

(No Model.)

3 Sheets—Sheet 1.

H. WOODMANSE & J. A. AUE.
PUMP VALVE.

No. 549,990.

Patented Nov. 19, 1895.

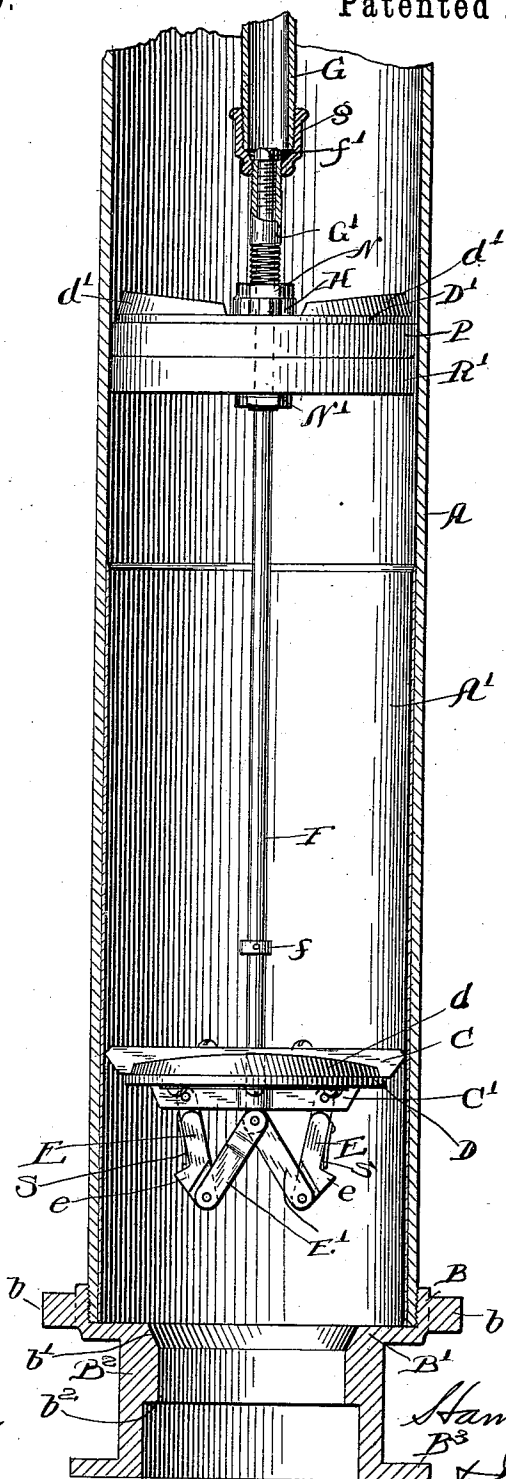


Fig. 1.

