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METHOD AND MEANS FOR FUELING AND CONTROLLING FURNACES

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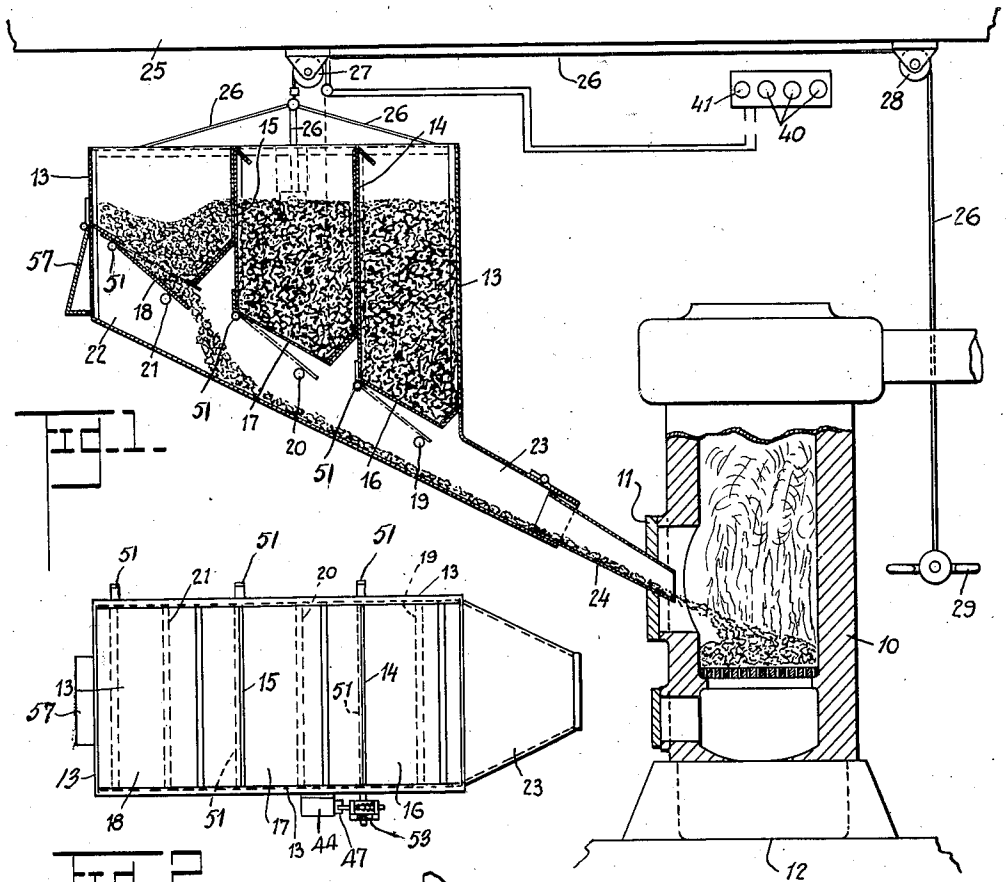


FIG. 1.

FIG. 2.

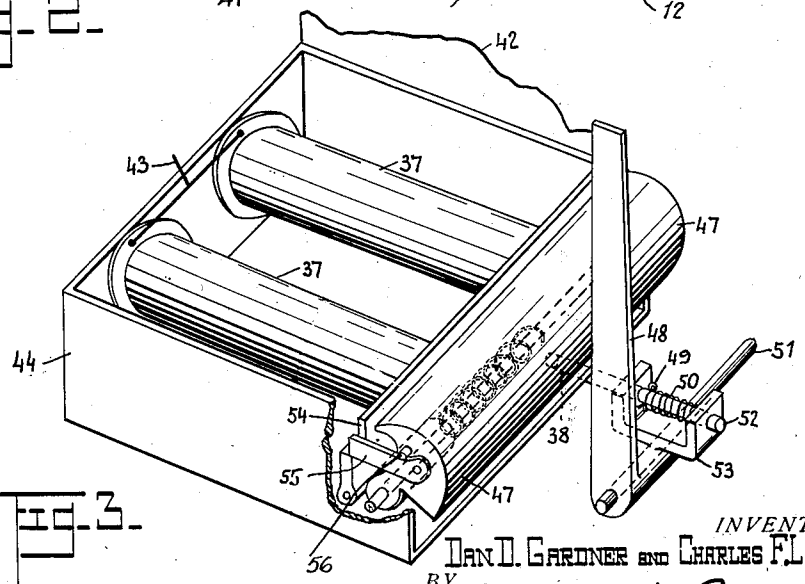


FIG. 3.

