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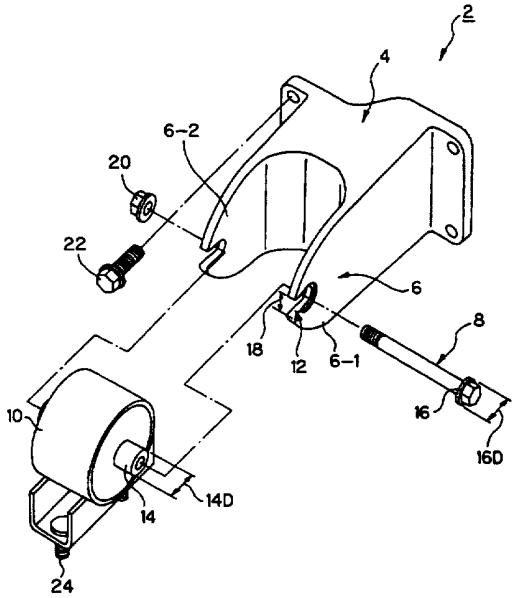
Online: WPI

(54) Engine-mounting bracket

(57) An engine-mounting bracket assembly has a bracket member 4 with parallel supporting arms 6-1, 6-2 formed with cutout portions 12 thereby eliminating the conventional practice of hole matching, with concomitantly enhanced convenience of assembly, ease of casting, fewer components, easy manufacture, and reduced costs. The bracket member 4, attached to either a vehicle body or the engine, has a bush 10 fixed to it by a bolt 8 which passes through an inner sleeve 14 engaged in the cutouts 12. The bush 10 is attached to the other of the engine or the vehicle body. The cutouts 12 may extend perpendicular to the length of the arms (Fig. 6). The sleeve 14 may be replaced by an unthreaded portion integral with the bolt (Fig. 11).