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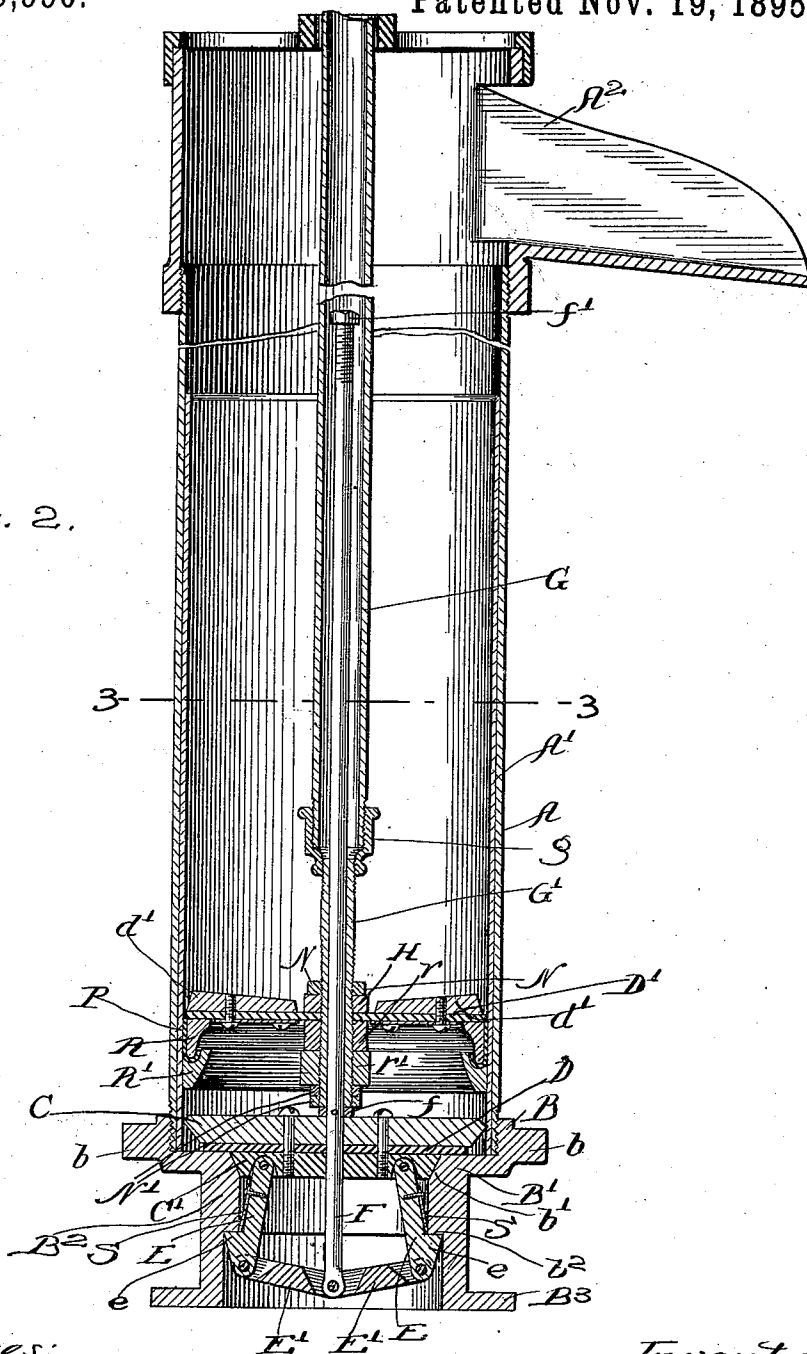
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Fig. 2.



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3 Sheets—Sheet 3.

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PUMP VALVE.

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Fig. 3.

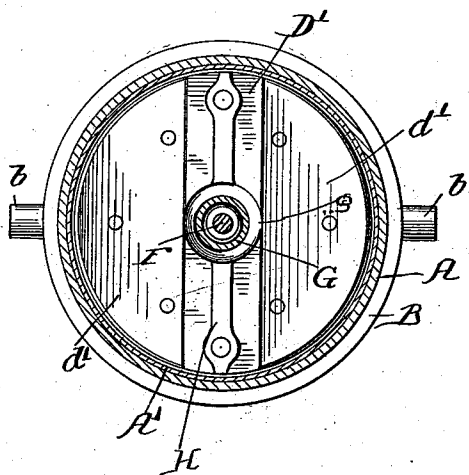


Fig. 4.

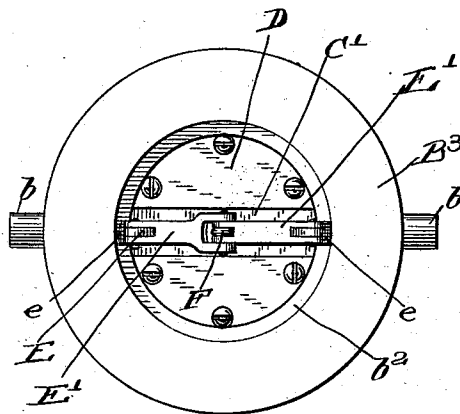


Fig. 5.

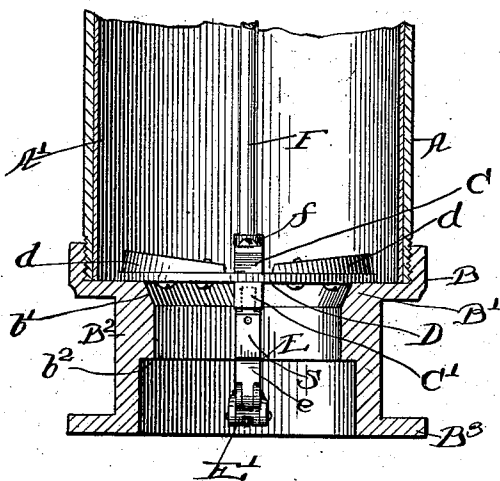
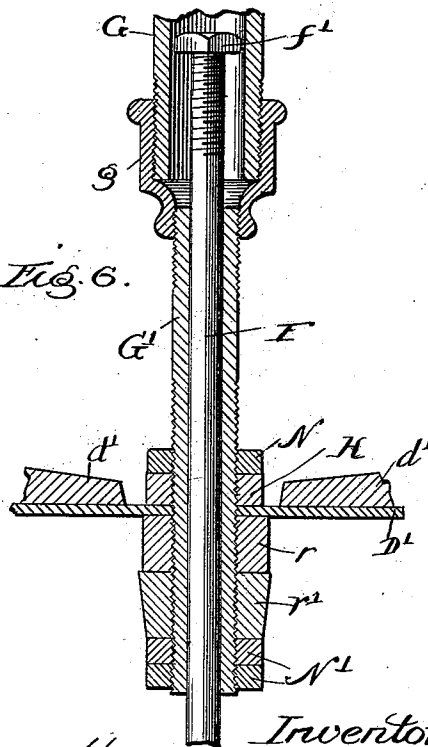


