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(72) GYONGYOSI, JURGEN, DE
(72) MANN, STEPHAN, DE
(71) RASMUSSEN GMBH, DE

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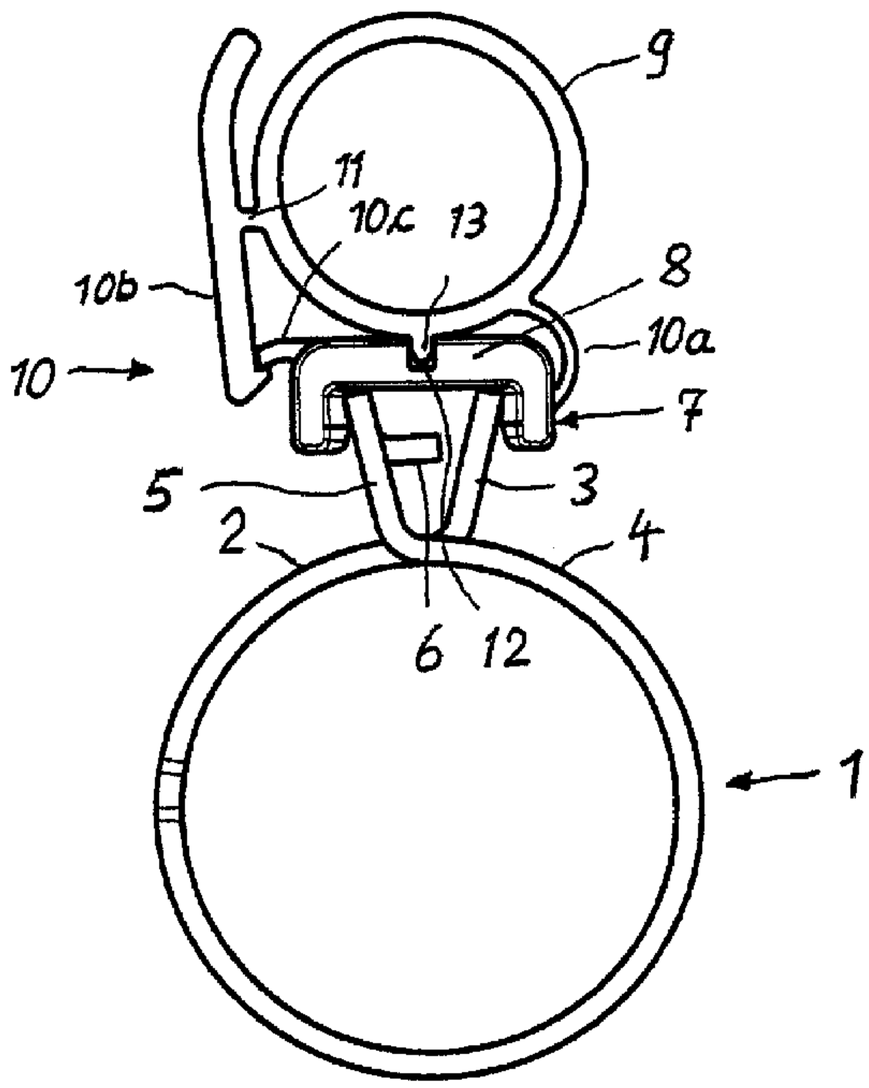
(54) **DISPOSITIF POUR FIXER UNE PINCE EN POSITION OUVERTE ET DEGAGER LA PINCE DE LA POSITION OUVERTE A LA POSITION FERMEE**

(54) **DEVICE FOR SECURING A CLIP IN AN OPEN POSITION AND RELEASING THE CLIP FROM THE OPEN POSITION TO THE CLOSED POSITION**



(57) A device for securing a clip in an open position and releasing the clip from the open position to the closed position has an approximately U-shaped clamped part that can be placed upon the clamping jaws of an open clip. The device has a gripping part that can be grasped by hand and is connected to the clamp part by a connecting part. The transverse part has a continuous groove extending transversely with respect to the transverse part. The gripping part has a projection that fits into the groove. The connecting part permits the projection, which is inserted in the groove, to be pulled out of the groove and also permits the clamp part to be pulled off of the clamping jaws of the clip so that the clip can move to the closed position.

ABSTRACT OF THE DISCLOSURE

A device for securing a clip in an open position and releasing the clip from the open position to the closed position has an approximately U-shaped clamped part that can be placed upon the clamping jaws of an open clip. The device has a gripping part that can be grasped by hand and is connected to the clamp part by a connecting part. The transverse part has a continuous groove extending transversely with respect to the transverse part. The gripping part has a projection that fits into the groove. The connecting part permits the projection, which is inserted in the groove, to be pulled out of the groove and also permits the clamp part to be pulled off of the clamping jaws of the clip so that the clip can move to the closed position.

