Nov. 29, 1966 E. H. GUTZMAN 3,288,458

SPRING ASSEMBLIES

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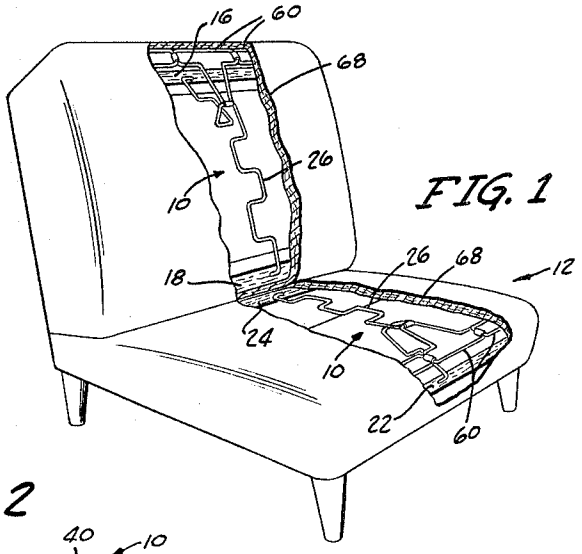


FIG. 1

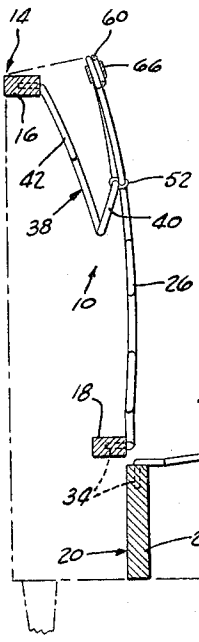
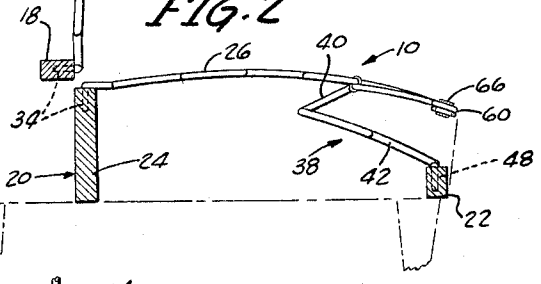


