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A. J. JONES

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MANUFACTURE OF PAPER OR LIKE BAG TUBES OR BAGS

Filed Aug. 15, 1934

2 Sheets-Sheet 1

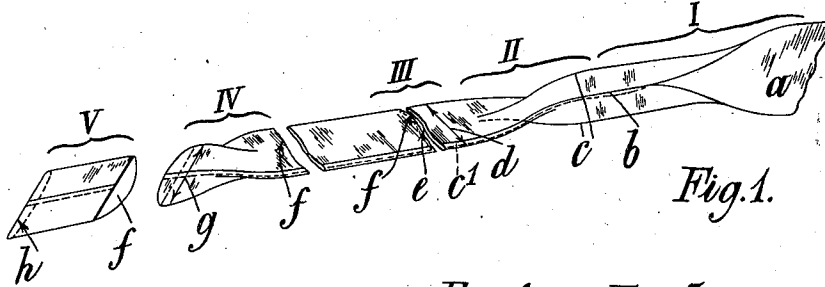


Fig. 1.

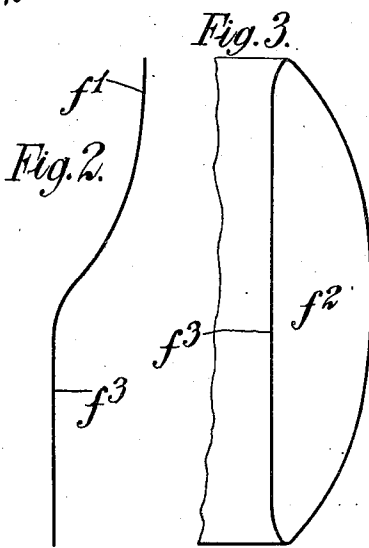


Fig. 2.

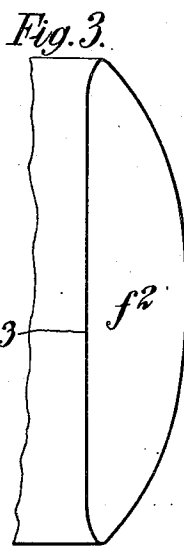


Fig. 3.

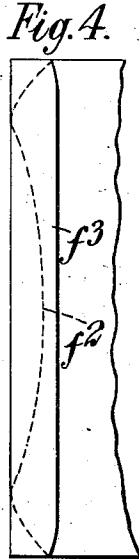


Fig. 4.

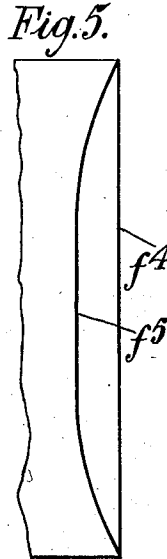


Fig. 5.

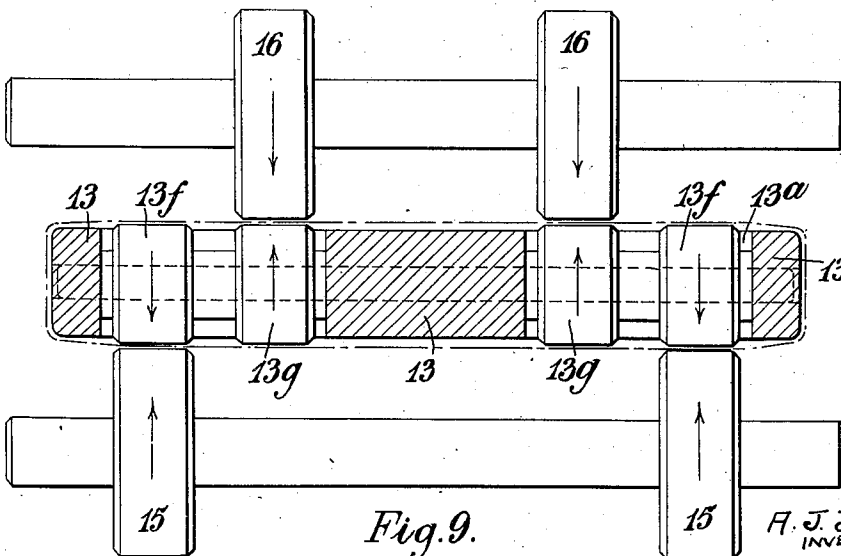


Fig. 9.

