April 8, 1941. W. DE FRIES 2,237,585

SPRING CUSHION

Filed Aug. 18, 1936 3 Sheets-Sheet 1

Fig. 1.

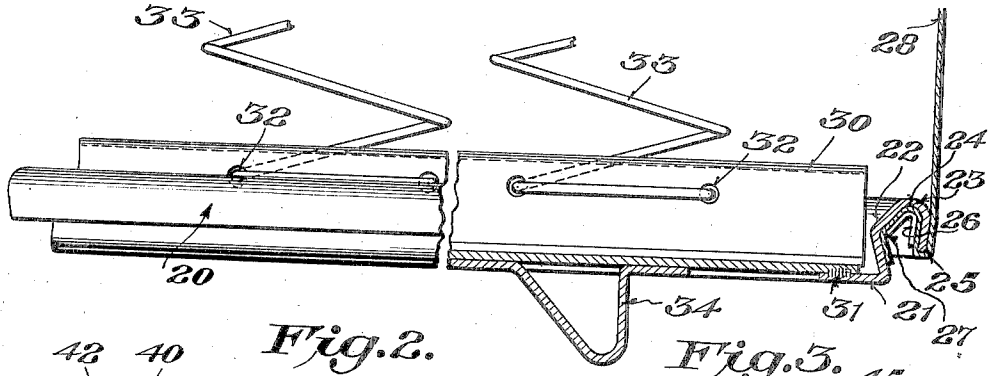


Fig. 2.

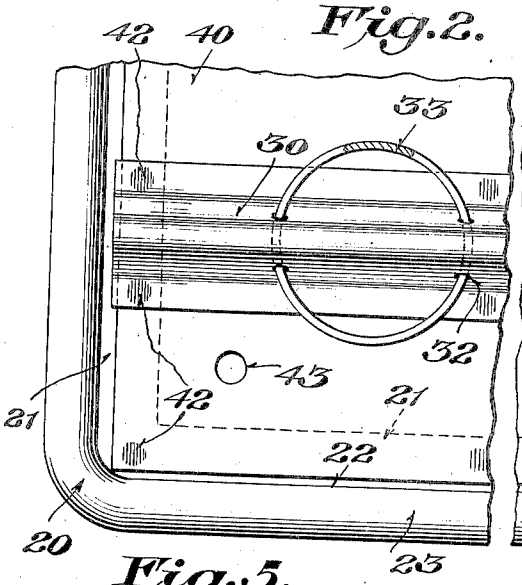


Fig. 3.

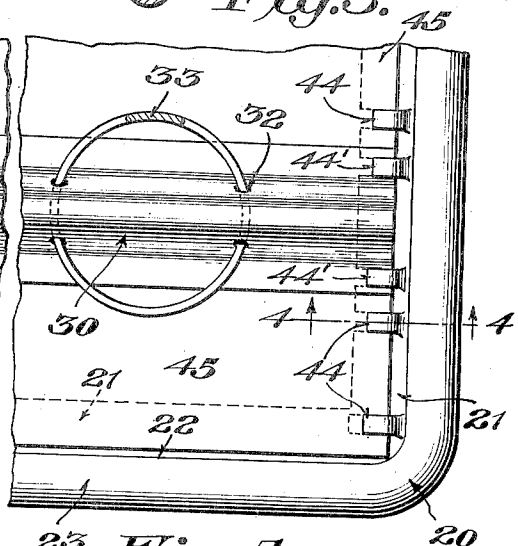


Fig. 5.

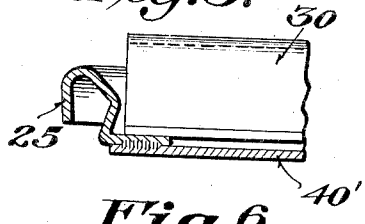


Fig. 4.

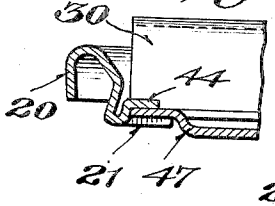


Fig. 4a.

