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[54] **METHOD OF AND DEVICE FOR PACKING ARTICLES**

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **93/82,** 53/180, 270/52.5, 270/57

[51] **Int. Cl.** **B31b 1/38**

[58] **Field of Search** 53/180; 93/82; 226/197, 196; 270/52.5, 57

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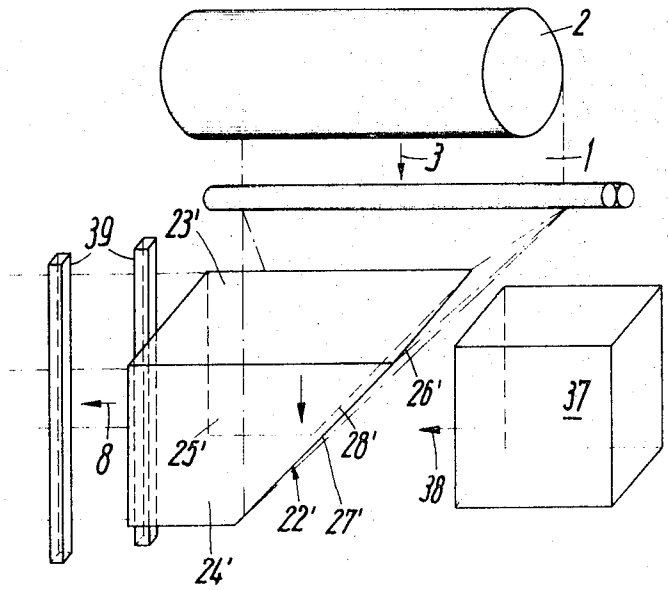
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[57] **ABSTRACT**

A method of and apparatus for forming a channel from a web of packaging material by passing the web over a body of substantially the desired cross section of channel and having guide edges, and changing the direction of movement of the web to form the desired channel. The goods to be packaged are supplied to the zone of the body in the direction in which the formed channel leaves the body.

