B. F. CURTIS.

TWIN CYLINDER SINGLE ACTING VERTICAL PLUNGER PUMP.

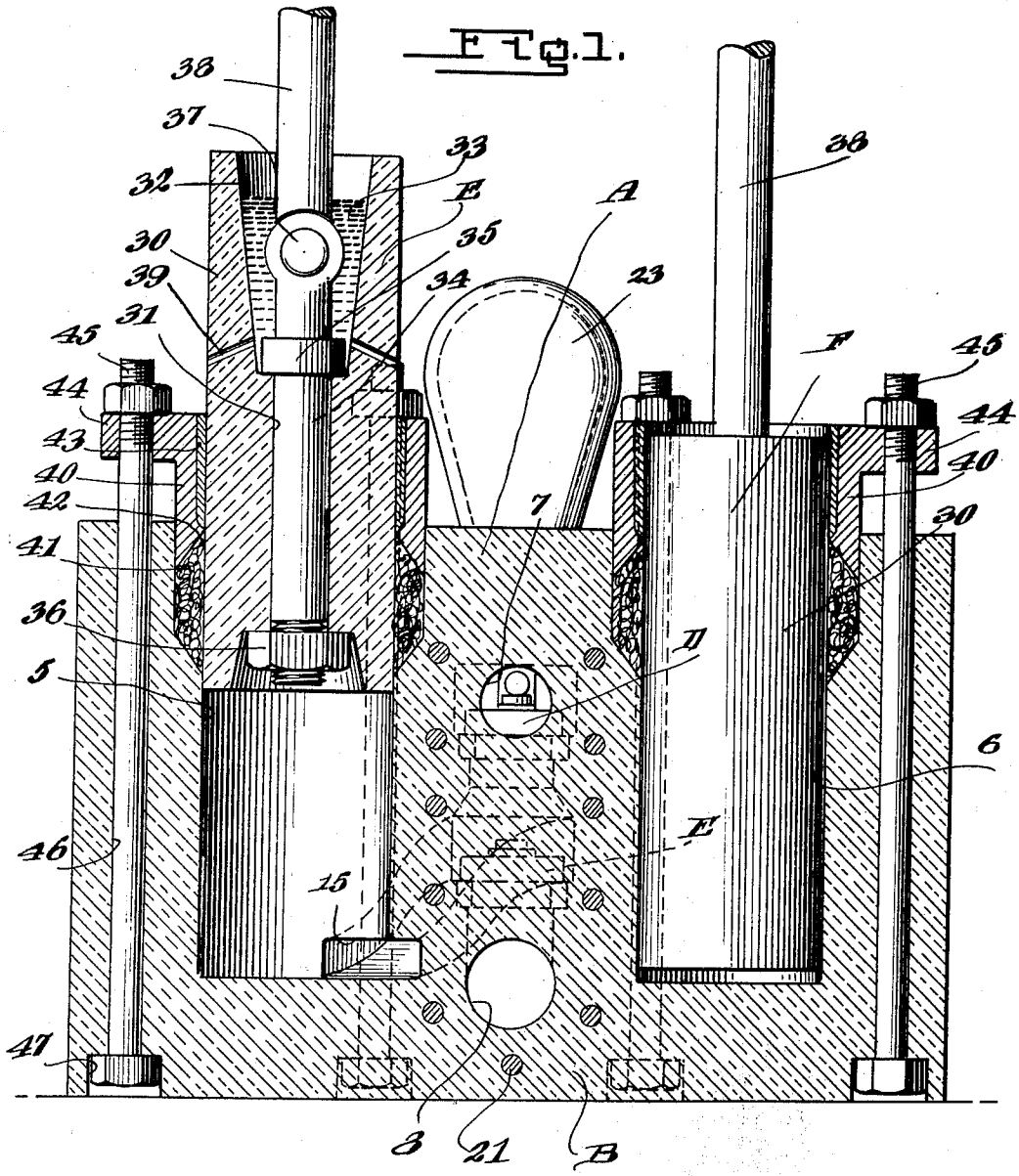
APPLICATION FILED SEPT. 3, 1920.

