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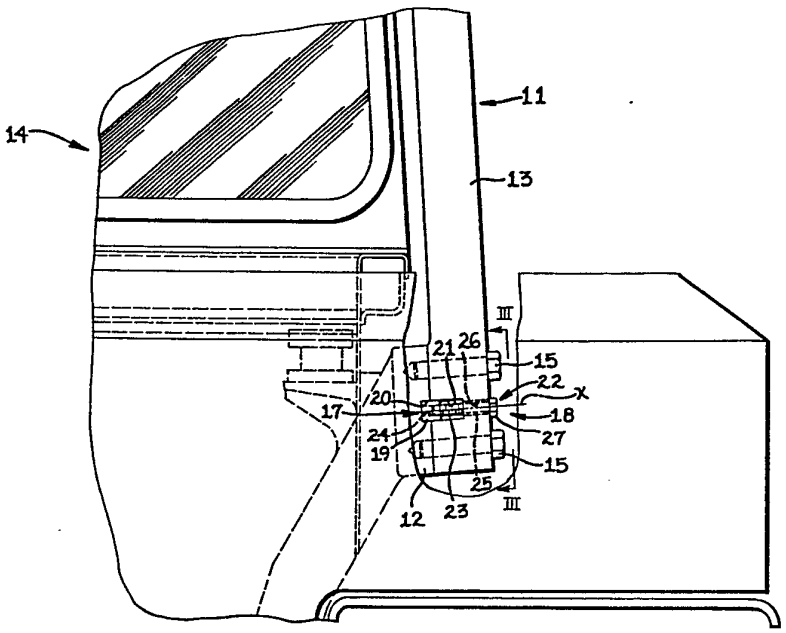
(54) Title: SHEAR BLOCK FOR ROLL-OVER PROTECTION STRUCTURE

(57) Abstract

A vehicle (10) has an operator's station (14) mounted on a frame (12) thereof along with a roll-over protection structure (11). A shear block (19) is mounted between each support arm (13) of the roll-over protection structure (11) and the frame (12) for absorbing shearing forces imparted to the structure (11) and a release bolt (18) is connected to the shear block (19) to reciprocate it between its engaged and disengaged positions. The bolt (18) is accessible to a workman to provide for expeditious and precise movement of the shear block (19) between its engaged and disengaged positions.



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Description

Shear Block for Roll-Over Protection Structure

Technical Field

This invention relates to a shear block removably mounted between a pair of first and second members, such as between the main frame and roll-over protection structure of a construction vehicle.

Background Art

A shear block or key is commonly employed for absorbing shearing forces imposed on one member which is bolted or otherwise suitably secured to a second member. The shear block thus protects the bolts from being subjected to adverse shearing forces which could damage the bolts to, in turn, cause separation of the attached members. A recurring problem with the use of such a shear block is the inability to remove the shear block without completely dismantling the structure on which it is used.

For example, a track-type tractor often times has a roll-over protection structure (ROPS) mounted thereon. Any attempt to mount a key-type shear block between each support member of the roll-over protection structure and the main frame of the tractor would place the shear block in a relatively inaccessible position. Such disposition of the shear block would thus necessitate substantial dismantling of the structure and/or adjacent components of the tractor (e.g., oil and gas tanks) for removal of the shear block.

Disclosure of the Invention

The present invention is directed to overcoming one or more of the problems as set forth above.

In one aspect of this invention, an operator's station is mounted on the frame of a vehicle and a protection structure has at least one pair of support members thereof attached to the frame. A shear block means transmits shearing forces between each of the members and the frame and a release means is adapted to selectively disengage the shear block means from the frame.

In another aspect of this invention, the release means includes at least one bolt threadably engaged with either the shear block means or one of the frame and support members. In this aspect of the invention, it will be understood that the release means may be employed for selectively disengaging the shear block means from attached members, other than the above protective structure and vehicle frame.

The shear block and release means of this invention thus provide a compact arrangement which facilitates expeditious engagement and disengagement of the shear block means between a pair of attached members and is positioned for ready access by a workman.

