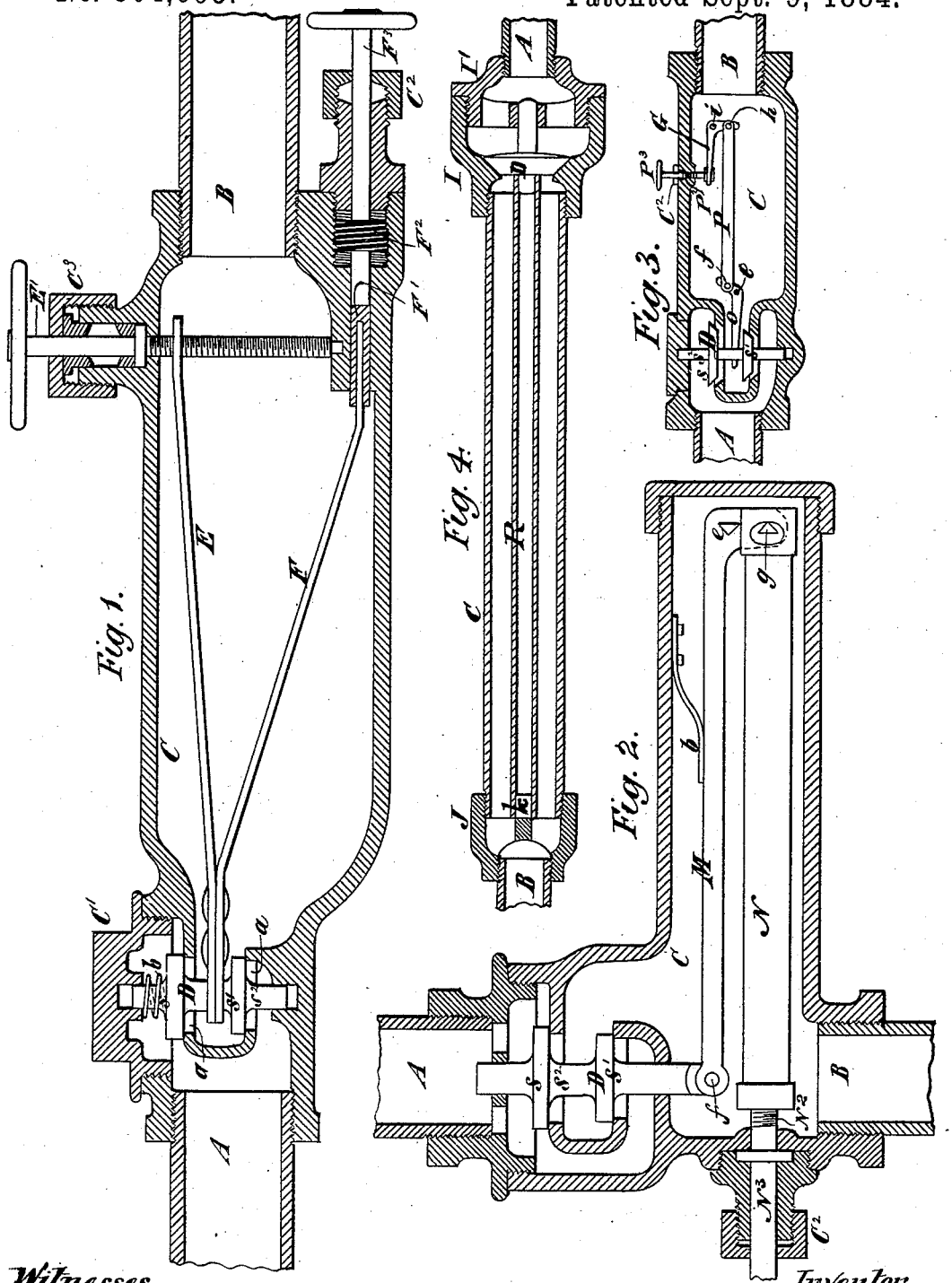
(No Model.) 2 Sheets—Sheet 1.

A. G. BRINCKERHOFF.

PRESSURE REDUCER OR REGULATOR.

No. 304,695. Patented Sept. 9, 1884.



Witnesses
Geo. Wadman
James R. Bowen.

Inventor
A. G. Brinckerhoff,
by his attorneys,
Gifford & Brown

(No Model.) 2 Sheets—Sheet 2.

