Jan. 11, 1966 W. A. DOUGHERTY 3,228,583

BAG FOR BULKY MERCHANDISE

Filed Sept. 26, 1963

FIG. 1.

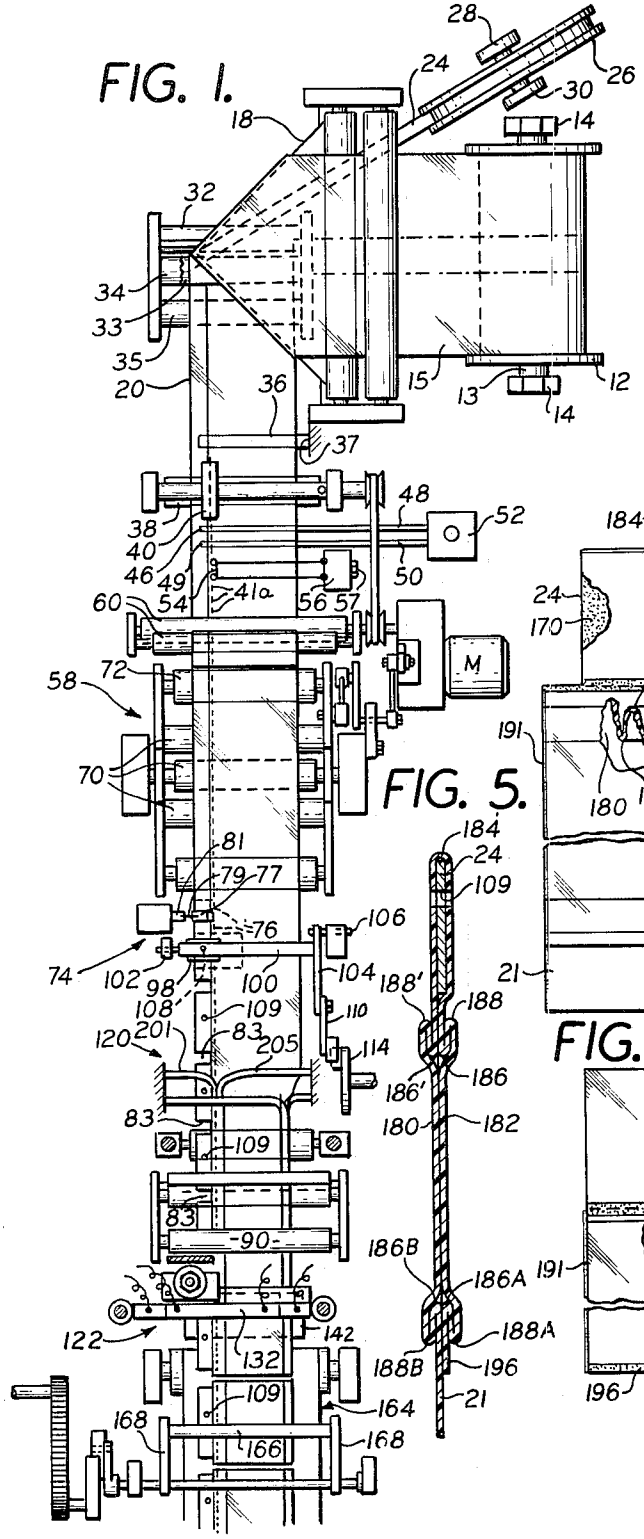


FIG. 2.

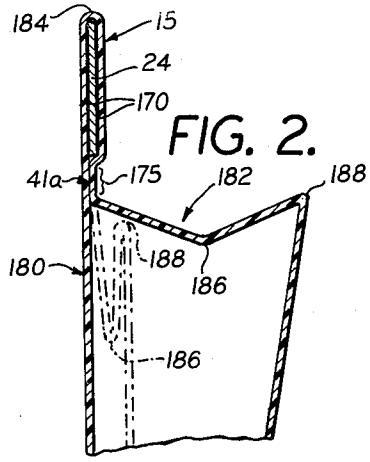


FIG. 3.

