

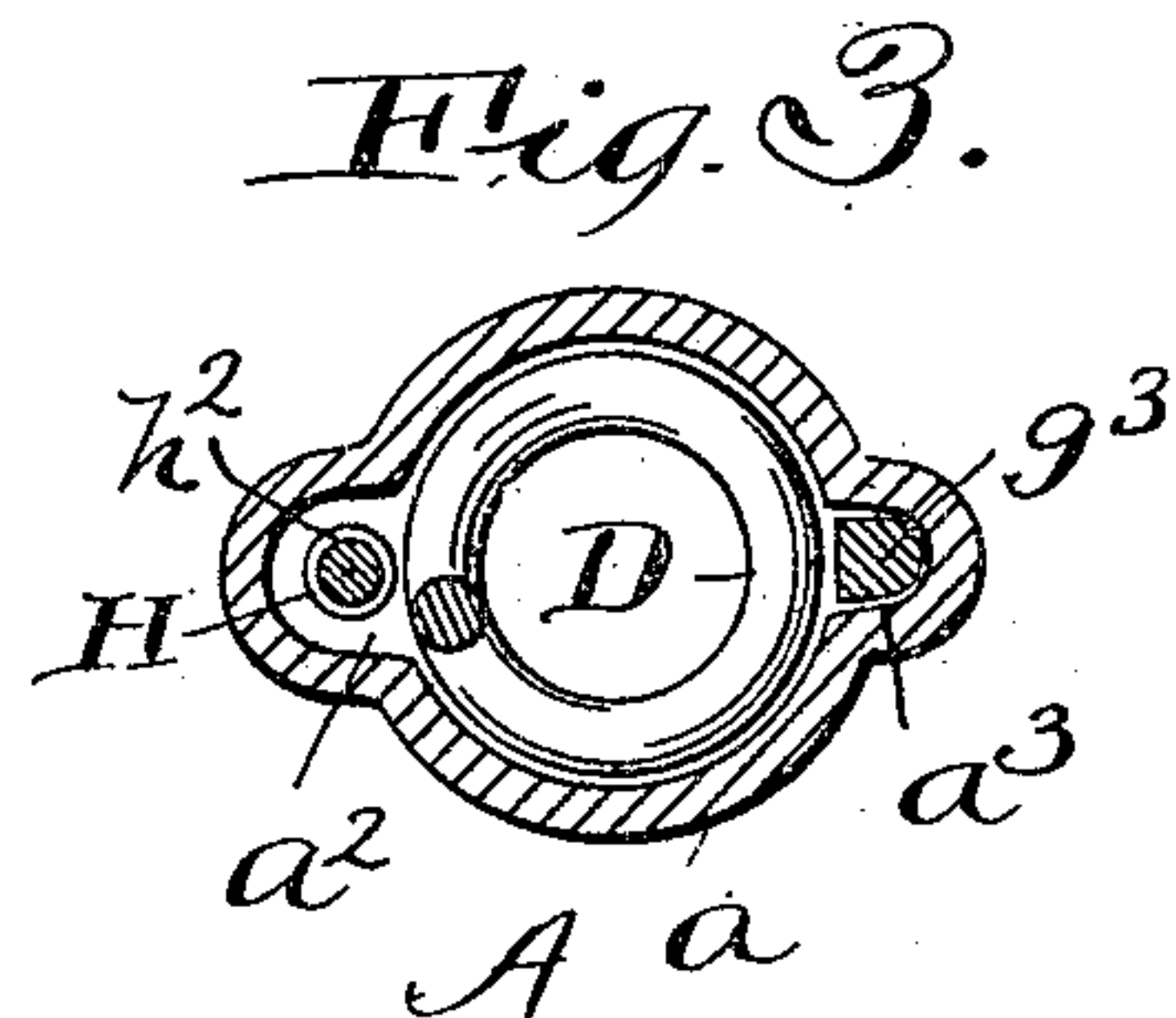
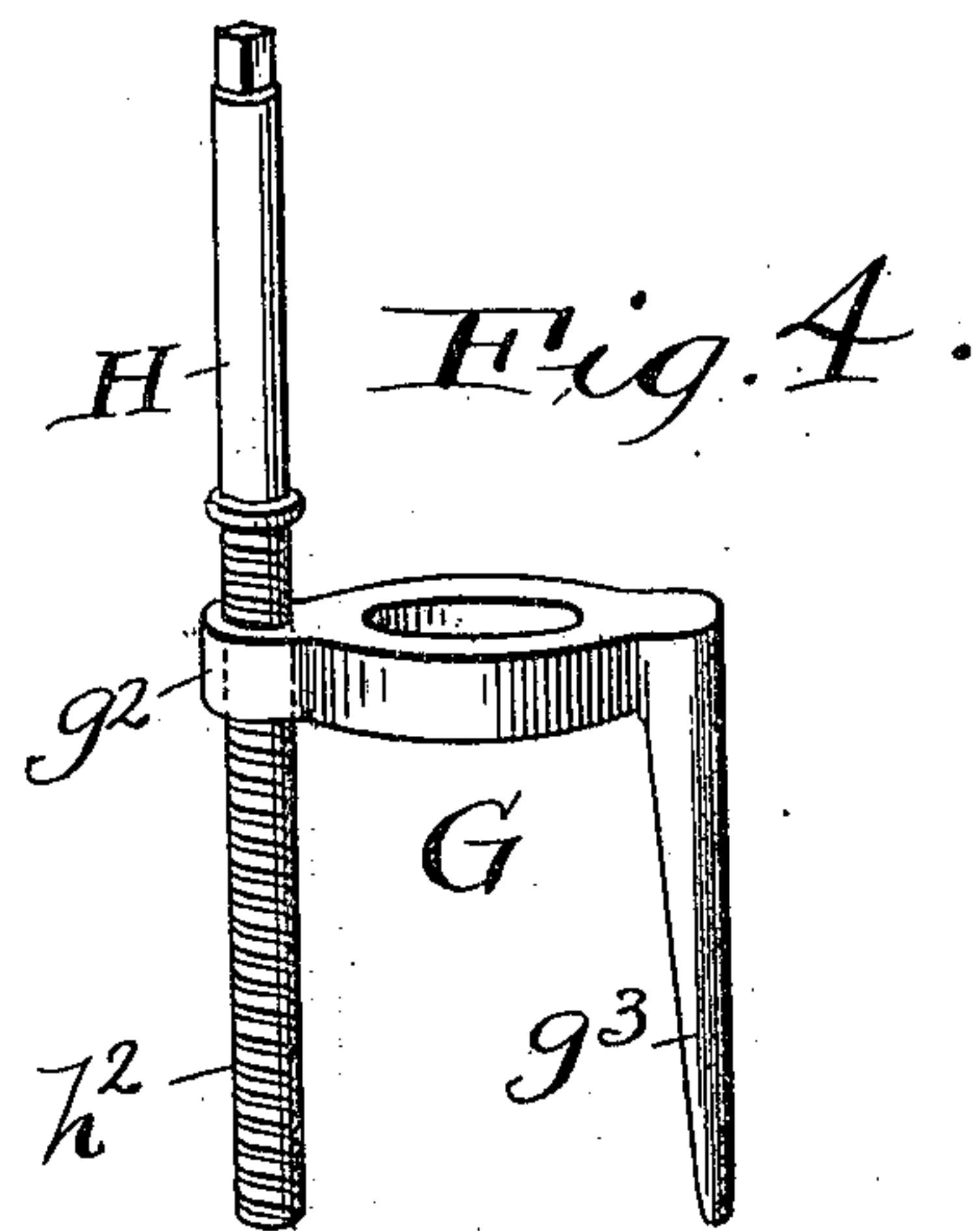
