March 5, 1963 E. KUGLER 3,079,844

METHOD OF MAKING DRAW STRING BAGS

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Fig. 1.

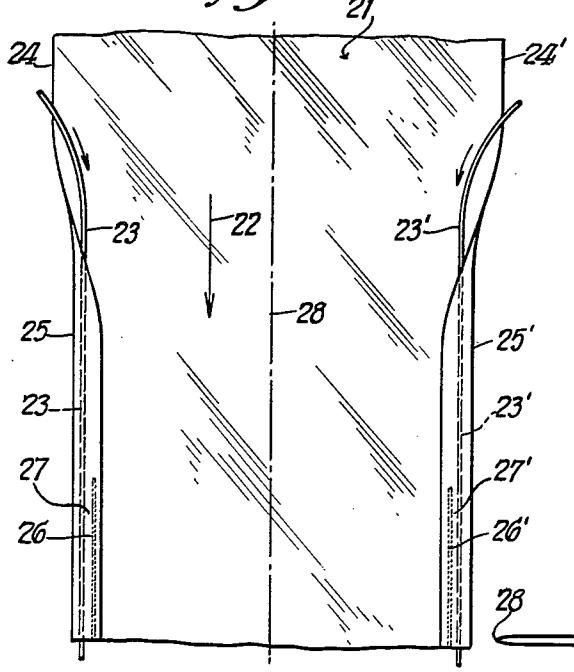


Fig. 2.

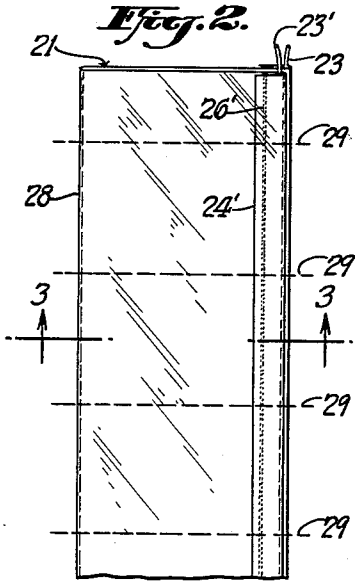


Fig. 3.



Fig. 6.

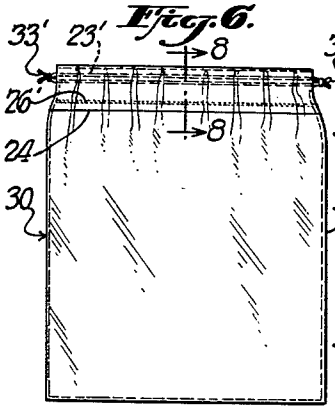


Fig. 5.

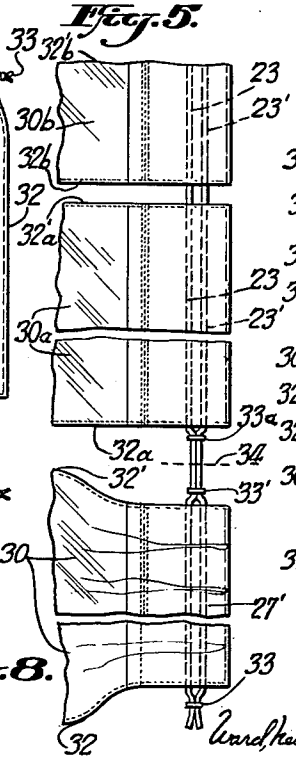


Fig. 4.

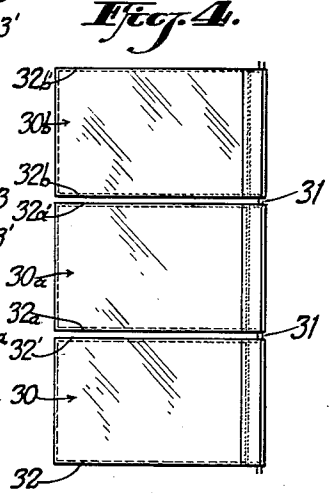
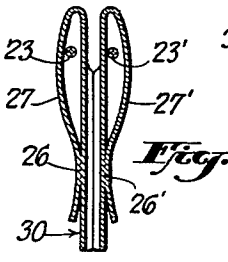


Fig. 7.



