

(No Model.)

J. ACTON.
FLUID PRESSURE REGULATOR.

No. 444,263.

Patented Jan. 6, 1891.

Fig. I.

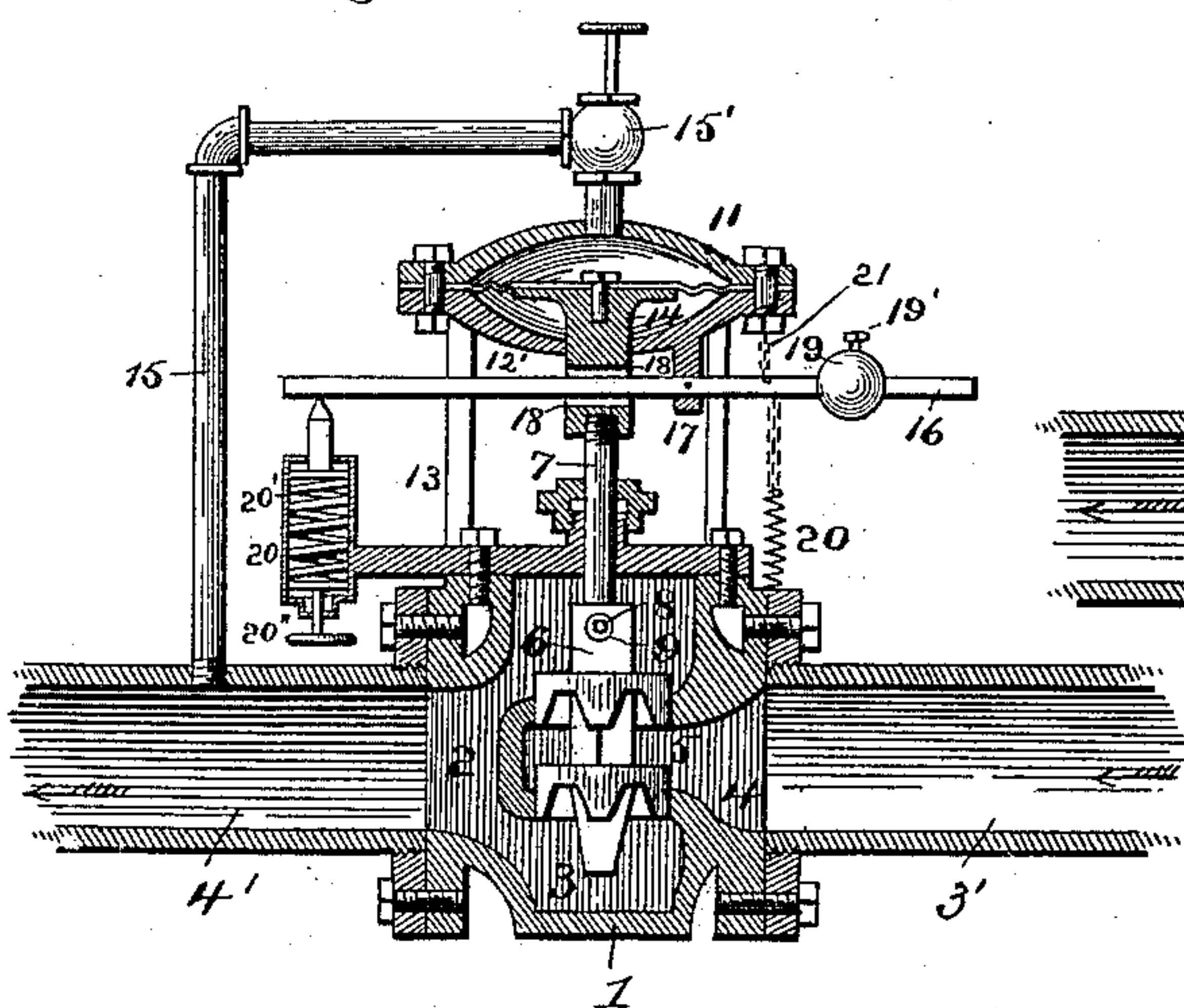


Fig. II.

