Nov. 3, 1964 R. KIRSTEN ETAL 3,155,018

FORMER FOR THE PRODUCTION OF TUBING

Filed Sept. 12, 1962 2 Sheets-Sheet 1

Fig. 1.

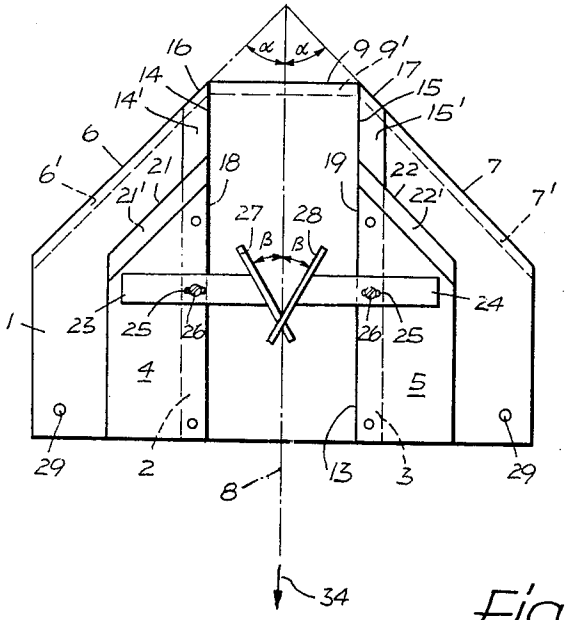

Fig. 2.

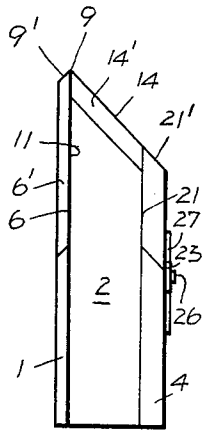

Fig. 3.

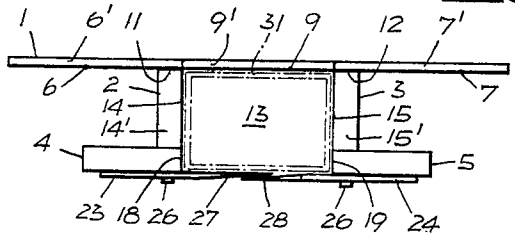

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Fig. 4.

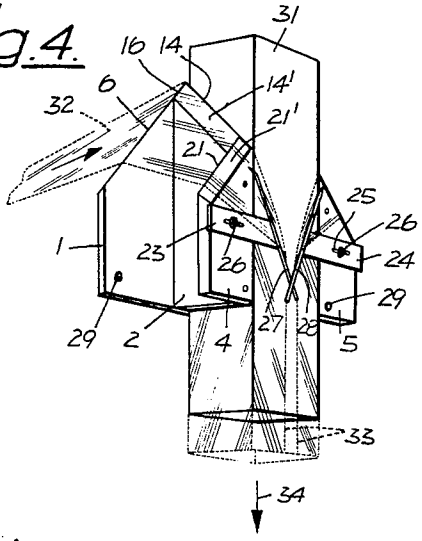
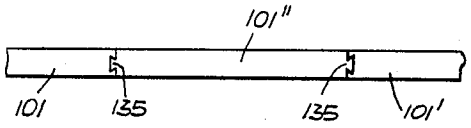


Fig. 5.



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3,155,018

FORMER FOR THE PRODUCTION OF TUBING

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9 Claims. (Cl. 93—82)

The present invention relates to a former for the continuous production of tubing from a flat strip of sheet material.

In the packaging industry the problem often occurs that a tubular material of a rectangular or circular cross section should be produced in a continuous operation from a flat strip of sheet material. This is usually done by means of a former which is provided with guides and a tubular mandrel and is designed in such a manner that the strip material, when drawn over or through the former, is folded or molded around the mandrel to the desired tubular shape. The longitudinal edges of this open tubing are then secured to each other by an adhesive, by welding, or similar means, and in a similar manner the front end of the sealed tubing is also closed transversely. Usually, the material to be packed is thereafter filled through the tubular mandrel into the open end of the tubing, whereupon during the next transverse welding operation also this end of the tubing is closed so that a filled bag is produced. After the individual filled bags are cut apart between their connecting ends, they may, for example, be passed to and inserted into a larger package which may hold a certain number of such bags. The length of the individual bags, as well as of the larger container in which they are packed depends upon the length or the amount of the material which is filled into each bag.

