April 20, 1948. S. G. BLUMENSAADT 2,440,001

ATTACHMENT FOR WIRE ELEMENTS TO FRAME STRUCTURES

Filed Feb. 10, 1944 3 Sheets-Sheet 1

FIG. 1

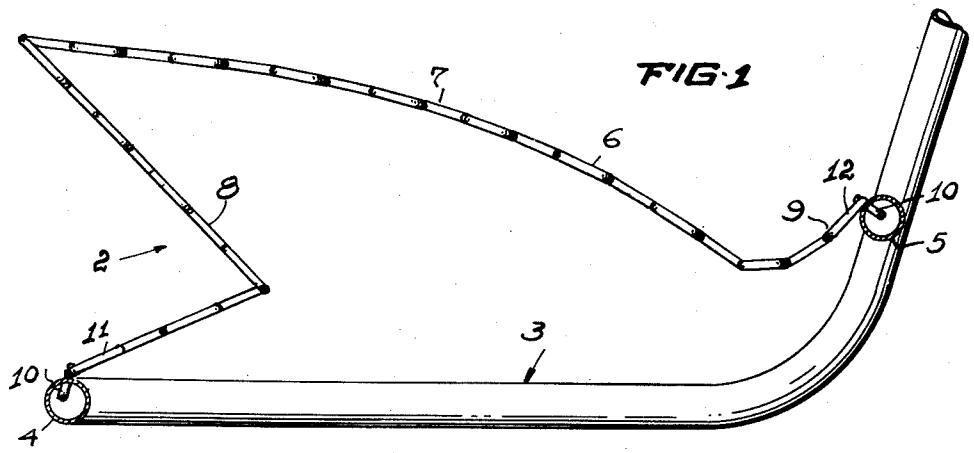


FIG. 2

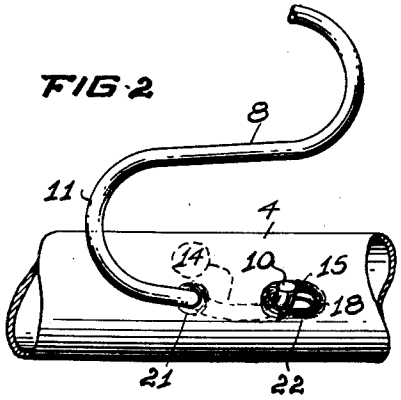


FIG. 4

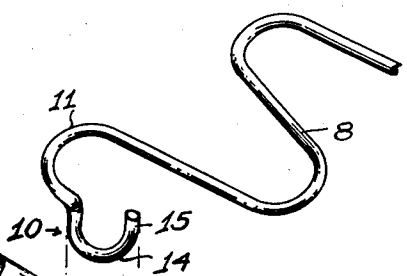


FIG. 5

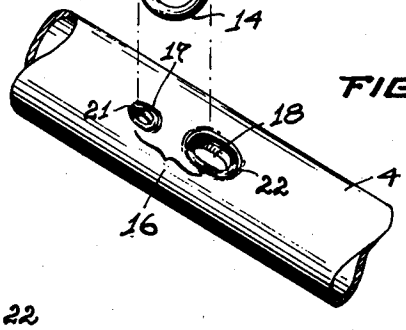
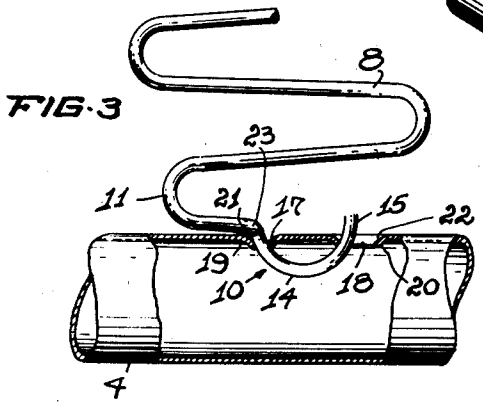


FIG. 3



INVENTOR.
SVEND G. BLUMENSAADT
BY Gustav A. Wolff.
ATT.

