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COMPLETE SPECIFICATION

Improvements in and Relating to Elastic Link Straps, Particularly Watch Bracelets

We, RODI & WIENENBERGER AKTIENGESELLSCHAFT, of Bleichstrasse 56–68, Pforzheim, Baden, Germany, a German company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

This invention relates to new improvements in elastic link straps for ornamental or utilitarian purposes, and especially in watch bracelets. More particularly, the invention relates to improvements in that type of strap which consists of two layers of hollow links which are staggered relative to each other by the width of one-half link, and wherein each link of one layer is pivotally connected with two links of the other layer by means of two substantially open rectangular connecting brackets, the short stub ends of which project into the links of one layer and are connected with torsion coil springs disposed within these links in such a manner that the springs will be tensioned when the strap is being expanded. These coil springs terminate at each end in an arm, and the coiled portions of the two adjacent springs are in each case combined with each other by being fitted upon an intermediate member, while their adjacent arms are supported within the respective link so as to prevent them from turning. The two outer arms of the springs either extend into the links of the other layer so as to form connecting members thereto, and their angular ends therein are mounted in a sleeve connecting the same, or the coiled portions of both springs are fitted on the opposite stub arms of an open connecting bracket, the main connecting arm of which extends parallel to the stub arms and is mounted within the link of the other layer, while the free spring arms engage under tension against the lateral arms of the bracket which then serve as connecting members. Furthermore, for the passage of the connecting members from the links of one layer to those of the other layer, the links of one layer are provided with slots only in the bottom thereof, while those of the other layer also have such slots in their longitudinal side walls, but only along a portion of their height. These slots only permit a limited pivotal movement of the connecting members and therefore only a limited expansion of the strap.

It is an object of the present invention to provide an elastic link strap of the general type as above described, in which, however, the mentioned disadvantages thereof are avoided, thus permitting the strap to be expanded to more than twice its contracted length.

Another object of the invention is to provide an elastic link strap in which the springs are of a more simple and inexpensive design, and are more easily assembled in the links than in a strap of this type as previously designed.

With the above in view, the invention consists in an elastic link strap for ornamental or utilitarian purposes, and especially as a watch bracelet having a plurality of hollow links extending transversely to the longitudinal direction of the strap and in the contracted position of said strap forming two layers of links superimposed upon and substantially in engagement with each other, the links in one layer then being staggered relative to the links in the other layer in the longitudinal direction of the strap by the width of one-half link, connecting brackets pivotally connecting each link of one layer with two links of the other layer, at least one spring mounted within each link of at least one layer and connected to said brackets and tending to pivot the same to a position in which at least the adjacent links of one layer are in engagement with each other, characterized by the fact that two open rectangular brackets connect each link of one layer with two links of the other layer, each bracket having a straight arm pivotally

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mounted within the links of one layer, there being two short arms extending from the links of one layer to the adjacent link of the other layer and two inwardly bent stub arms pivotally engaging the links of the other layer and that said springs within the links of at least one layer form torsion springs and are connected therein under an initial tension to at least one of the two stub arms of each bracket.

Preferably only one of the two stub arms of each connecting bracket which project into the link containing the spring is non-rotatably connected with the spring, while the opposite stub of the bracket is freely rotatable within the same link. These springs may consist entirely of torsion coil springs, at least one end of which is shaped so as to be non-rotatably fitted upon one stub of a bracket after being tensioned by being turned about its axis, the other end of the spring being held against turning in the same direction. It is possible to use only one spring in each link of one layer if the coil spring is shaped so as to be adapted to be non-rotatably fitted at both ends after being turned relative to each other to tension the spring, upon the diagonally opposite stub ends of the two connecting brackets entering into the link containing the spring and connecting such link with the two links of the other layer. The spring then extends in a slightly S-shaped curve from one stub of the one bracket to the diagonally opposite stub of the other bracket.

If there are used two springs in each link of one layer, one stub end of each bracket may be fitted into one end of a coil spring, the other end of which is non-rotatably mounted within the link itself. Also the center of each coil spring may be clamped tightly within the link, and the two ends of the spring, after the two halves of the spring have been tensioned by being turned in the same direction, are then mounted on the two opposite stubs of the same connecting bracket.

