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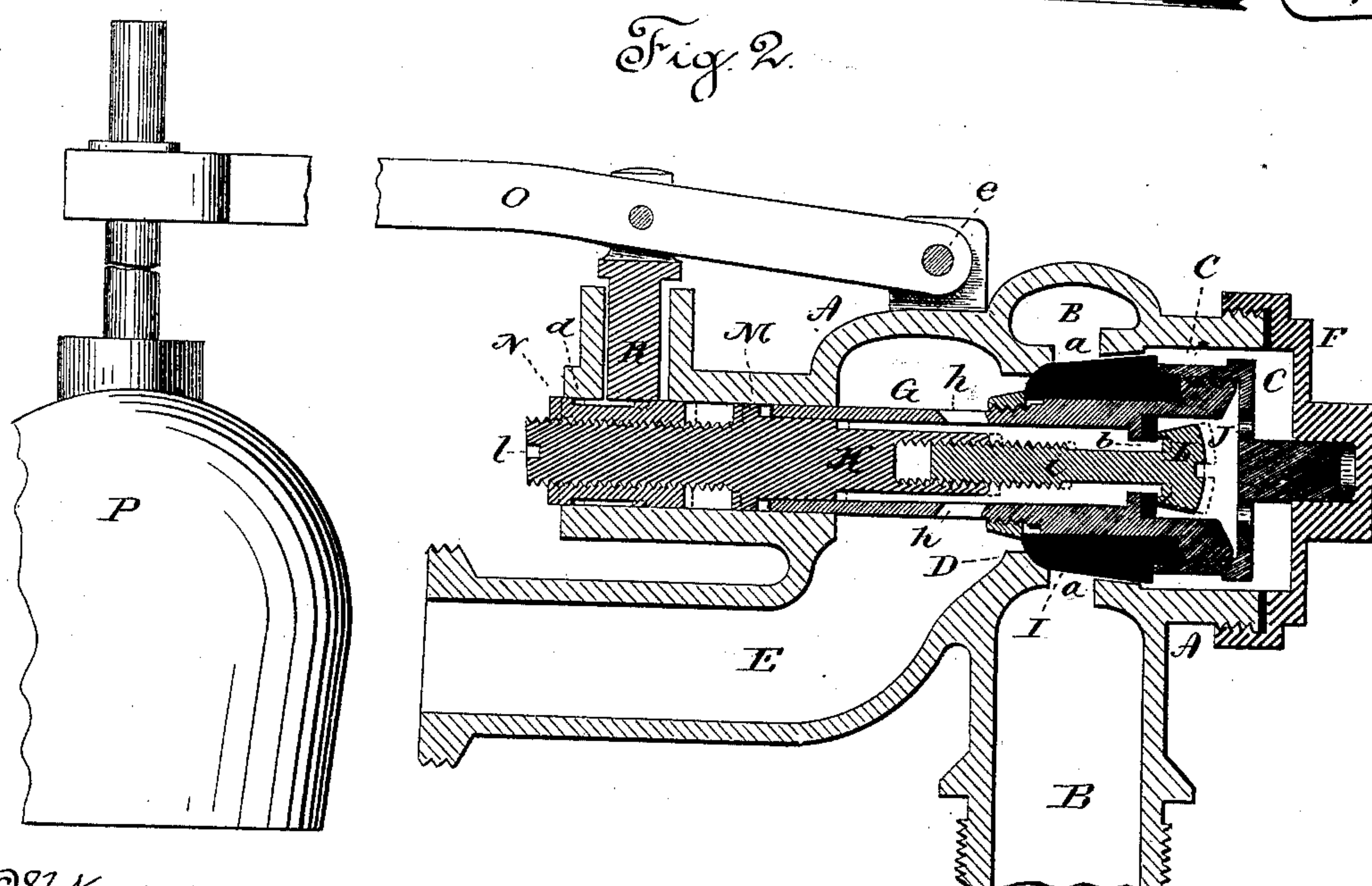