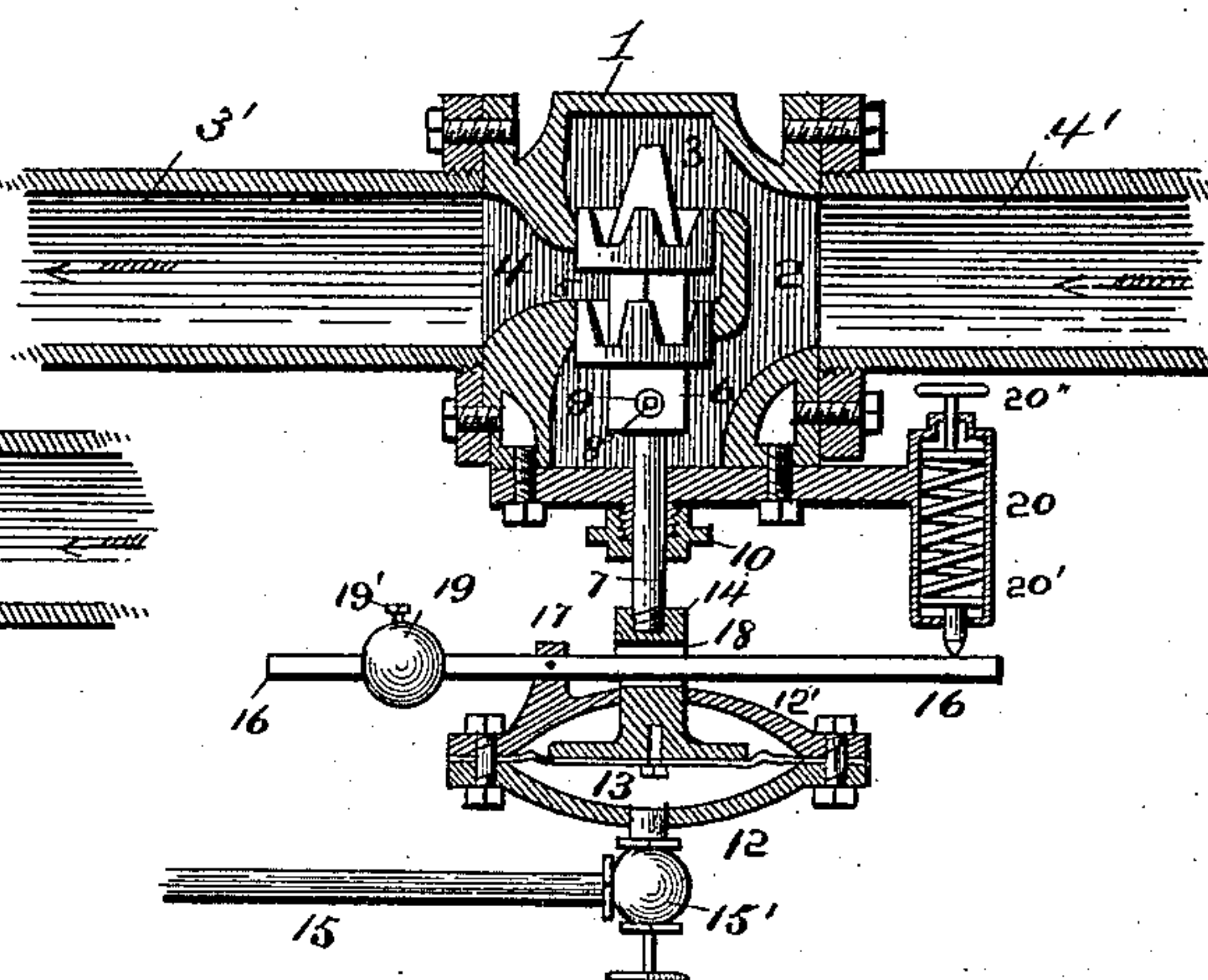


Fig. III.

