United States Patent [19]

White

[11] 3,859,895

[45] Jan. 14, 1975

[54] **METHOD OF MAKING RECLOSEABLE FLEXIBLE BAG**

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[73] Assignee: **E. S. & A. Robinson (Canada) Ltd.,** Toronto, Ontario, Canada

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[21] Appl. No.: **288,434**

[52] **U.S. Cl.** ..... **93/35 DS,** 93/1 TS, 93/35 R

[51] **Int. Cl.** **B31b 1/90**

[58] **Field of Search** ..... 93/35 DS, 35 R, 1 TS, 76

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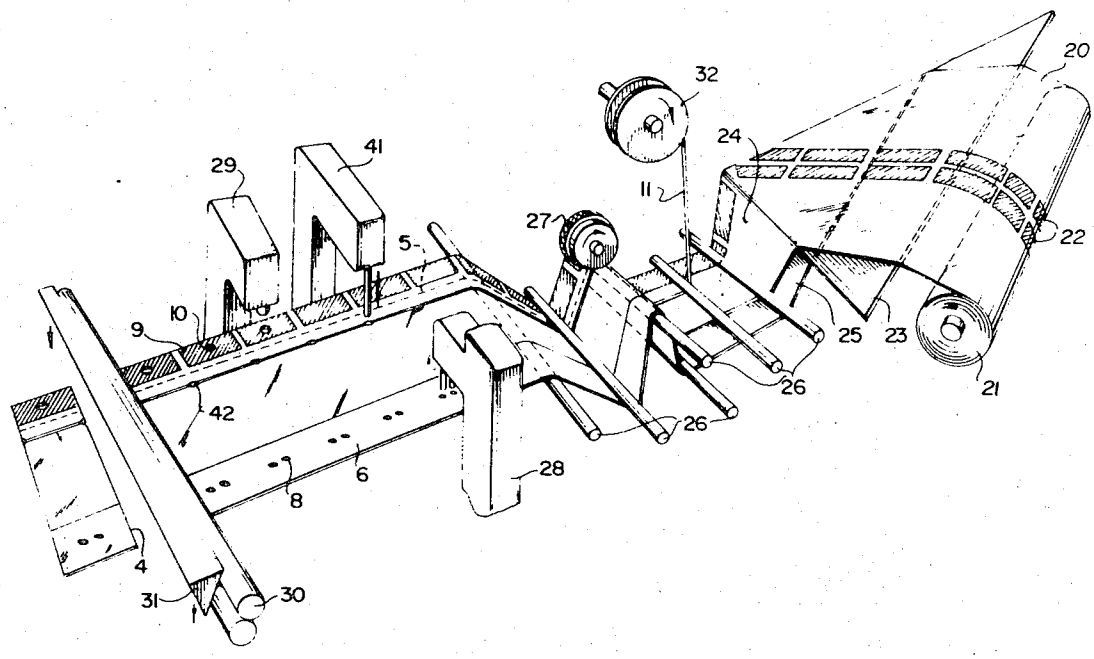
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Primary Examiner—Roy Lake
Assistant Examiner—James F. Coan
Attorney, Agent, or Firm—Stevens, Davis, Miller & Mosher

[57] **ABSTRACT**

The invention provides a recloseable bag formed of flexible sheet material comprising a front wall and a rear wall sealed together adjacent at least one of a pair of opposite edges thereof, said bag including in a wall thereof an elongated deformable member, such as a metal wire, extending transversely of said edges to provide for repeated closure of the bag, the ends of the elongated member being spaced from said edges of the bag and the sheet material between the ends of the member and the said edges of the bag being removed. The invention also provides a method of producing said bags.

13 Claims, 14 Drawing Figures



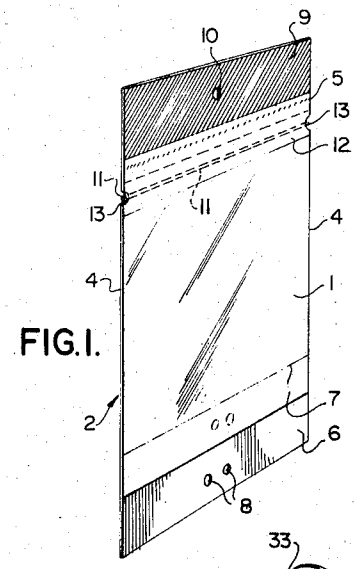


FIG.1.

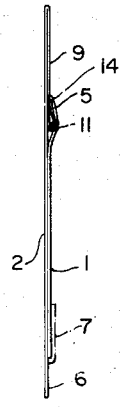


FIG.2.

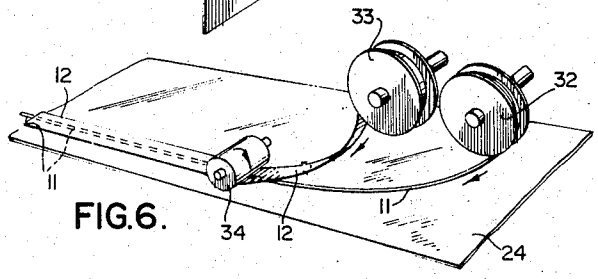


FIG.6.

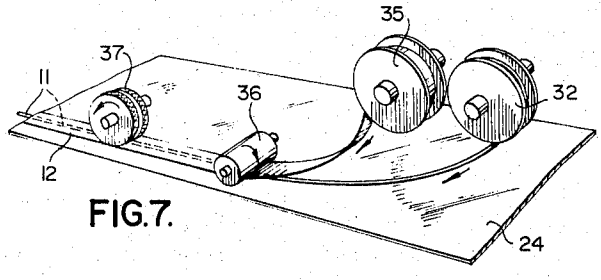


FIG.7.

