J. F. SENTER.

PUMP GOVERNOR.

APPLICATION FILED OCT. 9, 1908.

913,650.

Patented Feb. 23, 1909

Fig. 2.

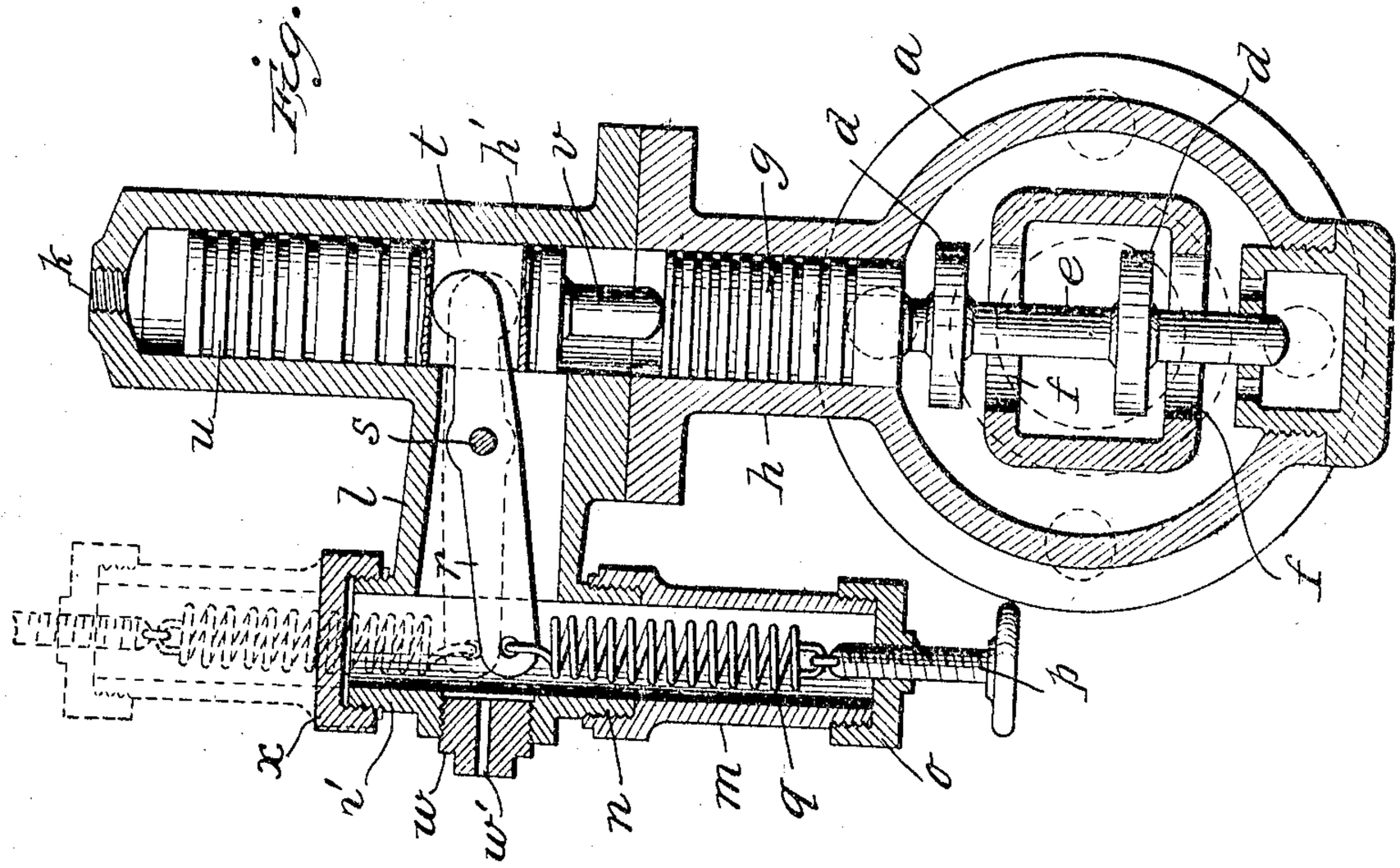
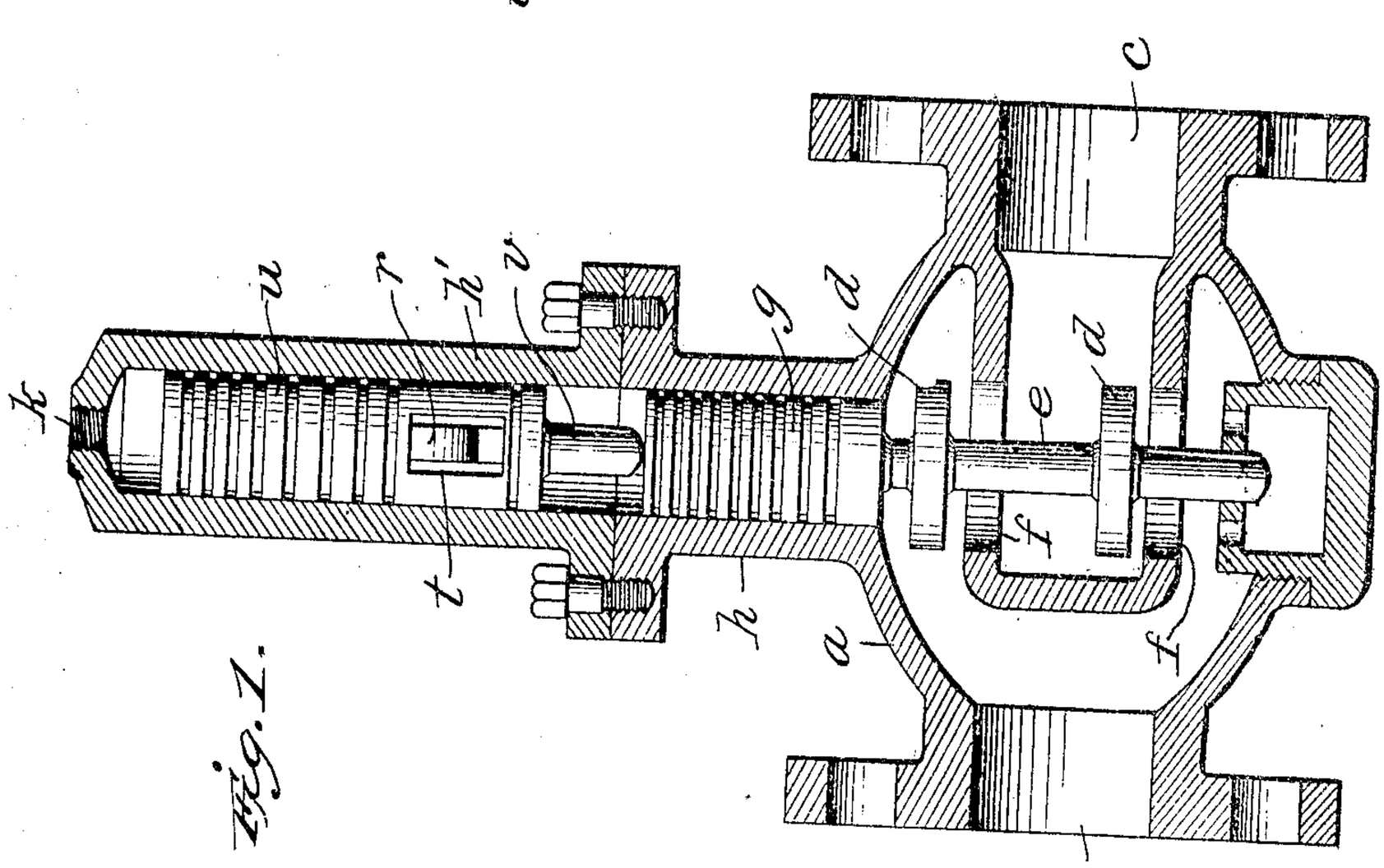


Fig. 1.