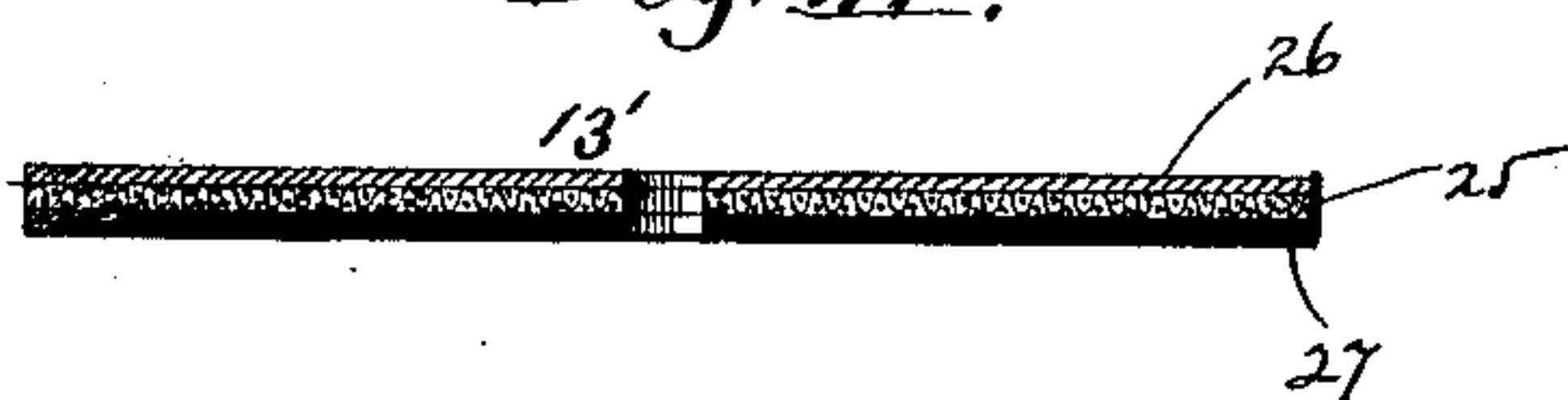
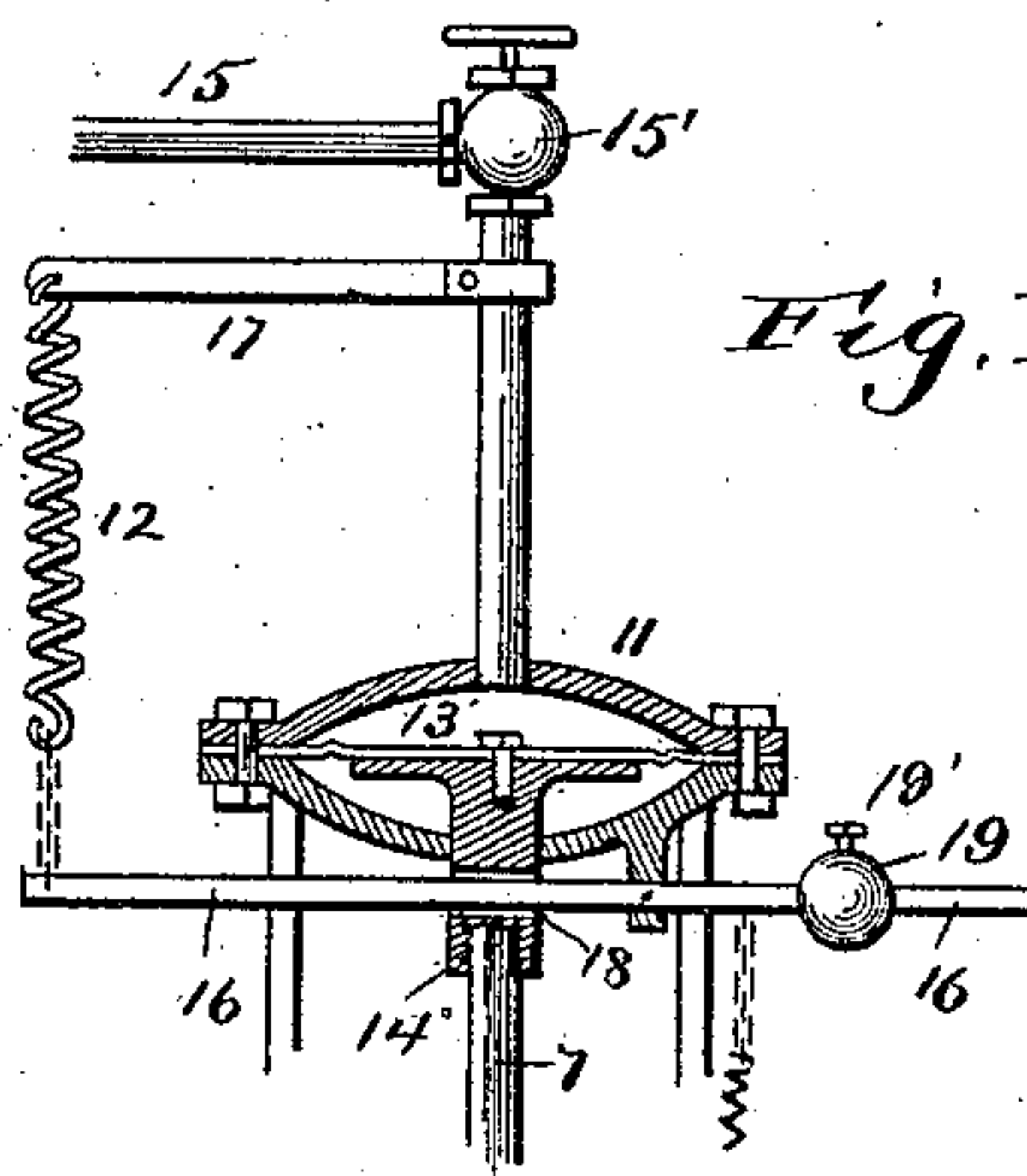