Each spring may also consist of a leaf spring or an assembly of such springs which, after being turned about its axis to tension the spring, is non-rotatably connected to the stub end of one connecting bracket in one link which connects such link with one of the other layer.

The apertures provided in the links for the passage of the connecting brackets from those in one layer to those in the other layer are provided either in such a manner that the side walls and the bottom walls of the links are cut back to such an extent from each of the end walls thereof which extend along the longitudinal sides of the strap so that immediately behind each end wall an aperture will thus be formed which is slightly wider than the thickness of the side arms of the bracket passing therethrough. If, however, these apertures for the passage of the side arms of the connecting brackets are to be disposed further inwardly, the downwardly and inwardly bent side and bottom walls are provided along their entire width with notches extending in the longitudinal direction of the strap. If desired, the links of the lower layer may also be provided with apertures of the first-mentioned kind and those of the upper layer with those of the last-mentioned kind. This may be desirable if the upper links are of greater width than the lower links transversely to the direction of expansion of the strap. In that case, those parts of the upper links which extend beyond the lower links may be tapered, angularly inclined, or rounded off toward the longitudinal outer edges of the strap. The links of the upper layer may also be of greater width than the lower links in the longitudinal direction of the strap so that the latter will be spaced from each other when the strap is contracted. Also, all the links of the layer which does not contain any springs are preferably designed so that the wall thereof facing toward the other layer and retaining the connecting brackets in these links are separated by a gap of such a width as to permit the pivotable straight arms of the brackets to be hooked into these links or to be unhooked therefrom so that the strap may be lengthened or shortened at any desired point.

Apart from the fact that the springs, as well as their assembly are much more simple than those of the straps of this type as previously designed, the new strap has the further important advantage that each connecting member thereof may be pivoted about an angle of 90° and even more degrees and thus permit the links of the two layers to pivot from their superimposed position when at least the upper links are in engagement with each other, to a position in which they are adjacent to each other and substantially within the same plane. Thus, depending upon the width of the upper and lower links relative to each other, the new elastic strap will allow an expansion of 100 to 130%. A further advantage of the new strap over those of prior design resides in the fact that the links may be very easily and inexpensively produced and each link may consist of only one small plate which may be easily stamped to its desired shape. The new structure of the elastic link strap also affords the possibility that, by merely leaving a gap between the wall portions of the links of one layer which are facing toward the other layer, the connecting brackets may be hooked into or unhooked from the links within a few seconds and without any tools in order to increase or reduce the length of the strap by the addition or removal of one or more links.

Further objects, features, and advantages of the present invention will become apparent from the following detailed description thereof, particularly when read with reference to the accompanying drawings, in which—

Fig. 1 shows a vertical longitudinal cross section through a first embodiment of the elastic link strap with upper and lower links of substantially equal width, as seen in a partly expanded position;

Fig. 2 shows a horizontal cross section taken closely underneath the upper wall of an upper link according to Fig. 1 and showing the manner of mounting the spring;

Fig. 3 shows a similar cross section through a lower link and the connecting brackets therein, taken closely underneath the upper wall portions of such link;

Fig. 4 shows a cross section taken along line IV—IV of Fig. 2;

Fig. 5 shows a vertical longitudinal cross section through a modification in which the links and connecting brackets are adapted to be disconnected from each other;

Fig. 6 is a front view of a connecting bracket;

Fig. 7 is an end view thereof;

Fig. 8 is a top view thereof;

Fig. 9 shows a vertical cross section through a second embodiment of the elastic link strap taken in the longitudinal direction of the strap, with upper and lower links of different width;

Fig. 10 shows a cross section similar to Fig. 2 through a modification of the resilient connection between the upper and lower links;

Fig. 11 shows a cross section similar to Fig. 5 through the modification according to Fig. 10;

Fig. 12 shows a cross section similar to Fig. 2 through another modification of the resilient link connection;

Fig. 13 shows a cross section similar to Fig. 5 through the modification according to Fig. 12;

Fig. 14 shows a cross section similar to Fig. 2 through a further modification of the resilient link connection;

Fig. 15 shows a cross section similar to Fig. 5 through the modification according to Fig. 14;

Fig. 16 shows a cross section similar to Fig. 4 through another modified elastic link strap in which the upper links are of greater length than the lower links; while

Fig. 17 shows a cross section through an upper link of the elastic strap in which a leaf spring is applied in place of a coil spring as in the previous embodiments.

