

O. BAGLEY.
FURNACE REGULATOR.
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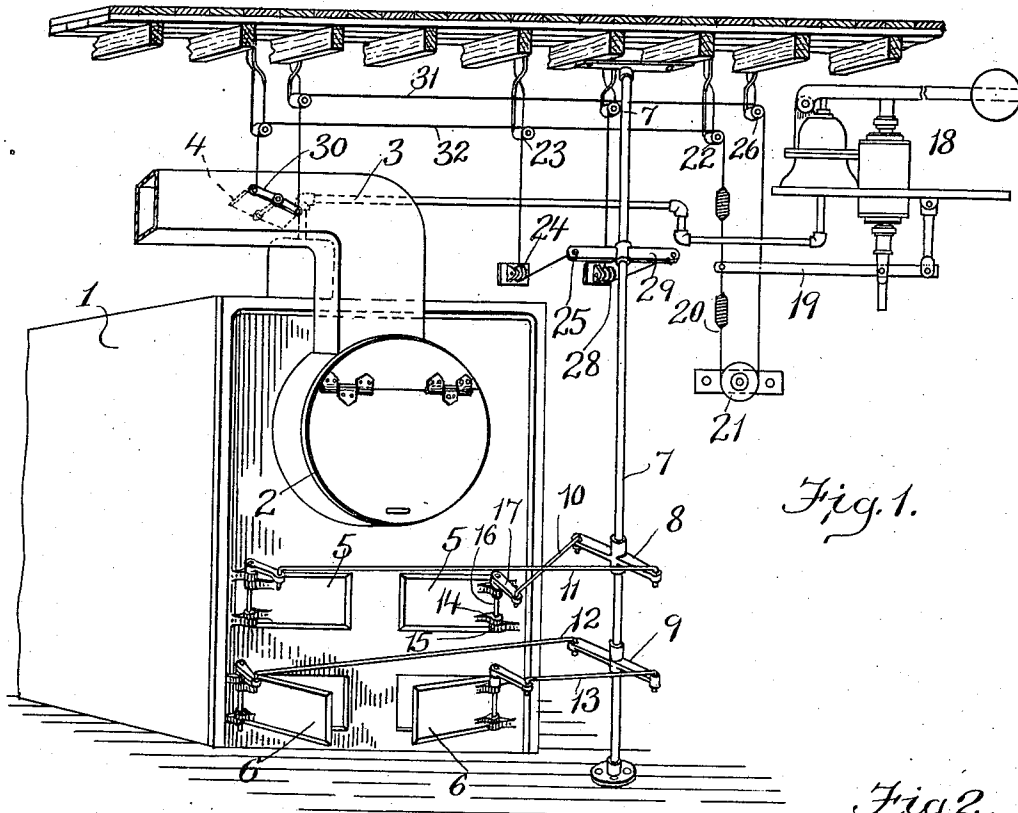


Fig. 1.

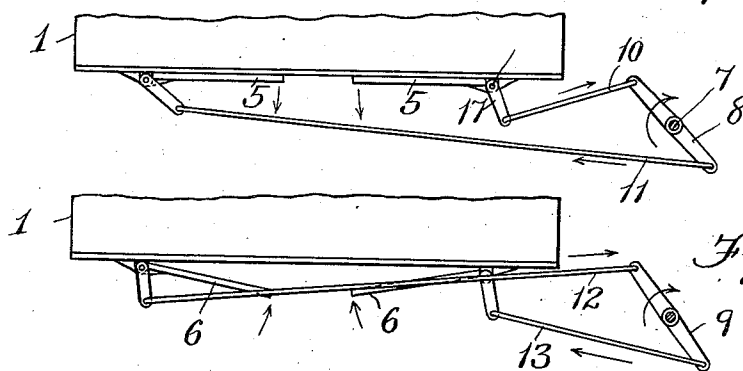


Fig. 2.

Fig. 3.

Witnesses:
H. L. Allen
P. H. Gyzetti

Inventor
Orin Bagley
by
Eugene B. Boudin
Attys.

UNITED STATES PATENT OFFICE.

ORIN BAGLEY, OF WALTHAM, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO ALICE MAY COLE, OF LEXINGTON, MASSACHUSETTS.

FURNACE-REGULATOR.

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To all whom it may concern:

Be it known that I, ORIN BAGLEY, of Waltham, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Furnace-Regulators, of which the following is a specification.

The object of the present invention is to provide an improved regulator for heating furnaces by which a better control of the combustion of fuel than has been obtainable with the regulators heretofore in use may be secured.

The invention may be applied to steam boiler furnaces and operated by a regulator controlled by the steam pressure, or it may be used with other types of heating furnace and controlled by any suitable regulator whatever.