Brief Description of the Drawings

Other objects of this invention will become apparent from the following description and accompanying drawings wherein:

FIG. 1 is a side elevational view of a track-type vehicle having a shear block and release means embodiment of the present invention incorporated therein;

FIG. 2 is an enlarged and partially sectioned view of the shear block and release means, taken in the direction of arrows II-II in FIG. 1;

FIG. 3 is a front elevational view of the shear block and release means, taken in the direction of arrows III-III in FIG. 2;

FIG. 4 is a view similar to FIG. 2, but showing the shear block and release means in a disengaged condition.

Best Mode of Carrying Out the Invention

FIG. 1 illustrates a track-type tractor 10 having a roll-over protection structure 11 (ROPS) mounted rearwardly on a frame 12 thereof. Roll-over protection structure 11 comprises a pair of laterally spaced and vertically disposed support members 13 (one shown) which straddle an operator's station 14 of tractor 10 and are releasably attached to frame 12 of the tractor by releasable fastening means, shown in the form of bolts 15. A horizontally disposed cover or canopy 16 is secured between support members 13 to cover at least substantially operator's station 14 for protection thereof.

Referring to FIG. 2, one problem occasioned with this type of arrangement is one of providing means for counteracting and absorbing shearing forces imposed on bolts 15 due to the weight of roll-over protection structure 11, as well as extraneous forces imposed thereon. To this end, this invention provides a shear block means 17 normally engaged between main tractor frame 12 and each support member 13 of roll-over protection structure 11 for counteracting and absorbing such shearing forces.

In addition, a release means 18 is connected to shear block means 17 to move selectively the shear block means between its engaged position illustrated in FIG. 2 and its disengaged position illustrated in FIG. 4 whereby bolts 15 may be released to remove roll-over protection structure 11 from tractor 10. Furthermore, it should be noted that a longitudinal axis X of release means 18 (FIG. 2) is preferably disposed at least substantially perpendicular relative to a longitudinal axis Y of shear block means 17 (FIG. 3).

A standard procedure for mounting a shear block or key between frame 12 and each support member 13 would be to insert it in opposed grooves defined therebetween, in the direction of the longitudinal axis Y of shear block means 17, for example. This shear block mounting arrangement thus requires substantial working areas on either end of the shear block, necessitating the dismantling of fuel and oil tanks and the like to provide such working areas. Furthermore, the end of the slot accommodating the shear block must be open-ended to facilitate insertion thereof in place.

Referrring once again to FIGS. 2 and 3, shear block means 17 includes an elongated shear block 19 of rectangular cross section which is accommodated within an opposed pair of first and second slots 20 and 21, defined in frame 12 and support member 13, respectively. Shear block 19 is disposed in slip-fit relationship within slots 20 and 21 to be moved in the direction of axis X from its engaged position illustrated in FIG. 2 to its disengaged position illustrated in FIG. 4, by release means 18. As shown in FIG. 4, when shear block 19 is moved to its disengaged position and is thus solely disposed within slot 21, bolts 15 may be released to permit removal of roll-over protection structure 11 from frame 12 of tractor 10.

Release means 18 comprises a bolt 22 having a threaded shank 23 thereof threadably engaged with screw threads 24 formed through shear block 19. An unthreaded portion 25 of bolt 22 is rotatably mounted in a bore 26, defined in member 13, which terminates at slot 21. A head 27 of bolt 22 is disposed in accessible relationship exteriorly of support member 13 of roll-over protection structure 11 to facilitate its engagement with a socket wrench. Thus, rotation of bolt 22 will function to reciprocate shear block 19 within slots 20 and 21 but will not cause axial displacement of bolt 22. If so desired, a stop member (not shown), such as a flange or washer secured between portions 23 and 25 on bolt 22, may be secured on the bolt to aid in preventing axial displacement of the bolt upon rotation thereof.

Although a single release means 18 may be employed with respective shear block 19, a pair of such release means (FIG. 3) are preferably employed to more closely control movements of the shear blocks between their engaged and disengaged positions.

