United States Patent

[11] 3,628,780

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[33] Japan
[31] 43/64718;
Nov. 9, 1968, Japan, No. 43/81620

[54] **SEAT FRAME STRUCTURE**
5 Claims, 10 Drawing Figs.

[52] U.S. Cl. 267/110
[51] Int. Cl. F16f 3/00
[50] Field of Search 267/102-112

[56] References Cited
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ABSTRACT: A seat frame structure composed of sinuous spring and a frame therefor comprising at least two opposed frame members. One of said frame members is of generally L-shaped cross section, one arm of the L having a turned over part with at least two openings for restraining an end of a sinuous spring. The other opposing frame member has at least one formation for stopping the other end of the sinuous spring the one end of which has been already fixed.

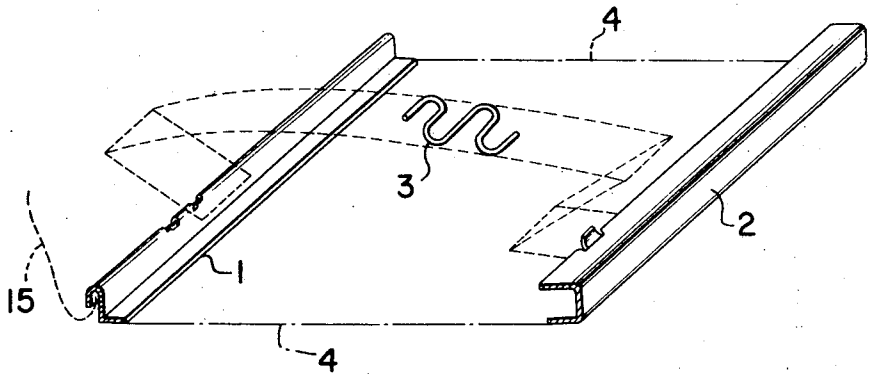

FIG. 1

