

[72] Inventor **Emanuel Kugler**
 124 Richmond Place, Lawrence, New York
 11559

[21] Appl. No. **613,881**

[22] Filed **Feb. 3, 1967**

[45] Patented **Oct. 13, 1970**
 Continuation-in-part of Ser. No. 417,402,
 Dec. 10, 1964, now abandoned, which is a
 continuation of Ser. No. 336,830, Jan. 9,
 1964, now abandoned.

[56]

References Cited

UNITED STATES PATENTS

2,212,469	8/1940	French	93/33
3,060,075	10/1962	Kincaid	93/35

FOREIGN PATENTS

751,339	6/1956	Great Britain.....	93/35(CPO)
825,610	12/1959	Great Britain.....	93/35(CPO)

Primary Examiner—Wayne A. Morse, Jr.
 Attorney—Amster and Rothstein

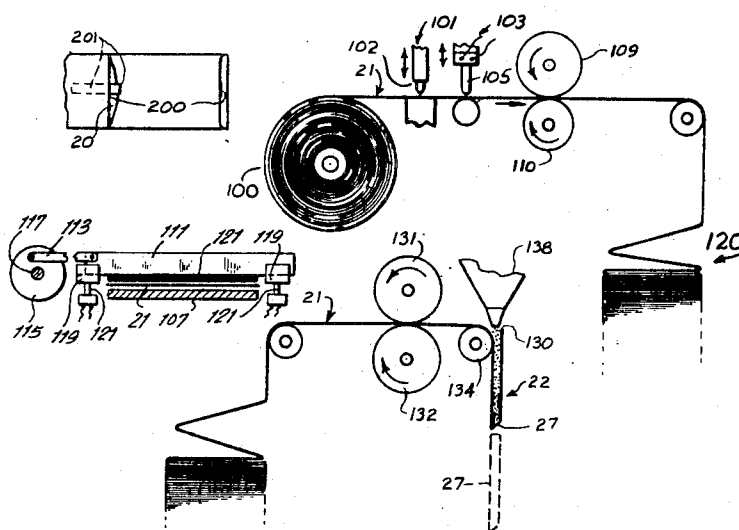
[54] **METHOD OF FORMING CONTINUOUS STRIP OF BAGS**
 2 Claims, 10 Drawing Figs.