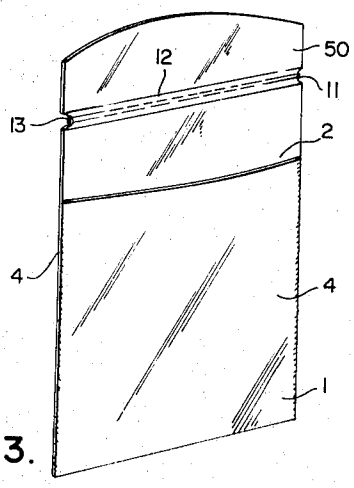


FIG. 3.

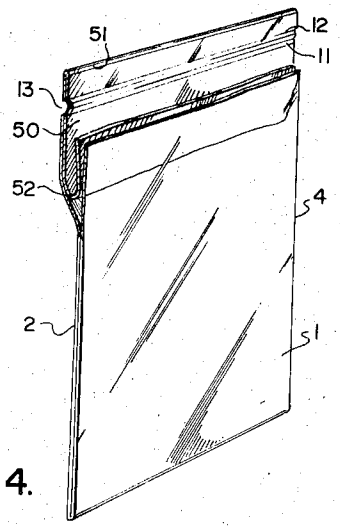


FIG. 4.

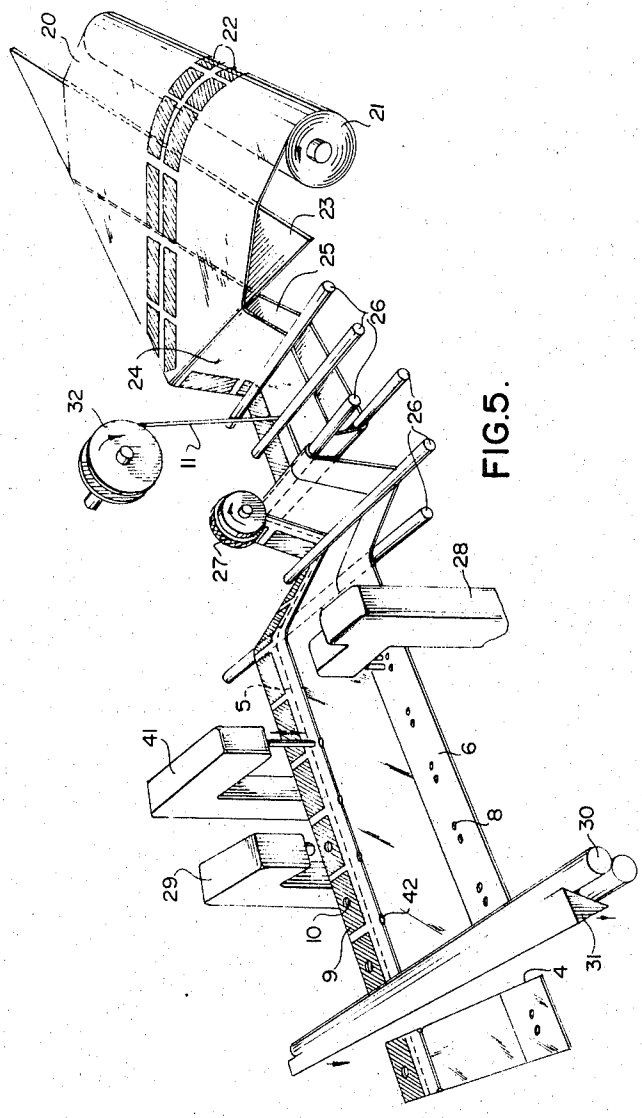


FIG.5.

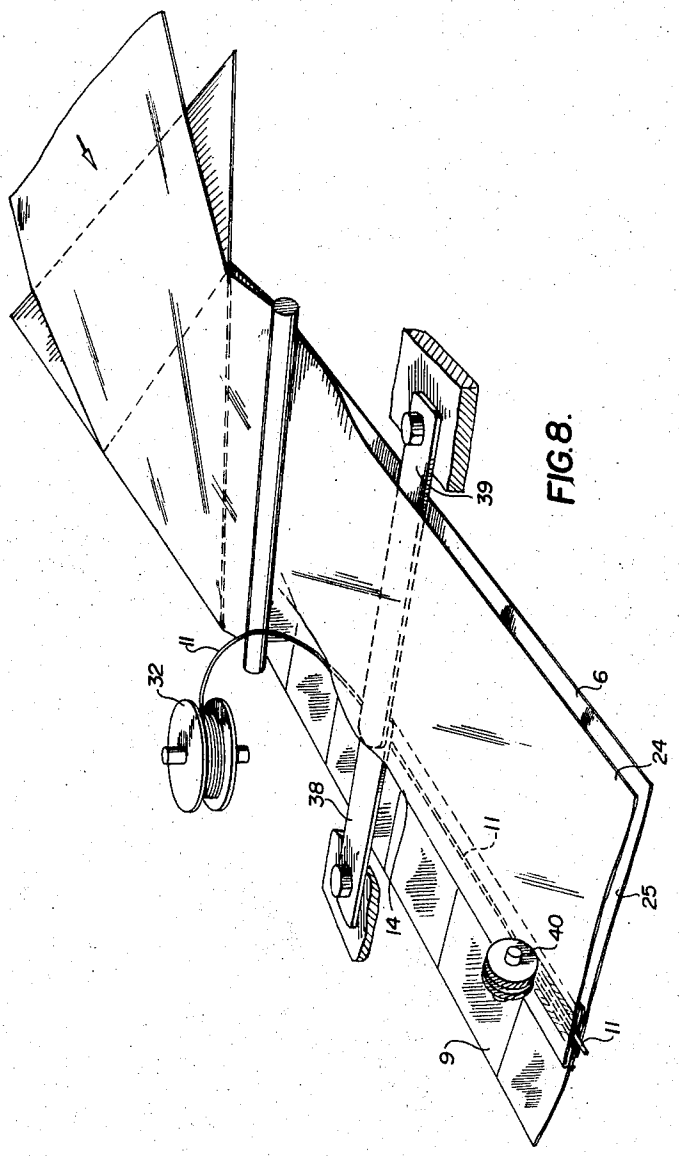


FIG.8.