Fig. 8.



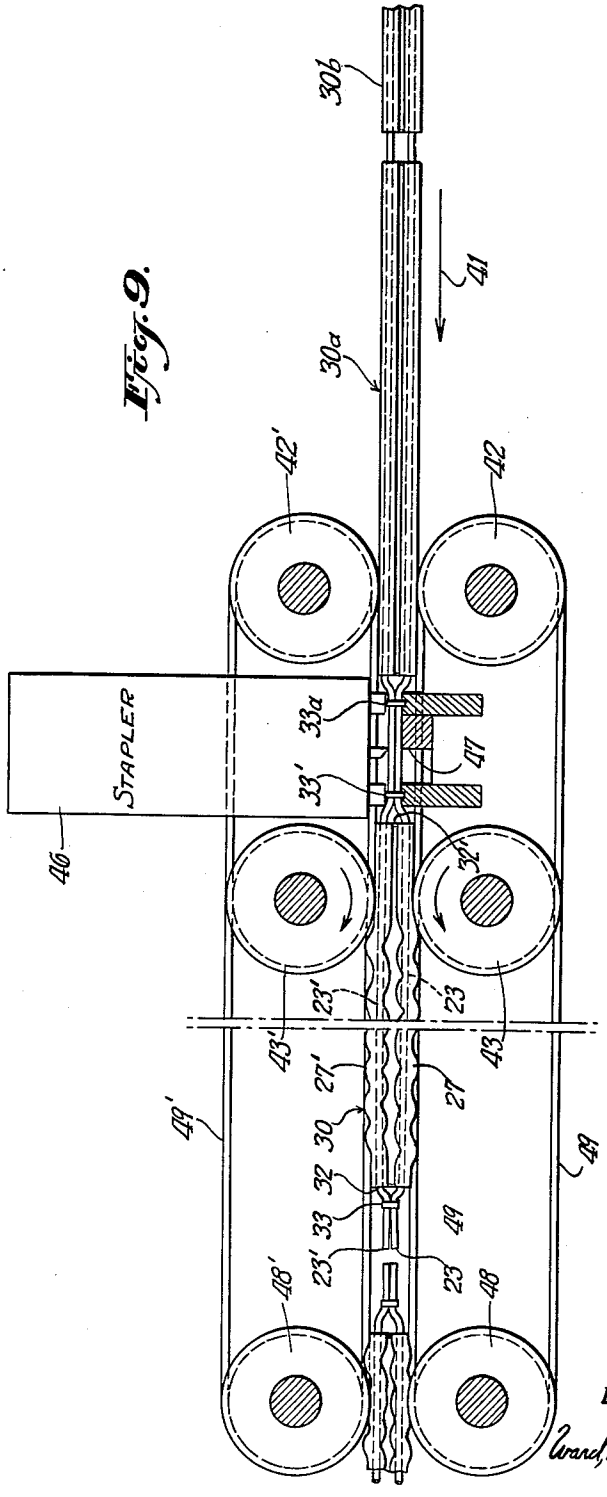
INVENTOR.
BY EMANUEL KUGLER.
Ward, Neal, Haselton, Ormew, McElhannon
ATTORNEYS.

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Fig. 9.



INVENTOR.
EMANUEL KUGLER
BY
Brand, Neal, Haselton, Orme & McElhannon
ATTORNEYS.

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METHOD OF MAKING DRAW STRING BAGS

Emanuel Kugler, Valley Stream, N.Y.
(124 Richmond Place, Lawrence, N.Y.)

Original application Dec. 16, 1959, Ser. No. 859,872. Divided and this application Feb. 20, 1961, Ser. No. 90,530

3 Claims. (Cl. 93—35)

This invention relates to the method of making draw string bags. More particularly, the invention relates to the method of making draw string bags of readily severable material.