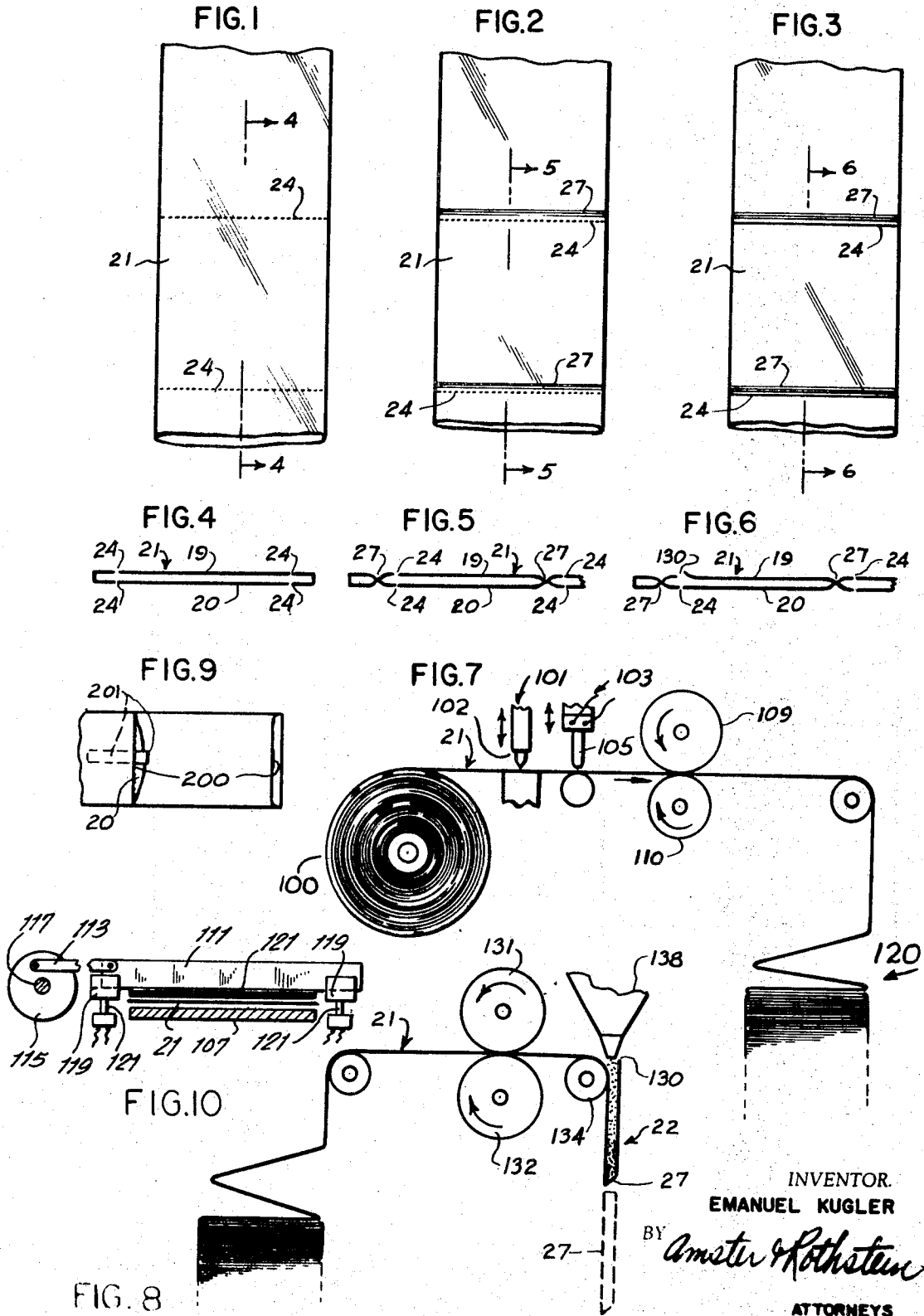
[52] U.S. Cl. 93/35,
 93/33

[51] Int. Cl. **B31b 1/14,**
 B31b 49/04, B31f 7/00

[50] Field of Search 93/33,
 35(PCO)

ABSTRACT: A continuous length of limp thermoplastic material, tubular in form, is fed from a supply, a series of pairs of registered lines of perforations are formed in the walls of the length, the walls are heat sealed at spaced intervals near the pairs of lines of perforations, and then one wall is moved relative to the other wall to tear the lines of only one wall to form open slit mouths for the connected bags.





METHOD OF FORMING CONTINUOUS STRIP OF BAGS

This is a continuation on part of U.S. Pat. application Ser. No. 417,402, filed Dec. 10, 1964, the latter being a continuation of pending U.S. Pat. application Ser. No. 336,830 filed Jan. 9, 1964 both now abandoned.

This invention relates to the art of thermoplastic bags and more particularly to the manufacture of a continuous bag strip providing a series of readily severable interconnected preformed thermoplastic bags of the type having opening slits on one side wall of said bag strip parallelly spaced with respect to each other, and arranged in a fan fold configuration.

The present invention is useful not only in making bags of the conventional type but in making bags of a novel nature to be hereinafter described in which the bags in a continuous stack are ready for filling.

In accordance with the present invention, tubular material is scored or otherwise weakened from edge to edge at longitudinally spaced intervals equal to the overall length of the desired bag to provide ready severability in such a manner that the lines of severance will define the respective bags. After the tubular strip is thus scored or weakened, opposite sides of the tube are sealed together along lines closely adjacent the respective lines of severability to form bottoms of the respective bags. Finally, one of the walls of the tubular strip is separated and broken at each of the lines of severability. The opposite wall of the tubular strip is left intact, however, so that each of the bags remain on one continuous strip until desired. The separation in one of the walls along the lines of severability provide a filling opening for each of the bags so that the said bags may be conveniently opened and filled without the necessity of separating the bag from the stack prior to filling, and without the use of such expedients as staples, rivets, hot needles, wickets, clamps or the like.

Thus, a continuous bag strip is provided which comprises a multiplicity of interconnected preformed bags which may be individually severed from the bag strip at the weakened or scored lines. This not only provides a greatly improved method of manufacture resulting in substantial economies, but also makes it possible to facilitate packing, handling, storage, shipping and dispensing the bags individually as they are required for either manual or machine filling.