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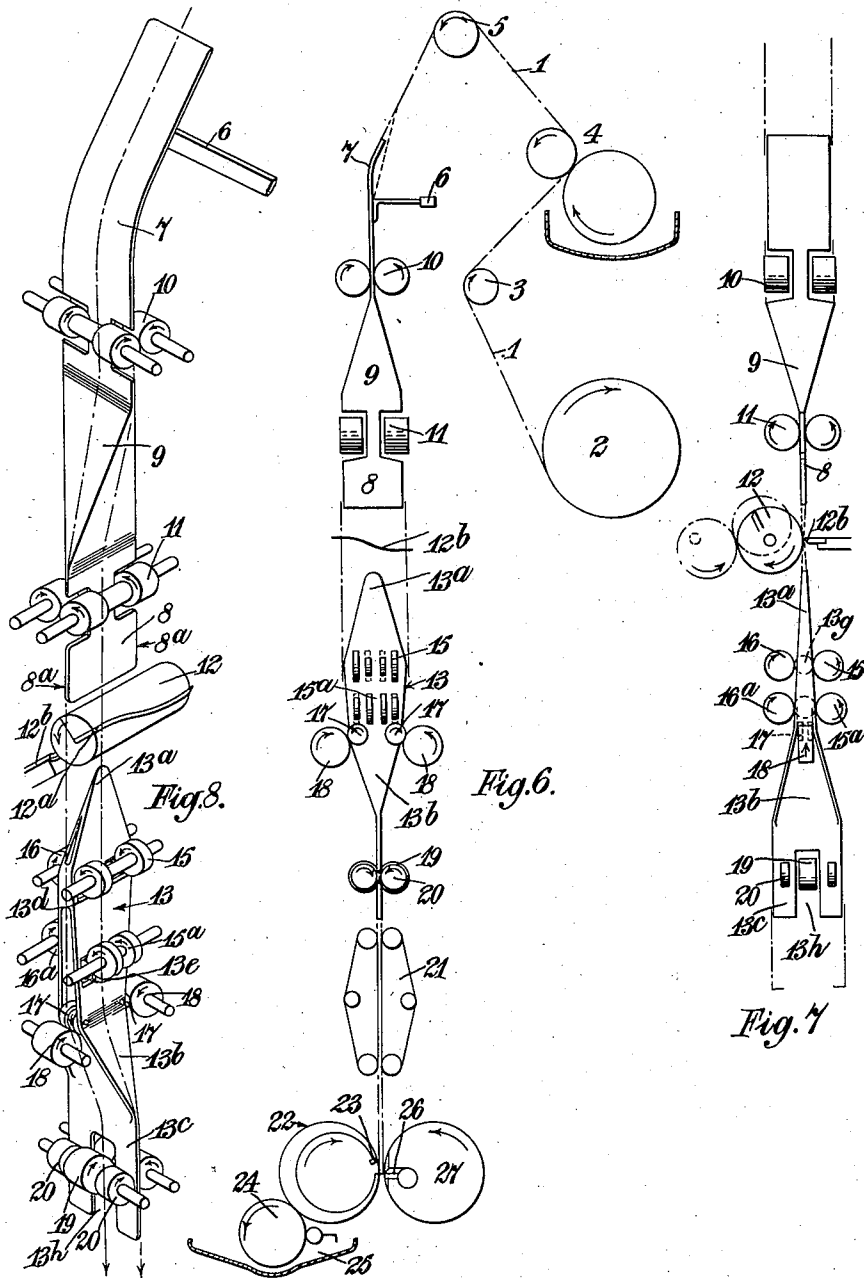
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MANUFACTURE OF PAPER OR LIKE BAG TUBES OR BAGS

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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TUBES OR BAGSAlfred James Jones, Bristol, England, assignor to
E. S. & A. Robinson, Limited, Bristol, Eng-
landApplication August 15, 1934, Serial No. 740,015
In Great Britain August 22, 1933

18 Claims. (Cl. 93—18)

This invention relates to methods of and means for the manufacture of paper or like bag tubes or bags and an aim of the invention is to manufacture bag tubes or bags using the continuous tubing principle and to provide bag tubes or bags which have a smooth-edged closure flap or overlap at the mouth, the invention being particularly intended for use with delicate or membranous material. One of the more common ways of making bags according to the continuous tubing principle, involves the folding around a former of an endless web into a continuous tube which is cut into bag lengths by a beater operating against serrated edges. This mode of forming bags has many advantages certain of which are particularly suited to the handling of very thin paper or delicate membranous material such as that known by the registered trade-mark "Cellophane". Material like Cellophane which lacks the stiffness and other characteristics of paper and which readily tears under certain conditions, is difficult to handle in sheets. Hence, the continuous tube method offers facilities for the manipulation, handling and control of thin paper or Cellophane but the usual serrated cut affords opportunity or leads for tearing or the start of a rupture. When beater means are used, it is possible not only to sever the tube but to sever it in such a way as to leave an overlap at the mouth of the bag or an integral closure flap. If cooperating rotary severing devices are employed it will be appreciated that normally the line of severance on one side of the tube will register with that on the other and no overlap or closure flap can be produced.

