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DOOR OPERATING MECHANISM

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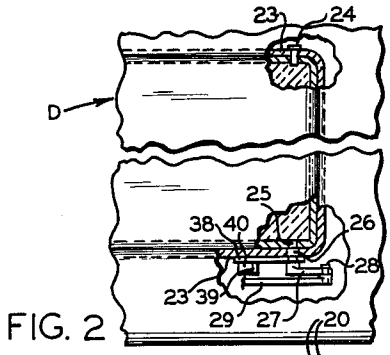


FIG. 2

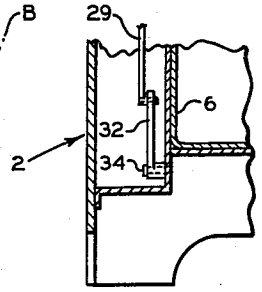


FIG. 3

FIG. 1

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DOOR OPERATING MECHANISM

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This invention relates to door operating mechanisms and more particularly to apparatus particularly adapted for operating the charging doors of devices such as domestic incinerators.

A domestic incinerator of the general class with which the invention is adapted for use conventionally comprises, top, bottom and side walls defining a chamber for the reception of combustible materials. Located within the chamber may be any one of a number of kinds of burning devices which serve to ignite the refuse, garbage, and the like. One of the walls of the incinerator has a charging opening therein through which the combustible materials may be introduced to the chamber and this charging opening usually is fitted with a door which normally is closed but which may be opened to permit the combustible materials to be dropped in the combustion chamber.

Various kinds of door actuating mechanisms have been incorporated with such incinerators, including pedal actuated apparatus which enables a user to open the door by stepping on a pedal, thereby freeing the hands of the operator. Operating mechanisms of this kind are useful and convenient in that they permit access to be had to the interior of the incinerator without necessitating manual operation of the door. In many instances, however, the user may have several loads of refuse to be deposited in the incinerator and it may be necessary for the operator to move away from the incinerator after depositing one load to pick up another load. In those incinerators where the door remains open only so long as force is exerted on the operating pedal, the reopening of the door for depositing successive loads risks the possibility that a back-draft or the like developed when the door was closed could cause flames suddenly to rise through the charging opening which might burn the person charging a successive load to the incinerator who is not exercising particular care.

The possibility of this occurring is greatly reduced if the charging door can be left open until the last load of refuse is deposited in the incinerator. As has been indicated, however, this cannot, so far as is known, be accomplished with pedal operated actuating mechanisms of the kind in present use.

Even with a construction in which the charging door could be left open during the period of time it takes to deposit several loads of refuse therein, it is possible that the rapid burning of such combustibles as paper may cause flames to rise susbtantially to or even above the level of the charging opening, though no backdraft exists. Under such conditions, it is somewhat dangerous to have to reach across the charging opening to effect manual closing of the door.

An object of this invention is to provide apparatus for operating the charging door of domestic incinerators or the like and which is so designed as to enable the difficulties encountered with prior art devices to be overcome.

Another object of this invention is to provide door-operating mechanism remote from the door and operable by foot so as to permit the door to be opened without requiring the use of the hands, the apparatus being capable of manipulation so as to permit the door to remain open even though the force applied on the operating pedal is removed.

A further object of the invention is to provide door operating mechanism of the kind referred to which not only is capable of operation in the manner referred to in the preceding paragraph, but which also is capable of opening and closing the door in direct response to the application or removal of force to and from the operating pedal.

Still a further object of the invention is to provide door operating mechanism of the kind which will enable the door to remain open without the application of force to the mechanism, but which can be operated when desired to close the door.

Other objects and advantages of the invention will be pointed out specifically or will become apparent from the following description when it is considered in conjunction with the appended claims and the accompanying drawings, in which:

FIGURE 1 is a fragmentary, partly elevational and partly sectional view of an incinerator or the like equipped with door operating mechanism constructed in accordance with the invention;

FIGURE 2 is a fragmentary, partly plan and partly sectional view of a portion of the structure shown in FIGURE 1 and looking in the direction of the arrows 2—2 in FIGURE 1; and

FIGURE 3 is a sectional view taken on the line 3—3 in FIGURE 1.

