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(54) Buckle for bracelets.

(57) A first lock member is connected to a first connecting plate of a foldable connecting plate. The first lock member has a pair of push plates laterally slidably mounted in a housing, a spring laterally disposed in the housing and arranged to be longitudinally bent by pushing the push plates. A lock plate is provided to be longitudinally moved by the spring when the push plates are pushed. A lock projection is provided on a second connecting plate of the foldable connecting plate and has an engaging notch to be engaged with the lock plate. The spring is arranged to release the lock plate from the notch when the push plates are pushed.

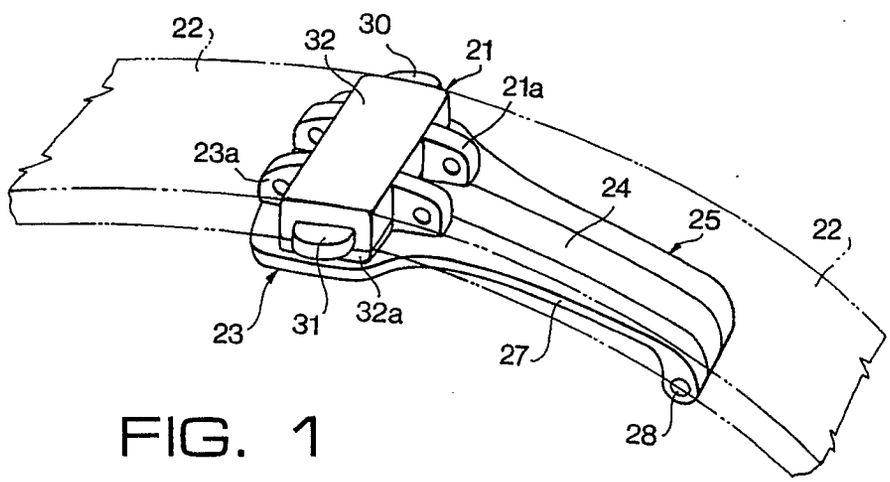

FIG. 1

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BACKGROUND OF THE INVENTION

The present invention relates to a buckle for a bracelet such as a watch bracelet or band, and more particularly to a buckle having a lock means.

Japanese Utility Model Application Laid Open 1-112712 discloses a buckle for a watch band. Fig. 15 shows the buckle. The buckle comprises a first lock member 1 connected to one end of a watch band 2 and a second lock member 3 provided on the other end of the watch band 2. Both ends of the band 2 are connected with each other by a foldable connecting plate comprising an inner plate 4 and an outer plate 5 connected by a hinge 6.

Referring to Fig. 16, the first lock member 1 has a slidable lock plate 7 having a locking hole 8 and laterally slidably mounted in a housing 1a. The lock plate 7 is urged by a spring 9 to a lock position, where a releasing projection 7a is outwardly projected. The second lock member 3 comprises a hook 10 which can be inserted into the housing 1a passing through an opening 11.

In a locking state, the hook 10 engages with an edge of the locking hole 8. When the projection 7a is pushed to move the lock plate 7, the edge of the hole 8 is disengaged from the hook 10, thereby releasing the hook.

In such a device, it may possibly occur that the projection 7a is pushed by other things so that the hook 10 is released. In order to prevent such an accident, for example, the force of the spring 9 is increased. However, if the spring force is increased, the projection 7a must be pushed at a large force. Such a large spring force produces a large reaction of the projection, which will cause pain to a finger of a wearer. Furthermore, a large force is required to engage the hook 10 with the edge of the hole 8.

Figs. 17 and 18 show another prior art. The buckle comprises a pair of slidable lock plates 12 and 13 slidably mounted in a housing 15, a spring 14 provided between the plates 12, 13, and a hook pin 16 securely mounted on the inner plate 4. The housing 15 is connected to the outer plate 5. The lock plates 12 and 13 have engaging hooks 12a and 13a, respectively. The engaging hooks 12a and 13a are urged towards the hook pin 16, thereby locking the hook pin.

The locking of the hook pin 16 is released by pushing the lock plates 12 and 13 at the same time. However, if one of the lock plate 12 and 13 is pushed under the condition that the engaging hooks 12a and 13a are slightly engaged with the hook pin 16 as shown in Fig. 18, there may occur that the lock plate does not return to the engaging state with the engaging pin when released. As a result, the buckle will be released.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a buckle for a bracelet which can not be released only when both lock plates are pushed at the same time.

Another object of the present invention is to provide a buckle which may be released with a small stroke.

According to the present invention, there is provided a buckle for connecting a bracelet comprising a foldable connecting plate having connecting plates hinged with each other, a first lock member having a housing connected to one of the end connecting plates of the foldable connecting plate, at least one push plate laterally slidably mounted in the housing, a spring laterally disposed in the housing and arranged to be longitudinally bent by pushing the push plate, and first lock means cooperating with the spring, a second lock member provided on another connecting plate of the foldable connecting plate and having second lock means to be engaged with the first lock means.

The spring is arranged to release the first lock means from the second lock means when the push plate is pushed.

In an aspect of the invention, the first lock means is a lock plate connected to the spring and moved in a longitudinal direction of the bracelet, and the second lock means has a recessed portion to be engaged with the lock plate.

The foldable connecting plate comprises two plates, the housing has an opening at a bottom thereof, and the second lock means is a lock projection provided on the other connecting plate so as to be inserted into the housing passing through the opening and having an engaging notch to be engaged with the lock plate.

In another aspect, the foldable connecting plate comprises three plates, and the second lock means is an engaging hole formed to be engaged with the lock plate.

In a further aspect, the first lock means includes an additional spring provided adjacent to the spring to form an expandable combined spring, and the second lock means is a lock pin having a large head and

securely mounted on another connecting plate of the foldable connecting plate, the housing has an opening through which the head of the lock pin passes, the combined spring is arranged to be expanded by the head of the lock pin and to grasp a stem of the lock pin.