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ATTACHMENT FOR WIRE ELEMENTS TO FRAME STRUCTURES

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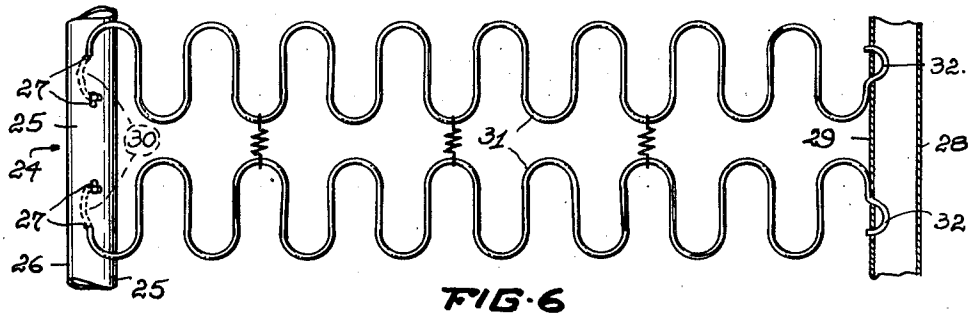
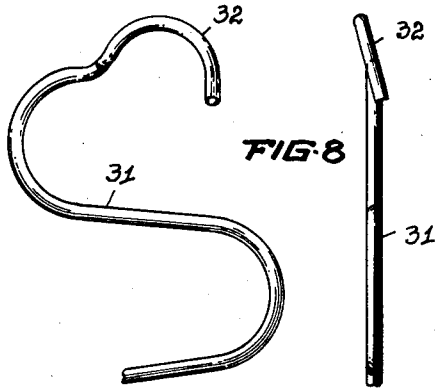


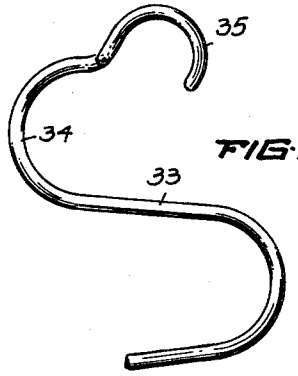
FIG·6

FIG·7

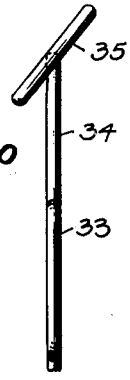


FIG·8

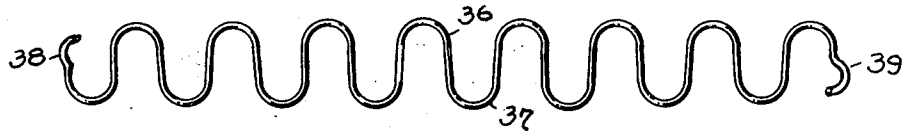
FIG·9



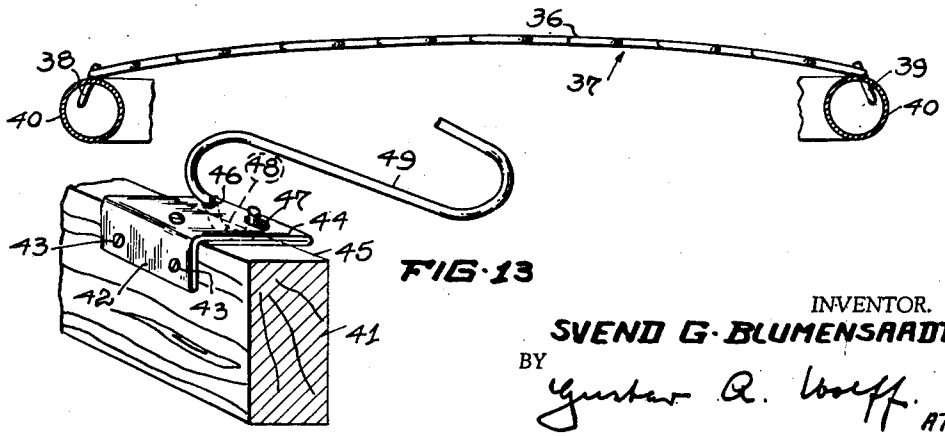
FIG·10



FIG·11



FIG·12



FIG·13

INVENTOR.
SVEND G. BLUMENSAADT
BY Gustav Q. Wolff. ATT.

