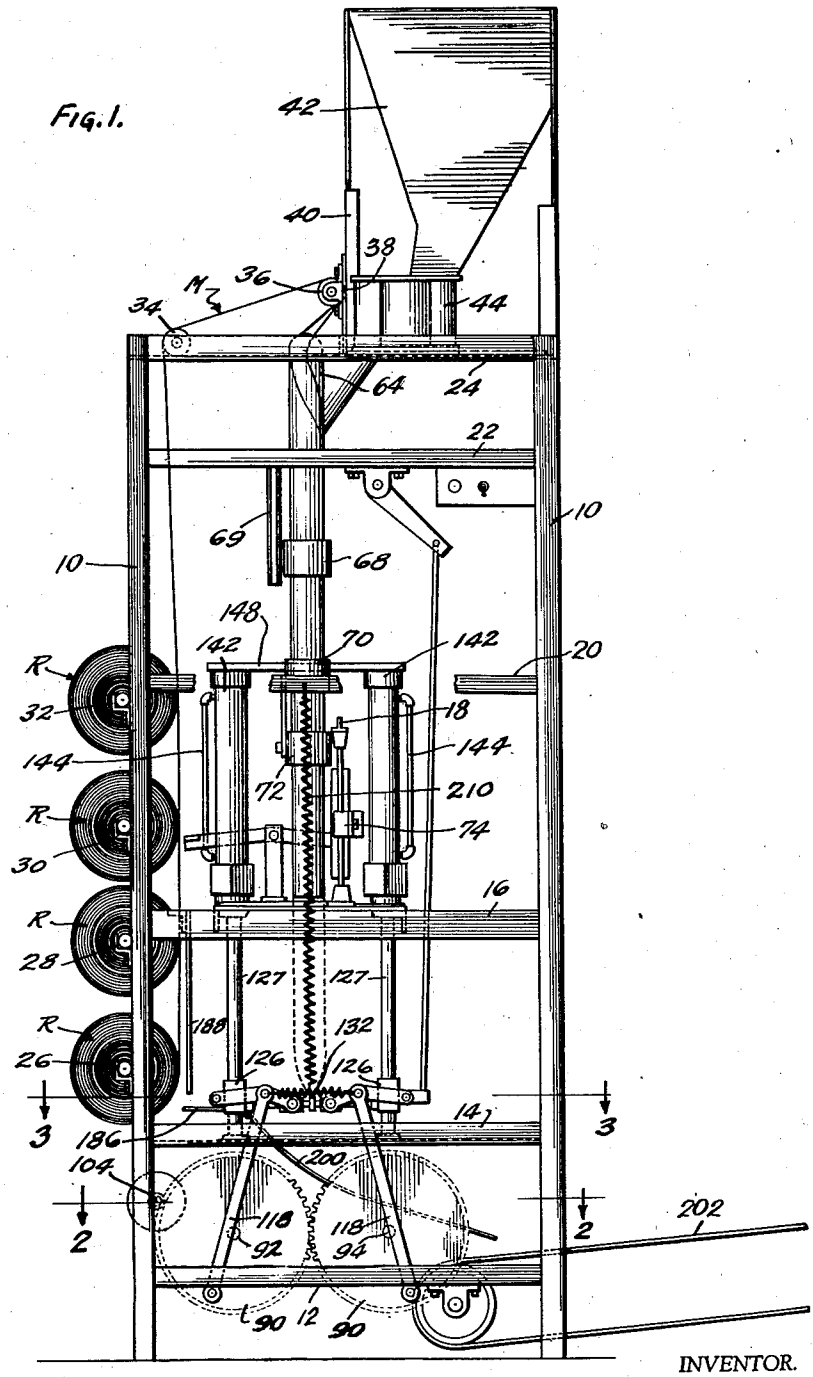
Dec. 9, 1941. R. W. SMITH 2,265,253

SEALING AND SEVERING MECHANISM FOR AUTOMATIC PACKAGING MACHINES

Original Filed July 26, 1940 4 Sheets-Sheet 1

FIG. 1.