These and other objects and features of the present invention will become more apparent from the following detailed description with reference to the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

Fig. 1 is a perspective view showing a buckle for a watch band as a first embodiment of the present invention;
Fig. 2 is an exploded perspective view of the buckle;
Fig. 3 is a sectional plan view of the buckle;
Figs. 4 and 5 are illustrations for explaining the operation of the buckle;
Fig. 6 is a perspective view showing a second embodiment of the present invention;
Fig. 7 is a perspective view of a main part of the buckle as viewed from the underside, removing a cover;
Fig. 8 is a side view of the buckle;
Fig. 9 is an enlarged side view of the buckle;
Fig. 10 is a plan view showing a modification of the second embodiment;
Fig. 11 is a perspective view of a third embodiment of the present invention;
Fig. 12 is a sectional plan view of the buckle;
Fig. 13 is a sectional side view of the buckle;
Fig. 14 is an exploded perspective view of the buckle;
Fig. 15 is a perspective view of a conventional buckle;
Fig. 16 is a sectional side view of the buckle;
Fig. 17 is a plan view of another conventional buckle;
Fig. 18 is a sectional side view of the buckle; and
Fig. 19 is an enlarged sectional view for explaining the operation of the buckle.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figs. 1 and 2, the buckle as the first embodiment of the present invention comprises a first lock member 21 connected to one end of a watch band 22 by connecting projections 21a, and a second lock member 23 connected to the other end of the watch band 22 by connecting projections 23a. The first lock member 21 is connected to a first connecting plate 24 of a foldable connecting plate 25 by a pin 26. The second lock member 23 is integral with a second connecting plate 27. The second connecting plate 27 has a bifurcated shape and connected to the first connecting plate 24 by a pin 28.

Referring to Fig. 3, the first lock member 21 has a pair of push plates 30 and 31. The push plates 30 and 31 are slidably mounted in a housing 32 so as to be moved in the lateral direction with respect to the longitudinal direction of the band. Between the push plates 30 and 31, a spring plate 33 is disposed so as to outwardly urge the push plates. A lock plate 34 having a W-shape is slidably held in the housing 32 so as to be moved in the longitudinal direction of the band. The lock plate 34 has a locking projection 35 and a connecting projection 36 which is connected to the spring plate 33. The spring plate 33 is inwardly bent so that the spring plate is further inwardly bent when the push plates 30 and 31 are pushed, thereby moving the lock plate 34 in the inner direction. The housing 32 has an opening 37 at a bottom plate 32a adjacent the locking projection 36.

On the other hand, the second lock member 23 has a hook projection 38 corresponding to the opening 37 of the first lock member 21. The hook projection 38 has a spherical top 38a and an engaging notch 38b.

To wear the band, the first lock member 21 and the first connecting plate 24 are pivoted about the pin 28 to the second lock member 23. The hook projection 38 enters the opening 37 and the spherical top 38a pushes the locking projection 35 to move the lock plate in the inner direction. At last, the locking projection 35 engages with the engaging notch 38b, thereby locking the first and second lock members 21 and 23.

In order to release the locking, the push plates 30 and 31 are pushed at the same time, so that the spring plate 33 is further bent in the inner direction to move the lock plate 34. Thus, the locking projection 35 removes from the notch 38b to release the locking. When the first lock member 21 is raised, it is disengaged from the second lock member 23.

Referring to Figs. 4 and 5, if one-half of the effective length of the spring plate 33 is a, the deflection of the spring plate is b, and the pushing distance of the push plate 30 is ℓ, the deflecting distance x of the spring plate is expressed as follows.

$(a - \ell)^2 + (b + x)^2 = a^2 + b^2$

$x^2 + 2bx - 2a\ell + \ell^2 = 0$

If $\ell^2 \fallingdotseq 0$

$$x = \sqrt{b^2 + 2a\ell} - b$$

If $a/b = n/1$

$$x = \sqrt{b^2 + 2n\ell b} - b$$

$$x = \sqrt{b^2 + 2n\ell b + n^2\ell^2 - n^2\ell^2} - b$$

Since $n^2\ell^2 \fallingdotseq 0$

$$x \fallingdotseq \sqrt{(b + n\ell)^2} - b$$

$x \fallingdotseq n\ell$

$x \fallingdotseq a/b \cdot \ell$

In other words, the deflecting distance x is a/b times as large as the pushing distance ℓ of the push plate.

For example, if $a/b = 5$ and $\ell = 0.2$ mm, x is 1.0 mm. Namely, the pushing stroke is multiplied. Therefore, the pushing distance can be reduced. Namely, it is possible to release the locking of the buckle with ease.

The pushing distance of the single push plate is determined to such a value that the deflecting distance dependent on the single push plate is too small to disengage the locking projection 35 from the notch 38b. Thus, the locking of the buckle can be released only when both the push plates are pushed at the same time.

Referring to Figs. 6 to 8, the buckle of the second embodiment is provided for a double foldable connecting plate 40 which comprises a first connecting plate 41, a second connecting plate 42, and an intermediate connecting plate 43 hinged to the first and second connecting plates 41 and 42 at both ends thereof. The second connecting plate 42 has a recess 44 in the underside thereof which is provided to be snugly engaged with a lateral bar 43a of the intermediate connecting plate 43 when folded.

The buckle comprises a first lock member 45 connected to one end of a watch band 46 by a connecting projection 47, and a second lock member 48 connected to the other end of the watch band 46 by connecting projections 50. The first lock member 45 is connected to the first connecting plate 41 and the second lock member 48 is connected to the second connecting plate 42.

As shown in Fig. 7, the first lock member 45 has a pair of push plates 51 and 52 slidably mounted in a housing 53. Between the push plates 51 and 52, a spring plate 54 is disposed so as to outwardly urge the push plates. A lock plate 55 is slidably mounted in the housing 53. The lock plate 55 has a locking projection 55a which is projected from the housing 53 and a connecting projection 55b which is connected to the spring plate 54.

The second lock member 48 has an engaging hole 56 corresponding to the locking projection 55a.

To engage the buckle as shown in Fig 9, the first and second connecting plates 41 and 42 are pivoted about the respective hinges. The locking projection 55a enters the hole 56 and engages with edges of the hole, thereby locking the first and second lock members 45 and 48.