DEVICE FOR SECURING A CLIP IN AN OPEN POSITION AND RELEASING THE CLIP FROM THE OPEN POSITION TO THE CLOSED POSITION

BACKGROUND OF THE INVENTION

1. Field Of The Invention

The present invention relates to a device for securing a clip in an open position and releasing the clip from the open position to a closed position. The clip is typically made of an annularly bent spring steel element. The clip is known in the art as a spring band clip. The spring steel element has a first end section having a first jaw and a second end section having a second jaw. The jaws can be moved due to the natural spring force of the clip so that the diameter of the clip is reduced from the open position to the closed position in which the clip bears firmly against the object to be clamped. The device has an approximately U-shaped clamp part that can be placed upon the clamping jaws of the open clip. The device has a gripping part that is connected to the clamp part by a connecting part.

2. Discussion Of The Related Art

A device of this type for securing a spring band clip in an open position and releasing the clip from the open position to the closed position is disclosed in German Reference No. DE 196 41 108 C1. In the clip according to the German '108 reference, pulling on the gripping part causes the clamp part to be pulled off of the clamping jaws so as to permit the clip to snap into the closed position. Because the clip typically has a very high natural spring force, on occasion, a considerable force is required to remove the clamp part from the clamping jaws. This is especially true if the legs of the clamp part have undercuts and the clamping jaws grip the undercuts from behind. In some cases, the clip may have to be tensioned somewhat further (i.e., the jaws are moved closer together) against the clip's natural spring force, to permit the clamp part to be removed.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a device for securing a clip in the open position and which facilitates the pulling off or removal of the clamp part of the device from the clip so that the clip can move to the closed position.

According to an exemplary embodiment of the present invention, this and other objects are achieved with a device having a U-shaped clamp part having a first leg and a second leg connected by a transverse part. The transverse part has a continuous groove extending transversely with respect to the direction of extension of the transverse part between the two legs. The gripping part has a projection of a sufficient size to fit into the groove. In the open position and with the projection inserted in the groove, the device has a connecting

part that permits the projection to be pulled out of the groove and then permits the clamp part to be pulled off of the clamping jaws of the clip.

In accordance with this exemplary embodiment, the cross section of the transverse part is weakened by the groove. But, in the open position, the clamp part fits over the clamping jaws, and the projection of the gripping part is introduced into the groove. Thus, the projection completely fills the groove. The transverse part of the clamp part is, therefore, virtually unable to bend, even when subject to the spring force of the clip. If, however, the gripping part is pulled sufficiently, the projection, which is inserted in the groove, is, at first, pulled out of the groove. Thereafter, the transverse part of the clamp part, due to the force exerted by the spring force of the clip via the clamping jaws onto the legs of the clamp part, bends around the groove bottom, which acts as a living hinge. Thus, with further pulling on the gripping part, the clamp part can be easily removed from the clamping jaws so that the clip can contract into the closed position.

The connecting part preferably includes a hinge that is connected to the clamp part at one side of the groove so that the gripping part, together with the projection, is pivotable with respect to the clamp part. Thus, when the clamp part is being removed from the clamping jaws, even while the projection is being pulled out of the groove, a force is exerted on the one side of the clamp part via the hinge. Therefore, a torque is exerted on the clamp part about an axis which is perpendicular with respect to the plane of the clip and approximately coincides with the free end of the clamping jaw that lies on that side of the groove that is remote from the location at which the hinge connects to the clamp part. This torque causes the clamp part to pivot about this axis and to be at least partially lifted off of the

other clamping jaw. Thus, it is easier to pull the clamp part off of the clamping jaws.

The gripping part is releasably connected to the clamp part on the opposite side of the groove remote from the hinge. The projection is inserted in the groove when the gripping part is connected to the clamp part on the opposite side of the groove (i.e., the releasable connection is maintained). So long as the releasable connection is maintained, the projection engages in the groove. After the releasable connection is released, the projection can be pulled out of the groove. Thus, so long as the releasable connection is maintained, the clamp part will rest relatively firmly on the clamping jaws.

The releasable connection is preferably a hook that is pivotably connected to the gripping part. The hook is in locking engagement with a projection of the clamp part on the opposite side of the groove when the projection is inserted in the groove. This type of releasable connection can easily be released by manually pivoting the hook.

Alternatively, the connecting means can include a first elastic connecting element and a second elastic connecting element. The elastic connecting elements are connected, at one end thereof, to the clamp part, one on each side of the groove, and, at the other end thereof, to the gripping part. Thus, when the clamping part is being pulled off, the connecting elements can first of all be elastically stretched by the gripping part sufficiently far enough so that the projection is pulled out of the groove. In this stretched position of the connecting elements, further pulling on the gripping part enables the clamp part to be completely and easily pulled off the clamping jaws because it bends around the groove bottom.

