

(No Model.)

2 Sheets—Sheet 1.

J. L. MITCHELL.

ROTARY VALVE.

No. 365,315.

Patented June 21, 1887.

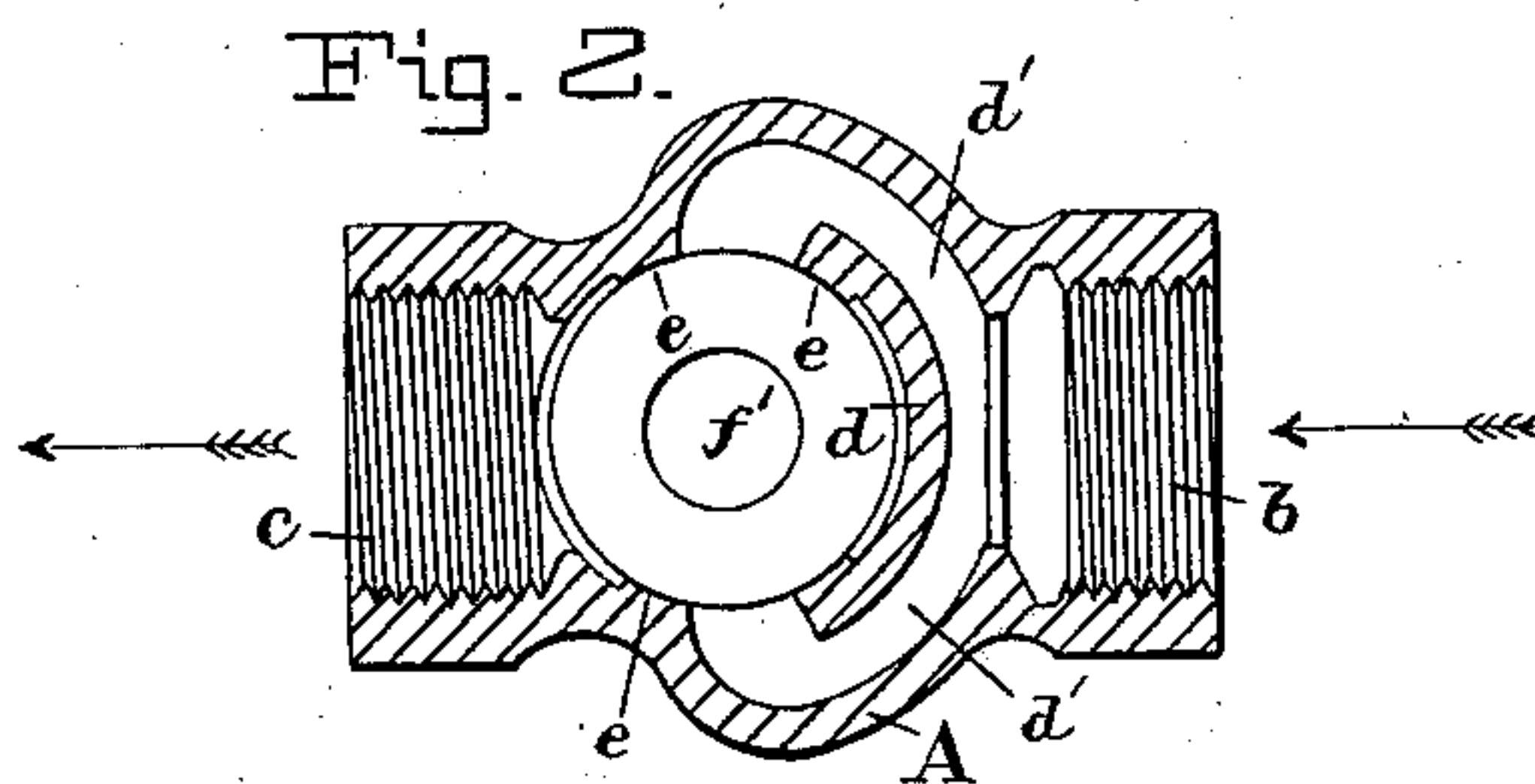
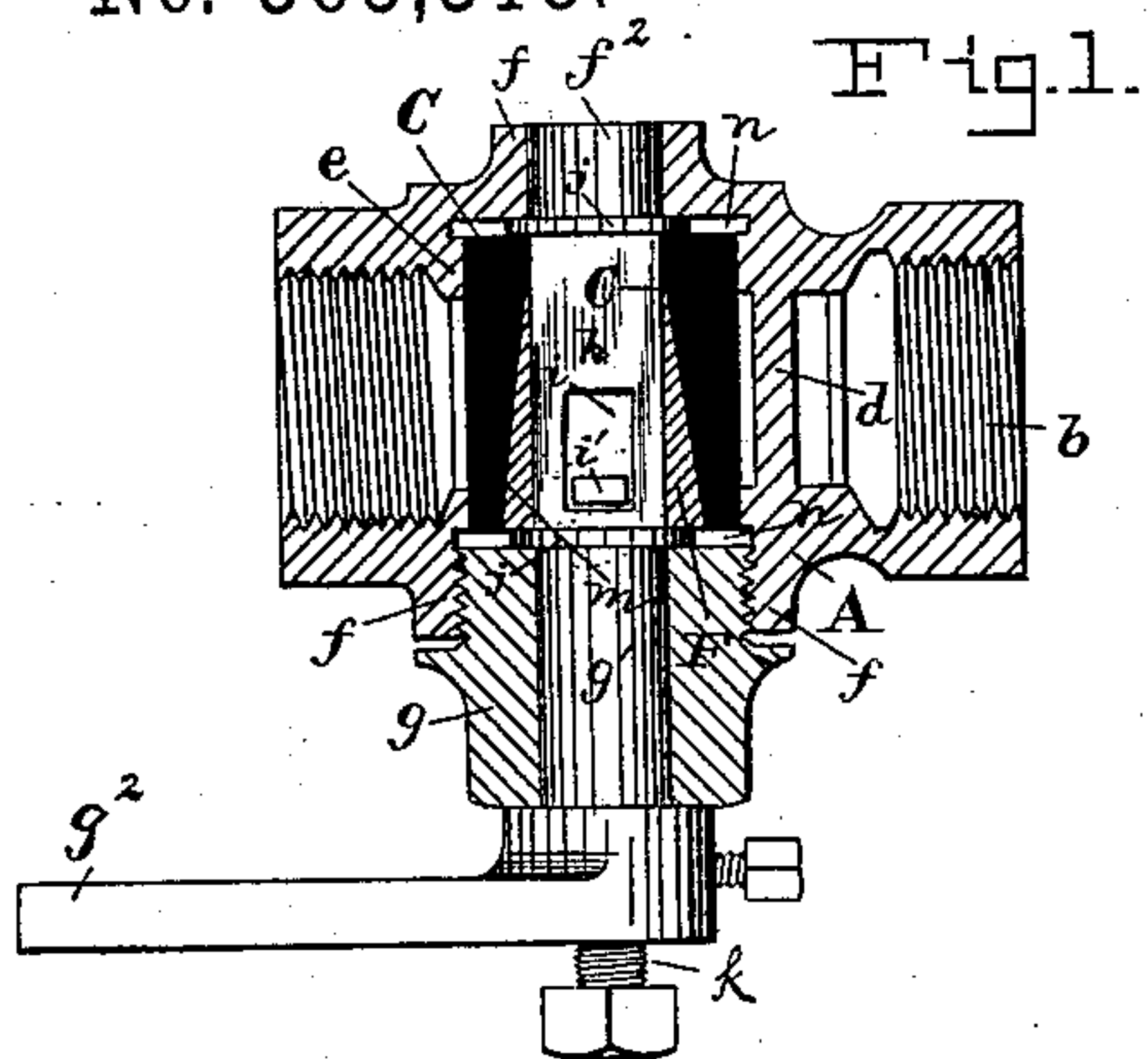