In the following specification, and in the drawings forming a part thereof, the invention is described and shown as being applied to the furnace of a steam boiler and operated by a pressure-controlled regulator or governor, but I desire to state emphatically that it is not limited to this particular use.

The manner in which the purposes of the invention are obtained is broadly in a means for regulating the doors of the furnace either in combination with the regulation of a flue damper, or independently thereof, in such a way that the doors above and below the combustion zone are moved simultaneously and oppositely toward closed or opened position, so as to regulate the amount of draft admitted respectively above and below the fire. That is, the furnace door above the grate through which the fuel is admitted and the ash pit door below the grate are controlled by the regulator and actuated simultaneously in such a way that when either is opened to any extent, the other is closed wholly or partially to the same extent.

In the accompanying drawings, Figure 1 is a perspective view showing a form of my novel regulator applied to a steam boiler furnace. Fig. 2 is a sectional plan view of the connections between the regulator and the furnace door or doors. Fig. 3 is a similar view of the connections from the regulator to the ash pit door or doors.

The same reference characters indicate the same parts in all the figures.

I will first briefly describe the construction of the apparatus here illustrated which con-

stitutes one embodiment of the invention, and then explain the principles involved therein.

1 represents the casing of a boiler from which the forward end 2 containing the smoke box of the boiler is shown projecting. An uptake flue 3 leads from the smoke box to a chimney or stack as usual, and in the flue is a damper 4 of the ordinary character serving the usual purpose.

5—5 represent the furnace doors of which there may be one, two or more, according to the size and character of the furnace, such doors being arranged as usual above the grate so that fuel may be thrown upon the fire when said doors are opened. 6—6 represent a similar number of ash pit doors which as usual cover the openings to the ash pit below the grate. These doors may be placed in closed or opened position to regulate the draft and rate of combustion of the fuel in combination with or independently of the chamber 4 in the smoke pipe.

One mode of regulating the doors and chamber which I have found efficient and desirable is the following. 7 represents a shaft carrying two 2-armed levers 8 and 9 respectively. The arms of the lever 8 are connected by links 10 and 11 with the furnace doors, while the arms of the lever 9 are similarly connected by links 12, 13 with the ash pit doors. The mode of connecting the links with the doors is substantially the same in all instances, and the description of one will answer for all. This connection involves a slight departure from the usual mode of mounting furnace doors and constitutes a feature of the invention. Each door is provided with lugs 14 overlapping lugs 15 on the front plate of the furnace, these lugs being perforated and receiving a pintle rod 16. The pintle rod is secured rigidly to the lugs of the door and carries also secured upon it a crank 17. The crank has a hole in its upper end in which the link which controls it is contained. The links are preferably made of iron rods bent over at their ends to make wrist pins or cranks which lie loosely in the arms 17, and levers 8, 9 respectively. Thus the links can be removed when it is desirable to open the doors widely for throwing on fresh fuel and cleaning the fires, or removing the ash. The lengths of the links and the arrangement of the levers and crank arms are such

that when either the furnace or ash pit door is closed, another door is partly opened, and such that also when the upright shaft 7 is turned one of the doors is moved toward its closed position and the other door toward its open position. The upright shaft 7 is held at its ends in bearings secured to the basement floor and to the ceiling above. It is rotated at need by any means or apparatus of appropriate character and preferably one controlled directly by the pressure of steam in the boiler. I have chosen for illustration for the purpose of showing one practicable type of governor or actuator suitable for my purpose, one of the pressure controlled damper regulators best known and most commonly used. This apparatus needs no detailed description, and may be indicated generally by the character 18. It includes a lever 19 which is moved up or down by small amounts in proportion to variations in the steam pressure, and when so moved, acts upon a cord or chain 20. The latter passes about a pulley 21 below the arm 19 and so forms two parts, one of which passes around guides 22, 23 and 24 to an arm 25 secured upon the shaft 7, and the other of which passes around guides 26, 27 and 28 to an arm 29 also secured to the shaft 7. Preferably also the flue damper 4 is controlled by the same apparatus and for this purpose the arms of the external controlling lever 30 of the damper are connected by chains or cords 31, 32 with the two branches of the chain or cord 20.

From the foregoing description it will be seen that when the arm 19 descends in response to increased boiler pressure, it pulls upon the arm 25 and the line 32, thereby so moving the damper 4 as to restrict the area of the flue, and turning the shaft 7 in a direction such that it opens the furnace doors 5 and partially closes the ash pit doors 6. An opposite movement of the lever produces exactly the reverse effect, opening the ash pit doors, closing the furnace doors and opening the damper 4. In the position of the parts shown in the drawings, the furnace doors are closed and the draft so set as to aid combustion to the fullest possible extent, so that the only movement of the arm 19 now permitted is a downward one.