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FIG. 3

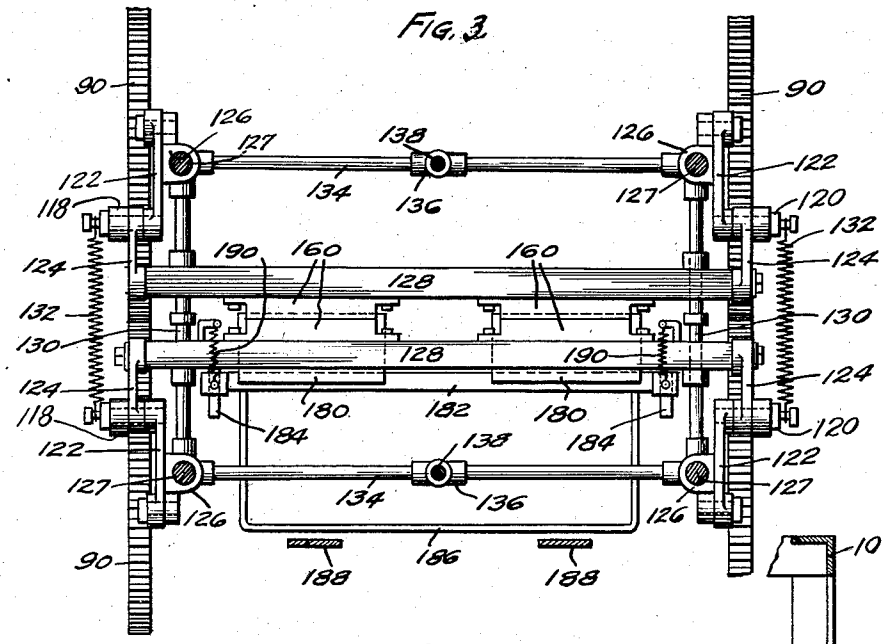
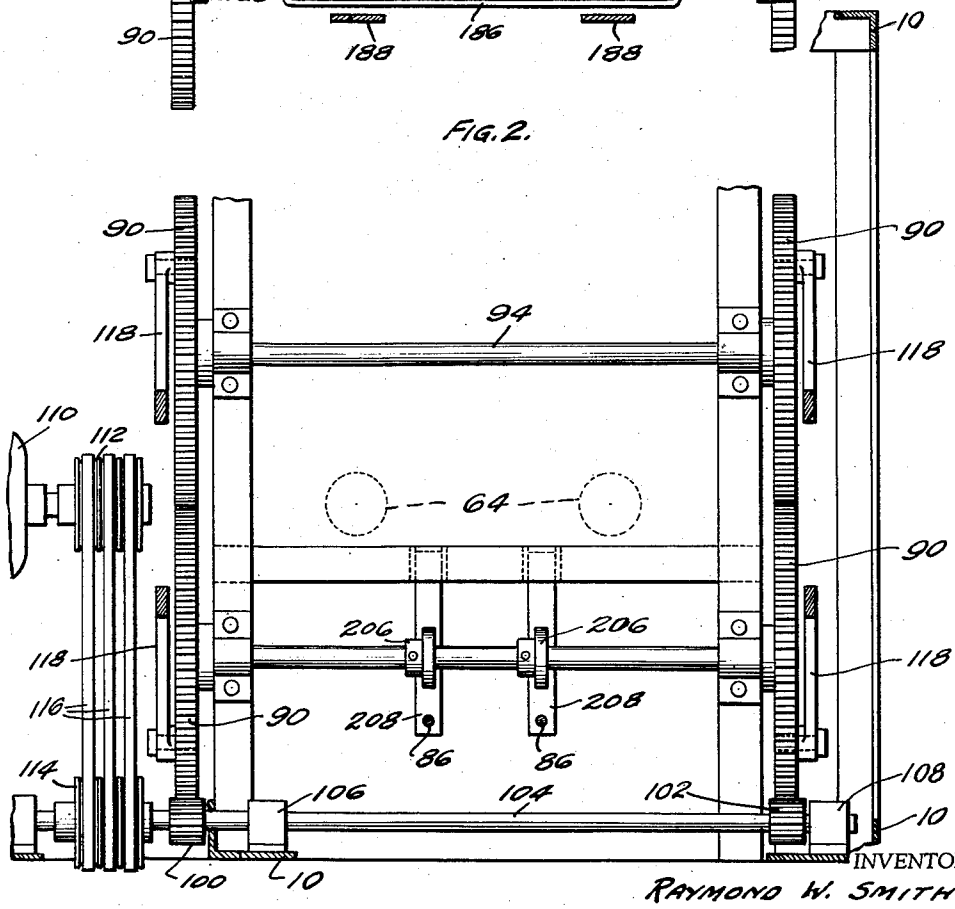


FIG. 2.



