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Method and installation for folding a textile strip length, in particular a strip length for a label

Technical Field

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The invention relates to a method for folding a textile strip length, in particular a strip length for a label, according to the preamble of claim 1 and to an installation for carrying out the method according to
10 the preamble of claim 2.

Prior Art

Methods and installations of the type mentioned at the
15 beginning are known, for example from IT-1 268 836 B. In the method described there and the installation for carrying it out, a strip length is first held firmly close to an auxiliary folding edge which is to be formed and whose direction is parallel to the
20 definitive folding edge. The part of the strip which projects reaches over a gap formed by two clamping elements, the clamping surfaces of which being aligned perpendicular to the plane of the strip lengths. A flat blade pushes this part of the strip into the gap,
25 forming a fold, and then has to be withdrawn again before the fold formed can be smoothed and fixed by pressing the clamping surfaces against each other. Here, the problem arises that when the blade is pulled out, the fold formed is easily changed or even
30 destroyed. Even when the fold is smoothed and fixed properly, there is the further disadvantage that this fold around the auxiliary folding edge is aligned perpendicular to the plane of the strip. By means of the smoothing and fixing operation, this auxiliary fold
35 is also firstly fixed, so that in the finally folded strip length the folded parts of the strip project at right angles to the plane of the strip lengths, which is undesired and as a rule makes post-processing of the

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folded strip lengths necessary.

US 3 148 874 A discloses another method and another
installation for folding a textile strip length, the
5 strip length firstly being held firmly by means of an
L-shaped holding element beside a folding edge to be
formed. The projecting part of the strip is firstly
folded by means of a folding element at right angles to
the plane of the strip length and then turned over a
10 holding foot of the L-shaped holding

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element, parallel to the plane of the strip length. The holding foot of the L-shaped holding element then has to be withdrawn again before the fold formed is smoothed and fixed by pressing clamping surfaces, which
5 are aligned parallel to the strip length, against each other. Although the fold formed already lies in the plane of the strip length, the problem also results here that when the holding foot is withdrawn, the fold formed can easily be changed or even destroyed.

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Summary of the invention

It is the object of the invention to improve a method and an installation for folding a textile strip length,
15 in particular a strip length for a label, in such a way that the aforementioned disadvantages no longer occur.

According to the invention, this object is achieved by

- 20 a) a method as claimed in claim 1; and
b) an installation for carrying it out as claimed in claim 2.

The fact that the strip part angled over around an
25 auxiliary folding edge is gripped and compressed and therefore folded against a clamping surface which is aligned substantially coplanar with the plane of the strip section results in two critical advantages. Since, during the compression, the compression tool
30 does not engage in the fold or a gap between the clamping elements, it can remain in use until the clamping surfaces have gripped and fixed the folds, so that exact alignment and shaping of the folds is always provided, and slipping is undoubtedly prevented.
35 Furthermore, the clamping surfaces rise substantially in the plane of the strip length, so that the folded, smoothed and fixed folds of the strip length likewise lie in the plane of the strip length and the auxiliary

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folded edge is eliminated, so that a satisfactory, flat, folded strip length is produced and post-treatment is no longer necessary.

In order to carry out the method, various installations are conceivable. For example, it is possible for support elements, on which strip sections rest for processing, to be arranged at rest and for folding and clamping tools to be moved against the resting support die. However, an installation as claimed in claim 2 is particularly advantageous for carrying out the method.

Advantageous developments of the installation are described in claims 3 to 21.

For the folding of the part of the strip projecting beyond the support surface of the support element, various possibilities result. For example, the support

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element can be arranged at rest and the holding
element, which can be biased, can be biased against the
support surface. An appropriate folding element can
then be moved along the support element in order to
5 turn over the projecting part of the strip against the
supporting surface. By contrast, a particularly
preferred solution is described by claim 3.

In addition, diverse possibilities result for the
10 configurations of the folding element. For example, a
spatula can be moved over the auxiliary folding edge of
the support element and along the supporting surface in
order to turn the projecting part of the strip over
against the supporting surface. However, the
15 configuration as claimed in claim 4 is particularly
advantageous, according to which the folding element
has an oblique run-on surface which, during a relative
movement between support element and folding element,
turns over a part of the strip which projects beyond
20 the support surface around the auxiliary folding edge
and against the supporting surface. In order to permit
reliable turnover, the support element and the folding
element are biased toward each other, as claimed in
claim 5.

25 It is particularly expedient if the folding element as
claimed in claim 6 is also designed as a clamping
element, against which the other clamping element is
biased. This biasing can be produced by various means,
30 for example by electromagnetic or fluid-actuated means.
However, biasing by means of a spring is particularly
advantageous. This also makes it easier to raise the
clamping element by means of the support element, which
can be moved in relation thereto.

