

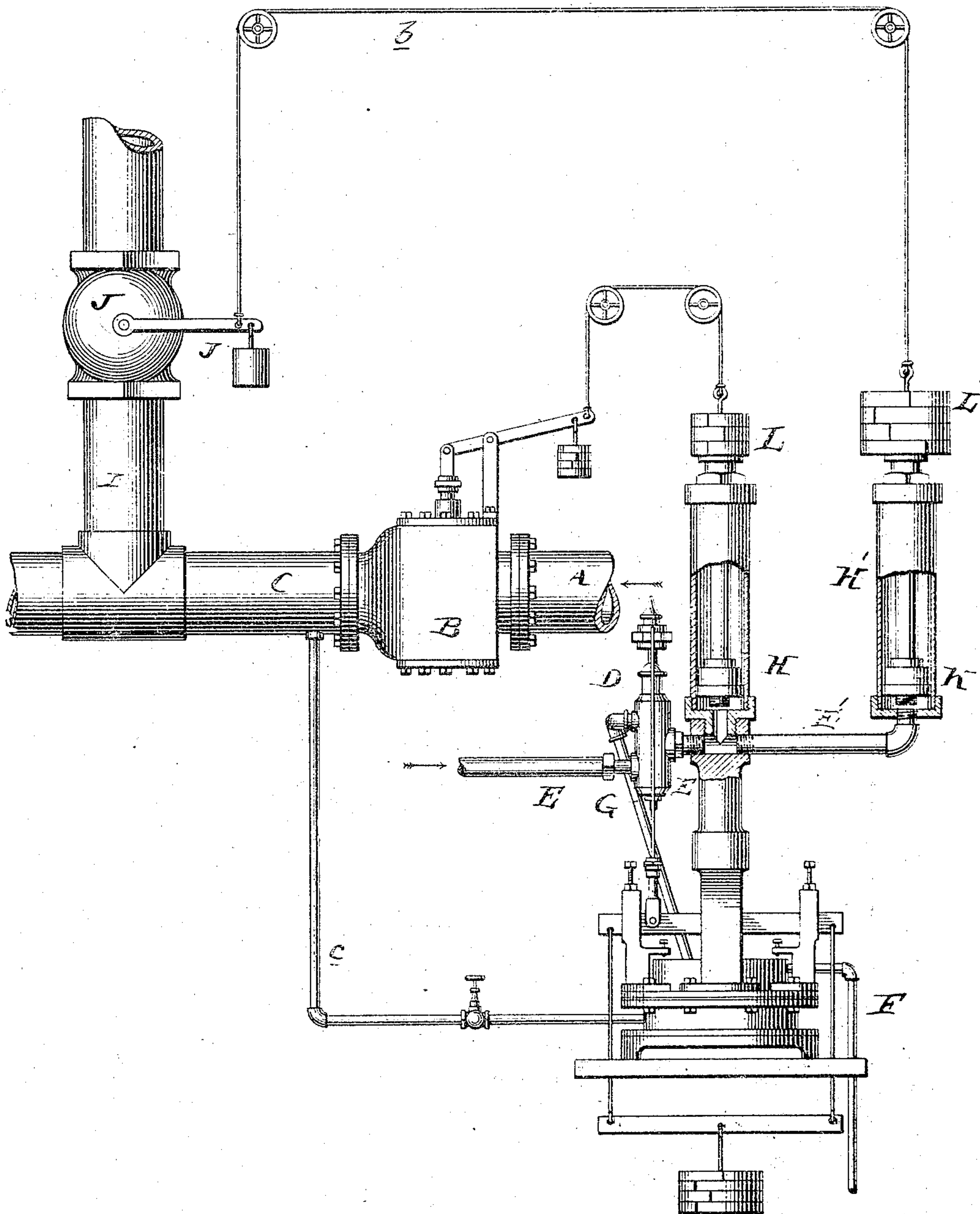
No. 613,030.

Patented Oct. 25, 1898.

W. G. FREER.
PRESSURE REGULATING APPARATUS.

Application July 13, 1898.

(No Model.)