12 Claims, 9 Drawing Figures



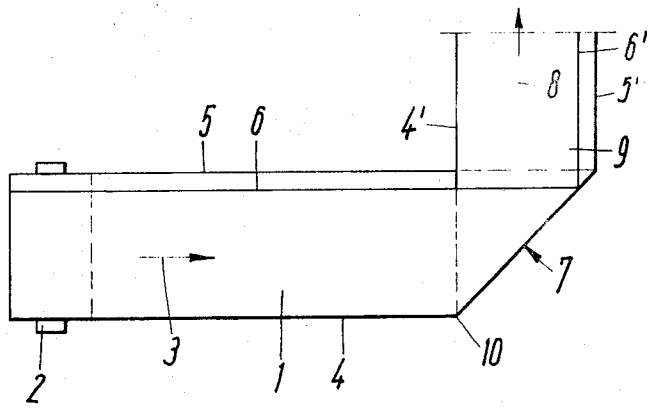


Fig.1

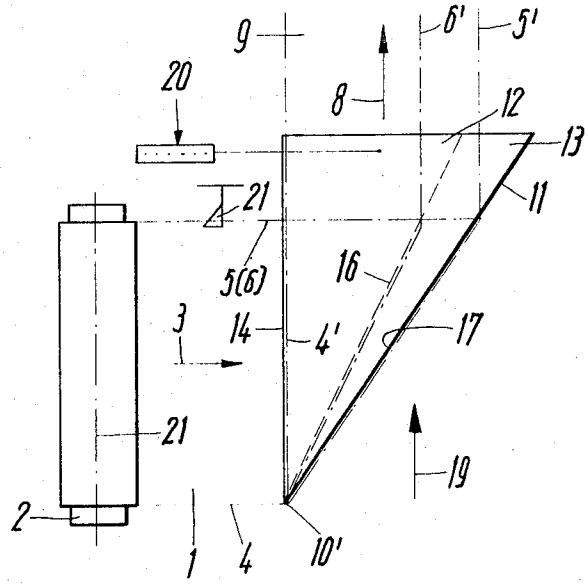


Fig.2

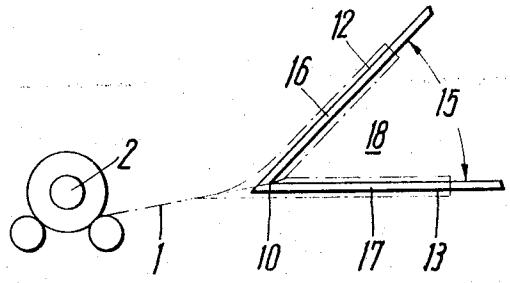


Fig.3

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Fig.4

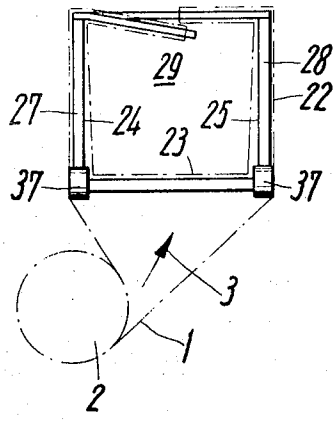
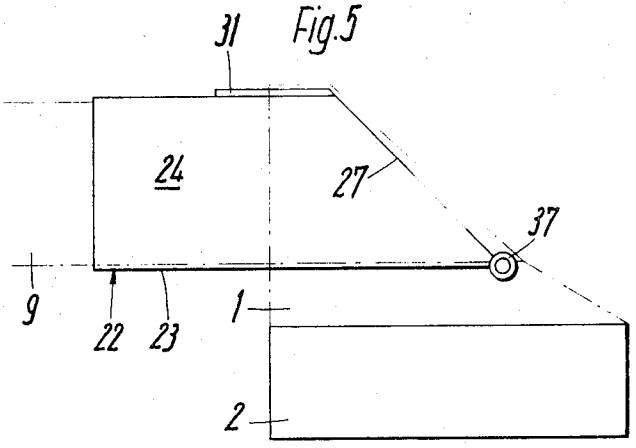


