June 29, 1948. G. KLEIN 2,444,402

DOOR OPERATED DAMPER

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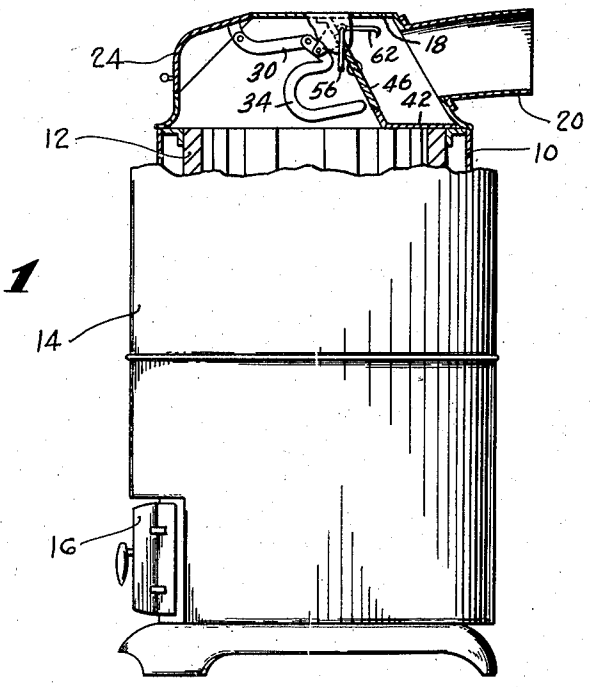


