Aug. 31, 1965 ZENICHI INOTSUME 3,203,200

THIN EXPANSIBLE BAND WITH COPLANAR SPRINGS

Filed March 21, 1963 2 Sheets-Sheet 1

FIG. 1.

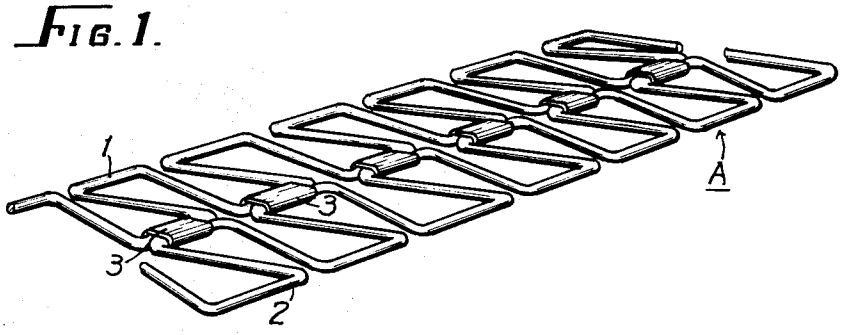

FIG. 2.

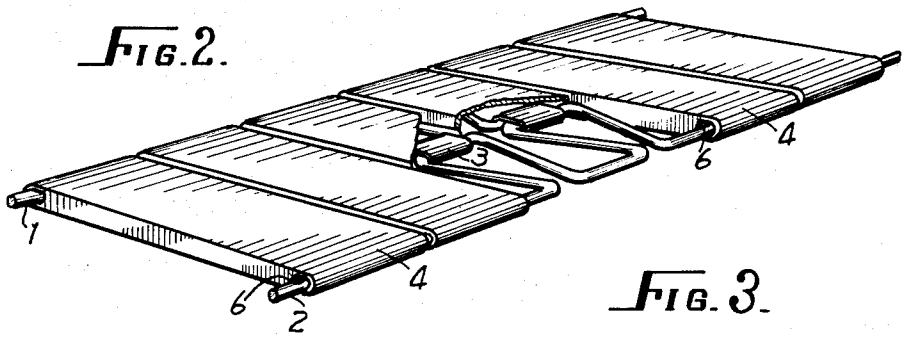

FIG. 3.

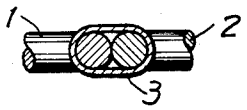

FIG. 4.

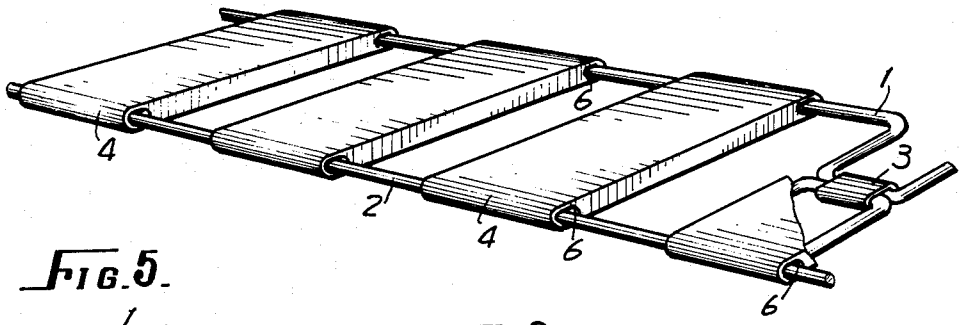

FIG. 5.

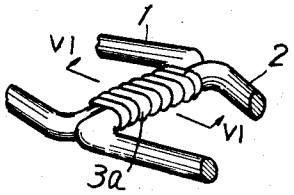

FIG. 6.

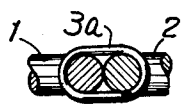

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FIG. 7.

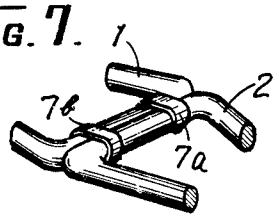


FIG. 8.

