

April 5, 1960

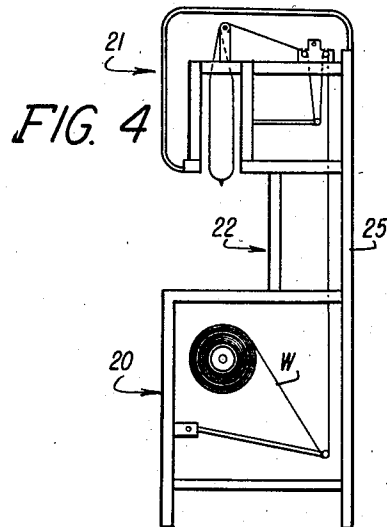
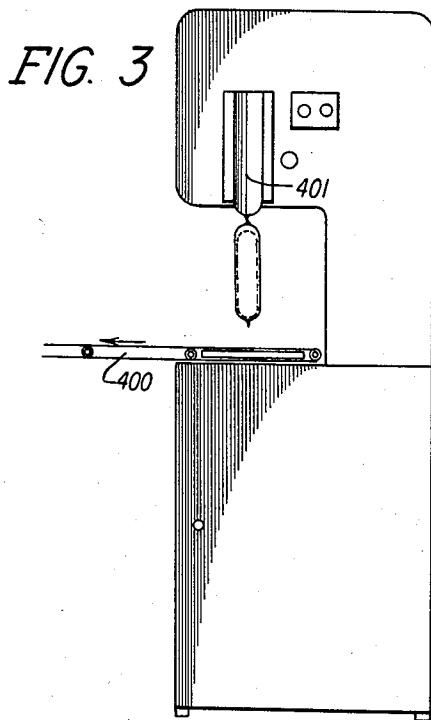
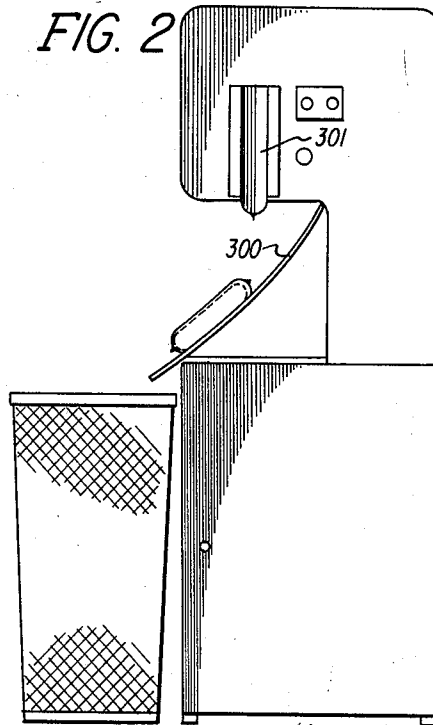
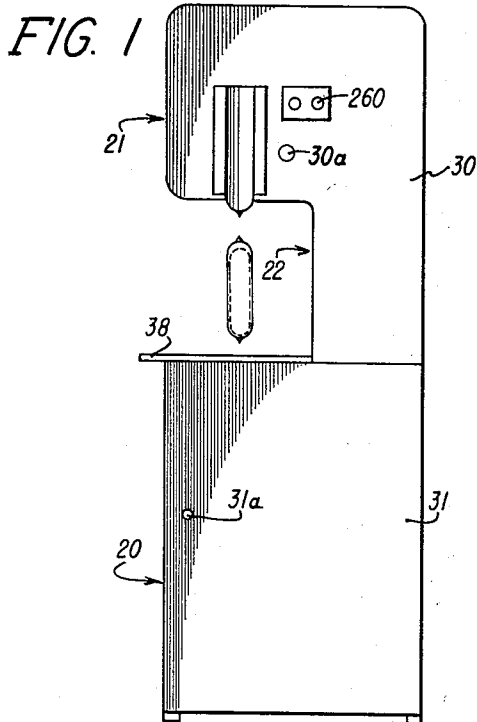
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2,931,149

PACKAGING MACHINES AND METHOD OF PACKAGING

Filed March 17, 1958

9 Sheets-Sheet 1



INVENTOR.

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April 5, 1960

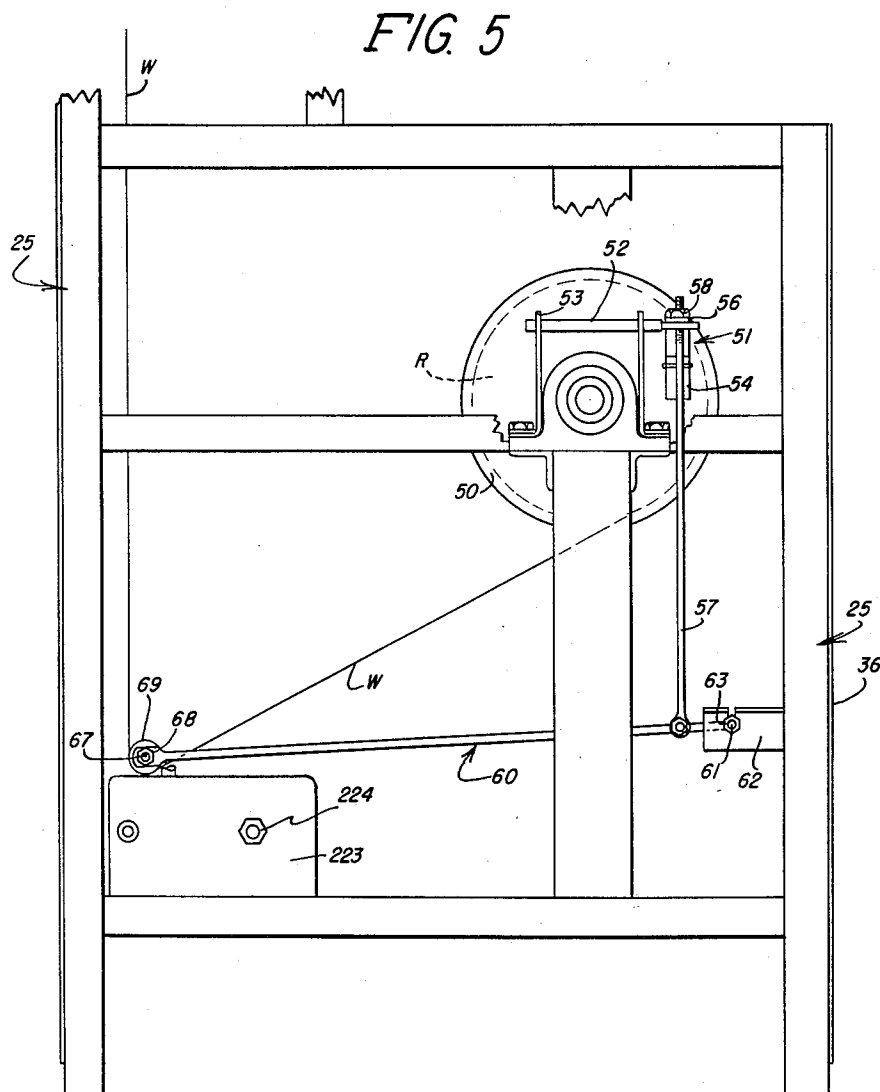
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PACKAGING MACHINES AND METHOD OF PACKAGING

Filed March 17, 1958

9 Sheets-Sheet 2



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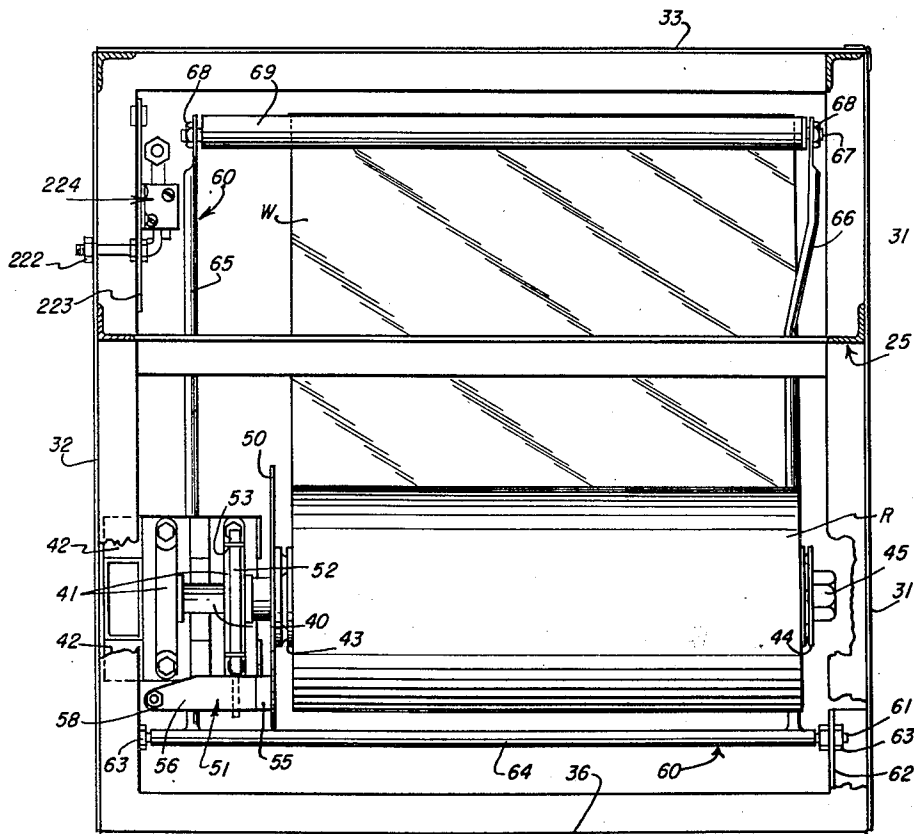
2,931,149

