

Jan. 6, 1959

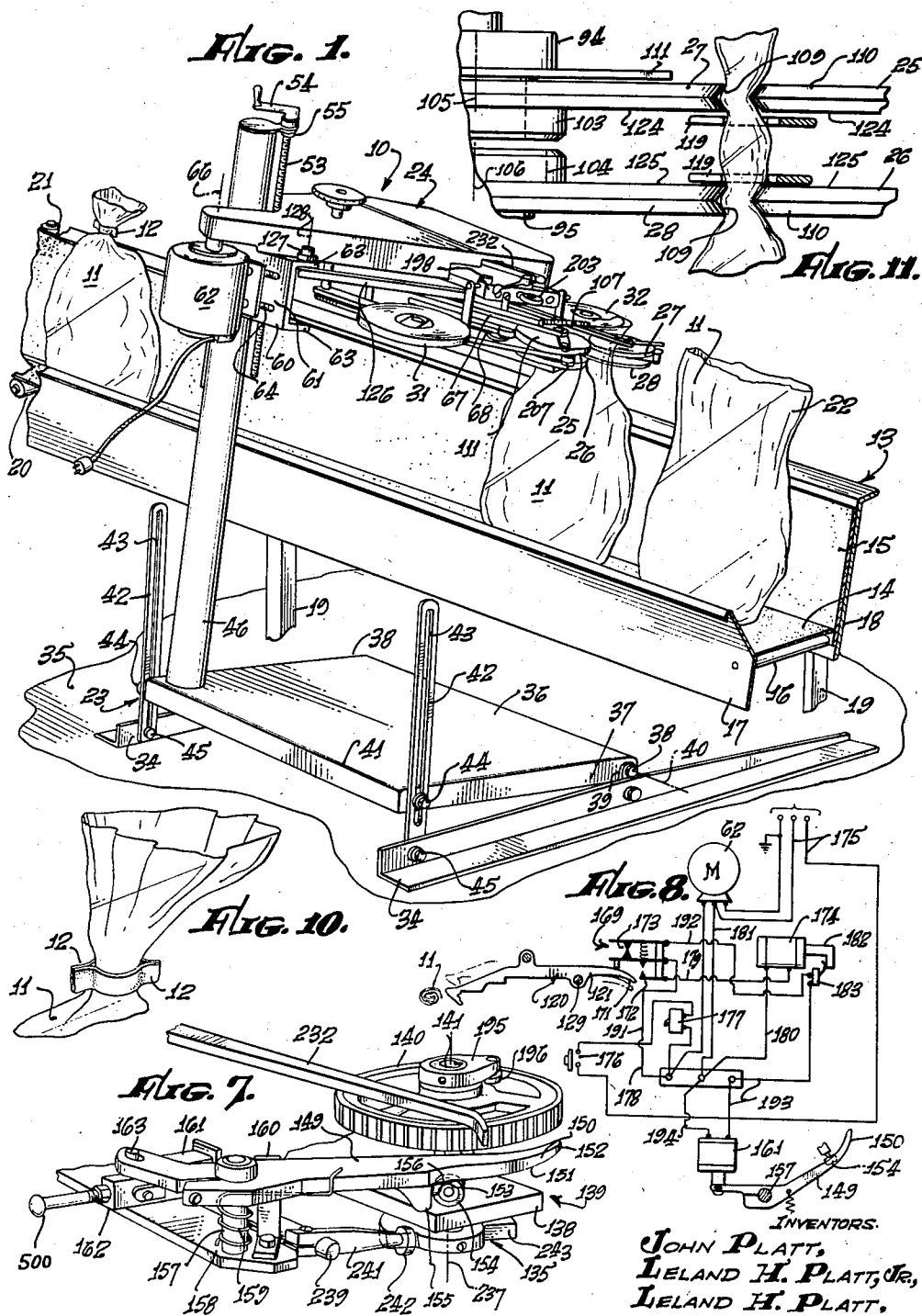
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2,867,067

APPARATUS FOR CLOSING FLEXIBLE BAGS

Filed March 13, 1957

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

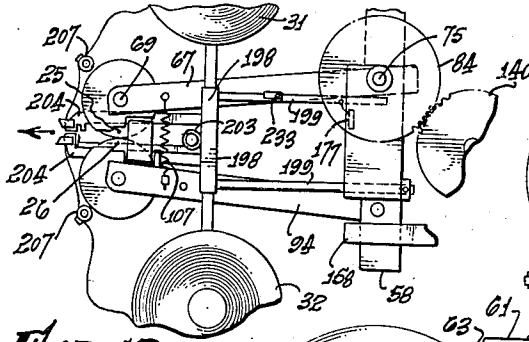


Fig. 12.