Fig. 3.

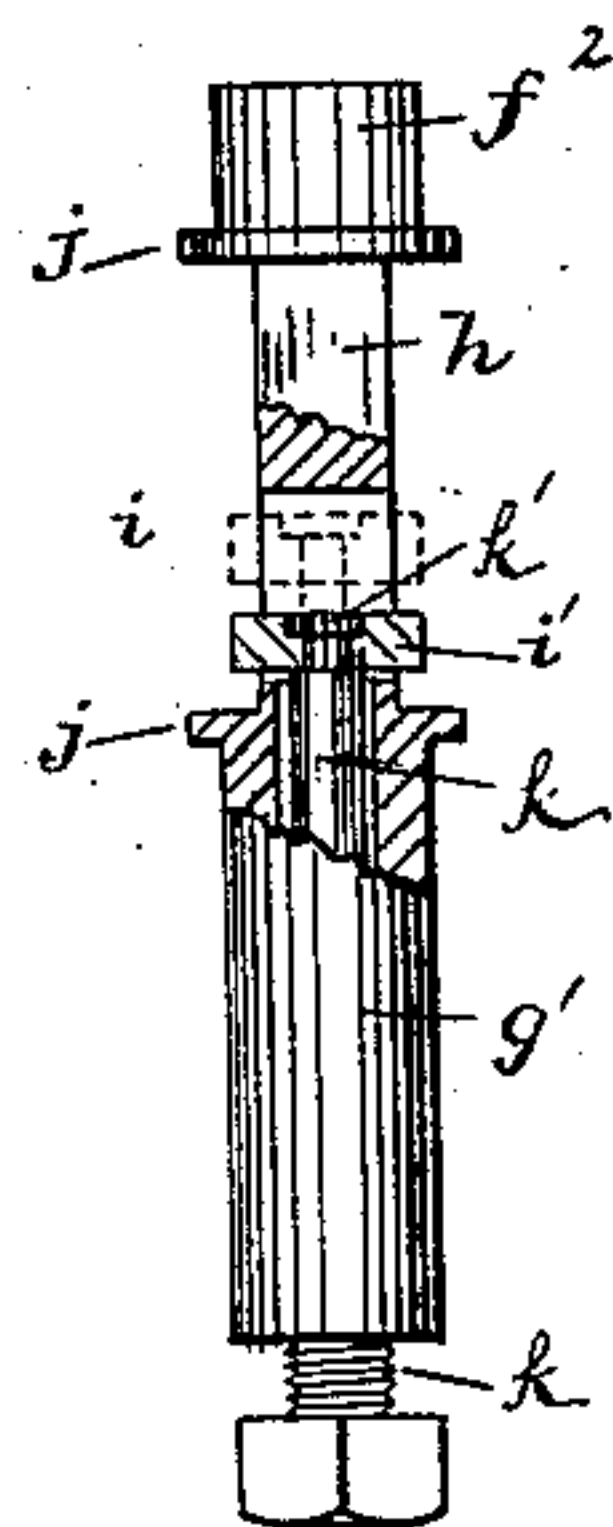


Fig. 4.