Previously, conventional draw string bags have had the draw strings of the respective hems of the mouth of the bag fastened together at points outside the bag and such points have been spaced apart a distance somewhat greater than the effective width of the bag. Bags thus formed can be closed by grasping the draw strings outside either edge of the bag and pulling material of the hems away from the point where the draw strings are grasped towards the other edge of the bag, thus gathering the hems to thereby close the mouth of the bag. Such bags are, therefore, very convenient to open and close. When such bags are opened, however, and especially when they are opened by mechanical fingers or spreader means prior to being filled with merchandise, the material of the bag frequently tears, especially along the longitudinal margins of the bag. This tearing of the bags during filling is caused by the mechanical fingers being inserted in the mouth and spread apart, sometimes quite abruptly and forcibly, to open the mouth of the bag as far as possible. Since in the conventional bag the points at which the draw strings are fastened together are spaced apart a distance greater than the effective width of the bag, this opening movement results in sudden strain upon the material of the bag as the mouth reaches its widest open position and the hems forming the mouth of the bag are stretched taut. This sudden strain frequently results in tearing of the material of the bag and is a source of considerable difficulty in connection with the loading of bags of this type. It is an object of the present invention to provide a draw string bag and method of making same which substantially eliminates the difficulties mentioned above while at the same time retaining the advantages of the type of draw string bag described above.

The present invention contemplates a draw string bag which comprises front and back panels of flexible, readily severable material connected together along longitudinal side margins of the bag. Preferably the material is heat sealable and heat severable (e.g. polyethylene) to facilitate fabrication. Opposed transverse edges of these panels are provided with tubular lips which form an open mouth of the bag and extend to the respective longitudinal margins of the bag. Each of the tubular lips is coextensive with the full width of the bag and contains a draw string and the draw strings of the respective tubular lips are fastened together outside the bag at points adjacent the respective longitudinal margins of the bag. The points at which the draw strings are fastened together are spaced apart a distance less than the width of the bag thereby limiting the exent to which the mouth of the bag can be opened and permanently retaining the tubular lips in a puckered or gathered condition.

It is apparent that when draw string bags constructed in accordance with the present invention are opened in the manner described above, the extent to which the mouth of the bag can be opened is limited not by the width of the bag, as is the case with previously known bags of the type described above, but rather by the distance between the respective points at which the draw strings are fastened together, since such distance is less

than the width of the bag. The sudden strain occurring when the mouth of the bag reaches its widest open position is, therefore, exerted on the draw strings rather than on the material of the bag. Since the draw strings may easily be made strong enough to withstand any amount of strain likely to be imposed in this manner, tearing of the bags during loading is substantially eliminated.

In accordance with a preferred embodiment of the invention, draw string bags of the character above referred to are formed by a process which includes the steps of forming a bag comprising front and back panels of flexible, readily severable material secured together along longitudinal margins of the bag with opposed transverse edge portions of said panels respectively forming an open mouth of the bag and each of said edge portions being provided with a tubular hem extending to the longitudinal margins of the bag respectively, each of the hems of the bag containing string means extending the width of the bag and also extending beyond the longitudinal margins thereof; fastening the string means of the respective hems together at a first point outside the bag adjacent one longitudinal margin thereof; moving material of the hems towards said first point relative to said string means to pucker the hems; and then fastening the string means of the respective hems together at a second point outside the bag adjacent the other longitudinal margin thereof and spaced from said first point by a distance less than the width of the bag.

Any suitable flexible, readily severable material may be used in making draw string bags in accordance with the present invention but plastic heat severable materials such as polyethylene are preferred. The thickness of such material may vary over a wide range but the usual thickness of polyethylene for average use is between about 0.001 and about 0.010 inch. Where relatively thin material is used or where heavy loads are to be carried it may be desirable to use multiple thicknesses of material for part or all of the bag.

Any suitable string means may be used in bags constructed in accordance with this invention and it is intended for example that conventional cords or plastic strings as well as metal strips or tapes may be used for this purpose.

In fastening the string means of bags constructed in accordance with this invention, any suitable method of fastening may be employed. For instance, heat sealing techniques may be employed with heat fusible tapes or strings while suitable means such as staples may be used to fasten other types of string means such as ordinary cords.

This application is a division of my copending application Serial No. 859,872 filed December 16, 1959, which in turn is a continuation-in-part of my previous copending application Serial No. 773,029 filed November 10, 1958, issued as Patent No. 3,058,402, dated October 16, 1962.

