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(54) **PLASTIC CLAMP**

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(57) **ABSTRACT**

A plastic clamp comprises a strip (**12**), which has a toothed section (**14**) on at least one side, and a lock (**36**) having a through-opening (**34**) for receiving the strip and a locking tongue (**38**) accommodated in the through-opening and locking the strip (**12**) by means of the toothed section (**14**) in the direction of withdrawal when the strip is inserted into the through-opening. Two heads (**32**) having a parallel through-opening (**34**) each which is aligned with that of the other head and which is parallel to the strip (**12**) are molded onto the strip one after the other, the lock (**36**) being designed as a separate component and locking the strip when laid between the two heads (**32**).

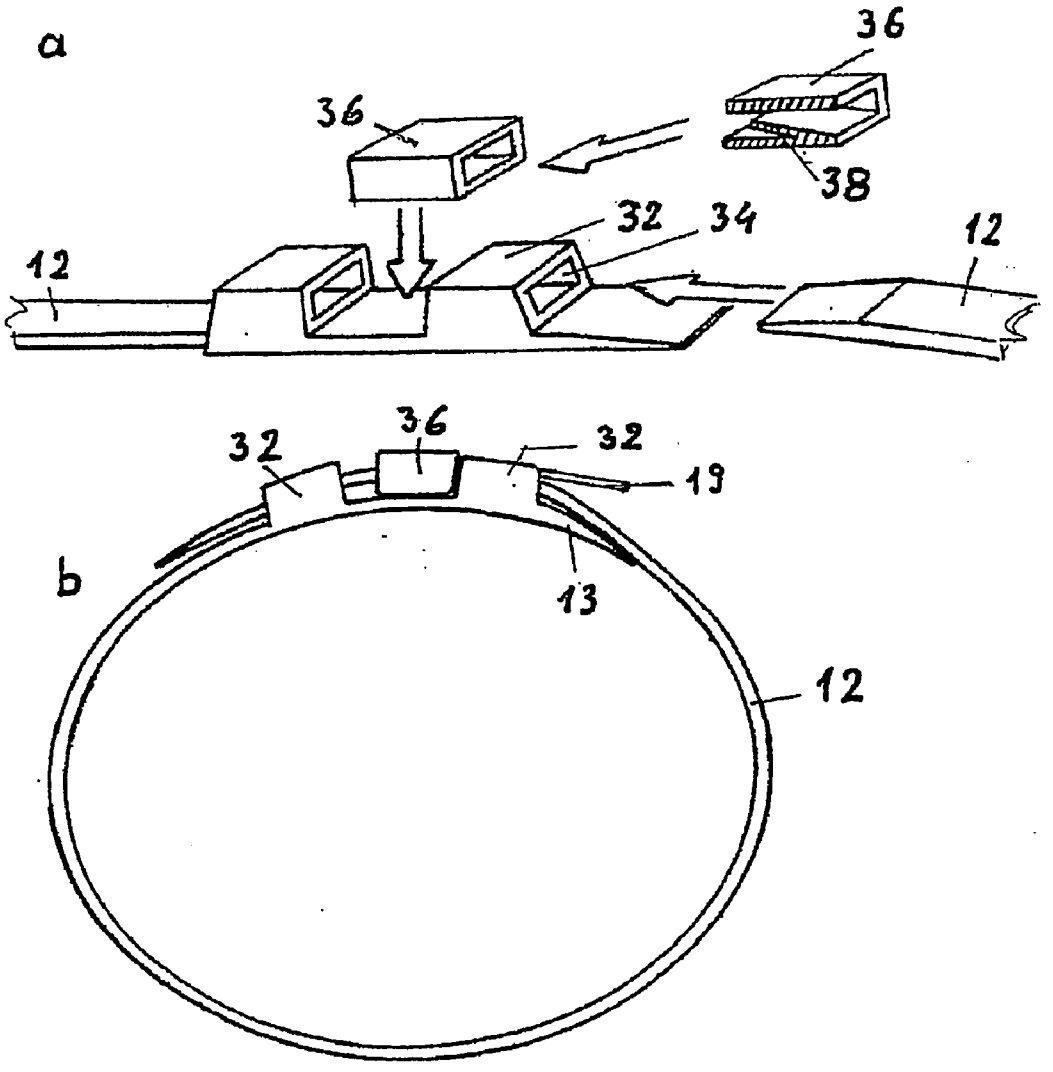
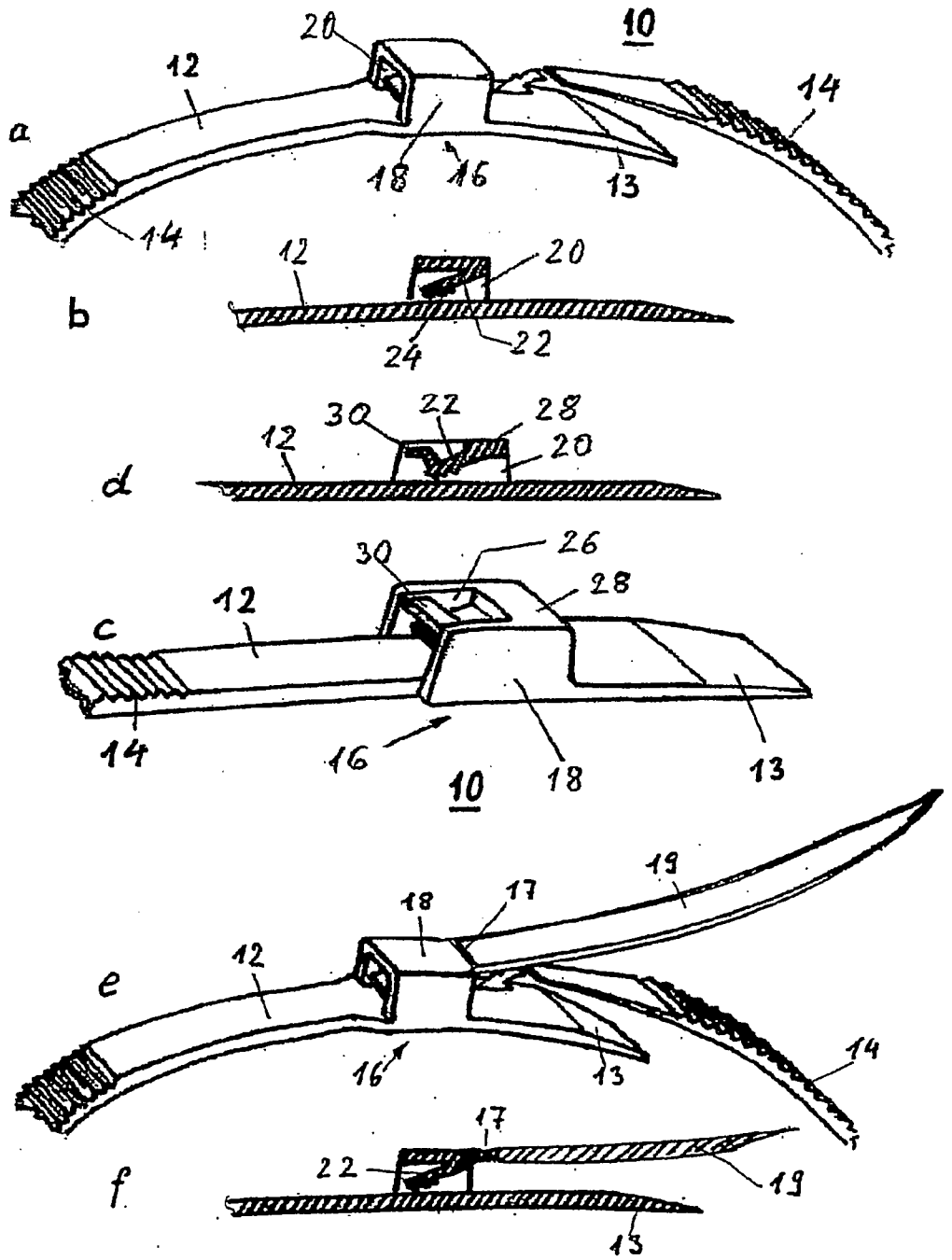


FIG. 1


a
10
20
12
14
18
16
13
14
b
12
20
24
22
d
30
22
28
12
20
c
30
26
28
12
14
16
18
13
10
e
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18
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12
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f
17
22
19
13

