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Donath et al.

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[54] **LATCHING APPARATUS FOR REMOVABLE ROOF OF TRANSPORT CONTAINERS, PARTICULARLY I. S. O. CONTAINERS**

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** ..... **220/55 G**, 292/161

[51] **Int. Cl.** **B65d 45/02**, E05c 1/12

[58] **Field of Search** ..... 220/1.5, 55 A–G, 220/55 BD; 49/276, 277, 463; 27/17; 105/377; 296/137 R; 292/156–162, 302

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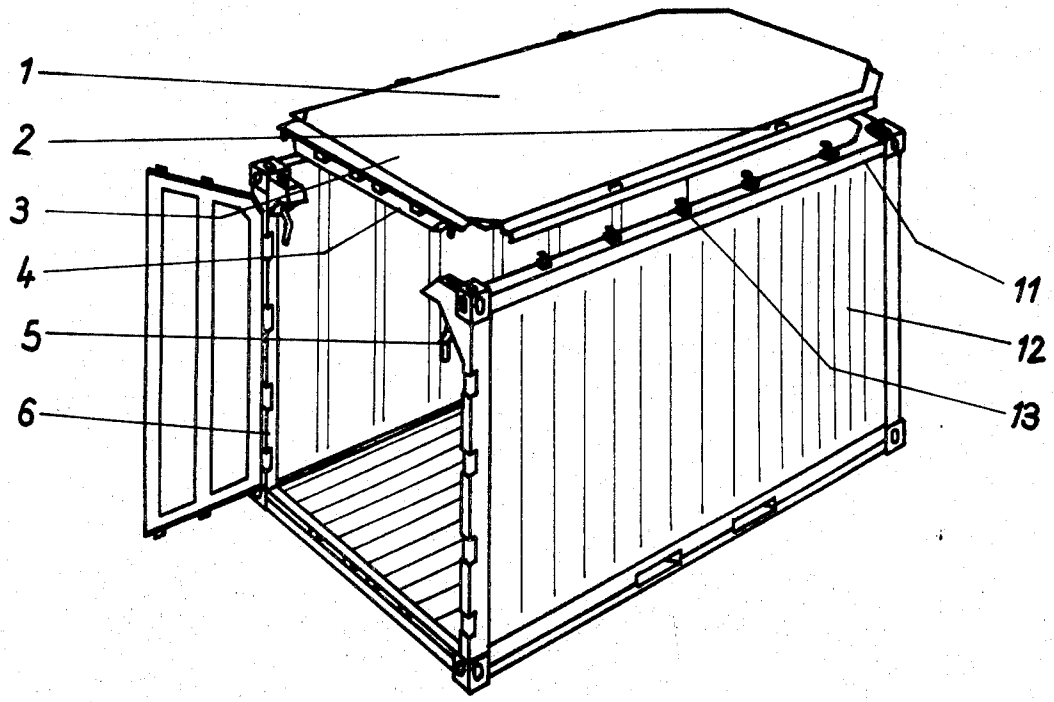
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Assistant Examiner—Lawrence J. Staab
Attorney—Nolte & Nolte

[57] **ABSTRACT**

A push rod extends along an edge of the framework of the roof. The rod has a plurality of wedge-like recesses. Corresponding projections are provided on or at the upper edge of the sidewall, for latching purposes.