Although proposals have been made to cut bag lengths on bag tubing machines with smooth edges (as opposed to serrated edges) and at the same time to form or produce a closure flap for subsequently closing or sealing the open mouth over the contained goods, such have met with little success.

The object of the present invention is to utilize and adapt the known continuous tube forming operation for the production of bag tubes (or bags) with smooth-edged mouths or closures (such as produced by cooperating shear edges—including flaps or overlaps) and particularly to enable such bags or bag tubes to be manufactured successfully from Cellophane, or like transparent membranous material.

The invention broadly consists in forming bag tube lengths from a continuous tube with smooth edge cuts such that the cut edges in the finished bag are transposed and lie substantially out of

register on opposite sides of the bag such that a closure flap or overlap is afforded and such that the mouth of the bag offers the minimum of leads or opportunity for tearing in the manipulation of the bag.

The invention comprises continuously forming a tube from a web, making a compound smooth-edged severance (i. e. a severance cut which extends both transversely and longitudinally of the tube), opening or expanding the tube and flattening it in a plane substantially at right-angles to the plane of the tube formation or the plane previously occupied, thereby transposing the position of the cut edges to provide a closure flap or overlap at the mouth. It is to be understood that a "cut of slit form" as used in the appended claims means a cut which permits the adjacent tube lengths to be separated without a waste or discarded portion.

The invention also comprises the features hereinafter described and defined in the claims including the improved bag.

In the accompanying drawings:—

Fig. 1 is a perspective view showing the treatment of the paper or material according to one mode irrespective of the means employed to carry out the various operations.

Fig. 2 shows a type of cut or severance line extending transversely and longitudinally of the tube.

Fig. 3 shows the top fragment of a bag with a closure flap such as produced by a severance line as in Fig. 2.

Fig. 4 shows the tail or bottom fragment corresponding with Fig. 3 illustrating the folding over of the tail of the bag onto the body part in the common way.

Fig. 5 shows the top fragment of a bag produced by a modified form of severance line, producing in this case a simple overlap of the back of the bag and a curved opening lip.

Fig. 6 is a diagrammatic elevation showing the mechanism for folding the web into a tube, folding the tube at right-angles and severing, refolding the web at right-angles and finally closing the bottom of the bag tube lengths to form bags.

Fig. 7 is a diagrammatic elevation taken at right-angles to that shown in Fig. 2 but with the bottom forming mechanism removed as it is of known kind and in side view would afford no further information.

Fig. 8 is a perspective view of the first and second right-angle former plates or member and the severing device. The supporting frame or

frames and bearings and driving means for the various rollers and severing means, as well as known auxiliary tube folding devices are omitted from the drawings for sake of clearness and in order to avoid obscuring essential parts.

Fig. 9 is a detail diagrammatic plan view of the rollers carried by the floating former plate and the driving and supporting rollers engaging therewith through the material of the tube.

The tube formation may be carried out in the usual way from a web by pasting or glueing one margin and folding the web around a former plate without crushing the edges. With a view to aiding subsequent operations, the web may be initially given a pair of longitudinal creases or folds one lying centrally of the body of the tube when formed and the other positioned on one margin or fold so that it lies near the seam. The position of the creases will depend on whether the final bag tube is to have a central or side seam.

The continuous bag tube is severed into bag lengths each severance being effected by a cut on a curved or angular line which extends transversely and longitudinally of the tube. The severed bag tubes are opened and flattened in a plane at right-angles to the plane of tube formation and severance, the initially made creases or folds giving the tube a predisposition to set in the opposite plane.

According to the preferred mode of treatment the initial creasing may be effected in the production of the tube by forming the bag tube (pressing the folded edge between pressure rollers in the known way) in the same plane as that of the finished bag. In this case the tube is opened and flattened in a plane at right-angles to the plane of its formation and then severed, while after severance the tube is again opened and reflatened in a plane at right-angles to that occupied during severance.

