May 31, 1949. K. WILLIAMS 2,472,034

DOOR OPENING MECHANISM

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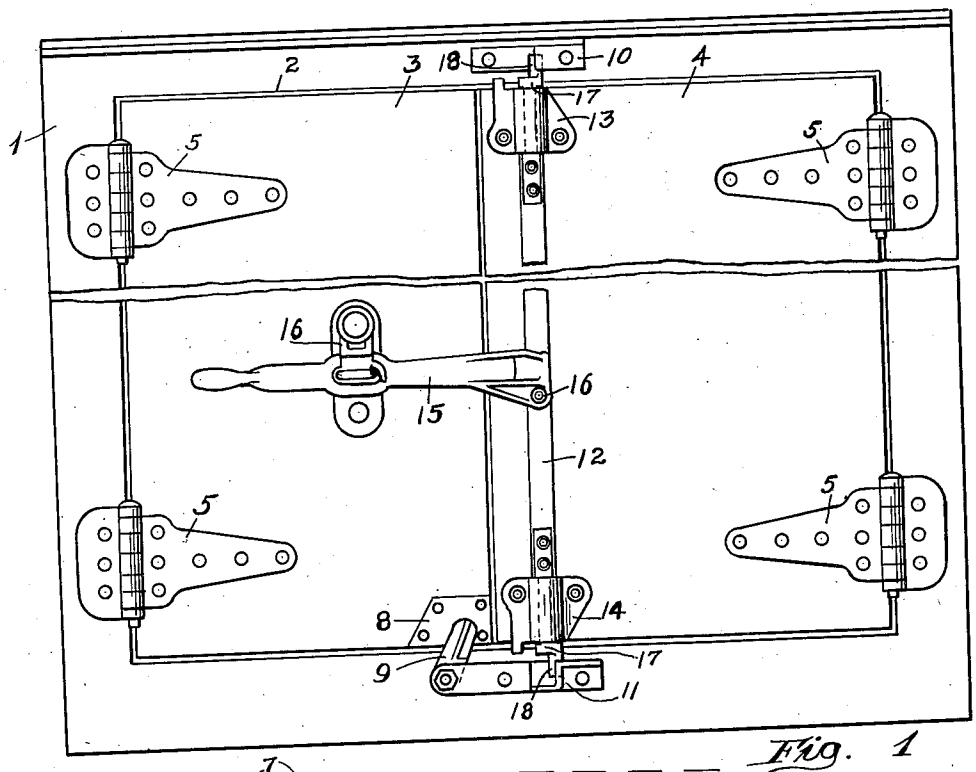


Fig. 1

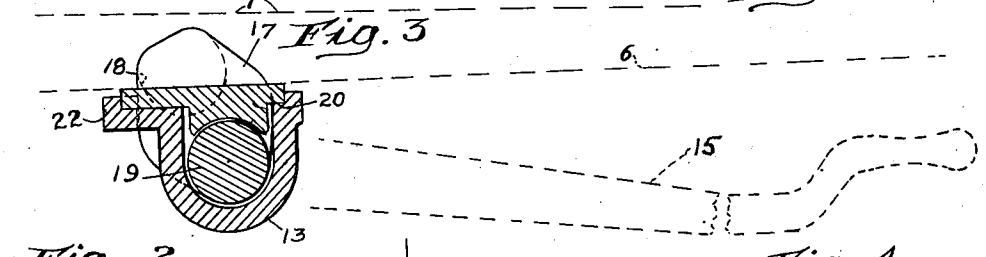


Fig. 3

Fig. 2

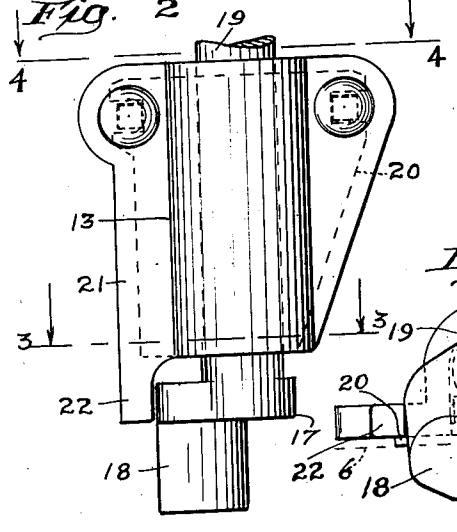


Fig. 5.