FIG. 2



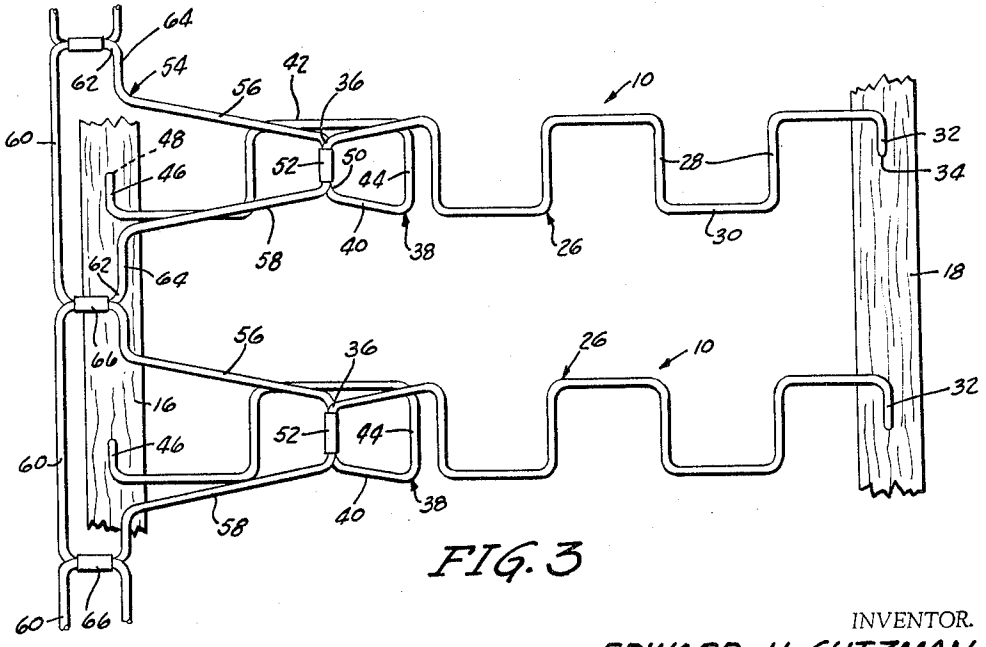


FIG. 3

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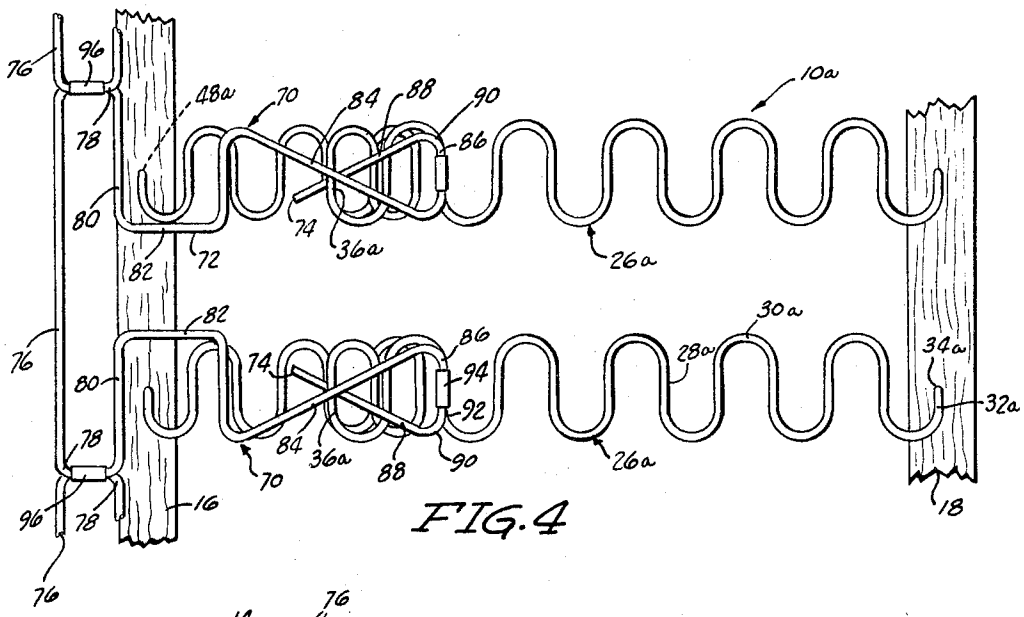


