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Brockmüller

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[54] **PROCESS FOR MANUFACTURING BAGS COMPRISING A LINER BAG WHICH PROTRUDES FROM THE OPENING**

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[21] Appl. No.: **90,333**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 790,579, Jan. 13, 1969, Pat. No. 3,576,154.

[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** .....**93/35 R,** 93/8 W

[51] **Int. Cl.** **B31b 49/04**

[58] **Field of Search** .....93/35, 8 WA, 33, 36 MM, 93/36.01, 58 P, 77 CC, 84 TW

[56] **References Cited**

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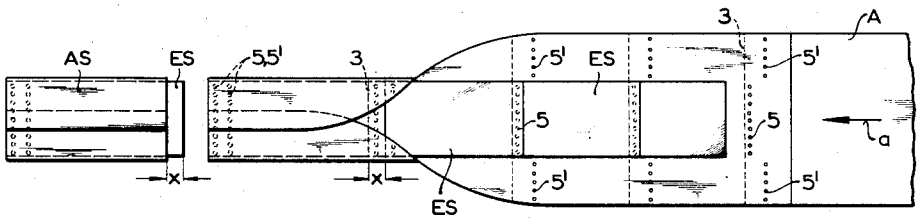
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[57] **ABSTRACT**

A method of manufacturing bags consisting of at least a single ply outside bag and a liner bag which extends at the filling end out of the outside bag. A web of material for the outside bag is divided by transverse perforations into specific outside bag lengths still attached to each other and pieces corresponding to the length of the inner bag are cutoff from a web of liner bag material. The individual liner bag pieces are placed in a sequence on the web of the outside bag material and the web of the outside bag material is wrapped around pieces of the inner bag in a tube shape. The transverse perforations are then torn into lengths of tube and the lengths of tube are fed into a bottom closing machine.

