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2,698,651

ZIGZAG SPRING UNIT HAVING CLOSED SUPPORTING END

Filed April 22, 1949

2 Sheets-Sheet 1

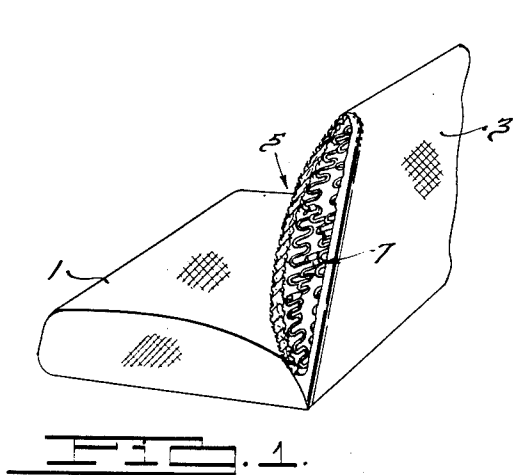


FIG. 1.

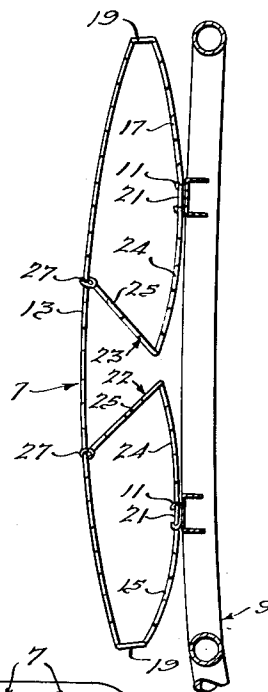
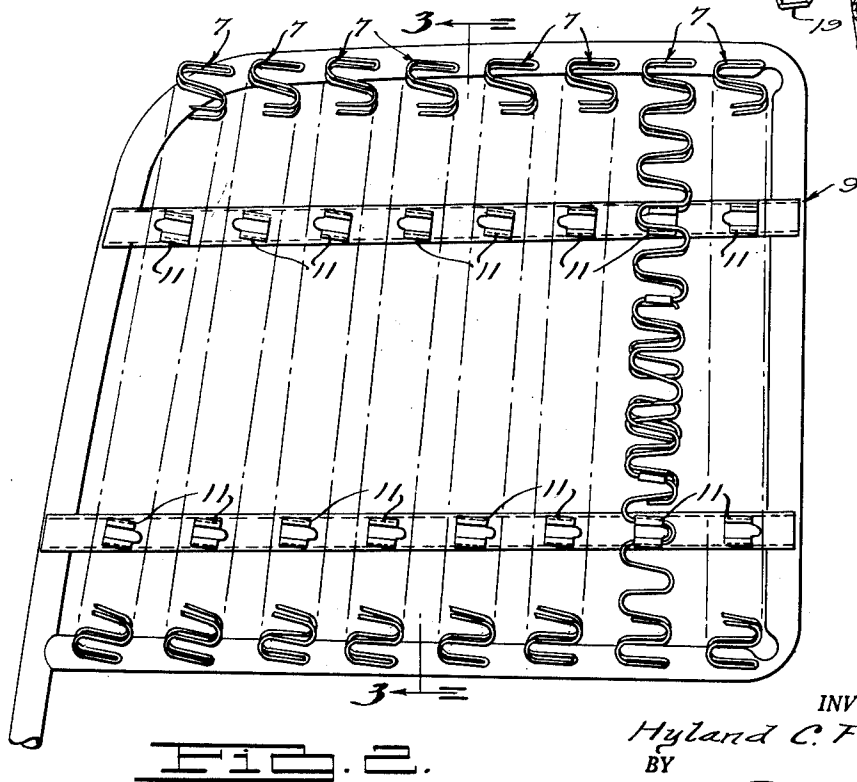


FIG. 2.