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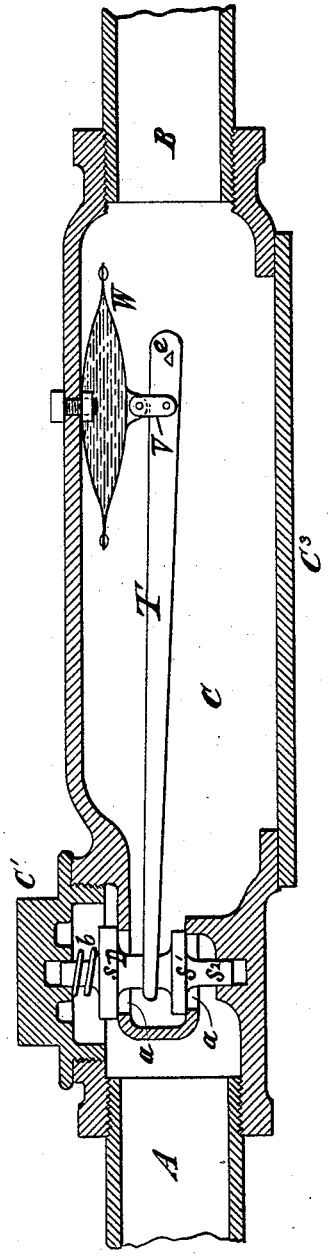

Fig. 5.

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UNITED STATES PATENT OFFICE.

ALEXANDER G. BRINCKERHOFF, OF BROOKLYN, NEW YORK.

PRESSURE REDUCER OR REGULATOR.

SPECIFICATION forming part of Letters Patent No. 304,695, dated September 9, 1884.

Application filed February 4, 1884. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER G. BRINCKERHOFF, of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Pressure Reducers or Regulators, of which the following is a specification.

The object of this improvement is to provide a means whereby steam may be maintained automatically at any desired pressure in a pipe or conduit leading from a pipe, conduit, or receptacle where steam is contained at a higher pressure.

In the accompanying drawings, Figure 1 is a central longitudinal section of an apparatus embodying the improvement. Fig. 2 is a central longitudinal section of an apparatus of modified form embodying the improvement. Fig. 3 is a central longitudinal section of an apparatus of another modified form embodying the improvement; Fig. 4 is a central longitudinal section of an apparatus of still another modified form embodying the improvement; and Fig. 5 is a central longitudinal section of an apparatus of still another modified form embodying the improvement.

In Fig. 1, A designates a pipe in which steam is contained at a high pressure—say, for example, at one hundred pounds to the square inch. B is a pipe in which steam is desired to be maintained at a much lower pressure—say, for instance, fifty pounds to the square inch. C designates a chamber arranged between the pipes A B and establishing communication between them. As here shown, the pipes A B are screwed into the ends of the chamber C. In the chamber C is a valve, D, controlling the passage of steam through the chamber. The valve D in the present instance consists of two disk, *s s'*, united by a common stem, s^2. The stem s^2 is guided at the ends so that it may move lengthwise, in order that the disks can move toward or away from seats *a*, in conjunction with which they operate. The stem of this valve is guided at one end in a recess in the chamber C and at the other end in a recess in a bonnet, C', with which the chamber is provided. A spring, *b*, surrounding the valve-stem between the bonnet C' and the disk of the valve which is adjacent thereto, tends to move the valve in such direction that its disks will close on their seats. The disk *s* of the valve D has a larger area than the disk *s'*; hence the steam in the pipe A always tends to keep the disks of the valve closed on their seats. This is important, because in the event of a breakage of parts the valve would cut off the passage of steam from the pipe A into the chamber C. All the parts described may be made of any suitable metal.

F designates a rod of iron, which preferably will be made flat, so that it can easily bend, and is fastened at one end to a bar, F'. The bar F' slides in a cavity in the chamber C and abuts against the inner end of the shank F^3 of a screw, F^2. The outer end of the shank F^3 of this screw extends through a stuffing-box, C^2, with which the chamber C is provided. By turning the screw F^2, the bar F' may be adjusted longitudinally inward to vary the action of the rod F within the chamber C.

E designates a rod, of brass, zinc, or like metal, which preferably will be made flat, so that it can easily bend, and which at one end is secured, by rivets or other means, to the end of the rod F which is unconnected from the bar F'. The rod E at the other end has a tapped hole which receives a screw, E'. The screw E' is supported in bearings in the chamber C, and its stem passes through a stuffing-box, C^3, with which the chamber is provided. By turning the screw E' the action of the rod E may be varied. The ends of the rods E and F which are united are engaged with the stem s^2 of the valve D between its disks *s s'*, so that they may impart motion to the valves. The screws F^2 E' are adjusted to certain points, so that the rods E F, when cold, will open the valve D quite wide; but after the passage of steam beyond, the valve will maintain the valve open to such an extent only as to maintain the desired pressure in the pipe B. The varying demand for steam from the pipe B will cause the steam to be carried away in varying quantities; consequently the temperature in the chamber C between the valve D and the pipe B will vary. As a result of these changes in temperature, the rods E F

will contract and expand, so as to open the valve more or less for the purpose of supplying the steam in quantities sufficient to keep up the desired pressure. The rods E F may be adjusted within certain limits for any desired pressure by manipulating the screws F^2 E'.