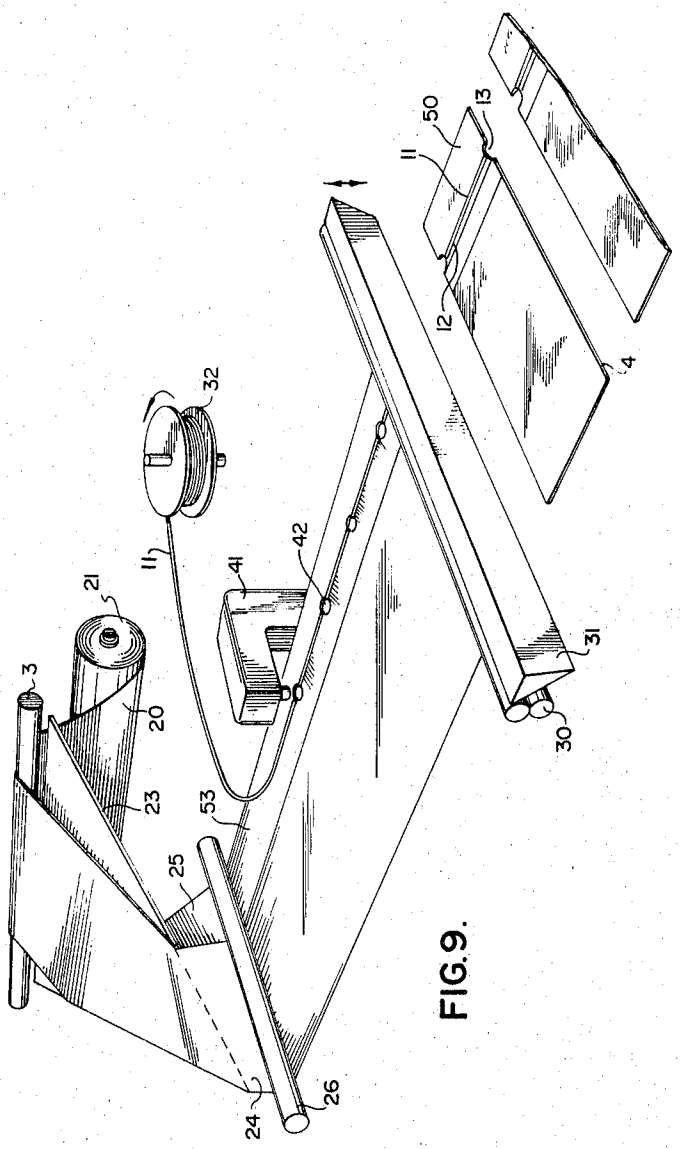


FIG. 9.

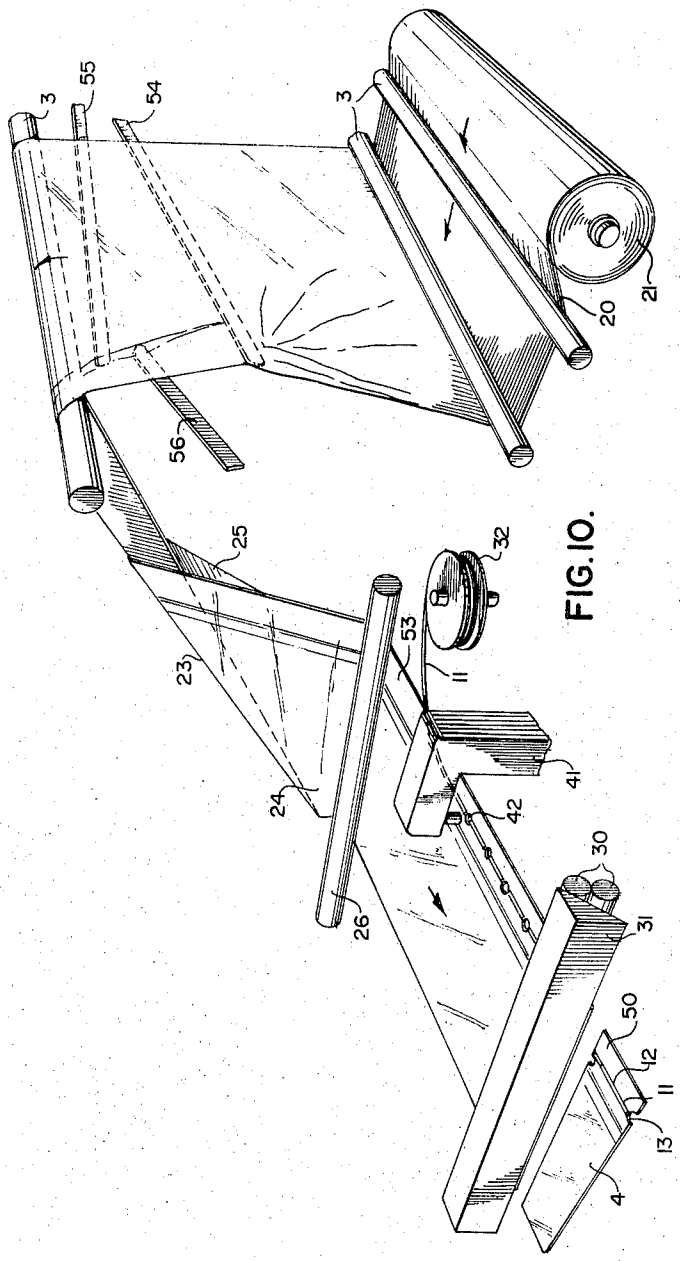


FIG. 10.