35 Claim 7 describes a very simple solution for biasing
the holding element against the support element and
controlling the holding element. For the control of the

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clamping element, there are various possible configurations for actuation and control. Claim 8 describes a very simple mechanical positive sequence for opening and closing the clamping elements.

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According to claim 9, at least one of the clamping elements is provided with a heating element.

10 The configuration of the installation as claimed in claim 10 permits continuous operation of the installation. For this purpose, a development as claimed in claim 11 is advantageous. In order to drive the conveying device, an extremely wide range of materials can be used, for example a stepping motor, a
15 standard motor with limit-switch control, a Maltese-cross drive or the like.

In principle, it is possible to construct the installation in such a way that a strip length is
20 provided with a fold only at one end. In the case of labels, however, two folds are desired at the two ends, so that a development of the installation as claimed in Claim 12 is advantageous. In order to be able to set the installation to strip lengths of different lengths,
25 one set of tools is arranged such that it can be displaced relative to the other set, in order to be able to set the mutual spacing to the desired length of the strip lengths.

30 As claimed in claim 13, the installation expediently has a delivery device for the strip lengths to the support element. Such a delivery device is advantageously configured as claimed in claim 14, in order to supply a continuous strip, from which strip
35 lengths are severed at an appropriate severing device. According to claim 15, the feed device can be equipped with a conveying element, in which the lengths of the strip lengths to be severed can be set. An installation

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which is particularly capable of adaptation results if,
as claimed in claim 16, the severing device has both a
mechanical cutting device and a thermal cutting device,
for example an infrared or ultrasonic cutting device,
5 which can be used as desired.

The installation as claimed in claim 17 is expediently
equipped with a stacking device for the folded strip
lengths, it having proven to be advantageous as claimed
10 in claim 18 with a magazine, in which the folded strip
lengths can be moved against a displacement resistance
and can be held.

It is also advantageous that both the method and the
15 installation are suitable for an extremely wide range
of folds, for example, not just as claimed in claim 19
for the production of strip lengths with one or two end
folds but also, as claimed in claim 20, for producing
strip lengths with a center fold. According to claim
20 21, even the production of strip lengths with a
diagonal fold is conceivable. This is possible since
folding is carried out merely by means of a compression
operation against a flat clamping surface which,
moreover, is aligned substantially in or parallel to
25 the plane of the strip lengths, so that folding can be
carried out at any desired point on the strip length
and with any desired alignment of the auxiliary folding
edge. This makes it possible to use only simple tools
which, on one and the same installation, can also
30 readily be replaced.

Brief description of the drawings

Exemplary embodiments of the invention will be
35 described in more detail below using schematic
drawings, in which:

Figure 1 shows an installation for
folding a textile strip

length, in particular a strip
length for a label in plan
view;
Figure 2 shows the installation of
figure 1 in side view;
5 Figures 3a to 3c show the folding station of
the installation according to
figure 1 in detail, in
longitudinal section and in
various operating positions;
10 Figures 4a to 4g show the principle of the
folding at the folding station
according to figures 3a to 3c
in a schematic representation
and in various intermediate
15 stages from the insertion of a
strip length until the
deposition of the folded strip
length;
20 Figure 5 shows an outline of the
folding station for producing
a strip length with center
fold;
Figure 6 shows the folding station
25 according to figure 5 in
longitudinal section;
Figure 7 shows an outline of the
folding station for producing
a strip length with diagonal
30 fold; and
Figure 8 shows the folding station of
figure 7 in longitudinal
section.

35 Description of the preferred embodiments

Figures 1 and 2 show a schematic representation of an
installation for folding a textile strip length, in

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particular a strip length for a label. The installation includes a delivery device 2, at which strip lengths 8 are severed from an endless strip 4 by means of a severing device 6 and are fed to a folding station 12 by means of a transfer device 10. At the folding station 12, the strip lengths 8 are folded at the ends and the folded strip lengths 8a are held firmly on clamping tools 14 of a carousel-like conveying device 16, which is rotatably mounted over a shaft 15. The folded strip lengths 8a are thus conveyed onward from the folding station 12 to an unloading station 18, where they are transferred by means of lever arms 20 to a magazine 22 of a stacking device 24. The lever arms 20, which are mounted such that they can rotate about a pivot 26, are actuated by means of an actuator 28 and discharge the folded strip lengths 8a to the magazine 22 against a displacement resistance 30.

