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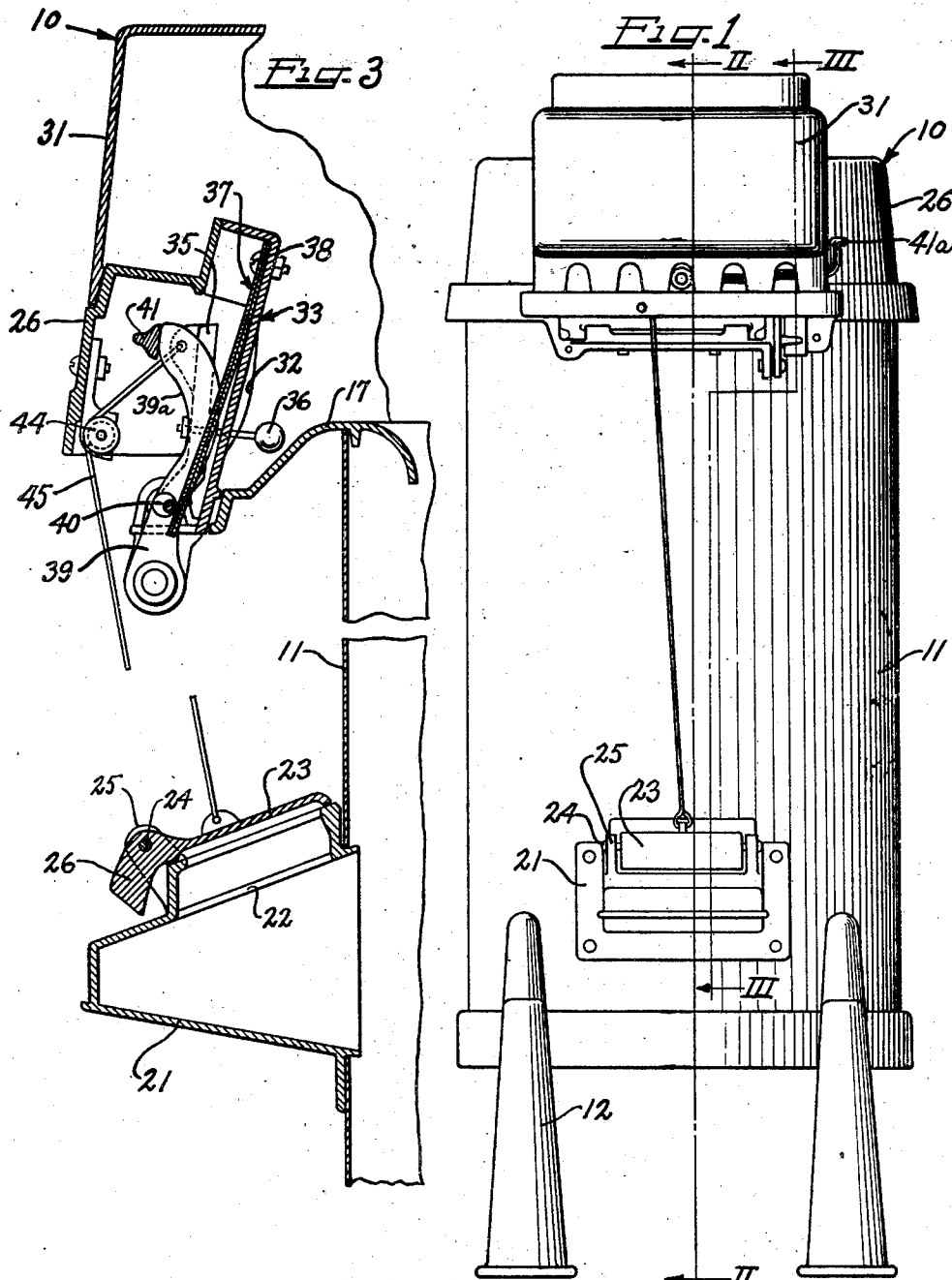
H. H. FLEER

2,409,480

AUTOMATIC CHECK AND DRAFT CONTROL FOR STOVES

Filed March 3, 1943

3 Sheets-Sheet 1



INVENTOR
HARRY H. FLEER

by Charles W. Hill, Att'y.