1,400,422.

Patented Dec. 13, 1921.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

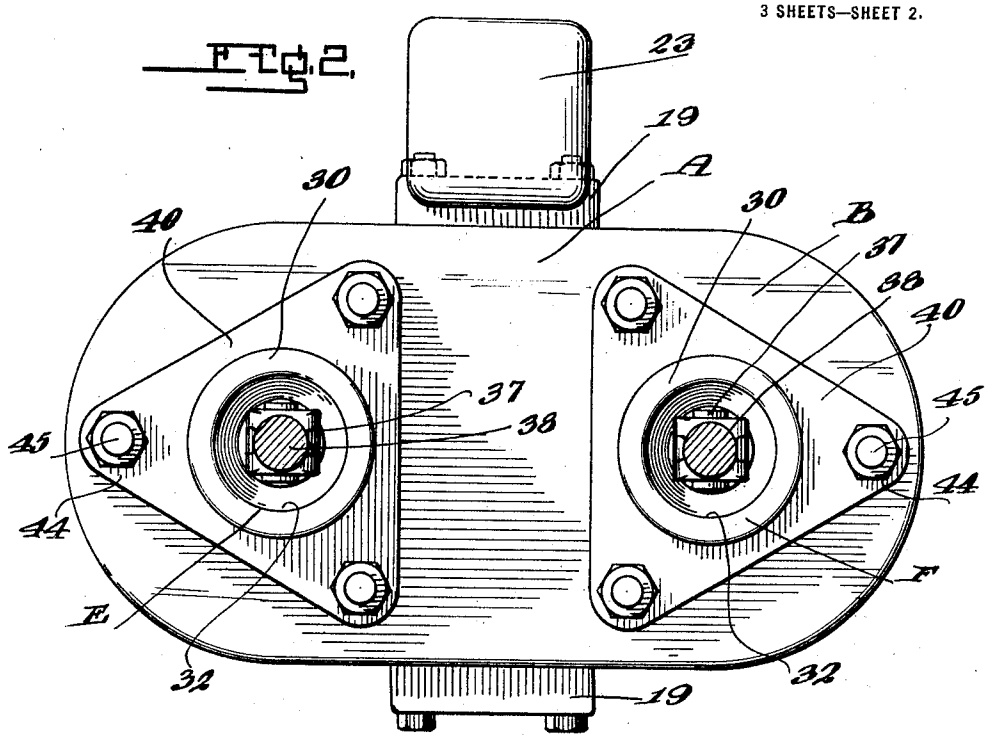
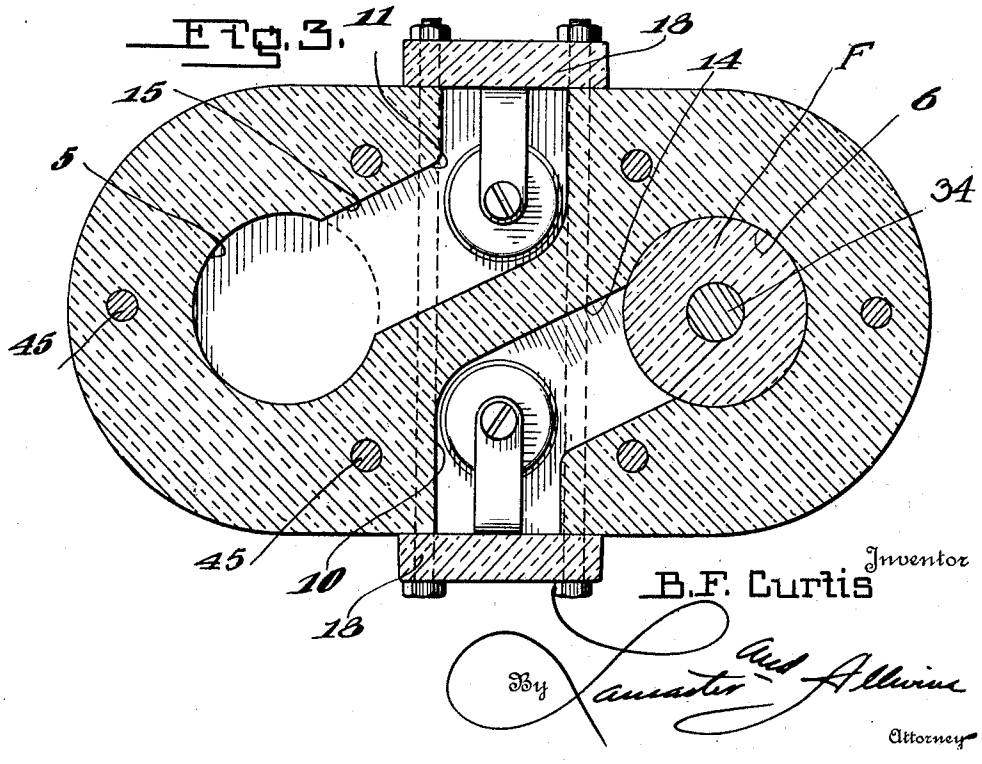


