

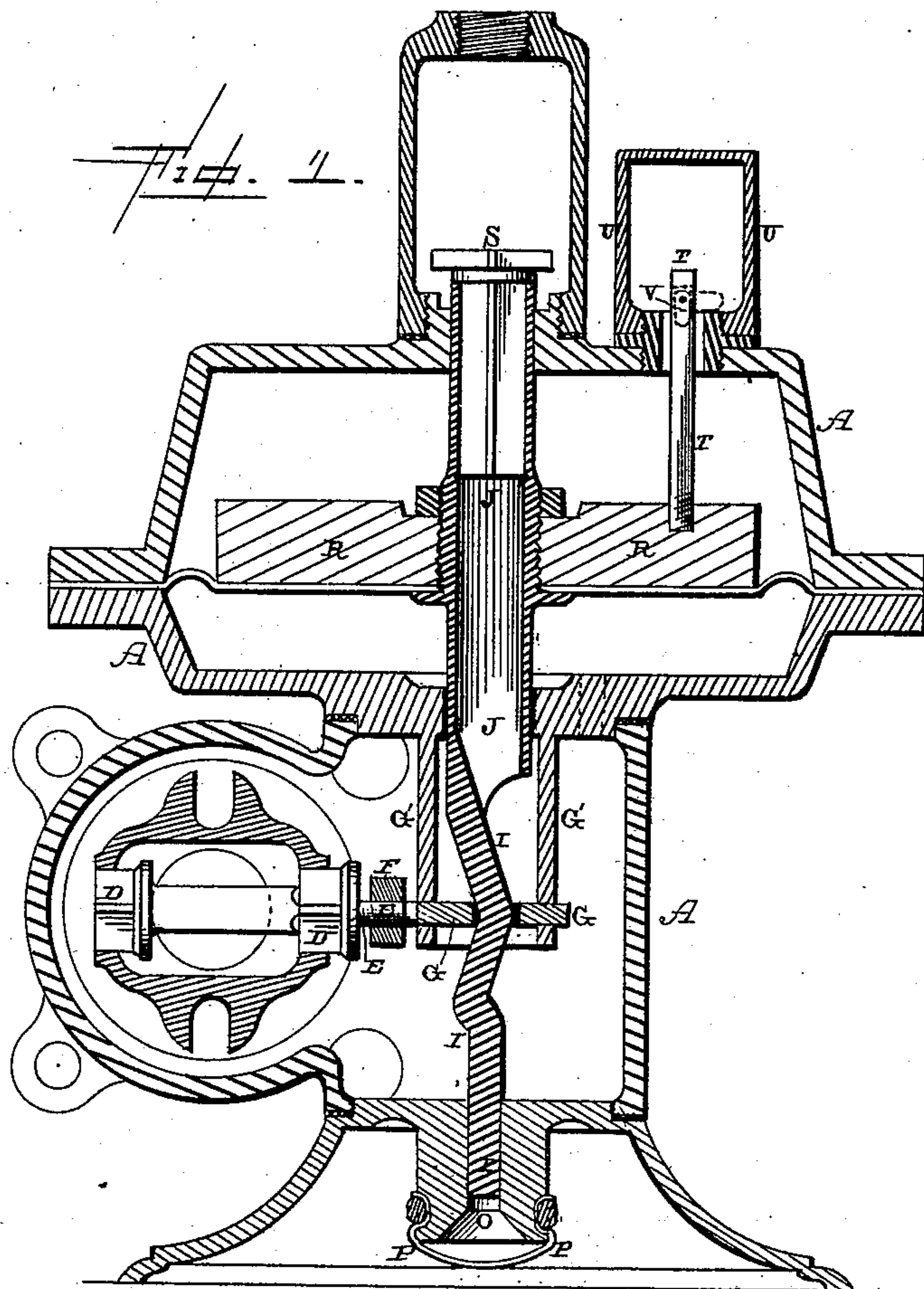
(No Model.)