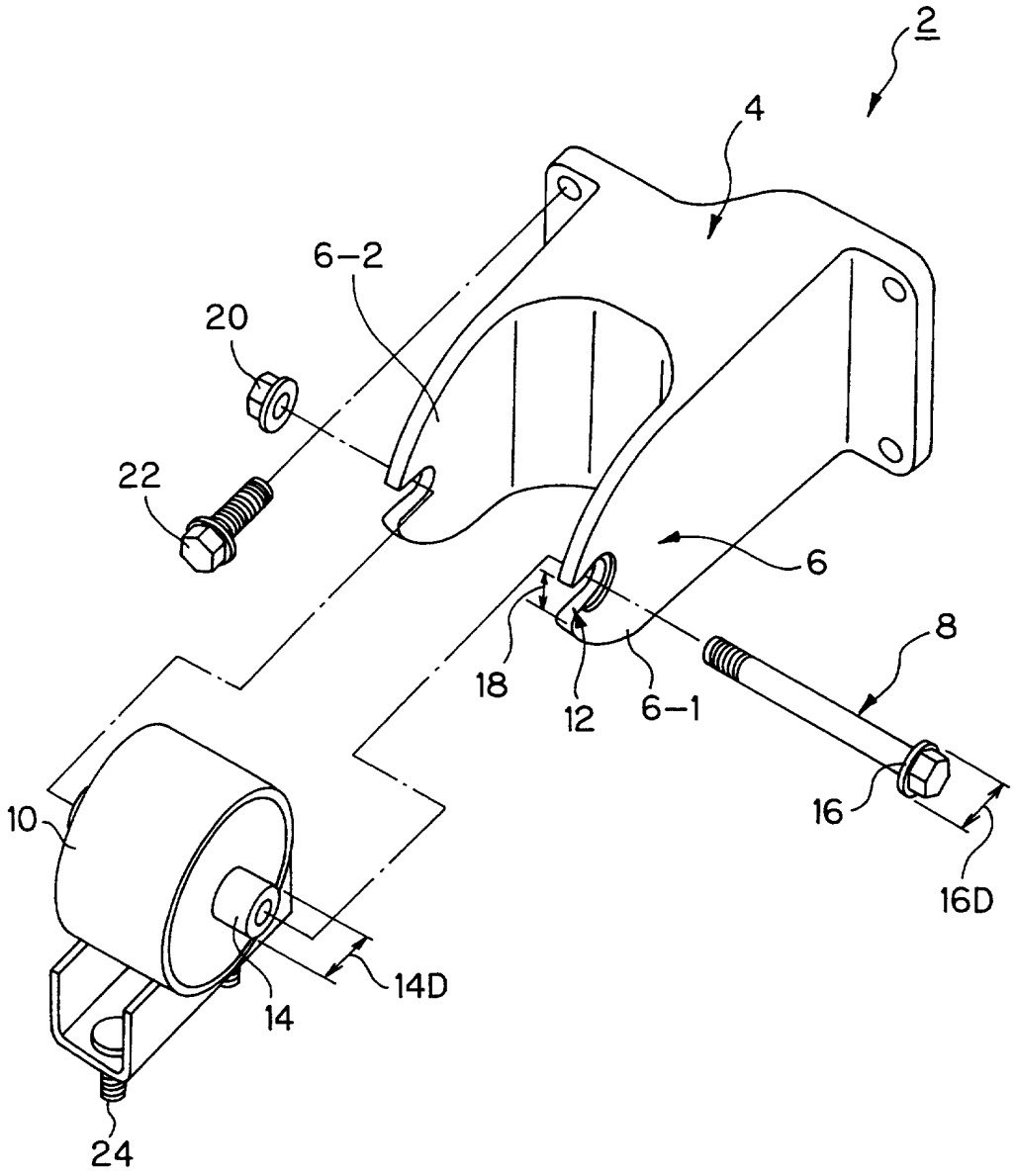
FIG. 1



SLEEVE DIAMETER<CUTOUT WIDTH<BOLT & NUT FLANGE DIAMETER

GB 2 314 537 A

FIG. 1



SLEEVE DIAMETER<CUTOUT WIDTH<BOLT & NUT FLANGE DIAMETER

FIG. 2

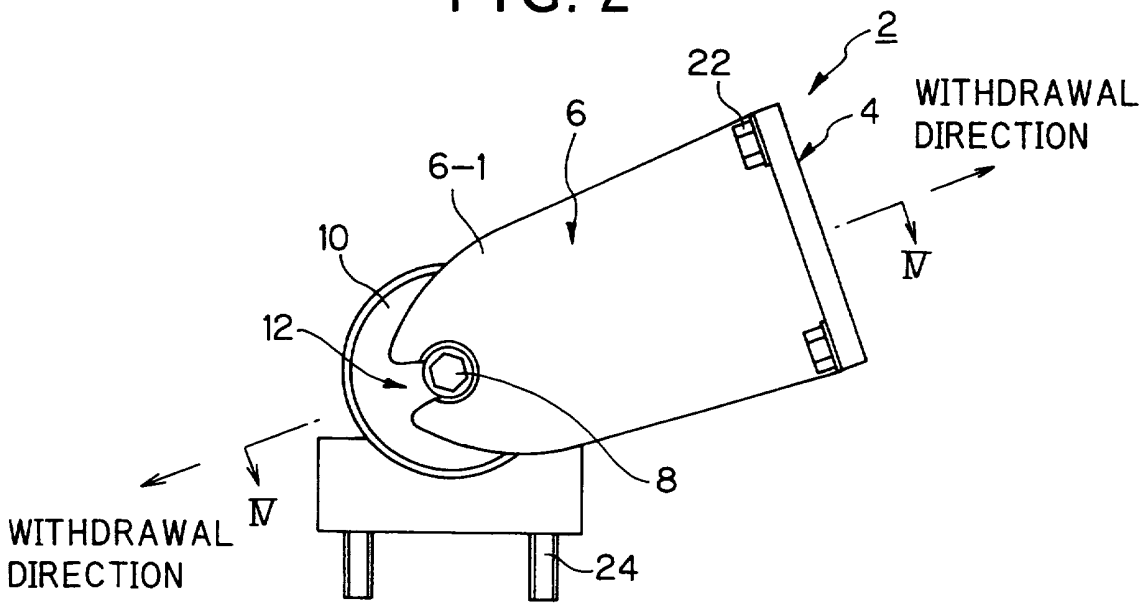

2
22
4
WITHDRAWAL DIRECTION
6
6-1
10
12
IV
8
WITHDRAWAL DIRECTION
IV
24

FIG. 3

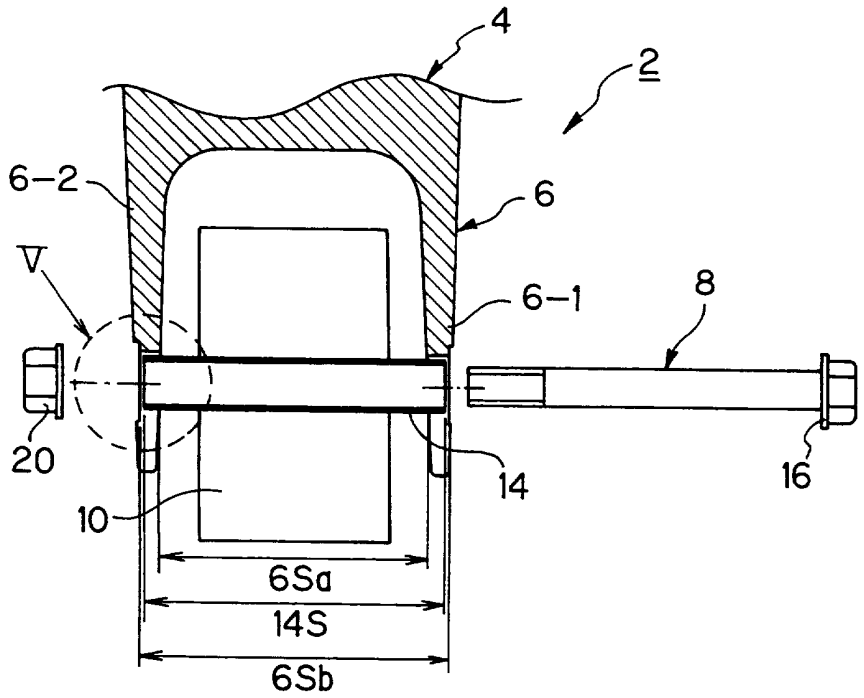

4
2
6-2
6
V
6-1
8
20
14
16
10
6Sa
14S
6Sb

FIG. 4

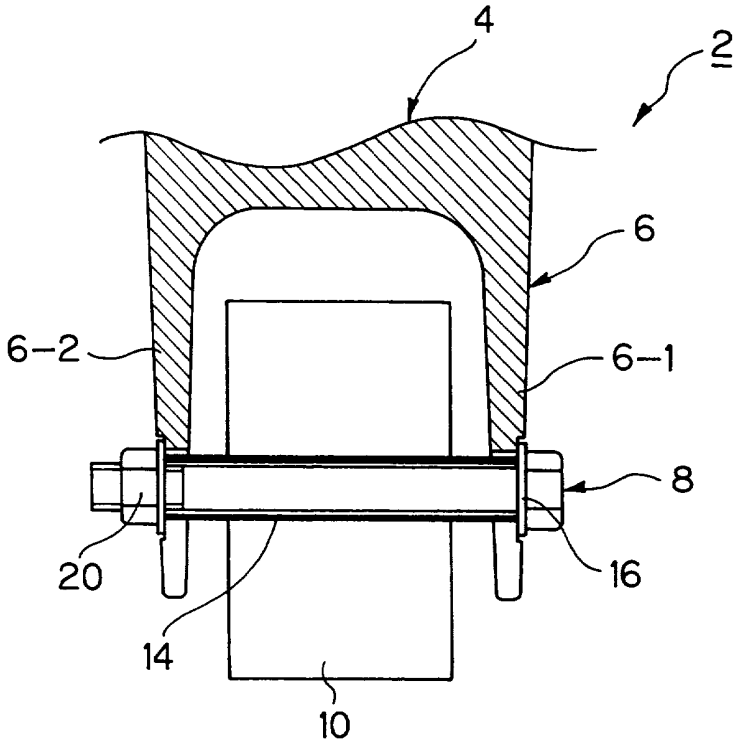


FIG. 5