In making draw string bags in accordance with the present invention the bag material may first be formed into a bag strip having oppositely disposed front and back panels connected together along one longitudinal margin of the strip corresponding to the bottom of the bags and in which oppositely disposed edge portions of said panels form the other longitudinal margin of the strip with each of said edge portions comprising a tubular hem containing string means. The material of the bag strip including material of the hems surrounding the string means may then be segmented and sealed along transverse seal lines at a bag width interval to form a bag segment while leaving the string means intact. This may be accomplished in any suitable manner such as by utilizing the method and apparatus disclosed in the above-mentioned application Serial No. 773,029. The transverse seal lines thus form the longitudinal margins of the bag segment while the hems extend the full width of the bag segment between such

margins. The string means of the respective hems is then fastened together at a first point outside the bag segment adjacent one longitudinal margin thereof and the material of the hems is then advanced towards said point relative to the string means contained in the hems. The string means of the respective hems are then fastened together at a second point outside the bag segment adjacent the other longitudinal margin thereof with the second point being spaced from the first point a distance less than the full width of the bag segment to retain the hems in a puckered condition. The string means may then be severed to separate the thus formed bag from the bag strip.

Various further and more specific objects, features and advantages of this invention will appear from the description taken in connection with the accompanying drawings which form a part of this specification and illustrate by way of example certain preferred embodiments of the invention. The invention consists in such novel features as may be shown and described in connection with the articles and methods herein disclosed.

In the drawings:

FIG. 1 is a plan view of a web of bag material showing somewhat schematically certain steps in the formation of draw string bags such as the bag shown in FIG. 6 in accordance with the invention;

FIG. 2 shows the same web in a later stage of formation;

FIG. 3 is a cross-sectional view taken at 3—3 of FIG. 2;

FIG. 4 is a plan view showing a still later stage in the formation of the web shown in FIG. 1 into bags such as that shown in FIG. 6;

FIG. 5 is a fragmentary plan view on a somewhat enlarged scale, showing a still later stage in the formation of the web shown in FIG. 1 into bags such as that shown in FIG. 6;

FIG. 6 is a plan view of a draw string bag constructed in accordance with this invention;

FIG. 7 is a top end view of the bag shown in FIG. 6;

FIG. 8 is a cross-sectional view taken at 8—8 of FIG. 6 on a somewhat enlarged scale; and

FIG. 9 is a somewhat diagrammatic side elevational view of apparatus suitable for making bags in accordance with the invention.

Referring to the drawings, FIGS. 1–5 show various stages in the formation of a draw string bag **30** which is shown in greater detail in FIGS. 6–8. Referring more particularly to FIG. 1, a web or bag strip **21** of polyethylene sheet material is shown advancing in the direction indicated by an arrow **22**. As the web advances continuous strings **23** and **23'** are positioned adjacent the longitudinal edges **24** and **24'** of the advancing web and these edges are folded over the strings about fold lines indicated at **25** and **25'**. The folded over edges **24** and **24'** are then heat sealed to opposed portions of the web as indicated by seal lines **26** and **26'** to form tubular hems **27** and **27'** containing the strings **23** and **23'** and forming the longitudinal margins of the web. The web **21** is then folded about a longitudinal fold line **28** to bring the tubular hems **27** and **27'** into opposed relation and to form a folded web or bag strip as shown in FIGS. 2 and 3. If desired, the fold about the line **28** may be gusseted so as to form a bag having a gusseted bottom. The folded web is then severed and sealed along transverse seal lines such as **29** (FIG. 2) to form individual bag segments such as **30**, **30***a* and **30***b* having sealed side margins **32**, **32'**, **32***a*, **32***a'*, **32***b* and **32***b'* to which the hems such as **27** and **27'** extend as shown in FIGS. 4 and 5. During this severing operation, the material of the web including material of the hems **27** and **27'** surrounding the strings **23** and **23'** is severed without severing the strings.

The operations described immediately above may all be performed in the manner taught in the above-mentioned application Serial No. 773,029 and the apparatus described in that application or other suitable apparatus may be used. If desired, the web may be maintained under tension during the folding and sealing operation while the strings are positioned in a substantially unstretched condition as described in application Serial No. 773,029 so that release of such tension after the severing and sealing operation results in small lengths of string being exposed between the bag segments **30**, **30***a* and **30***b* as indicated at **31** in FIG. 4, but it should be understood that such means of obtaining lengths of exposed string between the bag segments may be dispensed with when making bags in accordance with the present invention.