Industrial Applicability

Above described shear block means 17 and 17a, as well as their associated release means 18 and 18a, are particularly adapted for use on a construction vehicle, such as tractor 10, to counteract and absorb shear forces imposed thereon by roll-over protection structure 11. Thus, bolts 15 are substantially maintained in a stress-free condition to prevent damage thereto and possible shearing thereof.

Upon installation of roll-over protection structure 11 on frame 12 of vehicle 10 in FIGS. 1 and 2, it is assumed that bolts 15 have been completely released and that bolt 22 of release means 18 has been suitably rotated to back-off shear block 19 to its FIG.

4 disengaged position. Upon mounting of roll-over protection structure 11 on frame 12 to properly align the same, bolts 15 are tightened down to secure them together. A socket wrench may then be mounted on head 27 of bolt 22 to rotate the bolt whereby shear block 19 will move from its FIG. 4 disengaged position to its engaged position within slots 20 and 21, as shown in FIG. 2. It should be noted that since the ends of slots 20 and 21 are open, the workman can visually note when shear block 19 has been properly seated therein. However, it should be understood that the ends of the slots may be closed, if so desired, in contrast to standard key-type shear block arrangements wherein open-ended slots are required.

Should it be desired to remove roll-over protection structure 11 from vehicle frame 12, the above procedure would be reversed. In particular, the workman need only rotate bolt 27 in the proper direction to move shear block 19 to its FIG. 4, disengaged position and thereafter remove bolts 15.

Other aspects, objects and advantages of this invention can be obtained from a study of the drawings, the disclosure and the appended claims.

Claims

1. In a vehicle (10) comprising a frame (12), an operator's station (14) mounted on said frame (12), a roll-over protection structure (11) at least partially covering said operator's station (14), and fastening means (15) for releasably attaching said roll-over protection structure (11) to said frame (12), the improvement comprising shear block means (17) for transmitting shearing forces imparted to said roll-over protection structure (11) to said frame (12) directly and release means (18) for selectively disengaging said shear block means (17) from said frame (12).

2. The vehicle (10) of claim 1, wherein said release means (18) is disposed on a longitudinal axis (X) which is at least substantially perpendicular relative to a longitudinal axis (Y) of said shear block means (17).

3. The vehicle (10) of claim 1, wherein said shear block means (17) includes an opposed pair of elongated first and second slots (20,21) defined in said frame (12) and said roll-over protection structure (11), respectively, and a shear block (19) normally mounted in said slots (20,21).

4. The vehicle (10) of claim 3, wherein said shear block (19) is mounted in said first and second slots (20,21) for transverse movement relative to a longitudinal axis (Y) of said shear block (19) and said slots (20,21), between an engaged position within both said first and second slots (20,21) and a disengaged position solely within said second slot (21).

5. The vehicle (10) of claim 3, wherein said release means (18) is disposed in an accessible position exteriorly of said roll-over protection structure (11).

6. The vehicle (10) of claim 5, wherein said release means (18) includes at least one bolt (22) having a head (27) thereof disposed in accessible relationship exteriorly of said roll-over protection structure (11).

7. The vehicle (10) of claim 6, wherein said bolt (22) is threadably engaged with said shear block (19).

8. The vehicle (10) of claim 6 wherein said bolt (22a) is threadably engaged with a respective one of said support members (13a).

9. The vehicle (10) of claim 1 wherein said shear block means (17) and said release means (18) are disposed closely adjacent to said fastening means (15).

10. A shear block arrangement comprising a first member (12), a second member (13) mounted adjacent to said first member (12), shear block means (17) normally engaged between said first and second members (12,13) for transmitting shearing forces imparted to said second member (13) to said first member (12) directly, and release means (18), including at least one bolt (22) threadably engaged with one of said second member (13) and said shear block means (18), for selectively disengaging said shear block means (18) from said first member (12).

11. The shear block arrangement of claim 10, wherein said bolt (22) is disposed on a longitudinal axis (X) which is at least approximately perpendicular relative to a longitudinal axis of said shear block means (Y).