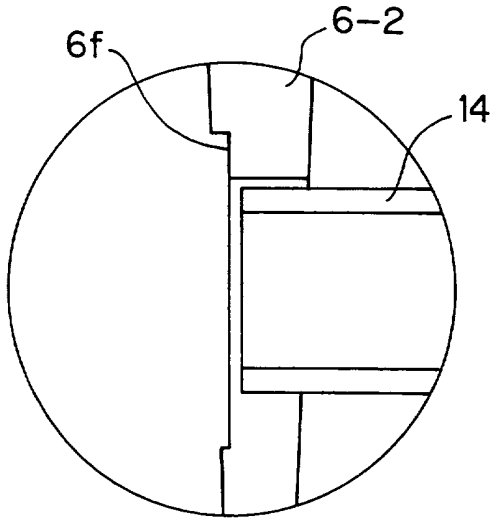


FIG. 6

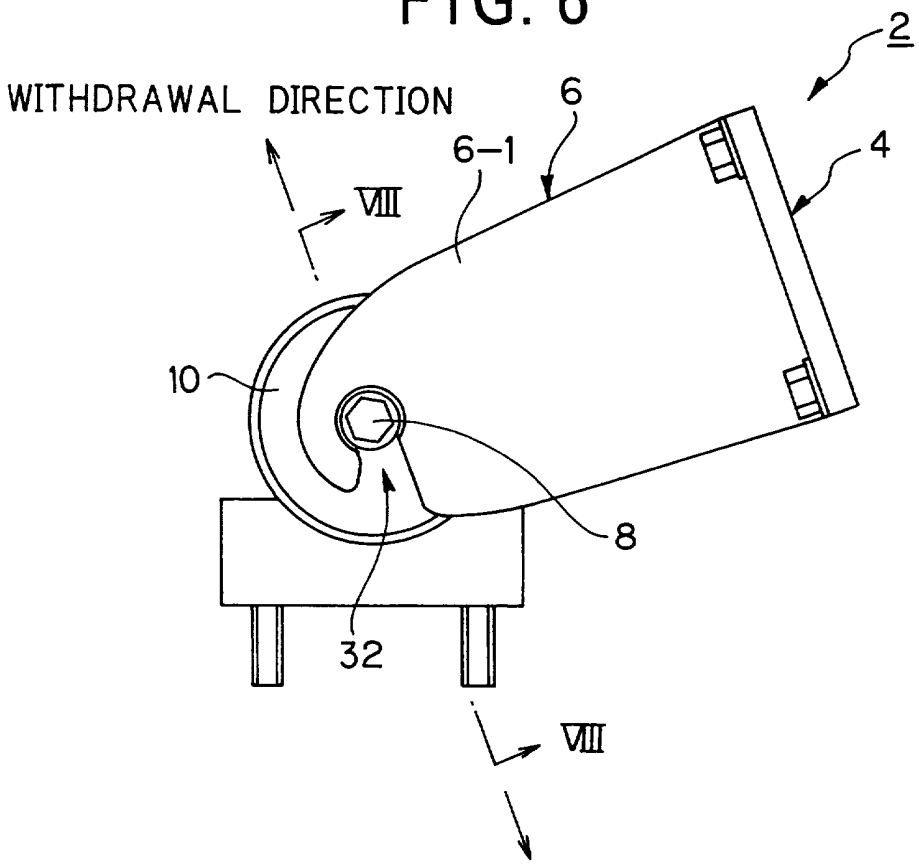

2
WITHDRAWAL DIRECTION
6
6-1
4
VIII
10
8
32
VIII
WITHDRAWAL DIRECTION

FIG. 7

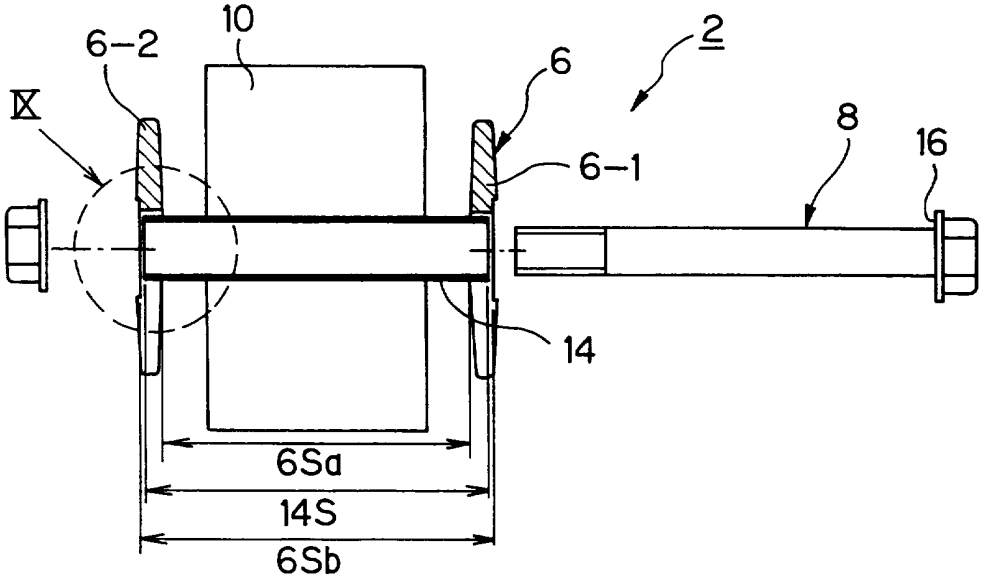

10
6-2
2
IX
6
8
16
6-1
14
6Sa
14S
6Sb

FIG. 8

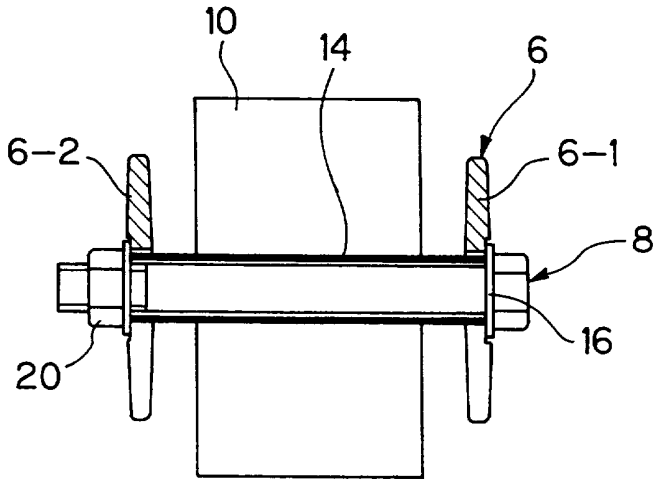


FIG. 9

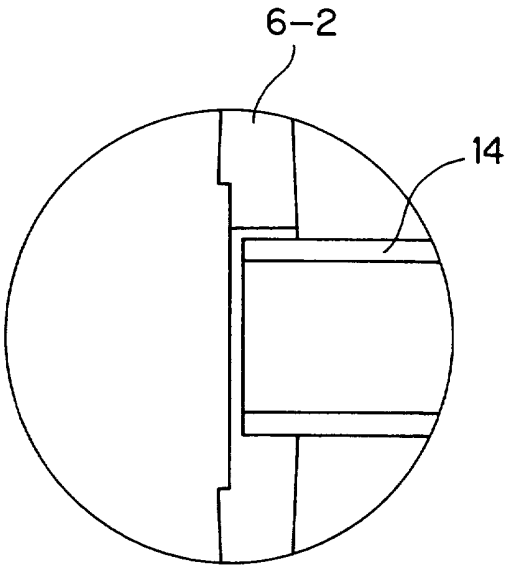


FIG. 10

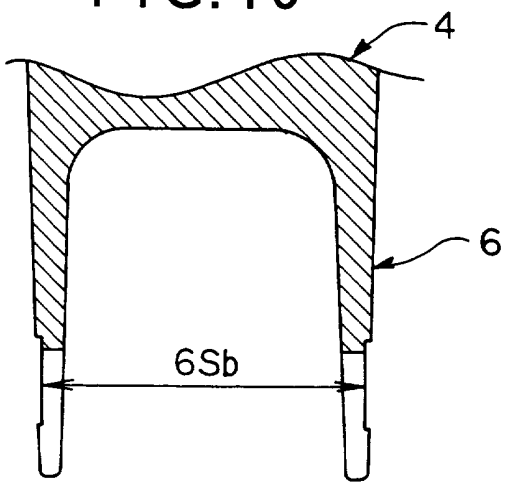


FIG. 11

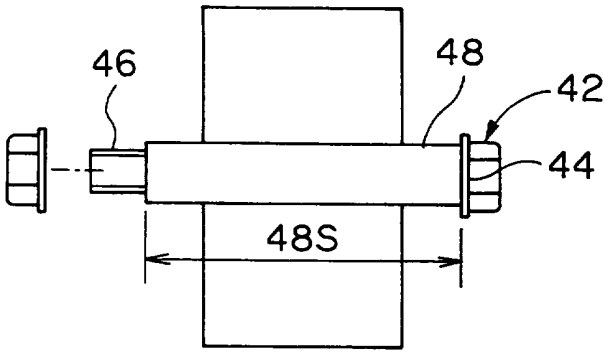


FIG. 12