Fig. 3.



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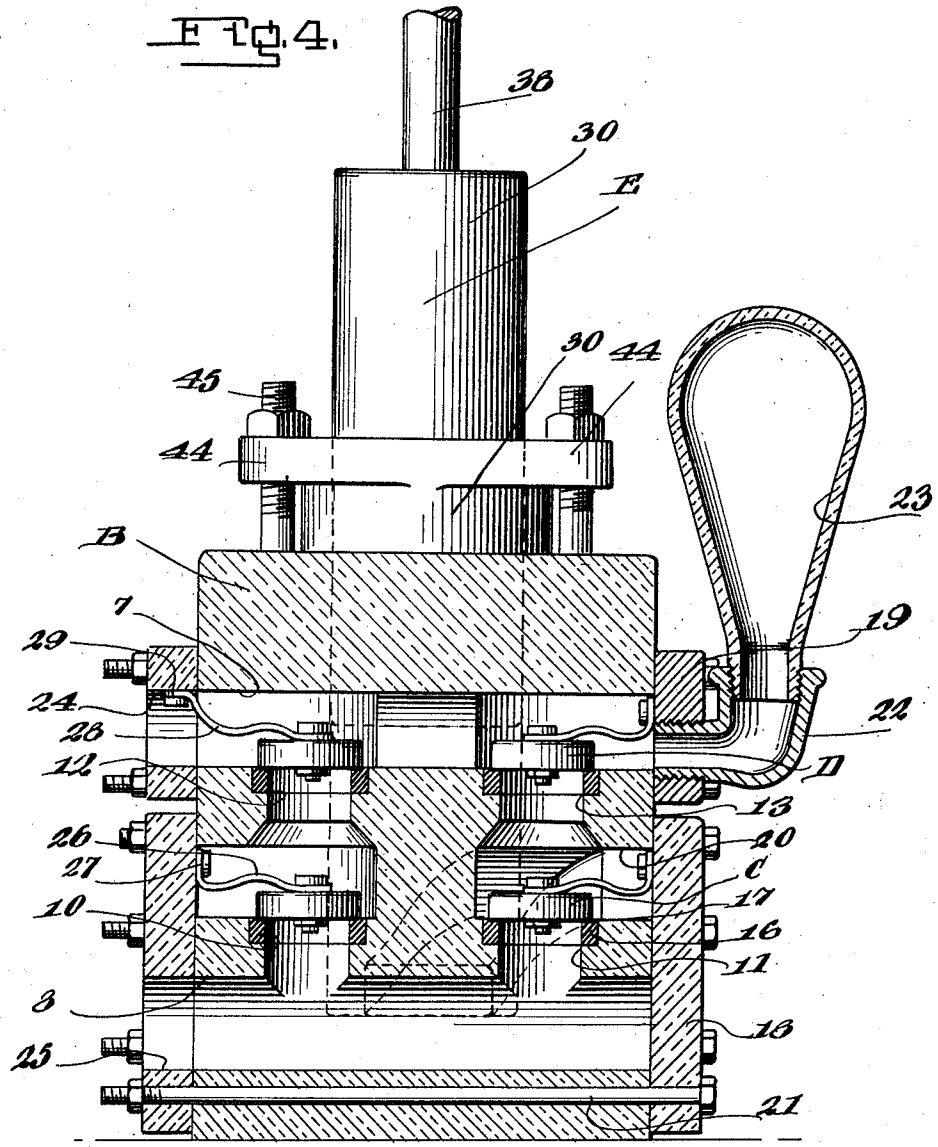
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3 SHEETS—SHEET 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

