

May 17, 1955

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2,708,293

HINGED DOOR CONSTRUCTIONS

Filed July 21, 1951

2 Sheets-Sheet 1

FIG. 1.

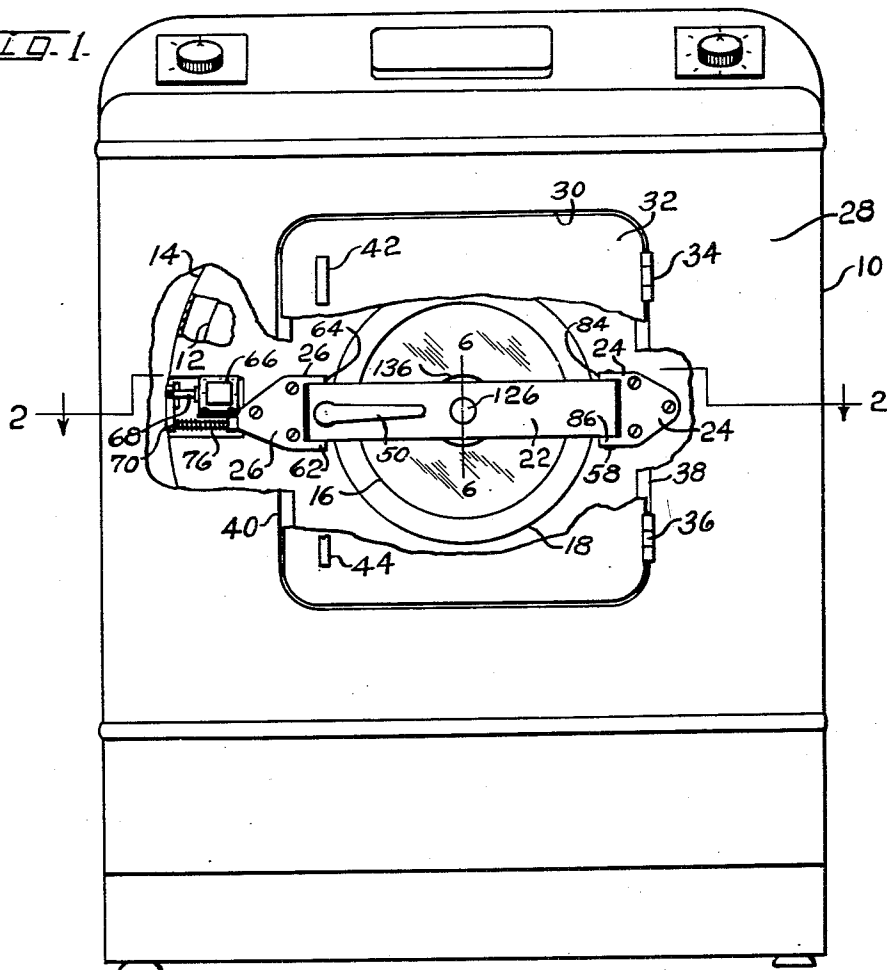
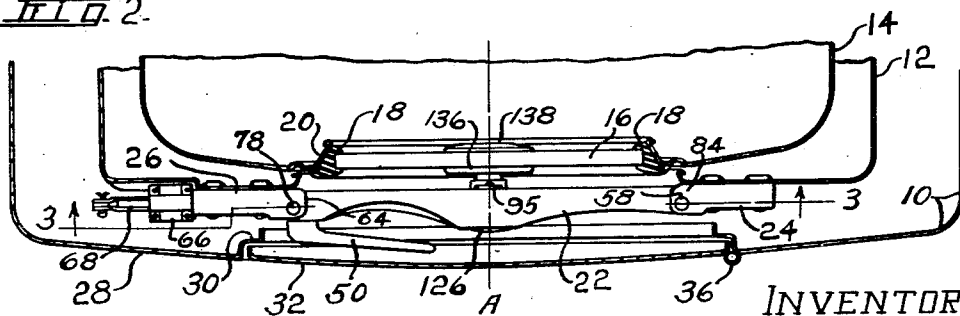


FIG. 2.



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2,708,293

HINGED DOOR CONSTRUCTIONS

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Application July 21, 1951, Serial No. 237,895

5 Claims. (Cl. 20—16)

This invention relates to hinged door constructions, particularly adapted to household appliances wherein it is desirable to reverse the hinge position and control the door against accidental opening.

In appliances such as washing machines and the like, it is desirable that access doors be reversible, that is, hingeable either to the right or to the left, for access convenience regardless of the location of such apparatus. At the same time, it is desirable to provide an interlock to prevent the opening of such door during certain stages of operation of such appliances, such interlock being preferably electrically controllable and operable from circuits controlling the stages of operation of such appliances.

It is accordingly an object of the present invention to provide a door construction which may be readily assembled to swing in either direction.