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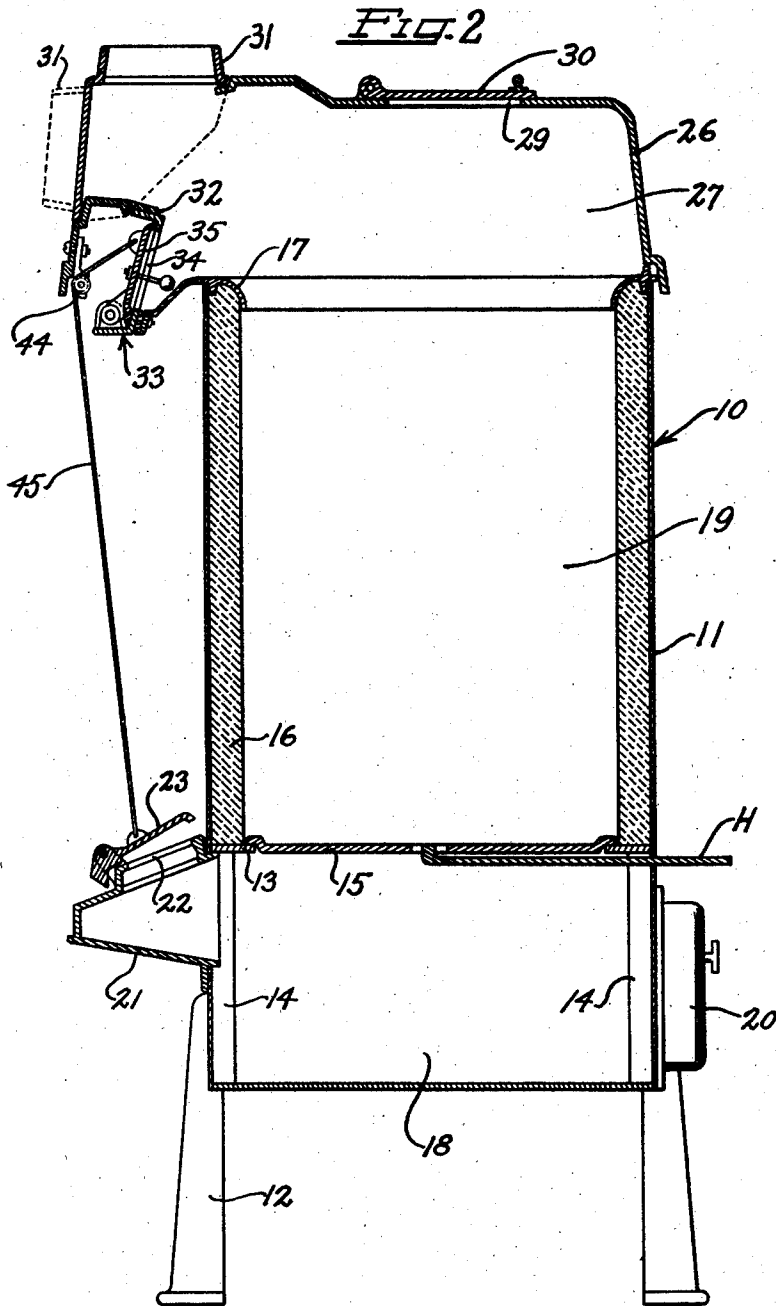
H. H. FLEER

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AUTOMATIC CHECK AND DRAFT CONTROL FOR STOVES

Filed March 3, 1943

3 Sheets-Sheet 2



INVENTOR
HARRY H. FLEER

By Charles Willis HUGS.