If one of the connecting elements is formed with a predetermined breaking

point, then when being stretched, this connecting element would be designed to tear due to the increase in the pulling-off force. After tearing, the clamp part would then easily pivot away from the clamping jaws due to further pulling on the gripping part, which is connected to the clamp part by the non-torn connecting element.

The projection of the gripping part is preferably releasably latched to the clamp part. Therefore, the projection will remain securely in the groove, even if subjected to a possible spring force, whether from the hinge or from the connecting elements, which force would seek to lift the projection out of the groove. Not until the gripping part is pulled will the projection be removed from the groove.

The device can be produced relatively simply if the gripping part and the connecting part are produced integrally primarily from a first plastic, the clamp part is produced primarily from a second plastic differing from the first plastic, and the clamp part is integrally connected to the connecting part.

The gripping part, at least on its side facing the clamp part, can then be curved toward the clamp part. This makes it easier for the clamp part to bend as it is being pulled off due to the transverse part bearing against the curvature.

BRIEF DESCRIPTION OF THE DRAWING FIGURES:

The above and still further objects, features and advantages of the present invention will become apparent upon consideration of the following detailed description of specific embodiments thereof, especially when taken in conjunction with the accompanying drawings wherein like reference numerals in the various figures are utilized to designate like

components, and wherein:

Fig. 1 is a side view of a first exemplary embodiment of a device for securing a clip in an open position and releasing the clip from the open position to the closed position according to the present invention, with the device in a position in which the device is placed upon clamping jaws of an open clip,

Fig. 2 is a side view of the device according to Fig. 1 in a position in which the device is pulled off of the clamping jaws of the clip; and

Fig. 3 is a side view of a second exemplary embodiment of a device according to the present invention in a position in which the device would be placed upon the clamping jaws of a clip according to Fig. 1.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to Figs. 1-2, the device for securing a clip in an open position and releasing the clip from the open position to the closed position according to the present invention is illustrated. The device can be used with, for example, a clip 1 as illustrated in Fig. 1. Clip 1 is a conventional spring band clip for securing tubing on a pipe or pipe stub. Clip 1 is comprised of an annularly bent spring steel element that is in the form of a band (e.g., a spring band). One end section 2 of the spring steel element has a radially outwardly protruding clamping jaw 3. Jaw 3 protrudes through a circumferentially extending slot in the other end section 4 of the spring steel element. End section 4 also has a radially outwardly protruding clamping jaw 5. A tab 6 is bent out of the slot in the region of clamping jaw 5. Tab

6 extends in the direction towards the other clamping jaw 3.

Clip 1, as illustrated in Fig. 1, is expanded or opened by pressing clamping jaws 3 and 5 together counter to the natural spring force of the spring steel element. To place clip 1 over the tubing to be clamped, clip 1 must be in the open position. To keep clip 1 in the open position until the tubing is pushed onto the pipe, a U-shaped clamp part 7 is placed over clamping jaws 3 and 5, so that they cannot move away from one another (i.e., so that clip 1 cannot contract). The legs of U-shaped clamp part 7 are connected by a transverse part 8. Transverse part 8 is connected to an annular gripping part 9 by a connecting part 10. Gripping part 9 and connecting part 10 are integrally produced primarily from a thermoplastic, such as, for example, polyamide 6 (i.e., PA6) or nylon 6 (i.e., N6), which can be bent relatively easily. Connecting part 10 contains a hinge 10a, which can be, for example in the form of a living hinge. Hinge 10a, at one end thereof, is integrally connected to clamp part 7, on the outside of one of its legs. Hinge 10a, at its other end, is integrally connected to gripping part 9. Therefore, hinge 10a permits gripping part 9 and clamp part 7 to pivot relative to each other. Connecting part 10 also includes a hook 10b, which is pivotably connected to the gripping part 9, and is releasably connected to a projection 10c. Projection 10c is molded onto the end of transverse part 8 that is remote from hinge 10a. Hook 10b is connected, approximately in the center of its length, to gripping part 9 by a living hinge 11.

Transverse part 8 of clamp part 7 has, approximately in its center, a continuous groove 12 that extends transversely with respect to the direction of extension of transverse part 8 between the two legs of clamp part 7. Gripping part 9 has, on its side that is curved toward clamp part 7, a rib-like projection 13 that is sized to fit into groove 12 and extends for

the entire length thereof. Projection 13 is slightly tapered toward its free end so that it may be more easily inserted into groove 12 (see, for example, Fig. 2). The depth of groove 12 is greater than half the thickness of transverse part 8. Thus, the bottom of groove 12 is relatively thin and flexible. But the material of clamp part 7 is harder than that of the gripping part 9 and of the connecting part 10. Clamp part 7 is preferably made from fiber reinforced plastic, which can be the same plastic that gripping part 9 and connecting part 10 are made from.

