

RESILIENT MOUNTING STRUCTURE

BACKGROUND OF THE INVENTION

1) Field of the Invention

This invention relates to a resilient mounting structure for mounting a member on another member in such a condition that they are resiliently biased to contact with each other.

2) Description of the Prior Art

Conventionally, in mounting a member on another member in such a condition that they are resiliently biased to contact with each other, a following structure is employed. In particular, a first member which is to be mounted on a second member has a fitting hole perforated therein while the second member has a holding element securely provided thereon. The first member is assembled to the second member with the holding element of the latter fitted in the fitting hole of the former. A coil spring having a uniform diameter over the entire length thereof is fitted around a portion of the holding element which extends outwardly from the first member, and a stop or retaining ring is fitted in an annular groove formed at ~~the~~^{an} ~~other~~ end portion of the holding element with the coil spring held in a compressed

condition. Accordingly, in the mounted condition of the first member on the second member, the former is normally biased to contact with the latter by the biasing force of the coil spring which is interposed
5 between the first member and the stop ring.

In such a conventional structure, a stop ring is required, which increases the number of parts accordingly. Further, since a coil spring must be held in a compressed condition when such a stop ring is to be
10 fitted into an annular groove of a holding element, the coil spring cannot readily be mounted in a simple operation. Accordingly, it is a problem that the operability in assembly is low and accordingly the mass productivity is low.

15 SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a resilient mounting structure which includes a reduced number of parts and enables a coil spring to be mounted with certainty by a simple
20 operation.

In order to attain the object, according to the present invention, there is provided a resilient mounting structure wherein a first member has a fitting hole perforated therein in which a holding element of a

second member is fitted and a coil spring is interposed between the first member and the holding element for resiliently biasing the first member to contact with the second member, the coil inner diameter of an end portion of the coil spring being made smaller than the coil inner diameter of the other portion of the coil spring, the holding element having a body portion and a head portion at an end of the body portion, the widthwise dimension of the body portion being made smaller than the coil inner diameter of the other portion of the coil spring while the maximum widthwise dimension of the head portion is made greater than the coil inner diameter of the end portion of the coil spring and smaller than the coil inner diameter of the other portion of the coil spring so that the end portion of the coil spring may be held by a step at a boundary between the body portion and the head portion of the holding element.

By placing the first member on the second member with the holding element on the second member fitted in the fitting hole of the first member and then fitting the coil spring onto the holding element with the other portion thereof directed toward the second member until the end portion of the coil spring passes over the head portion of the coil spring, the coil spring is mounted in position with the end portion thereof stopped by the

boundary step between the body portion and the head portion of the holding element. Thus, the coil spring is interposed in a compressed condition between the first member and the boundary step of the holding element and accordingly it resiliently biases the first member to contact with the second member.

Accordingly, such a stop ring as required in a conventional resilient mounting structure can be eliminated, and the number of parts can be reduced. Further, since the coil spring can be mounted by a simple operation, the facility in assembly is improved so that the mass productivity can be improved and smooth reduction in cost can be anticipated.

Specific embodiments of the present invention will now be described in detail by way of example with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a resilient mounting structure showing an embodiment of the present invention;

FIG. 2 is a fragmentary perspective view of the resilient mounting structure of FIG. 1;

FIG. 3 is a perspective view of another resilient mounting structure showing a second embodiment of the

present invention;

FIG. 4 is a fragmentary perspective view of a further resilient mounting structure showing a third embodiment of the present invention;

5 FIG. 5 is a cross sectional view of a still further resilient mounting structure showing a fourth embodiment of the present invention; and

FIG. 6 is a fragmentary perspective view of a conventional resilient mounting structure.

10 DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

At first, an exemplary one of conventional resilient mounting structures will be described with reference FIG. 6. In the arrangement shown, a first member 3 has a fitting hole 4 perforated therein, and a holding element 2 in the form of a rod or stud secured to a second member 1 is fitted in the fitting hole 4 and extends through and above the first member 3. A stop or retaining ring 6 is fitted in an annular groove 2a formed at the other or top end portion of the holding element 2. A coil spring 5 having a uniform coil diameter over the overall length thereof is fitted around the holding element 2 and interposed in a compressed condition between the first member 3 and the stop ring 6. Accordingly, the first member 3 is

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normally biased to contact with the second member 1 by the coil spring 5.

Now, several embodiments of the present invention will be described with reference to FIGS. 1 to 5 of the accompanying drawings. Referring first to FIGS. 1 and 2, a first embodiment of the present invention will be described. In the structure shown, a first member 12 in the form of an elongated plate is mounted on a second member 10 in the form of a plate. The second member 10 has thereon a holding element 11 which is formed as a bent lug of the second member 10. The holding element 11 has a body portion 11a connected to the second member 10, and a head portion 11b of an umbrella or triangular shape in front elevation formed contiguously at the other end of the body portion 11a and having a greater widthwise dimension than the body portion 11a so that a pair of steps 11c may be defined on opposite sides of the body portion 11a between the body portion 11a and the head portion 11b of the holding element 11. Meanwhile, the first member 12 has a fitting hole 12a in the form of slit perforated at an end portion thereof, and the holding element 11 is fitted in the fitting hole 12a of the first member 12 and extends through and upwardly from the first member 12 as shown in FIG. 1. A coil spring 13 of a specific configuration is fitted

around the holding element 11 and interposed in a compressed condition between the first member 12 and the steps 11c of the holding element 11 so that it normally biases the first member 12 to contact with the second member 10.