In order to release the locking, the push plates 51 and 52 are pushed at the same time, so that the spring plate 54 is further bent in the inner direction to retract the lock plate 55. Thus, the locking projection 55a removes from the hole 56 to release the locking. When the first and second lock members 45 and 48 are raised, both members are disengaged from each other.

The modification of the buckle shown in Fig. 10 has only one push plate 51. Other parts are the same as the second embodiment.

Referring to Figs. 11 to 13, the buckle as the third embodiment is provided for the double foldable

connecting plate 60. The buckle comprises a first lock member 61 connected to one end of a watch band 62 by connecting projections 63, and a second lock member 64 provided on an intermediate connecting plate 65 of the double foldable connecting plate 60. The first lock member 61 is connected to a first connecting plate 66 of the double foldable connecting plate 60 by a hinge 67. A second connecting plate 68 is connected to the other end of the band 62 by a connecting pipe 70 and connected to the intermediate connecting plate 65 by a hinge 71.

The second connecting plate 68 has an engaging hole 69 and the intermediate connecting plate 65 has an engaging pin 79 adapted to be snugly engaged with the hole 69 to connect the plates 65 and 68 with each other.

Referring to Figs. 12 to 14, the first lock member 61 has a pair of push plates 73 and 74 slidably mounted in a housing 75 so as to be moved in the lateral direction. Between the push plates 73 and 74, a combined spring 76 is disposed so as to outwardly urge the push plates. The combined spring 76 comprises a pair of curved spring plates 77 and 78 arranged to form a spindle shape in plan view. Both ends of each of the spring plates 77 and 78 are engaged with notches 80 formed in the push plates 73 and 74. The combined spring 76 is provided to act also as a locking member as described hereinafter.

The housing 75 has a notch 81 in the inner side of each side plate thereof. On the other hand, a holding plate 82 has a pair of projections 83 on both sides thereof corresponding to the notches 81. The holding plate 82 is inserted into the housing 75 from one side until both projections 83 engage with the notches 81 to be locked. Push plates 73 and 74 and the combined spring 76 are also inserted into the housing 75. Two stopper pins 84 are engaged in holes 85 of the housing and staked therein. Each of the stopper pins 84 is locked in a recess 86 formed in the corresponding push plate, and serves to prevent the push plate from removing and to restrict the pushing distance of the push plate.

On the other hand, the second lock member 64 comprises a lock pin 87 staked on the intermediate connecting plate 65 of the double foldable connecting plate 60. The lock pin 87 has a head 87a having a spherical surface, and is adapted to be inserted into the housing 75 passing through an opening 88 formed in the bottom of the housing. The head 87a has a larger diameter than a stem 87b so that the spring plates 77 and 78 may be engaged with the underside of the head. The head 87a is adapted to be inserted into a hole 90 formed in the holding plate 82.

To lock the buckle, the first and second connecting plates 66 and 68 are pivoted about the hinges 67 and 71. The engaging pin 79 engages with the engaging hole 69, thereby connecting the connecting plates 65 and 68 with each other. On the other hand, the lock pin 87 enters the housing, and the spherical head 87a expands the combined spring 76. When the head 87a passes the combined spring, the spring grasps the stem 87b of the lock pin 87. Thus, the buckle is locked.

In order to release the locking, the push plate 73 and 74 are pushed at the same time, so that the combined spring 76 is expanded. Thus, the lock pin 87 is removed from spring to release the locking. When the first lock member 61 is raised, the member is disengaged from the second lock member 64.

While the invention has been described in conjunction with preferred specific embodiments thereof, it will be understood that this description is intended to illustrate and not limit the scope of the invention, which is defined by the following claims.

Claims

1. A buckle for connecting a bracelet comprising:
   a foldable connecting plate having connecting plates hinged with each other;
   a first lock member having a housing connected to one of the end connecting plates of the foldable connecting plate, at least one push plate laterally slidably mounted in the housing, a spring laterally disposed in the housing and arranged to be longitudinally bent by pushing the push plate, and first lock means cooperating with the spring;
   a second lock member provided on another connecting plate of the foldable connecting plate and having second lock means to be engaged with the first lock means,
   the spring being arranged to release the first lock means from the second lock means when the push plate is pushed.

2. The buckle according to claim 1 wherein the first lock means is a lock plate connected to the spring and moved in a longitudinal direction of the bracelet, and the second lock means has a recessed portion to be engaged with the lock plate.

3. The buckle according to claim 2 wherein the foldable connecting plate comprises two plates, the

housing has an opening at a bottom thereof, and the second lock means is a lock projection provided on the other connecting plate so as to be inserted into the housing passing through the opening and having an engaging notch to be engaged with the lock plate.

4. The buckle according to claim 2 wherein the foldable connecting plate comprises three plates, and the second lock means is an engaging hole formed to be engaged with the lock plate.

5. The buckle according to claim 1 wherein the first lock means includes an additional spring provided adjacent to the spring to form an expandable combined spring, and the second lock means is a lock pin having a large head and securely mounted on another connecting plate of the foldable connecting plate, the housing has an opening through which the head of the both pin passes, the combined spring is arranged to be expanded by the head of the lock pin and to grasp a stem of the lock pin.