Fig.5



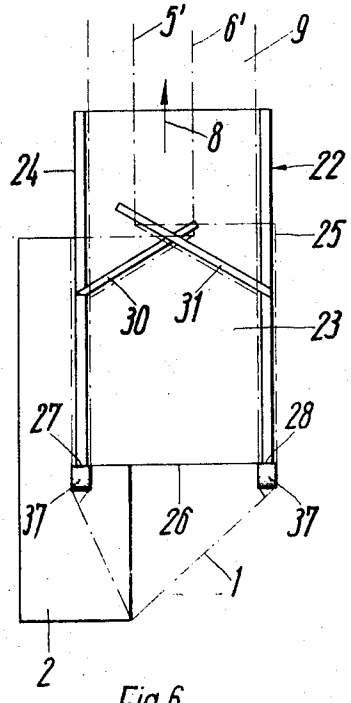


Fig.6

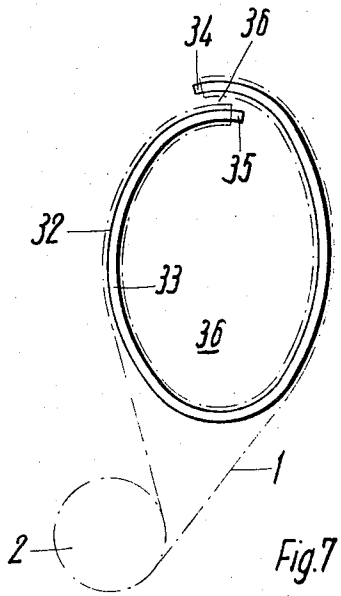


Fig.7

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Fig. 9

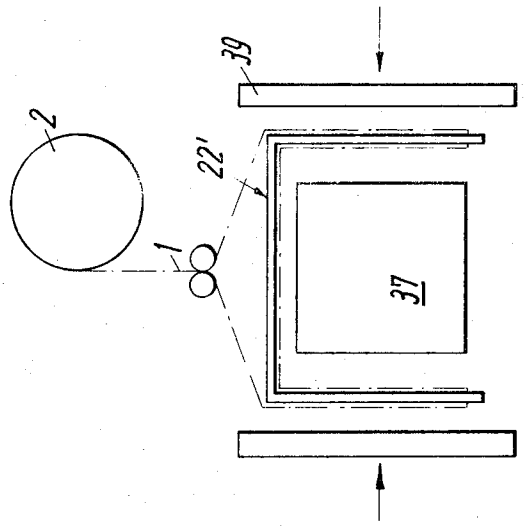
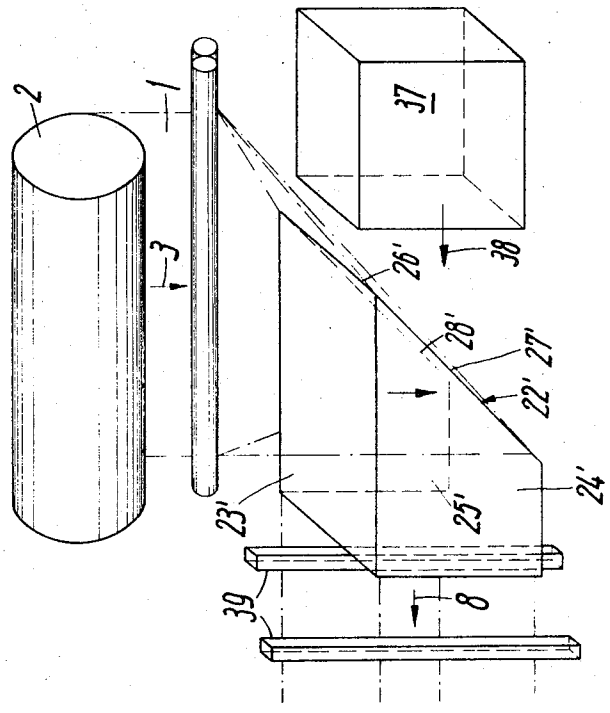


Fig. 8



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METHOD OF AND DEVICE FOR PACKING ARTICLES

This invention relates to a method of forming an open half-tube or channel from a cohesive band of material coming from a supply reel, in the context of the continuous packaging of articles in channel sections parted off from the continuous channel thus formed, after the articles have been placed in position there. The invention relates furthermore to a device for implementing this method.

In methods proposed heretofore, the band or web of material coming from a supply reel forms a flat channel whose walls are superimposed upon one another. This channel coming from the supply reel with its walls superimposed upon one another, is temporarily opened in order to insert articles in it. This is effected with the help of guide arrangements which engage at one side between the walls and progressively part them in order to create the desired access opening. The introduction of articles into the channel thus opened up is effected laterally using a motion disposed transversely of the direction of feed of the channel. During the introduction of articles being packaged, this taking place in successive phases, the feed motion of the channel must be interrupted in order that the articles can be arranged between the walls of the channel and given uniform spacing within it.

These operations can quite easily give rise to creasing in the channel walls or into twist phenomena, which interfere with subsequent packaging operations. Although they have only a low packaging performance, the known operational sequences entail a high outlay in construction and control arrangements, with corresponding high costs.

It is an object of the present invention to obviate or mitigate these disadvantages.

The present invention is a method of forming an open channel from a cohesive web of material coming from a supply reel, for the continuous packaging of articles in channel sections divided off from the continuous channel thus formed, after the articles have been placed in position therein, in which the web of material coming from the supply reel is deflected in a zone, which is fixed in relation to the web, out of the direction which it has prior to reaching the zone, in a direction which is at an angle thereto, and, simultaneously with the deflection, its cross-section is converted to an open channel with a loading opening for the purpose of introducing articles for packing in a direction parallel to the direction of take-up of the band.

The method in accordance with the invention makes it possible to introduce articles between the walls of the channel whilst the latter is being uninterruptedly advanced, the successively supplied articles being introduced into the channel in a direction which corresponds with said direction of advance. Accordingly, the packing performance can be boosted many times.

The present invention also provides a device for fitting to packing machines for forming an open channel from a cohesive web of material in which a supply reel for the web of material is followed by a deflecting and shaping device over which the web of material passes and which changes direction of motion of the web, said device comprising viewed in the direction of advance of the web a profiled body substantially corresponding to the cross-sectional profile of the open channel which

is to be formed, and in engagement with the passing web of material.

The device in accordance with the invention is extraordinarily cheap and simple in design, takes up only a small amount of space, has no moving parts and requires no control arrangements whatsoever.

In providing the packing material, it is possible to use either a flat strip or a channel with the walls lying flat one on top of the other. As for material, thermoplastic foils, hot-sealing viscose foil, paper, composite materials or the like can be used. Equally, there are no limitations upon the nature of the articles being packed. All piece-goods can be satisfactorily packed individually or in the form of bundles, bunches, etc.

In accordance with a particular embodiment of a device according to the invention, the profiled body conveniently employs rigid guide edges to define the zone of deflection of the web of material. Instead of this, however, it is equally possible for the profiled body to consist of a system of rollers defining guide edges, the rollers being idly mounted and being passed over by the web of material.

