June 15, 1943. E. L. BASS 2,321,790

SPRING STRUCTURE

Filed Aug. 17, 1942 2 Sheets-Sheet 1

Fig. 1.

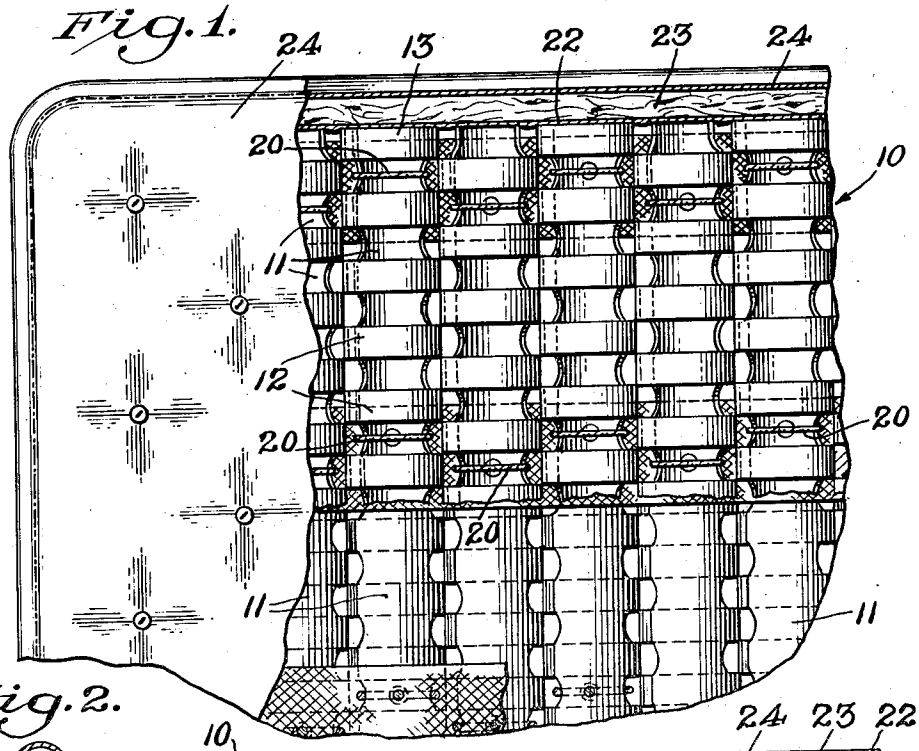
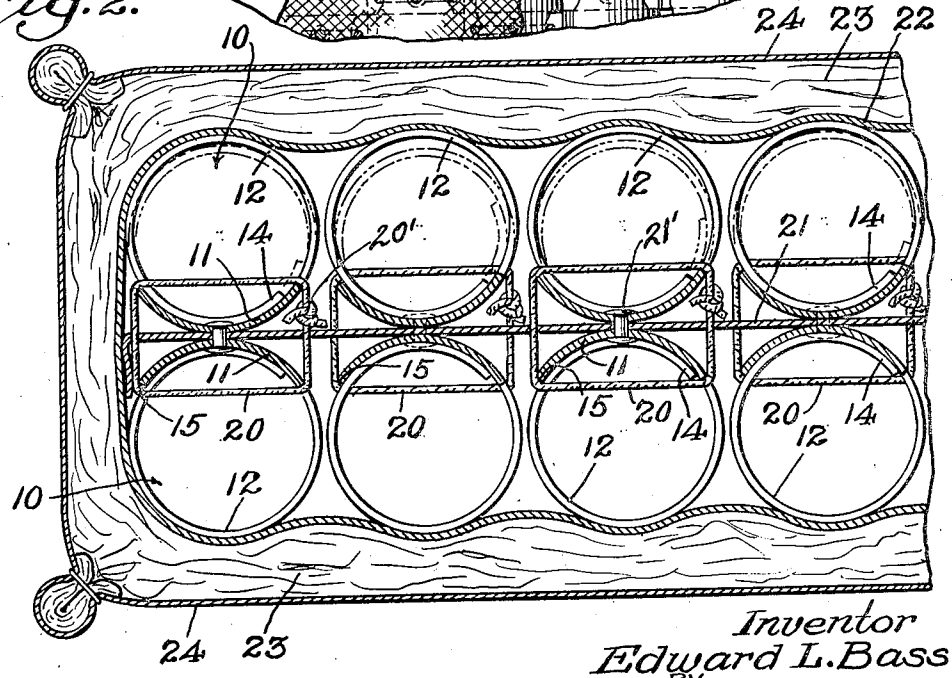


Fig. 2.