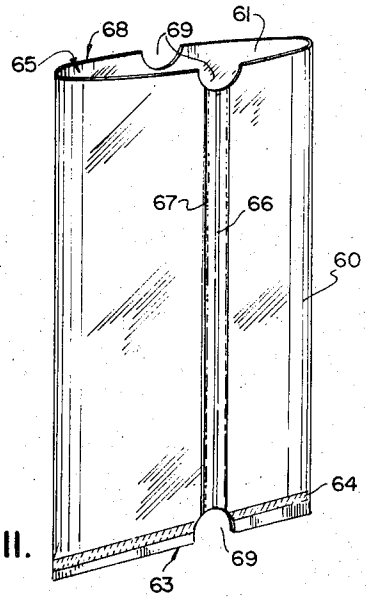


FIG. 11.

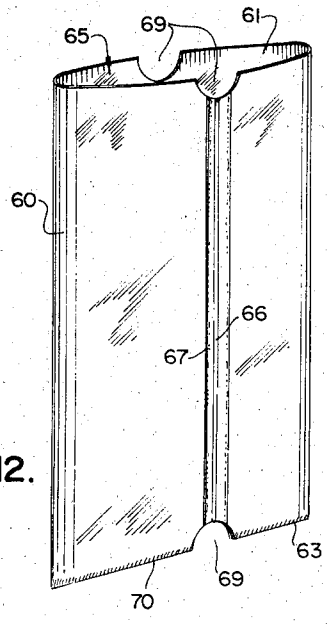


FIG. 12.

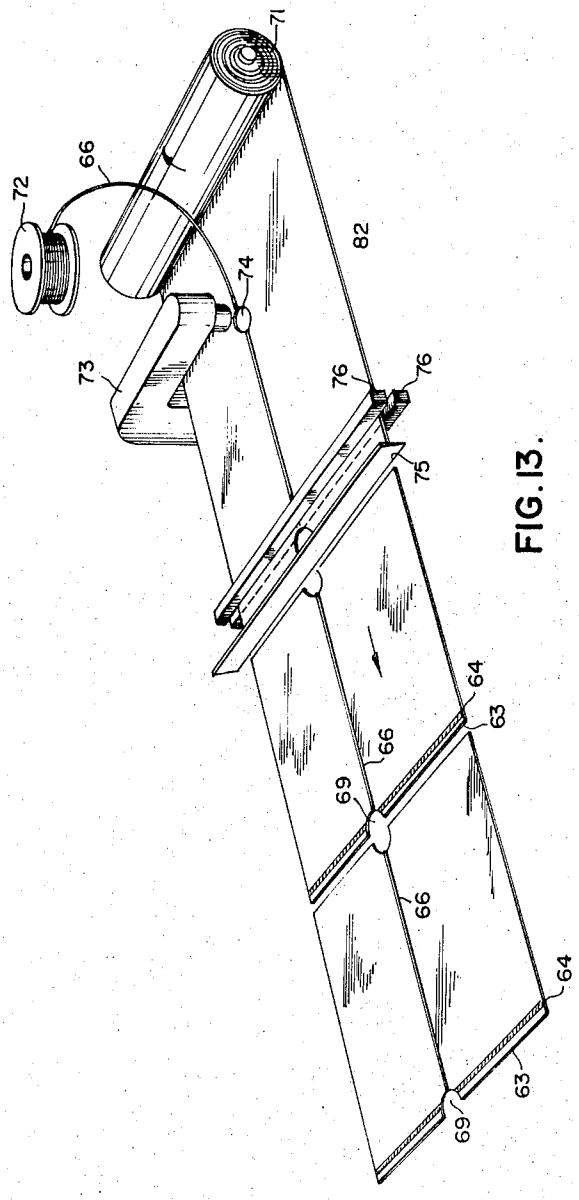


FIG. 13.