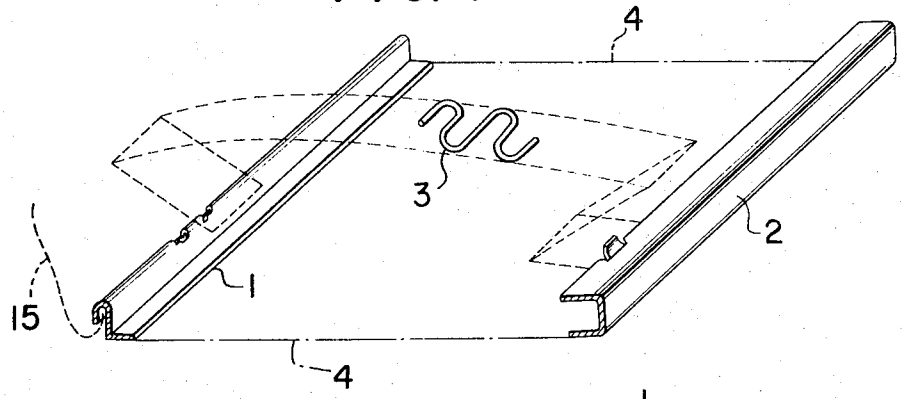

FIG. 2

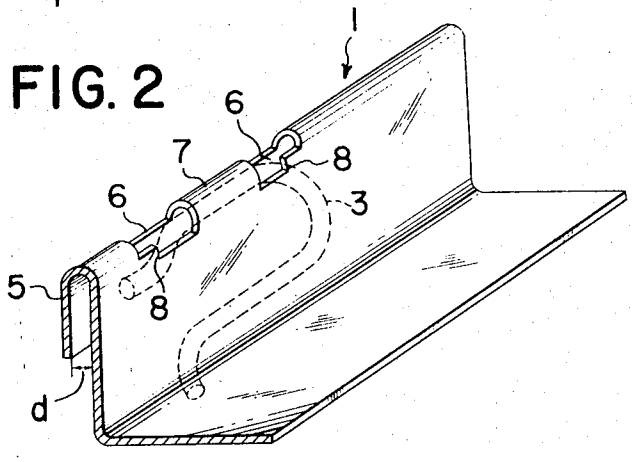

FIG. 3

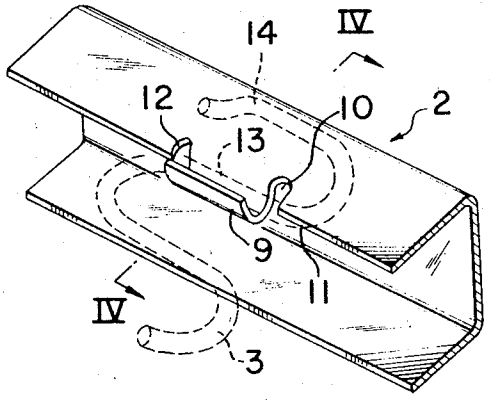

FIG. 4

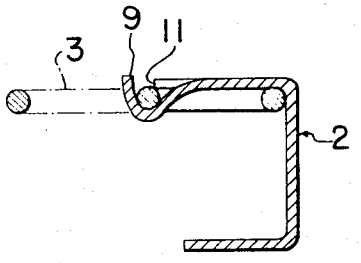

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FIG. 5

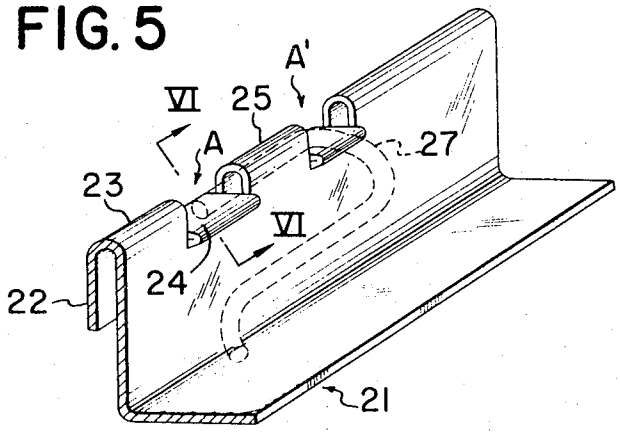


FIG. 6(a)

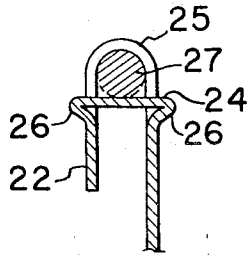


FIG. 6(b)

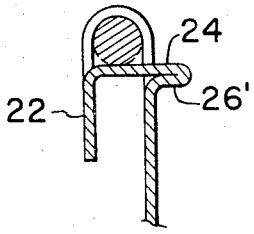


FIG. 6(c)

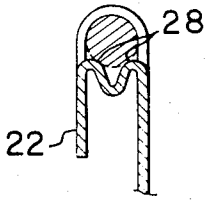
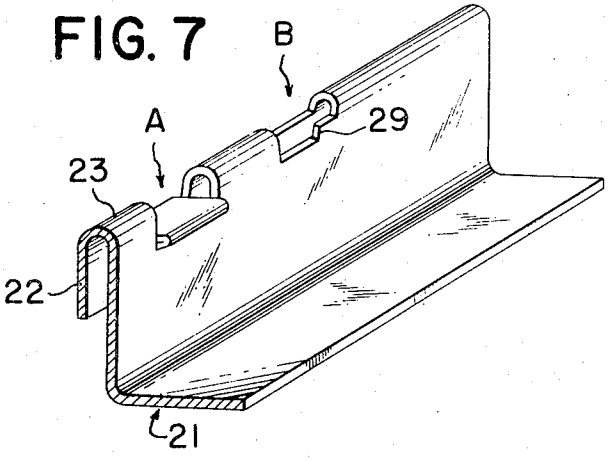


FIG. 7



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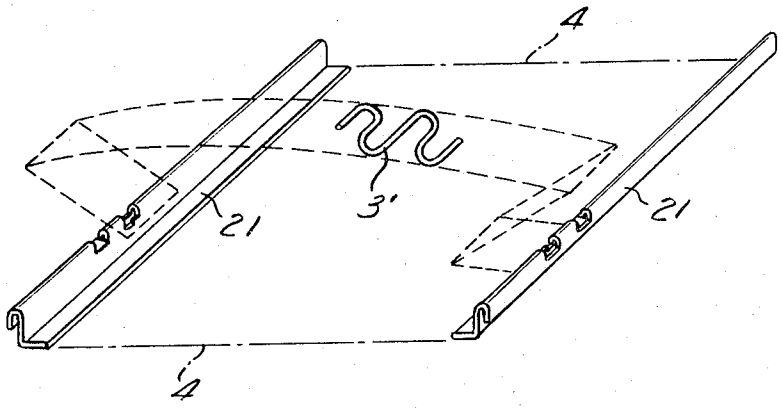

FIG. 8

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SEAT FRAME STRUCTURE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to an improvement in a seat structure for automobiles, particularly in the seat structure composed of a frame and sinuous springs mounted on the frame.