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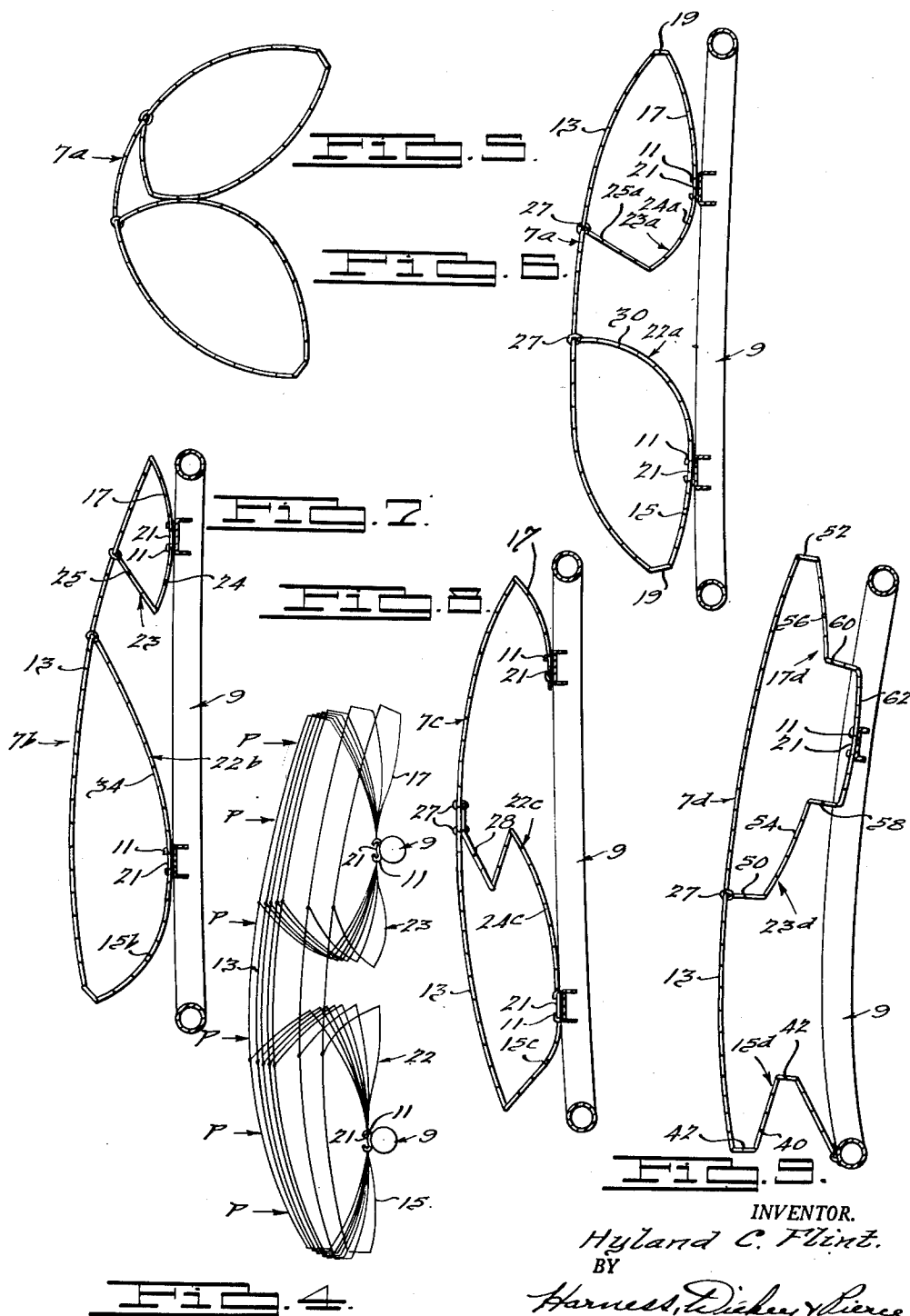
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ZIGZAG SPRING UNIT HAVING CLOSED SUPPORTING END

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1 Claim. (Cl. 155—179)

This invention relates to spring constructions embodying a plurality of pre-arched sinuous or zigzag spring strips of the type disclosed and claimed in Kaden Reissue Patent No. 21,263, and, in particular, refers to such a spring per se.

In spring constructions of the type indicated it is desirable for manufacturing reasons, as well as for the sake of lightness, to have the gage of wire from which the spring strips are formed as small as is commensurate with satisfactory spring characteristics, the latter including, as desiderata, uniform resiliency of the entire spring surface and also conformability to the contour of objects resting on the spring surface. Hook's law, of course, is the governing consideration in the selection of wire gage, but its influence can be circumvented by providing load carrying supports for sinuous strips, these being in addition to the required connections to the frame members. Such supports have a noticeable effect on the conformability and uniformity of the resilient spring surface and prior attempts to reduce the wire gage and spring weight by the use of additional supports have been often marked by the presence of hard spots in the spring construction which refuse to comfortably conform to the contour of an object placed thereupon. Additional supports of this nature are also employed to regulate the unloaded contour of the resilient surface itself and it will be appreciated that use of the supports for this purpose creates the possibility of conflict with their use to obtain the minimum size of spring wire and the optimum spring characteristics.

