C. T. MAPES.

SAND PUMP.

APPLICATION FILED MAR. 2, 1914.

1,145,158.

Patented July 6, 1915.

FIG.1.

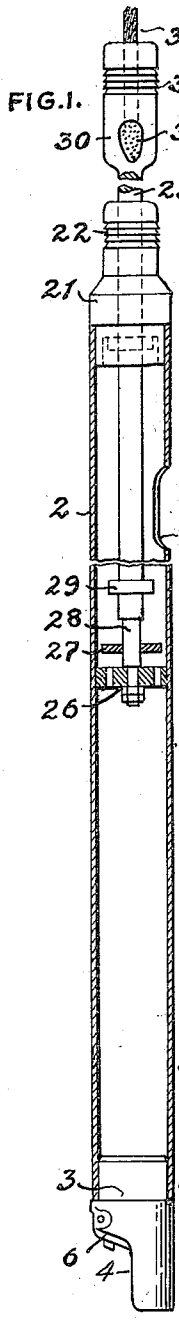



FIG.2.

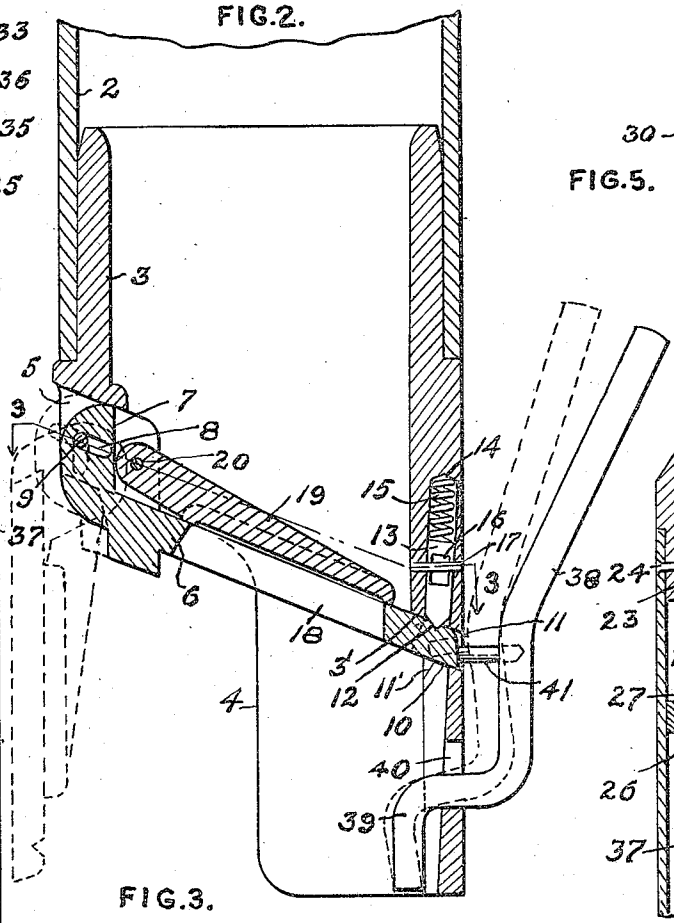



FIG.5.

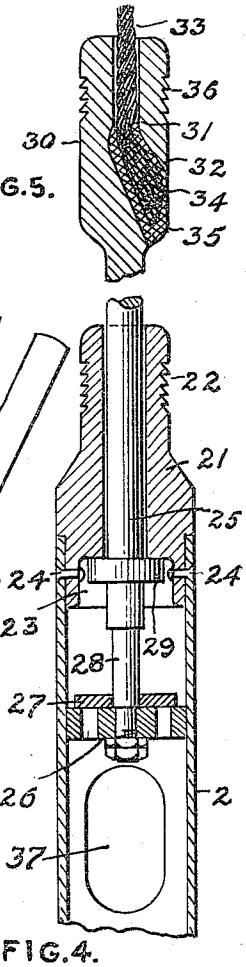



FIG.3.

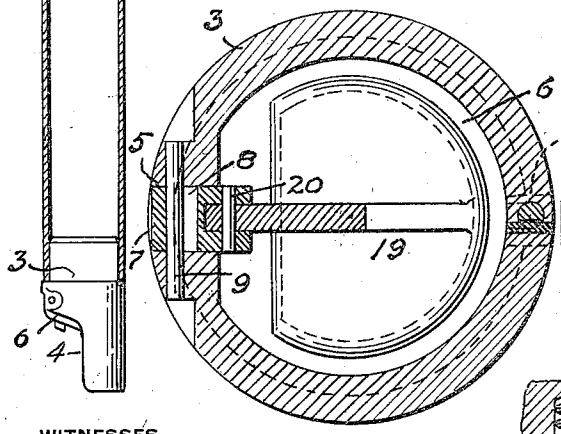



FIG.4.