Referring to the drawings, and first particularly to Figs. 1 to 4, the elastic link strap according to the invention consists of a layer A of upper links 10 and a layer B of lower links 20 which normally extend parallel to each other within each layer and between both layers. Both types of links 10 and 20 are of substantially rectangular shape and form hollow casings with continuous outer walls 11 and 21 on each link. These walls 11 and 21, respectively, merge in side walls 12 and 22, respectively, which extend transversely to the longitudinal direction of the strap and at substantially right angles to walls 11 and 21, respectively. Side walls 12 of the upper links, in turn, terminate in lower wall portions 13, while side walls 22 terminate in upper wall portions 23. These wall portions 13 and 23 are bent at substantially right angles to side walls 12 and 22, respectively, and face toward each other at the inside of the strap. Both the upper ornamental and the lower arm-engaging walls 11 and 21 are continued into end walls 14 and 24, respectively, which are also bent at substantially right angles thereto and together form the longitudinal sides of the strap. Side walls 12 and 22 are made at each end slightly shorter than walls 11 and 21, respectively, so as to form a slot 15 and 25, respectively, between each of their ends and end walls 14 and 24, respectively. Furthermore, the upper links 10 are offset or staggered relative to the lower links 20 by the width of one-half link in the longitudinal direction of the strap, and the superimposed parts of each upper link 10 and lower link 20 are pivotally connected with each other by an open rectangular bracket 30, as shown particularly in Figs. 6 to 8. Each connecting bracket 30 consists of a straight arm 31 which is adapted to be disposed within one-half of a lower link 20, as shown particularly in Fig. 4, and a pair of short arms 32 which are adapted to extend from the lower link 20 to the superimposed part of the upper link 10 through the respective slots 25 and 15 of these links, and the short inwardly bent stub ends 33 and 33' of which engage into such upper link 10. The width of these stubs 33 and 33', as seen in a vertical direction, substantially corresponds to the inner height of upper links 10. At least one of the stubs 33 terminates in a square-shaped end portion 34 upon which the hollow square-shaped end 41 of a coil spring 40 is fitted so as to be non-rotatably secured thereto. Coil spring 40 may, however, also be of a square cross-sectional shape throughout its length.

In the embodiment of the invention as shown in Fig. 2, coil spring 40 has a similar square-shaped portion 41 at each end and extends in an S-shaped curve and is twisted in a manner as indicated by the dot-and-dash line 42 from the square-shaped end portion 34 on stub 33 of one bracket 30 to the diagonally opposite square-shaped end portion 34 on stub 33 of the other bracket 30 in the same upper link 10. Both brackets 30 are

thus pivotally mounted in both the upper and lower links, and when being pivoted by the expansion of the strap relative to each other, each spring 40 will be torsionally tensioned, while the lateral arms 32 of brackets 30 will then slide within slots 15 and 25 of the upper and lower links 10 and 20, respectively, thereby partly releasing the tension of spring 40 until such pivotal movement will finally come to an end when bracket arms 32 engage against stop members 16 which are bent inwardly from end walls 14 of upper links 10 into the plane of the lower wall portions 13 thereof. As shown particularly in Figs. 7 and 8, the other bracket arm 32 with the free stub 33′ is bent slightly outwardly to the extent of the wire thickness of spring 40 relative to the opposite arm 32 and stub 33 with the square portion 34 thereon. This permits spring 40 which is mounted on square portion 34, as well as stub 33′ which is devoid of a square-shaped end to abut against the upper wall 11 of the upper link so that the latter will be prevented from turning to an oblique position relative to the lower link. The tension of springs 40 will then tend to contract the strap. When the strap is being expanded, the lateral arms 32 of two adjacent brackets 30 pivot outwardly relative to each other about arms 31 in the lower link casing 20, while stubs 33 and 33′ of such two brackets turn within the upper link casings 10 in opposite directions to each other. Such turning movement automatically tensions springs 40 so that the strap when released will again contract. When the strap is being expanded, slots 15 and 25 in the side walls 12 and 22 of the upper and lower links permit the two arms 32 of brackets 30 to pivot behind end walls 14 and 24, respectively of the links until they extend parallel to the upper and lower walls 11, 13 and 21, 23 thereof, in which case the upper and lower links 10 and 20 will be at substantially the same level with each other and all the parts 10, 20, and 30 which are movable relative to each other will be in a fully stretched position. Thus, when the upper and lower links 10 and 20 are of equal width, the degree of expansion of the strap between the fully contracted position and the fully expanded position thereof will, in view of the pivotal movement of brackets 30 be over 100%.