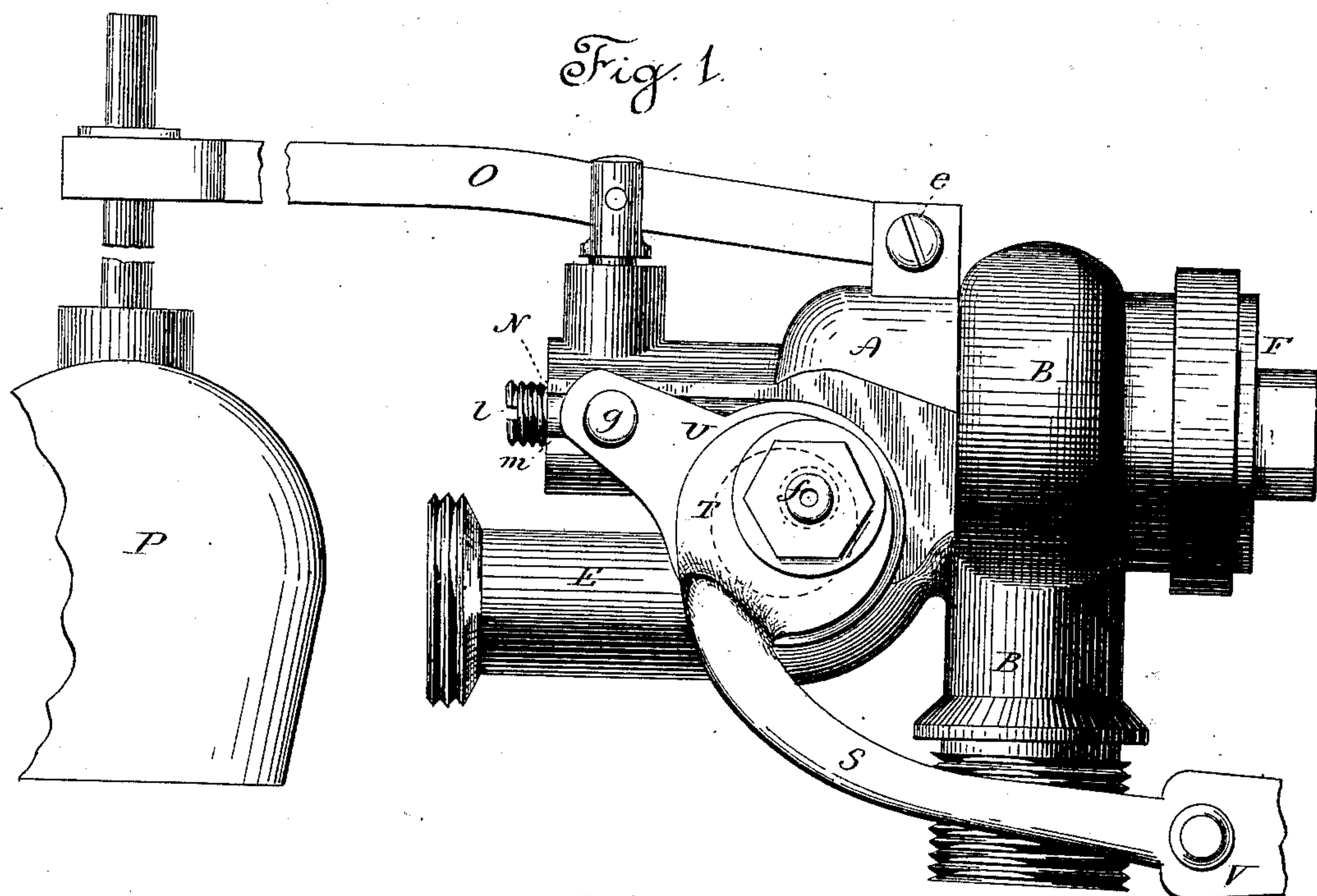
2 Sheets—Sheet 1.