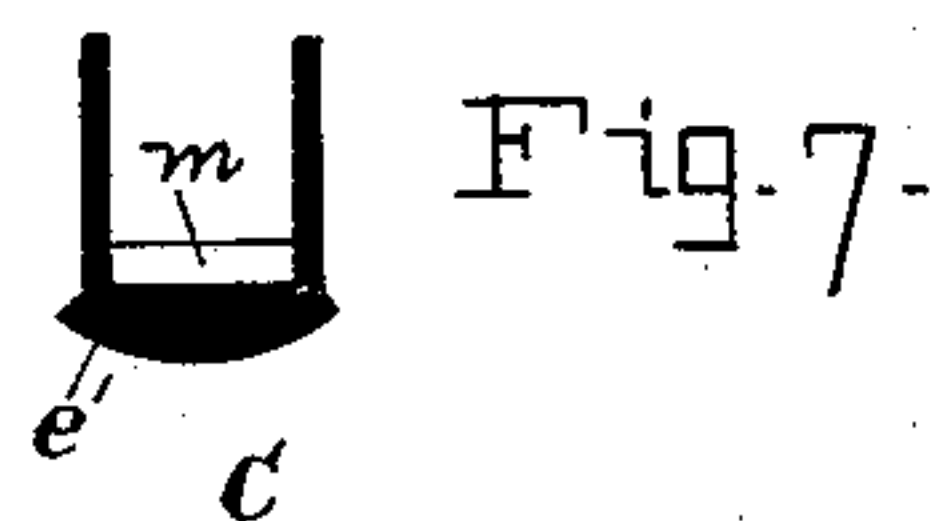
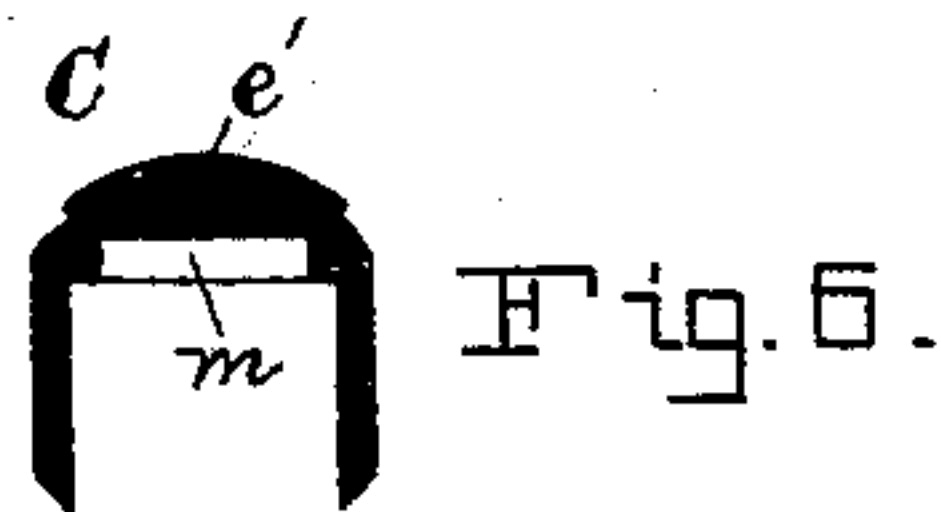
