

The invention relates to a method of securing a reclosable closure strap on a package and to an application device suitable for accomplishing the method.

A package is known, on which a reclosable, bag-shaped closure strap is secured. So-called zip fasteners are used as the closure straps and are produced by extrusion. Closure straps of this type are known, for example, from US-A-5 035 517 or EP-A-0 388 364. Instead of using extruded straps having a groove/rib closure, closures could of course be used which are known under the name of "Velcro" or, however, even slide fasteners.

A strap, which is cut to size and has mutually spaced closure straps, is known from US-A-5 024 537. The closure straps adhere to the strap and may be detached during the application. The production of such straps is complex and, in addition, it is always necessary to determine in advance the length and the mutual spacing which the closure straps must have. In consequence, the possibility of a rapaid adaptation or a change of product is excluded.

The object of the invention is to provide a method and a device, whereby closure straps can be cut to size immediately prior to their application and can be welded laterally.

This object is achieved by a method and a device in accordance with claims 1 and 7.

The method of the invention permits an endless closure strap to be used in a simple manner and permits it to be cut in an appropriate length immediately prior to its application and applied to the package. Because the protective strip is substantially insensitive to heat

and covers and protects the glued region on the closure strap, the closure strap can be cut to the desired length without damaging the protective strip. The use of an ultrasonic severing device permits a continuous operation, without the protective strip becoming weaker. The protective strip also serves to advance the closure strap to the application station. By displacing the severing-cum-welding device, the length of the desired portion of the closure strap can be adjusted. In this way, packages of variable sizes and/or closure strap portions of variable lengths can be produced and adapted at any time to the intended purpose of the package. The protective strip, which also serves as the carrier strap for the closure strap as far as the application station, is detached from the closure strap by being deflected shortly before the application station, and it is conducted away from the application region. The gluing of the endlessly extruded closure strap can easily be achieved, in that an adhesive strap, which has been glued on both sides and is commercially available on the market - carried by the protective strip - is applied to the closure strap immediately prior to the closure strap being cut-up into the desired portions. This method permits the gluing to be achieved always, such gluing being adapted to the package material and rendering optimum adhesion possible. It is not necessary to maintain stocks of the glued, rapidly aging closure strap, nor to maintain stocks of closure strap portions which have already been cut to length.

The invention is explained more fully with reference to illustrated embodiments. In the drawing: Figure 1 is a schematic, side elevational view of an application device; Figure 2 is a schematic view of the device for combining the closure strap with the adhesive strap;

Figure 3 is a perspective view of the closure strap; and Figure 4 is a cross-sectional view taken along the line IV-IV of Figure 3.

In Figure 1, a conveyor belt 1 is illustrated, on which packages 5, for example sacks formed from paper or plastics material films and filled with rice or other products, are supplied by guide rollers 3, of which only one is visible, to the application station 7 of an application system 9 for the application of bag-type closure straps 11. The application system 9 is disposed on a machine support 13, which supports all of the component parts of the system. The endless closure strap 11 is supplied from a supply reel 15, which may also be disposed externally of the support 13, via a guide roller 17 to a severing-cum-welding device 19. The closure strap 11 has a glued adhesive region 21, which is covered, or respectively protected, by a protective strip 23 (Figures 3/4). The severing-cum-welding device 19 is disposed in a displaceable and securable manner longitudinally of two guide rails or grooves 25 and 27 and has a counter-pressure plate 29 with a severing edge 31 and an ultrasonic head 33, of which either the counter-pressure plate and/or the ultrasonic head are disposed so as to be vertically displaceable relative to one another. The closure strap 11, with the protective strip 23 adhering thereto, is guided via the guide roller 17 between the counter-pressure plate 29 and severing edge 31 of the ultrasonic head 33 to an additional guide roller 35. In order to achieve as large a loop angle as possible, and hence an optimum adhesion on a conveyor or drive roller 37, the closure strap 11 is guided around an additional two guide rollers 39 and 41. The drive roller 37 is driven via a drive belt 43, which rotates on the driven shaft 45 of a drive motor 47. Instead of a belt drive, the drive roller 37 may of course be disposed

directly on a drive motor (no illustration). After being looped around the second guide roller 41, the closure strap 11 with the cover strip 23 adhering thereto passes to a guide plate 49 with a guiding edge 51 at its outlet end. At least one compression roller 53 is freely rotatably mounted on the guide plate 49 so as to be pivotable about a horizontally extending axis A on a pivot arm 55. The pivot arm 55, which supports the compression roller 53, may be pressed onto the package 53* by the force F of a spring (not shown) or by its own correspondingly high mass.

