United States Patent

Morris

[15] 3,661,412

[45] May 9, 1972

[54] FASTENING MECHANISM FOR DOORS

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[73] Assignee: **The Bloxwich Lock and Stamping Company Limited**, Bloxwich, Walsall, England

[22] Filed: **July 8, 1970**

[21] Appl. No.: **53,142**

[52] **U.S. Cl.** **292/218**

[51] **Int. Cl.** **E05c 3/04**

[58] **Field of Search** 292/213, 214, 216, 218

[56] **References Cited**

UNITED STATES PATENTS

3,484,127	12/1969	Pastva	292/218
3,464,729	9/1969	Chambers	292/218
2,943,879	7/1960	Allen	292/216 X
3,544,145	12/1970	Cerutti	292/218

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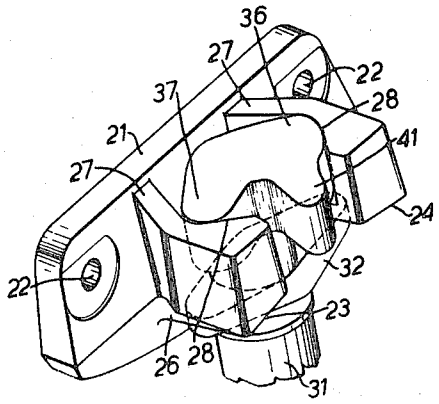
[57] **ABSTRACT**

In door fastening mechanism, particularly for the doors of freight containers or vehicles, comprising a bar mounted for angular movement about its axis on a door and carrying at its ends fastening members adapted to engage with keepers on the door frame, the fastening members are opposed forks which engage with spaced lugs on the keepers, the lugs having oppositely inclined surfaces which are engaged by limbs of the forks to urge the door towards the closed position.

