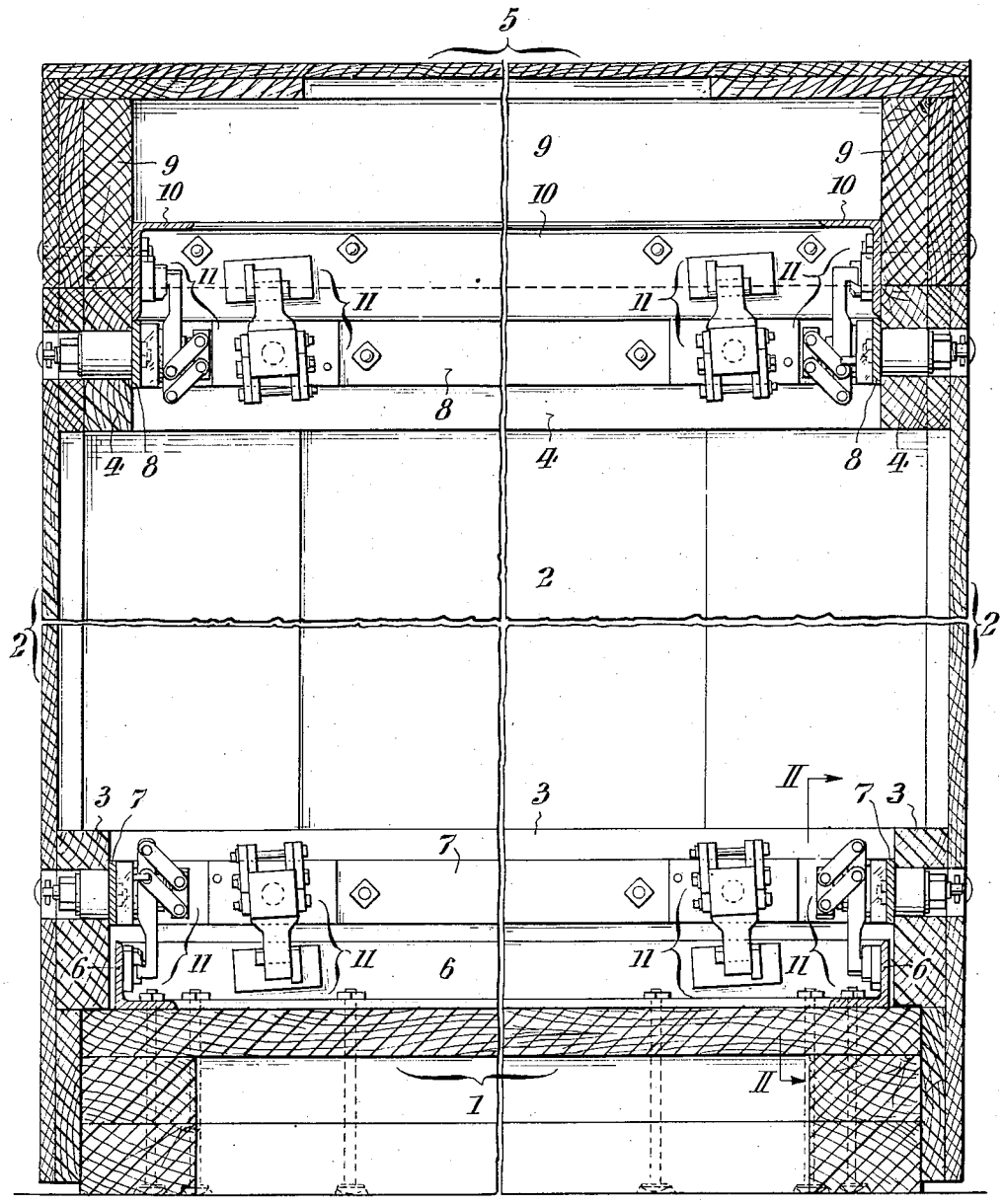
May 6, 1958 J. K. BARRY 2,833,005

SECURING DEVICES

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FIG. 1.