Oct. 15, 1946.

H. H. FLEER

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AUTOMATIC CHECK AND DRAFT CONTROL FOR STOVES

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3 Sheets-Sheet 3

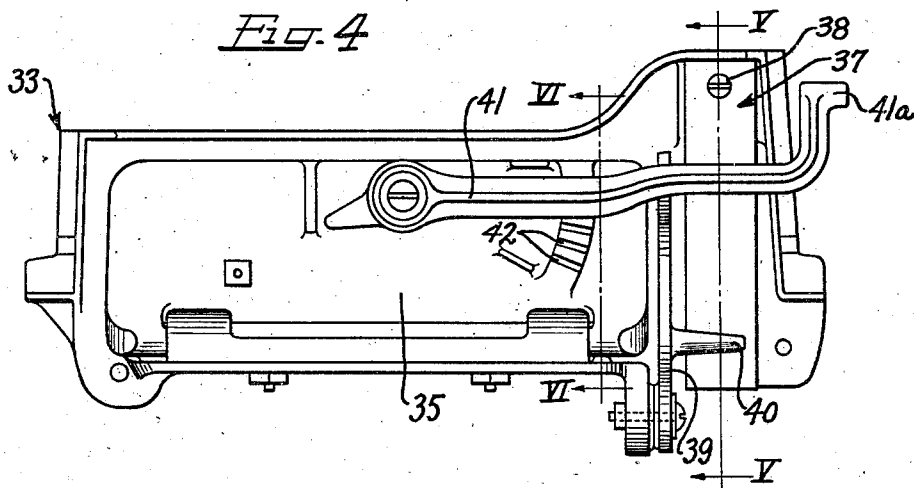


Fig. 5

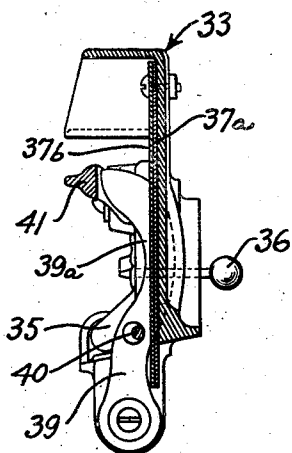
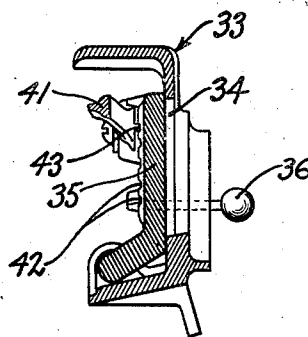


Fig. 6



INVENTOR
HARRY H. FLEER

By Charles W. Hill Att'y.

UNITED STATES PATENT OFFICE

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AUTOMATIC CHECK AND DRAFT CONTROL
FOR STOVESHarry H. Fleer, Quincy, Ill., assignor to Gem City
Pattern Co., Quincy, Ill., a corporation of Illi-
nois

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5 Claims. (Cl. 236—16)

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This invention relates to draft and check draft controls for heaters which are automatically operated by heat from the heaters.

Specifically, the invention relates to a check draft regulator actuated by a bi-metallic strip.

According to this invention a heater, such as a stove composed of a metal casing such as a steel drum, has a grate construction therein dividing the casing into an upper combustion chamber and a lower ashpit. The combustion chamber is lined with fire-resistant refractory means and a top supporting ring is mounted in the open top of the casing to hold this refractory means in position. A dome-topped member is supported on this ring and has a fuel inlet, a smoke outlet, and an opening adapted to receive a check door frame. This opening is positioned between the top of the combustion chamber and the smoke outlet.

The casing also carries a pouch communicating with the ashpit. This pouch has a draft air inlet in the top wall thereof adapted to be closed by a door hinged to the pouch.