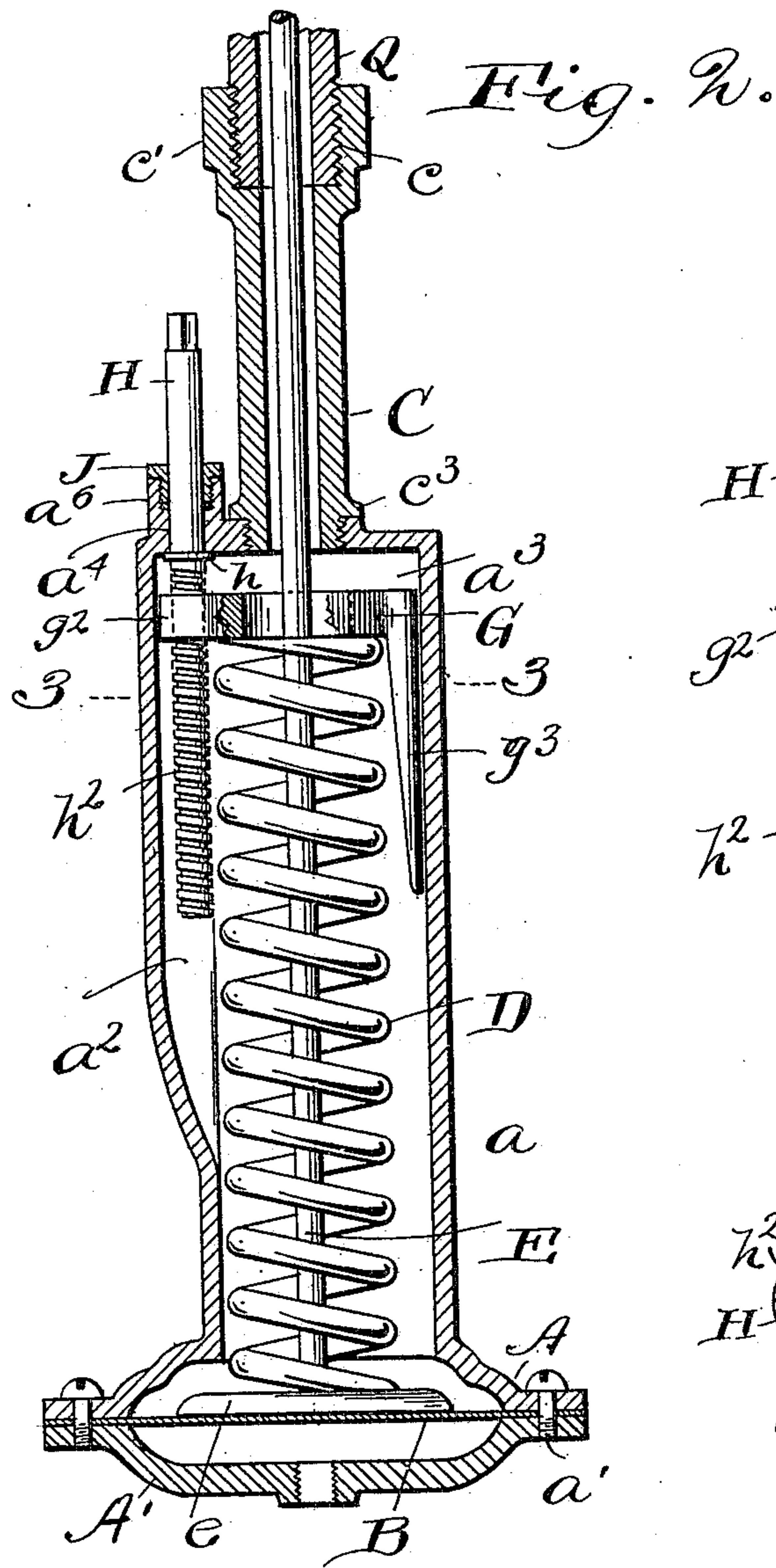


