

No. 652,041.

S. M. & J. POLSON.
DEEP WELL PUMP.

Patented June 19, 1900.

(Application filed May 13, 1899.)

(No Model.)

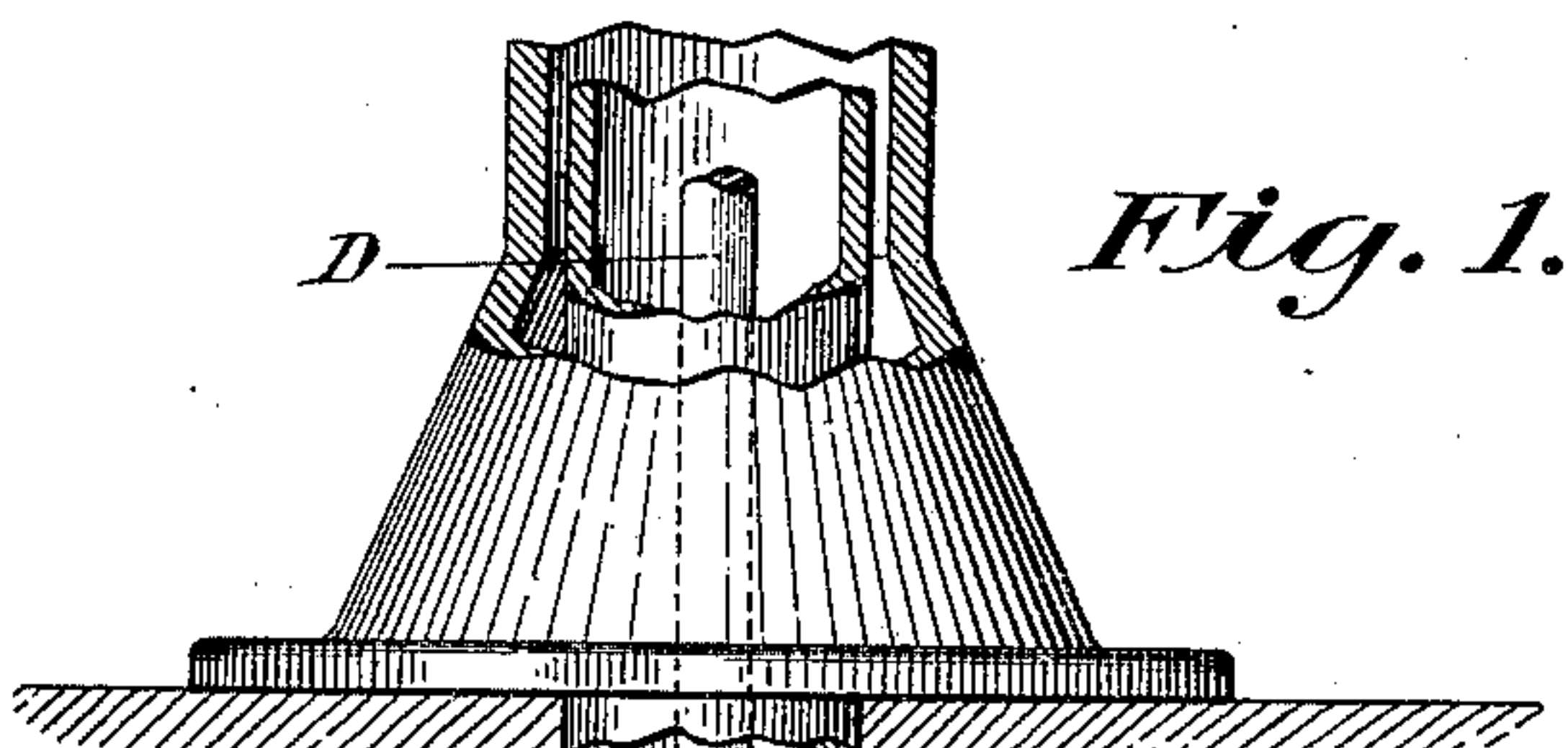


Fig. 1.