11 Claims, 8 Drawing Figures

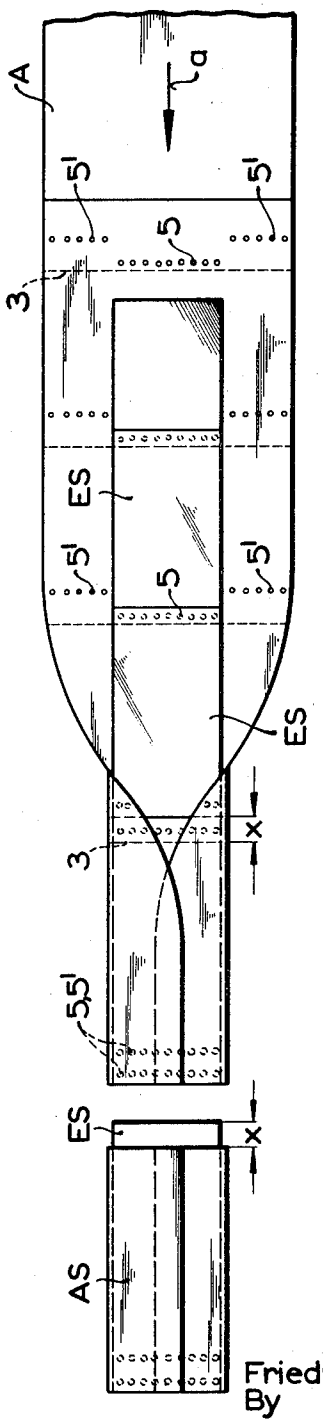


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SHEET 1 OF 5

FIG.1



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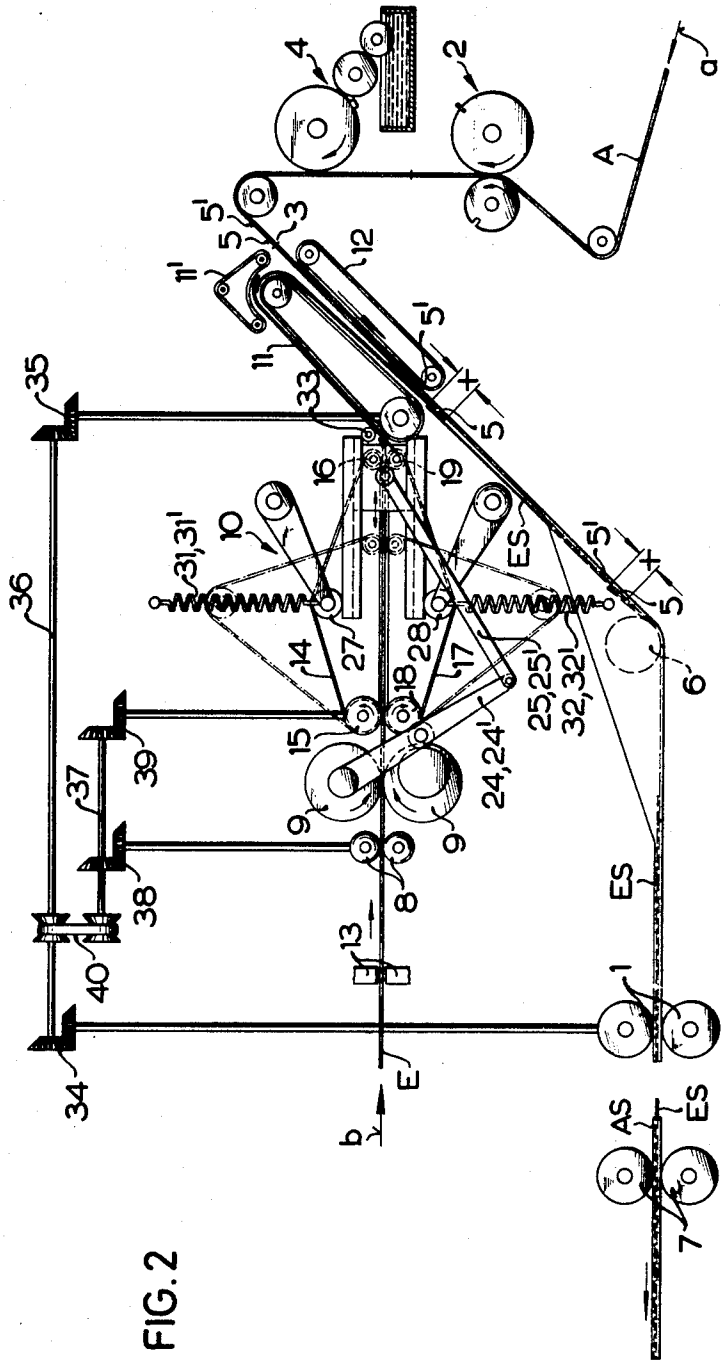


