United States Patent

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Continuation of application Ser. No. 564,105, July 11, 1966, now Patent No. 3,484,127.

[54] **DOOR-FASTENING APPARATUS**
17 Claims, 5 Drawing Figs.

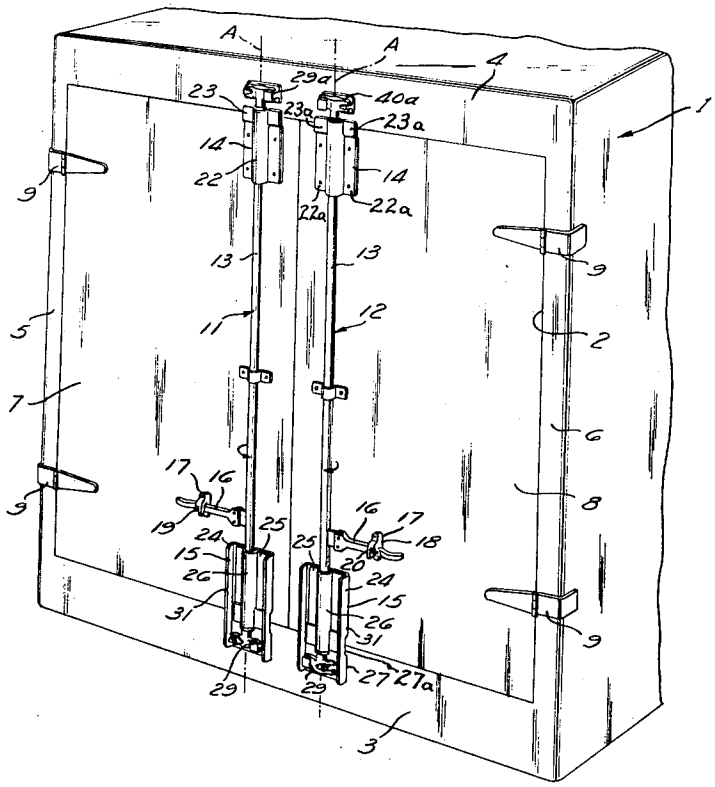
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[51] **Int. Cl.** **E05c 3/04**
[50] **Field of Search** ..... 292/218, (M), 240, 241, 213, 56, (0 369), (X), 337, 210

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ABSTRACT: Door-fastening apparatus, particularly well suited for fastening in closed position the rear doors of truck bodies, comprises a shaft and its actuating means mounted on the door, a keeper lock member mounted on the door frame, and a latch lock member, actuatable by rotation of the shaft, mounted on the door. The keeper member has two spaced projecting members of which one has a stem portion and a transverse portion, and the other of which has a free end portion. The latch member has two forks one of which engages beneath the transverse portion of the first projecting member in straddling relation and the other of which straddles the second projecting portion. The door also carries a member having an extension portion that overlaps the door frame to prevent inward movement of the door. This member preferably extends around the keeper member and is engaged by the forked portion of the latch member when the latch member is in locking engagement.



