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(54) **CLOSING CLIP FOR A PACKAGING TUBE
AND DEVICE FOR TREATING SAID
CLOSING CLIP**

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(57) **ABSTRACT**

The invention relates to a device and method involving closing clips designed for closing a flexible packaging tube, comprising two clip limbs (3) and a clip base (2) arranged between the clip limbs (3), the clip limbs (3) being disposed parallel to each other and perpendicular to the clip base (2). Each clip limb (3) has planar inner surfaces (4) each of which is oriented towards the respective other clip limb (3), and the clip base (2) has an inner surface (41) connecting the inner surfaces (4) of the clip limbs (3). The clip limbs (3) have planar side surfaces (6). When the clip limbs (3) are viewed in cross-section, said side surfaces (6) are arranged perpendicular to the inner surfaces (4) of the clip limbs (3), and the cross-sectional height of the closing clip (1) is smaller than the cross-sectional width (14) of the closing clip (1).

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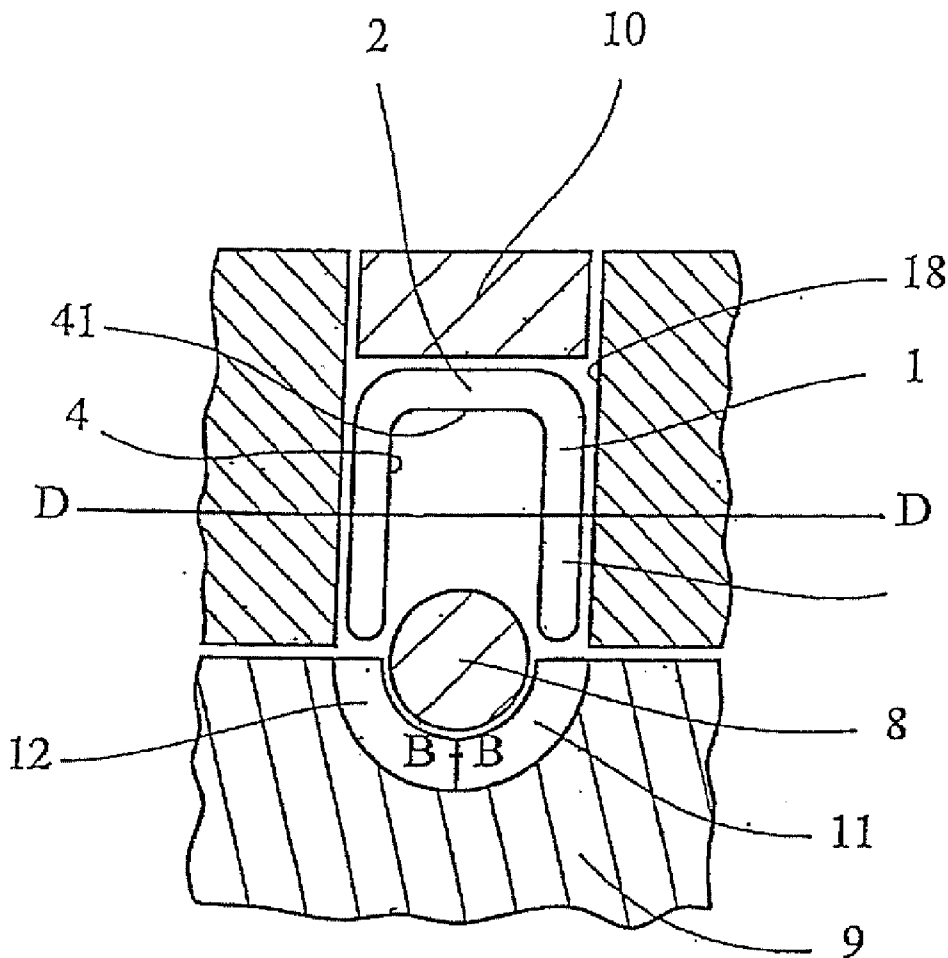
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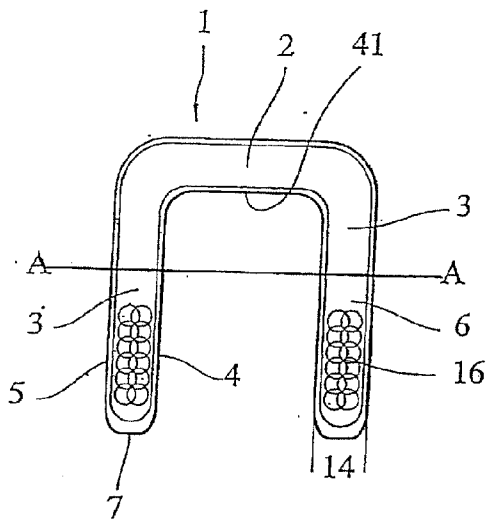