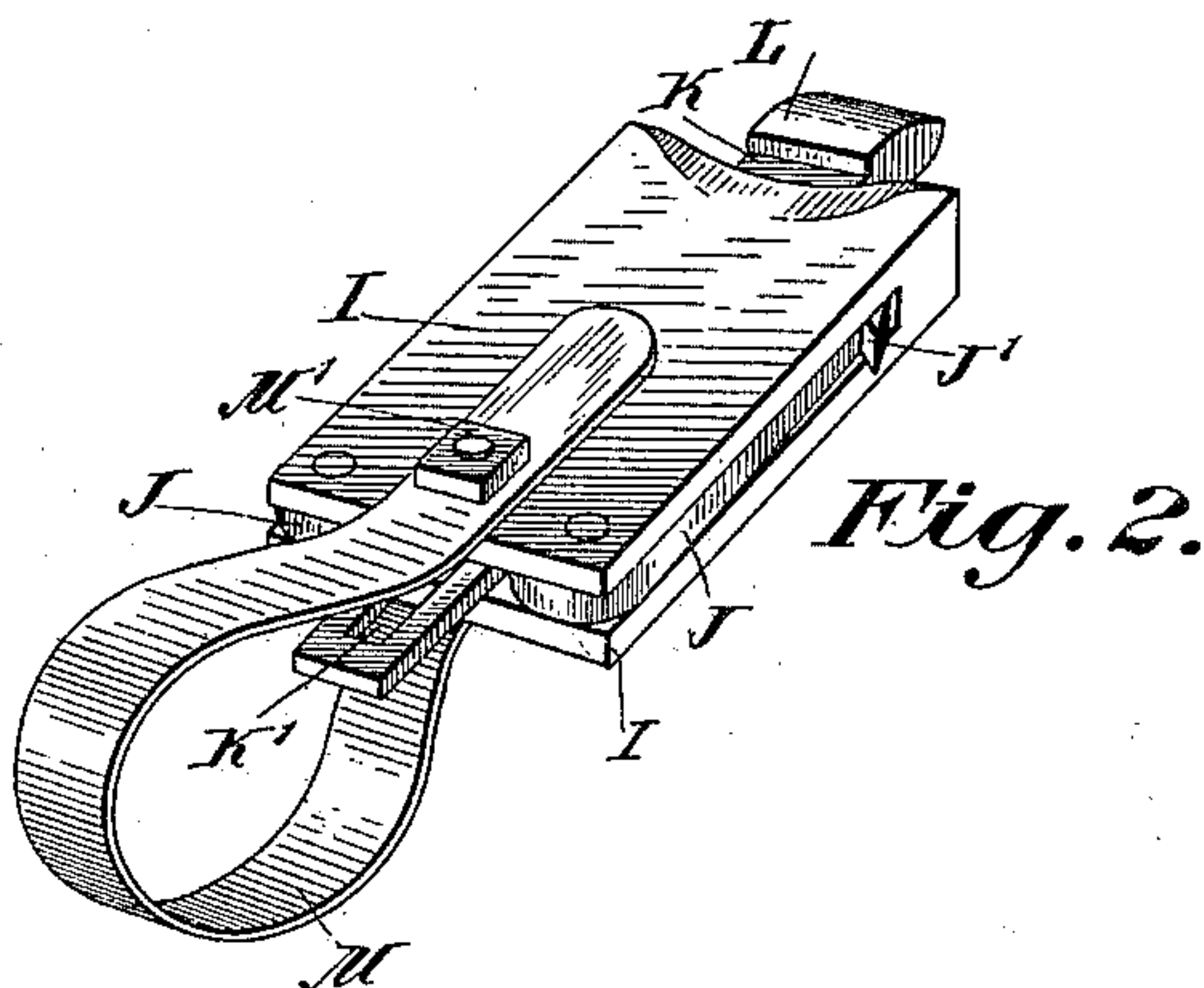
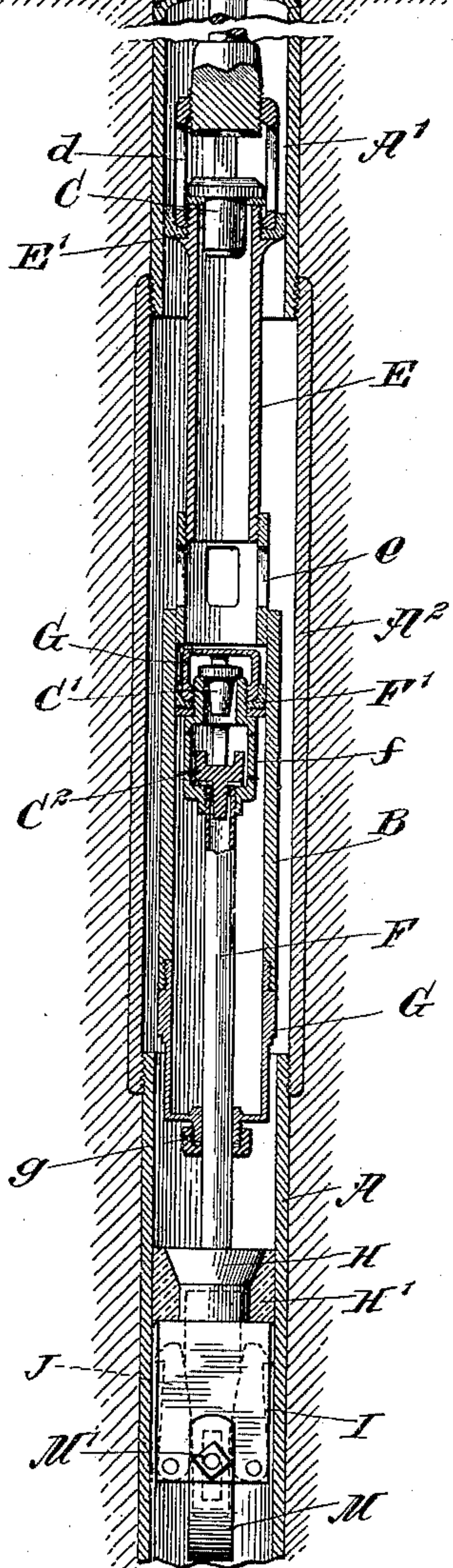