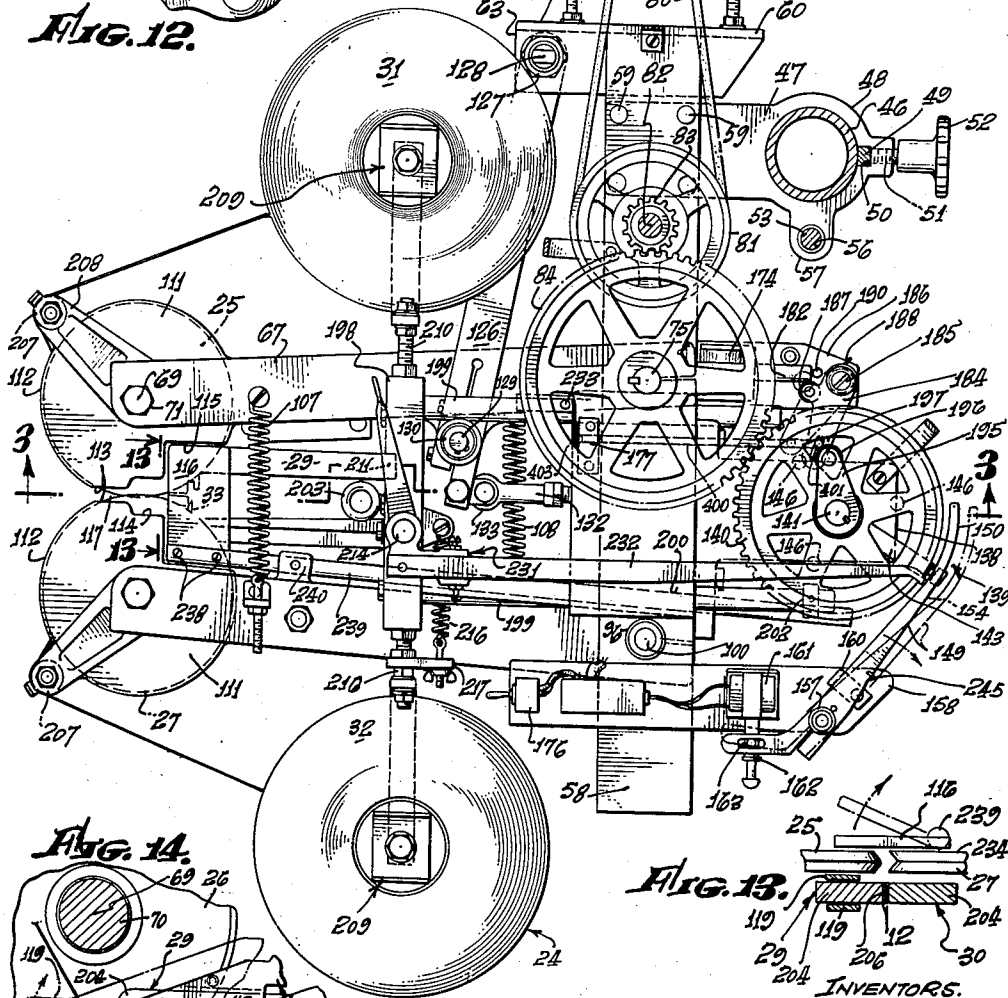


Fig. 13.

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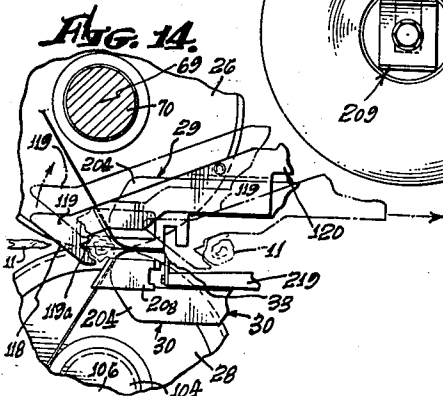


Fig. 14.

Jan. 6, 1959

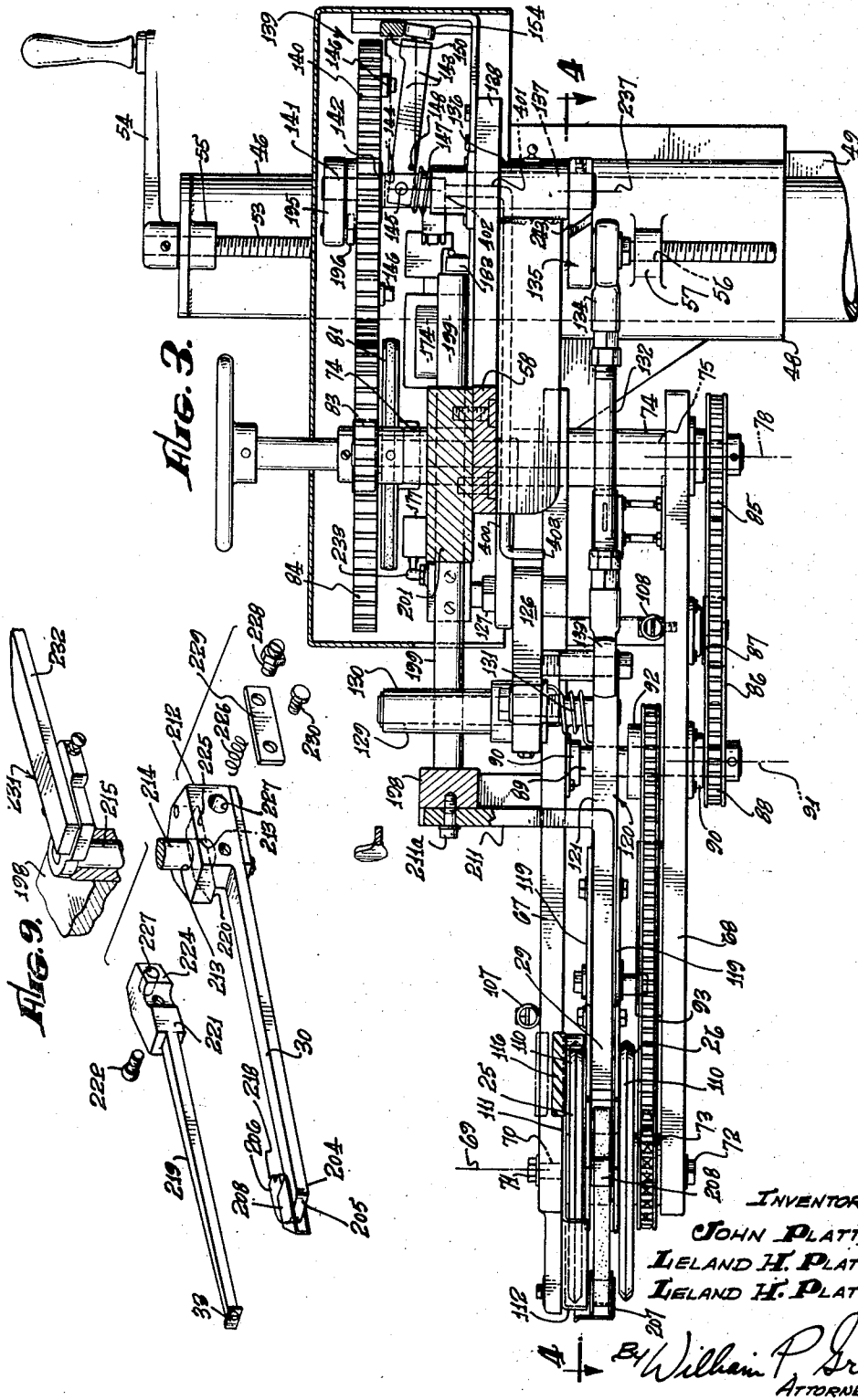
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APPARATUS FOR CLOSING FLEXIBLE BAGS

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Application March 13, 1957, Serial No. 645,737

25 Claims. (Cl. 53-198)

This invention relates to improved apparatus for closing the necks of flexible bags, and then fastening them in closed condition. The apparatus is in certain respects particularly adapted for taping closed the necks of flexible transparent plastic bags such as are now commonly used in packaging fruits, vegetables, and many other items sold in food markets and other types of stores.