Fig. IV.



Witnesses:

J. B. M. Givv.
W. J. Berukor

Inventor:

John Acton
By his Attorneys,
Edson Bros.

UNITED STATES PATENT OFFICE.

JOHN ACTON, OF NEW YORK, N. Y.

FLUID-PRESSURE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 444,263, dated January 6, 1891.

Application filed March 25, 1890. Serial No. 345,285. (No model.)

To all whom it may concern:

Be it known that I, JOHN ACTON, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Fluid-Pressure 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 appertains to make and use the same.

My invention relates to improvements in pressure-regulators adapted for use with fluids of any kind, as water, steam, air, or gas, and more especially designed to control high pressure, as in steam-pumps of hydraulic elevators, fire-pumps, electric-light engines, water-works, or in any contrivance or apparatus where there is more pressure than is required.

The primary object of my invention is to provide means which will effectually overcome a sudden jerking or jumping motion of the apparatus, which is especially noticeable in the ordinary passenger-elevators as at present constructed.

A further object of my invention is to provide an improved regulator for high pressure, which is thoroughly reliable and efficient in operation, is simple, cheap, and durable in construction, not liable to get out of order, and is readily accessible for manipulation and repairs.

With these ends in view my invention consists of the construction and combination of parts, as will be hereinafter described and claimed.

To enable others to understand my invention, I will now proceed to a detailed description thereof in connection with the accompanying drawings, in which—

Figure I is a vertical sectional view of my improved pressure-regulator. Fig. II is a sectional view illustrating the regulator in an inverted position, and Fig. III is a detail cross-sectional view of the composite diaphragm. Fig. IV is a detail of a modified form of spring.

Like numerals of reference denote corresponding parts in all the figures of the drawings, referring to which—

1 designates a valve case or shell of my im-

proved pressure-regulator for fluids of all kinds, which case or shell has the partition 2, which divides the shell or case into a high-pressure chamber 3 and a low-pressure chamber 4, with which chambers communicate respectively the high and low pressure pipes 3' 4', which pipes constitute the pipe-line through which the fluid passes. In this diaphragm is provided the seats 5 for the reception of the vertically-movable balanced valves 6, which are connected together and to a common vertical valve stem or rod 7. This valve-stem is connected to the balanced valve by a swivel or ball joint 8 to impart an easy and free motion to the piston or diaphragm, the stem being fastened to the valve or the socket by a clamping-screw 9, which prevents the parts from getting loose and becoming detached. The valve-stem passes vertically through the valve case or shell and emerges therefrom through a stuffing-box 10, and the free end of this valve-stem is connected to a protruding arm on the diaphragm-follower, as will be presently described.

The diaphragm-chamber 11 is supported on or suspended from the valve-case or from the pipe-line by two or more vertical rods or standards 13, and this chamber comprises two concavo-convex parts or members 12 12', which are suitably secured at their edges by overlapping flanges and bolts. In the center of the chamber formed by the members or parts 12 12' is arranged a diaphragm 13', arranged to vibrate in said chamber for a limited distance, the diaphragm being held in the chamber by having its edge fitted and clamped between flanges on the members or parts of the diaphragm-chamber.

This diaphragm is composed of a suitable metallic gauze 25, preferably of copper wire woven together, a textile fabric 26, and an impervious rubber material 27. These three parts are arranged in layers, one on top of the other, and suitably united together, the layer of wire or metal being interposed between the fabric and impervious rubber material, in order to be protected by the same.

