An elastic mounting of a radiator in a motor vehicle in which the two lateral walls of the radiator block are reinforced by a rigid housing part and one rigid mounting means extending essentially over the entire height of the radiator and constructed as profile rail is provided for the connection of the adjacent housing part with the vehicle superstructure; a continuous elastic damping rail is inserted between each mounting means and the adjacent housing part, whereby each mounting means is provided at the lower end with a support mounting on which is seated a support abutment of the adjacent housing part under interposition of an elastic cushion and the support abutment is forced against the support mounting by the downwardly directed effect of an elastic securing means engaging in the upper area of the housing part, and whereby each housing part is provided additionally with an upper support mounting on which is supported the clamping arm portion of a spring clip anchored to the mounting means by another arm portion.

18 Claims, 10 Drawing Figures
ELASTIC MOUNTING OF A RADIATOR OF MOTOR VEHICLES

The present invention relates to an elastic securing of a radiator on a motor vehicle, in which the two lateral walls of the radiator block are each reinforced by a rigid housing part and in which on both radiator sides a rigid mounting means each extending essentially over the entire radiator height and constructed as profile rail is arranged for the connection of the adjoining housing part with the vehicle superstructure, and in which a continuous elastic damping rail is inserted between each mounting support and the adjacent housing part, also extending essentially over the entire radiator height, and in which each mounting means is provided at the lower end thereof with a rigid support mounting which rests under interposition of an elastic cushion a rigid support abutment of the adjacent housing part, arm in which the support abutments are additionally pressed against the support mountings by the downwardly directed effect of elastic securing means engaging in the upper area of the housing parts.

With the mounting of this type as described in the German Offenlegungsschrift Pat. No. 1,430,852, the elastic damping rails are subjected to tensile stresses that are caused by the vertical movements of the radiator block.

The task on which the present invention is predicated, essentially consists in eliminating the disadvantages of the prior art radiator fastening and to improve the connecting means between radiator block and the lateral mounting means, especially in order to avoid the "jumping" of the radiator block favored by the elasticity of the rubber connections. For that purpose, provision is made according to the present invention that the lateral housing parts of the radiator block are provided each with an upper support mounting, on which is supported the elastically deflected clamping arm of a spring clip anchored by means of its other arm at the adjacent mounting means. In addition to the aimed-at purpose, a simple assembly of the radiator is achieved by the present invention in which the spring clip can be brought manually into the locking position without any tool.

In the radiator mounting of another type as described in the German Auslegeschrift Pat. No. 1,282,496, forces acting in the vehicle longitudinal direction are exerted by elastic rubber rings that engage at securing parts of the mounting means and of the radiator block mutually offset both in the vertical as also in the vehicle longitudinal direction, in order to keep the radiator in its upright, installed position. During the installation of these rubber rings requiring special tools, the rubber may be easily damaged by sharp-edged metallic parts. In case of larger installation tolerances between the radiator and the lateral mountings means, the elastic damping rails may be pressed out of the mounting means under the effect of the horizontally directed mounting forces of the rubber rings. These disadvantages do not occur in the securing arrangement according to the present invention.

In order to improve the sound-damping of the radiator mounting and fastening according to the present invention, an elastic cushion may be inserted between the elastically deflected clamping arm of the spring clip and the support mounting.

In order to escape the restricted space conditions between the radiator block and the mounting means for the accommodation of the connecting means, the arrangement may be made in such a manner that the spring clip is arranged on the side of the mounting means opposite the radiator block and the clamping arm supported on the housing part extends through an opening of the mounting means.

During the assembly, the radiator block must be able to be inserted unimpeded from above into the lateral mounting means. For that purpose, provisions are made according to this invention that the spring clip is pivotally secured at least in the vehicle longitudinal direction at the mounting means.

According to a further feature of the radiator fixing of the present invention, the spring clip may be advantageously preassembled at the lateral mounting means prior to the installation of the radiator, in that the respective mounting means is provided adjacent the opening for the clamping place of the clamping arm of the spring clip, supported at the housing part, with an additional opening or aperture for an assembly position of this clamping arm releasing the vertical movement of the radiator block. For the temporary disassembly of the radiator, for example, during repairs, the spring clips need not be disassembled in that case.

For purposes of series production one seeks to be able to undertake the locking of the radiator without special work tools. For that reason, the clamping arm of the spring clip, supported at the housing part, is provided with an assembly handle.

To economize additional parts for the cushioning to be inserted between the spring clip and the radiator block, provision is made according to a still further feature of the present invention that the damping rail is provided at its upper end with a bulge-like extension that covers the support mounting of the housing part.

For the locking position of the spring clip, the upper bulge-like extension of the damping rail may be provided with a trough-like recess for the engagement of the spring clip.

Finally, it is advantageous for the preassembly of the spring clip if the distance of the aperture for the assembly position of the clamping arm of the spring clip, adapted to be supported at the housing part, is chosen so large with respect to the pivoting point of the other arm at the mounting means that the spring clip is elastically spread or expanded in the assembly position and is thereby secured self-lockingly at the mounting means.

