No. 648,172. Patented Apr. 24, 1900.

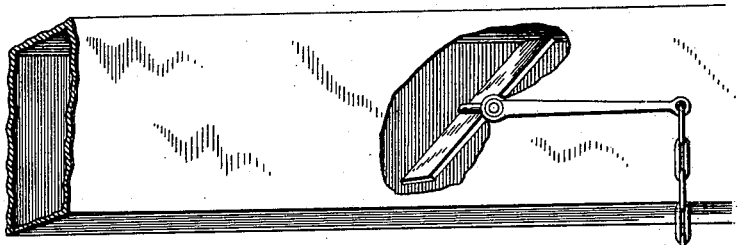
A. N. LOCKE.

DAMPER REGULATOR.

(Application filed Dec. 12, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



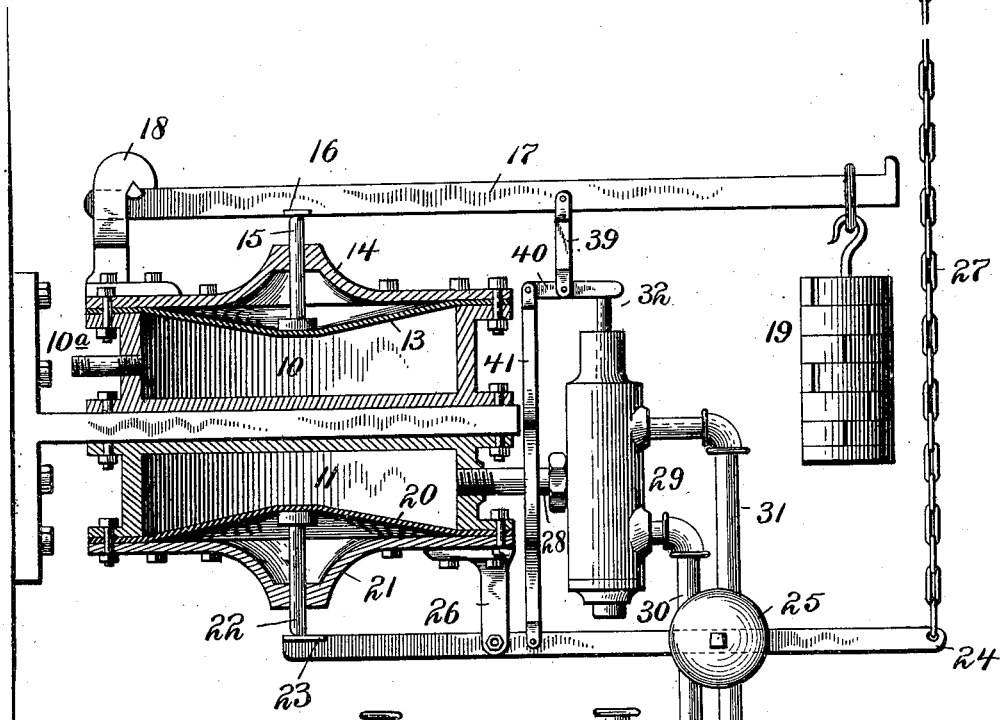


Fig. 3.

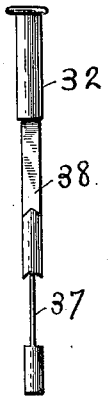


Fig. 4.

