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C. H. MAYERS.

REGULATING DEVICE FOR FURNACES.

(Application filed Dec. 7, 1900.)

(No Model.)

Fig. 1.

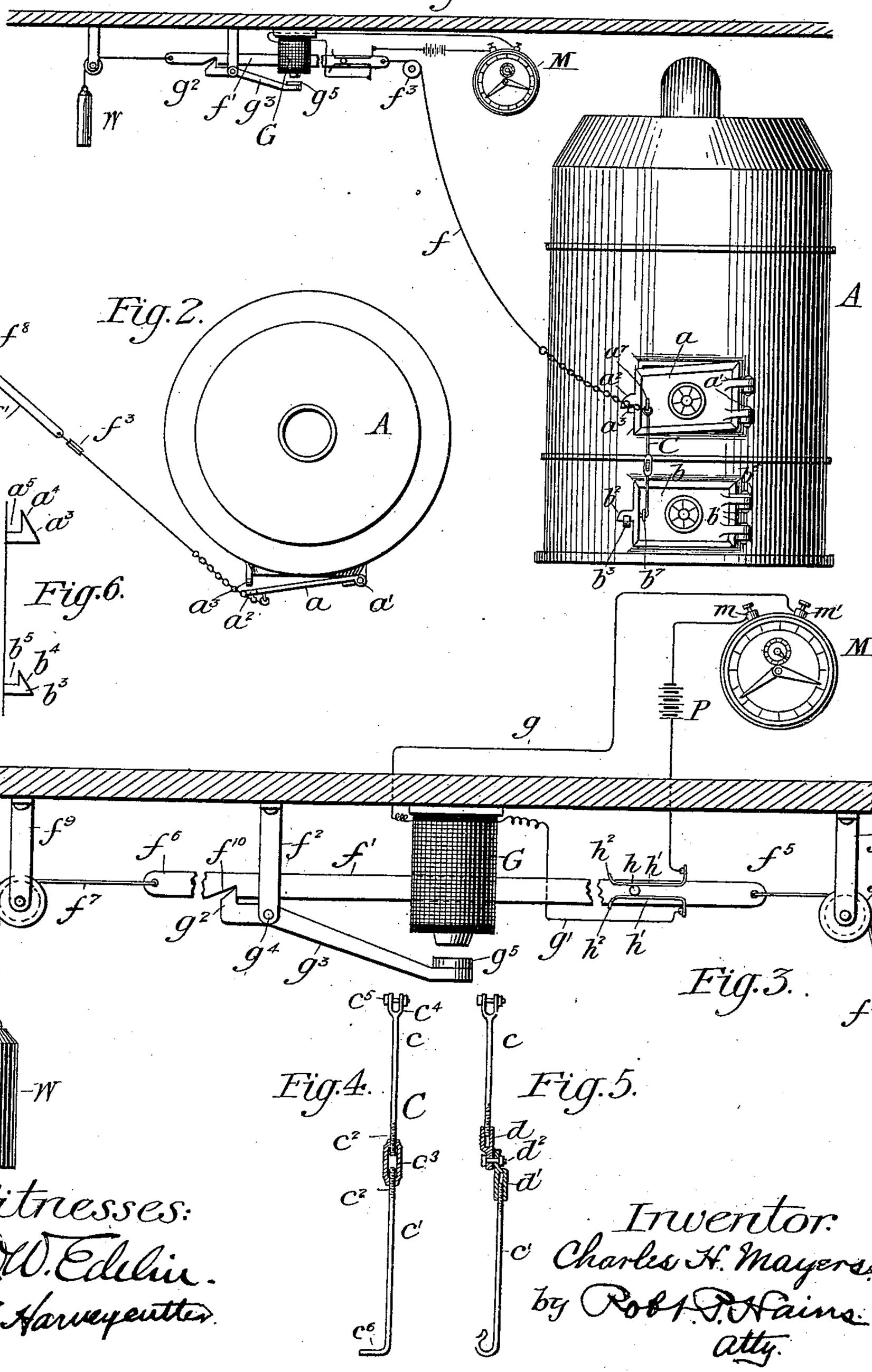

Fig. 2.

Fig. 6.

Fig. 3.

Fig. 4.

Fig. 5.

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REGULATING DEVICE FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 666,814, dated January 29, 1901.

Application filed December 7, 1900. Serial No. 39,084. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. MAYERS, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Regulating Devices for Furnaces, of which the following, in connection with the accompanying drawings, is a specification.

