(No Model.)

J. W. SCOTT.

FLUID PRESSURE REGULATOR.

No. 552,202. Patented Dec. 31, 1895.

Fig. 2.

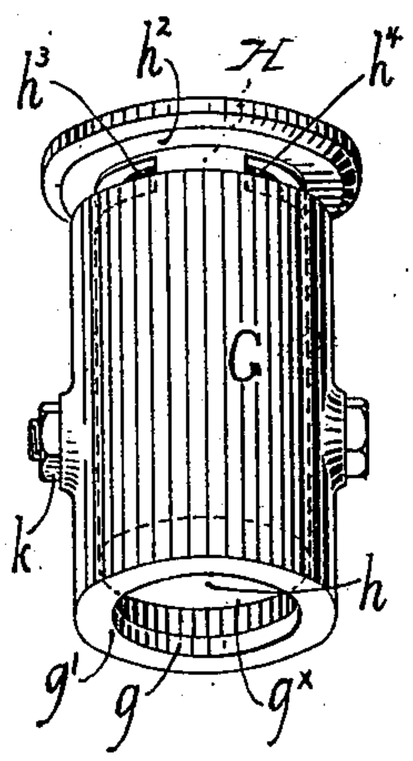
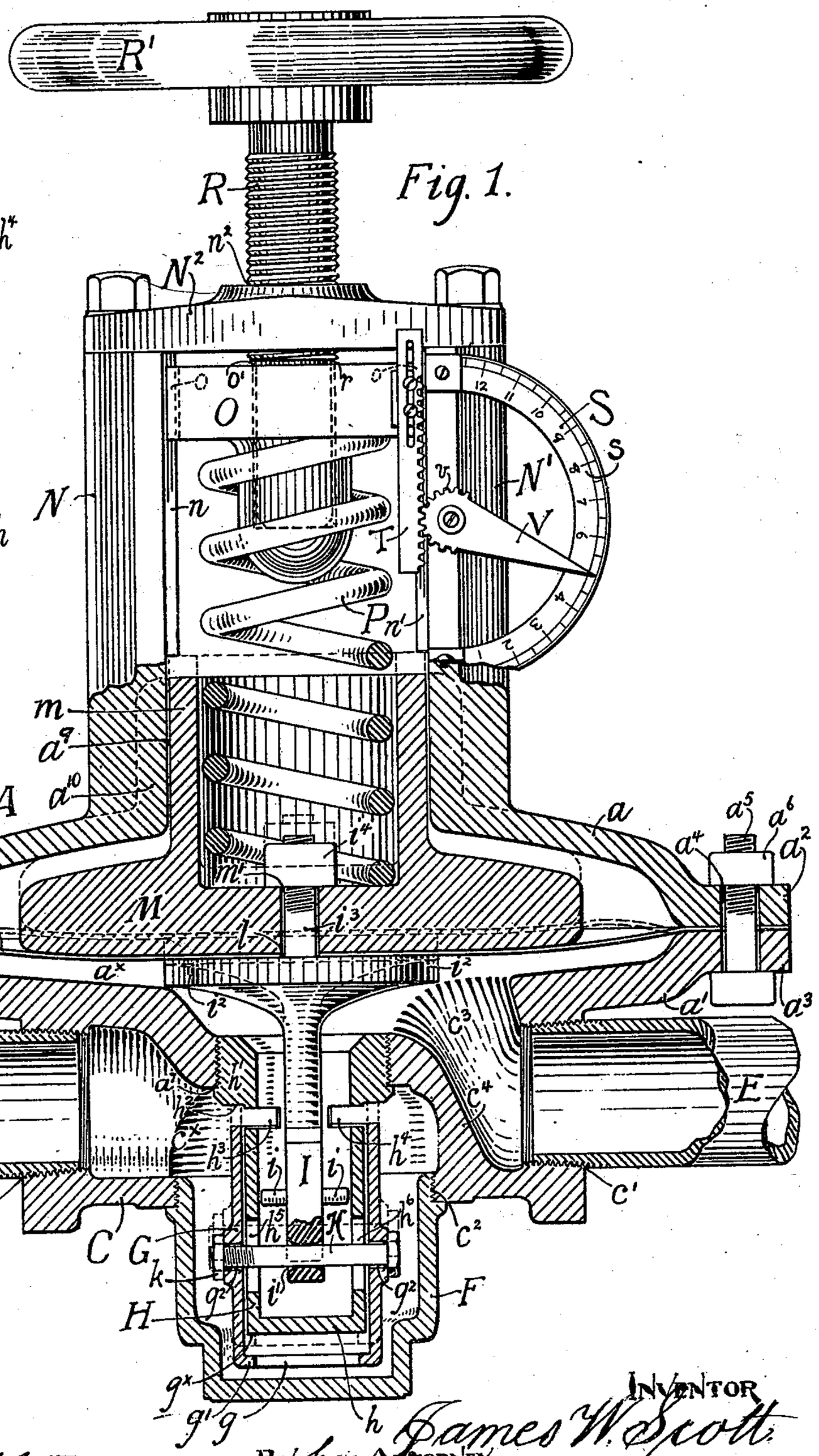


Fig. 1.