Fig. 1

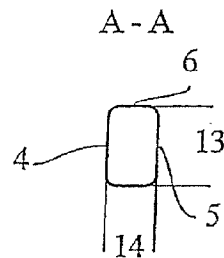


Fig. 2

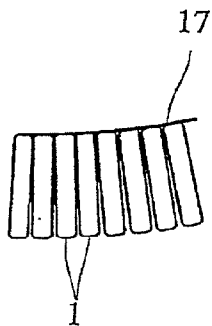


Fig. 9

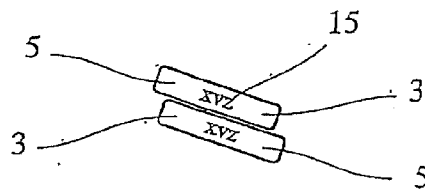


Fig. 7

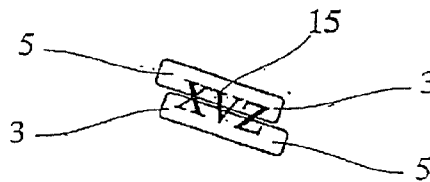


Fig. 8

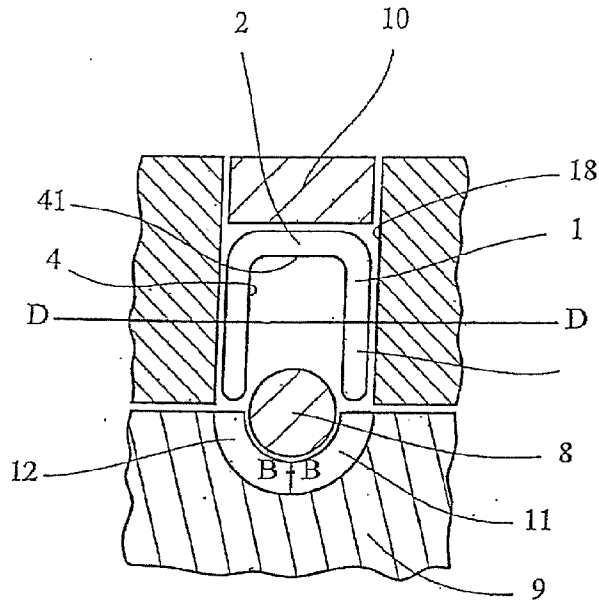


Fig. 3

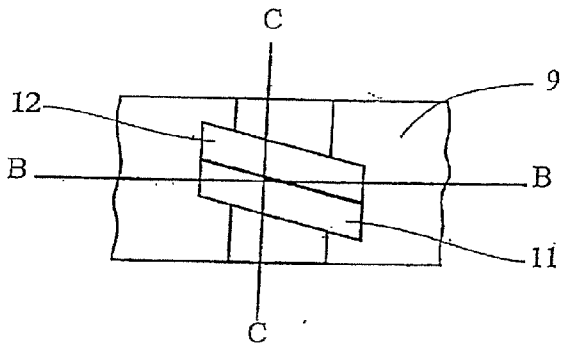


Fig. 4

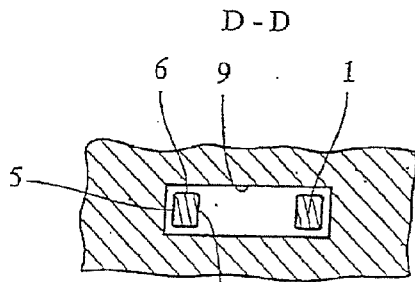


Fig. 6

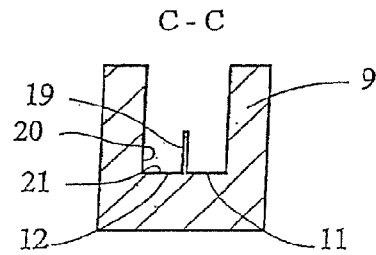


Fig. 5

**CLOSING CLIP FOR A PACKAGING TUBE
AND DEVICE FOR TREATING SAID
CLOSING CLIP**

[0001] The invention relates to a closing clip for closing a packing tube. The closing clip comprises two clip legs and a clip base arranged between the clip legs, the clip legs being arranged parallel to one another and at right angles to the clip base. The clip legs have planar inner surfaces which are oriented in the direction of the respectively other clip leg; the clip base has a planar inner surface which connects the inner surfaces of the clip legs.