For purposes of illustration, apparatus formed according to the invention is disclosed in association with a domestic incinerator 1 of known construction and including an outer casing 2 within which is an inner casing formed of front and rear walls 3 and 4, respectively, side walls 5 and 6, a bottom wall 7, and a top wall 8. Slightly above the bottom wall 7 is provided an ash drawer 9 and above the drawer 9 is a grate 10. Extending through the casing and the front wall 3 is a gas burner 11 over which extends a protective and flame distributing burner shield 12. Between the front wall 3 and the rear wall 4 is located an intermediate wall 13 which divides the interior of the cabinet or chamber into a primary combustion chamber 14 and a secondary combustion chamber 15. Communication between the chambers 14 and 15 is provided by an opening 14*a* surrounded by a collar or sleeve 15*a*. The upper end of the secondary chamber 15 communicates with a flue pipe P which passes through the casing 2. The primary combustion chamber 14 is adapted to receive combustible materials, and to permit the introduction of materials thereto, the top wall 8 of the primary combustion chamber is provided with a charging opening 16 which may be either selectively opened or closed by means of a charging door D. The door D includes an outer panel or member 19 composed of a pair of spaced apart plates 20 between which is located insulating material 21 of a suitable kind. Beneath the lowermost plate 20 is an inner panel or liner 22 which is secured to and moves with the outer member 19. The charging opening 16 is bounded by a substantially vertical wall 23 which not only defines the area of the charging opening, but also serves as a support on which the door may be mounted for swinging movements between open and closed positions.

Means is provided to mount the door for swinging movements between closed and open positions and comprises a pivot pin 24 at one side of the door and which extends through the wall 23 into the side of the door panel 19. At the opposite side of the door is a rock shaft 25 which also extends through the wall 23 into the door panel 19. The shaft 25 passes through a bearing 26 mounted in the wall 23, but the shaft 25 is rigidly connected to the door panel 19 in such manner that rocking of the shaft effects rocking movement of the door D. Also rigidly connected to the rock shaft 25 for movement with the latter is one end of a crank member 27, the other

end of the crank 27 being pivotally connected as at 28 to one end of a link 29. The link 29 is located between the sidewall 6 of the inner housing and the outer sidewall of the cabinet 2 and extends downwardly and forwardly towards the front of the incinerator.

Means designated generally by the reference character 30 is provided for effecting swinging movements of the crank 27 and the door D and comprises a manipulatable pedal member 31 located at the lower front of the incinerator outwardly of the latter, the member 31 being rigidly connected to one end of a lever 32 which extends through an opening 33 formed in the front wall of the incinerator cabinet 2. The lever 32 is of angular configuration as is shown in FIGURE 1 and has its other end pivoted as at 34 adjacent to the bottom of the wall 6. At a point between its ends, the lever 32 is pivotally connected by means of a pin 35 to the lower end of the link 29, the arrangement being such that downward movement of the pedal 31 will be transmitted to the lever member 27 by means of the link 29. The pedal 31 may be equipped with a forwardly projecting tread portion 36 to enable manipulation of the actuating means 30 by a person's foot.

Normally, the charging door D is in its closed position and the levers 27 and 32 and the link 29 are in the positions shown in full lines in FIGURE 1. When it is desired to load refuse in the incinerator, however, downward movement of the pedal 31 will cause the link 29 to exert a rocking force on the lever 27 and the rock shaft 25 so as to effect rocking of the door D in a clockwise direction, as viewed in FIGURE 1, from its closed position to a first or intermediate open position indicated by the reference character A. Referring to the full line disclosure of the parts 27 and 29 in FIGURE 1, it will be noted that when the door is closed the included angle between the crank 27 and the link 29 is greater than ninety degrees. Furthermore, it will be noted that the movement imparted to the lever 27 and the link 29 upon depression of the pedal 31 causes relative movement of the lever 27 and the link 29 in such directions as to increase the angle therebetween. The relationship among the parts 27, 29 and 30 is such that the parts 27 and 29 may move from the angular position shown in full lines in FIGURE 1 to a dead center position in which the lever 27 forms a straight line extension of the link 29. In these positions of the parts, further rocking movement of the door D under the influence of the link 29 from the position indicated at A in a clockwise direction is precluded and further downward movement of the pedal 31 is arrested. These positions of the link 29 and the pedal 31 may be referred to as primary positions and are indicated by the reference characters A′ and A″, respectively.

