

April 6, 1965

R. D. CHISHOLM

3,176,485

TAMPER-PROOF DOOR LATCHING MECHANISM

Filed Aug. 28, 1963

2 Sheets-Sheet 1

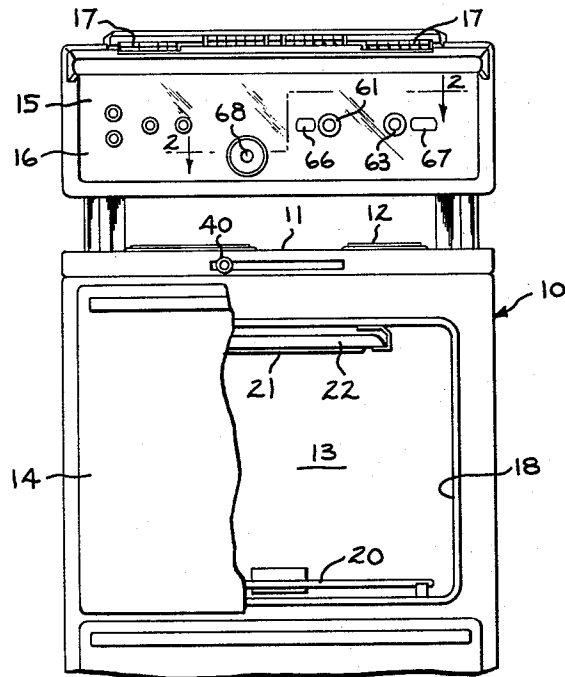


FIG. 1

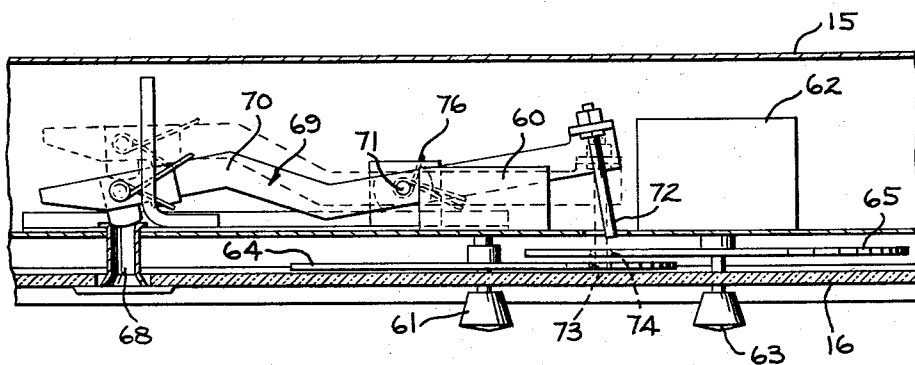


FIG. 2

INVENTOR
ROY D. CHISHOLM

BY *Richard L. Caslin*
HIS ATTORNEY

April 6, 1965

R. D. CHISHOLM

3,176,485

TAMPER-PROOF DOOR LATCHING MECHANISM

Filed Aug. 28, 1963

2 Sheets-Sheet 2

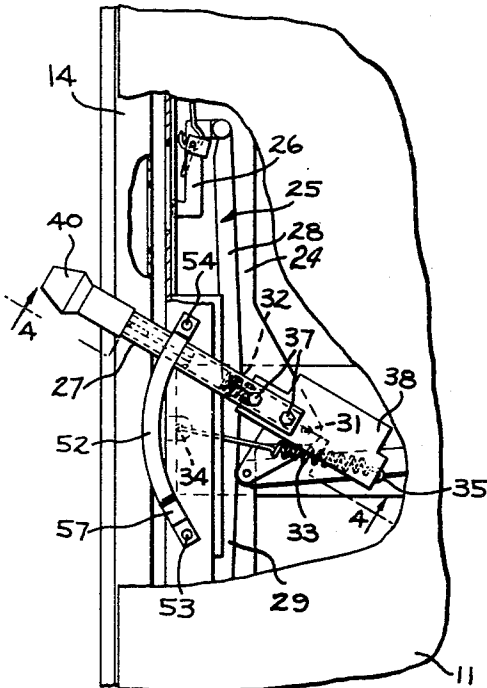


FIG. 3

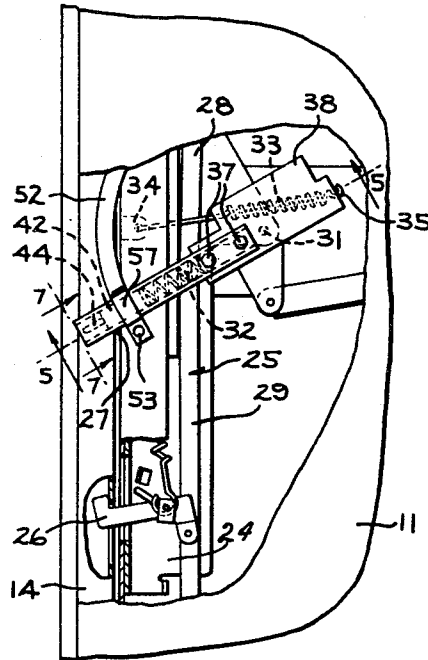


FIG. 6

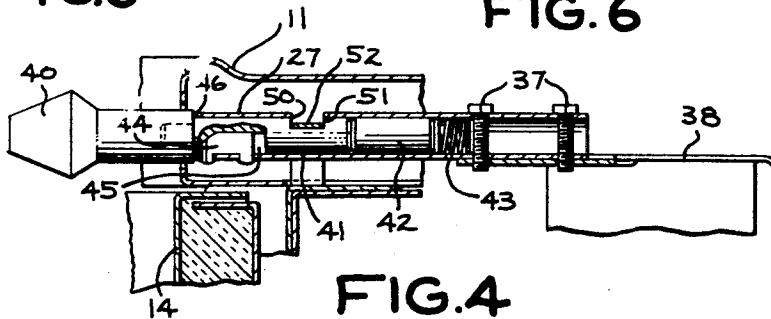


FIG. 4

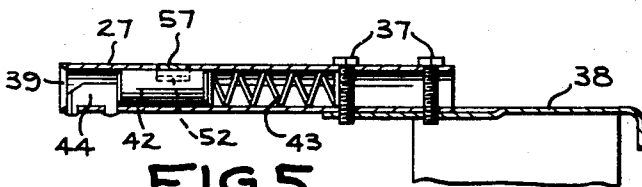


FIG. 5

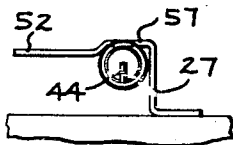


FIG. 7

INVENTOR
ROY D. CHISHOLM

BY *Richard L. Cashin*
HIS ATTORNEY

1

2

3,176,485
TAMPER-PROOF DOOR LATCHING MECHANISM
Roy D. Chisholm, Louisville, Ky., assignor to General Electric Company, a corporation of New York
Filed Aug. 28, 1963, Ser. No. 305,067
6 Claims. (Cl. 70-121)

The present invention relates to a door latching mechanism and particularly to one having a locking means for holding the handle of the latching mechanism in a latched position to render it tamper-proof.

This invention was conceived during the recent development of a new concept in baking ovens for domestic use wherein the interior oven walls may be cleaned automatically by a high temperature heat cleaning cycle. Such a high temperature oven is described in an earlier co-pending application of Bohdan Hurko, Serial No. 244,493, filed December 13, 1962, now Patent No. 3,121,158, which is assigned to the General Electric Company, the assignee of the present invention. The food soil and grease spatter that accumulates on the oven walls may be completely removed automatically by raising the temperature of the oven to a heat cleaning temperature within the range of about 750° F. to 950° F. so as to burn off foreign matter from the oven walls. In such a high temperature oven it is of primary importance to latch the door before the cleaning cycle is set in motion and to hold it latched so that the door cannot be opened during the heat cleaning cycle.