H. S. LORD.

WATER CLOSET VALVE.

No. 336,523.

Patented Feb. 16, 1886.



Witnesses.
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Fred C. Earle

Henry S. Lord.
Inventor.
By Atty.
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(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

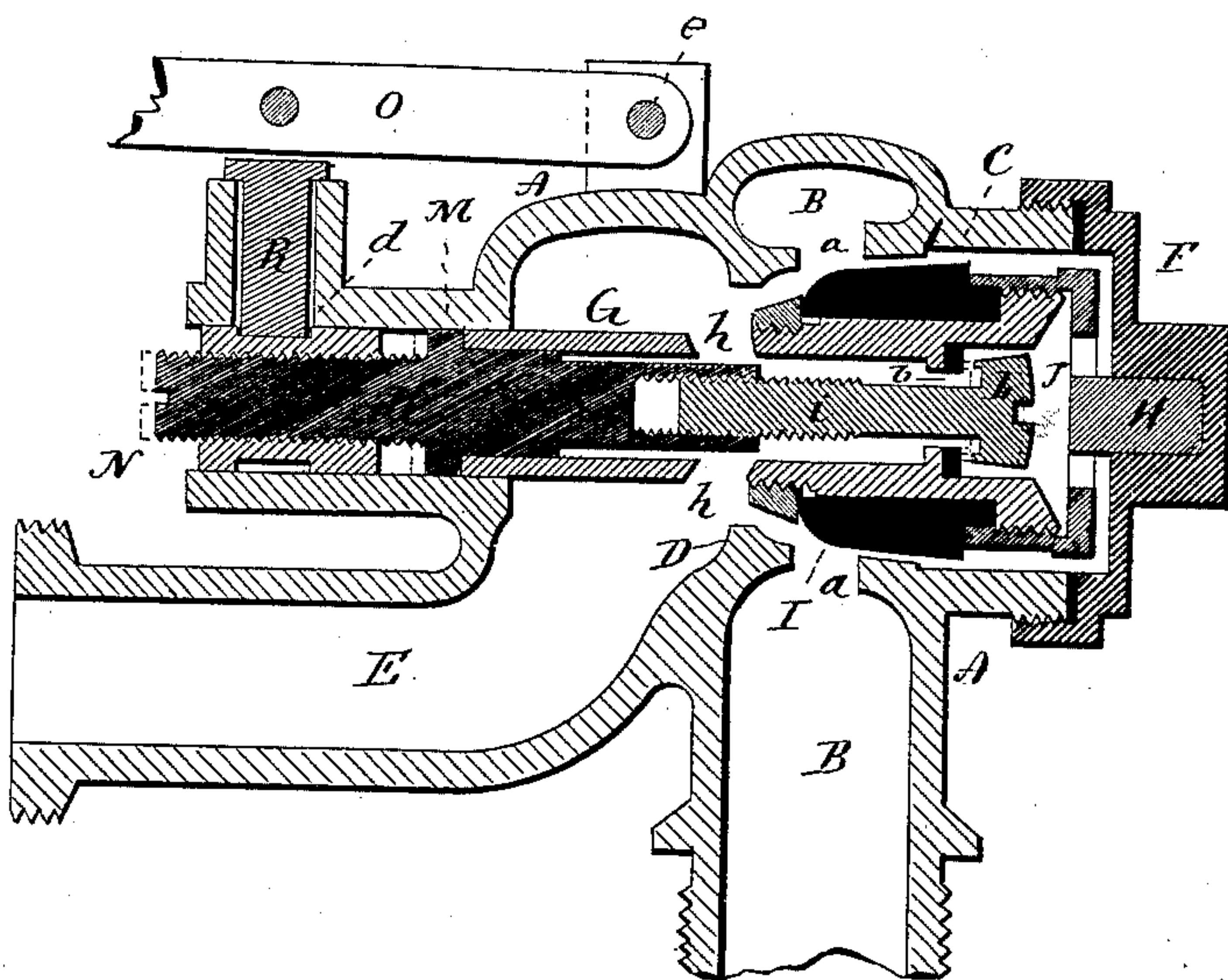


Fig. 4.