Witnesses

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PUMP-GOVERNOR.

No. 913,650. Specification of Letters Patent. Patented Feb. 23, 1909.

Application filed October 9, 1908. Serial No. 456,909.

To all whom it may concern:

Be it known that I, JOHN F. SENTER, a citizen of the United States of America, and a resident of Chattanooga, county of Hamilton, State of Tennessee, have invented certain new and useful Improvements in Pump-Governors, of which the following is a full and clear specification, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical sectional view taken longitudinally through the valve casing; Fig. 2 is a vertical section taken at right angles to the line on which Fig. 1 is taken.

The object of this invention is primarily to provide a simple and durable automatic cut-off for pumps and in its preferred construction it embodies means whereby it may be converted into a pressure reducing valve, as more fully hereinafter set forth.

The valve casing *a* is adapted to be connected at one end *b* to a steam generator and at its other end *c* to the valve chest of the pump. The valve consists of a pair of horizontal disks *d* mounted on a vertical stem *e* and adapted to close by dropping down into a pair of circular openings *f* in the partition walls of the valve casing, in which openings the valve disks are adapted to accurately fit.

The upper end of the valve stem is attached to an elongated piston *g* which works in a cylinder *h* formed integral with the valve casing, said piston being provided with annular grooves to form water packings. On top of the cylinder *h* an extension *h'* of the cylinder is bolted, this extension being provided at its upper end with a tapped opening *k* for the attachment of a small pipe which may be connected with the discharge pipe of the pump.

A lateral integral casing *l* is formed on the section *h'* of the cylinder, and depending from the outer end of this casing *l* is a tube *m*, this tube being removably screwed to a nipple *n* depending from said casing *l*. The lower end of tube *m* is closed by a cap *o* through which is tapped an adjustable tension screw *p* whose inner end is connected to the lower end of the contractile spring *q*, the upper end of the spring being connected to the outer end of a lever *r* pivotally mounted on a horizontal pivot *s* in the casing *l*. The inner end of this lever *r* enters a transverse slot *t* in a piston *u* adapted to reciprocate in the upper part of the cylinder and provided with annular grooves for water packings. The tension of the spring causes the inner end of the lever *r* (which end is provided with an enlargement) to bear upwardly against the upper wall of the slot and thus hold the piston normally up. The lower end of this piston is reduced to form a stem *v*.

It will be observed that the pressure of the steam will open the valve by pressure against the bottom of piston *g* and the lower end of valve stem *e*, thus forcing the piston upwardly until it strikes the depending stem *v* of the upper piston. The pressure of the steam will thus hold the valve open until the pressure in the discharge pipe of the pump is sufficient to force down the piston *u* against the combined action of the spring and the steam pressure, whereupon the piston *g* will be forced down and the valve disks moved into their nicely fitting holes *f* and thus shut off the steam to the pump and preventing the pump from bursting the piping or forcing out joints.

As soon as the pressure is relieved on the discharge line of the pump by opening a suitable valve the steam again automatically opens the governor valve which admits steam to the pump. As is obvious, any suitable arrangement of pipes and valves may be used to cause the excess of pressure in the discharge line of the pump to be transmitted to the upper end of the upper piston. It will be observed that the tension of the spring holds the upper piston up out of the way and leaves the lower piston free to be raised by the pressure of the steam.