The invention to be hereinafter described relates to regulating devices for furnaces, and more particularly to the type of said devices that are automatically controlled in their action by a timepiece.

It is well understood that the ordinary furnaces commonly used for heating buildings have the fires contained therein banked each night to prevent overheating the building, and to further secure this result the fire-box door is usually opened somewhat, while the lower draft or ash-pit door is maintained closed. In order to properly heat the building in the morning, it is desirable that the fire-box door be closed and the lower draft or ash-pit door be opened, to effect which in the absence of automatic devices requires the services of an attendant.

It is one object of my present invention to provide means which can be set to operate automatically at any desired time to cause the closing of the fire-box door and to open the lower draft or ash-pit door with certainty, and, further, to simplify the construction of said means so that it will not readily become disarranged or be rendered inoperative; and with these general objects in view my invention consists of the parts and combinations, as will be hereinafter more fully described, and definitely pointed out in the claims.

In the drawings, Figure 1 is an elevation of any usual form of furnace or heater having my improvements attached. Fig. 2 is a plan view of the furnace or heater with a portion of my improvements attached, showing the lead of the operating connections. Fig. 3 is an enlarged view of a portion of my device, showing more particularly in detail the electrical connections for tripping the armature-catch. Fig. 4 is a detail view of one form of device for connecting the fire-box and ash-pit or draft doors, and Fig. 5 is a like view of another form of such device. Fig. 6 is a detail of the door-catches.

A represents the furnace, which may be of any usual type—such as hot air, hot water, or steam, as desired—the said furnace being provided with the usual fire-box door *a*, shown in this form of my invention as hinged in any ordinary manner, as at *a'*, and having also an ash-pit or draft door *b*, also shown in this instance as hinged at *b'*. Each of these doors is provided with a lip or lug a^2 b^2, each designed to engage its appropriate catch a^3 b^3, respectively, to maintain the doors in closed position, all as usual in furnaces of this type, with the exception that the lifting-incline of the catch a^3 is somewhat greater than that of catch b^3, as shown more clearly in Fig. 6. It is well known that in furnaces of the type represented the holding lip or lug of the furnace-door when the latter is being closed rides up the inclined end a^4 or b^4 of the catch and then drops into the recess or notch a^5 or b^5 and that to open the said doors requires that the same be lifted the height of the recess or notch a^5 or b^5 to clear the lip or lug of the upper point of the catch. I have therefore taken advantage of this fact to devise means to connect the two doors in this embodiment of my invention, so that as the upper door rides up its relatively longer lifting-incline a^4 in closing it will lift the lower door, so as to free its lip or lug from its catch, and I provide a spring of any usual or preferred form, as at b^6, on the lower door, so that when said lower door is closed and is lifted by the upper door in its closing movement, and thereby frees the lip or lug b^2 from its catch b^3, the said spring will act at once to throw the lower door into its open position.

The means for connecting the upper or fire-box door and the lower or ash-pit door comprises a connecting rod or bar C, preferably formed in two parts, as *c c'*, Fig. 4, each provided with a screw end c^2 and joined by a turnbuckle or sleeve c^3, having interior and oppositely screw-threaded ends, in which the screw-threaded ends c^2 c^2 of the parts *c c'* of the rod or bar are adjustably held. The upper and lower doors *a* and *b* are each provided with a suitable means for engagement with the ends of the connecting rod or bar C, and said means in the present form of my invention comprises the ordinary eyebolts a^7 and b^7, to which the handle of the door may, if desired,

be also attached, and I provide the ends of the connecting bar or rod C with proper engaging devices—as, for instance, by providing the upper end of the bar c with a bifurcation c^4 to embrace the eyebolt a^7 on the upper door and to be connected thereto by means of the bolt c^5—and I provide the lower end of the bar or rod with a turned end c^6, adapted to engage the eyebolt b^7 in the lower door. Thus it will be seen by connecting the doors by the rod or bar C, which is of a length only slightly greater than the distance between the eyebolts a^7 and b^7 in the doors, respectively, that as the upper door rides up the engaging incline a^4 of its catch a^3 it will lift the lower door sufficiently to raise its lip or lug b^2 from the recess or notch b^5 and free it from the catch b^3, the spring b^6 thereupon exercising its function to at once throw the door b open to the extent of movement permitted by the connecting rod or bar C. It is only necessary in this class of devices that the lower door be open a small portion of its full extent in order to secure the benefits of the draft, and sufficient opening is provided for this purpose by the slight excess in length of the connecting bar or rod C over the distance between the bolts a^7 and b^7, both doors being in the same plane. It is evident, however, from the construction contemplated that the amount of opening of the doors may be regulated as desired, depending upon the length of rod or bar C connecting them and upon the excess in length of the engaging incline a^4 of the lower catch, and by substituting different sizes of catches a^3 b^3 or by trimming the lower catch to smaller dimensions and corrrespondingly adjusting the connecting bar or rod C the opening of the lower door when released from its catch by the closing movement of the upper door may be readily regulated.