Prior to this invention, the formers employed for this purpose usually consisted of a casting of light metal, and the necessary guides were either cast integrally with the former itself or they were subsequently secured thereto. It has been found that, in order to work properly formers which are produced in this manner must generally be subjected to expensive finishing treatments which render their mass production very uneconomical or even impossible.

It is an object of the present invention to overcome this disadvantage and to produce a former which may be easily designed and made and easily adjusted to different conditions. Furthermore, it should also be able to produce a tubing with sharply creased edges.

This object is attained according to the invention by making the former of a plurality of plates which are connected to each other and for molding the strip material are provided with end surfaces which are inclined in the direction of movement of the strip. These plates define three sides of a channel, the fourth side of which is bridged by a pair of guide arms which are connected to the former and serve for applying the longitudinal edges of the strip material upon each other. These plates forming the former may be very easily designed and accurately illustrated in a drawing, and they may also be very easily made according to such a drawing. It is also very simple to assemble them to form the complete former.

Another very advantageous feature of the invention is the fact that by exchanging some of the plates for others of a different size or by inserting intermediate members, it is possible to adjust the former for producing different sizes and shapes of tubing.

According to one preferred embodiment of the invention the former may comprise a base plate having a narrow top edge at the inlet side of the strip material and

a wide bottom edge being parallel to the narrow top edge and two inclined sides extending from the ends of the narrow top edge in the direction toward the bottom edge. The base plate carries a pair of side plates which are spaced from each other and extend at right angles to said base plate and to said narrow top edge of said base plate and parallel to each other. Each of these side plates is secured with one narrow longitudinal surface to the base plate. Its top end surface slopes downwardly from its rear edge which is in alignment with the inclined base plate front top edge which forms the associated inclined side of the base plate, and it is also laterally inclined in accordance with the inclined top edge of the base plate. Together with the base plate, these two side plates form a U-shaped channel with parallel side walls which extends from the narrow edge of the base plate. Each of the side plates carries a supporting plate which extends within a plane parallel to that of the base plate and has a rear top edge parallel to the associated inclined top edge of the base plate. Each inclined top edge of the base plate, the inclined surface of the top side of the associated side plate, and of the top side of the associated supporting plate then all lie within one common plane.

After the strip material is folded by the former around the tubular mandrel the longitudinal edges of the strip are overlapped with each other by means of the guide arms which are disposed directly on and over the U-shaped channel. These guide arms are secured to the front surface of the two supporting plates and their ends facing each other are made in the form of guide rods which cross each other. Each of these guide rods is preferably integrally secured to the respective guide arm, and the guide arms are preferably adjustably secured to the supporting plates.

With these and other objects in view, which will become apparent in the following detailed description, the present invention will be clearly understood in connection with the accompanying drawings, in which:

FIGURE 1 shows a plan view of a former according to the invention;

FIG. 2 shows a side view of the former according to FIG. 1;

FIG. 3 shows, upside down, a front view of the former according to FIG. 1, as seen in the direction of movement of a strip material to be molded into a tubular shape by the former;

FIG. 4 shows a perspective view of the former as seen during the molding of the strip material; and

FIG. 5 shows a partial view of a modification of the base plate of the former as shown in FIG. 3.

As illustrated in FIGS. 1 to 4, the former according to the invention comprises a base plate 1, a pair of side plates 2 and 3, and a pair of supporting plates 4 and 5. The base plate 1 has three front top edges 6, 7, and 9 and the top faces of the base plate 1 have also three rear top edges. The top edges 6 and 7 are each inclined at an angle α of 45° to the longitudinal central axis 8 of a U-shaped channel 13 formed by the plates 1, 2 and 3. The flat end surfaces 6', 7', and 9' which are, respectively, defined by the inclined edges 6 and 7 and the edge 9, which forms the narrower of the two parallel sides of base plate 1 and connects the ends of edges 6 and 7 and extends at a right angle to axis 8 of base plate 1, are beveled at an angle to the plane of plate 1, which is not particularly specified in the drawing, but differs from a right angle as shown in FIG. 2 and as indicated in FIG. 1 by a dotted line defining the rear edges of these beveled surfaces.