PACKAGING MACHINES AND METHOD OF PACKAGING

Filed March 17, 1958

9 Sheets-Sheet 3

FIG. 6



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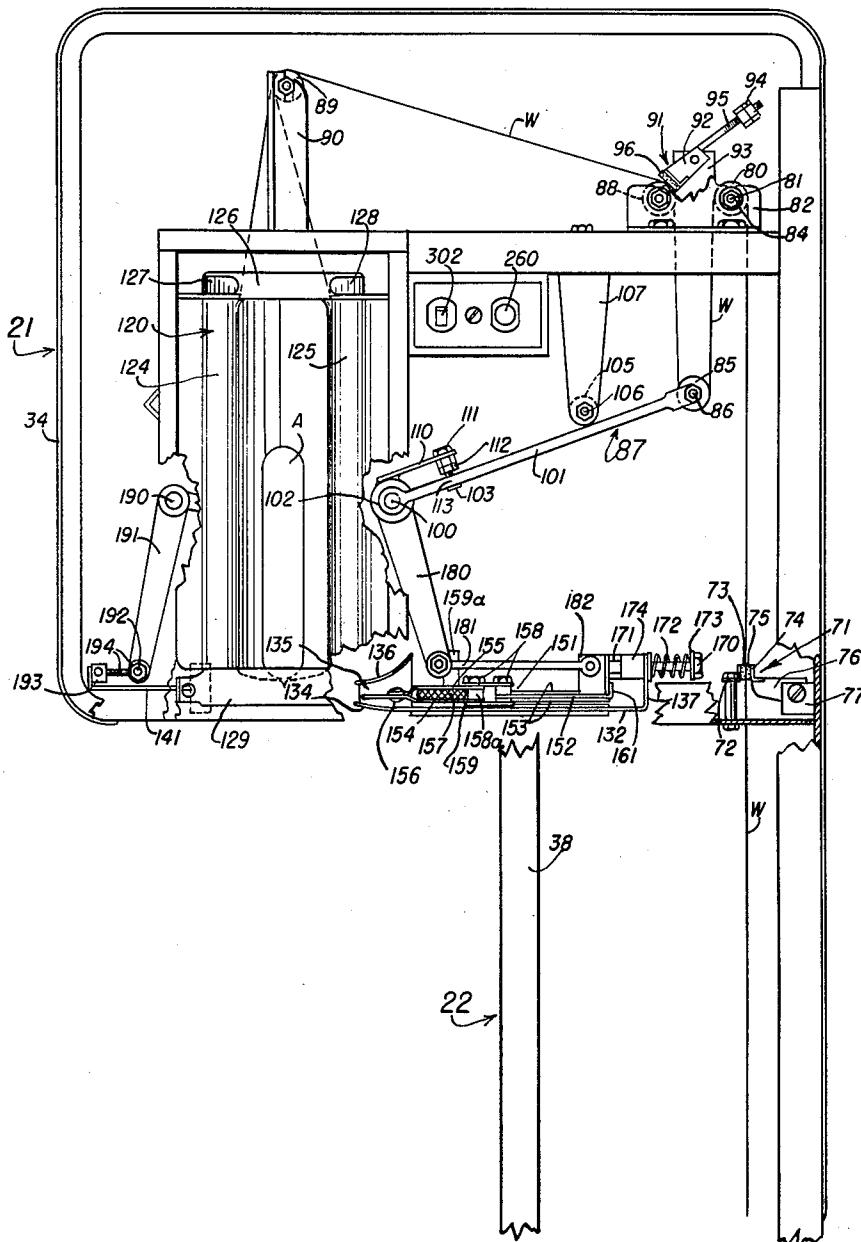
2,931,149

PACKAGING MACHINES AND METHOD OF PACKAGING

Filed March 17, 1958

9 Sheets-Sheet 4

FIG 7



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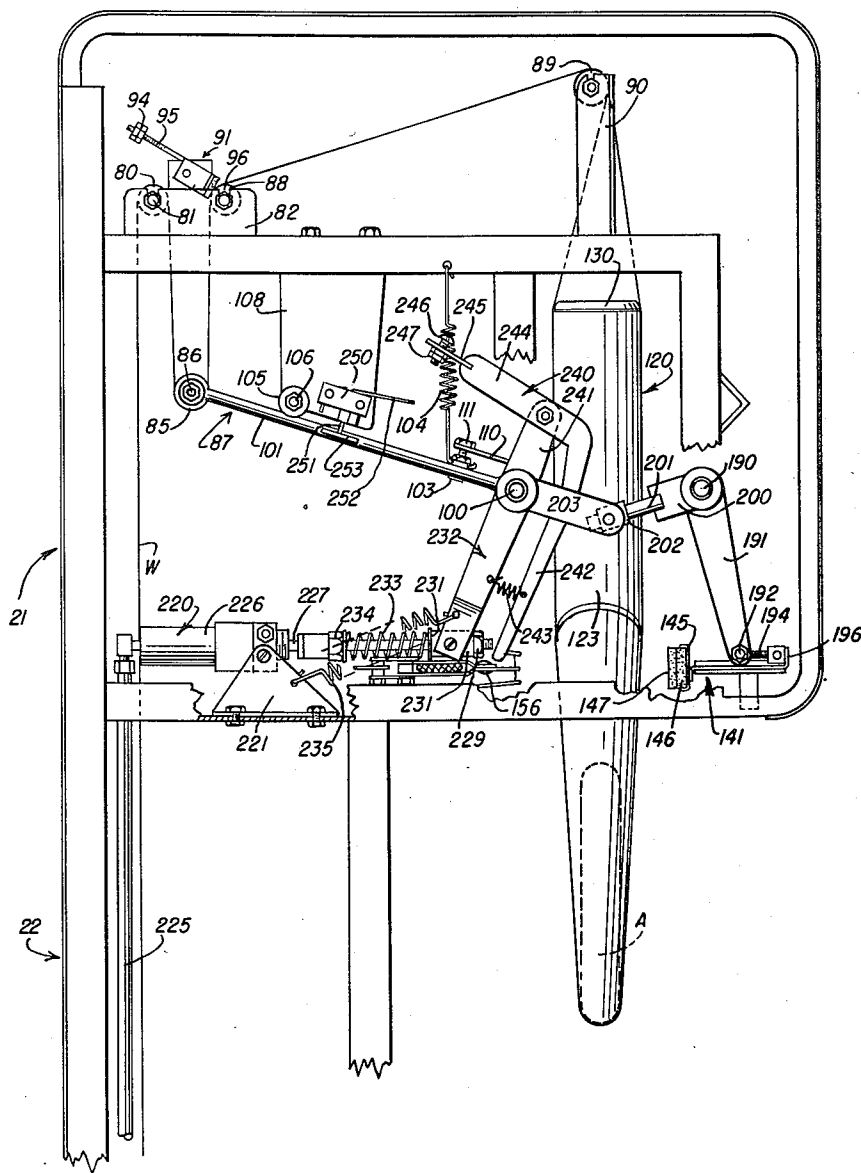
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PACKAGING MACHINES AND METHOD OF PACKAGING

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9 Sheets-Sheet 5

FIG. 8



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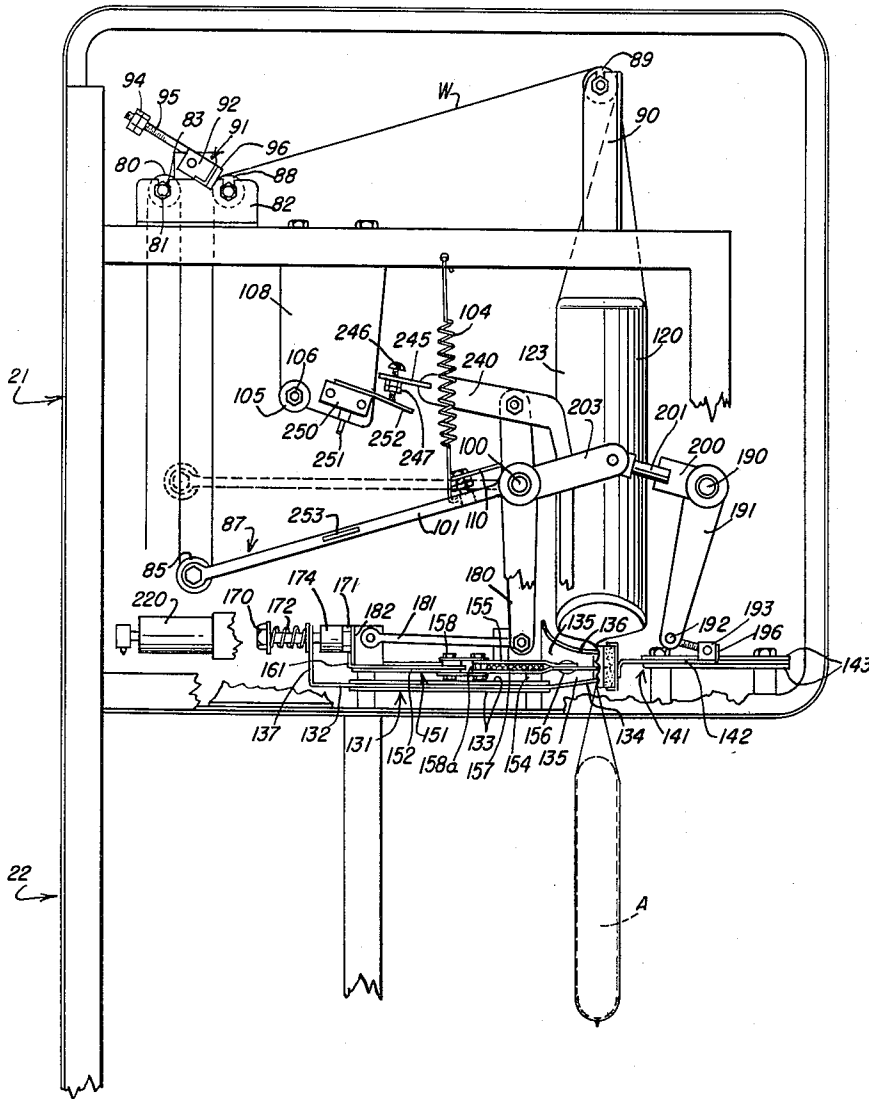
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PACKAGING MACHINES AND METHOD OF PACKAGING

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FIG. 9



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2,931,149

PACKAGING MACHINES AND METHOD OF PACKAGING

Filed March 17, 1958

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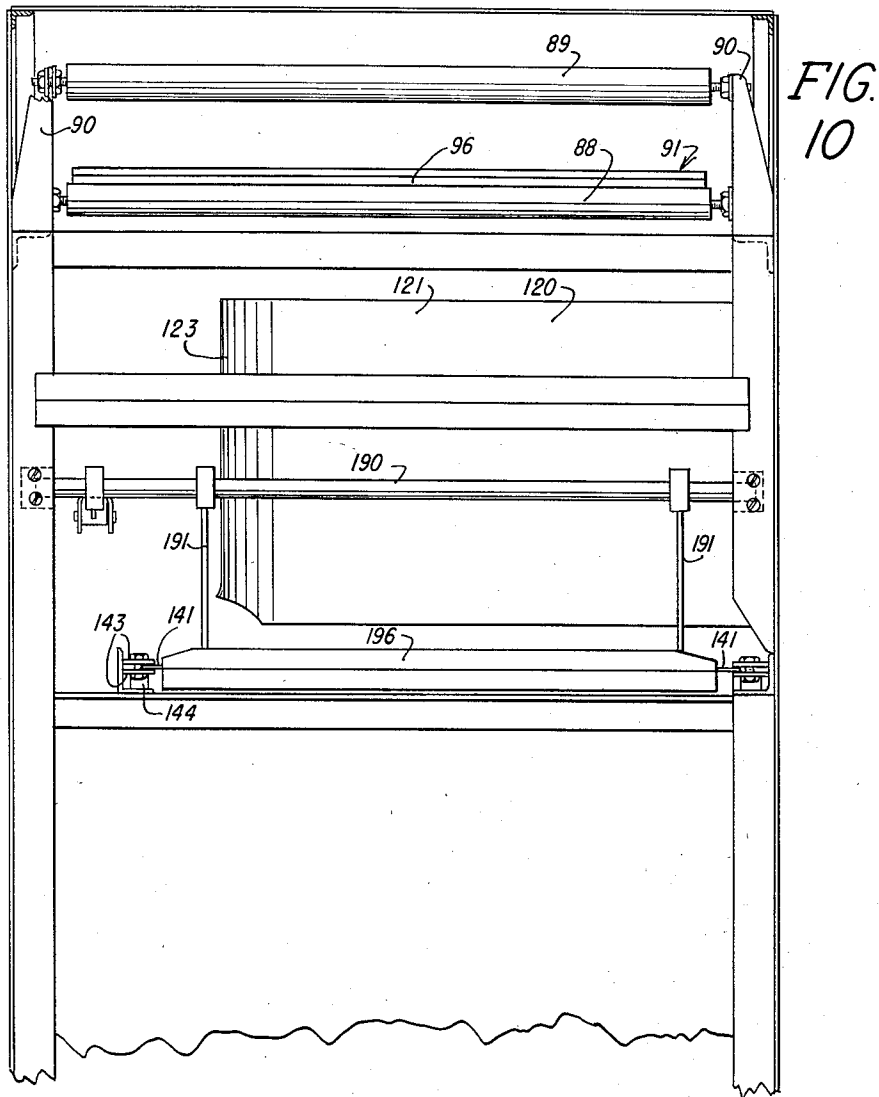