FIG. 1

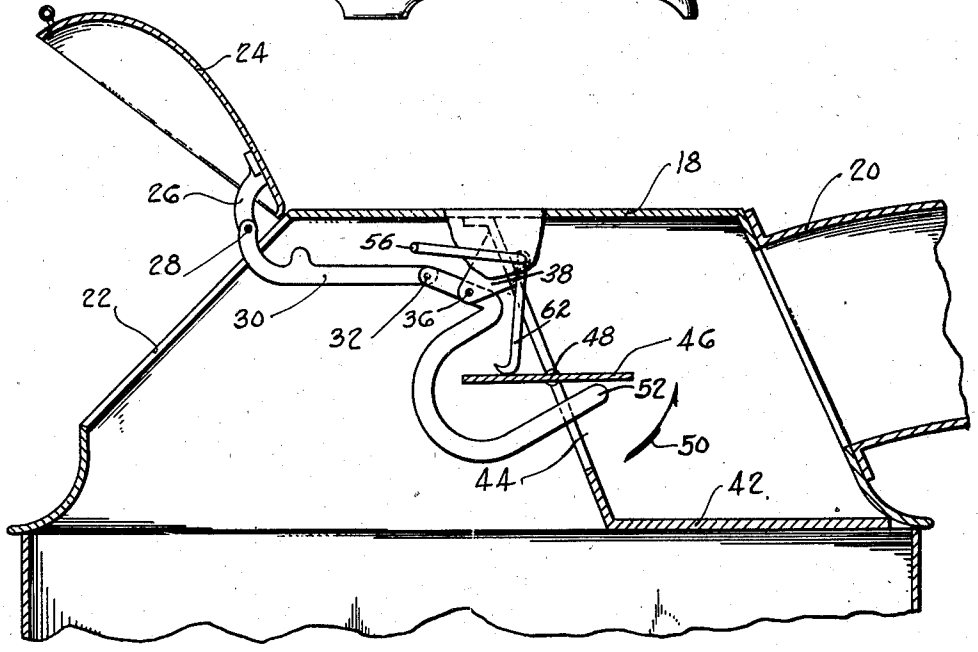


FIG. 2

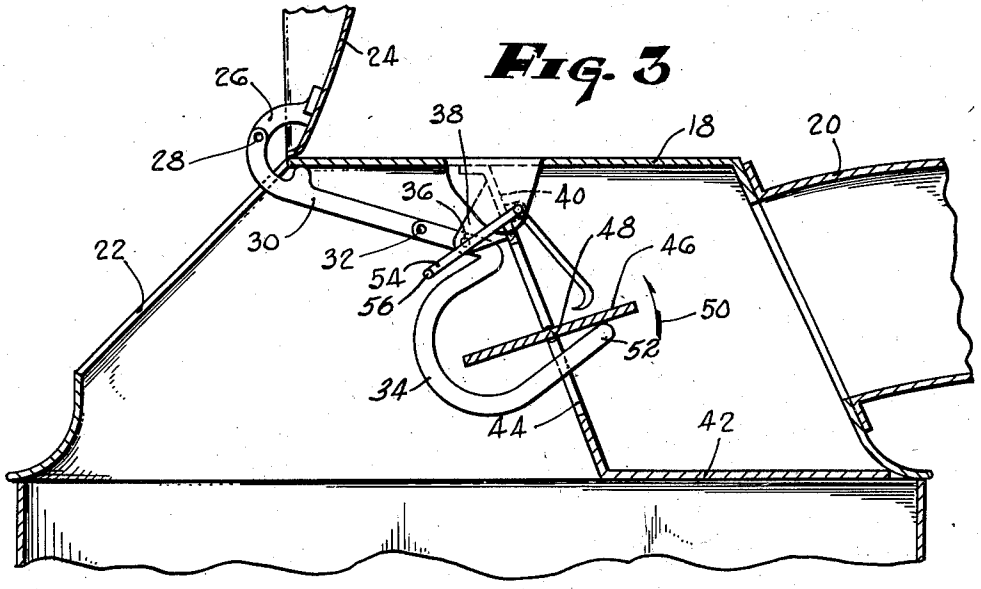
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Fig. 3



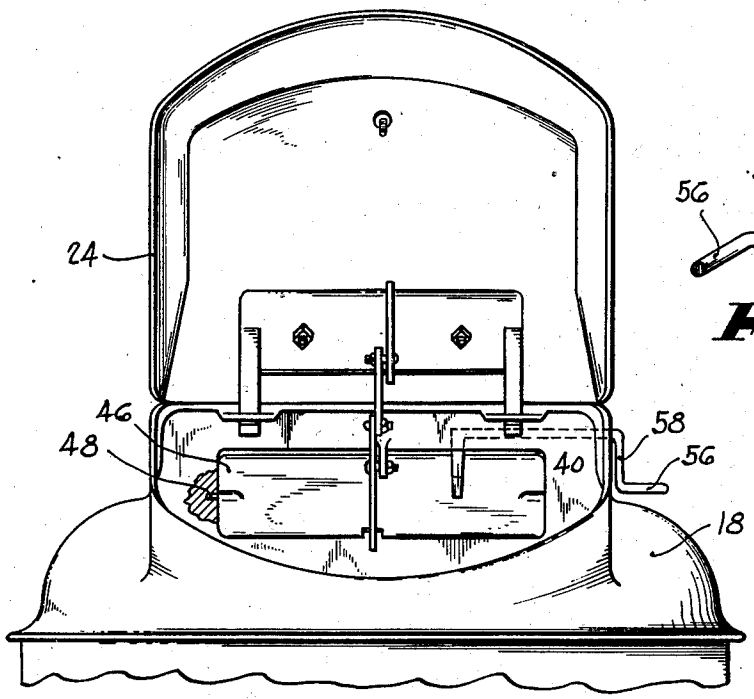


Fig. 4

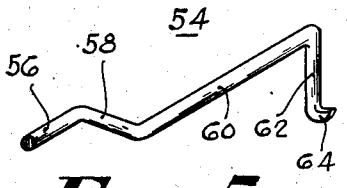


Fig. 5

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DOOR OPERATED DAMPER

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Application September 29, 1943, Serial No. 504,209

1 Claim. (Cl. 126—287)

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My invention relates to a damper construction particularly adapted for use in connection with solid fuel burning, space heating stoves and the like.

A desirable and commonly used stove is known as the magazine type, in which it is only necessary to charge the stove with solid fuel once or twice a day, according to the rate of consumption of fuel. Such stoves are desirably provided with dampers which normally segregate the magazine or green fuel storage space from the chimney through which gases of combustion escape into the smoke stack. This is for the purpose of preventing inflammable gases, which are distilled from the green coal in the magazine chamber, from escaping into the chimney without having first been burned and the heat thereof utilized. It is, however, equally true that it is necessary to provide for the escape of such gases into the chimney whenever the magazine door is opened either for inspection purposes or for recharging the stove, in order to prevent said gases, which are obnoxious, from being discharged to a point outside the stove. Likewise, it is sometimes desirable, in order to speed combustion and secure quick heat, to open the damper referred to, in order to increase the draft through the fire bed. In the event that a structure such as has been outlined is used, it is necessary to make the operation of the damper both independent of and concomitant with the operation of the door of the magazine of the stove, and likewise it is desirable to provide means which will insure restoration of the damper to its normal operating position, thus eliminating the possibility of the operator forgetting the damper in its, so to speak, permanently open position.