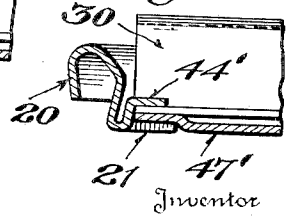
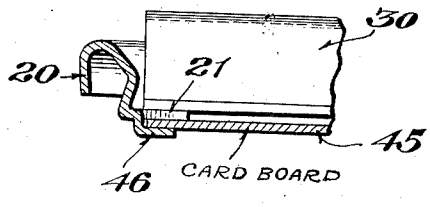


Fig. 6.



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SPRING CUSHION

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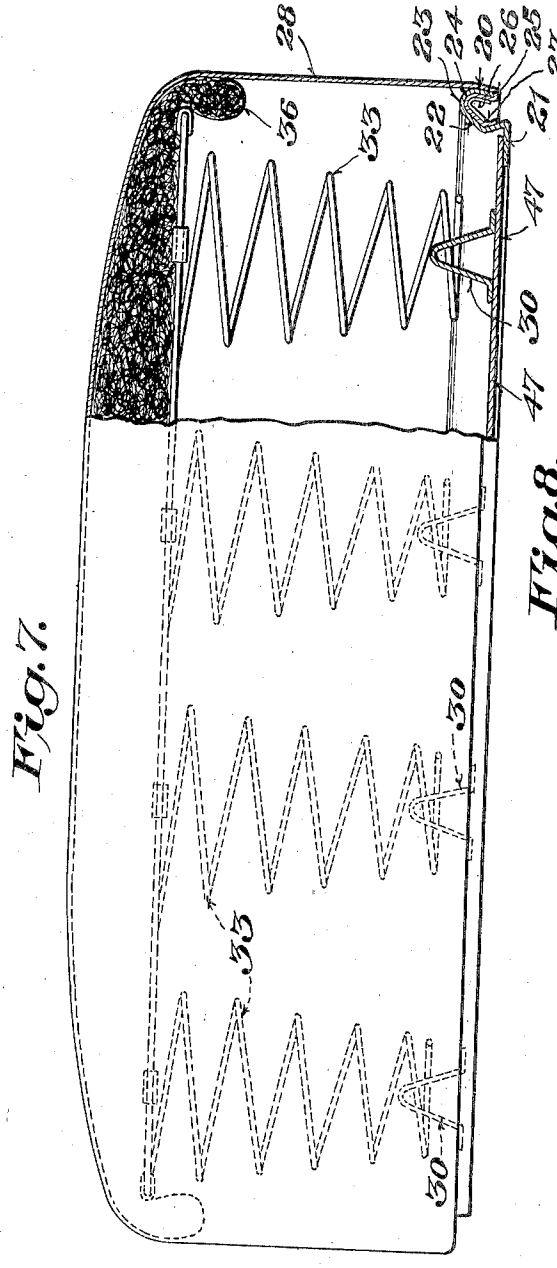

Fig. 7.

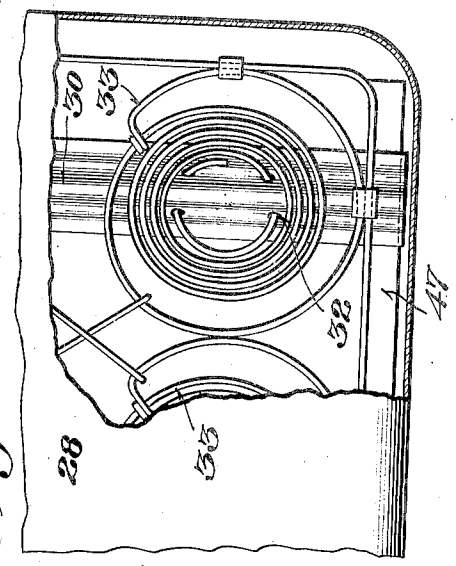

Fig. 8.