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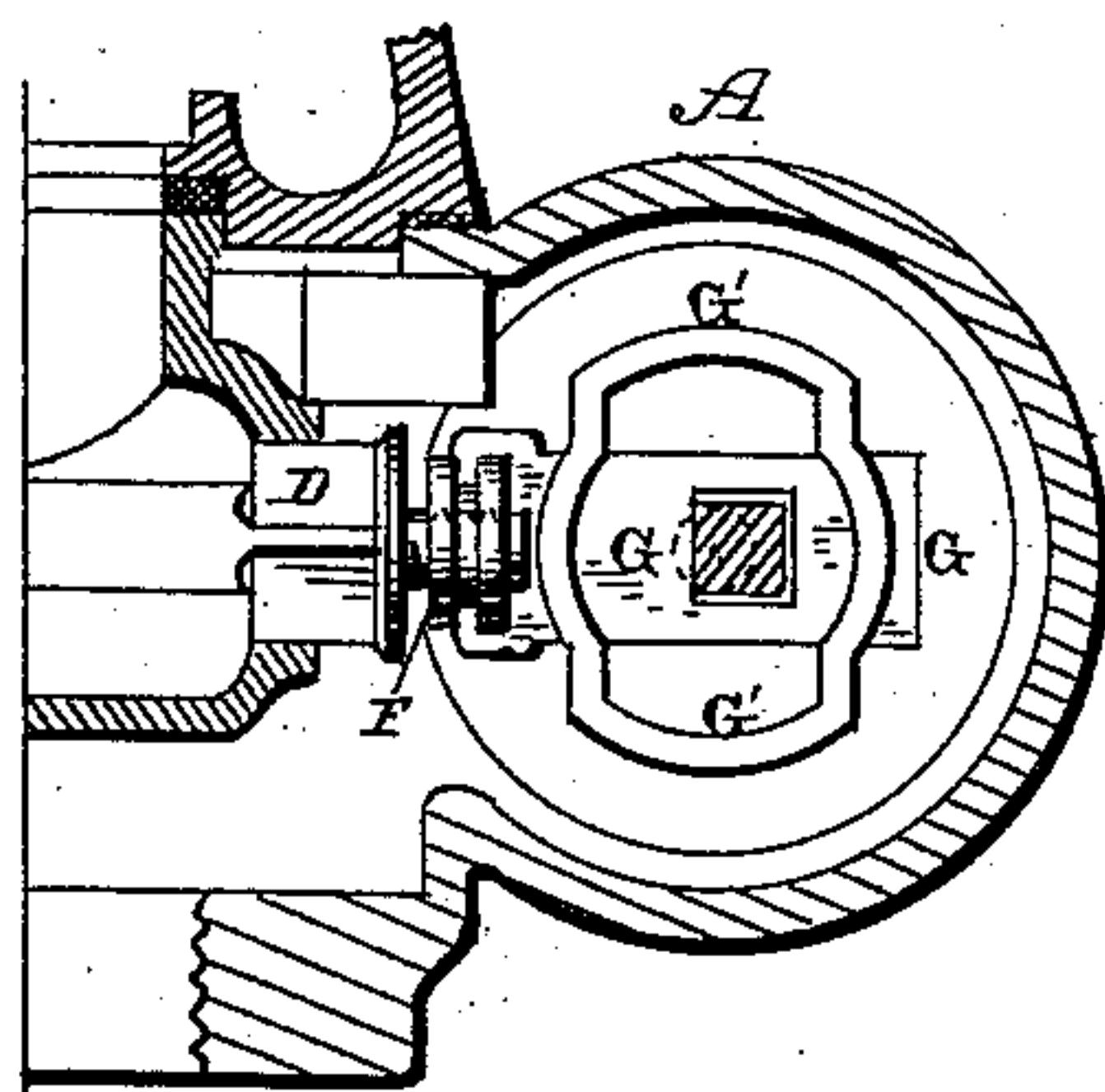
J. H. HELM.  
GAS REGULATOR.

No. 370,619.

Patented Sept. 27, 1887.



*Fig. 2.*



Witnesses.