In our copending application Serial No. 417,382 filed March 19, 1954 on "Bag Closing Machine," now U. S. Patent No. 2,840,967, we have disclosed a machine for closing the necks of a series of bags from an initially open condition to a closed condition, and then applying tape to the gathered necks to retain them closed. In that apparatus each neck was gathered by passing the neck between a pair of opposed rollers or other advancing units, with the bag advancement being restricted so that the material of the neck accumulates or is gathered at a desired location. The tape was then applied to the gathered neck by bodily shifting the rollers or advancing units relative to a pair of pressure elements, to force the neck between these elements so that the tape was applied thereby. This type of mechanism has proven extremely effective for very rapidly closing and taping rather small bags, such as are used in packaging candy and the like. However, the apparatus has not been as satisfactory where larger bags were involved, for instance of the type used in packaging potatoes, apples, oranges, etc.

A major object of the present invention is to provide a somewhat different type of bag closing apparatus which is better adaptable to the handling of larger bags, though it can also be used for smaller bags if desired. As in the prior application, this apparatus may include a pair of advancing units (preferably rollers) having opposed surfaces between which and by which a bag neck is advanced, together with a pair of pressure elements between which the closed neck is then forced to apply tape to the neck. One important difference between the present apparatus and that of the prior application resides in the manner in which the gathered neck is forced between the pressure elements. In the present apparatus, the neck is not forced between these elements by shifting movement of the rollers themselves, but instead is forced through by an additional member, which may be hook shaped to receive and act against the neck, and which is actuated relative to the rollers and the pressure elements to advance the neck after the gathering operation. This advancing element is desirably positioned in the path of advancement of the bag neck being handled, and is adapted to be laterally deflected thereby. Upon such deflection, the advancing element acts to automatically commence a single cycle of operation during which the bag neck is forced between the pressure elements.

An additional object of the invention is to provide apparatus of the discussed type which does not have to itself include a specially built conveyor, but may be used in conjunction with conventional conveyors of the type that are normally already present in packaging plants. The present apparatus is adjustable to work in conjunction

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with different sizes of such conveyors and with different sizes of bags. Specifically, the bag closing mechanism may be mounted for adjusting movement both vertically relative to a support structure, and to different inclinations relative thereto.

The above and other features and objects of the present invention will be better understood from the following detailed description of the typical embodiment illustrated in the accompanying drawings, in which:

Fig. 1 is a perspective view of a bag closing unit constructed in accordance with the invention;

Fig. 2 is a plan view of the Fig. 1 device with the upper protective cover removed to allow viewing of the inner working parts;

Fig. 3 is an enlarged vertical section taken on line 3-3 of Fig. 2;

Fig. 4 is a fragmentary horizontal section taken on line 4-4 of Fig. 3;

Fig. 5 is a section taken on line 5-5 of Fig. 4;

Fig. 6 is a fragmentary section taken on line 6-6 of Fig. 4;

Fig. 7 is a fragmentary perspective view of the inner working parts at the rear of the machine;

Fig. 8 is a diagram representing the electrical circuit of the control parts of the apparatus;

Fig. 9 is a fragmentary exploded view of the movable pressure member and cutter element of the apparatus;

Fig. 10 is a fragmentary perspective view of the upper neck portion of one of the bags, as it appears after being closed by the present apparatus;

Fig. 11 is an enlarged fragmentary vertical section taken on line 11-11 of Fig. 4, but showing the rollers in elevation;

Fig. 12 is a reduced size fragmentary plan view showing the manner in which the tape applying parts can be shifted outwardly to a retracted position;

Fig. 13 is a fragmentary section taken on line 13-13 of Fig. 2; and

Fig. 14 is a fragmentary view showing the apparatus as it appears at the moment that a bag neck has been gathered to closed condition, but prior to the application of the holding tapes to the neck.

Referring first to Fig. 1, there is shown at 10 a machine constructed in accordance with the invention for closing the upper neck portions of a series of flexible bags 11, and fastening the bags in those closed conditions by means of pressure sensitive tapes 12. The unit 10 is adapted to coact with any of various conventional types of conveyor 13, capable of holding a series of the bags 11 in generally upright condition, and progressively feeding those bags to the closing apparatus 10. These bags 11 may typically contain potatoes, oranges, or other items which are sold in bagged condition. Also, the bags 11 are typically formed of a flexible resinous plastic material, such as polyethylene.

The conveyor 13 may be of the type having two endless belts 14 and 15; the first of which extends generally horizontally but at a slight inclination, to receive and support the bags 11. The second belt 15 extends generally vertically but at such an inclination as to be perpendicular to the first essentially horizontal belt 14, so that the bag 11 may rest laterally against belt 15, and be held in a slightly inclined position by belts 14 and 15. The belts 14 may be supported by a series of rollers 16, mounted by suitable mounting plates 17 and 18, and the essentially vertical belt 15 may rest against the similarly inclined plate 18. These plates 17 and 18 are of course suitably mounted by leg structures 19. The two belts 14 are driven by suitable drive wheels or rollers, typically represented at 20 and 21, and the belts of course are guided in conventional manner along endless paths to continuously advance the bags 11 that are received on

the conveyor structure 13 (the return runs of belts 14 and 15 not being shown in the drawings).

The machines 10 for fastening closed the upper neck portions 22 of bags 11 includes a base structure 23, to which is adjustably mounted the upper closing mechanism 24. This mechanism 24 includes two pairs of neck-gathering rollers 25, 26, 27 and 28, which gather the neck from an initially opened condition to a closed condition in front of a pair of pressure members 29 and 30 (see Fig. 4). After the neck has been gathered to its closed condition, the closed neck is pulled through the space between the two pressure members 29 and 30, so that the pressure sensitive tape 12 (from the supply rolls 31 and 32) is applied to the neck by pressure members 29 and 30, and the applied portions of the tapes are then cut off by a cutter element 33. This then completes the closing and fastening of one bag, with the only manual step being that of initially feeding the leading portion of the open neck 22 into the space between the two sets of rollers 25 through 28.