BENJAMIN F. CURTIS, OF POTEAU, OKLAHOMA, ASSIGNOR TO CURTIS PORCELAIN PUMP COMPANY, A CORPORATION OF OKLAHOMA.

TWIN-CYLINDER SINGLE-ACTING VERTICAL-PLUNGER PUMP.

1,400,422. Specification of Letters Patent. Patented Dec. 13, 1921.

Application filed September 3, 1920. Serial No. 407,946.

To all whom it may concern:

Be it known that I, BENJAMIN F. CURTIS, a citizen of the United States, residing at Poteau, in the county of Le Flore and State of Oklahoma, have invented certain new and useful Improvements in Twin-Cylinder Single-Acting Vertical-Plunger Pumps, of which the following is a specification.

This invention relates to pumps of the type utilized for pumping fluids containing acids, such as water from mines, and the primary object of the present invention is to provide an improved twin cylinder single acting vertical plunger pump embodying a single body of vitreous material, having a novel arrangement of valves and valve chambers or ports therein, so that the positive operation of the pump is insured, and so that ready and easy access can be had to the ports at all times.

Other objects of the invention are to provide a novel type of piston or plunger so constructed, and arranged in such a manner with the pump that the necessity of providing a guide cross head therefor is eliminated, and to provide a novel means of lubrication for the piston or plunger.

A further object of the invention is to provide an improved means of connecting the cover plates for the valve chambers or ports and the stuffing boxes to the pump body, the means utilized for connecting the valve stem covers and the stuffing boxes to the pump body being arranged in such a manner as to form reinforcements for the pump body and thus add additional strength thereto.

A still further object of the invention is to provide a novel twin cylinder single action vertical plunger pump, which is of exceptionally simple and durable construction, and which entirely eliminates the complicated parts now utilized in a pump of this character.

With these and other objects in view, the invention consists in the novel construction, arrangement and formation of parts as will be hereinafter more specifically described, claimed and illustrated in the accompanying drawings, forming a part of this specification, in which drawings:

Figure 1 is a central vertical longitudinal section through the improved pump.

Fig. 2 is a top plan view of the improved pump, the connecting rods being shown in section.

Fig. 3 is a horizontal section through the improved pump illustrating the type of valves utilized therein.

Fig. 4 is a vertical transverse section through the improved pump also illustrating the type of valves utilized and the arrangement thereof in the pump body and in relation to the pump cylinders.

Referring to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter A indicates the improved pump; B, the body; C the inlet or suction valves; D, the discharge or outlet valves; and E and F the pistons.

The pump body B is formed of a single block of vitreous material, such as porcelain or the like, and is provided with a pair of spaced horizontally alined vertical bores 5 and 6 which form the cylinders, and which have reciprocably mounted therein the pistons or plungers E and F. The cylinders or bores 5 and 6 open outwardly of the upper end of the body B and terminate short of the lower end thereof as clearly shown in Fig. 1 of the drawings.