L. F. Gardner  
Edm. P. Ellis

Inventor  
J. Henry Helm,  
per J. W. Lehmann,  
att'y

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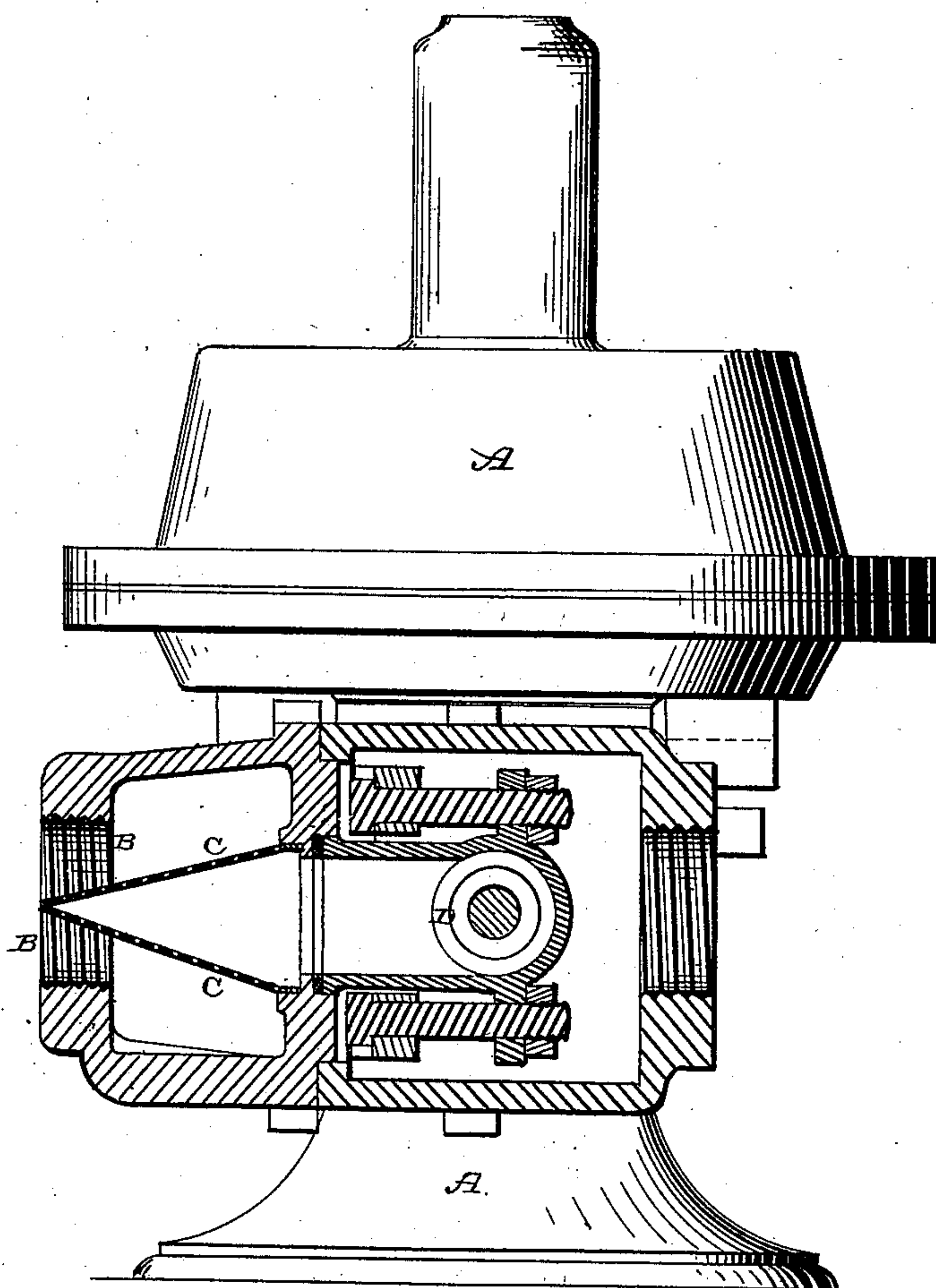
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*Fig. 3.*



WITNESSES.  
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INVENTOR.  
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*att'y*



# UNITED STATES PATENT OFFICE.

J. HENRY HELM, OF ALLEGHENY CITY, PENNSYLVANIA.

## GAS-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 370,619, dated September 27, 1887.

Application filed July 19, 1887. Serial No. 244,770. (No model.)