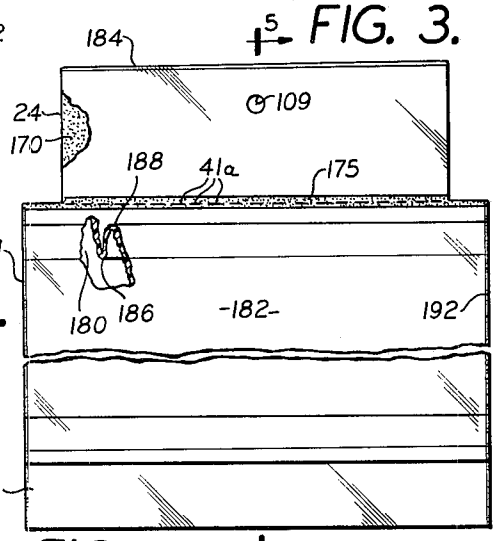
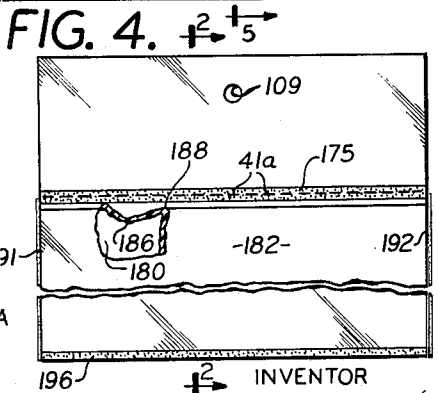


FIG. 5.

FIG. 4.



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BAG FOR BULKY MERCHANDISE

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5 Claims. (Cl. 229—55)

This invention relates to header bags.

Plastic bags having reinforcing headers at their upper ends are becoming increasingly popular as merchandising containers. Such bags are generally made of plastic sheet material, such as polyethylene, polypropylene, and various laminations and the front and back panels of the bag are heat sealed to one another along the edges of the bag.

It is an object of this invention to provide an improved and more economical construction for header bags which increases the capacity of the bag by giving it folds which serve as gussets for the bag. Such a gusset construction improves the hang of the bag when supported from a hook or rod, and makes the packages more attractive in appearance, especially when filled with bulky merchandise.

Another object is to provide a header bag construction in which the header is in line with the back panel of the bag even though the bag is filled and the contents have a substantial fore-and-aft extent.

Another feature of the invention relates to correlation of the header and the folds in the body of the bag by which the header is made narrower than the width of the flat and empty bag so that when the bag becomes narrower as it is filled, the header is not wider than the filled bag. This not only improves the appearance, but it is a practical improvement in that it reduces the transverse space required for groups of bags on adjacent supports on a merchandising display rack.

Another object is to provide improved method and apparatus for making bags of the character indicated.

Other objects, features and advantages of the invention will appear or be pointed out as the description proceeds.

In the drawing, forming a part hereof, in which like reference characters indicate corresponding parts in all the views:

FIGURE 1 is a diagrammatic plan view of apparatus for making the improved bags of this invention, and this view illustrates the different steps in the manufacture of the bag;

FIGURE 2 is a sectional view of a portion of the bag illustrating the way in which it opens up because of the folds below the header;

FIGURE 3 is a front view of one of the bags made in accordance with this invention, the bag being shown in its empty condition;

FIGURE 4 is a view similar to FIGURE 3 but showing the way in which the bag becomes narrower when filled with bulky merchandise; and

FIGURE 5 is a sectional view taken on the line 5—5 of FIGURE 3.

The bag making apparatus shown in FIGURE 1 includes a spool **12** rotatedly supported on an axle **13** from a fixed frame **14**. A web **15** of plastic material, preferably polyethylene, is wound on the spool **12**, and this web **15** is withdrawn from the spool and passes over a folder guide **18** which folds the web **15** along a line **20** parallel to the longitudinal edges of the web and offset sufficiently from the center line of the web so that one side of the fold extends some distance beyond the others to provide a flap **21** (FIGURE 5).