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SHEET 1 OF 2

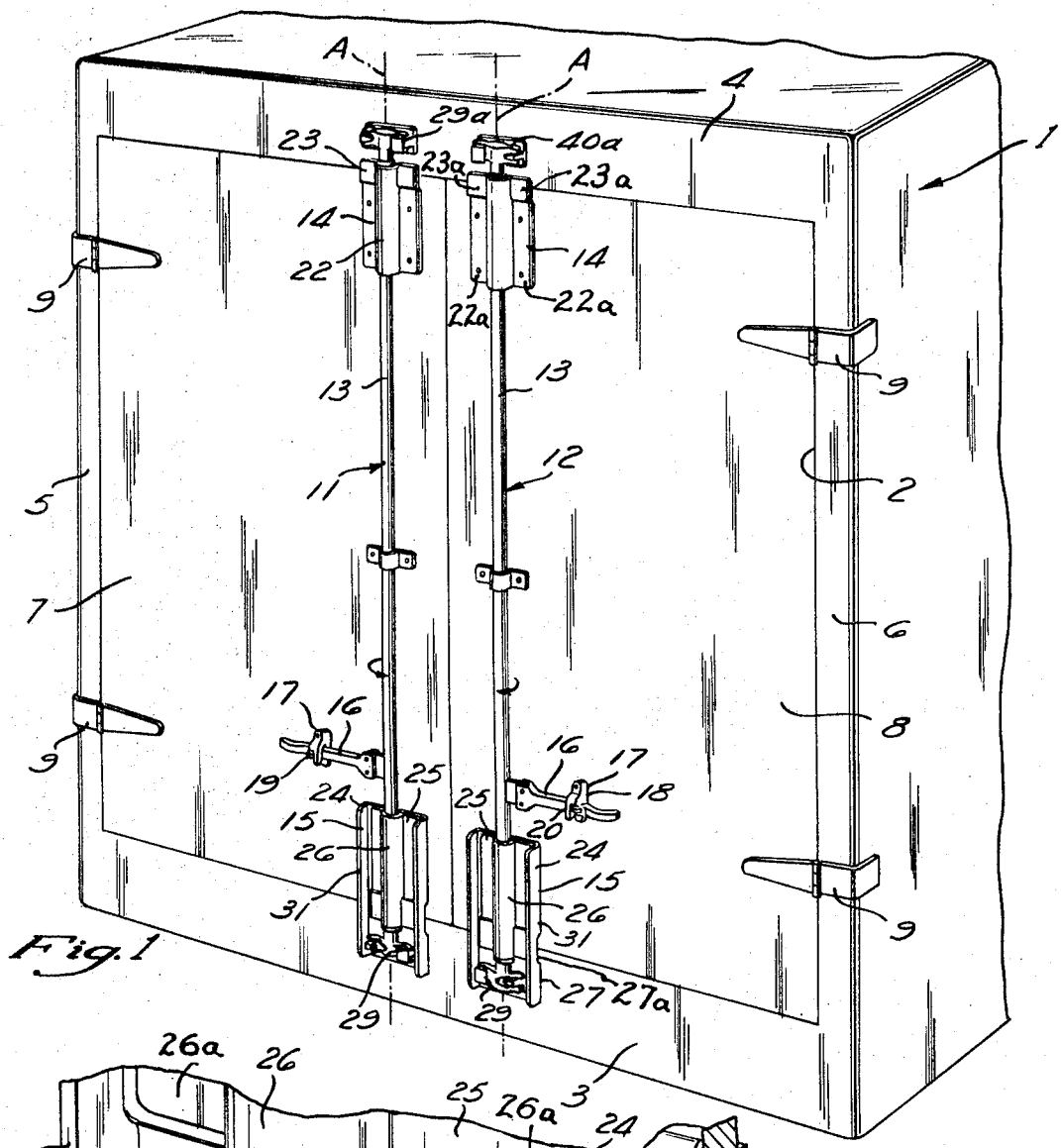


Fig. 1

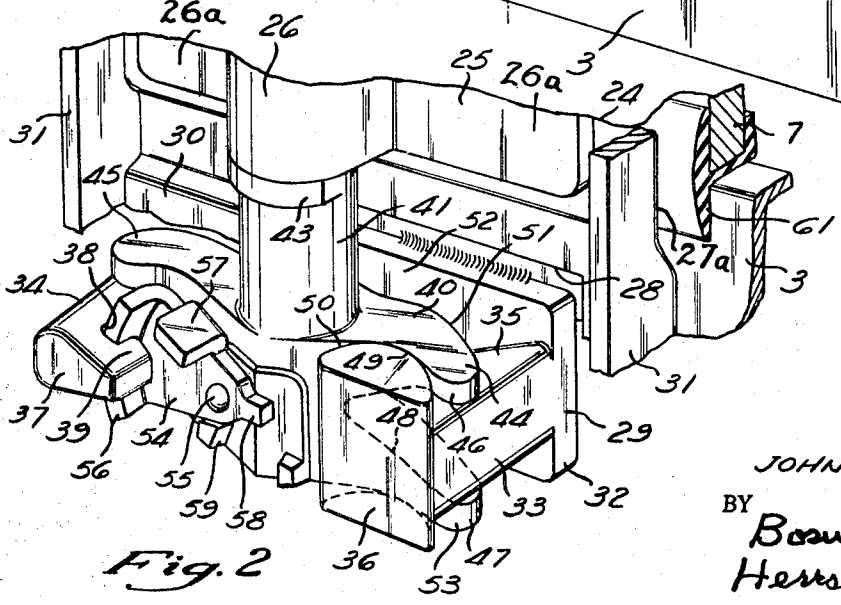


Fig. 2

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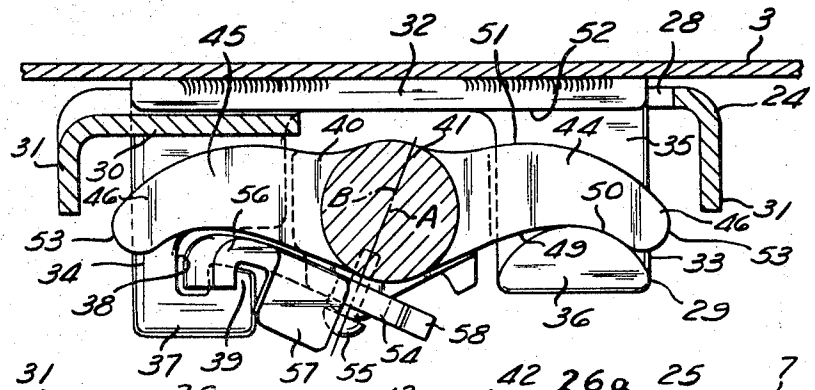


Fig. 4

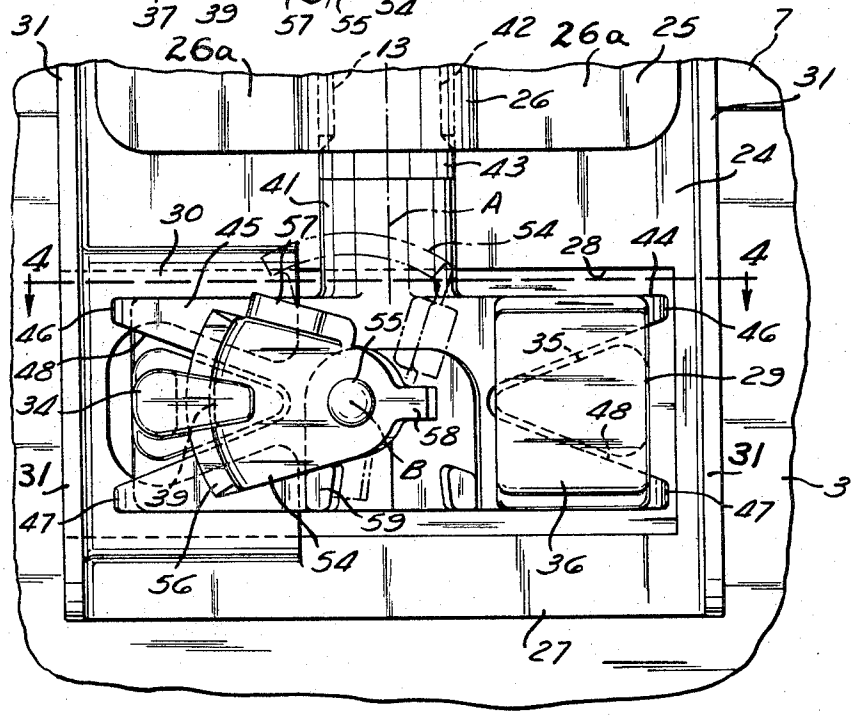