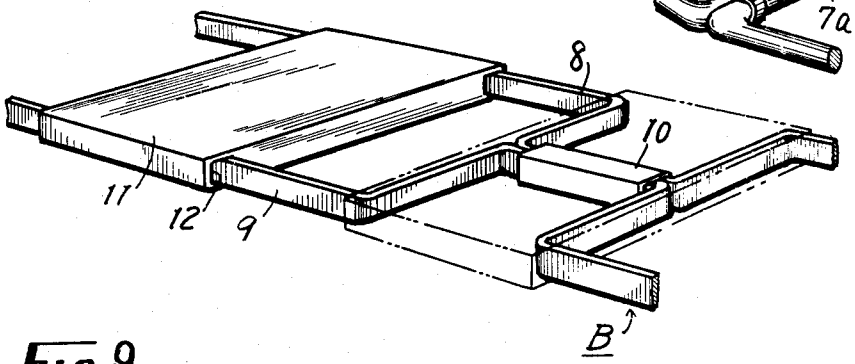


FIG. 9.

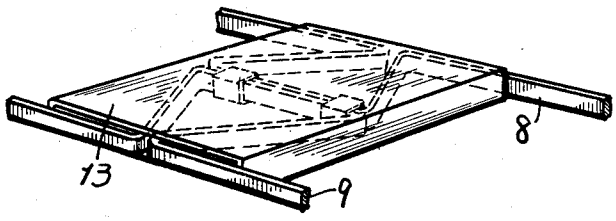


FIG. 10.

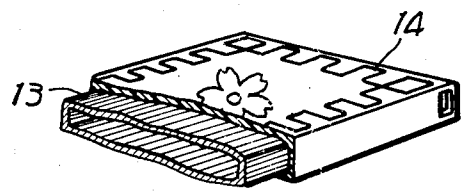
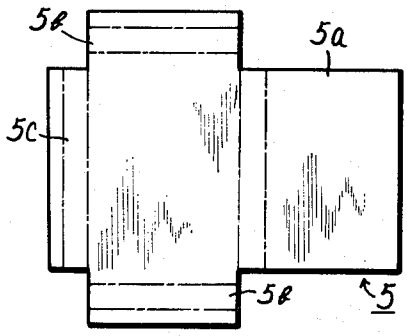


FIG. 11.



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3,203,200

THIN EXPANSIBLE BAND WITH COPLANAR SPRINGS

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Claims priority, application Japan, May 15, 1962, 37/19,452
9 Claims. (Cl. 63—5)

This invention relates broadly to resilient link bands, such as wrist watch band and the like, comprising a number of link members connected resiliently with each other by one or more elongated resilient means passing therethrough and attached at the both ends to the end links.

According to the conventional technique, the elongated resilient means take in most cases the form of coil springs.

It is one of the considerable drawbacks inherent in these kinds of resilient band that when it is subjected to a stronger tension the coil springs are liable to attain a permanent set. When this occurs, the band cannot recover its original shape, thus losing its resiliency at least partially.

It is a further inherent drawback in these conventional kinds of resilient band that when it is desired to furnish a smart band which is very thin, the desired construction cannot be realized because of the provision of the elongated coil springs within the band, as these coil springs have relatively large diameters or lateral dimensions.

If stronger coil springs are used to obtain an increased resiliency of the band, the thickness of the band must be correspondingly increased. Conversely, if it is desired to provide a very thin band, the coil springs must be correspondingly made smaller in diameter with a corresponding decrease in resiliency of the band.

It is, therefore, the main object of the present invention to provide resilient bands such as, for instance, wristwatch bands, having increased resiliency and enhanced thinness.

It is another object of the invention to provide resilient bands of the kind above referred to, which have a very simple construction and are easy to manufacture and cheaper in their price.

In order to fulfill the above objects, the band according to this invention comprises a resilient framework comprising in turn two or more elongated wire elements firmly connected with each other at spaced positions, each of said wires being in a zig-zag shape comprising a number of alternate triangles. Thanks to such configuration of the spring wire, it is possible to employ a stronger framework so as to provide enough resiliency. If tensioned the resilient framework as a whole will resist the external force and the number of triangles can provide effective resistance thereto. The resilient framework is of substantially flattened design so that the thickness of the band can be kept to a minimum, if desired.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view of part of a resilient framework adapted to provide resiliency to a link band which includes such framework;