5 Claims, 12 Drawing Figures



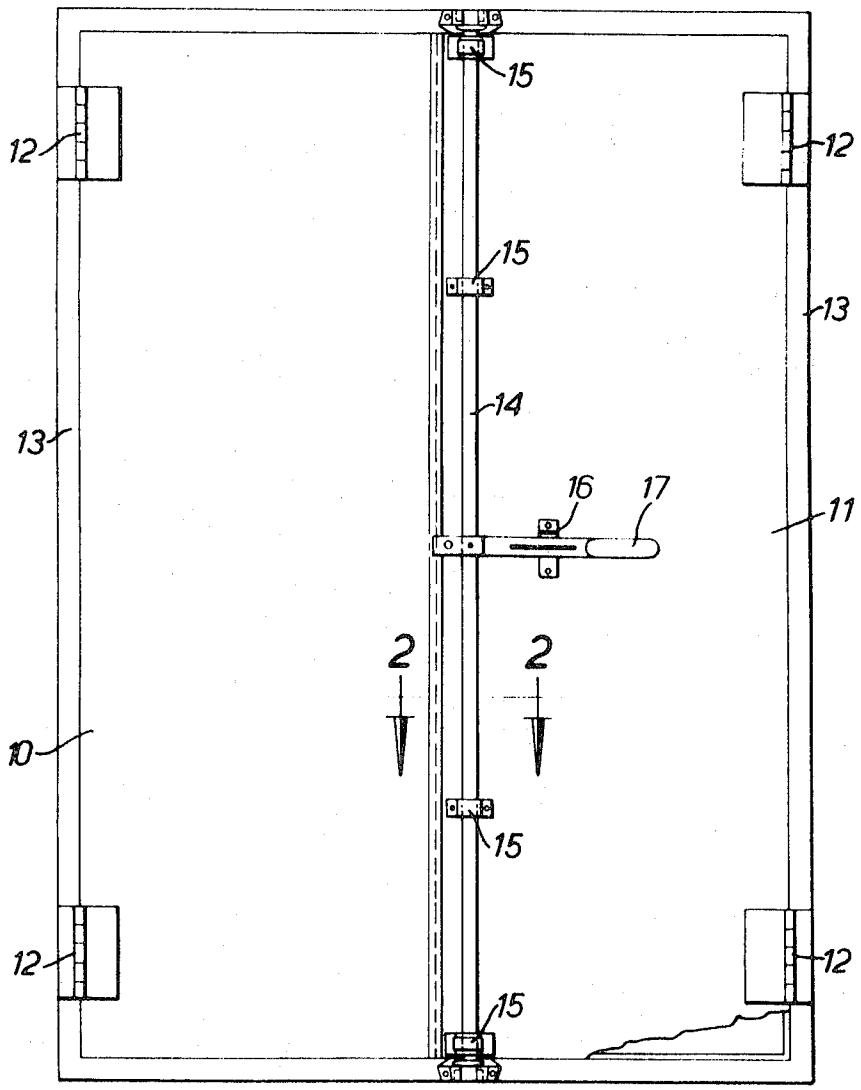


Fig. 1

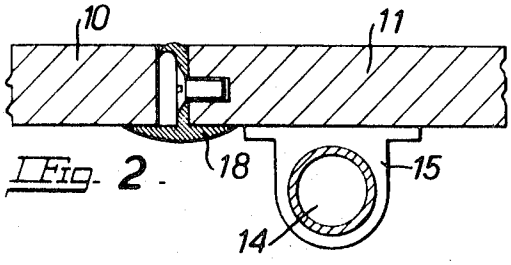


Fig. 2

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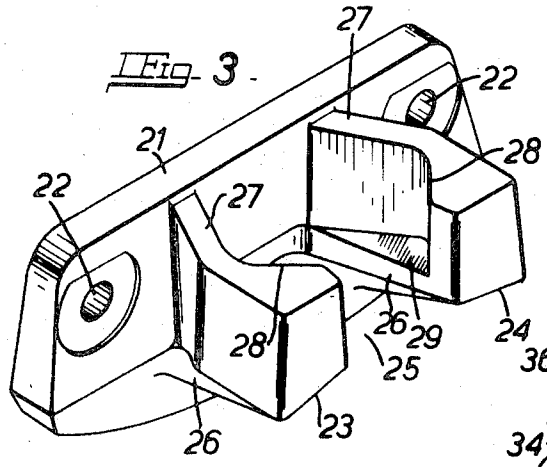

Fig. 3.

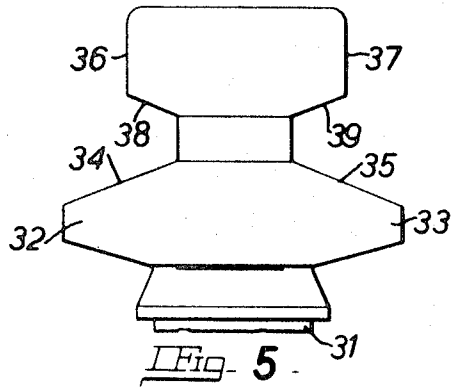

Fig. 5.

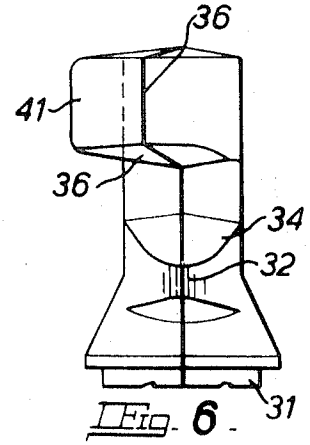

Fig. 6.

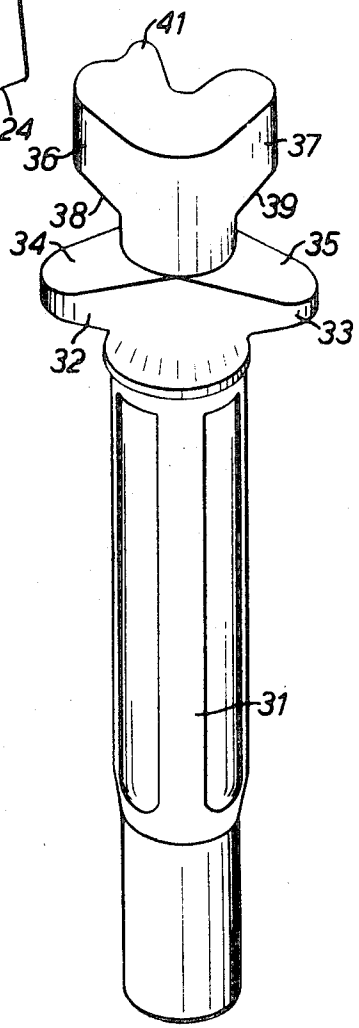

Fig. 4.