Accordingly, it is an object of the present invention to provide an elastic mounting and fixing arrangement of a radiator at a motor vehicle which avoids by simple means the aforementioned shortcomings and drawbacks encountered in the prior art.

Another object of the present invention resides in elastic connecting and securing means between radiator block and lateral mounting means of the vehicle which effectively avoid any jumping of the radiator block, permit a simple manual assembly and do not require any work tools for moving the spring clips into the locking positions.

A still further object of the present invention resides in a radiator mounting with improved sound-damping.
Still another object of the present invention resides in a simple elastic fastening of a radiator at a motor vehicle which permits an assembly of the radiator into the lateral mounting means from above.

These and further objects, features and advantages of the present invention will become more obvious from the following description when taken in connection with the accompanying drawings which show, for purposes of illustration only, one embodiment in accordance with the present invention, and wherein:

FIG. 1 is a cross-sectional view perpendicular to the vehicle longitudinal axis through the mounting and securing means of the left radiator side, it being understood that the mounting and securing means of the right radiator side is mirror-image-like;

FIG. 2 is a partial cross-sectional view taken along line II—II of FIG. 1;

FIG. 3 is a partial cross-sectional view taken along line III—III of FIG. 1;

FIG. 4 is a partial cross-sectional view taken along line IV—IV of FIG. 1;

FIG. 5 is an enlarged elevational view, taken in the direction of arrow V of the arrangement of FIG. 1, with the spring clip in another position;

FIG. 6 is a front view of the spring clip as individual part of the arrangement according to FIG. 1, on an enlarged scale;

FIG. 7 is a side elevational view of the spring clip according to FIG. 6;

FIG. 8 is an elevational view, partially in cross-section, of the damping rail of the arrangement according to FIG. 1, on an enlarged scale;

FIG. 9 is a side elevational view of the damping rail of FIG. 8, taken in the direction of arrow IX; and

FIG. 10 is a cross-sectional view taken along line X—X in FIG. 9.

Referring now to the drawing wherein like reference numerals are used throughout the various views to designate like parts, the left side wall 11 of the radiator block 12—of which the upper water box is indicated by reference numeral 13 and the lower water box by reference numeral 14—is reinforced by a housing part 15 substantially U-shaped in cross section, which is covered by an elastic damping rail 17. The damping rail 17 is "buttoned" to the housing part 15 at the places generally indicated by reference numeral 18 in a conventional manner.

The vehicle is provided with a left and a right rigid mounting means 16 constituted each by a sheet metal or steel profile member, at which a respective housing part 15 of the radiator is secured under interposition of a damping rail 17. The mounting means 16 forms at the upper end 19 and the lower end 20 a U-shaped profile 21 (FIG. 2) and 22 (FIG. 4), respectively, into which the adjacent housing part 15 of the radiator, together with the damping rail 17, is inserted from the top in the downward direction. Whereas the cross section of the damping rail 17 in the central area includes exclusively a rearward web portion 23 (FIG. 3) and together with the latter forms and L-profile, the two ends of the damping rail 17 are provided, within the area of the U-profiles 21 and 22 of the mounting means 16, additionally with a forward web portions 24 (FIG. 9) and 25 (FIG. 10) in cross section, so that U-profiles 23, 24 and 23, 25 results corresponding to the mounting means 16.

By this arrangement, the radiator block 12 is universally and elastically guided and supported horizontally.

For the support of the radiator block 12 in the downward direction, the mounting means 16 is provided at the lower end 20 with an essentially horizontal support mounting 26 on which is elastically supported an inclined support abutment 27 of the housing part 15 under interposition of a bulge-like extension 28 of the damping rail 17.

The jumping of the radiator block 12 is prevented according to the present invention by a spring clip generally designated by reference numeral 29 (FIGS. 1, 5, 6 and 7) which presses the radiator block 12 in the downward direction against the support mounting 26. The lower arm of the spring clip 29 consists of a mounting portion 30 whose end is bent back into the shape of a hook 31. The hook 31 extends through a lower aperture 32 (FIGS. 1 and 5) of the mounting means 16 and is anchored at the upper edge 33 of this aperture 32 which is pressed outwardly away from the damping rail 17. The edge 33 includes a circularly shaped section 33a (FIG. 5) along which the hook 31 engages displaceably so that the spring clip 29 can be brought by a pivoting movement into the assembly position 34, indicated in dash and dot lines in FIG. 5, in which the vertical assembly or disassembly of the radiator block is possible.

The upper clamping arm 35 of the spring clip 29 which is elastically or springly deflected in the illustrated clamping position 35 (FIG. 1), is seated with its hook-shaped end portion 37 in a trough-shaped recess 38 (FIGS. 1, 8 and 9) which is provided in an upper bulge-like extension 39 of the elastic damping rail 17. The bulge-like extension 39 extends over a rigid support mounting of the adjacent housing part 15 and serves thereby as elastic cushion between spring clip 29 and housing part 15.