In order that the nature of the invention may be more clearly understood, the mode last referred to will be explained with reference to Fig. 1 of the accompanying drawings. In Fig. 1 the web, tube and bag are represented as passing from right to left and as viewed by a party looking slightly downward.

In stage I the web *a* margins are being folded inwardly in overlapping relation to form a seam *b* one margin having previously received a line of adhesive. The edge folds *c* are pressed to give the material a permanent set. Proceeding from stage I which shows the transposition of the folding, the formed tube is opened, that is to say, the front and back of the tube are separated in stage II and the tube folded as at *d* in a plane at right-angles to the plane in which it was formed. In this stage the edges should not be crushed or given a permanent set since ultimately these margins will lie towards the middle of the bag while the initial folds *c* (which at this stage lie at the dotted position *c'*) will be restored to the middle of the bag. As the tube leaves stage II it is severed in stage III on a curved or angular line as at *e* simultaneously forming the head or top of one bag tube with a flap portion *f* and the tail of the next bag tube, the severed tubes proceeding with their tail or bottom ends leading. A complete tube length is seen between stages III and IV. After severing the position of the folds are again transposed, the tube being opened and reflatened as shown in stage IV so that the tube is reflatened at *g* in a plane at right-angles to the plane of severance. In this way the tube is re-

stored to the sense or way in which it was originally folded in stage I and, due to such initial creasing, has a predisposition to recover its original form with the seam *b* towards the centre.

When the tube has been transposed as in stage IV it may be treated to any of the known bottom closure forming operations. For example, the end may be turned over and stuck to the body of the bag as at *h* as in stage V where it will be seen that the flap part *f* is in its proper place for constituting a closure of the bag mouth. Alternatively, the bag tube bottom may be subjected to a block or square bottoming operation.

It it be desired to form gusseted or satchel bags gussets are folded into the web or in forming the tube in stage I but will disappear in stages II and III, being restored in stage IV.

The bag tubes may be severed on any predetermined line angular or curved to afford a flap or a mere overlap. If a curve such as seen in Fig. 2 be produced by the severing device a bag mouth as shown (in fragment) in Fig. 3 will be produced where the flap *f*² corresponds with the severance portion *f*¹ while the lip *f*³ corresponds with the part *f*³ of the curve in Fig. 2. The bottom of the bag shown in Fig. 3 is seen in Fig. 4 where the turned up edge *f*³ corresponds with the cut at *f*³ in Fig. 2 while the dotted part *f*² is the counterpart of *f*² and *f*¹ (Figs. 2 and 3). By modifying the curve shown in Fig. 2 and in effect reversing it, a bag mouth will be produced with the back of the bag at *f*⁴ overlapping a curved lip *f*⁵ (Fig. 5).

It will be appreciated that the operations shown in the stages illustrated in Fig. 1 may be carried out by hand with or without the aid of formers or other auxiliary appliances but to cope with commercial output an improved bag tubing machine is according to features of the invention adapted to carry out mechanically the sequence of operations.

According to one form it is preferred to run the web and bag tube downwardly as described hereinafter with reference to Figs. 6 and 7 of the drawings. A web *1* is run off a reel *2* over a guide roller *3* to an adhesive applying device *4* of known kind for pasting one margin of the web. The web passes over a guide roller *5* to a former plate supported by the usual foot or bracket *6*. The part *7* of the former plate is of known form and effects the tube fold as seen in stage I of Fig. 1. The lower part of the former is of special construction adapted to open and flatten the tube at right-angles (see stage II).

Looking at Fig. 8 it will be seen that the lower part of the former has a plate *8* which lies at right-angles to the upper portion *7* and which is joined thereto by an intermediate section *9* merging into the plate *7* on one side and the plate portion *8* on the other. The intermediate section comprises a double wedge form as shown.

