

[54] **MANUFACTURE OF BAGS WHICH HAVE A RELATIVELY WIDE BASE INCORPORATING A FILLING VALVE**

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[58] Field of Search.....93/8, 33, 35 SB, 36 MM, 58 P

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[57] **ABSTRACT**

A method and apparatus of forming a hinge valve comprising a valve tube and a leaf hinge and incorporating it in a folded

end closure of a bag. The method of attaching the tube to the hinge and adhering the preformed valve to a corner tuck of the end closure before the latter is finally folded utilizes apparatus comprising two pairs of feed rollers rotatable at equal speeds for simultaneously feeding, in superimposed relationship, a first web of material for forming a plurality of leaf hinges and a second web of material for forming a plurality of valve tubes, one pair of the feed rollers being spaced downstream of the other pair with rotary perforating means being disposed upstream of the one pair of feed rollers and extending across the webs for perforating both webs along transverse lines at a spacing equal to the desired length of each valve tube. Direction changing rollers for the second web are disposed between the other pair of feed rollers and the perforating means for laying the second web in a loop of a length such that the second web becomes offset in an upstream direction relative to the first web by a distance substantially equal to half the desired length of each valve tube. An adhesive applicator is positioned within the loop for applying adhesive to the second web beginning at each perforating line therein and extending for a distance substantially equal to half the spacing between adjacent perforating lines, the other pair of feed rollers being effective to bring the webs together and adhesively connect each valve tube length to an underlying length of leaf hinge. Means are provided for feeding bags in which hinge valves are to be incorporated at a predetermined speed, and a folding cylinder downstream of the other pair of feed rollers rotatable at a peripheral speed which is equal to the predetermined bag speed and greater than the peripheral speed of the web feed rollers, for tearing off successive adhesively interconnected valve tube and a leaf hinge lengths, folding each leaf hinge length double, finally forming each hinge valve and feeding successive hinge valves to successive bags, means being provided for applying adhesive to each folded-over leaf hinge portion before the hinge valves are applied to the bags.