Preferably, one guide edge or guide edge portion will be horizontally disposed in order in this fashion to form the correspondingly horizontally disposed wall zone in the opened channel, to which articles are supplied for packing.

The opened channel can have any desired cross-sectional form to accord with the nature and shape of the goods being packed. Thus, the guide edges can have an acute V-profile or for that matter a profile opening bounded substantially on all sides, the latter preferably having a rectangular contour.

A particularly simple embodiment of the profiled body is one in which two plate components, each triangular in form and disposed adjacent one another to include an acute angle, are provided, whose common joint edge defines the direction of feed of the half-tube and whose guide edges, over which the web of material passes, recede obliquely from the joint edge, in the direction of movement.

Instead of this, the profiled body can also form a groove or trough defined by a horizontal base wall and side walls disposed perpendicularly thereto, which exhibits folding fingers or the like disposed level with the top edge of the side walls and substantially horizontally, which fingers each extend over part of the width of the groove and, in each case with their free ends which project beyond the vertical central plane of the groove, are located at different intervals from the base level. The latter embodiment forms a substantially box-shaped half-tube with mutually overlapping free longitudinal tube edges which can readily be welded, stuck or otherwise attached to one another.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a schematic plan view of a band of material deflected and formed into an open channel, in accordance with the invention;

FIGS. 2 and 3 illustrate respectively plan and elevational views of a device for implementing the method in a first embodiment, the illustration being a much simplified schematic one;

FIGS. 4, 5 and 6 illustrate respectively end elevation, side elevation and plan views of a device for imple-

menting the method, in accordance with a modified embodiment;

FIG. 7 is a view similar to that of FIG. 3 or that of FIG. 4, illustrating a third embodiment of the device in accordance with the invention;

FIG. 8 is a perspective view of a fourth embodiment of a device in accordance with the invention; and

FIG. 9 is an end elevation of FIG. 8.

Referring now to the drawings, FIG. 1 depicts a web of material 1 which is unwound from a supply reel 2 in the direction of the arrow 3. The web of material chosen by way of example is already in the form of a channel the walls of which are resting flatly one on top of the other. The fold is marked 4. The free edges 5, 6 are offset slightly in relation to one another in order to illustrate more clearly the deflecting and shaping operations. The web of material 1 passing in the direction of the arrow 3, is deflected in a zone 7 out of its direction 3 of entry into this zone, in a direction 8 which is at an angle thereto, and at the same time has its cross-section opened up to form an open channel. This open channel developing in the zone 7 is marked 9. In the example of FIG. 1, the entry direction 3 and the exit direction 8 are at right-angles to one another. Instead of this, entry and exit directions, however, can be disposed at an obtuse or acute angle to one another. In the shaping zone 7, the fold edge 4 of the web of material 1 is deflected at the point 10 at right-angles to its direction of transfer. Its further passage is indicated by the reference 4'. A corresponding change in direction is experienced by the longitudinal edges 5, 6 which are marked 5' and 6' in the exit zone behind the form zone 7. As the illustration of FIG. 1 shows, with the change of direction of the web of material in the zone 7, turning takes place, at the same time the superimposed walls being lifted away from one another and spread fashion. As a consequence, an open channel 9 with a V-shaped cross-section is produced.