It is the general object of the present invention to provide additional supports for sinuous spring strips which tend to reconcile conflicts of the type indicated and furnish beneficial effects to sinuous spring constructions from all the standpoints mentioned above, viz., manufacturing, spring characteristics, and contour.

It is a more particular object of the invention described herein to provide a spring construction for the backs of body rest devices which features improved spring characteristics such as uniformity of resilient deflection and conformability, improved control of contour, and reduced cost of manufacture.

These and other objects of the invention are accomplished by means of the present construction which employs sinuous spring elements that are preferably an integral part of the sinuous spring strips themselves as the additional supports for the strips, preferred embodiments of the principles of this construction being shown by way of illustration in the accompanying drawings in which:

Figure 1 is a perspective view of a body rest device with the back construction broken away to show the improved sinuous spring strip;

Figure 2 is a plan view of a back frame with the present spring strips attached thereto;

Figure 3 is a section taken on line 3—3 of Figure 2;

Figure 4 is a diagrammatic view of the spring of Figure 3, showing the manner in which the resilient surface is deflected by gradually increasing uniform loads applied at the points indicated by arrows;

Figure 5 is a side elevation of modified form of spring strips attached to a frame;

Figure 6 is a side elevation of the spring of Figure 5 prior to attachment to the frame, showing the pre-arched condition thereof; and

Figures 7, 8 and 9 are side elevations of other modified forms of the invention.

2

As shown in Figs. 1 and 2, spring constructions of the type herein referred to may be embodied in the seat and back cushions 1 and 3 of an automobile seat or body rest device 5. The back construction of Fig. 2 comprises a plurality of laterally spaced sinuous spring strips 7 which may be secured to the frame 9 by means of the novel clips 11.

As shown best in Fig. 3, each sinuous spring strip 7 has a longitudinal portion 13 which will be referred to herein as a web, it being recognized that the webs of the plurality of springs 7 comprise, in combination, a resilient surface. It is this surface, and therefore the individual webs, which is provided with the desired contour and spring characteristics as mentioned hereinbefore, and it will be recognized that by forming it from wire having a minimum size consistent with the required resiliency, that the difficulties and expense of manufacturing will be minimized. In order to attach the webs 13 to the frame, the strips 7 have left and right portions 15 and 17 which are bent inwardly beneath the webs 13 and which may be connected to the webs through spacer loops 19, the latter serving to increase the overall height of the spring construction, but because of their substantial perpendicularity to the webs, adding little or no resiliency thereto. The left and right portions 15 and 17, which may be regarded as end supports or attachment strips for the web, begin at the loops 19 and for descriptive purposes are regarded as terminating in loops 21 which are secured to the frame 9 by clips 11 as already described.

According to the invention, the additional left and right supports 22 and 23 for the webs 13, and thus the resilient surface, are inward extensions of the attachment strips that are curved upwardly and connected to the web 13. In Fig. 3 the supports or extensions include the portions 24 which extend inwardly from the loops 21 and, with respect to the attachment strips 15 and 17, are more or less symmetrical thereto. The supports further include outwardly and upwardly extending rectilinear portions 25 that are secured to the webs 13 by means of suitable clips 27.

It will now be recognized that the additional supports 22 and 23 change the stress pattern in web 13, one such change consisting in a reduction of unit stress whereby it is possible to reduce the size of wire from which the springs 7 are formed. The resiliency, however, is not adversely affected in any way since the supports 22 and 23 are themselves resilient and, in fact, possessed of compound resiliency because they include two portions 24 and 25, each of which is capable of elastic bending between its extremities. The supports 22 and 23 also affect the deflection of various sections of the web 13 under load. Fig. 4 shows a typical deflection pattern for the spring 7 under the influence of increasing loads which were applied uniformly to the web 13 at the arrows identified by the reference character P. The uniformity of web deflection is striking and the manner in which the supports 22 and 23 deflect to bring about this result is apparent. It will be evident that there are no hard spots in the web 13 and that it will readily conform to objects placed thereon. Inasmuch as the spring strips 7 are pre-arched on a smaller radius than that which they have when secured to the frame 9, they are under stress even when no external loads are placed thereon. The web 13 therefore occupies a position, i. e., assumes a contour, which is dependent upon the shape of the supports 22 and 23 and the points at which these supports are connected to the web. The supports 22 and 23 can therefore be used as a simple means for controlling the contour of the web. This control is exercised, of course, by varying the shape of the supports 22 and 23 and their points of connection with the webs 13.

