April 13, 1948. C. A. TEA 2,439,530

CUSHION SPRING AND METHOD OF MAKING THE SAME

Filed June 22, 1944 2 Sheets-Sheet 1

FIG.1.

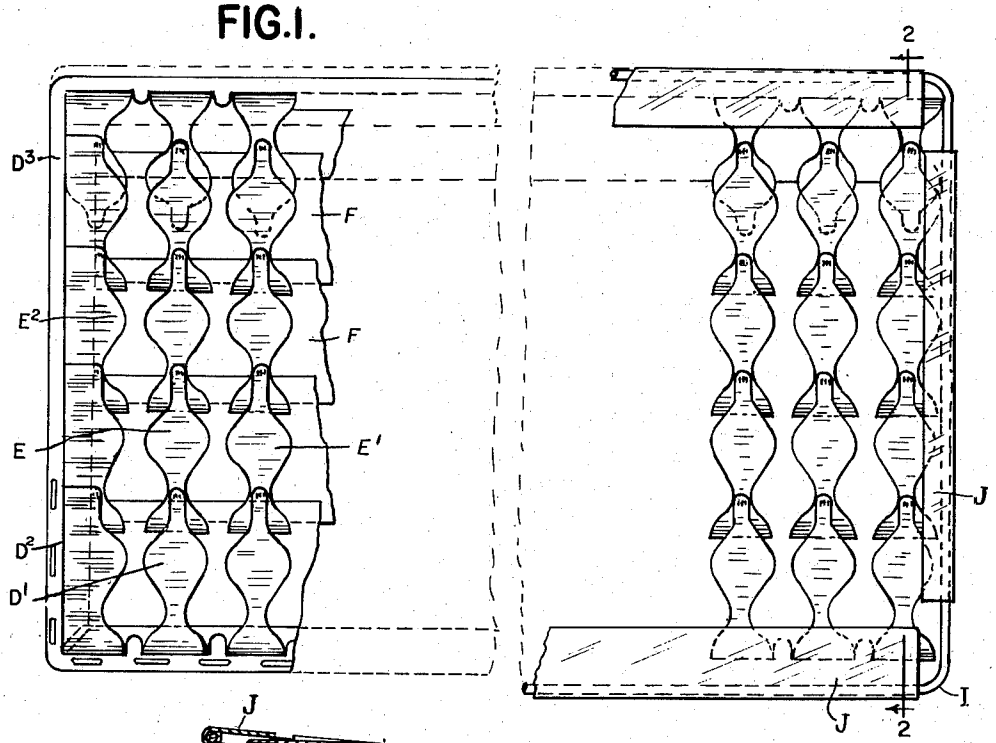


FIG.2.

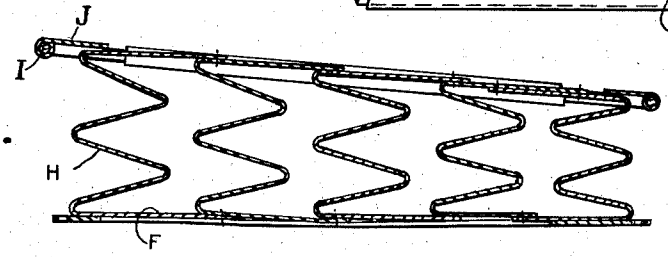
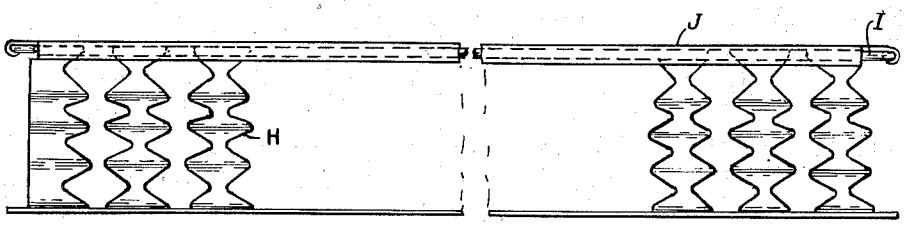


FIG.3.