Fig. 3

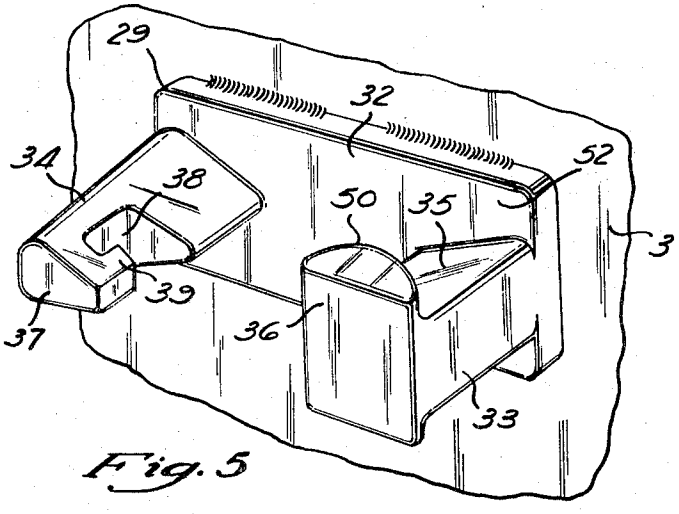


Fig. 5

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DOOR-FASTENING APPARATUS

CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation of Ser. No. 564,105, filed Jul. 11, 1966, now U.S. Pat. No. 3,484,127 of Dec. 16, 1969.