Fig. 2.

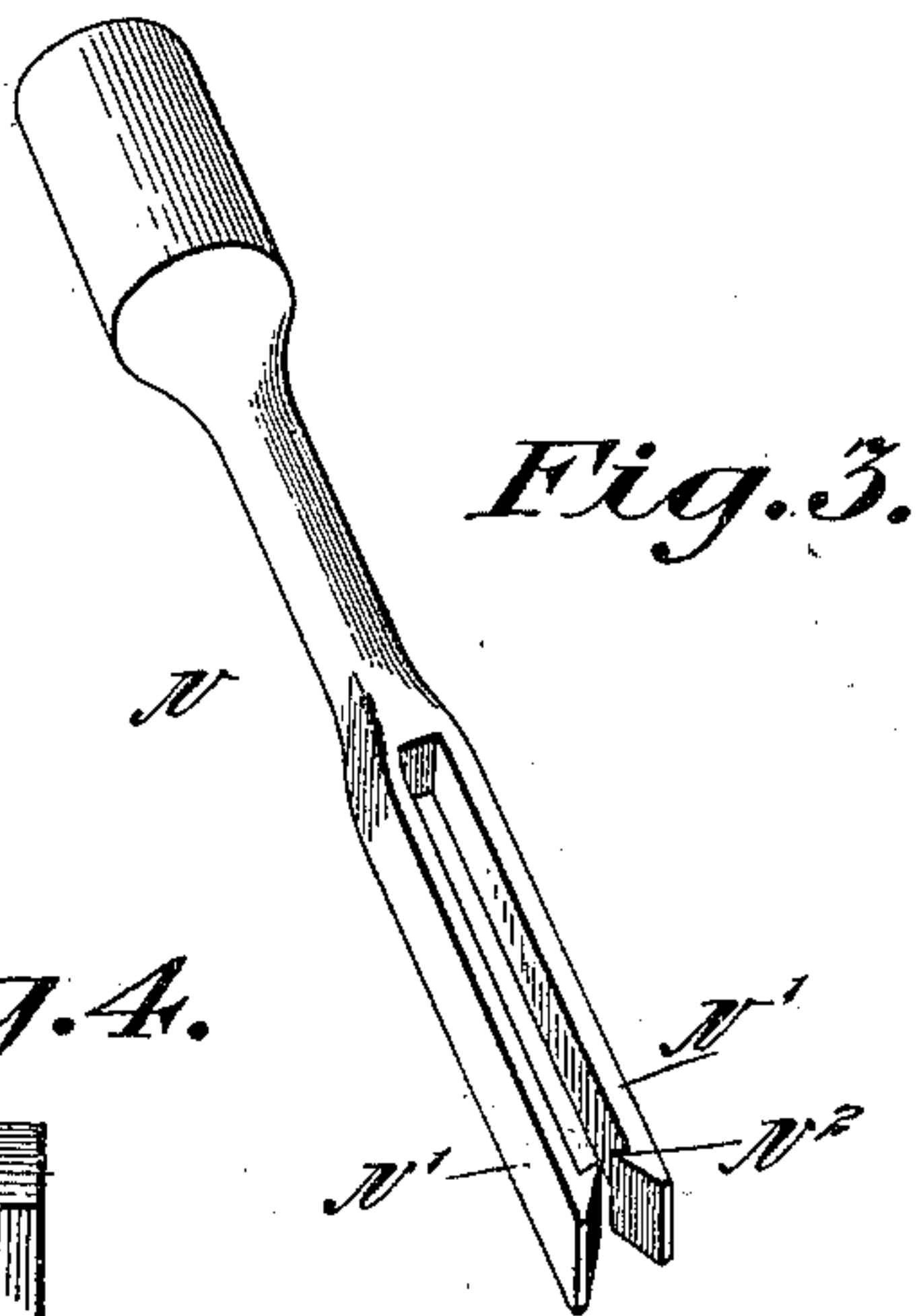