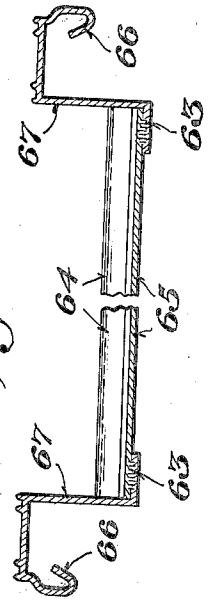

Fig. 15.

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SPRING CUSHION

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Fig. 9

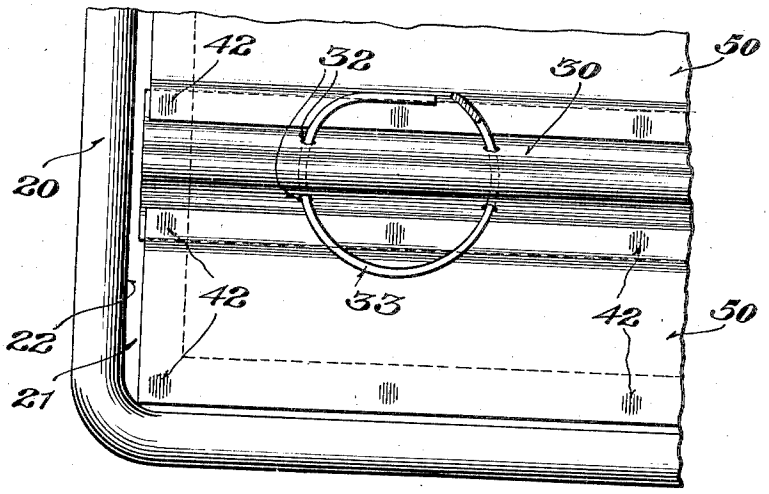


Fig. 10.

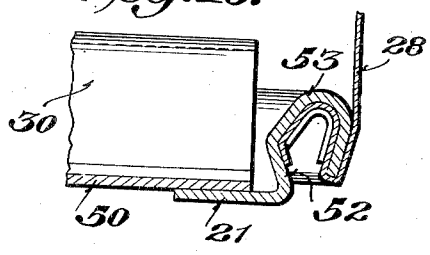


Fig. 12.

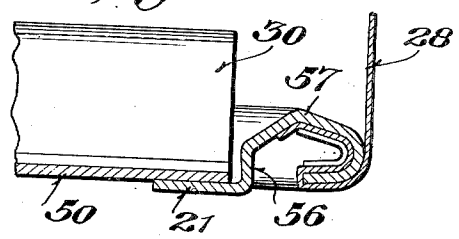


Fig. 11.

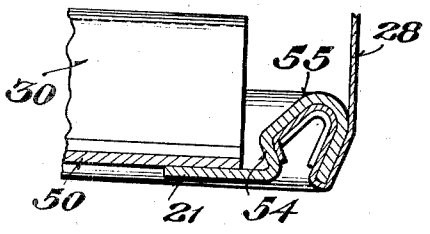


Fig. 13.

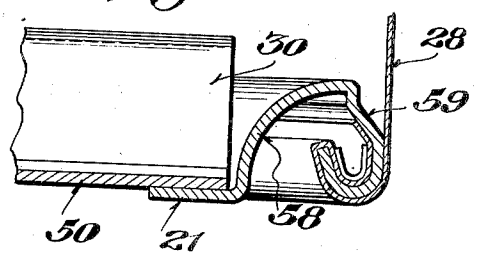
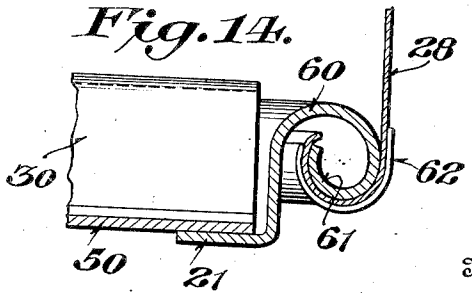


Fig. 14.