The delivery device 2 contains a feed device 31 with a feed table 32, on which an endless strip 4 from a supply roll, not specifically illustrated, is fed by means of a conveying element 34 to the severing device 6 in the desired length of the strip length. The conveying element 34 can be, for example, a conveying arm moving to and fro or a driven conveying roll. The strip length to be conveyed is to be determined by a sensor 36, which responds to strip marks on the strip 4 supplied. In addition, inspection means (not specifically illustrated) for determining strip faults can also be associated with the feed table 32. The severing device 6 contains a thermal cutting device 6a, for example an infrared or ultrasonic cutting device 6a, and a mechanical cutting device 6b, which can come into use as desired, depending on the material characteristics of the strip to be treated. The transfer device 10 between the severing device 6 and the folding station 12 has firstly, after the severing device 6, a conveying arm 40 which is driven in

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oscillation by means of a drive 38, for example a fluid-actuated piston/cylinder unit, which arm transfers the strip length 8 from the severing device 6 to a rail 42. The latter is driven to and fro by means of an oscillating drive 44 in order to feed the strip length to the folding station, as emerges from figure 4a.

One half of the folding station is illustrated schematically in figures 3a to 3c. A second half, which is of identical construction, exists as a mirror image of this, as emerges from 4a to 4h. The folding station 12 contains a support element 46, which is arranged on a carriage 50 such that it can be pivoted about an axis of rotation 48, said carriage 50 being mounted in the machine frame 52 such that it can be moved up and down. A bias spring 54 biases the support element 46 into the vertical basic position. On the upper side, the support element 46 contains a support surface 56, to which the strip length 8 to be treated is transferred by means of the rail 42 and deposited (figure 4a). A holding element 60 biased against the support surface 46 by means of a spring 58 holds the strip length 8 firmly on the support element 46 (figure 4b). The support element 46 also has an auxiliary folding edge 62, which is aligned parallel to the folding edge (96 in figure 4g) of the fold to be produced (94 in figure 4g) and around which the part 64 of the strip projecting beyond the support surface can be folded against a supporting surface 66 adjoining the auxiliary folding edge 62 (figures 4c and 4d). The supporting surface 66 is aligned substantially perpendicular to the support surface 56. The support element 46 can be moved by means of a drive 68 shown in figure 2, for example a fluid-operated piston/cylinder unit, from the basic position shown in figures 3a and 4b into the folding position shown in figures 3b and 4d. In the process, the support element 46 comes into contact with the

inclined run-on surface 70 of a folding element 72, which turns over the part 64 of the strip against the supporting surface 66 (figures 3b, 4c and 4d). At the same time, a clamping element 74 is raised, which is
5 arranged above the folding element 72 such that it can be pivoted and is biased by means of a spring 76 against the folding element 72 which, at the same time, is also designed as a clamping element 73. In order to permit the clamping element 74 to be raised, the
10 holding element 60 is set back with respect to the auxiliary folding edge 62 of the support element 46, so that the support element 46 can interact with the clamping element 74 projecting beyond the holding element 72 or clamping element 73.

15 In the folding position shown in figure 3b, the holding element 60 latches by means of an opening 78 onto a latching pin 80, which is biased into this latching position by means of a spring 82. The latching pin 80
20 can be pulled back from the locking position by means of an actuator 84. The holding element 60 is guided such that it can be displaced on a rail 86 by rollers 88, the rail 86 being connected in a fixed position to the machine frame 52.

25 The definitive formation of a fold is carried out in accordance with figures 4d to 4f, as follows. The folding edge 72 has a compression edge 90 which, as figure 4d reveals, co-operates with the end of the part
30 64 of the strip turned over against the supporting surface 66, the supporting surface 66 biased against the folding element 72 by means of the bias spring 54 reinforcing the engagement between the compression edge 90 and the part 64 of the strip. The support element 46
35 is then pulled back into the initial position, the compression edge 90 of the folding element 72 compressing the projecting part 64 of the strip against the clamping surface 92 of the clamping element 74 and,

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in the process, forming the definitive fold 94 with the folding edge 96, which lies in the plane of the strip length 8a, as revealed by figures 4e and 4f. In the process, the fold 94 is clamped in between the clamping surfaces 92 of the clamping element 74 and the clamping surface 98 of the folding element 72, which at the same time is also designed as a clamping element 73, said elements being aligned coplanar with the plane of the strip length (figures 4e and 4f). The clamping element 73 contains a heating element 100, in order to smooth the fold 94 clamped in between the clamping surfaces 92, 98 and to fix it in the turned-over form (figure 4g). Smoothing and fixing are carried out during the conveying movement of the carousel-like conveying device 16 from the folding station 12 to the unloading station 18 (figures 4f to 4h). There, the folded strip length 8a is transferred into the magazine 22 of the stacking device 24 by means of the lever arms 20 with the clamping elements 73, 74 open.