INVENTORS
DAN D. GARDNER AND CHARLES F. LOEFFLER.
BY
Ray Belmont Whiteman
ATTORNEY

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METHOD AND MEANS FOR FUELING AND CONTROLLING FURNACES

Dan D. Gardner, East Orange, N. J., and Charles F. Loeffler, New York, N. Y.

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2 Claims. (Cl. 221—144)

This invention relates to methods and means for fueling and controlling furnaces, and more especially to a gravity coal feeder, adapted for periodic operation from a point remote from the furnace.

An object of the invention is to provide a simple and economical means for adding fuel, such as coal, to a furnace fire, during the daytime for instance, without the necessity of the heavy work or bother of shoveling coal during such period. Thus, the device—when used in a domestic installation—may be charged in the morning by the man of the house, and thereafter the fire kept going during the day by the housewife.

Another object is to provide a method of fueling a fire, which will involve no work whatsoever except the pressing of an electric button, or other minor operation, for a series of such fuelings over a considerable period of time, such as a full day. Time control means for even this operation is also provided for.

A further object is to provide a remote control means for fueling a furnace, or controlling the fire by means of dampers, or both, where such remote control is operated either mechanically, electrically, or by some other power transmitting means.

A still further object is to provide means for fueling a furnace at a height above the floor with the minimum amount of work, this including applying fuel to a container positioned at the fuel level, or below, and thereafter raising the container with its fuel to a height above the furnace opening to the fire, to permit gravity thereafter to feed the coal thereto.

All these and other objects as suggested herebelow are attained by the methods and means now to be described, and illustrated in the accompanying drawing, in which—

Figure 1 is a side elevational view, partly in section, of the completely-installed fueling device, showing one of the hoppers discharging its fuel supply into the furnace immediately after it has been operated from a remote point.

Fig. 2 is a top plan view of the hopper arrangement comprising the main portion of the device.

And, Fig. 3 is a side elevational view, somewhat diagrammatic, of the electrical releasing mechanism with its relation to the tripping and resetting means, which is operated to release the charge of coal from a particular hopper chamber, and to manually re-position the hopper bottom for re-filling.

Like numerals refer to like parts throughout the several views.

In Fig. 1 is shown in outline a standard form of domestic heating furnace 10, having a fire door 11, through which the coal is normally fed to the fire. Furnace 10 is mounted upon a base on the floor 12, and may be either for the purpose of supplying hot air, steam or hot water to a heating system, for a house or other building.

The fuel feeder comprises a suspended hopper member 13 divided by lateral partitions 14 and 15 into three chambers, and in such manner that the chamber which is deepest, due to the slanting bottom of the hopper member, as shown in the drawing, is also the narrowest, such that the charge of coal in each of the three hopper chambers is of substantially the same or a different predetermined volume.

The longer side of each of the three hopper chambers is bent inwardly of the chamber across its lower end, in manner as shown, and the space between the end of each such wall and the opposite wall of each said chamber, and extending also across the bottom, is covered by a swinging bottom member 16, 17, or 18. These bottom members are normally in the "up", or closed, position when the hopper is filled with coal, but are released to the "down", or open position, as shown at 18, and in dotted line position beneath 16 and 17, and in manner as hereinafter explained. Members 16, 17 and 18 are permitted when released to move to the downward or open position, but restrained in such movement by stop members in the form of laterally extending pins or bars 19, 20 and 21, positioned across the main chute member 22 into which the three hopper chambers feed. By this arrangement, it does not matter, for instance, whether the hopper chamber nearest the furnace has its coal discharged first or not, since its bottom member 16 is prevented by stop member 19 from extending into the lowermost portion of chute 22, and so permits the coal from the other hopper members to pass. This feature may be eliminated by providing an electrical means for opening up the circuit to the chamber farthest from the furnace first, and next farthest next, and so on regardless of how one button is pushed, or several buttons are pushed, from the remote point of control, but with the mechanism as shown, such additional electrical complication is unnecessary.