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Patented Apr. 8, 1941 2,237,585

UNITED STATES PATENT OFFICE

2,237,585

SPRING CUSHION

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Application August 18, 1936, Serial No. 96,654

8 Claims. (Cl. 155—179)

This invention relates to spring cushions, and it comprises a cushion construction which embodies a lower border frame having, first, a straight and level flange to provide supporting means for load carrying and air confining members, second, a semi-tubular portion shaped for clamping the upholstery cover thereto, either by locking it inside of the hollow space with expansion clips or holding it to the outside thereof with grip fasteners, and third, a web member joining the aforesaid two flanges for the purpose of holding them in fixed relationship to each other, such shape constituting a beam-like construction for the support of pre-formed spring supporting cross-bars the ends of which rest upon said level flange and are attached thereto, and means for covering the area bounded by the border frame to serve as a dust pan as well as to confine air within the cushion structure, all as more fully hereinafter set forth and as claimed.

The type of cushion spring assembly, which is generally identified as suitable for tackless upholstery, has heretofore comprised a lower border frame composed of only two members and developed with various modifications of the semi-tubular portion positioned in such a way, that this part of the border frame acts as its principal tension member when subject to any superimposed load. With one edge of this semi-tubular section usually engaged by the upholstery cover, the other edge is customarily extended into a ledge adapted to receive the ends of spring supporting cross-bars which are passed thereto in different ways, requiring appropriate shaping of the cross-bar ends suitable for their connection to the ledge of the border frame.

It is the object, which is achieved by this invention, to simplify the fabrication of the spring supporting cross-bars by eliminating all shaping or special forming of their ends, so that they may be cut from preformed shapes to the required length and inserted into the underframe of the cushion spring assembly without further fabrication of their ends. This object is attained by forming the border frame with a straight inwardly directed horizontal flange or carrier flange, usually as its lower member, joining one edge thereof to a web portion rising perpendicularly therefrom, or approximately so. The other end of the web portion joins that edge of a semi-tubular bead of a general design as above referred to, which is not engaged by the cover material of the upholstery thus constituting a retainer flange. Thus the curved portion of this bead, customarily forming the tension member of the lower border frame in prior designs as above recited, now becomes the compression member in the normal border frame section by virtue of its position near the top of this frame, the functions of the tension member being now assumed by the straight horizontal flange at the lower end of the web. The tension and compression members are held in fixed relationship to each other by the connecting web portion of the border frame, resulting in a section with the characteristics of a structural beam, that is a shape having both tension and compression members advantageously formed for their respective functions and held in fixed relation to each other by a connecting web portion.

In forming this border frame section to the outline of a required seat shape, the semi-tubular bead portion is directed towards the outside of the frame and the straight and level flange portion to the inside thereof, providing support for cross-bars which span the opposite sides of the frame with their straight cut ends resting upon these flanges.

Where air-bound construction of a seat is preferred, or it is desired to exclude dust and draft from the spring cavity, means for covering the area surrounded by the border frame and adapted momentarily to confine the air present in its spring cavity may be added to the bottom frame structure, thereby forming an air cushion when subject to impact loads. The provision of a level, horizontal flange on the border frame therefore not only provides for support of the cross-bars, but permits such covering to be provided in flat sheet-like form simply cut to size and assembled with the border frame and the cross-bars without requiring any additional operation, such as stamping, dishing and trimming which has heretofore been necessary to have this bottom pan conform to the shaped ends of the cross-bars in order to obtain an adequate air cushioning effect.

Aside from the simplicity of assembling such cushion springs and the economy in their manufacture made possible by this design of border frame, the shaping of the frame section in beam fashion provides for the use of lighter gauge metal in its formation, so that the provision of the level flange does not add to the dead-weight of the structure, nor is the load-carrying capacity of the border frame adversely affected by the reduction in the metal gauge, since a more advantageous metal distribution in this beam section results in a section modulus equal to or bet-

ter than that of the bar or angle-like shapes heretofore provided.

