F. M. POWELL.

FURNACE DRAFT REGULATOR.

APPLICATION FILED MAR. 9, 1916.

1,213,944. Patented Jan. 30, 1917.

FIG. 1.

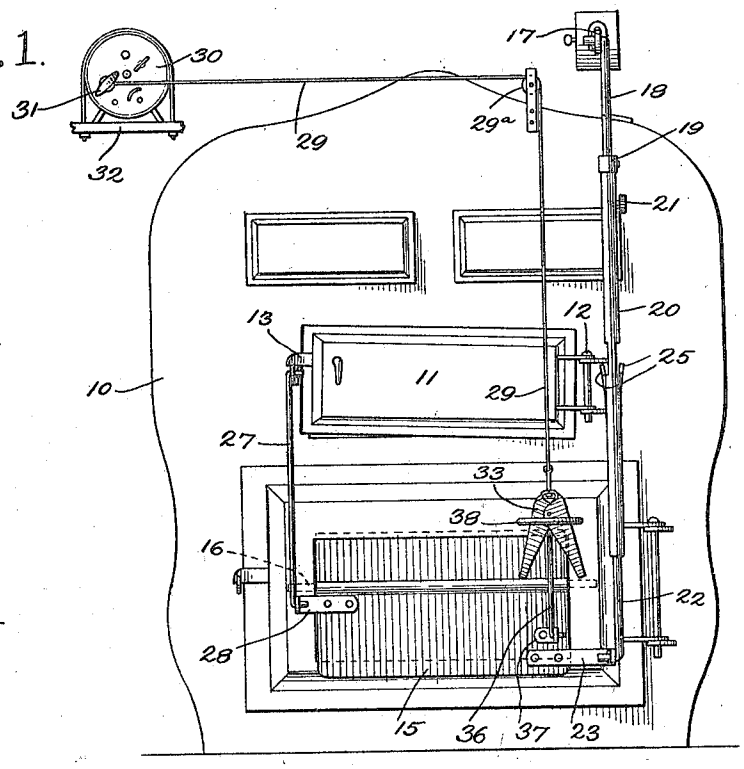


FIG. 2.

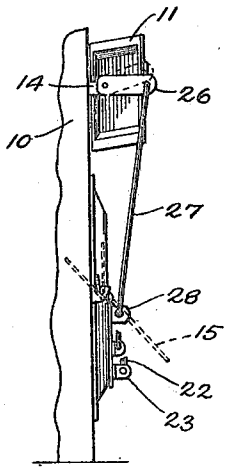


FIG. 3.

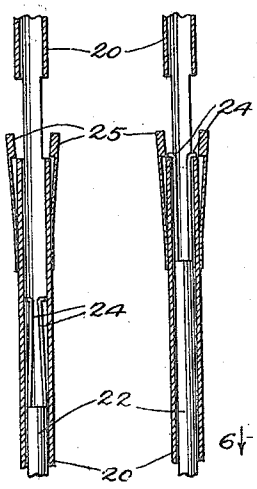


FIG. 4.

FIG. 5.

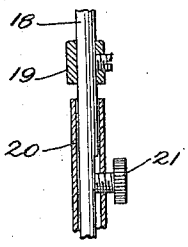


FIG. 6.

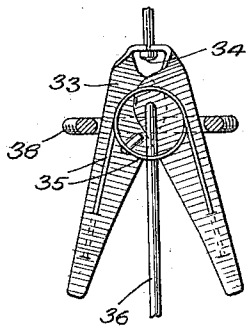
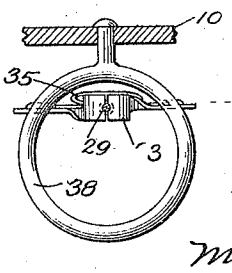


FIG. 7.



Witness:

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UNITED STATES PATENT OFFICE.

FORREST M. POWELL, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-FOURTH TO JOHN P. CRANGLE AND ONE-FOURTH TO EMIL DAVIS, BOTH OF CHICAGO, ILLINOIS.