The base or supporting structure 23 is designed for adjustment in different manners, to allow use of the machine 10 in conjunction with any of various different types of conventional conveyors. For this purpose, the base structure 23 may include a pair of parallel horizontal feet 34, which engage the supporting surface or floor 35, and are adapted to project under the conveyor structure 13. To these feet or angle irons 34, there is adjustably mounted a plate 36, which is planar except at its down turned edges 37. This plate 36 is pivotally mounted at 38 to a pair of projections 39 extending upwardly from elements 34 respectively, so that plate 36 may swing upwardly and downwardly relative to elements 34 about a horizontal axis 40. The pivotal connections 38 are located at a first edge of plate 36, while the opposite edge 41 of this plate is adapted to be releasably secured in any of various differently inclined positions by means of a pair of upstanding parallel members 42, containing slots 43 receiving screws 44 which are threadedly connected into the down turned sides 37 of plate 36. The lower ends of parts 42 are pivotally attached to the flanges of parts 34 by pins or screws 45. As will be apparent, plate 36 may be swung upwardly and downwardly to a desired inclination relative to the horizontal supporting surface 35, following which screws 44 may be tightened against parts 42 to releasably secure plate 36 in the desired set position.

The base structure also includes a cylindrical mounting column 46 which projects upwardly from plate 36 perpendicular thereto, and is rigidly attached to and carried by plate 36. The upper neck closing mechanism 24 is mounted to column 46 for adjusting movement upwardly and downwardly, that is, axially of the column. For this purpose, mechanism 24 includes a rigid frame structure, having a part 47 with a tubular portion 48 received about and slidable axially along column 46 (see Fig. 2). To hold part 48 against rotary movement about column 46, the column rigidly carries a laterally projecting and axially extending key 49 which fits within a key way 50 in part 48. A set screw 51 is threaded into part 48 and is tightenable against key 49 by handle 52 to rigidly secure member 48 in a fixed adjusted position relative to column 46.

The member 48 and the rest of mechanism 24 is adjustable axially of column 46 by means of a lead screw 53, having an upper actuating handle 54. An unthreaded portion of this lead screw 53 is journaled within a bearing 55 attached to the upper end of column 46, and is retained by that bearing against movement axially of column 46, while of course permitting rotation of screw 53 within the bearing. The lower end of screw 53 extends through and threadedly engages a threaded bore 56 within a laterally projecting lug 57 on part 48, so that rotation of screw 53 by handle 54 will axially or

vertically adjust member 48 and the carried mechanism relative to column 46.

In addition to the part 48, the rigid frame structure of mechanism 24 includes an elongated frame part 58, which is rigidly attached to part 48 by screws 59 (see Fig. 2), and which projects transversely of the direction of advancement of conveyor 13 and across the upper side of the conveyor, and which is parallel to base plate 36. This member 58 in turn carries most of the moving parts of the apparatus. Also, at its outer end, part 58 rigidly carries another frame member 60, having a vertically extending portion 61 to which the driving motor 62 of the apparatus is attached, and having a pair of parallel in-turned flanges 63. The motor 62 may be rigidly attached to part 60 in any suitable manner, as by a number of adjustable securing screws 64. The shaft 65 of motor 62 turns about an axis 66 which is parallel to the axis of mounting column 46.

The rollers 25 and 26 are rotatively mounted in fixed positions relative to frame member 58, while rollers 27 and 28 are mounted for swinging movement relative to member 58 and laterally toward and away from each other during the gathering of a bag neck. More specifically, the two rollers 25 and 26 are mounted to a pair of upper and lower spaced parallel mounting arms 67 and 68 (see Figs. 2 and 3) which are rigidly attached to member 58. The two rollers 25 and 26 are rotatably mounted between the forward end portions of these two arms 67 and 68, and for rotation about a generally vertical axis 69 which is parallel to axis 66 of the motor. Such mounting of the rollers or wheels 25 and 26 is effected by means of a suitable shaft 70 which is secured by screws 71 and 72 to the arms 67 and 68, and about which the hub portions of the rollers 25 and 26 are rotatable. These hub portions of the two rollers may be rigidly connected together and to the hub of a sprocket wheel 73 which is also rotatably mounted about shaft 70 so that power driven rotation of the sprocket wheel by the motor 62 through a later-to-be-described drive system will cause wheels 25 and 26 to be correspondingly rotatably driven, to advance and gather the neck portion of a bag.

The rear end portions of the two mounting arms 67 and 68 may be welded or otherwise rigidly secured to a tubular bushing element 74, which is rigidly welded to frame member 58. A shaft 75 is rotatably journaled within bushing element 74, with the latter being designed to function as a thrust bearing for supporting shaft 75 against downward movement relative to member 58. The axis 78 of shaft 75 and bushing 74 extends parallel to axes 66 and 69.

To now describe the manner in which motor 62 drives the wheels or rollers 25 and 26, it is noted that the driven shaft 65 of the motor carries and drives a pulley 79, which in turn drives a belt 80, driving a pulley 81. This pulley 81 is mounted to part 58 for rotation about an axis 82 which is parallel to axis 66. Also, pulley 81 rigidly carries and drives a gear 83, which engages and drives a larger gear 84 mounted to and rotatably keyed with respect to the upper end of the previously mentioned shaft 75. Thus, rotation of gear 84 acts to correspondingly turn shaft 75 which then drives a sprocket wheel 85 rigidly carried by the lower end of the shaft 75. Wheel 85 in turn drives a chain 86, which may pass an idler gear 87 and then engage and drive a sprocket wheel 88 which is rigidly attached to a shaft 89 journaled by bearings 90 mounted to arms 67 and 68. These bearings 90 mount shaft 89 for rotation about an axis 91 which extends parallel to axis 66 and the other previously mentioned axes. Above arm 68, shaft 89 rigidly carries a sprocket wheel 92, which drives a chain 93, which in turn engages and drives the previously mentioned sprocket wheel 73 which is rigidly attached to and drives rollers 25 and 26. The described drive mechanism acts to rotatively and continuously drive wheels 25

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and 26 in a direction for advancing a bag between these wheels and the opposed wheels 27 and 28.