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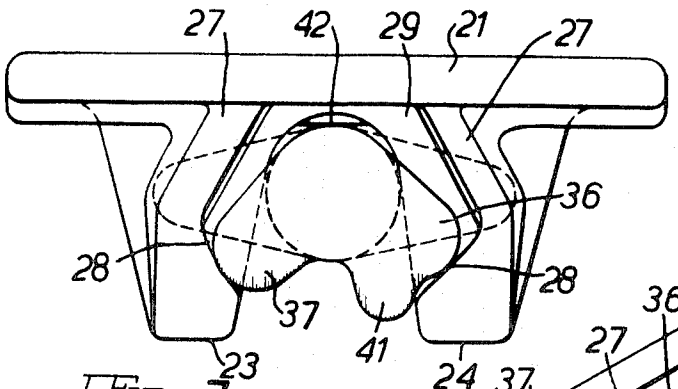

Fig. 7

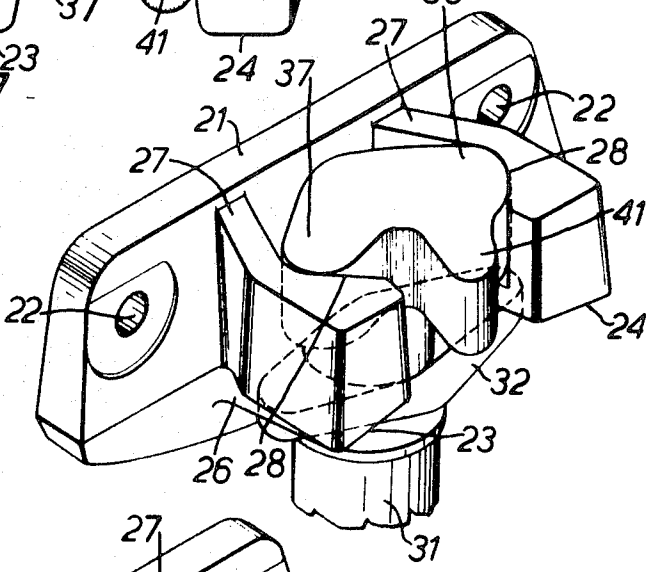

Fig. 11

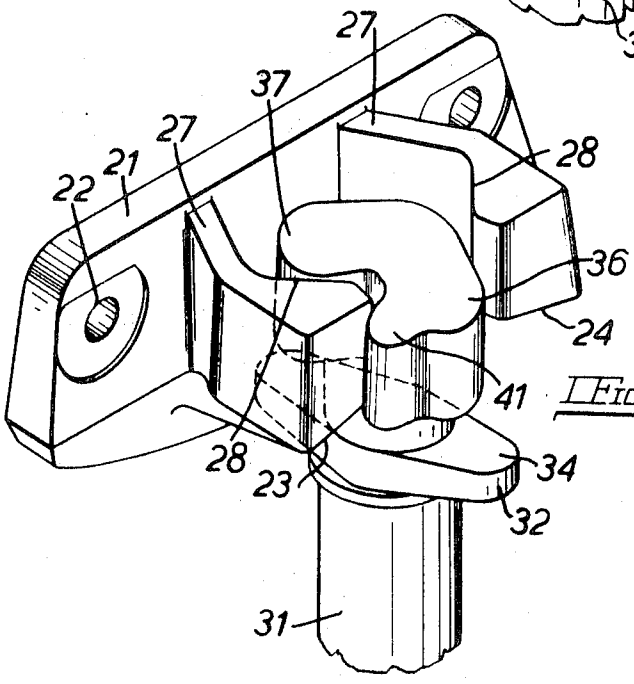

Fig. 12

