the bore adjacent the open end thereof, a check valve related to said delivery duct to check the flow of fluid from said duct into the bore and a spring loaded fluid pressure actuated means related to said first mentioned check valve and operable in response to predetermined fluid pressure in the delivery duct to open said first mentioned check valve and render the same ineffective.

3. A pump of the character referred to including, a body having a cylinder bore therein terminating at a bottom, a head closing the open end of the bore and having an elongate rod projecting therefrom and through the head, operating means coupled with the rod and operable to reciprocate the piston in the bore, an inlet duct communicating with the bottom of the bore, a check valve having a shiftable valve member and checking the flow of fluid outwardly through the inlet duct, a check valve carried by said ported piston and adapted to allow for the flow of fluid through the piston towards the open end of the bore, a delivery duct communicating with the bore adjacent the open end thereof, a check valve related to said delivery duct to check the flow of fluid from said duct into the bore and a fluid pressure actuating means related to said first mentioned check valve and having a shiftable member engaging said shiftable valve member, said means being operable in response to the fluid pressure in the delivery duct to open said first mentioned check valve and render the same ineffective.

4. A pump of the character referred to including, a body having a cylinder bore therein terminating at a bottom, a head closing the open end of the bore, a ported piston slidably engaged in the bore and having an elongate rod projecting therefrom and through the head, operating means coupled with the rod and operable to reciprocate the piston in the bore, an inlet duct communicating with the bottom of the bore, a check valve having a shiftable valve member and checking the flow of fluid outwardly through the inlet duct, a check valve carried by said ported piston and adapted to allow for

the flow of fluid through the piston towards the open end of the bore, a delivery duct communicating with the bore adjacent the open end thereof, a check valve related to said delivery duct to check the flow of fluid from said duct into tthe bore and a spring loaded fluid pressure actuated means related to said first mentioned check valve and having a shiftable member engaging said shiftable valve member, said means being operable in response to predetermined fluid pressure in the delivery duct to open said first mentioned check valve and render the same ineffective.

5. A pump of the character referred to including, a body having a cylinder bore therein terminating at a bottom, a head closing the open end of the bore, a ported piston slidably engaged in the bore and having an elongate rod prijecting therefrom and through the head, operating means coupled with the rod and operable to reciprocate the piston in the bore, an inlet duct communicating with the bottom of the bore, a spring loaded ball check valve related to said inlet duct and normally checking the flow of fluid from the bore out through the inlet duct, a check valve carried by the ported piston and adapted to allow for the flow of fluid through the piston towards the open end of the bore, a delivery duct communicating with the bore adjacent the open end thereof, a check valve related to said delivery duct to check the flow of fluid from said duct into the bore and a spring loaded fluid pressure actuated means related to said ball check valve and having a shiftable element to engage the ball, a duct establishing opening communication between the delivery duct and said actuating means, said actuating means being operable upon the establishment of a predetermined pressure in the delivery duct to urge the ball out of seated engagement and thereby render the ball check valve inoperative.

6. A pump of the character referred to including, a body having a cylinder bore therein terminating at a bottom, a head closing the open end of the bore, a ported piston slidably engaged in the bore and having an elongate rod projecting therefrom and through the head, operating means coupled with the rod and operable to reciprocate the piston in the bore, an inlet duct communication with the bottom of the bore, a spring loaded ball check valve in the bottom of the bore and normally checking the flow of fluid from the bore and out through the inlet duct, a check valve carried by the ported piston and adapted to allow for the flow of fluid through the piston towards the open end of the bore, a delivery duct communicating with the bore adjacent the open end thereof, a check valve related to said delivery duct to check the flow of fluid from said duct into the bore and a spring loaded fluid pressure actuated means related to said ball check valve and having a shiftable element to engage the ball, a duct establishing open communication between the delivery duct and said actuating means, said actuating means being operable upon the establishment of a predetermined pressure in the delivery duct to urge the ball out of seated engagement and thereby render the ball check valve inoperative.

7. A pump of the character referred to including, a body having a cylinder bore therein terminating at a bottom, a head closing the open end of the bore, a ported piston slidably engaged in the bore and having an elongate rod projecting therefrom and through the head, operating means coupled with the bore and operable to reciprocate the piston in the bore, an inlet duct in the body communicating with the bottom of the bore and connected with a supply pipe, a spring loaded ball check valve in the bottom of the bore and normally checking the flow of fluid from the bore out through the inlet duct, a check valve carried by the ported piston and adapted to allow for the flow of fluid through the piston towards the open end of the bore, a delivery duct in the body communicating with the bore adjacent the open end thereof and connected with a delivery pipe, a check valve related to said delivery duct to check the flow of fluid from said duct into the bore and a spring loaded fluid pressure actuated means carried by the body to occur adjacent the said ball check valve and having a shiftable element to engage the ball, a duct establishing open communication between the delivery duct and said actuating means, said actuating means being operable upon the establishment of a predetermined pressure in the delivery duct to urge the ball out of seated engagement and thereby render the ball check valve inoperative.

