

Feb. 14, 1939.

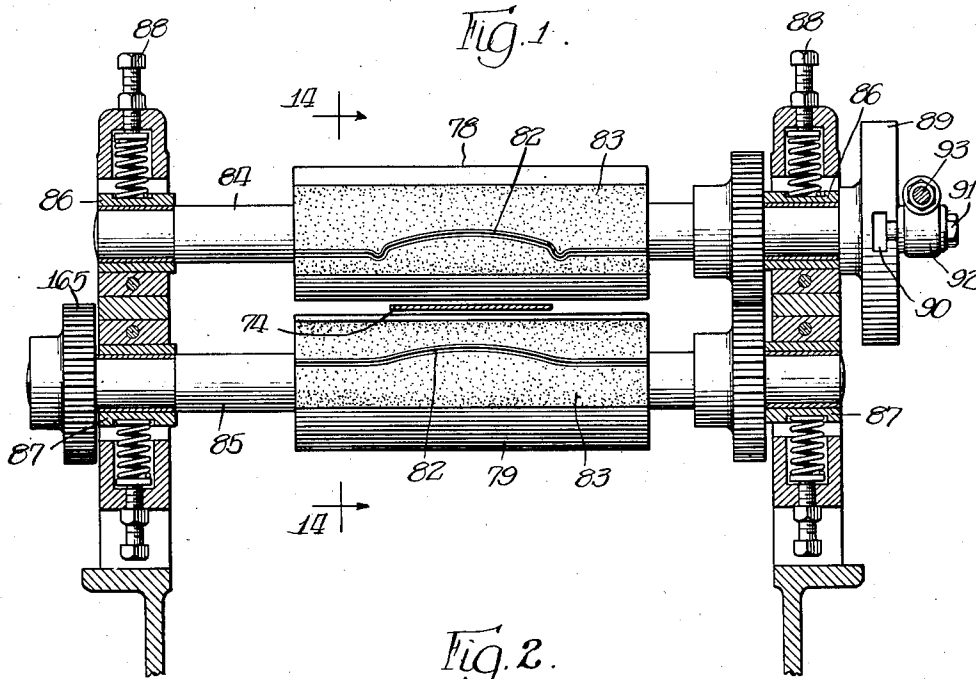
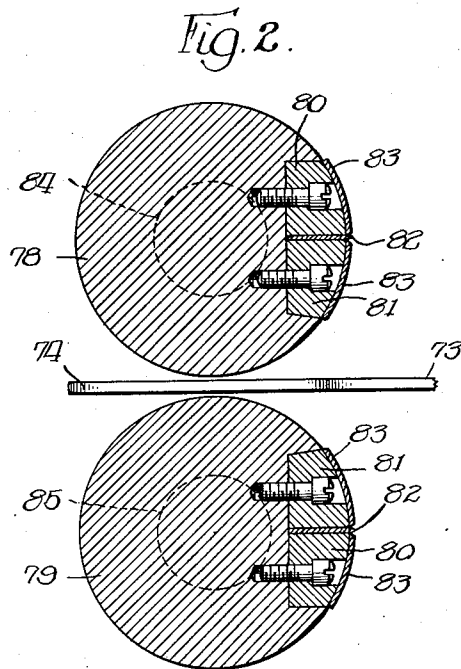
W. H. ENGEL