Another object of the invention is to provide a reversible door construction wherein an interlock operable from one of the stationary door members may act directly on the door lock, when such member is acting as a latch member, or through the door when acting as a hinge member.

A further object of the invention is to provide a door construction in which combination hinge and latch members are employed at either side of the door so that the door may be hinged on either member.

A still further object of the invention is to provide a door construction in which the principal member is a swinging support arm, and in which the latching and hinging members provide rigid support for the arm when in closed position.

A still further object of the invention is to provide a door construction having an interlock wherein the door may be easily and quickly reversed to swing in an opposite direction, and in which the interlock is effective for either position.

The above and other novel features of the invention will appear more fully hereinafter from the following detailed description when taken in conjunction with the accompanying drawings. It is expressly understood that the drawings are employed for purposes of illustration only and are not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

In the drawings, wherein like reference characters indicate like parts:

Figure 1 is a front elevation of the door structure with parts broken away;

Figure 2 is a horizontal section taken substantially on the line 2—2 of Figure 1;

Figure 3 is a section taken substantially on the line 3—3 of Figure 2, with the hinge at the right;

Figure 4 is a section taken substantially on the line 4—4 of Figure 3;

Figure 5 is a section taken substantially on the line 5—5 of Figure 3;

Figure 6 is a section taken substantially on the line 6—6 of Figure 1; and

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Figure 7 is a section similar to Figure 3, but taken with the door arm support in reversed position, and hinged at the left.

In Figures 1 and 2, there is shown a washing machine 5 of the cylinder type contained within a cabinet generally indicated as at 10. The washing apparatus contained in the cabinet comprises a stationary tub or splash guard 12, in which there is located a revolving wash drum or tub 14, the same rotating on a horizontal axis A. In practice, as is particularly shown in co-pending application Serial No. 775,237, filed September 20, 1947, now Patent No. 2,637,189, granted May 5, 1953, the wash tub 14 is power-driven from a drive shaft located at the rear end thereof and is supported at the front end on a revolving door 16. The door is provided with a seal 18 adapted to engage an annular tapered jamb 20 formed in the end of tub 14, so that the door is adapted to hold wash water within the tub 14, as, for example, should the tub be of the imperforate type.

Such revolving door is rotatably mounted upon a hinged arm 22, supported on bracket members 24 and 26 mounted upon the forward wall of the stationary tub or splash guard. The arm is adapted to be hinged at one end, and securely latched at the other, whereby a rugged mount for the revolving door and support for the forward end of the revolving tub 14 is provided. The forward wall of the cabinet is provided with a hinged door 32, nesting in a rectangular offset door frame 30 integrally formed in the forward wall 28 of the cabinet.

In laundry appliances of the type described, it is desirable that the access door be so constructed as to be readily hinged for either right or left hand operation, since in placing apparatus of the type described in a utility room, kitchen, or elsewhere, it is desirable to be able to arrange the door so as to hinge on whichever side is more convenient. The door 32 is preferably of the type which is symmetrical about its horizontal axis so that the hinges 34 and 36 may be affixed to the right hand vertical portion of the door frame as shown at 38, or the left hand vertical portion of the door frame as shown at 40 in a similar manner by merely inverting the door by 180° rotation. Such a change can be effected by mere change of the hinge mounting on the door frame from one side to the other, and in practice, holes for fastening such hinges to the door frame will be provided on both the right and left hand door jamb. Where a knob such as 42 is provided, which is non-symmetrically disposed with reference to the horizontal center line, an escutcheon plate such as 44 can be mounted in symmetrical relation to the knob, so that the plate and knob can be shifted or interchanged when the door hinges are changed from one side to the other.

Referring more in detail to Figures 3 to 7, inclusive, the arm 22 is of channel section with transverse webbing as at 43, 45 and 47, the web 45 supporting a stub shaft 46 centrally thereof. The flanges 53 and 51 of the arm at one end are provided with pintle-receiving apertures 48 and 49. At the other end of the arm, there is mounted a manually operable handle 50 having a shank 52 pivoted in the web portion 54 of the arm 22. The shank 52 carries on its inner end a latch member 56, having a lug or tongue 57, such member being rotatable by turning of the handle so as to engage or disengage the latch member with the cam surface 59 of a stationary latch plate 60 member 60.

In Figures 3 and 4, the arm is shown pivoted on pintle 58 in bracket member 24. Such bracket member is provided with spaced ears 84 and 86 for receiving the pintle, and such ears closely embrace the side flanges 51 and 53 of the arm 22. The pintle is positioned by spaced snap washers 61, acting as collars thereon. The bracket member 26 contains the latch plate 60 mounted trans-

versely upon shoulders 63 and 65, and the opposed lugs or ears 62 and 64 receive the end of the arm 22 in a manner to embrace and provide relatively rigid support for the otherwise free end of the arm when such arm is positioned with the latch member 56 in engagement with the latch plate 60.

