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COMPLETE SPECIFICATION

Improvements in and relating to Elastic Link Straps, particularly Watch Bracelets

We, RODI & WIENENBERGER AKTIENGESELLSCHAFT, of Bleichstrasse 58—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:—

The present invention relates to elastic link straps for ornamental or utilitarian purposes, and especially watch bracelets. More particularly, the invention relates to the type of strap which consists of two superimposed layers or rows of links which extend transversely to the longitudinal direction of the strap, and wherein the upper and lower links are staggered relative to each other by the width of one-half link and are resiliently connected with each other so as to be ~~exhaustable~~ against the action of springs which are disposed within the links.

The individual links of elastic link straps of this type as previously designed generally consisted of hollow sleevelike casings which were connected with and guided relative to each other by special connecting members. Thus, there has been one prior design of an elastic link strap in which the connecting members consisted of **U**-shaped connecting brackets, the back portions of which were disposed within the longitudinal side edges of the strap, while the bracket arms extended into the sleevelike upper and lower links. When the strap was being expanded or bent, these arms of the **U**-shaped connecting brackets were turned within the links and thereby tensioned the springs within the links. This prior strap design had the disadvantage of a very undesirable thickness. Furthermore, the open ends of the links which formed the outer longitudinal sides of the strap formed very sharp edges which scratched the wearer's hand and arm and wore out his sleeve cuffs very quickly. Although it has also been previously proposed to cover up the connecting brackets either partly or entirely along the longitudinal sides of the strap by means of bent-over tabs on the upper or lower walls of the links, whereby the sharp outer edges of the links were likewise covered, these tabs were again partly unbent when the strap was bent transversely to the direction of its expansion. Such unbending of the tabs considerably affected the ornamental value and appearance of the strap.

Other types of elastic link straps of prior design consisted of only one layer of hollow link casings into which **U**-shaped connecting brackets were inserted from the longitudinal sides of the strap, which brackets then acted upon leaf springs so as to compress the same in the direction of expansion of the strap. In order to prevent the connecting brackets from falling out of the links, two opposite **U**-shaped brackets were combined into a ring or they were otherwise secured within the links. The disadvantage of these types of straps consisted primarily in the fact that, when the strap was expanded, the individual links of such single-layer strap were necessarily separated by gaps which obviously destroyed the desired continuous, unitary appearance of the strap and thus reduced its value.

It is an object of the present invention to provide an elastic link strap or bracelet which overcomes all of the above-mentioned disadvantages of prior strap designs.

More particularly, it is an object of the invention to provide an elastic link strap which will give a closed unitary appearance even when fully expanded.

This object is attained by making the elastic strap of two superimposed layers of links which extend transversely to the longitudinal direction of the strap, and wherein the links of the upper layer are staggered or offset relative to those of the lower layer by the width of one-half link.

Another object of the invention is to pro-

[*Price 3s. 6d.*]

expansible

vide an elastic two-layer link strap, the individual links of which in each layer do not require any special connecting members to connect them to each other.

Another object of the invention is to provide an elastic two-layer link strap which requires no more than three different types of parts for its entire assembly.

A further object of the invention is to provide an elastic two-layer link strap which is considerably thinner than similar straps of previous design.

Another object of the invention is to provide an elastic link strap with smoothly rounded outer edges along the longitudinal sides thereof, and in which there is no danger that the end walls of the individual links will become partly unbent when the strap is being bent transversely to its direction of expansion.

Still another object of the invention is to provide an elastic two-layer link strap which fulfills all the above mentioned requirements and may be manufactured very easily and inexpensively so that the purchase price of such a strap will be relatively low, despite its considerable advantages over similar straps of prior design.

These objects of the invention will all be attained by making both the upper and lower links of the strap in the form of shell-like casings, wherein the upper links are open in the downward direction and the lower links in the upward direction, and wherein the lower links have upwardly extending side walls which project into the upper links through the bottom opening thereof. Each upper link further serves as a housing for at least one pair of curved leaf springs which engage on the one hand against the inside of the side walls of each upper link, and on the other hand against the inside of one inwardly projecting side wall of each of two adjacent lower links, so that these springs will be pressed flat when the strap is being expanded or bent. For connecting the upper and lower links with each other and to guide them relative to each other during the expanding and contracting movement of the strap and its individual parts, the transverse side walls of the links of one layer may have slots which extend inwardly from a point at or near the outer edges of the links, and in providing each of the links of the other layer with extensions at the opposite ends thereof which are then bent so as to form a pair of transversely extending tabs or cross-bars which project into the slots in the links of the other layer and thus serve both as connecting members for securing the upper and lower links to each other, and as guiding members along which the slotted links of the other layer may slide in the longitudinal direction of the strap relative to the links carrying these transverse tabs or cross-bars when the strap is being expanded or contracted under the action of the leaf springs within the links.

It is another important object of the invention to provide an elastic two-layer link strap of the smallest possible thickness.

This object is attained by making the lower links in the form of casings having a bottom wall, shallow end walls and side walls of greater height than the ends walls and connected to said bottom and side walls. The outer ends of these side walls are then provided with inwardly extending slots at the level of the upper edge of the shallow end walls so that the end portions of the side walls above these slots will form outwardly projecting tongues. The extensions of the upper wall of the upper links are then bent downwardly over these tongues and inwardly toward each other and into the outer slots in the side walls of the lower links. The height of the side and end walls of the lower links which are designed to extend into the upper links through the lower opening thereof, and the height and width of the tongues on these side walls may be made of any desired size in accordance with the dimensions of the upper links, bearing in mind, however, that the combined thickness of the upper and lower links should be as small as possible.