The two side plates 2 and 3 have in projection a shape of a trapezoid as shown in FIG. 2, and they are secured with their longer end surfaces 11 and 12 to base plate 1 in a position so as to extend parallel to the axis 8 and

vertically to the plane of base plate 1 at a distance from each other which exactly corresponds to the length of edge 9, so that the ends of edge 9 of base plate 1 coincide with the edges of surfaces 11 and 12, which edges are facing each other. Slide plates 2 and 3 thus form the side walls of the U-shaped channel 13. As shown in FIG. 2, the top edges 14 and 15 of side plates 2 and 3 are likewise inclined to the end surfaces 11 and 12 and thus likewise at the angle α to the plane of base plate 1. The end surfaces 14' and 15' of side plates 2 and 3 which are defined by the edges 14 and 15, respectively, are inclined to the planes of the side plates 2 and 3 at an angle differing from a right angle in such a manner that the common top edges 16 and 17 of surfaces 14' and 11 and of surfaces 15' and 12, respectively, extend exactly in alignment with the top edges 6 and 7 of base plate 1. The maximum length of side plates 2 and 3 corresponds to the maximum length of base plate 1, as seen in the direction of axis 8.

The supporting plates 4 and 5 also form equal rectangular trapezoids, as seen in a plan view. They extend parallel to base plate 1, and the longer parts of their lateral surfaces are secured to the front end surfaces of side plates 2 and 3 opposite to the end surfaces 11 and 12 in such a manner that the end surfaces 18 and 19 facing each other are in accurate alignment with the lateral surfaces of side plates 2 and 3 which form the opposite side walls of channel 13. The rear top edges 21 and 22 of the supporting plates 4 and 5 are likewise inclined to the axis 8 at an angle α. The end surfaces 21' and 22' which are defined by these edges 21 and 22 are also inclined to the plane of the supporting plates 4 and 5 in such a manner that, when these plates are secured to the side plates 2 and 3, the end surfaces 21' and 22' lie within the same planes as the end surfaces 14' and 15' of side plates 2 and 3 and the edges 6 and 7 of base plate 1.

Supporting plates 4 and 5 carry arms 23 and 24, respectively, which are connected thereto by screws 26 which engage in elongated apertures 25. On their ends projecting over the channel 13 these arms carry guide rods 27 and 28 serving as switches. The longitudinal axis of each of the guide rods 27 and 28 extends at an angle β of substantially 30° to the axis 8. The guide rods 27 and 28 may be easily adjusted relative to each other after screws 26 are loosened.

The assembled former, as above described is to be connected by means of screws engaging in bores 29 in base plate 1 to the upright of a packing machine (not shown). Thereupon, a mandrel consisting of a tubular member 31 which has an outer shape similar to channel 13, but a cross-sectional size slightly smaller than that of the channel 13, is inserted into this channel. The end of this mandrel 31, which in FIG. 4 projects from the top end of the former, is likewise connected to the upright of the packing machine. Thereafter, one end of a strip material 32 is inserted in such a manner into the gap between mandrel 31 and the former consisting of plates 1 to 5 that the two longitudinal edges 33 of the strip overlap each other behind the guide rods 27 and 28, as seen in the direction of the arrow 34 in FIG. 4. If the strip material 32 is then pulled in the direction of arrow 34 through the former which is formed by plates 1 to 5, it will be folded into the shape of a rectangular tube which then projects downwardly from the former. At a point behind the former, as seen in the direction of the arrow 34, the overlapping edges 33 are then connected to each other in a known manner, for example, by an adhesive or by welding by a mechanism (not shown). Thereafter, at a point behind this mechanism, the tubing is pressed together in a known manner by means of a mechanism (not shown), which moves, for example, intermittently together with the tubing and connects the walls thereof to each other, for example, by welding, in a direction transverse to the longitudinal axis of the tubing and thus also transverse to the axis 8, so that a bag is formed. This bag is then filled through the tubular mandrel 31 with a predetermined amount of the material which the bag is to contain. During the further movement of the tubing, the filled bag thereon is closed at its top end while at the same time the next bag is being formed. In this manner, the strip material 32 is made into a continuous series of sealed bags which are properly filled with the desired contents and thereafter merely need to be severed from each other by a transverse cut through the sealed ends of the adjacent bags.