FURNACE DRAFT-REGULATOR.

1,213,944. Specification of Letters Patent. Patented Jan. 30, 1917.

Application filed March 9, 1916. Serial No. 83,012.

To all whom it may concern:

Be it known that I, FORREST M. POWELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Furnace Draft-Regulators, of which the following is a specification.

This invention relates to an improved apparatus arranged to automatically regulate the draft of a heating furnace, and the invention refers more particularly to a clock-controlled mechanism which may be set to operate at an early hour in the morning and which will act to automatically close the coal-receiving door of the furnace and simultaneously open the draft door so that an effective draft will be provided to liven the fire and furnish the desired heat without the necessity of personal attention to the furnace.

One of the objects of the invention is to provide an apparatus of the character described which is especially adapted for use with steam boilers or steam heating plants, and in which the draft devices of the furnace are operatively associated with a controlling clock mechanism and are also independently connected to the automatic steam-pressure-controlled draft-regulating means commonly found on boilers, the connection to the clock mechanism being arranged to be broken and the connection to said automatic regulating means being at the same time established so that the operation of the clock mechanism will not only automatically adjust the draft devices to effect a draft through the furnace, but will also operatively connect said devices with the automatic regulating means by which the furnace is controlled during the daytime.

Another object of the invention is to provide an extremely simple and reliable apparatus for the purpose and one which may be manufactured cheaply and may also be readily attached to any existing furnace without alteration of the latter.

A further object of the invention is to provide an improved disengageable means for connecting the draft device to the clock mechanism.

Another object is to provide improved means for closing the coal door.

Another object has reference to the means forming the connection between the draft device and the automatic regulating means.

Further objects and advantages will become apparent from a perusal of the following detailed description.

In the accompanying drawings, Figure 1 is a view showing in front elevation a furnace equipped with a draft regulating apparatus embodying the features of my invention. Fig. 2 is a fragmental side elevation looking toward the left-hand side of Fig. 1. Figs. 3 and 4 are fragmental detail sectional views illustrating in different positions the connection between the draft door and the automatic regulating means. Fig. 5 is a similar view of the upper part of this connection. Fig. 6 is an enlarged detail view taken in the plane of line 6—6 of Fig. 7 and illustrating the means providing a disengageable connection between the draft device and the clock-controlled opening means. Fig. 7 is a horizontal sectional view illustrating said disengageable connecting means.

I have illustrated in the drawings and will herein describe in detail the preferred embodiment of my invention without any intention, however, of limiting the invention to the structure disclosed, except as recited in the appended claims.

In the drawings, a boiler or furnace is illustrated by reference numeral 10, 11 being the coal door hinged at 12 along one of its vertical edges and having a projecting lug 13 on its opposite edge to coöperate with the usual catch 14 (Fig. 2) on the furnace. The furnace further has a draft device in the form of a door 15 pivoted on a horizontal axis 16 and tending to swing by gravity into closed position. Mounted on the upper portion of the furnace is the usual steam-controlled draft-regulating means which includes a forwardly projecting lever 17.

The lever 17 is connected to the lower portion of the draft door 15 by means which is preferably constructed as follows: A rod 18 engages the forward end of the lever and depends therefrom, said rod having fixed thereon a collar or shoulder 19. A sleeve 20

slidably receives the lower end of the rod and is arranged to be fixed to the rod by a set screw 21. A second rod 22 engages a bracket 23 fixed to the draft door near its lower edge and said second rod projects upwardly slidably into the lower end of the sleeve 20. On the upper end of the second rod are fixed two spring dogs 24 having outwardly turned upper ends to engage shoulders provided by opposite cut-away portions of the sleeve 20. For disengaging the dogs from said cut-away portions a pair of spring arms 25 are provided, said arms having enlargements arranged to engage the outturned ends of the dogs and move the latter inwardly.