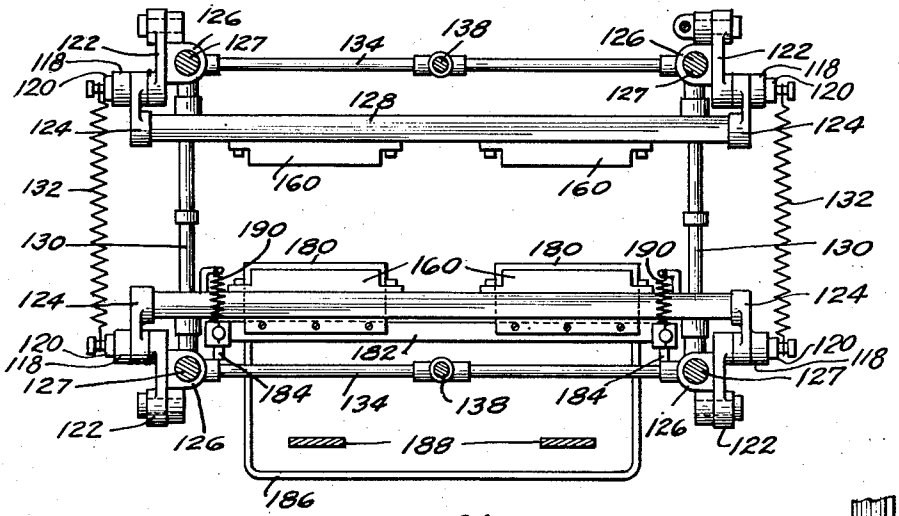
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Original Filed July 26, 1940 4 Sheets-Sheet 3

FIG. 5.



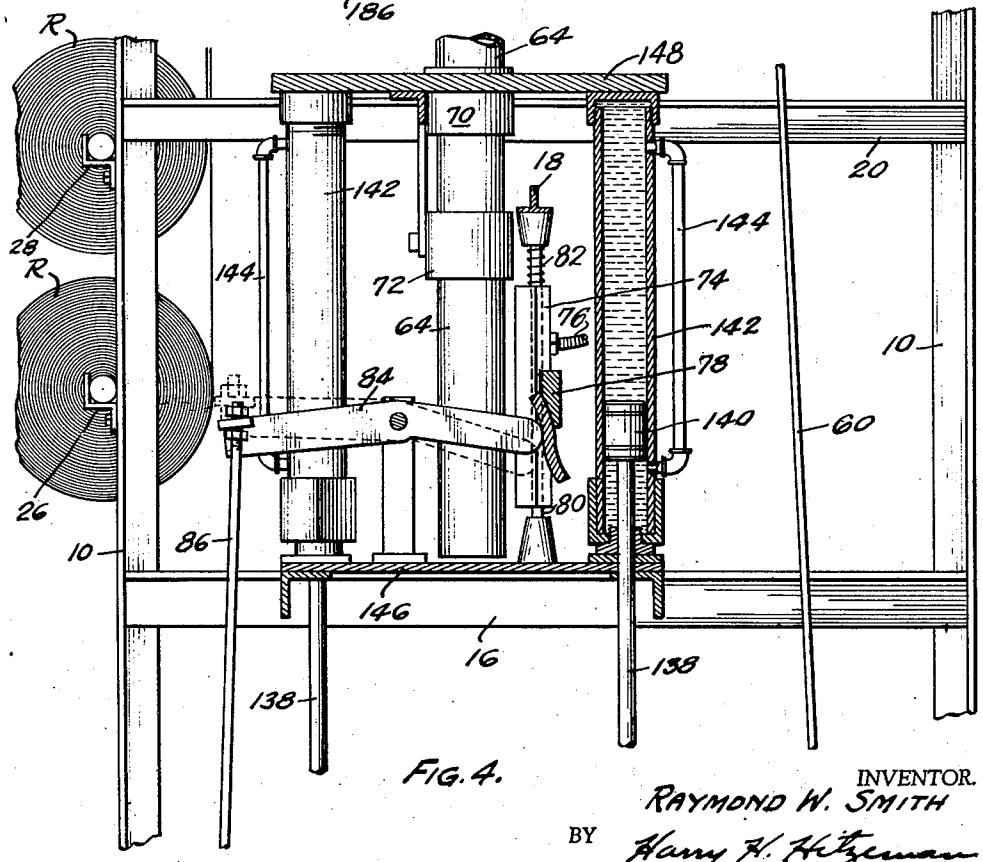


FIG. 4.