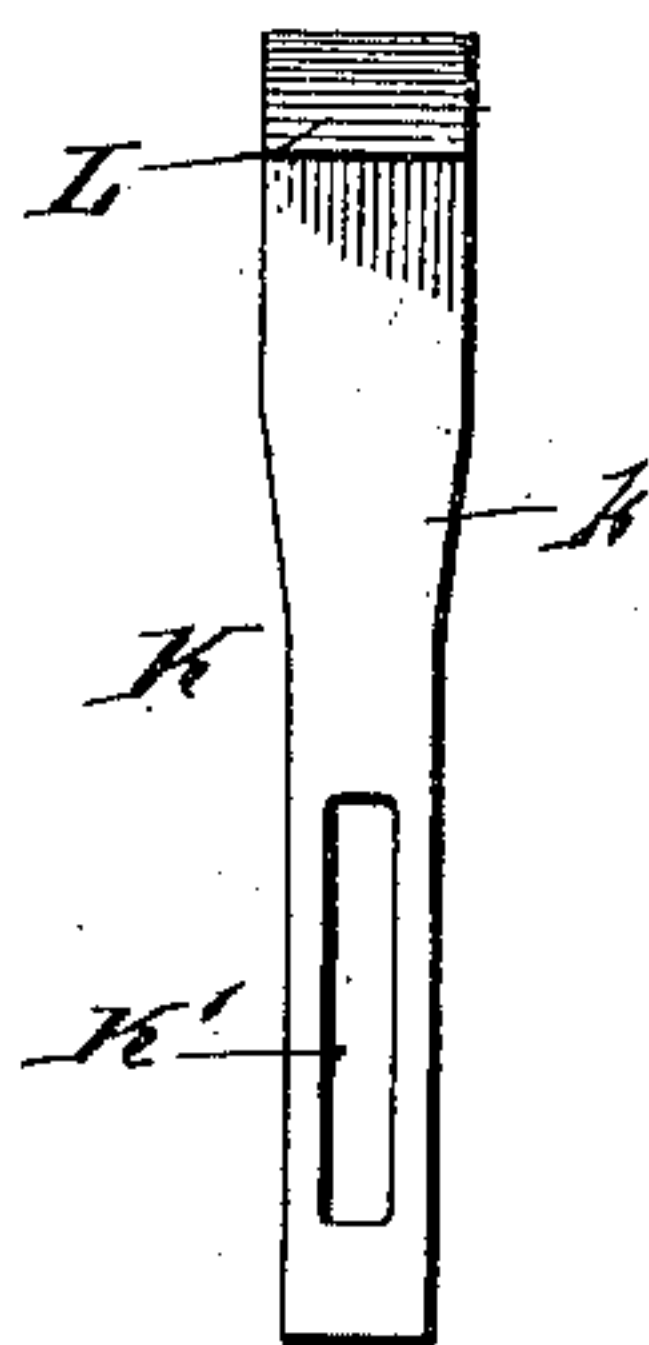


