

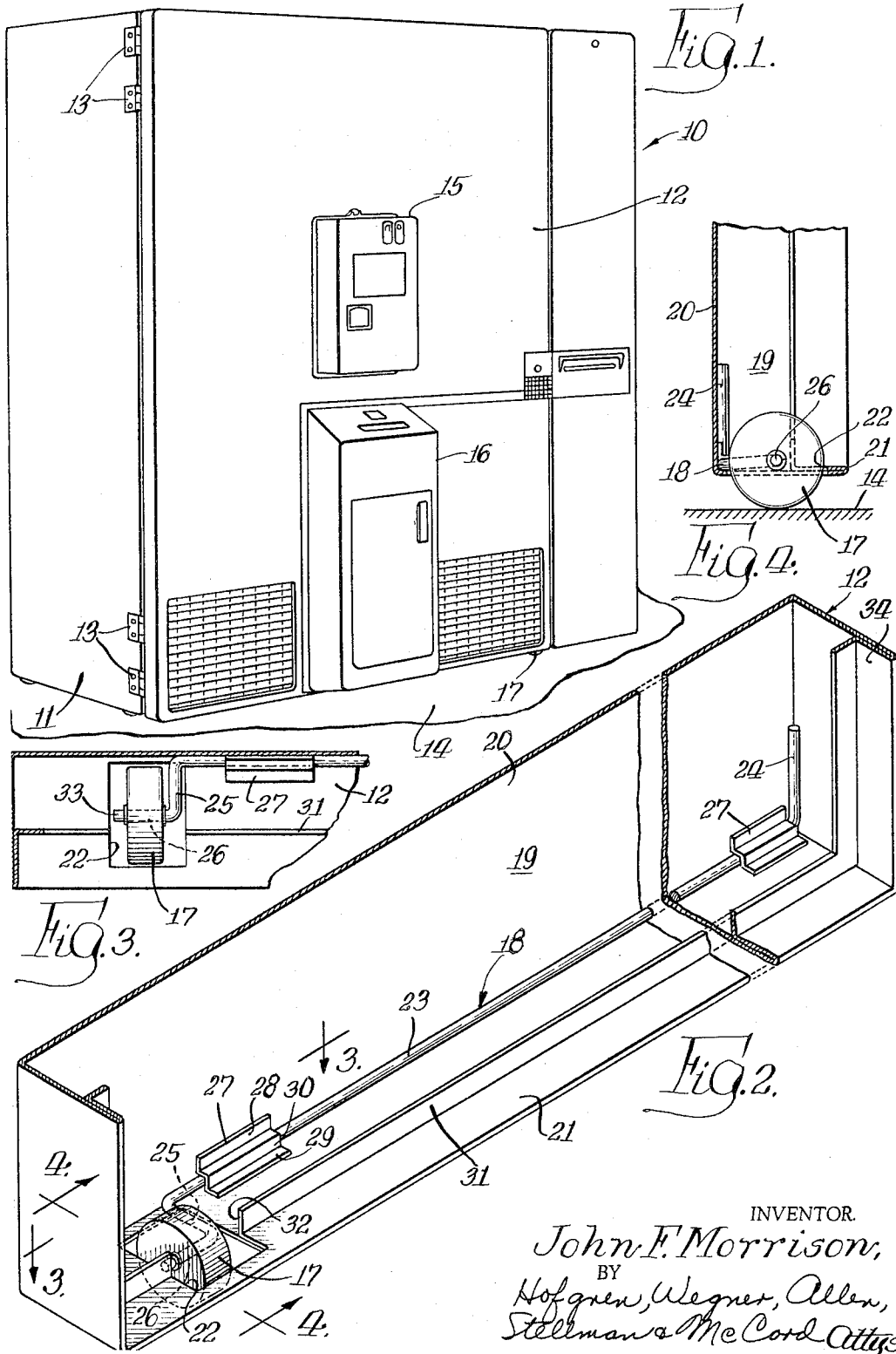
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WHEEL SUPPORT FOR DOORS

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3,281,992

**WHEEL SUPPORT FOR DOORS**

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 5 Claims. (Cl. 49—396)

This invention relates to door structures and in particular to door structures mounted for swinging movement.

