

Sept. 16, 1969

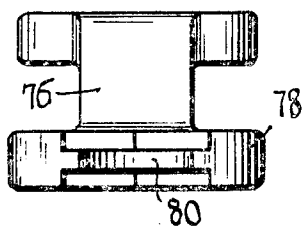
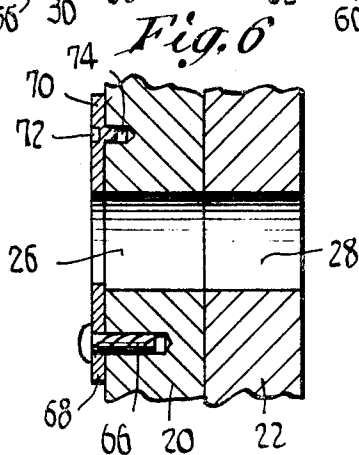
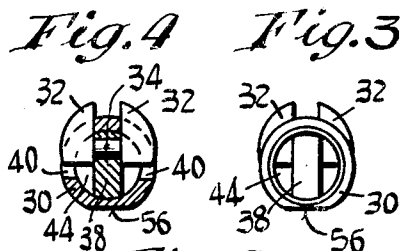
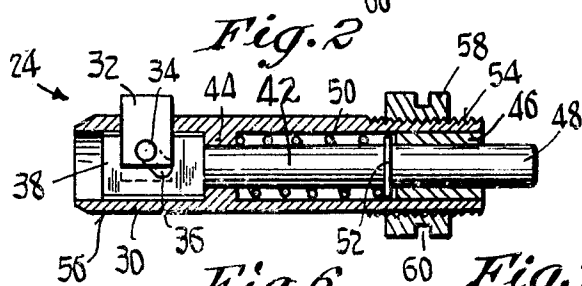
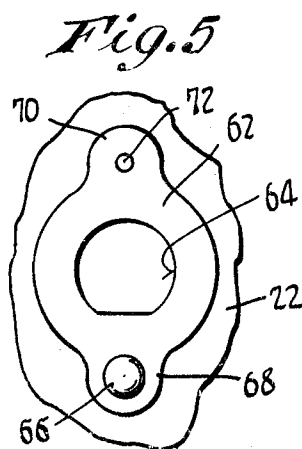
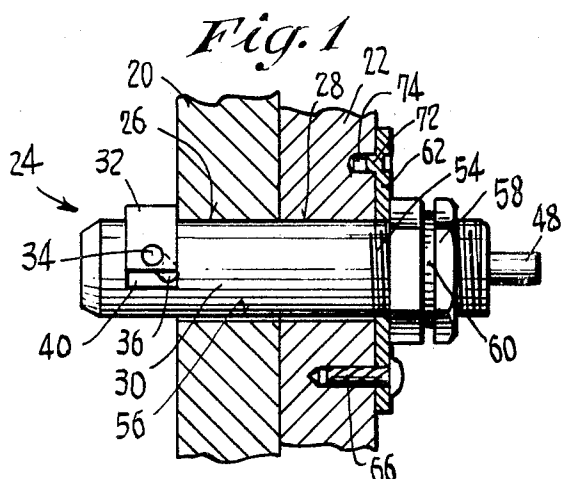
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3,466,965