The spring clip 29 is arranged between mounting means 16 and housing part 15 on the side of the mounting means 16 opposite the housing part 15 by reason of the restricted space conditions, exclusively the end portion 37 of the clamping arm 36 extends into the space between mounting means 16 and radiator whereby the clamping arm 36 extends through an upper opening 41 of the mounting means 16. An assembly handle 42 is provided at the end portion 37 of the clamping arm 36.

The aperture 41 for the clamping arm 36 in the mounting means 16 is enlarged in the upper area into a slot 43 (FIG. 5) whose lower edge 44 is spaced so far (distance 47) from the lower aperture 32 of the mounting means 16 that the clamping arm 36 with its abutment at the edge 44 can be elastically deflected and in this manner is held fast self-lockingly in the slot 43.

The stress-free rest position of the clamping arm 36 is indicated in FIG. 6 by reference numeral 45 and the disengaging position 46 thereof is indicated in FIG. 6 in dash and dot lines. The clamping arm 36 is initially moved by means of the handle 42 out of the clamping position 35 into the disengaging position 46—in which the end portion 37 of the clamping arm 36 is moved out of the recess 37—and thereafter is pivoted into the assembly position 34.

While I have shown and described only one embodiment in accordance with the present invention, it is understood that the same is not limited thereto but is
susceptible of numerous changes and modifications as known to those skilled in the art and I therefore do not wish to be limited to the details shown and described herein, but intend to cover all such changes and modifications as are encompassed by the appended claims.

I claim:

1. An elastic mounting arrangement of a radiator on a motor vehicle with a superstructure, in which the radiator includes a radiator block with lateral wall means each reinforced by a rigid housing part, and a rigid mounting means extending substantially over the entire radiator height and constructed as profile rail means for the connection of the adjacent housing part with the vehicle superstructure, and in which a substantially continuous elastic damping rail means is inserted between each mounting means and the adjacent housing part, each mounting means being provided at the lower end thereof with a support means on which a support abutment means of the adjacent housing part rests under interposition of an elastic cushion means, and in which the support abutment means are additionally forced against the support means by the downwardly directed effect of elastic securing means engaging in the upper area of the housing parts, characterized in that the lateral housing parts of the radiator block each include an upper support means, and in that spring clip means are provided as securing means, each having a clamping arm portion and another arm portion, the elastically deflected clamping arm portion being supported on a respective upper support means and the spring clip means being anchored at the adjacent mounting means by the other arm portion thereof.

2. A mounting arrangement according to claim 1, characterized in that the support means are substantially rigid.

3. A mounting arrangement according to claim 2, characterized in that an elastic cushion means is inserted between the elastically deflected clamping arm portion and the upper support means.

4. A mounting arrangement according to claim 3, characterized in that said last-mentioned elastic cushion means is a bulge-like extension of the elastic clamping rail means.

5. A mounting arrangement according to claim 3, characterized in that the spring clip means is arranged on the side of the mounting means opposite the radiator block and said clamping arm portion extends through an opening of the mounting means.

6. A mounting arrangement according to claim 5, characterized in that the spring clip means is secured at the mounting means so as to be pivotal at least in the vehicle longitudinal direction.

7. A mounting arrangement according to claim 6, characterized in that the mounting means, in addition to the opening for a clamping position of the clamping arm portion, is provided with an additional opening for an assembly position of said clamping arm portion releasing the vertical movement of the radiator block.

8. A mounting arrangement according to claim 7, characterized in that the clamping arm portion is provided with an assembly handle.

9. A mounting arrangement according to claim 8, characterized in that the damping rail means is provided at the upper end with a bulge-like extension that covers the upper support means.

10. A mounting arrangement according to claim 9, characterized in that the upper bulge-like extension of the damping rail means is provided with a trough-like recess for the engagement of the spring clip means.

11. A securing arrangement according to claim 10, characterized in that the distance of the opening for the assembly position of the clamping arm portion to the pivot point of the other arm at the mounting means is selected so large that the spring clip means is elastically expended in the assembly position and is thereby secured self-lockingly at the mounting means.

12. A mounting arrangement according to claim 1, characterized in that the spring clip means is arranged on the side of the mounting means opposite the radiator block and said clamping arm portion extends through an opening of the mounting means.

13. A mounting arrangement according to claim 12, characterized in that the spring clip means is secured at the mounting means so as to be pivotal at least in the vehicle longitudinal direction.

14. A mounting arrangement according to claim 1, characterized in that the mounting means, in addition to the opening for a clamping position of the clamping arm portion, is provided with an additional opening for an assembly position of said clamping arm portion releasing the vertical movement of the radiator block.

15. A mounting arrangement according to claim 14, characterized in that the clamping arm portion is provided with an assembly handle.

16. A mounting arrangement according to claim 1, characterized in that the damping rail means is provided at the upper end with a bulge-like extension that covers the upper support means.

17. A mounting arrangement according to claim 16, characterized in that the upper bulge-like extension of the damping rail means is provided with a trough-like recess for the engagement of the spring clip means.

18. A securing arrangement according to claim 12, characterized in that the distance of the opening for the assembly position of the clamping arm portion to the pivot point of the other arm at the mounting means is selected so large that the spring clip means is elastically expended in the assembly position and is thereby secured self-lockingly at the mounting means.

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