Fig. 3.

Fig. 4.



WITNESSES:

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SIDNEY M. POLSON AND JOHN POLSON, OF LACLEDE, MISSOURI; SAID JOHN POLSON ASSIGNOR OF THREE-TENTHS TO SAID SIDNEY M. POLSON.

DEEP-WELL PUMP.

SPECIFICATION forming part of Letters Patent No. 652,041, dated June 19, 1900.

Application filed May 13, 1899. Serial No. 716,762. (No model.)

To all whom it may concern:

Be it known that we, SIDNEY M. POLSON and JOHN POLSON, of Laclede, in the county of Linn and State of Missouri, have invented a new and Improved Deep-Well Pump, of which the following is a full, clear, and exact description.

Our invention relates to an improvement in pumps of that kind which are generally known as "deep-well" pumps, the object of the invention being to construct a pump which shall have a larger capacity than is usual for a given diameter and also provide a quick and convenient means of withdrawing the pump from the casing for repairs and replacing it in working position again.

Our invention comprises the novel features hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a vertical section of our pump shown in place in a well. Fig. 2 is a perspective view of the block or support which is placed within the well-casing and supports the lower end of the pump. Fig. 3 is a perspective view of an attachment by means of which the block shown in Fig. 2 may be raised from the well, and Fig. 4 is a detail view of the bar by means of which the dogs in said block are forced into engagement with the well-casing.

Pumps for use in bored or driven wells are limited very much in diameter and are correspondingly limited in capacity.

It is the object of our invention to construct a pump which may pass within a comparatively-small casing and yet shall have a large capacity. With this object in view two pistons are used, which are placed in tandem and are arranged so that one operates while the pump-rod is moving in one direction and the other while the pump-rod is moving in the other direction.

The pump-casing, as herein shown, is composed of two portions A and A', the portion A being at the lower end and the portion A' extending upwardly to the surface or as far as the casing is used. These parts are connected by a section A², which is of slightly

larger diameter, being, as herein shown, of sufficiently larger diameter to permit of its screwing outside of the parts A and A', which is for the purpose of providing a sufficient waterway between the cylinder B and casing A'. The upper portion or casing A' is at its lower portion used as a cylinder having a piston or sucker E' placed therein and acting to lift the water. This is secured to the lower end of a pump-rod D and is provided with a leather ring or other suitable device by which it is made water-tight. From the piston depends a tube E, through which the water passes to the upper side of the piston. In the upper end of this tube is placed a valve C, and the tube is connected with the pump-rod D by means of arms d, which form a cage, permitting water to pass between them, holding the valve in place. To the lower end of the tube E is connected a similar slotted ring or casing e, having openings for the passage of the water and supporting at its lower end the auxiliary cylinder B, which rises and falls with the pump-rod. The lower end of this cylinder is closed, being provided with a stuffing-box g, accommodating the piston-rod F of the auxiliary piston. This auxiliary piston F' has a valve C' therein, permitting the water to pass through, and is held in place by a cage G, composed of arms, between which the water passes.