A door frame is mounted in the opening of the dome top and provides a check draft inlet. A door is hinged carried by this frame and is biased to closed position by means of a weight. A flexible cable or chain connects the weight-biased door with the pouch-carried door so that the pouch door can move to closed position whenever the weight-biased door is moved to open position.

A bi-metal strip is anchored at one end to the door frame. This strip has a free end which will curl away from the frame when subjected to heat. The frame pivotally supports a lever which is swung away from the frame by the free end of the bi-metal strip as the strip is heated from the combustion chamber. The door carries a swingable arm extending across this lever so that the lever will open the door a selected amount when the bi-metal strip moves the lever. The arm has a pivotal connection with the door and can be set at selected positions toward and away from the lever pivot point to control the effect of lever movement on the door.

The entire arrangement is automatic in operation and is effective to introduce a check draft to the top of the combustion chamber while shutting off the draft to the ashpit which, of course, acts through the grate on the bottom of the combustion chamber. Alternately, of course, the device is operative to open the main draft and close the check draft. The heat generated by the heater itself will actuate the draft means.

It is, then, an object of this invention to pro-

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vide an entirely automatic draft control for stoves which does not require a power driver to actuate the same.

A further object of the invention is to provide a draft control actuated solely by a heat-sensitive member.

A still further object of the invention is to provide a draft control for heaters actuated entirely with bi-metallic heat-sensitive means.

A further object of the invention is to provide a draft control for stoves wherein a bi-metallic strip actuates a lever and the lever in turn actuates an arm on a draft door which arm can be positioned so as to control the effect of lever movement on the door.

A still further object of the invention is to provide a simplified heater construction that is automatic in operation to maintain a constant selected temperature for long periods of time without necessity for manual adjustment.

A still further object of the invention is to provide a stove which can be charged with fuel and set to maintain a constant temperature as long as the fuel lasts without requiring additional adjustments during the burning period of the fuel.

Other and further objects of the invention will be apparent to those skilled in the art from the following detailed description of the annexed sheets of drawings which, by way of preferred example only, illustrate one embodiment of the invention.

On the drawings:

Figure 1 is a rear side elevational view of a stove equipped with check and draft controls according to this invention.

Figure 2 is a vertical cross-sectional view taken along the line II—II of Figure 1.

Figure 3 is an enlarged fragmentary broken vertical cross-sectional view of the check and draft control assembly of this invention taken along the line III—III of Figure 1.

Figure 4 is an enlarged side elevational view of the check draft frame and control door assembly of this invention.

Figure 5 is a vertical cross-sectional view taken along the line V—V of Figure 4.

Figure 6 is a vertical cross-sectional view, taken along the line VI—VI of Figure 4.

As shown on the drawings:

In Figures 1 to 3 inclusive the reference numeral 10 designates generally a heater according to this invention composed of a casing 11 in the form of a steel drum having a cylindrical side wall, a closed bottom and an open top. The casing 11 is supported on legs 12. A grate ring 13

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is mounted in the casing 11 above the bottom thereof on supports such as 14 which supports 14 are bottomed on the bottom of the casing. A grate 15 is supported on the grate ring 13 and has a shaker handle H projecting therefrom through the front side of the casing as shown in Figure 2.

The grate ring 13 supports a fire-resistant refractory lining 16 which extends from the grate ring 13 to the top of the casing. A retainer ring 17 is mounted on the top of the casing 11 to hold the lining 16 in position.

The grate construction separates the casing 11 into a lower ashpit compartment 18 and an upper combustion chamber 19.

The casing has an ashpit outlet closed by a door 20 at the front side thereof together with a draft pouch 21 mounted on the rear side thereof and communicating with the ashpit compartment 18 under the grate 15. This pouch 21 has an apertured top wall 22 adapted to be closed by a door 23 which is hinged at 24 to ears or lugs 25 on the pouch. The door 23 is counterweighted as at 26 so that little effort is required to swing the door to open position.

As best shown in Figure 1, the pouch 21 can be bolted, riveted, or otherwise secured to the rear side wall of the casing 11.