A strip **24** of reinforcing material, preferably cardboard, is fed into the fold in a manner such as illustrated in FIGURE 1. The strip **24** is withdrawn from a spool **26** supported by an axle **28** which is carried by a fixed frame **30**.

The strip **24** can be fed into the fold across the spool **12**, but the construction illustrated makes the apparatus more compact and facilitates the feeding of the strip by feed rolls **32** and **33** that grip the web **15** directly and the strip **24** by pressure of the folded web against the strip.

Beyond the feed rolls **32** and **33**, the folded web **15**, with the reinforcing strip **24** located in the fold, passes around a guide roll **34** and then across other guide rolls **35** to change the direction of travel of the folded web from a vertical course to a horizontal course.

In order to hold the reinforcing strip **24** firmly in the fold of the web **15**, there is a rod **36** supported from a fixed support **37** and extending into the folded web **15** between the folds. The rod **36**, which is best shown in FIGURE 6, has a slotted end and the reinforcing strip **24** fits into the slot and is held against the fold of the web by pressure from the bottom face of the slot.

Beyond the rod **36**, the folded web passes over a roll **38** at a perforating station. Immediately above the roll **38** there is a perforating wheel **40** located in position to make discontinuous perforations through the web along a line immediately adjacent to the edge of the reinforcing strip **24**. These perforations, which are optional, are used only on bags where it is desirable to have the merchandise compartment severable from the compartment that carries the reinforcing strip; that is, from the header of the bag. This permits the merchandise-carrying portion of the bag to be torn from the header without removing the header from its pin, rod or other support on a merchandising rack.

The perforations **41***a* provided by cutters **41** on the perforating wheel **40**, best shown in FIGURE 3, extend through both layers of plastic in the upper portion of the plastic bags that are made from the folded web, or through a sealed zone that separates the upper and lower compartments of the bag from one another so that tearing of the bag from its support does not break the seal that encloses the merchandise-carrying compartment of the bag.

In order to prevent the reinforcing strip **24** from sliding out of the upper compartment, when the upper compartment is open at both ends, adhesive is used to bond the strip **24** to the web **15**. This adhesive is preferably applied to both surfaces of the reinforcing strip **24**, though it can be applied to only one surface, if desired. In the construction illustrated in FIGURE 1, the adhesive is applied to the upper surface of the strip **24** through a nozzle **46** at the discharge end of a long tube **48** extending into the fold of the web. Adhesive may be applied to the bottom of the strip **24** through a nozzle **49** at the end of another tube **50**.

These tubes **48** and **50** are supported from a location outside of the web and preferably from an adhesive supply tank **52**. The tubes **48** and **50** are preferably made long enough to accommodate webs of maximum width for which the apparatus is suitable. The nozzles **46** and **49** have some clearance, around at least a portion of their lips, from the strip **24** so that they apply lines of adhesive with sufficient depth to permit the adhesive to spread over the surface of the strip **24** when the layers of plastic web are pressed firmly against the lines of adhesive at the next feed-roll station.

Before the webs pass through the next feed-roll station, however, they travel across and in contact with a sealer **54**. This sealer illustrated is a runner, which consists of a hot wire which is heated by electrical resistance, and the electric current is supplied from transformers or other supply sources located in housing **56** located at the sealing station along the path of travel of the web. A wheel coated with polytetrafluoroethylene may be used in place of the hot wire sealer **54**. The amount of current supplied to the sealer **54** is correlated with the resistance

of the sealer and the speed and gauge of the web **15**. The heat supplied is adjustable by controller **57** and it is also correlated with the kind of material used for the web **15**, but the sealing by means of this hot wire **54** can be carried out only with thermo plastic materials capable of heat sealing by heat supplied through one layer of the plastic to the next layer. Such seals are easily made on polyethylene webs so long as the amount of heat from the sealers is kept within a temperature range that does not burn or melt through the layers of the webs.

In the process of the invention, as thus far described, the web moves with continuous and uniform motion. For subsequent operations it is desirable to have the webs move with intermittent motion and it is necessary, therefore, to provide a slack accumulator **58**.

