(No Model.)

J. F. DE PEW.

FLUID PRESSURE REGULATOR.

No. 332,645. Patented Dec. 15, 1885.

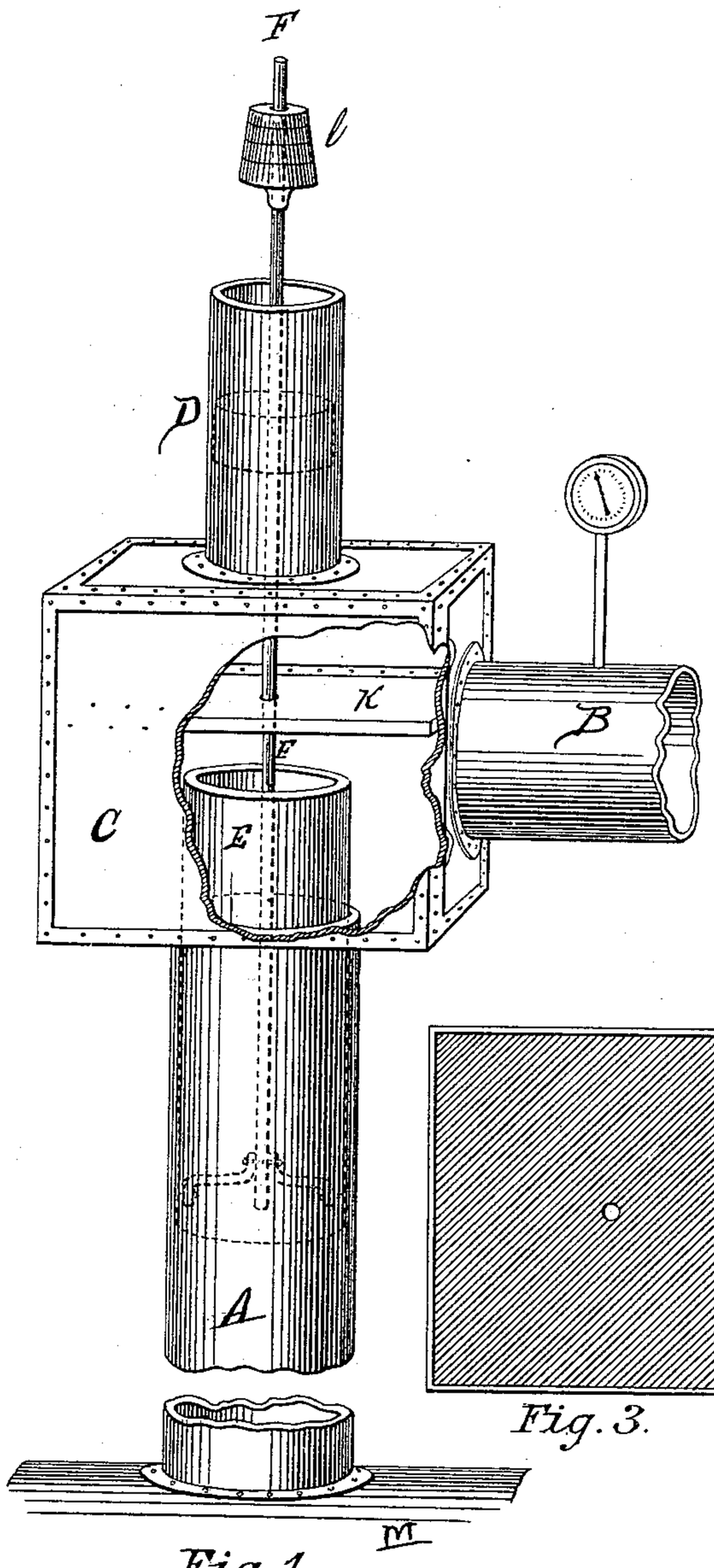

Fig. 1.