2,146,946

BAG MANUFACTURE

Filed Oct. 5, 1936

3 Sheets-Sheet 1



Inventor:
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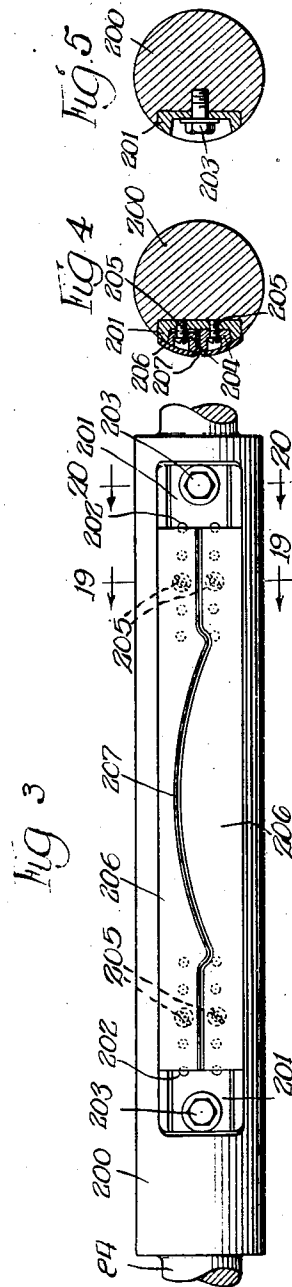
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BAG MANUFACTURE

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3 Sheets-Sheet 2



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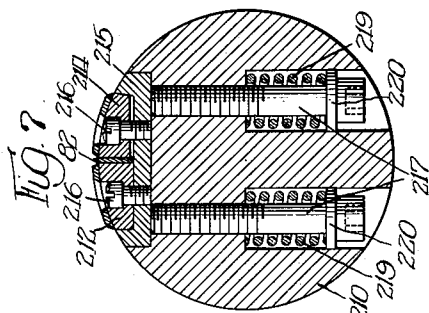
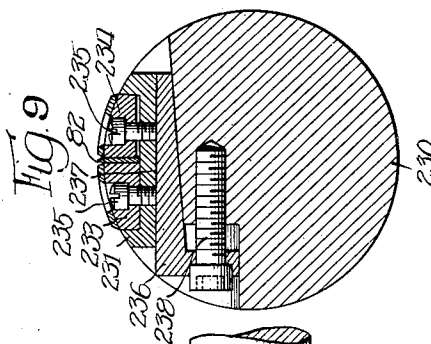
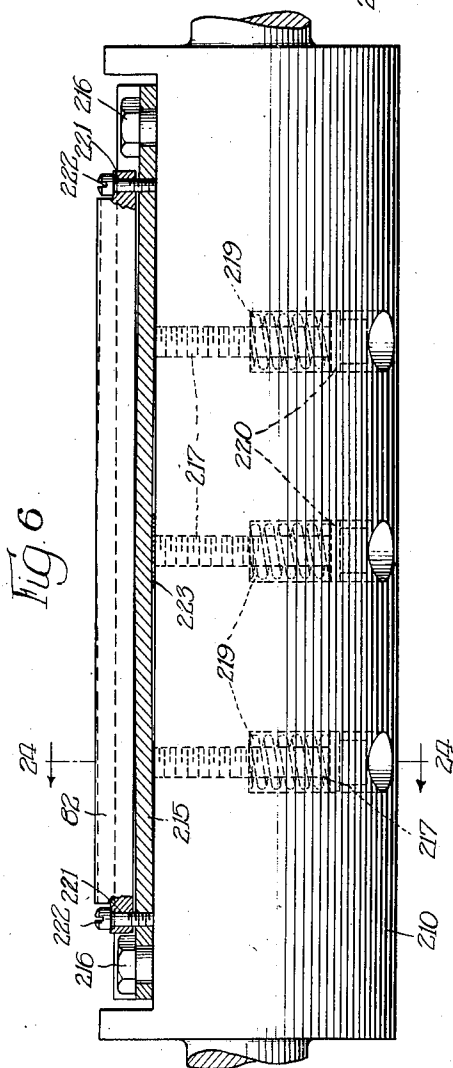
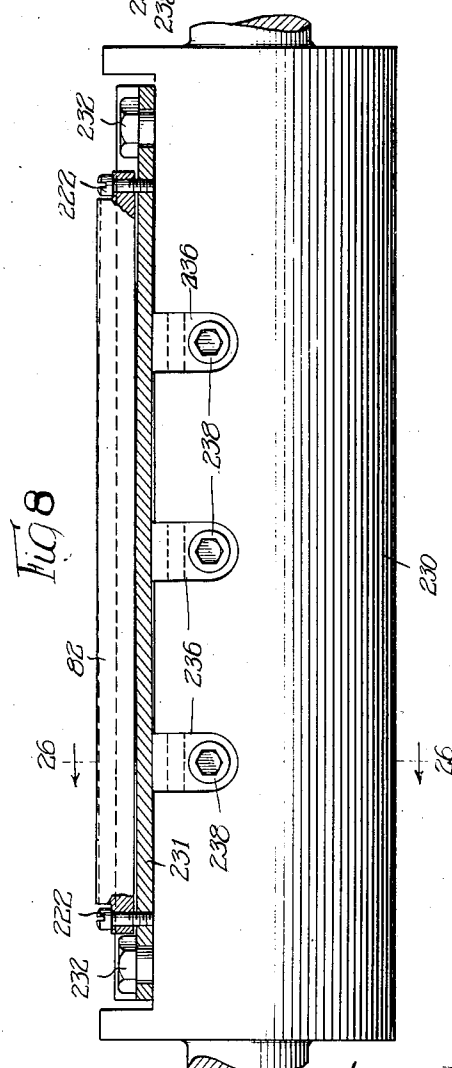
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BAG MANUFACTURE