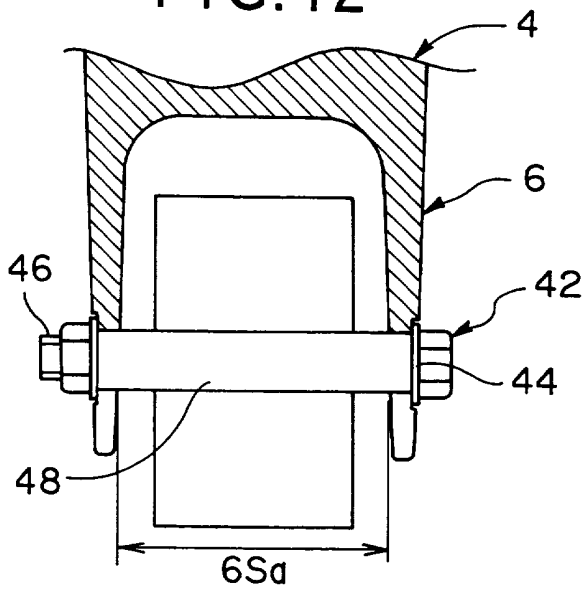


FIG. 13
PRIOR ART

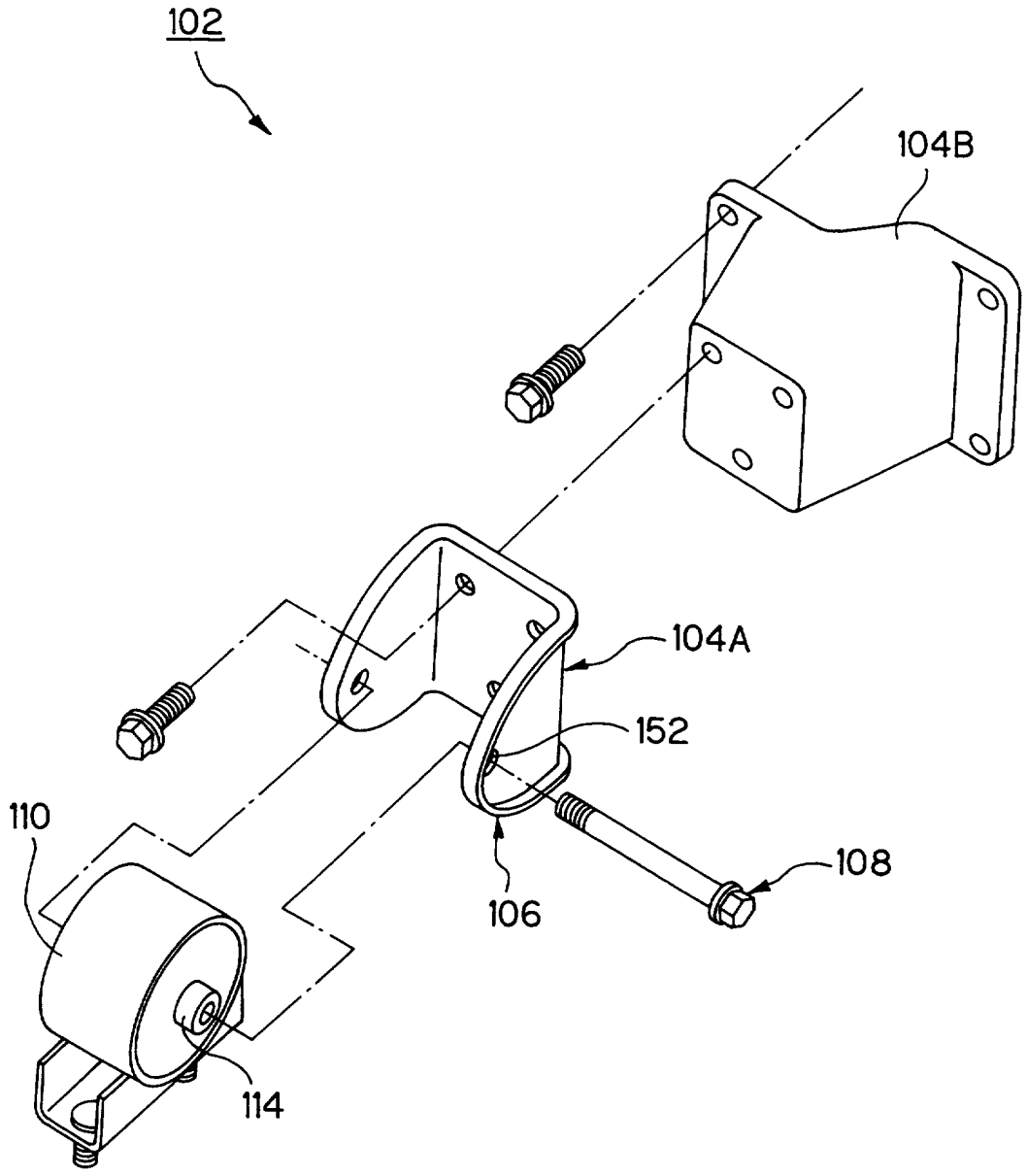


FIG. 14
PRIOR ART

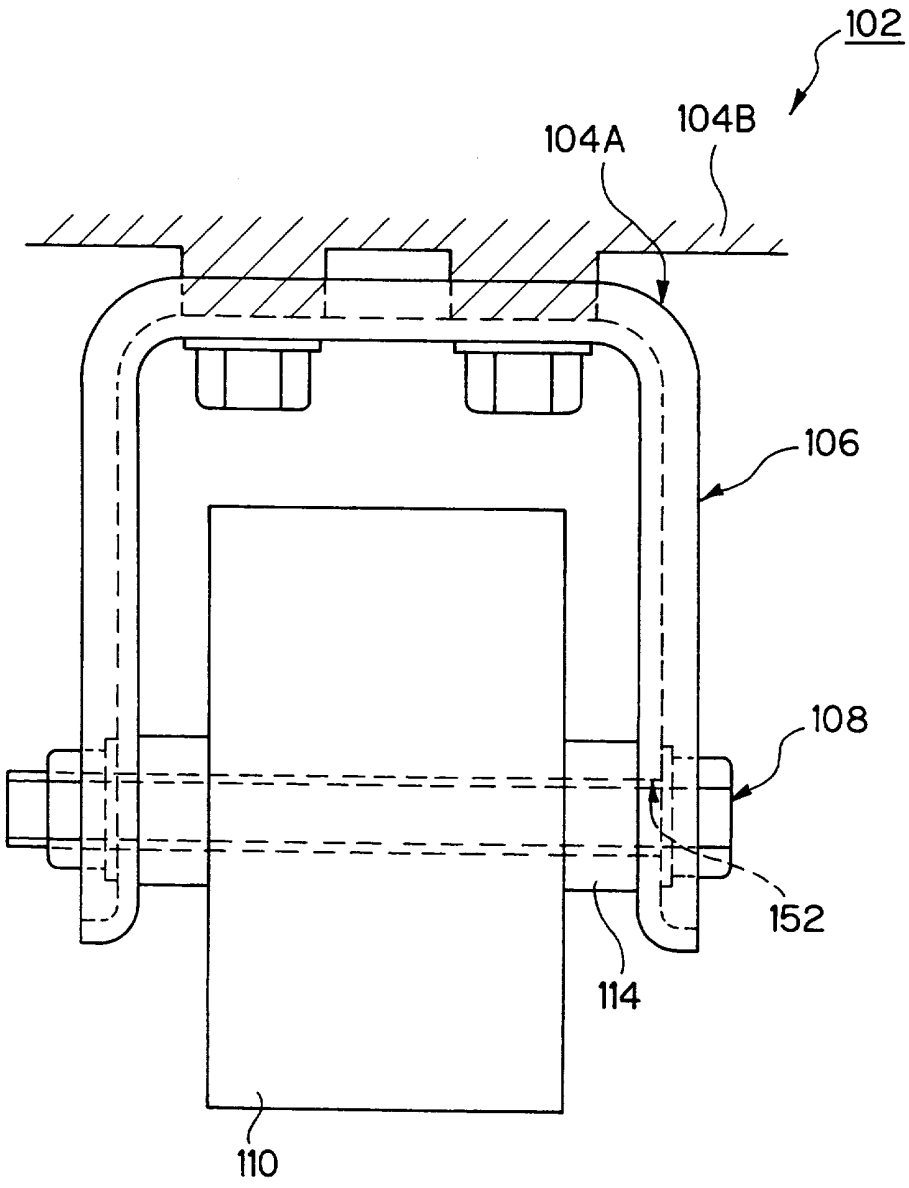


FIG. 15
PRIOR ART

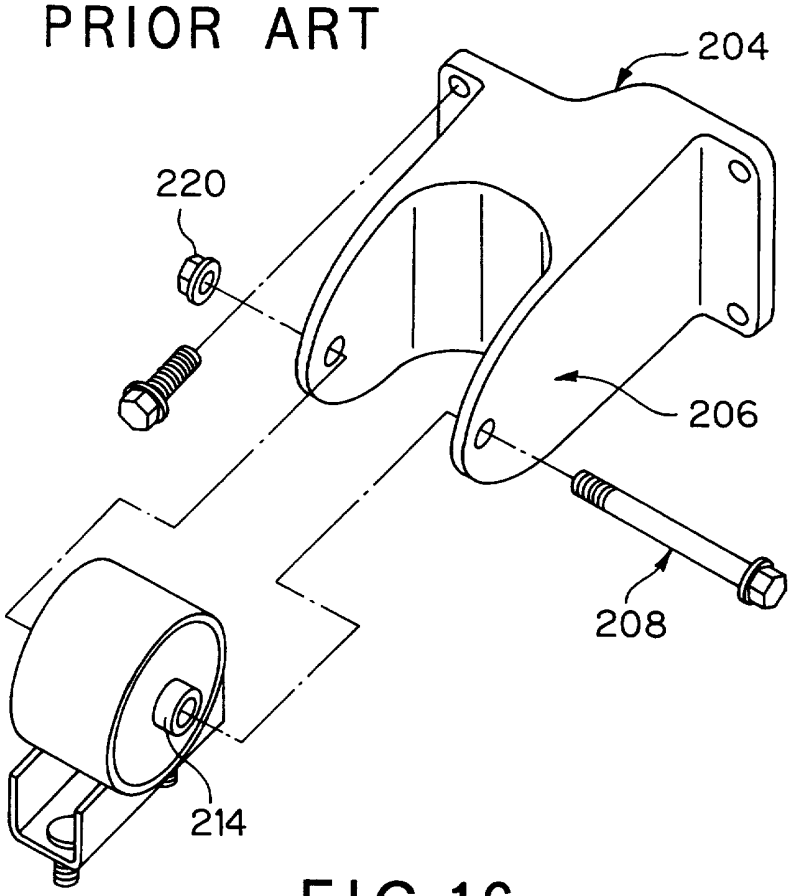


FIG. 16

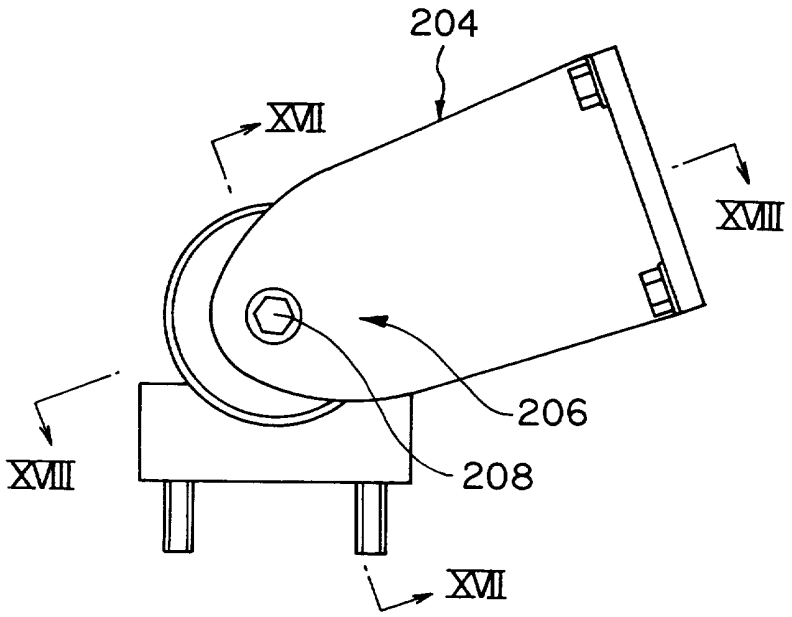


FIG. 17
PRIOR ART

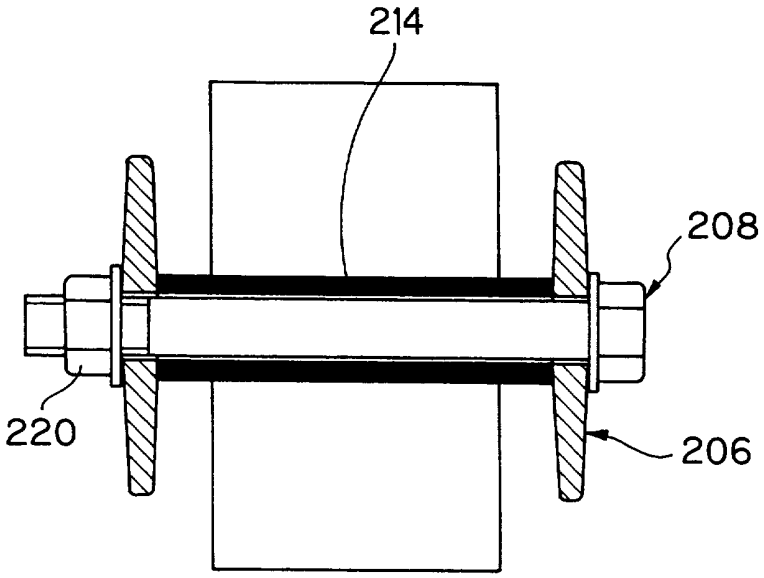


FIG. 18
PRIOR ART

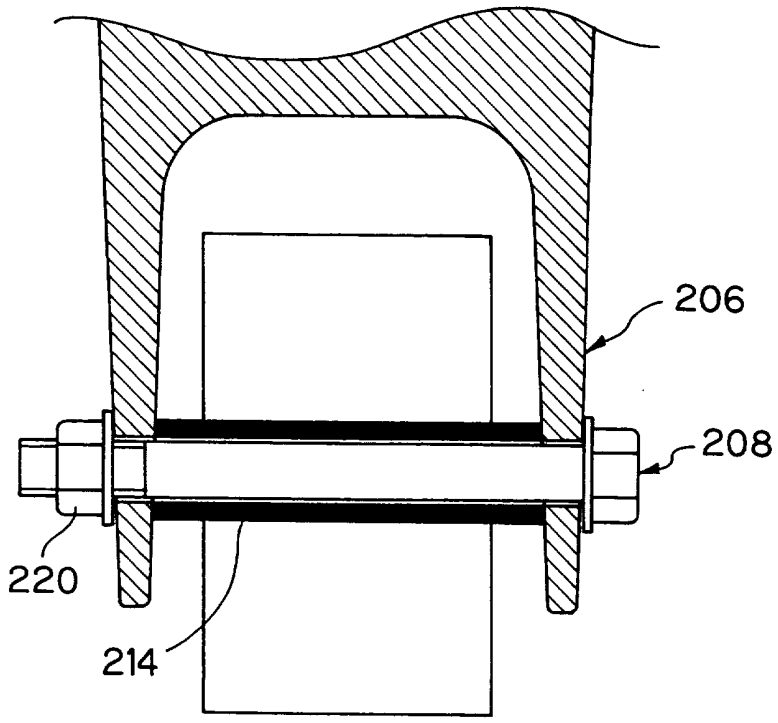


FIG. 19
PRIOR ART

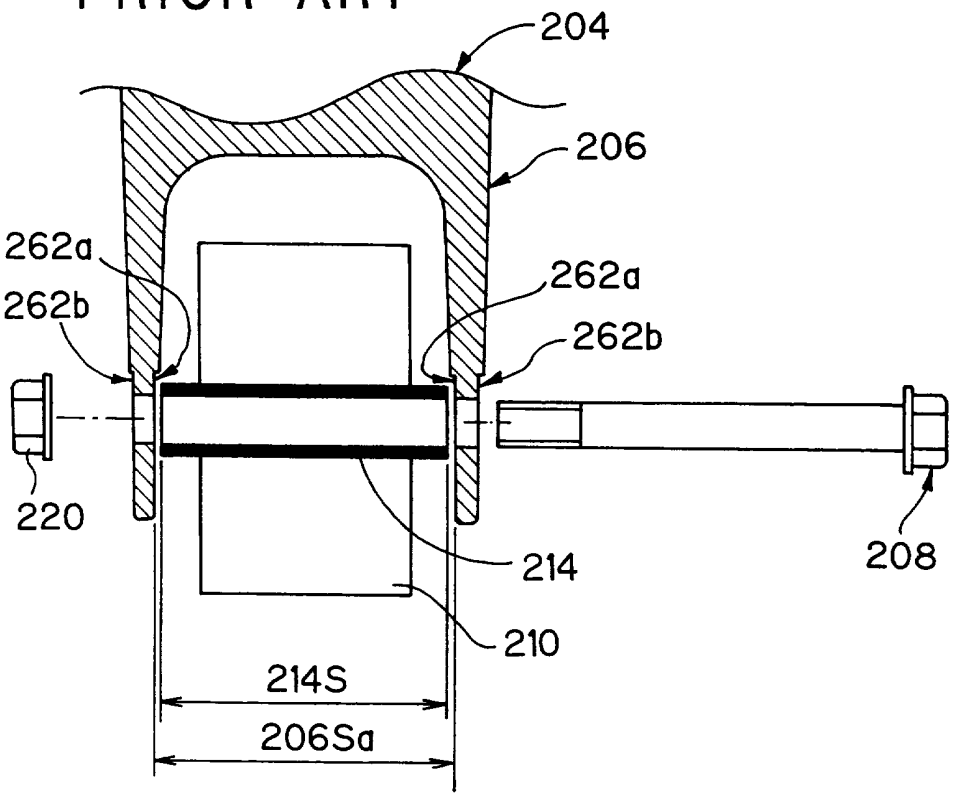
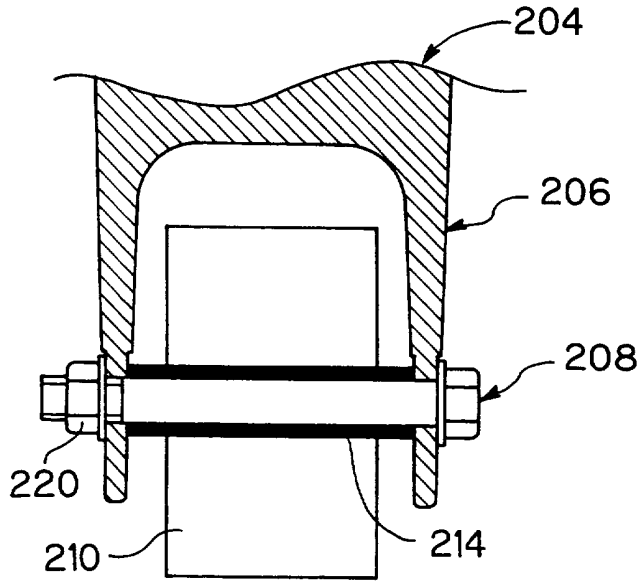


FIG. 20
PRIOR ART



ENGINE-MOUNTING BRACKET

FIELD OF THE INVENTION

This invention relates to an engine-mounting bracket. More particularly, it relates to an engine-mounting bracket in which a bracket is formed with cutout portions, thereby eliminating conventional hole-matching practice. This enhances convenience of assembly. Additionally, as the engine-mounting bracket can be formed by casting, fewer components are involved and costs are reduced.