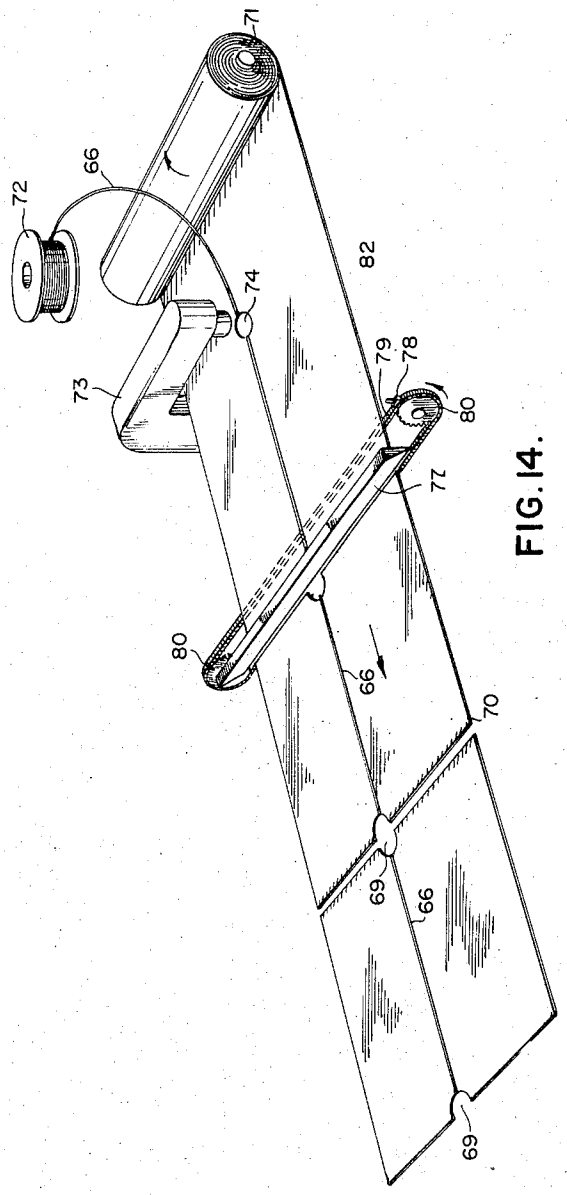


FIG. 14.

METHOD OF MAKING RECLOSEABLE FLEXIBLE BAG

The present invention relates to bags formed from flexible sheet material, particularly thermoplastic sheet material, such as polyolefins, preferably polyethylene and a method of producing such bags. In particular the present invention relates to recloseable flexible sheet bags which can be repeatedly closed subsequent to the breakage of the top seal thereof.

Flexible sheet bags such as thermoplastic sheet bags have heretofore been produced inter alia by continuously passing a pair of superimposed layers of the sheet material, which layers are suitably formed by longitudinally folding a single sheet of the thermoplastic material, along a defined path to a cutting and sealing station where the layers are cut and sealed, suitably by a vertically moving hot knife, transversely to the direction of motion of the layers in the defined path, which hot knife cuts and seals the sides of the bag to form side seams. During the passage along the defined path of the layers to the cutting and sealing station they may be longitudinally sealed adjacent to one end thereof to provide a header for the bag, the bottom of the bag being left unsealed for the insertion of the contents into the bag. When the bag has been filled the bottom of the bag is subsequently sealed. However, such bags have the disadvantage that once the top seal is broken to gain access to the contents of the bag the bag is not recloseable.

A recloseable bag has been shown in U.S. Pat. No. 2,973,131 to Mead, et al, which includes the presence of an opening and closing means including a tab which extends across the bag adjacent the top end thereof, the tab extending beyond the side seams of the bag and including wire therein as a deformable member. While this tab is effective in providing for repeated reclosing of the bag, the closure means has to be attached to each individual bag after it has been fabricated, i.e., after the cutting and sealing station which necessitates increased handling of the bag and thus substantially increases the cost of the production of the bag.

British Pat. No. 1,263,761 published Feb. 16, 1972 to TCF Canada Ltd. discloses a recloseable bag in which the bendable metal wire extends longitudinally of the bag to provide for reclosing of the bag.

The present invention provides a bag which includes a closure means for rendering the same repeatedly openable and closeable after the rupture of a seal in which less material is necessary to provide the closure means and in which the closure means can be incorporated into the bag during the course of its conventional manufacture without increased handling thereof.

It has now been found according to the present invention that by applying and sealing a continuous elongated deformable member, particularly metal wire, to the outer face of one of the layers, particularly in the aforesaid process, the member being disposed substantially parallel and adjacent to but spaced from an edge during its passage along the defined path and by punching holes through said layers where the member intersects the portion of the layers which are subsequently cut at the cutting station whereby the knife does not have to cut through the member thus avoiding damage thereto, a flexible bag is produced including a closure means rendering the same recloseable. In addition thereto it is found that by providing such holes in the bag communication may be provided between the interior of the bag and the external atmosphere whereby it is possible to avoid entrapment of air in the bag when the bottom of the bag is subsequently sealed.

According to the present invention there is provided in a recloseable bag formed from a flexible sheet comprising a front wall and rear wall sealed together at or adjacent at least one of a pair of opposite edges thereof, said bag including in a wall thereof an elongated deformable member extending transversely of said edges to provide for repeated closure of the bag, the improvement in which the ends of the elongated member are spaced from said edges of the bag, the sheet material between the ends of the member and said edges of the bag being removed.

In accordance with one embodiment of the present invention the pair of opposite edges are the side edges thereof both of which are sealed, the elongated deformable member extending transversely of said side edges adjacent to either the top or bottom of the bag.

In a particularly preferred embodiment of the present invention the front wall and the rear wall are sealed together adjacent the top thereof, said wire providing for subsequent repeated closure of the bag after rupture of the seal adjacent the top thereof and said removed sheet material providing for communication between the interior of the bag and the outside atmosphere. The bag of the embodiment may be in its fillable form and has a sealable open bottom and is suitably provided with a flap to enhance the sealing of the bottom thereof or alternatively the bag may be filled with the goods to be packaged, such as cookies, and has a sealed bottom. The bag may also be provided with a reinforced header attached to the top thereof as is conventional.

In an alternative embodiment of the present invention the bag has a closed bottom, said wire being disposed in a flap portion of the rear wall extending beyond the front wall.

Again, the bag of this alternative embodiment may be in fillable form and has a sealable top or alternatively the bag may be filled with the goods to be packaged and has a sealed top.