QUICK RELEASE PIN

Filed July 12, 1967

2 Sheets-Sheet 1



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Fig. 10

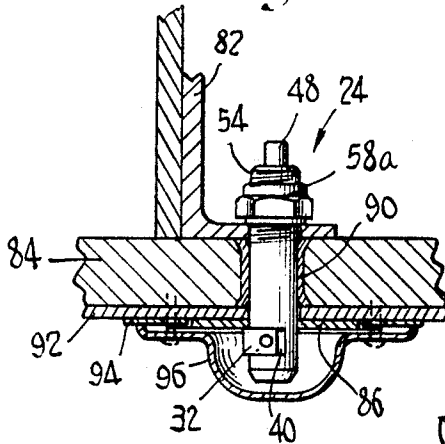


Fig. 14

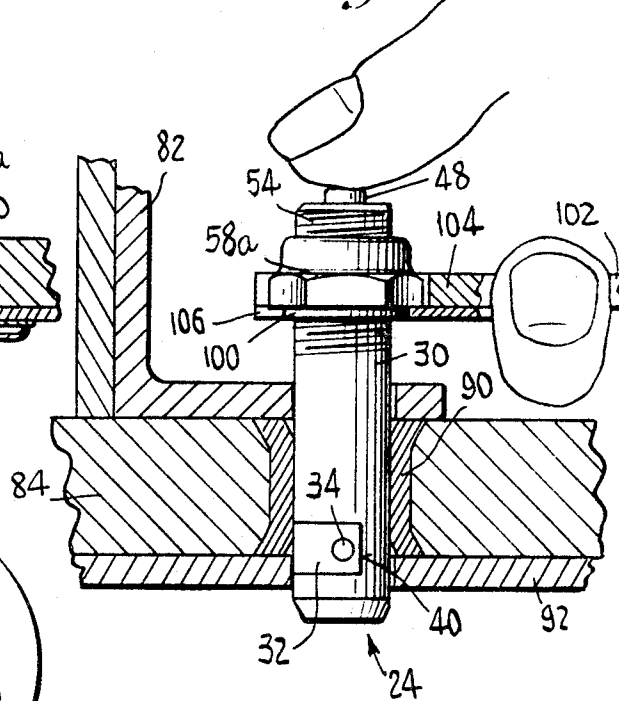


Fig. 11

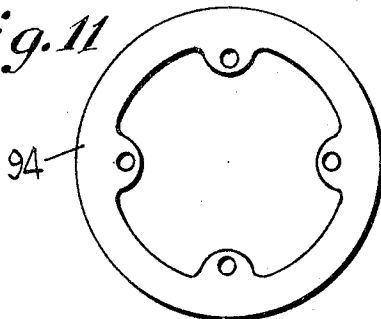


Fig. 13

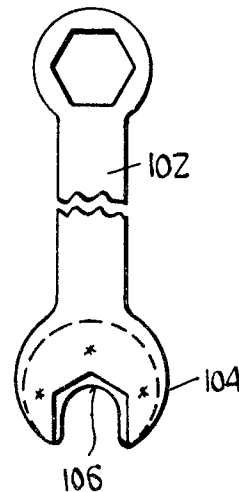
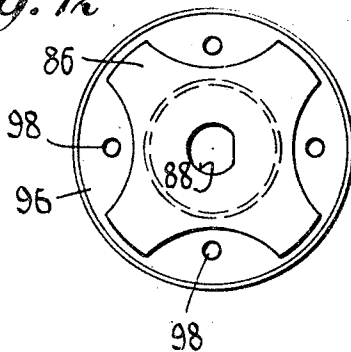


Fig. 12



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3,466,965

QUICK RELEASE PIN

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Int. Cl. F16b 21/00

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8 Claims

ABSTRACT OF THE DISCLOSURE

A quick-release draft bolt adapted to extend through aligned holes of structures which are to be fastened together. The bolt comprises a tubular body which is externally threaded and carries a nut at one end. An axially movable release button protrudes from the end carrying the nut, and is connected to actuate a laterally movable, protrudable and retractable head abutment or shoulder means movably mounted on the other end of the body. The nut has a special shoulder formation by which a special wrench that is applied to the nut can exert axial force on it and therefore on the tubular body. After the wrench has slightly loosened the nut, the release button is operated, whereupon the head abutment is retracted so that the bolt can be immediately withdrawn from its hole.

Cross references

- (1) U.S. Patent No. 3,184,816.
- (2) Copending application of John J. McCarthy, Ser. No. 524,647, filed Feb. 2, 1966, and having common ownership with the present application.
- (3) Copending application of Joseph R. Metz, Ser. No. 638,014, filed May 12, 1967, and having common ownership with the present application.

Background

This invention relates to quick-release pin or bolt type fasteners such as clevis pins, latch bolts and the like.

Ordinary threaded screws or bolts have the advantage that they can be pulled up or secured very tightly, so as to exert considerable and powerful forces on the parts being fastened together. However, there is the disadvantage that removal of the bolt or screw is time-consuming and involves repeated unscrewing movements.