In order to be able to set the installation to tape lengths of different lengths, the installation, as already mentioned, is constructed from two halves 102, 104, which can be displaced relative to each other, as indicated by the displacement arrow 106 in figure 1.

Figures 5 and 6 show the use of the installation for producing a label with a center fold. For this purpose, the strip length 8 is placed on the support elements 46, 46 in such a way that the strip length 8 rests with about half its length on the auxiliary folding edge 62. The folding operation can then be carried out as hitherto, the folding edge 96a of the center fold being located at half the length of the strip lengths.

Figures 7 and 8 show the modification of the installation for producing strip lengths with diagonal folding. To this end, the tools, that is to say the

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support elements 46a with the auxiliary folding edges 62a, the holding elements 60a, the folding elements 72a and the clamping elements 73a, 74a are aligned parallel to the diagonal folding edges 96b to be produced. The
5 folding operation is then likewise carried out again in a manner analogous to figures 4a to 4h.

LIST OF DESIGNATIONS

2	Delivery device	62	Auxiliary folding edge
4	Strip	62a	Auxiliary folding edge
6	Severing device	64	Part of strip
6a	Thermal cutting device	66	Supporting surface
6b	Mechanical cutting device	68	Drive
8	Strip length	70	Run-on surface
8a	Folded strip length	72	Folding element
8b	Folded strip length	72a	Folding element
8c	Folded strip length	73	Clamping element
10	Transfer device	73a	Clamping element
12	Folding station	74	Clamping element
14	Clamping tool	74a	Clamping element
15	Shaft	76	Spring
16	Carousel-like conveying device	78	Opening
18	Unloading station	80	Latching pin
20	Lever arm	82	Spring
22	Magazine	84	Actuator
24	Stacking device	86	Rail
26	Pivot	88	Roll
28	Actuator	90	Compression edge
30	Displacement resistance	92	Clamping surface of 74
31	Feed device	94	Definitive fold
32	Feed table	96	Folding edge
34	Conveying element	96a	Folding edge
36	Sensor	96b	Folding edge
38	Drive	98	Clamping surface of 73
40	Conveying arm	100	Heating element
42	Rail	102	Half
44	Drive	104	Half
46	Support element	106	Displacement arrow
46a	Support element		
48	Axis of rotation		
50	Carriage		
52	Machine frame		
54	Bias spring		

56 Support surface
58 Spring
60 Holding element
60a Holding element

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PATENT CLAIMS

1. A method for folding a textile strip length, in particular a strip length for a label, the strip length
5 (8) first being held firmly close to an auxiliary folding edge (62, 62a) whose direction is parallel to the definitive folding edge (96, 96a, 96b), and then a part (64) of the strip being folded around the auxiliary folding edge (62, 62a) substantially
10 perpendicular to the plane of the strip length (8) and the definitive fold (94) being formed and the latter being smoothed and fixed by being clamped between two clamping surfaces (92, 98), characterized in that, in order to form the definitive fold (94), the end of the
15 part (64) of the strip folded around the auxiliary folding edge (62, 62a) is gripped and the part (64a) of the strip is compressed against a clamping surface (92) arranged substantially co-planar with the plane of the strip length (8) and belonging to a clamping element
20 (74, 74a) forming the definitive fold (94), and the folded part (64) of the strip lying substantially in the plane of the strip length (8, 8a, 8b, 8c) then being smoothed and fixed between the clamping surfaces (92, 98) arranged substantially in the plane of the
25 strip length.

2. An installation for carrying out the method as claimed in claim 1, comprising:

- 30 - a support element (46, 46a) for a strip length (8) to be folded, having a support surface (56) aligned parallel to the strip length (8) and having an auxiliary folding edge (62, 62a) which is aligned parallel to a folding edge (96, 96a, 96b) to be
35 created;
- a holding element (60, 60a), co-operating with the support surface (56) of the support element (46, 46a), for the strip length (8);

- a folding element (72, 72a) for forming a fold (94) of the strip length (8a, 8b, 8c) between clamping surfaces (92, 98) of two clamping elements (73, 73a, 74, 74a) for smoothing and fixing the fold,

characterized in that the clamping surfaces (92, 98) of the clamping elements (73, 73a, 74, 74a) are aligned substantially co-planar with the plane of the strip length (8) to be treated, in addition in that the auxiliary folding edge (62, 62a) of the support element (46, 46a) is assigned a supporting surface (66) aligned substantially perpendicular to the support surface (56), and in that the folding element (72, 72a) has a compression edge (90) that co-operates with the supporting surface (66), in order to grip the end of a part (64) of the strip to be turned over against the supporting surface (66) and to compress the part (64) of the strip against the clamping surface (92) of a clamping element (74, 74a), forming the definitive fold (94) to be produced.