The regulator or governor 18 is of a character such as to occasion slight successive movements of the arm 9 in response to slight increases or reductions in the boiler pressure so as slightly to shift the positions of the dampers and doors in response to the requirements of the boiler, thus making a regulated adjustment of the draft. Instead of the damper and doors being thrown wide open or wholly closed at once, they are moved only slight distances at a time, except when sudden changes in the steam pressure demand and cause a quick operation of

the damper and doors. Other governors controlled by temperature instead of by pressure, and of known types, may be employed with like effect in the regulation of furnaces used otherwise than to generate steam.

I claim,—

1. In combination with a furnace having fire door and an ash-pit door, an upright shaft, arms extending to opposite sides from said shaft, an arm on each door, and links extending from the respective shaft arms to the door arms, whereby rotation of the shaft in either direction will move one of the doors toward the closed position and the other toward the open position.

2. The combination of a furnace having a door, an arm on such door, an upright shaft beside the furnace, an arm on said shaft, a link connecting said arms, an automatic governor including an oscillating lever, a second arm on said shaft, and a connection between said governor lever and said second arm whereby movement of the lever in either direction rotates the shaft and causes the door to be respectively opened or closed.

3. In combination a furnace having a fire door and an ash pit door, an outwardly projecting arm on each door, an upright shaft mounted beside the furnace, arms extending toward opposite sides from the shaft at approximately the heights of the arms on the respective doors, a link extending from each shaft arm to the adjacent door arm, an automatic governor having an oscillating lever, flexible lines connected to said lever and extending in opposite directions therefrom, guides about which said lines are led, and an arm or arms on the shaft with which the lines are connected in such manner that the shaft may be turned in different directions according as one or the other of the lines is pulled.

4. In combination a furnace having a fire door and an ash pit door, an outwardly projecting arm on each door, an upright shaft mounted beside the furnace arms extending toward opposite sides from the shaft at approximately the heights of the arms on the respective doors, a link extending from each shaft arm to the adjacent door arm, an automatic governor having an oscillating lever, flexible lines connected to said lever and extending in opposite directions therefrom, guides about which said lines are led, an arm or arms on the shaft with which the lines are connected in such manner that the shaft may be turned in different directions according as one of the other of the lines is pulled, a smoke pipe, a damper in said pipe, and extensions from said lines connected to said damper for opening and closing the same in unison with the actuation of the shaft and furnace doors.

5. In combination with a furnace having

an upper fuel-admitting door and also an ash pit door, a regulator consisting of an upright shaft, arms upon said shaft, cranks connected to the doors, and links extending
5 between corresponding arms and cranks, and so arranged that when the shaft is rotated one of the doors is opened and the other is closed.

6. In a furnace a door covering the fuel
10 admission opening above the fire zone, a door covering the ash pit opening below the fire zone, hinge pintles upon which said doors turn, crank arms secured to the respective hinge pintles, an upright control
15 shaft, lever arms secured to said control shaft opposite to the respective crank arms, and links connecting said lever arms and crank arms.

7. In a furnace, a door covering the fuel
20 admission opening above the fire zone, a door covering the ash pit opening below the fire zone, hinge pintles upon which said doors turn, crank arms secured to the respective hinge pintles, an upright control
25 shaft, lever arms secured to said control shaft opposite to the respective crank arms, and links connecting said lever arms and crank arms, said links being freely detachable from the arms, whereby to permit opening
30 of the doors for caring for the fire, without obstruction.

8. An automatic regulator for furnaces, comprising in combination with the fuel admitting doors, the ash pit doors and a draft damper of the furnace, a pressure-controlled
35 regulating apparatus, and connections from said apparatus to the damper and doors so constructed and arranged as to close the ash pit doors and damper while opening the fuel-admitting doors, and to open the ash
40 pit doors and damper while closing the fuel-admitting doors.

9. In a furnace, a door covering the fuel admission opening above the fire zone, a door covering the ash pit opening below the
45 fire zone, arms projecting from the doors, an upright shaft having arms opposite to the doors respectively, means for turning the shaft, and connections from the shaft arms to the arms on the doors, said arms
50 and connections being so arranged that when the shaft is turned in one direction the furnace door is opened and the ash pit door closed, and when turned in the opposite di-
55 rection the doors are oppositely actuated.

In testimony whereof I have affixed my signature, in presence of two witnesses.

ORIN BAGLEY.

Witnesses:

JOHN O. LIND,
P. W. PEZZETTI.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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