Following the severance of the bag strip **21** into bag segments such as **30**, **30***a* and **30***b* as described above, the strings **23** and **23'** of the leading bag segment **30** are fastened together as by a staple **33** outside the bag segment and adjacent one longitudinal side margin **32** thereof (FIG. 5). Material of the hems of the leading bag segment **30** is then advanced towards the staple **33** with respect to the strings **23** and **23'** to pucker the hems **27** and **27'** of the bag segment **30** as shown in FIG. 5. The strings **23** and **23'** are then fastened together outside the leading bag segment **30** adjacent the other longitudinal side margin **32'** thereof as by a staple **33'** which is spaced along the strings **23** and **23'** from the staple **33** by a distance less than the normal width of the bag segment **30** between the margins **32** and **32'** thus retaining the hems **27** and **27'** of the bag segment **30** in a permanently puckered condition. The strings **23** and **23'** may then be severed between the staple **33'** and the next succeeding bag segment **30***a*, as indicated by a line **34** in FIG. 5 to form a finished bag **30** as shown in FIGS. 6–8. Each succeeding bag segment may then be formed into a finished bag in the same manner. If desired, a staple **33***a* (FIG. 5) may conveniently be used to fasten the strings **23** and **23'** together adjacent the margin **32***a* of the next succeeding bag segment **30***a* before severing the strings as indicated by the line **34** between the staples **33'** and **33***a*.

Pairs of staples such as **33'** and **33***a* may be fired into the strings **23** and **23'** by conventional stapling equipment and the strings may be severed between the staples of each such pair by any conventional cutting knife. Alternatively, a single staple head may be used capable of firing two staples in close proximity to each other and simultaneously severing the strings between each pair of staples, as referred to hereinafter.

Bags such as the bag **30** shown more particularly in FIGS. 6–8 may be made in any suitable sizes. For instance, bags measuring 15 inches by 10 inches may be formed from a web of bag material measuring 33 inches wide by folding about 1½ inches of the web material over the strings along each longitudinal margin of the web to form tubular hems as described above and then severing the bag material transversely at intervals of about 10 inches.

Referring now to FIG. 9, apparatus is schematically shown for making draw string bags in accordance with the present invention. This apparatus will be described with reference to the production of bags such as that shown in FIGS. 6–8 by the process described in connection with FIGS. 1–5. As shown in FIG. 9, the bag strip **21**, the material of which has been severed and sealed to form bag segments such as **30**, **30***a* and **30***b* without severing the strings **23** and **23'** in accordance with the method and apparatus disclosed in the above-mentioned application Serial No. 773,029, is advanced in the direction indicated by an arrow **41** by means of a pair of draw rolls **42** and **42'**. The thickness of the bag strip **21** has been exaggerated to better show the parts. At the stage of the process shown in FIG. 9 the strings **23** and **23'** have already been fastened together by the staple **33** outside the bag segment **30** adjacent the leading longitudinal side margin **32** thereof in the manner to be described below with respect to bag segment **30***a*.

When the leading margin **32** of the bag segment **30** has been advanced to the point shown in FIG. 9, gatherer rolls **43** and **43'** advance material of the hems **27** and **27'** of the bag segment **30** with respect to the strings **23** and

23' as well as with respect to the succeeding bag segment 30*a*, thus puckering or gathering the hems of the bag segment 30. Additionally, the adjacent edges of the bag segments 30 and 30*a* are thus separated so as to provide an increased space and intervening length of string to facilitate fixing the staples a safe distance from the ends of the cut strings to prevent the staples from slipping off. If desired, the hems of the bag segment 30 may be puckered by merely causing the rolls 43 and 43' to advance the material of the hems faster than the rolls 42 and 42' are advancing the material of the bag segments and the strings 23 and 23'.