Conventional clevis pins, on the other hand, are capable of quick and easy release but are not capable of exerting the powerful forces characterizing threaded elements such as screw bolts. Thus, the fasteners which are quickly releasable and removable lack the advantages of the fasteners which are only slowly removable, and vice versa.

Summary

The present invention obviates the above drawbacks of the prior bolt-type or pin-type fasteners, and one object of the invention is to provide a novel and improved draft bolt which is capable of exerting very powerful forces on members which are to be fastened to each other, yet which may be very easily and quickly released and removed when this is desired. This is accomplished by the provision of a bolt structure which has a quickly retractable head abutment or shoulder at one end, a manually operable release member at the other end, which can retract the head abutment completely, and screw threads and a nut at said other end, for tightly pulling up the bolt when the head abutment is in its operative, projecting position. With the bolt fastened, a slight unscrewing of the nut and thereafter an actuation of the release member to retract the head abutment results in complete release of the bolt whereby it can be immediately completely removed from the associated members.

Other objects of the invention are to provide an improved quick-release bolt as above set forth, which is simple in construction and economical to produce, small and compact, easily understood and operated, strong and powerful, and not likely to malfunction or fail even under adverse conditions of use.

Still other features and advantages will hereinafter appear.

In the drawings:

FIG. 1 is a view partly in section and partly in elevation, showing the quick-release bolt of the invention functioning to secure together two panel members. The bolt is illustrated in side elevation.

FIG. 2 is an axial sectional view of the quick-release bolt per se.

FIG. 3 is a rear or "head" end elevational view of the bolt.

FIG. 4 is a transverse section, taken on the line 4—4 of FIG. 2.

FIG. 5 is a plan view of a portion of one of the panels of FIG. 1, illustrating a keying plate.

FIG. 6 is a sectional view of two panel members, showing the keying plate of FIG. 5 at the "head" side of the assemblage, as distinguished from the disposition of the plate at the opposite side of the assemblage illustrated in FIG. 1.

FIG. 7 is a top plan view of an improved open-end wrench as provided by the invention.

FIG. 8 is a front end elevational view of the wrench of FIG. 7.

FIG. 9 is a side elevational view of the wrench of FIGS. 7 and 8.

FIG. 10 is a sectional view of an assemblage embodying the quick-release bolt of the invention, involving a water-tight installation. The bolt is shown in side elevation.

FIG. 11 is a plan view of a sealing gasket employed in the construction of FIG. 10.

FIG. 12 is an inside elevational view of a keying plate and cover plate as provided in the assemblage of FIG. 10.

FIG. 13 is a top plan view of an open-end wrench for use with the assemblage of FIG. 10.

FIG. 14 illustrates the manner of using the wrench of FIG. 13, in removing the bolt from the assemblage of FIG. 10.

Referring first to FIGS. 1–5 there is shown a pair of superposed panels 20, 22 which are secured together by the improved quick-release bolt of the invention, said bolt being designated generally by the numeral 24. The panels 20, 22 have aligned openings 26, 28 through which the bolt 24 extends.

Considering FIG. 2, the bolt 24 comprises an elongate tubular body 30 having at one end a pair of laterally extendable and retractable head abutment members 32 joined to each other by a cross pin 34 which extends through a diagonal slot 36 in a control block 38. The abutment members 32 are carried in slots 40 provided for the purpose in the body 30. As seen in FIGS. 1–4, the head abutment members are in their extended, operative positions projecting laterally from the side of the body 30. Due to the diagonal disposition of the slot 36, it will be understood that when the control block 38 is shifted from right to left as viewed in FIG. 2, this will effect a retraction of the abutment members 32 whereby the outer curved surfaces thereof will be flush with the outer peripheral surface of the body 30.

Actuation of the control block 38 is effected by a shank 42 attached thereto, said shank passing through a partition wall 44 in the body 30 and through a bearing bushing 46 carried at the right end of the body 30 as viewed in FIGS. 1 and 2. The shank 42 extends completely through

the bearing bushing 46 and has a projecting end portion 48 which is accessible and which may be depressed by the fingers of the operator for the purpose of shifting the block 38 from right to left to retract the abutment members 32.

