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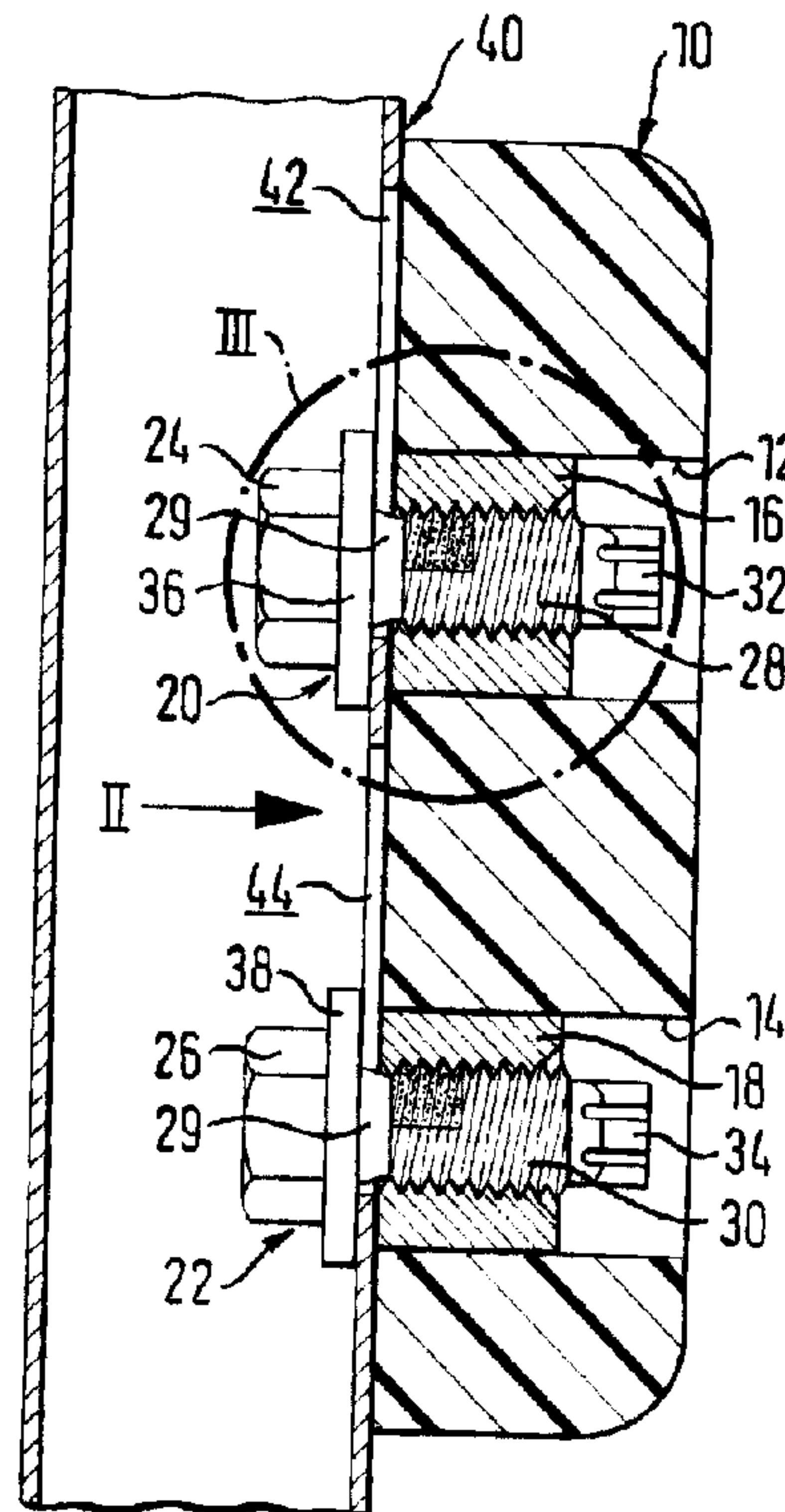
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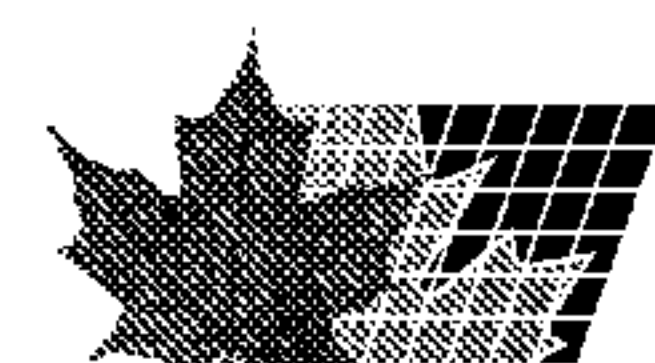
(54) Titre : DISPOSITIF D'ASSEMBLAGE POUR FIXER UN PREMIER ELEMENT A UN DEUXIEME ELEMENT