In addition to this, the decreased length of the several cross-bars, which results from eliminating a special shaping of their ends, and the smaller size of the bottom cover plate or pan which is made possible by inward direction of the level flange in the frame assembly contribute to weight reduction of the entire assembly.

Among the achieved objects of this invention is thus the provision of an exceptionally simple and economical cushion spring assembly, which is strong and durable, which retains all the advantages of the usual metal seats adapted for tackless upholstery procedure and air-bound construction, which requires a minimum amount of metal, which may be quickly and easily assembled from component parts available in standard stock sizes and which may be mounted on a supporting structure in such a manner, that the upholstery cover is protected from rubbing on the under structure supporting the cushion spring assembly.

In the accompanying drawings there are shown, more or less diagrammatically, several examples of specific embodiments of apparatus within the invention.

In the drawings,

Fig. 1 is a view, partly in elevation and partly in vertical section, of one form of border frame and cross-bar construction;

Fig. 2 is a plan view corresponding to Fig. 1 and showing one way of providing an air-bound construction;

Fig. 3 is a plan view showing a modified arrangement for holding the air-trapping and dust-preventing sheet;

Figs. 4, 4*a*, 5 and 6 show modified air-bound constructions in which the air-confining sheet also excludes dust;

Fig. 7 is a view partly in elevation and partly in vertical section of a complete vehicle cushion seat embodying the invention;

Fig. 8 is a fragmentary plan view corresponding to Fig. 7;

Fig. 9 is a view similar to Figs. 2 and 3 and showing a modified cushion construction; and

Figs. 10 to 14 show modified lower border frame constructions.

Fig. 15 is a transverse vertical section (broken away) illustrating a form of a box spring frame.

In the drawings, in which like reference characters indicate like parts, Fig. 1 shows one form of the invention, comprising a beam-like lower border frame **20** of size and shape corresponding to the size and shape of the finished seat or box spring and having at the bottom portion thereof a substantially horizontal flange **21**, a generally upwardly extending portion or web **22** and a bent-over semi-tubular portion **23** forming a groove or pocket **24** terminating at a level above the flange, as at **25**. The covering material (cloth, leather, etc.) indicated at **28**, is advantageously retained in these pockets as by means of a plurality of spring clips **26** abutting a shoulder **27** in portion **22**, as shown. Thus the covering is securely retained, while the fastening means are invisible. It is prevented from contacting the surface on which flange **21** rests (if such surface is provided, as in a bed frame) by reason of the termination of portion **23** above the level of the flange as described. If desired, the pocket portion may terminate at the same level as the flange (as shown in Fig. 11 described post) or below said level; such arrangements being quite feasible when the seat is to be supported by the cross-bars, or on columns, etc., not touching the pocket edge.

The border frame is bridged by a plurality of spring-supporting reinforced cross-bars **30**, substantially straight and of uniform cross-section, the ends resting on flange **21** as shown and being attached thereto in any suitable manner but conveniently by spot-welding as indicated at **31**. The cross-bars are provided with holes **32** for attachment of coil springs **33** in the usual manner. A stop **34** may be provided on one of the cross-bars as shown, in a seat construction, to aid in positioning the seat in the automobile frame or to position the frame with respect to the angle iron sides of a bed frame in box spring constructions. A noteworthy feature of the invention is that the cross-bars can be made by continuous rolling, and cutting operations and do not require special shaping or fastening lugs. Their cut ends rest directly upon the horizontal flange **21**.

A complete cushion seat, including the usual padding **36**, is shown in Figs. 7 and 8. Since a box spring construction would be similar to this except in the conformation of padding which forms no part of this invention it is considered unnecessary to show that construction separately.