Before being fitted on a tube, clip 1 is first brought into the open position according to Fig. 1. To move the clip to the open position, clamping jaws 3 and 5 are pressed together by means of a tool from a position in which they are at a relatively great distance from each other and clip 1 is unstressed. Thus, in the unstressed position clip 1 has a relatively small diameter. Clamping jaws 3 and 5 are pressed together until tab 6 bears against clamping jaw 3. Thus, clip 1 is expanded counter to its own spring force. Then, with the device in the unlocked position with hook 10b and projection 10c released from one another (see Fig. 2), clamp part 7 is placed upon clamping jaws 3, 5 so that the clamping jaws 3, 5 are maintained in the open position and clip 1 is, therefore, maintained in the opened position. Gripping part 9 is subsequently pivoted sufficiently far enough around hinge 10a toward transverse part 8 until projection 13 engages in groove 12 and gripping part 9 bears against transverse part 8. At the same time, during this pivoting movement, hook 10b latches below projection 10c so that the clip will be maintained in the open position and gripping part 9 is releasably connected to clamping part 7, as shown in Fig. 1. In this illustrated position, clip 1 is pushed over a tube whose external diameter is smaller than the internal diameter of the opened clip 1, but is somewhat larger than the internal diameter of clip 1 in its completely unstressed position. The

opened clip 1 is attached to the tube at the desired location (i.e., in a preassembled position). The tube, clip 1 and the device according to the present invention, which includes clamp part 7, gripping part 9 and connecting part 10, are then transported in the preassembled position to the installation location of the tube, for example, from a tubing manufacturer to a motor vehicle manufacturer, so that the tube can be connected to the connecting stub of a motor vehicle radiator. The tube is pushed onto a pipe or the pipe stub and then, after unlocking (i.e., selectively releasing) hook 10b from projection 10c, a finger of a user or other mechanical device is placed within annular gripping part 9 so that the clamp part 7 can be pulled off of clamping jaws 3 and 5. Clip 1 then contracts firmly around the tube and secures it to the pipe or pipe stub.

When clamp part 7 is being pulled off of clamping jaws 3, 5 by gripping part 9, at first, projection 13 is pulled out of groove 12 due to the force exerted on gripping part 9. This force is directed radially outwardly with respect to transverse part 8 or obliquely with respect to that side of transverse part 8 that is illustrated to the right in Figs 1 and 2. As this happens, the device moves to the position illustrated in Fig. 2. The gripping part 9 is then pulled further radially away from clip 1. In the process, a torque is exerted via hinge 10a on clamp part 7, in the counterclockwise direction with reference to Fig. 1, which causes clamp part 7 to rotate about an axis that is perpendicular with respect to the paper plane or plane of clip 1 and coincides approximately with the free end of clamping jaw 5. During this rotation, which can start before projection 13 is pulled completely out of groove 12, first, the leg of clamp part 7 that is shown to the right in Fig. 1 and onto whose outer side the hinge 10a is molded, pivots away from clamping jaw 3. Simultaneously, as soon as projection 13 has been

pulled sufficiently far enough out of groove 12, transverse part 8 starts to bend around the bottom of groove 12. As a result, clamp part 7 can be relatively easily pivoted away from clamping jaws 3 and 5, even if the insides of the legs of clamp part 7 have undercuts.

Referring now to Fig. 3, another exemplary embodiment of the device according to the present invention is illustrated. The device of Fig. 3 differs from that according to Figs. 1 and 2 only by the connecting part 10. This connecting part includes two elastic connecting elements 10d and 10e, which are integrally connected on both sides of groove 12 at one end thereof to clamp part 7 on the outside of the legs of clamp part 7, and at the other end to gripping part 9. The connecting elements 10d and 10e are designed in the same manner as hinge 10a in the embodiment according to Figs 1 and 2. That is, connecting elements 10d and 10e are each curved outward in a bow-like manner and are elastically flexible, but in this embodiment, they act less as a hinge and more as spring elements.

As described above, clamp part 7 is placed upon the clamping jaws 3 and 5 of the stressed open clip 1 so that the clip can be placed in a preassembled position. After the clip and tube are placed on a pipe or pipe stud, clamp part 7 is removed from clip 1. Gripping part 9 is pulled radially away from clip 7 so that connecting elements 10d and 10e are stretched due to this radial pulling. During this process, projection 13 is pulled out of groove 12. With the tensile force continuing to be exerted on gripping part 9, the entire tensile force is now exerted on clamp part 7. Clamp part 7 bends around the bottom of groove 12 because the groove is no longer impeded by projection 13 from bending in this manner. The legs of clamp part 7, therefore, expand (i.e., move away from each other) so that clamp part 7 can be easily pulled off of the clamping jaws 3 and 5, and so that clip 11 will firmly contract around the

tube to secure it to the pipe or pipe stub.