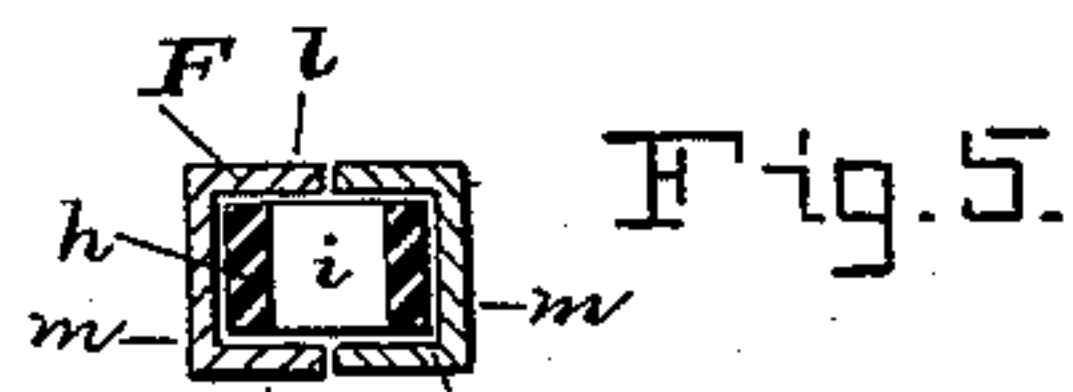
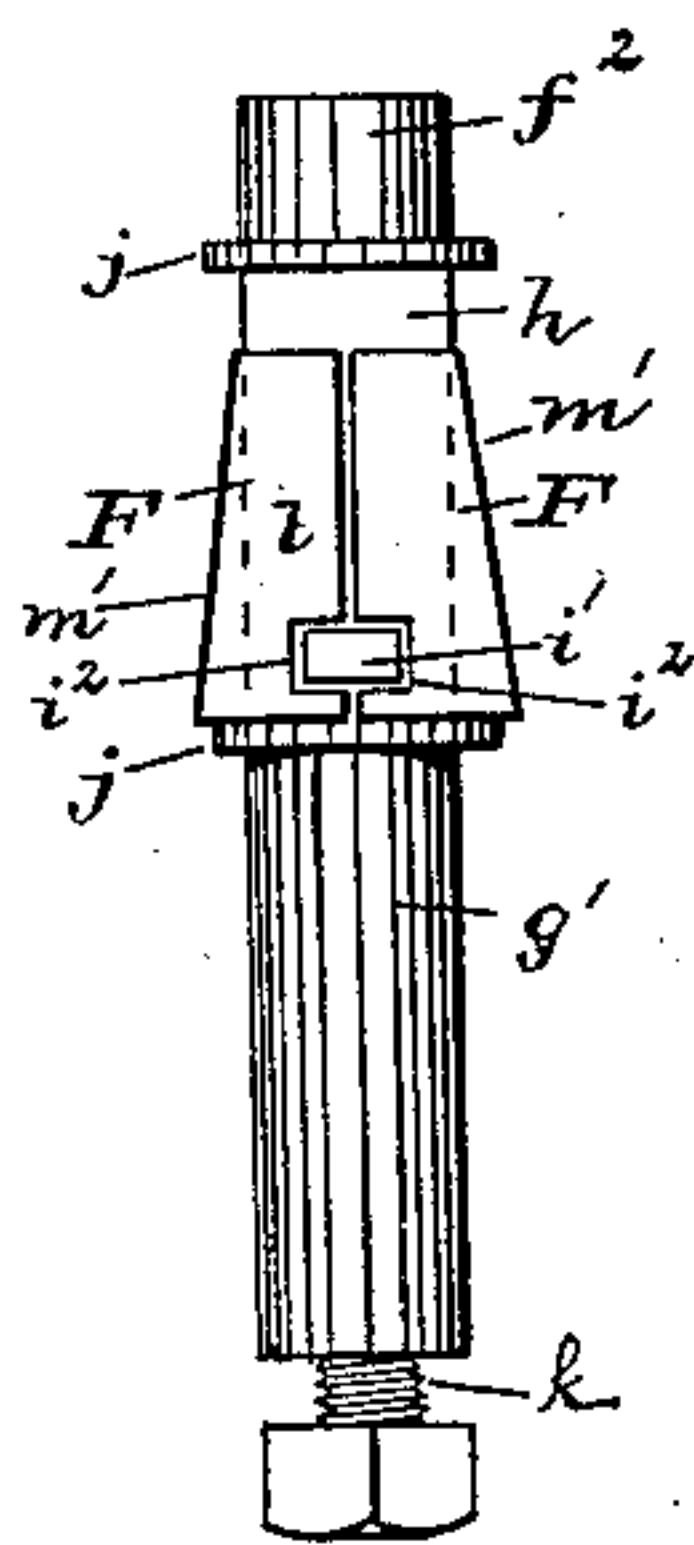