FIG. 2

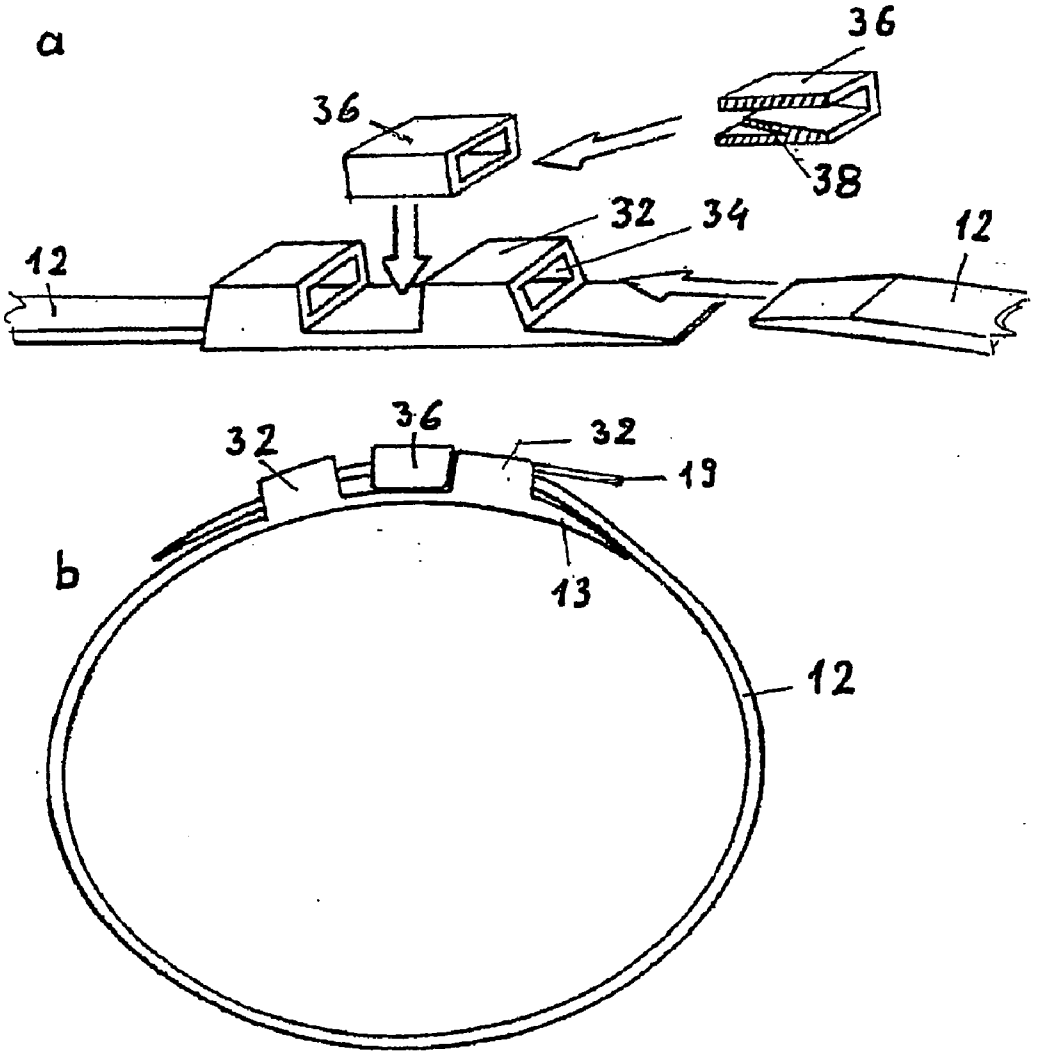


FIG. 3