FIELD OF THE INVENTION

This invention relates to door-fastening apparatus for fastening doors of vehicles or containers, and more particularly to such apparatus having associated means on the door for preventing the door from swinging inwardly of the doorway.

While door-fastening apparatus of the type to which the invention pertains may be employed for fastening the doors of a wide variety of containers or vehicles, it provides particular advantages when employed to secure in closed position hinged rear doors of closed trailer van bodies. In such a body, the large doorway at the rear of the body makes it impossible to construct the rear portion of the body stiff enough to prevent, under certain circumstances, racking action of the rear portion of the body in which the top moves or tends to move relatively to the bottom of the body in a path that is transverse to the body and generally parallel to the bottom of the body. For example, such racking action tends to occur if the vehicle is not standing in a level position so that its rear wheels are on different levels; it also tends to occur from twisting or jostling of the body during travel, particularly at high speeds.

It has been the practice to utilize the doors, when closed, to stiffen the rear portion of the trailer van body; to effect this, door lock apparatus preferably should have at least one latch member on each door engaging a keeper member on the body, at the top and bottom edges of the door, and these latch members should be actuated by a common handle or other actuating means. It is also important that each latch member firmly engages the keeper portion in such manner as essentially to prevent lateral or vertical movement of the door relative to the door frame, and to prevent the latch member from disengaging from the keeper member during transit or otherwise until intentionally disengaged. It is also important that, when closed, the door not move inwardly of the doorway to a position where it cannot close the opening or perform the desired stiffening function.

Other problems arise when trailer vans are used in services in which they are subjected to relatively high acceleration or deceleration forces, as often occurs in railroad "piggyback" transportation systems in which accelerations and decelerations to which the trailer vans are subjected, may be substantially greater than would be encountered in over-the-road transportation. In such service, cargoes in trailer vans exposed to higher than normal acceleration or deceleration forces often are not anchored to the trailer with sufficiently strong anchoring means that can prevent longitudinal movement of the cargo relative to the van toward its rear doors. The moving load can then exert a substantial, and often sudden, force on a rear door, which tends to open the door from the inside. The lowermost latch and keeper members are primarily subjected to such forces tending to open the doors; they should be strong and secure enough to resist such forces.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide door-fastening apparatus making possible as many as desired of the above desirable features and overcoming as many as desired of the above problems. Another object is the provision of a door-fastening apparatus embodying means for preventing inward as well as outward movement of the door relative to the door frame; another object is the provision of door-fastening apparatus in which the means for rotatably supporting an actuating shaft has an extension portion overlapping the door frame to prevent inward movement of the door relative to the door frame when the door is closed.

BRIEF DESCRIPTION OF THE DRAWINGS

The above objects and advantages of the invention will be apparent from the following description of a preferred embodiment of the invention, in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view showing the rear end of a truck trailer van body, showing two door lock apparatuses embodying the invention;

FIG. 2 is a perspective to a greatly enlarged scale showing the lowermost latch and keeper member of the left-hand door lock apparatus of FIG. 1;

FIG. 3 is an elevation viewed from the front of the apparatus of such lowermost lock and keeper member, showing the auxiliary securing member mounted on the latch member, the securing member being shown in its locking position in full lines, and in its released position in broken lines;

FIG. 4 is a plan elevation, along line 4–4 of FIG. 3 and to the same scale; and

FIG. 5 is a perspective of the keeper member of the apparatus to the same scale as FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the illustrated embodiment, reference numeral 1 designates the rear portion of a trailer truck body having a doorway opening 2 defined by lower and upper transverse members 3 and 4 and upright side members 5 and 6. Doors 7 and 8 are mounted at the outer edges by hinges 9 so that they can open, and also close to an aligned coplanar relation.

Each of the doors has mounted on its outside rear face a door-locking apparatus 11 and 12 embodying the invention. Each apparatus 11 and 12 comprises a shaft 13 mounted on its door by upper and lower mounting members 14 and 15 so it can rotate about a generally vertical axis A but cannot move vertically of the door. Each shaft 13 rigidly carries a handle 16 by which the shaft may be manually partially rotated about its axis A; each handle is adapted to be held in locking position by a known type of holding means 17 that comprises a base member 18 fixed to the door, an eye member 19 projecting through the handle 16 and adapted to receive the hasp of a padlock, and a latch member 20 that is rotatably mounted on base member 18 and acts to hold the handle in position and enables affixation of a conventional seal that must be broken before the door can be opened.