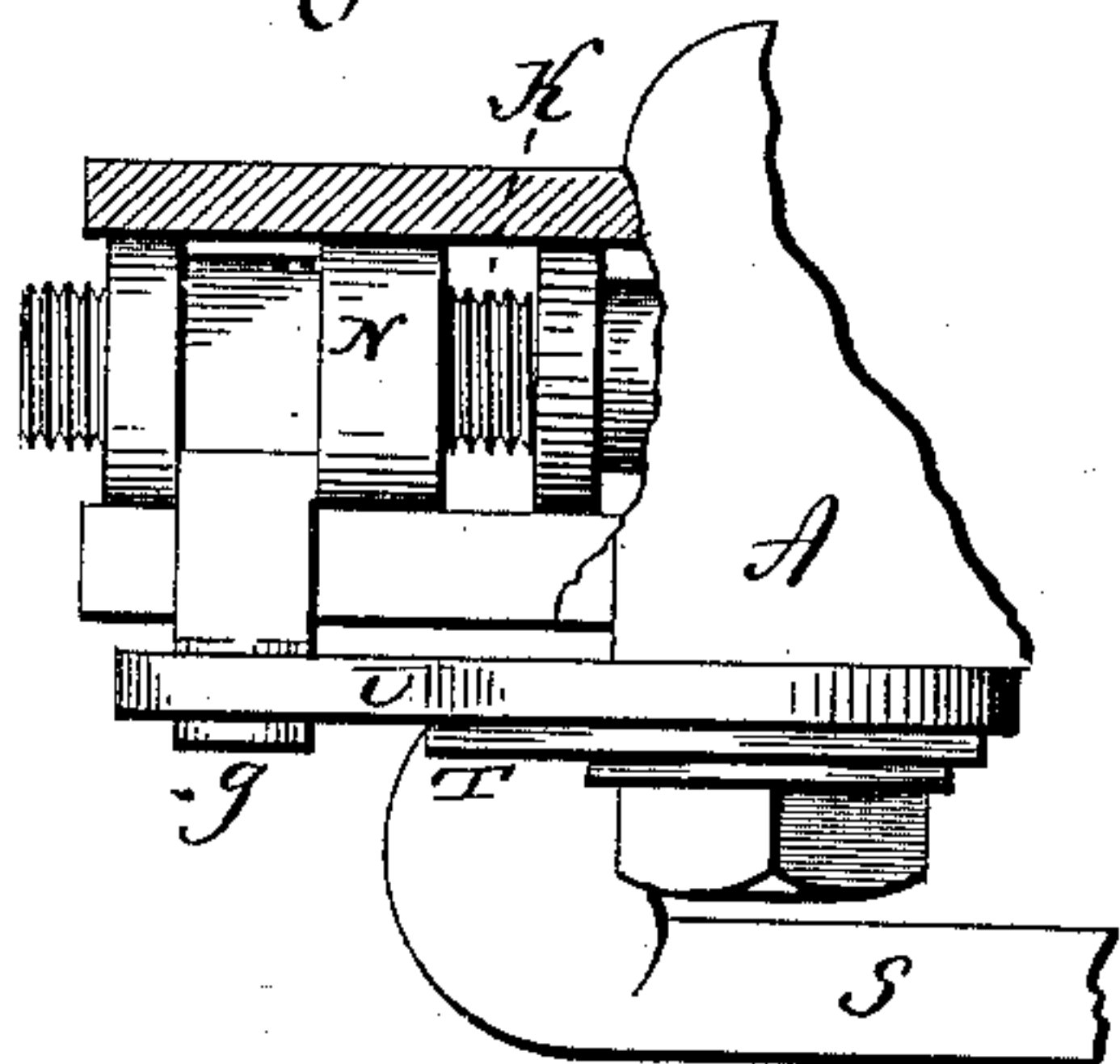


Fig. 5.

