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APPARATUS FOR FORMING GUSSETED TUBING

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2 Sheets-Sheet 1

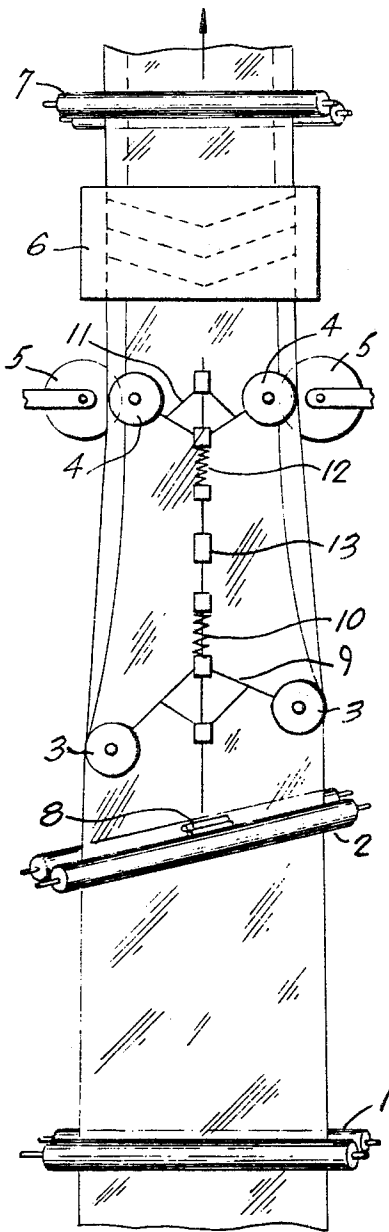


FIG. 1

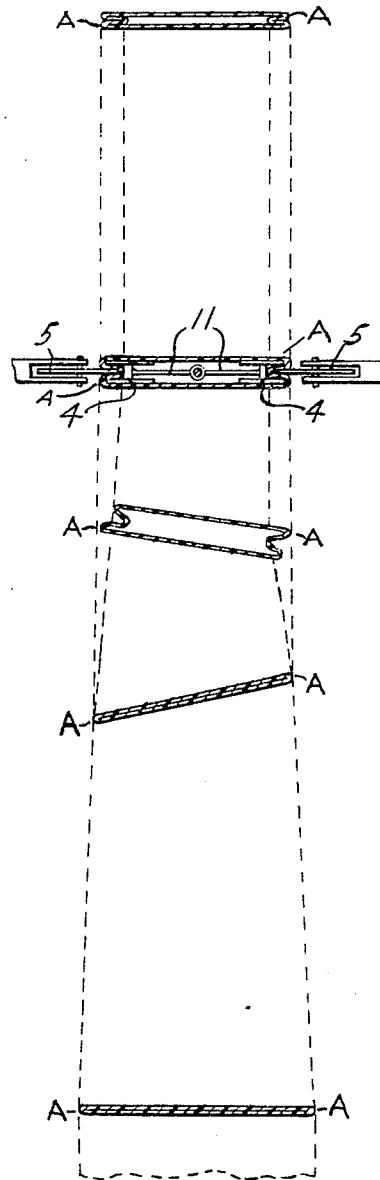


FIG. 2

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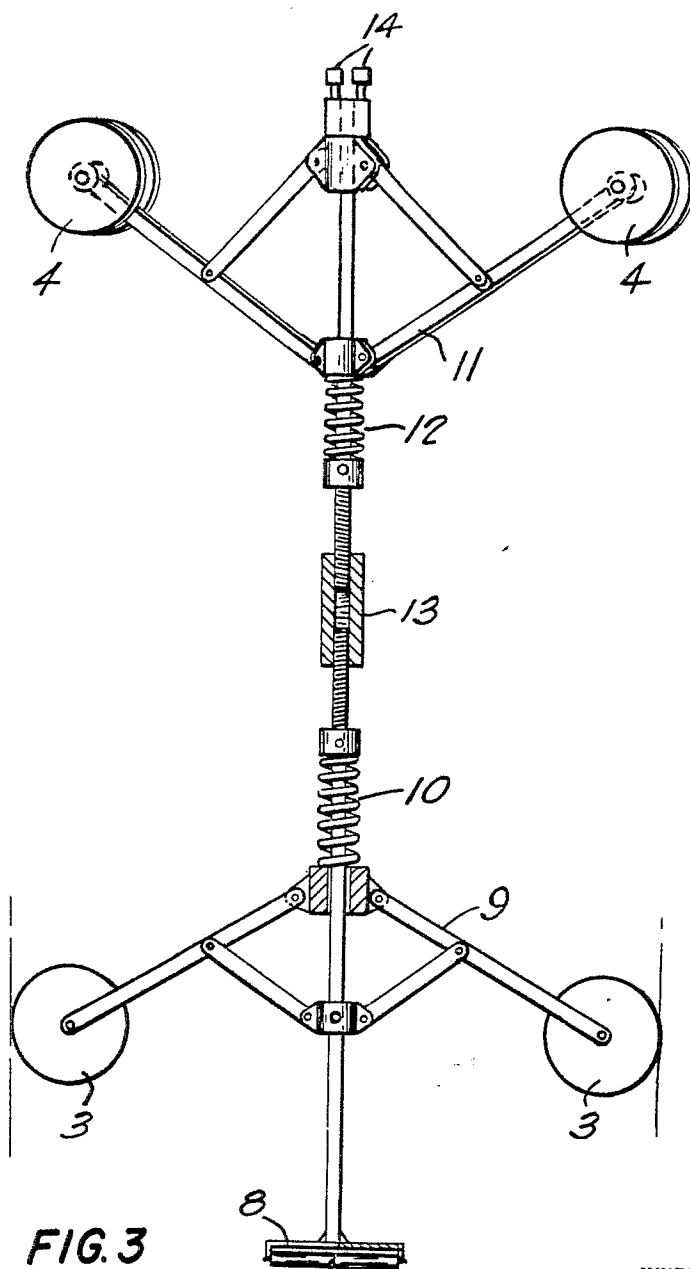