When the parts are in the positions indicated by A, A′, and A″, the door D has been swung through an angle less than ninety degrees. Consequently, it has a tendency to swing under the influence of gravity to its closed position. Thus, when force is removed from the pedal 31, the door D will swing under its weight to its closed position and will restore the operating parts to their full line positions shown in FIGURE 1.

In some instances, it may be desirable to permit the door D to remain open even though no force is exerted on the pedal 31. This is possible with apparatus constructed in accordance with the invention and may be effected merely by pushing the door D from the intermediate open position shown at A in a clockwise direction to a second open position shown at B. When the door has been swung to the position shown at B, it will have travelled a distance greater than ninety degrees from its closed position and such movement of the door will effect relative movement of the parts 27, 29 and 32 in such manner as to reestablish an angular relation between the crank 27 and the link 29, but on the other side of dead center. This position of the link 29 is indicated at B′. The relative movement between the link 29 and the lever 27 also will effect upward movement of the lever 32 and the pedal 31 from their primary positions at A″ to secondary positions indicated at B″. That is, the pedal 31 will be raised somewhat from its lowermost position upon opening of the door through an angle of greater than ninety degrees.

When the door D is in the position indicated at B in FIGURE 1, it has a tendency to swing under the influence of gravity in a further clockwise direction and would do so unless restrained. The door may be restrained from further clockwise movement in any number of ways, but it is preferred that stop means indicated generally by the reference character 37 be provided and be located in such position as to react directly on the crank 27. Stop means could be arranged to react directly on the door D or on the link 29, for example, but it is desirable from a manufacturing and operational standpoint to locate the stop means as shown. The stop means 37 conveniently may comprise a plate 38 welded or otherwise suitably affixed to the wall 23 and having a stop wing 39 projecting laterally therefrom in such position as to be located in the path of movement of the link 29 and the lever 27 when the latter elements have swung through their dead center position and thereby prevent further relative movement of those elements past their dead center positions. In order to reinforce the stop 39, it may be joined to a flange 40 which is so located as to resist deflection of the wing 39 when the latter is engaged by the crank.

When it is desired to effect movement of the door D from its second open position indicated at B, it is necessary only to apply downward force on the pedal 31 to cause it to move downwardly from its B″ or secondary position. Such downward movement of the pedal 31 will swing the link 29 and the lever 27 in such directions as to return them to their dead center positions and also will swing the door D from its position shown at B to its intermediate open position indicated at A. When the door has arrived at its intermediate position, the release of force from the pedal 31 will enable the door D to swing closed under the influence of its momentum and gravity in the manner previously described.

The disclosed embodiment is representative of a presently preferred form of the invention, but is intended to be illustrative rather than definitive thereof. The invention is defined in the claims.

I claim:

1. In an incinerator or the like having walls defining a chamber for the reception of combustible materials, a charging opening in one of said walls through which materials may be introduced to said chamber, a closure member, and means mounting said closure member for movements from and to a position in which it closes said charging opening, and to and from an open position wherein said door is passed beyond a vertical plane passing through the axis of the mounting means: operating means; means mounting said operating means for movements from a first position to a second position and return; crank means; means pivotally interconnecting said operating means and said crank means; and means connecting said crank means to said closure member for movement therewith and at such an angular relation with said interconnecting means when said closure member is in its closed position that movement of said operating means toward said second position effects relative movement of said interconnecting means and said crank means in such directions as to dispose said interconnecting means and said crank means in dead center relation, the movement of said crank means to such dead center relation causing movement of said closure member in an opening direction but in an amount insufficient to locate said closure member in a vertical position, said closure member being further movable in said opening direction independently of said operating means to a second open position inclined past the vertical, said connecting means between said closure member and said crank means ef-

fecting relative movement of said crank means and said interconnecting means to positions beyond dead center during such further movement, said operating means being capable of further movement toward said second position when said closure member is in said second position to effect relative movement of said crank means and said interconnecting means in directions such that said closure member is moved toward its closed position

2. The construction set forth in claim 1 including stop means located in the path of movement of one of said interconnecting means and crank means for limiting relative movement of the latter after their movement to beyond dead center relation.

3. The construction set forth in claim 1 wherein the movement of said closure member to said second open position effects movement of said operating means in a direction toward its said first position.

4. The construction set forth in claim 1 including means for holding said closure member in its said second open position.

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