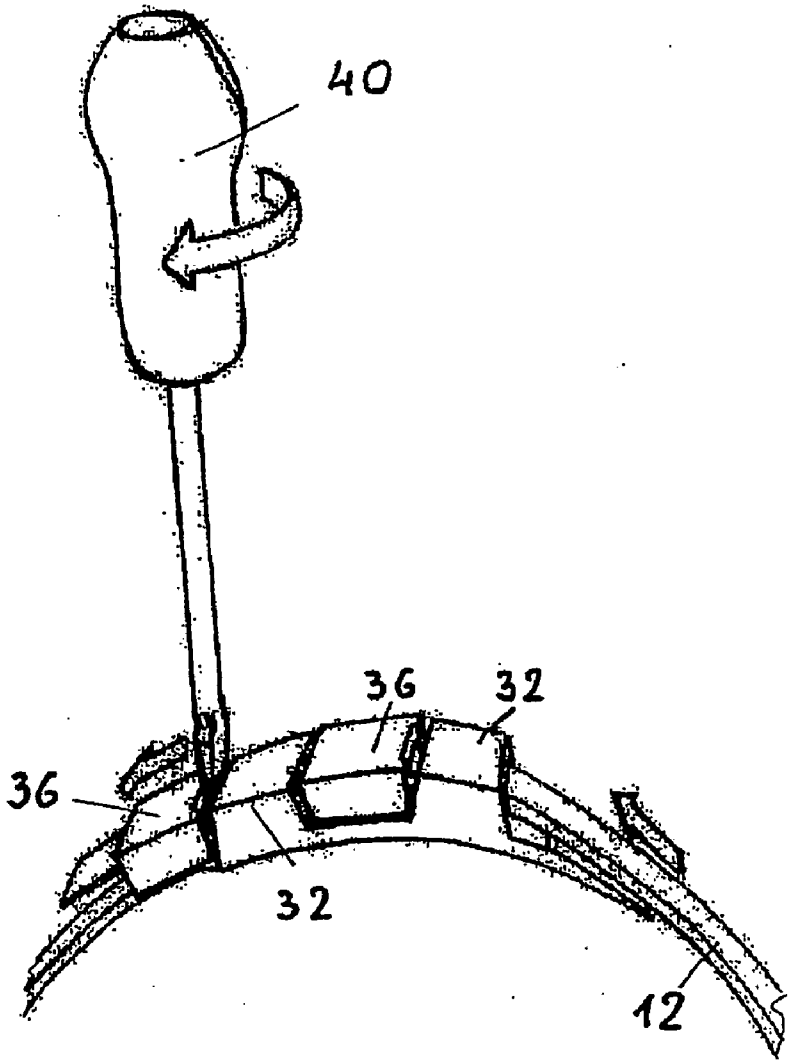
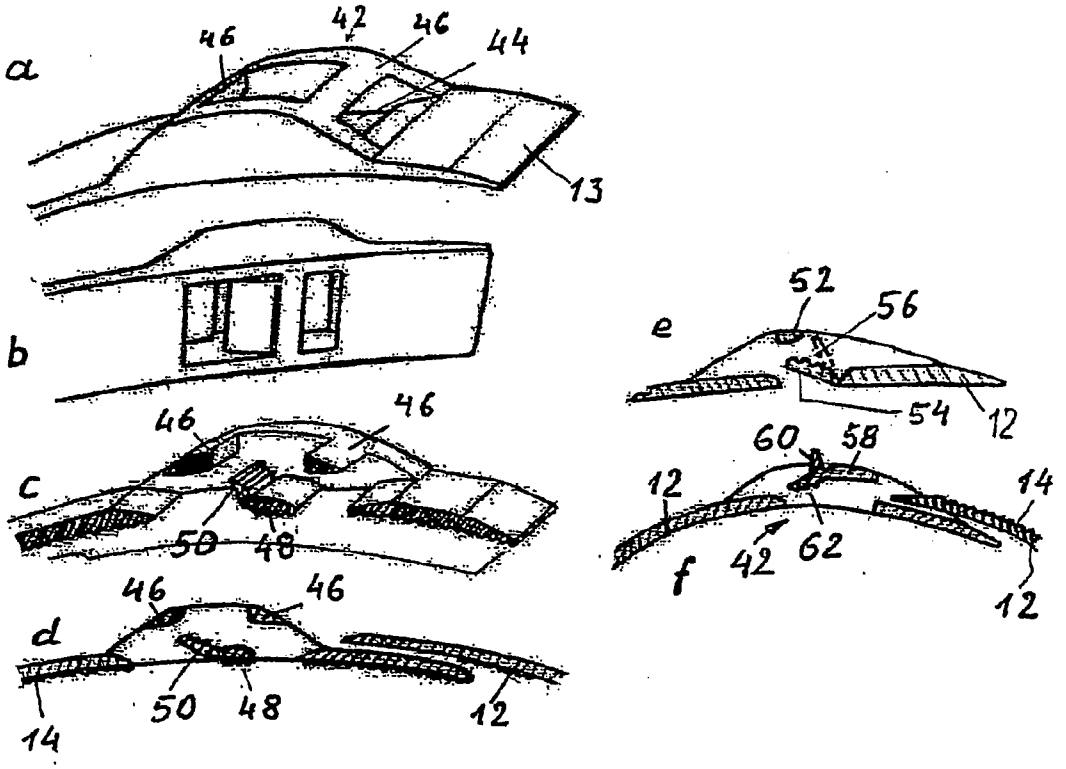