The second pair of rollers 27 and 28 are mounted for swinging movement by a pair of arms 94 and 95, which are similar to arms 67 and 68 except that arms 94 and 95 carry the two associated rollers separately, and are free for individual swinging movement independently of each other. To allow such relative swinging movement of these two arms, the arms are mounted by a tubular bushing element 96 (see Fig. 6) in a manner permitting independent rotary movement of the two arms relative to that bushing. This bushing has a transverse flange 97 which is connected by screws 98 to the underside of element 58, with an upper portion of tubular bushing 96 projecting upwardly through an opening in part 58. Beneath part 58, the bushing 96 has rotatably received about it a tubular outer bushing element 99, which extends through an opening in arm 94 and is rigidly welded or otherwise secured to that arm. Rotatably journaled within tubular bushing 96, there is a vertical shaft 100, which is rigidly attached at its lower end to the lower arm 95, and which carries a washer or flange element 101 at its upper end for engaging downwardly against the upper end of bushing element 96, to function as a thrust element for holding shaft 100 against downward movement from the illustrated Fig. 6 position. As will be apparent, each of the bearing elements 99 and 100, associated with the two arms 94 and 95 respectively, is independently rotatably movable about an axis 102 (parallel to axis 66 and the other axes) relative to bushing 96 and therefore the frame part 58.

Referring now to Fig. 11, roller 27 is rotatably mounted to the underside of arm 94 by means of a suitable bearing structure typically represented at 103. Similarly, the roller 28 is rotatably mounted to the upper side of the lower arm 95, by means of a bearing structure typically represented at 104. These bearing structures 103 and 104 are spaced apart axially to avoid any interference with the relative lateral deflection of one of the wheels 27 or 28 without the other. Also, the two bearing structures 103 and 104 of course mount wheels 27 and 28 for rotation relative to the associated arms 94 and 95 respectively about a pair of axes 105 and 106 which extend parallel to the common axis 69 of the two other rollers 25 and 26. The two axes 105 and 106 may at times coincide.

The two upper arms 67 and 95 are yieldingly urged relatively together by means of a tensioned coil spring 107 (see Fig. 2) connected at its opposite ends to the two arms respectively, while the two lower arms 68 and 95 are similarly yieldingly urged relatively together by means of a second tensioned coil spring 108 connected at its opposite ends to these arms. Springs 107 and 108 normally hold rollers 27 tightly in engagement with roller 25, and hold roller 28 tightly in engagement with roller 26. The peripheral surface of each of the rollers 27 and 28 may form an annular radially outwardly facing peripheral groove 109, of V-shaped cross-sectional configuration, and the peripheral surfaces of the two rollers 25 and 26 may form annular radially outwardly directed projections 110 of corresponding V-shaped cross-section, and adapted to nest within recesses 109 when there is no bag received between the rollers. When, however, the neck portion 22 of one of the bags is received between the two sets of rollers, as seen in Fig. 11, the bag material deflects the two rollers 27 and 28 laterally away from rollers 25 and 26, to pass the neck between the rollers.

Each of the upper arms 67 and 94 may carry a shield 111, which extends across the upper side of the associated roller 25 or 27, and which has a peripheral essentially annular flange 112 extending downwardly about the outside of the roller 25 or 27, to prevent direct contact of an operator's hands with these rollers. The shields 111 are interrupted at the point of engagement of roller

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25 with roller 27, to form first a relatively narrow gap 113 through which the bag neck initially passes, and to form beyond gap 113 a wider gap 114 within which the neck is received after it has been gathered to a completely closed position. Beyond gap 114, the shields 111 are interrupted in a manner forming an even greater width gap 115, within which there is received a part 116 which will be described in greater detail at a later point. The rollers 25 through 28 are desirably formed of a suitable steel or other metal.

When the leading portion of the neck of one of the bags 11 is manually fed to a point of contact at 117 with the two opposed sets of rollers 25—27 and 26—28, these rapidly moving rollers act to quickly advance the entire bag neck to the right as seen in Fig. 14, until the entire neck has been gathered to the closed condition illustrated in full lines in that figure. In order to assure such gathering action, the two previously mentioned pressure members 29 and 30 are positioned at a location to temporarily halt the rightward advancement of the material of the bag neck, so that this material accumulates or is gathered to the Fig. 14 condition ahead of the blocking elements 29 and 30. In moving to its full line position of Fig. 14, the bag neck engages a pair of angular cam surfaces 118 formed at the forward ends of two spaced parallel arms 119 of hook unit 120, and by such engagement acts to deflect unit 120 laterally of the path of bag movement, and out of that path until the entire bag neck has moved to the full line Fig. 14 position. When the neck is in that position, the hook unit 120 is free to return laterally to its normal Fig. 14 full line position, so that the hook 120 may then be actuated in the direction of bag advancement, to force the bag through the space between pressure elements 29 and 30, to apply the tapes to the bag. Hook unit 120 includes a main elongated rigid member 121, to the upper and lower sides of which the two arms 119 may be rigidly attached by screws 122 (see Fig. 4). The part 120 terminates at 123, with the two arms 119 projecting beyond that point and laterally inwardly at an angle, to a position of reception between the upper rollers 25 and 27 and the lower rollers 26 and 28 (see Fig. 11). The two arms 119 may be formed of planar sheet metal, with one of the arms 119 being received in close proximity to and essentially parallel to the flat undersurfaces 124 of rollers 25 and 27, and with the other arm 119 being received in closely spaced relation to and essentially parallel to the upper planar surfaces 125 of rollers 26 and 28. The parts 119 and surfaces 124 and 125 all preferably extend directly radially of the roller axes 69, 105 and 106.

The two arms 119 of hook unit 120 are identically shaped, and have notches 119a facing in the direction of bag advancement and adapted to receive and advance the bag necks. Hook unit 120 is mounted for its desired two types of movement by means of an arm 126 (Fig. 2), which is mounted by a bearing structure 127 to part 60 for swinging movement about an axis 128 extending parallel to axis 66. This arm 126 projects inwardly toward the path of the bags, and carries at its inner end a shaft 129, which is journaled within a bushing 130 projecting upwardly from arm 126. This shaft 129 turns about an axis which is parallel to axis 66, and carries at its lower end the part 121 of hook unit 120, to thus allow swinging movement of the hook unit relative to arm 126 as the forward end of the hook unit is deflected laterally by engagement with an advancing bag neck. A coil spring 131 disposed about shaft 129, and connected at its opposite ends to member 121 and member 126 respectively, yieldingly urges hook unit 120 in a direction causing the forward ends 119 of that hook unit to move laterally to their Fig. 14 full line positions of extension across the path of bag movement. Thus, this spring always tends to return the hook unit 120 to this full line Fig. 14 normal position.