Having described the presently preferred exemplary embodiment of a device for securing a clip in an open position and releasing the clip from the open position to the closed position in accordance with the present invention, it is believed that other modifications, variations and changes will be suggested to those skilled in the art in view of the teachings set forth herein. For example, the sides of groove 12 may have slight depressions into which small lateral projections of projection 13 can latch when gripping part 9 and clamp part 7 are pressed together. This engaging of lateral projections of projection 13 with the slight depression in the sides of groove 12 prevent projection 13 from inadvertently slipping out of groove 12, for example, due to a pretension that may occur when forming hinge 10a or connecting elements 10d, 10e, before the gripping part 9 is intentionally pulled. A similar latching connection between gripping part 9 and clamp part 7 can also be achieved by providing projection 13 with an extension whose free end is designed as a thickened head. The thickened head, may be, for example, in the shape of a ball or double cone, which can be pressed through a somewhat narrower hole in the bottom of groove 12. The thickened head latches behind the edge of the hole. In the case of the exemplary embodiment according to Fig. 3, one of the two connecting elements 10d, 10e can be provided with a weakened portion that has a predetermined breaking point that, if the gripping part 9 is pulled, tears apart before the clamp part 7 is lifted off of the clamping jaws 3 and 5. Thus, via the non-torn connecting element, even in the case of the exemplary embodiment according to Fig. 3, a pivoting movement can be exerted on clamp part 7, just as in the case of the exemplary embodiment according to Figs 1 and 2. It is, therefore, to be understood that all such modifications,

variations, and changes are believed to fall within the scope of the present invention as defined by the appended claims.

WHAT IS CLAIMED:

1. A device for securing a clip in an open position and releasing the clip from the open position to the closed position, said clip being made of an annularly bent spring steel element, said spring steel element having a first end section and a second end section, a first radially outwardly protruding clamping jaw disposed at said first end section, a second radially outwardly projecting clamping jaw disposed at said second end section, said first clamping jaw and said second clamping jaw being movable due to a natural spring force of said clip such that the diameter of said clip is reduced from an open position to a closed position in which the clip bears firmly against an object to be clamped, said device comprising:

an approximately U-shaped clamp part having a transverse part, a first leg and a second leg, said legs being connected by said transverse part, in the clip open position, said clamp part being placeable upon the clamping jaws of the clip;

a connecting part being connected at a first end thereof to said clamp part;

a gripping part being connected to said connecting part at a second end of said connecting part; and

wherein said transverse part has a continuous groove extending transversely with respect to the direction of extension of said transverse part between said two legs, said gripping part having a projection of a predetermined size to fit into said groove, and wherein said connecting part has means for permitting said projection to be pulled out of said groove when said projection is inserted in said groove and for permitting said clamp part to be pulled off of said clamping jaws of said clip when said clip is in said open position.

2. The device as claimed in claim 1, wherein said connecting part includes a hinge that is connected to said clamp part at a side of said groove so that said gripping part together with said projection are pivotable with respect to said clamp part.

3. The device as claimed in claim 2, wherein said gripping part is releasably connectable to said clamp part on an opposite side of said groove remote from said hinge said projection being inserted in said groove when said gripping part is connected to said clamp part on said opposite side of said groove.

4. The device as claimed in claim 3, wherein a hook is pivotably connected to said gripping part, said hook being in selective locking engagement with a projection of said clamp part on said opposite side of said groove when said projection is inserted in said groove.

5. The device as claimed in claim 1, wherein said connecting part includes a first elastic connecting element and a second elastic connecting element, said elastic connecting elements being connected, at a first end thereof, to said clamp part one on each side of said groove and, at a second end thereof, to said gripping part.

6. The device as claimed in claim 5, wherein said first connecting element has a predetermined breaking point.

7. The device as claimed in claim 1, wherein said projection is releasably latched to said clamp part.

8. The device as claimed in claim 1, wherein said gripping part and said connecting part are produced integrally primarily from a first plastic, said clamp part is produced primarily from a second plastic differing from said first plastic, and said clamp part is integrally connected to said connecting part.

9. The device as claimed in claim 1, wherein said gripping part, at least on its side facing said clamp part, is curved toward said clamp part.