2. Description of Prior Art

It has hitherto been appreciated to employ sinuous springs, square springs and like flexuous springs (hereinafter to be generally referred to as sinuous springs) in seat structure of this kind for eliminating the troublesome assembling of coil springs. However, the sinuous spring posed a problem in respect of the manner of mounting or fixing it on an associated frame member, and it was apt to make a sliding movement in relation to the frame structure causing objectionable squeaking noises. In order to solve this problem, there has been proposed a seat frame member disclosed in U.S. Pat. specification No. 3,386,725. The frame member is of a particular tubular shape and includes a hollow base with a hollow ridge extending axially thereof. Two axially spaced opening are provided in the ridge so that a sinuous spring end can be inserted and locked therein.

SUMMARY OF THE INVENTION

This invention concerns to improve the above-mentioned frame member more completely for facilitating the assembling of a seat structure.

In connection with the adoption of the above-mentioned frame member, there still remains two problems to be solved although such frame member is very effective to eliminate the squeaking noises.

Namely, as the frame members have to be bent to a predetermined size in its machining, they cannot be mass produced in a short time by use of high-performance multiple spot welding machine or the like.

Moreover, as the sinuous spring must be inserted into the opening from a certain obliquely upward direction, though this can be done for one end of the sinuous spring, it will be difficult to bring the other end to the obliquely upward direction to be securely fixed, with said one end having been already secured.

The object of the present invention is therefore to provide an improvement to eliminate these problems, basically utilizing the advantages of said restraining structure. More precisely, according to the present invention, a restraining structure is formed at the head portion of L-shaped cross section of the frame member, the tubular structure being abolished, and a frame member at the other end of the seat structure is in the form of a U-shaped member provided with an outwardly extending hook portion so that the straight portion of the sinuous spring can be supported by the hook portion and the U-corner portion of the frame member. Furthermore, according to the present invention which employs L- and U-shaped frame members instead of a tubular member, seat frames can be mass-produced with high precision in a short time by use of a high-performance multiple spot welding machine or the like, which leads to a highly advanced and economical operation in the mass-production of such seat frames. Moreover, compared with the formation of the particular tubular shape, the frame member may simply be rolled without in any way requiring welding, which leads also to a great reduction in the costs. Furthermore, with this U-shaped frame member, the sinuous spring can be inserted into the opening substantially along the horizontal direction to be securely fixed, thus facilitating the fixing of the above-mentioned other end. An additional advantage is also recognized in that treatment of the edge of sheet cloth may be simplified by the use of the space lower of the head part of the L-shaped frame member.

It is another object of this invention to provide, in substitution for the above U-shaped member similar to the above L-shaped frame structure for one end but different in the machining of the projections thereof thereby securely fixing

the other end in the similar manner as said one end. This structure is advantageous in that standardization of the frame members will be achieved and also the adoption of a multispot welding machine becomes facile.

Other objects, features and advantages of the present invention will be apparent from the following description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view schematically illustrating part of the seat frame structure according to the present invention;

FIG. 2 is an enlarged perspective view of part of a frame member for locking one end of a sinuous spring;

FIG. 3 is an enlarged perspective view of part of a frame member for locking the other end of the sinuous spring;

FIG. 4 is a section taken along a line IV—IV in FIG. 3;

FIG. 5 is an enlarged perspective view of a modification of a frame member for locking the other end of the sinuous spring;

FIG. 6*a* is a further enlarged section taken along a line VI—VI in FIG. 5;

FIGS. 6*b* and 6*c* show modifications of the sectional shape shown in FIG. 6*a*, and

FIG. 7 is an enlarged perspective view of a further modification of a frame, which can be used for fixing either and of the sinuous spring;

FIG. 8 is a perspective view illustrating an seat frame structure that comprises the frame members of FIG. 7.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, an embodiment of the seat frame structure according to the present invention comprises a front frame member 1, a rear frame member 2 and a plurality of spaced sinuous springs 3, only one of which is shown herein for the sake of simplicity. Side frame members are disposed at positions represented by the one-dot chain lines 4, but these side frame members are omitted since they may be conventional ones. As seen in FIG. 1, the sinuous spring 3 has a fish-mouth load-supporting portion adjacent to each end thereof, and is securely fixed to the frame members 1 and 2 at the opposite ends thereof.