It is sometimes desirable that the rod C be disengaged from the lower door, as during the day when both doors may be closed or during the time that ashes are to be taken from the furnace or during the process of coaling the furnace, and for this reason I have formed the lower end of the connecting rod or bar C with a turned end c^6. It may also be desirable that when the rod or bar C is disengaged from the lower door it be turned up out of the way, and for this purpose I provide a hinged connection between the upper and lower portion of the connecting-bar, as shown in Fig. 5. In the construction shown by Fig. 5 the upper portion c is screw-threaded into a socket-piece d, and the lower portion c' is likewise screw-threaded into a corresponding socket-piece d', the said two socket-pieces d and d' being joined together by a through-bolt or hinge d^2. In other respects the construction shown by Fig. 5 may be the same as that in Fig. 4, it being only necessary that the upper and lower portions of the connecting rod or bar shall be provided with suitable means for engagement with the eyebolts a^7 b^7 or other engaging means on the doors.

In order to properly operate the upper door at the desired time, I connect the same by means of a chain or other device f with a sliding catch-rod f', sliding in suitable hangers secured to the ceiling, as indicated in Fig. 1. The connection f leads from the upper or fire-box door of the furnace diagonally up and to the rear of the furnace, as indicated in Fig. 2, and passes over a guide-pulley f^3, connected to a suitable hanger f^4, and has its end attached at f^5 to the sliding catch f', all as indicated in Fig. 3. To the opposite end of the sliding catch f' at f^6 I connect a weight W by means of a flexible cord or chain f^7, which passes over a guide-pulley f^8, supported by a suitable hanger f^9, the weight serving to normally tend to move the sliding catch to the left in Figs. 1 and 3. Such movement of the sliding catch f' through the weight or other equivalent means W, which obviously may be a spring, the connection f between the sliding catch and the upper or fire-box door exerts a pull to the rear and upward of the furnace, thereby causing the lip or lug a^2 of the said door to ride up the engaging incline a^4 into engagement with its catch a^3. The upward and rearward pull upon the connection f tends to facilitate the said movement of the upper door into engagement with its catch, as will be evident.

Supported in proximity to the sliding catch f' is an electromagnet G of any usual construction and in circuit by wires g g' with a suitable battery P, which may, if desired, be the usual battery employed at the present day for supplying electric energy for gas-lights, door-bells, &c., and interposed in the circuit of wires g g' is an ordinary electric-contact-closing timepiece or clock M, the said wires being connected to said clock by the binding-posts m m'. I have not deemed it necessary in this description to describe in detail the electric-contact-closing clock, as it forms no part of my present invention, it being of the usual form of such devices which can be set to complete the circuit at any desired time, all as will be evident to one skilled in the art.

The sliding catch f' is provided in its length with a catch-recess f^{10}, adapted to be engaged by the end g^2 of an armature-trip g^3, pivoted at g^4 to a suitable support, as the hanger f^2, and carries at its opposite end the armature g^5.

From the construction thus far described it will be evident that on closing the circuit through the wires g g' by the clock or timepiece M the electromagnet G will be energized, thereby attracting the armature g^5, thus turning the armature-catch g^3 to disengage its end g^2 from the notch f^{10} in the sliding bar f', releasing said sliding bar f' to the action of the weight W, which immediately draws the said bar f' to the left in Figs. 1

and 3, and through the connection *f* the upper or fire-box door is closed. As the lip or lug a^2 of the door *a* rides up its catch a^3 it raises the lower door sufficiently to disengage the lip b^2 thereof from its catch b^3, whereupon the spring b^6 swings the lower door open to the extent permitted by the connecting rod or bar C.