Inventor
Edward L. Bass
BY
Marion S. Cayce
Attorney.

June 15, 1943. E. L. BASS 2,321,790

SPRING STRUCTURE

Filed Aug. 17, 1942 2 Sheets-Sheet 2

Fig. 3.

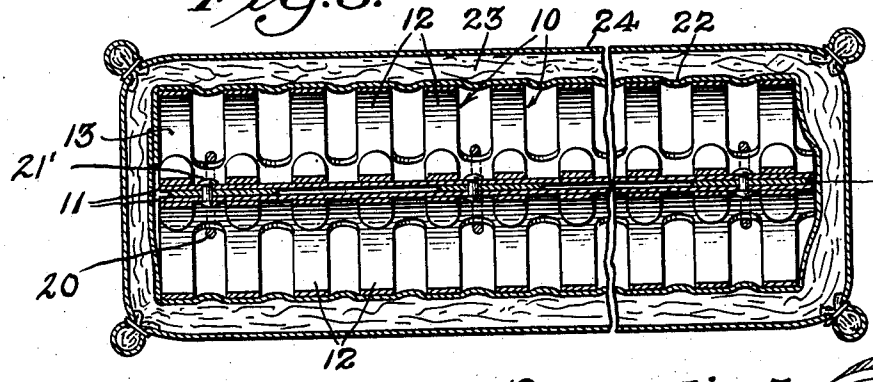


Fig. 4.

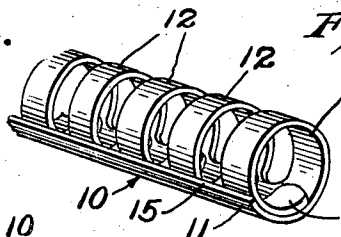


Fig. 7.

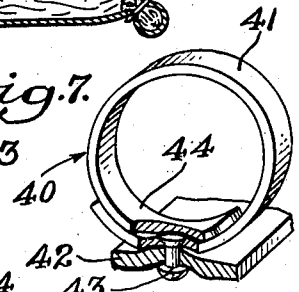


Fig. 5.

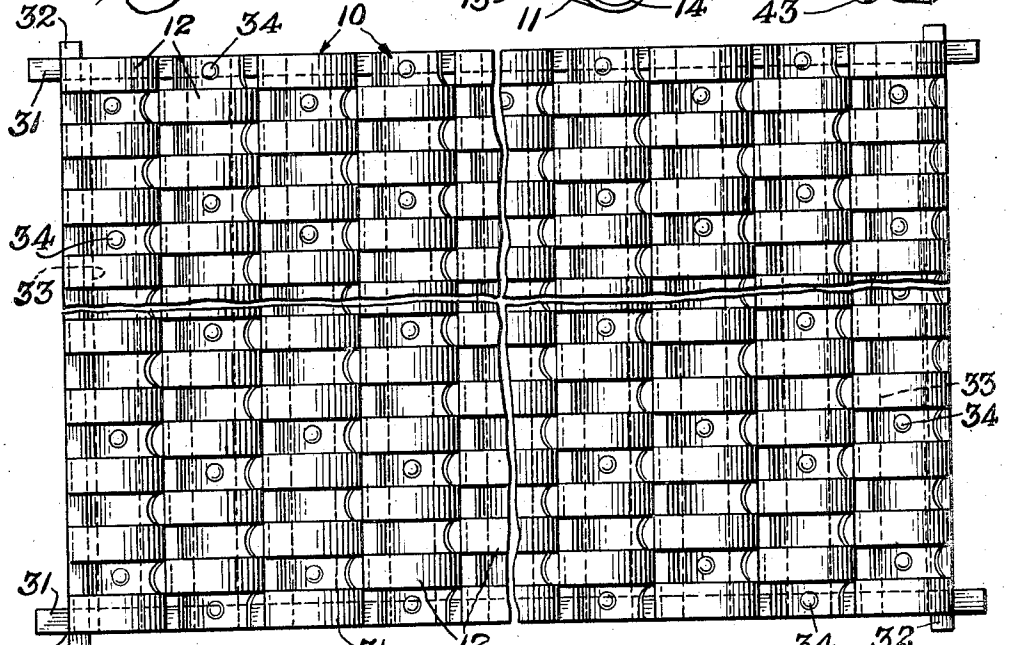
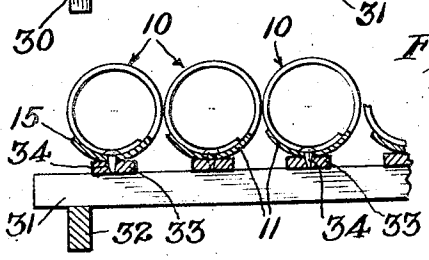