The upper mounting member 14 is made of two formed abutting sheet metal parts that are riveted or otherwise fixed to the upper outer surface of the door and are shaped to provide a tubular portion 22 rotatably supporting the upper end of shaft 13, a longitudinally extending lug 22*a* fixed to each side of said portion 22, and a portion 23 that extends beyond and projects upwardly from the door to overlap the upper frame portion 4 to aid the lock apparatus in limiting movement of the door inwardly of the doorway; preferably as shown, the portion 23 constitutes an extension of the lugs 22*a* and portion 22, so that portion 23 is reinforced laterally by portion 22 and is substantially coextensive with portion 22.

The lower mounting member 15 is generally similar in that it comprises two adjoining pieces of sheet metal 24 and 25 fixed to the lower outer surface of the door and formed to provide a tubular bearing portion 26 in which the lower end of shaft 13 is rotatably supported, and a lug 26*a* at each side of portion 26. This member 15 has a portion 27 tat extends beyond the bearing portion 26 and projects downwardly from the door to overlap and contact the lower frame member 3 and thus aid in limiting inward movement of the door in the doorway; it also has an opening 28 (FIGS. 2—4) through which projects the keeper member 29 of the lower portion of the lock apparatus so that member 27 entirely surrounds the keeper member; portion 27 of member 24 also partially overlaps a portion of the base of the keeper member at 30 and this also can aid in limiting inward movement of the door. Part 24 of this lower member 15 also has out-turned integral ribs 31 at

the outer edges of lugs 26*a* and extension portion 27 to aid in stiffening the member 15 and particularly portion 27 thereof.

The keeper member 29 forming part of the lower portion of the left-hand lock apparatus of FIG. 1 is shown in FIGS. 2—5. It is preferably formed of forged steel and comprises a base 32 that is fixed, as by welding, to the lower doorway frame member 3. Two fixed spaced members 33 and 34 project forwardly to the base. Member 33 comprises a stem portion 35 preferably integral with base 32 and transverse portion 36 fixed to and preferably integral with stem portion 35. Stem portion 35 (FIG. 3) is generally triangular in cross section with its apex extending toward the axis A of shaft 13. Projecting member 34, located on the other side of shaft axis A, through its length, except for its smaller free end 37 has a generally uniform triangular cross section preferably identical with the cross section of stem portion 35. The apex of its cross-sectional contour extends toward axis A and is spaced the same distance as the apex of stem portion 35; both triangular cross-sectional parts are also spaced equidistantly to a plane normal to axis A. The portion of opening 28 in portion 30 of part 24 through which member 34 is adapted to project is shaped to fit closely to but clear the member 34. Keeper member 29 also has a hook-shaped notch 38 formed in its projecting member 34, the notch extending transversely outwardly from the apex or inner edge of its member 34 and also extending toward the front or free end of member 34, to define a hook portion 39 that extends rearwardly toward base 32.

FIGS. 2—5 also show latch member 40 rigidly mounted on the lower end of shaft 13 of the left-hand lock apparatus of FIG. 1. This latch member, preferably formed of forged steel, includes a central body portion 41 having a reduced diameter portion 42 that extends into and is fixed in the lower end of shaft 13, which is tubular at least in its end portions, and a transversely extending lug 43 that bears against the lower end of tubular portion 26 to limit upward movement of the shaft and its keeper member. Integral with body portion 41 are two forks 44 and 45 that are oppositely extending and of opposite hand but otherwise of the same shape and dimension for ease in manufacture and for utilization in right and left-hand lock apparatuses. Each fork comprises two spaced fingers 46 and 47 defining between them a tapered slot 48 adapted to fit closely but clear the triangular cross-sectional portions of the associated projecting portions 33 and 34. Moreover, the front-facing surfaces 49 of the fingers are curved to provide cam surfaces that on fork 44 can wedgingly engage a curved rear-facing camming surface 50 of transverse member 36 of member 33 when the keeper is in locking position.