Of great importance to this invention is the apparatus utilized to separate one wall only of the tubular strip along the lines of severability without damaging or separating the said opposite wall. This is essentially accomplished by utilizing a pair of members contacting the moving tubular strip. The said members urge the said strip together by exerting pressure thereon. The member contacting the wall of the tubular strip desired to be severed advances at a greater speed than that of the said tubular strip. The opposite member will move at substantially the same speed as that of the advancing tubular strip. Thus, the faster member will urge one of the walls of the tubular strip to move relative to the opposite said wall, thereby causing a break in the desired wall of the tubular strip along its scored or weakened lines of severability. The above-described operation is repeated for each bag in turn, thus providing a filling opening for each said bag. Of course, the important feature herein is the relative movement of one wall to the other, even though that movement may be forward, rearward, up, down, or to the side.

In one embodiment of this invention, the said members will be comprised of a pair of rollers, one moving at a greater speed than that of the other.

Further, the fan fold stacking of the formed bags is of special importance.

With these objects in view the invention consists of the novel features of construction and arrangement of parts which will appear in the following specification and recited in the appended claims, reference being had to the accompanying drawings in which the same reference numerals indicate the same parts throughout the various figures, and in which:

FIG. 1 is a plan view showing one face of a section of a bag strip illustrating one step of the instant invention.

FIG. 2 is a plan view showing one face of a section of a bag strip illustrating a second step of the instant invention.

FIG. 3 is a plan view showing one face of a section of a bag strip illustrating a final step of the instant invention.

FIG. 4 is a sectional view taken substantially along line 4-4 of FIG. 1.

FIG. 5 is a sectional view taken substantially along line 5-5 of FIG. 2.

FIG. 6 is a sectional view taken substantially along line 6-6 of FIG. 3.

FIG. 7 is a sectional view illustrating diagrammatically the steps of carrying out the instant invention.

FIG. 8 is an elevational view primarily diagrammatically showing one method of utilizing the product of the instant invention.

FIG. 9 is a fractional plan view showing one alternate embodiment of the invention.

FIG. 10 is an elevational view of an alternate apparatus for separating the lines of weakness in one wall of the strip.

Referring to FIGS. 1 through 7, a bag strip 21 is shown from which individual preformed bags such as 22 may be severed. The bag strip 21 has a front wall or panel 19 and a rear wall or panel 20 formed into a tube of relatively thin polyethylene or other flexible thermoplastic-like material. The term "thermoplastic material" as herein used is to be understood as meaning plastic material which may be heat sealed to effect the sealing together of various portions of the strip 21 as described below. Strip 21 is provided with a series of transversely extending longitudinally spaced substantially parallel severance or tear lines, such as 24, extending from edge to edge of the strip and formed by any suitable means such as by scoring or perforating the material along these lines so that upon application of proper force, the bag strip 21 may be readily separated along the tear lines 24 to form the bags such as 22, as described below.

In the diagrammatic FIG. 7 there is shown schematically in elevation, several of the steps in accomplishing the instant invention. The strip 21 of tubular thermoplastic material may be advanced as from a roll 100 of such material. Of course, the said tubular strip 21 may be provided in any known fashion. The tubular strip 21 is advanced to a perforating die 101. The said die will have minute projections 102 extending therefrom and will be adopted to periodically descend against the strip 21. Thus, as the projections 102 periodically contact the said tubular strip 21 they will provide the severance tear lines through both walls 19 and 20 of the tubular strip 21.

It is to be noted that although the tubular formation 21 illustrated herein is relatively plain, other forms of tubular strips may be provided. For example, suitable gussets may be provided at either side of the said strip 21, or the said strip may have various embellishments thereon such as heat sealed portions, etc. Additionally, the said strip 21 may initially be provided as a flat sheet, and the perforations may, if desired, be provided while the material still is in the flattened sheet condition. In such an embodiment of this invention, the said strip will be folded about a fold line until its longitudinal edges are brought into overlapping engagement. The said edges may then be heat sealed along a longitudinal seam or seal line to complete the tubular formation.

No matter how provided, however, the said tubular strip 21 will be sealed at longitudinally spaced substantially parallel transverse seal lines 27 closely adjacent the respective tear lines 24 to provide the bottom seals of respective bags.

In the diagrammatic FIG. 7, the said transverse seal lines 27 are shown as being provided by a heat sealing bar 103. The said bar 103 has a suitable heat sealing portion 105 thereon. The said heat sealing bar 103 may be elevated to a desired temperature as by resistance electrical members. The heat sealing bar 103 will periodically contact the walls 19 and 20 of the strip 21 thereby heat sealing the said walls together along parallel transverse seal lines 27.