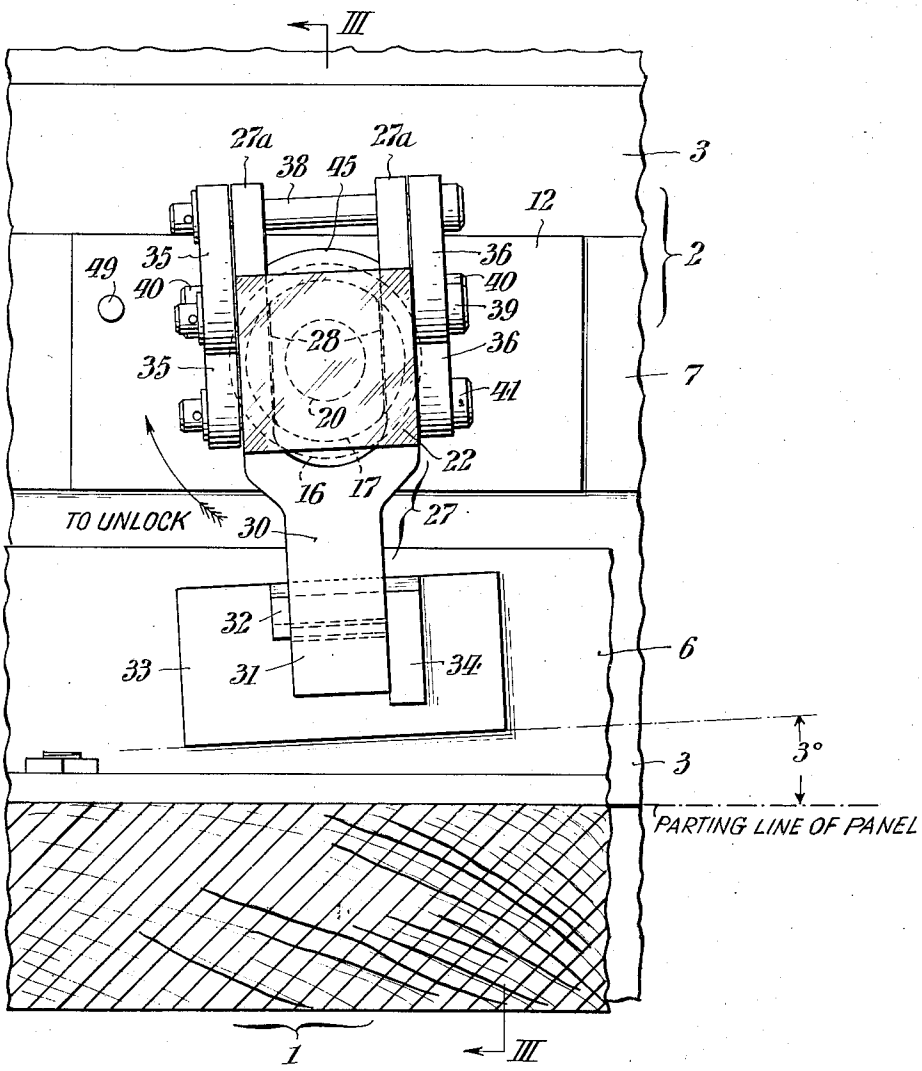

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FIG. 2.