FIG. 4

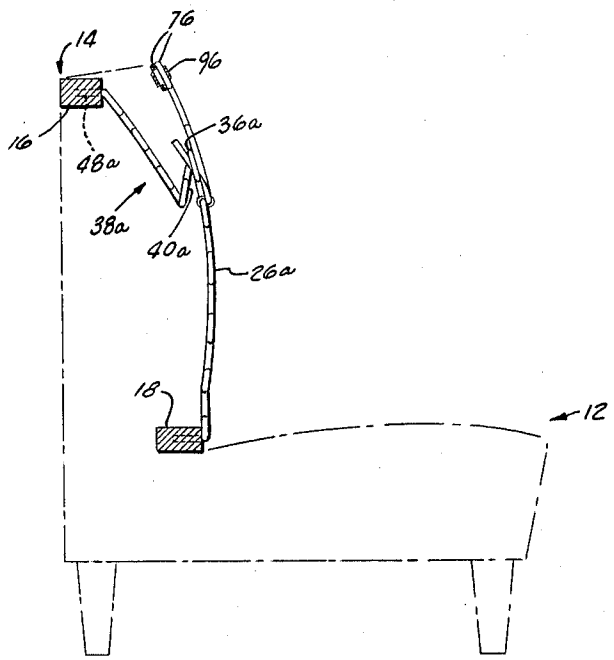


FIG. 5

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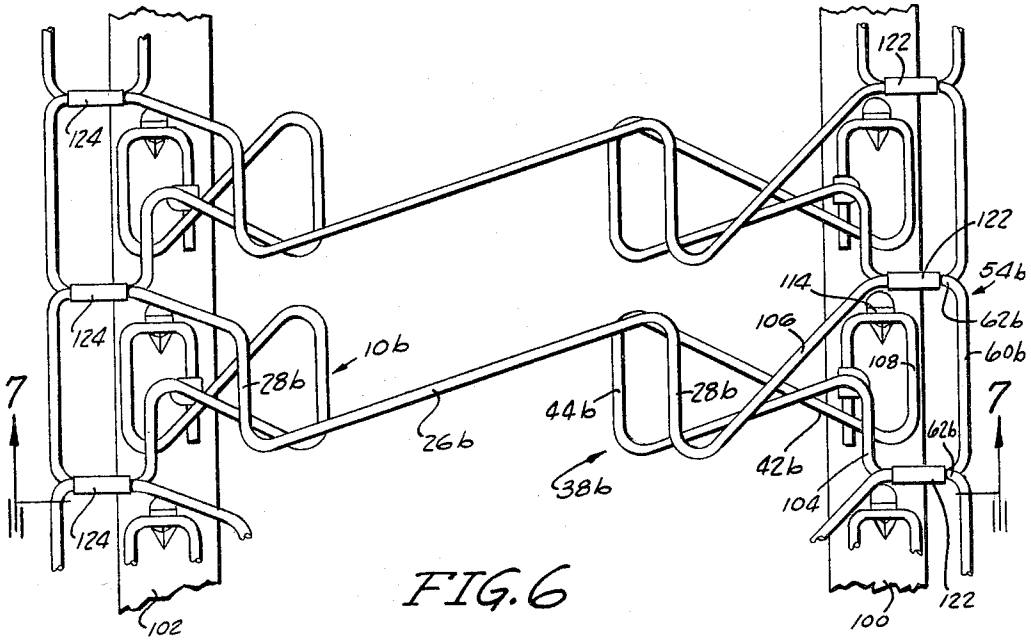


FIG. 6

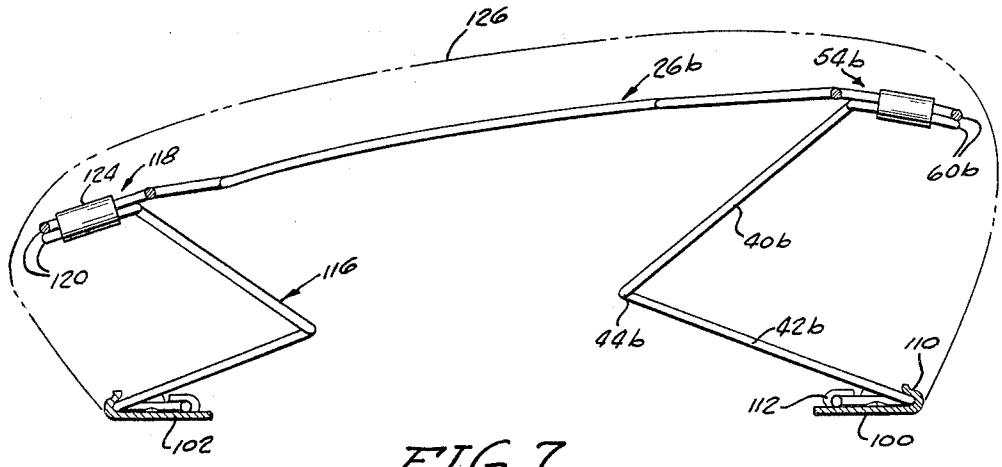


FIG. 7

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3,288,458

SPRING ASSEMBLIES

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Filed Sept. 21, 1964, Ser. No. 397,818
12 Claims. (Cl. 267—107)

This invention relates generally to upholstered seat structures and more particularly to an improved wire spring assembly for such structures.

In a seat spring assembly, some of the principal objectives are to provide a resilient platform for the padding and upholstery material which covers sufficient area to enable uniform transfer of load from the upholstery and padding to the springs; to form this platform from a minimum amount of wire for cost purposes, and to provide a spring platform which is readily yieldable to loads when in use and is free of stiffness in localized areas. It is also desirable to accomplish these objectives while also providing spring shapes which can be economically produced and assembled and which when assembled provide a seating structure in which loads on one portion have minimized adverse effects on other portions. It is an object of this invention, therefore, to provide improved seat spring assemblies for seating structures which accomplish the above objectives in economical and advantageous form.