In the upper end of the casing *l* is screwed a removable plug *w* and on the upper side of the casing, in axial alinement with the depending nipple *n* is an upwardly extending nipple *n'* which is closed by a removable cap *x*. This construction enables the action of the tension spring to be reversed to convert the device into a pressure reducer. To thus convert the device into a pressure reducer the lever *r* is turned over by removing plug *w* and the cylinder *m* is removed from the lower nipple and is screwed onto the upper nipple, as shown in dotted lines in Fig. 2, thus causing the inner end of the lever to force the upper piston downwardly against piston *g* and thus normally tend to close the valve. When thus used as a pressure reducer the inlet *k* is piped to the line leading from the outlet side of the valve so that when the pressure in this outlet line reaches

a predetermined degree said pressure, together with the tension of the spring, will cause the upper piston to force the lower piston to closed position and hold it closed until the pressure in the outlet line is reduced to the desired degree.

It will be observed that I avoid the objection of a seated valve joint by having my valve disks *d* pass bodily into the steam passages *f*, these passages being so machined as to nicely fit the disks and make a practically steam-tight joint, thus preventing accumulations on the valve seats interfering with the proper action of the valve. The valve disks are exactly the same size so as to be balanced. A further feature is the doing away with packing rings on the pistons, these pistons consisting of elongated metal cylinders turned and ground to nicely fit the bore of the cylinder and having each a series of shallow annular grooves. These grooves fill with water of condensation or with water which has been pumped into the top of the cylinder and thus form lubricating packings. The water of condensation will keep these grooves filled constantly and thus at all times provide for easy movement of the pistons and also prevent the escape of any appreciable amount of steam.

In the plug *w* is formed a small hole *w'* to put the interior of the casing into communication with the atmosphere, so that if any steam gets by either piston it will escape to the atmosphere and will not interfere with the operation of the pistons in any way. It will be observed further that I may use a very light spring in view of the fact that I provide against the pistons or valve disks sticking. Furthermore, there is a tendency for all springs that are subjected to the action of high temperature steam to lose their temper and become weak, but my spring will maintain its temper and adjusted tension in view of the fact that I at all times keep the spring chamber in communication with the atmosphere by means of the opening *w'*.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. In a cut-off of the class set forth, a valve casing having a cylinder communicating directly with the interior thereof, a gravitating lower piston working in said cylinder and having its lower side exposed to the pressure in said valve chamber and carrying the cut-off valve, an independent piston working in the upper end of said cylinder, the upper end of said cylinder being provided with an opening adapting it to be connected to a pressure source, and an adjustable tension device adapted to normally hold up the upper piston.

2. In a cut-off of the class set forth, a valve casing having a cylinder communicating with the interior thereof, a lower piston working in said cylinder and carrying the cut-off valve, an independent piston working in the upper end of said cylinder, the upper end of said cylinder being provided with an opening adapting it to be connected to a pressure source, and a reversible adjustable tension device adapted either to normally force said upper piston upwardly or to force it downwardly.

3. In a cut-off of the class set forth, the combination of a vlave casing, a cylinder communicating with the interior thereof, a cut-off valve and an operating piston connected thereto and working in said cylinder, a piston working in the cylinder above the aforesaid piston, and a reversible tension device operatively connected to the upper piston, for the purpose set forth.

4. In combination, a valve casing having a cylinder communicating with the interior thereof, a piston in said cylinder carrying the cut-off valve, another piston working in the cylinder beyond the aforesaid piston and provided with a transverse slot, a lateral casing connected to said cylinder, a lever inclosed in this casing and having its inner end working in the slot of the piston, a spring attached to the outer end of this lever, a lateral casing inclosing the spring, and a tensioning device for the spring.

5. In combination, a valve-casing having a cylinder communicating with the interior thereof, a free piston working in said cylinder and having its under side exposed to pressure in the valve chamber and carrying the cut-off valve, another piston working in said cylinder beyond the free piston and adapted to contact therewith, an actuating lever working through a slot in said cylinder and in a slot in the second-named piston, and a tensioning device connected to said lever, for the purpose set forth.

In testimony whereof I hereunto affix my signature in the presence of two witnesses this 7 day of Oct. 1908.

JOHN F. SENTER.

Witnesses:
H. G. WATSON,
O. P. STEWART.