No. 830,972.

PATENTED SEPT. 11, 1906.

N. G. COPLEY.  
PUMP GOVERNOR.  
APPLICATION FILED OCT. 6, 1905.

2 SHEETS—SHEET 2.



Witnesses.  
E. B. Gilchrist.  
H. R. Sullivan

Inventor.  
N. Guy Copley,  
By his attorneys,  
Thurston & Bates.



# UNITED STATES PATENT OFFICE.

NOIBERTO GUY COPLEY, OF FOSTORIA, OHIO, ASSIGNOR TO THE S. C. REGULATOR COMPANY, OF FOSTORIA, OHIO, A CORPORATION OF OHIO.

## PUMP-GOVERNOR.

No. 830,972.

Specification of Letters Patent.

Patented Sept. 11, 1906.

Application filed October 6, 1905. Serial No. 281,591.

*To all whom it may concern:*

Be it known that I, NOIBERTO GUY COPLEY, a citizen of the United States, residing at Fostoria, in the county of Seneca and State of Ohio, have invented a certain new and useful Improvement in Pump-Governors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of this invention is to provide an efficient governor for the feed-water pumps of steam-boilers, the regulator operating to shut off the steam to the feed-pump whenever the water-pipe from the pump to the boiler is closed either by hand or by a suitable water-level regulator.

