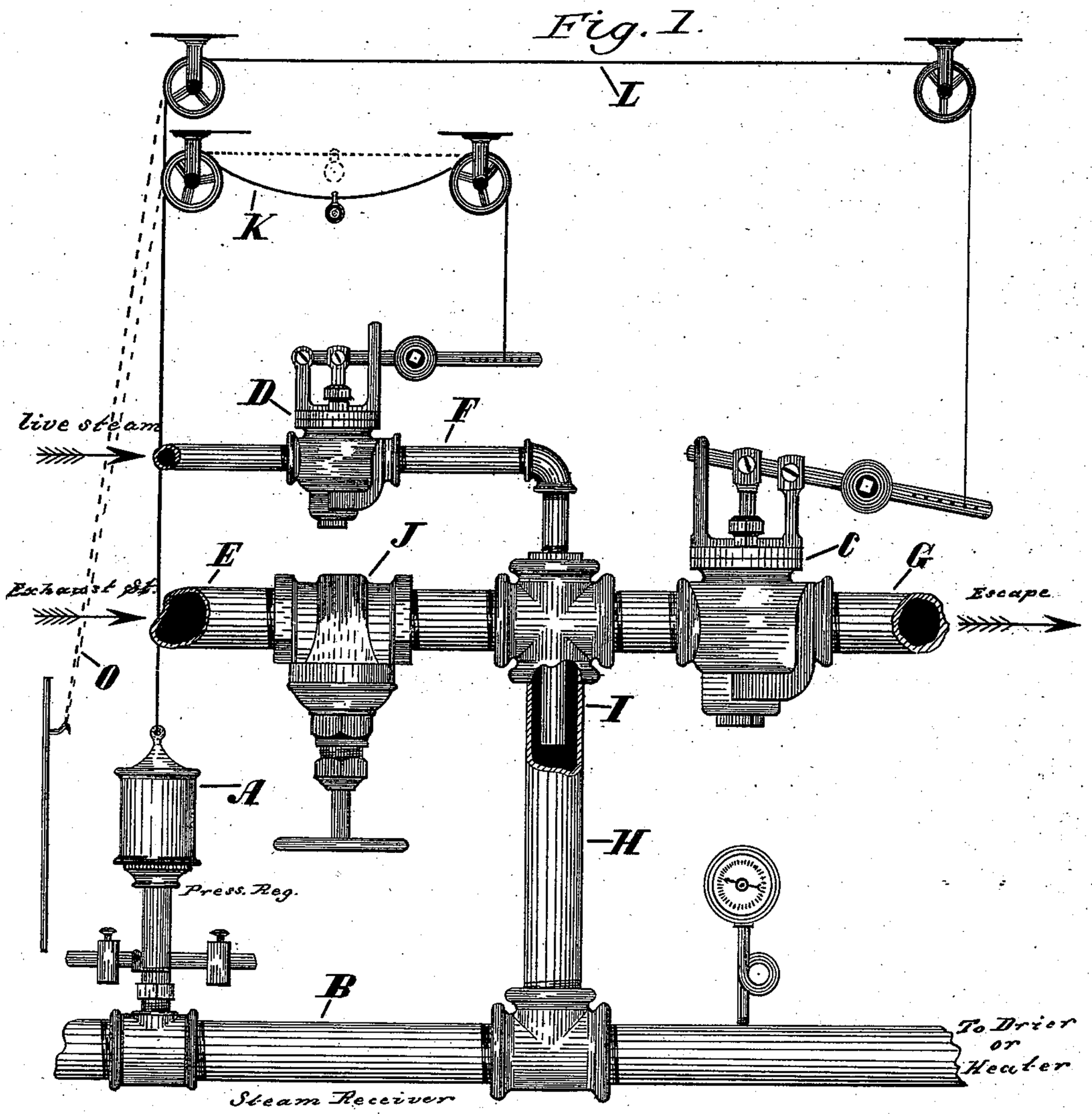
(No Model.) 2 Sheets—Sheet 1.

J. J. LOWDEN.

REGULATING LIVE STEAM AND EXHAUST FROM STEAM ENGINES.

No. 381,149. Patented Apr. 17, 1888.

Fig. 1.



WITNESSES:

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(No Model.) 2 Sheets—Sheet 2.

J. J. LOWDEN.

REGULATING LIVE STEAM AND EXHAUST FROM STEAM ENGINES.