Comparison of the embodiment 7a of Fig. 6 with that of Fig. 3 illustrates the effect on contour of variations in the shape of the supports 22 and 23. In strip 7a the left support 22a comprises a portion 30 which is curved through almost 90° before its connection 27 with the web 13. The right support 23a is somewhat similar to support 23, but the portions 24a and 25a thereof form an obtuse rather than acute angle. As a result of these changes in the supports 22 and 23, the spring 7a has more depth and its contour is considerably more rounded

than the strip 7. Nevertheless, it will be recognized by comparison of the secured spring 7a of Fig. 6 with the free pre-arched spring 7a of Fig. 5, that the contour is flatter than would be obtained in the absence of the additional supports 22a and 23a. The arch in the spring strip of Figs. 5 and 6 is such that in the free state the bent-under end sections abut each other.

In the embodiment 7b of Fig. 7 the right attachment strip and additional support are similar to those described in Fig. 3 and are therefore identified by the same reference numerals 17 and 23, respectively, though it may be noted that the spacer loop 19 is omitted in spring 7b. The left attachment strip 15b, however, has more depth than the strip 17 so that the web 13 is spaced further from the frame 9 at its left than at its right end. The left support 22b comprises an arcuate extension 34 of the attachment strip 15b, but it is curved on a much larger radius than the extension 30 of strip 7a and is connected to the web beyond the midpoint thereof. Because of its length and slight curvature the extension 34 provides a relatively soft support 22b for the web 13 of strip 7b.

The embodiments of Figs. 8 and 9 demonstrate that the beneficial features of the invention may be obtained with only one additional support. In Fig. 8 the spring 7c has a right attachment strip 17 which is a simple, arcuate, rebent extension of the web 13 as before. The front end support or attachment strip 15c extends downward from the web in a substantially rectilinear manner but is curved adjacent the connecting loop 21, and a comparatively lengthy arcuate extension thereof comprises the lower portion 24c of the left additional support 22c. A V-shaped supporting end portion 28 of the support 22c extends upwardly to the web 13 and is connected thereto by the clips 27.

In Fig. 9, the front support 15d for the strip 7d comprises a conventional outwardly opening V-shaped strip extension 40 which has spacer loops 42 connecting it to the web 13 and at the apex of the V to give added depth. The end support 17d and right additional support 23d are likewise adapted to give added depth to the strip while supporting the web 13 with the characteristics of a rather flatly curved continuous spring element. Thus, the additional support 23d is connected to an intermediate point of the web by spacer loops 50 while the end support 17d is connected to the web by spacer loop 52. Extending outwardly from the loops 50, the additional support 23d has an arcuate section 54 while the end support 17d has a similar arcuate section 56 extending inwardly from the loop 52. If fully extended, the sections 54 and 56 would meet, to form a continuous arcuate support for the spring. However, since depth is required, spacer loops 58 and 60 extend downwardly

from the sections 54 and 56, respectively. The loops 58 and 60 are interconnected by an arcuate section 62 which, it will be recognized, is merely a connection between sections 54 and 56 displaced downwardly. Inasmuch as the spacer loops 50 and 52 are substantially normal to the web 13 and the spacer loops 58 and 60 are substantially normal to the sections 54 and 56, they provide substantially no resiliency to the supports 23d and 17d. Thus, the spring characteristics of these supports are those of a continuous element composed of sections 54, 62, and 56, but the supports have been endowed with the required depth by means of the spacer loops.

From the preceding embodiments it will be seen that the invention may be embodied in many forms, hence, it is not intended to be restricted to the particular shapes shown. It will also be recognized that the connections of the additional supports 22 and 23 to the web 13 may be arranged therealong to provide the desired contour and spring properties. Further effects can be obtained also by shifting the points at which the strips are connected to the frame 9 by means of the loops 21 and clips 11.

What is claimed is:

A single spring unit embodying a strip made of wire bent back and forth to provide lateral portions joined by end portions which space the lateral portions, said strip having a central arched web section for supporting a load, intermediate straight sections abruptly bent from the ends of the web section to extend laterally thereof, and end sections abruptly bent from the intermediate sections to extend laterally thereof beneath said web section, both of said end sections being arched reversely from the web section with the ends extended upwardly into engagement with the web section, at least one of said extended ends being straight.

References Cited in the file of this patent

UNITED STATES PATENTS

Re. 21,263	Kaden	Nov. 14, 1939
2,371,407	Neely	Mar. 13, 1945
2,386,456	Haberstump et al.	Oct. 9, 1945
2,440,001	Blumenstadt	Apr. 20, 1948
2,526,183	William et al.	Oct. 17, 1950

FOREIGN PATENTS

667,407	France	June 17, 1929
498,160	Germany	Nov. 12, 1931
683,718	Germany	Nov. 13, 1939