The piston-rod F is connected with the piston by means of a cage f, composed of separated arms forming water-passages and contains a valve C², which opens inwardly and permits the water which passes through the piston-rod F, which is a hollow bar or a tube, to enter the auxiliary cylinder B. This piston-rod is held in a fixed position relative to the casing by means of a casing-stopper, which consists of a cone H, secured to the lower end of the piston-rod, and a ring H', of suitable packing material, as rubber, which is placed outside of the cone H, and is further held in position in the casing by means of the block, which is shown in perspective in Fig. 2. This block has two plates I, which are slightly separated and between which are placed two dogs J, pivoted at the lower end of the plates and provided at their upper ends with outwardly-extending teeth J', adapted to engage

the inside of the pump-casing. Between these two dogs is placed a bar K, which is shown in detail in Fig. 4. Said bar has an arrow-shaped upper end L, having a ledge on each side thereof, by means of which it may be engaged by a tool for withdrawing it. This bar also has inclined surfaces k , adapted to act as a wedge to force the two dogs J outward, and is also provided with a longitudinal slot K' , through which passes a bolt or pin M' , so that the bar K is held against removal. In inserting this block in place it is forced down into the well by engagement with the ends of the plates I. It is prevented from dropping freely into the casing by means of a spring M, which is composed of a plate or thin bar having its ends bent into parallelism and secured to the opposite sides of the block by means of the bolt M' . The loop thus formed is of such size as to engage opposite sides of the well-casing; but it does not cause sufficient resistance to prevent the block from being readily pushed downward when a slight power is applied thereto.

The pump is placed within the casing in the manner shown in Fig. 1, the dogs J being forced outward into engagement with the walls of the casing by forcing the bar K downward within the block. This supports the lower end of the piston against the power-stroke of the auxiliary piston.

The operation of this device is as follows: When the parts being in the position shown in Fig. 1 are raised, the upper or main piston E' will lift the water within the casing A' , and at the same time the water will flow from the lower portion of the auxiliary cylinder B to the upper portion through the valve C' in the piston, due to the movement of the piston F' within the auxiliary cylinder B. When the piston reaches the upper limit of its travel and then starts downward, the valve C' will close and the main piston in descending will carry with it the auxiliary cylinder B and force the water which is within said cylinder and above the piston F' to flow outward through the passages in the connecting-cage e into the space outside of the cylinder B and within the casing A^2 , while at the same time the valve C in the main piston E' will open and permit the transfer of water from beneath to above this piston. The amount of water transferred through the valve C will exceed the displacement of the piston E' by an amount equal to the displacement of the auxiliary piston F' . At the same time water will be drawn in through the hollow piston-rod F sufficient to make up the difference in displacement between the pistons E' and F' . At the same time water will flow upward through the hollow piston-rod F and the valve C^2 into the lower portion of the auxiliary piston. It is thus seen that the pump is double-acting, one piston acting while the pump is moving in one direction and the other while the pump is moving in the other direction. Water flows through the hollow rod F while

the pump is moved in either direction. The capacity of the pump is thus materially increased.

When it is desired to remove the supporting-block I I, this is done by first removing the piston and then using a tool similar to that shown in Fig. 3, which tool has a body N, adapted to be secured to a rod by screwing thereon or in any other suitable manner, and which has two spring-arms N' , having teeth N^2 projecting inward and having beveled ends, so that it may slide over the upper end of the bar K and engage the arrow-shaped upper end thereof. The block I I may then be readily withdrawn from the well.

Having thus fully described our invention, we claim as new and desire to secure by Letters Patent—

1. A pump comprising a casing having a portion thereof acting as a cylinder, a piston or sucker fitted in the cylinder and having an auxiliary cylinder connected thereto, a piston within the auxiliary cylinder having a hollow rod provided exteriorly with a casing-stopper holding it fixed in the casing, and suitable valves in the piston and auxiliary cylinder, substantially as described.