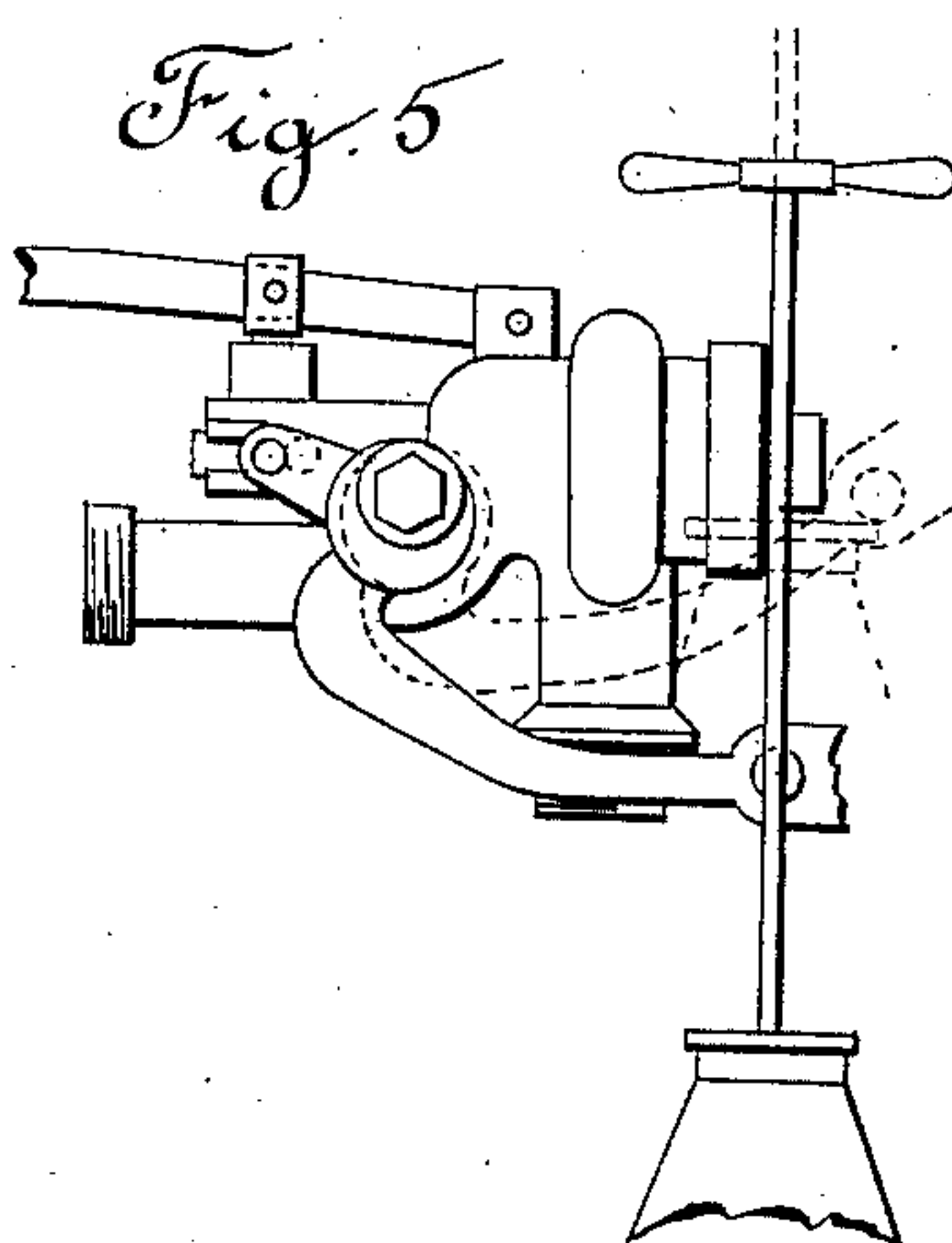
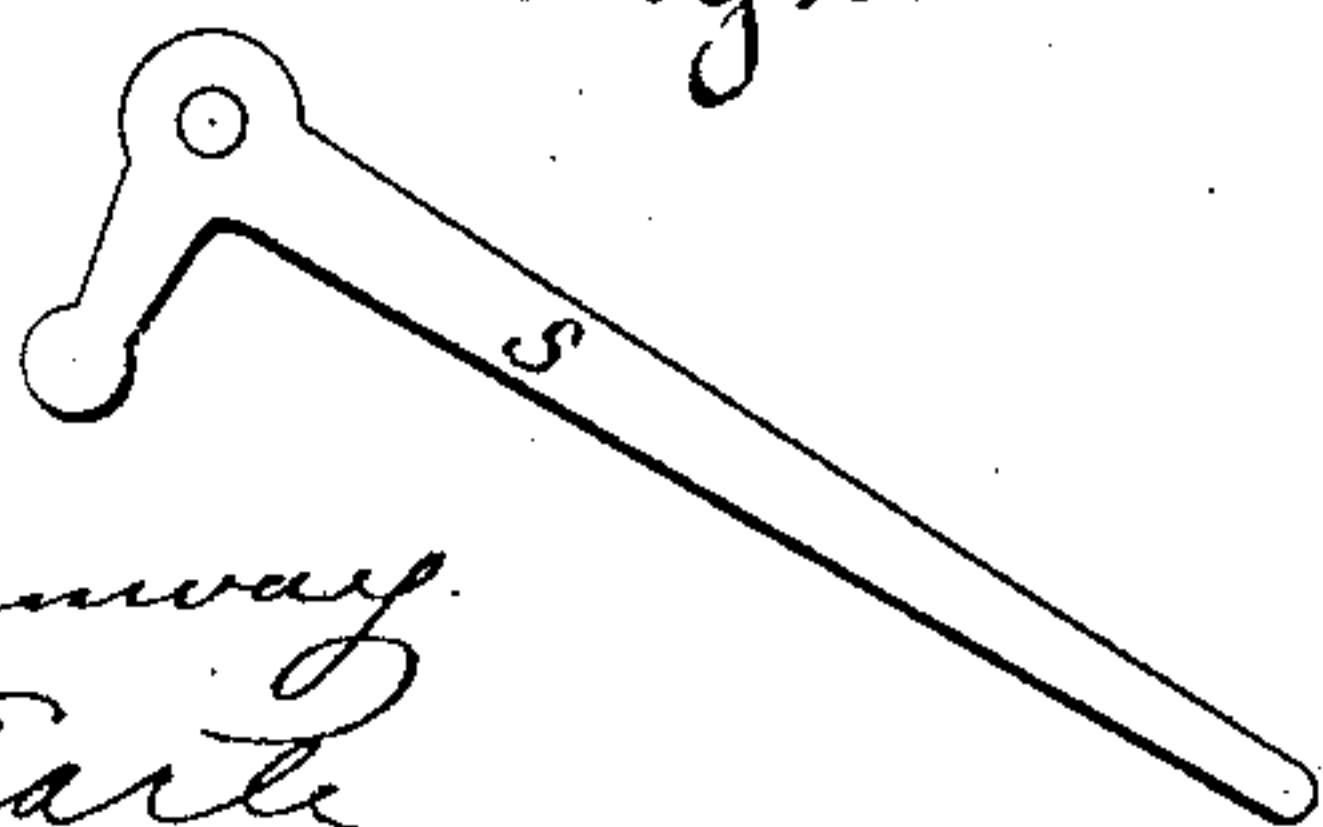