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ATTACHMENT FOR WIRE ELEMENTS TO FRAME STRUCTURES

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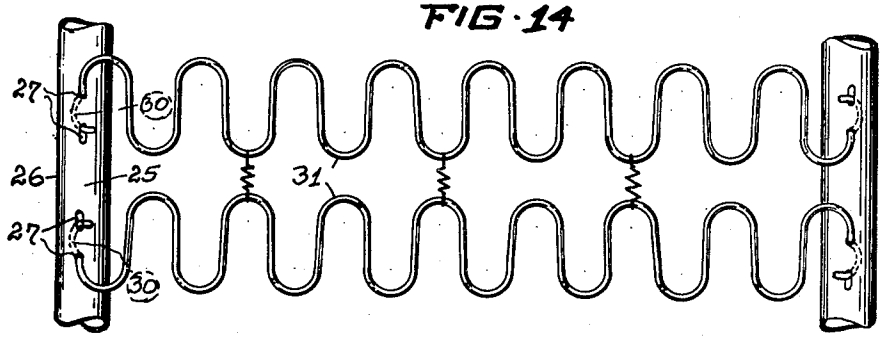
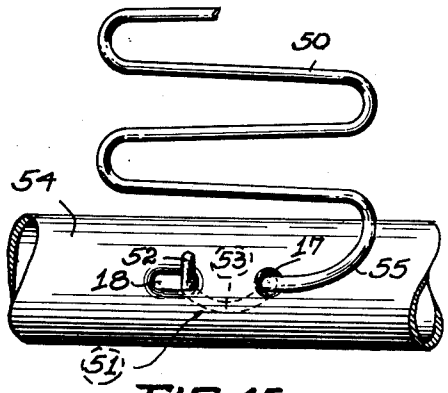
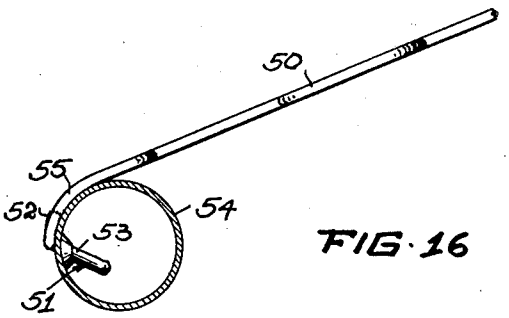
FIG·14

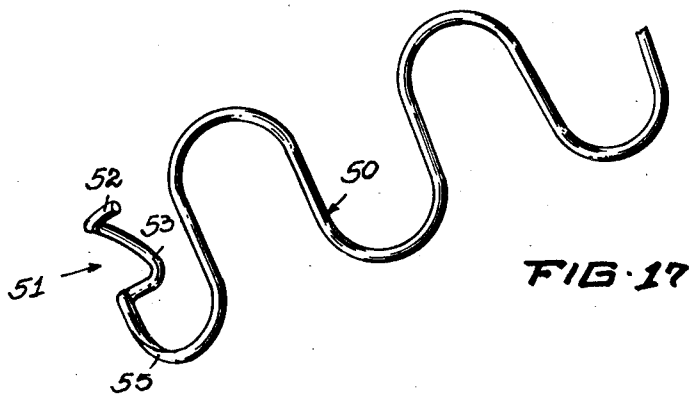




FIG·15



FIG·16



FIG·17

INVENTOR.
SVEND G·BLUMENSAADT
BY Gustav A. Wolff. ATT.

Patented Apr. 20, 1948

2,440,001

UNITED STATES PATENT OFFICE

2,440,001

ATTACHMENT FOR WIRE ELEMENTS TO FRAME STRUCTURES

Svend G. Blumensaadt, Beachwood Village, Ohio, assignor to The Universal Wire Spring Company, Cleveland, Ohio, a corporation of Ohio

Application February 10, 1944, Serial No. 522,192

6 Claims. (Cl. 155—179)

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This invention which is a continuation in part of my pending application Serial No. 486,477, filed May 8, 1943, now abandoned, relates in general to corrugated wire springs and seat assemblies of corrugated wire springs for upholstered furniture, vehicles, railroad cars, etc., in which the springs and their spring seat assemblies are supported on frame structures so as to extend above these structures, and, more particularly, to new and simple mountings of corrugated wire springs and the parts of their assemblies on frame structures. As well known, corrugated wire springs and the parts of their assemblies should be rigidly mounted on frame structures to prevent swaying of the springs and their assemblies. In addition, mounting of corrugated wire springs and their assemblies should be simple, efficient and readily demountable for economic assembly proceeding and quick exchange of damaged and broken springs or parts of their assemblies.

The primary object of the present invention is the provision of improved supporting and attaching means for wire elements, corrugated wire springs, etc., adapted to securely and removably mount same on frame structures of the desired cross section or design.