10. A device for securing a clip in an open position and releasing the clip from the open position to the closed position, said clip being made of an annularly bent spring steel element, said spring steel element having a first end section and a second end section, a first radially outwardly protruding clamping jaw disposed at said first end section, a second radially outwardly projecting clamping jaw disposed at said second end section, said first clamping jaw and said second clamping jaw being movable due to a natural spring force of said clip such that the diameter of said clip is reduced from an open position to a closed position in which the clip bears firmly against an object to be clamped, said device comprising:

an approximately U-shaped clamp part having a transverse part, a first leg and

a second leg, said legs being connected by said transverse part, in the clip open position, said clamp part being placeable upon the clamping jaws of the clip;

a connecting part being connected at a first end thereof to said clamp part;

a gripping part being connected to said connecting part at a second end of said connecting part; and

wherein said transverse part has a continuous groove extending transversely with respect to the direction of extension of said transverse part between said two legs, said gripping part having a projection of a predetermined size to fit into said groove.

11. The device as claimed in claim 10, wherein said connecting part includes a hinge that is connected to said clamp part at a side of said groove so that said gripping part together with said projection are pivotable with respect to said clamp part.

12. The device as claimed in claim 11, wherein said gripping part is releasably connectable to said clamp part on an opposite side of said groove remote from said hinge said projection being inserted in said groove when said gripping part is connected to said clamp part on said opposite side of said groove.

13. The device as claimed in claim 12, wherein a hook is pivotably connected to said gripping part, said hook being in selective locking engagement with a projection of said clamp part on said opposite side of said groove when said projection is inserted in said groove.

14. The device as claimed in claim 10, wherein said connecting part includes a first elastic connecting element and a second elastic connecting element, said elastic connecting elements (10d, 10e) being connected, at a first end thereof, to said clamp part (7) one on each side of said groove (12) and, at a second end thereof, to said gripping part (9).

15. The device as claimed in claim 14, wherein said first connecting element has a predetermined breaking point.

16. The device as claimed in claim 10, wherein said projection is releasably latched to said clamp part.

17. The device as claimed in claim 10, wherein said gripping part and said connecting part are produced integrally primarily from a first plastic, said clamp part is produced primarily from a second plastic differing from said first plastic, and said clamp part is integrally connected to said connecting part.

18. The device as claimed in claim 10, wherein said gripping part, at least on its side facing said clamp part (7), is curved toward said clamp part (7).