If an elastic strap as above described should be designed so as to be of adjustable length by the removal of one or more links or the insertion of additional links, a slot 27 may be provided between the two upper wall portions 23 of the lower links 20, as shown in Fig. 5, which slot is made of such a width that arm 31 of bracket 30 may be hooked into or unhooked from the lower link 20 through such slot. Thus, one or more pairs of upper and lower links 10 and 20 may be easily removed from or inserted into the strap, and the strap may thus be shortened or lengthened to adapt it to the size of the arm of the respective wearer. Bracket arms 31 cannot become unhooked unintentionally since the constantly existing tension of springs 40 presses these arms against side walls 22 of the lower links 20. Thus although bracket arms 31 may be unhooked very easily, this can only be done intentionally, and only by pushing them inwardly toward slot 27 against the force of springs 40.

The strap may be designed so that either the layer of links A which contain the springs or the other layer of links B forms the outer ornamental side of the strap. This applies likewise to the other embodiments of the invention as subsequently described.

The modified embodiment of the invention as shown in Fig. 9 differs from that previously described and shown in Figs. 1 to 8 merely by the fact that the upper links 50 have a greater width than the lower links 60. Consequently, when the strap is contracted and the upper links 50 engage each other, side walls 62 of the adjacent lower links 60 will be spaced from each other by a gap so as to permit air to pass toward the arm-engaging side of the strap to ventilate and cool the arm, and to prevent an accumulation of perspiration and also the skin or hairs on the arm of the wearer from being caught between the adjacent lower links.

If the lower links 60 are made of a width which is, for example, one-third narrower than that of the upper links 50, the degree of expansion of the strap will also be smaller and amount to about 66%. Such expansion is, however, still sufficient to permit the strap to be easily slipped on or off the arm and over the hand. The links of such a strap which are made of a single piece of material and may be provided with smoothly rounded edges will also have no tendency to scratch the hand of the wearer when the strap is being slipped over the hand and wrist.

Figs. 10 to 15 illustrate several modifications in the arrangement of the coil springs, the other parts of the strap being substantially the same as shown in Figs. 1 to 8 or Fig. 9. Therefore, the same reference numerals have been applied in Figs. 10 to 15 for all those parts which are substantially identical with those shown in Figs. 1 to 9. Each upper link 10 contains two coil springs 40. In the embodiments according to Figs. 10 to 13, the end 43 of each of these two springs 40 which faces in the opposite direction from the square-shaped bracket portion 34 is mounted on a supporting bracket which is stamped out of link 10 and is then bent over inwardly. For such mounting, the respective spring end 43 is made of a hollow, substantially square-shaped cross section in accordance with the rectangular cross section of the supporting bracket by being pressed flat. In