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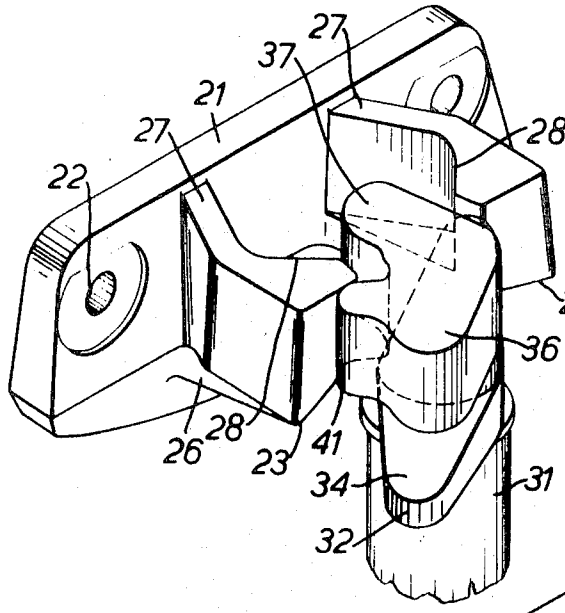

Fig. 9.

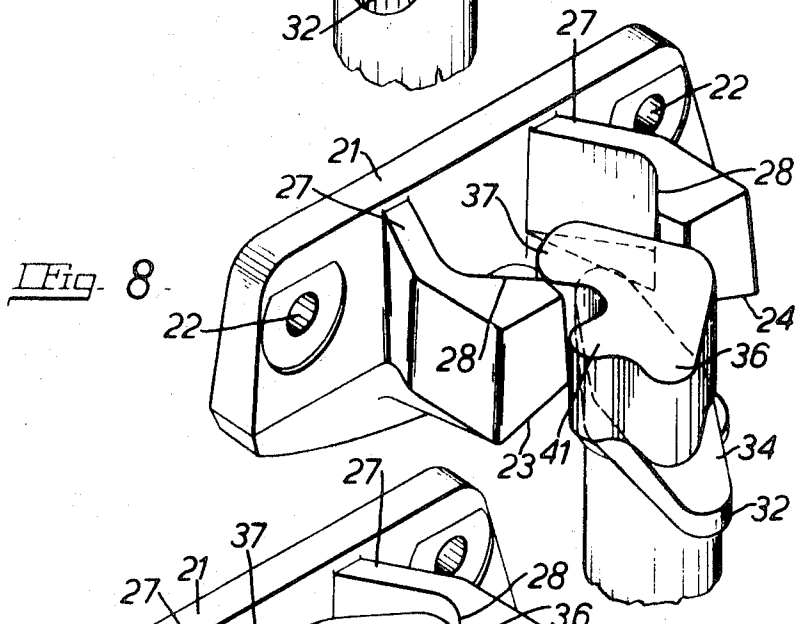

Fig. 8.

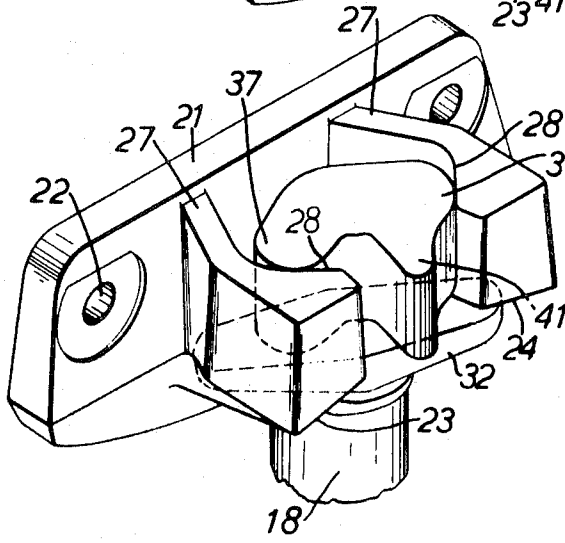

Fig. 10.