The lower links may for this purpose be made in the form of a substantially flat bottom plate with a pair of side walls thereon extending substantially at right angles thereto and transversely to the longitudinal direction of the strap and without any end walls connecting the opposite side walls as previously described. These side walls of the lower links are provided at their outer ends with tongues which project beyond the outer edges of the bottom plate and preferably are rounded off semi-circularly at their outer ends. The extensions of the upper wall of the upper links are then bent downwardly over these semicircular tongues and inwardly toward each other and into the outer slots in the lower links so as then to form semicylindrical end portions of the upper links. In order to reduce the combined thickness of the upper and lower links and to make the strap as thin as possible, the slots in the ends of the side walls of the lower links are preferably disposed immediately above and adjacent to the bottom plate thereof so that the latter forms the lower edges defining the slots.

The thickness of the strap may be further reduced so that the lower links will not add at all to the thickness of the upper links and the entire thickness of the two-layer strap will be merely that of the upper links. For this purpose, the slots in the side walls of the lower links are provided at such a low point so that they will remain only in the form of notches or recesses in the lower outer ends of the side walls, each being limited only by its inner edge and the lower edge of the projecting tongue over which the respective extension of the upper ornamental wall of the upper link is bent. The bottom plate of each lower link is

then shortened at both ends to the inner end of the notch or recess, and such notches are then only made of a width in the vertical direction so as to correspond substantially to the thickness of the material of the extensions of the upper link walls which are bent toward each other into such notches.

As previously described, the outer ends of the side walls of the links which are provided with the extensions are preferably notched out so that the extensions when bent over and inwardly toward each other engage into these notches, and the outer surfaces of the inwardly bent portions of the extensions are at the same level with the free edges of the side walls.

The bent-over extensions serve as retaining means for the loosely inserted leaf springs within the links. These leaf springs are preferably notched out at one side of each end so as to form supporting surfaces into which the inwardly bent end portions of the extensions engage so as to prevent the springs from tilting over, particularly at such time during the assembly of the strap when the side walls of the adjacent links of the other layer are being inserted into each link of the first layer and between the two springs therein.

Another object of the present invention is to simplify the design and construction of the various elements of a two-layer link strap, and to reduce the cost of production of such a strap. This object, as well as the object previously mentioned, of producing a two-layer strap of the smallest possible thickness is attained by making the upper and lower links of identical design and preferably also of identical dimensions so that the entire strap will then only consists of two different types of elements, namely, the links and the leaf springs, and the adjacent upper and lower links will be contained within each other and the thickness of the strap will be no more than the thickness of the upper links plus the thickness of the material of the bottom plate of the lower links. Both the upper and lower links are then similar to the lower links previously described and each consists of a substantially flat outer plate with side walls thereon extending at right angles thereto and provided with slots at the outer ends thereof which are formed by the space between the tongues projecting outwardly from the lower ends of the side walls of the upper links and the upper ends of the side walls of the lower links, respectively and the extensions of the respective outer walls of the upper and lower links, that is, the ornamental upper wall of the upper links and the bottom plate of the lower links, which are bent toward the links of the other layer and then inwardly toward each other. These bent-over extensions then form pockets at both ends of each link in which the tongues of the links of the other layer are guided for movement in the longitudinal direction of the strap when the upper and lower links are inserted into each other.

The slots may be provided in the side walls of the links of one layer and, in the assembled structure, the respective outer walls of such links, that is, the ornamental walls of the upper links or the bottoms of the lower links, respectively, are outwardly extended, and these extensions are bent over to close the slots in the outward direction. Since the outer ends of the slots are thus closed, it is no longer possible to insert the extensions of the outer wall of the links of the other layer into them from the outside to connect the upper and lower links to each other, but it is then necessary to provide a crossbar at each end of the links opposite to those in which the mentioned slots are provided, and to insert such cross-bars into the slots. These crossbars are likewise formed by extensions of the walls of the latter links, but in this case they are not provided on the outer wall as previously described, but on the side walls of these links and at a level depending upon the level of the slots or apertures in the side walls of the opposite links. These extensions are made of a thickness substantially corresponding to the width of the slots in the other links, as seen in the vertical direction, while the length of the slots is then also made so as to correspond substantially to the thickness of the material of the links and the extensions thereon. The extensions at the corresponding ends of both side walls of these links are bent toward each other so as to form a crossbar which is inserted into the slots in the side walls of two adjacent links carrying the crossbars and are guided thereon for movement in the longitudinal direction of the strap. In order to close the lateral edges of the strap completely when in the contracted position, the outer wall of the links carrying the crossbars may also be extended at both ends and such tablike extensions be bent over toward the other layer so as to cover the crossbars and close the partly open ends of these links. The free ends of the bent-over extensions of the links of both layers then face each other and slide closely along each other when the strap is being expanded or contracted. The thickness of the strap is therefore likewise equal to the thickness of the link of only one layer plus the thickness of the material of one outer link wall.