Fig. 6.



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UNITED STATES PATENT OFFICE.

HENRY S. LORD, OF HARTFORD, CONNECTICUT, ASSIGNOR TO ROBERT E. DAY, OF SAME PLACE.

WATER-CLOSET VALVE.

SPECIFICATION forming part of Letters Patent No. 336,523, dated February 16, 1886.

Application filed November 16, 1885. Serial No. 182,922. (No model.)

To all whom it may concern:

Be it known that I, HENRY S. LORD, of Hartford, in the county of Hartford and State of Connecticut, have invented a new Improvement in Water-Closet Valves; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a side view, parts broken away for the purpose of contracting the figure; Fig. 2, a vertical central section of the valve mechanism, showing the parts in their normal conditions; Fig. 3, the same as Fig. 2, showing the valve wide open; Fig. 4, a partial horizontal section, showing the connection between the spindle K and the eccentric-strap; Fig. 5, a view on a reduced scale, showing the plunger; Fig. 6, a modification of the lever S.

This invention relates to an improvement in valves for that class of water-closets in which the waste or escape from the bowl is produced by the lifting of a plunger-valve, thereby opening a very large escape-passage from the bowl, and such, for illustration, as that known as "The Hartford Sanitary Closet;" but other closets employ a similar plunger-valve.

In another application, Serial No. 167,934, I have shown and described a plug-valve for introducing and cutting off the supply of water to the bowl for flushing purposes, there being a lever extending from the plug into such relation to the plunger that when the plunger is raised the lever will be turned, and thereby turn the plug so as to open the valve, the lever being caught by a latch when fully opened, so as to remain open after the plunger is closed, and until a float acted upon by the water flowing into the bowl will, when the water has attained a certain elevation, trip the lever and permit it to fall and close the valve.

My present invention has for its object the construction of a valve of a puppet character, which shall be closed and held closed by the pressure of the flow of water, but mechanically opened by the raising of the plunger, and held open until the proper level of water in the bowl is attained; and the invention consists

in the construction as hereinafter described, and more particularly recited in the claims.

A represents the valve-case; B, the inlet thereto, which is in connection with the supply-pipe; C, the valve-chamber; D, the valve-seat. The inlet-passage B extends around the valve-chamber, and opens to the valve-chamber through a circumferential opening, *a*.

E is the outlet-passage which leads to the bowl. The rear end of the valve-chamber C is closed by a cap, F.

G is a tubular valve-stem arranged in an axial line through the valve-chamber and valve-seat, provided at one end with a stud, H, which takes a bearing in the cap F, and at the other end takes a bearing in the shell, as seen in Fig. 2, free to move therein in an axial line through the valve-seat. Upon the tubular valve-stem the valve I is arranged, which preferably consists of an india-rubber ring adapted to set into the valve-seat D, and so as to securely close it, as seen in Fig. 2, it extending therefrom into the valve-chamber.

Within the tubular valve-stem G, and at the valve end, is an auxiliary valve-chamber, J, into which an opening, *b*, from the tubular spindle G leads to the valve-chamber C.