As seen in FIG. 2, the front frame member 1 has a turned-over portion 5 formed by turning one end edge of an angle or L-shaped member of steel or like material. The body portion and the turned-over portion 5 of the frame member 1 are spaced from each other by a distance *d* which is same as or slightly larger than the wire diameter of the sinuous spring 3. The top contour of the turned over portion 5 is substantially semicircular, and a pair of spaced cutouts or slots 6 are formed therein at the mounting position of the terminal end of the sinuous spring 3. The front frame member 1 may be made by rolling a sheet of metal or bending such a sheet metal to the form. Two openings having a developed shape corresponding to the slots 6 may previously be punched in the sheet, and the sheet may then be rolled to the form.

A portion 7 lying between the slots 6 serves to accommodate therein the straight portion adjacent to the terminal end of the sinuous spring 3, and the slots 6 are formed with respective shoulders 8 which abut the sinuous portion of the sinuous spring 3. Thus, the sinuous spring 3 can be brought to the normal engaging position shown by the dotted lines in FIG. 2 when the sinuous spring 3 is inserted obliquely from above into one of these slots 6 and then advanced while gradually bringing it into its horizontal position until the tip end thereof appears in the other slot 6. According to this manner of engagement, the straight portion of the sinuous spring 3 is forced to abut the inner surface of the bridge portion 7 as a load imparted to the seat, and at the same time, the parts of the sinuous portion of the sinuous spring 3 which are axially spaced from the bridge portion 7 on the opposite sides thereof tend to sharply cut into the lower end of the slots 6 adjacent to the shoulders. 8. Thus, the sinuous spring 3 is rigidly locked more and more as a stronger force is imparted thereto. The in-

creased locking effect responsive to an increase in the load has a great significance. That is, the prior art mounting and fixing methods which have resorted to fastening means, clamping means and the like have a common representative fault in that the terminal attachment tends to become loose as a dynamic load is repeatedly imparted thereto even though the terminal attachment is rigidly fixed at the time of assembly, and as the terminal attachment becomes more loose, objectionable squeaking noises appear. According to the present invention, however, the locking effect described above is so marked that any squeaking noises whatsoever did not appear even after tens of thousands of dynamic load tests.

Another advantage of the present invention resides in the fact that the presence of the shoulders 8 effectively prevents the undesirable oscillation of the sinuous spring 3. It is a further advantage that the elevation angle of the sinuous spring, which is determined by the height of the bottom portion of the slots 6 adjacent to the shoulders 8 can freely be designed between a range of about 0° and 70° during the stage of design.

Referring to FIGS. 3 and 4, the rear frame member 2 comprises a U-shaped sheet of steel or like material which is formed with an outwardly and upwardly extending hook portion 9 at a predetermined position or position for locking the other end of the sinuous spring 3 thereat. The hook portion 9 has a length which is substantially equal to the length of the bridge portion 7 described above and has a width which is sufficient to embrace the straight portion next adjacent to the straight portion at the terminal end of the sinuous spring 3. The hook portion 9 is formed by cutting a pair of spaced cutouts 10 of suitable width in the U-shaped frame member 2 to define a tongue, bending the tongue downwardly at its root portion, and then bending the intermediate portion of the tongue upwardly so that the top end of the tongue protrudes beyond the front end edge 11 of the U-shaped frame member 2. As seen from FIG. 4, the hook portion 9 has an internal cavity of such a size which will snugly embrace the sinuous spring 3 therein.

In bringing the sinuous spring 3 into locking engagement with the frame member 2 having such a hook portion 9, the terminal end portion of the sinuous spring 3 is drawn in substantially bodily opposed relation to the hook portion 9 and is passed beneath the hook portion 9 until it comes midway of the upper inner surface of the U-shaped frame member 2. Then, with the straight portion at the terminal end of the sinuous spring 3 kept engaged with the upper inner surface of the U-shaped frame member 2, the sinuous spring 3 is pulled strongly upwardly by hand in such a manner that the second straight portion 13 of the sinuous spring 3 rides over the upper end of the hook portion 9. The sinuous spring 3 may then be forced inwardly into the U-shaped frame member 2 in the above state and the hand is put off to settle the sinuous spring 3 in the normal position shown in FIG. 3.

In this normal position, the sinuous spring 3 is retained in place with its straight portion 14 engaging the upper inner surface of the U-shaped frame member 2, its second straight portion 13 being forced against the hook portion 9 from the opposite direction and its sinuous portion adjacent to the second straight portion 13 engaging the end edges 12 of the cutouts 10. It will thus be understood that such a structure provides an effective and practical means for locking the other end of the sinuous spring whose one end has already been locked in place.