Fetherstonhaugh & Co.
Ottawa, Canada
Patent Agents

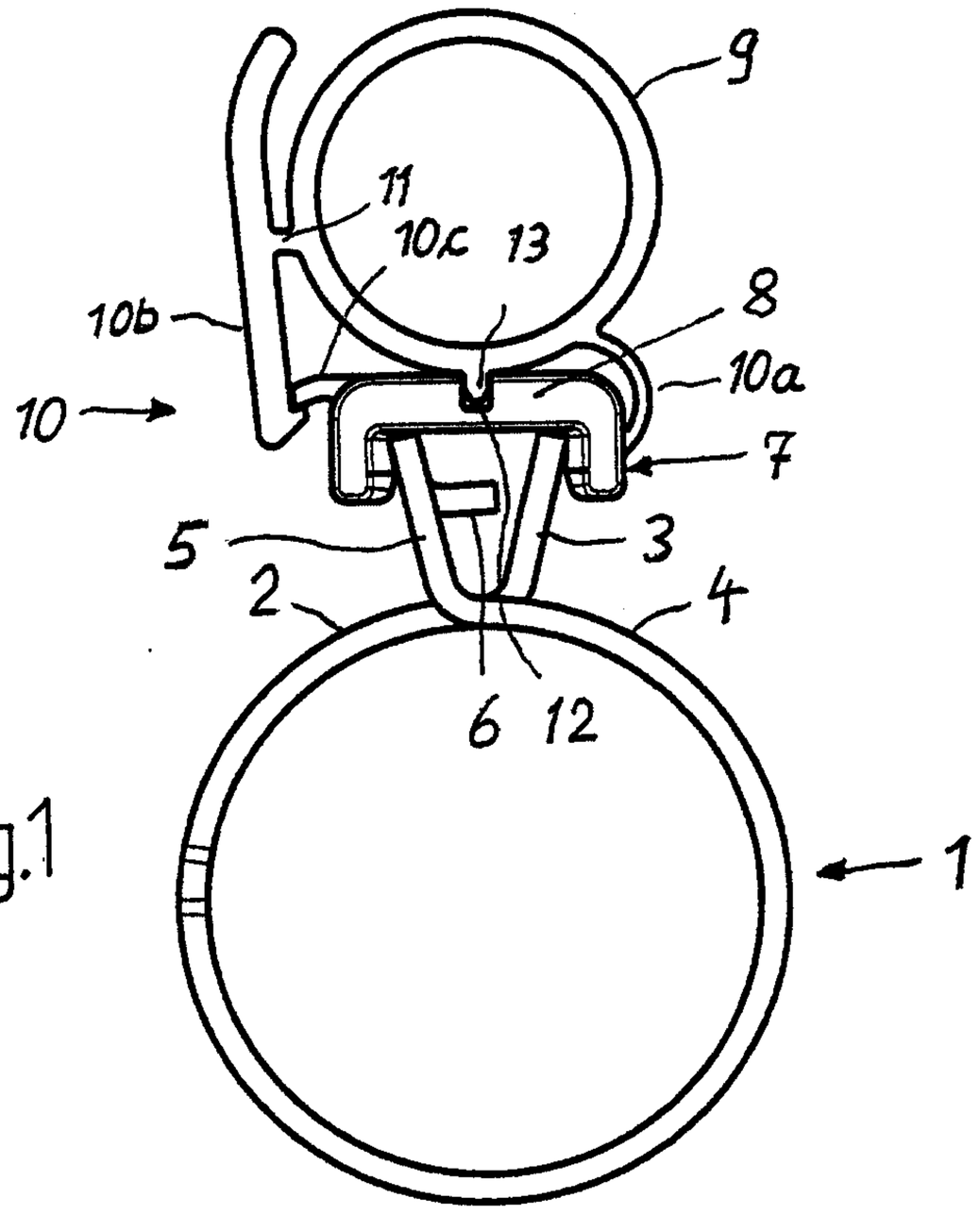


Fig.1

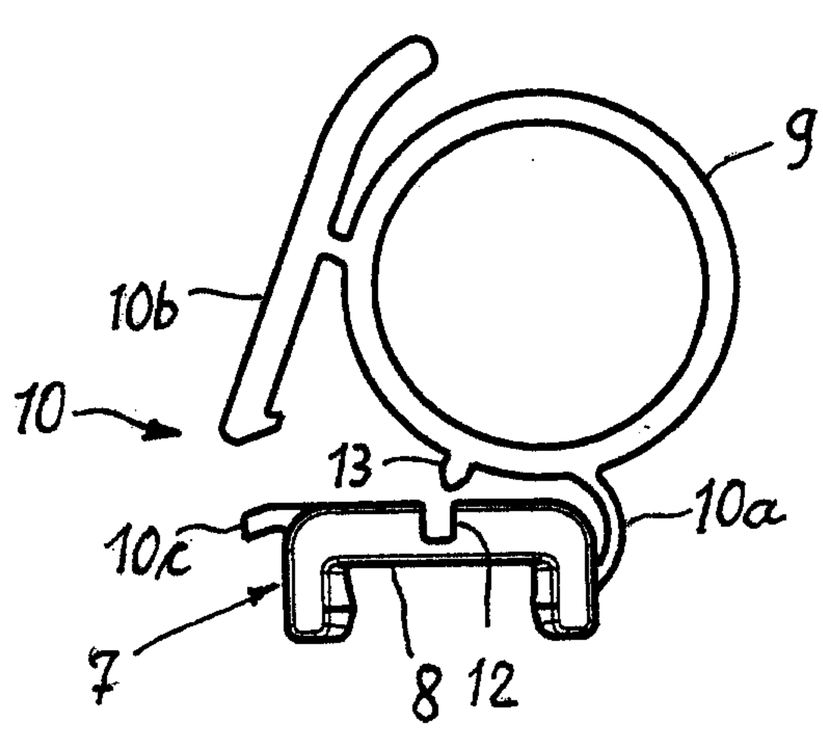