This invention is also related to a co-pending application of the present applicant entitled "Safety Control Mechanism for High Temperature Oven," Serial No. 305,013, which was filed on August 28, 1963, and is assigned to the General Electric Company, the assignee of the present invention. This co-pending application deals with a high temperature heat cleaning oven where the control panel is designed to accommodate a removable key taken from the door latching mechanism in the latched position where the key serves to actuate the heating means for the oven through an interlock system as will be better understood hereinafter.

The principal object of the present invention is to provide a door latching mechanism having a latch handle for receiving a removable key member whereby the handle may only be moved if the key is carried by the handle.

A further object of the present invention is to provide a door latching mechanism of the class described where the key may only be removed from the handle when the handle is in its locked position.

A further object of the present invention is to provide a door latching mechanism of the class described with means to prevent the operation of the handle by any tool other than the removable key member.

The present invention, in accordance with one form thereof, is embodied in a latching mechanism for latching a door in a closed position against a door frame on which the door is supported for movement between open and closed positions. The particular type of latching mechanism is not critical in that this invention may be combined with many varieties of latching mechanisms which comprise broadly a movable latch means adapted to engage the door when the door is closed and also a movable handle connected to the latch means for actuating the latch means between its locked and its unlocked positions. The handle of the latching mechanism has a removable key insertable into the outermost end thereof, as well as a spring-biased sliding bolt positioned in the handle in opposition to the key. A guide rail co-operates with the handle and key with an interlocking engagement so that the key may not be withdrawn from

the handle. This guide rail is formed to be out of engagement with the key when the handle is in its locked position thereby permitting the removal of the key in this one position of the handle. The removal of the handle causes the bolt to slide into an interference relationship with the rail so that the handle may not be moved out of its locked position unless the key is reinserted into the handle.

My invention will be better understood from the following description taken in conjunction with the accompanying drawings and its scope will be pointed out in the appended claims.

FIGURE 1 is a front elevational view of a free-standing electric range within an oven door having a latching mechanism that embodies the present invention.

FIGURE 2 is a fragmentary cross-sectional plan view of the backsplash of the range showing an interlocking mechanism between a key-receiving slot and the manual control components for the heating elements of the oven.

FIGURE 3 is a fragmentary plan view with parts broken away to show a portion of the door latching mechanism in the unlocked position and principally the handle construction embodying the present invention.

FIGURE 4 is a fragmentary elevational view partly in cross-section of the handle of the door latching mechanism taken on the line 4-4 of FIGURE 3.

FIGURE 5 is a view similar to that of FIGURE 4 with the key removed from the handle in its locked position and showing the sliding bolt in its forward position as seen on line 5-5 of FIGURE 6.

FIGURE 6 is a fragmentary plan view similar to that of FIGURE 3 showing the handle member located in its locked position and with the key removed therefrom in a condition related to that of FIGURE 5.

FIGURE 7 is a fragmentary front elevational view of the handle of the door latching mechanism taken on the line 7-7 of FIGURE 6 and showing the guide rail out of interlocking engagement with the handle which allows the removal of the key in the locked position of the handle.

Turning now to a consideration of the drawings and in particular to FIGURE 1 there is shown for illustrative purposes a free-standing electric range 10 having a top cooking surface 11 with a plurality of surface heating elements 12, an oven cavity 13, a front-opening drop door 14 for the oven, and a backsplash 15 arranged along the back edge of the cooking surface 11 and containing a control panel 16 in the front face thereof which includes a plurality of manual control devices which govern the energization of the various heating elements of the oven. Arranged along the top surface of the backsplash are a plurality of pushbutton switches 17 which control the energization of the surface heating elements 12 of the top cooking surface. The oven cavity 13 is formed by a metallic oven liner 18 of box-like construction that has an open front adapted to be closed by the oven door 14 mentioned previously.

As in standard electric ovens there is a lower heating element or Bake unit 20 and an upper heating element or Broil unit 21. Combined with the Broil unit is a metal reflector 22 that overlies the Broil unit and allows the majority of the heat energy developed by this unit to be directed toward the food placed thereunder. Both the Bake and Broil units 20 and 21 are provided with terminals that extend out through the back wall of the oven liner for connection to power lead wires (not shown) as is standard in this art. The oven liner 18 is insulated from the range body by having a relatively thick blanket of insulation (not shown) surrounding the liner in order to prevent the waste of heat energy from the oven cavity as well as to maintain the temperature of the outer walls

of the range at a temperature low enough to meet the requirements of the Underwriters' Laboratory, Inc., as well as for the comfort of the user.