3. The installation as claimed in claim 2, characterized in that the support element (46, 46a), together with the holding element (60, 60a) that can be biased against the support surface (56), can be moved out and in from a holding position for a strip length (8) into a holding position.

4. The installation as claimed in claim 2 or 3, characterized in that the folding element (72, 72a) has an oblique run-on surface (70) such that, during a relative movement between support element (46, 46a) and folding element (72, 72a), the latter turns over a part (64) of the strip projecting beyond the support surface (56) around the auxiliary folding edge (62, 62a) and against the supporting surface (66).

5. The installation as claimed in one of claims 2 to 4, characterized in that the support element (46, 46a) and the folding element (72, 72a) are biased against each other.

5

6. The installation as claimed in one of claims 2 to 5, characterized in that the folding element (72, 72a) is also designed as a clamping element (73, 73a), against which the other clamping element (74, 74a) is preferably biased by means of a spring (76) and can be raised by means of the support element (46, 46a).

10

7. The installation as claimed in one of claims 2 to 6, characterized in that the holding element (60, 60a) is biased against the support element (46, 46a) by means of a bias spring (58) and, as it is moved out by means of the support element (46, 46a), can be moved into an initial position in which it can be latched by means of a releasable latch (80).

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8. The installation as claimed in one of claims 2 to 7, characterized in that the holding element (60, 60a) is set back with respect to the auxiliary folding edge (62, 62a) of the support surface (56) of the support element (46, 46a), and the support surface (56) cooperates by means of the auxiliary folding edge (62, 62a) with the clamping element (74, 74a) arranged to project beyond the folding element (72, 72a), in order to raise said clamping element (74, 74a) off the folding element (72, 72a) as the support element (46, 46a) is moved out.

25

9. The installation as claimed in one of claims 2 to 8, characterized in that at least one of the clamping elements (73, 73a, 74, 74a) is provided with a heating element (100).

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10. The installation as claimed in one of claims 2 to

9, characterized in that the support element (46, 46a) and the holding element (60, 60a) are arranged in a stationary manner on a folding station (12), and the folding element (72, 72a) with the clamping element
5 (74, 74a) is arranged on a conveying device (16), preferably a rotating carrier, which can be moved from the folding station (12) to the unloading station (18).

11. The installation as claimed in claim 10,
10 characterized in that the conveying device (16) has a plurality of folding elements (72, 72a) and clamping elements (74, 74a) distributed over its length.

12. The installation as claimed in one of claims 2 to
15 11, characterized in that in order to produce strip lengths (8a, 8b, 8c) with two folds, it has a further tool set (102), which is preferably arranged as a mirror image of the first tool set (104) and such that it can be set at a distance from the first tool set
20 (104).

13. The installation as claimed in one of claims 2 to
12, characterized in that a delivery device (2) for the strip lengths (8) is associated with the support
25 element (46, 46a).

14. The installation as claimed in claim 13,
characterized in that the delivery device (2) comprises a feed device (31) for the intermittent feeding of a
30 continuous strip (4) to a severing device (6) in order to sever strip lengths (8) of a pre-determinable length, and a transfer device (10) in order to feed the strip lengths (8) to the support element (46, 46a) at a folding station (12).

35
15. The installation as claimed in claim 14, characterized in that the feed device (31) has a conveying element (34) which acts only in the conveying

direction and can be set in accordance with the pre-determined length of the strip length (8) to be severed.

- 5 16. The installation as claimed in claim 14 or 15, characterized in that the severing device (6) has a mechanical cutting device (6b) and a thermal cutting device (6a), which can be used as desired.
- 10 17. The installation as claimed in one of claims 2 to 16, characterized in that, at an unloading station (18) it has a stacking device (24) for stacking the folded strip lengths (8a).
- 15 18. The installation as claimed in claim 17, characterized in that the stacking device (24) has a magazine (22) into which the folded strip lengths (8a, 8b, 8c) can be moved against a displacement resistance (30) and can be held.
- 20 19. The installation as claimed in one of claims 2 to 18, characterized in that it is designed to produce strip lengths (8a) with an end fold.
- 25 20. The installation as claimed in one of claims 2 to 18, characterized in that it is designed to produce strip lengths (8b) with a center fold.
- 30 21. The installation as claimed in one of claims 2 to 18, characterized in that it is designed to produce strip lengths (8c) with a diagonal fold.