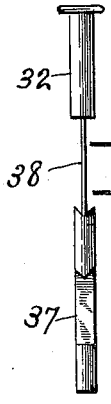


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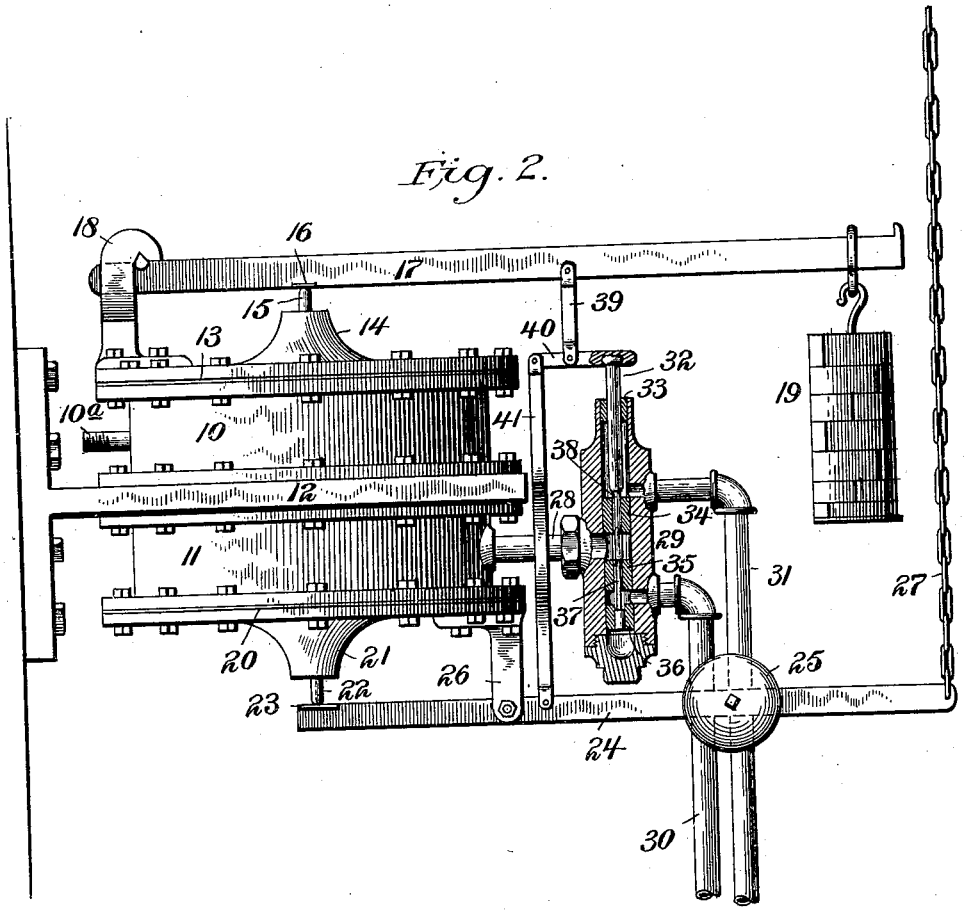
Fig. 2.



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DAMPER-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 648,172, dated April 24, 1900.

Application filed December 12, 1899. Serial No. 740,045. (No model.)

To all whom it may concern:

Be it known that I, ALBERT N. LOCKE, of Salem, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Damper-Regulators, of which the following is a full, clear, and exact description.

My invention relates to improvements in damper-regulators such as are used to control the damper, and consequently the heat, of steam-boilers, whereby the steam may be kept at a constant or essentially constant pressure. The machines of this class which are capable of giving close regulation are, as a rule, expensive and more or less complicated.

The object of my invention is to produce a very simple and cheap machine which is adapted to give the closest regulation, which is so simple that it is not likely to get out of repair, which is so compact as to occupy but little space, and which has all its different parts accessible.

To these ends my invention consists of certain features of construction and combinations of parts, which will be hereinafter fully described and claimed.

In the drawings, wherein similar figures of reference refer to similar parts throughout the several views, Figure 1 is a broken perspective view, partly in vertical section, of the apparatus as a whole connected operatively to a damper. Fig. 2 is a side elevation of the damper-regulator with the controlling-valve in vertical section. Fig. 3 is a detail of the stem of the controlling-valve; and Fig. 4 is a view similar to Fig. 3, but taken at right angles to the same.

In carrying out my invention I employ a steam-pressure chamber 10, which is in connection with the steam of the boiler through the pipe 10^a and which thus feels the boiler-pressure, and a second chamber 11, which is adapted to connect with the water of the boiler and be filled thereby, so as to actuate its diaphragm and control the boiler, as hereinafter described. These two chambers might of course be combined in a single structure; but for convenience I prefer to make them separate, and they are bolted together to a convenient support or bracket 12. These chambers are each provided with flexible diaphragms 13 and 20 of the usual kind, and the upper diaphragm 13 is held in the customary way between binding-flanges and carries a common form of pressure-foot 14, having a post 15, engaging the seat 16 of the steam weigher or lever 17, which is fulcrumed at one end in a lock-post 18 and which at the other end carries the weights 19. The arrangement of weights to balance the steam-pressure is well known in this connection, and it will be noticed that the weights may be adjusted so that when they just balance the steam-pressure in the chamber 10 the lever 17 will remain stationary; but if the pressure rises the weighing-lever 17 also rises, and if it falls the lever is depressed by the weights, which are thus rendered heavier than the steam-pressure.

The lower chamber 11 is provided with a diaphragm 20 at its lower end, which is precisely like the diaphragm described above and may be of any approved kind, both diaphragms being made of any suitable material, though rubber is perhaps the best of anything known for the purpose. The lower diaphragm has a pressure-foot 21 and post 22, the latter engaging a seat 23 on the damper-lever 24, which is fulcrumed in the post 25, secured to the chamber 11, and which has the customary balance-weight 26, which is held adjustably on the lever. The lever connects with the chain 27 and this is adapted to connect with the damper, as shown in Fig. 1. The water to move the diaphragm 20 is admitted to the chamber 11 through the pipe 28 and is also exhausted through said pipe, the supply and exhaust being controlled by a valve 29. This valve is connected with the water in the boiler by the pipe 30 and is also connected with an exhaust-pipe 31. The stem 32 of the valve is slidable longitudinally through the seat-rings 33, 34, 35, and 36, which for convenience are removable, and chambers are formed between the several seat-rings. The stem has a port 37, so that when this part is raised above the seat-ring 35 the water-supply passes up through the said seat-ring and so on through the pipe 28 to the motor-chamber 11; but when the stem is moved down the port through the ring 35 is closed and an exactly-similar port through the part 38 and ring 34 opened, so that the exhaust-

water may pass out through the ring 34 and the pipe 31.