Fig. 6.



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UNITED STATES PATENT OFFICE.

HARRISON WOODMANSE AND JOHN A. AUE, OF FREEPORT, ILLINOIS; SAID
AUE ASSIGNOR TO SAID WOODMANSE.

PUMP-VALVE.

SPECIFICATION forming part of Letters Patent No. 549,990, dated November 19, 1895.

Application filed March 4, 1895. Serial No. 540,491. (No model.)

To all whom it may concern:

Be it known that we, HARRISON WOODMANSE and JOHN A. AUE, citizens of the United States of America, residing at Freeport, in the county of Stephenson and State of Illinois, have invented certain new and useful Improvements in Pump-Valves, of which the following is a specification.

Our invention relates to improvements in pump-valves, its object being to provide a pump-cylinder with a valve normally stationary at the lower end of the cylinder and so constructed as to be seated in its place or removed therefrom through the upper end of the cylinder. The valve is preferably locked in place when in use, the locking device being so constructed as to be readily operated from above, either in fastening the valve in proper relation to its seat or in releasing it to permit its removal.

One form of our invention is fully described and explained in this specification and shown in the accompanying drawings, in which—

Figure 1 is a central vertical section of a pump-cylinder provided with a valve mechanism embodying our invention, the lower or normally stationary valve being shown above its seat and its parts being in the relative positions which they assume as the valve is moving either toward or away from its seat. Fig. 2 is a similar view showing the valve fastened in working relation to its seat. Fig. 3 is a horizontal section through the line 3-3, Fig. 2, the view being downward. Fig. 4 is a bottom plan of the lower valve and the cylindrical casting on which it rests, the parts being in the relation shown in section in Fig. 2. Fig. 5 is a vertical section of the lower portion of the cylinder, showing the stationary valve in its locked position, the plane of section being at right angles to the plane of section in Fig. 2. Fig. 6 is an enlarged vertical section showing the connection of the pump-rod and the movable valve or plunger of the pump.

In the views, A is a portion of a tubular pump-cylinder of any desired length, the entire cylinder being made up of any desired number of suitably-connected pipe-sections, preferably of the same diameter, and the upper end of the cylinder being provided with

a suitable discharge-spout A², Fig. 2. The lower portion of the cylinder or that in which the plunger works is preferably provided with a cylindrical lining A', of brass, fastened in place in any desired manner. The lower end of the cylinder A is screwed or otherwise fastened in the cylindrical neck B of a casting formed with an annular horizontal shoulder B' immediately within the lower end of the cylinder A, this shoulder being the valve-seat of the pump.

From the valve-seat an integrally-formed neck extends downward a suitable distance and is provided at its lower end with a horizontal annular flange B³, adapted to be bolted to the similarly-flanged upper end of a downwardly-extending tube reaching into the water below. In the upper end of the neck is an annular flange B², formed at its upper edge with a beveled shoulder b', and at its lower edge with an abrupt shoulder b², whose functions are hereinafter explained. The neck B is preferably provided with lugs b b, by means of which it may be rotated in securing it on the lower end of the cylinder.

On the valve-seat B' rests a flexible disk D, preferably of leather or rubber, firmly clamped between two diametrical bars C C' above and below it, respectively, the halves of the upper face of the disk on opposite sides of the bar C being provided with metal weights d d, adapted to press the disk downward and insure its contact with the valve-seat. The upper bar C is of a length approximately equal to the inner diameter of the brass lining A', and the lower bar C' is of such length and its ends are so beveled that the latter conform to the beveled shoulder b' at the upper edge of the annular flange B², already described. The valve comprising the bars C C', flexible disk D, and weights d d may thus evidently be inserted in the cylinder from above, and the bar C' will insure the proper centering and seating of the valve.