Plates 1 to 5 of the former may be connected to each other in any suitable manner, for example, by screws, so that the same former may be used for making bags of different thicknesses by varying the height of the channel 13 by merely exchanging the side plates 2 and 3 by a pair of a different size. The height of channel 13 may also be varied by inserting additional side plates between the side plates 2 and 3 and the supporting plates 4 and 5 or the base plate 1. If the width of the channel 13 should also be changed, base plate 1 may be made of two parts 101 and 101', as illustrated in FIG. 5, between which spacing members 101'' of any desired width may be inserted, for example, by means of dovetail joints 135.

The former according to the invention may, however, also be worked out of a single piece of material or be produced by being cast in one piece. The one-piece former or the individual former plates may consist of metal, plastic, or any other suitable material.

Although our invention has been illustrated and described with reference to the preferred embodiments thereof, we wish to have it understood that it is in no way limited to the details of such embodiments, but is capable of numerous modifications within the scope of the appended claims.

We claim:

1. A former for molding a strip of sheet material into a tubular shape comprising

a plate disposed about each of three sides of an imaginary channel and defining a channel open at one longitudinal side thereof and having a rear side and a front side adapted to feed a strip of sheet material into said channel, and

said plate disposed at the rear side of said channel having an end face inclined upwardly in the direction of movement of said strip of sheet material, in order to guide and mold said strip into a tubular shape during its movement toward and through said channel,

said plates disposed at the front side of said channel having an end face inclined downwardly in the direction of movement of said strip of sheet material,

a pair of guide members secured to said respective plates disposed opposite each other adjacent the open longitudinal side of said channel and extending from said plates over the open longitudinal side of said channel,

said guide members being adapted to move the longitudinal edges of said strip of said sheet material into overlapping position,

a tubular mandrel disposed in said channel and having its longitudinal axis coincide with the longitudinal axis of said channel, and

said tubular mandrel having a cross-section slightly smaller than that of said channel in order to provide a gap between the outer surface of said mandrel and the inner surface of said channel for feeding said strip of sheet material through said gap and along and about said mandrel.

2. A former for molding a strip of sheet material into a tubular shape comprising

a base plate having a narrow top edge and a wide bottom edge disposed parallel to each other and inclined edges extending from the ends of the narrow top edge in the direction toward said wide bottom edge,

a pair of side plates secured to said base plate and disposed parallel and spaced apart from each other

and extending from the ends of said narrow top edge of and substantially perpendicularly to said base plate,

each of said side plates having a front end face shorter than its rear end face and a top end face inclined to be aligned with said inclined edges of said base plate,

said side plates defining jointly with the center portion of said base plate a substantially U-shaped channel of a width corresponding to the length of said narrow top edge of said base plate,

a pair of supporting plates secured to the front end face of said respective side plates and disposed substantially parallel to said base plate,

each of said supporting plates having an inclined top edge substantially parallel to and spaced apart from the top edge of the lateral portions of said base plate, and

each of said supporting plates having also a top end surface inclined disposed in the plane of the top end surface of the corresponding of said side plates, and

a pair of guide members secured to said supporting plates and extending toward each other from said supporting plates over the fourth open side of said channel for guiding the longitudinal edge portions of said strip of sheet material into overlapping position, upon assuming its tubular shape.

3. The former, as set forth in claim 2, wherein

said top edges of the lateral portions of said base plate have an angle of about 45° relative to the longitudinal axis of said channel.

4. The former, as set forth in claim 2, wherein

said pair of guide members comprises guide rods crossing each other, and which includes

means for adjustably securing said guide rods to the corresponding of said supporting plates.

5. The former, as set forth in claim 2, which includes

a tubular mandrel disposed in and extending longitudinally through said channel and having an outer cross-section slightly smaller than the cross-section of said channel to define a gap between the outer faces of said mandrel and the surfaces of said channel, and

said gap being adapted to permit passage of said strip of sheet material through said channel along and about said mandrel and the latter being adapted to support the forming of the tubular shape of said strip and to operate as filling means for the formed bag.

6. The former, as set forth in claim 2, wherein

said guide members are disposed in front of the open side of said channel at an angle of about 30° relative to the longitudinal axis of said channel.

7. The former, as set forth in claim 2, wherein

said base plate comprises a central part and two lateral parts,

means for releasably connecting and exchanging said center part from said lateral parts, so that center parts of different width can be combined with said lateral parts in order to change the width of said channel.

8. The former, as set forth in claim 2, wherein

said base plate has top end faces backwardly inclined at an acute angle.

9. The former, as set forth in claim 2, wherein

said base plate, said side plates and said supporting plates are formed integrally as a single unit.

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