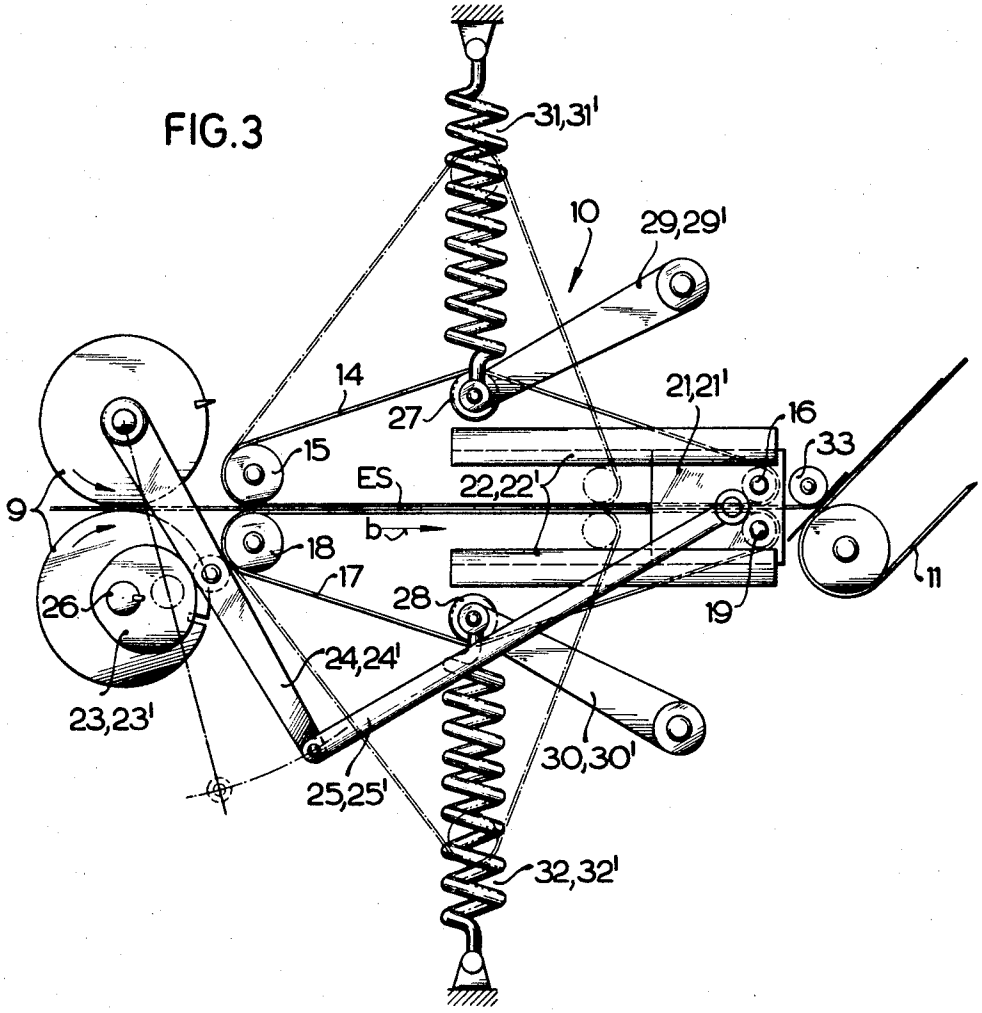
FIG. 2

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FIG.3



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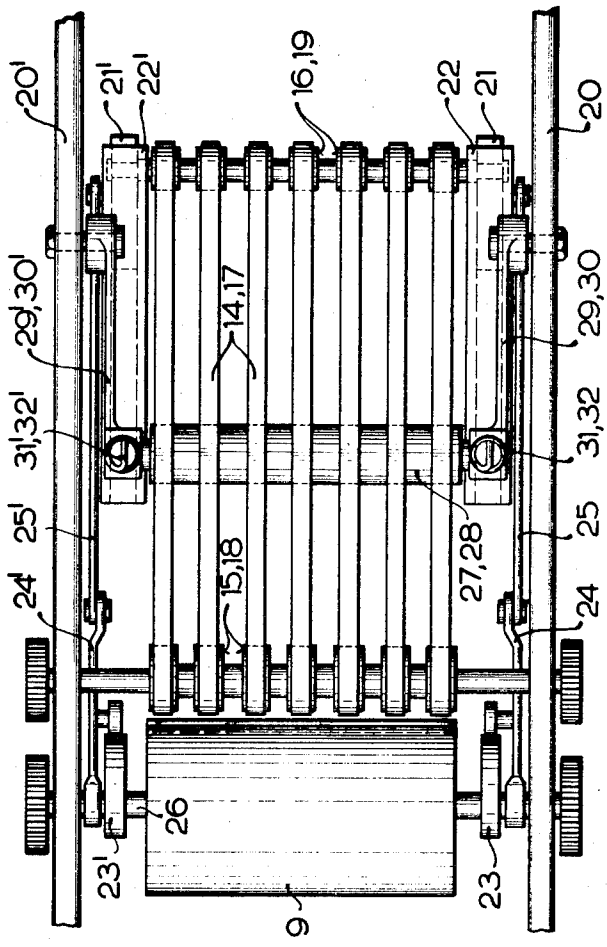