It is, therefore, an object of my invention to produce a damper construction which will satisfy all of the foregoing requirements and which will be inexpensive to manufacture and install and easy to operate.

These and other objects are effected by my invention as will be apparent from the following description and claim taken in connection with the accompanying drawings forming a part of this application, in which:

Fig. 1 is a view, partly in side elevation and partly in vertical section, of a magazine type solid fuel-burning, space heating stove embodying my invention;

Fig. 2 is an enlarged view of the upper portion of Fig. 1, showing the magazine door partly

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open and showing the damper in one position thereof;

Fig. 3 is a view similar to Fig. 2, showing the door of the magazine fully open and the damper in still another position;

Fig. 4 is a front elevation of Fig. 3; and,

Fig. 5 is a perspective view of a part of the damper-operating mechanism.

Referring to the drawings more in detail, 10 designates a magazine type of stove which is preferably lined with refractory material 12 and which is surrounded with a shell 14, spaced from the stove proper and open at its bottom and at its top so that relatively cool air from near the floor may enter between the shell 14 and the stove proper 10, to be heated and discharged at the upper end of the shell 14, thus creating a constant circulation. The stove is provided with the usual ash pit door 16. At the top of the magazine, which is defined by the refractory material 12, is a housing forming a dome 18, from the rear end of which extends a chimney 20. Products of combustion from the fire bed in the lower portion of the magazine pass upwardly into and are discharged through the chimney 20, through passages which form no part of the present invention and hence are not shown nor described. The dome structure 18 is provided with a charging opening 22 which is adapted to be closed by a door 24. The door 24 is provided with an arm 26 which is hinged, at 28, to a lever 30. The lever 30 is hinged, at 32, to a lever 34 which is fulcrumed, at 36, to a lug 38 carried by a partition 40. The partition 40 has a horizontally-extending securing, or supporting portion 42 and is provided with an opening 44 which is adapted to be closed by a damper 46, mounted for free pivotal movement about a horizontal trunnion 48.

Normally the damper 46 is arranged to close the opening 44 by gravity, so that with the door 24 closed, as in Fig. 1, the inflammable gases distilled from the coal in the magazine are confined therein to be drawn downwardly and consumed in the fire bed by the draft which operates in the passages, through which products of combustion travel upwardly into the chimney 20. As previously stated, these passages are not shown as they are not necessary for an understanding of the subject matter of this invention.

In order that the inflammable gases referred to may not be discharged to a point outside of the stove when the door 24 is open, the levers 30 and 34 will, as is clearly shown in Figs. 2 and 3, operate to open the damper concomitantly with the

raising of the door 24 from its closed position, as shown in Fig. 1. Thus, as the door 24 is raised the arm 30 is moved to the left, and pivots the lever 34 about the fulcrum 36 in the direction of the arrow 50 in Fig. 2. This causes the tip 52 of the lever 34 to engage the front surface of the lower portion of the damper 46 and move it upwardly until the damper occupies a slightly over-horizontal position when the door is fully open, as clearly shown in Fig. 3. Conversely, when the door is closed, the lever 30 moves to the right, thus pivoting the lever 34 in the reverse or clockwise direction to withdraw the deflected tip 52 of the lever 34 out of the path of the damper 46, which, by gravity, assumes a position closing the opening 44, as shown in Fig. 1. It will thus be seen that every time the door is opened, wholly or in part, the damper 46 is correspondingly actuated so that a corresponding portion of the opening 44 is unobstructed, thus permitting the inflammable gases accumulating in the dome 18 to be drawn by the draft prevailing in the chimney 20, so that they cannot escape into the room.