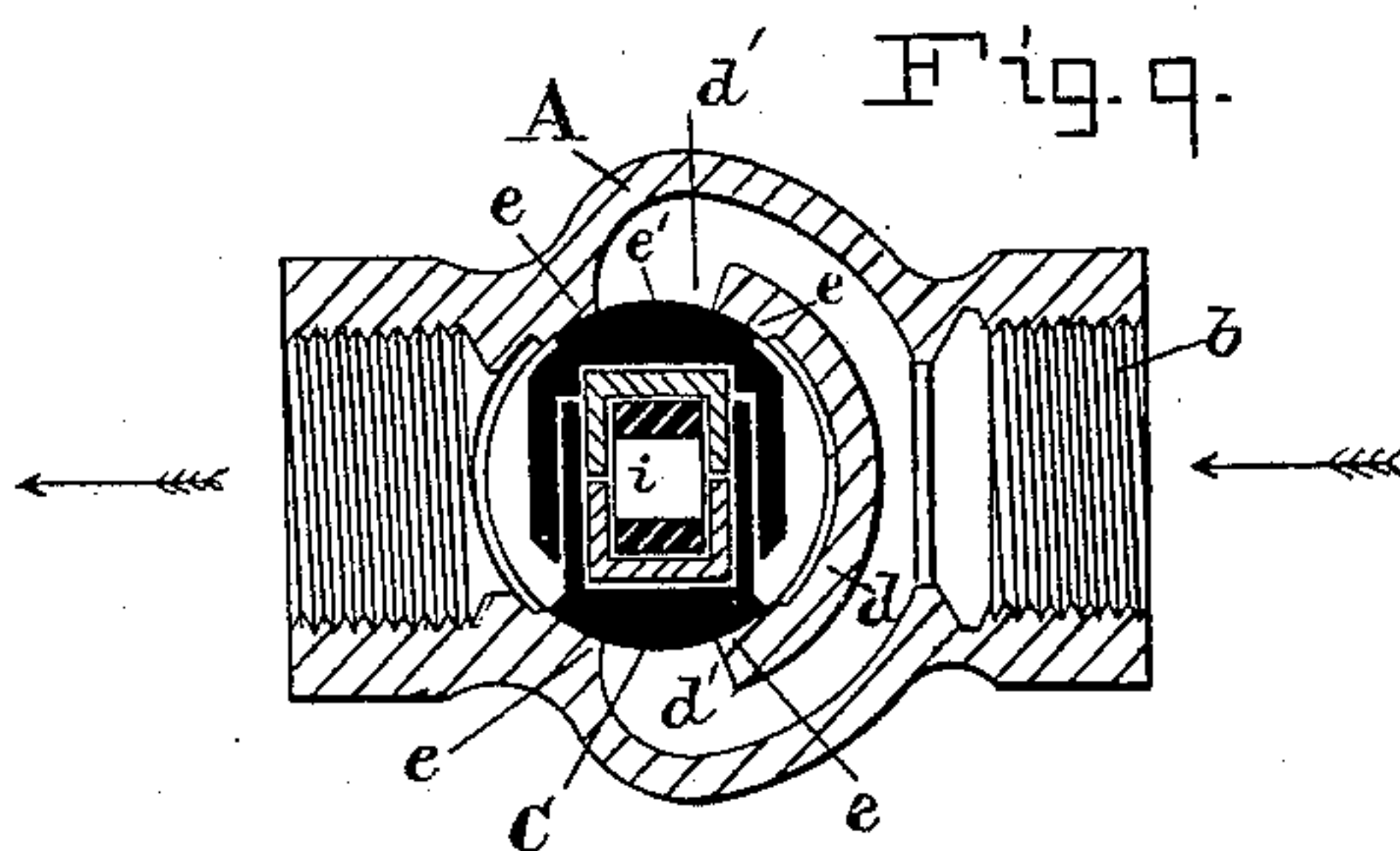
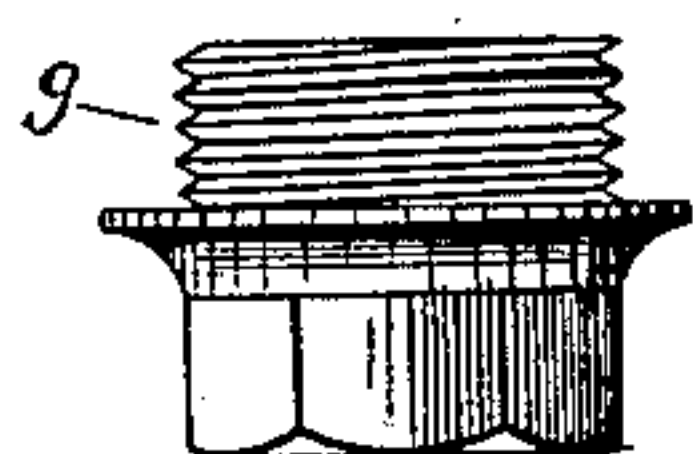