[0002] The invention also relates to an apparatus for closing a packaging tube by means of such closing clips. The apparatus comprises a feed channel for feeding closing clips, a punch for moving the closing clips in the feed channel, and two slide channels defining the deformation path of the clip legs.

[0003] Such closing clips are used, in particular, in sausage production. Sausage meat is introduced into the packaging tube through a filling tube. Once a packaging unit has been filled, the end of the packing tube is shirred to form a stuffing-free portion, and the closing clip is bent around the stuffing-free portion in order to close the packaging unit on a permanent basis.

[0004] Closing clips of this type have been known for some time now, cf., for example, EP 0 951 427. They are usually processed by the clip legs being forced, under the pressure of a punch acting on the clip base, along two slide channels formed in a die. The clip legs bend here in accordance with the path predetermined by the slide channels. The slide channels are configured such that the closing clip is bent around the packaging tube in the circumferential direction. At the same time, the closing clip is deformed in the lateral direction, in which case, once they enclose the packing tube, the clip legs, rather than butting against one another, are guided past one another. The combination of, deformation in the circumferential direction and deformation in the lateral direction results in a helical shape of the closing clip.

[0005] Since the clip legs do not butt against one another in the closed state, the length of the closing clip need not be adapted precisely to the circumference of the shirred packaging tube. Use can be made of, a closing clip with a length which exceeds the circumference of the shirred packaging tube. The excess length is compensated for by the two clip legs being guided past one another and overlapping by an amount which corresponds to the excess length.

[0006] When the closing clip is introduced into slide channels, the shirred portion of the packaging tube is located between the clip legs. The clip legs are thus simultaneously guided externally past the packaging tube and along the inlet region of the slide channels. In order to allow this, the clip legs of the closing clip are arranged parallel to one another.

[0007] As it moves along the slide channels, the closing clip undergoes complex deformation. Firstly, the deformation is not—as is the case if a closing clip is simply bent over—limited in a locally constricted manner; rather, the clip legs have to be constantly adapted, during the bending operation, to the path which is predetermined by the slide channels, and they thus undergo a continuous succession of individual deformations which, in total, give the overall deformation.

Secondly, the deformation is not limited to one bending direction; rather, the different bending directions combine to provide complex deformation.

[0008] For closing operations in which deformation in the circumferential direction is combined with deformation in the lateral direction use has predominantly been made, up until now, of closing clips with a more or less round cross section, cf., for example, EP 0 951 427 and DE 199 04 521. Closing clips with a round cross section have the advantage that they can be bent in any direction with the same application of force. They have the additional advantage that the bearing surface of the closing clip on the packaging tube and thus the loading to which the packing tube is subjected remain constant even when the closing clip is twisted.

[0009] Closing clips with a round cross section have the disadvantage that, on account of their curved outer surface, they subject the packaging tube locally to high pressure. This may result in damage to the packaging tube.

[0010] Furthermore, for combined deformation in the circumferential direction and in the lateral direction, use has already been made of closing clips with a planar inner surface and a, for example, trapezoidal cross section. The planar inner surface can basically provide the advantage that it rests in planar fashion on the packaging tube in the closed state and thus reduces the local loading to which the packaging tube is subjected. It has been found, however, that the closing clips also occasionally twist during the complex deformation operation. In this case, the planar inner surface rests obliquely on the packaging tube, and one edge of the inner surface subjects the packaging tube to concentrated pressure. The local loading to which the packaging tube is subjected is then even greater than in the case of a closing clip with a round cross section.

[0011] In the case of an alternative type of closure clip, the ends of the clip legs butt against one another by way of their end surfaces in the closed state, cf. for example, EP 0 452 338. One disadvantage of these so-called head-to-head closures is that their length has to be coordinated precisely with the circumference of the shirred packaging tube which is to be enclosed. If the closing clip is too long, the two ends butt against one another before the packaging tube has been securely enclosed. If the closing clip is too short, it cannot fully enclose the packaging tube. In both case, the closure is not sufficiently secure.

[0012] Even if the length of the head-to-head closing clips is coordinated with the circumference of the shirred packaging tube, this achieves a closure which is less secure than in the case of closing clips of the generic type. In order to open the closing clip from the closed state, all that is required is for the bending strength of the material to be overcome; there is no connection between the clip legs which provides any additional grip. The closing clips of the generic type, in contrast, may be deformed such that the lateral surfaces of the two clip legs rest directly one upon the other. In order to reopen the closing clip from the closed state in this case, it is necessary to overcome both the bending strength of the material and the friction between the two abutting clip legs.

