May 16, 1939. L. A. DUNAJEFF 2,158,929

RESILIENT SHEET

Filed May 14, 1937

Fig. 1

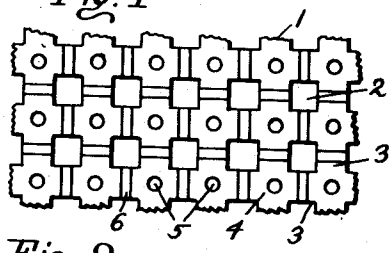


Fig. 3

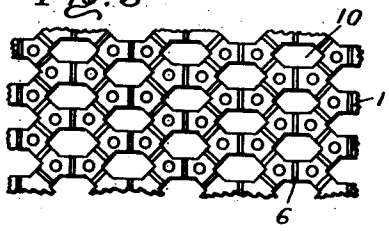


Fig. 2



Fig. 4

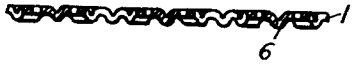


Fig. 9

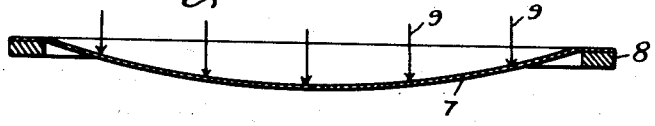


Fig. 5

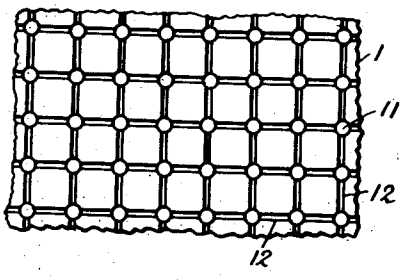


Fig. 7

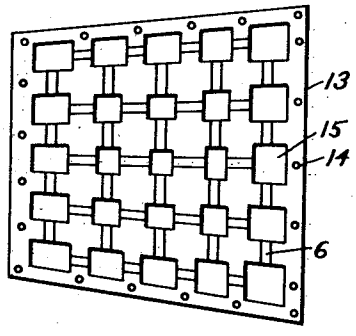


Fig. 8

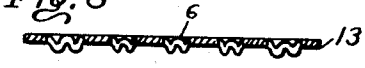
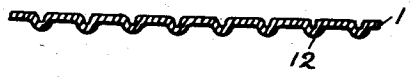


Fig. 6



LEONID A. DUNAJEFF

INVENTOR

BY John P. Nilsonow

ATTORNEY

Patented May 16, 1939

2,158,929

UNITED STATES PATENT OFFICE

2,158,929

RESILIENT SHEET

Leonid A. Dunajeff, New York, N. Y., assignor to Commercial Ingredients Corporation, New York, N. Y., as trustee

Application May 14, 1937, Serial No. 142,630

7 Claims. (Cl. 29—180)

My invention relates to resilient sheets and has particular reference to perforated and corrugated sheets made of a resilient material.

The object of my invention is to provide a sheet having high resiliency and substantial elongation in all directions combined with sufficient strength to withstand transverse loads, so that it can be used as a material for making seats and backs of chairs and similar furniture or as a foundation for upholstering in place of ordinary springs. For this purpose I use metal sheets of high resiliency, such as carbon or alloy steel, bronze etc., perforated so as to produce a mesh-like structure, the perforations resulting in the formation of a plurality of interconnecting bridges, and these bridges are then corrugated so as to form them into stretchable springs. The sheet, when perforated and formed, can be heat treated to increase its resiliency if made of carbon steel. With other metals and alloys the resiliency can be imparted by the cold working of the metal. My sheet, in order to be expansive or stretchable in all directions, must have corrugated bridges separated by perforations between elements which are connected by the bridges, and the perforations must extend across the bridges. It is evident that any longitudinal corrugations will not make the bridges expansive lengthwise. The corrugations, however, need not extend at right angles to the axis of the bridge. They may extend even at an angle, provided that they cross the bridge, i. e., begin and end in the perforations, so as to render the bridge expansive lengthwise. In the following description therefore the term "transverse" or "substantially transverse" corrugations will include all such corrugations as cross the bridges and end in the perforations or are interrupted by perforations.

Another object of my invention is to provide a resilient sheet which can be prepared of large sheets of metal as described above, these sheets being then cut and trimmed to suit various practical applications.

Another object of my invention is to provide a resilient sheet formed with a plurality of corrugated spring-like portions extending in various directions, the corrugations projecting to one side of the sheet, leaving the other side smooth so as to provide a smooth front side for the chair seats and backs, or for other similar applications where the surface must be smooth. The smooth surface may be then covered by some flexible inelastic protective material.

Another object of my invention is to provide a method of making resilient sheets, consisting in perforating a sheet so as to form a plurality of interconnected bridges, and corrugating the bridges into spring-like resilient members.