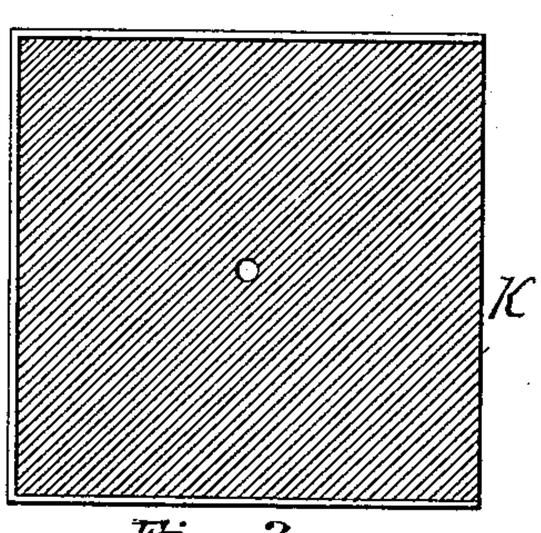

Fig. 3.

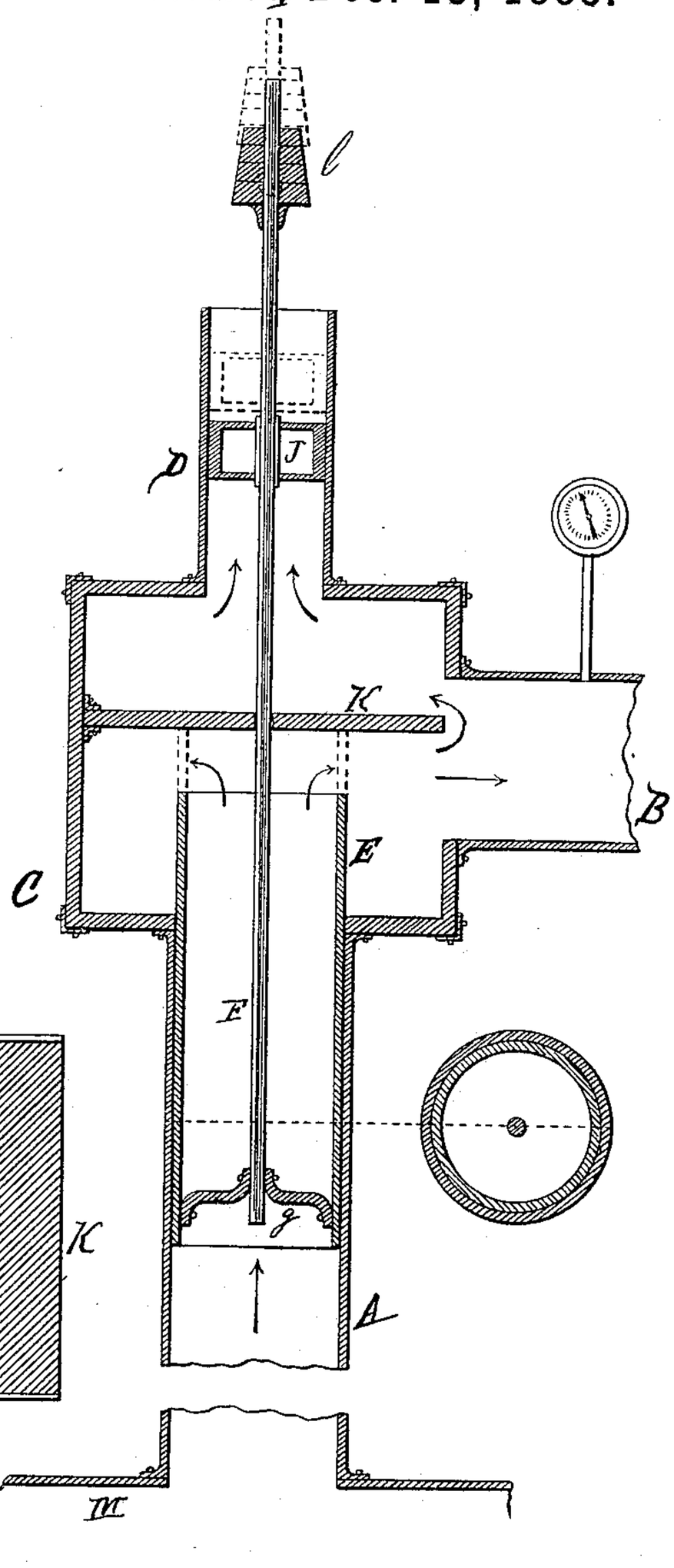

Fig. 2.

Witnesses.
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UNITED STATES PATENT OFFICE.

JOHN F. DE PEW, OF DENVER, COLORADO.

FLUID-PRESSURE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 332,645, dated December 15, 1885.