8. A pump of the character referred to including, a body having a cylinder bore therein terminating at a bottom, a head closing the open end of the bore, a ported piston slidably engaged in the bore and having an elongate rod projecting therefrom and through the head, manually operated operating means coupled with the rod and operable to reciprocate the piston in the bore, an inlet duct in the body communicating with the bottom of the bore and connected with a supply pipe, a spring loaded ball check valve in the bottom of the bore and normally checking the flow of fluid from the bore out through the inlet duct, a spring loaded check valve carried by the ported piston and adapted to allow for the flow of fluid through the piston towards the open end of the bore, a delivery duct in the body communicating with the bore adjacent the open end thereof, and connected with a delivery pipe, a spring loaded check valve in said delivery duct to check the flow of fluid from said duct into the bore and a spring loaded fluid pressure actuated means carried by the body to occur adjacent the said ball check valve and having a shiftable element to engage the ball, a duct in the body establishing opening communication between the delivery duct and said actuating means, said actuating means being operable upon the establishment of a predetermined pressure in the delivery duct to urge the ball out of seated engagement and thereby render the ball check valve inoperative.

9. A pump of the character referred to including, a body having a cylinder bore therein terminating at a bottom, a head closing the open end of the bore, a ported piston slidably engaged in the bore and having an elongate rod projecting therefrom and through the head, operating means coupled with the rod and operable to reciprocate the piston in the bore, an inlet duct communicating with the bottom of the bore, a check valve checking the flow of fluid outwardly through the inlet duct, a check valve carried by said ported piston and adapted to allow for the flow of fluid through the piston towards the open end of the bore, a delivery duct communicating with the bore adjacent the open end thereof, a check valve related to said delivery duct to check the flow of fluid from said duct into the bore, a fluid pressure actuated means related to said first mentioned check valve and operable in response to the fluid pressure in the delivery duct to open said first mentioned check valve and render the same ineffective and pressure release means including a flow passage between said inlet and delivery ducts and a spring loaded relief valve in said flow passage.

10. A pump of the character referred to including, a body having a cylinder bore therein terminating at a bottom, a head closing the open end of the bore, a ported piston slidably engaged in the bore and having an elongate rod projecting therefrom and through the head, operating means coupled with the rod and operable to reciprocate the piston in the bore, an inlet duct communicating with the bottom of the bore, a check valve checking the flow of fluid outwardly through the inlet duct, a check valve carried by said ported piston and adapted to allow for the flow of fluid through the piston towards the open end of the bore, a delivery duct communicating with the bore adjacent the open end thereof, a check valve related to said delivery duct to check the flow of fluid from said duct into the bore, a fluid pressure actuated means related to said first mentioned

check valve and operable in response to the fluid pressure in the delivery duct to open said first mentioned check valve and render the same ineffective and bleed means including a fluid passage between said inlet and delivery ducts and a manually operable valve related to said fluid passage to control the flow of fluid from the delivery duct into said inlet duct.

11. A pump of the character referred to including, a body having a cylinder bore therein terminating at a bottom, a head closing the open end of the bore, a ported piston slidably engaged in the bore and having an elongate rod projecting therefrom and through the head, operating means coupled with the rod and operable to reciprocate the piston in the bore, an inlet duct communicating with the bottom of the bore, a check valve checking the flow of fluid outwardly through the inlet duct, a check valve carried by said ported piston and adapted to allow for the flow of fluid through the piston towards the open end of the bore, a delivery duct communicating with the bore adjacent the open end thereof, a check valve related to said delivery duct to check the flow of fluid from said cut into the bore, a fluid pressure actuated means related to said first mentioned check valve and operable in response to the fluid pressure in the delivery duct to open said first mentioned check valve and render the same ineffective, pressure release means including a flow passage between said inlet and delivery ducts and a spring loaded relief valve in said flow passage and bleed means including a fluid passage between said inlet and delivery ducts and a manually operable valve related to said fluid passage to control the flow of fluid from the delivery duct into said inlet duct.