The seat construction as so far described is complete in that it can be, and is, used in automobiles etc. in the form described. However, this seat construction is eminently adapted for use in air-bound seats, a type which at present is preferred to simple spring seats. The seat construction is made into an air-bound seat by closing off the area enclosed by the lower border frame with an impervious member or members. The manner in which this is done depends partly on whether the impervious member is metallic or non-metallic. Both are suitable and desirable in box spring constructions as well as in vehicle cushion seats. The impervious member not only traps air within the cushion, which dampens the spring action, but it prevents drafts and the collection of dust within the cushion, as well. Two arrangements are shown in Figs. 2 and 3. Referring to Fig. 2, the impervious member can be a plate of thin sheet metal such as tinned iron, denoted by **40**, and of a size and shape substantially fitting the inside of the border frame and overlying the flange **21** as shown. The plate is conveniently attached to the flange by means of spot-welding as at **42**. No special care need be taken to secure an air-tight joint, as some leakage of air into and out of the cushion is desirable. In cases where only a partially air-bound construction is desired, the plate may be provided with an orifice as indicated at **43**, or it may be less tightly sealed on the flange by less frequent spacing of spot welds which join it thereto.

The metal parts of the frame are conveniently embodied in iron, aluminum or other suitable metals, lending themselves to spot-welding practice.

It is sometimes desired to use cardboard, fiber board or the like in lieu of the metal plate **40**. Such construction gives a cushion, in which liability to rattling is minimized. If the metal plate **40** is made of thin gauge metal it may be inexpensively reinforced by suitable corrugations or stamped depressions in its surface.

In using fiber board or other non-metallic material the most convenient arrangement is to provide tongue-like clips **44** integral with the flange **21** in Fig. 3, for holding the sheet of fiber

board 45. Or the sheet of fiber can be held to the bottom of the flange by similar clips 46, as shown in Fig. 6. This arrangement allows the fiber board to be put on after the cross-bars are welded to the border frame.

If desired, the impervious plate (metal or non-metal) can be dished downward as indicated at 47 in Fig. 4 to make it flush with or lower than the bottom of the flange. Such a construction is shown in Fig. 4a. Here the carrier flange 21 of the frame supports the dished plate 47' at its edges and also supports the ends of the cross-bars 30, the whole being clamped in assembled position by the tongue-like clips 44'.

Fig. 9 shows a modified arrangement of means for confining air within the cushion. As shown, the plurality of rectangular panel insert sheets 50 are inserted in the spaces between the cross-bars and the frame, and between the cross bars. The sheets are shown as spot-welded to the frame and the cross-bars as at 42. In case it is desired to use cardboard or the like in lieu of metal, the panel inserts can be held in place by an arrangement similar to that shown in Fig. 3. In this modification it is sometimes desirable to provide the holes 32 for attachment of the coil springs in the position shown in Fig. 9, that is lower down than is shown in Fig. 1, so that the bottom coil of each spring rests on the panel inserts and helps keep them in place.

This arrangement with the usual clearance in the holes through which the springs are anchored to the cross-bars, provides decidedly increased air inlet and outlet ports, so that this construction lends itself to instances, in which only a partial air-cushioning effect is desired, without the necessity of resorting to a special orifice such as 43 in Fig. 2.

Figs. 10 to 13 show modifications of the lower border frame structure. In each case, a lower horizontal flange 21 is provided. In Fig. 10, the border frame has a vertically extending web 52 merging with an overhanging pocket 53. Fig. 11 shows an arrangement which provides more contact between the cover and the border frame, which makes for securer fastening and reduces snubbing of the cover on the edge. The Fig. 11 structure has a web 54 extending upward from flange 21 and canted slightly inwardly. This portion merges with a pocket portion 55 similar to that in Fig. 10. In Fig. 12 the pocket is disposed horizontally. As shown, a vertically extending web 56 is provided as in Fig. 10 merging with a pocket portion 57. This structure is advantageous because the lower edge of the cover is entirely concealed even when it extends somewhat beyond the clips. This obviates necessity for close trimming. The lower border frame shape shown in Fig. 12 is in all respects especially advantageous. It is an ideal structural member for cushion seat purposes. A seat made embodying the construction of Fig. 12 can be made just as strong as an ordinary type of seat, while using much less weight of metal. The structure of Fig. 12, like those of Figs. 1 to 11, is very easy to manufacture by simple roll forming operations.