However, the links of one layer may also be made without the outer extensions on their outer wall and thus be left open at their outer ends. The extensions on the outer wall of the links of the other layer may then be extended so that, when bent over toward the links of the other layer, they will cover the open ends of the links of both layers at least when the strap is in the contracted position. Furthermore, the links of both layers may be provided with tablike extensions of such a length that, when bent over they will overlap and cover

each other and thus close the outer sides of the strap completely at any position of the expansion or contraction thereof.

A further object is to provide a two-layer elastic link strap of the type as first described, the individual links of which may be easily separated from each other without unbending any parts thereof to permit the strap to be lengthened or shortened by the insertion of additional links or the removal of one or more links.

Another object is to provide such a strap with means which will only permit the individual links to be separated intentionally and will prevent the strap from ever coming apart accidentally.

This object may be attained by providing at least some of the upper links with a recess or cutout at or near one outer corner of the free edge of one of the two bent-over extensions adjacent to one side wall of such links, and by shortening the respective tongue on the side wall of one of the two lower links which is being overlapped by such extension to such an extent that such shortened tongue may be slipped through such cutout and the respective lower link may be unhooked from the upper link. In order to prevent the links from becoming unintentionally unhooked from each other, it is merely necessary to shorten one tongue of that of two adjacent lower links entering into one upper link which moves away from the cutout at one side of the free edge of the bent-over extension of the upper link when the strap is being expanded.

Another means for shortening or lengthening the elastic strap consists in shortening the tongues at both ends of one side wall of at least some of the lower links to such an extent that such side wall may be inserted between or slipped out from the bent-over extensions of the adjacent upper link. A suitable connecting member is then provided within such upper link, and the outer ends of such connecting member are provided with recesses at its lower side so as substantially to correspond in shape to the notches or slots in the uncut side wall of the lower link. The bent-over extensions of the upper link engage into these lower recesses in the connecting member and thus retain the same in the upper link. The bottom wall of the respective lower link is then provided with a hole in which a screw is mounted which is screwed into a threaded hole in the connecting member to secure the latter removably to such lower link. Particularly if the individual links of the strap are to be made very narrow, each of the connecting members may be provided with a central reinforcing portion for receiving the screw hole, while one side wall of the upper link may then be provided with a corresponding cutout for receiving such reinforcing portion. However, the connecting member may also be made of angular shape, one arm of which is provided to abut against one side wall of the upper link, while the other arm abuts against the bottom wall of the lower link to which it may be removably secured.

It is advisable to make the lower links of smaller width than the upper links so that gaps will remain between the adjacent lower links even when the strap is in its completely contracted position and the skin and hairs on the hand and wrist of the wearer cannot be caught between these links.

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

Fig. 1 shows a plan view, partly in cross section, of a portion of the new elastic strap in its contracted position;

Fig. 2 shows a similar plan view of the same strap, but in the expanded position;

Fig. 3 shows a side view, partly in cross section of Fig. 1;

Fig. 4 shows a similar side view of Fig. 2;

Fig. 5 shows a cross section taken along line V—V of Fig. 4;

Fig. 6 shows a perspective view of a lower link;

Fig. 7 shows a perspective view of an upper link in the position as shown in Figs. 1 to 5;

Fig. 8 shows a perspective view of an upper link, but as seen in an upside-down position to Fig. 7; while

Fig. 9 shows a perspective view of one of the leaf springs.

Fig. 10 shows a perspective view of an upper link according to a second embodiment of the invention;

Fig. 11 shows a perspective view of the corresponding lower link;

Fig. 12 shows a perspective view of a leaf spring according to the second embodiment of the invention;

Fig. 13 shows a fraction cross section of an upper and lower link according to Figs. 10 and 11 in their engaged position with each other, as seen in a section transverse to the longitudinal direction of the strap;

Fig. 14 shows a view similar to Fig. 13 of a modification of the lower link;

Fig. 15 shows a perspective view of an upper link according to Fig. 10, but in the inverted position;

Fig. 16 shows a horizontal cross section through two links in the process of being disengaged from each other when the strap is to be shortened;

Fig. 17 shows a vertical longitudinal cross section through two links of both layers according to a further embodiment of the invention;

Fig. 18 shows a perspective view of a lower link according to Fig. 17;

Fig. 19 shows a perspective view of a connecting member according to Fig. 17;

Fig. 20 shows a perspective view of a modified connecting member;

Fig. 21 shows a perspective view of an upper link to be used in combination with a connecting member according to Fig. 20;

Fig. 22 shows a perspective view of an upper link according to another modification of the invention;

Fig. 23 shows a perspective view of the corresponding lower link;

Fig. 24 shows a perspective view of an upper link of still another modification of the invention; while

Fig. 25 shows a perspective view of the corresponding lower link.

Referring to the drawings, the new elastic strap consists in all of the embodiments of the invention of no more than three different kinds of elements. In the embodiment shown in Figs. 1 to 9, these elements consist of upper links 10, lower links 30, and curved leaf springs 50.

Each of the upper links 10 consists of a substantially rectangular hollow casing which is open at the bottom and preferably stamped of a single flat piece of material so as to form an upper wall 11 which preferably forms the ornamental outer surface of the strap, side walls 12, and end walls 13 which form a part of the longitudinal outer edges of the strap. The outer ends of side walls 12 are provided at the bottom edge thereof with notches 14 of a depth substantially equal to or slightly deeper than the thickness of the material of the casing. End walls 13 are slightly higher than the depth of side walls 12 near their outer ends so that small extensions or tabs 15 are formed which, when the strap is being assembled, are bent inwardly to rest within notches 14 so that the lower surface of these tabs 15 will then lie substantially at the same level as or slightly below the free lower edges of side walls 12.