In a still further embodiment of the present invention the pair of opposite edges are bottom and top edges of the bag at least the bottom edge of the bag being sealed, the deformable member extending transversely of said edges and longitudinally of the bag suitably in the center of thereof in a similar manner to the aforesaid British Patent.

The present invention also provides a method of making a recloseable bag of a flexible sheet material which comprises continuously passing two superimposed layers of said sheet material along a defined path to a sealing station and a cutting station where said layers are sealed and cut transversely of their direction of travel to form a pair of opposite edges of said bag and during passage along said defined path continuously passing an elongated deformable member to and sealing said wire on the face of one of said layers substantially transverse to said edges and continually punching holes through said layers at the points where the member intersects the portions of the layers which are subsequently cut at the cutting station.

In forming the bag with the deformable member transverse to the side edges thereof the superimposed layers may be cut and sealed simultaneously by a hot knife to form a weld or can be cut subsequent to sealing

using a cold knife in which case the seal generally lies slightly inwardly from the side edge of the bag.

In providing the bag according to the preferred embodiment of the present invention the layers during passage along the defined path are continuously longitudinally sealed adjacent one edge thereof to form the top of the bag, the elongated member being sealed on the outer face of one of said layers essentially parallel to and spaced from said longitudinal seal.

In providing the bag according to the alternative embodiment of the present invention the superimposed layers are continuously formed by longitudinally folding a single sheet of said material to provide a flap portion in one of such layers extending beyond the other layer, said elongated member being sealed in the adjacent flap portion.

In forming the bag with the deformable member transverse to the bottom and top edges of the bag the seals on the side edges of the bag are formed without cutting or the superimposed layers are in the form of a continuous tube. The bottom edge only of the bag may be cut and sealed using the hot knife as the top edge must be provided open for the insertion of the contents of the bag and is then sealed. This may be achieved by having the sealing station separate from and upstream of the cutting station, a cold knife being used at the cutting station. Alternatively this may be achieved by the use of a hot knife providing a weld at the bottom of the bag which operates on a timed sequence alternately with a flying knife so as to weld and cut the superimposed layers alternately.

The flexible material is preferably a thermoplastic material whence the side, top and bottom seals of the bag are suitably heat seals, the seals suitably being produced by a hot knife. Particular thermoplastic materials which may be mentioned include polyolefins, particularly polyalkylenes, preferably lower polyalklylenes and more preferably polyethylene. The elongated deformable member is preferably a metal wire.

In accordance with one embodiment of the present invention the wire is sealed to the surface of said layer by means of an adhesive tape which is continuously passed to the face so as to be superimposed on the wire and the tape is subsequently pressed into contact with the face to seal the wire to the

In another embodiment of the present invention, where the sheet material is a thermoplastic material, a thermoplastic strip is continuously passed to the face so as to be superimposed on the wire and the strip is heat sealed to the face to seal the wire to the face.

In yet a further embodiment of the present invention where the sheet material is a thermoplastic material, a gusset is continuously formed in the layer containing the surface, the wire being continuously introduced into the gusset and heat sealed therein.

The present invention will be further illustrated by way of the accompanying drawings in which:

FIG. 1 is a perspective view of a bag according to one embodiment of the present invention;

FIG. 2 is a vertical section through a bag according to an alternative embodiment of the present invention;

FIG. 3 is a perspective view of a bag according to yet another embodiment of the present invention;

FIG. 4 is a perspective view partially broken away in vertical section of a bag according to a still further embodiment of the present invention;

FIG. 5 is a schematic perspective view of an apparatus useful in making the bag according to the embodiments of the invention set forth in FIGS. 1 and 2;

FIG. 6 which is on the same sheet of drawings as FIG. 1, is a detail of the apparatus according to FIG. 5 showing a method of attaching the wire to the bag according to one embodiment of the present invention using an adhesive tape;

FIG. 7 which is on the same sheet of drawings as FIG. 1, is a detail of the apparatus according to FIG. 5 showing a method of attaching the wire to the bag according to another embodiment of the present invention using a thermoplastic tape;

FIG. 8 is a detail of an apparatus according to FIG. 5 showing a method of attaching the wire to the bag according to yet a further embodiment of the present invention by means of a gusset;

FIG. 9 is a schematic perspective view of an apparatus useful in making the bag according to the embodiment of the invention set forth in FIG. 3;

FIG. 10 is a schematic perspective view of an apparatus useful in making the bag according to the embodiment of the invention set forth in FIG. 4;

FIG. 11 is a perspective view of a bag according to another embodiment of the present invention;

FIG. 12 is a perspective of a bag similar to that in FIG. 11 but with a different bottom edge seal;

FIG. 13 is a schematic perspective view of an apparatus for making the bag of FIG. 11; and

FIG. 14 is a schematic perspective view of an apparatus useful for making the bag of FIG. 12.

Referring to FIGS. 1 and 2 the bag which is suitably formed of polyethylene has a front wall 1 and a rear wall 2 and has heat seals 4 along the side edges thereof and a heat seal 5 adjacent the top thereof. The bottom of the bag has a flap 6 and is open. The bag may be filled through the open bottom with the desired contents and the flap then turned up and heat sealed as at 7. In the unfilled state with the open bottom, the flap 6 has holes 7 therein by which the unfilled bag may be suspended. At the top of the bag there is suitably provided a flase header 9 which includes a hole 10 by which the filled bag may be suspended after the flap 6 has been sealed.