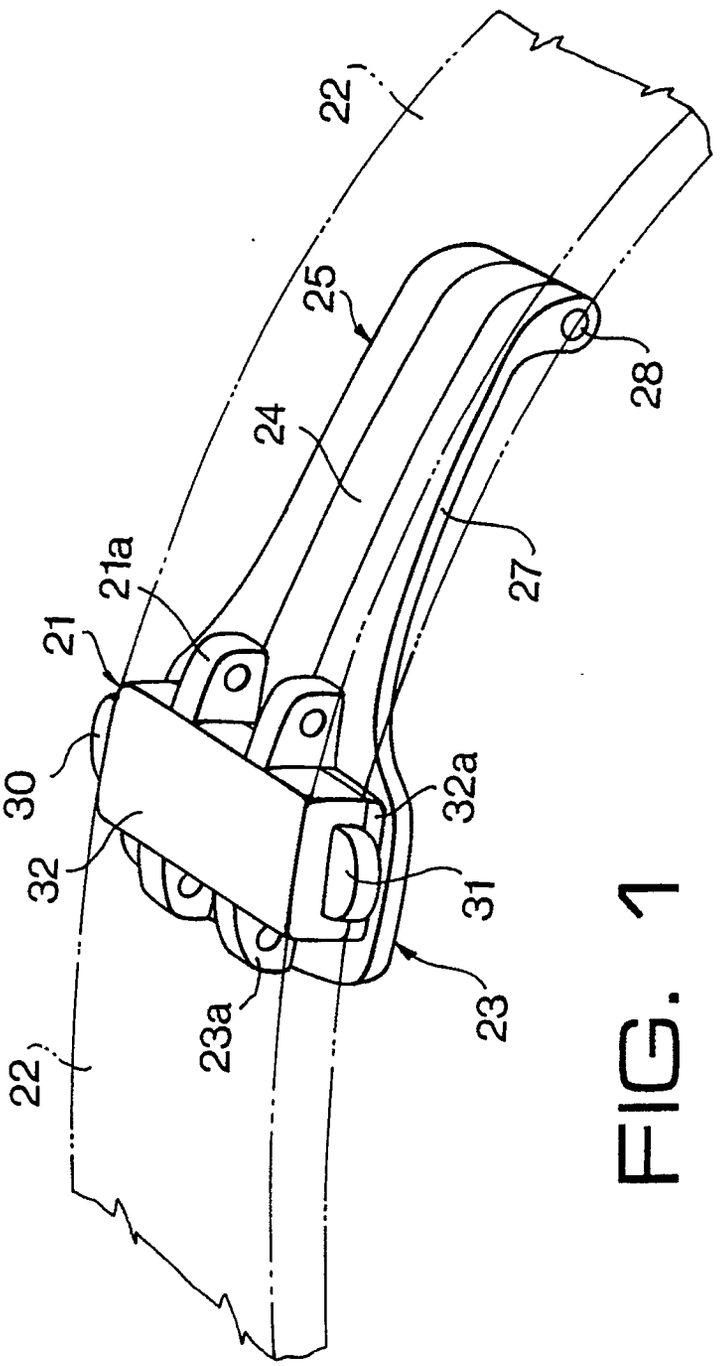


FIG. 1

FIG. 2

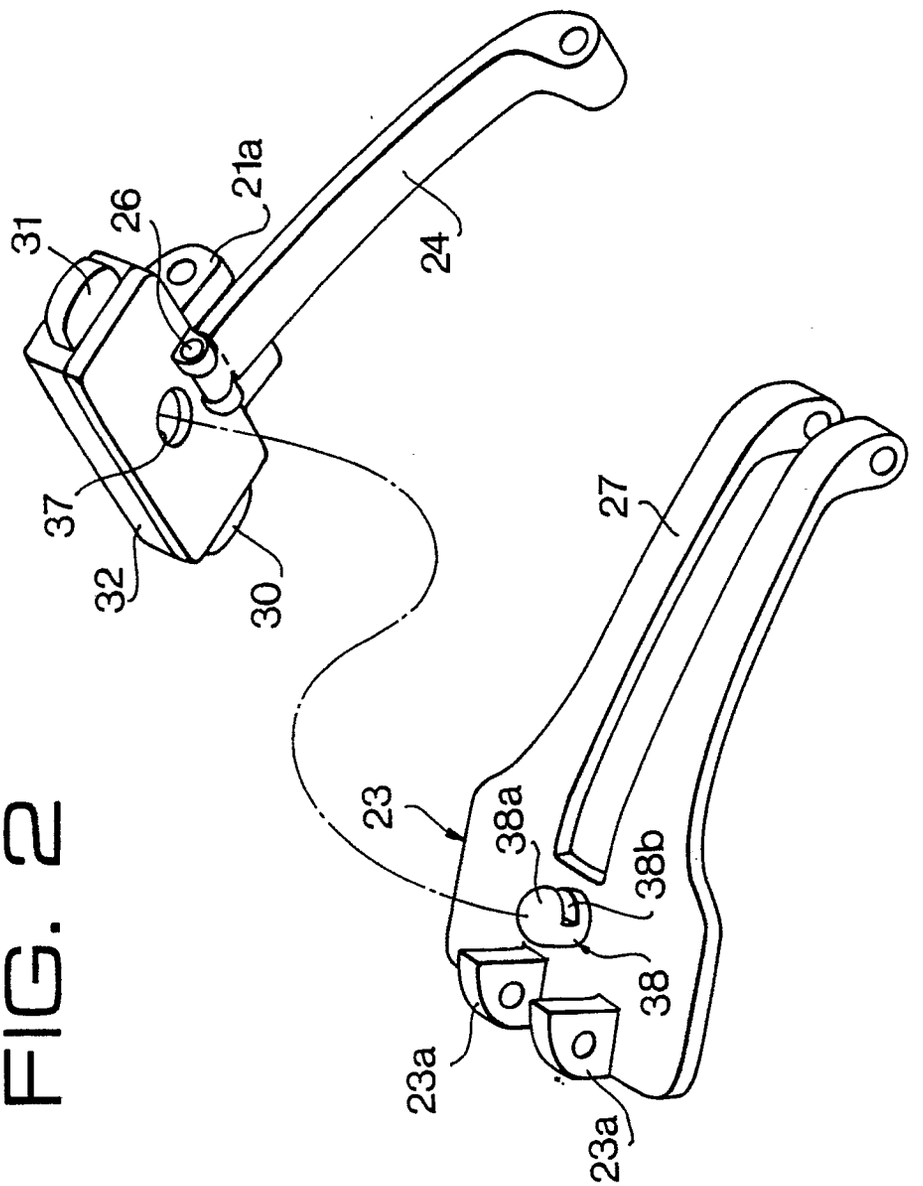


FIG. 3

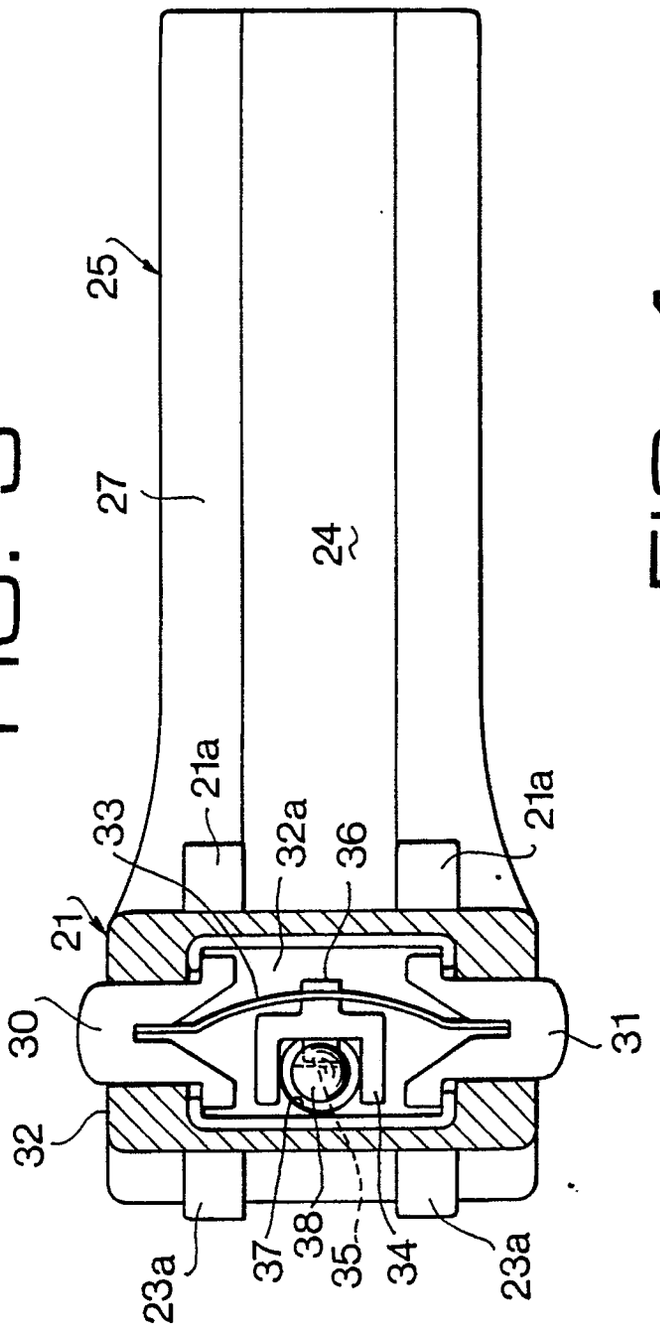


FIG. 4