The lower links 30 are of a shape substantially similar to that of the upper links 10, except as to their end portions. End walls 33 of lower links 30 are of a very shallow height *h*, considerably lower than the height H of end walls 13 of upper links 10. Furthermore, at the level of the free upper edge of end walls 33, side walls 31 of lower links 30 are provided at their outer ends with slots 32 so that the upper outer ends of side walls 31 form tongues 31^1. The inwardly bent tabs 15 of upper links 10 then envelop tongues 31^1 and extend into slots 32, and are slidably guided therein so as to hold the upper and lower links together and to permit them to slide relative to each other in the longitudinal direction of the strap during the expansion or contraction thereof. For this purpose, and so that the upper links 10 will accommodate the lower links 30, the total length L of the lower part of side walls 31 of each lower link 30, that is, below slots 32, is equal to the total length L of each upper link 10, while the upper part of side walls 31 above slots 32 and including tongues 31^1 has a length *l* and is at each end shorter than such total length L by the thickness of end wall 33.

Each upper link 10 contains a pair of curved leaf springs 50, the free ends of which engage against side walls 12, while the curved back portions thereof engage against side walls 31 of two adjacent lower links 30 which, except for the shallow bottom portion underneath the lower edges of slots 32, project into the upper links 10 when the strap is in the assembled condition.

The free ends of springs 50 are notched out at one side so as to form supporting surfaces 51 which may be slipped underneath tabs 15 at the lower side of upper links 12, as indicated in Fig. 8, so that the springs, although loosely inserted into links 12, will thus be retained therein and prevented from falling over during the insertion of the side walls 31 of the lower links into the upper links, as subsequently described.

Since the lower links 30 are staggered or offset in the longitudinal direction of the strap by the width of one-half link relative to the upper links 10, the portions of one side wall 31 of each of two adjacent lower links above the lower edges of slots 32 are adapted to project, as previously described, into the upper links 10, and one leaf spring 50 is then interposed between each of these side wall portions 31 of two adjacent lower links 30 and the two side walls 12 of one upper link 10. These two springs 50 are flattened out when the strap is either expanded or sharply bent.

When the individual parts of the strap, namely, the upper and lower links 10 and 30 and springs 50, are being assembled to form a complete elastic strap, end walls 13 of the upper links and their tabs 15 which are bent at a right angle thereto are at first still bent outwardly to such an extent as to permit these parts to be fitted together or into each other. Thereafter, end walls 13 will be bent inwardly to the position as shown in the drawings. The respective upper and lower links 10 and 30 will then be connected with each other by means of tabs 15 on upper links 10 which engage into slots 32 of lower links 30, so that the links of the two layers will then be able to move relative to each other only in the direction of expansion of the strap. In order to permit the strap to bend more easily in a direction transverse to such direction of expansion and also to twist or flex in any direction it is advisable to make the width and depth of slots 32 slightly larger than the thickness and length of tabs 15 which are guided within these slots.

The strap as illustrated in Figs. 1 to 8, although thinner than previous two-layer straps, is still relatively thick. Also, due to the troughlike shape of the lower links 30, dirt may easily collect therein. This will be avoided in the embodiments of the invention, as shown in Figs. 10 to 21. The lower links 34 of the

embodiment according to Figs. 10 to 16, as shown particularly in Fig. 11, are therefore devoid of any end walls and only consist of a substantially flat bottom plate 35 with two side walls 36 extending upwardly therefrom at a right angle thereto and provided at each end with a tongue 37 extending beyond bottom plate 35 and preferably rounded off semicircularly. Between tongues 37 and the upper edges of bottom plate 35 and directly adjacent thereto, side walls 36 are provided with inwardly extending slots or recesses 38. The corresponding upper link 15, as shown in Fig. 10, consists of an upper plate 16 which forms a part of the ornamental surface of the strap, side walls 17 extending transversely to the longitudinal direction of the strap, and outer extensions on upper plate 16 which are bent over downwardly and then inwardly so as to form semicircular end walls terminating in opposite tabs 18. The ends of side walls 17 are provided with notches 19. When the individual parts of the strap are being assembled and extensions 18 are then bent downwardly and inwardly and into notches 19, as shown in Figs. 10 and 15, they will curve around tongues 37 of lower links 30 and form semicylindrical end portions, and the lower surfaces of their inwardly bent ends will then be disposed at the same level as the edges of side walls 17 defining the bottom opening of each upper link and extend into slots 38 in side walls 36 of the lower links so as to be slidable therein in the longitudinal direction of the strap. During such assembly, a pair of curved leaf springs 50 with rounded outer ends, as shown in Fig. 12, is also inserted into each upper link 15 so that each spring will then be mounted between one side wall 17 of an upper link 15 and the corresponding side wall 36 of one of the two lower links 34 which are associated with such upper link, as shown in Fig. 16. Each spring 50 is undercut at its lower side near its outer rounded ends so as to form bearing surfaces 51 on which springs 50 may rest on the rounded inner end surfaces of extensions 18 of upper links 15.