Application filed April 6, 1885. Serial No. 161,321. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. DE PEW, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented a new and useful Fluid-Pressure Regulator, to be used in governing the supply, discharge, delivery, and pressure of steam, water, and other fluids that are conveyed through pipes, of which the following is a specification.

My invention relates to the class of fluid-pressure regulator used to govern, check, and reduce the supply, discharge, delivery, and pressure of steam, water, or other fluids that are conveyed through pipes.

Heretofore the supply of steam conducted through pipes from the boiler to steam-engines, radiators, &c., has been governed by means of a throttle-valve in the steam-pipe until the steam reached the governor-valve, and the pressure of the steam in the steam-pipe, steam-chest, or radiator varied with the pressure of steam in the boiler. In the case of water, (and other fluids,) the throttle-valve at the pump or reservoir being opened, the water was allowed to flow out into the pipes under a pressure which varied with the pressure in the pump or with the height or head of water in the reservoir.

The object of my invention is, in the case of steam, to regulate, by means of a valve working against a stationary head inside the steam-pipe, both the pressure and the supply of steam before the steam arrives at the steam-engine, cylinder, radiator, or other place where the steam is to do its work, and to reduce the pressure from a high point in the boiler to a desired lower point after passing through the valve and before it reaches the engine, radiator, &c.; and in the case of water or other fluids conveyed through pipes under pressure from pumps, reservoirs, &c., to regulate its delivery and to reduce its pressure to a desired point in the delivery-pipes when the pressure in the pipe leading from the pump or reservoir is above the desired point, and to maintain this reduced pressure in the delivery-pipes against a greater and a varying pressure in the pipe leading from the pump, reservoir, &c. To accomplish this object, I use in the case of steam a steam-pipe extending from the boiler to the engine, radiator, &c., made wholly or in part of two joints, one joint set vertically, connected with the boiler, and the other set horizontally and connected, as desired, with the engine, radiator, &c., these two joints being joined by a valve-chest, with which they compose a continuous steam-pipe. Inside the vertical joint and valve-chest I use a valve made of a cylindrical tube, which works telescopically up and down and against a stationary head set above it at right angles. To this cylindrical telescopic valve is attached in direct line a valve-stem, which, extended upward, forms a piston-rod attached to a piston, which works up and down in a cylinder provided for that purpose. Inside the valve-chest is fixed a horizontal stationary head at right angles to the valve, and dividing the valve-chest into a lower and an upper compartment. The piston works in a cylinder set above the valve-chest and opening into it. The valve-stem passes freely through the stationary head at right angles to it and extended upward as a piston-rod passes through the piston, and its extension above the piston is used to support any desired weight. The reciprocating motion of the cylindrical telescopic valve as it is moved by the piston (the piston being actuated by the pressure of the steam in the upper compartment of the valve-chest and reactuated by the weight above the piston) nearer to or farther from the stationary head varies the size of the passage for steam and checks and regulates the quantity of steam passing through the valve into the horizontal joint of the steam-pipe and the upper compartment of the valve-chest, and thus reduces the pressure of steam in the horizontal joint of the steam-pipe to any desired point and maintains it there, although the pressure of steam in the boiler and vertical joint may be above that desired point—that is to say, when the pressure of steam in the boiler is above a desired point, the automatic action of the valve as actuated by the pressure of steam in the upper compartment of the valve-chest checks the quantity of steam passing through the valve, and thus reduces the steam-pressure to any desired point in the horizontal joint of the steam-pipe, and consequently at the engine, radiator, &c. In the case of water and other

fluids I use the same valve, pipes, and parts without material change. The vertical joint of pipe is attached to the pump or the outlet from the reservoir, and the water passes through the cylindrical telescopic valve, and, filling the horizontal joint of pipe and upper compartment of the valve-chest, presses against the piston and operates through it the valve after the same manner as steam, and governs the pressure and supply of water in the horizontal joint of pipe as desired, and thus governs the quantity of water delivered.

In the accompanying drawings, in which similar letters refer to similar parts throughout, Figure 1 is a perspective view of the invention. Fig. 2 is a vertical section of the same through the middle, and Fig. 3 is the stationary head.

A is the vertical joint of pipe connecting the boiler, pump, or reservoir with the valve-chest.

B is the horizontal joint of pipe connecting the valve-chest with the engine, radiator, or delivery pipes.