Another object of the invention is the povision of curved supporting and attaching means extended from the ends of wire elements, corrugated wire springs, etc., which means are arranged at substantially right angles to the axis of the wire of these elements and wire springs and include means to lock the supporting and attaching means in proper working position.

A further object of the invention is the provision of wire elements, wire springs, etc., with curved supporting and attaching means extended from their ends at substantially right angles to the axis of the wire of these elements and wire springs for cooperation with frame elements arranged substantially at right angles to the axes of said elements and wire springs and provided with means adapted to interengage with the curved supporting and attaching means.

Still another object of the invention is the provision of wire elements, wire springs, etc., with curved supporting and attaching means extended from their opposite ends in angular relation with respect to the axis of the wire of said elements and wire springs and with offset locking means

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at the ends of said attachment means for cooperation with frame structures adapted to support these elements and springs on oppositely arranged rails having means for proper interengagement with the curved supporting and attaching means and the said locking means of said wire elements and springs.

A still further object of the invention is the combination of wire elements, wire springs, etc., having curved supporting and attaching means integrally extended therefrom in angular relation with respect to the axis of the wire of said elements and wire springs with a frame structure having its rails formed with pairs of perforations, each pair of which extends substantially parallel to the axis of the respective rail and cooperates with the supporting and attachment means in mounting the wire elements and springs on the frame structure.

With the above and other incidental objects in view, the invention has other marked improvements and superiorities which radically distinguish same from presently known structures. These improvements and superior characteristics embodying certain novel features of construction are clearly set forth in the appended claims and the preferred embodiments of the invention hereinafter shown with reference to the accompanying drawings forming part of the specification.

In the drawings:

Fig. 1 is a vertical sectional view through an automobile seat structure, the spring assembly of which embodies springs with supporting and attachment means constructed in accordance with the invention, the springs being removably coupled with the frame of the structure in accordance with the invention;

Fig. 2 is a fragmentary plan view showing the coupling connection of the front end of one of the springs with the front rail of the frame;

Fig. 3 is a front view, partly in section, of the coupling connection shown in Fig. 2;

Fig. 4 is a fragmentary perspective view of the front end of one of the springs showing its coupling hook angularly extended from the axis of the wire of the spring and angularly related to the axis of the spring;

Fig. 5 is a fragmentary perspective view of the front rail of the frame showing one of the pairs of perforations which cooperate with the coupling

hook in removably coupling a spring to a rail;

Fig. 6 is a fragmentary plan view of a spring seat structure with elongated springs, the front ends of which are secured to a rail in a manner similar to the disclosure of Fig. 1 through 3, and the rear ends of which are secured to the sides of a rail by curved attachment means at the rear ends of the springs, which means extend substantially in the plane of the springs;

Fig. 7 is a plan view of the rear end of one of the springs shown in Fig. 6, and

Fig. 8 is a side view of Fig. 7;

Fig. 9 is a plan view of a somewhat modified form of a curved attachment means for a spring, and

Fig. 10 is a side-view of Fig. 9;

Fig. 11 is a plan view of an axially twisted corrugated wire spring, the curved attachment means of which are extended from complementary loops at opposite ends of the spring to effect yielding locking engagement with pairs of perforations in opposite rails of a frame structure;

Fig. 12 is a side-view of the spring shown in Fig. 11 when attached to a frame structure, and

Fig. 13 is a perspective view of a coupling connection between a bracket element having pairs of perforations and a spring provided with curved supporting and attachment means;

Fig. 14 is a fragmentary plan view of a spring seat structure similar to Fig. 4, with the exception that front and rear ends of the elongated springs are secured to rails in a manner similar to the disclosure of Fig. 1 through 3;

Fig. 15 through 17 show spring coupling connections with locking means for postively locking the spring when in proper working position, thus

Fig. 15 shows the front view of a spring having its end portion partly wrapped around a rail and supporting and attaching means constructed in accordance with the invention interlocked with the rail and held in interlocked position by locking means extended from the end of the said supporting and attaching means;

Fig. 16 is a side-view of the structure shown in Fig. 15, and

Fig. 17 is a perspective view of the spring shown in Figs. 15 and 16.