A helical compression spring 50 in the body 30 bears against the partition 44 thereof and also against a washer assemblage 52 affixed to the shank 42 whereby the latter is biased from left to right, tending to maintain the control block 38 in the position shown wherein the abutments 32 project from the body.

The abutments 32 in effect constitute a shoulder means or head which is engaged with the panel 20 and which replaces the conventional fixed head of an ordinary bolt.

Further details of the construction and operation of that part of the bolt structure set forth above can be found in U.S. Patent No. 3,184,816 issued to John J. McCarthy and entitled "Quick-Release Fastening and Locking Device."

In accordance with the present invention, the tubular body 30 at the left end thereof remote from the abutment members 32 is provided with external screw threads 54; it is also provided with a keying configuration in the form of a flat 56 which is shown as extending for the whole length of the body 30. Additionally, there is provided a special nut 58 adapted to be screwed onto the threads 54, the said nut having an annular groove 60 forming a shoulder portion of reduced diameter for engagement by a lifting tool whereby, after an initial loosening of the nut, the tool can exert axial force on the nut and consequently on the tubular body 30 to effect withdrawal of the latter from the panels 20, 22. Such withdrawal can occur, however, only after retraction of the abutment members 32 has taken place as a consequence of the release button 48 having been depressed by the operator.

Referring now to FIG. 1, it will be seen that with the abutment members 32 in the extended position whereby they engage the panel 20, the nut 56 can be pulled up tightly against the panel 22 so as to exert a powerful force which secures the two panels to each other.

For the purpose of preventing turning of the body 30 during the turning of the nut 58, a keying plate 62 having a D-shaped hole 64 is provided, through which the body 30 extends. The keying plate 62 is secured to the panel 22 by a drive screw 66 extending through an apertured ear 68 of the plate, said plate also having a second ear 70 provided with an extruded projection 72 which is received in a recess 74 provided for this purpose in the panel 22. The close fit between the flattened exterior of the tubular body 30 and the D-shaped hole 64 of the keying plate 62 prevents turning of the body, whereby no additional holding means are required in order to pull up the nut 58 on the body.

It will now be understood from an inspection of FIG. 1 that, in addition to the powerful securing force which the bolt 24 applies to the panels 20, 22, it is possible to easily and quickly completely remove the bolt from the panels without entirely unscrewing the nut 52. In accordance with the invention, only a slight unscrewing movement of the nut 58 is done, to effect an initial looseness of the bolt 24. Thereafter, the release button 48 is depressed, whereupon the head abutments 32 will be retracted and made flush with the exterior of the body 30. The body can now be completely removed from the panels, by passing the end which contains the head abutments through the panel openings 26, 28.

For the purpose of facilitating such removal of the bolt, a special wrench 76 is provided having an open-end portion 78 adapted to fit the nut 58, said end portion additionally a central rib 80 which is arranged to be received in the groove 60 of the nut 58. Thus, the operator need only apply the open-end 78 of the wrench to the nut 58, and give the nut a partial turn to initially loosen the bolt 24. Thereafter, while the wrench is still in place on the nut, the operator depresses the release button 48 and

then withdraws the bolt by pulling on the same, utilizing the wrench as a handle or pulling tool. The rib 80 of the wrench, occupying the groove 60 will enable the axial force to be applied to the nut by the wrench, such force in turn being experienced by the body 30 and enabling the latter to be easily and quickly withdrawn as soon as the head abutments 32 are retracted to their flush positions.

Instead of the keying plate 62 being secured to the panel 22, it may be applied to the panel 20, this being illustrated in FIG. 6.

Another embodiment of the invention is illustrated in FIGS. 10-14. Here the bolt 24 is shown as passing through an angle bracket 82 and a panel member 84 as well as a star washer 86 which constitutes the keying plate and which has a D-shaped hole 88. The bolt 24 passes through a sealing bushing 90 in the panel 84 to provide a water-tight connection. Also, the panel 84 has a facing 92 on which there is disposed a sealing gasket 94, surrounding the star washer 86. A domed housing 96 encloses one end of the bolt 24 and bears against the sealing gasket, being secured in place by suitable screws passing through apertures 98 of the housing. Thus a water-tight enclosure is provided for the one end of the bolt 24, that end which contains the head abutments 32.

