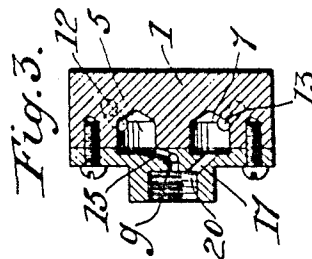
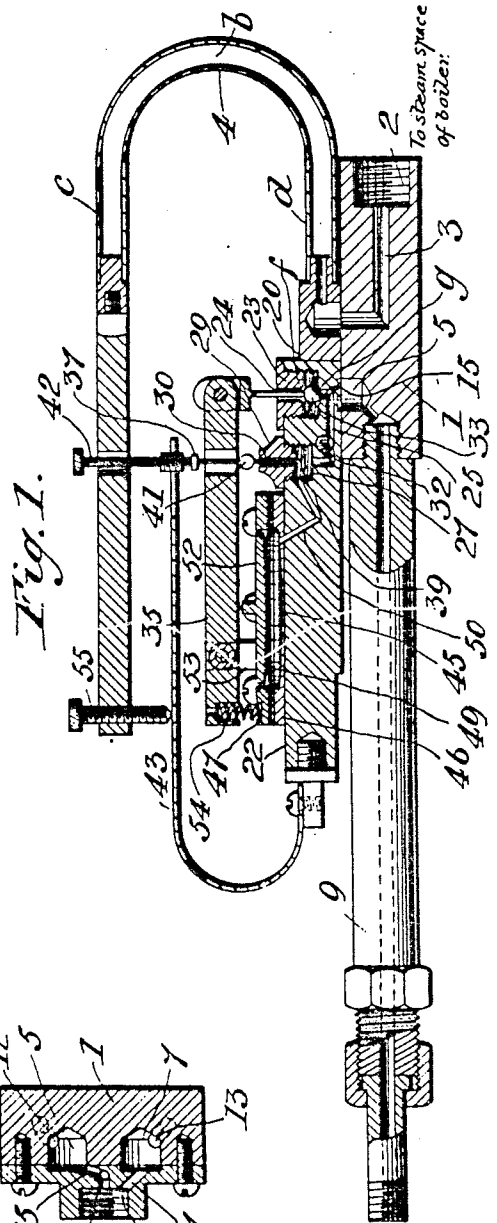
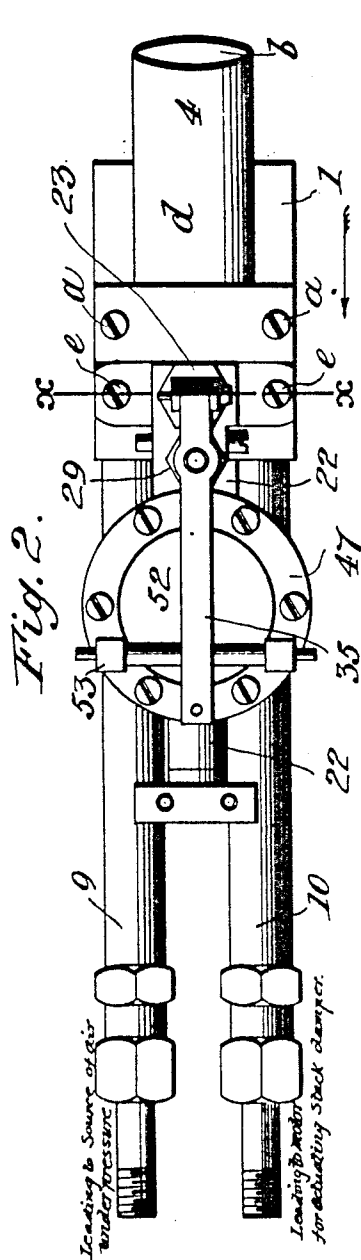


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 STEAM PRESSURE REGULATING APPARATUS.
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UNITED STATES PATENT OFFICE.

NATHAN E. NASH, OF TORONTO, ONTARIO, CANADA.

STEAM-PRESSURE-REGULATING APPARATUS.

1,057,447.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, NATHAN E. NASH, a citizen of the United States, and resident of the city of Toronto, in the Province of Ontario, Dominion of Canada, have invented certain Improvements in Steam-Pressure-Regulating Apparatus, of which the following is a specification.

This invention relates to an apparatus adapted for application to a steam boiler and to maintain therein a predetermined steam pressure, through the medium of a stack damper and a suitable motor actuated by air pressure, as will hereinafter fully appear.

In the further description of the said invention which follows reference is made to the accompanying drawing forming a part hereof and in which,—

Figure 1 is a partly sectional side view of the improved apparatus, and Fig. 2 a plan of the same with certain parts thereof removed. Fig. 3 is a section taken on the dotted line *e-e* Fig. 1.

Referring now to the drawing, 1 is the body of the apparatus adapted to be placed in the vicinity of the steam space of a boiler, having at one end a threaded socket 2 into which is screwed a pipe (not shown) leading to the steam space of the boiler, and 3 a passage leading from the socket 2 to the upper surface of the body 1.

4 is a Bourdon spring secured by means of the screws, *a, a* to the body 1, with its hollow portion *b* in communication with the passage 3. The action of the Bourdon spring 4 is such that an increase of pressure in the hollow portion of the device, has a tendency to straighten the same, and in the present case, to increase the distance between the straight portions *c* and *d* thereof; and in consequence, the device is well adapted as a motor where only a limited movement is required.