In the seat spring assemblies of this invention, desirable seating characteristics similar to the characteristics obtainable from the spring assemblies shown in Patent No. 2,480,667, assigned to the assignee of this invention, are obtained. These desirable characteristics are obtained by incorporating in each form of the spring unit of this invention face springs which are attached at one end to an inner frame rail and at the other end are supported on V-shape yieldable support springs. In the case of a seat back structure, the inner rail is the lower rail and the upper rail constitutes the outer rail, while in the seat portion, the front rail constitutes the outer rail and the rear rail constitutes the inner rail. Also, in all forms of the spring unit of this invention, the face springs are formed with longitudinally extending extensions which also form border wire sections. Adjacent border wire sections are clipped together so that they are hingedly connected to form the usual border wire. However, the hingedly connected sectional border wire obtained in this manner has some advantages in that it eliminates the effect of a load on one portion of the seating structure on a portion spaced therefrom. In other words, in a sofa provided with applicant's spring assemblies and jointed border wire construction, a person getting up or sitting down from one portion of the sofa has less effect on a person sitting on an adjacent portion. In some forms of the spring assembly of this invention, a plurality of side-by-side units are connected by joining the border wire sections, and each unit is formed from a single length of wire shaped to form the face spring, the support spring, and the face spring extension which includes the border wire section. In another form of the invention, a pair of adjacent face springs, each of which is provided with its own integral support spring, are connected by a single length of wire which constitutes an extension of both of the face springs and a section of border wire.

Further objects, features and advantages of this invention will become apparent from a consideration of the following description, the appended claims, and the accompanying drawing in which:

FIGURE 1 is a perspective view of a seat structure, showing the spring assemblies of this invention incorporated in both the seat and seat back portions of the seat structure, with some portions of the structure broken away and other parts shown in section to better illustrate the construction of the spring assemblies;

FIGURE 2 is a vertical sectional view of the seat structure shown in FIG. 1 with the upholstery removed;

FIGURE 3 is a front view of a portion of the seat back spring assembly shown in FIGS. 1 and 2;

FIGURE 4 is a front view, illustrated similarly to FIG. 3, of a modified form of the spring assembly of this invention;

FIGURE 5 is a side view of the spring assembly shown in FIG. 4 showing the assembly mounted on a seat structure frame;

FIGURE 6 is a fragmentary top view of another form of the spring assembly of this invention illustrated in an automobile seat structure; and

FIGURE 7 is a transverse sectional view of the modified spring assembly shown in FIG. 6, looking substantially along the line 7—7 in FIG. 6, and showing the shape of the upholstered seat structure in broken lines.

With reference to the drawing, one form of the spring assembly of this invention is illustrated in FIG. 1 mounted in both the seat and seat back portions of a seating structure **12**. Each spring assembly consists of at least one and usually a plurality of spring units **10** arranged side by side, only one of which appears in both the seat and seat back portions of the seating structure illustrated in FIG. 1. The structure **12** has a back frame **14** which includes top and bottom vertically spaced rails **16** and **18** on which one spring assembly is mounted, and a seat frame **20** which includes front and rear frame rails **22** and **24** on which another assembly is mounted. The top and front rails **16** and **22**, respectively, are sometimes hereinafter referred to as the outer rails, and the bottom and rear rails **18** and **24**, respectively, are sometimes hereinafter referred to as the inner rails, since these rails are disposed outwardly and inwardly, respectively, with respect to the seating structure **12**.

Each spring unit **10** includes a longitudinally extending face spring **26** having transversely extending longitudinally spaced cross wires **28** and connecting wires **30** which connect adjacent ends of adjacent cross wires **28**. At its inner end, each face spring **26** is formed with a short cross wire **32** which terminates in a prong **34** which extends into an inner frame rail **18** or **24**, as the case may be. At its opposite end, each face spring **26** terminates in a cross wire **36**.

A support spring **38**, which is of substantially V-shape, having a pair of legs **40** and **42**, is disposed laterally inwardly of each of the face springs **26**. The legs **40** and **42** of the support spring **38** are connected at their juncture by a transversely extending torsion bar **44**. The outer end of the leg **42** terminates in a short cross wire **46** which is bent at right angles to form a prong **48** adapted to extend into an outer frame rail **16** or **22**, as the case may be. The leg **40** terminates in a cross wire **50** which is positioned laterally adjacent the cross wire **36** and is secured thereto by a clip **52**.

A face spring extension **54**, formed integral with the cross wires **36** and **50**, extends longitudinally outwardly of the end of the face spring **26** formed by the cross wire **36**. The extension **54** includes a pair of relatively outwardly diverging legs **56** and **58**, the leg **56** being integrally formed with the cross wire **36**. The etxension **54** also includes a wire section **60** which extends transversely of the face spring **26** and is of a length substantially greater than the transverse dimension of the face spring **26**. This section **60** of the extension **54** constitutes a border wire section, as will more clearly appear hereinafter, and is formed at its ends with legs **62** which extend at substantially right angles relative thereto toward the legs **56** and **58**. Connecting sections **64** connect the legs **62** to the legs **56** and **58**.