6 Claims, 16 Drawing Figures



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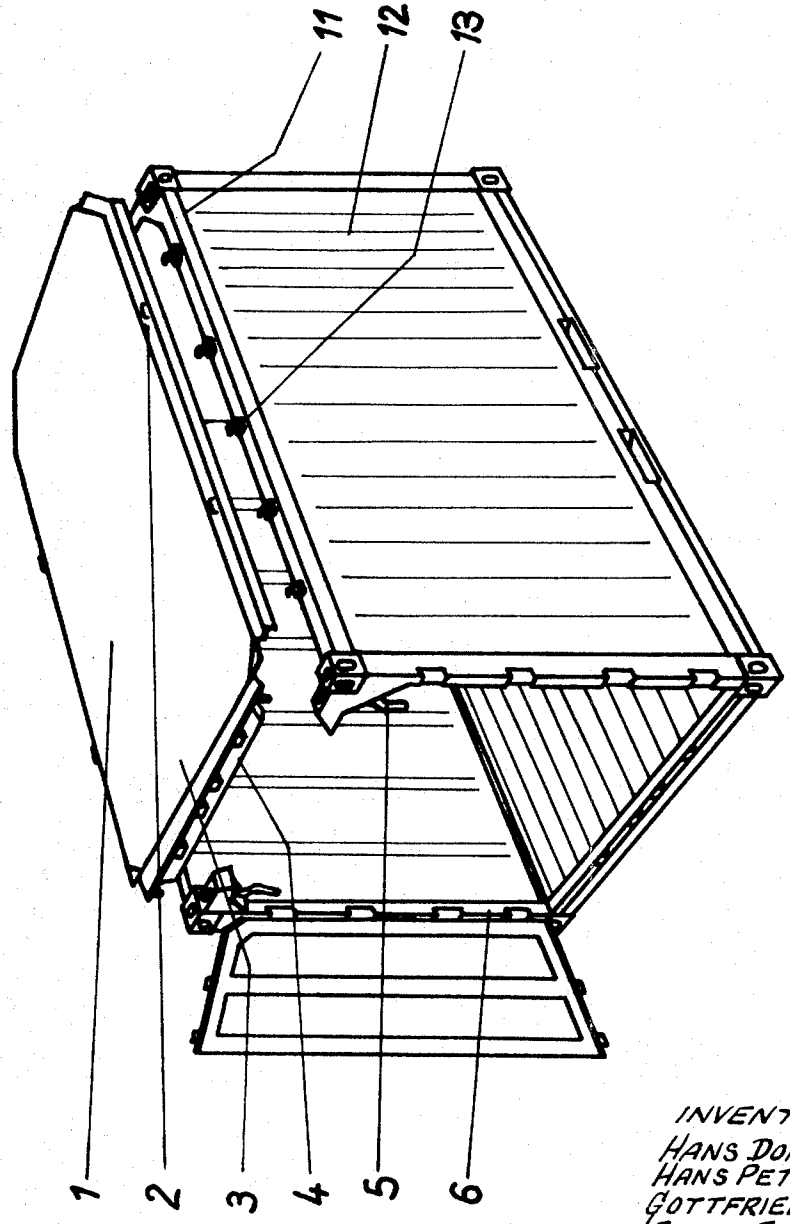


Fig. 1

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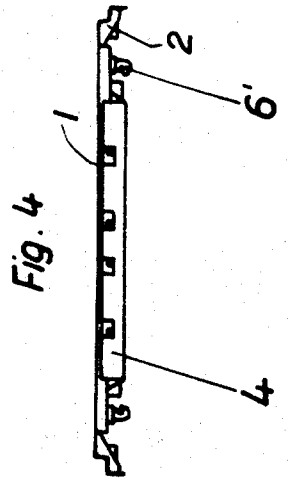