12. The shear block arrangement of claim 10 wherein said shear block means (17) includes an opposed pair of elongated first and second slots (20,21) defined in said first and second members (12,13), respectively, and a shear block (19) normally mounted in said slots (20,21).

13. The shear block arrangement of claim 12, wherein said shear block (19) is mounted in said first and second slots (20,21) for transverse movement relative to a longitudinal axis (Y) of said shear block (19) and said slots (20,21) between an engaged position within both said first and second slots (20,21) and a disengaged position solely within said second slot (21).

14. The shear block arrangement of claim 12, wherein a head (27) of said bolt (22) is disposed in accessible relationship exteriorly of said second member (13).

15. The shear block arrangement of claim 10 wherein said shear block means (17) includes a shear block (19) and wherein said bolt (22) is threadably engaged with said shear block (19).

16. The shear block arrangement of claim 10, wherein said bolt (22a) is threadably engaged with said second member (13a).

17. The shear block arrangement of claim 10 further comprising releasable fastening means (15) releasably attaching said first and second members (12,13) together and wherein each of said shear block means (17) and said release means (18) are disposed in close proximity to said releasable fastening means (15).

AMENDED CLAIMS
(received by the International Bureau on 24 March 1980 (24.03.80))

1. In a vehicle (10) comprising a frame (12), an operator's station (14) mounted on said frame (12), a roll-over protection structure (11) at least partially covering said operator's station (14), and fastening means (15) for releasably attaching said roll-over protection structure (11) to said frame (12), the improvement comprising shear block means (17) for transmitting shearing forces imparted to said roll-over protection structure (11) to said frame (12) directly and release means (18) for selectively disengaging said shear block means (17) from said frame (12).

2. The vehicle (10) of claim 1, wherein said release means (18) is disposed on a longitudinal axis (X) which is at least substantially perpendicular relative to a longitudinal axis (Y) of said shear block means (17).

3. The vehicle (10) of claim 1, wherein said shear block means (17) includes an opposed pair of elongated first and second slots (20,21) defined in said frame (12) and said roll-over protection structure (11), respectively, and a shear block (19) normally mounted in said slots (20,21).

4. The vehicle (10) of claim 3, wherein said shear block (19) is mounted in said first and second slots (20,21) for transverse movement relative to a longitudinal axis (Y) of said shear block (19) and said slots (20,21), between an engaged position within both said first and second slots (20,21) and a disengaged position solely within said second slot (21).

5. The vehicle (10) of claim 3, wherein said release means (18) is disposed in an accessible position exteriorly of said roll-over protection structure (11).

6. The vehicle (10) of claim 5, wherein said release means (18) includes at least one bolt (22) having a head (27) thereof disposed in accessible relationship exteriorly of said roll-over protection structure (11).

7. The vehicle (10) of claim 6, wherein said bolt (22) is threadably engaged with said shear block (19).

8. (CANCELLED)

9. The vehicle (10) of claim 1 wherein said shear block means (17) and said release means (18) are disposed closely adjacent to said fastening means (15).

10. A shear block arrangement comprising

a first member (12),

a second member (13) mounted adjacent to said first member (12),

shear block means (17) normally engaged between said first and second members (12,13) for transmitting shearing forces imparted to said second member (13) to said first member (12) directly, and

release means (18), including at least one bolt (22) threadably engaged with one of said second member (13) and said shear block means (18), for selectively disengaging said shear block means (18) from said first member (12).

11. The shear block arrangement of claim 10, wherein said bolt (22) is disposed on a longitudinal axis (X) which is at least approximately perpendicular relative to a longitudinal axis of said shear block means (Y).

12. The shear block arrangement of claim 10 wherein said shear block means (17) includes an opposed pair of elongated first and second slots (20,21) defined in said first and second members (12,13), respectively, and a shear block (19) normally mounted in said slots (20,21).

13. The shear block arrangement of claim 12, wherein said shear block (19) is mounted in said first and second slots (20,21) for transverse movement relative to a longitudinal axis (Y) of said shear block (19) and said slots (20,21) between an engaged position within both said first and second slots (20,21) and a disengaged position solely within said second slot (21).