[0013] The disadvantage of the length of the head-to-head closing clip having to be coordinated with the circumference of the shirred packaging tube is accepted because it is significantly easier to process the head-to-head closing clips. All that is required is for the closing clips to be bent around the shirred packaging tube in the circumferential direction; there is no need for any deformation in the lateral direction. For this

reason, the closing clips are usually configured to be thin in the bending direction, in order to allow for straightforward deformation. The closing clips attain their stability from a relatively large extent in the lateral direction, cf. EP 0 452 338.

[0014] An attempt has been made to avoid this disadvantage of the head-to-head closing clips by configuring the ends of the clip legs such that they can be guided past one another without any lateral deformation of the closing clip, cf. EP 0 842 096. This type of closing clip involves high outlay to produce since the legs of each closing clip have to be individually moved into the desired shape.

[0015] The object of the invention is to propose a closing clip according to the preamble of claim 1, and an apparatus for processing such closing clips, in the case of which the risk of damage to the packing tube is reduced. The object is achieved by the features of the independent claims. Advantageous embodiments can be found in the subclaims.

[0016] The closing clip is distinguished according to the invention in that the clip legs have planar lateral surfaces, and in that, as seen in a cross section of the clip legs, the lateral surfaces are arranged perpendicularly to the inner surfaces, and in that the cross-sectional height of the closing clip is smaller than the cross-sectional width of the closing clip.

[0017] A few terms will be defined first of all.

[0018] The state of the closing clip in which the clip legs are arranged at right angles to the clip base is referred to as the open state. The state in which the closing clip closes the packaging tube is referred to as the closed state.

[0019] The terms inner, outer and lateral(ly) refer to the cross section of the closing clip. The clip legs have been bent over in relation to the clip base via the inner surface of the closing clip in order to produce the right-angled arrangement between the clip legs and the clip base. The outer surface is located opposite the inner surface. The lateral surfaces are the surfaces which are located between the inner surface and outer surface.

[0020] Deformation in the circumferential direction is referred to if the closing clip is bent via its inner surface. For deformation in the lateral direction, the closing clip is bent via one of its lateral surfaces.

[0021] The terms cross-sectional width and cross-sectional height refer to the cross section of the clip legs. The cross-sectional width is the distance between the two lateral surfaces. Since the lateral surfaces are arranged perpendicularly to the inner surface, the lateral surfaces are parallel to one another; the cross-sectional width is thus constant. The cross-sectional height is the maximum extent of a clip leg between the inner surface and the outer surface, which is located opposite the inner surface.

[0022] The length of the closing clip is the sum of the length of the clip legs and of the length of the clip base.

[0023] The planar lateral surfaces according to the invention may be guided along guide surfaces during the deformation operation. The guide surfaces prevent the combined deformation in the circumferential direction and in the lateral direction simultaneously resulting in the closing clip twisting. In the closed state of the closing clip the positioning of the inner surface is precisely defined at the end of the deformation operation. The inner surface rests in planar fashion on the packaging tube and exerts uniform pressure.

[0024] In the prior art, no attention was given to the precise configuration of the lateral surfaces. The starting material in the production of closing clips is usually a strand of material

with a round or oval cross section. If a planar outer surface or planar inner surface is desired, the strand of material is rolled until planar surfaces of the desired dimensions are achieved. The lateral surfaces maintain their outwardly curved form during such processing of the inner surface and outer surface. It is also the case that nothing here changes if, from time to time, schematic drawings dispensed with illustrating the curvature and make the curved lateral surfaces appear planar.

[0025] The closing clip according to the invention combines two advantages. Firstly, it is not necessary for the length of the closing clip to be coordinated precisely with the circumference of the shirred packaging tube, since the clip legs are guided past one another, any excess length being compensated for as a result. Secondly, the pressure to which the packaging tube is subjected by the closing clip is distributed uniformly over a relatively large surface, in which the case the loading to which the packing tube is subjected is kept low.

[0026] In a prior art, it has been necessary, up until now, to decide between these advantages. Selecting one advantage has always been associated, thus far, with the acceptance of a corresponding disadvantage. The head-to-head closing clips do indeed provide a large bearing surface and thus do not adversely effect the packaging tube. However, their length has to be adapted precisely to the circumference of the shirred packaging tube. The closing clips which have been used up until now for combined deformation in the circumferential direction and in the lateral direction occasionally subject the packaging tube locally to excessive pressure.

[0027] In an advantageous embodiment, the clip legs have planar outer surfaces, which are located opposite the inner surfaces. It is likewise possible for the outer surface to be guided along guide surfaces during the deformation operation and to improve the guidance of the closing clip during the deformation operation.