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,146,946

BAG MANUFACTURE

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Application October 5, 1936, Serial No. 104,016

5 Claims. (Cl. 164—28)

The present invention relates to bag-making machines, and has particular reference to improvements in bag machines of the type described in United States Patent No. 1,265,270 issued May 7, 1918, which improvements facilitate the production of bags from material such as cellulose sheeting or Cellophane as well as from ordinary paper, and is a continuation in part of my application for Letters Patent, Serial No. 638,758, filed October 20, 1932.

Cellulose sheeting has come into wide use as a wrapping material, and has been employed somewhat extensively for the production of bags, but due to the flexible nature of the material and other characteristics, such as ease of tearing, the production of bags therefrom has not been entirely satisfactory. In one particular, if bag lengths are severed from a tube by means of the ordinary striker bar cut-off mechanism, whereby the ends of the bag length are serrated, the cellulose material tends to tear along the valleys of the serrations, thereby greatly weakening the bag.

A primary object of my invention is to produce an improved bag-making machine.

An additional object is the provision of a machine particularly adapted for the production of bags from material such as cellulose sheeting.

A further object is to provide a bag machine which is durable and rapid in operation.

A still further object is to provide a bag machine which will produce a bag of cellulose material having a smooth cut lip by which opening of the bag is facilitated.

These and other objects will be apparent from a consideration of the following illustrative and explanative description of a preferred embodiment of my invention and by reference to the accompanying drawings, in which

Fig. 1 is a view showing the cutting rolls by which bag lengths are partially severed and their mounting, the latter being shown in section;

Fig. 2 is a sectional view taken along line 2—2 of Fig. 1;

Fig. 3 is a plan view of a modified form of cutting roll;

Fig. 4 is a sectional view taken along line 4—4 of Fig. 3;

Fig. 5 is a sectional view taken along line 5—5 of Fig. 3;

Fig. 6 is a plan view of a modified form of cutting roll;

Fig. 7 is a sectional view taken along line 7—7 of Fig. 6;

Fig. 8 is a plan view of a further modified form of cutting roll; and

Fig. 9 is a sectional view taken along line 9—9 of Fig. 8;

To summarize shortly the operation of the machine, it may be said that a web of cellulose sheeting, the material used in the present description for purposes of illustration and explanation is formed into a tube, the tube is partially severed by smooth cutting knives carried by rolls and operating in cooperation with the smooth cutting shoe of a reciprocating mandrel traveling between the cutting rolls, the partially severed blank separated by fast transfer rolls, and the severed blank formed into a completed bag by bottom-forming rolls.

The reciprocating mandrel consists of a thin bar 73 having a hardened cutting shoe 74 at its front end. This mandrel moves with extreme rapidity, which may be of the order of 250 cycles per minute and it is important that the element of friction be reduced to a minimum.