Fig. 6.



Inventor

Edward L. Bass

BY

Warren S. Bayer

Attorney

Patented June 15, 1943 2,321,790

UNITED STATES PATENT OFFICE

2,321,790

SPRING STRUCTURE

Edward L. Bass, Chicago, Ill.

Application August 17, 1942, Serial No. 455,015

9 Claims. (Cl. 5—353)

This invention relates generally to resilient supports and more particularly to supports of this character utilized in the construction of spring cushions, spring mattresses, bed springs or wherever a resilient support may be necessary or desirable.

In the conventional construction of spring cushions, spring mattresses, and the like, there is employed a spring filling unit which generally consists of a plurality of vertically arranged coil springs of general cylindrical shape secured together. This spring filling unit is constructed of sheet metal or metal wire and produces the spring action desired in a device of this character. At the present time, due to the shortage of metals, this conventional construction has been banned. It is the main object of this invention to produce a resilient support from either metallic or non-metallic material, the resiliency being the result of a special configuration given to the elements making up the spring unit as distinguished from the inherent resilient characteristics present in the material used. With my improved construction it is possible to utilize such materials as plastics, wood, or plywood, as well as metal units made therefrom being so formed that the desired spring action will be obtained upon the application and removal of pressure.

It is an object of this invention to provide a resilient element constructed in the form of a loop, one end of which is fixed and the other end of which is free, whereby upon the application of pressure to the loop the same will tend to wind up upon itself to give the desired spring action.

Another object of the invention is to provide a resilient support comprising an elongated strip or band from one longitudinal edge of which extend a plurality of fingers bent upon themselves to form substantially circular loops, the free ends of which fingers are adapted to overlap the opposite edge of the strip or band whereby upon the application of pressure to the element said loops formed by said fingers tend to wind up upon themselves to produce the desired spring action.

Another object of this invention is to provide spring elements formed in loops one end of which is fixed and the other end of which is adapted to overlap said fixed end whereby upon the application of pressure to said loops the same will tend to wind up upon themselves to produce the desired spring action and to utilize such spring elements in the construction of spring cushions, spring mattresses, and the like.

A still further object of the invention is to produce a novel and improved construction of spring filling produced by arranging on a support a plurality of preferably non-metallic loops one end of each of said loops being fixed to said support and the other end of each of said loops being free and overlapping said fixed end whereby upon the application of pressure to said loops the desired spring action may be produced.

A still further object of the invention is to construct a novel and improved spring element consisting of a relatively flat elongated band or strip having a plurality of fingers extending from one longitudinal edge thereof, each of said fingers being bent to form rounded loops with the free ends of said fingers overlapping the inner edge of the band or strip opposite the edge from which the fingers extend whereby said loops would be caused to wind up upon themselves upon the application of pressure thereto to produce the desired spring action and utilizing a plurality of said strips or bands arranged in rows and suitably tied to each other to produce a resilient support.

A still further object of the invention is to provide a spring or resilient support which consists of a base, a plurality of loops mounted on said base and arranged in longitudinal and transverse rows, each of said loops having one end fixedly secured to said base and the other end overlapping said fixed end and free to move relative thereto in a substantially vertical plane whereby upon the application of pressure to the upper surface of the loop the free end thereof will tend to wind up upon itself to produce the desired spring action.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists in certain novel features of construction, arrangement and combination of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportion, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

For the purpose of facilitating an understanding of my invention, I have illustrated in the accompanying drawings a preferred embodiment thereof, from an inspection of which, when considered in connection with the following description, my invention, its mode of construction, assembly and operation, and many of its advantages should be readily understood and appreciated.