The structure described above is advantageous in that not only the frame members per se can easily be shaped to the form with sufficiently high precision by conventional working means but also a high-performance welding apparatus such as a multiple spot welding machine may be used to connect these frame members with each other to complete the seat frame structure. Such advantages could not be obtained with the prior structure consisting of tubular members rolled to specifically designed shape.

The modifications shown in FIGS. 5 and 6 for fixing the other end of the sinuous spring are advantageous in that their shape is fundamentally the same as the angle frame member for fixing the one end of the sinuous spring. In these modifications, an angle member 21 has a parallelly turned over portion 22, forming a top or head portion 23 which receives the sinuous spring 27 therein. A and A' denote a pair of hooking openings which correspond to cutouts 6 of the first embodiment shown in FIG. 2.

As shown in detail in FIG. 6*a*, the opening A or A' has a bottom or deck portion 24 for supporting the undersurface of the sinuous spring 27. This bottom portion 24 shown in FIG. 6*a* is formed by pressing and has side extended shoulders 26.

In assembling, the sinuous spring is substantially parallelly introduced into the opening A' and through the tunnel portion 25 until the straight end portion of the sinuous spring is brought on to the bottom portion 24 of the opening A. The spring can be mounted from other side as occasion demands, since the openings A and A' are entirely symmetric with the longitudinal axis of the top portion 23.

FIG. 6*b* shows a modification for single side use, having a relatively long shoulder 26'. FIG. 6*c* is another modification especially useful for supporting the straight end of the sinuous spring at two points 28 of the depressed bottom portion.

Also, the structure shown in FIG. 5 can be combined with the structure shown in GIG. 2. This combination is shown as FIG. 7. This combination is advantageous because it can be used for fixing both ends of the sinuous spring. When the one end of the spring is to be fixed, it is introduced from the hole B to the opening A. For fixing the other end, it is introduced from the opening A to the hole B. Thus, the single form of frame member can be used as front and also rear frame members as shown in FIG. 8 in which two such frame members are employed to fix the ends of sinuous spring 3'.

Further, as seen in GS. 1 and 2, the turned over portion 5 is extended downwardly over a length which is more than is required to retain the sinuous spring 3. The space thereby obtained may be utilized to hold the end edge of a seat covering 15 as shown by the dotted lines in FIG. 1. It has been conventional practice to insert a core wire in the end edge of such a seat covering, to sew the core wire into the end edge of the seat covering and then to fix the seat covering to the frame member. It will be appreciated that the present invention eliminates such a process and reduces the steps of manufacture as well as the costs of manufacture of seat structure.

While preferred embodiments of the present invention have been described above by way of example, it will be understood that the present invention is in no way limited to such specific embodiments and many changes and modifications may be made therein without departing from the spirit of the present invention.

What is claimed is:

1. A frame member for retaining a sinuous spring comprising an angle member having one edge turned over to form a longitudinally extending turned over projection having an inner diameter or width equal to the wire diameter of the sinuous spring, and a pair of spaced openings provided in said projection, said projection being such that the substantially straight portion at the terminal end of sinuous spring is received by the inner surface portion of said projection lying between said openings while the parts of the sinuous spring adjacent to its sinuous portion are received by the respective edges of said openings.

2. A seat frame structure comprising two frame member in the form of angle members and a sinuous spring extending between and having an end connected to each angle member, a turned over portion formed on each frame member by turning over one end edge of said angle member so that its top portion has a substantially semicircular section, a pair of spaced openings formed in said top portion, at least one of said openings being formed to have a depressed bottom portion receiving the undersurface of an end of said sinuous spring.

3. A seat frame structure comprising a first frame member in the form of an angle member, a turned over portion formed on said first frame member by turning over one end edge of said angle member so that its top portion has a substantially semicircular section, a pair of spaced slots formed in said top portion, each said slot having a shoulder at its lower end edge, a sinuous spring having one terminal end retained by said turned over portion said turned over portion having an inner diameter or width substantially equal to the wire diameter of said sinuous spring, a second frame member in the form of a U-shaped member for retaining the other terminal end of the sinuous spring, said U-shaped member having a hook portion projecting from its upper end edge and bent downwardly and then upwardly and retaining the straight portion of the other terminal end of the sinuous spring thereby.

4. A seat frame member comprising an angle member having a turned over portion formed thereon by turning over one edge thereof so that its top portion has a substantially semicircular section, a pair of spaced openings in said top portion, at least one of said openings being formed to have a depressed bottom portion for receiving the undersurface of an end of a sinuous spring.

5. The seat frame member as claimed in claim 4 wherein both of said pair of spaced openings are formed to have depressed bottom portions.

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