4 Claims, 6 Drawing Figures

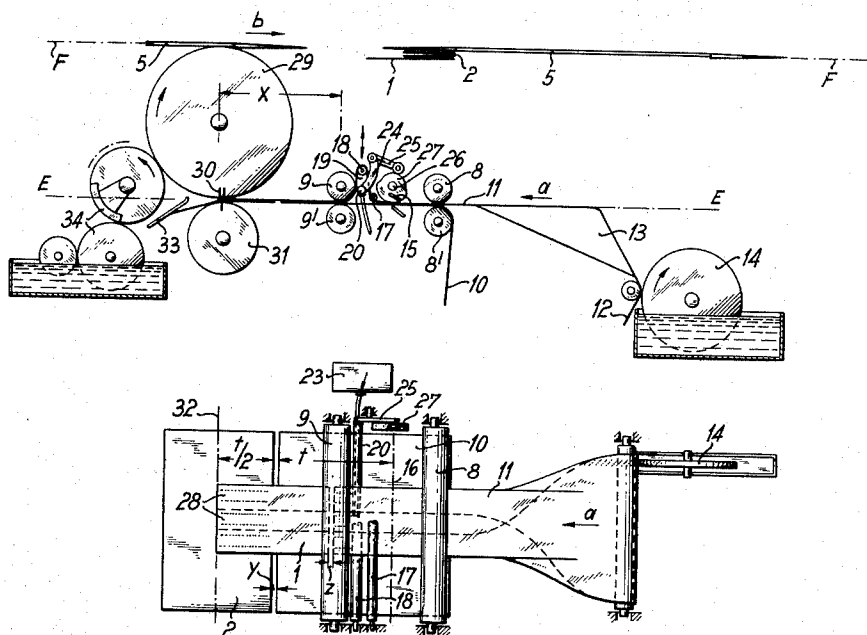


FIG. 1

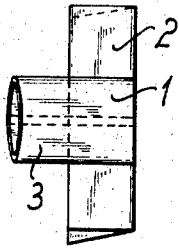


FIG. 2

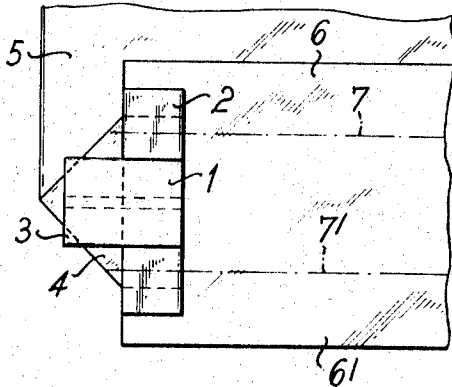
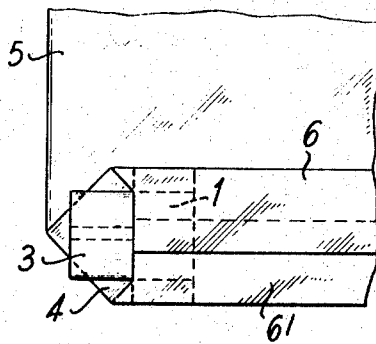