FIG. 10

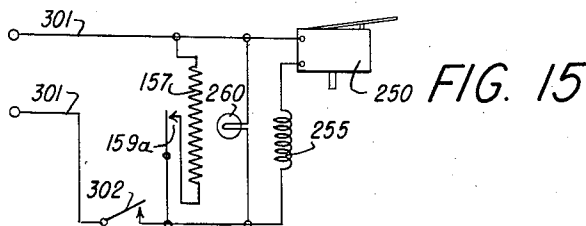


FIG. 15

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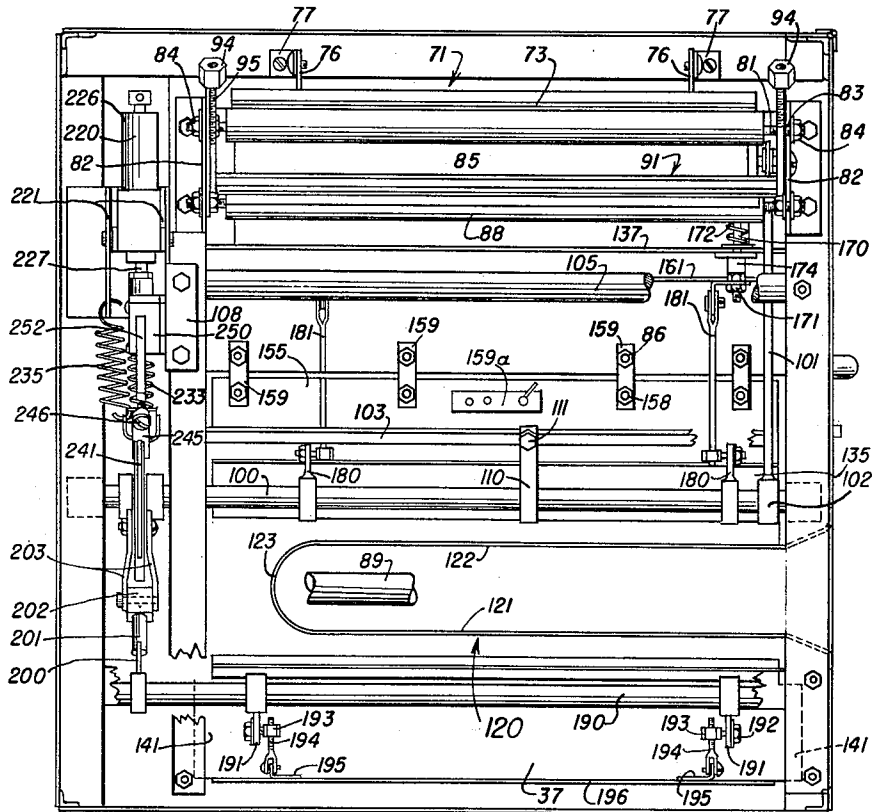
2,931,149

PACKAGING MACHINES AND METHOD OF PACKAGING

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9 Sheets-Sheet 8

FIG. 11



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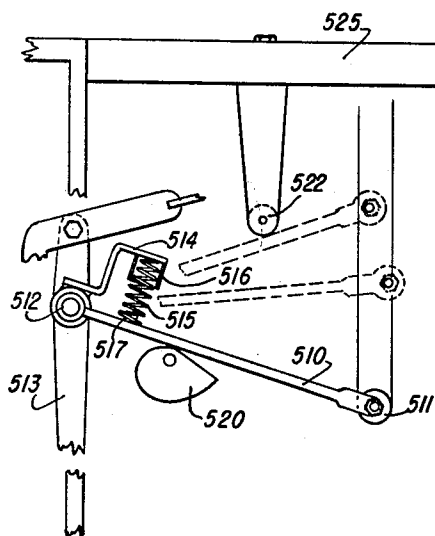
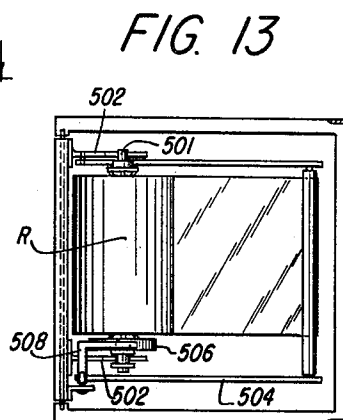
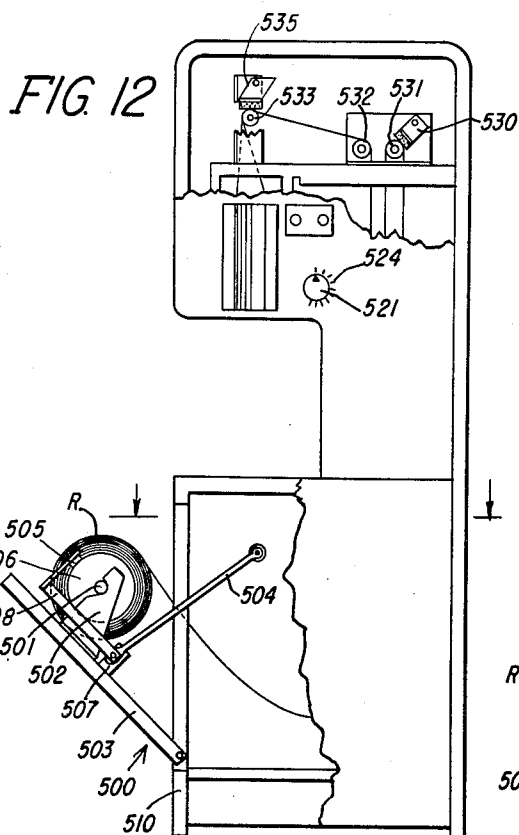
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PACKAGING MACHINES AND METHOD OF PACKAGING

Filed March 17, 1958

9 Sheets-Sheet 9



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2,931,149

PACKAGING MACHINES AND METHOD OF PACKAGING

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Application March 17, 1958, Serial No. 721,995

22 Claims. (Cl. 53—29)

This invention relates to packaging machines and to a method of packaging. More particularly, the invention relates to a novel method and machine for forming a bag-type container around the article to be packaged from film stock in web form.

This invention is adapted for application in packaging a large number of different items of various natures. One illustrative application is the packaging of folded items of clothing, such as men's shirts, and for the purpose of illustration the invention is described in connection with a machine especially adapted for such use, although the machine as shown is capable of packaging other items and the invention is not limited to such use.

Various articles, for example men's shirts, are often enclosed in a bag-type wrapper or container of flexible film stock, such as synthetic plastic material, in order to prevent such articles from being soiled during storage and handling. Such wrappers have heretofore taken the form of a complete bag open at one end into which the article to be packaged is inserted through the open end to complete the package. Such form of packaging is commonly employed in the packaging of folded, laundered men's shirt, for example. Also various items have been packaged by forming the wrapper from material in tubular web form, the material which is to constitute the wrapper being severed from the web either just before or during the bag-forming operation.

The use of a preformed container or wrapper or the use of material in tubular form has the disadvantage that the completely or partially formed bag must be opened sufficiently to receive the article, which is a difficult and time-consuming operation, especially where the wrapper is of such size as to closely fit the contents.

Wrappers have been formed heretofore from web material to provide packages by methods wherein at least some of the package-forming steps are carried out while the wrapper material is still in web form. However, such processes require complicated and expensive machinery to form the packages.

An object of the present invention is to provide novel apparatus for forming packages using wrapper material in web form.

A further object is to provide packaging apparatus for forming packages using flexible film stock in web form which apparatus is fully automatic and which requires no manual operations.

Another object is to provide packaging apparatus using flexible film stock material in web form which apparatus is automatic and which requires only the insertion of the article to be packaged into the apparatus to initiate the packaging operation.

Still another object is to provide packaging apparatus using flexible film stock in web form in which apparatus the weight of the article to be packaged is employed to initiate the packaging operation, which operation is completed in a fully automatic manner.

Another object is to provide apparatus for forming

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packages using flexible film stock in web form which apparatus is simple, inexpensive and highly efficient and safe to operate.

A further object is the provision of packaging apparatus using flexible film stock in web form wherein the material which is employed in forming the wrapper is withdrawn from a roll of such material in a predetermined length and is severed from the web and heat sealed to form the bag in a wholly automatic manner.

Another object of the invention is to provide packaging apparatus wherein predetermined lengths of web material are withdrawn successively from a roll of such material, the end-most portion of the web being periodically advanced relatively rapidly through a distance equal to the length of an increment sufficient to form the wrapper, during an initial portion of the packaging operation and wherein an equal length of web material is pulled off the roll at a relatively slow speed during a later portion of the cycle, whereby it is unnecessary to accelerate the roll to a rotational speed which would be necessary to draw off material through the length of such increment at the speed of movement of the end-most portion.

Still another object is the provision of a machine for packaging articles in bags formed around the articles from flexible film stock in roll form wherein adjustable means are provided for automatically withdrawing a measured quantity of stock from the roll during each cycle of operation.

Another object is to provide a machine for packaging articles in bags formed around the articles from flexible film stock which machine is so constructed that there is no likelihood of injury to the operator or damage to the article being packaged.

A further object is to provide a novel method of packaging articles in bags formed around the articles from flexible film stock in web form.

Another object is to provide a method of packaging articles in bags formed around the articles from flexible film stock in web form in which method the weight of each article is as the sole means employed to advance to the point of bag formation a length of stock sufficient to constitute the bag.

Still another object is to provide a method of forming a bag around an article from longitudinally folded film stock in web form having a closed end wherein the article is inserted between the folds and the folds are then welded together along a transverse line on the other side of the article from the closed end and are severed along the weld line, the weight of the inserted article being utilized as the sole means for advancing the web to the point of welding and severing.

A further object is to provide a method of forming a bag around an article from longitudinally folded film stock in web form having a closed end wherein the article is inserted between the folds and the folds are then welded together along a transverse line on the opposite side of the article from the closed end by the application of heat to the web along such line and wherein the application of heat is controlled by the advancement of the web effected solely by the weight of the inserted article.