After the bag neck has been gathered in the Fig. 14 full line position in front of pressure members 29 and 30, and after hook unit 120 has returned to its full line position of that figure from the laterally deflected broken line position, the hook is then bodily advanced to the right as seen in Fig. 14, to the dotted line position of that figure to apply the tapes to the bag neck. This bodily advancement of the hook unit 120 is effected by swinging arm 126 about axis 128 by rightward movement of a connecting rod 132, which is pivotally attached at one end 133 to member 126, and which is pivotally attached at its other end 134 to an essentially semi-circular member 135 which is mounted by a tubular bushing structure 136 for rotation relative to frame 58 about an axis 237 which extends parallel to axis 66. For thus mounting part 135, this part is rigidly attached to a shaft 137, which extends through bushing structure 136, with the latter being rigidly attached to a rear extension 138 of frame member 58. The pivotal connection 134 between connecting rod 132 and member 135 is at a location which is offset eccentrically with respect to the axis 237, so that member 135 functions as a crank element acting to move hook unit 120 first to the right and then back to the left in response to a single revolution of member 135 about axis 137. The bearing structure 136 may be of a type for supporting shaft 137 in a fixed axial position relative to the bearing structure and portion 138 of member 58.

Each time that a bag is fed into the roller mechanism, the crank member 135 and hook unit 120 are driven through a single cycle of operation by motor driven gear 84, through a single cycle or single revolution clutch mechanism 139 (see Figs. 3 and 7). This clutch mechanism includes a gear 140 which is rotatably mounted about an upper reduced diameter portion 141 of shaft 137, and which meshes with and is continuously driven by gear 84. When the clutch mechanism is disengaged, gear 140 turns continuously, while the shaft 141 does not turn, with the gear 140 being supported axially on the shaft by engagement with an annular shoulder 142 extending between the reduced diameter portion 141 and the increased diameter portion of the shaft. To clutch the shaft 137 to gear 140 for a single revolution, there is provided a clutch member 143, which is rotatably keyed to shaft 137 by reception of the inner end portion of element 143 within a slot 144 in the shaft. Part 143 is pivoted to shaft 137 by means of a pin 145 for swinging movement vertically between the full line retracted position of Fig. 3 and the broken line active position of that figure. In the raised active broken line position, element 143 is located in the path of rotary movement of three different pins 146 which are rigidly carried by and project downwardly from gear 140 at circularly spaced locations. When element 143 is in that raised position, the first pin 146 which engages it is effective to move element 143 and thus shaft 137 through one circular revolution, following which the part 143 is automatically retracted to its full line Fig. 3 position until the next successive actuation. Part 143 is yieldingly urged to its broken line position by means of a coil spring 147, which is disposed about shaft 137 and bears downwardly against the upper end of bushing structure 136. The upper end of spring 147 is connected into element 143 at a location 148 which is offset radially outwardly from pin 145 in a direction toward the part of element 143 which engages pins 146.

For automatically retracting element 143 downwardly after a single revolution of shaft 137, there is provided a retracting element 149 (see Figs. 3 and 7), which has an arcuate end portion 150 presenting an under surface 151 extending arcuately about axis 237 and progressively advancing downwardly from an end 152 to an end 153 of this surface. Member 143 rotatably carries a roller 154 at its outer end, which roller is adapted to be engaged by cam surface 151 and to be progressively

deflected or cammed downwardly thereby as member 143 turns, to thus cam member 143 from its broken line active position to its full line retracted position of Fig. 3 as roller 154 advances between points 152 and 153 on cam surface 151. At the end of cam surface 151, member 149 has a downwardly projecting lug 155 forming a vertical shoulder 156 which is engageable with roller 154 to limit the swinging movement of that roller and member 143 about axis 237 at the point of engagement of roller 154 with shoulder 156.

To initiate a single revolution of shaft 137, member 149 is mounted to swing to the broken line retracted position of Fig. 2, in which shoulder 156 is no longer positioned in the path of roller 154, so that the latter and the associated member 143 may commence a revolution. The member 149 is mounted for this limited swinging movement by means of a bearing structure 157, which is mounted to the upper side of a frame member 158 which is rigidly attached to frame element 58. The member 150 is yieldingly urged to its full line active position of Fig. 2 by means of a coil spring 159 which extends about the bearing structure, and has its opposite ends connected to or bearing against members 149 and 158 respectively. The swinging movement of member 149 under the influence of spring 159 is limited at the full line position of Fig. 2 by engagement of member 149 with a stop member 160 projecting upwardly from element 158. Part 149 is adapted to be actuated from its full line position of Fig. 2 to its broken line retracted position by energization of a control solenoid 161 (see Figs. 3 and 7), which is mounted to frame member 158, and has a movable plunger or armature 162 engaging and acting against member 149 through a pin and slot connection 163.

When the roller 154 is in engagement with stop shoulder 156, the crank 135 and the hook unit 120 controlled by the crank are in the Fig. 4 positions. One revolution of crank element 135 is then effective to advance hook unit and a carried gathered bag neck to the right, and then return the hook unit back to the left to its Fig. 4 position in preparation for the next cycle of operation. In the Fig. 4 position, hook unit 120 is free for lateral deflection to the broken line position of Fig. 14, but as soon as the hook unit 120 commences its rightward movements, the hook is then restrained against such lateral deflection until it returns to the Fig. 4 position. For this purpose, member 121 of the hook unit has a laterally projecting lug 164, which rotatably carries a downwardly projected roller 165, which roller is receivable within a guide way or roller track 166 formed in a guide member 167. At the position of Fig. 4, roller 165 is received opposite an open portion of the guide way, which permits lateral deflection of the roller and of unit 120. As soon as the roller moves a short distance to the right, it passes into the restricted guide way 166 so that shoulder 168 acts to prevent lateral movement of the roller and thus lateral deflection of the unit 120. Therefore, the guide way 166 functions to effectively guide element 120 as it forces the bag neck through the space between pressure elements 29 and 30.