FIG. 4

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FIG.5

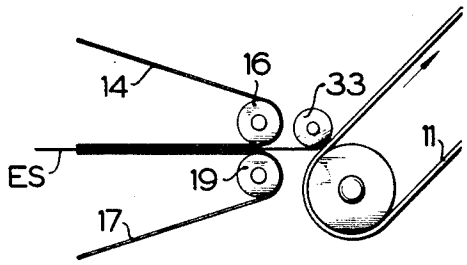


FIG.6

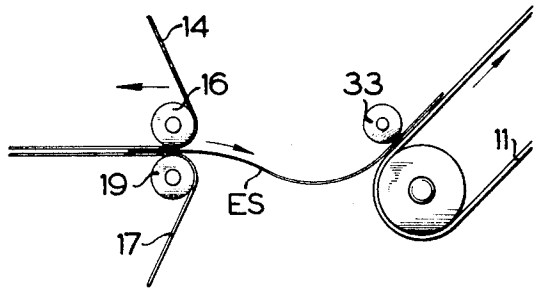


FIG.7

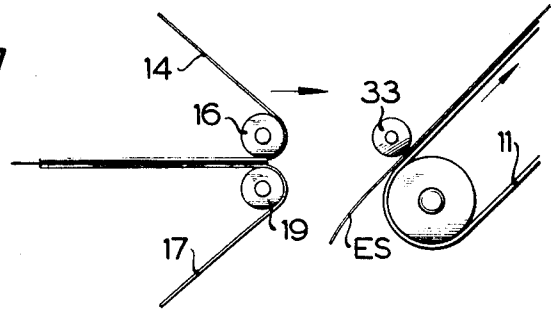
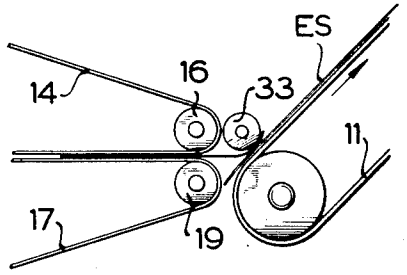


FIG.8



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PROCESS FOR MANUFACTURING BAGS COMPRISING A LINER BAG WHICH PROTRUDES FROM THE OPENING

This application is a continuation-in-part of U.S. application Ser. No. 790,579 filed Jan. 13, 1969, now U.S. Pat. No. 3,576,154 issued Apr. 27, 1971.

Bags which comprise so-called liner bags are used for packaging delicate bulk materials, and are for example hygroscopic or tend to dust off substances which are deleterious to health. The liner bags consist preferably of gas- or vapor- tight materials, particularly of plastic material sheeting, and in most cases have tightly adhered or heat-sealed seams to ensure a hermetic seal of the delicate contents from the atmosphere and contaminations. The wrapper bag which encloses the liner bag consists of strong paper. It protects the liner bag from damage and allows the liner bag to be made from thin, inexpensive sheeting.

In many cases, the liner bag is longer than the wrapper bag and its filling end protrudes from the wrapper bag. When the liner bag has been filled, it can be carefully sealed at said protruding end, for example, by a heat-sealed seam. The sealed filling end is then pushed or rolled up into the wrapper bag, which is subsequently closed, for example, by a stitched transverse seam or by folding its end portion.

In the previous practice, the wrapper and liner bags have been made separately and the liner bag has been inserted into the wrapper bag by hand with its closed end leading. This manual work is time-consuming and must be performed by two workers where the bags are large in size.

The present invention enables the manufacture of bags having a liner bag in an automatic, continuous operation.

According to the invention, the wrapper bag web consists in known manner of two or more transversely staggered plies, such as paper, and is divided into predetermined wrapper bag lengths by transverse perforation lines. The liner bag web preferably consists of plastic material sheeting and is cut into pieces corresponding to the length of the liner bag. In one embodiment of the invention these pieces are caused to overlap in the direction of travel to the extent by which the liner bag is to protrude from the wrapper bag. While the overlap is retained, the liner bag pieces are fed to the wrapper bag web and are tacked at their leading end to the wrapper bag web with glue dots so that their leading ends are aligned with the transverse perforation lines of the wrapper bag web or spaced a predetermined distance behind said perforation lines in the direction of travel. It has also been found that the invention can successfully be used without glue spots being applied or without the corresponding gluing station. Thereafter, the wrapper bag web is formed into a tube, which encloses the adhesively tacked liner bag pieces and is torn at the transverse perforation lines to form individual tube sections, which are fed to any desired and known end-closing machine.