Fig. 4

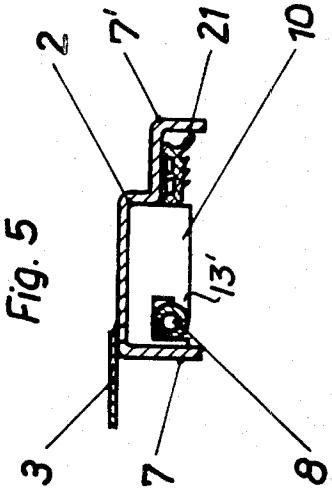


Fig. 5

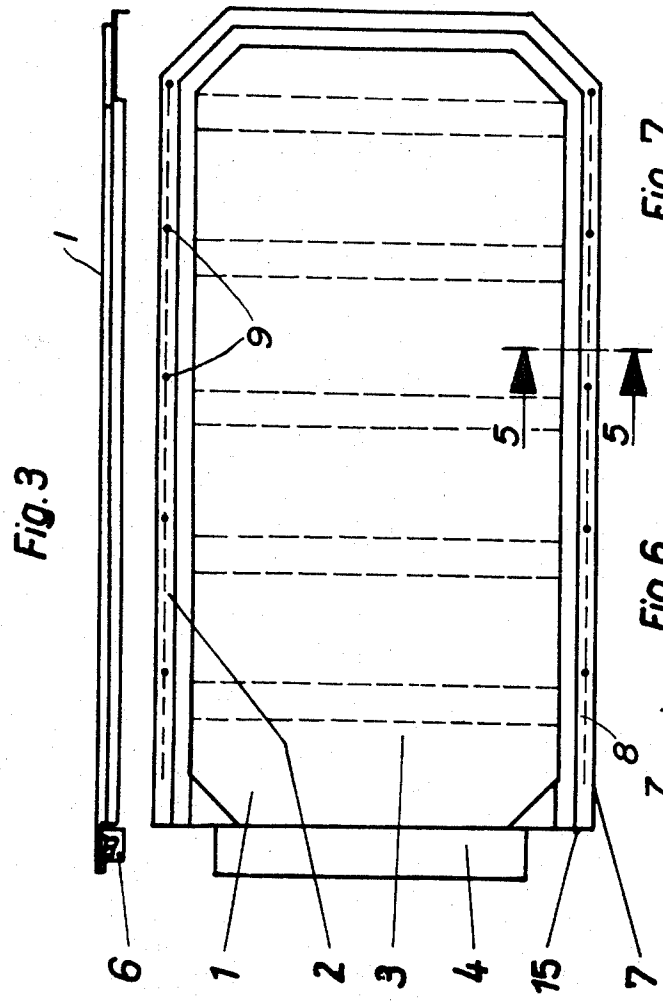


Fig. 3

Fig. 2

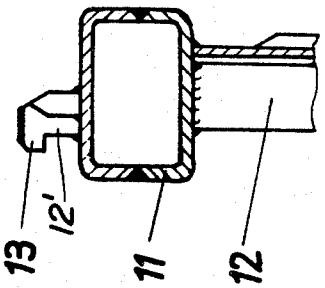


Fig. 7

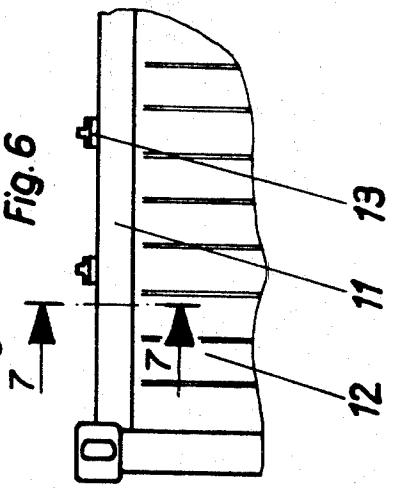


Fig. 6

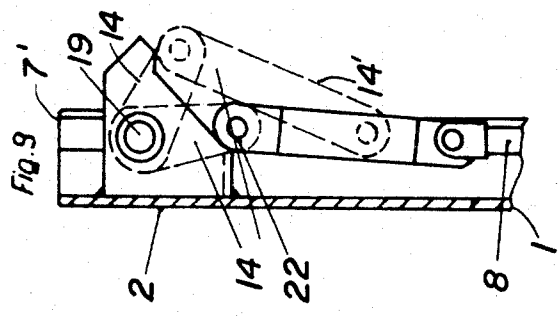


Fig. 9

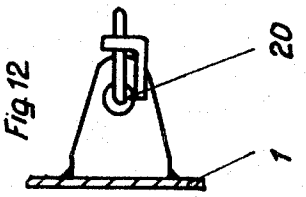


Fig. 12

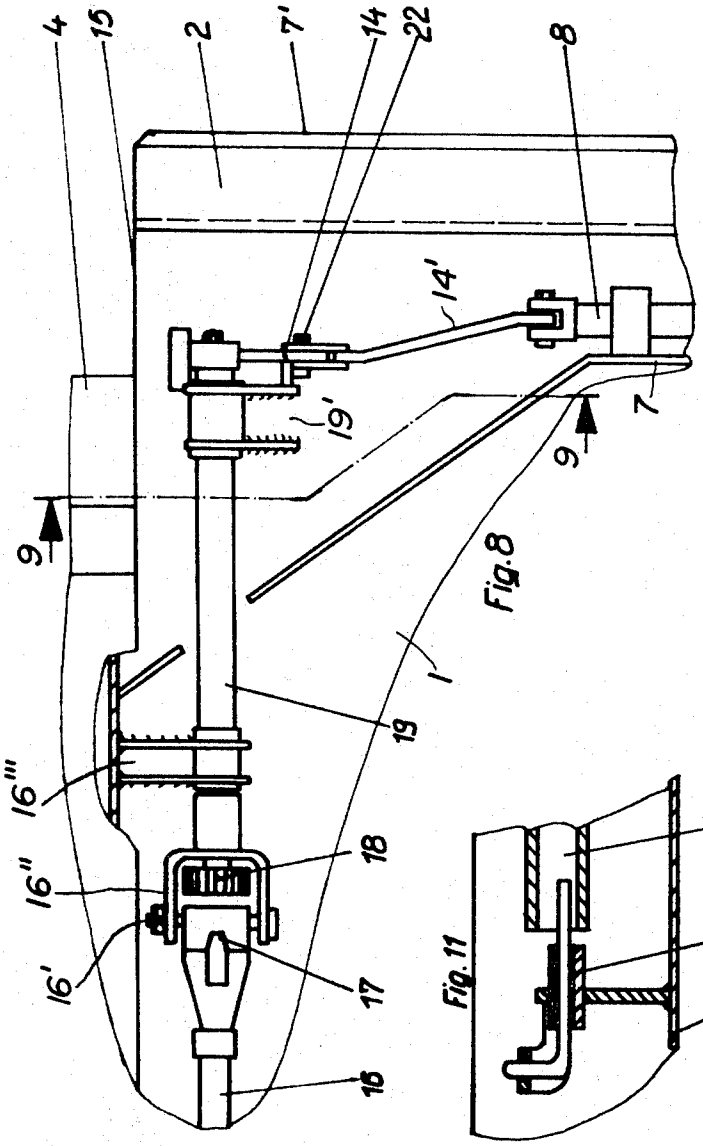


Fig. 8

Fig. 11

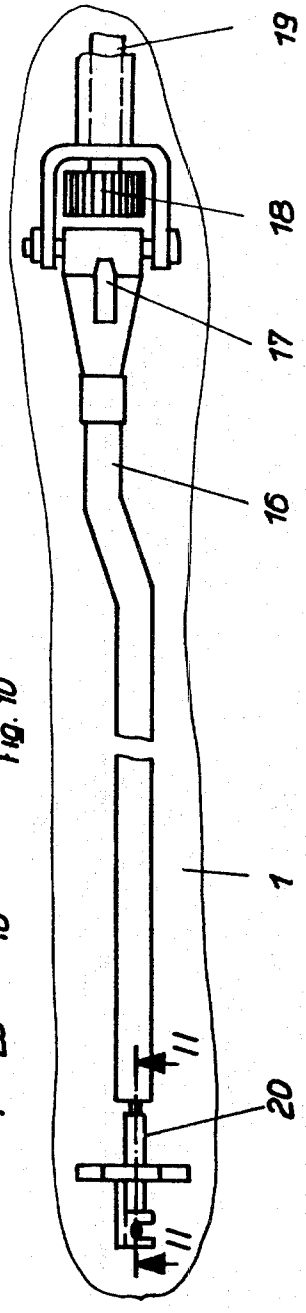


Fig. 10

Fig. 15

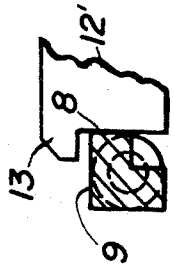


Fig. 13

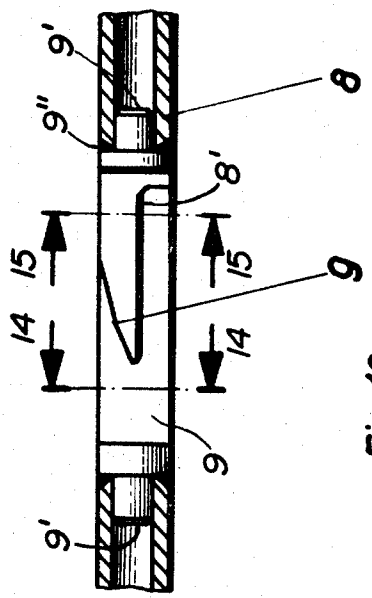
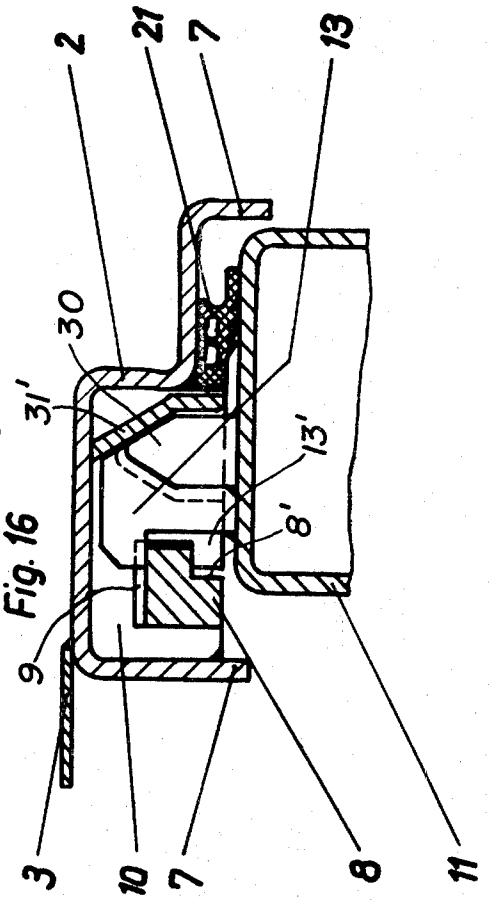


Fig. 14



Fig. 16



LATCHING APPARATUS FOR REMOVABLE ROOF OF TRANSPORT CONTAINERS, PARTICULARLY I. S. O. CONTAINERS

BACKGROUND AND NATURE OF THE INVENTION

The invention relates to latching means for removable roofs of transport containers, particularly I.S.O. containers which are specially suited for loading and unloading heavy goods by cranes.

It has been usual to provide a plurality of latching means in form of bell cranks and the like on the outside of the sidewall or in pockets of the roof. The bell cranks usually require individual customs seals; they are hard to operate, mainly in inclement weather.