As FIGS. 2 and 3 show in more detail, the deflecting and shaping take place in the aforedescribed manner with the help of a profiled body 11 which, in the embodiment illustrated, comprises two plate sections 12, 13 each substantially triangular in form. The two plate sections 12, 13 are mutually adjacent along a common joint edge 14 and include between one another an acute angle 15, exhibiting furthermore guide edges 16 and 17 over which the web of material passes, these edges together forming the deflecting and shaping zone 7. Commencing from their point of intersection 10' at the joint edge 14, the guide edges 16, 17 recede obliquely in the exit or take-up direction 8. On passing over the profiled body 11, the web of material 1 leaving the supply reel 2, said web once again being constituted by a channel with the walls disposed flatly one on top of the other and flush free edges 5, 6, experiences a change at right-angles in its direction of motion, this being indicated in FIG. 2 once again by the arrows 3 and 8. When the fold edge 4 of the web of material 1 reaches the point of intersection 10' of the guide edges 16, 17 on the profiled body 11, then the direction of transfer alters through 90° and a new fold edge is produced whose exit zone is marked 4'. The bottom wall zone, extending between the bottom free longitudinal edge 5 and the fold edge 4, passes beneath the plate section 13 of the profiled body 11, around the guide edge 17, undergoes a 90° deflection at the latter in the exit direction 8, and passes over the top of the plate section 13 until leaving the profiled body 11. The longitudinal edge 5 is once again marked 5' in the exit zone. The upper wall, located between the longitudinal edge 6 and the fold edge 4, runs over the top of the plate section 12, is deflected at the guide edge 16 and runs over the bottom part of the plate section 12 in the new exit direction 8 until leaving the profiled body 11. The longitudinal edge 6 is marked 6' in the exit zone. Because of the acute angled disposition of the top plate section 12 vis-a-vis the horizontal plate section 13, at the guide edges 16, 17 the tubular web 1, simultaneously with the change in direction, is formed into an open channel, the cross-section of the channel being that of a V with an apex angle the same as that of the plate sections 12, 13. Between the guide edges 16, 17 the channel 9 developed there forms a loading opening 18 which enables articles for packaging to be introduced parallel to the take-up direction 8. This supply of articles for packaging is indicated by the arrow 19. The supply of the articles for packaging themselves, can be effected through a chute, over roller conveyors, with the help of a feed table complete with in-feed drive arrangement, or for that matter using any other suitable means. Adjoining the profiled body in the direction of the arrow 8 there are conveyor belts of suitable design along which tools can be arranged for carrying on the packaging operation, e.g., part/weld tools, shrinking tunnels and so on. Machines for carrying out the operations still required in order to complete the packaging after the introduction of the articles being packed, are well known to persons skilled in the art.

It should also be pointed out that in order to take up the web of material, any known or suitable take-up device can be employed. The take-up device is designed, in the course of the operation, to draw the web of material around the guide edges of the profiled body under a certain tension.

Instead of the profiled body illustrated in FIGS. 2 and 3, any suitable profiled body can be employed, which has guide edges suitable to provide deflection of the web of material and formation of a desired open cross-section. For example, in departure from the embodiment of FIG. 2, it is possible simply to provide a V-shaped device which defines the guide edges 16, 17 and the point of intersection 10'. The device, forming the bottom guide edge 17 can be followed by a plate or the like which forms an exit track.

In order to modify the angle 15, conceivably the two plate sections 12, 13 could be attached to one another through a hinge defining the joint edge 14 and an adjuster mechanism 20 could be provided through which the obliquity of the top plate section 12 could be regulated.

Instead of a web 1 of material in the form of a flat channel, it is equally possible to employ a web of material in the form of a tube. In this case, it is sufficient to provide a cutter arrangement 21 in the path of the tube, this arrangement cutting the tube along one external edge and thus forming a channel which runs over the profiled body 11.

In the device shown in FIGS. 2 and 3, it is possible to employ a flat web in order to implement the method of the invention. In this case, it is merely necessary to arrange the supply reel 2 so that it is twisted through 90° in relation to the profiled body 11, the axis of rotation being disposed perpendicularly to the plane of the

drawing considering the illustration of FIG. 2 and being located, for example, at the point 21.

FIGS. 4 to 6 illustrate a modified embodiment of a profiled body marked in toto by 22. In detail, the profiled body consists of a horizontal base wall 23 and side walls 24, 25 perpendicularly thereto which together define a groove or channel of rectangular cross-section. The end edge 26 of the base wall 23 and the end edges 27, 28 of the side walls 24, 25, form guide edges at which a web 1 of material experiences a change in direction and a change in cross-sectional form. The process of deflection and shaping takes place in a manner described hereinbefore in relation to FIGS. 1 to 3, the sole difference being that because of the design of the profiled body 22, an open channel of rectangular cross-sectional profile is formed. The base wall 23 and the side walls 24, 25 delimit an opening 29 on three sides. Also attached to the side walls 24, 25 are folding fingers 30, 31 each of which extends substantially horizontally over at least part of the width of the groove or channel. These folding fingers in turn form guide edges over which the web 1 of material passes and which take part in deflecting it and shaping it. The guide edges formed by the folding fingers 30, 31 also form the top limit of the profiled opening 29. The arrangement of the folding fingers 30, 31 as illustrated in more detail in the drawing, is so contrived that the free ends, each of which extends beyond the central vertical plane of the groove or channel, are located at varying intervals from the base plane. In this fashion, overlap of the longitudinal edges of the opened channel 9 can be achieved and in the zone of such overlap a longitudinal bond achieved by welding, sticking or the like.