The coal door 11 is arranged to be operated from the draft door by means of an arm 26 pivoted to the catch 14 and a link 27 depending from said arm and engaging in its lower end in a bracket 28 on the draft door.

The draft door is arranged to be automatically opened by an operating member in the form of a flexible element 29 connected at one end to said draft door and passing around a sheave 29ª and at its other end associated with clock mechanism, as, for example, an ordinary alarm clock 30, for controlling movement of said element. In the preferred form, one end of the flexible element is attached to and arranged to be wound around the arbor 31 which constitutes the winding key of the alarm mechanism, although equivalent means may be provided. The clock 30 may be stationarily supported upon a bracket 32 on a wall of the building.

The means for connecting the flexible element to the draft door comprises a gripper 33 having two opposed jaws arranged to close upon an enlargement 34 (Fig. 6) attached to the lower end of the flexible element 29, said jaws being normally held closed by a spring 35. The gripper is connected to the draft door by a link 36 which detachably engages a bracket 37 on the door. An operating device is stationarily mounted on the furnace and receives the gripper 33, said operating device preferably being in the form of a ring 38 providing opposite sides arranged to engage the jaws in the upward movement of the gripper to open the jaws and release the flexible element.

The operation of the apparatus is as follows: At night the releasing arms 25 are pressed inwardly to disengage the spring dogs 24 from the sleeve 20 which permits the draft door 15 to swing by gravity into fully closed position. The link 27, which during the day is disassociated from the arm 26 and bracket 28 and laid aside, is assembled with said parts and the coal door 11 is partially opened and left so with the lug 13 resting upon the arm 26. The alarm key arbor 31 of the clock 30 is wound up, and the gripper 33 is placed in the ring 38 and attached to the lower end of the flexible element 29, and the link 36 is engaged with the bracket 37, said gripper and link during the daytime being detached and laid aside. When the alarm goes off in the morning, the flexible element 29 will be wound up and will draw the gripper 33 upwardly and open the draft door 15. In the opening movement of the draft door the arm 26 will be swung upwardly and the lug of the coal door 11 will slide down said arm to close said coal door. As the draft door continues its opening movement, the rod 22 will be elevated to raise the spring dogs 24 into operative association with the cut-away shoulders on the sleeve 20, and shortly thereafter the gripper 33 will reach a position in which the ring 38 will bind upon the jaws of the grippers and open said jaws to release the flexible element 29 so that the latter will have no further effect upon the draft door. When the spring dogs 24 are in their operative association with the shoulders on the sleeve 20, an effective operating connection is provided between the draft door and the lever 17 of the automatic regulating means which operates during the daytime to control the position of the draft door and thereby regulate the draft through the furnace in a manner well known. The set screw 21 connecting the upper end of the sleeve to the depending rod 18 provides means for adjusting the length of the connection and thereby setting the draft door 15 at any position desired. The shoulder 19 is provided to form a stop for the upper end of the sleeve to indicate the proper position to set the sleeve at night for coöperation with the spring dogs 24 when the clock mechanism opens the draft in the morning.

It will be noted that the connection between the draft door and the clock mechanism is separate and independent of the connection between said draft door and the automatic regulating lever 17 so that means is provided for automatically adjusting the draft devices in the morning to start up the fire and at the same time an operative connection is established between the draft door and the automatic regulator for controlling the draft in the daytime.

I claim as my invention:

1. The combination with a furnace having a coal door and a draft door and equipped with automatic draft-regulating means, of mechanism arranged to automatically open said draft door, means extending directly between the two doors and arranged to close the coal door when the draft door is opened, and means independent of the last mentioned means and of said mechanism and operable by the opening movement of said draft door to provide an inde-

pendent operating connection between the draft door and said automatic regulating means.