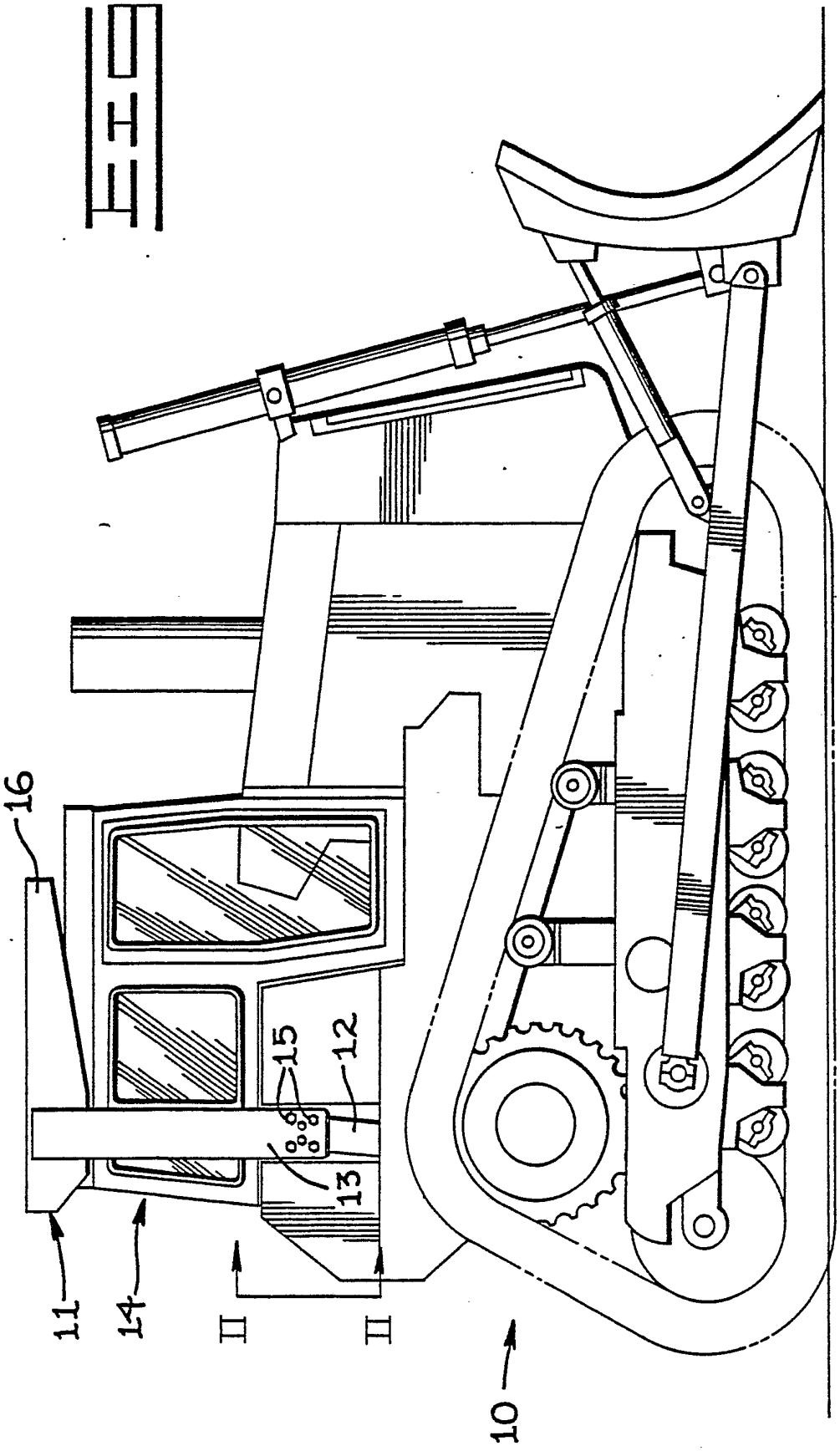
14. The shear block arrangement of claim 12, wherein a head (27) of said bolt (22) is disposed in accessible relationship exteriorly of said second member (13).