The slack accumulator **58** may be of a number of different types, and the detailed construction of the slack accumulator need not be illustrated or described for a complete understanding of this invention. It is sufficient to understand that the folded web **15** travels back and forth around a number of rolls **70**, some of which are movable toward and from others so as to accumulate loops of the web when necessary to keep the web moving continuously at the feed rolls **60**. Eventually the folded web travels around a final roller **72** of the slack accumulator and continues its advance, with intermittent motion, toward other stations of the apparatus.

The next station is a notching station **74** at which pieces of the header are cut out, for purposes which will be described later. This notching station **74** can be put at a different location, if desired and can be located beyond the region where folds or gussets are formed in the web. The folded web **15** passes across a fixed die **76**. There is a movable die element **77** located above the web **15** and this movable die element **77** slides up and down in guide bearings. Motion is imparted to the die element **77** by a bell crank **79** supported on a pivot and rocked about this pivot by a piston rod **81** of a pneumatic actuator **82** (FIGURE 1).

Whenever the actuator **82** is energized, it moves the piston rod **81** toward the right in FIGURE 1 to rock the bell crank **79** in a direction to thrust the movable die element **77** downward so that a section is cut out of the folded web **15** for a distance extending from the fold across the full width of the reinforcing strip **24**. The notch **83** formed by the movable die element **77** does not extend across the full width of the sealed zone produced at the sealing station.

The web **15** is pulled through the apparatus, beyond the slack accumulator **58**, with a step-by-step movement imparted to it by feed rollers **90** which move the web, with each operation, for a distance equal to the intended width of each individual bag that is to be made from the web. The intermittently-operated feed rollers **90** withdraw slack from the slack accumulator **58** when they are operating, and the slack accumulates in the slack accumulator **58** when there is an interruption in the operation of the feed rollers **90**.

The operation of the intermittent feed rollers **90** and that of the constantly or uniformly operating feed rolls **60** is so correlated that there is very little change in the speed of the feed rolls **60** as the result of the movement of the slack accumulator. Thus the operation of the feed rolls **60** does not vary in speed sufficiently to cause any perceptible change in the fused seal produced by the sealer **54** which seals off the top compartment for the bag.

Beyond the slack accumulator **58** and the notching station **74**, web **15** passes a hole-punching station which the web passes over a block **98**. The block **98** is located under the header portion of the folded web and there is a bar **100** supported at one end from a bearing **102** (FIGURE 1) and at the other end of the bar there is an actuator arm **104** which rocks about a fulcrum **106** to move a puncher **108** toward and from the block **98**.

The actuator arm **104** is moved by a pneumatic motor or by a linkage **110** from a crank pin on a fly wheel **114**. This fly wheel is rotated by an axle in timed relation with the feed rolls of the apparatus so as to bring the pin **108** down into the opening in the block **98** when the web **15** is at rest between intermittent movements. Thus the puncher pin **108** makes a hole **109** in the header portion for each individual bag so that the bag can be hung from a pin or rod on a display rack.

Beyond the hole-punching station there is a folding station **120** where guides fold the web **15** in a manner that will be described, in connection with FIGURE 2.

The web **15** continues its intermittent travel to a sealing and cut-off station **122**. At this station there is a hot element **132** located over the folded web **15** and this hot element **132** extends from the notch which was cut in the folded web at the station **74** and across the remaining width of the folded web. A roller **142** is located under the hot element **132** and this roller **142** supports the web **15**. When the hot element **132** is brought down against the web **15**, it melts its way through the web to sever the plastic along the lines at which the web is divided into separate bags.

At the location where the hot element **132** exerts its maximum pressure against the web **15**, the web is melted. On both sides of this region there are other regions where the web **15** is heated highly enough to seal the upper and lower portions of the web together but not hot enough to melt through the plastic. Thus the hot element **132** not only severs individual bags from one another but it seals the front side of one bag and the rear side of the next adjacent bag.