Fig. 14 shows a modification of the lower links 34. Bottom plate 35^1 is shortened at each end, as compared with the embodiment shown in Figs. 11 and 13, and side walls 37^1 are notched out accordingly by substantially the thickness of the material of tabs 18 of upper links 15. This embodiment therefore does not require any special slots in side walls 37^1 thereof, and the assembled upper and lower links will be still thinner than those shown in Fig. 13 since the lower surface of the inwardly bent tabs 18 of the upper links will be at the same level as the lower surface of bottom plate 35^1 of the lower links.

While the elastic strap as previously described does not permit any removal of any links or insertion of additional links in order to adjust the strap to a smaller or thicker wrist, unless one or more upper links are unbent and then rebent to disconnect them from the lower links, as well as from each other, and to reconnect them thereto, Figs. 11, 15, and 16 also illustrate a modification of the invention which permits such removal or insertion of one or more links to be carried out without any tools and without bending or unbending any links which might leave permanent marks on the strap and harm the appearance thereof. This modification is likewise applicable to the first embodiment of the invention, as shown particularly in Figs. 6 and 8.

Figs. 8 and 15 illustrate one of the upper links as shown in Figs. 7 and 10, respectively, but in the inverted position. While in the previously described embodiments it was assumed that tabs 15 or 18 forming the bent-over ends of the extensions of upper plate 11 or 16, respectively, of the upper links extended fully from one side wall 12 or 17 thereof to the other, Figs. 8 and 15 show one end of one of the two tabs 15 or 18 as being provided with a recess or cutout 20. If this cutout 20 should be hidden from the outside, it may be made of U-shape so that a narrow outer tongue will close the respective notch 14 or 19 in the adjacent side wall 12 or 17, or such notch may be made of shorter length. If the corresponding tongue 31^{11} or 37^{11} on one side wall 31 or 36 of one of the two lower links 30 or 34, which are associated with the respective upper link is shortened, as indicated in Figs. 6 and 11, respectively, by cross-hatching, it will then be easily possible to unhook such lower link 30 or 34 from the upper link 10 or 15, respectively. Referring particularly to Figs. 10 to 16, it is for this purpose only necessary first to expand the strap so that leaf springs 50 will be flattened completely between side walls 36 of lower links 34 and side walls 17 of the upper links, and then, while holding the adjacent links in such expanded position, to turn one of the lower links 34 which has such a shortened tongue 37^{11} to an oblique position opposite to the direction of expansion of the strap, as illustrated in Fig. 16, so that the end of the side wall of such lower link which carries the shortened tongue 37^{11} will be pushed back and placed in line with the cutout 20. The shortened tongue 37^{11} may then be slipped through cutout 20, and the other full tongue 37 on such side wall 36 may then also be unhooked from the opposite tab 18 of the upper link 15. In the same manner it is also possible again to hook the lower link 34 into the respective upper link 15. In order to prevent the links from becoming unhooked unintentionally, it is advisable to provide the shortened tongue 37^{11} on the side wall 36 of that of the two lower links engaging into the respective upper link 15 which is moved away from, rather than toward, cutout 20 in the upper link when the strap is being expanded. This cutout 20 should, however, only be made

of a depth so as still to leave a sufficiently large supporting surface between its edge and the outer end of the full or uncut tongue 37 of the side wall of the adjacent lower link so that this tongue can under no circumstances slip out through this cutout 20. All that has been said above with respect to Figs. 10 to 16 applies equally to Figs. 1 to 9.

Figs 17 to 21 illustrate another possiblity of shortening the new strap. The lower link 40 in Fig. 18 corresponds in shape generally to lower link 34 as shown in Fig. 11 insofar as it also has a bottom plate 41 and two side walls 42 and 43 at right angles thereto, and that one side wall 42 also has a tongue 44 at each end. However, the other side wall 43 does not have any outer tongues. This shortened side wall 43 may therefore be inserted between the ends of the inwardly projecting tabs 18 of the upper link 15, which is of a general shape similar to that shown in Figs. 10 to 16, without requiring these tabs 18 to be unbent. Aside from one spring 50, each upper link 15 contains an angular connecting member 45, as shown in Figs. 17 and 19, the higher side of which engages with the inner surface of one side wall 17 when the strap is in the released position, and the outer ends of which are provided at the lower side thereof with recesses 46 into which tabs 18 of the upper link 15 project so as to secure connecting member 45 thereto. Connecting member 45 is then removably secured to the bottom plate 41 of the lower link 40 by a screw 47. Thus, after screw 47 has been removed, the shorter side wall 43 may then be removed from the upper link 15 without requiring tabs 18 to be unbent.

If the links of the straps are made very narrow, it may be advisable or necessary to reinforce or enlarge the central part of connecting member 48 so as to provide sufficient material for the wall of the bore for screw 47. In such a case, connecting member 48 may be made of a shape as shown in Fig. 20, in which the central part thereof has a reinforcing projection 49, while the upper link 15, as shown in Fig. 21, is provided with a central cutout 21 in its one side wall 17^1 which is adapted to receive the projection 49. This same manner of separating the adjacent links of the strap is also applicable to the first embodiment of the invention, as shown in Figs. 1 to 9.