Chute 22 terminates in a funnel-shaped exit end 23, Fig. 2, having a removable extensible portion 24, Fig. 1, adapted to be slid downwardly through the fire door opening 11.

The entire hopper construction with its appurtenances is preferably suspended from the room ceiling 25 by means of cables or ropes 26

extending over pulleys 27 and 28 and down to a holding cleat 29, positioned conveniently on the side wall near the furnace, and adapted to permit rope 26 to be wound around said cleat to hold it in place and yet be conveniently unwound to permit the entire structure to be swung downwardly by gravity to a position at or near the floor. In this position, the coal from the coal pile (or other fuel) may be the more easily shoveled into the several hoppers. Thereafter, the entire weight of coal for charging the furnace several times, as for instance to fuel it over the period of a full day or night, may then be lifted up to gravity-feed position, as shown in Fig. 1. And by means of a block and fall arrangement introduced in the suspending device, this lifting may be accomplished with a minimum of muscular effort.

There is a hinge cover 57, Figs. 1 and 2, so weighted that it closes by gravity an opening in the hopper back. This provides for an escape in the event of a gas explosion in the furnace or chute, which otherwise might damage this apparatus. The means for releasing the bottom of each hopper chamber to discharge the coal will now be described. A preferred embodiment involves merely the introduction of an electrically-operated tripping unit, Fig. 2, operatively positioned to the outside wall of each hopper chamber. Each such unit usually consists of a container 44 mounted to the side of the hopper by means of an extension plate 42 and containing two magnets 37—37 which when magnetized attract an upright plate 54 hinged from below in manner as shown in Fig. 3. A catch member 47 is pivoted adjacent plate 54 to case 44, which also pivotally supports on each end a holding lever 55, the upward movement of which is restrained by a pin 56 intermediate its ends on member 47, and normally engaging the upper surface of member 55. The end of levers 55 normally rest in cut-out portions of plate 54, as shown, and in such manner that when this plate is moved inwardly or to the left through the magnetic effect of coils 37 when magnetized, the ends of levers 55 holding member 47 in place are no longer supported on plate 54, and thus catch member 47, as viewed in Fig. 3, is free to revolve counterclockwise through substantially a 90° arc around its axis. This movement coils up a coil spring (shown dotted) keyed around the shaft of catch 47. The movement is effected by the weight of the fuel above the bottom of the hopper in manner now to be described. Beneath the lower flat surface of catch 47 is a holding pin 38 normally held thereby and prevented from upward movement. Pin 38 slidably extends through a bracket 53 mounted to move around the axis of shaft 51 and with it, and containing upwardly-extending handle 48 adapted to return the parts and bottom to original or holding position after the device has been magnetically tripped to discharge the fuel. A spiral spring 50 surrounds shaft 52 which terminates in pin 38 and a cotter pin 49 passing through shaft 52 acts as a shoulder to compress spring 50 when lever 48 is moved to the left. Shaft 51 corresponds with the hinge about which hopper bottoms 16, 17 and 18 are pivoted, the hopper bottom being on the side of this shaft to the right viewed as in Fig. 3. Therefore, the weight of the fuel on the hopper bottom tends to constantly press pin 38 up against the lower flat surface of catch member 47 when in its normal or holding position. When plate 54 is moved by means of magnetized coils 37, and levers 55—55 are therefore freed from engagement with the cut-out ends of plate 54, catch member 47 rotates counter clockwise as shown in Fig. 3; that is, its lower flat surface moves upwardly by the weight of the coal on hopper bottom member which is mounted to the right of shaft 51, pressing downwardly and so pressing upwardly the pin 38 which engages with said flat portion of catch 47. This releases the fuel, after which the coil spring around the axis of catch member 47 returns it to its original position and plate 54 also returns after the magnetizing influence of coils 37 cease and then the device may be reset by pushing handle 48 to the left, during which operation pin 38 is cammed inwardly or to the right over the arc-like surface of catch member 47 to compress spring 50 until the pin is below the flat surface of catch member 47 when the spring 50 will push the pin out underneath said flat surface to again hold the bottom of the hopper in its closed position.