2. The combination with a furnace having a coal door and a draft door and equipped with automatic draft-regulating means, of a flexible element connected at one end to said draft door for opening the latter, mechanism arranged to wind up said flexible element, independent means extending directly between said two doors and operable by opening movement of the draft door for closing the coal door, means for breaking the connection between the said flexible element and the draft door, and independent means extending directly between said automatic draft-regulating means and said draft door and operable by opening movement of the latter to provide an operating connection for automatically controlling the draft door in the daytime.

3. The combination with a furnace having automatic draft-regulating means mounted at the upper portion thereof and including a pivoted lever, the furnace also having a draft door in its lower portion, of a connection between said draft door and said lever comprising a tube connected at its upper end to said lever and depending therefrom and having opposite cut-away portions, a rod connected at its lower end to said draft door and extending upwardly into said tube to slide in the latter, said rod being provided at its upper end with a pair of opposed spring dogs arranged to engage in said cut-away portions of the sleeve, and mechanism arranged to automatically open the draft door, the opening movement of said door acting to raise said rod in its sleeve and cause the locking dogs to engage the cut-away portions, thereby providing an operating connection between the automatic regulating means and the draft door for operation in the daytime.

4. The combination with a furnace having a draft device and equipped with automatic regulating means including a pivoted lever, of means for automatically opening said draft device, a sleeve connected at its upper end with and depending from said lever and having opposed cut-away portions, a rod connected at its lower end to said draft device and passing upwardly into said sleeve and being slidable in the latter, a pair of spring dogs carried by the upper end of said rod and having out-turned ends arranged to engage in said cut-away portions of the sleeve, and a pair of spring-mounted releasing devices carried by the sleeve and arranged to be pressed inwardly to engage and release said spring dogs from the cut-away portions of the sleeve.

5. The combination with a furnace having a draft door in its lower portion and equipped with automatic draft-regulating means which includes a lever pivoted on the upper portion of the furnace, a rod connected at its upper end and depending from one end of said lever, a stop shoulder on said rod, a sleeve receiving in its upper end the lower end of said rod, said sleeve being arranged to abut against said stop shoulder, a set screw for rigidly securing said sleeve to the rod, a second rod connected at its lower end to said draft door and passing upwardly slidably into the lower end of said sleeve, of a pair of spring-locking dogs carried by the upper end of said second rod and arranged to engage parts on said sleeve to lock the latter to said second rod, and means for automatically opening said draft door, whereby the second rod will be slid upwardly in the sleeve and will carry the locking device into operative position.

6. The combination with a furnace having automatic draft-regulating means mounted at the upper portion thereof and including a pivoted lever, the furnace also having a draft door in its lower portion, of a connection between said draft door and said lever comprising a telescoping tube and rod, the latter equipped with spring dogs arranged to lock the parts together, and mechanism for automatically opening said draft door, said telescoping parts being movable by the draft door in opening to carry said spring dogs into locking position and thereby provide an operative connection between said lever and said door for controlling the latter in the daytime.

7. The combination with a furnace equipped with automatic draft-regulating means and having a draft device, of means forming a direct connection between said automatic regulating means and said device and comprising telescoping members having parts arranged to interlock in the opening movement of the draft device, mechanism for opening the draft device, and means for breaking the connection between said device and said mechanism after the parts of said telescoping means have interlocked.

8. The combination with a furnace having a draft device and equipped with an automatic draft-regulating means, a flexible element connected at one end to said draft device, mechanism arranged to cause said element to move endwise and open said draft device, means operating in the opening movement of the draft device for breaking its connection with the flexible element, and means providing an independent connection between the draft device and said automatic regulating means and comprising relatively movable parts arranged to be carried into operative position in the opening movement of the draft device.

9. The combination with a furnace having a draft device, of an operating element connected to said device, mechanism arranged

to cause said element to be moved to open said draft device, means for breaking the connection between said element and said device, and means which is brought into operative condition by the opening movement of said device for controlling the device when said connection with the operating element is broken.