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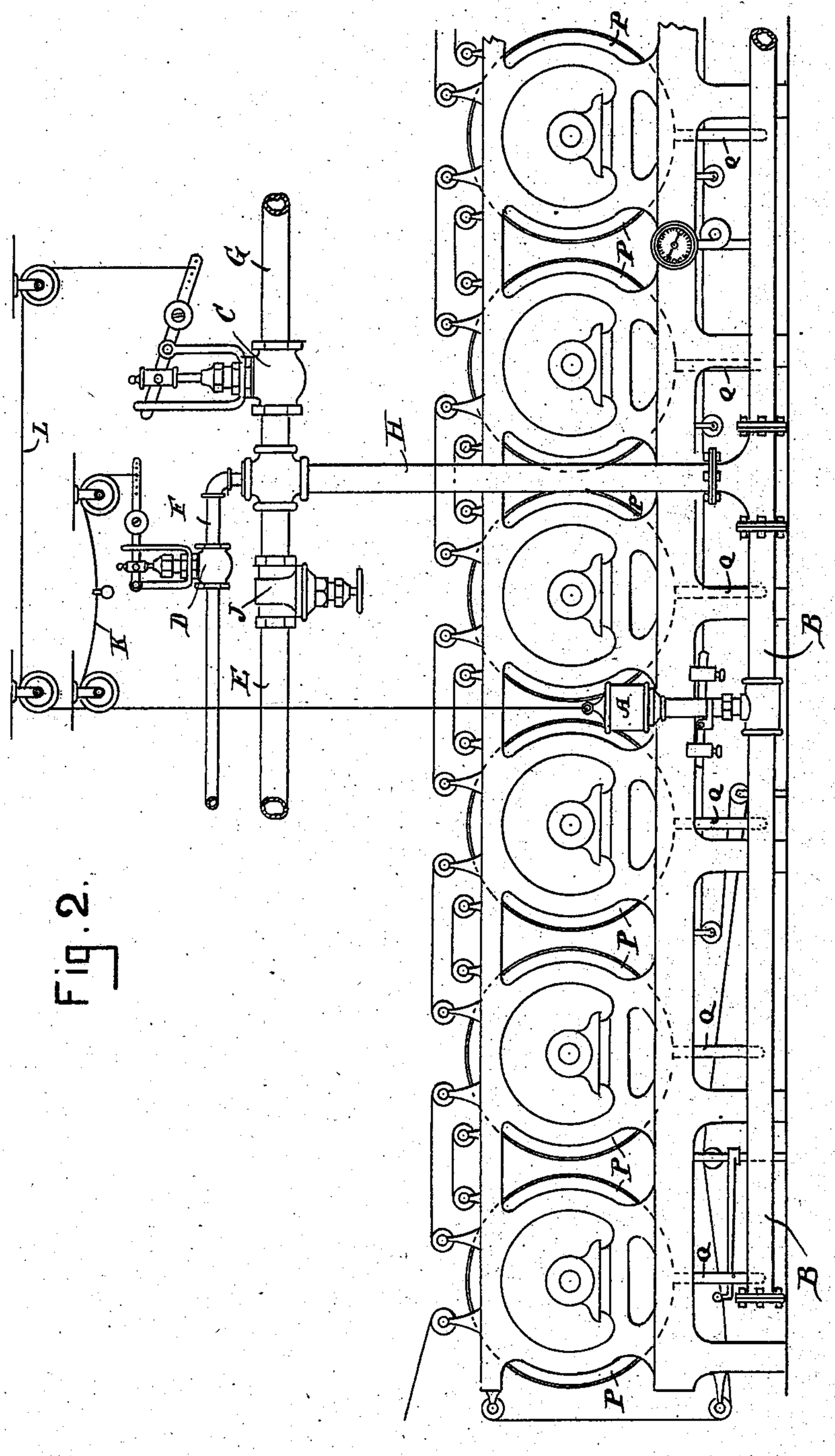

Fig. 2.

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UNITED STATES PATENT OFFICE.

JAMES J. LOWDEN, OF BOSTON, MASSACHUSETTS.

REGULATING LIVE STEAM AND EXHAUST FROM STEAM-ENGINES.

SPECIFICATION forming part of Letters-Patent No. 381,149, dated April 17, 1888.

Application filed August 31, 1886. Serial No. 212,337. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. LOWDEN, a citizen of the United States, residing at Boston, State of Massachusetts, have invented certain new and useful improvements in the means of regulating live steam and exhaust from a steam-engine both at one and the same time or separately with one automatic steam-pressure regulator; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

In certain manufacturing processes it requires all the exhaust from the steam-engine and large or small quantities of live steam, as the case may require. At other times there is no live steam required, but a small amount of exhaust-steam is sufficient. Again, the exhaust-steam is dispensed with and live steam alone is used.

My invention relates to improvements in regulating two balance-valves, one for live steam and one for exhaust-steam from a steam-engine, or separately, as required, with one automatic steam-pressure regulator. I attain these objects by the mechanism illustrated in the accompanying drawings.