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SECURING DEVICES

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FIG. 3

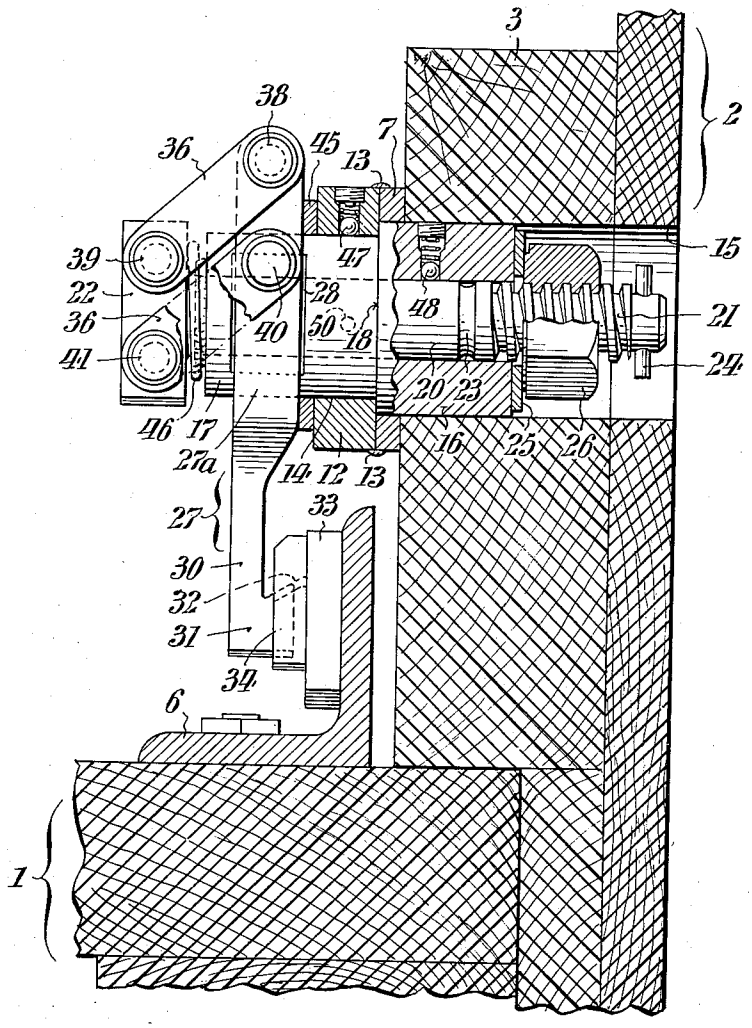
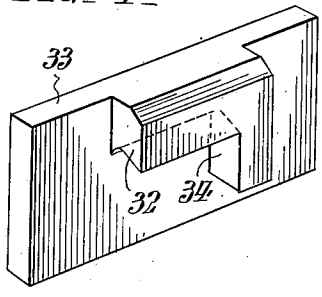



FIG. 4



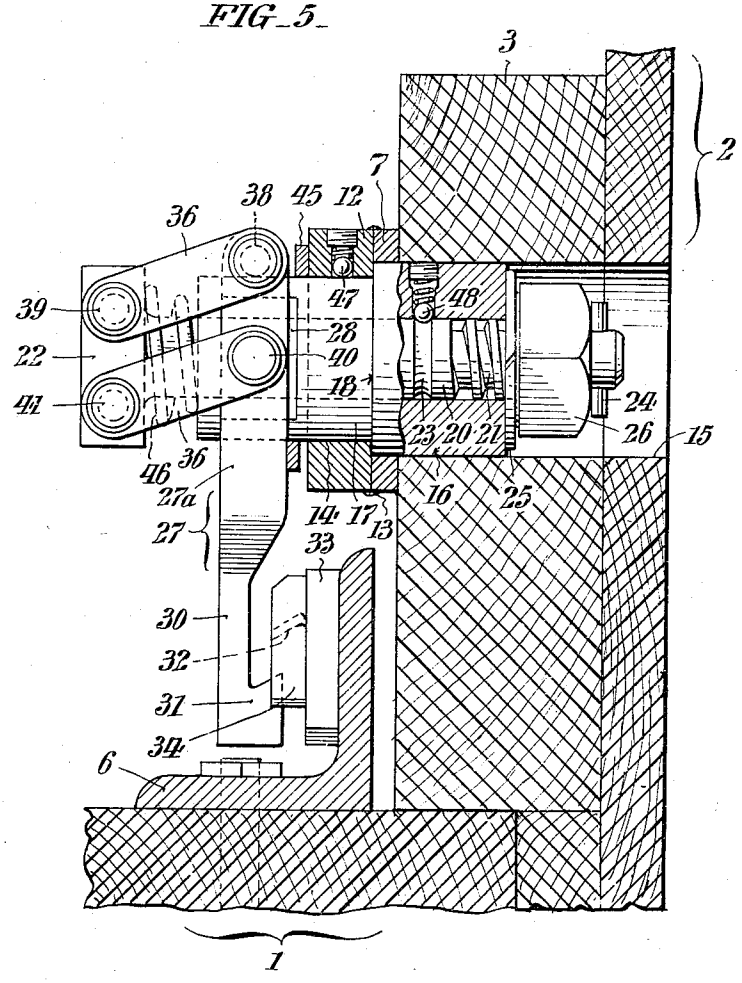

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FIG_5_




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SECURING DEVICES

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FIG. 7.