Fig. 8.



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(No Model.)

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Fig. 11.

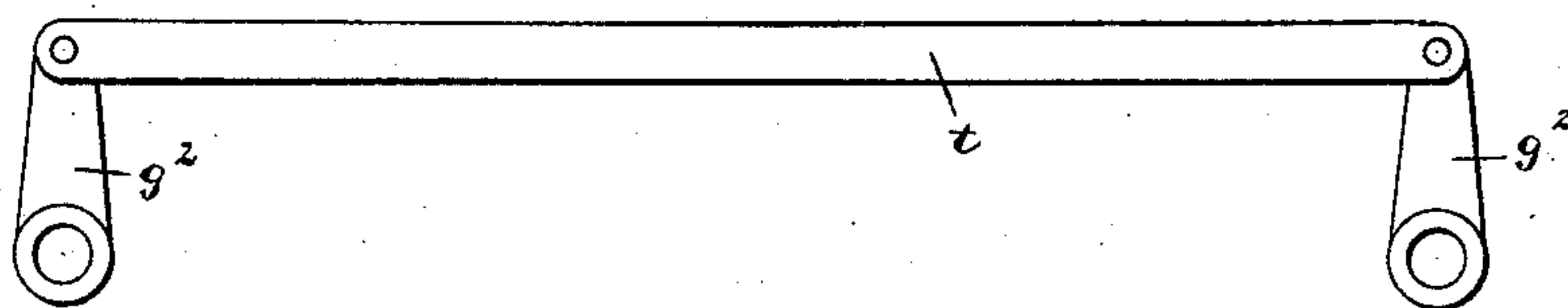
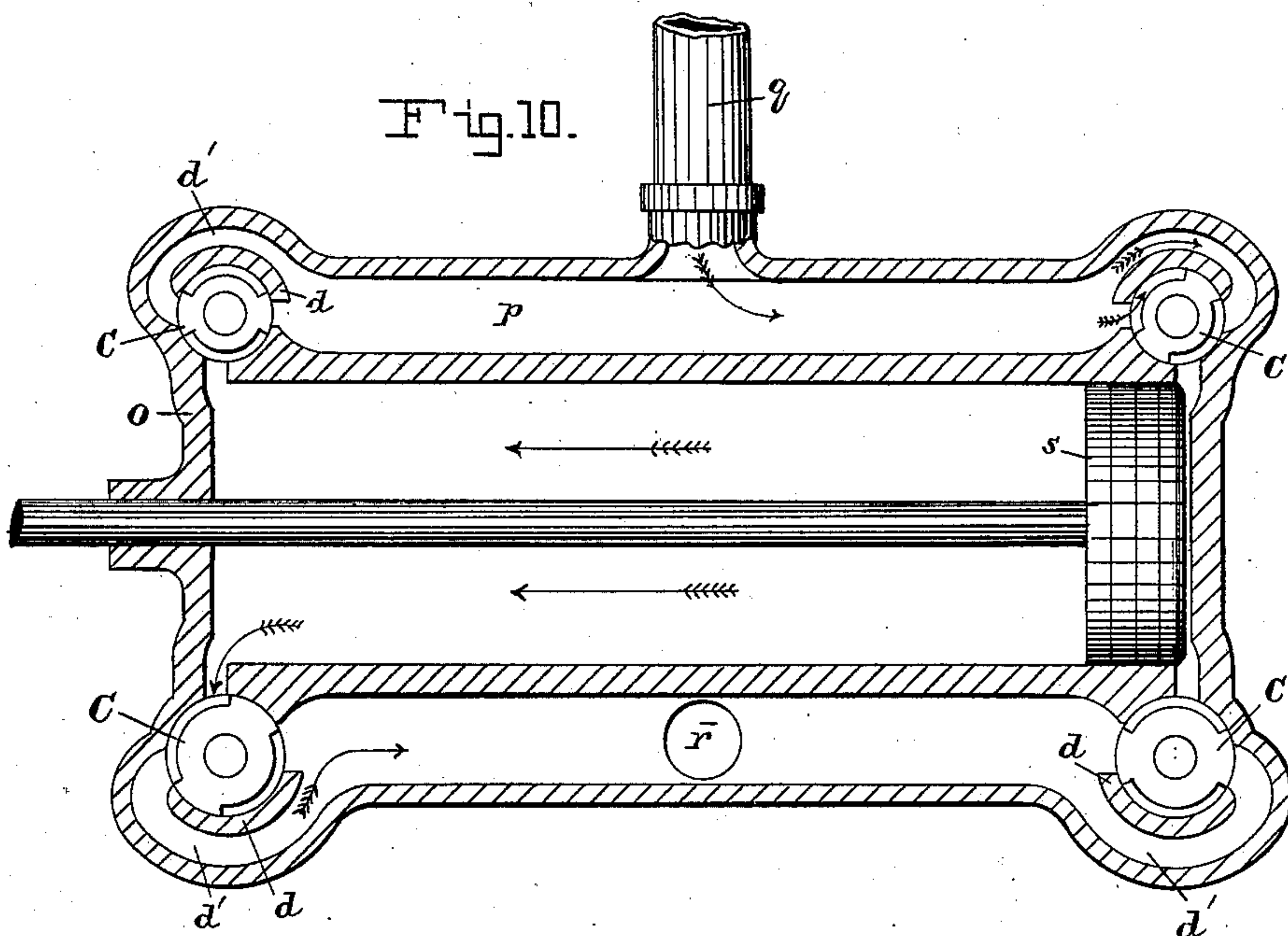