FIG. 4


a
46
42
46
44
13
b
c
46
46
50
48
d
46
46
50
48
14
12
e
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56
54
12
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60
58
12
14
42
62
12

FIG. 5

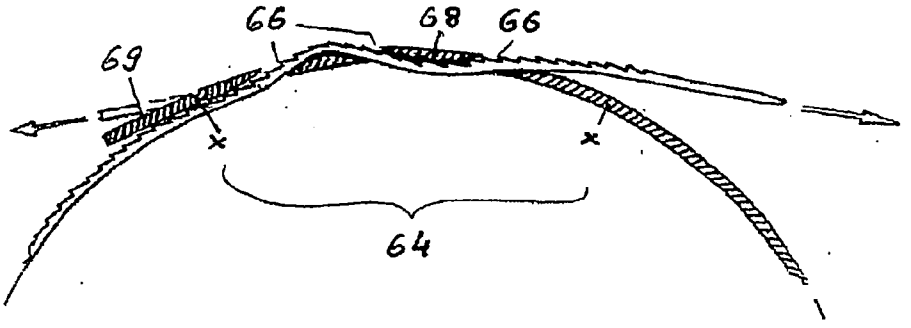
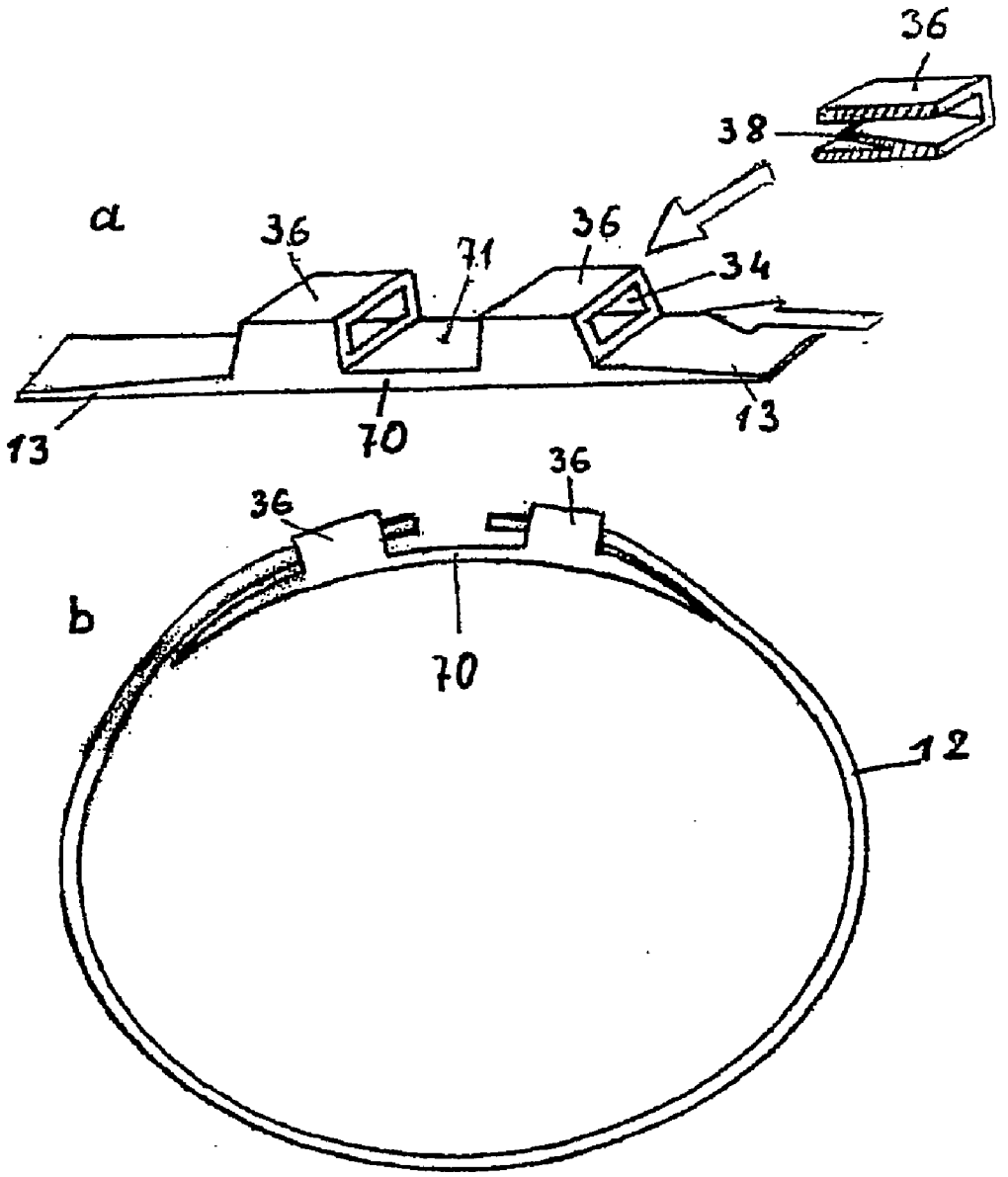