Fig. 13 shows a modification, in which the pocket is inclined inwardly. As shown, an arcuate web portion 58 merges with flange 21 and carries a pocket portion 59 in the manner shown. This arrangement, while it takes more metal than Fig. 12, is especially good because no trimming of the cover material is required.

Fig. 14 shows a modification utilizing a different type of cover retaining means. As shown a curved web 60 extends upward and outward from flanged portion 21, forming a roll edge 61. The cover is drawn around this edge and is held in place by clip means 62 resiliently pressing the cover against the roll edge. The clip means can be of any desired length in the direction of the length of the border frame.

Fig. 15 illustrates a modified form of border frame for box spring constructions comprising a frame adapted for tackless cover connection, with the level flange 63 for support of the cross-bars 64 which are welded thereto, the horizontal flange being connected to the bead portion 66 by a connecting angular web 67 which rises vertically from the horizontal flange 63 and then extends outwardly to its connection with the down-turned bead 65.

It is common practice in fabricating cushion structures to shape the spring supporting cross-bars at their ends in hook form to engage the frame. The present invention eliminates such special shaping, since the frame includes a flat carrier flange which supports the ends of the cross-bars. This construction results in a saving of metal required for the cross-bars and eliminates additional manufacturing operations which were formerly required in shaping the ends of the cross-bars to engage the frame.

Added economies result from the elimination of all drawing, shaping and trimming of the bottom plate into a pan form, a level sheet being used in each instance merely cut to the required size to overlie the carrier flange of the frame. The assemblies being of all metal construction, are readily joined by welding. There are, however, conditions where a metal bottom plate cannot be used. In such cases prongs are conveniently formed in the carrier flange of the border frame, extending below it, and in assembly these are bent to engage and retain a cardboard sheet which is attached to the underside of the flange.

An alternative method of assembling a frame and cardboard bottom pan is to form the carrier flange with prongs which extend upwardly to engage and retain the cardboard sheet and cross-bars resting on the upper surface of the carrier flange. In this manner the cardboard plate may be locked between the carrier flange and the cross-bars.

In constructions which utilize panels or strips between adjacent cross-bars, these are assembled in the manner heretofore described, such strips being cut to a length equal to that of the cross-bars and then attached to the frame by welding or by bent prongs struck from the carrier flange of the frame.

After the border frame and cross-bars are welded together, rectangular cardboard panels may be laid in the spaces between adjacent cross-bars in such a way that their longitudinal edges rest on the cross-bar flanges and their ends on the carrier flange of the border frame. In such a construction each panel will be held in contact with the cross-bar flanges by the lowermost convolutions of the springs which are supported by the cross-bars. Where additional clamping of the cardboard should appear desirable, one or more prongs struck out from the carrier flange of the border frame in such a way as to extend up from its upper face, may be bent down on the ends of the cardboard panel, thereby to secure a reasonably tight fit.

From the foregoing it will be understood that the manufacturing economies resulting from the

use of shorter cross-bars with plain ends are common to all of the assemblies hereinbefore described, whether welded or clamped connections are used.

Although the invention is herein described as embodied in box springs and motor vehicle seat constructions, it is not confined to those uses alone but is equally applicable to passenger coach and trolley car benches and chairs, gliders, couches and other upholstered furniture, wherein the cushioning spring assembly is supported by a border frame and is covered by a material which is fastened to such frame.