Torsion shafts have also been used for latching. Locking hooks were arranged on such a shaft, at certain distances from one another. They could be actuated from the inside when the front wall door was open. One of their drawbacks was that the actuating lever had to be tilted into the loading space, in the plane of the front wall door. Also, on actuation of the torsion shaft, there was internal torque, by an amount such as 30°, and the dimensional irregularities of the individual locking units had cumulative effect, so that the latching of locks, remote from the actuating device, was questionable.

It has therefore been an object of the invention to provide a transport container, particularly an I.S.O. container, with a removable roof for loading and unloading by crane, wherein the goods are well protected by the removable roof, and wherein the latching mechanism can be operated simply and effectively, also in case of inclement weather.

This object led to the problem of such improvement of the removable roof that differential latching paths are avoided, although actuation is central, and that accordingly all latching means will function safely even under unfavorable conditions, and will not interfere with the loading space in the door area.

This has been achieved by the invention, which uses a push rod in an edge portion of the roof frame, said rod having a plurality of wedge-like recesses. On or at the longitudinal carrier of the sidewall, corresponding latching projections are disposed.

DRAWINGS

FIG. 1 is a perspective view of a container according to the invention;

FIG. 2 is a plan view of the removable roof of the container;

FIG. 3 is a side elevation of this roof;

FIG. 4 is a front elevation of this roof;

FIG. 5 is a fragmentary sectional view taken along line 5—5 in FIG. 2, this view being shown on a larger scale;

FIG. 6 is a fragmentary side elevational view of the sidewall of the container;

FIG. 7 is a sectional detail view taken along line 7—7 in FIG. 6 and drawn on a larger scale;

FIG. 8 is a bottom view of the new latching device;

FIG. 9 is a sectional view taken along line 9—9 in FIG. 8;

FIG. 10 is a more detailed bottom view of an element from FIG. 8;

FIG. 11 is a sectional view taken along line 11—11 in FIG. 10;

FIG. 12 is a right-hand side elevational view of the element shown in FIG. 11;

FIG. 13 is a bottom view of an element, connected with those shown in FIGS. 8 and 9 and constituting a section of the push rod according to the invention;

FIG. 14 is a sectional view taken along line 14—14 in FIG. 13;

FIG. 15 is a sectional view taken along line 15—15 in FIG. 13; and

FIG. 16 is a more complete sectional diagram, showing the push rod in combination with other elements, for latching the roof the the container.