Finally, FIG. 7 illustrates an end elevation of a substantially elliptically shaped profiled body with adjoined guide edge 33 which, in the neighborhood of its ends 34, 35, overlaps leaving a transfer gap 36 and also delimits a correspondingly elliptically shaped profiled opening 36 which is bounded substantially on all sides.

All the guide edges can be coated with a friction-reducing coating for example of Teflon (C). By suitably radiusing the guide edges, the braking force which they exert upon the web of material when it passes over said edges, can be substantially reduced. In locations where there is a particular risk, e.g., at the point 10 in the embodiment of FIG. 2, or at the junctions between the guide edges 26, 27 and 26, 28, rollers can be provided in order to reduce friction. Correspondingly, in FIGS. 4 to 6, rollers are provided which are marked 37.

FIGS. 8 and 9, finally, illustrate a further example concerned with the packaging of stacked goods or the like, e.g., bricks on pallets. This corresponds essentially to the embodiment of FIGS. 4 to 6 and comprises a grooved portion 22' which is open in the downward direction, with side walls 24', 25' and a top wall 23'. The corresponding guide edges are marked 27', 28' and 26'. In the profiled opening formed, packaging articles 37 are introduced in the direction of the arrow 38, for example by means of conveyor belts, and pass the profiled body 22' being enveloped from the top. Welding jaws are provided, marked 39 for example, and can be moved in accordance with the arrows shown in FIG. 9.

Instead of profiled bodies with rigid guide edges, it is equally possible to provide profiled bodies in which the guide edges are formed by systems of freely rotatable rollers.

Finally, it is also possible to provide profiled bodies with rounded profiled plates, which produce a gradual deflecting and shaping action.

Although the invention is illustrated and described with reference to a plurality of preferred embodiments thereof, it is to be expressly understood that it is in no way limited to the disclosure of such a plurality of preferred embodiments, but is capable of numerous modifications within the scope of the appended claims.

What is claimed is:

1. A method of forming an open channel from a folded cohesive web material in the shape of a semi-hose which is being fed from a supply reel for the continuous packaging of articles in channel sections divided off from said web material, comprising the steps of

feeding said web material in a first feed direction to a stationary deflection zone;

deflecting the cohesive web material in the shape of a semi-hose in said deflection zone thereby causing said semi-hose to open and form a channel and said web material to be fed in a second direction which is at angle with respect to said first direction;

and feeding articles into said opened semi-hose forming a channel in said second direction.

2. A device for wrapping articles comprising in combination, a supply reel of folded web materials operatively mounted in the device for feeding said folded web material in a first direction, a deflecting and shaping device operatively mounted in the device along the path of movement of said web material which is adapted to pass over it and be deflected into the second direction, said deflecting and shaping device having edge portions which form transversely with respect to the second direction a profile which corresponds substantially to the cross-sectional profile of said channel.

3. A device as claimed in claim 2, in which one edge portion is horizontally disposed and in which the guide edge portions define an acute angle V.

4. A device as claimed in claim 2, in which the guide edge portions define a profiled opening which is bounded substantially on all sides.

5. A device as claimed in claim 4, in which the profiled opening has a substantially rectangular contour.

6. A device as claimed in claim 2, in which the guide edge portions have at least the major proportion of their overall length located in a common plane.

7. A device as claimed in claim 2, in which the shaping and deflecting device comprises two plate sections each of substantially triangular form and adjoining one another to include an acute angle, whose common joint edge defines the exit or advance direction of the channel and whose guide edges over which the web of material passes, recede obliquely in the exit direction, from the joint edge.

8. A device as claimed in claim 7, in which the angle included by the plate sections is adjustable.

9. A device as claimed in claim 2, in which the profiled body forms a groove or trough delimited by a horizontal transverse wall and side walls perpendicular thereto.

10. A device as claimed in claim 9, in which the groove comprises folding fingers disposed level with the top edges of the side walls and substantially horizontally, which in each case extend over part of the width of the groove and have their free ends, each of which extends beyond the vertical center line of the

groove, located at different intervals above the base level.

11. A device as claimed in claim **2,** in which the guide edge portions are provided with a friction-reducing coating.

12. A device as claimed in claim **2,** in which the deflecting and shaping device consists of idler rollers over which the folded web material passes, the rollers defining a system of guide edges.

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