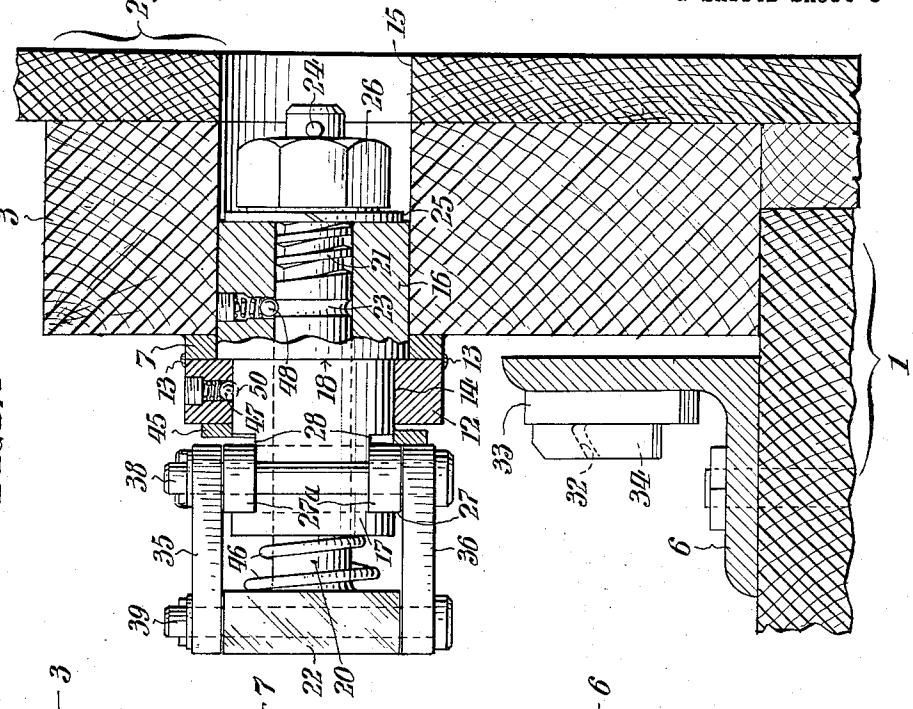
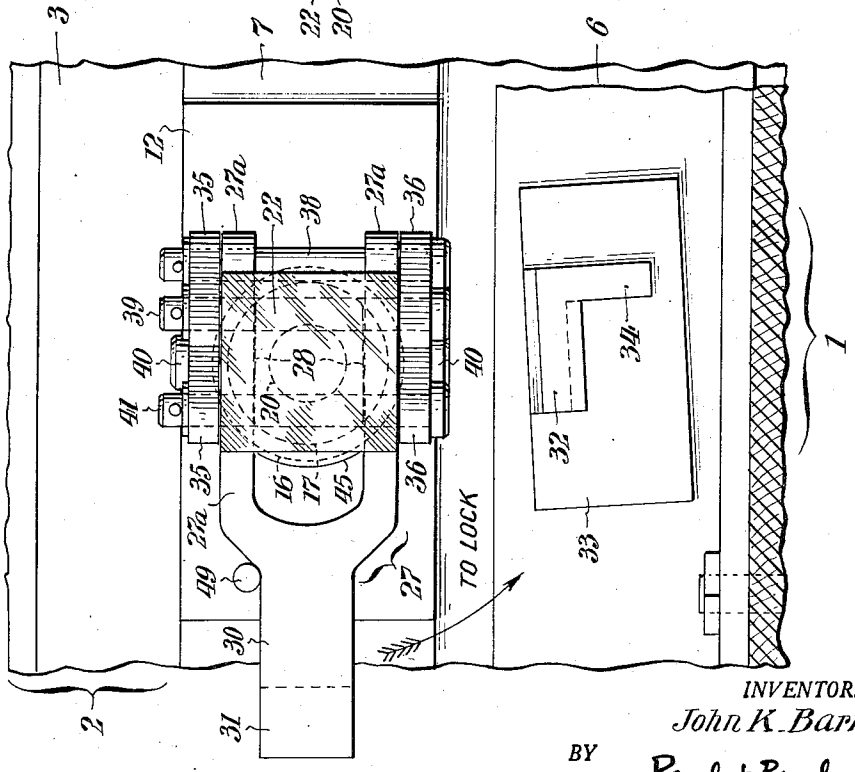



FIG. 6.