After passing through the draw rolls, the cellulose tube is received by an upper cutting roll 78 and a lower cutting roll 79. These rolls are of the same circumference as the length of the bag blank which it is desired to cut. Knives 82 of any desired shape are mounted in the cutting rolls by wedge blocks 80 and 81, the knives 82 extending beyond the outer surface of the cutting roll. After the wedge blocks are secured in place by suitable screws, layers 83 of a resilient material such as rubber are adhesively secured to the cutting roll about the knives 82, as shown in Figs. 1 and 2, the knives extending substantially to the surface of the rubber layers.

The cutting rolls 78 and 79 are mounted on shafts 84 and 85, respectively, and these shafts are journaled in adjustable bearing blocks 86 and 87, respectively, which blocks are carried by the frame structure. The vertical positions of the cutting rolls are regulated by set screws 88, so that the cutting shoe will be directly between the rolls, as will appear hereinafter.

Centrally mounted to one end of shaft 84 is a round disk or eccentric wheel 89 having diametric T-slot 90 in its outer face. In this slot is mounted an adjustable stud 91 which may be set in the slot any radial distance from the center of shaft 84. To the stud 91 is rotatably attached a sleeve 92. A rod 93 has one end connected to the sleeve 92 and its other end resiliently secured to the lower portion of an arm. A swivel connection 94 is joined to said arm and rod 93 passes freely through an opening therein. The rod 93 is threaded for a substantial distance on each side of the swivel connection and nuts 95 are posi-

tioned adjacent each end of the threaded portion. Between the nuts and the swivel connection are provided compression springs 96, suitable spring washers being positioned on the rod at each end of the springs. Motion of rod 93 is imparted to said arm through the springs 96, thereby providing a resilient connection.

The cutting knives on rolls 77 and 78 are positioned so as to be operable at substantially the same time. A suitable gear is keyed to shaft 85 of the lower cutting roll and meshes with a similar gear of the same size keyed to shaft 84 upon which the upper roll is mounted, thereby providing synchronous driving means for the two rolls.

The diametric T-slot 90 points in the direction of the cutting knife of the upper cutting roll. In other words, when the roll has been rotated until the cutting knife is on the bottom of the roll and in cutting position, the T-slot is in vertical position.

It will be seen that rotation of the cutting rolls causes rotation of the eccentric wheel, which, in turn, imparts a reciprocal motion to rod 93. This motion causes arm 37 and consequently arm 36 to move backwardly and forwardly through an arc determined by the length of the stroke of rod 93. As arm 37 moves the traveling mandrel is moved in the same direction, causing the cutting shoe 74 to reciprocate between the cutting rolls.

To impart to the cutting shoe during the cutting operation a speed substantially equal to the speed of the cutting rolls during the cutting operation, the stud 91 is set a radial distance from the center of shaft 84 equal to the radius of the cutting rolls. By positioning the T-slot in a radial manner with respect to the cutting knife of the upper cutting roll, the cutting shoe of the traveling mandrel is given substantially the same speed as the cutting rolls at the moment the cutting knives are in operative position. In this manner the upper and lower knives press against the smooth surface of the cutting shoe so as to impart a score cut to the cellulose material without a pronounced wiping effect of the knives across the cutting shoe such as would be the case if the cutting rolls traveled faster or slower than the cutting shoe.

During the cutting operation the cutting shoe is between the cutting rolls and is thrust in the same direction of travel of the cutting rolls. The speed of the shoe increases to a maximum which equals the speed of the cutting rolls as the T-slot approaches a vertical position and then decreases toward zero as the T-slot approaches a horizontal position. As the cutting knives are of curved shape it is seen that the cutting operation begins before the maximum speed of the cutting shoe is reached and continues as the speed of the cutting shoe decreases from this maximum. In other words, unless otherwise prevented, the cutting knives would have a slight wiping effect where the T-slot is not in exact vertical position. However, in accordance with my invention the rubber layers 83 grip the cutting shoe before the cutting knives reach their operative position and impart to the shoe a speed equal to the speed of the cutting rolls, thereby insuring a perfect score cut. As the rubber extends on both sides of the cutting knives, the speed of the knives and the shoe remain equal throughout the cutting operation.