Since it is hardly ever necessary that more than a few links be removed to shorten the strap sufficiently to comply with the circumference of the wrist of any wearer thereof, only a few links need be made removable in either of the ways as described above. For easier identification, such removable links may then preferably be marked in a suitable manner for example, on the lower surface of the lower links.

Figs. 22 and 23 illustrate a modification of the upper and lower links and of the means of connecting and guiding the same relative to each other. The upper and lower links 60 and 70, respectively, are of exactly the same shape and consist of a substantially flat plate 61 or 71 which forms either the outer ornamental surface of the upper link 60 or the lower arm-engaging surface of the lower link 70, respectively, and carries a pair of side walls 62 or 72, respectively, in which horizontal slots 63 or 73 are provided at the outer ends thereof which thus form outer tongues 64 or 74, respectively. The outer end portions of the flat plates 61 and 71 are bent over downwardly or upwardly, respectively, and their free ends project into slots 63 and 73, respectively, of the same links so as to form pockets 66 and 76, respectively, in which tongues 74 and 64 of the respective links of the other layer may slide in the longitudinal direction of the strap. The upper and lower links are therefore doubly engaged with each other at both sides of the strap and thus cover each other. Leaf springs are again provided between side walls 62 and 72 of the adjacent links and are pressed flat by them when the strap is being expanded. When the strap according to Figs. 22 and 23 is being assembled, the upper and lower links 60 and 70 are first inserted into each other and the springs inserted between side walls 62 and 72 while the ends 65 and 75 are still unbent. Thereafter, ends 65 of upper links 60 and ends 75 of the lower links 70 are bent over and around tongues 74 of the lower links and tongues 64 of the upper links, and into slots 63 and 73 in side walls 62 and 72, respectively, so that tongues 74 of lower links 70 are enclosed by the ends 65 of the upper links 60 and tongues 64 of the upper links 60 by the ends 75 of the lower links 70. Also in this embodiment of the invention it is preferred to round off the tongues 64 and 74 semicircularly so that the bent over ends 65 and 75 will be of a similar semicylindrical shape. Thus, it is evident that, while the other embodiments of the invention require three different kinds of parts, namely, the upper links, the lower links, and the springs, the last described embodiment only requires two different parts, namely, the identical upper and lower links and the springs.

While in each of the embodiments of the invention as previously described the upper and lower links are connected to and guided along each other by the bent-over tabs or ends of the outer walls of the links of one or both layers, the arrangement is made slightly different in the embodiment shown in Figs. 24 and 25, insofar as herein the lower links 90 are provided with cross arms 94 which, when the strap is assembled, engage in slots 83 in the side walls 82 of upper links 80. Each of the upper links 80 again consists of an upper ornamental plate 81 with side walls 82 thereon and at right angles thereto, and bent-over ends 85 of plate 81 which together form the lateral

edges of the strap. The lower links 90 consist of a bottom plate 91 with side walls 92 at right angles thereto, and a pair of extensions formed as cross arms 94 on each side wall 92 which are also bent at right angles and toward those of the other side wall 92. The bent-over ends 85 of the upper links 80 of this embodiment only serve to cover the end openings of the lower links 90. These links may, however, also be provided with end walls 95 which form extensions of the bottom plate 91 and are bent upwardly either so as to be in sliding engagement with the lower edges of the ends 85 of the upper links or to overlap these ends or to be overlapped thereby. Of course, the arrangement may also be reversed so that the cross arms 94 may be provided on the upper links 82 and slots 83 in the lower links 92. Similarly, the strap according to the other embodiments of the invention may be reversed so that the upper links as shown in the drawings serve as lower links and the lower links as upper links.

In all of the embodiments of the invention, it is advisable to make the width of the lower links smaller than that of the upper links so that gaps will be formed between the adjacent lower links when the strap is in the fully contracted position when the adjacent upper links engage each other, whereby the skin or hairs on the hand and wrist of the wearer will not be caught between the edges of the lower links.

Although the invention has been illustrated and described with reference to the preferred embodiments thereof, it is to be understood that it is in no way limited to the details of such embodiments, but is capable of numerous modifications within the scope of the appended claims.

Thus, for example, more than one leaf spring may be provided between each side wall of a lower link and the adjacent side wall of an upper link. This may be advisable, particularly if the links are of relatively great width, as seen transverse to the longitudinal direction of the strap. Such leaf springs are then preferably mounted so that the concave sides thereof face forward toward each other. If, however, only one pair of leaf springs is provided between the respective side walls of the interconnected upper and lower links they may be mounted either so that their concave sides face toward the side walls of the upper links, or so that both springs in each link face in the same direction.

WHAT WE CLAIM IS:—

1. An elastic link strap for ornamental or utilitarian purposes and especially a watch bracelet having two superimposed layers of links extending transversely to the longitudinal direction of the strap, and wherein the upper and lower links are staggered relative to each other by the width of one-half link in the longitudinal direction of the strap and are connected with each other so as to be expansible against the action of springs disposed within the links, characterized by the fact that the upper and lower links form shell-like casings which are open at one side, the upper links being open in the downward direction, and the lower links being open in the upward direction, that each link of at least one layer has side walls projecting into two adjacent links of the other layer through the open side thereof, and further by the fact that curved leaf springs are provided within said links and engage, against one side wall of each of two adjacent links within each link of the said other layer and against the two side walls of each link in said other layer, so that these springs will be pressed flat when the strap is being expanded or bent.