FIG. 3

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APPARATUS FOR FORMING GUSSETED TUBING
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8 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus for producing gusset folds in a moving length of plastic tubing. A gusset former rides inside a "bubble" of the rising tubing, and acting in cooperation with external guides forms a pair of gusset folds. The gusset former is simple in design and can be used to form small size gusseted tubing.

This invention relates to an apparatus for forming gusseted plastic tubing.

It is known to fabricate plastic bags (or sacks) from lengths of plastic tubing. This plastic tubing is usually formed by extruding molten plastic from an annular die and flattening the solidified tubing between a pair of opposing rolls. When such bags are fabricated from this flattened tubing the so-called flat "pillow bags" are obtained. Although these "pillow bags" are useful in many applications, there has been a tendency to use bags with gusseted side or bottom panels. A step in forming gusseted bags from the commercially available flattened plastic tubing is the forming of the gussets. This operation is conveniently carried out on the continuously advancing length of flattened tubing prior to the cutting and sealing of the bag. Since the flattened tubing already has two folds it is desirable that these folds be incorporated into the gusset as diametrically opposite gusset corner folds. The conversion of simple flattened tubing to tubing with two gusseted side panels thus requires turning the continuously advancing flattened tubing about its longitudinal axis through half the width of the gusseted side panels and then forming the four additional gusset folds. Since the gussets are being formed in a moving length of tubing, it is necessary that the gusset former be carried inside the tubing. With large diameter tubing there is sufficient space inside the tubing to fit complex guiding and spreading devices. However, when smaller diameter tubing requires to be gusseted there is need for a simplified internal gusset former which will float freely inside a "bubble" of extended tubing.

An improved gusset former has now been developed which floats inside a vertically rising continuously advancing flattened tubing which as it rises is deflected about its longitudinal axis through half the width of the gusseted side. The floating gusset former employs the original folds of the flattened tubing as indexing means to maintain its correct alignment inside the tubing. In cooperation with external gussetting guides the gusset former forms tube gussets incorporating the original tubing folds as diametrically opposite corner gusset folds. Because of its relatively simple design the novel gusset former can be employed with small diameter tubing.

The primary object of this invention is therefore to provide a simplified apparatus for the continuous gussetting of plastic tubing. Additional objects will appear hereinafter.

The novel apparatus of this invention for forming a pair of opposite gussets in a continuously-advancing and vertically rising length of preformed flattened tubing comprises lower and upper rectilinear guide means, said guide means being disposed in parallel horizontal planes, the angular configuration of said guide means being such as

to turn the rising tubing about its longitudinal axis through half the width of the gusseted side of the tubing, the lower guide means being adapted to maintain the tubing in flattened rectilinear form; and, disposed wholly within the tubing above said lower guide means, a free-floating gusset former, said former comprising two indexing guides adapted to fit into the two internal oppositely facing folds of the flattened tubing; and, connected to said indexing guides and disposed above the same, four rectangularly disposed internal gusset guides adapted to form four corner gusset folds, the configuration of indexing guides and internal gusset guides being such that the original folds of the flattened tubing become two diametrically opposite corner folds of the resulting gusseted tubing; and, cooperating with said four internal gusset guides, two external gusset guides adapted to form the two reentrant folds of the gusset; and means for withdrawing the gusseted tubing from the gussetting apparatus.

An embodiment of the gussetting apparatus is illustrated in the accompanying drawings wherein,

FIGURE 1 is a diagrammatic elevational view of the gussetting apparatus, showing a length of plain flattened tubing being converted into gusseted tubing;

FIGURE 2 is a series of sectional views of the length of tubing of FIGURE 1; and

FIGURE 3 is a diagrammatic elevational view of the gusset former of FIGURE 1.