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FIG. 6.

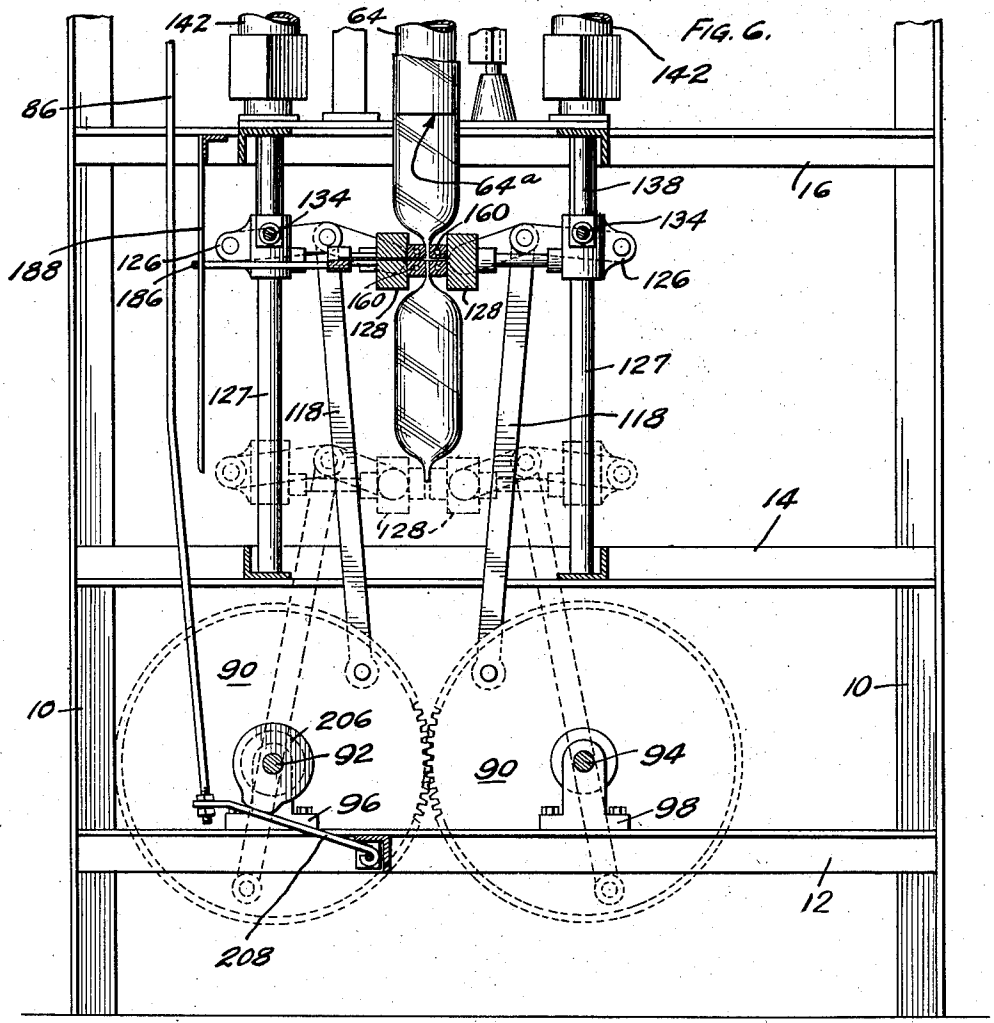


FIG. 7.

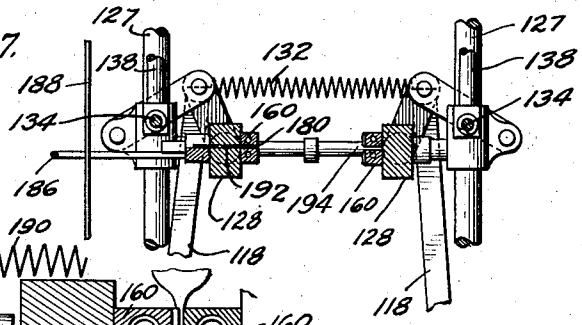
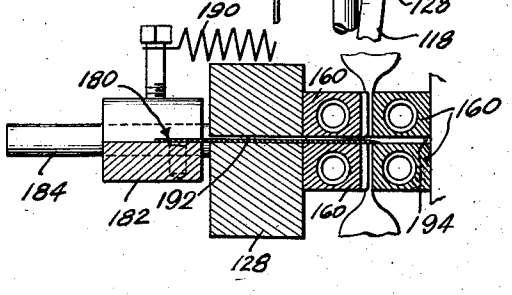


FIG. 8.