A first sensor 57 scans the (vertical) position of the pivot arm 55 (operational position substantially horizontal), as illustrated in Figure 1 or as lowered in the inoperative position (no illustration), when no package 5 is conducted past the compression rollers 53. A second sensor, for example a light barrier 59, is provided in order to detect the front end of a package 5 entering the application station 7 and to transmit its presence to the machine control unit 61.

A spool 65, which is driven by a motor 63, is also disposed on the machine support 13 to take-up the carrier and cover strip 23 detached from the closure strap 11. After the cover strip 23 has been detached from the closure strap 11 at the guiding edge 51 by the 180° deflection, it passes beneath the severing-cum-welding device 19 to the spool 65 via a plurality of guide rollers 67 and is wound-up there. A sliding coupling is preferably inserted between the motor 63 and

*Translator's note

Presumably the reference numeral "53" is a clerical error for "5" in the German text.

the spool 65 and exerts a constant tensile force upon the cover strip 25 to be wound-up.

The mode of operation of the application device 9 is described hereinafter. As soon as a package 5, for example a sack of rice or a bag, supported by the conveyor belt 1, reaches the light barrier 59, the drive motor 47 for the drive roller 37 is set in motion by the machine control unit 61 and, in consequence, the advancing movement of the closure strap 11 is activated. At the same time, the drive for the motor 63 of the spool 65 for the protective strip 23 is also set in motion and, in consequence, the closure strap 11, which is already situated above the guide plate 49 after the guide roller 41, is advanced. As soon as the closure strap 11, which is still covered by the protective strip 23, moves beyond the front guiding edge 51 of the guide plate 49, the bottom protective strip 23 is detached from the closure strap 11. The adhesive region 21, which is now exposed and is situated on the underside of the closure strap 11, is now in contact with the package 5, which is guided beneath the edge 51, and said adhesive region is pressed upon the surface of the package 5 by the compression rollers 53.

So that only a portion of the closure strap 11, which is adapted to the length a_1 of the package 5, is applied to the package, the closure strap 11 is cut to the length a_2 as it traverses the severing-cum-welding device 19. In addition, the closure strap 11 is severed during the stationary period for the advancing movement of the closure strap 11, that is to say when no package 5 is conducted beneath the application station 7, without

thereby damaging the cover strip 11*. The cover strip 23 serves as the carrier or conveyor belt for the closure strap 11 after the latter has been severed and its edges have been welded. The severing of only the closure strap 11 is effected by the ultrasonic head 33, in that the latter is activated, and the closure strap 11 is pressed onto the severing edge 31 and fused. Not only is the closure strap 11 severed thereby, but at the same time the edges 14, which are freshly formed during the severing operation, are welded. Laterally welded, bag-type closures 11 of the prescribed length a2 are formed in this manner.

These closures 11, which are supported by the cover strip 23 and are conveyed to the application station 7, form small bags, since their longitudinal edges 69 lying opposite the closure strap region 71 are welded. The longitudinal edges 69 are already welded during the production of the closure strap 11 and, in consequence, such welding is not described further. The advancing movement for the closure strap 11, which has now been cut into portions after the severing-cum-welding device 19, is effected by the drive motor 47 of the drive roller 37 and by the drive motor 63 of the spool 65 and corresponds to the length a2. This length a2, which is adapted to the length a1 of the package 5 - as already stated - can easily be adapted to the circumstances by a displacement of the severing-cum-welding device 19, i.e. it can be lengthened or shortened.

*Translator's note

Presumably the reference numeral "11" is a clerical error for "23" in the German text.

In the embodiment of the invention shown in Figure 2, the adhesive in the adhesive region 121 is only applied at the application system 109 and has not already occurred elsewhere, for example at the place of manufacture of the closure strap 111.

The closure strap 111 is drawn from a rotatably mounted supply reel 115 without any adhesive region and protective strip 123, as supplied from the extruder, via a motor-driven strap unwinder 173. The closure strap 111 passes from the strap unwinder 173 to a joining station 177 via a compensating roller 175, as is known from prior art.

An adhesive strap 181, which is adhesive on both sides, is wound-up on a second rotatably mounted supply reel 179, and one side of said adhesive strap is covered by a cover strip or protective strip 123. The adhesive strap 181 passes from the supply reel 179 likewise into the joining station 177 via one or more guide rollers 183. The two component parts are interconnected in the joining station 177, which substantially comprises a support roller 185 and a compression roller 187. The compression roller 187 is resiliently retained in a retaining device 189 so as to be able to press against the support roller 185.

An additional guide roller 191 is disposed beneath the support roller 185 so that as small a loop as possible can be achieved around the support roller 185 in the region where the adhesive strap 181 presses against the closure strap 111 in order to prevent the two component parts, which are to be interconnected, from becoming distorted during the subsequent stretching process.