Referring to the drawings in which the same characters of reference are employed to indicate

corresponding or similar parts throughout the several figures of the drawings:

Fig. 1 is a top plan view of a fragmentary portion of a spring cushion or mattress embodying my invention, parts thereof being broken away to more clearly illustrate the interior construction thereof.

Fig. 2 is a sectional view through the same.

Fig. 3 is a sectional view taken substantially at right angles to that of Fig. 2.

Fig. 4 is a view in perspective of the spring element constituting my invention.

Fig. 5 is a top plan view of a spring support utilizing my improved spring elements in the formation thereof.

Fig. 6 is an end elevational view of a fragmentary portion of the resilient support shown in Fig. 5.

Fig. 7 is a view in perspective illustrating a spring element embodying my invention, formed from a single strip of material.

Stated generally, the invention contemplates the provision of a novel and improved construction of spring element which lends itself to being formed from material which is inherently not sufficiently resilient to produce the spring action that would be required in the construction of such devices as spring cushions, bed springs, spring mattresses and the like. The material employed in my improved construction may thus be non-metallic, such for example as wood, plastics, plywood or similar materials. Obviously, metal may also be used in my improved construction if desired and when available.

As stated already, the important feature of my invention resides in so forming the element that it will produce the desired resiliency by reason of its configuration as distinguished from the inherent resilient characteristics of the material employed. A preferred embodiment of my invention consists in the formation of the element from a relatively narrow strip of material bent upon itself to form a substantially circular loop, one end of which may be fixedly secured in any well known manner to a support, and the other end of which may be free and arranged in overlapping relation with said said fixed end. The result of this arrangement will be that upon the application of pressure to the upper end of the loop, or to that end which is substantially diametrically opposite the fixed end, the free end of the loop will tend to move relative to the fixed end thereby causing the element to yield and to give the desired spring action. By properly constructing these loops as to size of loop, thickness of material, etc., it will be apparent that substantially any desired amount of spring action may be readily obtained even though the material itself, from which these loops are formed, does not possess a high degree of elasticity or resiliency.

Thus, with my improved construction it is possible to utilize non-metallic, as well as metallic, materials in the construction of spring elements. At the present time, due to the shortage of metal for non-war uses, it will be a decided advantage to utilize such materials as wood and plastics in the manufacture of spring elements for use in such devices as bed springs, spring cushions, spring mattresses, upholstered furniture and similar articles.

In the drawings I have illustrated the use of my improved spring element in the construction of a spring cushion or spring mattress and also in the construction of a bed spring. These embodiments, it should be understood, are merely illustrative of some of the many uses to which my improvement may be put.

Referring to the drawings more specifically by characters of reference, the numeral **10** designates generally an element constructed in accordance with my invention and which may be readily formed from either metallic or non-metallic materials but which will render the required spring action by reason of its formation or configuration when assembled in the manner to be now more fully described.

The element **10** comprises a relatively plain band or elongated strip **11** from one longitudinal edge of which extend a plurality of fingers **12** bent upon themselves, as shown more clearly in Fig. 4 to produce the loops **13**. The loops thus formed are closed, the free ends **14** of said fingers overlapping the longitudinal edge **15** of the strip opposite the edge from which the fingers **12** extend, and being disposed inwardly of said opposite edge **15**, as shown in Fig. 4. The material from which the strip or band is formed may be metallic or non-metallic. In either event, however, it should have sufficient elasticity to cause the free ends **14** of the fingers **12** to be in contact with the inner face of the strip or band **11** substantially at all times. It will be apparent from an examination of the illustration in Fig. 4 that upon the application of pressure to the upper surface of the loops **13** the free ends **14** will be caused to move inwardly, reducing the diameter of the loop and thereby placing the entire element under spring tension. Upon the release of pressure, the element will spring back to its original position, the loop tending to unwind itself. Of course, the element must be constructed so that the pressure it will be designed to withstand will not exceed the elastic limit of the material from which the same is formed.

In the embodiment illustrated in Figs. 1, 2 and 3, my improved spring elements are utilized in the construction of a spring filling for a spring cushion or mattress. In the conventional construction of devices of this character, the spring filling is completely encased within a fabric casing; the mattress or cushion is then assembled by surrounding the spring filling with layers of fibrous filling on all sides thereof, all of which is then disposed in a tick, the closing of which completes the assembly of the spring cushion or mattress. This invention does not concern itself with the construction and assembly of the spring cushion or mattress, but only with the spring filling to be used in such construction. For that reason it is believed unnecessary to describe in any great detail the construction or assembly of the various parts which go to make up the completed spring mattress or cushion.