Within the valve-stem G is a spindle, K, free for longitudinal movement. At its rear end it carries a valve, L, adapted to close the passage *b* from the tubular spindle G to the valve chamber C. This spindle K extends forward and beyond the end of the spindle G, and is constructed with a shoulder, M, adapted to bear against the end of the valve-stem G, but in its normal condition stands a short distance from the end of the stem, as seen in Fig. 2. The spindle K also carries an adjustable collar, N, outside the shoulder M. This collar N is internally screw-threaded to work upon a correspondingly screw-threaded portion of the valve-spindle K, and whereby it may be adjusted longitudinally. The collar is also constructed with a recess, *d*.

To the valve-shell a lever, O, is hung upon a fulcrum, *e*. This lever carries a float, P, and vertically over the collar N it also carries a stud, R, in a vertical guide, the stud adapted to rest upon the collar N, as seen in Fig. 2, and in rear of the recess *d*.

To the valve shell or case a second lever, S,

is hung upon a fixed fulcrum, *f*. On the hub of this lever is an eccentric, *T*, which works in an eccentric-strap, *U*, the said strap being in connection with a stud, *g*, which extends laterally from the collar *N*. Normally the lever *S* stands in the down position, as seen in Figs. 1 and 5, and so that as the plunger *W* is raised it will be brought to bear upon the lever *S*, and so as to raise that lever, as indicated in broken lines, Fig. 5, which movement will force the spindle *K* rearward until the shoulder *M* comes in contact with the end of the valve-stem *G*, and then continuing its movement, the valve-stem within the valve will also be moved rearward to open the valve, as indicated in Fig. 3, and when so open the lever *O* drops and forces the stud *R* into the recess *d* in the collar *N*, as seen in Fig. 3, and so that the valve will be held in its open position. It will be understood that the float *P* is in the usual relation to the bowl, so that the water flowing into the bowl will maintain a corresponding level at the float and raise the float accordingly, and also that the plunger *W* is adapted to open the escape from the bowl in the usual manner, this float-and-plunger arrangement being too well known to require detailed description.

The operation of the valve is as follows: Standing in the normal condition, as seen in Fig. 2, with the pressure of water coming through the inlet *B*, the water flows to the rear into the chamber *C*, and there bearing upon the main valve, and also upon the auxiliary valve *L*, serves to hold both valves in their closed condition, and so that the escape of water to the bowl in this condition is impossible. When the plunger is raised to turn the lever *S*, the first action is to move the spindle *K* independent of the valve-stem *G* and the principal valve. This movement of the spindle *K* throws the valve *L* from its seat, as indicated in broken lines, Fig. 2, and so that the water in the chamber *C* may escape through the passage *b*, thence through openings *h* in the stem *G* to the escape-passage *E*. This operation relieves the pressure upon the principal valve. Then a continued movement of the lever *S* in the raising of the plunger brings the shoulder *M* to bear against the stem *G*, and so that in such continued rear movement of the lever *S* the principal valve will be thrown open, as seen in Fig. 3. The plunger being raised, the water escapes from the bowl and permits the float to fall, and as the valve reaches its extreme open position, as seen in Fig. 2, the descent of the float brings the stud *R* into the recess *d* in the collar *N*, and so holds the valve in its open position, from which it cannot be released until the float rises. Both the principal and auxiliary valve stand open under these conditions the flow of water is therefore free through the escape-passage *E* to the bowl. The plunger being dropped closes the escape from the bowl, and the water thus flowing into the bowl gradually fills it until at the proper

level the float is acted upon by the water and rises, and with it the lever *O*, and so as to take the stud *R* from its engagement with the collar *N*, leaving the valve-stem and spindle free. Thus freed, the lever *S*, which is weighted by an enlargement, *V*, or otherwise, falls, returns the eccentric and forces the valve-spindle *K* forward to close the valve *J*, as indicated in broken lines, Fig. 3, which prevents the escape of water from the chamber *C*. The flow of water will therefore be into the chamber *C* and still through the principal valve-opening; but the area of the principal valve being greater in the chamber *C* than at its seat the differential pressure will force the valve toward its seat until it is completely closed, and as seen in Fig. 2, thus cutting off the flow of water to the bowl. The movement of the principal valve, under the differential pressure of the water and of the lever *V*, makes the movement of the valve so easy and slow that water-hammer cannot occur. The closing, however, is positive. The weight of the lever *S* may be such as to close the principal valve so quickly that the full force of the water will not be attained in the chamber *C*; hence the flow will continue into the chamber *C* after the valve is closed, and that flow being so gradual will prevent water-hammer, so that whether the valve be closed by the action of the lever *V* or by the differential pressure of the water the closing is equally easy and water-hammer prevented. The extent of movement of the valve-spindle *K* with relation to the valve-stem *G*, so as to give a greater or less advance movement to the auxiliary valve *L*, is adjusted by making the valve *L* upon or as a part of a stem, *i*, screw-threaded into the spindle *K*. The spindle itself extends forward through the shoulder, and is there provided with a nick, *l*, or otherwise constructed so as to be readily turned, and by such turning the shoulder *M* will be taken farther from or nearer to the end of the stem *G*, according to the direction in which it is turned. That the collar *M* may retain its same relative position to the stud *R* during such adjustment, the collar is threaded onto the spindle with the same pitch as that of the auxiliary valve-stem *i*. The stud *g* on the collar *N* extends outward through a longitudinal slot, *m*, in the casing.