The door latch mechanism is identified as element 25 in FIGURES 3 and 6 and it includes an elongated bracket 24 supporting a movable latch means in the forming of a pair of swinging hook members 26 and a handle 27 which is connected to the latch means 25 by use of suitable link members 28 and 29. This particular latch mechanism is the same as that disclosed in a copending application of Ray C. Eigelbach, Serial No. 135,876, now Patent No. 3,125,365, which was filed on September 5, 1961, and is assigned to the General Electric Company, the assignee of the present invention. More details of this latch mechanism will not be given herein for the reason that many different types of latch mechanisms may be used with the present invention without departing from the scope thereof. It is believed sufficient to state that the handle 27 is pivoted about pivot point 31 to move in a horizontal plane between the unlocked position of FIGURE 3 and the locked position of FIGURE 6. This handle is likewise connected to the link members 28 and 29 by way of a pivot pin 32. There is also shown an over-center coil spring 33 which is connected in tension at one end to the bracket 24 as at 34 and connected at its opposite end 35 to the innermost end of the handle 27 to give an over-center snap action to the handle so that it does not linger in an intermediate position, but is either in the unlatched or the fully latched position when manual force is released from the handle.

The best showing of the handle 27 is presented in FIGURE 4 which is taken on the line 4-4 of FIGURE 3 as was mentioned previously. The handle 27 is of tubular metal construction and it is fastened by means of a pair of screw members 37 to a channel formation 38; only a portion of which is shown, but it serves as the bearing member for the pivot pin 31. The outermost or distal end 39 of the handle 27 is adapted to receive a removable key member 40 which has a shank 41 of about half of the length of the key that slides smoothly into the tubular handle. Also located within the handle is a sliding bolt 42 that is spring-biased by a coil spring 43 which is backed against one of the fastening screws 37. This spring-biased bolt 42 acts in opposition to the key 40. It will be noted in FIGURE 5 that when the key 40 has been removed from the handle the bolt 42 will slide forward as the spring 43 expands. This forward motion of the bolt 42 is arrested by a tooth 44 that is fastened in the mouth of the tube to provide an obstruction to screw drivers and the like tools which might be selected as a substitute for the key 40 in an attempt to tamper with the latching mechanism without authority. A longitudinal slot 45 is cut in the shank 41 of the key 40 so that the tooth 44 may be accommodated within the slot, and the key inserted into the handle up to the extent shown in FIGURE 4 where a shoulder 46 of the key abuts the end 39 of the tube.

This invention includes a locking arrangement between the key 40 and the handle 27 in order to prevent the removal of the key from the handle in all positions of the handle except the fully latched position of FIGURE 6. This is accomplished first by forming a transverse slot 50 in the top surface of the tubular handle as is seen in FIGURE 4, as well as provided in the shank of the key a transverse slot 51 coextensive with the slot 50. There is also an arcuate guide rail 52 that cooperates with these slots 50 and 51 and may be seen in FIGURE 3. This guide rail 52 is stationary in that both of its ends are fastened to the range body by means of fastening means 53 and 54. This rail 52 is arcuate in shape and is of narrow width to lie transverse to the longitudinal axis of the handle 27 in all positions thereof. The major length of this rail 52 is adapted to be seated or interlocked within the slot 50 of the handle and the slot 51 of the key as is best seen in FIGURE 4. An exception is at the very end of the rail as at 57 as best seen in FIGURE 7 where

the rail is raised to the top of the handle 27 so as to be out of engagement with the key 40.

It should be understood after comparing both FIGURES 4 and 5 that when the key 40 is removed from the handle 27 the biasing spring 43 will push the bolt 42 forward until it comes to rest against the tooth 44, and the bolt is then more or less centered under the slot 50 in the handle. When the bolt 42 is in this position it is not possible for the handle 27 to move out of this locked position, shown in both FIGURES 5 and 6 because the bolt 42 serves with the rail 52 as an obstruction to movement. It is only when the key 40 is inserted into the handle and the bolt 42 is retracted to the position shown in FIGURE 4 that the slot 51 of the key comes into position with the rail 52 so that the handle and key together may slide under the rail 52 into the unlocked position of FIGURE 3.