Other objects and advantages will appear from the following description, taken in connection with the appended drawings wherein:

Figure 1 is a front elevational view showing one embodiment of a packaging machine in accordance with my invention;

Fig. 2 is a front elevational view of a second embodiment;

Fig. 3 is a front elevational view of a third embodiment;

Fig. 4 is a somewhat diagrammatic, front elevational

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view of the machine of Fig. 1 with the front covers removed and certain parts omitted;

Fig. 5 is a rear elevational view of the lower section of the machine of Fig. 1, with the rear cover removed;

Fig. 6 is a top plan view of the lower section of the machine of Fig. 1, with the cover removed;

Fig. 7 is a front elevational view of the upper section of the machine of Fig. 1, with the front cover removed;

Fig. 8 is a rear elevational view of the upper section of the machine of Fig. 1, with the rear cover removed;

Fig. 9 is a view similar to Fig. 8, only showing the mechanism in a different operating condition;

Fig. 10 is a side elevational view of the upper section of the machine from the left-hand side of the machine, with the side cover removed;

Fig. 11 is a top plan view of the machine, with the top cover removed;

Fig. 12 is a front elevational view of a fourth embodiment of the machine with certain parts broken away;

Fig. 13 is a top plan view of the bottom section of the machine of Fig. 12, with the cover removed;

Fig. 14 is a view of a detail of the machine of Fig. 12; and

Fig. 15 is a wiring diagram of the electrical connections of the machine of Fig. 1.

It will be understood that where, in the following description, reference is made to the "front," "back," "left" or "right," respectively, such reference applies to the machine as viewed from the front of the machine and regardless of the orientation of the machine in a particular figure of the drawings to which reference may be made.

The machine of my invention embodies mechanism for forming a bag-like container or wrapper around an article from flexible, heat-sealing, thermoplastic film stock in the form of a continuous web and then severing such bag-like container or wrapper from the web, thus providing a package including a bag enclosing the article. The stock may be any suitable heat-sealing, thermoplastic film material, and preferably I employ polyethylene because of its desirable properties, such as its strength, flexibility, heat-sealing and thermoplastic nature and transparency, which adapt it especially well for use in the manner described hereinafter and in the various applications contemplated by my invention. The stock is supplied to the bag forming mechanism in the form of a continuous web withdrawn from a supply roll by the operation of the machine.

The stock used in forming the bags in accordance with my invention is folded along its longitudinal center line before being wound into a roll, thereby providing two folds or plies. Thus, when the stock is withdrawn from the roll it is in the form of a double-ply web, the plies of which are joined along one longitudinal edge. This edge forms a closed edge which may be considered the bottom of the bag formed from such stock.

Referring now particularly to Figs. 1 and 4, the machine is formed with a bottom section 20, a top section 21 and an intermediate section 22 upstanding from the rearward portion of the bottom section so as to support the top section 21 in overhanging relation to the bottom section.

The machine comprises a frame 25 formed from a plurality of vertically and horizontally arranged structural members secured together suitably to support the various members forming the mechanism hereinafter described. The frame 25 and the mechanism supported thereby are enclosed in a casing formed by a plurality of cover members 30 to 37, inclusive, and by a delivery counter 38.

The two front covers 30, 31 are hinged to the frame to permit access to the interior of the casing and preferably are provided with locks 30a, 31a to prevent unauthorized opening. The remaining cover members 32 to 37 and the counter 38 are secured to the frame as by screws (not shown).

An arbor 40 is rotatably journaled in two spaced bearings 41 supported on brackets 42 secured on the frame in

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the lower portion of the machine at the rear thereof. The arbor 40 (see Fig. 6) is supported only at its rear end and at the other end is free to receive the roll of stock R thereover. A rear mounting cone 43 and a front mounting cone 44 are removably disposed on the arbor for mounting the roll R thereon. A nut 45 is threaded on the free end of the arbor and abuts the cone 44 for clamping the roll R between the cones 43, 44, and nonrotatably on the arbor 40, a spacing collar being placed between the cone 43 and the front bearing 41.

A roll brake is provided for holding the arbor against rotation in its bearings which brake includes a brake disc 50 secured non-rotatably on the rear cone 43. The brake disc 50 is formed from a suitably rigid material such as a metal and preferably is formed from aluminum for the sake of lightness. Cooperating with the brake disc 50 is a brake member 51 which takes the form of a two-armed lever carried on a shaft 52 journaled in two upstanding brackets 53. The brake member 51 is mounted adjacent the disc 50 with its vertical arm 54 carrying at its lower end a brake shoe 55 and positioned for rocking movement to bring the brake shoe 55 into engagement with the rear face of the brake disc 50. The brake shoe 55 is formed from a suitable resilient, friction material such as rubber or leather. The other, second arm 56 (Fig. 5) of the brake member 51 extends generally horizontally and is provided with a hole (not shown) through which a brake-actuating rod 57 extends freely for vertical movement through the arm 56. Threaded on the end of the brake-actuating rod 57 which projects above the arm 56 is an adjustable stop nut 58 for engaging and rocking the horizontal arm 56 upon predetermined downward movement of the rod 57. The construction is such that the rod 57 may be raised without moving the arm 56 correspondingly. Thus, it will be seen that when the rod 57 is pulled downwardly to an extent wherein the nut 58 engages the horizontal arm 56 the brake member 51 is rocked to urge the brake shoe 55 against the rear face of the disc 50 and restrain the disc 50, and consequently the arbor and roll carried thereby, against rotation. On the other hand when the brake actuating rod is in normal position or above, the brake is released so that the roll can rotate freely.

The lower end of the brake actuating rod 57 is pivotally connected to one arm of an accumulator yoke 60 pivotally supported by a shaft 61 extending through brackets 62 (one of which is shown) the front and rear frame members and secured against axial displacement by nuts 63.

The accumulator yoke 60 includes a mounting tube 64, a pair of side bars 65 and 66, and a reinforcing bar (not shown) intermediate the mounting bar and the outer ends of the side bars. Carried in and extending between the outer ends of the side bars 65 and 66 is roller mounting shaft 67 secured against axial displacement by nuts 68 which shaft carries a roller 69 freely rotatable on the shaft 67. It will be noted that the front arm 66 is offset at its forward portion from the remaining portions, thus permitting the roller 69 to have a greater length than would be possible if the arm 66 were straight. The roller 69 extends parallel to the arbor 40 and thus parallel to the axis of the stock roll R. The yoke 60 and the roller carried thereby may be termed an accumulator.

Referring particularly to Figs. 4 and 5, it will be seen that the portion W of the stock which has been withdrawn from the roll and which is sometimes hereinafter referred to as the web extends from the supply roll R and under the roller 69 and thence upwardly through the intermediate section 22 of the machine and to the upper section 21 of the machine.

Referring particularly to Fig. 7, the web W passes through a one-way brake 71 mounted on the frame at the lower right portion of the upper section 21. The brake 71 includes a bar 72 fixed on the frame 25 and extending throughout substantially the depth of the

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machine from front to rear and which carries a friction facing 73 formed of a suitable resilient friction material, such as sponge rubber, or spongy plastic. A second brake member 74 generally similar to the member 72 and having a friction facing 75 is carried by a pair of arms 76 pivotally mounted in brackets 77 fixed on the frame, the arrangement being such that the brake member 74 is pressed by gravity against the brake member 72 and bears against the web W to grip the latter between the brake members in such manner as to permit upward advancing movement of the web W but to prevent any downward, reverse movement.

The accumulator (Figs. 5 and 6) serves to withdraw material from the supply roll R and to apply the brake to prevent rotation of the supply roll when the desired length of material has been withdrawn from the roll by the accumulator. Upon any upward movement of the web W past the brake 71, which movement is effected by means to be described hereinafter, the tendency of the web W to shorten in the portion extending between the point at which it leaves the supply roll R and the brake 71 causes the accumulator yoke 60 to be rotated upwardly from the normal position (shown in Fig. 5). This upward rotation causes the brake actuating rod 57 to be raised and to relieve the pressure of the brake shoe 55 against the brake disc 50, which frees the disc and consequently the arbor 40 and the stock roll R for rotation. As explained above, the web W is gripped by the brake 71 so that it can not be drawn downwardly. Accordingly, when the upward movement of the web ceases, the weight of the accumulator yoke 60 in moving downwardly to its normal position causes stock to be withdrawn from the stock roll R with the result that the roll is rotated. However, when the accumulator 60 reaches its normal position the nut 58 acting on the arm 56 causes the brake shoe 55 to be pressed against the disc 50 with sufficient force to halt further rotation of the roll R and to hold the roll in its halted position until the accumulator yoke 60 is again lifted.

The accumulator yoke may be counterbalanced by a spring (not shown) connected between it and the frame, so that the force exerted by the yoke on the web is approximately the same in all positions of the yoke.

It will be seen that the difference in the length of the web W which extends from the roll R to the brake 71 in the upper and lower positions of the accumulator 60 constitutes an accumulated length of web W which may be drawn upwardly through the brake 71 merely upon the application of sufficient force to lift the accumulator yoke 60. The machine is so designed that this length of material is always sufficient for the purposes required by other mechanisms of the machine so that it is not necessary for such other mechanisms to cause the roll to rotate. Rotation of the roll is effected by the lowering of the accumulator as just explained, which action takes place during a portion of the cycle of operation of the machine in which the web is not being drawn upwardly through the brake 71. Accordingly, it is not necessary that the web-advancing means hereinafter to be described serve to withdraw stock from the roll or cause rotation of the roll. It might be explained at this point that the web-advancing means hereinafter described operates with sufficient rapidity so that if it were required to accelerate the roll to withdraw stock from the roll an undue load would be placed on such mechanism and, moreover, the web would be stressed and either stretched or torn.

After passing through the brake 71, the web W is carried upwardly and trained over a first guide roller 80 (see Figs. 7 and 11) mounted rotatably on a shaft 81 secured in a pair of brackets 82 mounted on the frame 25, the shaft being located in slots 83 in the brackets 82 and adjustably positioned therein by nuts 84. The web W is then trained downwardly and around a measuring roller 85 rotatable on a shaft 86 carried by a measuring

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yoke 87 which together form a measuring member hereinafter described more in detail. The web W then extends upwardly and is trained over a second guide roller 88 rotatably supported in the brackets 82 in a manner similar to the first guide roller 86. From thence the web W is trained over a third guide roller 89 rotatably journaled (in a manner similar to the roller 80) in brackets 90 supported on the frame. The web W then passes downwardly over an article guide 120 which is described more in detail hereinafter and which serves to separate the two folds or plies of the web as it passes over the article guide.

A one-way brake 91 is provided which cooperates with the guide roller 88 for the purpose of preventing reverse movement of the web W past the roller 88. This one-way brake 91 includes a brake member 92 which is pivotally supported between upward extensions of the brackets 82 and which has a friction facing similar to the brake 71. The brake member 92 extends preferably beyond the ends of the roller 88 and is positioned so that its braking surface is adapted to engage against the web W trained over the roller 88 at a portion of such roller approximately 45° in a clockwise direction (as viewed in Fig. 7) from the top of the roller. The brake member 92 is mounted for pivotal movement such that it rocks downwardly by gravity to bear against the roller. In order to adjust the force which the brake member 92 exerts against the roller 88, a counterweight 94 is provided which takes the form of one or more nuts threaded onto a rod 95 extending from the brake member 92 in a direction opposite to its braking end. Secured on the brake member at its braking end is a resilient pad 96 formed from a spongy plastic similar to the material from which the facing member 73 and 75 are formed.

Means are provided between the brake 71 and the brake 91 for advancing a measured length of stock, the length of which is sufficient to form the bag. Such measuring means operates to provide between the brakes advanced past the brake 91 during the formation of the 71 and 91 a length of stock which is available to be advanced past the brake 91 during the formation of the bag, by means hereinafter described, without requiring the withdrawal of any additional stock from the roll R.

The stock-measuring means includes the aforementioned yoke 87 carrying at its free end the roller 85 which yoke is rotatably secured to a main drive shaft 100 journaled in the frame 25 for rocking movement.