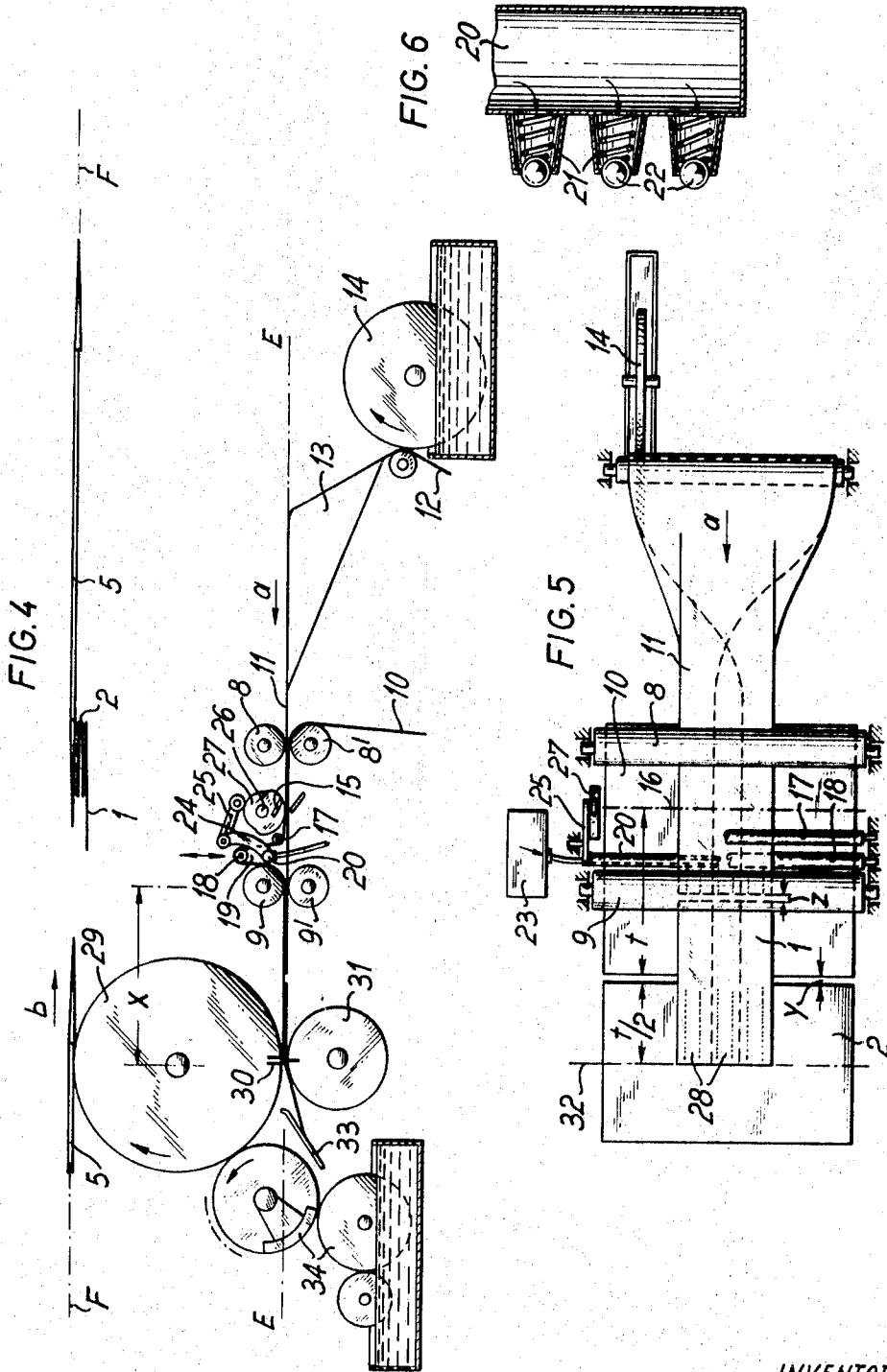
FIG. 3



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**MANUFACTURE OF BAGS WHICH HAVE A
RELATIVELY WIDE BASE INCORPORATING A FILLING
VALVE**

The invention relates to the manufacture of bags which have a relatively wide base incorporating a filling valve which is narrower than the base and is in the form of a so-called hinge valve which comprises a valve tube and, connected thereto, a leaf hinge by which the valve is secured in a folded end closure of the bag. The leaf hinge relieves the folded and stuck end closure from undue stresses, especially during the filling operation, and also forms a pocket into which a projecting end of the valve tube can be inserted after filling.

The formation of the hinge valve and its application to the bag takes place while the end closure of the bag is formed in an end closure laying machine, the latter being equipped with additional operating stations for this purpose. Hitherto, the process has involved taking the leaf hinge, which is a sheet folded double, and adhering its lower leaf to a corner tuck or inward fold of the intended end closure so that the folded edge of the hinge is directed to the interior of the bag, whereupon the valve tube is adhered to the upper leaf of the hinge with one end of the tube flush with the fold line of the hinge.

To carry out this known process it is therefore necessary to provide two additional operating stations in the end closure laying machine, these two additional stations being located in series with the other stations that are required for folding the end closures of the bags. If the bags have large dimensions, this involves a considerable increase in the length of the production line, i.e. of the machine frame and of a conveyor for feeding the bags in order that the two additional operating stations may be accommodated. Since the bags are fed side foremost and the end closure laying machine must therefore be correspondingly wide, the end effect of having two additional operating stations is a considerable increase in the weight of and space taken up by the machine and therefore a considerable increase in the manufacturing costs.

The invention aims to provide a method and apparatus which requires only one additional operating station in the end closure laying machine so that the manufacturing costs and space requirements can be kept to a minimum.

According to the invention, a method of forming a hinge valve comprising a valve tube and a leaf hinge and incorporating it in a folded end closure of a bag comprises first attaching the tube to the hinge and then adhering the preformed valve to a corner of the end closure before the latter is finally folded.

Accordingly, the method of the invention requires only one additional operating station to be interposed in the end closure laying machine, namely a station where the preformed hinge valve is stuck to the still open end closure, because formation of the valve itself can take place independently of the end closure laying machine or in a production line that extends parallel to the production line for the bags.

Since laying of the bases of the bags takes place while the bags are continuously moving through the end closure laying machine, it is advantageous if the hinge valves can also be made continuously in synchronism with the end closure laying machine. For the purpose of continuously forming and applying the hinge valves, the method preferably comprises the following steps, namely, a first web of material for forming a plurality of leaf hinges and a second web of material for forming a plurality of valve tubes are fed in superposed relationship at equal speeds and are simultaneously scored or perforated along transverse lines at equal spacings to define equally long hinge and tube pieces in the respective webs between adjacent score or perforating lines therein, the second web is subsequently lifted off the first web and laid in a loop so that it becomes offset in an upstream direction relatively to the first web by a distance substantially equal to half the length of a tube piece, the concave face of the loop of the second web is provided with adhesive beginning at each score or perforating line therein and extending for a distance substantially equal to half the length of a tube piece, the webs are superposed again whereby the leading half of each tube piece becomes adhe-

sively connected to the trailing half of an underlying hinge piece, the leading half of the underlying hinge piece is folded over transversely onto the trailing half thereof, and the resulting hinge valves are successively torn off the webs and each fed to a bag moving at the same speed as the valve so that the latter is adhered to a corner tuck of the bag by the folded-over half of the hinge piece.