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2,833,005

# SECURING DEVICES

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Application February 11, 1957, Serial No. 639,468

8 Claims. (Cl. 20—92)

This invention relates to securing devices.

My invention has for its chief aim, the provision of a securing device which is rugged and can be relied upon to rigidly and tightly secure together separable parts against the possibility of subsequent displacement when assembled; which is simple in construction; which is easy and quickly manipulated incident to latching and unlatching; and which, moreover, lends itself to ready fabrication in quantity at small cost both from the standpoint of labor and materials employed.

Other objects and attendant advantages will appear from the following detailed description of the attached drawings, wherein:

Fig. 1 is a view, in vertical section, of a "knockdown" shipping container of which the component parts are fastened together with securing devices conveniently embodying my invention.

Fig. 2 is a fragmentary view in section taken as indicated by the angled arrows II—II in Fig. 1, showing one of the securing devices on a larger scale.

Fig. 3 is a fragmentary view in vertical section taken as indicated by the angled arrows III—III in Fig. 2.

Fig. 4 is a perspective view of a keeper member forming a component of the device.

Fig. 5 is a view similar to Fig. 3 showing an intermediate stop in the operation of the device.

Figs. 6 and 7 are views corresponding respectively to Figs. 2 and 3 showing the device in unlocked position.

The box illustrated in Fig. 1, for convenience of exemplifying my invention, is constructed from lumber and has a bottom 1; side wall panels 2 which overlap the bottom, said panels having transverse battens 3 to rest on said bottom and similar battens 4 interiorly thereof at their tops; and a lid or cover 5 which fits over the tops of the side panels. Bolted to the bottom 1 somewhat inward of its perimetric edges are angle bars 6, and similarly bolted to the battens 3 and 4 are metallic strips 7 and 8. To reinforcing blocks 9, internally of the sides of the lid or cover 5, are bolted angle bars 10 similar to those on the bottom 1, the vertical flanges of said bars 10 partially lapping the battens 4 on the side walls 2.

In Fig. 1, individual securing devices, each embodying my invention are designated comprehensively by the numeral 11.

With reference now more particularly to Figs. 2–7 wherein one of the securing devices 11 by which a side wall panel 2 of the box of Fig. 1 is connected to the bottom 1, it will be noted that the device comprises a mounting plate 12 which is permanently affixed, as by welding at 13 (Fig. 3), to the inner face of the strip 7, with the central opening 14 in said strip axially aligned with a somewhat larger pre-allocated hole 15 in the panel 2. Fitting snugly into the hole 15 in the panel 2 is a rotatable bushing 16 whereof the inner end 17 protrudes beyond the inner face of the panel and is diametrically reduced with provision of an annular shoulder 18 for abutment against the back of the plate 12. Passed through the axial bore of the bushing 16 with capacity



for endwise shifting, is a bolt 20 which has an "Acme" threaded portion 21 adjacent the outer end thereof, a square head 22 at the opposite end and, somewhat inward of said threaded portion, a round section circumferential groove 23. The bolt 20 is also provided at its outer or distal end, beyond the threaded portion 21, with a nut stop in the form of a diametral pin 24. Engaged upon the threaded portion 21 of the bolt 20, with interposition between it and the corresponding end of the bushing 16 of a split spring friction washer 25, is a hexagonal nut 26.