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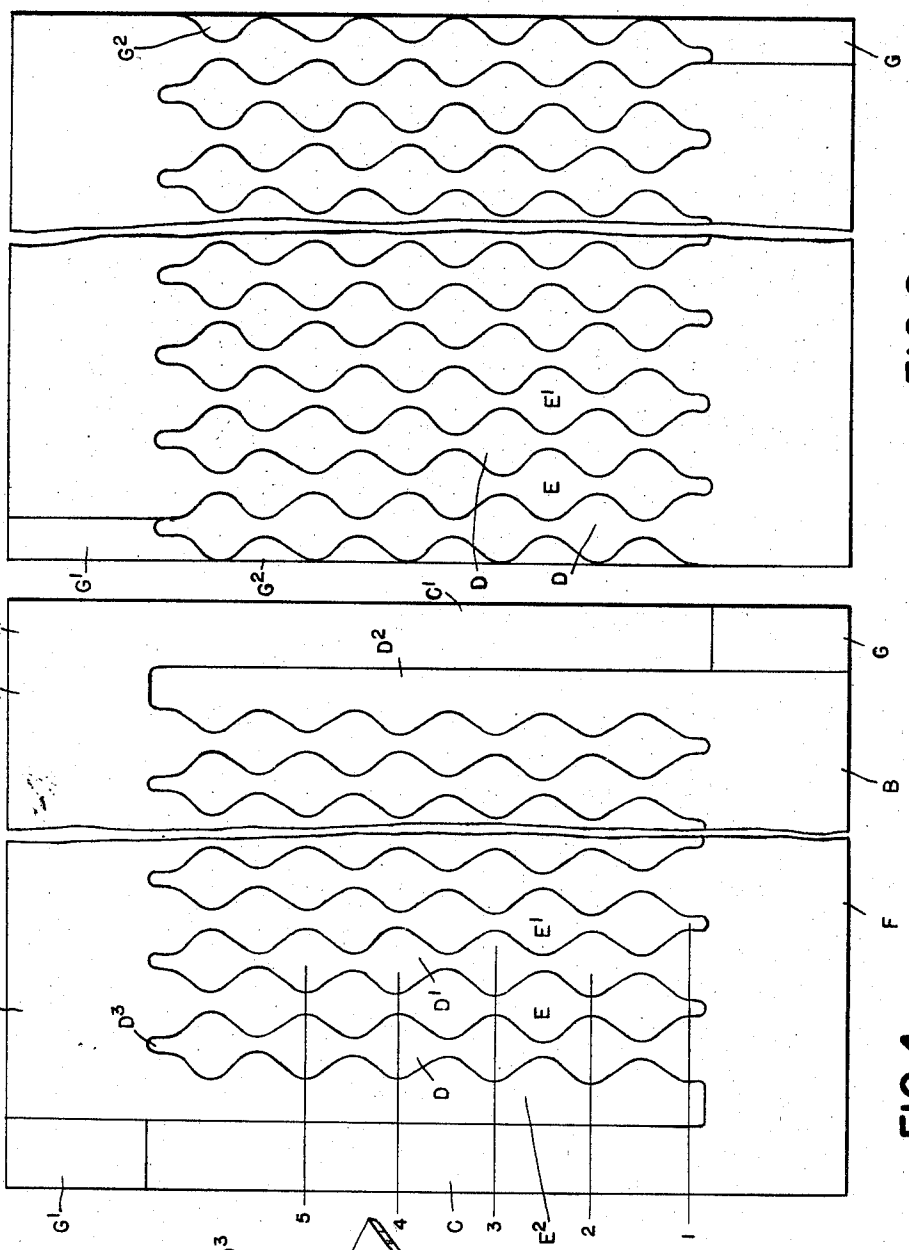


FIG.6.

FIG.4.

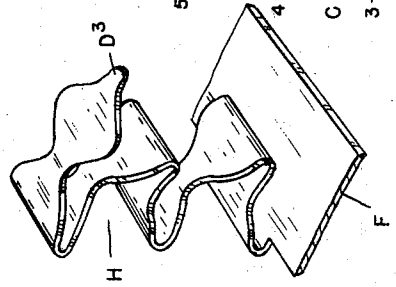


FIG.5.

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CUSHION SPRING AND METHOD OF MAKING THE SAME

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Application June 22, 1944, Serial No. 541,489

5 Claims. (Cl. 155—179)

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The invention relates to cushion springs and forms a continuation in part of my former application, Serial Number 521,413, filed February 7, 1944, now abandoned.

It is the object of the instant invention to simplify the construction and reduce the cost of manufacture while maintaining all of the advantages of the construction forming the subject matter of the parent application. To this end the invention consists in the construction and method of forming the same as hereinafter set forth.

In the drawings:

Fig. 1 is a plan view of my improved cushion spring;

Fig. 2 is a cross section on line 2—2, Fig. 1;

Fig. 3 is a side elevation;

Fig. 4 is a plan view of the blank from which the spring members are formed;

Fig. 5 is a perspective view of a portion of one of the spring members; and

Fig. 6 is a view similar to Fig. 4 showing a slightly modified construction of the blank.

As set forth in my earlier application above referred to, the cushion spring comprises a plurality of elements each formed of a sheet metal strip bent into zigzag form and having its opposite ends welded or otherwise attached to an adjacent element. To distribute and equalize the stresses in different portions of these members when under load, portions of the metal are cut out so as to leave a greater cross section at the bends than intermediate the same. The metal thus removed is scrap which cannot be used in any other part of the structure. My improved construction also has a plurality of elements formed from sheet metal bent into a zigzag form, and these elements are formed with a differential cross section to produce substantially the same distribution and equalization of stresses as in the former construction. However, instead of obtaining this result by cut-outs forming scrap metal, I blank the original sheet so as to utilize substantially the entire area thereof for forming the zigzag members.