When the transverse perforation line is being torn, the liner bag which is in the wrapper bag tube participates in the movement of the latter and easily slips from the overlapping succeeding liner so as to protrude from the wrapper bag tube to the extent of the previous overlap. It has been found that the liner bag pieces can

be applied to the web of outside bag material in such a manner that their forward edges lie at a considerable distance as seen in the direction of conveyance behind the crosswise perforations of the web of outside bag material, this distance for equal lengths of liner bag and outside bag being equal to the length of inner bag extending out of the outer bag so that there is no overlapping of the liner bag piece on the web of outside bag material. Such overlapping does occur however when the liner bag is longer than the outside bag.

The liner bag material preferably consists of a plastic material sheeting, in the form of a seamless extrusion. In a development of the invention, the tube sections of plastic material sheeting may be sealed at their leading edge by heat sealing before they are fed to the wrapper bag web. This method ensures that the liner bag will be perfectly tight.

The liner bag material may also be processed in the form of a single wide web of sheeting. In this case, the liner bag tube is formed in accordance with the invention at the same time as the wrapper bag tube. The longitudinal and transverse seams which are required can be formed by adhering or heat sealing during the formation of the tube.

The wrapper bag tube may be closed at its leading end by a stitched transverse seam, which also closes the leading end of the liner bag tube. This practice eliminates the need for separate seams for closing said tube end.

According to the invention, the apparatus for carrying out the process comprises known means for feeding single-ply or multi-ply tubing for the wrapper bags and known means for feeding and cross-cutting liner bag webs or tubings. The feeding wrapper means can have associated with it a known transverse perforator and a glue applicator for applying glue dots to the wrapper bag web. The perforator and glue applicator when utilized precede the tube-laying device in the direction of travel and a known tear-off device succeeds the tube-laying device. The liner means can be succeeded by an apparatus for overlapping the pieces which were cut from the liner bag web or tubing. A conveyor revolves at the speed of travel of the wrapper bag web and places the series of liner bag pieces on the wrapper bag web, the arrangement of the conveyor being such that the liner bag pieces are applied to the wrapper bag web between the transverse perforator and the glue applicator, on the one hand, and the tube-laying device, on the other hand.

The overlapping of pieces which have been cut from the liner bag web may be effected with known apparatus, such as are used for shingling the bags which are delivered by bag-making machines. These known apparatus are not suitable for highly flexible, thin sheetings and for this reason can be used only with limitations in the present process.

The apparatus which serves to overlap or position the pieces which have been cut from the liner bag web is capable of overlapping or positioning highly flexible, thin materials with high accuracy and reliability. This apparatus comprises a double belt conveyor, which is disposed between the guillotine and the conveyor for supplying the cut-off pieces to the wrapper bag web. The conveyor comprises upper and lower conveyor belts, which revolve at a higher speed than the succeed-

ing conveyor, the double belt conveyor comprising a pair of delivery belt pulleys for delivering the pieces to the succeeding conveyor. The belt pulleys are forwardly and rearwardly movable in the direction of travel in synchronism with the machine cycle while the belt tension is maintained by tensioning rollers. The tensioning rollers engage the two outer courses of the belts, whereby the preceding end of the pieces is threaded into the succeeding conveyor, which moves at a lower speed, and the trailing end is prematurely released.

The free trailing end of the piece which is now moving at a lower speed descends by gravity out of the path of the piece which succeeds at a higher speed. The latter piece is moved by the advancing belt pulleys beyond the trailing end and is threaded into the succeeding conveyor before the trailing end has been received by the succeeding conveyor. The resulting overlap, lack of overlap or positioning depends on the difference between the speed of the double belt conveyor and of the succeeding conveyor.

To enable an adjustment of the overlapping apparatus to the various bag sizes included in the manufacturing program, it is a development of the invention to provide an infinitely variable transmission, which connects the drive means for feeding the wrapper bag web to the double belt conveyor and the pair of feed rolls for the liner bag web. For each size of bag, the infinitely variable transmission permits a simple and exact adjustment of the length of the liner bag and the distance by which the liner bag protrudes from the wrapper bag.

According to the invention, the pair of belt pulleys at the delivery end of the double belt conveyor are mounted in lateral carriages, which are displaceable parallel to the plane of travel of said conveyor and which are reciprocated in synchronism with the machine cycle by pusher cams mounted on the cutter shaft of the guillotine.