Similar letters refer to similar parts throughout.

Figure 1 is a general view in perspective, parts being broken away. Fig. 2 is a view in perspective showing my improvement as applied to a paper-making machine.

A is an automatic steam-pressure regulator of any known or approved style.

B is a pipe or receptacle to receive exhaust from a steam-engine, or live steam, or both at one and the same time.

C is a balance-valve on the branch exhaust-pipe G.

D is a balance-valve on live-steam pipe, through which live steam is admitted and conveyed in pipe F and discharged into pipe H, where it forces the exhaust into pipe B.

I is a broken section in pipe H, showing how pipe F is inserted into pipe H.

J is a clearway-valve, to be closed when live steam is used without exhaust.

K and L are wire ropes or cords by which automatic steam-pressure regulator A operates and controls balanced valves C and D. It is shown at O how either cord K or L is detached from automatic steam-pressure regulator A as the case may require.

The valves C and D are operated in reverse motion to each other—that is, when the end of the weighted lever of valve C falls it opens the valve, but when the weighted lever of valve D falls it closes the valve. This is effected by having the fulcrum of the levers on opposite sides, the lever of valve C being fulcrumed at *c* and the lever of valve D fulcrumed on the opposite side at *d*.

In Fig. 2 I have shown my invention as applied to a paper-making machine, in which the steam from pipe B is supplied to the cylinders P by branch pipes Q.

The mode of operation is as follows: When the exhaust from steam-engine is more than enough to maintain a given pressure in pipe B, cord K, that connects balance-valve D with said regulator A, is disconnected, as shown at O, and leaves valve D closed, shutting off live steam entirely. Automatic steam-pressure regulator A is set to operate at any desired pressure to be maintained in pipe B. Said regulator A is connected to and controls balance-valve C by cord L. If pressure in pipe B should rise above the point at which regulator A is set, said regulator A rises with the pressure and opens balanced valve C and passes surplus exhaust through branch pipe G out into the atmosphere or elsewhere. If pressure in pipe B diminishes, regulator A goes down accordingly and closes valve C, and more exhaust passes to pipe B to maintain the desired pressure in said pipe. When exhaust-steam from engine is dispensed with, clearway-valve J is closed and the cord L is detached from regulator A, as shown at O, thereby closing valve C. The cord K is connected to regulator A, and by the operation of said regulator A valve D is controlled and regulated, so that the desired pressure in pipe B is maintained. As balance-valve C is closed, pressure cannot pass to branch exhaust-pipe G, and the clearway-valve J being also closed pressure cannot pass to pipe E. When clearway-valve J is open and exhaust-steam is used and is not sufficient to maintain a given pressure in pipe B, cords K and L are both connected to regulator A. When said regulator A rises by the pressure in pipe B, as shown,

live steam is shut off by valve D, and a slack in cord K is drawn between the two pulleys by a small weight attached to cord K, as shown. At this time valve C is opened and surplus exhaust-steam passes through branch exhaust-pipe G and out into atmosphere or any suitable receptacle. As the pressure in pipe B goes down, the regulator A goes down accordingly and closes valve C, when all the exhaust-steam passes down pipe H, takes up slack in cord K, opens valve D, and applies live steam in connection with exhaust-steam, and maintains the desired pressure in pipe B, and forces the exhaust along to pipe B.

It depends on the amount of live steam required in connection with exhaust-steam as to how much slack is to be allowed in cord K, that controls live-steam valve D.

Among the many uses to which my invention is applicable are the following: in drying paper in the process of its manufacture, in boiling and rendering lard, in slashers for drying warp-yarns, in drying tobacco, in heating buildings, and in all cases where exhaust-steam is utilized for manufacturing or heating purposes.

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

1. In combination with an exhaust-steam pipe having a discharge-opening, a valve governing said opening, a live-steam pipe communicating with the exhaust-steam pipe and having a valve, a pressure-regulator communicating with the exhaust-steam pipe, and suitable connections between the regulator and the valves on the respective pipes, substantially as set forth.

2. In combination with an exhaust-steam pipe having a branch leading to the atmosphere or any suitable receptacle, a live-steam pipe communicating with said exhaust-steam pipe, a pressure-regulator, also communicating with the exhaust-steam pipe, a valve on the live-steam pipe, connected to the pressure-regulator, and a valve on the branch pipe, also connected to the regulator, substantially as set forth.

3. In combination with an exhaust-steam pipe, a pressure-regulator connected to and operating two balance-valves, one on the live-steam pipe and one on the exhaust branch pipe, said valves being operated by the regulator in reverse direction to each other, so that when one valve is being opened the other is being closed, substantially as set forth.

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Witnesses:
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