This electrical releasing unit shown to the left of Fig. 3 is a standard device which is now on the market and adapted to various uses of this character, and therefore, no part of this invention, except in combination with the other essential elements thereof, and hence further details have been omitted from the drawing.

It will now be seen that by pressing any one of a series of buttons 40, Fig. 1, on the first or second floor of the home, or at some other remote point from this device, an electric circuit is completed through the wires shown in Fig. 3 as connecting to magnet 37 to accomplish this operation. Of course, such a circuit would include a source of electric current, such as a battery or the regular electric light line.

It is of course understood that the plurality of buttons 40 will be so wired to the individual releasing elements that there would be an individual button for each hopper-operating device and such that pressing any one button will operate its particular hopper to release the fuel.

While the disclosure shows the entire assemblage suspended by a flexible cable or rope from a central point above the hopper and attached to the ceiling, it is of course understood that instead of such an arrangement, the complete assemblage may for instance be mounted on wheels to be moved in and out of connection to the furnace, as desired; or it may be mounted in position, and arranged to be moved up and down on vertical tracks to prevent side sway. Or, of course, it may be stationarily attached in position or made portable.

It is obvious from the arrangement shown in Fig. 1 that the slant or degree of declivity of chute 22 may be varied at will so that the coal when released will slide down the chute and cover a larger or smaller area of fire; likewise, baffling members may be introduced at the exit end of member 24, or said member so shaped as to automatically spread the coal in some predetermined proper arrangement over the fire, this depending for instance, upon the size and type of fuel burned. Thus, it might happen that fuel of one character would need one slant of the chute 22, or one type of exit or baffling surface, and fuel of other characters, other types.

When the furnace is to be used only occasionally, as during the summer months, the entire device may be swung up out of the way or else removed and stored away from the furnace, thus permitting it to be fueled and controlled in the

normal manner without interference from the device.

It is to be understood that the present disclosure is for the purpose of illustration only, and that the invention is not limited thereto. To those skilled in the art, many modifications of the invention will be readily apparent, and it will also be obvious to such skilled persons that part of the method and means may be used without other parts thereof, many such combinations of the parts readily suggesting themselves. Therefore, it should be, and is to be distinctly understood that for a definition of the limitations of the invention, reference must be had to the appended claims.

Having now described the invention, what is claimed as new and for which Letters Patent of the United States is desired, is:

1. The combination in a hopper for dischargeably retaining a material, of a plurality of adjacent independent material-holding hopper units, a common slanting chute positioned beneath said units and adapted to convey away by gravity material discharged thereto from any of said units, and a bottom member for each unit adapted when closed to retain said material in said unit, and having remote actuating means for independently releasing the said bottom member to permit the material to drop into the chute, including stop means for the bottom members limiting their downward movement to a position sufficiently above the bottom of the chute immediately below to permit material to pass thereunder down the chute.

2. The combination in a hopper for dischargeably retaining a material, of a plurality of adjacent independent material-holding hopper units, a common slanting chute positioned beneath said units and adapted to convey away by gravity material discharged thereto from any of said units, and a bottom member for each unit adapted when closed to retain said material in said unit, and having actuating means for independently releasing the said bottom member to permit the material to drop into the chute, including stop means for the bottom members limiting their downward movement to a position sufficiently above the bottom of the chute immediately below to permit material to pass thereunder down the chute.

DAN D. GARDNER.
CHARLES F. LOEFFLER.