[0028] In order keep the local loading to which the packaging tube is subjected to a low level, the inner surfaces of the clip legs and of the clip base should be as large as possible. The larger surface area would be achieved if the inner surface extended over the entire cross-sectional width of the closing clip. In this case, however, the inner surface would be bounded by sharp edges, in which case the risk of damage to the sausage casing would increase again. The planar inner surfaces of the clip legs thus advantageously extend over at least 70%, preferably at least 80%, further preferably at least 90% of the cross-sectional width. The inner surface of the clip base is preferably at least as wide as the inner surfaces of the clip legs.

[0029] In order to make it easier to provide information, it is desirable to have as large a planar surface as possible on the outside. Since sharp edges are undesirable here too, the planar outer surfaces of the clip legs preferably extend over at least 70%, further preferably at least 80%, and further preferably at least 90% of the cross-sectional width. Those edges of the outer surface and inner surface which are located at the transition to the lateral surfaces are preferably rounded.

[0030] In an advantageous embodiment, the planar lateral surfaces of the clip legs extend over at least 70%, preferably at least 80%, further preferably at least 90% of the cross-sectional height. If both the lateral surfaces and the outer surface and inner surface, with the exception of the rounded edges, extend over the entire cross-sectional width and cross-sectional height, the closing clip has a more or less rectangular cross section. In this case, the closing clip may be deformed such that the outer sides of the clip legs, in a closed

state, are located one beside the other and are separated only by a small gap. Information which is provided on the outer sides of the clip legs can be taken in at a glance. On the one hand, it is possible to provide separate information on each of the two clip legs, the information thus being displayed on two lines. As an alternative, the relatively large surface area formed from the outer sides of the two clip legs may be utilized for applying relatively large symbols thereon. The relatively large symbols aid legibility. The information may be, for example, stamped in or provided on a label.

[0031] The outer surfaces, inner surfaces and lateral surfaces can merge into planar end surfaces at the ends of the clip legs. The edges of the end surfaces are preferably rounded in order that the sausage casing is not damaged by sharp edges as the clip legs are guided around it.

[0032] The closing clip preferably has a cross section which is constant over its longitudinal extent. A constant cross section makes it possible for the closing clips to be produced simply by being severed from an endless strand of material with a uniform cross section. A constant cross section in this sense is not precluded if the cross section changes slightly at individual locations on account of bending deformation.

[0033] Closing clips are generally designed to be closed once and then to remain closed. Subsequent opening is not envisaged. By virtue of the lateral surfaces of the clip legs being arranged parallel to one another, the closing clip may be deformed such that the lateral surfaces of the clip legs, in the closed state, rest one upon the other. The friction between the lateral surfaces improves the strength of the closure. A further improvement may be achieved if the lateral surfaces of the clip legs are provided with a surface structure. The surface structure may be of any desired form which increases the friction; however, the individual elements of the structure have to be small enough for the lateral surfaces overall to remain planar surfaces.

[0034] It has been found that the closing clip, with a cross-sectional width between 1.5 mm and 6 mm, preferably between 2 mm and 4.5 mm, and a cross-sectional height between 1 mm and 5 mm, preferably between 1.2 mm and 3.5 mm, is suitably dimensioned in order to close typical packaging units in sausage production. The length of the closing clip may be between 10 mm and 70 mm, preferably between 20 mm and 50 mm, for sausage production. The ratio between the length of the clip legs and the length of the clip base is typically between 3:1 and 1:1. The closing clip provides good stability with simultaneously good deformability if it is produced from aluminum or aluminum alloy.

[0035] For industrial usage and mechanical feeding of the closing clips, it is desirable to make the closing clips available in magazine form. For this purpose, a plurality of closing clips are advantageously arranged in a chain such that the respectively following closing clip butts laterally against the respectively preceding closing clip. A force to which the following closing clip is subjected can be transmitted in this way to preceding closing clips. The closing clips can thus be fed one after the other to a processing apparatus by a uniform force acting on the chain.

[0036] It is not necessary for the closing clips to rest one upon the other over their surface areas. Rather, it is sufficient if the closing clips are adjacent to one another by way of a part which is sufficient for force-transmission purposes. In order

that the chain can be guided along curvatures, it is advantageous if the closing clips butt against one another in the region of the clip base.

[0037] In order to facilitate transportation, the closing clips may be connected to an adhesive strip. As an alternative, or in addition, the closing clips may rest on a rail.

[0038] The closing clips according to the invention can be processed with the aid of the apparatus for closing a packaging tube. In particular it is critical for the processing of the closing clips for the latter to be guided in a defined manner during the bending operation. In a combined bending operation, the closing clip has to be bent simultaneously in the circumferential direction and in the lateral direction. It has to be ensured that the closing clip does not twist during the combined bending operation.