Again, it should be noted that as in the previous steps, this step is shown only schematically and any well known heat sealing means may be substituted therefor.

It is now necessary, however, to separate one of the walls 19 periodically in order to provide a filling opening for each of

the bags, while the said bags are still in a continuous strip. To accomplish the same, there is shown as the final step in FIG. 7, a pair of pressure or draw rollers 109 and 110. The said rollers 109 and 110 will be driven at a carefully controlled speed. Further, they will be biased toward each other so as to exert a controlled pressure upon the said moving tubular strip 21. As will be noted, one of the said rollers 109 is substantially larger than the corresponding roller 110. Assuming that the central shafts of each of the said rollers 109 and 110 are driven at an equal speed of rotation, the periphery of the larger roller 109 will be moving at a greater tangential speed than that of the corresponding smaller roller 110. Assuming further that the said smaller roller 110 is moving at a carefully calculated speed so that the periphery of the said roller will be advancing at the same tangential speed as that of the tubular strip 21, the roller 109 will tend to move one of the walls 19 of the said tubular strip 21 relative to the other. It is well known that thermoplastic materials such as polyethylene are relatively smooth and will tend to slip. Thus, the said wall 19 of the tubular strip 21 in the area of this roller 109 and 110 will move slightly relative to the said opposite wall 20 of the tubular strip 21, thereby causing a tear in the said wall 19. In that there is a weakened line 24 provided in the said wall 19, the wall 19 will tear along the line of weakness 24.

Thus, as each bag length in turn passes by the rollers 109 and 110, one of the walls 19 of the strip 21 will be torn along its lines of weakness. As the tubular strip 21 passes the rollers 109 and 110, it will, therefore, consist of a continuous length of material 20 having sealed thereto discontinuous lengths of material 19 forming individual bags with an opening opposite the heat sealed edge of the bag. Immediately thereafter, the now formed continuous bag strip 21 will be fan folded as at 120 to be held for use. It is desirable to urge the strip 21 into the fan fold 120 in a position closely spaced to that of the pressure rollers 109 and 110 to prevent distortion of the said strip 21. The strip 21 as previously mentioned will have one continuous wall and one discontinuous wall. As most thermoplastic materials will stretch and yield under tension, the continuous wall 20 may distort if there is tension or pressure thereon. To avoid the same, immediate folding is preferable.

There are other ways in which to move one wall of the tubular strip 21 relative to the other wall of the strip in order to separate said wall at its lines of weakness 24, rather than by the use of the two rollers 109, 110 shown in FIG. 7. Such an alternate form is illustrated in FIG. 10 wherein the strip 21 passes along a table 107 formed typically of hard rubber or metal. When each line of weakness 24 in the wall 19 in turn passes by a predetermined location, that is, under an elongated rod 111, the rod is reciprocated transversely of the strip. The rod 111 is connected by a link 113 to a cam wheel 115 fast on a driven shaft 117. The link 113 is rotatably mounted on and offset with respect to the wheel whereby as the wheel 115 rotates, the rod 111 reciprocates. The link is retained in its transversely extending path by a pair of guides 119 on either end thereof. The rod carries, along its bottom surface, a rubber pad 121 which presses the strip against the table 107 and rubs or scuffs the upper wall 19 along a line of weakness 24 in the strip, thereby severing the same but leaving the bottom wall 20 uncut. The guides 119 are mounted on solenoids 121 which lift the rod upwardly away from the strip 21 to permit the strip to advance. When the next line of weakness reaches a location below the rod, the solenoids 121 lower the rod to permit the same to act on said line of weakness.

The weakened lines of severance 24 permit individual bags to be readily severed from the bag strips 21, either by exerting pressure, as by a straight, quick pull, or in any other conventional manner. Prior to severance, each of the individual bags will have a filling opening 130 adjacent the line of severance of that bag from the strip 21.

This makes it possible to fill bags of this type much more expeditiously and economically than is possible in prior art devices. For example, as shown in the diagrammatic FIG. 8, the stack of finished bags 120 may be unfolded in any con-

venient manner, as by a pair of draw rollers 131 and 132. The strip 21 may then pass over a bar 134 so that the one bag length will hang downward. When in that position, the opening 130 in the wall 19 of the bag will be at the top of the bag facing upward. Any convenient hopper 138 may be utilized to fill the said bag. When the bag is filled, it will be torn from the strip 21 and lowered as onto a conveyor belt or the like (not illustrated). Thus, the fan fold stack of bags may be easily filled. Large numbers of bags preformed in a continuous strip of any desired length may be unwound from the stack to facilitate handling, packing, storage and shipping.