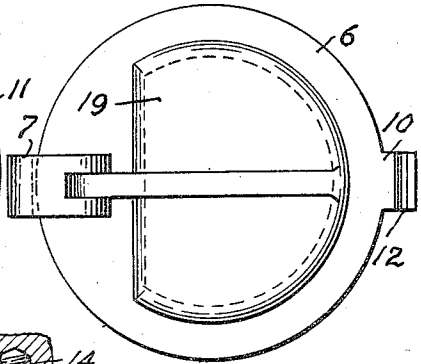
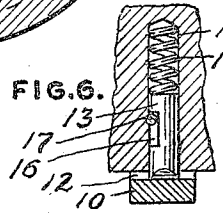



FIG.6.




WITNESSES

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## SAND-PUMP.

1,145,158. Specification of Letters Patent. Patented July 6, 1915.

Application filed March 2, 1914. Serial No. 821,901.

*To all whom it may concern:*

Be it known that I, CLARENCE T. MAPES, a citizen of the United States, and a resident of Crafton, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Sand-Pumps, of which the following is a specification.

One object of this invention is to provide a simple and highly efficient bottom closure which may be readily released for emptying the pump, and which when closed is securely held, the arrangement being preferably such that while the pump closure is adapted to open downwardly the weight of the pump contents tends to hold it in closed position.

A further object is to improve and simplify the upper portion of the pump body.

A characteristic of the invention is the permanent union between the upper end of the pump and the sand line by which it is operated, thereby doing away with screw connections or other joints that are liable to loosen under the unavoidable rotation of the pump resulting from the twisting and untwisting of the operating line. The expense of forming and maintaining the usual screw box and pin connections is avoided, likewise the labor incident to making and breaking such connections. The extremity of the sand line may be connected to and disconnected from the tool with comparatively little difficulty; and furthermore, as such line is used primarily, and in many instances only, for operating the sand pump or boiler, disconnection is necessary only for making repairs or when renewing either the line or its connection with the tool.

In the accompanying drawings, Figure 1 is an elevation of a sand pump embodying the invention, the pump body being shown in section. Fig. 2 is a vertical section of the lower portion of the body, the valved bottom thereof being shown in closed position in full lines, and in open position in dotted lines, also illustrating a suitable tool for opening the bottom closure. Fig. 3 is a sectional plan on line 3—3 of Fig. 2. Fig. 4 is a top plan of the bottom gate or closure. Fig. 5 is a sectional elevation of the upper portion of the tool. Fig. 6 is a detail of the closure-holding latch.

Referring to the drawings, the main portion of the pump body or cylinder is formed of a section of tubing or casing 2 of suitable length, to the lower end of which is secured the tubular shoe-like body 3, having its lower portion cut away at one side at 4, and the top edge of the cut-away portion is slotted upwardly as indicated at 5.

6 is the gate-like closure or dumping bottom of circular form to fit within and close the bore of body 3 as shown in Figs. 2 and 3, and projecting upwardly from closure 6 is the hinge lug 7 which is entered in slot 5. The lug is slotted at 8 in a plane parallel with the plane of closure 6, and extending through the lug slot is the hinge pin 9, the pin bridging slot 5 and completing the movable hinge connection between the pump body and closure 6.

A tongue 10 projecting from the free edge of the closure is adapted to enter an aperture 11 in shoe 3, thereby supporting gate or closure 6 in body-closing position, as in full lines in Fig. 2. As gate 6 when closed is downwardly inclined from its hinge-supported side to its free portion sustained by projection 10, the weight of the fluid opposes the transverse sliding upward movement of the closure necessary to permit it to open, and to that extent the weight of the pump contents operates to hold the gates closed. The hinge connection formed by slot 8 and pin 9 permits of a sufficient sliding movement to release projection 10 from opening 11 so that the gate may swing to the open position shown in dotted lines in Fig. 2, and the inclination of the hinge connection is such that when closing upwardly projection 10 engages inclined face 11′ and is automatically entered in opening 11 by the sliding of the closure when the latter is fully raised. When thus raised and closed the gate bears upwardly against the inclined shoulder 3′ extending around the inner face of body 3, and this shoulder together with the sediment or sand lodging against it on the upper face of the gate forms a seal which retains the fluid load during the upward or outward travel of the pump.