In Fig. 2, M designates an elbow-lever fulcrumed at *e* to the chamber C. Preferably it will have a knife-edge fulcrum, so as to operate easily. The longer arm of the lever is pivotally connected by a pin, *f*, to one end of the stem of the valve D. A flap-spring, *b*, secured at one end to the interior of the chamber C and impinging at the other end against the lever, tends to force the valve-disks toward their seats. The area of the disk *s*, being greater than the area of the disk *s'*, tends to this same result. The rod N may be made of zinc, brass, or analogous metal, and has in one end large bearings, in which knife-edge pivots *g*, extending from the shorter arm of the lever M, are received. At the other end of the rod N a screw, N^2, enters it. The stem N^3 of this screw extends through a stuffing-box, C^2, with which the chamber C is provided. By turning this screw an adjustment of the rod N may be effected, so as to secure its proper operation under expansion and contraction for maintaining any desired pressure of steam in the pipe B. The bearings in the rod N, which receive the pivots *g*, may be made very large, because they only operate on the lever M when contracting, and when expanding merely allow the valve to close upon the seats *a* under the action of the steam and the spring *b*.

In Fig. 3, D designates a valve which is intended to be like the valves D before described. O designates a lever fulcrumed within the chamber C at *e*. One of its ends engages with the stem of the valve D. The other end is pivotally connected by a pin, *f*, with one end of the rod P. The other end of the rod P is pivotally connected by a pin, *h*, to the short arm of a lever, G, fulcrumed in the chamber C at *i*. The rod P is to be made of zinc, brass, or analogous metal. The longer arm of the lever G is engaged with a screw, P^2, whose stem P^3 works through a stuffing-box, C^2, with which the chamber C is provided. By manipulating this screw an adjustment may be made which will effect the desired result. It will be observed that in all these examples of my improvement the expansion and contraction of the rods secures a movement of the valve in a direction transverse to the length of the rods.

In Fig. 4 I have shown a chamber, C, made of zinc, brass, or like metal, and connected by coupling-pieces I I' J to the pipes A B. In the coupling-piece I a valve, D, is arranged. The stem of this valve is at one end guided in a bridge formed in the coupling-piece I', and at the other end it is fastened to a rod, R. This rod R may be made in tubular form, of iron or like material. It is fastened at one end to a stud, *k*, projecting from a bridge with which the coupling-piece J is connected. When this rod expands and contracts, it moves valve D. There may be any provision for adjusting this rod.

In Fig. 5 the pipes A B, the chamber C, and the valve D are all substantially the same as they are in Fig. 1. The chamber C has, however, in the example of my invention shown in Fig. 5, a removable plate, C^3. The lever T is fulcrumed at *e*, and connected by a link, V, to a vessel, W, which is connected to the chamber C. The vessel W is made of sheet metal or like material, so as to be expansible. It is filled with mercury or other liquid material which varies in volume considerably under slight changes in temperature. By the variations in the volume of the liquid in the vessel W, the lever T has imparted to it motions which cause adjustments of the valve D.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A chamber for containing steam or similar fluid whose temperature bears a definite relation to its pressure, and in which it is desired to maintain a uniform temperature, and therefore a uniform pressure, a valve whereby the influx of the fluid from its source of supply will be controlled, a material for expanding and contracting under changes of temperature, and means for transmitting motion produced by the expansion or contraction of the said material to the valve, all combined and organized substantially as specified.

2. A chamber for containing steam or similar fluid whose temperature bears a definite relation to its pressure, and in which it is desired to maintain a uniform temperature, and therefore a uniform pressure, a valve whereby the influx of the fluid from its source of supply will be controlled, a material for expanding and contracting under change of temperature, and means for transmitting motion produced by the expansion or contraction of the said material to the valve, all being so combined and organized that in the event of any breakage of the parts through which motion is imparted to the valve the valve will be closed, substantially as specified.

3. The combination, with two pipes, of a chamber establishing communication between them, a valve and a rod or rods for expanding and contracting under the influence of steam at different temperatures, and thereby moving a valve, so as to maintain a desired pressure in one of the pipes, substantially as specified.

4. The combination, with two pipes, of a chamber establishing communication between them, a valve for controlling the passage of steam from one of the pipes to the chamber, a rod or rods adapted to expand and contract under the influence of steam, for the purpose of operating the valve to maintain any desired pressure of steam in the pipe which re-

ceives steam from the chamber, and means for adjusting the rod or rods, substantially as specified.

5. A valve and a rod or rods for operating the same, and adapted to operate the valve by expanding and contracting, the said valve and rod or rods being so combined that the valve is moved in a direction transverse to the direction of the expansion and contraction of the said rod or rods, substantially as specified.

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Witnesses:
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E. T. ROCHE.