It can thus be seen that each unit **10** is formed from a single length of wire which is bent to form a face spring **26**, a support spring **38**, and a face spring extension **54** shaped to form a border wire section **60**. When the unit **10** is utilized as a back spring, the prong **34** is extended into the bottom frame rail **18** until the short cross wire **32** engages one side of the rail **18**. The prong **48** is similarly inserted into the top rail **16** until the short cross wire **46** engages one side of the rail **16**. When the unit **10** is used as a seat spring, the prong **34** is similarly installed in the rear rail **24** and the prong **48** is similarly installed in the front frame rail **22**. Adjacent units **10** in a spring assembly are spaced longitudinally of the supporting frame rails so that a leg **62** on one unit **10** is adjacent a leg **62** on an adjacent unit **10**. Spring clips **66** are then utilized to hingedly connect adjacent legs **62**, as shown in FIG. 3. When adjacent legs **62** are so connected by means of the clip **66**, the border wire sections **60** are substantially axially aligned and one border wire section **60** is hingedly movable relative to the other border wire section **60**. The border wire sections **60** are so named because they constitute the support for the outer border of the padding and upholstery material **68** (FIG. 1) which is conventionally applied over the spring units **10** and is supported on the spring platform formed by adjacent border wires **26** and their extensions **54**. By virtue of the jointed border wire provided in the spring assemblies shown in FIGS. 1, 2 and 3, the effect of a load on one portion of the spring assembly on other portions is minimized. Also, a spring assembly of any desired length can be obtained by providing the requisite number of spring units **10**. The extent of spacing of adjacent units **10** can be adjusted merely by changing the shape of the extension **54** so as to shorten or lengthen the length of each border wire section **60** since this length determines the spacing of adjacent units **10**.

Another form of the spring assembly of this invention is illustrated in FIGS. 4 and 5. This assembly likewise consists of one or more identical units, indicated generally at **10***a*, like the units **10**. For convenience of illustration, the unit **10***a* is shown in FIG. 5 mounted on the back frame **14** of the seating structure **12** only, it being understood that it is similarly mountable on the seat frame **20**. Each unit **10***a* consists of a pair of transversely spaced longitudinally extending face springs **26***a*, each of which includes a plurality of transversely extending cross wires **28***a* connected by connecting wires **30***a*. The inner end of each face spring **26***a* is formed with a short cross wire **32***a* which terminates in a prong **34***a* similar to the prong **34** previously described. At its opposite end, each face spring **26***a* terminates in a cross wire **36***a* which also forms the terminal end of the leg **40***a* of a support spring **38***a* which is disposed laterally inwardly of the face spring **26***a*.

Support spring **38***a* is of substantially V-shape and is similar to the support spring **38** previously described, terminating in a prong **48***a* supported on the top rail **16**. In the unit **10***a*, each face spring **26***a* is provided with a longitudinal extension **70**, like the extension **54** in the unit **10**, but in the unit **10***a* the extension **70** for one face spring **26***a* is formed integral with a similar extension **70** formed on the adjacent face spring **26***a*. In other words, a pair of integral extensions **70**, formed from a single length of wire **72**, constitute an extension for a pair of face springs **26***a*.

The wire **72** is bent so that substantially midway between its ends **74**, it has a straight section **76**, which constitutes a border wire section, that terminates at its ends in short legs **78** which are substantially perpendicular to the section **76**. The legs **78** are formed integral with sections **80** which extend inwardly toward each other and then turn toward the face springs **26***a* in the form of substantially parallel legs **82**. Inclined portions **84** of the wire **72** are joined at one end to the legs **82** and at the opposite end to cross wires **86** which are then bent back upon the inclined portions **84** in the form of straight sections **88**. The inclined sections **84**, the cross wires **86**, and the straight sections **88** form end loops **90** on the wire **72**.

The wire **72** is attached to the face springs **26***a* by positioning each loop **90** relative to a face spring **26***a* such that the endmost cross wire **36***a* in the face spring **26***a* is clamped between the wire sections **84** and **88** in the loop **90** and so that the cross wire **86** is adjacent a cross wire **92** in the face spring **26***a* spaced from the endmost cross wire **36***a*. A clip **94** connects the cross wires **86** and **92** in each case.