The upper face of projection 10 is notched at 12 to receive the lower extremity of the latch bolt 13 which opposes opening movement of the gate, although the beveled faces of the bolt and notch are such as to cause the bolt to yield to opening and closing force applied to the gate. Bolt 13 is confined in a

socket 14 in the wall of body 3, a spring 15 holding the bolt normally projected. The bolt is recessed on one side at 16, and the pin 17 entered in this recess limits the downward movement of the latch.

Closure or gate 6 is formed with the relatively large passage 18 which is closed by the upwardly opening check valve 19 hinged to lug 7, as indicated at 20. Secured to the upper end of the barrel-forming tube 2 is a centrally apertured head 21, notched or roughened on its exterior at 22 in the usual manner to provide a hold or grip for a fishing tool. The under face of head 21 is recessed at 23 to form a flange for rivets 24 which secure the head to tube 2.

Movable vertically through the apertured head 21 is plunger rod 25 at the lower end of which is secured the vertically apertured plunger or piston head 26 which is closed to the passage of fluid during its up-stroke by sliding check valve 27, the latter moving on reduced portion 28 of rod 25. Above this reduced portion the rod is provided with stop 29 which is adapted to enter recess 23 and engage head 21, as indicated in Fig. 5, for lifting the pump body.

An important feature of the invention is the permanent connection of the rope socket head 30 with plunger rod 25, in the present adaptation being integral therewith. The head is formed with the central downwardly extending passage 31 which is deflected and enlarged through a side face thereof as indicated at 32, and the sand line 33, usually a wire rope or cable, has its extremity entered through the passage and its end knotted in enlargement 32 as indicated at 34, the knotted end being secured by Babbitt metal 35 which fills the remainder of the cavity. The exterior of the rope socket head 30 is curved or roughened at 36 to provide a hold for fishing tools. With the sand line thus permanently connected to the tool which it operates, in the present adaptation to the pump plunger rod, the usual screw box and pin joint is avoided, averting danger of the parts being accidentally disconnected by the constant swirling or turning of the pump resulting from the twisting and untwisting of the sand line. The babbitt may be readily melted from cavity 32 and the sand line disconnected whenever from any cause such disconnection is necessary. As this line is used primarily, and in most well operations solely, for operating the sand pump or bailer it is seldom necessary to disconnect it.

In operation, the pump is lowered in the well until it strikes bottom, or until floated in the fluid, or its movement to the well bottom is prevented from other cause. As the pump body lowers, the fluid may pass upwardly thereinto, valve 19 opening for this purpose as will be understood. After the pump has come to a standstill the plunger 26 is lowered in the cylinder, the upward rush of fluid through the plunger raising check valve 27, as in Fig. 1, so that the plunger may lower to the bottom of the cylinder. Thereupon the plunger is raised and the suction created by its upward movement draws the fluid, sand, pieces of rock, tool fragments and other loose matter into the pump body until the latter has been completely filled. The fluid above plunger 26 discharges through the lateral opening 37 during the upward movement, this opening being so located that the plunger when fully raised is above it as shown in Fig. 5. When so raised, stop 29 engages head 21 and the necessary hold is thus provided for causing the plunger rod to lift the pump body from the well.

When the pump has been raised out of the hole onto the derrick floor and is to be emptied of its contents, any suitable means may be employed for sliding closure 6 backwardly on hinge pin 9 sufficiently to release projection 10 from opening 11. A convenient means consists of a lever-like bar 38 having a bent extremity 39 which may be entered in a slot 40 in the lower portion of body 3, the lever being formed with a pin-like projection 41 adapted to engage projection 10, and by pressing the lever inwardly or toward the pump cylinder the gate or closure is forced back, releasing the hold of spring bolt 13 and permitting the closure to swing downwardly on its hinge to full open position, as in dotted lines in Fig. 2. The cut-away portion 4 of the lower extremity of body 3 is only of sufficient height or depth to permit the closure to fully open, with the result that when the pump is lowered in the well gate or closure 6 is brought as close as possible to the well bottom, only a few inches intervening.

While the several features of the invention are designed primarily to be embodied in a sand pump, it will be understood that the improved bottom gate may be utilized as a dumping closure for well-emptying implements quite regardless of the use of a plunger. Also, the feature of permanently connecting the rope socket and tool may be applied to tools of various constructions without departing from the invention.

I claim:

1. The combination of a sand pump body, a downwardly opening closure for the body slidable transversely thereof with the free portion of the closure adapted to be supported in closed position by the body, and means for securing the closure in closed position.