BACKGROUND OF THE INVENTION

An engine disposed in a vehicle is anchored to a body of the vehicle through an engine-mounting bracket. The engine-mounting bracket suppresses vibration from the engine. As a result, such vibration is intercepted and prevented from being transmitted to the vehicle body or, e.g., to the interior of the vehicle.

An engine-mounting bracket is disclosed in published Japanese Patent Application Laid-Open No. 1-202525. An automobile engine-supporting device, which is disclosed in this publication, has a supporting bracket and a retaining bracket secured to one another by means of a fastening bolt. The supporting bracket supports a support member which is provided on the engine. The retaining bracket is mounted on the vehicle body. In such an automobile engine-supporting structure, a cutout portion is formed at either a bolt insertion-hole of the supporting bracket or a bolt insertion-hole of the retaining bracket for permitting the engine to be turned on an axis extending in a transverse direction of the vehicle in proportion with impact loads. The impact loads are imposed on the engine upon a collision of the vehicle. As a result, the engine is prevented from horizontal movement in a rearward direction of the vehicle upon a frontal collision of the automobile.

In conventional engine-mounting brackets, an engine-mounting bracket 102, as shown in Figures 13 and 14,

includes first and second brackets 104A and 104B in which the second bracket 104B is attached to either the engine or the vehicle body, while the first bracket 104A is fitted to the second bracket 104B. The first bracket 104A is formed by a plate-shaped member being bent into a U-shaped configuration in cross-section. The second bracket 104B is formed by way of casting.

In addition, a sleeve 114 is fixed to the first bracket 104A between supporting arm portions 106 by means of a fixing bolt 108. Further, a bush 110 is fixed onto the periphery of the sleeve 114. The bush 110 is attached to the other of the engine and the vehicle body. The supporting arm portions 106 are formed with hole portions 152 for inserting the fixing bolt therethrough.

When desired, the second bracket 104B and the bush 110 may alternately be secured to the engine and the vehicle body.

Since the first bracket 104A is formed by the plate-shaped member being bent into a U-shape in cross-section, the engine-mounting bracket 102 becomes difficult to manufacture. Further, in producing a large number of components, these difficulties lead to increased costs which are disadvantageous from an economical viewpoint.

Additionally, as the supporting arm portions 106 are formed with the hole portions 152, through which the fixing bolt is inserted when the bush and the sleeve are fixed to the bracket, there further arises the inconvenience of the required hole-matching practice, which results in further inconvenience during the assembly process.

In order to avoid the aforesaid inconveniences, the first bracket 104A may be cast of a metallic material such as iron or aluminum. Alternatively, the first and second brackets 104A and 104B may be integrally molded by way of casting.

However, as shown in Figures 15 and 16, when a bracket 204 is integrally cast-molded, drafts or tapers

are formed at supporting arm portions 206 of the bracket 204, as illustrated in Figures 17 and 18. As a result of being formed with the drafts, the supporting arm portions 206 must be machined to remove the drafts so as to provide abutment surfaces against which a fixing bolt 208, a nut 220, and a sleeve 214 are pressed. This causes yet further inconveniences of an additional machining process, difficulties in manufacturing, and increased costs which are disadvantageous from an economical viewpoint.

Further, as illustrated in Figures 19 and 20, even when inner and outer sides of the supporting arm portions 206 are formed with respective abutment surfaces 262a and 262b, distance 206Sa between the inner surfaces of the supporting arm portions 206 must be greater than length 214S of the sleeve 214 by a slight amount (i.e. some 2 millimeters). However, when the bush 210 and the sleeve 214 are assembled onto the bracket 204 at the supporting arm portions 206, deflection caused by a difference between the aforesaid distance 206Sa and length 214S is brought about by the tightening force of the fixing bolt 208 and/or that of the nut 220. Such deflection causes stresses which are then exerted on the supporting arm portions 206.

As a result, the integrally cast-molded brackets have inconveniences in that: the supporting arm portions are deficient in flexibility when compared with those formed by sheet metal, which is thus disadvantageous in view of practical use; and, it is difficult to realize the brackets by way of casting.

To overcome or minimize the above-mentioned inconveniences, the present invention provides an engine-mounting bracket disposed between an engine and a vehicle body, comprising a bracket attached to one of the engine and the vehicle body, and a bush fitted to the other thereof, the bush being fixed to the bracket between supporting arm portions of the bracket by means of a

fixing bolt, wherein the bracket has cutout portions defined at the supporting arm portions for fixing the bush to bracket.

According to the invention having the above structure, when the bracket and the bush are assembled together, the bush is brought into engagement with the cutout portions that are formed at the supporting arm portions of the bracket. The bush is then fixedly positioned between the supporting arm portions by means of the fixing bolt. As a result, the cutout portions present at the supporting arm portions obviate the need for conventional hole-matching practice, and consequently enhance convenience of assembly. Further, the castability of the engine-mounting bracket provides fewer components and reduced costs.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view illustrating an assembled state of an engine-mounting bracket according to a first embodiment of the present invention;

Figure 2 is a right side view showing the engine-mounting bracket;

Figure 3 is a schematic cross-sectional view showing the engine-mounting bracket in a state of a bush being assembled on a bracket;

Figure 4 is a schematic cross-sectional view taken along line IV-IV of Figure 2; and

Figure 5 is a schematic enlarged cross-sectional view taken along line V-V of Figure 3.

Figure 6 is a right side view illustrating an engine-mounting bracket according to a second embodiment;

Figure 7 is a schematic cross-sectional view illustrating the engine-mounting bracket in a state of a bush being assembled on a bracket;

Figure 8 is a schematic enlarged cross-sectional view taken along line VIII-VIII of Figure 6; and

Figure 9 is a schematic enlarged cross-sectional view taken along line IX-IX of Figure 7.

Figure 10 is a schematic cross-sectional view illustrating a bracket of an engine-mounting bracket according to another embodiment;

Figure 11 is a front view showing a state in which a bush is fixed to a fixing bolt; and

Figure 12 is a schematic cross-sectional view showing the engine-mounting bracket in a state of the bush being assembled on the bracket.

Figure 13 is a perspective view illustrating an assembled state of an engine-mounting bracket according to first prior art that underlies the present invention; and

Figure 14 is an enlarged plan view showing the assembled engine-mounting bracket.

Figure 15 is a perspective view illustrating an assembled state of an engine-mounting bracket according to second prior art that underlies the present invention;

Figure 16 is a right side view showing the engine-mounting bracket;

Figure 17 is a schematic enlarged cross-sectional view taken along line XVII-XVII of Figure 16; and

Figure 18 is a schematic enlarged cross-sectional view, taken along line XVIII-XVIII of Figure 16.

Figure 19 is a schematic cross-sectional view illustrating an engine-mounting bracket in a state of a bush being assembled on a bracket according to third prior art that underlies the present invention; and

Figure 20 is a schematic cross-sectional view showing the engine-mounting bracket after the bush is assembled on the bracket.

DETAILED DESCRIPTION

Figures 1-5 illustrate a first embodiment of the invention.

Referring to Figure 1, the engine-mounting bracket 2 arrangement is shown including a bracket 4 and a bush 10. The bracket 4 is secured to either an engine (not shown) or a vehicle body (not shown). The bush 10 is fitted to

the other of the engine or vehicle body opposite the bracket 4. In addition, the bush 10 is fixed to the bracket 4 between supporting arm portions 6 thereof by means of a fixing bolt 8. In addition, the supporting arm portions 6 are formed with cutout portions 12 for fixing the bush 10 to the bracket 4.

In greater detail, the supporting arm portions 6 are cast in a metallic material such as iron or aluminum and are formed into a U-shaped configuration in cross-section. The arm portions 6 are defined with plate-shaped, first and second arm portions 6-1 and 6-2 at both end portions thereof in an opposed and generally parallel relationship to one another. As illustrated in Figures 1 and 2, the cutout portions or slots 12 are formed parallel to an outwardly extending direction of the first and second arm portions 6-1 and 6-2, while being formed by being cut inwardly away from respective outer edges or ends of the first and second arm portions 6-1 and 6-2. This cutaway direction accords with a withdrawal direction. The bolt 8 and the under-mentioned nut 20 are seated on outer side surface portions of the first and second arm portions 6-1 and 6-2, and the outer side surface portions are machined to define flats 6f. (See Figure 5)

Referring to Figure 1, the cutout portions 12 are shown having cutout width 18, which is greater than diameter 14D of cylindrical sleeve 14, but smaller than diameter 16D of a flange portion 16. The sleeve 14 is provided in the bush 10. The flange portion 16 is formed on the bolt 8. In brief, the following dimensional relationship is established:

sleeve diameter<cutout width<flange portion diameter

In this connection, the above description is made with reference to the flange portion 16; however, if a washer is used on bolt 8 instead of the flange portion 16, then the above "flange portion diameter" may be replaced by a washer diameter.