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Patented Dec. 9, 1941 2,265,253

UNITED STATES PATENT OFFICE

2,265,253

SEALING AND SEVERING MECHANISM FOR AUTOMATIC PACKAGING MACHINES

Raymond W. Smith, Chicago, Ill., assignor to Transparent-Wrap Machine Corporation, New York, N. Y., a corporation of New York

Original application July 26, 1940, Serial No. 347,679. Divided and this application September 11, 1940, Serial No. 356,374

7 Claims. (Cl. 93—3)

My invention relates to machines of the general type capable of manufacturing or forming a bag, package or container from a roll of material, filling the same with a product in measured quantities and then closing the package and disconnecting it from the roll.

My invention relates more particularly to machines of this type that are automatic in operation and capable of making and filling bags in a continuous uninterrupted process.

This application is a division of my co-pending application for a patent on an Automatic packaging machine, Serial Number 347,679, filed July 26, 1940, and is particularly directed to the cross-sealing means for closing the upper and lower ends of the filled bags and the bag severing mechanism.

The principal object of my invention is to provide improved cross-sealing means for closing the upper and lower ends of the filled bags with automatically operated severing means that cut the filled bag from the lower end of the tubular column of package material.

A further object of my invention is to provide an improved combined heat-sealing and severing or cutting means whereby one bottom and one top bag seal is made and the bags are separated between said seals all in one cycle of operation.

A further object of my invention is to provide improved and simplified drive means for operating the mechanism described including means associated with the heat sealing members for intermittently advancing the packaging material from the rolls through the entire machine.

A further object is to provide a sealing means for making the top and bottom seals in the bags capable during the sealing period of advancing the package material through the machine.

Other objects and advantages will be more apparent from the following description wherein reference is had to the accompanying four sheets of drawings, upon which

Fig. 1 is a side elevational view of an automatic packaging machine embodying my improved cross-sealing means and bag severing mechanism;

Fig. 2 is a plan and sectional view taken on the lines 2—2 of Fig. 1 showing the drive mechanism for the same;

Fig. 3 is a fragmentary plan view taken generally on the line 3—3 of Fig. 1; illustrating the bag sealing and severing mechanism in a closed position;

Fig. 4 is a fragmentary vertical sectional view through a part of the machine taken along a plane perpendicular to the line of vision of Fig. 1, showing generally the cylinder and piston mechanism for providing the pressure for the sealing jaws;

Fig. 5 is a fragmentary plan view similar to Fig. 3 with the sealing jaws in an open position;

Fig. 6 is a fragmentary vertical sectional view through a part of the machine taken along a plane perpendicular to the line of vision of Fig. 1 and illustrates the bag closing mechanism in a position just starting to pull down on the web of material. The lowermost position of the closing jaws is shown in dotted lines in the same figure;

Fig. 7 is a fragmentary view of the closing jaws of Fig. 6 shown in the relative positions which they occupy just prior to the time that they have been closed about the bag and started on their downward stroke; and

Fig. 8 is a similar fragmentary view showing the operation of the knife member in severing the packages.

The machine embodying the herein disclosed invention is intended to utilize any suitable sheet material, and particularly thin transparent material such as regenerated cellulose, preferably of the moisture proof type or any similar moisture proof transparent or semi-transparent material hereinafter referred to as packaging material, and in using such material, the sealing of the bottom, top, and if desired, the side seam also, may be effected by the application of heated sealing units. Hence, in the construction shown, the sealing members are preferably heated electrically by the use of resistance material. It will be understood, however, that the invention is not limited in this respect and it is contemplated that the joining of the material to form the tube top, bottom and side seams may be by the use of adhesives or folds or any other improved method. It is feasible in some instances to feed the articles into the tubular feed conduit either by hand or by hand controlled mechanism, but it is preferable in most cases to feed it automatically in timed relationship to the formation of the container. By so doing a very considerable speed of operation is obtained. Automatic feeds which may be employed will take different forms, depending upon the material to be fed and the quantity. In the form of the invention shown in the drawings, the feed mechanism is designed to feed into each container a measured quantity of small articles such as popcorn, peanuts, Cracker Jack, or other similar

articles, and in the embodiment shown I have preferred to employ the type of feed mechanism shown and described in the patent to C. W. Vogt, No. 2,113,636. Also, it is understood that other types of automatic feed mechanism may be employed.