The measuring yoke 87 includes a pair of parallel side arms 101 which are journaled on the main drive shaft 100 by bearing members 102 and are connected by a cross bar 103 parallel to the main drive shaft 100. The roller 85 is carried in the side arms 101 as previously described.

The measuring yoke 87 is arranged for angular movement about the axis of the main drive shaft 100 between an upper position, as shown in Fig. 8, and a lower position, as shown in Fig. 9, which movement may be termed a "measuring stroke." The movement of the measuring yoke through the measuring stroke causes a length of web W to be advanced past the brake 71 which length is equal to twice the distance of movement of the roller 85 from its upper position to its lower position. This advancing movement of the web W is effected by reason of the fact that the web is held against reverse movement by the brake 91 but is permitted to move past the brake 71 in a forward or feeding direction. The measuring yoke 87 is moved from its upper position to its lower position by means hereinafter described. It is normally urged towards an intermediate position, (shown in dotted lines in Fig. 9) by a return or counterbalancing spring 104 connected between the measuring yoke 87 and the frame 25 of the machine.

The upward movement of the measuring yoke 87 is limited by a limit bar 105 which is carried on a shaft 106

supported in brackets 107 and 108 carried by the frame of the machine. Such bar 105 may be formed of any suitable material but preferably it is either formed of, or covered by, a material which is sufficiently resilient to absorb the shock of contact between the measuring yoke 87 and itself in order to prevent undue shock and minimize the noise of such contact. The lower limit of movement of the measuring yoke 87 is determined solely by the means for actuating the yoke which means is hereinafter described.

Rigidly carried by and extending to the right of the main drive shaft 100 is an arm 110 which carries at its outer end a stop screw 111 which is adjustable in the arm 110 and is secured in adjusted position by a pair of nuts 112. The stop screw 111 is positioned to strike against the cross bar 103 to move the measuring yoke 87 downwardly upon rotation of the main drive shaft 100 in a clockwise direction (as viewed in Fig. 7).

It will be seen from the foregoing that when the main drive shaft 100 is rotated in a clockwise direction (as viewed in Fig. 7) the measuring yoke 87 is correspondingly rotated to cause the roller 85 to draw down a length of web W corresponding to the length of movement of the roller 85. Since the engagement between the arm 110 (through the screw 111) provides a one-way drive, the measuring yoke 87 is moved downwardly upon downward movement of the main drive shaft 100 but is free to move upwardly independently of the position of the main drive shaft 100, when the latter is in such position that the adjustable stop screw 111 is in its upper position and to assume the counterbalanced position shown in dotted lines in Fig. 9.

The length of web W which is measured by the measuring means just described provides a correct length of material to form the bag. Owing to the construction and arrangement of the measuring means, this length of material may be advanced very rapidly and with a comparatively small force, such force being only that which is necessary to lift the comparatively light measuring yoke 87. In advancing this portion of the web it is not necessary to advance any of the web which is between the one-way brake 71 and the accumulator roller 69. Accordingly, the advancement of the portion of the web between the brake 71 and the article guide 120 does not require the lifting of the accumulator which latter is considerably heavier than the measuring yoke 87 and would require a considerably greater force to move it than does the measuring yoke 87.

The weight of the accumulator is such that the web is advanced past the brake 71 only when the measuring yoke 87 moves downwardly to draw the web past the brake 71. When the web forwardly of the brake 71 is advanced by the weight of the article, as hereinafter explained, and the measuring yoke 87 moves upwardly, the weight of the accumulator is such as to prevent any movement of the web which is rearwardly of the guide roll 80. In other words, the portion of the web rearwardly of the guide roll 80 is advanced only when the measuring yoke 87 is moved downwardly by its actuating mechanism and any other advancement of the web forwardly of the guide roll 80 does not require advancing movement of the web rearwardly of the guide roll 80.

The article guide 120 (see Figs. 7, 8 and 11) serves both for spreading the two plies or folds of the web W and for guiding an article to be packaged into the space between the two folds or plies. The article guide 120 includes a member of sheet material bent into a U shape disposed vertically, thus providing a left-hand wall 121, a right-hand wall 122 parallel thereto and an arcuate end wall 123 joining the right and left-hand walls 121 and 122. The walls 121 and 122 at their forward portions are formed with divergent portions 124 and 125 which form an entry portion of the article guide and which portions are secured to the frame for supporting the article guide thereon. An upper member 126 is provided for defining the upper limit of the opening of the article guide

and has fingers 127 and 128 corresponding to the vertical walls 121 and 122 of the principal member of the article guide 120. A lower bar 129 extends horizontally below the article guide proper to define the bottom limit of the entry opening of the article guide.

The upper edge portions 130 of the article guide 120 are bevelled in a convergent direction, as shown particularly in Fig. 8, in order to guide the two plies or folds of the web W over the article guide without damaging the film stock.

The bar 129 serves as a guard to prevent the operator from inserting his hand or hands into the path of the clamping and welding members, hereinafter described. However, even should the operator get his hands in the path of the clamping and welding members hereinafter described and such members should clamp against the hand of the operator, nevertheless, because of the construction of the machine no serious injury would be occasioned.

The side walls 121 and 122 of the article guide are spaced apart a distance which permits the easy insertion of the article A to be packaged. Thus, the spacing between such walls is dictated by the thickness of the article. The height and length of such walls also are dictated by the corresponding dimensions of the article to be packaged. The dimension of the package in a front to rear direction relatively to the machine is determined, of course, by the width of the film stock. The dimension of the package in a vertical direction relatively to the machine is determined by the adjustment of the measuring means. The thickness of the package, of course, is established by the thickness of the article to be packaged, since the flexible film stock adapts itself to the size and shape of the article to be packaged, insofar as this result may be accomplished depending upon the size and shape of the article relatively to the size of the wrapper.

Means are provided for clamping the two plies of the web below the article guide 120 together to permit severing the web and welding the plies together on the two sides of the line of severance. The severing of the web and the heat sealing or welding are accomplished simultaneously and by the same means. In this action which is well known, the film stock is gripped between a relatively narrow heated blade and a resilient pad or platen for a sufficient time to melt the film along the line of the blade and to fuse and weld together the corresponding edges of the two plies of film stock on opposite sides of the line of separation of the web.

Referring now particularly to Figs. 7 to 9 and 11, the clamping and welding means includes a clamp slide 131, a pad slide 141 and a blade slide 151.

The clamp slide 131 is formed with a plate or slide portion 132 which is horizontally slidable in two pairs of plate guides 133 suitably secured to the frame of the machine at the front and rear portions, respectively. The forward portion of the plate 132 serves as a clamping element 134 functioning in a manner hereinafter explained. Upstanding from the forward portion of the plate 132 is a pair of arms 135 at the front and rear portions of the plate which support a second clamping element 136 vertically above the first clamping element with its forward edge projecting slightly beyond the forward edge of the latter for a purpose hereinafter explained.

At its rearward portion the plate 132 is formed with an upstanding flange 137 which cooperates with actuating means for the clamp slide hereinafter described.

The pad slide 141 is formed with a plate or slide portion 142 which is slidable in guides 143 suitably supported on the frame 25 at the front and rear of the machine in a manner similar to the guides for the clamp slide. The plate portion 142 carries at its forward end a channel 145 in which is secured a pad 146 formed of a suitable resilient material such as a heat resisting foam plastic and having a facing strip 147 of sufficiently heat resistant material so that it is not deteriorated by the heat of the

severing and welding blade, hereinafter described. The facing strip 147 preferably is formed of silicone rubber although other suitable material may be used.

The clamp slide 131 and the pad slide 141 are arranged for sliding movement in a horizontal plane toward and away from each other below the article guide 120 so that they meet and are arranged to clamp together the two plies of the web along a line substantially in the vertical medial plane of the article guide 120. At this point it should be explained that the clamping elements 134 and 136 and the pad 146 extend from the front to rear of the machine a sufficient distance so that they project beyond the side edges of the web.

Means are provided for moving the clamp slide 131 and the pad slide 141 between a first (inner) position of mutual engagement and a second (outer) position away from each other in which latter position they are well to the side of the article guide 120 and do not interfere with the movement of the two plies of the web past and below the lower edges of the article guide 120.

The blade slide 151 includes a plate or slide member 152 which is horizontally slidable in plate guides 153 suitably secured to the frame at the front and rear of the machine, respectively. Secured to the plate 152 is a blade assembly which consists of two strips 154 and 155 which are secured together in face-to-face relation at their forward portions, as by rivets 156, and are spaced throughout their main body portions to clamp therebetween a heating element, including a resistor 157 suitably insulated. The forward portion of the lower strip 154 projects forwardly of the upper strip 155 and serves as the blade proper or knife portion which effects the severing and welding action. The strips preferably are formed from a suitable metal.

At their rear portions the strips 154, 155, are secured in spaced relation by bolts 158 carrying spacing collars 158a, which screws also serve to secure connector strips 159 which are also connected, as by screws 160, to the blade 152, to thereby connect the blade assembly to the plate 152. The rear edge portion of the plate 152 is turned up to form a flange 161 which provides means for attaching to the blade 152 suitable actuating means hereinafter described.

The blade slide 151 is disposed above the clamp slide 131 and the knife portion is slidable in the space between the upper and lower gripping elements 136 and 134, which elements, together with the side arms 135, form a sheath or guard for the knife portion.

A connection is provided between the blade slide 151 and the clamping slide 131, whereby when the former is moved inwardly the latter is moved correspondingly, such connection, however, permitting the blade slide 151 to move a short distance further when the clamp slide 131 is halted against the pad slide 141, as shown in Fig. 9. Such connection includes a pair of bolts 170 secured in the flange 161, as by nuts 171, and extending outwardly from the flange 161 and through the flange 137 of the clamp slide plate portion 132. A spring 172 is carried on each bolt 170 and is compressed between the flange 137 of the clamp slide and a washer 173 seated against the bolt head to urge the bolt 170 and consequently the blade slide 151 outwardly. A spacing collar 174 formed of rubber or other suitably resilient material is carried on each bolt between the flanges 137 and 161.

The clamp slide 131 and the blade slide 151 are actuated simultaneously from the main drive shaft 100 to move them between their inner and outer positions, shown, respectively, in Figs. 9 and 8 of the drawings. To this end, a pair of levers 180 are secured to the main drive shaft 100 and each is pivotally connected at its free end to one end of a pull rod 181, the other end of which rod is pivotally connected to a bracket 182 secured to the flange 161 of the blade slide 151, by a threaded, adjustable connection.

The pad slide 141 is actuated by the rocking move-

ment of an auxiliary drive shaft 190 rotatably journaled in the frame 25 to the left of the article guide 120. The shaft 190 carries a pair of levers 191, each of which is connected to a screw 192 through a swivel block 193 threaded on a screw 194 having a clevis head pivoted to a bracket 195 secured to a flange 196 formed by turning up the outer edge of the pad slide plate 142.

The auxiliary shaft 190 is rocked by the main drive shaft 100 through an equalizing connection now to be described. A lever 200 secured on the auxiliary drive shaft 190 at the rear of the machine carries rigidly at its end a rod 201 which is slidable in a swivel block 202 pivotally carried by a pair of spaced arms 203 secured on the main drive shaft 100. Thus, the rotation of the main drive shaft 100 in a clockwise direction (as viewed in Fig. 8) effects rotation of the auxiliary drive shaft 190 in a counterclockwise direction and rotation of the main drive shaft in the opposite direction effects corresponding rotation of the auxiliary drive shaft 190 in a clockwise direction.