As generally shown in FIG. 1, roof 1 is removably disposed on an I.S.O. container. The roof contains a frame 2 with suitable boarding or sheeting 3 thereon. It has upper front edge 4. When roof 1 is placed on the container, front latching mechanism 5, 5' connects this edge by positive linkage with door frame 6 to provide firm connection therebetween.

According to the invention as basically shown in FIGS. 2 and 5, the roof frame 2 has inner and outer flanges 7, 7' and the latching mechanism comprises a push rod 8 extending along the frame, adjacent flange 7. At a plurality of positions along the roof, for example near the broken lines in FIG. 2, push rod 8 has wedge-like recesses, one of which is shown in FIGS. 13 to 16 at 9.

Advantageously, push rod 8 is actuated by hand lever mechanism shown in FIGS. 8 to 12 and disposed adjacent roof edge 4 (FIGS. 1 and 2). The lever can have a pivot axis at right angles to the extension of the push rod and can operate the rod by suitable linkage. Provision can be made to fold the handle of the lever into position parallel to or extending to the aforementioned axis, in order to store the lever elements, in rest position thereof, without interference with the loading space of the container. Furthermore, provision can be made to remove the push rod and the linkage thereof from the roof frame, on removal of a bolt. In operation, the basic latching mechanism comprising the push rod and parts engaging the same is covered by frame 2 and lies between flanges 7, 7' thereof, thereby safely preventing damage to the mechanism when the roof is put upon the ground or the container and secured thereto. This arrangement is tentatively indicated in FIG. 2 and 5. It is shown more fully in FIG. 16.

It will be seen that all constructive elements of the push rod latching device according to the invention are disposed within the container, whereby they are safe from unauthorized interference and from inclement weather. As will now be described, the mechanism can be operated safely and simply in such a way as to allow construction thereof with relatively large tolerances, so that the structure is inexpensive as well as unusually effective. In contrast to former torsion shafts and the like, the push rod latching device according to the invention is free from changes of the latching path when the containers are made longer, and is also free from interference with the loading space in the container.

Push rods 8 are slidably guided in suitable apertures of ribs 10 in roof frame 2 as shown in FIG. 5 in such a manner that inward projections 10' of the ribs 10 engage lower recesses 8' in the wedge acting recess portion 9 of the push rods 8 (see FIG. 16). Of course the ribs are suitably spaced, longitudinally of the container, from wedge recesses 9.

Longitudinal upper frames **11** of container sidewalls **12** (FIG. 7) have latching bolts **13** thereon, which in turn have inward projections **13'**, disposed between flanges **7, 7'** of roof frame **2** when the roof is latched on (FIG. **16**). These latching members can be made from short pieces of plate or rod material welded to frame **11**, as indicated by FIG. **7**, and should be disposed opposite wedge recesses **9** as may be seen from FIGS. **2** and **6**. As further shown by FIGS. **13** to **15**, push rod **8** may have the general form of a steel tube, while wedge recesses **9** can be made from steel rod material of generally square cross-section, suitably milled and shaped for present purposes, these sections being interconnected by several end pins **9'** and weld seams **9''**.

For actuation of push rod **8**, FIGS. **8** and **9**, linkage **14, 14'** is connected to the end of this rod adjacent door end **15** of the roof. One part **14** of this linkage constitutes part of the manual lever mechanism for actuation of the latching device. The mechanism includes a lever handle **16**, which can be folded into inoperative position by swinging it about pin **16'** in a yoke **16''**, suitably pivoted at **16'''**. When lever handle **16** is swung into operative position, a tooth element **17** engages a gear **18** on one end of shaft **19**, pivoted at **16'''** and also at **19'**, while the other end of this shaft has linkage element **14** extending therefrom. Thus the lever handle **16** can be swung in a plane parallel to side edge **7'** of the roof, thereby operating linkage **14, 14'** and longitudinally shifting rod **8**. In rest position, when the tooth **17** no longer engages gear **18**, lever handle **16** can be secured to roof **1** by a handle holding or fixing device **20** illustrated in FIGS. **10** to **12**. This device safely prevents inadvertent lever and link operation and loosening of the roof latches on the push rods. Meanwhile the roof is safely sealed to the top of sidewall frame **11** by compressible seal **21**, which is disposed, in suitable manner, between flanges **7, 7'** of roof frame **2**.