The rear surfaces and ends of the fingers are also so shaped that when the shaft 13 of the apparatus of FIGS. 2—4 is turned counterclockwise in FIG. 4 to unlock the door, curved surfaces 51 of the fork 44 contact the front wall 52 of the base 32 of the keeper, thus forcing the shaft 13 and the door on which it is mounted away from the closed position of the door to initiate door opening. Continued turning of the shaft moves the fork 44 out from the space between transverse member 36 and the base 32 of the keeper member and permits the door to be fully opened; the curved ends 53 facilitate this. The shapes of the fingers also facilitate moving the keeper to its locking position.

Lower latch member 40 also has a manually-operable securing member or auxiliary latch 54 that is pivotally mounted about an axis B on a stud 55 fixed on the front portion of the latch member. This securing member, which preferably is formed of heavy sheet metal, has a forward-facing arcuate flange 56 that is circular about the axis B, and a forwardly-facing handle portion 57 by which member 54 can be manually moved. The member 54 is angularly movable about axis B that is off center of the latch member 40 and inclined to the keeper member, so that when the latch member 40 is fully in its fastened position in keeper member 29 (FIG. 4), securing member 54 can be manually turned downwardly about its axis B so its flange 56 engages the notch 38 of projecting member 34 behind its hook portion 39 and thus secures latch member 40 against twisting or turning movement about its axis A. Downward movement of member 54 is limited by its contact with a projecting stop 59 on latch member 40. Securing member 54 tends to be held in this locking position by gravity biasing.

Securing member 54 can be pivotally turned upwardly, i.e., clockwise in FIG. 3, to a released position, shown in broken lines in FIG. 3, in which the flange 56 of member 54 is completely removed from notch 38 of the keeper member, and in which a lug 58 on securing member 54 contacts the lug 59 of the latch member. Member 54 remains in such released position by gravity biasing since the center of gravity of member 54 is to the side of the vertical. When the securing member is in such released position, the latch member can then be rotated about the axis A to unlock the door as indicated above.

The keeper member 29 of the right-hand lock apparatus in FIG. 1 can be identical with the above described keeper member 29 of the left-hand apparatus, except that it is installed so its projecting members 33 and 34 are of opposite hand from those of the keeper member of the left-hand apparatus shown in FIGS. 2—5. The latch member 40 of the right-hand lock apparatus also is identical with the latch member of FIGS. 2—5, except that its securing member 54, suitably modified, is mounted for use off center on the opposite side of the shaft axis to engage the notch of the right-hand lower keeper member 29.

The keeper members 29*a*, and latch members 40*a* at the upper door edges can be identical with those of the lower edges of the corresponding door and also include securing members 54. However, since the forces from loads inside the trailer are usually directed against the lower portions of the doors, in most cases it is not necessary to utilize securing members 54 on the upper latch members and it is not necessary to provide the upper keeper members with the notches 38 as in the lower keeper members, although no harm is done if for standardization the upper keeper members have such notches. The upper keeper members and upper latch members, for standardization purposes, can otherwise be identical to the lower keeper members and latch members.

As shown in FIG. 2, there is a resilient or compressible sealing gasket 61 at the edge of the door as in common in refrigerator-type trailers. Part of the gasket 61 projects out transversely of the door and frame, and the portion 27 of member 15 is formed to have a recess 27*a* extending across the member 15 to clear the gasket 61, while the lower part of portion 27 bears directly on the transverse member 3. The wedging action of the mechanism holds portion 27 firmly against the transverse member 3, so that the door is held firmly against inward as well as outward movement.

Similarly the portion 23 of the upper bearing member 14 is formed to be offset at 23*a* to provide clearance for the sealing gasket 61. In this case portion 23 does not overlap the gasket completely to bear directly on the transverse member 4 but bears on member 4 through the gasket 61.

In each case the extension portions 23 and 27 respectively are integral parts of the mounting members 14 and 15 that rotatably support the shaft 13. The extension portions therefore can be strongly fixed to the door because of the large door-contacting areas made possible by the members 14 and 15, and moreover they themselves can be of adequate strength and can be inextensively formed of sheet metal as shown.