the embodiment as shown in Figs. 10 and 11, this supporting bracket 70 is stamped out of the side wall 12 of the upper link 10, while in the embodiment according to Figs. 12 and 13, a similar supporting bracket 71 is stamped out of the lower wall portion 13 of the upper link 10. In both embodiments, the supporting brackets 70 and 71 are then bent over so that their free ends face toward the square stub 34 of brackets 30. Finally, in the embodiment according to Figs. 14 and 15, each of the two springs 40 is provided with two hollow square-shaped ends 41 and slipped upon corresponding square-shaped ends 34 on both stubs 33 of brackets 30. The central parts 45 of these springs 40 are pressed flat and are non-rotatably secured between a member 73, which is inserted between the upper wall 11 of the upper link and such flattened central part 45 of both springs 40, and a pair of supporting lugs 74 which are stamped out of side walls 12 of the link and bent over and against the flattened central part 45 of springs 40 so as to clamp them securely at that point. Both halves of each spring 40 are then twisted as indicated by dot-and-dash lines 42' and thus torsionally tensioned so as to pivot the respective bracket arm 31 which is connected thereto in a direction toward the upper link 10 and the other bracket arm 31, and thereby to draw the lower links 20 toward each other.

In the embodiment of the invention as shown in Fig. 16, the upper links 80 are provided with longer end walls 81 which are tapered outwardly and their free ends 82 then bent inwardly so as to form a rooflike structure overhanging the lower link 20. Such downward slope of the upper links 80 toward their outer edges produces the optical impression of a very small thickness of the strap and improves the appearance thereof.

The embodiment of the invention as shown in Fig. 17 differs from the embodiments previously described by the fact that the torsion spring for pivoting brackets 30 consists of one or more leaf springs 90. Bracket 30 may thus, for example, consist of two layers which may be combined by being made of a single strip of metal which is folded over along the lower edge of arm 31 and the two layers thus formed then being riveted to form stubs 33' of the brackets 30. One end 91 of the spring assembly 90 may then also be riveted to one stub 33' or between the two layers thereof, while the other end 92 thereof may be bent apart into a T-shape which after the spring is twisted to give it the required tension, is non-rotatably secured between a bifurcated bracket 75 which is stamped out of each lower wall portion 13 of links 10 and then bent at a right angle thereto. Naturally, the spring assembly 90 and its supporting means, and its connection to brackets 30 may also be designed in a manner analogous to that shown in the embodiments according to Figs. 10 and 11 or 14 and 15, respectively.

While the invention has been described in detail with reference to certain now preferred examples and embodiments thereof, it will be understood by those skilled in the art that various changes and modifications may be made without departing from the spirit and scope of the invention as defined in the appended claims.

WHAT WE CLAIM IS: —

1. An elastic link strap for ornamental or utilitarian purposes, and especially as a watch bracelet having a plurality of hollow links extending transversely to the longitudinal direction of the strap and in the contracted position of said strap forming two layers of links superimposed upon and substantially in engagement with each other, the links in one layer then being staggered relative to the links in the other layer in the longitudinal direction of the strap by the width of one-half link, connecting brackets pivotally connecting each link of one layer with two links of the other layer, at least one spring mounted within each link of at least one layer and connected to said brackets and tending to pivot the same to a position in which at least the adjacent links of one layer are in engagement with each other, characterized by the fact that two open rectangular brackets connect each link of one layer with two links of the other layer, each bracket having a straight arm pivotally mounted within the links of one layer, there being two short arms extending from the links of one layer to the adjacent link of the other layer and two inwardly bent stub arms pivotally engaging the links of the other layer and that said springs within the links of at least one layer form torsion springs and are connected therein under an initial tension to at least one of the two stub arms of each bracket.

2. An elastic link strap as defined by Claim 1, characterized by the fact that only one of the two stub arms of each connecting bracket which extend into the link containing at least one spring is non-rotatably connected to the spring, while the opposite stub of the bracket is mounted in such link so as to be freely rotatable therein.

3. An elastic link strap as defined in Claims 1 and 2, characterized by the fact that the springs are made in the form of wire coil springs, each of which has at least one end non-rotatably fitted upon one stub of the connecting bracket and is initially tensioned by being turned about its own axis relative to its other end which is held against being turned in the same direction.