Having described above the design of a novel door latching mechanism with a removable key actuator, attention will not be returned to FIGURES 1 and 2 of the drawing and particularly an interlocking system positioned within the backsplash 15 as is taught in the co-pending Chisholm application Serial No. 305,053. The control panel 16 in the front face of the backsplash has supported therefrom an oven selector switch 60 having a rotatable knob 61 and an oven thermostat 62 with a knob 63. Both of these control components are fitted with an indicator dial 64 and 65 respectively. A small window 66 and 67 is provided for each dial 64 and 65 respectively to enable the reading of indicia present on the front face of the dials and obtaining the proper settings of the devices that control the heating circuits and temperatures for the oven.

A key hole 68 is formed in the control panel 16 for receiving the removable key 40 of the door latching mechanism. Located between the key hole and the switch and thermostat 60 and 62 is an interlock means 69 in the form of an elongated link member 70 that is pivoted adjacent its center as at 71 to move in a horizontal plane. A spring biasing force is exerted by spring member 76 to move the link in a counterclockwise direction against the innermost end of the key hole 68. The opposite end of the link is provided with a feeler 72 in the form of a locating pin which is capable of determining whether the switch 60 and/or the thermostat 62 are set properly for the high temperature heat cleaning cycle. Each dial 64 and 65 is provided with an indexing opening 73 and 74 respectively so that when the switch and thermostat are set properly these openings are aligned and the feeler 72 is able to penetrate through the openings. The interlocking means 69 also initiates the heat cleaning cycle when the key is inserted into the backsplash and the feeler mates with the openings 73 and 74 as by closing certain circuit switch means (not shown). During the heat cleaning cycle the key is locked into key slot 68 by a hook (not shown) to prevent its removal and use to open the latch while the oven is being operated at the high heat cleaning temperatures.

Modifications of this invention will occur to those skilled in this art therefore it is to be understood that this invention is not limited to the particular embodiments disclosed but that it is intended to cover all modifications which are within the true spirit and scope of this invention as claimed.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a latch mechanism for latching a door, a door and a door frame where the door is hingedly mounted to the door frame along one edge thereof, the door frame including a latch mechanism having a movable latch means and a swinging handle member for moving the latch means between a locked and an unlocked position, the door including a keeper means for engagement by the latch means for locking the door in a closed position; the invention comprises a locking means for holding the handle of the latch mechanism in the locked position, said handle

5

having a main portion and a removable key portion that must be inserted in the main handle portion in order to be able to move the latch mechanism, the main handle portion being connected to the latch means of the latch mechanism, and a guide rail cooperating with the main handle portion throughout the extent of the movement thereof, the main handle portion having slot means inter-fitted with the guide rail, the removable key portion also having slot means that is registrable with the first-men-tioned slot means and interfitted with the guide rail ex-cept when the handle is in its locked position, whereby the removable key may only be inserted and removed from the main handle portion when the handle is in its locked po-sition, and a sliding bolt member within the main handle portion, biasing means exerted on the bolt member to cause interference with the guide rail so as to hold the handle member in the locked position when the key mem-ber is absent therefrom.

2. A latch mechanism for latching a door comprising a swinging hook means adapted to engage a keeper means on a door and a swinging handle member for moving the hook means between a locked and an unlocked position, and locking means for holding the said handle member in the locked position, said locking means comprising a guide rail transverse to the longitudinal extent of the handle member, a removable key carried by the handle and a sliding bolt member also carried by the handle, the handle being of tubular form with a notch in one side thereof, the guide rail being positioned in said notch ex-cept when the handle is in its locked position, the key serving to depress the sliding bolt when the key is carried by the handle, and spring-biasing means acting upon the sliding bolt so that the removal of the key will bring the bolt into interference with the guide rail and prevent the movement of the latch mechanism to its unlocked posi-tion, the key also being notched for mating engagement with the guide rail so that when the handle is moved out of its locked position the key is interlocked with the guide rail and cannot be removed from the handle.