A pair of spaced passages or ways 7 and 8 are arranged transversely through the pump body B intermediate the cylinders or bores 5 and 6 and the uppermost passage or way 7 forms the discharge or outlet way for the pump while the lower passage or way 8 forms the suction or inlet way for the pump. The lower inlet or suction passageway 8 has communicating therewith the inlet or suction ports or chambers 10 and 11 and these chambers are arranged on the opposite sides of the longitudinal center of the pump body and are so disposed, that one will act for each cylinder. The upper passageway 7 which forms the discharge or outlet way for the pump has communicating therewith the valve discharge or outlet chambers or ports 12 and 13 and these chambers or ports also communicate with the upper ends of the valve chambers or ports 10 and 11. By referring to the drawings, it can be seen that one discharge and one suction valve is provided for each cylinder, or bore. The valve chamber 10 has communi-

cating therewith a downwardly and inwardly extending way 14, which communicates with the lower end of the bore or cylinder 6, while the chamber 11 has communicating therewith the depending and inwardly extending way 15, which communicates with the lower end of the cylinder or bore 5. The suction or inlet valves C and the outlet or discharge valves D are arranged in their respective chambers, and each of the cylinders are provided with annular grooves 16 for the reception of the annular valve seats 17 which are preferably formed from rubber or the like to form a cushion seat for the valves. The valve bodies are preferably formed of vitreous material such as porcelain or the like and adapted to fit upon the upper surface of the valve seats 17 as clearly shown in Fig. 4 of the drawings. From this arrangement, it will be seen that on the suction stroke, the suction valve will be operated, and that on the discharge stroke, the discharge or outlet valves will be operated. The passage ways 7 and 8 extend entirely through the body B and cover plates 18 are provided for the opposite sides of the passageway 8 and cover plates 19 are provided for the opposite sides of the passageway 7.

The cover plates 18 also overlie the laterally extending passageways 20 which communicate with the valve chambers 10 and 11. The provision of these passageways 20 form means for facilitating the positioning of the inlet or suction valves in the chambers.

The cover plates 18 and 19 are held in place by transversely extending bolts 21 which extend through suitable openings formed in the body B and the cover plates. These bolts act as reinforcements for the body and serve to strengthen the same.

The cover plate 19 on one side of the body B is provided with an elbow joint 22, which communicates with the passageway 7, and this elbow joint supports the air chambers 23. The opposite cover plate 19 is provided with an opening 24 which is adapted to receive the outlet or discharge pipe. The cover plate 18 on the same side of the body B as the cover plate 19 which is provided with the opening 24 is provided with an opening 25 for the inlet or suction pipe, (not shown). The valves C are normally held upon their seats by means of leaf springs 26, and these leaf springs 26 are attached by means of bolts or the like 27 to the cover plates 18. The valves D are also held on their seats by means of springs 28, which have their outer ends secured by means of screws or the like 29 to the cover plates 19. It can thus be seen that when the cover plates are removed the valves C and D will be removed therewith. This permits of the easy repair of the valves or the valve seats.