My invention is more fully explained in the accompanying specification and drawing in which:

Fig. 1 is a front view of my resilient sheet.

Fig. 2 is a sectional view of the same.

Fig. 3 is a front view of a modified resilient sheet.

Fig. 4 is a sectional view of the same.

Fig. 5 is a front view of another modification.

Fig. 6 is a sectional view of the same.

Fig. 7 is a front view of a resilient sheet made to form a chair seat.

Fig. 8 is a sectional view of the same.

Fig. 9 is a diagrammatic view of my resilient sheet deflected under a load.

My resilient sheet consists of a sheet of metal 1, preferably carbon steel which can be heat treated to a spring temper, or an alloy which can be made resilient by cold rolling and stamping or forming operations. It is provided with a plurality of perforations 2, the material between the perforations forming bridges 3 extending at right angles to each other. Portions 4 of the sheet of metal interconnecting the bridges may be provided with holes 5 which may be used for attaching the sheet to supporting frames or for attaching covering and upholstering materials to the sheet. The bridges are folded or corrugated as shown so that every bridge forms a spring which can expand under load, returning to the original shape when the load is removed.

The corrugations act as small individual springs imparting a certain elasticity to the whole sheet in all directions. The result is that the sheet deflects under a load as if made of a very elastic substance, as shown in Fig. 9 where an elastic sheet 7 is fastened to a frame 8 and is deflected by a load 9 at different points. The curve of deflection, of course, will vary considerably for an irregular distribution of load as every individual spring will become deflected in accordance with its load. My sheet therefore can replace mattress and bed foundations made of individual helical springs at a considerably reduced cost and with increased reliability. The use of a single integral sheet eliminates a large number of joints necessary with a helical spring assembly thereby also eliminating points of friction and wear, these points of friction being often a cause of annoying squeaks. The sheets can be made in standard sizes and trimmed to suit particular applications, the holes 5 being then used for attaching the sheet to its supporting frame and also for at-

taching fabric and covers. The front side of the sheet is made smooth by keeping the corrugations 6 below its front surface as shown in Fig. 1.

A modified structure is shown in Figs. 3 and 4 with hexagonal perforations 10 which may be elongated in one direction so as to obtain a greater resiliency in one direction.

Another modification is shown in Figs. 5 and 6. Here holes 11 are provided at the points of intersection of corrugations 12, the sheet being of a somewhat greater rigidity and strength than the sheet shown in Figs. 3 and 4. It has a smoother and more uniform surface suitable for certain applications where a flat metal surface may be required without any covering by a fabric, as in metal chairs, for instance.

Another modification is shown in Figs. 7 and 8 depicting a sheet 13 made as a seat for a chair and provided with holes 14 at its edges for fastening these edges to the frame of the chair. The perforations 15 are made of different sizes in order to adjust the resiliency of the corrugations 6 and, partly, for ornamental purposes, if the sheet is left uncovered by any upholstering.

My resilient sheets are especially suitable for office and outdoor furniture where it is desired to have all-metal furniture with sufficiently soft or resilient seats and backs; also for hospitals etc. where the furniture must be sanitary and can be washed and sterilized.

I claim as my invention:

1. An expansive sheet having a plurality of portions connected by bridges with perforations between the bridges, every portion being connected by the bridges with at least three other portions, the bridges having corrugations directionally extending in a substantially transverse direction, the corrugations being interrupted by the perforations.

2. A resiliently expansive sheet formed integrally with portions connected by bridges with perforations between the bridges, the bridges having substantially transverse corrugations for rendering them longitudinally expansive, the corrugations being interrupted by said perforations, every portion being connected by bridges with at least three other portions.

3. A resiliently expansive sheet formed integrally with portions connected by bridges with perforations between the bridges, the bridges having substantially transverse corrugations for rendering them longitudinally expansive, the corrugations being interrupted by said perforations, the portions being provided with supplementary perforations.

4. A resiliently expansive sheet made of perforated sheet material, the perforations being distributed so as to leave a pattern of portions interconnected upon their outsides by bridges, the bridges being folded in substantially transverse directions, the ridges of the folds being interrupted by the perforations.

5. A sheet made laterally expansive by folding it into a plurality of groups of corrugations forming rows, the corrugations of one group of rows extending in generally parallel directions but intersecting the corrugations of the other groups of rows, the corrugations at the points of intersection being interrupted by perforations.

6. A sheet made resiliently expansive in different directions by folding it into a plurality of groups of corrugations, the corrugations of one group directionally intersecting the corrugations of other groups, the corrugations at the points of intersection being interrupted by perforations.

7. A resiliently expansive perforated sheet having a plurality of polygonal portions interconnected by bridges, the bridges being folded in substantially transverse directions, the ridges of the folds terminating in perforations separating the bridges and portions.

LEONID A. DUNAJEFF.