In the preferred embodiment of the invention, it is desirable that the severance of the web by the hot element **132** be not complete. By having short interruptions in the face of the hot element **132**, uncut lands can be left between successive bags for continuing the feeding of the web to a conveyor **164**.

This conveyor **164** which is preferably of the endless belt type, runs at a higher speed than the speed of the web **15**. The conveyor advances the web **15** by friction with it, but there is slippage between the rapidly moving conveyor **164** and the web **15**. A pressure roller **166** on an operating arm **168** is periodically brought into contact with the web **15** to press the end portion of the web against the conveyor belt and this pressure stops the slippage between the conveyor belt and the web and causes the conveyor belt to jerk the end bag of the web forward and to break the bag loose from the remainder of the web.

FIGURE 2 shows the construction at one end of one of the bags of this invention. The web **15** is shown folded over the strip **24** and connected to the strip by adhesive **170**. This adhesive, which is preferably applied over both faces of the strip **24** throughout their entire area produces a laminated construction for the header of the bag and thus provides a maximum stiffness.

Below the strip **15**, the web is heat sealed across a zone **175**. The perforations **41A**, previously described, extend through the web at a location intermediate to the upper and lower limits of the zone **175**.

For purposes of discussing the construction of the bag, the portion of the web **15** on one side of the fold will be referred to as a back panel **180** of the bag and the portion of the web on the other side of the fold will be referred to as a front panel **182**. The original fold of the web at the top of the header will be referred to as the "first" fold **184** to distinguish it from other folds which will be described in connection with the construction of the bag.

In FIGURE 2 there is a "gusset" formed by making a second fold **186** in the front panel **182** where the material of the web is folded outwardly and then upwardly as shown in dotted lines in FIGURE 2. A third fold **188** is then made in the front panel **182** by folding the material forwardly and downwardly as also shown in dotted lines in FIGURE 2. The advantage of these folds is that when

the bag is filled with merchandise, it can open up as shown in full lines in FIGURE 2 to provide a substantial volume of space between the front panel **182** and the back panel **180** below the third fold **188**.

FIGURE 3 is a front view of the empty bag. The notches which were cut out at the notching station **74** leave the strip **24** and the parts of the web **15** which cover it substantially shorter than the width of the body of the bag below the zone **175**. When the front panel **182** is moved upwardly away from the back panel **180** as illustrated in solid lines in FIGURE 2, this causes the side edges **191** and **192** to move inwardly to the positions shown in FIGURE 4. Thus the body of the bag, when the bag is filled, is substantially equal to the length of the header above the zone **175**.

The extent to which the side edges **191** and **192** move inwardly depends upon how much the front panel **182** is moved away from the back panel **180**; and this in turn depends upon the vertical extent of the portion of the front panel **182** between the second fold **186** and the third fold **188**. There is, therefore, a correlation between the amount of material which should be removed at the notching station **74** (FIGURE 1) and the distance between the second fold **186** (FIGURE 2) and the third fold **188**. In practice, the amount of material removed by notching the folded web preferably has a length, measured in the direction of the length of the web, equal to approximately two times the distance, in a vertical direction, between the folds **186** and **188**. This correlation is approximate, and in the preferred construction the longitudinal length of the notches is somewhat longer than the distance between the folds **186** and **188**.

With folds **186** and **188** in the front panel **182**, and with no corresponding folds in the back panel **188**, the header is in line with the back panel **180** and this produces a neat package when hung from a hook or rod of a merchandising rack. For bags having even greater volume to the merchandise enclosed therein, other folds **186'** and **188'** are made in the back panel **180**, as shown in FIGURE 5. When the front and back panels of the bag shown in FIGURE 5 are pulled away from one another, there is an even greater reduction in the width of the bag and for bags having such a gusset construction for both the front and back panels, the notching of the web to shorten the header should be even greater; the longitudinal length of the notches being approximately four times the distance between the folds **186** and **188**.