It can thus be seen, that the unit **10***a* consists of a pair of face springs **26***a*, a pair of support springs **38***a*, and face spring extensions **70** which take the form of a single wire **72** bent so that it is readily connected to the face springs **26***a* to form extensions thereof and to form an elongated border wire section **76** which is of a length such that it extends transversely beyond the transverse confines of the face springs **26***a* in the unit **10***a*. A spring assembly is formed by connecting adjacent units **10***a* by connecting the adjacent legs **78** in the adjacent units as shown in FIG. 4, by means of clips **96**. This arrangement provides for a jointed border wire, the advantages of which have been previously explained.

Another form of the spring assembly of this invention is illustrated in FIGS. 6 and 7 in the form of a spring assembly for an automobile cushion frame, only the front and rear rails **100** and **102**, respectively, of which are shown. As in the spring assemblies previously described, the spring assembly shown in FIG. 6 consists of a plurality of identical spring units, indicated generally at **10***b*. Each unit **10***b* is similar to the unit **10** previously described in that it is formed from a single length of wire bent to form a face spring **26***b* having a plurality, namely, two in this case, cross wires **28***b*. In the embodiment of the invention shown in FIGS. 6 and 7, the cross wires **28***b* constitute the ends of the face spring **26***b*. The outer end of the face spring **26***b* is supported on a support spring **38***b* which is of generally V-shape having a pair of legs **40***b* and **42***b* connected by a torsion bar **44***b*.

The face spring **26***b* is formed integral with the support spring **38***b* and also with an extension **54***b* of the face spring **26***b* which extends longitudinally outwardly therefrom. The extension **54***b* includes a section **60***b* which constitutes a border wire section having perpendicular legs **62***b* at its ends. One of the legs **62***b* is formed integral with a cross wire **104** which constitutes one end of the support spring **38***b*. The other leg **62***b* is formed integral with an inclined leg or wire **106** which is formed integral with the cross wire **28***b* at one end of the face spring **26***b*. The opposite or mounting end of the support spring **38***b* is formed with a loop shape mounting means **108** which is secured to the front rail **100**. The loop **108** at its front side fits under a reversely bent flange **110** on the rail **100** and at its rear side fits under a tang **112** bent upwardly out of the rail **100**. A spacer stop **114** bent upwardly out of the rail **100** engages the loop **108** to prevent it from shifting lengthwise of the rail **100**.

The opposite end of the support spring **26***b* is similarly formed integral with a support spring **116**, similar to the support spring **38***b*, and an extension **118** having a border wire section **120**, similar to the extension **54***b* and the border wire section **60***b*.

A plurality of units **10***b* are arranged side by side as shown in FIG. 6 and adjacent legs **62***b* in adjacent units are connected by clips **122**. Similar legs on the extensions **118** are connected by clips **124**. The units **10***b* are shown mounted on an automobile cushion frame in which case the units **10***b* have border wire sections at both ends which are connected as shown to form a border support for upholstery shown diagrammatically at **126** in FIG. 7. In other applications, one or the other end of each unit **10***b* can be supported by a different struc-

ture without detracting from the illustrated mounting at the other end.

It will be understood that the spring assemblies which are herein disclosed and described are presented for purposes of explanation and illustration and are not intended to indicate limits of the invention, the scope of which is defined by the following claims.

What is claimed is:

1. In a seat spring, a longitudinally extending face spring having a predetermined transverse dimension, a support spring for said face spring disposed laterally thereof and attached to one end of said face spring, and an extension on said one end of the face spring extending longitudinally thereof, said extension including a border wire section which extends in a direction transversely of said face spring and is of a length substantially greater than said transverse dimension of said face spring so that a plurality of said face springs can be arranged in a spaced side by side relation with said border wire sections connected to form a border wire.

2. In a seat spring according to claim 1 in which said face and support springs and said border wire section consist of a single length of wire bent to a shape such that said extension has a pair of legs spaced transversely of said face spring, one of said legs being integral with said face spring end, and the other one of said legs being integral with said support spring.

3. In a seat spring according to claim 1 in which said face and support springs consist of a single length of wire and said extension is formed from a separate length of wire secured to a pair of side-by-side face springs.