In the embodiment of the invention which I have chosen for illustration, I have shown generally a vertically disposed frame comprising the angle members 10 supported both for rigidity and to provide supports for other mechanism at spaced intervals by the angle members 12, 14, 16, 18, 20, 22 and 24. I provide pairs of supporting brackets 26, 28, 30 and 32 for a plurality of reels R of packaging material M. The packaging material may extend upwardly over the guide rollers 34 and around a directing roller 36 mounted in brackets 38 on the uprights 40 which form a part of the support for the hopper 42. The hopper 42 communicates with the revolving mechanism 44 provided with vertically disposed measuring cylinders. These cylinders are rotated in timed relation to the sequence of the operations of the machine by mechanism not shown and described herein, but described in detail in the above referred to parent application.

The cylindrical tube is adapted to be formed about the feed tube 64 by suitable mechanism and passes down inside of the guide collars 68, 70 and 72. As can be seen on reference to Figs. 1, 3 and 5, the mechanism has all been devised as a duplex machine, each component of which may use two rolls of packaging material to provide a double thickness package, and duplicate parts throughout the machine are provided for making and filling the bags. Since these parts are identical only one complete assembly will be herein described.

The heat sealing means 74 for effecting the longitudinal seal in each tube may comprise a heating member connected to a source of electricity by the conduits 76. Each of the heating members is mounted upon a bracket 78 supported upon a vertical shaft 80 positioned between the supporting members 16 and 18. A spring member 82 normally tends to hold the sealing member against the tube 64. To provide an intermittent motion I have provided a rocker arm member 84 adapted to be rocked from the drive mechanism by a rod member 86. The arm 84 is thus rocked through a short angular motion with its end bearing against the bracket 78 so that in timed relation with the other mechanism the heater 74 is moved away from the tube 64 during said intervals of operation.

The mechanism for making the cross seals and at the same time moving up and down to pull the web of material through the machine will now be described. This mechanism may include dual sets of face gears 90 mounted upon cross shafts 92 and 94 supported in brackets 96 and 98 upon the cross frame members 12. The face gears, which are of exactly the same size and engage each other, may be driven by a pair of pinions 100 and 102 mounted upon a cross shaft 104. The shaft 104 is mounted in suitable bearings 106 and 108 connected to the vertical uprights 10. The drive for shaft 104 may be obtained from a suitable source of energy such as the electric motor 110 which carries a pulley 112 that drives a drive pulley 114 keyed to the shaft 104 by a plurality of belt members 116.

Each of the four face gears 90 carries a pivotally mounted connecting rod 118 which extends upwardly (see Figs. 2, 3 and 6), and connects to a pin 120 carried by a pair of levers 122 and 124. Each of the levers 122 is connected to a vertically disposed sliding bearing 126 and each of the levers 124 is connected to a cross seal bracket 128. The bearings 126 are adapted to reciprocate upon four vertically positioned rigid rods 127 mounted in suitable supports at their upper and lower ends connected to side frame members 14 and 16. The bearings 126 of each of the two pairs, disposed respectively at opposite sides of the machine, are joined by an adjustable cross bar 130 provided at its opposite ends with right and left hand threads, whereby the tension upon the seal members may be increased or decreased. The pin members 120 of each of the two pairs, correspondingly disposed at opposite sides of the machine, are joined by a tension spring member 132 for assisting in drawing the same together during a certain portion of the operation. The bearings 126 of each of the two pairs, disposed respectively in the front and rear portions of the machine, are connected by a cross brace 134 which carries a socket 136 into which a vertically disposed rod 138 is fastened. Each of the rods 138 (see Fig. 4) extends upwardly and is provided at its upper extremity with a piston 140 that travels up and down in a cylinder 142 which is filled with oil or other suitable material. During the operation of the machine, on the upward stroke of the piston 140 the oil in the cylinder is forced from the space above to that below the piston by means of a small by-pass 144, and during the down stroke of the piston the action is reversed and the oil or other fluid is forced upwardly in the same manner.