Fig.2

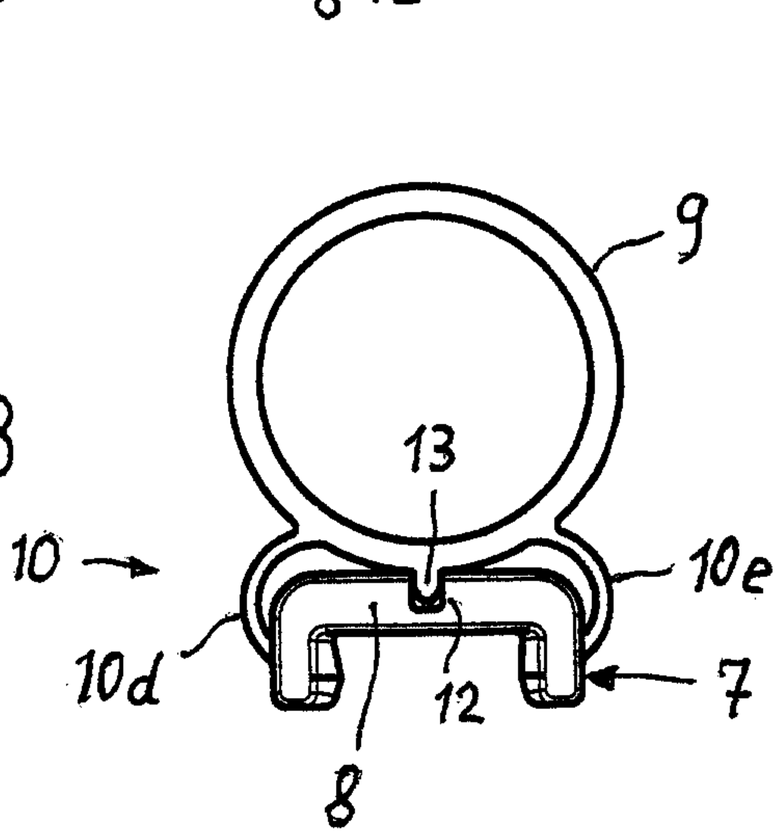
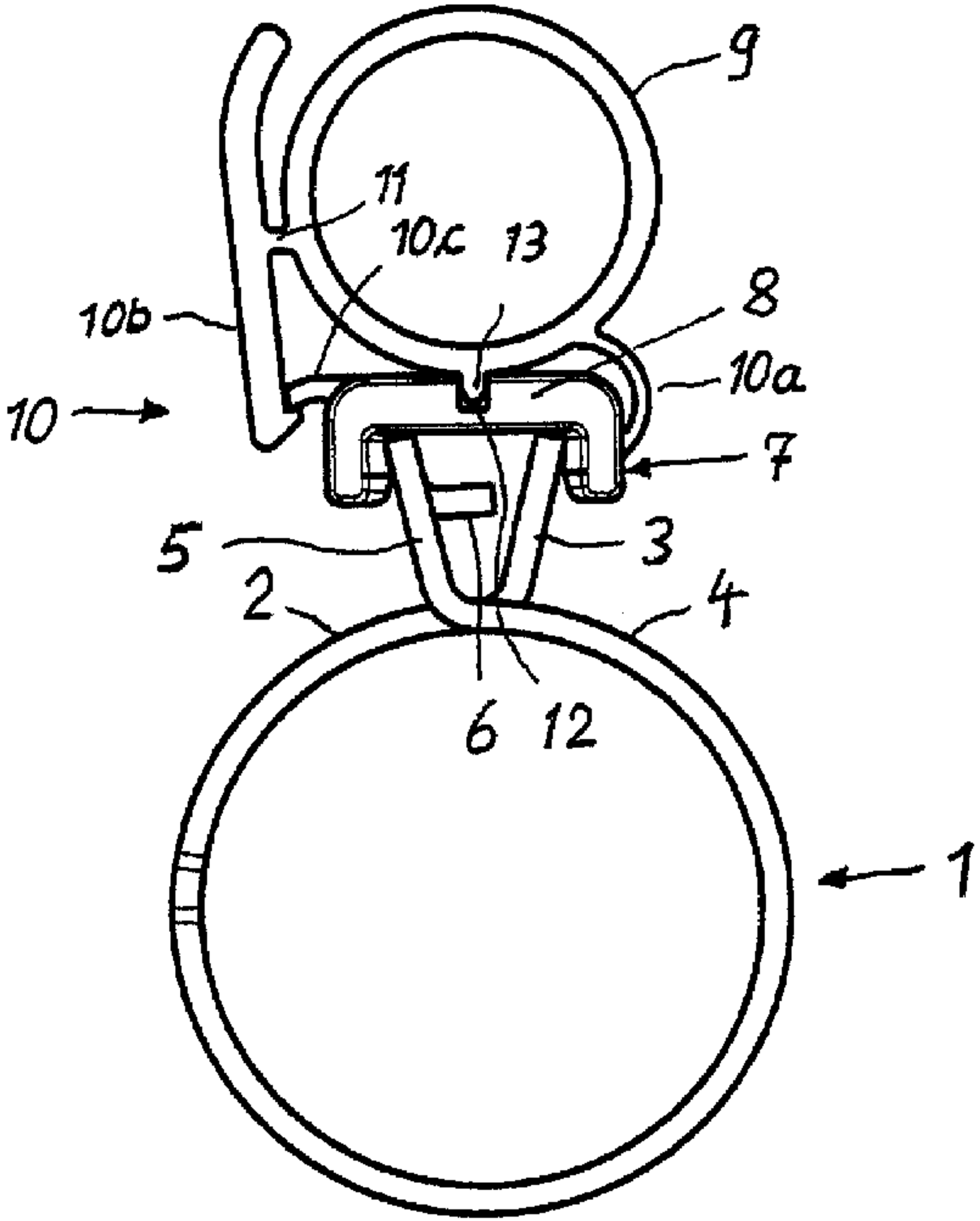


Fig.3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