In cabinets such as provided for housing automatic ice making equipment, door structures may be provided arranged to be swung from a cabinet closing position to an access position wherein the interior of the cabinet is made accessible to the user. Such door structures may be relatively heavy and thus introduce substantial strain forces in the hinge means provided for swingably mounting the doors on the cabinet. The present invention is concerned with the problem of supporting such doors for swinging movement over a subjacent surface and comprehends the provision of new and improved means for augmenting the swingable support of the hinges.

Thus, a principal feature of the present invention is the provision of new and improved structure for supporting a door for swingable movement.

Another feature of the invention is the provision of such a door supporting structure having new and improved means for engaging the subjacent surface for use in supporting the door.

A further feature of the invention is the provision of such a door supporting structure including a wheel and new and improved means within the door for rotatably mounting the wheel on the door to extend below the bottom of the door for engaging the subjacent surface, the mounting means being arranged to yieldably adjust the position of the wheel for maintained engagement with the surface during swinging movement of the door thereover.

Still another feature of the invention is the provision of such a door supporting structure wherein the wheel mounting means comprises a torsion spring.

A yet further feature of the invention is the provision of such a door supporting structure wherein the spring is anchored to the door to retain the spring against transverse and axial displacement and to lock one end of the elongated portion of the spring against turning about the axis thereof.

A yet further feature of the invention is the provision of such a door supporting structure wherein the retaining means comprises a bracket extending from the upright means to the bottom about the elongated portion of the spring.

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIGURE 1 is a perspective view of an ice maker provided with a door having means embodying the invention for supporting the door for swinging movement;

FIGURE 2 is a fragmentary broken enlarged rear isometric view of the lower portion of the door illustrating the arrangement of the door supporting structure therein;

FIGURE 3 is a fragmentary horizontal section taken substantially along the line 3—3 of FIGURE 2; and

FIGURE 4 is a fragmentary vertical section taken substantially along the line 4—4 of FIGURE 2.

In the exemplary embodiment of the invention as disclosed in the drawing, a commercial ice maker generally designated 10 is shown to comprise a cabinet 11 having a front door 12 mounted for swinging movement on the cabinet by conventional first means such as hinges 13. The cabinet 11 is arranged to be carried on a subjacent surface 14 over which the door swings in moving from the closed portion of FIGURE 1 to an opened position

(not shown) wherein access to the interior of the cabinet 11 is provided. While I have illustrated the invention in connection with a commercial ice maker, it is to be understood that the invention is susceptible of utilization with other cabinet structures wherein a door is provided for swinging movement over a subjacent surface.

In swingably mounting a door of such relatively large size and weight as door 12 of the ice maker apparatus 10, a serious problem arises in that the hinges 13 may become distorted or the cabinet 11 itself may become distorted due to the substantial forces acting thereon by the hung door. This problem is aggravated where additional weight is added to the door such as the weight of the coin mechanism 15 and the delivery mechanism 16 illustrated in FIGURE 1. The present invention comprehends a solution to this problem wherein an outboard wheel 17 is carried in a novel manner by the door 12 for rolling movement over the surface 14 as the door is moved from and toward the closed position of FIGURE 1.

Referring now more specifically to FIGURES 2 through 4, wheel 17 is carried on a torsion spring generally designated 18 which is mounted within the space 19 behind the front panel 20 and above the bottom wall member 21 of the door 12. The bottom wall member is provided with an opening 22, downwardly through which the wheel 17 extends to rest on the surface 14, as seen in FIGURE 4.

The torsion spring 18 includes an elongated torsion midportion 23, a first turned end portion 24 and an opposite turned end portion 25 having a further turned distal end 26 extending parallel to midportion 23 and comprising an axle on which the wheel 17 is rotatably mounted. The spring 18 is retained against lateral and axial movement by a pair of brackets 27 each of which includes an upper flange 28 secured to the front panel 20, a lower flange 29 secured to the bottom wall member 21 and a midportion 30 extending approximately 90° around the spring portion 23 to retain the spring portion 23 in the inside corner of the door defined by the juncture of the front panel 20 and the bottom wall member 21.