Referring now in detail to the exemplified form of the invention shown in Figs. 1 through 5, reference numeral 2 indicates a seat structure in which a tubular frame 3 supports on its tubular front and rear rails 4 and 5 a plurality of sinuously corrugated wire springs 6 embodying a resting portion 7, an L-shaped front supporting arm 8 and an upwardly extended rear supporting arm 9. These two supporting arms are removably secured to the tubular front and rear rails 4 and 5 by supporting and attachment means 10 which extend integrally from the end loops 11 and 12 of said supporting arms and consist of curved portions 14 of preferably semi-circular shape with straight end portions 15 tangentially extended therefrom. Curved portions 14 are angularly related to the axis of the wire of the end loops 11 and 12 and in the form of invention disclosed in Figs. 1 through 5 and extend substantially at right angles to the axes of their supporting arms, though any other suitable angle may be chosen if so desired. The supporting and attachment means 10 interengage with pairs of perforations 16 in the rails of tubular frame 3, each of which pairs of perforations is arranged lengthwise on said rails in parallel relation with respect to their axes. Preferably, each pair of

the perforations 16 embodies a circular hole 17 and an elongated hole 18, which holes have threaded therethrough the curved portions 14 of the supporting and attachment means and are spaced from each other a distance proportionate to the curvature of the curved portion threaded through these holes. In addition, the areas of the wall of the rails surrounding holes 17 and 18 are forced inwardly to form truncated bodies 20 and 19, the base portions 21, 22 of which gradually flow or diffuse into the wall of the rail, an arrangement insuring proper interlocking engagement of the springs with their supporting rails without excessive bending of the spring wire at junction 23 between end loop 11 or 12 and curved portions 14 of attachment means 10.

The desired angular relationship between a spring and its supporting frame is controlled by the angular relationship of the supporting and attachment means of a spring to its axis or by the location of the pairs of holes in the rails of the supporting frame, as will best be understood from an inspection of Fig. 6 of the drawing. In this figure frame structure 24 embodies in top portion 25 of its front rail 26 pairs of perforations 27, whereas rear rail 28 has its pairs of perforations arranged in the inner side wall 29 so that the attachment and supporting means 30 at the front ends of springs 31 must be angularly offset with respect to the axis of he springs, and attachment and supporting means 32 at the rear ends of the springs must extend substantially in the planes of the springs.

The angle formed by the axis of a spring and its attachment and supporting means may of course be chosen to suit the particular purpose for which the spring has been designed and this angle is limited only by the shape and form of the frame to which the spring is to be attached.

Should it be desirable to more rigidly interlock springs with their supporting frame structure, both holes of the pairs of perforations in the frame may be made circular, and in this case the curved portion of the supporting and attachment means of the spring must be circularly shaped as shown in Fig. 9, in which spring 33 has extended from its end loop 34 a circularly shaped supporting and attachment means 35.

When wire elements and springs of the type described above are secured to frame structures without pretensioning, these springs and elements may turn axially and then partly release their connections with the frame structure. This action is best overcome by shaping the springs with complementary end loops so that the attachment means at the ends of these loops extend in opposite directions, all as specifically shown in Figs. 6 and 14. Additional protection against axial turning of the wire elements and springs can be obtained by slight torsional twisting of the elements and springs as shown in Figs. 11 and 12, in which the main body 36 of spring 37 in unassembled condition is slightly twisted so that its supporting and attachment means 38 and 39 at the end loops of spring 37 extend in different planes, and in assembled condition of the spring are torsionally tensioned when attached to frame structure 40 in the manner previously described.

The supporting and attachment means can readily be used for attaching straight, corrugated or otherwise constructed wire members to frame construction with rails of different cross section, such as tubes, channels, angles, etc., and frame structures with wooden rails, in which latter case the wire elements or springs are mounted on

U-shaped or L-shaped brackets as shown in Fig. 13. In this figure the wooden rail 41 of a frame structure mounts an L-shaped bracket 42 secured to said rail by means of screws 43. This bracket has its horizontal portion 44 extended beyond the inner edge 45 of rail 41 and formed with a pair of holes, round hole 46 and elongated hole 47, which holes have threaded therethrough attaching and supporting means 48 of spring 49.

Supporting and attaching means used on springs of elongated spring constructions such as automobile seats, sofas, etc., with corrugated wire springs of so-called left-handed and right-handed construction, all as indicated in Figs. 6 and 14, have their supporting and attaching means on springs in different halves of the spring construction, preferably extended in opposite directions toward the center of the spring construction.