10. The combination with a furnace having a draft device, of a flexible element, mechanism connected to one end of said element for drawing up the latter, means for detachably connecting the other end of the element to the draft device, and means arranged to operate the last mentioned means in the opening movement of the draft device to disconnect the flexible element.

11. The combination with a furnace having a draft device, of a flexible element, means associated with one end of said element and with the draft device, whereby endwise movement of said element will open the draft device, said means being operable in the opening movement of said device to release said element, and mechanism for causing endwise movement of said element.

12. The combination with a furnace having a draft device, of a flexible element, mechanism for controlling longitudinal movement of said element, a gripper having a pair of jaws arranged to hold one end of said element, said gripper being connected to said draft device, and means acting during the opening of the draft device for operating said gripper jaws to release said flexible element.

13. The combination with a furnace having a draft device, of means for automatically operating said device, said means including a disengageable portion arranged to be operated during the movement of said draft device for breaking connection between the latter and its operating means.

14. The combination with a furnace having a draft door, of a flexible element, means for drawing said element endwise, a gripping device connected to said door and arranged to grip said element, and means acting in the opening movement of said door for operating said gripping device to release said element.

15. The combination with a furnace having a draft door, of an operating member therefor, a gripper comprising a pair of spring-pressed jaws connected to said door and arranged to grip said member, and stationary means into engagement with which said jaws are carried in the opening movement of said door for opening the jaws to release said member.

16. The combination with a furnace having a draft door, of an operating member therefor, a gripper comprising a pair of spring-closed jaws connected to said door and arranged to grip said member, and a device stationarily mounted on the furnace and providing opposite sides between which the jaws of said gripper are carried in the opening movement of the door, said device being arranged to operate the jaws and cause them to release said member.

17. The combination with a furnace having a coal door and a draft door, the coal door being hinged along one vertical edge and the draft door being pivoted on a horizontal axis, of an arm pivoted to the furnace adjacent to the edge of the coal door opposite its hinged edge and arranged to support the former edge to maintain the door in partially opened position, a link connecting said arm to said draft door, whereby the opening of the latter will raise said arm and cause the coal door to slide down said arm into closed position, and mechanism for automatically opening said draft door.

18. The combination with a furnace having a coal door, of an arm pivoted to the furnace adjacent to the door and projecting outwardly therefrom, the door having a portion arranged to rest on said arm when the door is in partially opened position, and means for automatically swinging said arm upwardly to cause the door to slide down the arm into closed position.

19. The combination with a furnace having a coal door, of a member mounted adjacent to said door, the latter being arranged to rest upon said member, and mechanism for raising the member and causing the door to slide down the member into closed position.

20. The combination with a furnace having a coal inlet opening and a door pivoted along one of its vertical edges and arranged to close said opening, of a member mounted on the furnace adjacent to the opposite edge of said door and beneath a portion of the door, the door being arranged to rest upon said member, and mechanism for raising said member to cause the door to move by gravity along said member into closed position.

21. The combination with a furnace having a draft device, of means for automatically opening said device, and automatic regulating means independently connected to said device, the parts being operable by said draft-opening means to move the automatic regulating means into operative position and to break the connection between the draft-opening means and the draft device.

22. The combination with a furnace having a coal door and a draft door and equipped with automatic draft-regulating means, of mechanism arranged to automatically open said draft door and close said coal door, means for automatically breaking the connection between said mechanism and

said doors, and independent means to provide an operating connection between said draft door and said automatic regulating means.

23. The combination with a furnace having a draft device and equipped with automatic regulating means, of means arranged to automatically open said draft device and then disconnect therefrom, and means operable in the opening movement of said draft device to provide an operative connection between the latter and said automatic regulating means.

24. The combination with a furnace having a draft device and equipped with automatic regulating means, of means for connecting said draft device to said automatic regulating means, and means mounted separately from and acting independently of said connecting means for automatically opening said draft device, the last mentioned means acting to set said connecting means in its operative condition.

In testimony whereof, I have hereunto set my hand.

FORREST M. POWELL.

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