In the embodiment of FIGS. 10-14, the nut 58a differs slightly from the nut 58, in that the shoulder portion of lesser diameter, indicated at 100, is provided on one end of the nut. Likewise, the wrench 102 having the open end 104 is provided with a rib member 106 at one side of the open end, whereby it may engage the shoulder 108 adjoining the portion 100 of reduced diameter.

FIG. 14 illustrates the applying of the wrench 102 to the nut 58a, with the rib plate 106 engaged with the shoulder 108 of the nut whereby axial force may be applied to the bolt 24 to lift it out of the panel 84. It will be noted that during such lifting, the operator's finger is applied to the release button 58 to effect the initial retraction of the head abutments 32 to their flush positions. The functioning of the bolt 24 illustrated in FIGS. 10-14 is in general similar to that already described above in detail in connection with FIGS. 1-9. The main differences involve the water-tight sealing associated with the bolt, and the slightly different nut and wrench construction, as well as the slightly different keying plate construction.

It will now be understood from the foregoing that I have provided a novel and improved quick-release draft bolt for securing together panels and other similar structures, said bolt being capable of exerting powerful forces in effecting the fastening while at the same time being easily and quickly, completely removed from the associated structures without requiring repeated unscrewing motions or involving an appreciable elapse of time. It is merely necessary to partially loosen the nut by the special wrench provided, then depress the release button while the wrench is in place, and thereafter lift the bolt out using the wrench as a handle or force-applying, lifting member. The construction is seen to be simple, small and compact, and the parts are sturdy and reliable in operation, whereby the likelihood of failure or malfunctioning is largely eliminated.

Variations and modifications may be made, and portions of the improvement may be used without others.

I claim:

1. A quick-release bolt comprising, in combination:
 - (a) an elongate tubular body having an opening in its side wall adjacent an end portion thereof,
 - (b) a laterally extendable and retractable abutment member movably carried by said end portion of the body and disposed in said opening,
 - (c) said abutment member being shiftable on the body in a plane perpendicular to the body axis, between a laterally protruding, operative position and a non-protruding inoperative position,
 - (d) means including a protruding manually operable

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plunger part disposed axially in the body and extending beyond the other end of the body, for actuating said abutment member from the operative to the inoperative position in response to axial movement of said plunger part inward of the tubular body to a less protruding position.

- (e) means for continuously biasing said abutment member to its protruding, operative position,
 - (f) external screw threads on the said other end of the body, and
 - (g) means including a threaded nut carried by said screw threads, for placing the tubular body in tension by pulling up the nut tightly on a structure through which the bolt has been passed,
 - (h) said abutment member, when retracted, permitting the said end of the tubular body and the member to be passed through a close-fitting hole of said structure, and said member snapping out to its protruding position and abutting the adjoining surface of said structure immediately after emerging from said hole and without further movement of the body being required.
2. A quick-release bolt as in claim 1, wherein:
- (a) the tubular body has a keying configuration on one side, and
 - (b) keying means adapted to be carried by the structure through which the bolt passes, cooperating with said keying configuration to prevent turning of the bolt as the nut is tightened against the structure.
3. A quick-release bolt as in claim 2, wherein:
- (a) the keying configuration comprises a flat extending longitudinally on the body.
4. A quick-release bolt as in claim 3, wherein:
- (a) the said keying means comprises a plate having a D-shaped opening through which the tubular body passes.

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5. A quick-release bolt as in claim 4, wherein:

- (a) the keying plate has means, including at least one apertured ear, for engagement with a fastening device to enable it to be attached to the structure through which the tubular body passes.

6. A quick-release bolt as in claim 1, wherein:

- (a) the nut has a shouldered portion of reduced diameter for engagement by a lifting tool whereby, after an initial loosening of the nut and movement of the abutment member to its inoperative position, the tool can exert axial force on the body to remove the same from the structure supporting it.

7. A quick-release bolt as in claim 6, wherein:

- (a) the shouldered portion of the nut comprises an annular external groove in the nut intermediate the ends thereof.

8. A quick-release bolt as in claim 6, wherein:

- (a) the said shouldered portion of the nut is disposed at one end thereof.

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U.S. Cl. X.R.

24—211; 81—53; 151—68