Witnesses:
C. C. Wurdeman
Wm. B. B. B.

Inventor
Wm. G. Freer
By *[Signature]*
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM G. FREER, OF NEW YORK, N. Y., ASSIGNOR TO THE WARREN WEBSTER & COMPANY, OF NEW JERSEY.

PRESSURE-REGULATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 613,030, dated October 25, 1898.

Application filed July 13, 1898. Serial No. 685,831. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM G. FREER, of New York, (Brooklyn,) Kings county, New York, have invented an Improvement in Pressure-Regulating Apparatus, of which the following is a specification.

My invention relates to pressure-regulating apparatus; and it consists of the improvements which are set forth in the following specification and are shown in the accompanying drawing.

Heretofore it has been usual to operate a pressure-reducing valve by a fluid-pressure motor controlled by the pressure in the pipe or chamber to which the steam is supplied. In such apparatus the pressure is controlled wholly by the operation of the said reducing-valve.

It is the object of my invention to further control the pressure in such pipe or chamber by an additional relief or back-pressure valve independent of the pressure-reducing valve, but also controlled by the pressure in said pipe or chamber.

My invention is especially adapted to the control of the pressure in steam-heating systems in which exhaust-steam from the engine supplemented by a supply of live steam from the boiler is used as the heating medium. In thus applying my invention the steam-supply pipe is provided with the ordinary pressure-reducing valve controlled by the pressure in the pipe itself, and the back-pressure valve on the exhaust is similarly controlled, so that when the pressure in the system falls below the normal the reducing-valve is opened and the back-pressure valve is shut; but when the pressure rises above the normal the reducing-valve is closed and the back-pressure valve is opened to relieve the excess pressure and restore the normal.

In the preferred embodiment of my invention the reducing-valve and relief or back-pressure valve are operated by independent fluid-pressure motors, both controlled by the pressure in the system, and by a proper arrangement or construction of such motors, as by a differential counterweighting, the reducing-valve motor is operated to close the reducing-valve before the relief-valve motor is operated to open the relief-valve, and upon a

fall of pressure in the system the latter motor is operated to close the relief-valve before the pressure-reducing valve is opened, thus permitting the normal pressure to be restored under certain conditions without the necessity of opening the reducing-valve.

In the drawing I have shown a side elevation of a pressure-regulating apparatus embodying my invention with parts in vertical section.

A is a steam-pipe leading from the boiler or other source of supply to a reducing-valve B, through which steam is fed to the pipe C, leading to the apparatus to which the steam is to be supplied—*e. g.*, to a steam-heating system.

D is a valve controlling the flow of motor fluid, such as water under pressure, through a pipe E to a motor H and operated by a motor F, controlled by the pressure in the pipe C, through a connecting pipe or passage *c*, leading therefrom.

G is the discharge or waste pipe from the valve D. The motor H is operatively connected with the valve B.

When the pressure in the pipe C rises beyond the desired amount, the motor F, controlled thereby, operates the valve D and permits the motor fluid to pass to the motor H, which in turn closes the valve B and stops the flow of steam from the pipe A into the pipe C. When the pressure falls, the motor F moves back and operates the valve D to open to the discharge G and permit the motor H to return and open the valve B.

So far as the apparatus has been referred to it is of well-known construction and is fully described in Letters Patent of the United States No. 424,561, dated April 1, 1890, to which reference may be had for greater particularity, only so much of the construction being here shown and described as is necessary to an understanding of my invention.

I is a pipe—such, *e. g.*, as the exhaust-pipe of an engine—containing a back-pressure valve J, which may be of usual construction.

H' is a motor similar to the motor H and communicating with the motor-fluid pipe E therefrom by a pipe E', (shown connecting with the pipe E at the inlet to the motor H'.) As shown, the motor H' consists of a cylinder

containing a counterweighted piston K, operatively connected, as by a connection b, with the counterweighted lever J' of the valve J. The motor H' is so connected with the valve J that when operated by the pressure of the motor fluid it will open the valve to relieve the pressure in the pipe I. The counterweight L' of the motor H' is heavier than the counterweight L of the motor H, so that when the valve D is operated in the manner described, upon an excess of pressure in the pipe C the pressure of the water or motor fluid will first operate the motor H to close the valve B and will then operate the motor H', opening the back-pressure valve J and relieving the pressure in the pipe I.