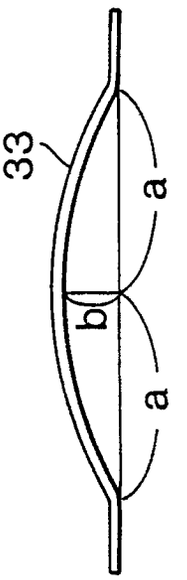


FIG. 5

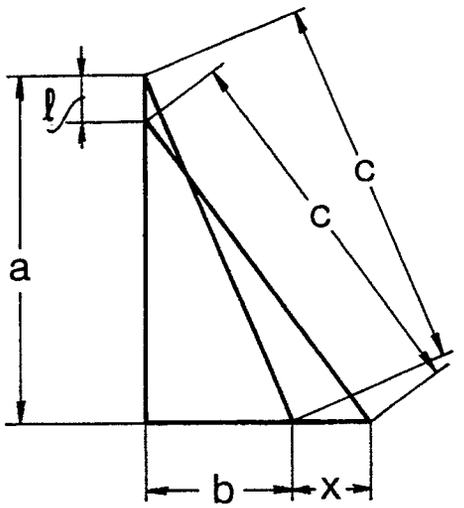


FIG. 6

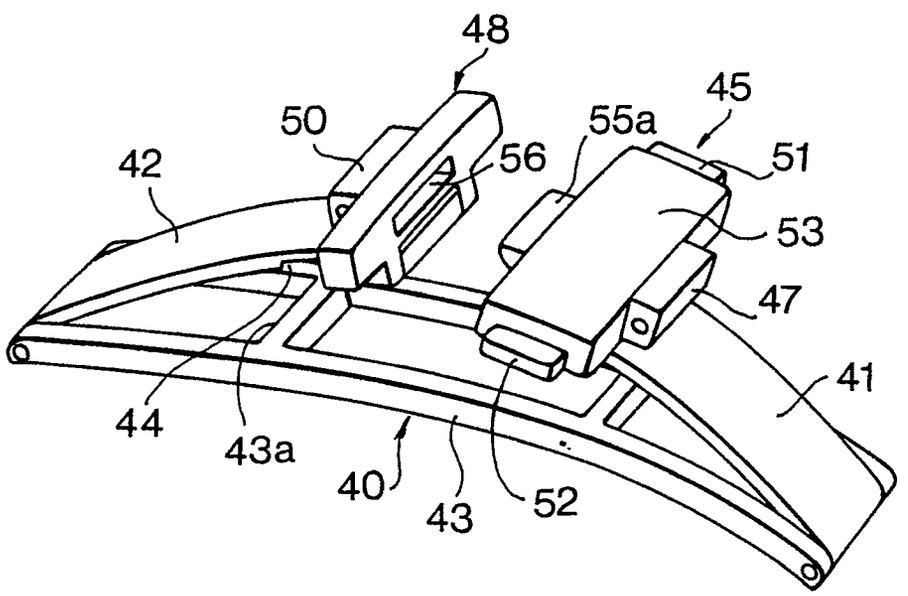


FIG. 7