When the rubber layers 83 grip the cutting shoe, the speed of the latter is increased above the speed naturally imparted to the traveling

mandrel by the eccentric wheel, rod 93 and arms 36 and 37. If the last named connections were rigid, the shoe would be prevented from increasing in speed. By employing the resilient connection between the rear end of rod 93 and arm 37, the increase of speed of the cutting shoe merely causes the forward spring of the connection to be compressed. After the T-slot has passed its vertical position in the cutting operation, the cutting shoe is prevented from slowing down by continued contact with the rubber layers, thereby compressing the rear spring of the resilient connection. When the cutting operation is complete and the rubber layers have rotated out of contact with the cutting shoe, the latter is returned to its natural position by the rear spring of the resilient connection.

Thus, in the cutting operation the traveling mandrel reciprocates within the cellulose tube and between the cutting rolls. The cutting shoe is preferably beneath the bellows fold whereby the upper knife score-cuts through three layers of cellulose adjacent the edge of the tube and one layer between the opposite bellows folds, while the lower knife score-cuts a single layer.

By providing smooth cutting knives and a smooth, hardened cutting shoe against which these knives rotate, the bag is given a smooth-cut edge as distinguished from a serrated edge.

As shown in the drawings, the upper cutting knife has a main curved portion provided at each of its ends with a tangential reverse curve. The main curve strikes a lip portion from the tube, while the tangential reverse curve cuts to the outer edge of the tube, forming an upwardly extending tip at the outer creases of the bag length. If the cellulose material comes down to a point at the creases, the bag is weakened in that the material tears easily along the crease. By making the cellulose sheeting come up to a point along the crease, the tendency of the bag to split is considerably decreased. The complementary portion of the tube from which the bag length is severed is subsequently folded over to form a bottom section.

Where a curved knife is employed, the contact of the knife with the cutting shoe is, theoretically, along two points rather than along the entire edge of the knife as would be the case if a straight, transverse knife were used. The two point contact between a curved knife and the smooth cutting shoe permits effective and prolonged operation of the cutting device.

As the upper and lower cutting knives operate against the faces of the smooth cutting shoe, the bag length remains attached to the tube by thin portions which represent the cellulose material along the vertical edges of the cutting shoe. The bag lengths then pass to other parts of the machine where they are severed from each other and formed into completed bags.

In Figs. 3, 4 and 5 is shown a modified form of cutting roll which has been found particularly satisfactory. The roll 200 shown in the drawings extends substantially the length of the shaft 84 upon which it is mounted and is provided with a cut-out portion of substantial length. In this cut-out portion is mounted a base plate 201 having a series of threaded openings 202 along its length. The base plate is fastened in place by means of bolts 203 which are screwed into rolls 200.

Knife sections 204 of any desired width may be mounted in the cutting roll by means of screws 205 which are engaged at proper points

with the threaded holes 202. Rubber layers 206 are adhesively secured to the outer face of the knife sections.

In this manner adjustment of the machine for bags of different width is effected easily and without changing the cutting rolls. It is preferred to cast the knife sections 204 about the knife blade 207 in order to provide a firm engagement, a suitable alloy such as babbitt being employed as the material for the knife sections.

Figs. 6 to 9 show other modifications of the cutting rolls and means for adjusting the knives for minute or fine settings used in cutting extremely thin sheets. There is also disclosed means for crowning or curving the knife centrally by an underlay to allow for the spring of the cylinder. Unless some such means is used the cylinder tends to reduce its diameter in the central portion, curving the knife and causing it to wear more rapidly on its ends.

In Figs. 6 and 7 there is shown the cutting roll 210 with a cutting knife 82 mounted thereto by the filler block 212 and the wedge block 214. Beneath these blocks in the cut-out portion of the roll 210 is the base plate 215 which is fastened to the roll by the screws 216.