Turning now to Figure 3, the bush 10 is shown fixed onto the periphery of the sleeve 14 whose length 14S is greater than distance 6Sa between inner surfaces of the supporting arm portions 6, but is smaller than distance 6Sb between the machined surfaces or outer surfaces of the supporting arm portions 6.

Reference numeral 20 denotes the aforesaid nut to be in threading engagement with the bolt 8; 22 denotes a first attachment bolt for fastening the bracket 4 to one of the engine (not shown) and the vehicle body (not shown); and, 24 is a second attachment bolt for securing the bush 10 to the other of the above.

The operation of the first embodiment will now be described.

As illustrated in Figure 3, when the bracket 4 and the bush 10 are assembled together, then the sleeve 14, which is rigidly secured to the bush 10, is inserted with pressure into the cutout portions 12 which are defined at the first and second arm portions 6-1 and 6-2 of the bracket 4.

Then, the fixing bolt 8 is driven through the inside of the sleeve 14. As illustrated in Figure 4, the nut 20 is brought into threading engagement with the bolt 8. The bush 10 is thereby secured onto the bracket 4.

In this way, the cutout portions 12, which are formed at the first and second arm portions 6-1 and 6-2 of the supporting arm portions 6, eliminate conventional practice of hole matching, and thus enhance convenience of assembly. This is advantageous in view of practical use.

In addition, since the engine-mounting bracket 2 can be cast, then the bracket 2 can easily be manufactured with fewer components at reduced costs. This is advantageous from an economical viewpoint.

Further, since cutout width 18 of the cutout portions 12 is rendered greater than diameter 14D of the cylindrical sleeve 14 disposed in the bush 10, but is

made smaller than diameter 16D of the flange portion 16 formed on the bolt 8, then such cutout width 18 enables the sleeve 14 to be positioned at the cutout portions 12. In addition, cutout width 18 obviates the likelihood that the bolt 8 breaks loose and falls off the cutout portions 12. This is advantageous in view of practical use.

Yet further, since the bush 10 is fixedly positioned on the periphery of the sleeve 14 whose length 14S is greater than distance 6Sa between the inner surfaces of the supporting arm portions 6, but is smaller than distance 6Sb between the outer surfaces or machined surfaces of the supporting arm portions 6, then the sleeve 14 can be securely positioned at the cutout portions 12, with consequentially enhanced convenience of assembly. In addition, end surfaces of the sleeve 12 and the outer surfaces of the supporting arm portions 6 are machined, thereby providing improved accuracy in dimension. For example, a difference between the aforesaid distance 6Sb and length 14S is minimized, whereby deflection at the supporting arm portions 6 can be minimized.

Figures 6-9 illustrate a second embodiment. In this embodiment, the same reference characters are hereinafter used for features identical in function to those described in the first embodiment.

The second embodiment is characterized in that, when the engine-mounting bracket 4 is provided with cutout portions 32 at supporting arm portions 6 for fixing a bush thereto, the cutout portions 32 are cut away in the same direction as a withdrawal direction.

More specifically, similar to the first embodiment, the supporting arm portions 6 are cast in a metallic material such as iron or aluminum, and are formed into a U-shaped configuration in cross-section. The supporting arm portions 6 have plate-shaped, first and second arm portions 6-1 and 6-2 formed at both end portions thereof in an opposed relationship to one another. As

illustrated in Figure 6, the cutout portions or slots 32 are formed in the same direction as the withdrawal direction. In other words, the cutout portions 32 are defined so as to be perpendicular to an outward extending direction of the first and second arm portions 6-1 and 6-2, while the cutout portions 32 are defined by being cut away from the first and second arm portions 6-1 and 6-2 at a downward slant in Figure 6.

Similar to the first embodiment, the cutout portions 32 have a cutout width greater than a diameter of a cylindrical sleeve 14 but smaller than a diameter of a flange portion 16. The sleeve 14 is disposed in a bush 10. The flange portion 16 is formed on a fixing bolt 8.

Again, similar to the first embodiment, the bush 10 is rigidly mounted on the periphery of the sleeve 14 which has a length 14S greater than the distance 6Sa between the inner surfaces of the supporting arm portions 6, but smaller than distance 6Sb between the outer surfaces of the arm portions 6.

As shown in Figure 7, when the bracket 4 and the bush 10 are assembled together, the sleeve 14, which is fixed to the bush 10, is pushed into the cutout portions 32 which are formed at the first and second arm portions 6-1 and 6-2 of the bracket 4. Then, the bolt 8 is inserted through the inside of the sleeve 14. As illustrated in Figure 8, a nut 20 is driven into threading engagement with the bolt 8. As a result, the bush 10 can be assembled on the bracket 4.

In this way, the cutout portions 32, which are defined at the first and second arm portions 6-1 and 6-2 of the supporting arm portions 6, obviate the need for the conventional practice of hole matching. As a consequence, enhanced convenience of assembly is provided, which is advantageous in view of practical use, similarly to the first embodiment.

In addition, since the supporting arm portions 6 of the engine-mounting bracket 2 are castable, the bracket 2

can easily be fabricated with fewer components at reduced costs, which is advantageous from an economical viewpoint, similarly to the first embodiment.

Further, since cutout width 18 of the cutout portions 32 is greater than diameter 14D of the cylindrical sleeve 14 provided in the bush 10, but is smaller than diameter 16D of the flange portion 16 formed on the bolt 8, then the aforesaid cutout width allows the sleeve 14 to be positioned at the cutout portions 32. In addition, the above cutout width obviates the possibility that the bolt 8 breaks loose and falls off the cutout portions 32, which is advantageous in view of practical use, similarly to the first embodiment.

Yet further, since the bush 10 is fixed onto the periphery of the sleeve 14 whose length 14S is greater than distance 6Sa between the inner surfaces of the supporting arm portions 6, but is smaller than distance 6Sb between the outer surfaces or removed surfaces of the supporting arm portions 6, then the sleeve 14 can reliably be positioned at the cutout portions 32, with concomitantly enhanced convenience of assembly, similarly to the first embodiment. In addition, end surfaces of the sleeve 14 and the outer surfaces of the supporting arm portions 6 are machined surfaces, thereby providing improved accuracy in dimension. For example, a difference between the aforesaid distance 6Sb and length 14S is minimized, whereby deflection at the supporting arm portions 6 can be minimized.

It is to be noted that the present invention is not limited to the above-described first and second embodiments, but is susceptible to various changes and modifications.

For example, in the first embodiment, the bush 10 is fixed onto the periphery of the sleeve 14, and the cutout portions 12, which are formed at the supporting arm portions 6 of the bracket 4 for fixing the bush to the bracket 4, permit the bush 10 to be fixed to the bracket

4 between the supporting arm portions 6 by means of the fixing bolt 8. Now, as illustrated in Figures 10-12, a fixing bolt 42 may be formed into a shape such that an incompletely threaded portion 48 is provided between a flange portion 44 at one end of the bolt 42 and a threaded portion 46 at the other end thereof. That is, the incompletely threaded portion 48 may be substituted for the sleeve.

More specifically, when the bolt 42 is formed by the flange portion 44, the threaded portion 46, and the incompletely threaded portion 48, then the incompletely threaded portion 48 is formed in such a manner that length 48S of the threaded portion 48 is greater than distance 6Sa between the inner surfaces of the supporting arm portions 6, but is smaller than distance 6Sb between the outer surfaces of the supporting arm portions 6, as illustrated in Figures 10 and 11.