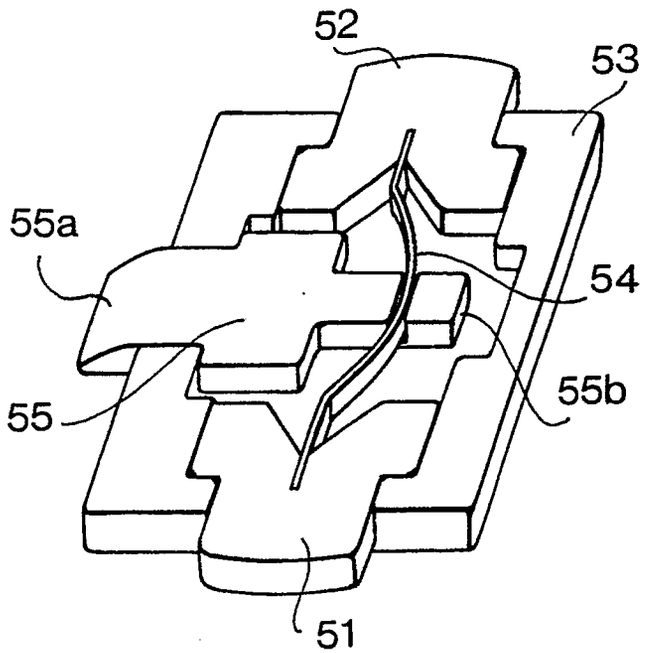


FIG. 8

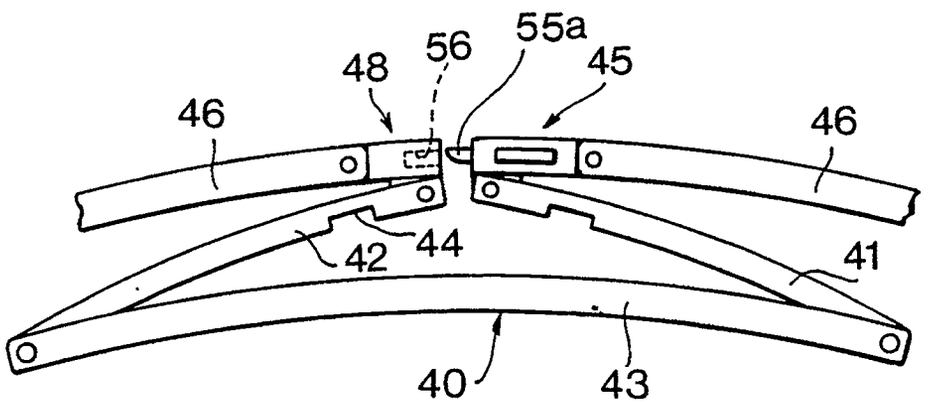


FIG. 9

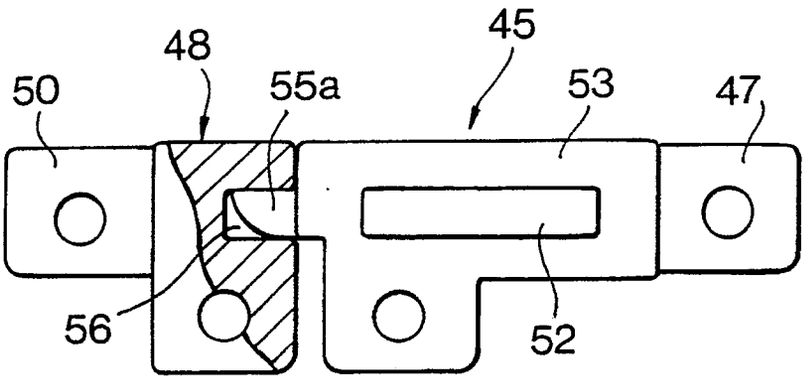
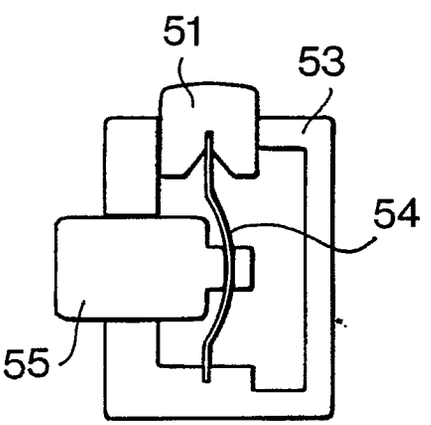