*To all whom it may concern:*

Be it known that I, J. HENRY HELM, of Allegheny City, in the county of Allegheny and State of Pennsylvania, have invented certain  
5 new and useful Improvements in Gas-Regulators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it,  
10 reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in gas-regulators; and it consists in, first, the combination of a suitable valve or valves which  
15 control the flow of the gas through the regulator, a perforated slide connected to the valve, and a vertically-moving tube having suitable inclines formed upon the stem or rod which is secured to its lower end, and the weighted  
20 diaphragm which is connected to the tube; second, the combination of the valve or valves which control the flow of gas through the regulator, a perforated slide connected thereto, a tube or rod connected to the weighted dia-  
25 phragm, and which has inclined surfaces to operate the valve, and has its lower end to project down through an opening in the bottom of the regulator; third, the arrangement and combination of parts, which will be more fully  
30 described hereinafter, and set forth in the claims.

The object of my invention is to operate the valves which control the flow of gas through the regulator by means of a rod which has in-  
35 clined surfaces formed upon its sides, so that the rising or the falling of the weighted diaphragm will open or close the valves, and to so construct the register that when the gas is shut off from the main the regulator will at  
40 once close, so as to prevent the flow of gas to the burner after the gas is again turned onto the main.

Figure 1 is a vertical section of a gas-regulator embodying my invention. Fig. 2 is a  
45 detached horizontal section taken through the valves. Fig. 3 is a vertical section through the valve.

A represents a suitable frame-work of any desired construction, but which is here shown  
50 as being made in four different parts, which

parts are connected together gas-tight, so as to prevent leakage at any point. Through the frame-work is made the inlet B, through which the gas enters the regulator, and placed in or opposite to this opening is a strainer, C, 55 made of any suitable perforated material, and which has inclined sides for the gas to strike against. Should the gas carry along with it pieces of dirt, sand, or scale, they will strike the inclined sides of the strainer, be deflected 60 off, and then fall into the bottom of the frame-work. If this strainer extends vertically across the opening, these pieces of dirt, sand, or scale would be blown directly against the openings, or through them if small enough, and thus 65 gradually clog the strainer up. As long as these particles strike the inclined sides they are thrown off, and hence the strainer never becomes clogged to any appreciable extent, while it prevents the particles from interfering 70 with the working parts of the regulator.

As here shown, two valves, D, are connected together and will preferably be used; but this is a mere matter of choice, for only a single valve may be used, if so preferred. These 75 valves may either be of the same or of unequal size, as desired. Projecting from the end of the inner valve is a screw-rod, E, of suitable length, and upon which is placed the grooved regulating-nut F. This nut is grooved upon 80 its sides, so as to allow the hooked ends of the slide G to catch over it, and thus adapt the slide to be adjusted endwise in relation to the valves. If it is desired that the valves shall close quickly, the nut is screwed back upon 85 the rod, so as not to give the valves as much movement; but if it is desired that the valves shall close more slowly, and thus allow a greater amount of gas to pass through the regulator, the nut is screwed up closer to the end 90 of the valve, and then the valves are given a greater amount of play. A slide, G, passes through openings made in opposite sides of the vertical guide G', formed as a part of the lower diaphragm-case, and through this slide 95 is formed an opening, as shown in Fig. 2, so as to allow the rod I, having inclined surfaces upon both of its sides, to play up and down through the slide for the purpose of opening and closing the valves, and thereby control the 100



flow of gas through the regulator. This rod I is formed upon the lower end of the pipe J, and the inclined surfaces upon opposite sides are such that when the rod I is raised by the pressure of the inflowing gas against the bottom of the weighted diaphragm the valve is gradually closed in proportion to the distance the diaphragm is raised upward, and when the gas is shut off entirely from any cause the weighted diaphragm forces the rod downward, and then the upper incline closes the valves D until they are again opened by hand. The gas passes through the frame, so as to bear against the under side of the diaphragm, either through an opening shown in dotted lines in Fig. 1, or it may pass around the pipe J, as may be preferred. The lower inclines serve to regulate the distance that the valves shall open, and thus regulate the amount of gas which shall pass through the regulator, while the upper incline only closes the valve in case the gas from the main is shut off entirely. The upper incline closes the valves and holds them closed, so as to prevent the admittance of any gas to the regulator in case the gas is again turned on from the main, and thus prevents all accidents arising from gas flowing through open burners into the house. After the gas has once been shut off it can only be turned on through the regulator again by raising the diaphragm by hand.