Referring particularly to FIG. 1 the bag includes a metal wire 11 held in place on the front wall 1 by a tape 12 which may be an adhesive tape or a thermoplastic tape which thermoplastic tape is heat sealed to the front wall 1 of the bag. At the side edges of the bag semi-circular holes 13 have been punched out which has also removed the ends of the wire 11 and also provides communication of the interior of the bag with the external atmosphere and thus prevents entrapment of air when the bag is closed by sealing the flap 6.

Referring specifically to FIG. 2 in an alternative embodiment the wire 11 is held in place in a heat sealed gusset 14 in the front wall of the bag.

The bags of FIG. 1 may be made with the apparatus of FIG. 5 in combination with that of FIG. 6 or 7 and that of FIG. 2 with the apparatus of FIG. 5 in combination with that of FIG. 8.

Referring to FIG. 5 sheet polyethylene 20 is withdrawn from a roll 21. The sheet 20 contains printed portions 22 which form the false header 9 in the finished bag. The sheet 20 is folded at folder 23 into superimposed layers 24 and 25, the lower layer 25 extending beyond the upper layer 24 to form the close-

able flap 6 in the finished bag. The folded sheet 20 passes from the folder 23 over tensioning rolls 26 and is contacted by a header edge sealer 27 to provide the seal 5 in the bag. The flap 6 in the lower layer 25 has holes 8 punched therein by punch 28 and the false header 9 has holes 10 punched therein by punch 29. The folded sheet 20 finally passes through nip rolls 30 and vertically reciprocating hot knife 31 to provide the edge seals 4 in the bag. Instead of the hot knife 31 the heat seal may be made separately at or adjacent the edge 4 and then separately cut with a knife. The procedure as set forth heretofore constitutes the standard method of making the bag. In accordance with the present invention the metal wire 11 is fed to the upper layer 24 of the sheet 20 from a reel 32 and is sealed thereto by the techniques shown in FIGS. 6, 7 or 8.

Referring specifically to FIG. 6, adhesive tape 12 is fed from reel 33 to overlay the wire 11 on the layer 24 and tape 12 is pressed into sealing contact with the layer 24 by pressure roller 34.

Referring to FIG. 7 thermoplastic tape 12 is passed from reel 35 to overlay the wire 11 on the layer 24 and is maintained in contact by pressure roller 36 and heat sealed to the layer 24 by hot pressure roller 37.

Referring to FIG. 8 a gusset 14 is formed in the upper layer of the sheet 24 by a pair of rigid arms 38 and 39. Arm 39 extends between the layers 24 and 25 and arm 38 extends into the gusset 14. The metal wire 11 from reel 32 is fed into the gusset 14 and the gusset 14 is then heat sealed by hot pressure roller 40.

Referring once more to FIG. 5 a punch 41 punches out holes 42 in the sheets 24 and 25 at the points where the wire 11 intersects the portion of the layers 24 and 25 to be cut by the hot knife 31, thus avoiding damage to the knife during the cutting operation.

The bag of FIG. 3 comprises a front wall 1 and a rear wall 2 and has heat seals 4 along the side edges thereof. The top of the bag is open and the bag may be filled through such top opening with the desired contents and the opening subsequently heat sealed. The rear wall 2 includes a flap 50 having a metal wire 11 held in place on the inside surface thereof by a tape 12 which may be an adhesive tape or a thermoplastic tape, the latter being heat sealed to the flap 50, and semi-circular holes 13 are punched at the side edges of the bag, which holes have removed the ends of the wire 11. The flap 50 serves to reclose the bag when the sealed opening is broken to remove a portion of the contents.

Referring to FIG. 4, the flap 50 is double folded at 51 and 52. The top of the bag is open and is filled with the desired contents through the opening which is then heat sealed. Metal wire 11 is attached to the flap 50 and is held in position on the inside surface of the flap 50 by a tape 12 as shown in FIG. 3 and semi-circular holes 13 are provided as in FIG. 3. The flap is thus of a double thickness.

The bag of FIG. 3 may be made with the apparatus of FIG. 9 in which polyethylene sheet 20 is withdrawn from a roll 21 over tensioning rolls 3 and is folded at folder 23 into superimposed layers 24 and 25, the lower layer 25 extending at 53 beyond the upper layer 24 to form the flap 50 in the finished bag. The folded sheet 20 passes from the folder 23 over tensioning roller 26 and then through nip rolls 30 and vertically reciprocating hot knife 31 to provide the edge seals 4 in the finished bag. Metal wire 11 is fed to extension 53 of the lower layer 25 from a wire reel 32 and sealed thereto by the techniques shown in FIGS. 6, 7 or 8 described previously. A punch 41 punches out holes 42 in the extension 53 at the points where the wire 11 intersects the portion of the extension 53 to be cut by the wire knife 31 thus avoiding damage to the knife during the cutting operation.

The bag of FIG. 4 may be made with the apparatus of FIG. 10 in which polyethylene sheet 20 is withdrawn from a roll 21 under tensioning rolls 3 and during passage between a lower and upper tensioning roll 3 is contacted by rigid folding arm 54 which institutes the fold 51 into one edge of the sheet 20 and then rigid folding arms 55 which introduce the fold 52 into the folder portion 51 formed by the arms 54. The sheet 20 so folded is further folded at folder 23 to form an upper layer 24 and a lower layer 25, which upper layer 24 extends beyond the lower layer 25 at 53 to form the double width flap 50 in the finished bag of FIG. 4. The folded sheet 20 passes from the folder 23 under tensioning roll 26 and then through nip rolls 30 and vertically reciprocating hot knife 31 to provide edge seals 4 in the finished bag. Metal wire 11 is fed to the extension 53 of the upper layer 25 from a reel 32 and is sealed thereto by the techniques shown in FIGS. 6 or 7 as described previously. Punch 41 punches out holes 42 in the extension 53 at the points where the wire 11 intersects the portion of the extension 53 to be cut by the knife 31, thus avoiding damage to the knife during the cutting operation.

