March 26, 1946. H. GHEZ ET AL 2,397,415

FLEXIBLE DEVICE

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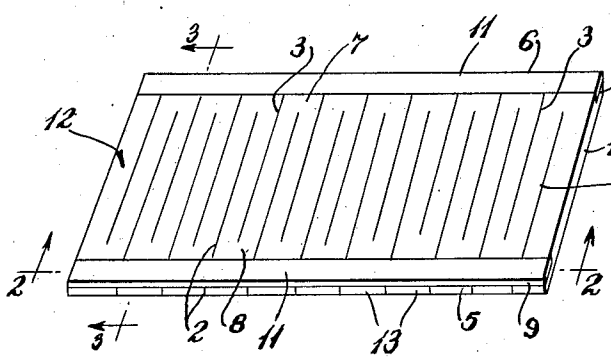


Fig. 1.

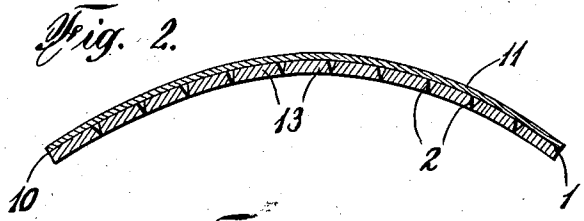


Fig. 2.

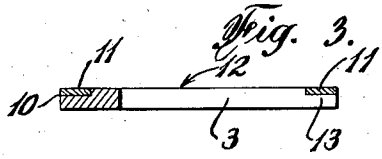


Fig. 3.

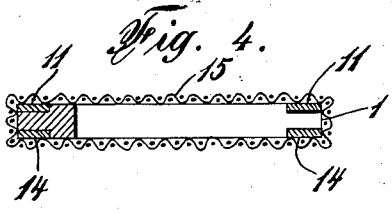


Fig. 4.

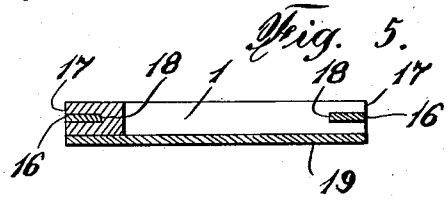


Fig. 5.

INVENTORS:
Henry Ghez
Oscar Ghez

BY
Haseltine, Lake & Co.

ATTORNEYS.

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FLEXIBLE DEVICE

Henry Ghez and Oscar Ghez, New York, N. Y.

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1 Claim. (Cl. 46—157)

The present invention relates to flexible devices which include or have incorporated in their structures one or more resilient members made of normally stiff material which is rendered flexible by being partly slotted from two sides thereof.

The main object of our invention is to produce a resilient structure which is capable of taking many forms and being modified in material and dimensions for making various toys and useful articles.

Another object is to utilize wood and other inherently stiff materials for embodying the invention and making resilient members without the use of rubber and in most cases without using metal in order to conserve both rubber and metal.

A further object is to utilize resilient members made of originally stiff material to produce new lines of articles and toys that will have a new and different appeal than those heretofore available on the market.

Other objects and the advantages inherent in our invention and accruing from its actual application in practice will appear more fully in detail as this specification proceeds.

In order to facilitate ready comprehension of the invention, the same is illustrated in several forms in the accompanying drawing forming part hereof, in which like parts are designated by like numerals, and in which:

Fig. 1 illustrates in perspective a mat or article embodying the invention, and including means for limiting flexure to prevent breakage.

Fig. 2 is a longitudinal section of the mat of Fig. 1 as taken on line 2—2, with the mat bent or curved to show the flexure thereof limited by a feature of its construction.

Fig. 3 is a transverse section of the same as taken on line 3—3 in Fig. 1.

Fig. 4 is a transverse section similar to Fig. 1 showing a modification.

Fig. 5 is a similar section of a further modification.

In the field of toys and even in practical fields it has often been considered necessary in order to produce a resilient article, to utilize rubber, at least for portions thereof in order to introduce resiliency into the construction. However, if the cost of rubber is prohibitive and such material is almost unobtainable, it is preferable to utilize available materials which are normally rather stiff and perhaps almost rigid, while rendering the same resilient by means of a special system of alternated slots or cuts disposed transversely of the longitudinal axis of the article involved. Such treatment of the normally stiff material is intended to convert the same virtually into a spring and thus opens a new field which will involve not only toys but practical articles.

Hence, in the practice of our invention a flat member or mat generally indicated at 1 in Fig. 1 is made of flat sheet material which is normally substantially stiff and inflexible, such as wood, veneered wood, plastic, or even metal, etc. Member 1 is provided with two series of alternated transverse slots 2 and 3 which extend through the thickness of the material from the edges thereof to within a short distance of the respectively opposite edges 5 and 6. Thus one series of slots 2 extend from one side edge 5 inwardly across the major portion of the width of the member 1 but stop short of the opposite side edge 6 while the other series of slots 3 extend from edge 6 inwardly across member 1 and stop short of edge 5. As shown slots 2 are in alternate arrangement with slots 3 along the length of the material and may be generally perpendicular to the longitudinal axis of member 1. Slots 2 and 3 thus permit flexure at the remaining portions 7 and 8 of the material which remain beyond the slots 2 and 3. Thus member or mat 1 as a whole may be flexed and will therefore behave in a similar fashion to a thin mat of cellulose acetate or Celluloid, or even of rubber, thus the article will be one of general utility.