The coil spring 13 has such a configuration that the inner diameter of a coil or coils at an end portion 13a thereof is made smaller than the inner diameter of coils of the other portion 13b thereof. Meanwhile, the holding element 11 is dimensioned such that the widthwise dimension of the body portion 11a thereof is made smaller than the coil inner diameter of the other portion 13b of the coil spring 13 while the maximum widthwise dimension of the head portion 11b thereof is made greater than the coil inner diameter of the end portion 13a of the coil spring 13 so that the end portion 13a of the coil spring 13 may be received or stopped by the steps 11c of the holding element 11 but is made smaller than the coil inner diameter of the other portion 13b of the coil spring 13 so that the head portion 11b of the holding element 11 may pass smoothly in the other portion 13b of the coil spring 13.

In assembling the first member 12 to the second member 10, at first the first member 12 is placed on the second member 10 with the holding element 11 of the

latter fitted in the fitting hole 12a of the former as seen in FIG. 2. Then, the coil spring 13 is fitted first at the portion 13b thereof onto and around a portion of the holding element 11 which extends upwardly from the first member 12 and then the end portion 13a of the coil spring 13 is forced downwardly until it passes the head portion 11b of the holding element 11 and comes to a position below the boundary steps 11c of the holding element 11. Opposite downwardly expanding edges of the umbrella-shaped head portion 11b of the holding element 11 facilitate such passing of the end portion 13a of the coil spring 13. After then, if the force is removed, the coil spring 13 is extended axially by its own spring force until the end portion 13a thereof is engaged with and stopped by the steps 11c of the holding element 11. Consequently, the first members 12 is mounted on the second member 10 in a condition that they are pressed against each other by biasing force of the coil spring 13 as shown in FIG. 1.

While various modifications can be made to the resilient mounting structure shown in FIGS. 1 and 2, several examples are shown as different embodiments in FIGS. 3 to 5. It is to be noted that, in FIGS. 3 to 5, like or corresponding elements or parts are denoted by like reference numerals to those of FIGS. 1 and 2 and

detailed description thereof will be omitted herein to avoid redundancy.

Referring to FIG. 3, the modification shown is different from the embodiment of FIGS. 1 and 2 in that
5 the head portion 11b of the holding element 11 has a shape other than an umbrella shape. In particular, the head portion 11b has a diamond shape in front elevation. Accordingly, the boundary steps 11c between the body portion 11a and the head portion 13a of the holding
10 element 11 extend obliquely laterally, and the end portion 13a of the coil spring 13 is received by the oblique boundary steps 11c of the holding element 11.

Referring to FIG. 4, the modification shown is different in that the holding element 11 itself has a
15 different configuration than that of the embodiment. In particular, the holding element 11 here is in the form of a rod or stud of a circular cross section secured to the second member 10 by a suitable means such as
riveting. Thus, the head portion 11b of the holding
20 element 11 has a conical shape while the fitting hole 12a of the first member 12 has a corresponding circular shape.

Referring to FIG. 5, the modification shown is different in that the coil spring 13 itself has a
25 different configuration than that of the embodiment of

FIGS. 1 and 2. In particular, while in the embodiment of FIGS. 1 and 2 the configuration of the coil spring 13 is such that only the coil inner diameter of the end portion 13a is set smaller than the coil inner diameter of the other portion 13b and the coil inner diameter of the other portion 13b is made uniform over the overall axial length of the coil spring 13, the coil spring 13 of the modification of FIG. 5 has a tapered configuration such that the coil inner diameter of the coil spring 13 increases from the end portion 13a toward the other base end remote from the end portion 13a. It is to be noted that the holding element 11 in FIG. 5 has a similar configuration to that of FIG. 2.



CLAIMS:

1. A resilient mounting structure wherein a first member has a fitting hole perforated therein in which a holding element of a second member is fitted and
5 a coil spring is interposed between said first member and said holding element for resiliently biasing said first member to contact with said second member, the coil inner diameter of an end portion of said coil
10 spring being made smaller than the coil inner diameter of the other portion of said coil spring, said holding element having a body portion and a head portion at an end of said body portion, the widthwise dimension of said body portion being made smaller than the coil inner diameter of said the other portion of said coil spring
15 while the maximum widthwise dimension of said head portion is made greater than the coil inner diameter of said end portion of said coil spring and smaller than the coil inner diameter of said the other portion of said coil spring so that said the end portion of said
20 coil spring may be held by a step at a boundary between said body portion and said head portion of said holding element.

2. A resilient mounting structure as set forth in claim 1, wherein said the other portion of said coil



spring has a substantially uniform coil inner diameter over the entire axial length thereof.

3. A resilient mounting structure as set forth in claim 1, wherein said coil spring has a generally conical configuration such that the coil inner diameter thereof gradually increases from said end portion toward the other end thereof.

4. A resilient mounting structure as set forth in any one of the preceding claims, wherein said head portion of said holding element has such a profile as to facilitate said end portion of said coil spring to pass over said head portion.

5. A resilient mounting structure as set forth in any one of the preceding claims, wherein said holding element and said second member are formed as an integral unit.

6. A resilient mounting structure as set forth in any preceding claim, wherein said holding element is a lug which is formed integrally with said second member and is bent outwardly therefrom.

7. A resilient mounting structure as set forth in any one of claims 4, 5 and 6, wherein said head portion of said holding element has a diamond shape in front elevation.

8. A resilient mounting structure as set forth in any one of claims 4, 5 and 6, wherein said



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head portion of said holding element has a triangular shape in front elevation.

9. A resilient mounting structure as set forth in claim 4, wherein said holding element is a rod or stud secured to said second member.

10. A resilient mounting structure as set forth in claim 4 or 9, wherein said head portion of said holding element has a generally conical shape.

11. A resilient mounting structure substantially as hereinbefore described with reference to, and as shown in, any of FIGS 1 to 5 of the accompanying drawings.