FIG.10



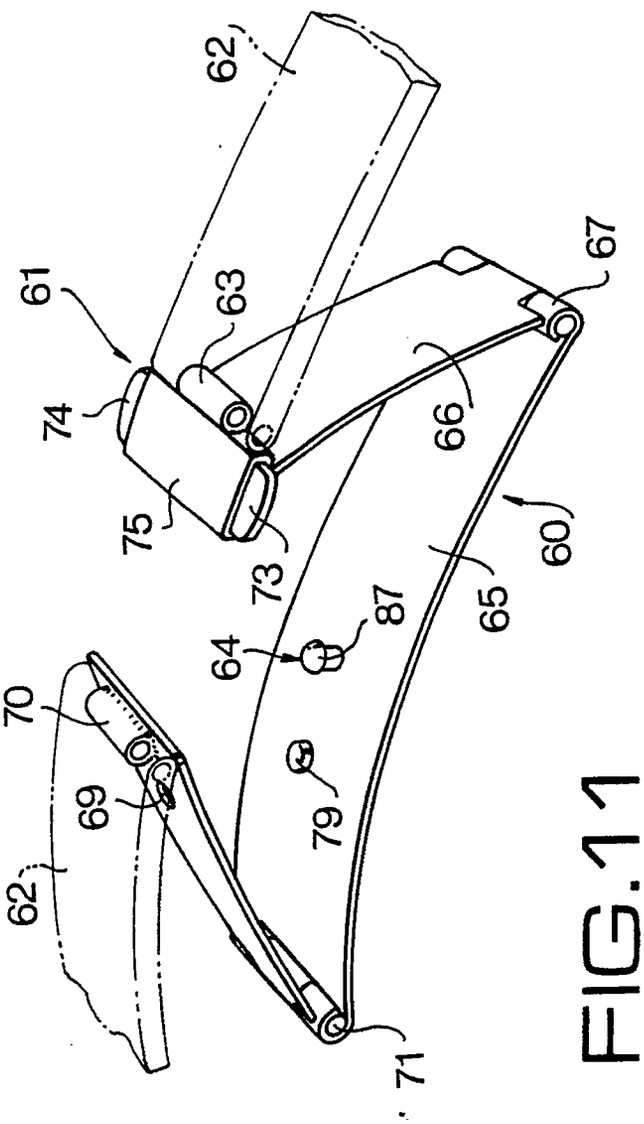
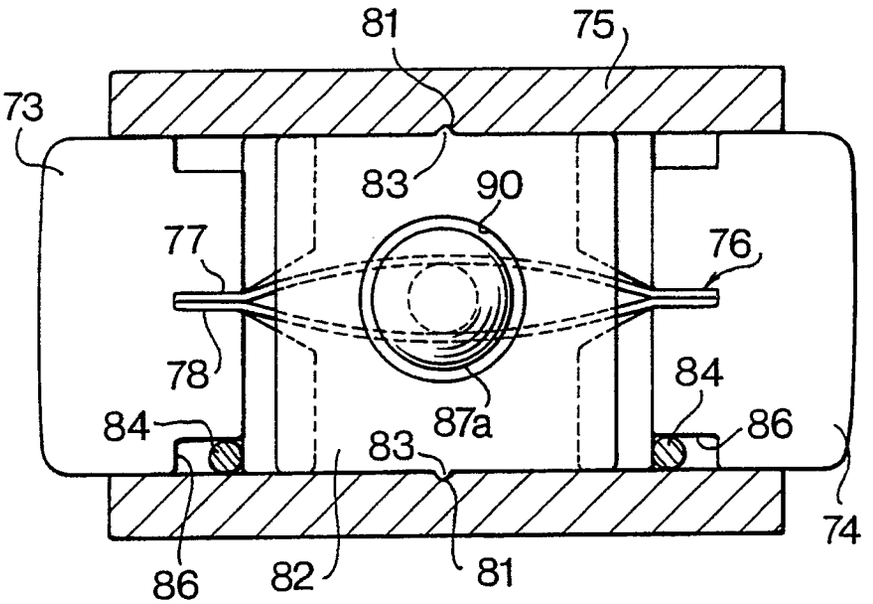


FIG.11

FIG.12


81
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90
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76
78
84
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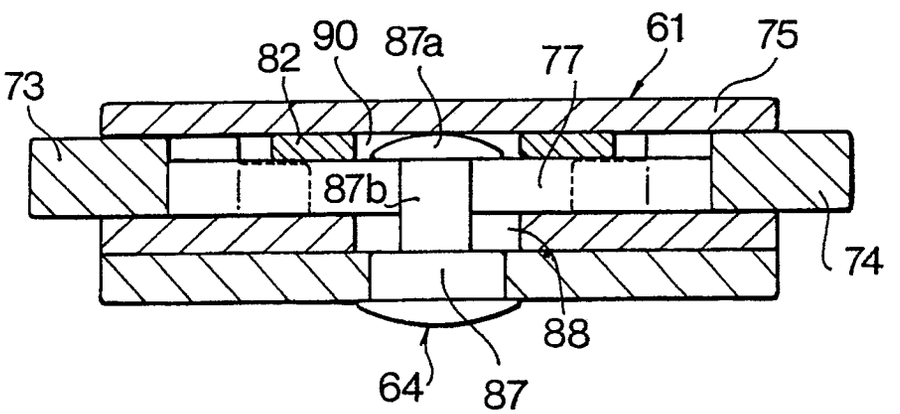
87a
86
83
74
86
82
81

FIG.13


82
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61
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87b
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64
87