A preferred apparatus for performing the method comprises:

- a. two pairs of feed rollers rotatable at equal speeds for simultaneously feeding in superposed relationship a first web of material for forming a plurality of leaf hinges and a second web of material for forming a plurality of valve tubes, one pair of the feed rollers being spaced downstream of the other pair
- b. rotary perforating means disposed upstream of said one pair of feed rollers and extending across said webs for perforating both webs along transverse lines at a spacing equal to the desired length of each valve tube
- c. direction changing rollers for said second web disposed between said other pair of feed rollers and said perforating means for laying the second web in a loop of a length such that the second web becomes offset in an upstream direction relatively to the first web by a distance substantially equal to half the desired length of each valve tube
- d. an adhesive applicator within the said loop for applying adhesive to said second web beginning at each perforating line therein and extending for a distance substantially equal to half the spacing between adjacent perforating lines, the said other pair of feed rollers being effective to bring the webs together and adhesively connect each valve tube length to an underlying length of leaf hinge
- e. means for feeding at a predetermined speed bags in which hinge valves are to be incorporated and
- f. a folding cylinder downstream of said other pair of feed rollers rotatable at a peripheral speed which is equal to the said predetermined bag speed and greater than the peripheral speed of said web feed rollers, for tearing off successive adhesively interconnected valve tube and leaf hinge lengths, folding each leaf hinge length double and thereby finally forming each hinge valve and feeding successive hinge valves to successive bags, means being provided for applying adhesive to each folded-over leaf hinge portion before the hinge valves are applied to the bags.

Such an apparatus can be of simple construction. It readily permits the continuous formation of tubular valves and their adhesion to the folded end closure of the bags. The simultaneous feeding and perforating of the webs between the two pairs of feed rollers permits the dimensions and shape of the valves to be kept within close tolerances even at high production rates, the folding cylinder ensuring accurate adhesion of the valves to the bags.

The adhesive applicator for applying adhesive to the web of tube material may comprise a pipe extending within the loop transversely to the web. The pipe is provided with a plurality of ball valves facing the web, means, preferably a thrust cam, for pressing the pipe onto the web and withdrawing it again, and an adhesive container for supplying adhesive to the pipe under pressure. With such an applicator, the pipe can be readily accommodated and actuated within the comparatively small loop of web.

An example of the invention will now be described with reference to the accompanying diagrammatic drawings, wherein:

FIG. 1 is a perspective view of a hinge valve;

FIG. 2 is a fragmentary plan view of an open end closure of a bag having the FIG. 1 valve adhered thereto;

FIG. 3 is a fragmentary plan view showing the valved end of the bag ready for use;

FIG. 4 is a side elevation of an apparatus for continuously forming the FIG. 1 valves and incorporating them in the end closures of bags;

FIG. 5 is a plan view of that part of the FIG. 4 apparatus which is concerned with forming the valves, and

FIG. 6 is a longitudinal section through part of an adhesive applicator used in the FIGS. 4 and 5 apparatus.

The hinge valve shown in FIG. 1 comprises a valve tube 1 and a folded leaf hinge 2. These two components are interconnected by adhering the tube to the upper leaf of the hinge so that one open end of the tube lies substantially flush with the folded edge of the hinge and the other end of the tube projects beyond the hinge as shown at 3. The hinge valve is, as illustrated in FIG. 2, stuck by the lower leaf of the hinge 2 onto a corner tuck or infold 4 of a partially folded end closure for a bag 5, the end of the tube that is flush with the fold line of the hinge facing the interior of the bag. By folding over side flaps 6, 6' along respective fold lines 7, 7' which lie beyond the side edges of the tube 1, the hinge valve is incorporated in the base folds of the bag in the manner shown in FIG. 3 so that the tube portion 3 projects sideways from the end closure of the bag to serve as a filling end.