A plurality of openings extend through the roll 210 to the under side of the base plate 215 and adjusting screws 217 are threaded into these holes and in contact with said base plate. Preferably, a portion of these openings is enlarged to form a spring housing for a spring member 219 that is compressed between the shoulder 218 and a washer 220 associated with the head of said adjusting screws. These spring members act as lock washers to prevent the screws from turning out under the constant impression of the cutting knife against the steel shoe. In the drawings there are three sets of screws with two screws to each set, the sets being preferably equally spaced apart. By tightening or loosening these screws very fine adjustments of the cutting knife 82 may be obtained. Where the knife at its ends has a tendency to work out of the wedge and filler blocks, the knife may be notched out at its ends to form screw seats 221 and screws 222 may be inserted therethrough and into the base plate 215 to hold the ends firmly in place.

In order to arch or crown the knife at its center to allow for the spring of the cylinder, an underlay or shim 223 may be inserted centrally beneath the cutting knife 82 and held in place by any suitable means. Both the upper and lower rolls may be made in accordance with the construction shown in Figs. 6 and 7.

In Figs. 8 and 9 another modification of the cutting roll is shown with a series of adjusting wedges forming the adjusting means for the base plate or insert block and the cutting knife mounted thereon. As seen in these views there is a cutting roll 230 having a cut-out portion into which is fitted the base plate or insert block 231 held to the cutting roll by the screws 232. The cutting knife 82 is mounted to the base plate and held to it by the end screws 222. Filler block 233 and wedge block 234 hold the cutting knife 82 securely in place and are mounted to the base plate by the screws 235.

The cut-out portion of the cutting roll, as shown in Fig. 9, is formed with a base having a slight

angle to the base of the insert block 231 and is spaced therefrom to form an opening for the adjusting wedge members 236. The upper surface 237 of the wedge members is parallel to the base of the insert block as shown. The wedge members are substantially L-shaped with the short leg pointing downwardly and adjusting screws 238 are inserted through this leg and into the cutting roll for moving the wedge-shaped members 236 forwardly or backwardly, thus raising and lowering the base plate 231, the blocks 233, 234 and the cutting knife 82.

Three wedge members 236 are shown in the drawings. They form an excellent support for the insert block or base plate and hold it free from any rocking motion. With this construction the central underlay of the construction shown in Fig. 6 is unnecessary as the wedges may be adjusted to form the central crown.

It will be understood, of course, that the rubber or resilient layers 83, although not shown for purposes of clarity, may be used in connection with the cutting knives 82 as shown in Fig. 6 to 9, inclusive.

The various modifications of the herein described structure and method coming within the spirit of my invention are intended to be included in the appended claims.

I claim:

1. In a device of the type described, a cutting roll having a cut-out portion, a base plate secured to said roll in said cut-out portion, a knife blade, knife sections clamping said blade, screws securing said knife sections to said base plate, means for arching said knife centrally, and layers of rubber secured to said roll about said knife.

2. In a device of the type described, a cutting roll having a cut-out portion, a base plate secured to said roll in said cut-out portion, a knife blade secured at its ends to said base plate, knife sections clamping said blade and secured to said base plate, means for arching said blade centrally of its ends, and layers of rubber secured to said roll about said knife.

3. In a device of the type described, a cutting roll having a cut-out portion, a base plate secured to said roll in said cut-out portion, a knife blade, knife sections clamping said blade and secured to said base plate, adjustable means underlying said base plate for regulating said knife blade, and layers or rubber secured to said roll about said knife.

4. In a device of the type described, a cutting roll having a cut-out portion, a base plate secured to said roll in said cut-out portion, a knife blade, knife sections clamping said blade and secured to said base plate, a plurality of adjusting screws in said roll and in contact with said base plate beneath said knife for regulating the same, and layers of rubber secured to said roll about said knife.

5. In a device of the type described, a cutting roll having a cut-out portion, a base plate secured to said roll in said cut-out portion, a knife blade, knife sections clamping said blade and secured to said base plate, a plurality of wedge members between said base plate and the cut-out portion of said roll, and means for adjusting said wedges to raise or lower said knife blade.

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