[0039] For the combined bending operation, the apparatus comprises a feed channel from which the clip legs are fed to two slide channels defining the deformation path of the clip legs. A punch moves the closing clips relative to the feed channel and thus causes the clip legs to be deformed in accordance with the deformation path predetermined by the slide channels.

[0040] In order to prevent the closing clips from twisting, the slide channels each comprise two mutually opposite planar lateral guide surfaces which are spaced apart parallel to one another by a distance which is adapted to the cross-sectional width of the clip legs. The lateral surfaces of the clip legs can be guided along the lateral guide surfaces over a defined distance. At the beginning of the bending operation, the closing clip is still located entirely within the feed channel; it is thus only that part of the clip legs which has already passed out of the feed channel which is guided on the guide surfaces of the slide channels.

[0041] The lateral guide surfaces firmly define the positioning of the clip legs within the slide channels; twisting of the clip legs is prevented. This ensures that the inner surface of the closing clip rests in a defined manner on the packaging tube and the packing tube is subjected to uniform loading. The risk of damage to the packaging tube is reduced.

[0042] For guiding the outer sides of the clip legs, the slide channels may comprise base guide surfaces which, as seen in a cross section of the slide channels, are planar. Good adaptation to the cross-sectionally rectangular clip legs is achieved if the base guide surface, as seen in cross section, is arranged perpendicularly to the lateral guide surfaces.

[0043] In order to allow the closing clip to bend in the lateral direction, the clip base, in relation to which the legs are to be bent in the lateral direction, has to be guided reliably. For this purpose, the feed channel may have guide surfaces which are adapted to the lateral surfaces of the clamp base. The lateral surfaces of the clamp base can be guided along these guide surfaces during the bending operation.

[0044] It is occasionally necessary to apply symbols to the closing clip. The symbols may contain information, for example, regarding the contents of the packaging tube, the processing date or similar information. The symbols may be applied in a form in which they are stamped into the closing clip; it is also conceivable, however, for a label to be adhesively bonded to the closing clips. The apparatus may comprise a device for applying such symbols to the outer surfaces of the clip legs. Since the outer surfaces of the clip legs are located one beside the other in a closed state of the closing clip, more information can be accommodated here than in the case of conventional closing clips. All the information pro-

vided there can be taken in by the user at a glance without the closing clip having to be turned back and forth. Information can be particularly advantageously provided here if the clip legs are bent over through 180° in relation to the clip base in each case in the circumferential direction. In this way, the outer surfaces of the two clip legs form a common, continuous surface on which the information can be provided.

[0045] The invention will be described by way of example hereinbelow by way of an advantageous embodiment and with reference to the accompanying drawings, in which:

[0046] FIG. 1 shows a plan view of a closing clip according to the invention;

[0047] FIG. 2 shows a cross section through the closing clip from FIG. 1;

[0048] FIG. 3 shows a cross section of a schematically illustrated apparatus according to the invention;

[0049] FIG. 4 shows a die as a detail of the apparatus from FIG. 3;

[0050] FIG. 5 shows a cross section through the die from FIG. 4;

[0051] FIG. 6 shows a cross section through the apparatus from FIG. 3;

[0052] FIG. 7 shows a plan view of a closing clip according to the invention in the closed state;

[0053] FIG. 8 shows another embodiment in the view from FIG. 7; and

[0054] FIG. 9 shows a chain of closing clips according to the invention.

[0055] A closing clip 1 in FIG. 1 comprises a clip base 2 and two clip legs 3 arranged at right angles in relation to the clip base 2. According to FIG. 2, the closing clip 1, with the exception of the rounded edges, is rectangular in cross section. The inner surface 4 and the outer surface 5 each extend over more or less the entire cross-sectional width. The lateral surfaces 6 extend over more or less the entire cross-sectional height. At their ends, the clip legs 3 merge into end surfaces 7. The edges between the end surfaces 7 and the adjacent surfaces are likewise rounded. With the exception of the rounded edges of the end surfaces and slight deviations possibly produced by virtue of the clip legs 3 being bent over in relation to the clip base 2, the closing clip 1 has a constant cross section over its entire length. The clip legs 3 are free; the closing clip 1 is thus not connected to any further closing clips via its clip legs 3. A surface structure 16 is applied to the outer sides 6 of the clip legs 3.

[0056] The inner surface 4 and the outer surface 5 have larger dimensions in the transverse direction than the lateral surfaces 6. The cross-sectional width 13 of the closing clip 1 is thus larger than the cross-sectional height 14.