To the diaphragm, preferably at the middle of the same, is secured a follower 14, which protrudes or extends beyond the diaphragm-chamber through a suitable opening in one of

the parts or members of the same, and to this arm is connected the stem or rod of the balanced valve, as hereinbefore explained.

15 designates the fluid-pipe, which opens into the diaphragm-chamber at the opposite side from the valve-rod, and the other end of the pipe is connected to the low-pressure pipe 3' of the pipe-line.

16 designates a lever, which is connected to the valve-stem at a point between the diaphragm-chamber and the valve case or shell. This lever is fulcrumed at a point intermediate of its length to a fixed post 17 on the diaphragm-chamber, and said lever passes through a slot 18 in the valve-stem, and it is thus connected to said valve-stem at an intermediate point of its length, the ends of said lever extending beyond the valve-stem and the diaphragm-chamber. On one end of this lever is placed an adjustable ball-weight 19, which is clamped on the lever by a set-screw 19', and against the opposite end of said lever is applied the force of a spring 20, said weight and spring serving to normally hold the balanced valve in an open position. The spring employed may be arranged on the lower side of the lever, as shown, to push the lever upward; or said spring may be applied to the upper side of the lever and arranged to pull or lift the lever, as in Fig. IV, the upper end of the lifting-spring being connected to a fixed arm, as shown.

When the spring is arranged below the lever, as in Fig. I, one end of the spring is applied or connected to the lever and the other end is housed within a fixed shell 20', and the tension of the spring is regulated by an adjusting-screw 20'', which works in a suitable bearing in the lower end of the shell.

It will be seen that the balanced valve is held in an open position when the pressure in the pipe-line is normal or below; but when the pressure becomes excessive the force of the liquid on the diaphragm supplied to the chamber by the pipe 15 operates to depress the diaphragm, thus overcoming the weight and force of the ball, weight, and spring on the lever and to depress the balanced valve proportionately to the excess of pressure, so that the balanced valve is partially or wholly closed to reduce or cut off the pressure. The fluid-supply pipe 15 is provided with a cock or valve 15', by which the fluid admitted to the diaphragm-chamber can be regulated. A suspending hook and chain 21 is also provided for the purpose of holding the weighted end of the lever in a raised position, which operates to close the valve and admits of repairs to the apparatus. This chain is connected to the diaphragm-chamber; but it normally hangs free of the lever and is only connected thereto when it is desired to put the regulator out of use and repair the same.

One of the leading advantages attained by the use of my invention is its adaptability for use on either the upper or lower side of the pipe-line to which it is applied.

Although I have described the regulator as adapted for use on the upper side of the pipe-line and illustrated this adaptation in Fig. I, yet I do not confine myself to this arrangement of parts, because the regulator can be used with equal advantage and efficiency on the lower side of the pipe-line, as illustrated in Fig. II. I do not therefore confine myself to the exact arrangement of the regulator herein shown and described as an embodiment of my invention, but hold myself at liberty to arrange the same in any manner which shall be most convenient and well adapted for service.

The operation and advantages of my invention will be readily understood from the foregoing description, taken in connection with the drawings.

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

1. In a pressure-regulator, the combination of a valve-chamber having the high and low pressure pipes connected thereto, a diaphragm-chamber, a balanced valve fitted in said valve-chamber and having an extended rod, a diaphragm secured within the diaphragm-chamber and having the valve-rod connected thereto, a lever connected to the valve-rod at a point between the valve-chamber and the diaphragm-chamber and having its ends extended beyond said valve-rod, a weight on one end of said lever, and a spring operating against the other end of the lever, substantially as described.

2. In a pressure-regulator, the combination of a valve-chamber, the high and low pressure pipes, the vertical standards or rods rigid with said valve-chamber and supporting the diaphragm-chamber, the balanced valve seated in the valve-chamber, the diaphragm having the rigid follower, which operates freely through one side of the diaphragm-chamber, the valve stem or rod connected to said diaphragm-follower, and having a swiveled connection with the balanced valve, the lever pivoted to the valve-rod at a point between the diaphragm and balanced valve and carrying a weight at one end, and a spring operating against the other end of the lever, all combined and arranged substantially as described, for the purpose set forth.

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

JOHN ACTON.

Witnesses:

WM. H. CAPEL,
J. A. HURDLE.