C is the valve-chest, a hollow chest steam and water tight, of suitable dimensions, with the joint A entering from below, the joint B opening into it at one side, and the cylinder D opening into it from above, directly opposite the joint A.

A, C, and B combined form a continuous pipe for conveying steam, water, &c.

D is a cylinder fixed on top of the valve-chest and opening into it directly above the joint A.

E is a movable valve, made of a cylindrical tube open at both ends, fitted loosely into the joint A, and extending into the valve-chest. It moves up and down telescopically in the joint A and valve-chest as actuated by the piston-rod and valve-stem. It forms an extension of the joint A, and when forced against the stationary head K it prevents steam or water from passing from A to B.

F is the combined valve-stem and piston-rod. It is connected with the valve E by means of the cross-bar *g*, and passing upward steam and water tight through the stationary head it is attached to the piston, and passing through the piston its extension is used to support any desired weight.

J is the piston, which works steam and water tight in the cylinder D, and operates the valve E up and down by means of the piston-rod and valve-stem.

l is any desired weight or weights set on top of the piston-rod extension to press the piston down, and thus counteract the upward pressure of the steam or water below the piston.

K is the stationary head—a head or partition set in a horizontal position in the valve-chest C and dividing it into a lower and an upper compartment. It has a hole in it, through which the valve-stem passes.

M is the boiler, or, in the case of water, it may be considered the pump or outlet from the reservoir.

The method of operating is as follows: When there is no steam, water, or other fluid in the joint A, the piston J is forced down to its lowest point by means of the weight *l*, and the valve E is wide open. On steam or water being admitted from the boiler or reservoir into the joint A it flows in the direction of the arrows through the valve E, filling the valve-chest and joint B, and presses against the piston J. The pressure of steam or water against the piston J forces it up in the cylinder D, and as the piston rises it draws, by means of the piston-rod and valve-stem, the valve E nearer and nearer to the stationary head K, and thus reduces the size of the passage between the end of the valve E and the stationary head K, and consequently the quantity of steam or water flowing through the valve is reduced, and in case the valve is forced against the stationary head the passage is closed. As the pressure in the joint B increases the piston J rises and the valve gradually closes, and as this pressure is reduced the valve gradually opens.

The object in view is to keep the pressure of the steam or water passing through the joint B constantly at a desired point, although the pressure in the joint A may be greater than that desired point and be varying from time to time. This is accomplished by so adjusting the weight *l* above the piston that this weight will exactly counterbalance the pressure of steam or water under the piston, and consequently the pressure of the steam or water flowing through the pipe B will be kept at a desired point, although the pressure may be above that point in the joint A.

A spring may be used in lieu of the weight *l* to force the piston down.

The valve, valve-chest, stationary head, and pipes may be made round, square, or any other desired shape, and they may be made of metal or any other suitable material. It is not necessary that the steam-pipe A C B be set in the position described, and that the valve and piston operate vertically; but the whole combination may be set at any desired angle. To illustrate this, Fig. 2 may be considered a horizontal section of the invention.

The steam or water acts on the lower and on the upper sides of the stationary head under varying pressures, the higher pressure being below and the lower pressure being above it.

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

1. The continuous pipe A C B, composed of the joint A and the joint B, connected by the valve-chest C, as described, in combination with the stationary head K and the valve E, substantially as described, and for the purposes set forth.

2. In a fluid-pressure regulator, the telescopic valve E, working as described, in combination with the joint A, the valve-chest C, and the stationary head K, substantially as described, and for the purpose set forth.

3. The valve-chest C, with the joint A, the joint B, and the cylinder D opening into it, in combination with the stationary head K, which divides it into an upper and a lower compartment.

4. In the continuous pipe A C B, the combination of the valve E with the stationary head K and the valve-stem and piston-rod F, substantially as described, and for the purposes herein set forth.

5. In the continuous pipe A C B, the combination of the valve E with the stationary head K, the valve-stem and piston-rod F, the piston J, the cylinder D, and the weight *l*, all substantially as described, and for the purposes herein set forth.

6. The combination of the joint A with the valve-chest C, the joint B, the valve E, the stationary head K, the valve-stem and piston-rod F, the piston J, the cylinder D, and the weight *l*, all substantially as described, and for the purposes herein set forth.

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