[0057] The closing clip 1 is intended to be used, with the aid of an apparatus illustrated in FIG. 3, for the purpose of closing packaging tubes. In FIG. 3, a shirred portion 8 of a packaging tube is located above a die 9. The closing clip 1 is located in a feed channel 18 of the apparatus and is positioned such that the two clip legs 3 are arranged on both sides of the packaging tube 8. With the aid of a punch 10, which is mounted in a movable manner in the feed channel 18, pressure can be applied to the clip base 2 of the closing clip 1.

[0058] As can be seen in the plan view in FIG. 4, the die 9 comprises two slide channels 11 and 12. Each of the two slide channels 11, 12 is intended for guiding one of the clip legs 3 of the closing clip 1. It is thus possible for the clip legs 3 to be simultaneously guided into the slide channels 11 and guided

past the shirred portion of the packaging tube, because the two clip legs 3 are arranged parallel to one another.

[0059] The clip legs 3 are introduced into the slide channels 11, 12 under the pressure of the punch 10. As the punch 10 is moved further, the clip legs 3 are forced along the path predetermined by the slide channels 11 and 12, and bend correspondingly. FIG. 3 illustrates the slide channels 11, 12 in a section along line B-B from FIG. 4.

[0060] At the end of the bending operation, the closing clip 1 rests on the packaging tube 8 by way of the inner surfaces 4 of the clip legs and the inner surface 41 of the clip base. The clip legs 3 have been bent over in accordance with the path predetermined by the slide channels 11, 12, and they butt against one another by way of their lateral surfaces 6. On account of the elasticity of the material of the closing clip, the lateral surfaces 6 of the clip legs are adjacent to one another even when the slide channels 19, 20 are spaced apart from one another by a small lateral distance and the closing clip is thus tensioned laterally to some extent beyond the definitive position during the bending operation.

[0061] In order to ensure reliable guidance of the closing clip 1 during the bending operation, the slide channels 11, 12, as can be seen in FIG. 5, have a rectangular cross section formed from the lateral guide surfaces 19, 20 and the base guide surface 21. The closing clip 1 has its lateral surfaces 6 butting against the lateral guide surfaces 19, 20 and its outer surface 5 butting against the base guide surface 21. The closing clip 1 is thus guided precisely in every direction, and this prevents the closing clip from twisting.

[0062] According to the sectional illustration of FIG. 6, the feed channel 18 is also adapted to the shape of the closing clip 1. The closing clip 1 is reliably guided by the guide surfaces of the feed channel 18 by way of its lateral surfaces 6 and its outer surface 5, in which case the position of that part of the closing clip 1 which is still located in the feed channel 18 is also precisely defined throughout the bending operation.

[0063] In the closed state, the two clip legs 3 of the closing clip, with a suitable configuration of the slide channels 11, 12, are located one beside the other, in which case the outer surfaces 5 of the clip legs 3 are adjacent to one another. Symbols 15 for providing information regarding properties of the packaged products may be applied to the outer surfaces 5. It is possible, as is illustrated in FIG. 7, for each clip leg to be provided with dedicated symbols, in which case it is possible to take in a relatively large amount of information from the same viewing direction. However, it is also conceivable, as is shown in FIG. 8, for the symbols to extend jointly over the outer surfaces 5 of the two clip legs 3. The symbols 15 are then larger and thus easier to read.

[0064] FIG. 9 shows a chain of closing clips 1 connected by an adhesive strip 17. The closing clips 1 butt against one another in the region of the clip base 2, in which case a compressive force can be transmitted from one closing clip to the next. Magazined in this way, the closing clips can be mechanically processed to good effect.

[0065] The closing clip according to the invention has the advantage that it rests on the packaging tube 8 by way of its wide inner surface 4, 41 and thus keeps the loading to which the packaging tube 8 is subjected to a low level. In order to achieve the aim of a low level of loading on the packaging tube, it has to be ensured that the closing clip actually rests in planar fashion on the packaging tube by way of its inner surface 4. If the closing clip is located obliquely, or if it is twisted, one of the edges between the inner surface 4, 41 and

the lateral surfaces 6 subject the packaging tube 8 to increased pressure and increases the loading. It is ensured that the closing clip rests in planar fashion on the packaging tube 8 by way of its inner surface 4 in that, during the bending operation, the closing clip 1 is guided over a precisely defined path by way of the guide surfaces in the feed channel 18 and the guide surfaces in the slide channels 11, 12.