66
68
66
69
64

FIG. 6



PLASTIC CLAMP

[0001] The invention relates to a plastic clamp with a strip equipped with a toothed section on at least one side and a lock having a through-opening for receiving the strip and with a locking tongue accommodated in the through-opening which locks the strip inserted into the through-opening by means of the toothed section in the direction of withdrawal.

[0002] Cable ties are favored fixing elements for temporarily or permanently joining practically all kinds of objects. They are plastic bands or strips, which are provided with ribs or saw teeth running transversely to its longitudinal extension. A small cuboid-shaped head is formed on one end of such a plastic strip, with a rectangular through-opening corresponding to the profile of the band or strip. A locking lip or tongue, spring pre-loaded relatively to a longitudinal side of the rectangular through-opening, which allows itself to be pushed aside when inserting the band or strip and which catches one of the ribs or saw teeth grooves when pulling the strip so that the strip cannot be pulled back without using an appropriate tool, is set in the through-opening. The head equipped in such a manner will be called a lock in the following. Cable ties are therefore generally destined for single use only; once closed, a cable tie is opened by ripping the strip by means of a knife or a tong.

[0003] The field of application of cable ties far outruns the function suggested by its designation, fastening and tying electrical cables. They can be used for instance and among other things in the plumbing trade (for fastening the insulation of a pipe), in tool building, packaging, . . . through to a restraining instrument for refractory delinquents.

[0004] In the known cable ties, the rectangular through-opening in the cuboid-shaped head runs perpendicularly to the surface of the strip, so that the free end of the strip can be inserted easily into the opening. The disadvantage of this is however that the cable tie cannot closely follow the outline of a round body (circular, elliptical, oval . . .) enclosed by it. A "spandrel", in the area of which the cable tie does not fit tight with the round body, always remains in the area of the lock. If it is used for instance as a clamp for fastening a hose on a tube socket, leaks can appear in this place, especially since the hose material can be easily squeezed into folds.

[0005] The object underlying the invention is to propose a cable tie fitting tight with an object enclosed by it on its entire course, so that a secure and leak-free connection can be ensured in the described and similar cases. In other words, a cable tie should be further developed so that it is adapted for use as a clamp, for instance as a hose clamp.

[0006] The object underlying the invention is solved by a plastic clamp with two heads formed in a row on the strip with a through-opening each, aligned with that of the other head and parallel to the strip, the lock being configured as a separate component and, being disposed between both heads, locking the strip. In order to make it easier to pull the clamp tight, a pulling strap is formed onto at least one (free) side of the lock.

[0007] Another solution to the object underlying the invention consists of a plastic clamp in which the strip is equipped with at least one transverse slot into which the strip can be inserted, thus closing the plastic clamp, the area of the band preceding the transverse slot in the direction of insertion being equipped with an opposing toothed section which catches the toothed section of the strip. In order to increase the pressing between both toothed sections, two other transverse slots through which the strip can be inserted, are disposed before the transverse slot.