From the foregoing it will be seen that when the main drive shaft 100 is rocked in a counterclockwise direction, as viewed in Figs. 8 and 9, the consequent rocking movement of the levers 180 and 191 causes the clamp slide 131 and the pad slide 141 to be moved inwardly until the clamping elements about the pad and further movement of the clamp slide and pad slide is halted. In this position the clamping element and pad clamp together the two plies of the web which pass therebetween, as illustrated in Fig. 9. Since the blade slide 151 is connected directly to the lever 180 by the pull rods 181, and since there is a lost motion connection between the blade slide 151 and clamp slide 131, provided by the bolts 170 and associated members, the blade slide 151 continues to move inwardly against the force of the springs 172, after the clamp slide is halted, with the result that the forward edge of the blade or knife is moved inwardly to a position wherein it projects slightly from the sheath provided by the upper and lower clamp elements 136 and 134 and into firm engagement with the face of the pad 146. When the main drive shaft 100 is rocked in a clockwise direction, as viewed in Fig. 9, the blade slide 131 and the pad slide 141 are caused to move apart, and shortly thereafter the spacing collars 174 about the flange 137 of the clamp slide and cause the latter to move outwardly along with the blade slide.

It should be noted at this point that the upper clamp element 136 projects inwardly beyond the lower clamp element 134 and thus engages the web before the latter during the inward movement of the clamp slide and is disengaged from the web after the lower clamp element during the outward movement of the clamp slide. Thus the upper clamp element 136 serves to clamp the web after the heat severing takes place and the clamp slide and pad slide start to move outwardly, thus permitting the package, including the article and the formed bag surrounding the article to drop free of the web without any possibility of the weight of the package causing the web to be torn at the line of severance.

Suitable means are provided for receiving the packages which are discharged from the machine. In the first embodiment described herein the counter 38 which is located vertically below the article guide serves the foregoing purpose. It will be seen that when each article is packaged and the package wrapper severed from the web the package drops by gravity onto the counter 38.

The main drive shaft 100 is rocked by a suitable drive means which in the present illustrative embodiment of the invention includes an air motor 220 pivotally supported for slight rocking movement on a pair of brackets 221 supported on the frame 25. The air motor 220 is supplied with compressed air from a suitable source of air under pressure such as an air compressor (not shown)

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which is connected to a fitting 222 secured to a supporting plate 223 mounted on the frame 25, which fitting is connected to a solenoid actuated air valve 224 and carried on the plate 223. The outlet of the air valve is connected to the air motor by a hose 225. The hose connection 225 between the fitting and the motor 220 is flexible and is of sufficient length to permit the motor 220 to rock slightly in its brackets 221 to accommodate the action of the mechanism connected to the motor as hereinafter described.

The air motor includes a cylinder 226 in which a piston (not shown) is slidable and to which is connected a piston rod 227 which projects from the cylinder and which extends slidably through a swivel block 231 pivotally connected to a clevis portion of a main actuating lever 232 secured on the main drive shaft 100. The end of the piston rod 227 which projects through the swivel block 231 threadedly carries an adjustable stop nut 229. A spring 233 surrounds the piston rod 227 and is compressed between the swivel block 231 and a nut 234 on the piston rod 227 to yieldably urge the swivel block 231 against the stop nut 229.

The main drive shaft is normally rotated clockwise (as viewed in Fig. 8) to the limit of its movement by a return spring 235 connected between the arm 232 and a fixed anchor such as the motor bracket 221.

When the air valve 224 is opened to allow air under pressure to enter the hose 225, the piston (not shown) is driven forwardly (to the right as viewed in Fig. 8) to exert a force, through the driving spring 233, on the swivel block 231 and rock the drive arm 232 to thereby rock the main drive shaft 100 in a counterclockwise direction and move the clamp slide 131 and pad slide 141 into their inner, abutting positions.

Supported on the bracket 108 is a microswitch 250 having a closing plunger 251 and an opening spring arm 252. The microswitch is of a conventional type wherein it is closed upon depression of the plunger 251 and stays closed until the opening arm 252 is depressed, and is opened upon depression of the opening arm 252 and stays open until it is again closed by the depression of the closing plunger 251. The measuring yoke 101 carries a blade 253 projecting laterally therefrom and positioned to strike against and depress the plunger 251 when the measuring yoke is elevated to the upper limit of its movement by the advancing movement of the web.

The opening arm 252 of the microswitch is actuated by a two-armed lever 240 pivotally carried on an upwardly extending arm 241 of the operating lever 232. The two-armed lever normally is rocked, along with the main actuating lever, by reason of the fact that its lower arm 242 is yieldably urged toward the lever 232 by a tension spring 243 and abuts the end of the piston rod 227. The upper arm 244 of the lever 240 carries a blade 245 in which a contact screw 246 is threaded and adjustably secured by nuts 247. The contact screw 246 is positioned to engage the opening arm 252 to depress the latter to open the microswitch 250. The arrangement of the two-armed lever 240 and the actuating lever 232 is such that these two members are rocked together when the air motor 220 is actuated to move the piston rod to the right and rock the lever 232 is a counterclockwise direction (as viewed in Fig. 8) to thereby move the clamp slide 131 and pad slide 141 to their inner, abutting positions. When the clamp and pad abut and further movement of the corresponding slides is halted, the two-armed lever 240 is in a position wherein the contact screw 246 has not been moved far enough to depress the opening lever 252 to open the switch. However, upon further movement of the piston rod to the right, the actuating arm 232 is not rocked further but the piston rod 227 is projected further to the right through the swivel block 231 to rock the lever 240 in a counterclockwise direction about its pivot on the lever 232 and against the

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force of the spring 243 to cause the stop screw 246 to depress the opening arm 252 and open the switch 250.

The period of time from the moment of engagement between the knife and the pad until the microswitch is opened to cause these members to be separated constitutes what may be termed a "dwell" during which heat is applied to the web to sever it and weld together respectively the plies on opposite sides of the line of severance. This dwell is provided by reason of the arrangement of the two-armed lever on the operating lever 232. It will be seen that when the lever 232 is halted, the contact screw 246 carried by the lever 240 has not yet engaged and depressed the opening arm 252 of the switch 250. The dwell is thus equal in time to the time it takes the stop screw 246 to be moved from its position at the time the lever 232 is halted, to its further position depressing the opening arm 250. The length of the dwell may be adjusted in accordance with the nature and thickness of the web to be severed and welded.

Reference is now made to Fig. 15 wherein is shown a schematic wiring diagram of the electrical circuits embodied in the machine. A pair of conductors 301 are provided for connecting the several circuit elements hereinafter described to a source of electric power (not shown) and a main switch 302 is provided which is connected in series with all of the other circuit elements. The blade heating resistor 157 and an adjustable thermostatic switch 159a are connected across the line beyond the switch 302. The thermostatic switch 159a which is suitably carried by the blade assembly (Fig. 11) serves to control the energization of the heating resistor to maintain the knife at a substantially uniform desired temperature. The actuating solenoid 255 forming a part of the air valve 224 is connected across the line beyond the switch 302 and in series with the microswitch 250, whereby the solenoid is actuated to maintain the valve open while the microswitch is closed and is de-energized when the microswitch is open to permit the normally closed air valve to close. A pilot lamp 260 preferably is provided which is connected across the line beyond the main switch 302 to indicate whether the latter is open or closed.

The machine normally assumes the condition illustrated in Figs. 7 and 8, for example, wherein the three slides are in their outer positions. Under normal conditions of operation the slides are in their inner positions only for a period sufficient to sever and weld the film material. Assuming that there is no film stock in the machine, and the machine is to be prepared for operation, a roll of film stock is placed on the arbor 40 and against the rear cone 43 and the front cone 44 is placed on the arbor and tightened against the roll by the nut 45 to secure the roll between the supporting cones.

Film stock is withdrawn from the roll and trained under the roller 69 of the accumulator, and then upwardly through the one-way brake 71 and then over the guide roller 80, then under the measuring roller 85, forming a part of the measuring device, then over the guide roller 88 and then over the guide roller 89 and then down over the article guide 120 with a sufficient length of web depending below the article guide to permit the formation of a preliminary weld. The depending end of the web is pulled downwardly manually to apply a sufficient tension thereto and for a sufficient distance to raise the measuring yoke 87 to its upper position to close the microswitch. This institutes an initial cycle of operation of the machine similar to that initiated by the insertion of an article in the article guide, as described hereinafter, resulting in the severing of the web and welding the edges of the plies or folds along transverse lines on opposite sides of the line of severance. The two plies of the portion of the web which is above the line of severance are welded together throughout their transverse edge portions and the web thus extends in unbroken form across the bottom of the article guide from one side edge to the other. This prevents the web from being

drawn upwardly over the article guide and provides a closed side for the bag to be formed, as will now be described.

In the packaging operation of the machine subsequent to the initial cycle an article to be packaged is inserted manually in the article guide 120 through the front opening thereof and is then released, whereby it falls by its own weight. Owing to the fact that the two plies of the film stock are welded along a transverse line and form a continuous expanse of film under the article guide, the article is caught thereby and its weight causes the web to be drawn downwardly over the article guide.

In this connection it is to be understood that the machine is so constructed and adjusted that a cycle of operation will be initiated solely by the weight of the article when inserted in the machine, as just described.

The aforementioned movement of the web causes the portion of the web which extends from the article guide back to the measuring roller 85 to be advanced, the weight of the accumulator being sufficient to prevent any feed or advancing movement of the portion of the web which extends from the accumulator roller back to the stock roll. However, the weight of the article is sufficient to raise the measuring yoke 87 and permit a length of web corresponding to the distance through which the measuring roller 85 is elevated to be advanced.

The elevation of the measuring yoke 87 causes the blade 253 thereon to depress the plunger 251 and close the microswitch 250, which energizes the solenoid 255 to open the air valve 224 which admits air under pressure to the air motor 220. The air motor 220 when energized moves the piston rod 227 to the right (as viewed in Fig. 8) to rock the arm 232 counterclockwise, which effects corresponding movement of the main drive shaft 100.

The rocking of the shaft 100 acts through mechanism hereinabove described to move the blade slide 151, a clamp slide 131 and pad slide 141 inwardly until the clamping elements and pad abut, gripping the web therebetween, and further inward movement of the clamp slide and pad slide is halted. However, the blade slide 131 is moved further inwardly to cause it to project slightly beyond the edges of the clamping elements 136 and 134 to engage the web tightly between the edge of the knife and the pad. The heated knife edge melts the film to sever it along a line corresponding to the line of the engagement of the knife and the film and welds the two plies of the web together along lines transversely thereof on both sides of the line of severance.

Upon still further movement of the piston rod 227 to the right, the lever 240 is rocked by its pivot on the lever 232 to move the contact screw 246 against the opening arm 252 to open the microswitch 250. This deenergizes the air valve solenoid 255 and allows the valve to close, thus cutting off the compressed air and permitting the piston (not shown) and piston rod 227 and connected mechanism to be returned to starting position by the return spring 235. The slides thereby are separated and the clamping elements and pad moved away from the web to allow the package below the line of severance to fall by gravity onto the counter 38.