The present invention is simple and cheap in construction, is adapted for use with an ordinary valve in the steam-pipe, is easily adjusted from the outside, and does not leak. It is hereinafter more fully explained and its essential characteristics set out in the claims.

In the drawings, Figure 1 is a diagrammatic view of a pumping equipment having my governor. Fig. 2 is a vertical central section through the governor. Fig. 3 is a horizontal section through the governor on the line 3 3 of Fig. 2. Fig. 4 is a perspective view of the collar and screw which effect the adjustment of the governor-spring.

My governor includes a two-part casing separated by a diaphragm and a valve-rod bearing on one side of the diaphragm and pressed against it by a spring. This side of the diaphragm is an open communication from the steam-pipe to the pump. The other side of the diaphragm is an open communication to the water side of the pump. This is shown in Fig. 1, wherein the governor-casing appears as A A'.

The steam-pipe from the boiler N to the pump R is designated M. In this pipe is a valve P, which is connected with the governor by a pipe Q.

S designates the water-pipe from the pump to the boiler. From this pipe a branch T leads to the water side of the governor. In this pipe is shown a drip-chamber *t* and a valve *t'*. In the water-pipe S between the branch T and the boiler is a suitable valve S', which is closed when the water has reached

the right level in the boiler, either by hand or by a suitable water-level regulator.

Between the two casings A A' of the governor is a diaphragm B, the two casings being bolted together through the diaphragm, as shown at *a'*. Extending upward from the casing A is a tubular extension *a*, which is substantially cylindrical, except that on its opposite sides are longitudinal recesses *a*<sup>2</sup> *a*<sup>3</sup>. Extending upward from the casing is a short pipe-section C, which screws into the upper end of the casing and has at its upper end an internal thread *c* and an angular exterior *c'*. This extension is screwed tightly in the casing, and it receives at its upper end an ordinary pipe Q, which connects it with the body of the steam-valve P.

Within the casing A is a stiff helical spring D. This spring rests at its lower end on a head *e* of a valve-stem E. This head rests on the diaphragm B, and the stem extends upward through the spring and through the extension C into the steam-valve casing. On the upper end of the stem is the valve-plug *p'*, which coöperates with a suitable seat in the valve-casing.

Normally the steam-pressure on the upper side of the diaphragm and the water-pressure on the lower side substantially balance each other, disregarding the slight excess on the water side when water is entering the boiler. The downward pressure of the spring D on the diaphragm (which is considerably greater than such excess) keeps the valve P open. When, however, the valve S' is closed, the pump causes an excess of pressure below the diaphragm, and when this has overcome the spring the governor closes the valve in the steam-pipe, shutting off the steam to the pump, whereupon the pump stops.

Bearing on the upper end of the spring D within the casing A is a collar G, which has a suitable opening for the free passage of the valve-stem and has on one side an ear *g*<sup>2</sup> and on the diametrically opposite side a longitudinally-extending rib *g*<sup>3</sup>. This rib *g*<sup>3</sup> occupies the recess *a*<sup>3</sup> and serves to guide the collar. This recess *a*<sup>3</sup> extends from the lower end of the bore of the casing to the upper end of such bore, but has no exterior opening at the upper end of the casing. The ear *g*<sup>2</sup> oc-



cupies the other longitudinal recess  $a^2$ . This recess  $a^2$  preferably begins at an intermediate point on the barrel of the casing, as shown. At its upper end is a vertical opening  $a^4$ , which extends through a boss  $a^6$  on the casing. Passing through this opening  $a^4$  is a rod H, which has a shoulder  $h$  bearing against the upper wall of the casing at the base of the opening  $a^4$ , while below this shoulder are screw-threads  $h^2$ , which extend through threads in the ear  $g^2$ . The force of the spring keeps the collar pressed upward and the shoulder  $h$  snugly against the top wall of the casing. The rotation of the rod, however, in the proper direction forces downward the collar G and compresses the spring to increase the pressure on the diaphragm. The rib  $g^3$  on the collar lying alongside of the spring and within the recess  $a^3$  guides the collar, so that it may be easily depressed by a single screw, while the spring, just easily fitting the bore of the casing, is guided thereby. The upper end of the rod H may be formed angularly to allow it to be conveniently rotated by a wrench, and the threads on it may be left-handed, so that a right-hand turn of the rod will compress the spring. The shank of the rod H passes through a stuffing-box, which consists of the boss  $a^6$  and a cap J, screwing thereonto and compressing packing around the rod. The extension C is made with a flaring flange  $c^3$  adjacent to its lower end, which abuts the upper end of the casing beneath the cap J, and thus insures a tight connection between the casing and extension without being in the way of the stuffing-box cap.