4. An elastic link strap as defined in Claim 3, characterized by the fact that the two ends of each wire coil spring are non-rotatably fitted upon the diagonally opposite

the embodiment as shown in Figs. 10 and 11, this supporting bracket 70 is stamped out of the side wall 12 of the upper link 10, while in the embodiment according to Figs. 12 and 13, a similar supporting bracket 71 is stamped out of the lower wall portion 13 of the upper link 10. In both embodiments, the supporting brackets 70 and 71 are then bent over so that their free ends face toward the square stub 34 of brackets 30. Finally, in the embodiment according to Figs. 14 and 15, each of the two springs 40 is provided with two hollow square-shaped ends 41 and slipped upon corresponding square-shaped ends 34 on both stubs 33 of brackets 30. The central parts 45 of these springs 40 are pressed flat and are non-rotatably secured between a member 73, which is inserted between the upper wall 11 of the upper link and such flattened central part 45 of both springs 40, and a pair of supporting lugs 74 which are stamped out of side walls 12 of the link and bent over and against the flattened central part 45 of springs 40 so as to clamp them securely at that point. Both halves of each spring 40 are then twisted as indicated by dot-and-dash lines 42′ and thus torsionally tensioned so as to pivot the respective bracket arm 31 which is connected thereto in a direction toward the upper link 10 and the other bracket arm 31, and thereby to draw the lower links 20 toward each other.

In the embodiment of the invention as shown in Fig. 16, the upper links 80 are provided with longer end walls 81 which are tapered outwardly and their free ends 82 then bent inwardly so as to form a rooflike structure overhanging the lower link 20. Such downward slope of the upper links 80 toward their outer edges produces the optical impression of a very small thickness of the strap and improves the appearance thereof.

The embodiment of the invention as shown in Fig. 17 differs from the embodiments previously described by the fact that the torsion spring for pivoting brackets 30 consists of one or more leaf springs 90. Bracket 30 may thus, for example, consist of two layers which may be combined by being made of a single strip of metal which is folded over along the lower edge of arm 31 and the two layers thus formed then being riveted to form stubs 33′ of the brackets 30. One end 91 of the spring assembly 90 may then also be riveted to one stub 33′ or between the two layers thereof, while the other end 92 thereof may be bent apart into a T-shape which after the spring is twisted to give it the required tension, is non-rotatably secured between a bifurcated bracket 75 which is stamped out of each lower wall portion 13 of links 10 and then bent at a right angle thereto. Naturally, the spring assembly 90 and its supporting means, and its connection to brackets 30 may also be designed in a manner analogous to that shown in the embodiments according to Figs. 10 and 11 or 14 and 15, respectively.

While the invention has been described in detail with reference to certain now preferred examples and embodiments thereof, it will be understood by those skilled in the art that various changes and modifications may be made without departing from the spirit and scope of the invention as defined in the appended claims.

WHAT WE CLAIM IS: —

1. An elastic link strap for ornamental or utilitarian purposes, and especially as a watch bracelet having a plurality of hollow links extending transversely to the longitudinal direction of the strap and in the contracted position of said strap forming two layers of links superimposed upon and substantially in engagement with each other, the links in one layer then being staggered relative to the links in the other layer in the longitudinal direction of the strap by the width of one-half link, connecting brackets pivotally connecting each link of one layer with two links of the other layer, at least one spring mounted within each link of at least one layer and connected to said brackets and tending to pivot the same to a position in which at least the adjacent links of one layer are in engagement with each other, characterized by the fact that two open rectangular brackets connect each link of one layer with two links of the other layer, each bracket having a straight arm pivotally mounted within the links of one layer, there being two short arms extending from the links of one layer to the adjacent link of the other layer and two inwardly bent stub arms pivotally engaging the links of the other layer and that said springs within the links of at least one layer form torsion springs and are connected therein under an initial tension to at least one of the two stub arms of each bracket.

2. An elastic link strap as defined by Claim 1, characterized by the fact that only one of the two stub arms of each connecting bracket which extend into the link containing at least one spring is non-rotatably connected to the spring, while the opposite stub of the bracket is mounted in such link so as to be freely rotatable therein.

3. An elastic link strap as defined in Claims 1 and 2, characterized by the fact that the springs are made in the form of wire coil springs, each of which has at least one end non-rotatably fitted upon one stub of the connecting bracket and is initially tensioned by being turned about its own axis relative to its other end which is held against being turned in the same direction.