The diaphragm and the weight, R, placed thereon are attached to the pipe J in the usual manner. Upon the upper end of the pipe J is placed an escape-valve, S, through which the gas escapes when the pressure exceeds a certain regulated amount. Secured to the upper surface of the weight is a rod, T, which extends up through an opening in the top of the frame A, which opening is to be closed or covered over by the cap U, which surrounds the upper end of the rod. The upper end of this rod is notched or recessed, and pivoted in this recess is a suitable catch or stop, V, which can be turned upward at right angles to the rod when so desired, and thus act as a stop to prevent the weighted diaphragm from dropping below a certain point. When this catch or stop is not turned upward, as shown in dotted lines, it remains in a line with the rod, and then the rod can be dropped downward as far as the weighted diaphragm will carry it. If the catch is not turned upward, as shown in dotted lines, and the pressure of the gas in the main falls below a certain regulated amount, then the weighted diaphragm sinks downward far enough to instantly close the valves, and thus prevents the ingress of gas into the regulator when the gas is again turned on in the main. When the pressure of gas in the main falls below the regulated amount, but is not entirely shut off, and the consumers wish to get the benefit of what there is then in the main, the catch in the upper end of the rod is turned outward, as shown in

dotted lines, and this catch then serves as a stop to prevent the weighted diaphragm from closing the valve.

Through the bottom of the frame is made an opening, O, through which the lower end of the rod I plays vertically. Around the lower end of the extension upon the bottom of the frame through which the opening is made is placed a suitable elastic covering, P, down to which the end of the rod I sinks when the gas is shut off. In order to open the regulator so as to again allow the gas to flow through, the finger must be applied to the lower end of the rod under the elastic covering, so as to force the rod and weighted diaphragm upward, thus causing the upper incline upon the rod to open the valves D, and thus again admit the gas.

It will be seen that the parts which constitute my invention are few and simple and are not easily gotten out of order and will last indefinitely. The only wear which comes upon any of the parts is in the movement of the rod I through the slide which operates the valves. As the rod I, having inclined surfaces, acts upon the slide with a wedge movement, all liability of having the diaphragm flutter is entirely done away with, and hence no separate frictional or other device such as is shown in my patent of December 7, 1886, need ever be employed for the purpose of preventing the diaphragm from having a pulsating movement.

Having thus described my invention, I claim—

1. In a gas-regulator, the combination of a weighted diaphragm, a rod having inclined surfaces connected to and operated thereby, a slide which is operated by the movement of the rod, and the valves which control the flow of the gas through the regulator, substantially as shown.

2. In a gas-regulator, the combination of the valves which control the flow of the gas through the regulator, a slide connected to the valves, and a vertically-moving rod having two separate inclines formed in or upon it, and which inclines operate the valves through the slide, substantially as described.

3. The combination of the frame A of the regulator, having an opening, O, through its lower end, the rod I, projecting downward from the weighted diaphragm and having its lower end to extend into or through the opening O, the valves placed at an angle to the rod but connected thereto, and a flexible covering, P, which is placed over the opening, substantially as set forth.

4. The combination of the rod having inclined surfaces and the weighted diaphragm connected thereto with the slide having hooked ends, the grooved nut, and the valves having a screw-thread formed upon one end, substantially as specified.

5. The combination of a weighted dia-



phragm, a rod connected thereto and having inclined or wedge-shaped surfaces, a slide, and the valves, whereby the valves are opened and closed by a wedge movement, substantially as shown.

5 6. The combination of the weighted diaphragm, a rod connected thereto and extending through the top of the frame, and a catch which can be made to prevent the diaphragm

from sinking downward beyond a certain point, substantially as described.

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

J. HENRY HELM.

Witnesses:

A. S. PATTISON,  
F. A. LEHMANN.