The use of the described overlapping device is not restricted to the present process but may be used alone for shingling any other flat workpieces, as for example, in the formation of stacks of workpieces.

The invention will now be explained more fully with reference to the drawing, in which

FIG. 1 is a diagrammatic top plan view illustrating the process steps.

FIG. 2 is a diagrammatic side elevation showing an apparatus for carrying out the process.

FIG. 3 is an enlarged side elevation showing the apparatus for overlapping the liner bags.

FIG. 4 is a top plan view showing the overlapping apparatus according to FIG. 3.

FIGS. 5 to 8 show four different phases of the overlapping operation.

The apparatus shown in FIG. 2 and serving to carry out the process comprises a known tube-laying device 6 for processing the wrapper bag web A. The device 6 comprises a pair of feed rolls 1, which are optionally preceded by known glue applicators, which are not shown in the drawing and serve to apply glue for the adhered seams of the wrapper bag tube, and a known guillotine 9 having associated with it a pair of feed rolls 8 and serving to cut off pieces of liner bag web or tube pieces ES from the liner bag web E. According to the invention the tube-laying device 6 is preceded in the direction of travel by a known transverse perforator 2 for producing transverse perforation lines 3 in the web A, and an optional glue applicator 4 for applying glue dots 5, 5' to said web. The tube-laying device 6 is succeeded by a known tearing device 7, which tears off individual wrapper bag tubes AS from the web A along the transverse perforation lines 3. The guillotine 9 is succeeded according to the invention by an apparatus 10, which will be described more fully hereinafter and serves to overlap or sequentially place the liner bag web or tube pieces ES, which have been cut from the web or tubing E, and a conveyor 11, 11' and 33, preferably a belt conveyor, which comprises a back-pressure belt 12 and revolves at the speed of travel of the wrapper bag web A and supplies the latter with the cut-off web or tube pieces ES.

The wrapper bag web A which can consist of one or more paper plies which have staggered longitudinal edges is withdrawn by the pair of feed rolls 1 at a uniform speed from one or more supply rolls, which are not shown on the drawing, and moves in the direction *a* initially through the perforator 2, in which it is provided with transverse perforation lines 3, which are spaced by the length of the wrapper bag tubes. Thereafter, the web moves through the optional glue applicator 4, which applies glue dots 5 to the inside surface of the web at points which are spaced in the direction of travel *a* behind the transverse perforation lines 3.

The wrapper bag web A then moves through the tube-laying device 6, where it is formed into a tube, and finally the tear-off device 7, which tears the individual bag tubes AS from the web A along the transverse perforation lines 3.

In an embodiment shown by way of example, the liner bag web E consists of a seamless extruded tubing of plastics material. The web E is withdrawn by the pair of feed rolls 8 at a uniform speed by a supply roll, which is not shown on the drawing, and is cut into individual tube sections ES by the guillotine 9. The length of these tube sections can be approximately the same as the length of the outer bag tubes AS plus the distance *x* (FIG. 1) by which the liner bag tube ES should protrude from the wrapper bag tube AS. The liner bag tubes ES are subsequently overlapped by the device 10 by said amount *x* and are delivered to the belt conveyor 11, which feeds it to the wrapper bag web A in synchronism therewith while the overlap *x* is maintained, and places the tubes ES on the inside surface of the web A between the glue applicator 4 and the tube-laying apparatus 6 and in such a manner that the leading ends of the tube sections lie on the glue dots 5. The pressure-applying belt 12 ensures that the tube sections ES will be tacked to the wrapper bag web A.

In the present invention the liner bag pieces or tubes ES can be placed on the web of the outside wrapper bag web A in any desired sequential manner. One such variant within the scope of the invention is to place the liner bag pieces ES on the wrapper bag web A so that their forward edges are flush with the crosswise perforations 3 of the web of outer bag material A.

The tube sections ES then move together with the wrapper bag web A through the tube-laying device 6, which lays the wrapper bag web A about the liner bag

tubes ES. The tear-off device finally tears the individual bag tubes AS along the transverse perforation lines 3 from the web A, which has been laid to form a tube. During this tear-off operation, the associated liner bag tube ES slips easily away from the succeeding tube and protrudes from the wrapper bag tube AS.