The apparatus can be operated as follows. Assuming that the doors are in their locked positions as shown in FIG 1, and it is desired first to open the left-hand door 7, the securing member 54 on the left-hand lower keeper member 29 is then moved to its release position, shown in broken lines in FIG. 3; if any such securing member is on the upper keeper member it also is moved to its release position. Any seal that may be on the handle 16 is then broken, any lock locking the handle unlocked, and pivoted member 20 of holding means 17 is then moved to its release position. The handle then is pulled away from the door to turn the shaft 13 counterclockwise, as shown

in the left-hand lock mechanisn in FIG. 1. This causes the rear curved surfaces 51 of the forks 44 of both the lower and upper latch members 40 and 40*a* substantially simultaneously to engage the front surfaces 52 of the lower and upper keeper members, thus driving the shaft 13 supporting these latch members and the door 7 on which the shaft is pivotally mounted away from the doorway members 3 and 4. The door is thus partially opened. Continued turning of the handle in the counterclockwise direction removes the forks 44 of these latch members from the space between the transverse members 36 and the base 32 of the lower and upper keeper members 29 and 29*a*, and causes the forks 45 of the same latch members to pass forwardly over the free ends of projections 34 of the keeper members, thus permitting the door to be completely released and to be swung completely open.

The right-hand door can be similarly opened, the parts being so designed that clockwise movement of the handle, as shown on the right-hand shaft 13 in FIG 1, will open the door.

When it is desired to close the left-hand door, the door can be partially closed with its handle 16 in the extreme open position until the curved outer edges 53 of the forks 44 of the lower and upper latch members contact the front surfaces 52 of the base members of the upper and lower keeper members. The close fit of the portion of openings 28 in part 24 adjacent the projecting members 34 aids in guiding the door and the latch members into proper alignment with the parts with which they are to cooperate. The handle is then moved in a clockwise direction to cause forks 45 of the latch members 40 and 40*a* to pass rearwardly over the free ends of the projections 34 of keeper members 29 and 29*a* and to turn the ends of the fingers of the forks 44 of these latch members into the spaces between the transverse members 36 of the projecting members 33 of the keeper members and the base members 32 of the keeper members sufficiently to cause the front surfaces 49 of the fingers of the forks 44 to contact the rear surfaces 50 of the transverse members 36. These surfaces act as camming surfaces and cooperate to provide wedging action that drives the door firmly inward at its upper and lower ends; this wedging action not only firmly holds the door in place, but also is particularly beneficial when, as shown in FIG. 2, there is a compressible sealing gasket 61 at the edge of the door.

The procedure is similar to close the right-hand door in FIG. 1.

The securing members 54 then are moved to their locked positions. The handles 16 are then secured in their door-locking position, locks and seals being applied if desired.

The door lock mechanism described thus firmly holds closed each door at its upper and lower edges in the doorway opening while extension portions 23 and 27 of members 14 and 15 prevent the doors from moving inwardly of the doorway. Since the doors are thus firmly secured in closed position against inward as well as outward movement, this prevents racking action that would otherwise tend to occur since the closed doors act as stiffeners against transverse movement of the top of the rear portion of the trailer relative to its bottom portion if the trailer is standing on uneven ground or is traveling over rough terrain. Furthermore, the two forks extending over two closely fitting projections on the keepers, and the securing members 54 on each of the lower keeper members, firmly hold the latch members in locked position, resist racking action, and also resist tendencies of the locking apparatus to open if substantial or abrupt forces are exerted on the door from the inside, as by shifting of loads in services in which high accelerations or decelerations are encountered.

It is apparent from FIG. 4 that in the absence of these features a force exerted on the inside of the door would tend to cause a substantial force to be exerted between the front surface 49 of the fork 44 of the latch member and the rear surface 50 of the transverse member 36 of the keeper member, which would tend to drive the fork 44 inwardly and the other fork 45 of the keeper member outwardly, thus exerting a twisting action on the latch member and the shaft that could distort or break the latch member or shaft or break the connection between the latch member and the shaft. However, the securing member 54 when locked prevents outward movement of the fork 45 relative to the projecting member 34 of the keeper member, and thus resists any twisting action about the shaft axis, while the close fit of both forks about the projecting members of the keeper member prevents any twisting action transverse of the shaft axis.

Consequently, the improved lock apparatus of the invention enables the doors effectively to resist racking action, and holds the doors closed against both inward and outward movements or forces.

It is apparent that various modifications may be made in the illustrated embodiment without departing from the spirit of the invention.