1. A closing clip for closing a packaging tube (8), having two clip legs (3) and a clip base (2) arranged between the clip legs (3), the clip legs (3) being arranged parallel to one another and at right angles to the clip base (2), having planar inner surfaces (4) which are arranged on the clip legs (3) and are oriented in the direction of the respectively other clip leg (3), and having a planar inner surface (41) which is arranged on the clip base (2) and connects the inner surfaces (4) of the clip legs (3), characterized in that the clip legs (3) have planar lateral surfaces (6), and in that, as seen in a cross section of the clip legs (3), the lateral surfaces (6) are arranged perpendicularly to the inner surfaces (4) of the clip legs (3), and in that the cross-sectional height (13) of the closing clip (1) is smaller than the cross-sectional width (14) of the closing clip (1).

2. The closing clip as claimed in claim 1, characterized in that the clip legs (3) have planar outer surfaces (5), which are located opposite the inner surfaces (4).

3. The closing clip as claimed in claim 1 or 2, characterized in that the planar inner surface (4) extends over at least 70%, preferably at least 80%, further preferably at least 90% of the cross-sectional width (13) of the closing clip (1).

4. The closing clip as claimed in one of claims 1 to 3, characterized in that the planar outer surface (5) extends over at least 70%, preferably at least 80%, further preferably at least 90% of the cross-sectional width (13) of the closing clip (1).

5. The closing clip as claimed in one of claims 1 to 4, characterized in that the planar lateral surfaces (6) extend over at least 70%, preferably at least 80%, further preferably at least 90% of the cross-sectional height (14) of the closing clip (1).

6. The closing clip as claimed in one of claims 1 to 5, characterized in that the edges between the lateral surfaces (6) and the inner surface (4) and outer surface (5) are rounded.

7. The closing clip as claimed in one of claims 1 to 6, characterized in that the ratio of cross-sectional height (13) of the closing clip (1) to cross-sectional width (14) of the closing clip (1) is smaller than 0.9:1, preferably smaller than 0.8:1.

8. The closing clip as claimed in one of claims 1 to 7, characterized in that the cross section of the clip base (2) corresponds to cross section of the clip legs (3).

9. The closing clip as claimed in one of claims 1 to 8, characterized in that the lateral surfaces (6) of the clip legs (3) are provided with a structure (16).

10. The closing clip as claimed in one of claims 1 to 9, characterized in that the clip legs (3) terminate in planar end surfaces (7), and in that the edges of the end surfaces (7) are rounded.

11. The closing clip as claimed in one of claims 1 to 10, characterized in that the cross-sectional width (13) of the closing clip (1) is between 1.5 mm and 6 mm, preferably between 2 mm and 4.5 mm and in that the cross-sectional height (14) of the closing clip (1) is between 1 mm and 5 mm, preferably between 1.2 mm and 3.5 mm.

12. The closing clip as claimed in one of claims 1 to 11, characterized in that it has a length between 10 mm and 70 mm, preferably between 20 mm and 50 mm.

13. The closing clip as claimed in one of claims 1 to 12, characterized in that it is produced from aluminum or aluminum alloys.

14. The closing clip as claimed in one of claims 1 to 13, characterized in that the ratio between the length of the clip legs (3) and the length of the clip base (2) is between 3:1 and 1:1.

15. A chain made of a plurality of closing clips (1) designed in accordance with one of claims 1 to 14, characterized in that the respectively following closing clip (1) butts laterally against the respectively preceding closing clip.

16. The chain as claimed in claim 15, characterized in that the closing clips (1) are located against one another by way of the clip bases (2).

17. The chain as claimed in claim 15 or 16, characterized in that the closing clips (1) are connected to an adhesive strip (17).

18. The chain as claimed in one of claims 15 to 17, characterized in that the closing clips (1) rest on a rail.

19. An apparatus for closing a packaging tube by means of closing clips (8) designed in accordance with one of claims 1 to 14, having a feed channel (18) for feeding closing clips (1), having a punch (10) for moving the closing clips (1) in the feed channel (18), and having two slide channels (11, 12) defining the deformation path of the clip legs (3), characterized in that the slide channels (11, 12) each comprise two mutually opposite, planar lateral guide surfaces (19, 20), and in the guide surfaces are spaced apart parallel to one another by a distance which is adapted to the cross-sectional width (13) of the closing clips (1).

20. The apparatus as claimed in claim 19, characterized in that the slide channels (11, 12) comprise base guide surfaces (21) which, as seen in the cross section of the slide channels (11, 12) are planar.

21. The apparatus as claimed in claim 19 or 20, characterized in that the feed channel (18) has guide surfaces which are adapted to the lateral surfaces (6) of the clip base (2).

22. The apparatus as claimed in one of claims 19 to 21, characterized in that it comprises a device for applying symbols (15) to the outer surfaces (6) of the clip legs (3).

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