A dome-topped member 28 is mounted on the ring 17 and extends upwardly above the combustion chamber 19 to provide a space 27 for burning partially gases of combustion from the chamber 19.

The top member 26 has a fuel inlet 29 closed by a charging door 30, a reversible smoke outlet collar 31 adapted to be mounted in either the full line or dotted line positions shown in Figure 2 for connection with a top stove pipe or a rear side stove pipe, and a check draft door frame opening 32 between the smoke outlet and the combustion chamber 19.

A check draft door frame 33 is bolted to the top 26 and the ring 17 as best shown in Figures 2 and 3, and fits in the opening 32.

As best shown in Figures 4 to 6 this frame 33 provides a door opening 34 communicating with the opening 32. A check draft door 35 is hinged at the bottom thereof to the frame 33 and is adapted to open and close the door opening 34. This door 35 carries a weight 36 projecting through the door opening 35 and biasing the door toward closed position.

A bi-metal strip 37 is anchored at the top end thereof as by means of a bolt 38 to the frame 33 adjacent one side of the door 35. This bi-metal strip 37 is composed of laminated sheets 37a and 37b of metal having different coefficients of expansion. The sheet 37a lying adjacent the frame 33 has a higher coefficient of expansion than the sheet 37b overlying the sheet 37a. When the frame 33 is heated, the sheet 37a will expand more than the sheet 37b, causing the free end of the strip to curl outwardly away from the frame.

A lever 39 is pivoted to the frame 33 at the lower end thereof and has a finger 40 projecting in front of the free end of the bi-metal strip 37. This finger is adapted to be engaged by the free end of the strip 37 as the same curls outwardly from the frame 33 when the frame is heated, to swing the lever about its pivot point away from the frame.

The door 35 pivotally supports an arm 41 which overlies the lever 39 and is adapted to be engaged by the lever as the lever is swung outwardly by

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the bi-metal strip 37 to open the door 35. The door is provided with a plurality of notches such as 42 and the arm 41 has a tooth 43 adapted to be seated in a notch 42 to hold the arm at a selected position.

As best shown in Figure 5, the lever 39 is curved as at 39a and the lever 41 can be positioned at any point along this curved portion 39a of the lever.

The arm 41 has a free end portion 41a adapted to be manually gripped to swing this arm for moving the tooth 43 thereof into a selected notch 42 and thereby position the arm at the desired distance from the pivot point of the lever 39. The position of the arm 41 will thereby control the effect of lever movement on the door 35.

As best shown in Figures 1 to 3, a portion of the top 26 overlies the opening 32 across which the door frame 33 is mounted. This portion of the top 26 carries a pulley wheel or roller 44 and a chain or cable 45 is trained around this pulley 44 and connected at one end thereof to the upper portion of the door 35 and at the other end thereof to the door 23. The cable 45 is of such a length that whenever the door 35 is fully closed the door 23 is fully opened. On the other hand, when the door 35 is fully opened, the door 23 is fully closed.

Air introduced through the pouch 21 into the ashpit chamber 18 will, of course, promote combustion in the combustion chamber 19 by flowing upwardly through the grate 15 and creating a draft through the body of fuel in the combustion chamber. On the other hand, air introduced through the door opening 34 will break the draft through the combustion chamber and will serve to check combustion. Regulation of the positions of the doors 23 and 35 therefore controls the rate of combustion and the temperature of the heater. The introduction of secondary air into the chamber 27 above the combustion chamber 19 is desirable for efficient combustion since smoke or partially burned gases from the combustion chamber can be completely burned by air introduced at this point in the chamber 27.

The bi-metallic strip 37 is the sole actuator for both doors 35 and 23 and, since it is entirely controlled by the temperature of the heater itself, the entire device of this invention is fool-proof in operation and completely automatic. The manual adjustment permitted by swinging the arm 41 makes it possible for an operator to set the heater for maintenance of a constant selected temperature. Movement of the arm 41 toward the pivot point for the lever 39 will decrease the amount of door opening of the door 35 and, as a result, the stove will operate at higher temperatures than if the arm 41 is set so as to engage the end of the lever 39 remote from its pivot.