To the bar C' are pivoted two dependent arms E E, free to oscillate in a vertical plane, and provided at their lower ends with outwardly-extending hooks e e, adapted when pressed outward to pass under and engage the shoulder b² at the lower edge of the annular flange B². The outer ends of two arms

E' E' are pivoted to the lower ends of the arms
 E E, the inner ends of the two arms E' E' be-
 ing pivoted to each other and also to the lower
 end of a vertically-sliding rod F, extending
 5 upward through the valve C C' D, and pro-
 vided with a stationary collar *f* lying above
 the valve and at a suitable distance from the
 lower end of the rod. The vertical movement
 10 of the rod F with relation to the valve C C'
 D is evidently limited by the collar *f* and the
 inner ends of the arms E' E', and the collar
 is so placed that when the rod is at its lowest
 limit of movement (the collar being in con-
 15 tact with the upper face of the bar C) the
 lower end of the rod and the inner ends of
 the arms E' E' are slightly below the outer
 ends of said arms. The arms E' E' thus form
 a toggle-lever adapted to pass above and be-
 20 low a center midway between the points of
 connection of the arms E' E' with the arms E
 E, and the length of the arms E' E' is such
 that when they are approximately horizontal
 or in the position shown in Fig. 2 the hooks
 25 *e e* of the arms E E lie beneath and in engage-
 ment with the shoulder *b*² of the flange B².
 Springs S S, fastened to the outer faces of the
 arms E E above the hooks *e e*, pressed against
 the inner face of the flange B², take up the
 30 slight loss of motion caused by the arms E'
 E' crossing the center and prevent any rat-
 tling or looseness of the parts. It is evident
 that if the rod F be moved upward with suf-
 ficient force to carry the inner ends of the
 35 arms E' E' across the center and into the rela-
 tive positions shown in Fig. 1, the lower ends
 of the arms E E will be drawn inward and
 the hooks *e e* disengaged from the shoulder
*b*² *b*², thus permitting the upward movement
 40 of the valve C C' D.
 The rod F, which extends upward from the
 valve C C' D a considerable distance, is pro-
 vided at its upper end with a nut *f*' and lies
 within a tubular pump-rod made up of two
 45 parts connected by a suitable union *g*, the
 upper portion being a pipe G of suitable
 length and of an internal diameter greater
 than the diameter of the nut, and the lower
 portion being a tube G', fitting closely upon
 50 the rod F, as clearly indicated in Figs. 2 and
 6. The lower portion G' of the pump-rod car-
 ries a valve-plunger which may be of any de-
 sired construction, but is preferably made up
 of the parts shown in Figs. 2 and 6, in which
 55 R R' are two rings formed with diametrical
 webs *r r*', respectively. D' is a flexible disk
 resting upon the upper ring and provided
 with weights *d' d'*, and H is a diametrical bar
 resting on the disk D' directly above the webs
 60 *r r*'. The lower portion of the tube G' passes
 through the bar H and webs *r r*', and the
 parts are held together by means of nuts N N'.
 A suitable packing-ring P encircles the up-
 per ring R, its lower edge being clamped be-
 65 tween the two rings R R'. The length of the
 rod F and the distance between the collar *f*
 and nut *f*' are such that when the collar is
 in its normal position, as shown in Fig. 2, the

tube G' may move freely up and down within
 the limits of the stroke of the plunger without
 striking the nut *f*'. This being the case it is
 70 evident that when the lower valve is locked
 in place, as shown in Fig. 2, the operation of
 the pump differs in no respect whatever from
 that of any other, the lower valve and the rod
 F projecting upward from it being not af-
 75 fected in any way by the normal movement
 of the plunger. If, however, it be desired to
 remove the lower valve at any time, the up-
 per end of the pump-rod may be disengaged
 from the usual operating mechanism, and the
 80 pump-rod may then be lifted up until the up-
 per end of the tube G' strikes and lifts the
 nut *f*', thereby lifting the inner ends of the
 arms E' E' and carrying them across their center
 and into the relative positions shown in
 85 Fig. 1, when the valve will be unlocked from
 its seat and may be lifted with the plunger
 entirely out of the cylinder. The insertion
 of the valve is simply the reversal of the op-
 90 eration just described.

The parts being connected, as shown in
 Fig. 1, and the lower valve being suspended
 by means of the rod F and nut *f*', the parts
 are all inserted in the upper end of the cylin-
 95 der and dropped downward until the lower
 valve seats itself upon the flange B' of the
 casting B, the valve being centered accu-
 rately by means of the bar C', as already de-
 scribed. The plunger is then dropped down
 upon the collar *f*, which is thereby forced
 100 downward, pressing the toggle-lever into the
 position shown in Fig. 2 and locking the sta-
 tionary valve in place.