During the rocking movement of the main drive shaft 100 in a counterclockwise direction (as viewed in Fig. 8) the arm 110 is similarly rocked to cause the stop screw 111 to bear against the cross bar 103 of the measuring yoke 87 and rock the latter in a counterclockwise direction to draw down the web, the yoke being moved from an upper position such as shown in Fig. 8 to a lower position such as shown in Fig. 9. In order to permit such drawing down of the web, the portion of the web between the accumulating roller and the measuring roller must be advanced, inasmuch as the portion of the web forwardly of the brake 91 is held against reverse feeding movement. The foregoing advance of the web is accomplished by the raising of the

accumulator yoke to advance the web, which is effected without initiating rotation of the stock roll. The length of the web thus advanced is determined by the extent of the rocking movement of the measuring yoke 87.

Upon completion of the downward rocking movement of the measuring yoke 87, the latter is returned by the spring 104 to an intermediate position, such as shown for example in broken lines in Fig. 9.

As soon as the tension exerted on the web by the measuring yoke is relieved, the web is gripped by the brake 71 to prevent reverse feeding and the lack of advancing tension on the web permits the accumulator yoke 60 to drop by gravity, which causes a predetermined length of stock to be withdrawn from the stock roll. The stock roll is permitted to rotate to permit a length of stock to be withdrawn, by reason of the fact that when the accumulator roll is raised, the roll brake is released. When the accumulator roll reaches its lower position it causes the brake to be applied and prevent rotation of the stock roll.

Various modifications may be made in the machine without departing from the scope of the invention. For example, the machine, instead of being provided with a flat counter for receiving the packages discharged from the machine, may be provided with an inclined chute 300 such as shown in the embodiment illustrated in Fig. 2. Such chute 300 is secured to the frame and extends under the article guide 301 and preferably has its discharge end located to permit a receptacle to be placed thereunder in order to receive by gravity packaged articles which are discharged by the machine.

In another embodiment of the invention, shown in Fig. 3, a traveling conveyor 400 is provided having one end portion disposed under the article guide 401 in position to receive packages discharged from the machine and to convey them away from the machine to a point of collection.

Still another embodiment of the invention is illustrated in Figs. 12 to 14, inclusive, in which several of the mechanisms of the first embodiment of the machine (shown in Figs. 1 and 5 to 11, inclusive) are shown in modified form. It will be understood that any one or more of such modified mechanisms of the machine may be substituted for the corresponding portions of the machine shown in the first embodiment or for similar mechanisms in the other embodiments and described in connection therewith. In the embodiment illustrated in Figs. 12 to 14 the stock roll is supported on an arbor 501 journaled in spaced brackets 502 secured on the inner face of a front panel 503 of the machine cabinet which is pivotally supported on the frame 500 for movement between a closed position (not shown) and an open position (as shown) in which latter position the brackets are arranged and positioned for ready access to and removal and replacement of the stock roll R. In this form of the invention a brake is provided which is actuated by an accumulator 504 in a manner generally similar to that described in connection with the first embodiment of the invention. The brake includes a bell crank 508 having an L-shaped arm carrying at one end a brake shoe 505 adapted to bear against the periphery of a brake drum 506 rigidly carried on the arbor 501. The bell crank 508 is pivotally supported on a bracket 507 and on the inner face of the frame 503 and is rigidly connected to the accumulator 504 for actuation thereby.

In Fig. 14 a modified form of measuring yoke 510 and actuating and stop means therefor is shown wherein the measuring yoke 510 carries a measuring roller 511 pivotally carried on a main drive shaft 512 on which an actuating lever 513 is rigidly mounted. An arm 514 is rigidly secured on and extends laterally from the main drive shaft 512, and a spring 515 is interposed between the arm 514 and the cross bar (not shown) of the measuring yoke 510, such spring being held against dis-

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lodgment by suitable means such as a cup 516 on the arm 514 and a stud 517 on the yoke 510. An adjustable lower stop 520 is provided which takes the form of a rotatable cam shaped member 520 pivoted for rotary adjustment on the frame 525 in a position to be in the path of and establish the lower limit of downward movement of a measuring yoke 510. Rotatable adjustment of the position of the stop 520 is effected by a dial knob 521 on the outside of the casing, the position of which may be indicated in any suitable manner, as by a cooperating fixed scale 524, to show the corresponding position of the stop 520. It will be seen that by rotating the stop to various positions, a considerable variation in the extent of movement of the measuring yoke can be effected. The upper position of the measuring yoke is established by a stop bar 522 similar to the stop bar previously described.

Instead of employing a one-way web brake, such as the brake 71, shown in Fig. 7, between the accumulator and the first guide roller, a brake 530 may be provided which cooperates with the first guide roller, and which may be generally similar to the brake 91 except that it is not provided with any adjustable counter-balancing means. Where a brake such as the brake 530 is provided in connection with the first guide roll 531, I prefer to employ a generally similar brake 535 in connection with the third guide roller 533. Such an arrangement insures that a minimum of static will be generated by the feed movement of the web past the brake. The arrangement of the brake 535 for cooperation with the roller 533 instead of with the roller 532 eliminates any crowding which might otherwise result, especially where the rollers 530 and 533 are close together.

It will be understood that the machine of my invention is adapted for employment for forming packages of shapes and dimensions other than those of the illustrative package shown and that the machine may be readily so adjusted or constructed to provide for the forming of packages of such other shapes and dimensions without departing from the scope of my invention.

From the foregoing description of the machine and method it will be seen that the present invention provides a novel method and machine for forming a bag type container from film stock in web form.

The arrangement is such that it is only necessary to insert an article to be packaged in the article guide of the machine and release the article, whereupon the weight of the article serves both to draw a predetermined length of web past the severing and sealing means and to initiate the operation of the heat severing and sealing means to complete the bag, whereafter the machine is automatically reset for another cycle of operation. Accordingly, the machine is substantially automatic in operation and can be operated by an unskilled operator. The machine will be operated automatically merely upon the operator placing the article sufficiently within the article guide so that it drops between the folds of the web and it is not necessary for the operator to perform any additional operation such as operating an actuating member, for example, a switch or starting button, or insert the articles in a special manner to actuate a member or mechanism within the article guide necessary to initiate the operation of the machine.

The means for guiding and controlling the feed movement of the web through the machine is simple and effective and there is no danger of stretching, tearing, creasing or causing any other damage to the film stock. On the other hand, the web is fed at a sufficiently rapid rate so that the article may be inserted and packaged in a very short period of time, with the result that the machine has a high production rate. In fact, the machine is capable of packaging the articles at a faster rate than they can be inserted manually in succession.

The accumulator and stock roll brake mechanism provides an effective means for withdrawing stock from the

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stock roll without requiring rapid acceleration of the stock roll and thus eliminating any likelihood of stretching or tearing the stock. Moreover, the stock roll is held against rotation except when stock is being withdrawn therefrom and thus preventing any likelihood of excess stock being withdrawn from the roll and causing malfunction of the machine or creasing or wrinkling of the stock.

The measuring mechanism is simple and effective and provides for a length of stock which is relatively free to move upon the application of a relatively small force, thus permitting the advancement, solely by the weight of the article, of a measured length of stock of the correct length to suitably form the enclosing container or wrapper for the article to be packaged. The measuring operation takes place during the inward movement of the slides and therefore it is not necessary to delay any operation of the machine to permit the measuring operation to be carried out. Also, it is not necessary to delay the operation of the machine during the removing of stock from the roll by the accumulator action.

In one form of the invention the measuring yoke is accelerated gradually by reason of the yieldable drive between the main operating shaft and the measuring yoke, thus permitting the web to be accelerated gradually by the measuring yoke and minimizing strain on the web by the movement of the measuring yoke. Moreover, the extent of movement of the measuring yoke through its measuring stroke may be adjusted throughout a substantial range in order to insure that any predetermined, desired length of web, within limits corresponding to such range, is drawn forward by the measuring yoke.

The manner of mounting the guide rollers is such that they can be readily adjusted to provide for different conditions of the web. Thus, each guide roller can be elevated or depressed or tilted out of horizontal position sufficiently to cause the material to follow a predetermined path through the machine and thus maintain the web in the proper location and prevent it from shifting laterally as it is advanced.

Various adjustments are provided for insuring the most effective operation of the machine. Such adjustments should be obvious from the structures described hereabove. However, it may be noted that among such adjustments are the adjustment of the roll brake actuating means, the adjustment of the length of the stroke of the measuring yoke, the adjustment of the extent of projection of the piston rod beyond its swivel block, the adjustment of the blade slide and pad slide for parallelism, the leveling adjustment for the web guide rollers, the adjustment of the lost motion connection between the blade slide and the clamp slide, the pressure adjustment of the web guide roller brake, and the period of the dwell or time that the blade is in severing and welding position.

As above mentioned, the construction of the machine is such as to prevent injury to the operator. The machine is enclosed except at the article guide and it is unlikely that the operator will place his hands thereto sufficiently to cause injury thereto. However, the actuating arrangement, including especially the spring drive between the piston rod and the main actuating arm for the slides is such that no damage will be caused to many types of articles to be packaged, such as items of clothing, even though the clamp and pad should accidentally clamp the article therebetween. In fact, the arrangement is such that even should the operator accidentally place his hand or hands between the slides he would not be injured by the pressure exerted by such slides.

I claim:

1. A packaging machine for forming a bag around an article to be packaged from flexible, heat-sealing, thermoplastic film stock in longitudinally folded web form, said machine comprising a frame, means for supporting a roll of film stock rotatably on said frame, means for spreading the two folds of the web, means for gripping

and welding said two folds along a zone transversely of the web and beyond said spreading means, means for severing the web along said zone whereby the two folds are joined on both sides of said line of severance, and means actuated solely by the movement of the web effected by the weight of the article to be packaged when inserted between the folds of the web and released, for initiating the actuation of said gripping and joining means.

2. A packaging machine for forming a bag around an article to be packaged from a roll of flexible, heat-sealing, thermoplastic film stock which is in longitudinally folded web form, said machine comprising a frame, means on said frame for rotatably supporting the roll of film stock, means on said frame for releasably gripping the web of stock withdrawn from the roll, means for welding together the folds along a zone transversely of the web and for severing the web transversely at such zone, means for guiding said web from said roll to said gripping means and for spreading the folds of a portion of said web ahead of said gripping means, and means actuated solely by the movement of the web effected by the weight of the article to be packaged when inserted between the folds of the web and released for initiating the actuation of said gripping means and said severing means.

3. A packaging machine comprising means for supporting a roll of flexible, heat-sealing, thermoplastic, film stock in longitudinally folded web form, said machine comprising means for guiding and for spreading the folds of the web progressively upon progressive removal from the roll to a distance apart sufficient to admit the article to be packaged between the folds, means for severing a measured length of wrapping material from the web along a line transversely of the web and for joining the edges of the two folds on both sides respectively of the line of severance, and means actuated solely by the movement of the web effected by the weight of the article to be packaged when inserted between the folds and released for initiating the operation of said severing and sealing means.

4. The invention as set forth in claim 3 wherein a delivery counter is disposed below said article guide to receive packaged articles dropping therefrom by gravity.

5. The invention as set forth in claim 3 wherein a delivery chute extends below said article guide for receiving packaged articles dropping therefrom by gravity and for guiding them to a point of discharge.