The purpose of having the sealing jaws connected to the pistons 140 is to provide the desired pressure upon the heat-sealing members during their downward stroke as well as to regulate the timing of the entire mechanism during its operation. The cylinders 142 as shown may be mounted upon a cross platform 146 positioned upon the supporting members 16, and may be connected at their upper ends by a cross brace 148.

The making of the upper and lower seals of a bag is effected by a pair of sealing jaws 160 carried by the supporting bars 128. The sealing units may preferably be heat-sealing units of the type used for making the longitudinal seal, and may be connected to a suitable source of electricity to heat the same to the desired temperature.

The operation of the heat-sealing jaws is as follows: When the machine is started and the material has been formed about the filling tube 64 and reaches a point below the end 64a of the filling tube 64, the gears 90 will have revolved so that the connecting rods 118 will have carried the bearings 126 to their uppermost positions. Due to the sets of links 122 and 124, the jaws 160 will have been retracted to the positions shown in Fig. 7 on their upward journey, thus passing upwardly about the sides of the bag. As the rods 118 pass over the peak of their rise and start to descend, the links 122 and 124 will be caused to approach relative positions of alignment by the initial downward pulling action and the jaws will be forced together upon opposite sides of the material of the formed tube. Due to the retarding action of the cylinders 142, a large amount of pressure will be brought to bear through the sealing jaws against the opposite sides of the material. This pressure will remain throughout the downward stroke of the rods 118,

during which the jaws are carried downwardly to the dotted line position shown in Fig. 6.

At this point it is desirable to sever the connection between the top of a completed lower bag and the bottom of the partly formed next higher bag. Accordingly (see Figs. 3 and 8), I provide a pair of knife members 180 which are mounted upon a cross bar 182 that is carried upon horizontal stub members 184 of one of the seal supporting bars 128. The knife supporting bar 182 also carries a U-shaped member 186 which, during the upward travel of the jaw assemblies, is raised while in a position such that its intermediate element is extended beyond a pair of vertically disposed blades 188 (see Figs. 3, 6 and 7). As the jaws are closed upon the beginning of the downward stroke, the U-frame 186, which is connected with the cross member 182, is kept in the extended position during the downward travel of the jaws during the sealing operation. When the sealing jaw assembly has reached the position shown in dotted lines in Fig. 6, the U-rod 186 passes below the ends of the blades 188, and after which, due to the impelling influence of spring members 190 connected to the cross member 128, the knife assembly, including the flat blades 180, the cross bar 182 and the U-rod 186, is pulled forward sharply, the knife traveling through the slot 192 in the frame 128 and the slot 194 between the heater elements 160, thus sharply and quickly severing one bag from another at a point midway between the extremities of the seal.

In this manner the upper and lower seals of adjacent bags are made simultaneously, and during the same cycle of operation and at the end of a sealing operation the lower bag is severed from the next higher bag. The severed bag may drop by gravity upon a receiving platform 200 pivotally connected to a pair of the movable bearings 126, from which, during the reciprocation of these bearings, the bags are shaken off upon a suitable conveyor 202 to carry them from the machine.

The operation of rod 86 to move the longitudinal heater member 74 away from the tube 64 is accomplished by a cam 206 mounted upon the shaft 92 and operating against a pivoted lever 208 connected to the lower end of rod 86. To assist in steadying the operation of the reciprocating jaws, I provide a pair of comparatively heavy spring members 210 connected to the cross braces 130 at their lower ends, and at their upper ends to the frame members 20.

From the foregoing description it will be apparent that I have provided a comparatively simple and efficient machine for making and filling bags provided with a very efficient cross-sealing and bag severing mechanism. It can be seen that in the cycle of operation, the bag is formed about the filling tube through which the product is delivered, the longitudinal seal is made directly against the side of the filling tube, the sealing jaws move towards each other and close a portion of the tube of packaging material, draw the same downwardly and effect the sealing simultaneously of the upper end of one bag and the lower end of another. During the return movement of the jaws from the lower to the upper position, the charge of the product with which the bag is to be filled is delivered into the bag. At the same time the longitudinal seal is being made upon the next portion of the tube. When the jaws arrive at their upper station, the filling mechanism is stopped, the longitudinal seal is moved away from the tube, the jaws grip the closed bag at a point above the top level of the charge of the product, move downwardly carrying the tubular bag with them, seal the upper end of the filled bag and the lower end of the next succeeding bag, and at the bottom of their stroke the knife members snap into position and cut off the lower bag.