Apparatus for continuously making and applying such hinge valves is illustrated in FIGS. 4 and 5. It comprises two spaced pairs of feed rollers 8, 8' and 9, 9' for uniformly feeding a lower web 10 of material for forming the hinges 2 and a centrally superposed web 11, the webs being moved in the direction of the arrow *a*. The web 10 is preferably a single layer of paper or plastic. It is unwound from a supply reel (not shown) in conventional manner. The web 11 is either a film of plastic material that has been extruded in tubular form or, as indicated in FIG. 4, a flattened tube made from a paper or plastic sheet 12 which is continuously shaped to tubular form by an apparatus 13 and the overlapping longitudinal edges of which are interconnected by adhesive that is applied continuously with the aid of an applicator 14.

Upstream of the feed rollers or between the two pairs of feed rollers a perforating apparatus 15 simultaneously provides transverse perforations 16 to both the webs 10 and 11 along lines which are spaced from one another by a distance *t*. This causes both the webs to be sub-divided into equally long pieces but these pieces are still interconnected and form parts of the respective webs. The spacing *t* corresponds to the desired length of the tube 1 of the hinge valve.

Between the pairs of feed rollers and downstream of the perforating apparatus 15 direction changing rollers 17 and 18 are provided for the web 11. These continuously lift the web 11 from the web 10 and cause it to form a loop 19. The total length of the loop 19 is set, by adjusting the roller 18 in the direction of the arrows shown in FIG. 4, so that it is substantially equal to half the spacing *t* of the transverse perforations 16. As a result of the detour that is made by the web 11 in forming the loop 19, the web 11 becomes offset relatively to the web 10 which continues to move in a straight line, the extent of offsetting being substantially equal to half the spacing *t* and its direction being upstream of the webs. The tubes 1 defined between successive transverse perforations 16 are thus likewise offset by half their length relatively to the underlying pieces of hinge-forming material so that the leading half of each hinge-forming piece is overlapped by the trailing half of each length of tube 1.

Within the loop 19 there is a pipe 20 which, as shown in FIG. 6, is equipped with a set of ball valves 21 of which the balls 22 partly project from associated housings in a manner similar to the balls of ball pens. The pipe 20 is closed at one end and its other end communicates with a vessel 23 for adhesive under pressure. The adhesive is supplied to the balls 22 but the pressure causes the latter to remain closed unless a force is applied to overcome the action of associated springs. The pipe 20 is fixed to the free end of a lever 24 which is pivoted in the machine frame through the action of a cam follower 25 which co-operates with a cam 27 mounted on a shaft 26 of the perforating apparatus 15. The cam 27 is driven in synchronism with a drive for the feed rollers. The pipe 20 is so mounted on the lever 24 that the ball valves are directed towards the web 11 within the loop 19. The cam 27 is formed so that the ball valves of the pipe 20 will be applied to the web 11 at one of the transverse perforating lines 16 and not be lifted off again until the web 11 has traversed a distance equal

to substantially half the spacing *t*. By applying the balls 22 at a position where the web 11 is backed by the feed roller 9, the valves 21 will be opened against the spring force and adhesive will be applied in the form of strips 28 (FIG. 5) to each leading half of the tubes 1.

Pairs of feed rollers are followed by a folding cylinder 29 which is tangential to a plane E—e in which the webs 10 and 11 are moved and also tangential to a plane F—f in which bags 5 are conveyed in an end closure laying machine for the bags. The cylinder 29 has a peripheral speed equal to the speed of the bags 5 which travel in the direction of the arrow *b*, this bag speed being greater than the peripheral speed of the feed rollers 8, 8', 9, 9'. At its periphery, the cylinder 29 is provided with one or more folding tongs 30 co-operating with a cylinder 31 which carries a folding edge. The rotary speeds of the cylinders 29 and 31 and of the feed rollers 8, 8', 9, 9' as well as the spacing *x* of the downstream pair of feed rollers from the cylinders 29, 31 are selected so that the leading half of each hinge piece 2 at the edge of the tube 1 lying thereon is pressed into one of the tongs 30 of the cylinder 31 and thereby folded transversely along a fold line 32 and clamped together with the tube 1. The folding equipment 29—31 for the leaf hinge is associated with a guide plate 33 which, as shown in FIG. 4, lays the leading half of the length of leaf hinge onto the trailing half. Immediately downstream of the folding cylinder 29 and guide plate 33 means 34 are provided for applying adhesive to the folded-over half of the hinge that is being fed by the folding cylinder 29.