15. The shear block arrangement of claim 10 wherein said shear block means (17) includes a shear block (19) and wherein said bolt (22) is threadably engaged with said shear block (19).

16. (CANCELLED)

17. The shear block arrangement of claim 10 further comprising releasable fastening means (15) releasably attaching said first and second members (12,13) together and wherein each of said shear block means (17) and said release means (18) are disposed in close proximity to said releasable fastening means (15).

FIG-1



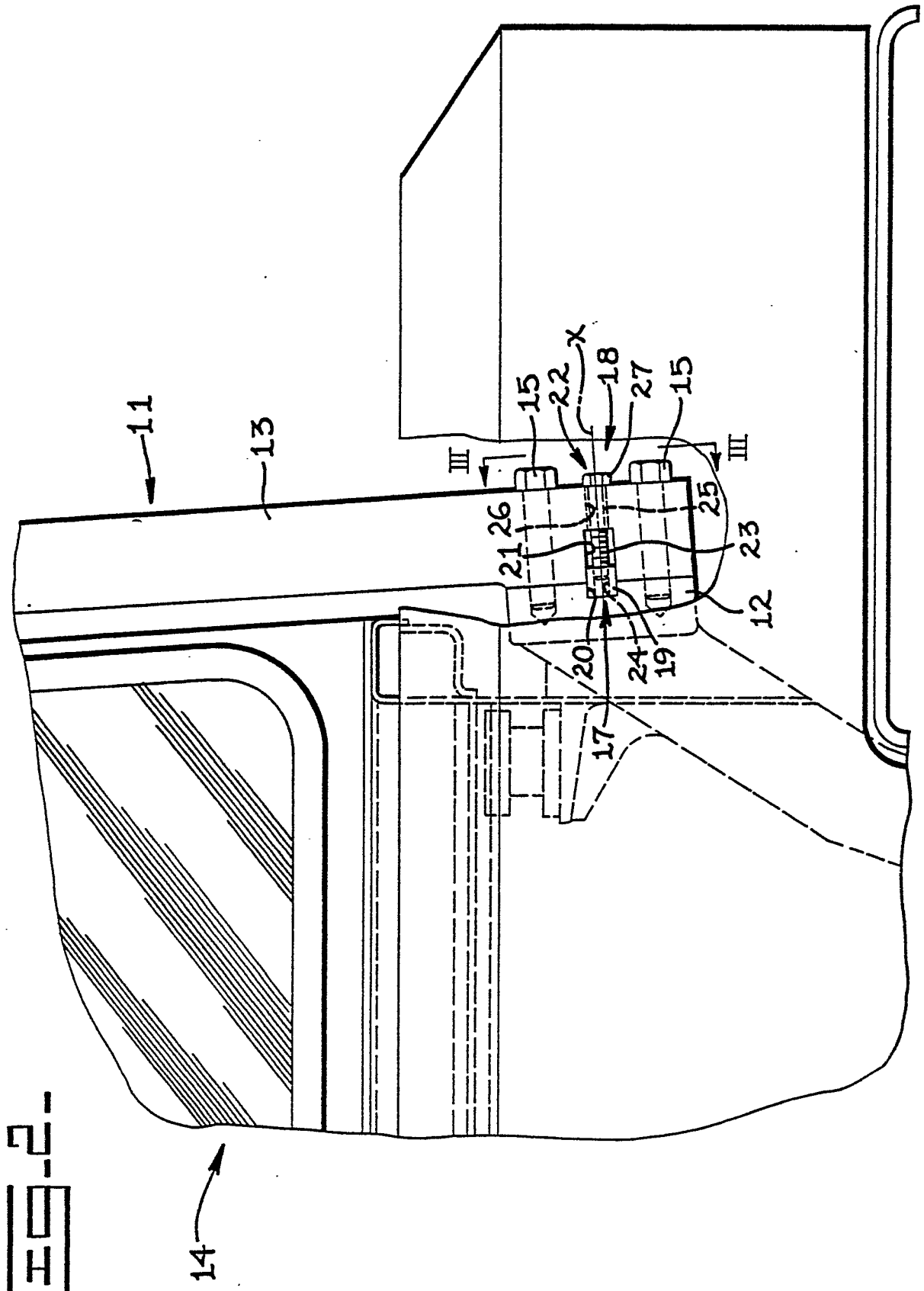


FIG-2-

Fig. 3

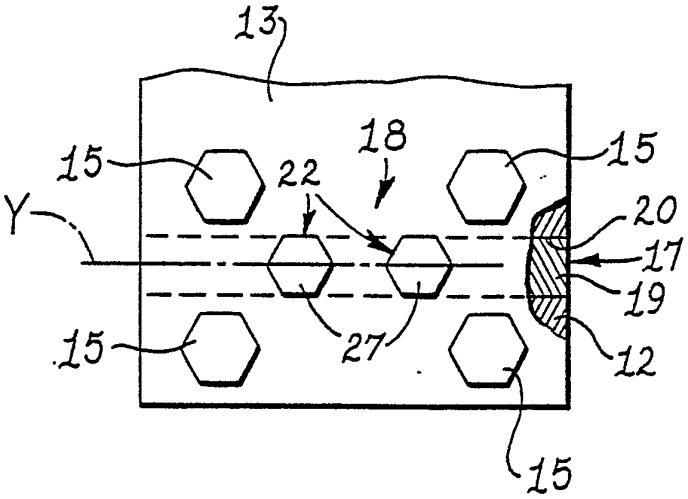
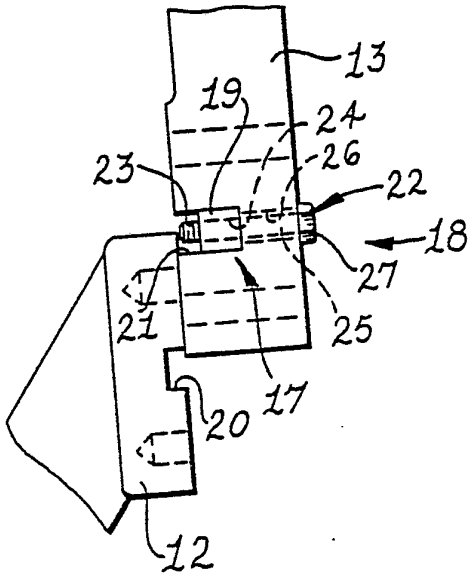


Fig. 4



INTERNATIONAL SEARCH REPORT

International Application No PCT/US79/00385

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl. B60R 21/00
US Cl. 280/756, 403/319

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
US	280/756 85/1P 180/89.12 296/102,104,137R 403/294,319,356,355,380,408

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
X	US, A 3,632,134 Published 4 January 1972, Babbitt,	1-2,9-11,17
A	US, A 3,733,103 Published 15 May, 1973, Hansen	1,10
A	US, A 3,851,982 Published 3 December 1974,	1,10
X	US, A 2,592,217 Published 8 April 1952,	1-2,9-11,17
A	US, A 2,284,214 Published 26 May 1942, Kelly	1,10

* Special categories of cited documents: [15]

"A" document defining the general state of the art

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IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
7 January 1980	23 JAN 1980
International Searching Authority [1]	Signature of Authorized Officer [20]
ISA/US	D. Mitchell

Form PCT/ISA/210 (second sheet) (October 1977)

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

V. [X] OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE [10]

This International search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. [ ] Claim numbers....., because they relate to subject matter [12] not required to be searched by this Authority, namely:

2. [X] Claim numbers 8-16 because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out [13], specifically:

Each of the claims define an arrangement where the bolt is threadably engaged with a support member designated (13a). Such an engagement is not supported by the description in either the text or drawings as required by Article 6.

VI. [ ] OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING [11]

This International Searching Authority found multiple inventions in this international application as follows:

1. [ ] As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. [ ] As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the International application for which fees were paid, specifically claims:

3. [ ] No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

Remark on Protest

[ ] The additional search fees were accompanied by applicant's protest.

[ ] No protest accompanied the payment of additional search fees.