When shifted in leftward direction, as seen in FIG. **13**, wedge-shaped recess surfaces **9** engage the lower edges of projection **13'** on the sidewall, thereby locking the roof to the sidewall and sealing it at **21**, FIG. **16**.

The latching becomes particularly firm when the outer edge of the roof and the upper edge of the sidewall are additionally held together by lateral pressure and/or counterpressure. For this purpose, wall frame **11** is shown as also having upwardly extending wedge members **30** engaging the undersides of inclined rigid members **31** in roof frame **2**, in such a way that, when wedge mechanism **9** pulls roof frame **2** down to wall frame **11**, there also occurs slight lateral motion of the two frames relative to one another as indicated by the broken lines parallel to wedge **30**. It will be seen that the push rod engaging members **10', 13'** on the container sidewall can thus be forced to engage upper wedge surface **9** of the push rod with downward pressure and outer as well as lower surfaces of the push rod with inward and upward pressure, thereby providing firm and vibration-proof locking at each point of interengagement between roof and wall (**9** and **13** in FIGS. **2** and **6**, **10'** in FIGS. **5** and **16**).

In order to remove roof **1** from container (FIG. **1**) the operator releases front edge lock **4** by handle **5**, releases lever handles **16** at **20**, engages them at **18**, and swings them in a direction out of the container to move push rod **8**, so as to release the lock actions described with reference to FIG. **16**. The opposite operations allow re-attachment of the roof, incident to the loading and unloading operations.

It sometimes may be desired to remove the push rod mechanisms from the roof, for lubrication and inspection. This is done very simply by removing, for each push rod, a single bolt **22** connecting link **14'** of rod **8** to link **14** of the lever mechanism, and by then pulling the entire push rod assembly out of the roof frame, through the openings in the ribs **10**.

Evidently the invention can be used to latch a roof to its container, either against bodily removal of the entire roof, or against tilting it or swinging it into open position.

What is claimed is:

1. A container comprising a removable roof, said roof having a frame member disposed adjacent an upper edge of a side wall of the container, said frame member having a push rod therein, said push rod comprising a plurality of guide sections and a plurality of latching sections, said guide and latching sections being arranged alternately in end to end relationship, each latching section defining wedged shaped recesses, a plurality of L-shaped members on said upper edge of said side wall, said L-shaped members being insertable into corresponding ones of said recesses, means, disposed within the container, for moving said push rod longitudinally relatively to said upper edge of said side wall to latch the roof to the side wall by interengagement of said L-shaped members and said recesses, said means for moving said push rod comprising a hand lever, a shaft rotatable about an axis normal to said push rod, a gear wheel mounted on said shaft and turnable by means of said hand lever, a linkage including a connecting rod movable with said shaft, said linkage being connected to said push rod to shift the push rod longitudinally as the lever is turned, said frame member including resilient packing means cooperating with said upper edge of said side wall to seal the roof and side wall.

2. A container as claimed in claim **1** wherein said hand lever is shiftable between operative and inoperative positions, said hand lever, in the operative position drivingly engaging said gear wheel and in said inoperative position being disengaged from said gear wheel.

3. A container as claimed in claim **1** wherein said linkage comprises a connecting rod secured to and rotatable with said shaft and a link connecting said connecting rod and said push rod, said link and connecting rod being separable to facilitate removal of said push rod.

4. A container as claimed in claim **1** wherein said recesses include a wedge surface which is subdivided into three surfaces of different inclinations to the longitudinal axis of the push rod one of said surfaces imparting to the L-shaped element a force normal to the axis of said push rod upon movement of said push rod.

5. A container as claimed in claim **1** wherein said frame member is generally U-shaped comprising a base and a pair of flanges the outermost flange being extended and said push rod being disposed in apertures in web plates extending transverse to the frame member between the flanges.

6. A container as claimed in claim **5** wherein there are an equal number of web plates to the number of L-shaped members on the upper edge of said side wall said web plates, in the latched position of said roof, being adjacent to said L-shaped members of said upper edge of said side wall.

* * * * *