WITNESSES

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FLUID-PRESSURE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 552,202, dated December 31, 1895.

Application filed April 12, 1895. Serial No. 545,447. (No model.)

To all whom it may concern:

Be it known that I, JAMES W. SCOTT, a citizen of the United States, residing at Colorado Springs, in the county of El Paso and State of Colorado, have invented certain new and useful Improvements in Fluid-Pressure Regulators; and I do hereby declare that the following is a full, clear, and exact description thereof, such as will enable others to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

My invention has for its object primarily to control the resistance of the valve anterior to the admission of the fluid under degrees of pressure corresponding to the predetermined resistance of said valve, and thereby regulate the quantity of fluid which it is desired to pass through the valve in a definite space of time, and, second, to equalize in degree the fluid-pressure upon all parts of the valve and prevent back-pressure.

My invention further consists in the novel construction and combination of parts, such as will first be fully described, and specifically pointed out in the claim.

In the drawings, Figure 1 is a view in elevation of the improved fluid-pressure regulator and indicator, showing the receiver and pressure-regulating valve in vertical section. Fig. 2 is a detail view in perspective of the valve.

Similar letters of reference indicate corresponding parts in all the figures.

A in the drawings represents a receiver for fluids, which consists of two horizontal circular plates $a\,a'$, which are depressed outwardly in opposite directions to each other, and between the inner side portion of which plates is a chamber $a^{\times}$.

Upon the outer edge portion of the plate a is an annular flange a^2, and upon plate a' is an annular flange a^3, which flanges are fitted together and provided with registering perforations a^4, arranged at suitable distances apart from each other and extending around the said flanges. In the perforations a^4 are bolts a^5, secured by the nuts a^6.

In the central portion of the plate a' is a threaded opening a^7. To the outer side portion of plate a' and integral therewith is a hollow casting C, which extends in a direction horizontal to the line of the axis of the receiver A. In one end portion of the casting C, in the threaded opening c, is fitted one end of an induction-pipe D. In the other end portion of said casting is an opening c', in which is fitted one end of an eduction-pipe E. In the side portion of the casting C, in a vertical line with the opening a^7 in the plate a', is a circular screw-threaded opening c^2, in which is fitted the screw-threaded end portion of a pipe-closing cap F, which extends in a downward direction a considerable distance below the casting C. Within the space described within the hollow casting C and the cap F is formed the valve-chamber $c^{\times}$.

In the plate a' a short distance from the opening a^7 is an opening c^3, which communicates with the eduction-opening c' in the casting C. Between the respective openings c^3 and a^7 is a web c^4, which extends from the inner side portion of the casting C at a point between the opening c for the cap F and the eduction-opening c' in the casting C and in an upward direction to the opening a^7, forming one side of said opening. Said web c^4 also extends in a transverse direction from one inner side portion to the other of said casting C, so that the fluid in chamber $a^{\times}$ will pass through the opening c^3 outwardly through pipe E.

In the chamber $c^{\times}$ formed by the casting C and cap F is placed the regulator-valve G. The valve-guide consists of a tube H, which is closed at one end, as at h, the diameter of which is less than the described width of the opening a^7. Upon the other end of said tube is an externally-threaded flange h', which is fitted to the screw-threaded opening a^7 in the plate a'. The closed end of the valve-guide H extends within the cap F to a point a short distance from the inner side portion of said cap. Over the tube H is fitted loosely the valve G, which consists of a tube fitted loosely over the closed tube or guide H. In the outer end portion of the valve or tube G is an opening g. Concentric with and forming the sides of said opening g is a flange g', between which and the outer end portion h of the guide H is formed a valve-seat $g^{\times}$. The other end portion of the tube or valve G is fitted to bear upon the valve-seat h^2, which is formed by the portion of the flange h' concentric with the tube H, both of which valve-seats are ground so as to fit when in a closed position. In one side of the

tube H at a point transversely in line with the valve-seat h^2 is a port or opening h^3, which communicates with the chamber $c^\times$. In the other side of said tube is a similar opening h^4, which also communicates with chamber $c^\times$. In the tube H is a spindle or valve-stem I. From the opposite sides of the stem I, at a point a short distance from the inner end portion of stem I, extend the guide-pins $i\ i$ which connect with the inner side portion of the tube H.

In the tube or valve-guide H a short distance from the end portion g is a vertical slot h^5. In the other side of said tube is a slot h^6. In the valve G registering with the slots $h^5\ h^6$ are the perforations g^2. In the extreme inner end portion of the stem I is a transverse perforation i'. Through the perforation g^2 in the valve G and the perforation i' in the stem I and the slots $h^5\ h^6$ in the tube H is inserted a bolt K, which is provided with a head at one end and screw-threaded at the other and provided with a securing-nut k.

In the chamber $a^\times$ of the receiver A is a diaphragm L, which consists of a circular depressed plate or disk which is comparatively thin and capable of flexion. The outer edge portion of said diaphragm extends between the flanges $a^2\ a^3$ of the receiver A and is clamped in position between said flanges.