The commencement of the rightward movement of hook unit 120 is controlled by the lateral deflection of unit 120, through actuation of a microswitch unit 169 (see Fig. 4), having an actuating pin 170 engaged by the rear end portion 171 of hook unit 120. This microswitch 169 is a double switch, including a first switch 172 which is normally open (in the full line Fig. 4 position of unit 120), and which is adapted to close upon swinging movement of unit 120 to its broken line position of Fig. 14. The second switch 173 of switch unit 169 is normally closed (in the full line position of Fig. 14), and is opened in the broken line position of that figure. In order to close the circuit to solenoid 161 for commencing a rightward actuation of unit 120,

it is necessary for switch 172 to first be closed, and then for switch 173 to be closed. The closure of switch 172 closes a circuit to a second solenoid 174 from the two 110 volt A. C. power leads 175. This circuit extends from one of the leads 175 through a main manually actuated switch 176 (see Figs. 2 and 8), from which the circuit extends through a safety cut out switch 177 (later to be discussed), and then through a lead 178 to one side of switch 172. From the other side of the switch 172, the circuit for energizing a solenoid 174 follows a line 179 to solenoid 174, and then lines 180 and 181 back to the second of the power leads 175. When solenoid 174 is thus energized by closure of switch 172 (assuming switches 176 and 177 to be closed), the armature 182 of solenoid 174 is moved to the left as seen in Fig. 8, to actuate a switch 183 to closed condition. The armature is retained temporarily in that position, even after breaking of the energizing circuit, by means of a latch element 184 (Fig. 2), which is pivotally mounted at 185 to a member 186 attached rigidly to element 58. This latch element 184 rotatably carries a roller 187, which is movable slightly into the path of plunger 182 by clockwise movement of element 184, and under the influence of a coil spring 188, when plunger 182 moves to the left (in Fig. 2) to a position allowing such clockwise movement of element 184 and the roller to the broken line position of Fig. 2. The movement of member 184 is limited at this position by engagement with a stop pin 190.

The switch 183 which is closed by actuation of solenoid 174 is connected into a series circuit which leads from the two power lines 175, and which series circuit includes switch 176, switch 177, line 191, switch 173, line 192, switch 183, lines 193, solenoid 161, and lines 194, 181, and the return line 175. Thus, closure of switch 173 upon return of unit 120 after a deflection, and with switch 183 held closed, functions to energize solenoid 161 to actuate arm 149 and commence a single cycle of rightward and then leftward movement of unit 120. During that cycle of movement, the solenoid 161 is automatically de-energized by release of latch element 184. Specifically, this release of the latch element is effected by means of an axially movable elongated rod 400, whose upturned end portion 401 is pivotally attached at 402 to latch 184. As member 126 swings to the right in Figs. 2 and 3, after closure of both of the switches 172 and 173, and resultant energization of solenoid 161, and after roller 153 has been freed by the solenoid actuated part 149 to commence a single revolution of arm 143 about axis 237, member 126 then acts to engage a downturned portion 403 of rod 400, to deflect this rod to the right as seen in Figs. 2 and 3, and to thus swing latch 184 to a released position. That is, rod 400 swings element 184 to its Fig. 2 released position, against the influence of spring 188, to allow returning movement of the armature 182 associated with solenoid 174.

The pressure members 29 and 30, as well as the two rolls of tape 31, are carried by a rigid member 198 (Figs. 2 and 3) which extends transversely of the path of bag movement and at a location above the two arms 67 and 94. Member 198 is mounted for bodily shifting movement, with the carried parts, by means of a pair of parallel spaced rods 199, which are slidably confined within correspondingly dimensioned parallel spaced bores 200 in a block 201 which is attached to the upper side of member 58. The rods 199 mount member 198 for movement exactly parallel to the direction of advancement of the bags along conveyor 13, with member 198 being movable between the active position of Fig. 2, and the retracted or inactive position of Fig. 12. In the Fig. 12 position, the sliding movement of members 199 is limited by engagement of an enlarged diameter stop element 202 with the rear face of mounting block 201. Member 198 is manually actuated between its two different posi-

tions by means of a circular pull ring or handle member 203 attached to the forward side of member 198 and of a size to receive an operators finger.

The two pressure members 29 and 30 are elongated in the direction of bag movement, and have enlarged forward head portions 204 (see Fig. 4), which head portions have a pair of opposed surfaces 205 which progressively converge toward one another in the direction of bag movement, and which then curve into parallelism at 206. The two tapes 12 from supply rolls 31 curve along the inner sides of the surfaces 205, and then extend parallel to each other and in direct abutting engagement at the portions 206 of the pressure member surfaces. Tapes 12 are both desirably of the pressure sensitive type, having adhesive applied to their inner or mutually interengaging surfaces, so that when the tapes are pressed together by members 29 and 30, or are pressed against the material of a bag neck, the adhesive will hold the tapes together at opposite sides of the neck and will hold the tape tightly to the bag material. The tapes from rolls 31 may pass about a pair of guide rollers 207, mounted to support members 208 which are rigidly attached to arms 57 and 94. From these rollers 207, the tapes may normally converge in the direction of bag movement, and as the tapes reach the locations of elements 29 and 30, the tapes may pass through guide channels formed by the forward faces of these members 29 and 30 and a pair of guide elements 208 which are rigidly attached to members 29 and 30 respectively (see Figs. 4 and 9). The two tape rolls 31 may be mounted for rotation about a pair of spaced axes extending parallel to axis 66, the mounting being effected by any suitable type of roll mounting support structure 209, which is desirably rigidly secured to member 198 by suitable connections represented at 210.

The pressure member 29 is mounted in fixed relation to member 198, as by having an upturned rear end portion 211 (Fig. 3) attached by a screw 211a to member 198. The other pressure member 30 is mounted for swinging movement toward and away from member 29. To thus mount member 30, this member has an enlarged rear portion 212 (Figs. 4 and 9), which contains a vertically extending bore 213 through which a shaft 214 extends. This shaft 214 extends through and is journaled by a tubular bushing 215 which is rigidly carried by and extends through an opening in part 198, so that shaft 214 is rotatable about an axis parallel to axis 66. Member 30 is thus mounted for swinging movement about the axis of shaft 214, and relative to that shaft. Such swinging movement allows the forward end portion 204 of member 30 to move toward and away from the corresponding enlarged forward portion of member 29. A tensioned coil spring 216 is connected at its opposite ends to a rear portion of member 30 and an element 217 attached to part 198, to thus yieldingly urge the portion 204 of member 30 toward the corresponding portion of member 29.