I claim:

1. Door-securing apparatus for use with a door and associated door frame comprising a rotatable shaft; a keeper member adapted for mounting on said door frame; a latch member adapted to be carried by said door and actuatable to and from securing engagement with said keeper member by rotation of said shaft; and a member supporting said shaft for rotation about its axis, said shaft-supporting member being fixed to said door and having an extension portion projecting beyond the edge of the door and adapted when the door is closed to overlap said door frame and limit inward movement of said door relative to said door frame, said latch member having a projecting portion that extends transversely of said shaft and adjacent said keeper member when said latch member is in securing engagement with said keeper member, and said extension portion of said shaft-supporting member having a portion that extends between said projecting portion of said latch member and said door frame when said latch member is in securing engagement with said keeper member.

2. The apparatus of claim 1 in which said keeper member is located in close proximity to the edge of said door and said extension portion extends past said keeper member to overlap said door frame.

3. The apparatus of claim 2 in which said extension portion entirely surrounds said keeper member.

4. The apparatus of claim 1 in which said extension portion bears against said door frame.

5. The apparatus of claim 1 in which there is a gasket located between the door and the door frame and projecting transversely beyond the surface of the door on the side thereof carrying said shaft-supporting member, and in which said extension portion is recessed to clear said gasket.

6. The apparatus of claim 5 in which said extension portion is recessed to clear said gasket and has a portion that bears directly against said door frame.

7. The apparatus of claim 1 in which there is a gasket located between the door and the door frame that projects transversely beyond the surface of the door on the side thereof carrying said shaft-supporting member, and in which said extension portion bears on said gasket.

8. The apparatus of claim 1 in which said shaft-supporting member comprises a shaft-bearing portion, and lug means fixed to said bearing portion on each side of said bearing portion and adapted to be fixed to the door, and in which said extension portion projects from said lug means to overlap said door frame.

9. The apparatus of claim 8 in which said extension portion projects beyond said bearing portion.

10. The apparatus of claim 9 in which at each side of said bearing-supporting member there is an outwardly projecting stiffening rib connected to said lug portion and connected to and substantially coextensive with said extension portion.

11. Door-securing apparatus for use with a door and associated door frame comprising a rotatable shaft; a keeper member adapted for mounting on said door frame; a latch member adapted to be carried by said door and actuatable to and from securing engagement with said keeper member by rotation of said shaft; and a member supported by said shaft for rotation about its axis, said shaft-supporting member being

fixed to said door and having an extension portion projecting beyond the edge of the door and adapted when the door is closed to overlap said door frame and limit inward movement of said door relative to said door frame, said keeper member having fixed to said door frame a base having a transverse portion substantially parallel to said door frame and a portion projecting from said transverse portion, said latch member having a portion extending transversely of said shaft adapted to engage said projecting portion of said keeper member when said latch member is in securing engagement with said keeper member, and said extension portion of said shaft-supporting member having a portion that extends over said transverse portion of said keeper member base adjacent its projecting portion and between said transversely extending portion of said latch member and said base, when said latch member is in securing engagement with said keeper member.

12. The apparatus of claim 11 in which said keeper member is located in close proximity to the edge of said door and said extension portion extends past said keeper member to overlap said door frame.

13. The apparatus of claim 12 in which said extension portion entirely surrounds said keeper member.

14. Door-securing apparatus for use with a door and associated door frame comprising a rotatable shaft; a keeper member adapted for mounting on said door frame; a latch member adapted to be carried by said door and actuatable to and from door-securing engagement with said keeper member by rotation of said shaft; and a member supporting said shaft for rotation about its axis, said shaft-supporting member being

fixed to said door and having an extension portion projecting beyond the edge of the door and adapted when the door is closed to overlap said door frame and limit inward movement of said door relative to said door frame, said keeper member comprising first and second spaced projecting portions of which the first of said projecting portions comprises a stem portion and a transverse portion connected to said stem portion and the second of said projecting portions has a free end, said latch member having two forks one of which forks is engageable beneath said transverse portion of said first projecting portion in straddling relation to said stem portion and the other of which forks can receive in straddling relation said second projecting portion which second projecting portion is shaped to permit said other fork to pass over the free end of said projecting portion, and said extension portion of said shaft-supporting member overlaps said door frame at a level between said forks of said latch member and said door frame when said forks are so engaged with said keeper member that one fork is engaged beneath said transverse portion of said first projecting portion of said keeper member.

15. The apparatus of claim 14 in which said keeper member is located in close proximity to the edge of said door and said extension portion extends past said keeper member to overlap said door frame.

16. The apparatus of claim 15 in which said extension portion entirely surrounds said keeper member.

17. The apparatus of claim 15 in which said extension portion overlaps a portion of said keeper member.