FIG. 2 is a perspective view of the normal state of such a link band, wherein the band is illustrated only part thereof and partially has been broken away in order to reveal the inside construction;

FIG. 3 is an enlarged sectional view taken along a transverse line through one of the connectors 3 in FIG. 1;

FIG. 4 is a perspective view of the band above referred to, shown in its tensioned state;

FIG. 5 is a detail perspective view of the modification of connecting means for uniting two resilient elements so as to form the resilient framework;

FIG. 6 is a sectional view of the modified connecting means taken along the line VI—VI in FIG. 5;

FIG. 7 is a perspective view of another modified connecting means;

FIG. 8 is a perspective view of part of a modified band, wherein the imaginary line represents a link member;

FIG. 9 is a perspective view of a part of a further modified band in its normal or contracted state;

FIG. 10 is a perspective view of a decorative synthetic resin cover piece assembled with a band link; and

FIG. 11 is a developed plan view of a band link.

Now referring to the drawings, especially FIG. 1 thereof, **1** and **2** denote two wire elements made of carbon steel, stainless steel, Phosphor bronze or the like spring material, and each shaped in a zig-zag form comprising a number of alternately oppositely directed similar triangles.

These two elongated spring wire elements are united into a resilient framework, expandable in its longitudinal direction, by means of a number of metal strips **3**, each of which is shaped by bending into a hollow tube embracing a pair of adjoining sides of two opposite triangles belonging, respectively, to the wire elements **1–2**. It will be noted from FIG. 1 that these small tubes are arranged along the center line of the thus formed framework at spaced positions, thus preventing said two wires from separating physically from each other.

The resilient framework is covered by a number of box elements **4**, each of which is wide enough to wholly contain one of said connecting tube elements **3**. The length of the box element **4** is so selected as to completely cover the width of the framework generally denoted by A in FIG. 1. The box element **4** is made from a substantially cross-shaped metal sheet **5** (FIG. 11) having a relativley large flap **5***a* and three small flaps **5***b*, **5***c* and **5***d*, by bending along eight folding lines shown in the drawing by imaginary lines. The cross-shaped sheet elements **5** are preferably made from a metal strip by stamping, as will be easily imagined by those skilled in the art. The original shape of sheet element **5** is preferably so selected that four small openings **6** can be automatically produced in the course of the box-shaping job. Or alternatively, these openings **6** may be produced by mechanical drilling after completion of each of the said box elements. The openings **6** serve for loosely or slidably receiving the outer chords of the framework A as shown in FIGS. 1 and 2. In the normal state of the thus provided resilient band, box elements **4** occupy side-by-side positions with a small gap between each pair thereof. When tensioned by being subjected to an external tensile force acting in the longitudinal direction of the band, the small gap is naturally caused to increase and the aforementioned triangles are expanded, to a more or less degree, into widened U-shapes as illustrated in FIG. 4. When released, the band will recover its original contracted shape automatically by its own resiliency.

FIGS. 5 and 6 show a modification of the connecting means described in the foregoing as a metal tube. In the embodiment of FIGS. 5 and 6, two wire elements are united together by flexible metal strips **3***a* wound around each two adjoining chords of these elements, of which only one of such uniting positions is illustrated in FIG. 5 or 6, respectively.

In FIG. 7, there is shown a further modification of the

connecting means, each of which comprises two separate clips 7*a* and 7*b*.

In a modified band according to this invention shown in FIG. 8, wire elements 8 and 9 have each a rectangular cross-section instead of a round one as in the foregoing embodiments. In this case, connecting means are also somewhat modified so as to be hollow tubes 10 of rectangular cross-section. Cover elements 11 are substantially similar to those denoted by 4 in the foregoing embodiments, except that corner openings 12 are of rectangular instead of round configuration, so as to receive snugly, yet slidably the corresponding chords of the resilient framework denoted generally by B.

In a still further modified band shown in FIG. 9, cover element 13 comprises a hollow rectangular sheath having open ends, through each of which a pair of chords of the resilient framework extend. This construction provides for more free relative movement of resilient triangles.

As can be readily understood, the resilient frame employed in each of the foregoing embodiments has an ample bending resiliency to meet occasional conditions in use. If it is desired to increase the bending resiliency in the plane perpendicular to that of the band, the thickness of the cover element should preferably be selected somewhat larger than that of the resilient wire.