Referring to FIGURE 1, a length of plain flattened tubing is shown passing through lower nip rolls 1. The flattened tubing then passes through a second set of nip rolls 2, the rotational axes of which make an angle of about 45° to the plane of the tubing passing through the lower nip rolls 1. Upper nip rolls 7 lie in the same plane as lower nip rolls 1 and thus are at an angle of about 45° to rolls 2. Rolls 2 thus cause the tubing to be rotated through an angle of about 45° as it rises. A gusset former shown in detail in FIGURE 3 floats inside the rising tubing just above rolls 2. The gusset former indexing guides are shown at 3 fitting into the internal folds of the flattened tubing. At 4 are shown the four internal gusset guides, two diagonally opposite members of which fit into the original folds of the tubing which has now been extended. The other two internal gusset guides form two new corner gusset folds. The two reentrant gusset folds are formed by external gusset guides 5 which tuck the tubing in between pairs of internal gusset guides. After the forming of the gussets the gusseted tubing passes between herring bone spreader plates 6 which guide and compress the gusseted tubing, and through upper nip rolls 7. The gusseted tubing passing through rolls 7 is in the same plane as the ungusseted flattened tubing passing through lower rolls 1, the rotation of the longitudinal axis of the tubing caused by rolls 2 being absorbed in the gussetting operation.

In FIGURE 2 is illustrated the changing cross section of the tubing as it is converted from plain flattened tubing into gusseted tubing. The changing positions of the original tubing fold lines A can be seen at different stages of gusset formation. The relationship of the gussets to gusset guides 4 and 5 are also shown in cross section.

In FIGURE 3 is illustrated the gusset former carrying internal guides 3 and 4. The gusset former rides on a pair of short rolls 8 which fit into the trough formed by the flattened tubing issuing from rolls 2. The indexing guides 3 are maintained in position in the tubing folds by the action of linkage 9 and actuating helical spring 10. The gusset guides 4 are maintained in position in the corner gusset folds by action of linkage 11 actuated by helical spring 12. The plane of indexing guides 3 is at an angle to the plane of gusset guides 4, this angle corresponding to the rotation imparted to the tubing by rolls 2. At 13

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is shown a turnbuckle device for adjusting the relative positions of guides 3 and 4. At 14 are indicated the fine adjustments for gusset guides 4 which permits precise positioning of these guides in the gusset corner folds.

In the embodiment described the rising tubing is rotated 45° about its longitudinal axis. The exact amount of rotation required is dependent upon the cross sectional shape of the gusseted tubing and the depth of the reentrant gusset fold during the gusseting operation. However, the end result is to turn the tubing through half the width of the gusseted side panel.

Although in the embodiment described the gusset former rides on rolls 8 it is possible to dispense with these rolls and support the gusset former on indexing guides 3. The rolls 8 are useful when a large gusset former is used in large diameter tubing.

The herring bone spreader plates 6 serve to compress the gusseted tubing and maintain the position of the gusset folds prior to its passing through nip rolls 7.

The gusseting apparatus is especially suited to the forming of gusseted tubing from "lay flat" polyethylene tubing.

When gusseted tubing is formed from flattened tubing it is of advantage to print information on the flattened tubing prior to gusseting. The printed message then can be positioned in the gusset portion of the tubing.

What we claim is:

1. An apparatus for forming a pair of oppositely located gussets in flattened flexible tubing which comprises:

(a) a lower horizontal rectilinear guide means adapted to guide said flattened tubing,

(b) disposed above said lower guide means and adapted to receive the tubing issuing therefrom, an upper horizontal rectilinear guide means, said upper guide means having its rectilinear axis turned at such an angle in the horizontal plane from the rectilinear axis of said lower guide means that the rising tubing turns about its longitudinal axis through half the width of the gusseted side of the tubing,

(c) disposed wholly within the tubing between said lower and upper guide means, a free-floating gusset former, said former comprising

(i) two indexing guides adapted to fit into the two internal oppositely facing folds of the flattened tubing, and

(ii) connected to said indexing guides and disposed

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above the same, four rectangularly disposed internal gusset guides adapted to form four corner gusset folds, the configuration of the indexing guides and internal gusset guides being such that the original folds of the flattened tubing become two diametrically opposite corner folds of the resulting gusseted tubing,

(d) cooperating with said four internal gusset guides, two external gusset guides adapted to form the two re-entrant folds of the gusset, and

(e) means for withdrawing the gusseted tubing from the gusset-forming means.

2. An apparatus as claimed in claim 1 wherein the horizontal rectilinear guide means is a pair of rotatable nip rolls.

3. An apparatus as claimed in claim 1 wherein prior to entering the lower horizontal rectilinear guide means, the flattened tubing passes through a primary rectilinear guide means disposed in the same plane as the upper horizontal rectilinear guide means.

4. An apparatus as claimed in claim 1 wherein the guides carried by the gusset former are rotatable discs.

5. An apparatus as claimed in claim 2 wherein the gusset former is fitted at its lower extremity with a pair of support rolls which ride in the trough formed by the flattened tubing as it issued from the lower horizontal guide means.

6. An apparatus as claimed in claim 1 wherein the external gusset guides are rotatable discs.

7. An apparatus as claimed in claim 1 wherein in order to guide and compress the gusseted tubing subsequent to formation of the gusset but prior to entering the upper horizontal rectilinear guide means, a pair of cooperating herringbone spreader plates is provided.

8. An apparatus as claimed in claim 1 wherein the means for withdrawing the gusseted tubing from the gusset-forming means is a pair of driven nip rolls.

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