My improved construction of spring filling which is to take the place of the spring fillings heretofore used, which were made up of sheet metal coils or wire coils, comprises a plurality of the elements **10**, arranged in substantially parallel rows, disposed adjacent each other. Each row may consist of either one or a pair of the elements **10**. In the embodiment shown in Figs. 1 and 2, each row consists of a pair of the elements **10** connected to each other with the plain bands or strips **11** being positioned in contacting engagement with each other throughout the full length of the element. In this position the pair of elements forming each row is tied together in any suitable and well known manner to prevent

relative movement of one element with respect to the other element in any one row.

In the embodiment illustrated there is utilized a fiber cord **20** which is looped around the pair of elements and tied as shown at **20'**, said cord extending into the spaces formed between the fingers **12**. The said cords should be sufficiently taut to hold the two elements **10** in a position in which their plain bands or strips **11** will be in contacting engagement with each other substantially throughout the full length of the element and will prevent any turning movement of said elements relative to each other. Obviously some means other than the cords may be employed for securing the pair of elements in each row to each other. Thus a rivet **21'** may be used either instead of or in addition to the cord fastening means.

To complete the assembly of my improved spring filling the rows of elements are arranged adjacent each other and either transversely or longitudinally of the spring cushion or mattress to be made and when in that position are tied to each other by means of strips of cloth **21** or other suitable material, said strips of cloth extending across the full width of the spring filling and acting as a tie member for tying the rows of elements to each other.

The spring filling, when completely assembled, is received in a fabric casing **22** of burlap or the like, and surrounding the casing are layers of fibrous filling **23**, such as cotton, cotton felting, or the like, said layers being placed around all sides, top and bottom of the spring filling. The entire assembly is then enclosed in a tick **24**, being of a size equal to the full length and width of the cushion or mattress being made. The assembling of the tick and the spring filling with the fibrous layers may be performed in any conventional manner with or without the aid of a mattress filling machine or device.

In the embodiment illustrated in Figs. 5 and 6, my improved element **10** is utilized in the construction of a bed spring or the like. Thus there is shown in this embodiment a frame support **30** consisting of the longitudinal members **31** and the cross members **32** which are connected to each other to form a substantially rectangular supporting frame. Disposed on the frames are a plurality of transverse bars or tie rods **33**, said bars or rods being suitably spaced from each other for a purpose to be presently more fully described. Mounted upon each of the transverse tie bars **33** is an element **10**, the strip or band **11** of which is securely fastened to the tie bar with which it is associated by any suitable fastening means, such for example as a screw or a nail **34**. These fastening means **34** may be suitably spaced as shown in Fig. 5 and are sufficient in number to securely fasten the element **10** to its tie bar. The size and thickness of each of the fingers **12** which form the loop **13** will, of course, depend upon the nature of the material used and the purpose for which the spring element is designed.

Obviously instead of the elements being formed in longitudinal strips, each strip carrying a plurality of loops, said elements may be formed by individual strips bent to form a loop and each loop having one end secured to the base supporting member with the free end of the loop arranged in overlapping relation with said fixed end and adapted to move relative to said fixed end upon the application of pressure to the upper surface of the loop.

In the Fig. 7, is shown a single loop element mounted upon a base. The element is generally designated by the reference character **40**, and is formed from a narrow strip of material bent upon itself to form a closed loop **41**. One end of said loop is fixedly secured to its support **42**, by means of countersunk screw or nail **43**. The opposite end **44** is free and is arranged in overlapping relation with said fixed end.

It is believed that my invention, its mode of construction and assembly, and many of its advantages should be readily understood from the foregoing without further description, and it should also be manifest that while a preferred embodiment of the invention has been shown and described for illustrative purposes, the structural details are nevertheless capable of wide variation within the purview of my invention as defined in the appended claims.

What I claim and desire to secure by Letters Patent of the United States is:

1. A spring member constructed of a single strip forming a closed loop with the ends thereof disposed in overlapping relation, the elasticity of the material holding said ends in contacting engagement whereby upon the application of pressure in a direction parallel to the plane of said loop the same will tend to wind up upon itself and be placed under tension, and a support for mounting said spring member, one end of said loop being fixedly secured to said support, and the other end being free for movement relative to said fixed end.