6. The invention as set forth in claim 3 wherein a traveling conveyor is provided having a portion disposed under said article guide for receiving articles dropping therefrom by gravity and for conveying them to a point of discharge.

7. In a machine for forming packages from flexible, heat-sealing, thermoplastic film stock in longitudinally folded web form, said machine comprising a frame, means for rotatably supporting a roll of said material on said frame, measuring means for advancing a measured length of the web, a one-way brake between said advancing means and said roll support for holding the web against reverse movement in a direction from said advancing means toward said roll support, means active after each actuation of said measuring means for withdrawing from said roll a length of material equal to that advanced by said advancing means upon its just preceding actuation, means for severing said web along a line transversely thereof and for welding the folds together respectively on both sides of said line of severance, and means actuated solely by the movement of the web effected by the insertion between the folds of the web at a point between said advancing means and said severing and sealing means of an article to be packaged and release of the inserted article for initiating the actuation of said advancing means and said severing and sealing means.

8. In a machine for forming packages from flexible,

heat-sealing, thermoplastic film stock in longitudinally folded web form, said machine comprising a frame, means for rotatably supporting a roll of said material on said frame, means for advancing a measured length of the web, a one-way brake between said advancing means and said roll support for holding the web against reverse movement in a direction from said advancing means toward said roll support, means active after each actuation of said advancing means for withdrawing from said roll a length of material equal to that advanced by said advancing means upon its just preceding actuation, brake means controlled by said withdrawing means for restraining rotation of said roll except when material is being withdrawn therefrom, means for severing said web along a line transversely thereof and for welding the folds together respectively on both sides of the line of severance, and means actuated solely by the movement of the web effected by the insertion between the folds of the web at a point between said advancing means and said severing and sealing means of an article to be packaged and release of the inserted article for initiating the actuation of said advancing means and said severing and sealing means.

9. In a machine for forming packages from flexible, heat-sealing, thermoplastic film stock in longitudinally folded web form, said machine comprising a frame, means for rotatably supporting a roll of said material, means for advancing a measured length of the web, a one-way web brake between said advancing means and said roll support for holding the web against reverse movement in a direction from said advancing means toward said roll support, means active after each actuation of said advancing means for withdrawing from said roll a length of material equal to that advanced by said advancing means upon its just preceding actuation, a roll brake controlled by said withdrawing means for restraining rotation of said roll except when material is being withdrawn therefrom, a supporting member carrying said roll support, said advancing means and said roll brake, and pivotally mounted for movement between a position wherein said roll support is located within said frame and a position wherein said roll support is located outside said frame, means for severing said web along a line transversely thereof and for welding the folds together respectively on both sides of the line of severance, means actuated solely by the movement of the web effected by the insertion between the folds of the web at a point between said advancing means and said severing and sealing means of an article to be packaged and release of the inserted article for initiating the actuation of said advancing means and said severing and sealing means.

10. A machine for forming a bag around an article to be packaged from a roll of flexible, heat-sealing, thermoplastic film stock in longitudinally folded web form, which machine comprises a frame, means for rotatably supporting a stock roll on said frame, first and second spaced web guide rollers on said frame and parallel to said stock roll, a first one-way web brake cooperating with said first web guide roller for preventing reverse feeding of the web toward said stock roll, a second one-way brake between said second web guide member and said stock roll, a measuring roller, means rotatably supporting said measuring member and moving it a predetermined distance in a generally vertical direction between upper and lower positions both of which are below the level of said first and second web guide rollers, whereby upon downward movement of said measuring member a measured length of web is drawn past said second one-way brake, means for severing said web along a line transversely thereof and welding the folds together respectively on opposite sides of said line of severance, and means actuated solely by the movement of the web effected by the insertion between the folds of the web at a point between said advancing means and

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said severing and sealing means of the article to be packaged and release of the inserted article for initiating the actuation of said advancing means and said severing and sealing means.

11. A machine for forming a bag around an article to be packaged from a roll of flexible, heat-sealing, thermoplastic film stock in longitudinally folded web form, which machine comprises a frame, means for rotatably mounting a stock roll on said frame, a first web guide roller on said frame and parallel to said stock roll, a first one-way web brake cooperating with said first web guide roller to prevent reverse feeding of the web toward said stock roll, a second web guide roller on said frame between and parallel to said first guide roller and said stock roll, a third guide roller on said frame between and parallel to said second guide roller and said stock roll, a second one-way web brake cooperating with said third web guide roller for preventing reverse feeding of the web toward said stock roll, a measuring member, means rotatably supporting said measuring member and moving it in a generally vertical direction between upper and lower positions both of which are below the level of said second and third web guide rollers, whereby upon downward movement of said measuring member a measured length of web is drawn past said second one-way brake, means for severing said web along a line transversely thereof and welding the folds together respectively on opposite sides of said line of severance, and means actuated solely by the movement of the web effected by the insertion between the folds of the web at a point between said advancing means and said severing and sealing means of the article to be packaged and release of the inserted article for initiating the actuation of said means for moving said measuring member severing and welding means.

12. A machine for making bags from film stock in roll form, which machine comprises a frame, means for rotatably supporting on said frame a roll of flexible stock in web form, means for severing said web, a web guide roller rotatably supported on said frame parallel to said stock roll and a one-way web brake for preventing reverse feeding of said web toward the stock roll, said brake including an elongate brake member having a friction surface thereon and extending substantially the length of the web guide roller and means supporting said brake parallel to said web guide roller for swinging movement about a pivot parallel to the web guide roller and spaced upwardly and laterally therefrom, said means supporting the brake member in a position to be swung by gravity into engagement with said roller.

13. The process of packaging an article which comprises spreading the longitudinal edges of the folds of a web of longitudinally folded flexible, heat-sealing, thermoplastic film stock, the folds of which are welded together along a line transversely of the web to provide a closed end, suspending in a vertical plane a portion of said web including said closed end in position to receive an article therein, inserting between the folds and above said weld line an article to be packaged, releasing the article to cause an advancing movement of the web, welding the folds together along a line transversely of said web on the other side of said article from said first weld line and above said article, severing said web along a transverse line on the other side of said second weld line from said article, and utilizing the advancing movement of the web for controlling said severing and welding steps.

14. The process of packaging an article which comprises spreading the longitudinal edges of the folds of a web of longitudinally folded, flexible, heat-sealing, thermoplastic film stock, the folds of which are welded together along a line transversely of the web to provide a closed end, suspending in a vertical position a portion of said web including said closed end in position to receive an article therein, inserting between said folds and above said closed end an article to be packaged, releasing the

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article to cause an advancing movement of the web, welding the folds together along a line transversely of said web on the other side of said article from said first weld line and above said article, severing said web along a transverse line on the other side of said second weld line from said article, and utilizing the advancing movement of the web for controlling said severing and welding steps.

15. The process of packaging an article which comprises supporting in a horizontal position a roll of longitudinally folded, flexible, heat-sealing, thermoplastic film stock, the folds of which are welded together along a line transversely of the web, to provide a closed end, withdrawing a length of stock in web form from the roll, spreading the longitudinal free edges of said withdrawn web, inserting between said spread folds and against the closed end an article to be packaged, releasing the article, causing said withdrawn web portion to move downwardly solely by the force created by the weight of the inserted article, applying clamping forces on the two folds to clamp them together along two spaced parallel lines transversely of the web and above the article and to halt the movement of said web, heating said web along a zone intermediate and parallel to said lines of clamping to sever the web along a line between said lines of clamping and to weld the folds together along two transverse lines on opposite sides of said line of severance, controlling the application of said clamping forces and heat to said web by said article-induced movement of said web; discontinuing said heating and releasing said clamping forces to allow said packaged article to drop free from the severed end of the web.

16. The process of packaging an article which comprises advancing progressively along a path in a direction longitudinally thereof a web of longitudinally folded, flexible, heat-sealing, thermoplastic film stock the folds of which are welded together along a line transversely of the web to provide a closed end, spreading the longitudinal free edges of said folds progressively, inserting between the spread folds an article to be packaged, releasing the article to thereby advance the web solely by the weight of the article, halting the advancing movement of the web, applying opposed clamping forces on the two folds to clamp them together along two spaced parallel lines transversely of the web at a portion thereof on the other side of said inserted article than said weld line, heating said web along a zone intermediate and parallel to said two lines of clamping to sever the web along a transverse line between said lines of clamping and to weld the folds together along transverse lines on opposite sides of said line of severance, utilizing the article-induced movement of the web to initiate the application of said clamping forces and said heat, discontinuing said heating, and releasing said clamping forces.

17. A method of packaging an article of manufacture having a predetermined weight comprising the steps of folding in two along its length an elongated web of wrapping material, sealing such web at one end so as to provide an elongated aperture along the length of such web opposite the folded region, suspending the end portion of such web in a substantially vertical plane with its sealed end downward and positioned at a selected height, biasing said web against movement in a downward direction by a biasing force which is less than a predetermined amount when the downward movement of said web is less than a predetermined value and greater than said predetermined amount when said downward movement is greater than said predetermined value, inserting into the elongated aperture in said web an article having a predetermined weight, releasing said article so as to cause a downward movement of said web a distance equal to said predetermined value, again sealing the web across its width in the region which is now positioned at said selected height, cutting said web across its width at said last-mentioned seal region intermediate the width of such seal so as to leave the web sealed at its downward end, and utilizing

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the downward movement of the web to initiate the sealing step.

18. The combination of steps set forth in claim 17 wherein the sealing constitutes heating the web so as to cause a seal across its width.

19. The combination of the steps set forth in claim 17 wherein the sealing comprises pressing heating elements against opposite sides of said web so as to cause a seal across its width.

20. A method of packaging an article of manufacture comprising the steps of folding in two along its length an elongated web of wrapping material and sealing such web at one end so as to provide an elongated aperture along the length of such web opposite the folded region, suspending the end portion of such web in a substantially vertical plane with its sealed end downward and positioned at a selected height, securing said web against movement by a force which is substantially greater than the weight of said article to be packaged, providing a slack in said web between its sealed end and the region where it is secured, inserting into the elongated aperture of said web the article to be packaged, releasing said article so as to cause a downward movement of said web approximately sufficient to take up said slack, again sealing the web across its width in the region which is now positioned at said selected height, cutting said web across its width at said last-mentioned seal region intermediate the width of such seal so as to leave the web sealed at its downward end, and utilizing the downward movement of the web to initiate the sealing step.

21. The combination of steps set forth in claim 20 wherein the slack maintained in said web is approximately equal to the width of an article to be packaged.

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22. A method of packaging an article of manufacture comprising the steps of folding in two along its length an elongated web of wrapping material and sealing such web at one end so as to provide an elongated aperture along the length of such web opposite the folded region, suspending such web in a substantially vertical plane with its sealed end downward and positioned at a selected height, securing said web against movement by a force which is substantially greater than the weight of said article to be packaged, impressing a force less than a predetermined amount on said web between its sealed end and the region where it is secured so as, in effect, to provide a slack region, inserting into the aperture in said web an article having a predetermined weight, releasing said article so as to overcome the last-mentioned force impressed on said web to advance the web and take up a substantial portion of the slack in said web, again sealing the web across its width in the region which is now positioned at said selected height, connecting said web at said last-mentioned seal intermediate the width of such seal so as to leave the web sealed at its downward end and utilizing the advancing movement of the web to initiate the sealing of said web.

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