As shown in Figure 1, the overlying portion of the top 26 protects the draft door and operating mechanism but the free end 41a of the lever 41 projects beyond the side of this overlying structure so that it can be readily set by an operator.

Both the door 23 and the door 35 are so balanced by counterweights 26 and 36 that very little effort is required to swing the same, and the bi-metallic strip 37 will be sufficient to supply this effort.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon

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otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. A heater comprising a casing, a grate construction separating the casing into an upper combustion chamber and a lower ashpit chamber, a pouch on said casing communicating with the ashpit chamber, said pouch having a top wall with an air inlet, a first door hinged on said pouch for opening and closing the air inlet, a top member mounted on top of the casing defining a burning zone above the combustion chamber, said top member having a fuel inlet, a smoke outlet, and a door frame opening, a door frame secured to the top member having a check draft inlet, a second door, means hinging said second door on said door frame for opening and closing said inlet, means biasing said second door toward closed position, a bi-metal strip anchored at one end thereof on said door frame, a lever pivoted on said door frame having a finger in the path of the free end of said strip, an arm pivoted on said second door extending across the path of said lever, means for holding the arm at a selected distance from the lever pivot, said strip being warped by heat to move the free end thereof against the finger for swinging the lever to act on the arm for opening the second door, and flexible means connecting the second door with the first door to control positions of the first door.

2. A check draft device for heaters comprising a door frame defining a check draft inlet, a door hinged on said frame for closing said inlet, a weight biasing said door to closed position, a bi-metal strip anchored at one end only on said frame, said strip being composed of two laminated metal pieces with the piece adjacent the frame formed of metal having a high coefficient of expansion and the overlying piece formed of metal having a lower coefficient of expansion whereby heating of the frame will cause the free end of the strip to move away from the frame, a lever pivoted on the frame adapted to be swung away from the frame by the free end of said strip, an arm on said door adapted to be actuated by said lever for opening the door, and means for moving said arm toward and away from the pivot point of the lever to control the effect of lever movement on the door.

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3. A check draft device for stoves comprising a door frame having a door opening, a door hinged on said frame for closing said opening, a bi-metal strip anchored at one end only on said door frame, said strip having a free end moving away from said frame when the frame is heated, a lever pivoted on said frame having a finger overlying said bi-metal strip, said lever having a curved end portion, an arm pivotally mounted on said door extending across the path of the curved end portion of the lever, and means for selectively positioning said arm relative to said lever to control the effect of lever movement on the door.

4. A draft control for heaters comprising means defining a draft inlet, a regulator for opening and closing said inlet, a bi-metal strip anchored at one end only on the heater and having a free end deflected relative to the heater when heated, a swingably mounted lever in the path of movement of the free end of said strip to be moved by the strip, a pivot on the regulator, and an arm swingable on said regulator pivot and projecting into the path of movement of the lever to be selectively engageable with said lever along the length of the lever to vary the effect of the strip movement on the regulator.

5. A draft control for stoves comprising means defining a draft inlet, a regulator for said inlet, a bimetal device mounted adjacent said regulator and having an end portion that moves in response to temperature changes, a pivot mounting adjacent said end portion of said bimetal device, a lever pivoted on said pivot mounting and having a portion in the path of movement of said end portion of said bimetal device to be engaged by the device for swinging the lever, a pivot on said regulator, an arm carried by said pivot and overlying said lever in the path of movement thereof by said bimetal device to be engaged thereby for operating the regulator, and said arm being swingable on its pivot to move the portion thereof overlying the lever along the length of the lever toward and away from the lever pivot for selectively varying the effect of lever movement on the regulator.

HARRY H. FLEER.