Pressure rolls *10* nip the side folds and pass the folded web or tube forward over the plate *7* from whence it is drawn over the section *9* by draw rolls *11* operating through slots in the plate part *8*. The side edges *12a* are rounded or blunt so as not to impress a fold or crease in the material at this stage. The tube is presented to a rotary severing device *12* having a blade *12a* which is curved or angled to afford a cut of the predetermined configuration and cooperates with a corresponding fixed blade *12b*. The leading end of the tube projected between the knives is supported upon the upper end of a second former or reversing plate member *13* the nose *13a*

of which enters the tube. The entry of the nose is made easy by reason of the fact that the tube tends to open in the middle because of its previous fold crease *c* (stage I, Fig. 1) effected by the pressure rolls 10. Referring to Fig. 8, the former 13 comprises an intermediate section 13b uniting an upper plate-like or shallow wedge portion (the upper termination of which is formed by the nose 13a) and a lower plate piece 13c located at right-angles to the plane of the upper part of the former. The section 13b is of double wedge form (as seen in Fig. 8) which merges into both the upper and lower portions of the member 13. Slots 13d and 13e are provided for the location of an upper and a lower series of rollers. The upper series of rollers is illustrated in the sectional plan and numbered 13f and 13g in Fig. 9 where the former plate is seen at 13 and the upper slot at 13d. The chain dotted line represents the bag tube. The outer rollers 13f cooperate with positioning rollers 15 through the material of the tube while the rollers 16 coact with the inner rollers 13g. The lower slot 13e has a similar set of rollers to those shown in Fig. 9 but are oppositely engaged to those of the upper set, viz. the lower locating rollers 15a engage the inner rollers of the slot 13e and the rollers 16a engage the outer set. In addition to the rollers just described the former 13 has a pair of lateral rollers 17 resting upon outside rollers 18 as these are located below the rollers 17 and afford a rolling contact and floating support for the member 13. The spindles of the rollers 15, 16, 15a, 16a and 18, are supported in bearings carried by the framework of the machine and all the rollers may be driven to draw the tubes downwardly over the former or only certain of these rollers, for example rollers 18, may be driven. It will be seen that the rollers position the former member 13 on both sides and at the same time support it within the tube. The lower end of the member 13 is provided with a slot 13h through which both sides of the tube are engaged by draw rolls 19 on each side of which auxiliary rolls 20 are adapted to engage the tube on the plate 13c. As the tube lengths pass over the former 13 they are again transposed and refolded at right-angles as in stage IV (Fig. 1) and are ready for forwarding to a bottom forming device. Running tapes 21 forward the tubes as they come off the end of the plate 13c and present them to the bottom forming device 22. The tapes run at a speed adapted to accelerate the tubes so that they are presented in spaced relation to the bottom forming device. In Fig. 2 a known type of rotary bottom forming device 22 is diagrammatically shown where 23 represents an eccentrically operating pasting bar which picks paste from a roller 24 (operating in a paste bath 25) and applies it to the tube close to its end. Adjacent to the paste bar a dipper blade is located which creases the tail of the bag (actually the leading margin as it comes from the tapes 21) and folds it into a gripper 26 in the opposite roller 27 of the device. As the roller 17 continues its rotation the gripper releases the formed bag (such as seen at stage V, Fig. 1) and delivers it to any appropriate collecting device or conveyor.

When it is desired to make gusseted or satchel bags, gussets may be impressed in the material by placing gusset-forming means of known kind in extension of the former plate 7. As the tubes pass over the former member 9 the gussets are pushed out but the effect of their folds or creases remains so that subsequently they can be readily

restored. In this case the rollers 11 are positioned so as not to bear upon the outward fold (that is to say, what was the inner fold when the tube was in the gusset form) so as not to impose a reverse fold. The restoration of the gusset folds is effected as the tube lengths pass on to the part 13c of the former 13. For this purpose the edges of the plate 13c are provided with gusset grooves and the usual fingers or guides are employed.

Where in this specification the term "right-angling" is used, it is to be understood that the angle is not strictly limited to 90° but may vary within certain limits.

Although the invention is specially suitable for treating Cellophane and the like, it may also be employed for ordinary paper where a smooth-edged cut giving an overlap or closure flap is required.

The improved bag is characterized by its formation from a continuous tube and the smooth-edged overlapping or flap cut displayed at both ends of the bag tube which afford no leads for tearing.

Having now described my invention what I claim as new and desire to secure by Letters Patents is:—

1. A method of forming bags or bag tubes of the character specified consisting in forming a tube from a web, transposing the sides of the tube, severing the tube with a compound cut into bag tube lengths and transposing the position of the cut edges so that the edges of the mouth of the tubes or finished bags lie substantially out of register and provide a closure flap or overlap.

2. A method of forming bags of the character specified consisting in forming a tube from a web, opening or expanding the tube and flattening it in a plane transverse to the plane of formation, severing the tube into bag tube lengths by a compound cut and closing the ends of the tubes to form the bottoms of the bags.