(54) Title: FASTENING ASSEMBLY FOR FASTENING A FIRST MEMBER TO A SECOND MEMBER



(57) Abrégé/Abstract:

A fastening assembly for fastening a first member to a second member comprising - at least one threaded fastener having a head at one end thereof, said head having engagement surfaces for a tool, a threaded shank, the other end of said shank having engagement surfaces for a tool, - at least one receiving bore in the first member into which said threaded shank is threaded in a pre-mounted state from one end thereof, with the head being spaced from the associated surface of the first member, - the second member being preferably of thin sheet material and having at least one elongated opening, said opening having a first portion adapted to allow the entrance of said head and a smaller portion adapted to accommodate said shank while said head grips behind the edge of said opening.



**FASTENING ASSEMBLY FOR FASTENING A FIRST MEMBER
TO A SECOND MEMBER**

A B S T R A C T

A fastening assembly for fastening a first member to a second member comprising

- at least one threaded fastener having a head at one end thereof, said head having engagement surfaces for a tool, a threaded shank, the other end of said shank having engagement surfaces for a tool,
- at least one receiving bore in the first member into which said threaded shank is threaded in a pre-mounted state from one end thereof, with the head being spaced from the associated surface of the first member,
- the second member being preferably of thin sheet material and having at least one elongated opening, said opening having a first portion adapted to allow the entrance of said head and a smaller portion adapted to accommodate said shank while said head grips behind the edge of said opening.

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FASTENING ASSEMBLY FOR FASTENING A FIRST MEMBER TO A SECOND MEMBER

The invention refers to a fastening assembly for fastening a first member to a second member.

When fastening a sensor, e.g. for an airbag, it is required that the fastener means, for example, one or a plurality of threaded fasteners, must not project beyond the sensor, otherwise there is a danger that the safety belt which is attached to a column of the car body may contact the end of a solid fastener and thus may be damaged. A fastening of such a housing from the opposite side normally is not possible as the hollow column does not admit access to the interior thereof.

The invention provides a fastening assembly consisting of a member to be fastened, in particular a housing for a sensor and a support member which allows a safe and extremely simple and quick fastening without leaving unnecessarily protruding parts.

The invention in one aspect provides a fastening assembly, comprising a first member having at least one threaded bore defined therein and a first engagement surface, at least one threaded fastener having a head at a first end thereof and a threaded shank connected at a first end thereof to the head and having a second opposite end which has means thereon for engaging a rotary tool, the at least one threaded fastener being disposed within the at least one threaded bore of the first member as a result of threaded engagement of the threaded shank of the at least one threaded fastener with the at least one threaded bore of the first member whereby the head of the at least one threaded fastener is separated from the first engagement surface of the first member so as to define a space therebetween. A second member comprises a

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panel having first and second engagement surfaces and at least one elongated opening having a first larger portion for accommodating the head of the at least one threaded fastener and a second smaller portion for accommodating the threaded shank of the at least one threaded fastener so as to permit the second member panel to be disposed within the space defined between the head of the at least one threaded fastener and the first engagement surface of the first member when the head of the at least one threaded fastener is initially inserted through the first larger portion of the at least one elongated opening of the second member and when the first end of the threaded shank is subsequently moved from the first larger portion of the at least one elongated opening of the second member and into the second smaller portion of the at least one elongated opening of the second member. When the at least one threaded fastener is subsequently tightened as a result of rotary engagement of a rotary tool with the second opposite end of the at least one threaded fastener, the head of the at least one threaded fastener will be engaged with the first engagement surface of the second member while the second engagement surface of the second member will be engaged with the first engagement surface of the first member.