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FASTENING MECHANISM FOR DOORS

This invention relates to improvements in fastening mechanism for the doors of vehicles and of containers adapted for the carriage of goods by road and/or rail.

Mechanism for such purposes must be capable of withstanding very rough handling, must be capable of holding the door or doors closed even when distortion of the vehicle body or container or of the door itself takes place, and should as far as possible prevent any relative movement between the door or doors and the top and bottom of the vehicle body or container in the plane of the door or doors.

It is common practice to provide, for closing the end of a vehicle body or container, two doors hinged respectively to opposite sides of the opening, and to provide on the free edge of one door a flexible seal which overlaps the free edge of the other door and extends between the adjacent edges when the doors are closed, and where the mechanism is applied to such doors operation of the mechanism in the releasing direction should initiate the opening movement of the door carrying the seal and un-make the seal between the doors, and the final part of the movement of the mechanism in the fastening direction should complete the closing of the doors and the making of the seal.

Our invention relates to fastening mechanism of the kind in which an operating bar mounted on a door for angular movement about its axis carries at each end a fastening member adapted to engage with a keeper mounted on the door frame, the bar being movable angularly by a handle which can be positively locked in a position corresponding to the full engagement of the fastening members with the keepers.

According to our invention, in fastening mechanism of the kind set forth the operating bar which is adapted to be mounted in bearings on the door has on one or each end a fastening member comprising a shank carrying opposed forks engageable with spaced lugs on a keeper, the lugs extending forwardly from an attachment plate part of the keeper and incorporating portions adapted to be engaged between the limbs of the forks in the fastened position of the mechanism and adjacent surfaces oppositely inclined with respect to the attachment plate for engagement by a limb of each fork to urge the fastening member towards the attachment plate.

The engagement of portions of the lugs on the keeper between the limbs of the forks on the bar is an "anti-rack" feature preventing relative movement between the door and its frame in the plane of the door, and the engagement of one limb of each fork with the inclined faces on the lugs holds the door tightly closed.

Further, in the final part of the turning movement of the bar in the fastening direction, the engagement of a limb of each fork with oppositely inclined faces of the lugs on the keeper forces the door tightly into engagement with its frame and completes the seal between the door and the frame or between the doors where the door is one of a pair.

Conversely, on angular movement of the bar out of the fastened position the engagement of a limb of each fork with portions of the keeper initiates the opening movement of the door and breaks the seal.

One example of fastening mechanism for a container door is illustrated in the accompanying drawings, in which:

FIG. 1 is an elevation of the end of the container with the door in the closed position;

FIG. 2 is a fragmentary section on the line 2—2 of FIG. 1;

FIG. 3 is a perspective view of a keeper adapted to be mounted on the frame above the door;

FIG. 4 is a perspective view of a fastening member for co-operation with the keeper shown in FIG. 3;

FIG. 5 is an elevation of the operative part of the fastening member;

FIG. 6 is an elevation in a direction at right-angles to that of FIG. 5;

FIG. 7 is a plan view of the keeper and fastening member in the fully engaged position;

FIG. 8 is a perspective view showing the initial approach of the fastening member to the keeper in the closing movement of the door;

FIGS. 9 and 10 show further successive positions of the fastening member relative to the keeper as the door approaches the fully closed position; and

FIGS. 11 and 12 show successive positions of the fastening member relative to the keeper in the opening movement of the door.

The container shown in FIG. 1 is provided with a door formed in two co-operating halves 10, 11 each mounted by means of hinges 12 on the vertical side frame members 13 of the container.

A vertical operating bar 14 is mounted in spaced bearings 15 on the half door 11 for angular movement about its axis. The angular movement of the bar is effected by a handle 16 welded or otherwise secured to the bar. In the closed position of the door the handle is received in a fitting 17 on the half door 10 and any convenient means (not shown) are provided for locking the handle to the fitting 17.

The bar is formed by a length of steel tube and fastening members described below are located on the ends of the bar for engagement with keepers rigidly secured to the top and bottom members of the door frame.