3. A method of forming bag tubes of the character specified consisting in forming a tube from a web, opening or expanding the tube and flattening it in a plane transverse to the plane of formation and severing the tube into lengths by a compound cut.

4. A method of forming bags or bag tubes of the character specified consisting in forming a tube from a web, opening or expanding the tube and flattening it in a plane substantially at right-angles to the plane of formation of the tube, severing the tube into bag tube lengths by a compound cut, and reopening or expanding the tubes and reflatting them in a plane substantially at right-angles to the plane wherein the tubes were cut so as to restore the tubes to their original form.

5. A method of forming bag tubes of the character specified consisting in forming a tube from a web, opening or expanding the tube, flattening it in a plane at right-angles to the plane of formation, severing the tube into lengths by a compound cut and feeding the bag tube lengths in spaced relation for forming a bottom closure therein.

6. Apparatus for making bags or bag tubes of the character specified comprising continuous tube forming mechanism, former means for transposing the sides of the tube, knife means for severing bag lengths on a compound line of severance, and means for flattening the tube in a plane transverse to the plane of the tube previously occupied.

7. Apparatus for making bags or bag tubes of

- the character specified comprising continuous tube forming mechanism, means for forming creases in the web or tube defining the plane of formation, means for transposing the sides of the tube so that it lies in a plane other than the plane of formation, severing means for severing bag lengths on a compound line of severance, and means adapted to expand the tubes and flatten them in a plane defined by the previously formed creases.
8. Apparatus for making bags or bag tubes of the character specified comprising continuous tube forming mechanism, means for opening and flattening the tube in a plane substantially at right-angles to the plane of formation of the tube, a smooth knife for severing the tube into bag tube lengths and means for reopening the tubes and ref flattening them at right-angles to the plane wherein the tube was cut.
9. Apparatus for making bags or bag tubes of the character specified comprising tube forming mechanism, means for transposing the sides of the tube into a plane other than the plane of formation, a smooth knife for severing the tube into bag lengths on a compound severance line, means adapted to transpose the cut edges and means for closing the ends of the tubes to form bottoms of bags.
10. Apparatus for making bags or bag tubes of the character specified comprising tube forming mechanism, means for transposing the folds of the tube through substantially a right-angle, a smooth knife for severing the tube into bag lengths, means for transposing the cut edges through substantially a right-angle and means for closing the ends of the tubes to form bottoms of bags.
11. Apparatus for making bags or bag tubes of the character specified comprising tube forming means, means for making a compound cut in the tube at bag length intervals, a former of double oppositely disposed wedge shape for transposing the position of the tube folds and means for separating the bag lengths into bag tubes.
12. Apparatus for making bags or bag tubes of the character specified comprising tube forming means, means for severing the tube into bag lengths by a compound cut, and former means comprising a pair of plate-like portions lying in transverse planes and an intermediate portion of double wedge form for transposing the position of the cut edges of the bag lengths.
13. Apparatus for making bags or bag tubes of the character specified comprising former plate means, means for folding a web about said plate means to form a tube, a second former plate means lying on a plane transverse to the plane of said first plate means, a double wedge shaped means forming a transition between said first and said second plate means for transposing the tube folds and means for severing bag tube lengths by a compound cut.
14. Apparatus for making bags or bag tubes of the character specified comprising continuous tube folding means, means for separating bag tube lengths involving a compound cut and former means for transposing the edges of the folded tube said means having a nose portion, a plate-like part of shallow wedge shape, a second plate part transverse to the first plate like part and an intermediate section of double wedge form.
15. Apparatus for making bags or bag tubes of the character specified comprising continuous tube forming means, means for separating bag tube lengths involving means for making a compound cut, a former of double wedge form for transposing the edges of the tube and roller means external to the tube for supporting the former in floating position within the said tube.
16. Apparatus for making bags or bag tubes of the character specified, comprising a former plate and means for continuously folding a tube thereabout, means for transposing the sides of the folded tube and means for severing bag lengths by a compound cut.
17. Apparatus for making bags or bag tubes of the character specified, comprising means for continuously folding a tube from a web and impressing fold lines or creases in the tube, former means for opening and flattening the tube in a plane other than the plane of formation, said means being arranged not to crush the edges of the flattened tube, and means for severing bag length by a compound cut.
18. A method of forming bags or bag tubes of the character specified, comprising continuously forming a tube by inwardly folding the sides of a web one upon the other, severing bag lengths by means of a compound cut and transposing the cut edges to form a closure flap or overlap.

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