Coupling connections of the type described are preferably provided with means to more securely lock the springs to frame structures when such springs are in their proper working position. Thus, as shown in Figs. 15 through 17, spring 50 has extended from the end of its curved supporting and attachment means 51 a short arm 52 angularly offset with respect to the plane of the curved part 53 of said supporting and attachment means, which arm engages the outer surface of rail 54 when attachment means 51 has been threaded through holes 17 and 18 of the pair of perforations in rail 54 and spring 50 is in its proper working position. This construction, in which the offset of arm 52 must permit proper threading of attachment means 51 through the pair of perforations, effects a secure locking engagement between spring 50 and rail 54, which engagement can be released only by shifting spring 50 in a direction opposite to its movement under load. A still better locking engagement between spring 50 and rail 54 can be obtained by curving the end of spring 50 partly around rail 54 so that the curved end 55 of spring 50 contacts the outer surface of the rail and transfers part of the spring load to the rail.

Having thus described my invention, what I claim is:

1. A coupling connection for removably and axially non-rotatably coupling wire elements to frame-like structures embodying a wire member having left and right-handed loops connected by straight wire portions, a sharply outwardly curved portion at the end of said wire member extended from a straight wire portion in a plane angularly related to the longitudinal axis of said wire member, and a frame structure saving a rail with a pair of perforations extended at a right angle through the wall of said rail and arranged so that a line connecting said perforations is parallel to the axis of said rail, said perforations being dimensioned to fit the gauge of the wire of said wire member, said curved portion being threaded through said pair of perforations and said perforations being spaced from each other a distance approximately equal to the diameter of said curved portion so that the wire of the curved portion extends substantially at a right angle through the wall of said rail.

2. A coupling connection for removably and axially non-rotatably coupling wire elements to frame-like structures as described in claim 1 wherein said frame structure embodies tubular rails, and wherein said perforations are positioned and arranged in inwardly extended truncated portions of the walls of said rails.

3. In a seat structure a frame having rails

with pairs of laterally spaced perforations extended at a right angle through said rails, and corrugated wire springs bridging said frame and secured to its rails, said springs each having left and right-handed loops connected by straight portions to form and elongated resting surface and having their one end portions curved and partly wrapped around a rail, and said springs each having sharply outwardly curved attaching means integrally extended from a straight portion at the end of said one end portion in a plane angularly related to the longitudinal axis of the spring, each of said attachment means being threaded through a pair of perforations and including at its end a short extension slightly angularly related to the plane of said attaching means to permit threading of said attaching means through a pair of perforations and prevent dislodging of said attachment means in proper working position of said spring.

4. In a spring construction, a frame having a hollow rail with a pair of perforations arranged so that a line connecting the perforations extends parallel to the axis of the rail and with said perforations extended diametrically through the wall of the rail, a corrugated wire spring bridging said frame and attached thereto, said spring including left and right-handed loops connected by straight portions to form a resting surface and having sharply outwardly curved supporting and attaching means extended from a straight portion at one end of said spring in a plane angularly related to the longitudinal axis of said spring, said curved supporting and attaching means being threaded through said pair of perforations and including at its end a short guiding and locking extension slightly angularly related to the plane of said attaching means.

5. In a spring construction, a frame having hollow rails provided with pairs of perforations with each pair arranged so that a line connecting its perforations extends parallel to the axis of their rail and with the perforations extended diametrically through the wall of their rail, and wire elements bridging said frame and attached thereto, each of said wire elements including a sharply outwardly curved supporting and attaching end portion threaded through a pair of perforations in substantially diametrical relation to the wall of its rail, one of the perforations of each of said pairs being dimensioned to fit the wire of said wire element and the other one of said perforations being elongated to facilitate threading of the supporting and attachment means through a pair of perforations.

6. In a spring construction, a frame having a hollow rail provided with pairs of perforated inwardly truncated wall portions arranged so that a line connecting the perforations of a pair of said truncated wall portions extends parallel to the axis of the rail, and wire elements bridging said frame and attached thereto, the perforations in said truncated wall portions being extended diametrically through the wall of said rail and sized to engage opposite sides of the wire of said elements when extended through the perforations, and each of said wire elements including a sharply outwardly curved end portion having a curvature shaped to substantially diametrically extend the wire of the end portion through the wall of the rail when such end portion is threaded through the perforations of a pair of said truncated wall portions.

SVEND G. BLUMENSAADT.

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