2. An elastic link strap as defined in Claim 1, characterized by the fact that the side walls of the links of one layer are provided with recesses or slots at or near the outer ends thereof; and that extensions are secured on the links of the other layer which extend into said recesses so as to connect the links of both layers with each other and to allow them to slide relative to each other in the longitudinal direction of the strap.

3. An elastic link strap as defined in Claim 2, characterized by the fact that the extensions are formed by tabs which are bent over and inwardly toward each other from the upper walls of the upper links.

4. An elastic link strap as defined in Claims 1 to 3, characterized by the fact that the lower links have shallow end walls lower than the upwardly extending side walls thereof, and that the lower edges of the slots in the outer ends of said side walls are disposed at a level of the upper edges of the end walls of said ~~lower~~ links and thus form outer tongues on said side walls above said slots which are enveloped by the bent-over tabs of the upper links.

5. An elastic link strap as defined in Claims 1 to 3, characterized by the fact that the lower links consist of a substantially flat bottom plate and a pair of side walls thereon and at right angles thereto extending transverse to the longitudinal direction of the strap and each having a rounded tongue on each end extending beyond said bottom plate and that the tabs bent over from the upper walls of the upper links form semicylindrical end portions which envelop the rounded tongues of the side walls of the lower links.

6. An elastic link strap as defined in Claim 5, characterized by the fact that the slots in the outer ends of the side walls of the lower links are disposed immediately adjacent and above the inner surface of the bottom plate.

7. An elastic link strap as defined in Claim 5, characterized by the fact that the lower edges of the rounded tongues on the side walls of the lower links are recessed from the edges of the lower surface of the bottom plate thereof by substantially the thickness of the material of the semicircular end portions so that the

edges of the strap. The lower links 90 consist of a bottom plate 91 with side walls 92 at right angles thereto, and a pair of extensions formed as cross arms 94 on each side wall 92 which are also bent at right angles and toward those of the other side wall 92. The bent-over ends 85 of the upper links 80 of this embodiment only serve to cover the end openings of the lower links 90. These links may, however, also be provided with end walls 95 which form extensions of the bottom plate 91 and are bent upwardly either so as to be in sliding engagement with the lower edges of the ends 85 of the upper links or to overlap these ends or to be overlapped thereby. Of course, the arrangement may also be reversed so that the cross arms 94 may be provided on the upper links 82 and slots 83 in the lower links 92. Similarly, the strap according to the other embodiments of the invention may be reversed so that the upper links as shown in the drawings serve as lower links and the lower links as upper links.

In all of the embodiments of the invention, it is advisable to make the width of the lower links smaller than that of the upper links so that gaps will be formed between the adjacent lower links when the strap is in the fully contracted position when the adjacent upper links engage each other, whereby the skin or hairs on the hand and wrist of the wearer will not be caught between the edges of the lower links.

Although the invention has been illustrated and described with reference to the preferred embodiments thereof, it is to be understood that it is in no way limited to the details of such embodiments, but is capable of numerous modifications within the scope of the appended claims.

Thus, for example, more than one leaf spring may be provided between each side wall of a lower link and the adjacent side wall of an upper link. This may be advisable, particularly if the links are of relatively great width, as seen transverse to the longitudinal direction of the strap. Such leaf springs are then preferably mounted so that the concave sides thereof face forward toward each other. If, however, only one pair of leaf springs is provided between the respective side walls of the interconnected upper and lower links they may be mounted either so that their concave sides face toward the side walls of the upper links, or so that both springs in each link face in the same direction.

WHAT WE CLAIM IS:—

1. An elastic link strap for ornamental or utilitarian purposes and especially a watch bracelet having two superimposed layers of links extending transversely to the longitudinal direction of the strap, and wherein the upper and lower links are staggered relative to each other by the width of one-half link in the longitudinal direction of the strap and are connected with each other so as to be expansible against the action of springs disposed within the links, characterized by the fact that the upper and lower links form shell-like casings which are open at one side, the upper links being open in the downward direction, and the lower links being open in the upward direction, that each link of at least one layer has side walls projecting into two adjacent links of the other layer through the open side thereof, and further by the fact that curved leaf springs are provided within said links and engage, against one side wall of each of two adjacent links within each link of the said other layer and against the two side walls of each link in said other layer, so that these springs will be pressed flat when the strap is being expanded or bent.

2. An elastic link strap as defined in Claim 1, characterized by the fact that the side walls of the links of one layer are provided with recesses or slots at or near the outer ends thereof; and that extensions are secured on the links of the other layer which extend into said recesses so as to connect the links of both layers with each other and to allow them to slide relative to each other in the longitudinal direction of the strap.

3. An elastic link strap as defined in Claim 2, characterized by the fact that the extensions are formed by tabs which are bent over and inwardly toward each other from the upper walls of the upper links.

4. An elastic link strap as defined in Claims 1 to 3, characterized by the fact that the lower links have shallow end walls lower than the upwardly extending side walls thereof, and that the lower edges of the slots in the outer ends of said side walls are disposed at a level of the upper edges of the end walls of said lower links and thus form outer tongues on said side walls above said slots which are enveloped by the bent-over tabs of the upper links.