The plungers E and F as stated are reciprocably mounted in the bores 5 and 6 and each one of the plungers or pistons is constructed identically the same and each includes a relatively long cylindrical vitreous body 30 which has the longitudinally extending bore 31 arranged therein. The upper ends of the bores 31 are enlarged as at 32 and the enlarged portion 32 of the bore forms a reservoir for the lubricating oil 33. A piston rod 34 is fitted within each bore 31 and has an annular shoulder 35 formed thereon, which engages the shoulder formed by the enlarged portion 33 of the bore 31. A nut or the like 36 is threaded on the lower end of the piston rod and holds the same firmly connected with the piston or plunger. A wrist pin 37 is utilized for connecting each piston rod with each connecting rod 38. By forming the pistons or plungers relatively long, the necessity of providing a guide cross head for the same is eliminated and the connecting rods can be secured directly to the crank shaft or the like if so desired. Relatively fine openings 39 are formed in the pump plunger or piston body 30 at the lower end of the enlarged portion 32 of the bores and these fine openings permit the lubricating oil 33 to flow therethrough so as to lubricate the sides of the pistons and the walls of the cylinder bores 5 and 6. Suitable packing glands 40 are provided and these packing glands are adapted to engage the packings 41 fitted in enlarged portions of the bores 5 and 6. The lower portions of the glands 40 are tapered as at 42 so as to insure that the packing will be forced into engagement with the outer sides of the plunger piston bodies 30. If so desired these glands may be lined with Babbitt metal or the like. The glands are provided with laterally extending apertured ears 44 through which are adapted to extend the retainer bolts 45. These bolts 45 may extend entirely through the body B which may be provided with bores 46 for the reception of the same. If so desired, the heads of the bolts may be countersunk in the lower surface of the block B as at 47.

By this arrangement, it can be seen that a twin cylinder single acting vertical plunger piston pump has been provided of exceptionally simple and compact construction, in which the operating parts thereof can be readily replaced when desired or necessary.

If so desired, the connector may be used in two, four, six or eight units, by arranging them in series according to the requirements.

Changes in details may be made without departing from the spirit or scope of this invention; but,

I claim:

1. A pump comprising a body formed from a single piece of vitreous material, cyl-

inders formed in said body in longitudinal, vertical alinement, transversely extending discharge and inlet ways arranged through the body intermediate the cylinders, discharge and inlet valve chambers formed in the body and communicating with said discharge and inlet ways and with the lower ends of the cylinders, cover plates for said discharge and inlet ways, transversely extending bolts connecting the covers to said bodies, said bolts forming reinforcements for the bodies, and pistons reciprocably mounted in said cylinders.

2. A pump comprising a body formed of a single block of material having a pair of vertically disposed longitudinally alined bores formed therein, the bores terminating short of the lower end of the block and forming cylinders, relatively long pistons reciprocably mounted in said cylinders, transversely extending vertically alined discharge and inlet ways formed in the block intermediate the cylinders, discharge and inlet valve chambers formed in the ways for each cylinder, said valve chambers communicating with each other, downwardly and inwardly extending ways communicating with the valve chambers and with the lower end of each cylinder, cover plates for said ways, an air chamber carried by one of said covers for the discharge way, and discharge and inlet valves carried by said cover plates arranged in said valve chambers.

3. A pump comprising a body, a pair of cylinders formed in the body, reciprocating pistons in said cylinders, transversely extending inlet and discharge ways formed in the body intermediate the cylinders, discharge and inlet chambers formed in said ways, laterally extending ways connecting the valve chambers with the lower ends of the cylinders, discharge and inlet valves arranged in said valve chambers, cover plates for the ways arranged on opposite sides of the bodies, transversely extending bolts arranged through the body for connecting the plates thereto, packing glands for the pistons, and vertically disposed bolts extending through the body and the glands, said vertically disposed and transversely disposed bolts forming reinforcements for said body.

4. A pump comprising a body formed from a single block of vitreous material having inwardly extending spaced cylindrical bores formed therein in longitudinal alinement, the cylindrical bores terminating short of the lower end of the block, a pair of centrally disposed superposed transversely extending ways formed in the body intermediate the cylindrical bores, one of said ways being disposed adjacent to the upper ends of the cylindrical bores and constituting the discharge outlet, the other way being arranged adjacent to the lower ends of the bores and constituting the inlet, relatively long vitreous pistons reciprocably mounted in the cylindrical bores, discharge and inlet chambers communicating with each other and with the upper and lower ways, discharge and inlet valves arranged in said chambers, and inwardly extending ways communicating with the transversely extending ways and with the chambers.

BENJAMIN F. CURTIS.