Additionally, other means of various types may be utilized to fill and dispense the bags. For example, the strip 21 can be mounted in a suitable dispenser, such as for example, dispensers in which stacks of paper tissues and the like material are mounted and the individual bags severed from a bag strip fan fold as needed.

No matter what be the filling means, however, the essential feature of the invention is the provision of a continuous bag strip having lines of weakness with one of the walls discontinuous thereby providing openings to each of the bags, and the stacking of the bags in a fan fold configuration.

The stacking of the bags in a fan fold configuration is an especially important feature of this invention. It permits the bags to remain in a continuous stack without tension being placed on any but the bags being removed. If, for example, the bags were positioned on a roll or the like, in a continuous strip, tension on one bag would be transmitted rearward to other bags on the roll. However, it will be noted that the finished strip of this invention provides bags interconnected only by perforations through one wall of the bag. In view of the delicate material usually utilized in the fabrication of such bags, it is not considered good practice to place such bag strips in tension for any length of time as they will soon stretch and possibly tear along the line of perforations. Any premature tearing will cause inefficiencies and possibly rethreading of the filling machine.

The fan fold arrangement 120 described herein insures that the major portion of the stack is not under tension at any time. When the bags are unwound, the only tension on the bags not being filled may be due to their own weight, which is usually insignificant. Thus, the fan fold described herein provides a useful adaptation of the invention and insures proper operation thereof.

There is shown in FIG. 9 an alternate embodiment of the invention. The construction of the bags of FIG. 9 is as described hereinbefore except for the provision of a slit partially across the continuous wall of the strip. The line of perforations extending across the continuous wall is broken at the midsection forming a slit 200. This allows a tongue 201 or the like to extend entirely through the unit to hold the same in place as desired.

While there are above disclosed but a limited number of embodiments of the structure and product of the invention herein presented, it is possible to produce still other embodiments without departing from the inventive concept herein disclosed, and it is desired, therefore, that only such limitations be imposed on the appended claims as are stated therein, or required by the prior art.

I claim:

1. A method of forming a continuous strip of like bags, each bag having an open slit mouth, said method including the steps of:

- supplying a continuous length of thin limp flexible thermoplastic material in a tubular form, the length being folded into flattened condition so that the length has an elongated first wall and an elongated second wall, the walls being superimposed;
- advancing the length of material in said folded condition along a path passing through an operative zone;
- periodically weakening the length of material at the operative zone so as to form pairs of similar lines of weakness, one line of each pair being formed in registry

therewith in the other wall, said lines extending transversely of the length of material and being evenly distant a dimension the same as the length of a single bag;

- d. periodically heat sealing one wall of the length of material to the other wall at the operative zone to form evenly distant seal lines extending maximumly transversely of the length of material adjacent the pairs of lines of weakness, each heat seal line constituting the bottom seam for a different bag; and
- e. then passing the length of material between a pair of rollers, the axes of the rollers being substantially parallel to one another and substantially parallel to the lines of weakness and driving the rollers at different peripheral velocities so as to urge one wall of the length of material relative to the other wall whereby to periodically tear only said one wall at each of its lines of weakness thereby to provide an open slit mouth for each bag.

2. A method of forming a continuous strip of like bags, each bag having an open slit mouth, said method including the steps of:

- a. supplying a continuous length of thin limp flexible thermoplastic material in a tubular form, the length being folded into flattened condition so that the length has an elongated first wall and an elongated second wall, the

walls being superimposed;

- b. advancing the length of material in said folded condition along a path passing through an operative zone;
- c. periodically weakening the length of material at the operative zone so as to form pairs of similar lines of weakness, one line of each pair being formed in one of the walls and the other line of each pair being formed in registry therewith in the other wall, said lines extending transversely of the length of material and being evenly distant a dimension the same as the length of a single bag;
- d. periodically heat sealing one wall of the length of material to the other wall at the operative zone to form evenly distant seal lines extending maximumly transversely of the length of material adjacent the pairs of lines of weakness, each heat seal line constituting the bottom seam for a different bag; and
- e. then driving an elongated member transversely of the length of material, said member being in contact with one wall of the length adjacent a line of weakness whereby to periodically tear only said one wall at each of its lines of weakness so as to provide an open slit mouth for each bag.