To the upper end portion of the stem I is attached a circular flange-plate i^2, which fits against the under side portion of the diaphragm L. In the diaphragm L is an opening l. To the upper side portion of the flange i^2 is rigidly attached a pin i^3, which extends upwardly through the opening l in the diaphragm L, and is screw-threaded at the upper end.

In the plate a above the diaphragm L is a circular opening a^9. Extending in an upward direction a short distance from plate a and around said opening is a flange a^{10}. Within the chamber $a^\times$ and bearing upon the upper side of the diaphragm L is a circular plate M, the under surface of which is curved slightly, so as to conform to the line of the depression in the diaphragm L. To the upper side portion of the plate is attached a circular upwardly-extended flange m. In the plate M is an opening m', which receives the pin i^3, and upon which stem is fitted within the flange m the nut i^4. To the outer side portion of the flange m is attached rigidly a standard N, and upon the other side portion of said flange is attached a standard N′, both of which standards extend a considerable distance in an upward direction and are connected at their upper ends by the cross-bar N^2. Upon the inner side portion of the standard N is a vertical guide-strip n, and upon the inner side portion of the standard N′ is a guide-strip n'. Between the standards N N′ is a movable head-block O, which consists of a circular plate which is slotted upon each side at $o\ o$ to receive the respective guides $n\ n'$ on the standards N N′. In the head-block O is a vertical opening o'. Between the standards N N′, and bearing upon the plate M, between the sides of the flange m of said plate at one end, is a spring P, the other end of which spring bears against the under side portion of the head-block O. Said spring is made to sustain the degrees of pressure required to measure the same in foot-pounds or balance the fluid-pressure, as hereinafter described.

In the head-block N^2 is a threaded opening n^2, which receives a screw R, the lower portion of which screw is made smooth and fits within the opening o' in the head-block O, and provided with a shoulder r, which bears direct upon said head-block. Upon the upper end portion of the screw R is a band-wheel R′.

To the standard N′ near the cross-bar N^2 is attached rigidly one end of an indication-dial S, which consists of a semicircular plate, the other end of which plate is attached to the said standard a suitable distance below the position of the upper end. Upon the dial S is a scale s.

Upon the cross-head O near the standard N is secured adjustably a vertical rack T. To the standard N at a point equidistant from the upper and lower ends of the dial S is pivoted a dial-finger V, which extends to the dial S and moves in the arc of a circle. The pivoted portion of said finger consists of a pinion v, which engages with the rack T.

In the operation of my improved pressure-regulator the hand-wheel R′ is turned a sufficient number of times to cause the degree of pressure upon spring P, which is required to be offset by an equal number of pounds pressure upon the diaphragm L, which is exerted by the liquid. The degree of contraction of the spring P by the pressure of the head-block is at once indicated by the finger V, which passes over the scale s and stops at the point at which the tension of the spring P is now placed. For illustration, the compression of the spring P is given a tension which indicates six pounds upon the dial. The position of the valve G is open so as to admit the fluid through the ports $h^3\ h^4$. The fluid is then admitted to the chamber $a^\times$ through the induction-pipe D, which passes in chamber $c^\times$, and around the valve G, and exerts pressure against the diaphragm L. So long as the pressure of the fluid does not exceed the stated degree of pressure—viz., six pounds—the valve remains open and the fluid passes through the opening c^3, outwardly through the eduction-pipe E. At the moment the increase of pressure occurs, however, in the fluid which is entering the induction-pipe D, and in excess of the six pounds, as stated, the spring P yields to cause the diaphragm to move upward, and in this movement the valve-stem I, which is connected with the diaphragm, is moved in position and the valve G closes the ports $h^3\ h^4$, and they remain closed until the pressure of the fluid has lessened in degree or corresponding to the position indicated upon the dial S. In the pressure exerted by the fluid the back-

pressure it will be observed is counteracted by the disparity in the width of the valve-seats, which are in my invention so designed as to offer but little surface to the resistance of the fluid, and at the same time permit the equalization of the pressure of the fluid upon all parts of the valve. The space between the valve G and the guide-tube H is sufficiently large to admit the fluid and prevent the tendency of the valve to "stick" or refuse to close. In the operation of the valve it is practically performing a reciprocal movement during the time the fluid is being supplied. When springs are placed in position beneath the head-block, their tension varies, and to meet this variance the rack T is adjusted in position so as to set the indicator-finger G at a uniform starting-point, as at zero, on the indicator.

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

In a fluid pressure regulator a receiver for the fluid having induction and eduction openings and a diaphragm within said receiver actuated by the fluid in one direction and a spring exerting a defined pressure in the opposite direction a valve chamber beneath said receiver having a suitable induction opening a tubular valve guide having slots in both sides within said induction opening in said receiver extending within said valve chamber and having a closed outer end and ports near said receiver and a flanged valve seat near said ports a tubular balanced valve upon said valve guide having perforations registering with the slots in said valve guide and a circular flange at the closed end of said valve guide a pin extending through the perforations in said valve and also through the slots in said valve guide and a valve stem within said valve guide connected with said pin at one end and also with the said diaphragm at the other end substantially as shown and described.

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