The device further comprises a locking element 27 in the form of an arm which is bifurcated as at 27*a* and has the sides of its bifurcation slidably engaged in tangential grooves 28 at opposite sides of the diametrically reduced portion 17 of the bushing 16. At its distal end 30, the arm 27 is formed with a bevel undercut hook 31 which is adapted to engage beneath the projecting bevel undercut lug 32 of a plate 33 arranged at a slight angle to the horizontal and welded fast to the vertical flange of the angle bar 6 on the box bottom 1, said lug 32 having, at one end thereof, a downward striker extension 34 that serves as a stop for said arm 27 when the latter is in the locked position of Figs. 2 and 3. By means of pairs of parallel toggle links 35 and 36, the arm 27 is connected to opposite sides of the head 22 of the shaft 20, the opposite ends of the upper links pivoting on the protruding ends of pins 38 and 39 extending transversely of the bifurcation of said element and the bolt head 22 respectively, and the lower links being connected at one end to laterally projecting lugs 40 on the bifurcation of the locking element 27 and at their opposite ends to another pin 41 extending crosswise through the bolt head 22. As further shown, a hardened thrust washer 45 is interposed between the plate 12 and the confronting face of the bifurcation of the arm 27; and a spiral conical compression spring 46 is interposed between the opposite face of the reduced end 17 of bushing 16 and the head 22 of the bolt 20. Confined in radial apertures respectively in the plate 12 and in the bushing 16 are spring-urged balls 47 and 48, the functions of which will be explained presently.

*Operation*

In Fig. 3, the nut 26 is tightened, the bolt 20 drawn to the right to the full extent with the washers 25 and 45, and the spring 46 "solid." Under these conditions, the locking arm 27 is effectively held against dislodgment with its beveled hook end 31 firmly engaged beneath the sloped undercut bevel edge of the lug 32 on the plate 33 and stopped against the striker projection 34. When the panel 2 is to be detached from the box bottom, the nut 26 is first backed off by means of a suitable wrench (not shown) and is eventually stopped in binding relation with the pin 24, as shown in Fig. 5. As the nut 26 is backed off, the spring 46, in expanding, shifts the bolt 20 endwise toward the left in Fig. 5, with incidental entry of the spring pressed ball 48 into the circumferential groove 23 in said bolt to yieldingly hold the latter in its new position, and with incidental downward shifting of the arm 27 by the toggle links 35 and 36 to ease its hook end from beneath the lug 32. Upon further turning the nut 26 thereafter in the same direction, the bushing 16 and the bolt 20 are caused to turn by the action of the spring friction washer 25, in unison with the nut, with attendant swinging of the arm 27 clockwise in Fig. 2 clear of the lug 32 to the position in which it is shown in Figs. 6 and 7. This swing of the arm 27 is limited to an arc substantially quadrant in extent by its engagement with a stop projection 49 on the plate 12. The arm 27 will be yieldingly held thereafter in fully retracted position by engagement of the spring-backed ball 47

into the indentation 50 in the diametrically-reduced portion 17 of the bushing 16 as shown in Fig. 7. Re-locking of the device is accomplished by a procedure reversely of that just described incident to which the counterclockwise return swing of the arm 27 will be limited by the striker lug 34 on the plate 33.

Preferably, as shown, the length of the large diameter portion of the bushing 16 in relation to the hole 15 in the panel 2 is made such that the nut 26 and the threaded distal end portion of the bolt 20 are wholly accommodated out of the way within the thickness of said panel. Attention is also directed to the fact that the pin 24 is in longitudinal alignment with the arm 27, and thus serves as an indicator visible at the exterior of the panel 10 to indicate the position of said arm in both its locked and unlocked positions. It is to be further noted that the construction and arrangement of the components of the device such that when the device is in locked condition as in Figs. 2 and 3, the holding load is transmitted from the arm 27, through the links 35 and 36, to the bolt 20. Actually therefore, the only components which carry shear load are the pivot pins of the links 35 and 36 which, in practice, are made from hardened steel. Moreover, the construction of the device is such that it will withstand heavy impact forces readily since these forces are transmitted in tension to the bolt 20 which will easily absorb impact loading due to its length and novel design.