4. In a seat spring according to claim 2 in which said extension legs terminate in overlapped cross wires, one of which constitutes said one end of said face spring and the other one of which constitutes one end of said support spring, and means extending about said overlapped cross wires so as to connect them together.

5. In a seat spring according to claim 2 in which said extension legs terminate in spaced cross wires, one of which constitutes said one end of said face spring and the other one of which constitutes one end of said support spring.

6. In a seat spring, a pair of transversely spaced longitudinally extending zigzag springs having transversely extending longitudinally spaced cross wires, mounting means formed at one end of each of said face springs, a substantially V-shape support spring disposed laterally of each of said face springs and having a pair of ends, one of said ends of each of said support springs being connected to the opposite end of one of said face springs, mounting means formed integral with the opposite end of each of said support springs, and extension means on said opposite ends of said face springs extending longitudinally thereof, said extension means including a border wire section which extends in a direction transversely of said face springs and is of a length greater than the combined transverse dimension of said face springs.

7. In a seat spring according to claim 6 in which said extension means consists of a single length of wire secured at one end to one of said face springs and at the other end to the other one of said face springs.

8. In a seat spring according to claim 6 in which said extension means is comprised of a pair of lengths of wire, one of which is integral with one of said face springs and the other one of which is integral with the other one of said face springs, said lengths of wire being shaped to form adjacent axially aligned portions which form said border wire section, side-by-side legs integral with and extending substantially perpendicular to said portions, and means pivotally connecting said legs.

9. A seat spring unit comprising a pair of transversely spaced longitudinally extending zigzag face springs each having transversely extending longitudinally spaced cross wires, mounting means formed at one end of each of said face springs, a pair of substantially V-shape support springs corresponding to said face springs, each of said support springs being disposed laterally of its corresponding face spring and having a pair of ends, one of the ends of each of said support springs being formed integral with the opposite end of its corresponding face spring, mounting means formed integral with the opposite end of each of said support springs, and an extension for the opposite ends of said face springs, said extension consisting of a single length of wire shaped intermediate its ends to form a border wire section which extends in a direction transversely of said face springs and is of a length such that its ends are postioned transversely outwardly of said face springs, said length of wire being connected at the ends thereof to a pair of cross wires in each of said face springs.

10. A plurality of side-by-side seat spring units, each of said units comprising a single length of wire shaped to form a longitudinally extending zigzag face spring having transversely extending longitudinally spaced cross wires, mounting means formed at one end of said face spring, a support spring disposed laterally of said face spring and having a pair of ends, one of said support spring ends being formed integral with the opposite end of said face spring, mounting means formed integral with the opposite end of said support spring, an extension on said opposite end of the face spring, said extension having an intermediate portion which forms a border wire section extending in a direction transversely of said face spring and of a length greater than the transverse dimension of said face spring, said extension terminating at its ends in a pair of cross wires one of which constitutes said one end of said support spring and the other of which constitutes said other end of said face spring, said extension also including legs which extend angularly from opposite ends of said border wire section, and the legs for adjacent units being arranged side by side and hingedly connected.

11. In a seating structure having inner and outer spaced rails, a spring unit comprising a longitudinally extending face spring having transversely extending longitudinally spaced cross wires and a pair of ends, means on one of said ends mounting said face spring on said inner rail, a substantially V-shape support spring formed integral with and arranged in a supporting relation at one end with the opposite end of said face spring, means on said support spring at the opposite end thereof mounting said support spring on said outer rail, and an extension for said face spring terminating in a border wire section which extends transversely of said face spring and is disposed in a substantially parallel spaced relation with said outer rail.

12. In a sealing structure having inner and outer spaced rails, a pair of identical spring units each of which comprises a longitudinally extending face spring having transversely extending longitudinally spaced cross wires and a pair of ends, means on one of said ends mounting said face spring on said inner rail, a substantially V-shape support spring formed integral with and arranged in a supporting relation at one end with the opposite end of said face spring, means on said support spring at the opposite end thereof mounting said support spring on said outer rail, an extension for said face spring terminating in a border wire section which extends transversely of said face spring and is disposed in a substantially parallel spaced relation with said outer rail, said units being arranged on said rails in a side-by-side relation so that said face springs are spaced apart in a direction transversely thereof and so that said border wire sections are substantially axially aligned, and means connecting said border wire sections for pivotal movement relative to each other.

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