The webs 10 and 11 are symmetrically superposed and are fed by their feed rollers at a speed which, as already indicated, is lower than the speed of the bags 5 in the end closure laying machine, the respective speeds being chosen so that one hinge valve is fed for each bag 5.

It will now be evident that the cylinder 29 causes each hinge valve that is engaged thereby to be torn along a line of perforations 16 from the two webs 10 and 11, this torn condition being shown in FIG. 5 by the respective gaps *y* and *z*. The cylinder 29 is also effective to apply each severed hinge valve to the trailing end of one of the bags 5, the adhesive that was applied to the folded-over half of the leaf hinge by the means 34 resulting in the hinge valve being stuck to the end closure of the bag in the manner illustrated in FIG. 2, the end closure still being open and being directed downwardly.

What is claimed is:

1. A method of forming a hinge valve comprising a valve tube and a leaf hinge and incorporating it in a folded end closure of a bag comprising the steps of feeding a first web of material for forming a plurality of leaf hinges and a second web of material for forming a plurality of valve tubes in superimposed relationship at equal speeds, simultaneously perforating said first and second webs of material along transverse lines at equal spacings to define equally long hinge and tube pieces in the respective webs between adjacent perforating lines therein, subsequently lifting said second web off the first web, positioning said second web in a loop so that it becomes offset in an upstream direction relative to the first web by a distance substantially equal to half the length of a tube piece, providing the concave face of the loop of said second web with adhesive beginning at each perforating lines therein and extending for a distance substantially equal to half the length of a tube piece, superimposing said webs again so that the leading half of each tube piece becomes adhesively connected to the trailing half of an underlying hinge piece, folding the leading half of said underlying hinge piece transversely over onto the trailing half thereof, successively tearing the resulting hinge valves off the webs and feeding each to a bag moving at the same speed as the valve so that the latter is adhered to a corner tuck of the bag by the folded-over half of the hinge piece.

2. Apparatus for forming a hinge valve comprising a valve tube and a leaf hinge and incorporating it in a folded end closure of a bag comprising:

- a. two pairs of feed rollers rotatable at equal speeds for simultaneously feeding in superimposed relationship a first web of material for forming a plurality of leaf hinges and a second web of material for forming a plurality of valve tubes, one pair of the feed rollers being spaced downstream of the other pair, 5
- b. rotary perforating means disposed upstream of said one pair of feed rollers and extending across said webs for perforating both webs along transverse lines at a spacing equal to the desired length of each valve tube, 10
- c. direction changing rollers for said second web disposed between said other pair of feed rollers and said perforating means for laying the second web in a loop of a length such that the second web becomes offset in an upstream direction relative to the first web by a distance substantially equal to half the desired length of each valve tube, 15
- d. an adhesive applicator is positioned within the loop for applying adhesive to said second web beginning at each perforating line therein and extending for a distance substantially equal to half the spacing between adjacent perforating lines, the said other pair of feed rollers being effective to bring the webs together and adhesively connect each valve tube length to an underlying length of leaf hinge, 20

- e. means for feeding bags in which hinge valves are to be incorporated at a predetermined speed, and
 - f. a folding cylinder downstream of said other pair of feed rollers rotatable at a peripheral speed which is equal to said predetermined bag speed and greater than the peripheral speed of said web feed rollers, for tearing off successive adhesively interconnected valve tube and leaf hinge lengths, folding each leaf hinge length double and finally forming each hinge valve and feeding successive hinge valves to successive bags, means being provided for applying adhesive to each folded-over leaf hinge portion before the hinge valves are applied to the bags.
3. Apparatus according to claim 2, wherein the adhesive applicator comprises a pipe extending within the loop transversely to the said second web, the pipe being provided with a plurality of ball valves facing the said second web, means for pressing the pipe onto the second web and withdrawing it again, and an adhesive container for supplying adhesive to the pipe under pressure.
4. Apparatus according to claim 3, wherein the pipe is carried at an end of a lever which is pivotable by a cam follower co-operating with a cam which is rotatable in synchronism with a drive for said feed rollers.

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