Referring to FIG. 11, the polyethylene bag comprises a front wall 60 and a rear wall 61 sealed adjacent the bottom edge 63 thereof by a heat seal 64. The upper end of the bag is open at 65 for the insertion of the contents thereof and is then sealed. A metal wire 66 extends longitudinally of the bag and is held in position on the front wall 60 by an adhesive or thermoplastic tape 67, the thermoplastic tape being heat sealed to the front wall 60 of the bag. At the bottom edge 63 of the bag and the top edge 68 of the bag, semi-circular holes 69 are punched out which also removes the ends of the wire 66 and provides communication with the external atmosphere thus avoiding entrapment of air when the bag is closed by sealing the top edge 68.

Referring to FIG. 12 the bag is identical to the bag of FIG. 11 except the seal at the bottom edge 63 is a weld seal.

The bags of FIG. 11 and FIG. 12 are produced by the apparatus set forth in FIGS. 13 and 14 wherein a continuous flattened tube of polyethylene 82 is withdrawn from a supply roll 71 and has applied to one surface thereof a metal wire 66 from a supply 72, the wire 66 being attached to the surface of the bag by means of an adhesive tape by the technique shown in FIG. 6 of a thermoplastic tape by the technique shown in FIG. 7. A punch 73 punches holes 74 in the tube 82 at points where the wire 66 intersects the portion of the tube 82 to be cut by the cold knife 75 or hot knife 77 thus avoiding damage to the knife during the cutting operation.

In FIG. 13 the bottom of the bag is sealed by hot bars 76 before cutting by downstream cold knife 75 to produce seals 64 in the bag of FIG. 11. In FIG. 14 tube 82 is alternatively cut by hot knife 77 to form the bottom edge 63 of a pair of bags each with weld seal 70 and then by upstream flying knife blade 78 on chain 79 driven by sprockets 80 in timed sequence to form unsealed open tops 65 of the pair of bags which are subse-

quently sealed after insertion of the contents of the bag.

I claim:

1. A method of making a recloseable bag of a flexible sheet material which comprises continuously passing a pair of superimposed layers of said sheet material along a defined path to a sealing station and a cutting station where said layers are sealed and cut transversely of their direction of travel to form a pair of opposite edges of said bag; and during passage along said defined path, continuously passing an elongated deformable member to, and sealing said member on, the face of one of said layers transverse to said edges; and continually punching holes through said layers at the points where the member intersects the portion of the layers which are subsequently cut at the cutting station, while at the same time punching out the adjacent section of said deformable member.

2. A method as claimed in claim **1** in which said layers are cut and sealed to form side edges of said bag.

3. A method as claimed in claim **2** including during passage along said defined path continuously longitudinally sealing said layers adjacent one edge thereof to form the top of said bag, said elongated member being sealed on the outer face of one of said layers essentially parallel and adjacent to, but spaced from said longitudinal seal.

4. A method as claimed in claim **1,** in which the elongated member is a metal wire.

5. A method as claimed in claim **1,** in which adhesive tape is continuously passed to said face so as to be superimposed on said elongated member and the tape is subsequently pressed into contact with said face to seal said member on said face.

6. A method as claimed in claim **1,** in which the sheet material is thermoplastic sheet material and the sealing is heat sealing.

7. A method as claimed in claim **6** in which the thermoplastic strip is continuously passed to said face so as to be superimposed on the elongated member and the strip subsequently heat sealed to said face to seal said member on said face.

8. A method as claimed in claim **6,** in which a gusset is continuously formed in the layer containing said face, the elongated member being continuously introduced into said gusset and heat sealed therein.

9. A method as claimed in claim **1,** in which the cutting and sealing of the layers at the cutting and sealing stations is effected by means of a hot knife to provide a weld.

10. A method as claimed in claims **1,** in which the cutting and sealing of the layers at the cutting and sealing stations is effected by a separate sealing bar and a cold cutter disposed downstream thereof.

11. A method of making a recloseable bag of a flexible sheet material which comprises continuously passing a pair of superimposed layers of said sheet material along a defined path to a sealing structure and a cutting station where said layers are sealed and cut transversely of their direction of travel to form a pair of opposite edges of said bag; and during passage along said defined path, continuously passing an elongated deformable member to, and sealing said member on, the face of one of said layers transverse to said edges; and continually punching holes through said layers at the points where the member intersects the portion of the layers which are subsequently cut at the cutting station, said layers being cut and sealed to provide a sealed bottom edge to said bag and an open top to said bag.

12. A method as claimed in claim **11** in which the superimposed layers are passed along said defined path as a tube.

13. A method of making a recloseable bag of flexible sheet material which comprises continuously passing a pair of superimposed layers of said sheet material along a defined path to a sealing station and a cutting station where said layers are sealed and cut transversely of their direction of travel to form a pair of opposite edges of said bag; and during passage along said defined path, continuously passing an elongated deformable member to, and sealing said member on, the face of one of said layers transverse to said edges; and continually punching holes through said layers at the points where the member intersects the portion of the layers which are subsequently cut at the cutting station, said layers being cut and sealed to form side edges of said bag, the superimposed layers being continuously formed by continuously longitudinally folding a single sheet of said material to provide a flap portion on one of said layers extending beyond the other layer, said elongated member being sealed on a face of the flap portion.

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