It is evident that the device thus described
 provides a simple and practical means for the
 105 insertion and removal from above of the nor-
 mally-stationary lower valve of a pump, and
 that a valve thus constructed may at any time
 be removed in a moment for repair or replace-
 ment and can be inserted with equal facility.
 110 This simple operation obviates the necessity
 for the removal of the entire pump-cylinder
 when the replacement or renewal of the valve
 becomes necessary, and this is a great conven-
 115 ience in every case and a very great saving of
 time and labor when the pump-cylinders are
 of considerable diameter, as is frequently the
 case. In many situations, and particularly in
 the pumping of water from shallow wells in the
 120 arid regions of the West, pumps of large diam-
 eter are coming into extensive use, and in these
 pumps, particularly, our invention is of the ut-
 most importance.

The form shown in the drawings has been
 described with great particularity, in order to
 125 make its construction and operation perfectly
 clear; but we have no intention of limiting our
 invention to the details thus shown and de-
 scribed or to the particular locking mechan-
 130 ism by means of which the invention, as illus-
 trated, is made practical. We believe it to be
 broadly new to provide a pump-cylinder with
 a normally-stationary valve adapted to be in-
 serted and removed through the upper end of

the cylinder, whether the valve be locked in place or held in place by its own weight or by any other means whatever, and we intend therefore to include within our invention a valve susceptible of such insertion and removal, as well as any means whatever for locking the valve, these means being adapted to be operated from above for the purpose of locking or releasing the valve.

Having now described and explained our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination with a pump cylinder and its valve seat, of a valve resting normally upon the valve seat and adapted to be inserted in and removed from the cylinder through the upper end thereof, locking mechanism attached to the lower face of the valve and adapted to be thrown into or out of engagement with the cylinder or a continuation thereof and means connected with said locking mechanism and extending upward through the valve, whereby said locking mechanism may be operated from above the valve and the valve thereby locked in place or released.

2. The combination with the cylinder, A, having the valve seat, B, at its lower end and a shoulder, b^2 , below the valve seat, of the valve resting upon the valve seat and provided with the pivoted arms, E, E, formed with hooks, e, e , adapted to engage the shoulder, the toggle arms E', E' , connecting the ends of the arms, E, E, and the rod, F, connected with the inner ends of the arms, E', E' , and extending upward through the valve, the vertical movement of said rod in one direction being adapted to throw the hooks, e, e , into engagement with the shoulder and the movement of the rod in the opposite direction being adapted to disengage the hooks from the shoulder; substantially as shown and described.

3. The combination with the cylinder, A, having the valve seat, B', and the shoulder, b^2 , below the valve seat and the valve constructed substantially as described and comprising the flexible disk, D, resting on the valve seat, the diametrical bars, C, C', lying above and below the disk, respectively, clamping it between them and the weights, d, d , attached to the disk, of the arms, E, E, pivoted to the bar, C', and formed with hooks,

e, e , adapted to engage the shoulder, the vertical rod, F, passing through the valve and means connecting the lower end of the rod with the arms, E, E, whereby the vertical movement of the rod in either direction will throw the hooks, e, e , into or out of engagement with the shoulder, b^2 .

4. The combination with a pump cylinder and its valve seat, of a valve resting normally upon the valve seat, and adapted to be inserted in and removed from the cylinder through the upper end thereof, a tubular pump rod lying within the cylinder, a plunger mounted upon the pump rod and having a normally limited movement in the cylinder, locking mechanism attached to the valve and adapted to fasten it in place upon the valve seat or release it therefrom and a rod connected with said locking mechanism and extending upward through the valve and into the tubular pump rod, said rod being provided with stops above and below the plunger, respectively, and separated by a distance greater than the normal movement of the plunger, the downward pressure of the plunger upon the lower of said stops being adapted to lock the valve in place and the upward movement of the plunger against the upper of said stops being adapted to release the valve and adapt it to be lifted from the cylinder.

5. The combination with the cylinder and its valve seat, of the valve resting upon the valve seat and provided with locking mechanism substantially as described, the tubular pump rod, G, G', and the plunger mounted thereon and the rod, F, connected with the locking mechanism of the valve and extending upward through the part, G', of the pump rod, the rod, F, being provided with the stops, f', f , above and below the plunger, respectively, the downward pressure of the plunger upon the stop, f , being adapted to lock the valve in place and the upward pressure of the plunger upon the stop, f' , being adapted to release the valve and to lift it by means of the rod, F.

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