Another aspect of the invention relates to a method of assembling such a fastener system.

More particularly, the fastening assembly, according to the invention, provides a threaded fastener which is accommodated by a through-going bore of the member, e.g. sensor

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housing. The threaded fastener has a head at one end thereof which may be additionally formed with a flange portion serving as a washer. The threaded shank of the fastener is accommodated by an inner thread of the bore and has engagement surfaces for a tool at the free end thereof, e. g. a so-called Torx-portion. The second member which is preferably of thin sheet material, e. g. a column of the body of an automobile, has an opening or a hole which comprises two portions, namely a larger portion allowing the passage of the fastener head and a smaller sized portion which allows the head to grip behind the edge of the hole while contemporarily accommodating the fastener shank. The fastener is pre-assembled in the member such that the head is spaced from the associated surface of the member. According to an embodiment of the invention, the fastener shank can be threaded into an insert which for example forms an interference fit with the bore. If, however, the member is of metallic material in the area of the bore, the bore can be provided with an inner thread. In any case it is appropriate if the thread of the shank has an adhering portion by which the threaded fastener is held in the pre-position. With the pre-mounted threaded fastener the member is then brought into engagement with the support member, with the head being introduced through the larger portion of the hole. Thereafter, the member is displaced along the outer surface of the support member so that the head grips behind the edge of the hole, and the shank enters the smaller portion thereof. Now, the threaded fastener can be tightened in that the tool engages the end of the shank. When tightened the head of the fastener engages the inner side

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of the sheet material of the support member. It is understood that the threading movement at the end of the shank is opposite to that at the end of the head. As the most screw drivers normally are turning right-hand, it is recommended according to an embodiment of the invention to provide the threaded shank with a left hand thread. For the pre-assembling in this case a driver is necessary which turns left hand.

If as explained above a protruding of the fastener is not desired it must be taken care that sufficient space is prevailing for the engagement of the driver. If an insert is used the space between shank and wall of the bore is automatically larger. If, however, the fastener is directly threaded into the bore, the bore preferably has an enlarged portion at the end opposite to the fastener head to allow engagement of the screw driver.

The hole in the support member preferably has the shape of a keyhole with the smaller portion being below the larger one.

The fastener assembly according to the invention allows a pre-assembling of the member with the threaded fastener so that the final assembling can be carried out within shortest time. The portion of the shank which is free of a thread adjacent to the head thus cannot be damaged which would not allow an assembling or a

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threading. For example, the fastener shank can have a clearance with respect to the wall of the hole in order to allow the precise positioning of the member. The fastener assembly according to the invention for example allows the attachment of the housing of an airbag sensor to the column such that unnecessarily protruding parts are avoided. The fastener assembly according to the invention is extremely simple structured. A simple threaded fastener is used only having the particularity that the end of the shank is provided with engagement surfaces for a tool. A nut which normally is used for the screw attachment is not necessary.

An embodiment example is subsequently explained along accompanying drawings.

Fig. 1 shows a cross section through an attachment of an airbag sensor to a column of the body of an automotive vehicle.

Fig. 2 shows a view on the assembly of Fig. 1 in the direction of arrow A.

Fig. 3 shows a detail B of Fig. 1 without the column and in a pre-assembled condition of the sensor housing with a threaded fastener.

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By cross hatching in Fig. 1 the housing 10 of an airbag sensor is indicated. The housing 10 has two through-bores 12, 14 into which inserts 16 and 18 are inserted by an interference fit. The inserts 16, 18 have an inner thread.

Threaded fasteners 20 and 22 are provided with a head 24, 26, threaded shanks 28, 30 and ends 32, 34. The threaded shank is threaded into the inner thread of the inserts 16, 18. The ends 32, 34 of the shank have a Torx-portion. The heads 24, 26 have integrally formed radial flanges 36, 38. A non-threaded portion 29 joins the heads 24, 26.