The free edge of the half door 11 carries a sealing member 18 which, in the closed position of the door, makes a seal with the free edge of the other half door 10 as shown in FIG. 2.

The remaining figures of the drawings show the fastening member and keeper at the top edge of the door. Those at the bottom are identical but inverted.

The keeper, which is shown by itself in FIG. 3, may be a malleable casting but is preferably a steel casting or a forging. It comprises a flat attachment plate 21 having at its ends holes 22 adapted to receive rivets or bolts by which the keeper is secured to the door frame above the upper edge of the door. Extending forwardly from the attachment plate are two integral lugs 23, 24 spaced apart by a gap 25 which at its inner end next the base is slightly wider than the diameter of the bar 14 and which increases slightly in width towards its open forward end. Each lug comprises a lower part 26 which is of wedge shape in a cross section parallel to the attachment plate, and an upstanding web 27 which extends from the attachment plate.

The webs increase in width at their forward ends and are recessed on their inner sides to provide on the inner side of each lug an inclined face 28 and a bottom step or ledge 29 which forms the upper face of the wedge-shaped lower part of the lug.

The fastening member, which is shown by itself in FIGS. 4, 5 and 6, is also a steel casting or forging. It has a shank 31 which fits into the upper end of the tubular bar 14 to which it is welded so that it becomes in effect a part of the bar. Above the shank there are integral opposed forks for engagement with the keeper. The lower limbs 32, 33 of the forks are diametrically opposite each other and their upper surfaces 34, 35 are oppositely inclined, as shown more particularly in FIGS. 4 and 5, to conform to the lower faces of the lugs 23, 24 on the keeper.

The upper limbs 36, 37 of the forks are angularly spaced at between 90° and 150° to each other and are shorter than the lower limbs. Their under surfaces 38, 39 are inclined to conform to the inclination of the steps or ledges 29 on the keeper. The free ends of the lugs are radiused for engagement with the inclined faces 28 of the lugs on the keeper, and a projecting boss 41 is provided on the limb 36 for the purpose described below.

The ways in which the fastening member and keeper co-operate in the closing and opening of the door are shown in FIGS. 8 to 12.

As the door moves towards the closed position the bar is substantially in alignment with the gap in the keeper and the upper limb 37 of one fork on the fastening member enters between the lugs on the keeper as shown in FIG. 8.

As the movement continues the boss 41 on the limb abuts against the end face of the lug 23 on the keeper as shown in FIG. 9. While the closing pressure continues to be applied to the door the bar is moved angularly about its axis in an anti-clockwise direction as viewed from above.

The fastening member swings round initially about the boss 41 while the member moves as a whole into the gap between the lugs on the keeper. The free end of the fork limb 36 then bears on the inclined surface 28 on the lug 24 and slides along that surface towards the attachment plate as shown in FIG. 10 while the free end of the fork limb 37 comes into engagement with the inclined surface 28 on the lug 23. Then as the final angular movement of the bar takes place the fork limb 37 is forced against the surface 28 on the lug 23 to urge the fastening member and keeper together into the fully engaged position shown in FIG. 7.

This completes the closing of the door and the making of the seal between the two half doors.

In the meantime the lower limbs 32, 33 of the forks on the fastening member have moved from the position shown in FIG. 8 through the positions shown in FIGS. 9 and 10 into the position shown in FIG. 7 in which the inclined upper faces of the fork limbs engage the complementarily inclined lower faces of the lugs on the keeper. At the same time the inclined lower faces 38, 39 of the upper fork limbs have come into engagement with the steps or ledges 29 on the lugs so that there is a tight wedging engagement between the forks on the fastening member and the lugs on the keeper.

This is an "anti-rack" feature preventing relative movement between the door and its frame in the plane of the door.

It will be appreciated from FIG. 7 that in the fully engaged and fastened position of the mechanism the fastening member is in engagement with the keeper at three angularly spaced points. The radiused end of the fork limb 37 is in engagement with the inclined surface 28 on the lug 23, the radiused end of the fork limb 36 is in engagement with the inclined face 28 on the lug 24, and at an intermediate point 42 the member is in engagement with the inner end of the gap between the lugs against which it is urged by the engagements of the fork limbs with the inclined faces 28.