After the two straps have been joined, namely the closure strap 111 and the adhesive strap 181, the strap 121, which now has an adhesive region, is conducted to a heating device 195 via an additional compensating roller 193. The closure strap 111, which is now provided with the adhesive region 121, passes from said heating device to the severing station, such as is referenced 19 in Figure 1.

In an alternative embodiment of the invention, which is not illustrated, fluid adhesive is applied to the closure strap instead of an adhesive strap and subsequently covered with a cover strip, which does not become joined to the adhesive layer. The cover strip is also necessary here so that the closure strap can be conveyed further to the application station once it has been split into prescribed lengths a on the severing-cum-welding device.



CLAIMS

1. Method of securing a reclosable closure strap (11, 111) on a package (5), wherein

- an endless closure strap (11) is stored on a supply reel (15, 115, 179) and has a glued adhesive region which is protected by a protective strip (23, 123), or the closure strap is provided with an adhesive region and a protective strip (23, 123) after being drawn from the supply reel (15),

- the closure strap (11, 111) is drawn with the protective strip (23, 123),

- a prescribed length (a) is measured and cut,

- the cut portion (12) of the closure strap (11, 111) is welded to the front and rear ends of a closure strap portion and severed from the subsequent portion, and

- the cut portion (12) is supplied to an application station (7) on the non-severed protective strip (23, 123), which is connected to the supply reel (15, 115, 179) and a take-up spool (65),

characterised in that

- the closure strap (11, 111) is severed with an ultrasonic or heating rod severing-cum-welding device (19), and the resultant edges (14) lying one above the other are welded together,

- the protective strip remains undamaged during the severing process,

- the protective strip (23, 123) is detached from the front portion (12), and

- the portion (12), having the exposed glued region, is pressed onto the package (5).

2. Method according to claim 1, characterised in that the protective strip (23, 123) is detached from the



glued region (21, 121) by being guided around an edge (51) through at least 90° and wound-up.

3. Method according to one of claims 1 or 2, characterised in that the non-severed closure strap (11, 111) and the cut portions (12) are advanced by the drawing movement for the protective strip (23, 123) and/or by a feed roller (37).

4. Method according to one of claims 2 or 3, characterised in that the cutting device (19) is displaceable relative to the direction of conveyance of the closure strap (11, 111) for the adjustment of the length (a2) of the portions (12).

5. Method according to one of claims 1 to 4, characterised in that, immediately prior to the portions (12) being cut to length, the closure strap (11, 111) is glued (21, 121) and the protective strip (23, 123) is applied to the glued region (21, 121).

6. Method according to claim 5, characterised in that the gluing (21, 121) is effected by a double-sided adhesive strap (181) which is applied to the protective strip (23, 123), supplied to the closure strap (11, 111) and joined thereto by pressure.

7. Application device for applying a reclosable closure strap (11, 111) to a package (5), wherein an endless closure strap is stored on a supply reel (15, 115, 179) and has a glued adhesive region which is protected by a protective strip (23, 123), or the closure strap is provided with an adhesive region and a protective strip (23, 123) after being drawn from the



supply reel (15), the closure strap is drawn with the protective strip, a prescribed length (a) is measured and cut, the cut portion (12) of the closure strap (11, 111) is welded to the front and rear ends of a closure strap portion and severed from the subsequent portion, and the cut portion is supplied to an application station (7) on the non-severed protective strip (23, 123), which is connected to the supply reel and a take-up spool (65), characterised in that a severing-cum-welding device (19) is provided in front of the application station (7) for severing and welding the resultant edges (14) lying one above the other, said device exclusively severing the closure strap (11, 111), but not the cover strip (23, 123), in that a conveyor means (1) is disposed beneath the application station (7) for conveying the package (5) to the application station (7), in that a guide plate (49) and compression means (53), which follow said plate when viewed with respect to the direction of conveyance, are disposed in front of the application station (7), said compression means serving to press the portions (12) of the closure strap (11, 111), which are provided with an adhesive region (21, 121), onto the package (5).

8. Application device according to claim 7, characterised in that an ultrasonic probe (33) is inserted in the severing-cum-welding device (19) for severing and simultaneously for fusing the edges (14) of the closure strap (11, 111).

9. Application device according to one of claims 7 or 8, characterised in that the adhesive region (21, 121) in front of the severing-cum-welding device (19) is drawn from a supply reel (179) in the form of a



double-sided adhesive strap, which is protected on one side by a cover strip (23, 123), and is pressed onto the closure strap (111) by a pressure roller (187), said closure strap being drawn from a second supply reel (115).