Fig. 10.



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# UNITED STATES PATENT OFFICE.

JONAS L. MITCHELL, OF LOGAN, OHIO.

## ROTARY VALVE.

SPECIFICATION forming part of Letters Patent No. 365,315, dated June 21, 1887.

Application filed October 5, 1886. Serial No. 215,334. (No model.)

*To all whom it may concern:*

Be it known that I, JONAS L. MITCHELL, a citizen of the United States, residing at Logan, in the county of Hocking and State of Ohio, have invented certain new and useful Improvements in Rotary Valves, of which the following is a specification.

My invention relates to an improved cut-off valve, the object of which is to provide for the adjustment of the wearing parts, whereby, when the same become loose in consequence of wear they may readily be tightened up without taking the valve apart.

The invention is illustrated in the accompanying drawings, (two sheets,) in which—

Figure 1 is a longitudinal section of the entire valve. Fig. 2 is a longitudinal section of the valve-case, taken in a direction transverse to that shown in Fig. 1. Fig. 3 is a view of the valve-stem separate, part being shown in section. Fig. 4 is a view of the valve-stem and wedge-shaped valve-plug expanders. Fig. 5 is a section of the valve-stem and expanders on the line  $x x$  of Fig. 4. Figs. 6 and 7 show both end and cross-section views of the adjustable two-part valve-plug. Fig. 8 is a view of the screw-gland. Fig. 9 is a longitudinal section of the entire valve, taken on the same line as Fig. 2. Fig. 10 is a sectional view of a steam-cylinder, showing the improved cut-off valve applied thereto. Fig. 11 shows the gear attachment for operating the valve on the steam-cylinder.

The valve-case A has at the inlet  $b$  a screw-threaded connection, and at the outlet  $c$  another similar connection. The case is provided at the inlet side with a semicircular divide or partition,  $d$ , which forms two diverging inlet-passage ways,  $d'$ . The valve-seat  $e$  is on each side of the way  $d'$ . Both ways  $d'$  are cut off by the valve-plug C at diametrical opposite points. The two passage-ways are of the same area or capacity. This is a useful feature, as thereby the pressure of the fluid is on opposite sides of the valve-plug, and is equal on opposite sides. The valve therefore is a non-pressure valve.

On one side of the valve-case is an opening or bearing,  $f'$ , for the valve-stem  $C'$ , and on the opposite side is a screw-neck,  $f$ , for the screw-gland  $g$ . The valve-stem  $C'$  is round at

each end. The end  $f^2$  fits in the case-bearing  $f'$ , and the end  $g'$  fits in the screw-gland  $g$ . Between the round ends the valve-stem is square, as at  $h$ , and a rigidly-fixed collar,  $j$ , separates each round end from the square part. One of these collars bears against the case around the opening or bearing  $f'$ , and the other collar is in contact with the screw-gland  $g$ . This latter, therefore, by pressing endwise on the valve-stem, makes a steam-tight joint. The valve-stem at one end has a longitudinal bore which extends from the end to the square part  $h$ , whereat is a cross-mortise,  $i$ . A screw-threaded bolt,  $k$ , fits the said longitudinal bore of the stem, and has at its inner end a round head,  $k'$ , which carries loosely a cross-head,  $i'$ . The cross-head occupies the cross-mortise  $i$  in the stem and projects laterally from each side. By turning the threaded bolt  $k$  the cross-head  $i'$  may be moved back or forth in the cross-mortise, for a purpose hereinafter set forth.