When the bag segments 30 and 30*a* are in the position shown in FIG. 9 and the hems of the bag segment 30 have been puckered as shown, the strings 23 and 23' are fastened together outside the bag segment 30 adjacent the longitudinal margin 32' thereof by the staple 33' which is spaced along the strings 23 and 23' from the staple 33 a distance less than the full width of the bag segment 30 so as to retain the hems of the bag segment 30 in a permanently puckered condition. The staple 33' may be fired by a staple machine 46 which may conveniently fire the staple 33*a* outside the bag segment 30*a* and adjacent the longitudinal margin 32*a* thereof simultaneously with firing the staple 33'. The staple machine 46 is illustrated as being a single staple unit, such as disclosed and claimed in my copending application Serial No. 858,659 filed December 10, 1959, issued as Patent No. 3,058,403, dated October 16, 1962, adapted to fire two staples simultaneously and sever the strings, but it should be understood that the staple machine 46 may comprise two conventional single staple heads spaced a suitable distance apart. Alternatively, the staple machine 46 may comprise a single staple head adapted to fire the two staples in succession as the strings 23 and 23' and the bag segments are advanced as by the draw rolls.

After the strings 23 and 23' have been fastened together by the staples 33, 33' and 33*a* as described above, and the strings severed between the staples 33' and 33*a* by means such as a suitable cutting blade 47, the finished bag 30 is separated from the succeeding bag segment 30*a* and successive bags such as 30 are then discharged through delivery rolls 48 and 48'.

In order to assist in the advancement of the bag segments and the discharge of the finished bag 30 a series of transversely spaced parallel belt loops 49 and 49' of cord or other suitable material are preferably positioned around the rolls 42 and 48 and 42' and 48' and driven by one or both pairs of these rolls to provide conveyor means for advancing bag segments and discharging finished bags.

While the invention has been described in detail with respect to certain preferred embodiments, it will be understood by those skilled in the art that various changes and modifications may be made without departing from the spirit and scope of the invention and it is intended to cover all such changes and modifications in the appended claims.

What I claim is:

1. A method of making a draw string bag from a bag strip having oppositely disposed front and back panels of flexible, heat severable plastic material connected together along one longitudinal margin of the strip and in which oppositely disposed longitudinal edge portions of said panels form the other longitudinal margin of the strip with each of said edge portions comprising a tubular hem containing string means which includes the steps of sealing and segmenting the material of said bag strip including material of said hem surrounding said string means along transverse seal lines at a bag width interval to form a bag segment while leaving said string means intact, said transverse seal lines forming the side margins of said bag segment and said hems extending the full width of said bag segment, fastening the string means of the respective hems together at a first point outside said bag segment adjacent one side margin of said bag segment, then advancing material of said hems towards said point relative to the respective string means, and then fastening said string means together at a second point outside said bag segment adjacent the other margin thereof and spaced from said first point a distance less than the full width of said bag segment.

2. A method of making draw string bags from a bag strip having oppositely disposed front and back panels of readily severable, flexible material connected together along one longitudinal margin of the strip and in which oppositely disposed longitudinal edge portions of said panels cooperate to form the other longitudinal margin of the strip with each of said edge portions comprising a tubular hem containing a draw string which includes the steps of sealing material of said bag strip along transverse seal lines at bag width intervals, segmenting material of said bag strip including material of said hems surrounding said strings at said bag width intervals to form bag segments while leaving said strings intact, said transverse seal lines thereby forming the longitudinal side margins of said bag segments with said hems extending the full width of each of said bag segments between the side margins thereof, advancing material of the hems of each bag segment along said strings with respect to the succeeding bag segment, fastening the respective strings of each bag segment together adjacent the respective side margins of the bag segment at points outside said hems and spaced apart a distance less than the full width of the bag segment, and severing said strings intermediate said bag segments between the fastened points of said strings to produce individual draw string bags having puckered hems.

3. In the manufacture of draw string bags of flexible, heat severable material from a bag strip having opposed tubular hems containing string means, the steps which include severing material of said hems surrounding said string means contained therein at intervals to form pairs of opposed hem segments while leaving said string means intact, puckering each pair of hem segments with respect to the string means contained therein, and fastening the respective string means of each pair of puckered hem segments together at points outside the respective ends of the hem segments to retain the hem in a puckered condition.

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