2. A spring member constructed of a single elongated strip, a plurality of fingers extending from one longitudinal edge of said strip and bent upon themselves to form loops with the free ends of said fingers extending inwardly of the longitudinal edge opposite to that from which the fingers extend, such free ends being held in contacting engagement with the body of the strip by the elasticity of the material, whereby upon the application of pressure in a direction parallel to the plane of said loops same will tend to wind up upon themselves and be placed under tension.

3. A spring member constructed of a single elongated strip, a plurality of fingers extending from one longitudinal edge of said strip and bent upon themselves to form loops with the free ends of said fingers extending inwardly of the longitudinal edge opposite to that from which the fingers extend, such free ends being held in contacting engagement with the body of the strip by the elasticity of the material, whereby upon the application of pressure in a direction parallel to the plane of said loops same will tend to wind up upon themselves and be placed under tension, and a support mounting said strip to which the same is fixedly secured.

4. A spring member formed from relatively non-resilient material constructed of a single strip forming a closed loop with the ends of said loop disposed in overlapping relation and a support for said spring member arranged in a plane perpendicular to the plane of said loop, the plane of said loop being parallel to the direction of application of the load to be carried thereby, one end of said loop being fixedly secured to said support and the other end of said loop being free to move relative to said fixed end.

5. A spring member formed from relatively non-resilient material constructed of a single elongated strip having a plurality of substantially parallel fingers extending from one longitudinal edge thereof, said fingers being bent

upon themselves to form closed loops with the free ends of said fingers disposed in overlapping relation with the longitudinal edge of said strip opposite to that from which said fingers extend, said free ends being held in contacting engagement with said strip by reason of the elasticity of the material from which said strip is constructed, a support for said strip arranged in a plane substantially perpendicular to the plane of said loops, means for securing said strip to said support, the plane of said loops being parallel to the direction of application of the load to be carried by said spring member.

6. A bed spring comprising a substantially rectangular frame adapted to rest at its ends upon the rails of a bed stead, a plurality of spring units carried by said frame, each unit comprising an elongated strip having a plurality of fingers extending from one longitudinal edge thereof, each of said fingers being bent upon itself to form a closed loop with the free end of the fingers disposed inwardly of the edge opposite to that from which said fingers extend, said loops being arranged in a plane perpendicular to the plane of the supporting frame and parallel to the direction of application of the load to be carried by said spring units.

7. A bed spring comprising a substantially rectangular frame adapted to rest at its ends upon the rails of a bed stead, a plurality of independent spring units carried by said frame, each unit comprising an elongated strip constructed of relatively non-resilient material, fingers extending from one longitudinal edge of said strip and bent upon themselves to form closed loops with the free ends of said fingers extending inwardly and overlapping the longitudinal edge of said strip opposite to the edge from which said fingers extend, the plane of said loops being perpendicular to the plane of the frame and parallel to the direction of the application of the load, and means for fixedly securing said strip to said frame with the free end of said fingers being permitted to move relative to said fixed strip.

8. A bed spring comprising a supporting frame adapted to rest at its ends upon the rails of a bed stead, a plurality of spaced bars mounted upon said frame and a plurality of spring units carried by each of said bars, each spring unit being constructed of a single strip of relatively non-resilient material and forming a closed loop with the ends thereof disposed in overlapping relation, one end of said loop being fixedly secured to its associated bar and the other end being free to move relative to said fixed end, the plane of said loops being parallel to the direction of application of the load and perpendicular to the plane of the bar upon which it is mounted.

9. A spring mattress of other resilient support comprising a resilient body composed of a plurality of pairs of resilient units arranged juxtaposed and close to each other, means arranged transversely to the longitudinal direction of said pairs for connecting the latter into a unitary body, each of said pairs freely supporting itself, each unit of each of said pairs being constructed from an elongated strip of relatively non-resilient material having a plurality of fingers extending from one edge thereof and bent upon themselves to form closed loops with the free ends of the fingers disposed inwardly of the longitudinal edge of said strip opposite to the edge from which said fingers extend, the units of any one pair being secured to each other with the longitudinal strips in contacting engagement with each other throughout the full length, the plane of said loops in any one pair being parallel to the direction of the application of the load to be carried by said units.

EDWARD L. BASS.