In a further embodiment shown in FIG. 10, cover element 13 is enclosed in a decorative synthetic resin sheath 14, thus obtaining a rather soft touch and a superior design effect.

It will be appreciated from the foregoing that according to the present invention a more resilient, permanent-set-free, thinner link band can be obtained with simpler construction.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention, and therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalents of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A resilient band comprising, in combination, plural relatively elongated resilient frames arranged in laterally juxtaposed substantially coplanar relation; each of said frames comprising a relatively elongated continuous resilient wire bent in zig-zag fashion to define a plurality of coplanar longitudinally juxtaposed substantially similar triangles, longitudinally adjacent triangles of each frame being oppositely oriented laterally of said plural frames; the bases of alternate triangles of each frame being normally substantially rectilinearly aligned to define one normally rectilinear longitudinal edge of the associated frame, and the bases of triangles of each frame, intermediate said alternate triangles, being normally substantially rectilinearly aligned to define a second normally rectilinear longitudinal edge of the associated frame; alternate triangles of each frame each having its base juxtaposed and substantially coextensive with the base of a respective alternate triangle of the laterally adjacent frame; connecting means joining the juxtaposed bases of each pair thereof to each other; and plural link members loosely mounted on said plural frames in longitudinally substantially juxtaposed relation, each link member having a length of the order of that of said triangle bases and a width substantially equal to the overall widths of said juxtaposed frames, said link members engaging laterally extending elements of said frames to limit expansion of said band.

2. A resilient band as set forth in claim 1, wherein each of said connecting means comprises a metal strip shaped into a tube.

3. A resilient band as set forth in claim 1, wherein each of said connecting means comprises an elongated metal strip wound into a coil.

4. A resilient band as set forth in claim 1, wherein each of said connecting means comprises two or more metal rings.

5. A resilient band, as set forth in claim 1, wherein adjacent triangles in each frame have one side in common.

6. A resilient band, as set forth in claim 1, wherein each of said link members has a box-shape and confines a respective lateral row of said triangles within the interior space thereof.

7. A resilient band, as set forth in claim 6, wherein the laterally extending sides of each box-type link member are apertured, adjacent the opposite longitudinal edges of the respective link member, for slidable extension of triangle bases therethrough.

8. A resilient band, as set forth in claim 6, wherein said box-type link members are open at laterally opposite longitudinally extending ends thereof whereby the frame edge defining triangle bases extend exteriorly of said box-type link members.

9. A resilient band comprising, in combination, plural relatively elongated resilient frames arranged in laterally juxtaposed substantially coplanar relation; each of said frames comprising a relatively elongated continuous resilient wire bent in zig-zag fashion to define a plurality of coplanar longitudinally juxtaposed substantially similar triangles, longitudinally adjacent triangles of each frame being oppositely oriented laterally of said plural frames; the bases of alternate triangles of each frame being normally substantially rectilinearly aligned to define one normally rectilinear longitudinal edge of the associated frame, and the bases of triangles of each frame, intermediate said alternate triangles, being normally substantially rectilinearly aligned to define a second normally rectilinear longitudinal edge of the associated frame; alternate triangles of each frame each having its base juxtaposed and substantially coextensive with the base of a respective alternate triangle of the laterally adjacent frame; means interconnecting laterally adjacent frames to each other at points spaced uniformly longitudinally of said band; and plural link members loosely mounted on said plural frames in longitudinally substantially juxtaposed relation, each link member having a length of the order of that of said triangle bases and a width substantially equal to the overall widths of said juxtaposed frames, said link members engaging laterally extending elements of said frames to limit expansion of said band.

References Cited by the Examiner

UNITED STATES PATENTS

1,140,445	5/15	Collingwood	63—5 X
1,847,901	3/32	Roy	63—4 X
2,115,022	4/38	Kastner	2—339
2,443,191	6/48	Miller	267—73 X
2,553,563	5/51	Feid	63—5.1
2,564,744	8/51	Wilkening	63—5 X

FOREIGN PATENTS

466,750	11/51	Italy.

OTHER REFERENCES

German printed application S 41,494, Sparn, July 19, 1956.

RICHARD C. PINKHAM, *Primary Examiner.*