4. An elastic link strap as defined in Claim 3, characterized by the fact that the two ends of each wire coil spring are non-rotatably fitted upon the diagonally opposite

square-shaped ends of one of the stubs of each of the two connecting brackets extending into one link from the opposite longitudinal sides of the strap, said spring being initially tensioned by its two ends being turned relative to each other, and then extending in a substantially S-shaped curve from one stub to the other.

5. An elastic link strap as defined in Claim 3, characterized by the fact that the end of the wire coil spring opposite to the end which is non-rotatably fitted upon the end of the stub of the connecting bracket is non-rotatably secured within the link, for example, to a supporting arm which is stamped out of one wall of the link and bent over toward said stub end.

6. An elastic link strap as defined in Claim 5, characterized by the fact that the supporting arm is stamped out of one side wall of the link.

7. An elastic link strap as defined in Claim 5, characterized by the fact that the supporting arm is stamped out of one bottom wall portion of the link.

8. An elastic link strap as defined in Claims 5 to 7, characterized by the fact that the spring ends which are fitted upon the supporting arms and the ends of the stubs respectively have a substantially square hollow shape in accordance with the rectangular cross section of said arms and said stubs respectively and that the square hollow shape of the springs is produced by the spring ends being pressed flat.

9. An elastic link strap as defined in Claim 1, characterized by the fact that the two ends of each coil spring are of a substantially square hollow shape and are fitted upon square-shaped ends on both stubs of the same connecting bracket; that the coil spring is pressed flat at a central part thereof, and that such central part is non-rotatably clamped between an insert engaging with the inside of the upper wall of the link and an arm which is stamped out of one side wall and one part of the bottom wall of the link.

10. An elastic link strap as defined in any of Claims 1 to 3, characterized by the fact that the torsion springs are provided in the form of leaf springs, one end of each of which is non-rotatably connected to one stub of a connecting bracket, while its other end is secured in a fixed position within the link.

11. An elastic link strap as defined in Claim 10, characterized by the fact that each of the connecting brackets is made of two layers, and that one end of the leaf spring is riveted between the two layers of one stub.

12. An elastic link strap as defined in Claim 11, characterized by the fact that the leaf spring consists of two separate spring leaves which are combined with each other to form a set, and that the two spring leaves are bent apart at their free end into a T-shape and are non-rotatably secured at said end in a bifurcated arm stamped out and bent over from a wall of the link, for example, the bottom wall.

13. An elastic strap as defined in any of Claims 1 to 12, characterized by the fact that the links form hollow substantially rectangular casings, each being stamped from a single piece of material; that the inner wall thereof forms two portions bent at substantially right angles to the side walls; that the outer wall is extended so as to form end walls bent at substantially right angles thereto; and that the slots in the side and inner walls of said links are disposed at the outer ends thereof immediately adjacent to said end walls, and are of a width slightly larger than the thickness of the short arms of the connecting brackets, said slots permitting the brackets to pivot behind the end walls of the links to a point in which all parts of the strap are in a stretched-out position so as to be substantially within the same plane.

14. An elastic link strap as defined in any of Claims 1 to 13, characterized by the fact that the links of one layer are provided with projections extending inwardly from the free edge of the end walls thereof and substantially within the plane of the inner wall thereof, and serving as stop members to limit the pivotal movement of the connecting brackets toward each other.

15. An elastic link strap as defined in any of Claims 1 to 14, characterized by the fact that the two parts of the inner wall of the links of one layer are spaced from each other so as to leave a gap of a width sufficient to permit the straight arms of the brackets to pass therethrough and thus to hook said bracket into said link or to unhook them therefrom.

16. An elastic link strap as defined in any of Claims 1 to 15, characterized by the fact that the end walls of the upper links forming the outer longitudinal edges of the strap are bent so as to project like a roof over the end walls of the lower links.

17. Elastic link straps substantially as described in the foregoing specification and as illustrated with reference to Figs. 1–8, Figs. 9–11, Figs. 12–13, Figs. 14–15 or Figs. 16–17 of the accompanying drawings.

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