5 and 7 are chambers situated side by side in the body 1 as shown in Figs. 1 and 3; and 9 and 10 are nozzles screwed into the body and in communication with the said chambers by means of the channels 12 and 13; and they lead respectively to a source of air under pressure, and a motor whereby the stack damper is actuated. The chambers 5 and 7 intercommunicate by means of the channels 15 and 17, and they are in communication with a third chamber 20 see Fig. 3, formed in a block 22 which is

fastened by means of screws *e, e* shown only in Fig. 2. Into the upper end of the chamber 20 is screwed a plug 23 having a central air escape aperture 24; and at the lower end of the aperture 24, and at the upper end of the channel 15 are formed the valve seats *f* and *g* respectively.

25 is a continuously open duct leading from the channel 15 at a point which is below the face *g* to the valve chest 27 formed in the block 22, which is fitted with a screw plug 29 having a central aperture 30 leading to the outer air.

32 is a plug which extends transversely through the block 22 and across the duct 25; and at the point where it intersects the said duct it is flattened to produce a device similar in action to a cock key which can be turned to reduce the transverse area of the duct at that place.

Within the chamber 20 is a spherical valve 33 adapted to seat on either of the valve faces *f* or *g*, and its stem extends loosely through the aperture 24 and is pivoted at its upper end to a rocker 35 hereinafter described.

Placed loosely in the aperture 30 in the screw plug 29 is a stem 37 having at its lower end a collar 39 which is inoperative except that it serves to prevent withdrawal of the stem entirely from the plug; and upon this stem, and directly over the said plug is a valve 41 adapted to close the annular space 30 around the stem 37 under circumstances hereinafter described.

The upper end of the stem 37 is provided with a head upon which rests the adjusting screw 42 at the end of the curved spring blade 43 which is attached to the block 22, and under tension in such direction as to normally hold the valve 41 away from the plug 29 and so disclose the central annular aperture 30 therein.

45 is a diaphragm chamber formed in a circular plate 46 mounted on the block 22 over which is secured by means of a ring 47 a flexible diaphragm 49. The interior of the diaphragm chamber is in communication with the valve chest 27 by means of the angular channel 50; and supported by the diaphragm 49 is a disk 52 having a boss on its upper side which is in contact with the rocker 35 before referred to, and which is pivoted to the columns 53 forming parts of the ring 47.

The long arm of the rocker 35 is pivoted

to the head of the stem of the valve 33; and its short arm is yieldingly held in an upward position by a coiled spring 54 the upper end of which rests in a recess in the rocker, and its lower end in a similar recess in the ring 47.

The end of the bar forming a portion of the part *c* of the Bourdon spring, is provided with an adjusting screw 55 the end of which rests on the curved spring blade 42 and bears with a sufficient pressure thereon to overcome the tendency of the said blade to rise.

As before the nozzles 9 and 10 are respectively connected by means of pipes, to a reservoir of compressed air, and to the motor which serves to operate a chimney damper which as it forms no part of the present invention is not shown in the drawing.

The operation of the apparatus is as follows:—In the drawing, the various elements of the apparatus are represented as they would appear when the steam in the boiler is at the desired pressure, the valve 33 being seated on the seat *g* which cuts off all admission of compressed air to the diaphragm chamber, except the limited amount which passes the plug 32 and is reduced to atmosphere pressure owing to the valve 41 disclosing the escape aperture 30 around the valve stem 37. Should the steam pressure in the boiler fall, the upper straight portion *c* of the Bourdon spring 4 will approach the lower portion *d*, and the adjusting screw 55 pressing with considerable force on the spring blade 43, the end of that device will be depressed carrying with it the valve 41 which closes the air escape aperture 30. The air which to this time had been escaping through the aperture 30 as described, now accumulates in the diaphragm chamber, 45, and its pressure being increased, the diaphragm is raised together with the disk 52 and the long arm of the rocker 35. This movement of the rocker causes the lifting of the valve 33 from its lower seat *g* to its upper seat *f*, which not only prevents the escape of the incoming air at the aperture 24, but admits air at full pressure from the nozzle 9 leading from the source of compressed air by way of the chamber 5, the

channels 15 and 17, and the chambers 20 and 7, to the nozzle 10 which conveys it to the motor the operation of which opens the chimney damper or any other device which has a similar effect. The fire in the furnace being brightened by the opening of the chimney damper, the generation of steam in the boiler is increased, and when the pressure of steam has exceeded the desired pressure, the Bourdon spring expands and the various parts of the apparatus resume their original positions as shown in the drawing, which causes the closing of the chimney damper, and reduces the steaming capacity of the boiler until upon a prearranged reduction of pressure being attained, the operation described is repeated.

I claim as my invention,—

In a steam pressure regulating apparatus, the body thereof having a pair of nozzles, one leading to a source of air under pressure, and the other to a motor adapted to govern the generation of steam in a boiler, a pair of intercommunicating chambers open to the said nozzles, a third chamber in communication with the others, a valve chest in communication with the third chamber by means of a duct, and a socket adapted to receive steam from the boiler, combined with a valve in the third chamber adapted to close or open communication between the said nozzles, and at times admit of the escape of air from the nozzle leading to the motor, a diaphragm with its under side open to the valve chest, a trunnioned rocker actuated by the said diaphragm to open and close the valve in the third chamber, a Bourdon spring the interior of which is in communication with the said socket, and means whereby the movement of the Bourdon spring produced by a change in the steam pressure in the boiler is transmitted to the valve in the valve chest, to control the escape of air from the said chest and from the underside of the diaphragm, substantially as specified.

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