3. A latch mechanism having a swinging handle for operating same between a locked and an unlocked position, and interlocking means for holding the handle in the locked position, the handle being a tubular member in which is supported a spring-biased sliding bolt in op-position to a removable key member that is insertable into the outermost end of the handle, both the tubular handle and the key being slotted at coincident places, and a guide rail overlying the handle and being located in the slotted portion of the handle and key to prevent the re-moval of the key from the handle, the end of the guide rail which overlies the handle when the handle is in its locked position being raised out of engagement with the slot formed in the key so that the key may be removed, the removal of the key causing the bolt member to shift into the vicinity of the slot in the handle thereby to form an obstruction with the guide rail to prevent the movement of the handle.

4. A latch mechanism for latching a door, a door and a door frame on which the door is supported for movement between open and closed positions, the latch mechanisms being supported within the door frame and comprising a movable latch means adapted to engage the door when the door is closed and also a movable handle connected to the latch means for actuating the latch means between its locked and its unlocked position, the handle having a removable key insertable into the outermost end thereof, a spring-biased sliding bolt positioned in the handle in op-position to the key, a stationary arcuate rail positioned within the door frame and being arranged to lie trans-

6

verse to the longitudinal axis of the handle, the key being interlocked with the rail so that the key may not be with-drawn from the handle, the rail being formed out of en-gagement with the key when the handle is in its locked position, the removal of the key in said locked position causing the bolt to slide into an interference relationship with the rail so that the handle may not be moved to its unlocked position unless the key is inserted into the handle.

5. A latch mechanism for latching a door, a door and a door frame on which the door is supported for move-ment between open and closed positions, the latch mech-anism being supported within the door frame and com-prising a movable latch means adapted to engage the door when the door is closed and also a movable handle con-nected to the latch means for actuating the latch means between its locked and its unlocked position, the handle having a removable key insertable into the outermost end thereof, a spring-biased sliding bolt positioned in the han-dle in opposition to the key, a stationary arcuate rail posi-tioned within the door frame and being arranged to lie transverse to the longitudinal axis of the handle, both the handle and key being notched at coincident points so that the rail may be positioned therein in an interlocking en-gagement and the key may not be withdrawn from the handle, the rail being formed out of engagement with the key when the handle is in its locked position, the removal of the key in said locked position causing the bolt to slide into an interference relationship with the rail so that the handle may not be moved to its unlocked position unless the key is inserted into the handle.

6. A latch mechanism for latching a door, a door and a door frame on which the door is supported for move-ment between open and closed positions, the latch mech-anism being supported within either the door or the door frame and comprising a movable latch means adapted to engage the opposite member when the door is closed and also a movable handle connected to the latch means for actuating the latch means between its locked and unlocked position, the handle having a removable key insertable into the outermost end thereof, a spring-biased sliding bolt positioned in the handle in opposition to the key, a stationary arcuate rail positioned within the latch sup-port means door and being arranged to lie transverse to the longitudinal axis of the handle, both the handle and key being notched at coincident points so that the rail may be positioned therein in an interlocking engagement and the key may not be withdrawn from the handle, the rail being formed out of engagement with the key when the handle is in its locked position, the removal of the key in said locked position causing the bolt to slide into an interference relationship with the rail so that the handle may not be moved to its unlocked position unless the key is inserted into the handle, the open end of the handle in-cluding an inner tooth member, the key having a longitu-dinal slot formed therein in which the tooth is accommo-dated, the tooth serving to prevent the unauthorized manipulation of the sliding bolt without the use of the key.

References Cited by the Examiner

UNITED STATES PATENTS

698,841	4/02	Klein	70—195
1,167,600	1/16	Saunders	70—193
1,581,035	4/26	Stephenson	70—193
3,125,365	3/64	Eigelbach	126—197

ALBERT H. KAMPE, *Primary Examiner*.

BOBBY R. GAY, *Examiner*.