In order to be able to actuate the damper 46 to a non-closing position when the door 24 is left closed, I provide the crankarm 54, best shown in Fig. 5. This crankarm includes a handle 56, an offset portion 58, a horizontal portion 60, and another offset portion 62, the latter having a deflected tip 64. The mounting of the crankarm 54 is best seen in Fig. 4, from which it will be apparent that the handle 56 and the offset portion 58 extend beyond, or outwardly of the dome 18, while the horizontal portion 60 extends inwardly so that the portion 62 and the deflected tip 64 are disposed above or to the right of the damper 46, as viewed in Fig. 1. When it is desired to open the damper 46 without opening the door 24, it is merely necessary to rotate the handle 56 in clockwise direction to bring the deflected tip 64 into engagement with the rear side of the upper portion of the damper 46. As the handle 56 is further rotated, the damper 46 is moved to the substantially horizontal position shown in Fig. 2. At this point it is to be noted that, either the handle 56 is weighted, or the combined weight of the handle portions 56 and 58 is in excess of the weight of the portion 62 and the deflected tip 64, so that, other things being equal, the crankarm 54 would normally tend to return to the position shown in Fig. 1, and the damper closes the opening 44. However, the construction is such that when the curved tip 64 is in engagement with the damper 46, as shown in Fig. 2, the friction between the tip 64 and the damper 46 is sufficient to overcome the weight differential, so that the crankarm 54 will maintain its damper-opening position, shown in Fig. 2, until it is positively dislodged by externally applied force or action. By this construction, it is possible to open the damper 46 without opening the door 24, thus increasing the draft through the fire bed at the lower end of the magazine in order to produce quick heat. This is most commonly done early in the morning to raise the fire in the stove which had been "banked" the night before so as to heat the space rapidly. However, somewhat later, it is also necessary to shake the grates and replenish the coal supply, and I utilize this fact in order to insure that the damper 46 is not forgotten in its open position throughout the day when rapid combustion is not needed.

In order to accomplish this end, I have so arranged the lever 34, and more particularly the tip 52 thereof, that when the door 24 is opened

to the full extent shown in Fig. 3, the tip 52 of the lever 34 further moves the damper 46 from the substantially horizontal position shown in Fig. 2, to the over-horizontal position shown in Fig. 3. In this position, it will be seen that the upper portion of the damper 46 will be out of contact with the deflected tip 64 of the crankarm 54 and that there is now nothing to retain the crankarm 54 in its damper opening position, as shown in Fig. 2. The excess weight of the handle 56 and of the portion 58 now rotates the crankarm in the opposite or counterclockwise direction until it assumes the position shown in Fig. 1. The fire is now inspected and, if necessary, an additional charge of coal is introduced and since the crankarm 54 is now inoperative, the damper 46 will close the opening 44 as the door 24 is closed. By this construction, it is possible to actuate the damper 46 to its open position independently of the operation of the door 24, but as soon as the door 24 is open, and it has to be opened sooner or later in order to inspect the fire or to replenish the supply of fuel, the damper 46 is automatically returned to its automatic opening and closing position unless it is again actuated to the open position by positive and deliberate manipulation of the crankarm 54 in the manner hereinabove described.

It will thus be seen that by merely adding the crankarm 54, by strategically positioning it with respect to the damper 46, and by proportioning the weight of the handle 56 and the offset portion 58 in respect to the portions 62 and 64 of the crankarm, and by correspondingly proportioning the tip 52 of the lever 34, all of the foregoing advantages are accomplished by a very simple arrangement which involves minimum use of material and minimum labor and time in assembly and installation. It will also be seen that the structure is foolproof, in that there are no parts that can, in any way, go out of order or that can even be damaged by normal abuse incidental to normal usage.

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

In a stove having an access opening leading to the interior thereof, a door for closing said opening, a chimney for exhausting combustion gases, a wall structure defining a passage interconnecting the interior of said stove with said chimney, a pivoted damper movable by gravity to a first position in which it closes said passage and rotatable to a second position in which said passage is open, said damper including a first portion disposed to one side, and a second portion disposed to the other side of the axis of rotation thereof, door-actuated means movable, when said door is opened to a first predetermined extent, into engagement with one of said damper portions to rotate said damper to said second position, a pivoted arm rotatable, independently of said door and said door-actuated means, to a first position in which it engages the other of said damper portions and rotates said damper toward, and retains it in, said second position, said arm, when not engaged with said damper portion, being movable by gravity to a second position in which it does not affect the operation of said damper, said door-actuated means being movable, when said door is moved to a second and greater predetermined extent, to rotate said damper further in the direction of said second position until said other portion of said damper is disengaged from said arm, whereby said arm

moves, by gravity, to its second position and said damper moves, by gravity, to its first position.

GUSTAV KLEIN.

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