The interfitting tubes AS, ES are subsequently sealed in a known manner at their leading end by a transverse seam or a folded end closure.

If a folded end closure, as for example, a folded crossed end closure, is to be formed, it may be desirable to use the glue applicator 4 to apply the glue dots 5 as well as further glue dots 5' to the side portions of the wrapper bag web A, which side portions are subsequently reversely folded in the tube-laying device 6 to the liner bag material. The liner bag tube ES is then tacked by the glue dots 5, 5' to the outer bag tube AS on all sides and will reliably open when the outer bag tube is subsequently pulled open at its bottom end in the succeeding end closure-forming device.

The interfitting tubes AS, ES may be jointly closed by transverse stitched seams at their preceding ends.

If the tightness of the liner bag is to meet high requirements, the same should be sealed in known manner at its leading end by a transverse heat-sealed seam before it is applied to the wrapper bag web. The heat sealing device 13 used for producing this transverse seam is of known type and as shown in FIG. 2 preferably precedes the guillotine 9.

According to FIGS. 3 and 4, the apparatus 10 for sequentially arranging the liner bag tube pieces ES comprises a double belt conveyor having an upper conveyor belt 14, which revolves about the belt pulleys 15 and 16, and a lower conveyor belt 17, which revolves about the belt pulleys 18 and 19. The arrangement of the belt pulleys is such that adjacent courses of the belts 14 and 17 contact each other in the plane in which the tubes ES are conveyed and these courses move in the direction of travel *b* of the tubes ES. The pair of belt pulleys 15 and 18 at the receiving end are mounted in fixed position in the machine frame 20 and 20'. The pair of belt pulleys 16 and 19 at the delivery end are mounted in lateral slots 21, 21', which are displaceable in lateral guides 22,22' which are parallel to the plane in which the tubes ES are conveyed. By the pusher cams 23, 23', the carriages 21, 21' are reciprocated with the aid of the roller-carrying follower levers and the pull rods 25, 25'. The pusher cams 23, 23' are carried by the cutter shaft 26 of the cross-cutter 9 so that the carriages 21, 21' are reciprocated in synchronism with the cycle of the apparatus. The two outer courses of the belt conveyors 14 and 17 are engaged by tension rollers 27 and 28, which are guided by the lateral links 29, 29' and 30, 30' and tensioned by the springs 31, 31' and 32, 32'. The tension rollers 27 and 28 ensure that a uniform tension of the conveyor belts 14 and 17 will be maintained when the pair of belt pulleys 16 and 19 at the delivery end are reciprocated by the carriages 21, 21'.

The arrangement of the double belt conveyor 14 and 17 is such that the pair of belt pulleys 16 and 19 at the delivery end are disposed in its outermost, right-hand dead center position as close as possible to the delivery end of the belt conveyor 11 and a draw-in roll 33 associated with the conveyor 11.

As is apparent from FIG. 2, the pair of feed rolls 1 for advancing the wrapper bag web A and the belt conveyor 11 for feeding the liner bag webs ES to the latter are driven by means of the bevel gear trains 34 and 35 from the driving shaft 36 of the apparatus. The pair of feed rolls 8 for advancing the liner bag tubing E and the double belt conveyor 14 and 17 for overlapping the liner bag tubes ES are driven from the countershaft 37 by means of the pairs of bevel gears 38 and 39. The countershaft 37 is connected to the driving shaft 40 by the infinitely variable gear 40, which permits an arbitrary change of the speed at which the liner bag tubes ES are conveyed relative to the wrapper bag web A.

If, for example, the liner bag should protrude from the wrapper bag by 10 percent of the length of the latter and the length of the wrapper bag tube ES exceeded the length of the outer bag tube AS by 10 percent, the liner bag web E is conveyed at a speed which is 10 percent higher than the speed at which the wrapper bag web A is conveyed to achieve the overlap *x* of the liner bag tubes. The latter speed is adjusted by means of the infinitely variable transmission 40.