The fastening member is thus effectively held in the keeper and a force applied to the door in the opening direction cannot apply any turning movement to the fastening member to move it out of the fully engaged position so that there is no risk of the door opening under a force applied to it from the inside even if the handle on the bar has not been locked.

To unfasten the door the operating bar 14 is partially rotated in a clockwise direction. The upper fork limb 37 swings round towards the attachment plate while the limb 36 moves away from the attachment plate. As the movement continues the limb 36 comes into alignment with the open end of the gap between the lugs while the limb 37 is forced against the attachment plate to initiate the opening movement of the door and break the seal between the two half doors. While the operating bar is being partially rotated a pull in the opening direction is maintained on the door and the fastening member starts to move out of the gap in the keeper. As the angular movement of the bar continues the boss 41 bears on the outer end of the lug 23 of the keeper as shown in FIG. 12 to complete the movement of the fastening member out of the gap in the keeper. At the same time the lower limbs 32, 33 of the fastening member have been disengaged from the bottom surfaces of the lugs on the keeper and the door can be pulled open.

In the embodiment described above the fastening mechanism is designed for a door hinged about one vertical edge and the operating bar is vertical and parallel to the axis about which the door swings, the bar having fastening members at each end co-operating with keepers on the door frame at the top and bottom of the door opening.

However, it will be appreciated that in fastening mechanism for a door angularly movable about a horizontal or other non-vertical axis the operating bar will be mounted on the door in a horizontal or other non-vertical position.

Further, in the particular description of the embodiment illustrated the keeper is stated to be preferably a steel casting or forging rivetted or bolted to the door frame, but it may be formed by rolling or extrusion and it may be welded to the door frame. Similarly the fastening member may be formed by rolling or extrusion.

I claim:

1. Fastening mechanism for a door of a vehicle or a container for the carriage of goods in which the door is mounted in a door frame on the vehicle or container and has an operating bar mounted on the door for angular movement about its axis which operating bar carries on at least one end a fastening member adapted to engage with a keeper mounted on the door frame, the bar being angularly movable to a position in which the fastening member is engaged with the keeper when the mechanism is in fastened condition, said fastening member comprising a shank carrying opposed forks each defined by spaced limbs, and said keeper comprising means for attaching it to the door frame and spaced lugs with a gap between the lugs fixed to said attaching means and extending transversely forwardly relative to a plane generally parallel to the door frame, said lugs incorporating portions that are engaged between the limbs of said forks of said fastening member in the fastened condition of the mechanism, each lug comprising a base portion which in cross sections parallel to said plane is of wedge shape with the narrower edges of the lugs next to said gap, and each lug also comprising a web portion which increases in width in a direction away from said plane and has an inner surface which presents a face that is directed toward said gap and inclined with respect to said plane and that is adapted to be engaged by a limb of a fork in the fastened condition of said fastening mechanism.

2. Fastening mechanism as in claim 1 wherein each fork has facing adjacent surfaces that are oppositely inclined at an angle substantially equal and complementary to the angle between the opposite faces of the wedge-shaped base portions of the lugs on the keeper.

3. A fastening member for fastening mechanism as in claim 1, comprising a shank angularly movable about its axis and integral forks extending from opposite sides of said shank each of said forks having first and second limbs, the first limbs of said forks extending substantially diametrically opposite to each other, and the second limbs of said forks being spaced angularly between about 90° and 150° from each other and being shorter than said first limbs, the adjacent faces of the limbs of each fork being oppositely inclined so that the axial distance between said faces increases towards the free ends of the forks.

4. A fastening member as in claim 3 wherein a radially projecting boss is provided on the second limb of one fork for engagement with a lug on the keeper as the fastening member moves into and out of the gap in the keeper.

5. Fastening mechanism as in claim 1 comprising a handle for imparting said angular movement to said bar to engage said fastening member with said keeper in fastened condition, and means for positively locking said bar in said position.

* * * * *