It will be seen that my regulator is very simple in construction and that the spring is easily adjusted from the outside. No stuffing-box is required around the valve-stem. The only place where a stuffing-box is employed is around the rod which adjusts the spring; but as this rod turns with a wrench the packing may be made very tight about it, absolutely preventing leakage. On the other hand, the valve-rod being free from packing is much more sensitive and will close the steam-valve on just the desired excess of pressure on the water side of the diaphragm. The casing below the diaphragm is filled with water from the pump, while the casing above the diaphragm is always full of water from the condensed steam. The balance of pressures is therefore maintained, and the action of the spring is easy and regular and there is no jerking or pounding.

Having thus described my invention, I claim—

1. The combination, with a boiler, a pump, a pipe connecting them and a valve in the pipe, of a governor comprising a diaphragm,

means establishing communication between one side of the diaphragm and the water side of the pump, a tubular connection from the other side of the diaphragm to the valve, allowing free communication therebetween, a valve-rod in such connection, and a spring in such connection pressing the valve-rod toward the diaphragm.

2. The combination of a casing, a diaphragm across it, a valve, a tubular connection between the valve and one portion of the casing, a valve-rod passing through such connection and through the casing, a head on said rod bearing against the diaphragm, a spring within the casing, said spring surrounding the valve-rod and bearing at one end against said head, and means for compressing said spring at its other end.

3. The combination, with a boiler, a pump, a pipe connecting them and a valve in the pipe, of a governor comprising a diaphragm, means establishing communication between one side of the diaphragm and the water side of the pump, a tubular connection from the other side of the diaphragm to the valve, allowing free communication therebetween, and means tending to move the valve-rod toward the diaphragm.

4. The combination of a casing having a substantially cylindrical bore, longitudinal recesses at the sides of said bore, a diaphragm at the base of the casing, a spring within said bore bearing against the diaphragm, a collar within the bore at the opposite end of the spring, projections on said collar occupying said recesses, and a screw passing from the outside of the casing into one of said recesses and engaging said collar.

5. The combination of a casing, having a bore with recesses along its wall, a collar within said bore having lugs extending into said recesses, one of said recesses having a longitudinal opening communicating with the exterior, a rod occupying said opening, said rod being threaded within the casing and screwing into one of said lugs, a stuffing-box on the casing for packing said rod, a diaphragm at the base of the casing, and a spring within the bore of the casing bearing at one end against the diaphragm and at the other end against said collar.

6. The combination of a pair of casings, a diaphragm clamped between them, one of said casings having a tubular barrel, a spring within said barrel guided by the wall thereof, a valve-stem within the spring and having a head at one end which bears against said diaphragm, the spring bearing against said head, and a tubular extension from the other end of said casing through which said stem loosely passes.

7. The combination of a pair of casings, a diaphragm clamped between them one of



said casings having a tubular barrel, a spring within said barrel, means extending outside of the barrel for adjusting said spring, a valve-stem within the spring and having a head at its lower end which bears against said diaphragm, the spring bearing against said head, a tubular extension from the other end of said casing through which said stem loosely passes, a valve-casing in communication with said tubular extension and a valve in said valve-casing operated by said stem.

8. The combination of a pair of casings, a diaphragm clamped between them, one of said casings having a tubular barrel, a spring within said barrel guided by the wall thereof, a valve-stem within the spring and having a head at its lower end which bears against

said diaphragm, the spring bearing against said head, a tubular extension from the upper end of said casing through which said stem loosely passes, a collar within the casing loosely surrounding the valve-stem and bearing on the upper end of the spring and guided by the casings, a screw engaging said collar and extending upwardly through the casing for adjusting said collar, and a stuffing-box carried by such casing for packing said screw.

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

N. GUY COPLEY.

Witnesses:

HENRY KOHN,  
CHARLES L. GUERNSEY.