The liner bag tubing E is fed by the pair of feed rolls 8 at the above-mentioned higher speed of travel and is cut by the guillotine 9 into tube sections ES, which are gripped by the double belt conveyor 14 and 17 and fed at the higher speed of travel to the conveyor belt 11, which revolves at the lower speed of travel of the wrapper bag web A. At the time when the tube sections are transferred to the conveyor belt 11, the carriage 21, 21' and the pair of belt rollers 16 and 19 are in its righthand dead center position, which is shown in solid lines in FIG. 2. The leading end of the tube section ES emerges from the belt pulleys 16 and 19 and by the latter is threaded into the conveyor 11 and 33, as is shown in FIG. 5. The tube section ES is then moved by the conveyor 11 and 33 at the lower speed of travel of the latter. During that time, the carriage 21, 21' carrying the pair of belt pulleys 16 and 19 is moved to its left-hand dead center position so that space is afforded for the sagging (FIG. 6) of the tube section ES which is advanced at its leading end at the lower speed and at its trailing end at the higher speed, by the double belt conveyor 14 and 17. Due to said sagging, the trailing end portion of the tube is lowered as soon as it has emerged from the double belt conveyor 14 and 17 (FIG. 7). The pair of belt pulleys 16 and 19 are then quickly returned to its right-hand dead center position to thread the leading end of the succeeding tube section from the double belt conveyor 14 and 17 into the succeeding conveyor so that said succeeding tube section can overlap that end of the tube section which has not yet been drawn in by the conveyor 11 and 33 (FIG. 8). The distance of the resulting overlap or of the sequential placement will depend on the difference of the speeds of travel of the double belt conveyor 14 and 17 and the conveyor 11 and 33.

While the preferred embodiment of the invention has been disclosed, it is understood that the invention is not limited to such an embodiment since it may be otherwise embodied in the scope of the appended claims.

What is claimed is:

1. A method of manufacturing bags consisting of at least a single ply outside bag and a liner bag, which extends at the filling end out of the outside bag, compris-

ing the steps of dividing a web of material for the outside bag by transverse perforations into specific outside bag lengths still attached to each other, cutting off pieces corresponding to the length of the liner bag from a web of liner bag material, forming a sequence of individual liner bag pieces, placing said sequence of liner bag pieces on the previously perforated web of the outside bag material in such a way that the trailing end of the liner bag pieces overlaps a transverse perforation by the amount of extension of the liner bag out of the outside bag at the filling end, wrapping the web of outside bag material around the thus applied sequence of individual pieces of liner bag into a flat tube shape, tearing the foremost bag length from the web of outside bag material along the transverse perforations, the associated liner bag tube by this tear-off operation slipping with its trailing overlapping end out of the succeeding outside bag length and thus extending out of the torn off outside bag at the filling end and feeding the lengths of tube to a bottom-closing machine.

2. A method according to claim 1, wherein said bottom-closing machine is a bottom-making machine.

3. A method according to claim 1, wherein the pieces cut off from the web of liner bag material are moved over each other in direction of conveyance to such an extent that they form a sequence of individual overlapping liner bag pieces; the amount of the mutual overlap being equal to the amount by which the liner bag pieces are longer than the outer bag lengths.

4. A method according to claim 1, wherein the length of the liner bag pieces is such that their forward edges lie at a given distance behind the crosswise perforations of the web of outer bag material, as viewed in the direction of conveyance, when placed on the web of outer bag material.

5. A method according to claim 3, wherein the liner bag pieces are placed on the web of outer bag material so that their forward edges are flush with the transverse perforations of the web of outer bag material.

6. A method according to claim 1, wherein the liner bag pieces are glued at their front end to the web of outer bag material by means of glue spots.

7. A method according to claim 1, wherein the liner bag web is a tubing.

8. A method according to claim 3, wherein the liner bag pieces are closed by heat sealing at their leading edge before they overlap.

9. A method according to claim 5, wherein the wrapper bag tube is closed at its preceding end by a transverse stitched seam, said transverse stitched seam also closing the leading end of the liner bag tube.

10. A method according to claim 1, wherein the liner bag web consists of a simple sheeting web which is formed into the liner bag tube in conjunction with the formation for the wrapper bag tube, with longitudinal and transverse seams being formed therein by adhering during the formation of the tube.

11. A method according to claim 10, wherein the adhering is heat sealing.

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