FIG.14

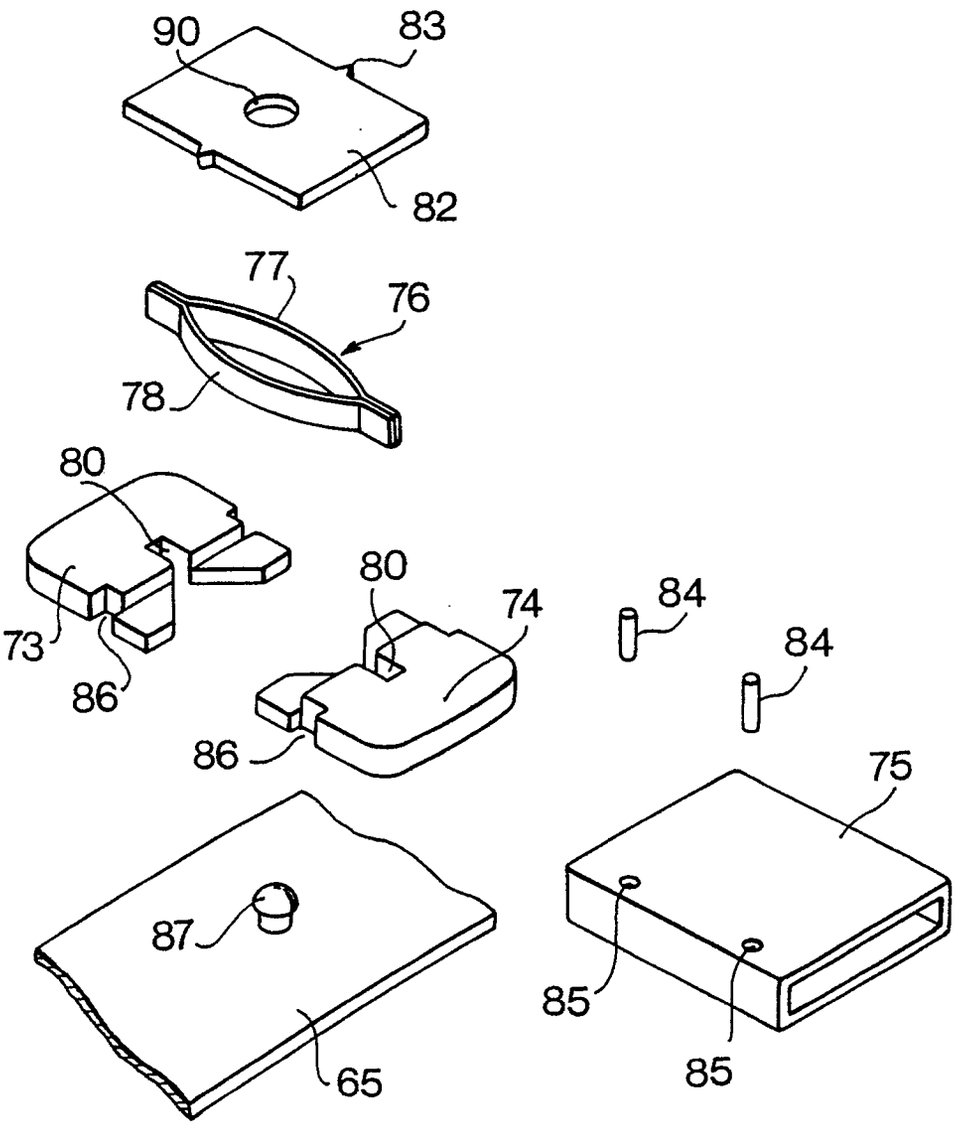

FIG.15 PRIOR ART

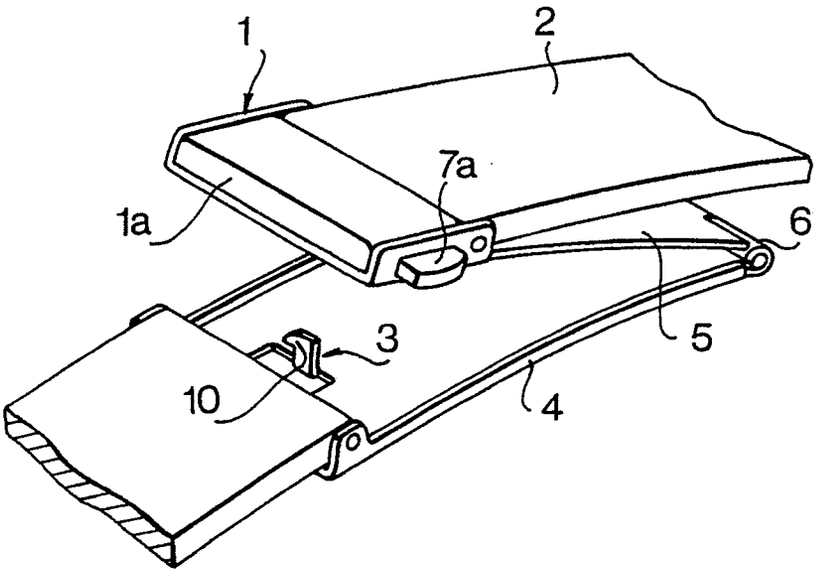

FIG.16 PRIOR ART

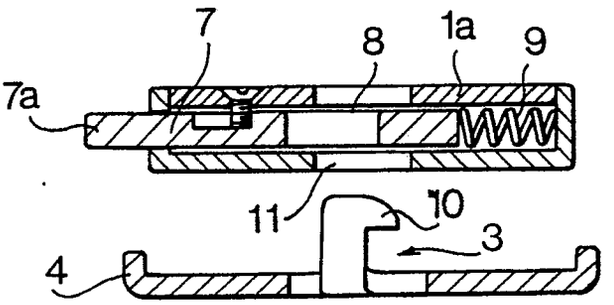

FIG.17 PRIOR ART

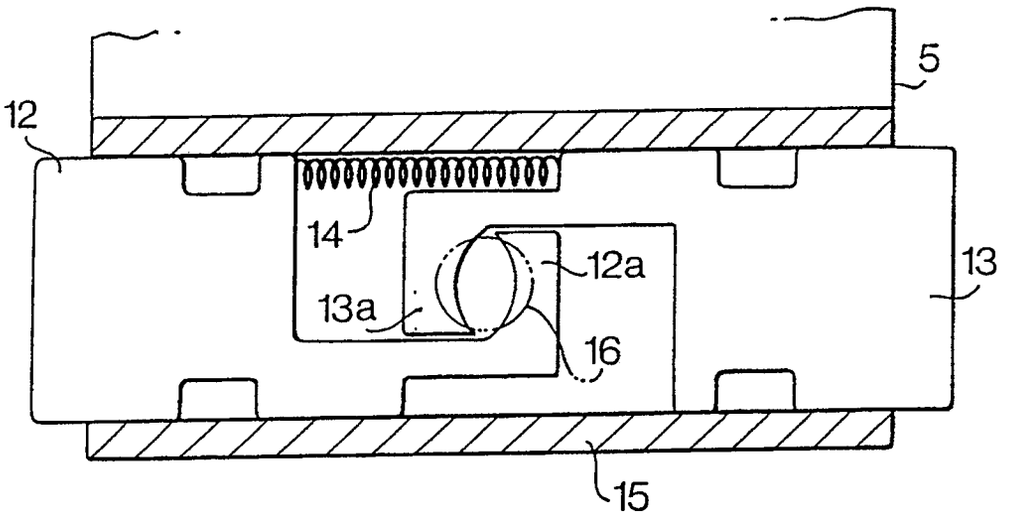

FIG.18 PRIOR ART

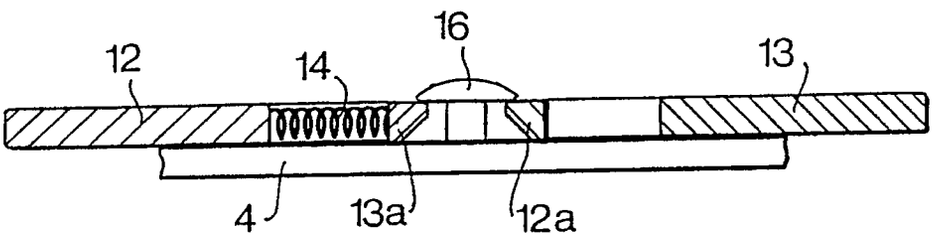

FIG.19 PRIOR ART