2. A pump having a cylinder, a valve piston or sucker working therein, a tube depending from the piston and communicating at its ends with said valve, and having passages communicating with its exterior, a second cylinder connected with the lower end of the depending tube and having a discharge-valve, a piston therein having a hollow rod serving as a water-supply pipe, a casing depending from the cylinder and surrounding the other mechanism, and a pipe-stopper on the hollow piston-rod and fitting the casing to hold the piston in place therein, substantially as described.

3. A pump comprising a cylinder a valved piston or sucker fitted in the cylinder, an auxiliary cylinder connected with said piston, a piston within the auxiliary cylinder and provided with a valve, a hollow piston-rod connected at its upper end with said piston and provided at said upper end with a valve, the lower end of said hollow piston-rod extending through a stuffing-box in the lower end of the auxiliary cylinder, and means for holding said hollow piston-rod in fixed position, substantially as described.

4. A pump comprising a cylinder, a piston or sucker working therein, a tube depending from the piston, a pump-rod connected with the upper end of said tube by arms forming a cage, a valve held in said cage at the upper end of the tube, an auxiliary cylinder connected with the lower end of the depending tube, a piston in said auxiliary cylinder and provided with a valve, a hollow piston-rod extending at its lower end through the lower end of the auxiliary cylinder, arms connecting the hollow piston-rod at its upper end with the said auxiliary piston forming a cage a valve contained in said cage, and a casing-

stopper for the lower end of the hollow piston-rod to hold it in fixed position, substantially as described.

5 5. A pump comprising a cylinder a casing connected therewith, a pump-rod extending within the cylinder, a piston connected with said pump-rod, an auxiliary cylinder connected with said piston, a piston in said auxiliary cylinder having a hollow piston-rod
10 acting as a water-supply, a casing-stopper secured to said rod, and a clutch or grip device adapted to grip the casing, and located beneath the stopper for the purpose set forth.

15 6. A valve-supporting device for insertion in well-casings, comprising a block having slots therein, dogs pivoted in the slots at the lower end of said block and adapted to engage the casing, and a wedge located between the dogs and adapted to engage the dogs to
20 force them outward, the said wedge being provided with a longitudinal slot and a bolt or pin secured to the block and passing through the said slot, substantially as described.

25 7. A valve-supporting device for insertion in well-casings, comprising a block having slots therein, dogs in the slots adapted to engage the casing, a wedge between the dogs and adapted to force them outward, the said wedge being provided with a longitudinal
30 slot, a bent plate-spring having a loop portion adapted to engage the casing to temporarily support the device and a bolt or pin for securing the ends of said spring to the block, the said bolt also passing through the
35 slot in the wedge, substantially as described.

8. A valve-supporting device for insertion in well-casings comprising a block having slots therein, dogs in the slots adapted to engage the casing when forced outward, a wedge

lying between said dogs and having an arrow-shaped upper end projecting above the block, the said wedge being adapted when driven down to force the dogs outward, and a spring plate or bar secured at its ends to opposite sides of the block and having a loop portion
45 extending below the block and adapted to engage opposite sides of the well-casing, substantially as described.

9. A pump comprising a casing having therein a pump-rod with main and auxiliary
50 cylinders and pistons arranged in tandem, one piston and its non-related cylinder being secured to the casing and the other piston and its non-related cylinder being secured to the pump-rod, the rod of the fixed or lower
55 piston having a cone at its lower end, a ring of packing material held in the casing outside of the cone, and a block having a clutch device and adapted to be secured to the casing below the said cone, for the purpose set
60 forth.

10. A pump comprising a casing adapted to act as a cylinder, a piston therein, an auxiliary cylinder depending from said piston, an enlarged casing-section surrounding the
65 auxiliary cylinder, a piston within the auxiliary cylinder and having a hollow piston-rod supported from the casing, a valve for permitting the water to pass the piston, and a valve to permit the water to pass from the
70 hollow piston-rod to the auxiliary cylinder, substantially as described.

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Witnesses:

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