The member 26 has mounted thereon a solenoid 66 adapted to actuate an armature 68, which in turn actuates a bar 70 slidably mounted in guide apertures 73 and 74 in the end boss 75 and in the shoulder 65 of the member 26, respectively. The bar 70 lies substantially in the plane of the latch member 56. When the latch member is in latched position, and the bar moved to the right by armature 68, such bar takes the position indicated in dotted lines 70', so as to block the movement of the lug 57 and prevent the counterclockwise turning of the latch member 56. The manual release of the latch is thereby prevented. When the solenoid 66 is de-energized, the bar 70 is moved to the left by reason of the compression spring 76, so as to clear the lug 57 of the latch member 56 and permit the arm to be unlatched and swung from the member 26, pivoting upon the pintle 58 in the bracket 24.

As previously pointed out, it is desirable that the arm 22 be so constructed as to be pivoted upon the bracket 26 so as to reverse the direction in which the arm 22 swings when opening the revolving door 16 supported thereby. The ears 62 and 64 of the bracket 26 are provided with pintle-receiving apertures 78 and 80, so that the arm 22, by end for end rearrangement, may be pivoted in the bracket 26 in the manner shown in Figure 7. The bracket 24 is provided with a latch plate 82 secured on shoulders 83 and 85 adapted to engage the opposite side of the lug 57 of the latch member 56 to provide substantially the same latching mechanism as previously described in connection with the bracket 26. The ears 84 and 86 on the bracket 24, previously described as having apertures to receive the pintle 58, provide support for the latched end of the arm 22, embracing and coacting with the flanges 53 and 51, respectively, when pivoted on bracket 26 as in Figure 7.

In order to maintain the arm in latched position when reversed in accordance with Figure 7, there is provided within the arm 22 a rod or bar 88, slidably mounted in apertures 90 and 92 of webs 43 and 47, and retained in a slot 94 in the transverse web 45. The rod 88 may be offset as at 98 and 100 to clear the stud 46. The rod 88 may be inserted into the arm by projecting first one end and then the other end into the apertures referred to, after which the offset portion is placed in the slot 94 and retained by an overlying finger 95 (see Figure 6). At the left hand end (see Figure 7), such rod is provided with a snap washer 102 bearing against a compression spring 104 threaded on the rod, the spring acting to move the rod to the left and bearing at its other end against the web 47, through which the rod extends. The end 108 is in alignment with the solenoid-actuated bar 70, and when such bar is moved to the right, the end thereof engages the end 108 of rod 88, moving the rod 88 to the right, so that the right hand end 110 of such rod projects into the path of the finger 112 on the latch member 56. Thus, when the solenoid is actuated, the locking movement of bar 70 is transmitted through rod 88 to the latch member 56 through the tongue 112, when the parts are arranged as in Figure 7, whereas when the parts are arranged as in Figure 3, the rod 70 cooperates directly with the tongue 57, so that in either position, the arm is provided with a solenoid interlock effective to prevent release of the latch, when such solenoid is energized.

It will be seen that the hinged arm is so constructed that it can be moved end for end to either position, as shown in Figure 3 or Figure 7, by simply removing the snap rings 61 on the pintle 58, and reinstalling the pintle in whichever of the bracket members 24 or 26 is to serve as the hinge member. The arm, by reason of its flanges 51 and 53, is adapted to mate within and be closely embraced by the channel-forming ears 84

or 86 or 62 and 64 of the respective brackets 24 and 26, so as to form a rigid bar support for the door pivot stud 46, regardless of which bracket member acts as pivot.

The pivot stud 46 is adjustable axially in the center web 45, there being provided a threaded shank 120, threaded in the web 45. A set screw 122 engaging a reduced diameter portion 124 on the stud 46, is adapted to lock the stud in any position to which it is set. A cap 126 fitting in an enlarged recess in the bar is adapted to cover the end of the stud. The other end of the stud supports an anti-friction ball bearing 128 held by snap rings 130 and 132, and the outer race 134 of such bearing supports the transparent circular door 16 through ring 136 and cap 138 clamped thereagainst.

The arrangement thus described provides a rigid hinged support which may be readily reversed by simply shifting the hinge pin and reversing the arm. The hinge and latch members at either end, at the same time afford a rigid positive support for the arm, and the interlock is effective in either position, requiring no assembly adjustment or alteration upon shifting the pivot position for the arm. The entire arrangement is such as to provide a rigid accurately located journal for the revolving door, which location will be maintained, whether the arm is hinged at one end or the other. The construction is such that the door arm may be easily changed in the field from right to left, without danger of disturbing the alignment or engagement of the revolving door.