[0008] In another solution, the clamp consists of a double lock with individual locks fitted side by side on a carrier strip with flattened end straps, which lock in opposing directions, as well as an endless strip, equipped with transverse ribs, which can be inserted into each of the individual locks from one side.

[0009] In all embodiments of the plastic clamp of the invention, a continuous tight-fitting of the strip on the enclosed body is ensured.

[0010] The invention is described in the following with the help of the exemplary embodiments represented in the drawings:

[0011] FIG. **1***a* the perspective view of a plastic clamp,

[0012] FIG. **1***b* a section of the plastic clamp in the area of the lock,

[0013] FIG. **1***c* the perspective view of a modified plastic clamp,

[0014] FIG. **1***d* a section of the plastic clamp of FIG. **1***c* in the area of the lock,

[0015] FIG. **1***e*, **1***f* a perspective view, respectively a section of the embodiment of FIGS. **1***a*, **1***b* with a pulling strap formed on it,

[0016] FIG. **2***a*, **2***b* a perspective view, respectively a side view of a second embodiment of the plastic clamp,

[0017] FIG. **3** a schematic of a possible tightening process in the embodiment of FIGS. **2***a*, **2***b*,

[0018] FIG. **4***a* a perspective view of a third embodiment of the plastic clamp, from above,

[0019] FIG. **4***b* a perspective view of the plastic clamp of FIG. **4***a* from below,

[0020] FIG. **4***c*, **4***d* a sectioned perspective view, respectively a section of the plastic clamp of FIG. **4***a*,

[0021] FIG. **4***e*, **4***f* section views of the plastic clamp in the area of the lock with two different embodiments of the locking tongue,

[0022] FIG. **5** a side view of a modified embodiment of a plastic clamp according to the invention, and

[0023] FIG. **6***a*, **6***b* a perspective view, respectively a side view of an embodiment, in which an endless clamp strip can be used.

[0024] FIG. **1***a* shows the perspective view of a plastic clamp **10** consisting of a strip **12** equipped with a toothed section **14**, which ends in a flattened strap **13**. In its untoothed area a lock **16**, consisting of a cuboid-shaped head **18** and equipped with a rectangular through-opening **20** running parallel to the strip **12** in its longitudinal direction, is formed on the strip **12**. A pre-stressed locking tongue **22** is formed onto the upper wall of the head **18** facing the strip **12**, a sharp edge or, as shown, several teeth **24**, which catch the teeth **14** of the strip **12** after inserting the free end of the strip **12** into the through-opening **20**, being located on the free end of the strip.

[0025] FIGS. **1***c* and **1***d* show a similar plastic clamp **10**, in which the lock **16** is formed in another manner. The lock **16** has a cut-out **26**; a locking tongue **22** with an offset root **30** is formed onto the remaining rib **28**. In this embodiment, the closed plastic clamp can easily be reopened, which is difficult with the plastic clamp of FIG. **1***a*, **1***b*.

[0026] As when closing a known cable tie, it is often also difficult with the clamp according to the invention to apply the required opposing force onto the lock **18** on the free end of the strip **12** during pulling. A pulling strap **19** is therefore formed

onto the head **18** in a preferred embodiment, as shown in FIGS. **1***e* and **1***f*. A groove **17** between the head **18** and the strap **19** facilitates cutting the strap **19** off when required after closing the clamp.

[0027] FIGS. **2***a* and **2***b* shows a perspective view of a plastic clamp **12** during the closing process. Two heads **32** with a through-opening **34** each are formed onto the strip **12**. These heads **32** do not serve as locks, meaning they are not equipped with a locking tongue. A separate lock **36** serves for closing the plastic clamp. A locking tongue **38** is formed on a wall of the lock **36**.

[0028] A lock **36** is set between both heads **32** for closing the plastic clamp. The free end of the strip **12** is first pushed into the through-opening of the first head **32**, then into the through-opening of the lock **36** and finally into the through-opening of the second head **32**.

[0029] FIG. **2***b* shows the plastic clamp in a closed state from the side. The view shows that the plastic clamp forms a continuous line on its inner side, meaning that it fits tightly on the wall to be secured.