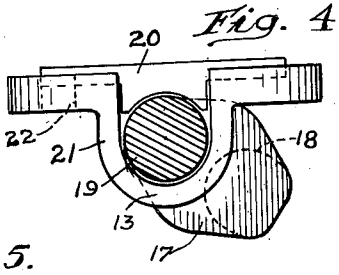


Fig. 4

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DOOR OPENING MECHANISM

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2 Claims. (Cl. 292—241)

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This invention relates to improvements in door operators especially designed for use in connection with the doors of refrigerator cars, trucks, and other vehicles.

My invention is concerned more particularly with the type of door operating mechanism which is mounted upon the door and which includes a vertical rotary bar having at its upper and lower ends cam means engaging keepers on the door frame and having intermediate its ends an operating handle which in closed position lies across the face of the adjacent wall of the vehicle if used for a single door or across the face of the companion door if used for a pair of doors. The handle swings horizontally through about 180° across the face of the other door upon which it is mounted in unlocking and opening the door. The handle is pivoted on the operating bar to swing downwardly into parallel relation to the bar. It is customary for the operator when unlocking the door to swing the handle into contact with the face of the door and then allow it to drop into vertical hanging position, this being done usually with a good deal of force, with the result that the door becomes dented and otherwise damaged and the finish becomes marred and scraped and presents an unsightly appearance.

The object of my invention is to provide a door operating structure of this type, in which the handle is prevented from coming in contact with the face of the door during the operation of the handle, making it impossible to damage or mar the door face.

Another object is to provide a stop or limit device on the bearing or bracket casting in position to cooperate with the crank arm on the operating bar for limiting the movement to the handle in such manner that the handle cannot contact the face of the door.

Another object is to provide a stop device of the character which requires the modification of only the bearing casting of the present door operating mechanisms and which is thereby interchangeable with the bearing castings of door operating mechanism already in use.

Other objects of the invention will appear from the following description in connection with the accompanying drawing which illustrates one embodiment of the invention.

Referring to the drawing,

Fig. 1 is an elevational view of a pair of mounted hinged doors illustrating my improvement in connection therewith;

Fig. 2 is an enlarged elevational view of the

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lower end portion of the operating means illustrated in Fig. 1;

Fig. 3 is a transverse section on line 3—3 of Fig. 2, including the face of one of the doors to illustrate the relation of the operating lever or handle thereto in open position;

Fig. 4 is a sectional view on the line 4—4 of Fig. 2, but with the parts illustrated in position corresponding to closed position of the doors; and

Fig. 5 is a bottom plan view of the structure shown in Fig. 2, the parts being in position corresponding to open position of the door.

In the drawing, 1 designates the wall of the car or vehicle, provided with the usual door opening 2 which is closed by a pair of hinged doors 3 and 4. The wall 1 of the car may be provided as usual with a frame which surrounds the door opening. The hinged doors are of the usual design, having beveled edges which cooperate with the correspondingly beveled edges of the frame. The meeting edges of the two doors are also beveled, and all of the cooperating engaging faces of the doors and door frame are provided with the usual insulating material. The door 3 is the first closed, the beveled edges being so arranged that the inner edge of the door 4 overlaps the inner edge of the door 3. As shown, each door is supported by a pair of hinges 5 of the usual type employed in connection with double doors of refrigerator units. It is to be understood that while the door operating mechanism is illustrated in connection with a pair of doors, it is equally applicable to a single door, in which case the door 3 is to be regarded as representing the car wall or the frame for the door 4. It is usual in structures of this kind to have the face of the door or doors flush with the frame or vehicle wall so that the faces of the door and frame lie in the same plane. If double doors are used, the door 3 is provided with a protecting wear plate 8 at the lowermost inner corner, over which a pivoted latch member 9 is adapted to engage to hold the door closed.