Turned end 24 of the spring 18 bears against the front panel 20, as seen in FIGURES 2 and 4, to prevent rotation of the spring portion 23 in a counterclockwise direction as seen in these figures. As best seen in FIGURE 4, a decrease in the spacing between the door bottom 21 and surface 14 causes the wheel to urge the spring end 26 upwardly relative to the door bottom member 21, thus urging the spring 18 in a counterclockwise direction. However, as the end 24 is effectively positively retained against such counterclockwise movement by its engagement with the front panel 20, the torsion or midportion 23 of the spring twists resiliently as a result of the counterclockwise stress developed therein and thereby resiliently permits the movement of the spring end 26. Thus, as the door 12 swings over the surface 14, the wheel axle 26 may rise and fall relative to the level of the door bottom wall member 21 with the spring portion 23 resiliently accommodating this movement. As shown in FIGURE 2, the midportion 23 of the spring 18 may extend substantially the width of the door 12. The amount of support given to the door by the wheel 17 is readily controlled by the length of the spring portion 23 and the stiffness characteristics of the material of which the spring is composed. In the illustrated embodiment the spring 18 is arranged to maintain the door substantially horizontal at all times whereby smooth free swinging action of the door on the hinges 13 is effected.

In the illustrated embodiment, the brackets 27 may be secured to the door panel 20 and bottom wall member 21 by welding or the like, the door panel 20 and wall member 21 being formed herein of metal. As best seen in FIGURE 2, the door may be reinforced by a flange 31

provided with a gap 32 at opening 22 to accommodate the wheel 17. The wheel 17 may be secured on the spring end 26 by a suitable retaining cap 33 of conventional construction. Further, as illustrated in FIGURE 2, the end 24 of the spring 18 may extend adjacent the left side wall 34 of the door 12 whereby axial movement of the spring away from the opening 22 is effectively precluded, and the end 25 of the spring is limited in a downward direction of movement by the door bottom wall member 21.

While I have shown and described one embodiment of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as defined in the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. Structure for supporting a door for swinging movement about a vertical axis over a subjacent surface, comprising: means defining a door having a bottom and a free edge portion spaced from said axis; a wheel; and means rotatably mounting the wheel on said door at said free edge portion to extend below said bottom for engaging the subjacent surface to support the door thereon, said mounting means including a torsion spring having an elongated torsion portion extending in the direction of the width of said door for yieldably adjusting the position of the wheel for maintained engagement with the subjacent surface during swinging movement of the door thereover, and means on said door for retaining said elongated spring portion against transverse displacement, means at one end of the spring at said free edge portion of the door for mounting said wheel for rotation about an axis parallel to the elongate axis of the elongated spring portion, and means at the other end of the spring for locking said other end against rotation about said axis only in the direction of rotation of the wheel about said axis in moving upwardly relative to said door bottom.

2. The door supporting structure of claim 1 wherein said spring is mounted within said door and said bottom is provided with an opening, said wheel extending through said opening.

3. Structure for supporting a door for swinging movement about a vertical axis over a subjacent surface, comprising: means defining a door having a bottom and a free end portion spaced from said axis; a wheel; and means rotatably mounting the wheel on said door at said free edge portion to extend below said bottom for engaging the subjacent surface to support the door thereon, said mounting means including a torsion spring having an elongated torsion portion extending in the direction of the width of said door for yieldably adjusting the position of the wheel for maintained engagement with the subjacent surface during swinging movement of the door thereover, said spring including a first turned end and said door including an upright element, and means for retaining said elongated spring portion against transverse displacement comprising a bracket extending from said upright means to said bottom about said elongated portion of the spring, said first turned end bearing against said element to lock one end of said spring against turning in one direction about the elongate axis thereof, said spring further including a second end turned from said elongated portion and provided with means for carrying the wheel for rotation about an axis spaced parallel to said elongate axis.

4. The door supporting structure of claim 3 wherein said second turned end engages said bottom to resist rotation of said elongated portion only in a direction opposite to said one direction of rotation.

5. The door supporting structure of claim 3 wherein said second turned end extends perpendicularly from said elongated portion and said wheel carrying means comprises a turned distal portion of said turned second end extending parallel to said elongate axis.

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UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,281,992

November 1, 1966

John F. Morrison

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 4, for "end" read -- edge --.

Signed and sealed this 5th day of September 1967.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

EDWARD J. BRENNER

Commissioner of Patents