5. An elastic link strap as defined in Claims 1 to 3, characterized by the fact that the lower links consist of a substantially flat bottom plate and a pair of side walls thereon and at right angles thereto extending transverse to the longitudinal direction of the strap and each having a rounded tongue on each end extending beyond said bottom plate and that the tabs bent over from the upper walls of the upper links form semicylindrical end portions which envelop the rounded tongues of the side walls of the lower links.

6. An elastic link strap as defined in Claim 5, characterized by the fact that the slots in the outer ends of the side walls of the lower links are disposed immediately adjacent and above the inner surface of the bottom plate.

7. An elastic link strap as defined in Claim 5, characterized by the fact that the lower edges of the rounded tongues on the side walls of the lower links are recessed from the edges of the lower surface of the bottom plate thereof by substantially the thickness of the material of the semicircular end portions so that the

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lower edges of said end portions are disposed in substantially the same plane as that of the lower surface of said bottom plate and said end portions are slidable within the recesses in the longitudinal direction of the strap.

8. An elastic link strap as defined in Claims 1 to 7, characterized by the fact that the side walls of the upper links are provided at a point adjacent to the lower edges thereof defining the bottom opening in said links with notches which are adapted to receive the bent-over tabs extending from the outer ends of the upper walls of said links.

9. An elastic link strap as defined in Claims 1 to 8, characterized by the fact that the free end of one of said bent-over tabs extending from the upper walls of at least some of said upper links is provided with a cutout adjacent to one side wall of said upper links, and that one of the tongues on one side wall of one of the two lower links which are connected to one of said upper links is shortened as compared with the other tongues to such an extent as to permit the shortened tongue to be slipped through said cutout to unhook said lower link from said upper link.

10. An elastic link strap as defined in Claim 9, characterized by the fact that the shortened tongue is provided on that side wall of the two adjacent lower links connected to said upper link which moves away from the cutout in the bent-over tab of said upper link when the strap is being expanded.

11. An elastic link strap as defined in Claims 1 to 8, characterized by the fact that at least at some portions of the strap the projecting tongues on one of the two side walls of two adjacent lower links extending into one upper link are cut off to such an extent as to permit such side wall to be inserted between or removed from the free ends of the bent-over tabs of said upper link; that a connecting member is provided within said upper link and has recesses therein at the lower side of its outer ends into which the free ends of the bent-over tabs of said upper link engage so as to retain said connecting member within said upper link; and that a screw is inserted in the bottom plate of the lower link having the tongueless side wall for removably securing said connecting member to the inner surface of said bottom wall.

12. An elastic link strap as defined in Claim 11, characterized by the fact that the connecting member has a projecting reinforcing portion to provide for an adequate wall strength to accommodate the screw hole therein, and that the adjacent side wall of the upper link has a cutout to receive said reinforcing portion.

13. An elastic link strap as defined in Claim 11, characterized by the fact that the connecting member is of angular shape having one arm abutting against the adjacent side wall of the upper link, and the other arm abutting against the bottom plate of the lower link.

14. An elastic link strap as defined in Claims 1 to 3, characterized by the fact that the side walls of the upper and lower links are of substantially equal height; that said side walls have a projecting tongue on both ends thereof; that the outer ends of the upper wall of each upper link and of the bottom wall of each lower link are extended, and such extensions are bent over toward the corresponding extensions of the links of the other layer and then inwardly toward the outer ends of said side walls so as to form a pocket at both ends of each upper and lower link; that the upper surface of each pocket is spaced from the adjacent tongue so as to form a slot having a width substantially equal to the thicknes of the material of said pocket; that the tongues of the upper links are disposed and slidable in the longitudinal direction of the strap within the pockets of the lower links; and that the tongues of the lower links are similarly disposed and slidable within the pockets of the upper links.

15. An elastic link strap as defined in Claims 1 and 2, characterized by the fact that the opposite side walls of the links of one layer are connected with each other by a crossbar, and that said crossbars of one link are slidable in the longitudinal direction of the strap within slots in one side wall of each of two adjacent links of the other layer.

16. An elastic link strap as defined in Claim 15, characterized by the fact that each crossbar is formed by an extension on the outer ends of the opposite side walls of said links.

17. An elastic link strap as defined in Claims 15 and 16, characterized by the fact that the outer walls of the links of at least one layer have tablike extensions at their outer ends, and that said extensions are bent-over toward the links of the other layer so as to close the outer longitudinal sides of the strap at least when said strap is in the contracted position.

18. An elastic link strap as defined in Claims 15 and 16, characterized by the fact that the outer walls of the links of both lawers have tablike extensions at their outer ends, and that said extensions are bent over toward each other so that the outer edges thereof substantially engage with each other.

19. An elastic link strap as defined in Claims 15 and 16, characterized by the fact that the outer walls of the links of both layers have tablike extensions at their outer ends, and that said extensions are bent over toward each other and overlapping each other so as to close the outer longitudinal sides of the strap in any position of the expansion and contraction thereof.

20. An elastic link strap as defined in any of the preceding Claims 2 to 13, characterized by the fact that the curved leaf springs are notched at their outer ends at one side thereof, so as to form supporting surfaces on which the extensions are adapted to engage so as to retain said springs within the links.

21. An elastic link strap as defined in any of the preceding claims, characterized by the fact that the lower links are of narrower width than the upper links so that, when the strap is in the fully contracted position, the adjacent lower links will be separated by gaps.

22. An elastic link strap substantially as described in the foregoing specification and as illustrated in the accompanying drawings.

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