The invention is not intended to be unduly limited to specific features of the preferred embodiment of the same which has been selected for purposes of illustration, but should be regarded as including modifications and variations thereof within the scope of the appended claims.

What is claimed is:

1. Bag severing mechanism for automatic bag making and filling machines comprising a pair of reciprocating brackets, vertical rods upon which said brackets are moved up and down, links carried by said brackets, a pair of jaws carried by said links, heat sealing means in said jaws, a medial horizontal slot through each of said jaws, a knife member carried by one of said jaws positioned in the slot therein, power driven means associated with said jaws for moving the same together in a heat sealing operation and means associated with said last named means for moving said knife member forward at the end of a heat sealing operation to sever the material sealed into two parts.

2. Bag severing mechanism for automatic bag making and filling machines comprising a pair of reciprocating brackets, vertical rods upon which said brackets are moved up and down, links carried by said brackets, a pair of jaws carried by said links, heat sealing means in said jaws, a medial horizontal slot through each of said jaws, a knife member carried by one of said jaws positioned in the slot therein, power driven means associated with said jaws for moving the same together in a heat sealing operation and means associated with said last named means for moving said knife member forward at the end of a heat sealing operation to sever the material sealed into two parts, said power driven means including a pair of similar face gears and links thereon connected to said brackets.

3. Bag severing mechanism for automatic bag making and filling machines comprising a pair of reciprocating brackets, vertical rods upon which said brackets are moved up and down, links carried by said brackets, a pair of jaws carried by said links, heat sealing means in said jaws, a medial horizontal slot through each of said jaws and a knife member carried by one of said jaws positioned in the slot therein, a piston carried by each of said brackets, an oil cylinder in which said piston operates, means associated with said jaws for moving the same together and downwardly in a heat sealing operation and means associated with said last named means for moving said knife member forward at the end of a heat sealing operation to sever the material sealed into two parts.

4. Apparatus of the class described for association with a tube forming and filling mechanism comprising two sets of vertical rod members, a pair of connected bearings mounted on each set of rod members, a piston rod carried by each of said pairs of bearings, oil cylinders in one of which each piston operates, a by-pass from the lower to the upper end of each cylinder, a pair of connected links carried by each bearing, a

sealing jaw carried between each set of sliding bearings connected to the ends of said links, a connecting rod pivotally joined to the pivot of each of said connecting links, said connecting rods having their opposite ends secured to face gears, and means for driving said face gears to move said jaws outwardly away from each other, upwardly, toward each other to grasp material to be sealed therebetween, and downwardly with pressure against said material to effect a seal therein, the pressure being provided by the pistons in said oil cylinders.

5. Apparatus of the class described for association with a tube forming and filling mechanism comprising two sets of vertical rod members, a pair of connected bearings mounted on each set of rod members, a pair of connected links carried by each bearing, a clamping and sealing jaw carried between each set of sliding bearings connected to the ends of said links, a connecting rod pivotally joined to the pivot of each of said connecting links, said connecting rods having their opposite ends secured to face gears, means for driving said face gears to move said jaws outwardly away from each other, upwardly, toward each other to grasp material to be sealed therebetween, and downwardly with pressure against said material to effect a seal therein, and hydraulic means associated with said jaws for providing the desired pressure.

6. Apparatus of the class described for association with a tube forming and filling mechanism comprising two sets of spaced vertical rod members, a sliding bearing mounted on each rod member, a pair of connected links carried by each bearing, sealing jaws carried between spaced sets of sliding bearings connected to the ends of said links, connecting rods pivotally joined to the pivots of said connecting links, said connecting rods having their opposite ends secured to face gears, and means for driving said face gears to move said jaws outwardly away from each other, upwardly, toward each other to grasp material to be sealed therebetween, and downwardly with pressure against said material to effect a seal therein.

7. Apparatus for forming cross-seals and drawing bag forming material through a machine for association with a tube forming and filling mechanism comprising two sets of spaced vertical rod members, a sliding bearing mounted on each rod member, a pair of connected links carried by each bearing, clamping and sealing jaws, carried between spaced sets of sliding bearings, and connected to the ends of said links, hydraulic pressure means associated with said jaws, connecting rods pivotally joined to the pivots of said connecting links, said connecting rods having their opposite ends secured to face gears, and means for driving said face gears to move said jaws outwardly away from each other, upwardly, toward each other to grasp material to be sealed therebetween, and downwardly with pressure against said material to pull the same through the machine and effect a seal therein.

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