The valve is not claimed in this application, although its structure is believed to be novel, because in this invention I do not limit myself to the use of any particular valve; but any slide-valve can be used which will properly control the exhaust and supply.

The valve-stem is actuated and the supply and exhaust controlled by the auxiliary levers connecting the main levers 17 and 24 and comprising the link 39, extending from the lever 17 downward, the horizontal link 40, connected to the valve-stem 32 at one end and at the other pivoted to the rod 41, and the rod 41, extending from the link 40 to the damper-lever 24.

The operation of the device is as follows: The steam-boiler pressure of course prevails in the chamber 10, and so long as the pressure just balances the weights 19 the steam-pressure will be just that which is desired and the levers 17 and 24 will remain practically motionless. If, however, the steam rises beyond the desired point, the diaphragm 13 is of course pushed up and the weighing-lever 17 is lifted, thus lifting the links 39 and 40 and raising the valve-stem 32. This closes the port through the ring 34 and opens the port at 37, so that the water-pressure comes in through the pipe 30, valve 29, and pipe 28 to the chamber 11, thereby depressing the diaphragm 20 and acting on the lever 24, tilting the said lever on its fulcrum and slackening the chain 27, thus permitting the damper to close slightly, thereby diminishing the heat, and consequently reducing the boiler-pressure. The action of the lever 24 will cause the rod 41 to be raised, slightly tilting the link 40 and depressing the valve-stem 32, thus closing the port at 37, and as the heat rises farther the operation will be again repeated exactly as described, until finally the damper will be entirely closed and the heat must of course subside. If, on the other hand, the pressure falls below the desired limit, the weight 19 pulls down the lever 17, which depresses the links 39 and 40 and moves down the valve-stem 32. This closes the port 37, permits the exhaust through the ring 34, and also pushes down on the rod 41 and lever 24, thus pulling on the chain 27 and opening the chamber, thereby increasing the draft, and consequently the heat, so that the steam-pressure is raised. It will be noticed, therefore, that this structure, while being very simple and compact, provides for a very close regulation of steam, and it will be further observed that the structure is very simple and inexpensive.

It will be noticed that the diaphragm 13 is in constant connection with the boiler-pressure and that the diaphragm 20 is in connection therewith only when its controlling-valve is operated by the movement of the first diaphragm, and while the valve and the lower chamber 11 are connected with the water of the boiler, still it will be seen that the operation would be essentially the same, even if it were connected with the steam-pressure.

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

1. A damper-regulator comprising two superposed independent chambers arranged base to base with diaphragms at their outer ends, the first chamber being in constant connection with the steam-pressure and the second being adapted to connect with the boiler-pressure, a weighted lever to balance the pressure of the upper diaphragm, a second lever connected with the lower diaphragm and with the damper, a valve controlling the supply and exhaust of the lower chamber, and an operative connection between the two mentioned levers and the valve whereby the movement of the levers is imparted to the valve.

2. A damper-regulator comprising two independent chambers arranged one above the other, having diaphragms at their outer ends, a weighted lever fulcrumed above the upper chamber and operated by the diaphragm of said chamber, a damper-lever adjacent to the lower chamber and operated by the diaphagm thereof, said lever being also adapted to be connected with the damper, means for admitting steam or other fluid to the upper chamber, a slide-valve controlling the supply and exhaust of the lower chamber, and a link-and-lever mechanism connecting the upper and lower levers and operating the stem of the valve, substantially as described.

3. The combination with the opposed steam and motor chambers and their flexible diaphragms of the steam-weighing lever to balance the steam-pressure in the steam-chamber, the damper-lever operated by the diaphragm of the motor-chamber and adapted to connect with a damper, the slide-valve controlling the inlet and exhaust to the motor-chamber, a lever as 40 operating the stem of the valve, and a link connection between the steam and damper levers and lever 40, substantially as described.

4. A damper-regulator comprising steam and motor chambers arranged one above the other and each provided with flexible diaphragms, a steam-weighing lever fulcrumed on the upper chamber and operated by the diaphragm of said chamber, a damper-lever fulcrumed beneath the lower chamber and operated by the diaphragm of said chamber, a slide-valve controlling the inlet and exhaust of the motor-chamber, and means for opening the inlet through the valve by the rise of the weighing-lever and for closing the inlet and opening the exhaust of the valve by the fall of the weighing-lever or the tilting of the damper-lever substantially as described.

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