2. The combination of a sand pump body, a downwardly opening closure for the body supported thereby and movable transversely thereof when in closed position, and means made effective by such transverse movement for providing an interlocking connection be-

tween the free portion of the closure and the body.

3. The combination of a sand pump body, a downwardly opening closure, a sliding hinge connection between the body and closure whereby the latter may move transversely of the body, and means made effective by such transverse movement for providing an interlocking connection between the free portion of the closure and the body.

4. The combination of a sand pump body, a downwardly opening closure, a sliding hinge connection between the body and closure whereby the latter may move transversely of the body, and an interlocking union between the free portion of the closure and the body with said union adapted to be made and broken by the transverse movement of the closure.

5. The combination of a sand pump body, a downwardly opening closure, a sliding hinge connection between the body and closure whereby the latter may move transversely of the body, a projection on the free portion of the closure, the body being recessed to receive said projection and provide an interlocking union between the closure and body with the union adapted to be made and broken by the transverse movement of the closure.

6. The combination of a sand pump body, a downwardly opening closure, a pin and slot connection between the body and closure constituting a hinge for the latter and affording the closure movement transversely of the body, and an interlocking union between the free portion of the closure and the body adapted to be made and broken by the transverse movement of the closure.

7. The combination of a sand pump body, a closure thereof formed with a slotted hinge lug, the body recessed to receive the lug, a hinge pin bridging said recess and extending through the lug slot whereby the closure is adapted to swing downwardly on the pin and is also adapted to move transversely of the body, and means providing an interlocking union between the free portion of the closure and the body with said union adapted to be made and broken by the transverse movement of the closure.

8. The combination of a sand pump body circular in cross-section and with the lower extremity thereof cut away at one side and with an opening in the opposite side of the body, a downwardly opening closure, a sliding hinge connection between the closure and the portion of the body above said cut-away portion, and means affording an interlocking union between the free portion of the closure and the body with said union adapted to be made and broken by the sliding movement of the closure.

9. The combination of a sand pump body, a downwardly opening closure having a sliding hinge connection with one side of the body whereby the closure may move transversely of the body, means affording an interlocking union between the free portion of the closure and the body with said union adapted to be made and broken by the transverse movement of the closure, and a spring latch for maintaining said union and for opposing breaking thereof.

10. The combination of a sand pump body, a downwardly opening body-closure slidable transversely of the body and inclined when closed with the lowermost portion of the closure free and adapted to be supported in closed position by the body, the closure adapted to slide in a downwardly inclined direction for causing its free portion to be supported in closed position and adapted to slide in a reverse direction for releasing said free portion.

11. The combination of a sand pump body, a downwardly opening closure, a sliding hinge connection between the body and closure whereby the latter is adapted to move transversely of the body, a notched projection on the free portion of the closure, the body formed with an opening in which the closure projection is entered and removed by the transverse movement of the closure, and a spring latch carried by the body and adapted to engage the projection notch for holding said projection within the body opening.

12. The combination of a sand pump body, a downwardly opening closure, a sliding hinge connection between the body and closure whereby the latter is adapted to move transversely of the body, the side of the body opposite the hinge formed with an opening, and a projection on the closure adapted to be entered in said opening by the transverse movement of the closure for holding the latter in closed position, the projection adapted to be engaged by a tool at the exterior of the body for forcing it out of the body opening and releasing the closure.

13. The combination of a sand pump body, a downwardly opening closure, a sliding hinge connection between the body and closure whereby the latter is adapted to move transversely of the body, the side of the body opposite the hinge formed with an opening, a projection on the closure adapted to be entered in said opening by the transverse movement of the closure for holding the latter in closed position, the body formed with a slot beneath said opening to receive a releasing tool, said tool adapted to force the closure projection out of the body opening for releasing the closure.

14. The combination of a sand pump body, a downwardly opening closure therefor inclined when closed, a sliding hinge connection between the body and closure

whereby the latter is adapted to move transversely of the body, and an interlocking union between the lower free portion of the closure and the body with said union adapted to be made and broken by the transverse movement of the closure.

15. The combination of a sand pump body, a closure therefor inclined when closed, a sliding hinge connection between the higher portion of the closure and the body with said hinge connection arranged to afford the closure sliding movement in a plane parallel with the plane of the closure when closed, and means providing an interlocking union between the lower free portion of the closure and the body with said union adapted to be made and broken by the transverse movement of the closure.

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

CLARENCE T. MAPES.

Witnesses:
J. M. NESBIT,
F. E. GAITHER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."