While I prefer the eccentric on the lever *S* and its strap as the best means for imparting longitudinal movement to the spindle *K* and the valve-stem, this movement may be imparted by an arm constructed as a rigid part of the lever *S*, as seen in Fig. 6.

In the illustration I have shown the lever *S* as extending to the right and the float-lever *O* to the left. I have done this as a convenience in illustration, but in actual use the levers will both extend in the same direction.

I claim—

1. The combination of a valve-casing provided with an inlet, *B*, and an outlet, *E*, constructed with the valve-chamber *C* and the valve-seat *D*, a tubular valve-stem arranged

longitudinally in bearings, and extending longitudinally through said valve-seat into said valve-chamber and carrying the valve I, the said stem constructed with an auxiliary valve-chamber, J, opening into said valve-stem, the spindle K, carrying the auxiliary valve L, adapted to close the passage between said auxiliary chamber and the stem, the said spindle provided with a shoulder, M, adapted to take a bearing upon the valve-stem, but permit longitudinal movement of the spindle independent of said valve-stem, a lever hung upon said case, and in connection with said valve-spindle, whereby, under the turning of the said lever, longitudinal movement is imparted to said spindle and to said valve-stem, with a lever, O, carrying the float P, the said lever adapted to engage said spindle when the valve is in the open position, or release said spindle to permit it to close, according to the position of the float, substantially as described.

2. In a valve for water-closets, the combination of the casing constructed with the inlet B, outlet E, valve-seat D between said inlet and outlet, and also with the valve-chamber C in rear of said valve-seat, the tubular valve-stem G, arranged longitudinally through said seat and supported in bearings for longitudinal movement, the valve I on said stem, between said valve-chamber and said seat, the said valve-stem constructed with a valve chamber, J, opening from said valve-chamber C into said stem, the valve-spindle K, arranged longitudinally in said stem and carrying the auxiliary valve L in said auxiliary chamber J, adapted to open or close the passage from the chamber C into the stem, the said auxiliary valve provided with a screw-threaded stem, the valve L, made adjustable longitudinally with relation to said spindle, the said spindle constructed with a shoulder, M, adapted to

engage said stem G, but free for certain longitudinal movement independent of said valve-stem G, collar N, adjustable on said spindle and constructed with a recess, *d*, the lever O, carrying the float P, provided with a stud, R, adapted to engage said recess *d* in said collar N, substantially as described.

3. In a valve for water-closets, the combination of the casing constructed with the inlet B, outlet E, valve-seat D between said inlet and outlet, and also with the valve-chamber C in rear of said valve-seat, the tubular valve-stem G, arranged longitudinally through said seat and supported in bearings for longitudinal movement, the valve I on said stem, between said valve-chamber and said seat, the said valve-stem constructed with a valve-chamber, J, opening from said valve-chamber C into said stem, the valve-spindle K, arranged longitudinally in said stem and carrying the auxiliary valve L in said auxiliary chamber J, adapted to open or close the passage from the chamber C into the stem, the said auxiliary valve provided with a screw-threaded stem, the valve L made adjustable longitudinally with relation to said spindle, the said spindle constructed with a shoulder, M, adapted to engage said stem G, but free for certain longitudinal movement independent of said valve-stem G, the lever S, hung upon the valve-case, its hub constructed with an eccentric, the strap U on said eccentric, and in connection with said spindle, substantially as described, and whereby as the said lever is turned up or down corresponding movement is imparted to said spindle.

HENRY S. LORD.

Witnesses:

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LOUIS A. TRACY.