When the pressure in the pipe C is reduced and the valve D is operated in the manner described to open to the discharge G, the motor H', having the heavier counterweight, will first return and close the back-pressure valve J, and if the pressure in the pipe C is not restored the motor H will then operate and open the supply-valve B in the manner described.

I have shown the pipe I, in which the back-pressure valve J is located, connected with the supply-pipe C, as is usual in a heating system where exhaust-steam is used for heating purposes and is supplemented by a supply of live steam through the valve B. In this application of my invention it will be observed that whenever the pressure in the pipe C rises above the normal the supply-valve B for live steam is first closed and the back-pressure valve J is then opened to relieve the excessive pressure, and that when the pressure is reduced the back-pressure valve J is first closed, and if this does not restore the desired pressure the valve B is opened to admit live steam. In this way the back-pressure valve is controlled by the pressure in the pipe C, being opened when there is an excess of pressure and the supply-valve B is closed, and closed when the pressure is reduced and the valve B is opened. The excess weight of the motor H' insures the closing of the back-pressure valve when the valve B is open.

If the closing of back-pressure valve J through the operation of the motor H' is sufficient to restore the normal pressure in the pipe C, the motor F will operate the valve D and close it before the motor H has operated to open the reducing-valve B, which will thus remain closed until the pressure in the pipe C falls, when the valve D will be opened by the motor F and the pressure on the motor H relieved and the valve B opened.

The details of construction are not material to the invention and may be varied without departing from it.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a pressure-regulating apparatus, the

combination of a valve for controlling the supply of steam, a fluid-pressure motor for operating it, a valve for controlling the fluid-pressure to said motor, a motor for operating said motor-controlling valve, controlled by the pressure in the pipe or chamber supplied by said steam-controlling valve, a back-pressure valve, and a fluid-pressure motor controlled by the pressure in said pipe or chamber for operating said back-pressure valve.

2. In a pressure-regulating apparatus, the combination of a valve for controlling the supply of steam to a pipe or chamber, operated by the pressure therein, of a back-pressure valve adapted to control the pressure in said pipe or chamber, and means for operating said back-pressure valve controlled by the pressure in said pipe or chamber.

3. In a pressure-regulating apparatus, the combination of a valve for controlling the supply of steam to a pipe or chamber, operated by the pressure therein, of a back-pressure valve adapted to control the pressure in said pipe or chamber, and a fluid-pressure motor controlled by the pressure in said pipe or chamber and operatively connected with said back-pressure valve.

4. In a pressure-regulating apparatus, the combination of a valve for supplying steam to a pipe or chamber, a fluid-pressure motor for operating said valve, a back-pressure valve for controlling the pressure in said pipe or chamber, a fluid-pressure motor for operating said back-pressure valve, and means controlled by the pressure in the pipe or chamber for operating said fluid-pressure motors.

5. In a pressure-regulating apparatus, the combination of a valve for supplying steam to a pipe or chamber, a fluid-pressure motor for operating said valve, a back-pressure valve for controlling the pressure in said pipe or chamber, a fluid-pressure motor for operating said back-pressure valve, a valve for controlling the fluid-pressure to said motors, and a motor controlled by the pressure in the pipe or chamber for controlling said valve.

6. In a pressure-regulating apparatus, the combination of a valve for supplying steam to a pipe or chamber, a counterweighted fluid-pressure motor for operating said valve, a back-pressure valve for controlling the pressure in said pipe or chamber, a counterweighted fluid-pressure motor for operating said back-pressure valve having a greater counterweight than the motor for operating the supply-valve, and means controlled by the pressure in the pipe or chamber for operating said fluid-pressure motors.

In testimony of which invention I hereunto set my hand.

WILLIAM G. FREER.

Witnesses:

DANL. A. SLATTERY,

JOHN A. SEWELL.