As thus far described, the flexure of the slotted members shown is substantially left to the judgment of the person handling the object involved, but if too great a strain is imposed breakage will very likely result. Hence, a means for preventing breakage is also shown in Figs. 1, 2 and 3, wherein a mat 1 is provided with side recesses 9 and 10 across all of the slots 2 and 3 with one or more strips 11 of leather, rubber, flexible plastic, or even metal, or any other suitable material, so that the side 12 with which these strips 11 preferably lie flush may be flexed as shown in Figure 2. It is quite evident that the strips 11 will limit flexure of the mat to a certain curved position beyond which it will not be possible to bend the mat because the strips will prevent the individual slotted members 13 from having the upper edges of their slots 2 and 3 separated beyond a predetermined small distance controlled by said strips.

A modification of mat 1 is shown in Figure 4, in which the mat or other flexible member 1 has not only the upper strips 11, 11, but also lower strips at the bottom at 14, 14, preferably of very flexible material, such as soft skin or rubber;

or one of the sets of the strips on one side may be of leather, rubber, paper or metal, etc., while the other strips on the opposite side should then be of rubber, soft skin or fabric, etc. When two strips are present having appropriately balanced characteristics, as just mentioned, flexure is possible in both upward and downward directions, while flexure will also be limited in both directions. In addition, it is obvious that the whole article could be covered with various materials, such as plastic or rubber or fabric 15, which is actually shown in Figure 4, but this feature may be omitted if desired.

Another modification of service which is feasible is shown in Figure 5, in which the mat or flexible member 1 has a strip 16 embedded intermediately between the upper and lower surfaces in the side edges 17, 17 in slots 18, 18. In this form the strips will serve to prevent excessive flexure in either direction, while remaining entirely neutral as to the direction of flexure. This mat may have a flexible strip 19 covering the entire bottom surface instead of having the side strips 16, 16, or the latter may also be included at the same time.

It is, of course, clear that in the forms shown of Figures 1 through 5, the strip which prevents the excessive flexure from occurring may be molded, cemented, glued, nailed, riveted, screwed or otherwise fastened to the portions of the flexible member with which they are in contact, and we are not limited to any particular means for fastening the strips to said flexible member or slotted resilient object.

The flexible member embodying the invention may, if desired, have slots which are neither straight nor directly perpendicular to the longitudinal axis of the member or article, but may be sinuously curved, or at an angle other than a right angle with respect to the side edges of the article. For example, the mat or other flexible member 1 may have sinuous, curved or arcuate slots which may be disposed at any practical angle with respect to the side edges and we are not limited to either the shape or the angle, nor even the number of slots used on a side.

In view of the actual scope of the main principles of the invention, the slotted material or the article may be of any desired shape and is not limited to the substantially rectangular shape shown in Fig. 1. Thus we propose to embody the same not only in toy fish, snakes, houses, boats, dolls, etc., but any form of animal either marine or land animal whether biped or quadruped, or bird or reptile, may be simulated while the slots are provided according to the same general principles. However, it will be understood that we are not limited to toys but we may apply the invention to any article of utility and even build up new articles which will be feasible to produce because of the presence of the slots and the normally stiff nature of the material actually used.

It has been indicated that the flexible member is slotted in order to render the same flexible, whereas it is actually made of a more or less stiff and unyielding material. In other words, the flexible member may in any case consist of wood, ply-wood, plastic-wood, any and all known plastics or combinations thereof, cork or cork agglomerate, hard rubber, cardboard, fiber, metals and alloys of all common metals, glass and various combinations and compositions. The slots may be cut, molded, formed or made in any other practical manner in the flexible member. On the other hand, the flexible sheets or strips included to prevent excessive flexure may partly or completely cover said flexible member and may or may not itself be slotted and preferably consists of leather, skin, rubber or rubber compound, cardboard, fiber, fabric, metal, Vinylite plastics, or any other flexible plastic material. The material partly or completely covering the flexible member may be applied temporarily or permanently and in the case of plastics and rubber, etc., the same actually penetrating into the individual slots if so desired.

From the foregoing it will be clearly evident that the invention lends itself to many forms of application in many arts, and may be modified in actual form, outline, cross section, in longitudinal dimensions, etc., and the result will in all cases be approximately the same, namely that, in view of the broad principle herein we reserve the right to make further modifications not shown, but would rather indicate that those forms actually shown and described are merely representative of many fields which have merely been touched upon above.

Having now fully described our invention, we claim:

A toy or other article of manufacture having at least one portion made of a material which is normally stiff and inflexible, said stiff and inflexible material having two series of slots extending through the thickness thereof, one series of slots extending from one side edge inwardly across the major portion of the width of the material but stopping short of the opposite side edge, the second series of slots extending from the opposite side edge inwardly across the major portion of the width of the material and alternating with the first series of slots but stopping short of the other side edge, said series of slots rendering the normally stiff and inflexible material flexible but not to the extent wherein the toy or other article of commerce loses its original identity or function as such, and a strip of flexible material disposed in a recess along each of two opposite edges of said material and bridging the slotted portions of said toy or other article of manufacture so as to prevent excessive flexure thereof.

HENRY GHEZ.
OSCAR GHEZ.