Although a single embodiment of the invention has been illustrated and described, it is to be understood that the invention is not limited thereto. As various changes in the construction and arrangement may be made without departing from the spirit of the invention, as will be apparent to those skilled in the art, reference will be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. In a hinged door construction, a door frame, hinge members secured upon opposite sides of said frame, each having latch plate means, a door member adapted to be pivoted from one side only on either member, and having a manually movable latch means adapted to engage either of the latch plate means of said hinge members, said door being pivoted to one of said members, with its latch means coacting with the latch plate means of the other member, interlocking means mounted on the other of said hinge members adapted to be projected into the path of said movable latch means when said door member is closed, and in latched position with respect to the other hinged member, to prevent unlatching movement of said latch means, and means carried by the door member and adapted to be projected into the path of said movable latch means to prevent unlatching movement of said latch means when said door member is hinged on the other of said hinge members, said interlocking means and said door-carried means being so constructed and arranged that movement of said interlocking means moves said door-carried means into position to prevent unlatching movement of said latch means when said door member is hinged upon the other of said hinge members and is in latched position with respect to the one hinge member.

2. In a hinged door construction, a door frame, hinge members secured upon opposite sides of said frame, each having latch plate means, a door member in the form of an arm having one end only adapted to be pivoted on either member, and having a manually movable latch means adapted to engage either of the latch plate means of said hinge members, said door member being pivoted to one of said members with its latch means coacting with the latch plate means of the other member, interlocking means mounted on the other of said hinge members adapted to be projected into the path of said movable latch means when said door member is closed, and in latched position with respect to the other hinged member, to prevent unlatching movement of said latch means,

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and means carried by the door member and adapted to be projected into the path of said movable latch means to prevent unlatching movement of said latch means when said door member is hinged on the other of said hinge members, said interlocking means and said door-carried means being so constructed and arranged that movement of said interlocking means moves said door-carried means when said door member is hinged upon the other of said hinge members and in latched position with respect to the one hinge member, each of said hinge members being channelled to receive the ends of said arm and embrace said ends on opposite sides, when in latched position.

3. In a hinged door construction, a door frame, hinge members secured upon opposite sides of said frame, each having latch plate means, a door member adapted to be pivoted from one side only on either member, and having a manually rotatable latch means including a lug adapted to engage either of the latch plate means of said hinge members and an oppositely projecting finger, said door member being pivoted to one of said members with its latch plate means coacting with the latch plate means of the other member, interlocking means mounted on the other of said hinge members adapted to be projected into the path of the lug of said rotatable latch means when said door member is closed, and in latched position with respect to the other hinged member, to prevent unlatching movement of said latch means, and means carried by the door member and adapted to be projected into the path of the finger of said movable latch means to prevent unlatching movement of said latch means when said door member is hinged on the other of said hinge members, said interlocking means and said door means being so constructed and arranged that movement of said interlocking means moves said door-carried means when said door member is hinged upon the other of said hinge members and in latched position with respect to the one hinge member.

4. In a hinged door construction, a door frame, hinge members secured upon opposite sides of said frame, each having latch plate means, a door member adapted to be pivoted from one side only on either member, and having a manually rotatable latch means including a lug adapted to engage either of the latch plate means of said hinge members and an oppositely projecting finger, said door member being pivoted to one of said members with its latch means coacting with the latch plate means of the other member interlocking means mounted on the other of said hinge members adapted to be projected

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into the path of the lug of said rotatable latch means when said door member is closed, and in latched position with respect to the other hinged member, to prevent unlatching movement of said latch means, means carried by the door member and adapted to be projected into the path of the finger of said movable latch means to prevent unlatching movement of said latch means when said door member is hinged on the other of said hinge members, said interlocking means and said door-carried means being so constructed and arranged that movement of said interlocking means moves said door-carried means when said door member is hinged upon the other of said hinge members and in latched position with respect to the one hinge member, and electromagnetic means mounted on said one of said hinge members, and coupled to said bar.

5. In a reversible door interlock, a door frame, hinge members secured to said frame along opposite sides thereof, each of said members having hinge pintle-receiving means and latch-engaging means, a door member adapted to be hinged at one end only to one or the other of said members, and having at the other end manually operable latch means adapted to engage the latch-engaging means of either hinge member, said door member being pivoted to one of said members with its latch means coacting with the latch plate means of the other member interlock means associated with the other of said hinge members and adapted to prevent release of said manually operable latch means when cooperating with said latch-engaging means of said last-named hinge member, and shiftable means carried by said door member adapted to prevent release of said manually operable latch means, when cooperating with the latch-engaging means of the other of said hinge members, said interlock means and said shiftable means being so constructed and arranged that the latter is operated by the former when the hinged member is hinged to the hinge member having said interlocking means.

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