Since after making the electric connection between the wires *g g'* by the clock or timepiece M the circuit remains unbroken unless a switch is provided, it is evident that the battery P will soon become exhausted, and I have therefore interposed a switch in the circuit to be operated by the sliding catch *f'* as the same moves to close the door of the furnace, the said switch being preferably constructed as follows: Mounted on the sliding bar *f'* is a conductor *h*, preferably in the form of a pin secured to the said bar, which conductor when the device is set, as represented in Fig. 3, and the upper door is open for the night rests between two spring-contacts *h' h'*, preferably having outturned ends h^2 h^2, the said spring-contacts being joined in circuit with one of the wires, as *g'*, so that when the pin or conductor *h* rests between the spring-contacts *h'* the circuit to energize the magnet may be completed by the operation of the clock; but after the circuit has been completed and the armature-catch g^3 disengaged from the notch f^{10} in the sliding bar *f'* the movement of the sliding bar *f'* under the impulse of the weight W will draw said pin *h* from between the contacts *h'*, and thereby interrupt the circuit. As this interruption of the circuit takes place when the device operates to close the upper door and open the lower door, it is evident that the battery P will not become exhausted.

While I have shown the particular form of contacts as presenting the preferred form thereof and while other details of the mechanism are shown as the present embodiment of my invention, it is to be understood that the same may be varied without departing from the spirit of my invention. Neither do I regard myself as limited to the particular form of furnace and its connected parts.

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

1. In a regulating device for furnaces, the combination of a furnace provided with upper and lower doors, means for automatically operating the upper door, a timepiece for controlling the time of operation of said means, and connections between the upper and lower doors of the furnace whereby closing movement of the upper door frees the lower door from its holding-catch and permits the said door to open, substantially as described.

2. In a regulating device for furnaces, the combination of a furnace provided with upper and lower doors, means connected to the upper door for operating it, a timepiece for controlling the time of operation of said means, devices for directly connecting the lower door to the upper door whereby the closing movement of the upper door disengages the lower door from its holding-catch, said devices being adjustable to regulate the extent of opening of the upper and lower doors.

3. In a regulating device for furnaces, the combination of a furnace provided with upper and lower doors, means connected to the upper door for operating it, a timepiece for controlling the time of operation of said means, devices for directly connecting the lower door to the upper door whereby the closing movement of the upper door disengages the lower door from its holding-catch, said devices being adjustable to regulate the extent of opening of the upper and lower doors, and a spring connected to the lower door for throwing it open when freed from its holding-catch.

4. In a regulating device for furnaces, the combination of a furnace having upper and lower doors, electrically-controlled means connected to the upper door for operating the same, a timepiece in the electric circuit for determining the time of operation of said means, adjustable devices for directly connecting the upper door to the lower door for lifting the latter through the closing movement of the upper door and freeing the said lower door from its holding-catch, said devices being detachably connected to said doors, and a spring for throwing the lower door open when freed from its holding-catch.

5. In a regulating device for furnaces, the combination of a furnace having an upper and a lower door, means for operating the upper door, a timepiece for determining the time of operation of said means, and a rod or bar directly connecting the said upper and lower doors to lift the lower door through the closing movement of the upper door, substantially as described.

6. In a regulating device for furnaces, the combination of a furnace provided with an upper and a lower door, means leading upwardly and rearwardly for directly closing said upper door, a timepiece for controlling the time of operation of said means, a rod or bar directly connecting the upper and lower doors to operate the latter by the closing movement of the former.

7. In a regulating device for furnaces, the combination of the furnace having an upper and a lower door, a sliding bar connected to the upper door of the furnace, means normally tending to move said bar to close the upper furnace-door, an electric circuit including an electromagnet, an armature-catch for holding the sliding bar against movement by its actuating means, a timepiece for completing the circuit at a predetermined time, and a bar or rod directly connecting the upper and lower furnace-doors to cause the lower door to open on the closing movement of the upper door.

8. In a regulating device for furnaces, the

combination of a furnace having an upper and a lower door, means operating the upper door comprising a sliding bar f', means normally tending to move said bar to close the upper door, an electric circuit including an electromagnet, an armature-catch adapted to hold the sliding bar against movement, a timepiece for closing the circuit at a predetermined time, and a circuit-breaker or switch operable by movement of the sliding bar to break the circuit when the said bar operates to close the furnace-door.

9. In a regulating device for furnaces, the combination of a furnace having an upper and a lower door, means operating the upper door comprising a sliding bar f', means normally tending to move said bar to close the upper door, an electric circuit including an electromagnet, an armature-catch adapted to hold the sliding bar against movement, a timepiece for closing the circuit at a predetermined time, and a circuit-breaker or switch comprising spring contact-plates, a conductor or pin on said bar movable between said contact-plates, and adapted to be withdrawn from electric connection therewith when the sliding bar moves to close the furnace-door.

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