As shown in Figure 11, when the bracket 4 and the bush are assembled together, the bush is fixed to a peripheral surface portion of the incomplete threaded portion 48. As illustrated in Figure 12, the bolt 42 having the bush fixed thereto is inserted with pressure into the cutout portions which are formed at the first and second arm portions 6-1 and 6-2 of the bracket 4. Then, a nut is driven into threading engagement with the threaded portion 46 of the bolt 42. In this way, the bush can be assembled onto the bracket 4.

In short, the cutout portions 12 defined at the supporting arm portions 6 obviate the need for conventional practice of hole matching, and thus enhance convenience of assembly. This is advantageous in view of practical use. In addition, the castability of the supporting arm portions 6 provides fewer components, easy manufacture, and reduced costs. This is advantageous in an economical viewpoint. Furthermore, the use of the incompletely threaded portion 48 of the bolt 42 in place

of the sleeve provides fewer components, which leads to enhanced convenience of assembly.

As detailed above, the engine-mounting bracket arrangement positioned between an engine and a vehicle body according to the present invention includes a bracket, which is fitted to one of the engine and the vehicle body, and a bush which is attached to the other of the engine and the vehicle body. The bush is fixedly secured to the bracket between supporting arm portions of the bracket by means of a fixing bolt. In addition, the bracket has cutout portions formed at the supporting arm portions for fixing the bush to the bracket. As a result, the cutout portions defined at the supporting arm portions eliminate conventional hole-matching practice, and thus provides enhanced convenience of assembly. This is advantageous in view of practical use. In addition, the castability of the engine-mounting bracket realizes fewer components, easy manufacture, and reduced costs. This is advantageous in an economical viewpoint.

CLAIMS

1. An engine-mounting bracket disposed between an engine and a vehicle body, comprising:

a bracket attached to one of said engine and said vehicle body; and

a bush attached to the other of said engine and said vehicle body, said bush being fixed to said bracket between supporting arm portions of said bracket by means of a fixing bolt, wherein said supporting arm portions are defined with cutout portions for fixing said bush thereto.

2. An engine-mounting bracket according to Claim 1, wherein said cutout portions have a cutout width greater than a diameter of a cylindrical sleeve disposed in said bush, but smaller than a diameter of a flange portion formed on said fixing bolt.

3. An engine-mounting bracket according to Claim 1, wherein said bush is fixed onto the periphery of said sleeve, and said sleeve has a length greater than a distance between inner surfaces of said supporting arm portions, but smaller than a distance between outer surfaces of said supporting arm portions.

4. An engine-mounting bracket according to Claim 1, wherein said fixing bolt has an incompletely threaded portion formed between a flange portion at one end of said bolt and a threaded portion at the other end of said bolt, whereby said incompletely threaded portion is used in place of said sleeve.

5. An engine-mounting bracket for disposition between an engine and a vehicle body, comprising:

a bracket attachable to the engine or said vehicle body and having supporting arm portions for a bush; and

a bush attachable to the engine or the vehicle body respectively, said bush being securable to said bracket between the supporting arm portions of said bracket by means of a securing bolt, wherein said supporting arm portions have cut-out portions into which said sleeve or a portion of the bolt may enter and being for securing said bush thereto.

6. An engine-mounting bracket as claimed in claim 5, in which said cut-out portions have a cut-out width greater than a diameter of a cylindrical sleeve disposed in said bush of greater than a bolt portion intermediate the ends of the bolt, but smaller than a diameter of washer located on or of a flange portion formed on said securing bolt.

7. An engine-mounting bracket as claimed in claim 5, in which said bush is secured onto the periphery of said sleeve or said bolt portion, and said sleeve or bolt portion has a length greater than a distance between inner surfaces of said supporting arm portions, but smaller than a distance between outer surfaces of said supporting arm portions.

8. An engine-mounting bracket as claimed in claim 6, in which said securing bolt has an incompletely threaded portion formed between a flange portion at one end of said bolt and a threaded portion at the other end of said bolt, and said incompletely threaded portion forming said bolt portion is used in place of said sleeve.

9. An engine-mounting bracket as claimed in claim 6 or 7, in which the outer diameter of the sleeve and the supporting surfaces defining the cut-out portions are such

that the sleeve is insertable with pressure into the cut-out portions and retainable therein against falling out by the consequential gripping action.

10. An engine-mounting bracket as claimed in any of claims 5 to 9, in which the nut of the securing bolt and/or head of the bolt has or have a flange portion or portions of greater diameter than that of the cut-out portions.

11. An engine-mounting bracket as claimed in claim 10, in which a recessed portion for receiving said flanges is provided in the outer surfaces of said arms around said cut-out portions.

12. An engine-mounting bracket substantially as herein described with reference to Figs. 1 to 12 of the accompanying drawings.

13. A vehicle body and engine-mounting bracket substantially as herein described with reference to Figs. 1 to 12 of the accompanying drawings.

Amendments to the claims have been filed as follows

1. An engine-mounting device disposed between an engine and a vehicle body, comprising:

a bracket attached to one of said engine and said vehicle body; and

a bush attached to the other of said engine and said vehicle body, said bush being fixed to said bracket between supporting arm portions of said bracket by means of a fixing bolt, wherein said supporting arm portions are defined with cut-out portions for fixing said bush thereto.

2. An engine-mounting device according to claim 1, wherein said cut-out portions have a cut-out width greater than a diameter of a cylindrical sleeve disposed in said bush, but smaller than a diameter of a flange portion formed on said fixing bolt.

3. An engine-mounting device according to claim 1, wherein said bush is fixed onto the periphery of said sleeve, and said sleeve has a length greater than a distance between inner surfaces of said supporting arm portions, but smaller than a distance between outer surfaces of said supporting arm portions.

4. An engine-mounting device according to claim 2 or 3, wherein, in place of said sleeve, said fixing bolt has an incompletely threaded portion formed between a flange portion at one end of said bolt and a threaded portion at the other end of said bolt.

5. An engine-mounting device for disposition between an engine and a vehicle body, comprising:

a bracket attachable to the engine or said vehicle body and having supporting arm portions for a bush; and

a bush attachable to the engine or the vehicle body

respectively, said bush being securable to said bracket between the supporting arm portions of said bracket by means of a securing nut and bolt and a sleeve or a securing nut and bolt with said bolt having an intermediate portion of greater diameter than its threaded portion but lesser diameter than a flange or washer adjacent the head, wherein said supporting arm portions have cut-out portions or recesses into which said sleeve or the intermediate portion of the bolt may enter for securing said bush to the supporting arm portions.

6. An engine-mounting device as claimed in claim 5, in which said cut-out portions or recesses have a width greater than the diameter of the cylindrical sleeve disposed in said bush or greater than the intermediate portion of the bolt, but smaller than a diameter of a washer located on or of a flange portion formed on said securing bolt.

7. An engine-mounting device as claimed in claim 5, in which said bush is secured onto the periphery of said sleeve or on said intermediate bolt portion, and said sleeve or bolt portion has a length greater than a distance between inner surfaces of said supporting arm portions, but smaller than a distance between outer surfaces of said supporting arm portions.

8. An engine-mounting device as claimed in claim 6, in which said securing bolt has an incompletely threaded portion formed between a flange portion at one end of said bolt and a threaded portion at the other end of said bolt, and said incompletely threaded portion forming said bolt portion is used in place of said sleeve.

9. An engine-mounting device as claimed in claim 6 or 7, in which the outer diameter of the sleeve and the supporting surfaces defining the cut-out portions or

recesses are such that the sleeve is insertable with pressure into the cut-out portions and retainable therein against falling out by the consequential gripping action.

10. An engine-mounting device as claimed in any of claims 5 to 9, in which the nut of the securing bolt and/or head of the bolt has or have a flange portion or portions of greater diameter than that of the cut-out portions.

11. An engine-mounting device as claimed in claim 10, in which a recessed portion for receiving said flanges is provided in the outer surfaces of said arms around said cut-out portions.

12. An engine-mounting device substantially as herein described with reference to Figs. 1 to 12 of the accompanying drawings.

13. A vehicle body and engine-mounting device substantially as herein described with reference to Figs. 1 to 12 of the accompanying drawings.

The Patent Office

Application No:	GB 9710574.6	**Examiner:**	Tom Sutherland
Claims searched:	1 - 11	**Date of search:**	13 August 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): B7H (HDP, HDR)

Int Cl (Ed.6): B60K 5/10, 5/12

Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2222126 A (SUZUKI)	
A	US 4131256 (F'GEPPERT)	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.