12. A pump of the character referred to including, a body having a cylinder bore therein terminating at a bottom, a head closing the open end of the bore, a ported piston slidably engaged in the bore and having an elongate rod projecting therefrom and through the head, operating means coupled with the rod and operable to reciprocate the piston in the bore, an inlet duct communicating with the bottom of the bore, a spring loaded ball check valve related to said inlet duct and normally checking the flow of fluid from the bore out through the inlet duct, a check valve carried by the ported piston and adapted to allow for the flow of fluid through the piston towards the open end of the bore, a delivery duct communicating with the bore adjacent the open end thereof, a check valve related to said delivery duct to check the flow of fluid from said duct into the bore and a spring loaded fluid pressure actuated means related to said ball check valve and having a shiftable element to engage the ball, a duct establishing opening communication between the delivery duct and said actuating means, said actuating means being operable upon the establishment of a predetermined pressure in the delivery duct to urge the ball out of seated engagement and thereby render the ball check valve inoperative, and pressure release means including a flow passage between said inlet and delivery ducts and a spring loaded relief valve in said flow passage.

13. A pump of the character referred to including, a body having a cylinder bore therein terminating at a bottom, a head closing the open end of the bore, a ported piston slidably engaged in the bore and having an elongate rod projecting therefrom and through the head, operating means coupled with the rod and operable to reciprocate the piston in the bore, an inlet duct communicating with the bottom of the bore, a spring loaded ball check valve related to said inlet duct and normally checking the flow of fluid from the bore out through the inlet duct, a check valve carried by the ported piston and adapted to allow for the flow of fluid through the piston towards the open end of the bore, a delivery duct communicating with the bore adjacent the open end thereof, a check valve related to said delivery duct to check the flow of fluid from said duct in the bore and a spring loaded fluid pressure actuated means related to said ball check valve and having a shiftable element to engage the ball, a duct establishing opening communication between the delivery duct and said actuating means, said actuating means being operable upon the establishment of a predetermined pressure in the delivery duct to urge the ball out of seated engagement and thereby render the ball check valve inoperative, and bleed means including a fluid passage between said inlet and delivery ducts and a manually operable valve related to said fluid passage to control the flow of fluid from the delivery duct into said inlet duct.

14. A pump of the character referred to including, a body having a cylinder bore therein terminating at a bottom, a head closing the open end of the bore, a ported piston slidably engaged in the bore and having an elongate rod projecting therefrom and through the head, operating means coupled with the rod and operable to reciprocate the piston in the bore, an inlet duct communicating with the bottom of the bore, a spring loaded ball check valve related to said inlet duct and normally checking the flow of fluid from the bore out through the inlet duct, a check valve carried by the ported piston and adapted to allow for the flow of fluid through the piston towards the open end of the bore, a delivery duct communicating with the bore adjacent the open end thereof, a check valve related to said delivery duct to check the flow of fluid from said duct into the bore and a spring loaded fluid pressure actuated means related to said ball check valve and having a shiftable element to engage the ball, a duct establishing opening communication between the delivery duct and said actuating means, said actuating means being operable upon the establishment of a predetermined pressure in the delivery duct to urge the ball out of seated engagement and thereby render the ball check valve inoperative, pressure release means including a flow passage between said inlet and delivery ducts and a spring loaded relief valve in said flow passage, and bleed means including a fluid passage between said inlet and delivery ducts and a manually operable valve related to said fluid passage to control the flow of fluid from the delivery duct into said inlet duct.

15. A pump of the character referred to including, a body having a cylinder bore therein terminating at a bottom, a head closing the open end of the bore, a ported piston slidably engaged in the bore and having an elongate rod projecting therefrom and through the head, manually operated operating means coupled with the rod and operable to reciprocate the piston in the bore, an inlet duct in the body communicating with the bottom of the bore and connected with a supply pipe, a spring loaded ball check valve in the bottom of the bore and normally checking the flow of fluid from the bore out through the inlet duct, a spring loaded check valve carried by the ported piston and adapted to allow for the flow of fluid through the piston towards the open end of the bore, a delivery duct in the body communicating with the bore adjacent the open end thereof, and connected with a delivery pipe, a spring loaded check valve in said delivery duct to check the flow of fluid from said duct into the bore and a spring loaded fluid pressure actuated means carried by the body to occur adjacent the said ball check valve and having a shiftable element to engage the ball, a duct in the body establishing opening communication between the delivery duct and said actuating means, said actuating means being operable upon the establishment of a predetermined pressure in the delivery duct to urge the ball out of seated engagement and thereby render the ball check valve inoperative, pressure release means including a flow passage between said inlet and delivery ducts and a spring loaded relief valve in said flow passage, and bleed means including a fluid passage between said inlet and delivery ducts and a manually operable valve related to said fluid passage to control the flow of fluid from the delivery duct into said inlet duct.

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