A column 40 of a body of an automotive vehicle not shown in detail is hollow and formed of sheet material. At the inner side the column 10 has two holes 42, 44 in vertical alignment. The holes 42, 44 are shaped like a keyhole with an upper circular larger portion 46, 48 and a smaller portion 50, 52 below the larger position. The larger portion is so dimensioned that the head 24, 24 with flange 36, 38 can be inserted. The smaller portion 50, 52 is dimensioned such that the flange may grip behind the edge of the hole 42, 44 as can be seen in Figs. 1 and 2.

In Fig. 3 two different embodiments are to be seen. In the lower portion of Fig. 3 the illustration corresponds to that of Fig. 1. In the upper portion of Fig. 3 the insert 16 is omitted. Rather, bore 12a has an inner thread into which the threaded shank 28 is threaded immediately. In order to allow the engagement of a screwdriver with the Torx-portion 32 in Fig. 3 the bore 12a is provided with an enlarged portion 12b. In Fig. 3 it can be finally seen that the fastener 20 has a pre-assembled position wherein flange 36 is spaced a distance from the associated surface of the housing, the distance being somewhat larger than the thickness

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of the sheet material into which the holes 42, 44 are formed. The shank is partially provided with a plastic coating 60 which allows the fastener 20 to remain in the pre-assembled position. The coating 60 not only secures the pre-assembled state, but also locks the screw when finally tightened as shown in Fig. 1.

The shank 28 for example, has a left hand thread so that during pre-assembling the fastener is threaded into bore 12 by a left hand screwdriver. In the pre-assembled state the sensor housing 10 is brought against column 40 with the heads 24, 26 inserted through the portion 46, 48 of holes 42, 44. Then the housing can be released so that the shank 28, 30 enters the smaller portion 50, 52 of hole 42, 44 and flange 36, 38 grips behind the edge of the hole. Now the fastener 20, 22 can be tightened by a right hand screwdriver in order to attach the housing 10 tightly to column 40. The end of the shaft does not project beyond the housing so that a damage of the safety belt does not occur.

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The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A fastening assembly, comprising:

a first member having at least one threaded bore defined therein and a first engagement surface;

at least one threaded fastener having a head at a first end thereof and a threaded shank connected at a first end thereof to said head and having a second opposite end which has means thereon for engaging a rotary tool, said at least one threaded fastener being disposed within said at least one threaded bore of said first member as a result of threaded engagement of said threaded shank of said at least one threaded fastener with said at least one threaded bore of said first member whereby said head of said at least one threaded fastener is separated from said first engagement surface of said first member so as to define a space therebetween; and

a second member comprising a panel having first and second engagement surfaces and at least one elongated opening having a first larger portion for accommodating said head of said at least one threaded fastener and a second smaller portion for accommodating said threaded shank of said at least one threaded fastener so as to permit said second member panel to be disposed within said space defined between said head of said at least one threaded fastener and said first engagement surface of said first member when said head of said at least one threaded fastener is initially inserted through said first larger portion of said at least one elongated opening of said second member and when said first end of said threaded shank is subsequently moved from said first larger portion of said at least one elongated opening of said second member and into said second smaller portion of said at least one elongated opening of said second member, whereby when said at least one threaded

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fastener is subsequently tightened as a result of rotary engagement of a rotary tool with said second opposite end of said at least one threaded fastener, said head of said at least one threaded fastener will be engaged with said first engagement surface of said second member while said second engagement surface of said second member will be engaged with said first engagement surface of said first member.

2. The fastener assembly as set forth in claim 1, wherein:

said threaded shank of said at least one threaded fastener has a left-hand thread provided thereon.

3. The fastener assembly as set forth in claim 1, further comprising:

insert means fixedly disposed within said first member and having an internal thread defined therein so as to define said at least one threaded bore within said first member.

4. The fastener assembly as set forth in claim 3, wherein:

said insert means is fixedly disposed within said first member by an interference fit.

5. The fastener assembly as set forth in claim 1, further comprising:

coating means disposed upon said threaded shank of said at least one threaded fastener for increasing adherence of said at least one threaded fastener within said at least one threaded bore of said first member.

6. The fastener assembly as set forth in claim 1, wherein:

said head of said at least one threaded fastener has means for engaging a rotary tool which comprises external hexagonal facets defined upon said head.