An important function of the device is to create a tight compressive force between the mutually abutting surfaces of the parts secured together by it so that such parts are drawn tightly together against the possibility of shifting relatively in three directions. This action is assured as a consequence of the angular disposal of the plate 33 and its lug 32. Thus when the arm 27 is in locked position, as in Figs. 2 and 3, contacting the striker projection 34 on the plate 33 with its hook end 31 engaged beneath the inclined bevel undercut and sloped bottom edge of the lug 32 on said plate, the panel 2 is rigidly held against vertical and lateral as well as against edgewise displacement relative to the bottom 1 of the box. In a similar manner all of the other devices 11 shown and arranged as in Fig. 1 serve, when locked, to rigidly bind together the parts respectively coupled by them likewise against the possibility of relative displacement notwithstanding rough handling of the box in shipment.

The securing device of my invention is not necessarily restricted to the use herein exemplified since, as will readily be obvious, it can be employed, without sacrifice of any of its inherent advantages, as a means for securing doors or panels within or over wall openings, and also in many other instances where it is essential that the separable parts connected be firmly and rigidly fastened together.

Having thus described my invention, I claim:

1. A securing device comprising a rotatable bushing constrained against endwise movement within a hole in a panel or the like and protruding beyond one face of the panel; a bolt constrained to endwise movement in the bore of the bushing and extending beyond the protruding end of the bushing; a locking element in the form of an arm engaged with the protruding end of the bushing with capacity for endwise movement diametrically of the protruding end of the bushing and having a bevel undercut hook end; a member affixed to a part to which the panel is to be detachably secured and having a projecting sloping bevel undercut lug adapted to be engaged from beneath by the hook end of the locking element; toggle link means connecting the locking element with the inner end of the bolt; and actuating means operable to draw upon the bolt and the toggle means, to keep the locking element firmly engaged with the lug to secure the panel rigidly to the aforesaid part, and also operable to shift the bolt in the opposite direction and thereby cause, through the toggle means, easement of the hook end of the locking element relative to the lug, so that the bushing and the locking element can be turned together thereafter for movement of the locking element away from the lug when the panel is to be removed.



2. A securing device, according to claim 1, further including means for yieldingly holding the locking element in retracted position.

3. A securing device, according to claim 1, further including means for limiting the retractive swing of the locking element to a partial rotation.

4. A securing device comprising a rotatable bushing constrained against endwise movement within a hole in a panel or the like and protruding beyond the inner face of the wall; a bolt constrained to endwise movement in the bore of the bushing and extending beyond opposite ends of the latter, said bolt having a threaded portion with a terminal stop at its outer end, and a parallel sided head at the inner end; a nut engaged upon the threaded portion of the bolt; a friction washer interposed between the nut and the confronting end of the bushing; a locking element in the form of an arm having a bevel undercut hook end, connected to the protruding end of the bushing with capacity for endwise movement at right angles to the bushing; toggle links each pivotally connected at one end to one side of the head of the bolt and to the corresponding side of the locking element; a thrust washer interposed between the inner end of the bushing and the locking element; a compression spring interposed between the head of the bolt and the bushing; and a member affixed to a part to which the panel is to be secured and having a projecting sloping bevel undercut lug for engagement from beneath by the hook end of the locking element whereby, as the nut is backed off until it contacts the stop on the bolt, the bolt is shifted by action of the spring with incidental impartation, through the toggle links, of endwise movement to the locking element to ease the hook end of the locking element from beneath the lug on the aforesaid member, and whereby upon further turning of the nut through a partial rotation in the same direction, the bushing is caused to rotate therewith, with incidental bodily swinging of the locking element away from the lug when the panel is to be removed.

5. A securing device, according to claim 4, further including means for yieldingly maintaining the bushing against rotation when the locking element has been swung to retracted position.

6. A securing device, according to claim 4, further including means for limiting the retractive swing of the locking element to a partial rotation.

7. A securing device, according to claim 4, wherein the locking element is bifurcated; wherein the inwardly protruding end of the bushing is tangentially grooved at opposite sides for sliding engagement by the side portions of the bifurcation of the locking element; wherein the head of the bolt is square and of a width corresponding to that of the bifurcation of the latching element; and wherein pairs of parallel toggle links connect the opposite sides of the bolt head with the corresponding sides of the bifurcation of the locking element.

8. A securing device, according to claim 4, wherein the stop on the bolt is in the form of a diametral pin in longitudinal alignment with the arm and serves as a means visible at the exterior of the panel to indicate the locked and unlocked positions of said arm.

No references cited.