Ordinarily the folds **186**, **188**, **186'** and **188'** are made in the panels of the bag at the upper part of the bag and there are no corresponding folds near the bottom of the bag. However, for maximum volume within the bag, other folds can be made near the bottom edge of the front and back panels as shown in FIGURE 5. These corresponding folds in the front panel **182** are indicated by the reference characters **186A** and **188A**; and the corresponding folds in the back panels **180** are indicated by the reference characters **186B** and **188B**. The folds **186A** and **186B** are made far enough from the lower edge of the front panel **182** so that the downwardly folded portion of the web will not extend as far as the bottom edge of the front panel. The extending portion **21** of the back panel **80** is left to facilitate filling of the bag. After the bag has been filled, it is heat sealed at the location **196**, across the full width of the bag, and the extending portion **21** is generally cut off after the bag has been sealed closed.

The preferred embodiment of the invention has been illustrated and described, but changes and modifications can be made, and some features can be used in different combinations without departing from the invention as defined in the claims.

What is clamed is:

1. As an article of manufacture, a string of bag blanks formed along a plastic sheet,

(a) the sheet being folded longitudinally to form front and back panels for the bag blanks,

(b) a sealed area extending lengthwise of the sheet and substantially continuously across all of the bag blanks, parallel to the fold and spaced from the fold to form header portions of the bag blanks,

(c) said blanks having cut-outs along the fold separating the header portion of each bag blank from that of the next bag blank,

(d) each of the cut-outs extending through the fold and inward to a line part way across the transverse width of the sealed area,

(e) a reinforcing and stiffening strip in the fold of each bag blank and extending for the full longitudinal length of each header portion, and

(f) gussets for the bag blanks formed by other folds parallel to the first fold and extending across the full width of each bag blank and continuously to and across the next blank,

(g) each gusset being formed by an upward and then a downward fold spaced from one another,

(h) the longitudinal width of the cut-outs being approximately equal to at least two times the spacing of the gusset folds from one another.

2. The string of the bag blanks described in claim **1** characterized by the cut-outs having bottom edges that are parallel to the top fold and that extend along the sealed area above the lower end of the sealed area and below the level of the upper end of the sealed area that extends across each bag blank from one cut-out to the next successive cut-out.

3. The string of bag blanks described in claim **1** characterized by the reinforcing and stiffening strip being secured to the sheet by adhesive within the area of the header portion of each bag blank, the sheet being made of heat-sealing plastic material and having the front and back panels of the bag blanks directly confronting one another from the sealed area to the bottom edge of one of the panels to provide portions of the blanks that are heat sealable across a transversely extending area of the folded sheet and that are adapted to be melted through substantially midway across the transversely extending area to separate successive bags from the strip of bag blanks, the bag blanks having all portions other than said transversely extending areas in substantially finished condition.

4. The string of bag blanks described in claim **3** characterized by both the front and back panels having folds forming similar gussets whereby the header is located midway between the front and back panels of bags made from said blanks and when the gussets are expanded, whereby the bags hang straight when supported by the header, the longitudinal width of the cut-outs being approximately equal to four times the spacing of the folds from one another in each of the gussets.

5. A bag including

(a) front and back panels formed from a sheet folded over at the upper end of the bag and sealed to one another across the full transverse width of the bag over an area generally parallel to the fold but spaced a substantial distance down from said fold,

(b) the front and back panels below the sealed area having side edges and being sealed to one another along the respective sides of the bag,

(c) a reinforcing and stiffening strip between the panels above the transversely sealed area and forming with the upper end portions of the panels a reinforced header for the bag,

(d) the panels at the header being narrower, on both sides of the bag, than are said panels below the header and having an abrupt change in width at a region near the lower end of the header,

(e) the transversely sealed area being of substantial height and extending below the region of change in width and including the upper ends of the wider parts of the panels,

(f) the transversely sealed area also extending above the region of change in width and holding the nar-

rower parts of the panels together below the reinforcing and stiffening strip, and

(g) an outward and upward fold extending transversely across the bag at a substantial distance below the header, and an outward and downward fold parallel to the upward fold and closer to the header and forming with the upward fold a gusset for expanding the volume of the bag.

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