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7. The fastener assembly as set forth in claim 1, wherein:
said first member has two threaded bores defined therein;
said second member has two elongated openings defined therein; and
said at least one threaded fastener comprises two threaded fasteners respectively
threadedly engaged within said two threaded bores of said first member.
8. The fastener assembly as set forth in claim 1, wherein:
said first member comprises an automotive airbag sensor; and
said second member comprises an automotive support panel.
9. The fastener assembly as set forth in claim 7, wherein:
said elongated openings of said second member have substantially keyhole
configurations which define said first larger and second smaller portions thereof.
10. The fastener assembly as set forth in claim 1, wherein:
said second member comprises a hollow portion; and
said head of said at least one threaded fastener is disposed internally within said
hollow portion of said second member while said second end of said at least one threaded
fastener is disposed internally within said at least one threaded bore of said first member such
that said head and second end portions of said at least one threaded fastener do not project
externally of said first and second members.
11. A method of assembling, comprising the steps of:
providing a first member with at least one threaded bore and a first engagement
surface;
pre-assembling at least one threaded fastener, having a head and a threaded

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shank connected at a first end thereof to said head and having a second opposite end, within said at least one threaded bore of said first member as a result of threaded engagement of said at least one threaded fastener within said at least one threaded bore of said first member such that said head of said at least one threaded fastener is separated from said first engagement surface of said first member so as to define a space therebetween;

providing a second member comprising a panel with first and second engagement surfaces and at least one elongated opening having a first larger portion for accommodating said head of said at least one threaded fastener and a second smaller portion for accommodating said threaded shank of said at least one threaded fastener;

inserting said head of said at least one threaded fastener through said first larger portion of said at least one elongated opening of said second member panel;

moving said at least one threaded fastener and said first member relative to said second member such that said first end of said threaded shank of said at least one threaded fastener is moved from said first larger portion of said at least one elongated opening of said second member and into said second smaller portion of said at least one elongated opening of said second member and said panel of said second member is disposed within said space defined between said head of said at least one threaded fastener and said first engagement surface of said first member; and

threadedly tightening said at least one threaded fastener within said at least one threaded bore of said first member such that said head of said at least one threaded fastener will be engaged with said first engagement surface of said second member while said second engagement surface of said second member will be engaged with said first engagement surface of said first member.

12. The method as set forth in claim 11, wherein:

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said threaded shank of said at least one threaded fastener is provided with a left-hand thread.

13. The method as set forth in claim 11, further comprising the steps of:

threadedly engaging said at least one threaded fastener within said at least one threaded bore of said first member, during said pre-assembling step, from said second end of said at least one threaded fastener by means of a left-hand drive; and

threadedly engaging said at least one threaded fastener within said at least one threaded bore of said first member, during said tightening step, by said head of said at least one threaded fastener by means of right-hand drive.

14. The method as set forth in claim 12, wherein:

said head of said at least one threaded fastener has a hexagonal external configuration so as to facilitate said threaded engagement of said at least one threaded fastener within said at least one threaded bore of said first member and said second end of said at least one threaded fastener is provided with a Torx-portion for also facilitating said threaded engagement of said at least one threaded fastener within said at least one threaded bore of said first member.

15. The method as set forth in claim 11, further comprising the step of:

providing an internally threaded insert within said first member so as to define said at least one threaded bore within said first member.

16. The method as set forth in claim 15, further comprising the step of:

fixedly disposing said threaded insert within said first member by an interference fit.

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17. The method as set forth in claim 11, further comprising the step of:
providing a coating upon said threaded shank of said at least one threaded fastener for increasing the adherence of said at least one threaded fastener within said at least one threaded bore of said first member.
18. The method as set forth in claim 11, further comprising the steps of:
providing said first member with two threaded bores;
providing said second member with two elongated openings; and
threadedly engaging two threaded fasteners within said two threaded bores of said first member.
19. The method as set forth in claim 11, wherein:
said first member comprises an automotive airbag sensor; and
said second member comprises an automotive support panel.
20. The method as set forth in claim 11, wherein:
said at least one elongated opening of said second member has a substantially keyhole configuration defining said first larger and second smaller portions thereof.