What I claim is:

1. In a cushion spring assembly, a lower beam-like border frame having an inwardly extending carrier flange and a web portion extending upwardly therefrom at an angle and joined to a retainer flange provided with a semi-tubular bead for the retention of covering material, and closure means extending outwardly beyond the inner edge of said carrier flange and covering the area bounded thereby.

2. In a cushion spring assembly, a lower beam-like border frame having an inwardly extending substantially horizontal carrier flange and a web portion extending upwardly at an angle thereto and joined to a retainer flange so constructed and arranged as to provide a hollow bead for the retention of covering material and disposed in a direction opposite to that of the carrier flange with regard to the web, said carrier flange being adapted to support a number of substantially straight spring-supporting cross-bars which are fixed at their extremities thereon, and closure means extending beyond the inner edge of said carrier flange and covering the area bounded thereby.

3. In a cushion spring assembly of the air-bound type, a lower border frame of beam-like characteristics, formed to the desired outline, and comprising a carrier flange, a web portion rising from the outer edge thereof and an outwardly extending flange of semi-tubular shape joining said web portion as a retainer for cover material, said carrier flange being adapted to support spring sustaining cross-bars which are fixed at their extremities thereon and a substantially impervious bottom closure overlapping said carrier flange and covering the area of said lower border frame, adapted to control air inflow and outflow to and from the spring cavity of the cushion under a superimposed load.

4. In a cushion spring assembly of the air-bound type, a lower border frame of beam-like characteristics, formed to the desired outline, and comprising a carrier flange, a web portion rising from the outer edge thereof, and an outwardly extending flange of semi-tubular shape joining said web portion as a retainer for cover material, said carrier flange being adapted to support spring sustaining cross-bars which are fixed at their extremities thereon and a substantially impervious bottom closure overlapping said carrier flange and covering the area of said border frame, said bottom closure being secured to the cross-bars and adapted to control air inflow and outflow to and from the spring cavity of the cushion under a superimposed load.

5. In a cushion spring assembly of the air-bound type, a lower border frame of beam-like characteristics, formed to the desired outline, and comprising a carrier flange, a web portion rising from the outer edge thereof, and an outwardly extending flange of semi-tubular shape joining said web portion as a retainer for cover material, and a substantially impervious bottom closure covering the area of said lower border frame and carried by said carrier flange, adapted to control air inflow and outflow to and from the spring cavity of the cushion under a superimposed load.

6. In a cushion spring assembly of the air-bound type, a lower border frame of beam-like characteristics, formed to the desired outline, and comprising a carrier flange, a web portion rising from the outer edge thereof, and an outwardly extending flange of semi-tubular shape joining said web portion as a retainer for cover material, said carrier flange being adapted to support spring sustaining cross-bars which are fixed at their extremities thereon and a substantially impervious bottom closure covering the area of said lower border frame and secured to the cross-bars and carrier flange, adapted to control air inflow and outflow to and from the spring cavity of the cushion under a superimposed load.

7. In a cushion spring assembly, an under frame comprising a border shaped in beam fashion with a level, inwardly directed carrier or tension flange for seating the ends of a plurality of spring-sustaining members, a web rising from said carrier flange at an angle thereto, and a retainer or compression flange directed oppositely to the tension flange and terminating at its remote edge in a semi-tubular section or bead adapted to clamp cover material for the assembly thereto in such a way that the edge of such cover material is concealed within the cavity of the bead, means for joining these parts to each other so as to form a unitary structure and closure means overlapping the edge of said inwardly directed carrier flange and covering the area bounded thereby.

8. In a cushion spring assembly, a lower border frame of generally Z-shaped cross section comprising a semi-tubular bead adapted for clamping cover material thereto by means of spring clips, and a lower inwardly extending support connected thereto by a web so conformed as to offset the semi-tubular bead outwardly and thereby provide clearance for entry of spring clips towards the bead and the tools employed for their setting, said inwardly extending support being adapted to receive and seat a plurality of rigid cross bars on opposite sides of the frame and closure means for the area surrounded by the border frame extending between and overlapping said supports.

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