The valve-plug C is made in two parts. (See Figs. 6 and 7.) Each part has an exterior rounded surface,  $e'$ , to fit the valve-seat  $e$  on the case. Each part also has three sides, similar to a letter U, and one part is enough smaller than the other to fit within it, as shown in Fig. 9. Each part also has an internal inclined side,  $m$ . That end of each valve-plug where the inclined side is thickest rests against one of the collars  $j$ . Two wedge-shaped or tapering expanders, F, unite the valve-plug C with the valve-stem  $C'$ , so that when the stem is partly rotated the valve-plug will also be partly rotated. The said two expanders F are shorter than the square part  $h$  of the valve-stem and set on opposite sides thereof between the two collars  $j$ . The outer sides,  $l$ , of each expander are parallel, and one side,  $m'$ , is wedge-shaped or tapering, whereby when on the valve-stem the two tapered sides  $m'$  are opposite each other, and these tapered sides are in contact with the inclined sides  $m$  of the valve-plug. The parallel sides  $l$  of the expanders fit close on the valve-stem; but the other sides fit loose, or with a space between. This is to allow the valve-plugs C to adjust themselves in the event their surfaces  $e'$  wear unevenly. Both sides  $l$  of each expander have a notch,  $i^2$ , and the notches in the two expanders coincide or confront each other.



The laterally-projected ends of the movable cross-head  $i'$  occupy the notch  $i^2$  in the expanders, and thereby when the threaded bolt  $k$  moves the cross-head the two expanders also  
 5 move along the square part  $h$  of the valve-stem, and the tapered sides  $m'$  of the expanders move along the internal inclined sides,  $m$ , of the plug. Thus it will be seen that if the valve-plug  $C$  is loose in the valve-seat  $e$  the  
 10 movement of the expanders  $F$  will tighten it up. An annular space,  $n$ , is formed around each collar  $j$ , which may be filled by steam or other fluid. The end  $g'$  of the valve stem has attached a lever,  $g^2$ , whereby the valve is con-  
 15 trolled or shifted to effect the cut-off.

As a cut-off valve, this device is effective and satisfactory, and the described construction allows of the valve-plug being adjusted to the seat without taking the valve out. The  
 20 adjustment is effected from the outside by the screw-threaded bolt  $k$ . By this means engineers are saved all trouble in taking up lost motion and looseness of fit induced by wear.

This valve is applicable to many purposes  
 25 or uses. It may be used on steam-engines, steam and air pumps, air-compressors, and other machines. In Fig. 10 it is shown applied as a cut-off to a steam-cylinder.

The letter  $O$  designates the cylinder,  $p$  the  
 30 steam-chest,  $q$  the steam-pipe,  $r$  the exhaust, and  $s$  the piston. Four valves  $C$  are here employed, and with each valve a divide or partition,  $d$ , forms the diverging inlet-passage ways  $d'$ . The valves are properly connected and  
 35 operated by a rod,  $t$ , attached to the valve-lever  $g^2$ .

The operation will be readily understood.

Having described my invention, I claim and  
 40 desire to secure by Letters Patent of the United States—

1. In a cut-off valve, the combination, with the valve-stem, constructed as described, of the tapering expanders  $F$   $F$ , having notches  $i^2$   $i^2$ , capable of vertical motion on the valve-stem,

and means, substantially as described, for op- 45  
 erating said expanders, as and for the purpose set forth.

2. In a cut-off valve, the combination, with the casing, the valve-plug made in sections one within the other, the expanders  $F$ , also 50  
 made in sections and having notches  $i^2$   $i^2$ , of the valve-stem  $C'$ , having bolt  $k$ , with mortise and cross-head to operate said expanders on the valve-stem, and the collars  $j$   $j$ , as shown and described, and for the purpose set forth. 55

3. In a cut-off valve, the combination, with the casing provided with an inlet and outlet and a screw-gland, the valve-stem, constructed as described, of the plug made in sections one within the other, with rounded surfaces  $e$   $e'$  and 60  
 inclined sides  $m$   $m$ , as shown and described, and for the purpose set forth.

4. In a cut-off valve, the combination, with the casing having an inlet and outlet, the screw-gland  $g$ , the valve-stem  $C'$ , having rounded 65  
 upper and lower portions,  $f^2$   $g'$ , engaging the bearings of the case and gland, said stem also provided with collars  $j$   $j$ , and a squared portion,  $h$ , between the collars, of the valve-plug  $C$ , made in sections one seated within the 70  
 other, as shown and described, and for the purpose set forth.

5. In a cut-off valve, the combination, with the casing, constructed as described, the gland  $g$ , the valve-stem  $C'$ , working in said casing 75  
 and gland, provided with an opening,  $i$ , and longitudinal bore, the bolt  $k$  in said bore, having head  $k'$ , provided with cross-head  $i'$ , working in said opening, of the expanders  $F$   $F$ , having notches  $i^2$   $i^2$ , engaging said cross-head, 80  
 as shown and described.

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

JONAS L. MITCHELL.

Witnesses:

JOHN B. COCHRAE,  
 J. J. GILLESPIE.