[0030] In order to make it easier to pull the clamp tight, a pulling strap **19** is formed on the free side of a lock **32**, namely the one into which the strip **12** is first inserted.

[0031] If one pulls another separate lock **36** onto the end of the plastic clamp thus closed, as shown in FIG. **3**, the plastic clamp can be easily and strongly tightened by means of a tool, for instance a screwdriver **40**.

[0032] FIG. **4** shows a plastic clamp with a head **42** flattened on both sides in the direction of the strip **12** with a through-opening **44** running parallel to the strip. The head **42** is opened out toward the upper side. The through-opening is likewise opened out downward so that two transverse ribs **46** are stopped on the upper side and one transverse rib **48** is stopped on the underside. A locking tongue **50** with teeth pointing upward, which catch with the toothed section **14** formed onto the underside of the strip **12** after its insertion, is formed onto the lower transverse rib **48**.

[0033] In the embodiment of FIG. **4***e* the head **42** is opened out more broadly, so that only one rib **52** remains. The strip **12** is pulled up to the area of the head and a clamping tongue **54** is formed onto its edge. Its toothed section **56** directed upward catches with the toothed section **14** of the strip **12**, the rib **52** acting as a counter bearing.

[0034] In the embodiment of FIG. **4***f* the head **42** has two torn spaces, between which a transverse rib **58** is located. A clamping tongue **62** equipped with a projection **60** is formed onto it, with its teeth directed downward toward the strip **12**. In this embodiment, the toothed section **14** is disposed on the outer side of the strip **12**. The projection **60** facilitates a subsequent opening of the plastic clamp.

[0035] FIG. **5** shows a side view of a modified embodiment of a plastic clamp according to the invention. The strip **12** has a widened area **64** (in the vertical direction relative to the drawing surface) between the points x-x. Three transverse slots **66**, the width of which is slightly wider than that of the rest of the strip **12**, are cut into this widened area **64**. The strip **12** is inserted in the shown manner through the transverse slots **66** from below or the inside outward, from the outside inward, and again from the inside outward. The surface of the last bar directed toward the strip between the middle and the last transverse slot **66**, on the right hand side in the drawing, is equipped with a opposing toothed section **68**, which catches with the toothed section **14** of the strip **12** when the strip is pulled tight and secures the plastic clamp. In order to avoid a disruptive friction when pulling the plastic clamp tight, only the last transverse bar should be equipped with a toothed section. A strap **69** which facilitates pulling tight the plastic clamp is formed on the widened area and can subsequently be cut off. In this embodiment, the plastic clamp also fits close to the surface enclosed by it.

[0036] FIGS. **6***a* and **6***b* show a clamp in which an endless strip **12** equipped with transverse ribs can be used by means of a double lock **70**. Two locks **36** which lock in opposing directions are set on a carrier strip **71**. As shown in FIG. **6***a*, the free end of the locking tongue **38** of the right lock points left, while the locking tongue (not shown) of the left lock **36** points in the opposing direction. The free ends of the locking tongues **12** which catch with the transverse ribs of the strip **12** are thus directed inward toward one another. During fitting, a free end of the endless strip **12** is inserted into one of the locks **36** and after being shortened by the appropriate length, the other end is inserted into the opposing head **36**. After pulling the last inserted end tight, it can be shortened to its final length.

1-5. (canceled)

6. A plastic clamp comprising:

a strip having a first end and a second end and being equipped with a toothed section on at least one side and having two heads formed in a row onto the strip, each head having a through-opening aligned with the through opening of the other head and parallel to the strip; and

a lock having a through-opening for receiving the first end of the strip, and a locking tongue accommodated in the through-opening, said locking tongue locking the strip inserted into the through-openings against withdrawal by means of the toothed section,

wherein the lock is disposed between the two heads and is configured as a separate component, wherein the second end of the strip ends with a flattened strap and wherein a pulling strap is formed onto an end of the lock into which the first end of the strip is inserted.

7. The plastic clamp according to claim **6**, wherein the toothed section is only disposed on an outer side of the strip.

8. The plastic clamp according to claim **6**, further comprising an additional separate lock that is slid onto the strip on a side opposite the pulling strap.

* * * * *