The usual top and bottom keepers 10 and 11 are secured to the frame 1 adjacent the top and bottom margins of the door, and each of these keepers have cam slots adapted to be engaged by cam means on the ends of the door operating bar to force the door closed or release the door upon the rotation of the operating bar. The operating bar 12 is disposed vertically on the outer face of the door 4 adjacent the inner vertical margin thereof and is mounted for rotation in upper and lower bearings or bearing brackets 13 and 14.

The door operating mechanism is operated by a handle 15 which is pivotally mounted at 16 on

the vertical operating bar intermediate the ends thereof, so that the handle, if free, will swing downwardly from its horizontal position indicated in Fig. 1, to a vertical position substantially parallel to the operating bar. In the closed position of the door, the handle **15** extends horizontally and is locked in position by the usual locking and sealing means **16***a*.

In the usual construction, the handle lever and the bar **12** upon which it is mounted can be swung through an arc of substantally 180° and actually into contact with the face of the opposite door **4** in order to release the cam mechanism from the keepers so that the door **4** may be swung open. The handle lever is then allowed to swing downwardly in vertical position in order not to interfere with the full opening of the door. The actual contact, most of the time forcefully with the surface of the door and the swing downwardly of the handle lever, damages the face of the door by denting it and by chipping and scraping off the finish. In accordance with my invention, this difficulty is overcome in a simple yet very effective manner. The cam devices which engage the keepers **10** and **11** are mounted on the ends of the operating bar **12** and project above and below the upper and lower margins respectively of the door **4**. These cam devices are in the form of crank arms **17** having lugs or crank pins **18** which are offset with respect to the axis of rotation of the bar so that their engagement with the cam slots of the keepers forces the door outwardly or inwardly as the case may be. This is indicated by the dotted line **7** in Fig. 3 which represents the face of the frame and line **6** represents the plane of the outwardly swung door.

The bar **12** itself is rectangular in section but has round portions **19** in the form of forked castings riveted to the ends of the bar and rotatably mounted in the bearing brackets **13** and **14**. The crank arms **17** and their lugs **18** are integrally formed on the ends of these forked castings. The bearing brackets **13** and **14** comprise base members **20** and cap members **21**, together forming cylindrical bearings for the rounded end members **19** of the bar. These bearing parts are usually made as castings and provided with flanges by which they may be bolted or otherwise secured to the face of the door. They are positioned on the door with their ends adjacent the upper and lower margins of the door. The cap members **21** are provided with integral lugs or abutment stops **22** which project beyond the margins of the door and into the path of the crank arms **17** and are adapted to be engaged by the crank arms. These parts are so arranged and proportioned that the crank arms strike the abutment stops **22** just before the handle lever **15** reaches contact with the face of the door, as indicated by the position of the handle as dotted lines in Fig. 3, thus preventing the handle from striking the door and without interfering with the full swing of the handle in the operation of the door mechanism. The provision of these abutment stops thus solves the problem without requiring the redesign of any of the other parts of the mechanism. The cap members **21** are thus interchangeable with the cap members of door operating mechanisms already in use. As appears from the drawings, the stop **22** of the lower bearing bracket is integral with the left hand flange of the lower cap **21** (Figs. 1 and 2) and the stop **22** of the upper bearing bracket is integral with the left hand flange of the upper cap **21** (Fig. 1).

I claim:

1. A bearing cap member for a rotary bar and crank arm door operating mechanism, said bearing cap being adapted to be fixed to the door to form at least a part of the bearing surface for the rotary bar and said bearing cap being provided with an integral axially extending lug adapted to project beyond the margin of the door and into the path of said crank arm thereby to form a stop to prevent excessive rotation of said operating mechanism.

2. In a rotation limiting stop means for the rotary operating bar of a door fastener carried on a door, the combination with a radially extending keeper engaging crank arm on one end of said bar disposed beyond the outer edge of said door; of a bearing bracket in which said bar is rotatably journaled; a stop lug integral with said bearing bracket and projecting therefrom into the path of rotary movement of said crank arm to be engaged thereby and arrest rotary movement of said bar in one direction.

KEITH WILLIAMS.

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