As shown in Fig. 4, a rectangular sheet A of metal of proper gauge is cut by blanking punch and die members to form two identical blanks B and B' with interspersed interfitting portions. Each of these blanks has at one side thereof a strip C or C' having parallel edges and between this side and the opposite side a series of spaced portions D, D', etc. having sinusoidal edges. The shape is such that the portions of the sheet E, E', etc. between adjacent portions D, D' are the

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same in shape as these portions but in staggered relation thereto. The blank B has at one end thereof an uncut portion F of somewhat greater width than the dimension between adjacent crests of the members D, D'. A similar portion F' at the opposite end of the sheet will be integral with the portions E, E'. One side edge of the blank B is parallel to the edge of the rectangular sheet, this resulting in a strip C' with parallel edges similar to the strip C but integral with the end portion F'. As a consequence, the last portion D^2 has one of its edges sinusoidal and the other straight, and this is also true of the portion E^2 which is integral with the end portion F' of the blank B'. Thus, the only portions of the original sheet which are not utilized in forming the blanks B, B' are the small rectangles G and G'.

The blanks B and B' may be bent into zigzag elements H by any suitable form of apparatus which need not be described in detail. It will be sufficient to say that return bends are formed along the lines 1, 2, 3, 4 and 5 resulting in a structure such as shown in Fig. 5. A plurality of these zigzag elements are then secured to each other by arranging them in parallel rows so as to overlap the bottom portions F, F', welding or otherwise securing them to each other. In the same manner the sub-portions D^3 of the portions D, D', etc. overlap the adjacent zigzag elements and may be secured thereto by welding. However, to obtain symmetry the zigzag elements at opposite ends of the assembly are reversed in relation to each other.

If it is desired to make a spring seat structure with its forward edge higher than the rear edge, as shown in Fig. 2, it is only necessary to progressively increase the dimensions between successive crests of the sinusoidal members. This is shown in Figs. 1 and 2. The gauge of sheet metal selected for forming the blanks may also be varied in accordance with the load to be carried.

While I have used the term "sinusoidal" in describing the contour of the strips, this term is used generically. It is, however, desirable to avoid sharp angles as these would localize stresses which might result in fracture.

The modified construction of blank illustrated in Fig. 6 is the same as that in Fig. 4 with the exception that the portions C, C', D^2 and E^2 have been omitted. All of the portions D, D', E, E' are, therefore, symmetrical having sinusoidal contours on opposite edges thereof. There is, however, a scrap portion G^2 at each edge of the original sheet in addition to the portions G and

G'. This slightly increases the waste area but not to a detrimental extent.

To complete the spring, an annular border frame may be attached to the upper end thereof. Thus as shown in Figs. 1, 2 and 3, a wire frame I is secured to the upper ends of the members H by means of strips J bent around said frame and overlapping and attached to the upper end portions of the adjacent members.

The strips C and C' form portions of the base of the spring frame which are at right angles to the portions F and F'.

What I claim as my invention is:

1. A spring comprising a strip of uniform thickness having a sinusoidal side edge contour, said strip being bent transversely to its length at successive crests of the curve into a zigzag form.

2. A spring comprising a strip having its side edges of opposite sinusoidal contours, said strip being bent transversely to its length at successive crests of the sinusoidal curves into a zigzag form.

3. A spring comprising spaced strip portions connected to each other at one end by a transversely extending portion, each of said strip portions having its side edges of opposite sinusoidal contours and being bent transversely to its length at successive crests of the sinusoidal curves into a zigzag form.

4. A spring comprising a plurality of members each member being formed of an integral blank having a plurality of spaced strip portions connected at one end by a transversely extending rectangular portion each of said strips having its side edges of opposite sinusoidal contours and being bent transversely to its length at successive crests of the sinusoidal curves into zigzag form, said members being arranged with the spaced portions thereof in parallel rows having said rectangular portions in adjacent rows overlapping and secured to each other and the opposite end portions of the strips in each row overlapping and secured to the adjacent end portions in an adjacent row.

5. A spring comprising a plurality of members each member being formed of an integral blank having a plurality of spaced strip portions connected at one end by a transversely extending rectangular portion each of said strips having its side edges of opposite sinusoidal contours and being bent transversely to its length at successive crests of the sinusoidal curves into zigzag form, said members being arranged with the spaced portions thereof in parallel rows having said rectangular portions in adjacent rows overlapping and secured to each other and the opposite end portions of the strips in each row overlapping and secured to the adjacent end portions in an adjacent row, the dimension between the bent crests in one member differing from the corresponding dimension in successive members to vary the height thereof and resilient pressure thereof under load.

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