After a bag neck has passed between the two pressure members 29 and 30, and has reached the point 22a in Fig. 4, so that the pressure members have had an opportunity to return together and press a substantial length of the tapes into interengagement behind the bag neck, the cutter element 33 is then automatically actuated to cut off the portions of the tape that have been applied to the bag neck, leaving the neck in the condition of Fig. 10 with the two tapes forming a closure about the neck and secured together at opposite sides of the neck. This cutter element 33 is a short blade, which extends transversely of the path of bag movement, and is slidable transversely along rear transverse faces 218 of parts 29 and 30, to cut off the tapes. Cutter 33 may be formed of a somewhat resilient metal, adapted to remain by its resiliency in tight engagement with faces 218. The cutter 33 is attached to a forward end of a swinging arm 219,

which is attached to shaft 214 for actuation thereby. Specifically, shaft 214 has a lower end portion which projects downwardly into a cutaway or recessed side portion 220 of part 212 (see Fig. 9), and which is attached at one side to an enlargement 221 on arm 219. To effect this attachment, a screw 222 extends through an opening in enlargement 221, and threadedly connects into shaft 214. The arm 219 and shaft 214 are free for very limited swinging movement relative to member 30, which movement is just sufficient to actuate cutter 33 across faces 218 for effecting a tape cutting operation. This swinging movement is limited by engagement of a pair of vertical surfaces 224 on enlargement 221 with co-acting vertical surfaces 225 formed on enlargement 212 of pressure member 30. The arm 219 is normally yieldingly urged to the Fig. 4 position relative to member 30 by means of a coil spring 226 which is contained within a pair of aligned bores 227 in enlargements 212 and 221 respectively, and bears at one end against an end of the bore in enlargement 221, and at the other end against a screw 228 which is threadedly and adjustably connected into a plate 229 attached to enlargement 212 by means of a screw 230.

For actuating the cutter arm 219 relative to pressure member 30, there is rigidly attached to the upper end of shaft 214, as by an adjustable connection represented at 231 in Fig. 9, an arm 232 which extends rearwardly to a location (see Fig. 7) at which the arm 232 is engageable by a cam roller 196 carried at an eccentric location by a cam arm 195 rigidly attached to the upper end of shaft 137—141. This roller 196 thus deflects arm 232 to actuate cutter 33 in a cutting operation at a proper time during each taping cycle. The switch 177 which has been referred to previously in connection with a discussion of the Fig. 8 circuit diagram is a safety switch for preventing actuation of the apparatus when the pressure members 29 and 30 and the associated parts 198 etc. are in the retracted positions of Fig. 12. Specifically, this switch 177 is mounted to the upper side of member 201, and has its movable actuating element positioned to be engaged and actuated in a circuit closing direction by a member 233 rigidly attached to one of the slide rods 199, when that rod and part 198 and the other associated parts are in the Fig. 2 position. When these parts are moved to the Fig. 12 retracted position, switch 177 is open, to break the energizing circuit to motor 62 and all of the other electrically actuated parts. The reason for mounting part 198 etc. to slide to the Fig. 12 position is to allow for positioning of the pressure members and tape feeding parts at a location (Fig. 12) in which the tapes can be manually threaded into the space between the pressure members without interference from rollers 25—28 and hook 120. Switch 177 positively prevents injury to the operator by accidental starting of the apparatus during such a threading operation.

As a bag neck is being pulled by hook unit 120 through the tape applying space between the two pressure members 29 and 30, the upper portion of the bag neck above the pressure members is confined within a relatively narrow constricted space between the upper transverse and aligned planar surfaces 234 (Fig. 13) of rollers 25 and 27 and the parallel under surface of flat member 116 which overlies rollers 25 and 27. This space between the rollers and member 116 is of a vertical width just sufficient to pass the material of the bag above its gathered neck, while resisting passage of that material in a manner folding it back to an essentially horizontally extending condition such that the retention of the turned upper portion of the bag neck between member 116 and the rollers assists in effectively supporting the bag during its passage between the pressure members. After the bag neck has passed beyond the tape applying portions of the pressure members 29 and 30, the member 116 is automatically swung upwardly to a retracted position in which it frees the bags for unrestrained advancement with the

conveyor. For this purpose, member 116 is attached at one edge by screws 238 to an elongated shaft or rod 239 which is journaled by bearings 240 attached to arm 94 for rotary movement about the longitudinal axis of rod 239. At its rear end, this rod 239 rigidly carries a laterally projecting arm 241 rotatably carrying a roller 242, which is adapted to be deflected upwardly by the previously discussed part 135 once during each rotation of that part. Specifically, the semi circular part 135 has a pair of inclined cam faces 243 which extend at an angle to advance axially with respect to part 135 as they advance circularly, so that when one of these surfaces 243 engages roller 242 it deflects the roller upwardly until the other surface 243 is reached, to allow the roller to again fall downwardly until the next actuation. This camming operation is properly timed to swing member 116 upwardly to the broken line position of Fig. 13 after a bag neck has moved beyond the tape applying portions of the pressure members 29 and 30, and to then return member 116 downwardly before the next successive bag neck reaches the forward edge of that member. Rod 239 is normally yieldingly urged in a direction for moving arm 241 downwardly, by means of a coil spring 244 (Figs. 4 and 6) which is attached at one end 245 to member 58, and at the other end to an arm 246 which is rigidly attached to shaft 239. Such swinging movement under the influence of spring 244 is limited at the Fig. 7 position of arm 241 by any suitable stop element, as by a member 247 (Fig. 6) which is engageable with a co-acting stop surface on arm 94. In the position at which this element stops the rotation of rod 239, element 116 of course is positioned as shown in full lines in Fig. 13.

To now describe the operation of the apparatus, the first step in setting up the apparatus is of course to properly position the unit 10 with respect to conveyor 13. As previously discussed, the plate 236 is adjusted to a proper inclination such that column 46 extends parallel to inclined conveyor belt 15, and screw 53 is then adjusted by handle 54 to adjust the tape applying mechanism 24 vertically along column 46 to a proper level for engaging and applying tape to the neck portions 22 of the bags 11 which move along conveyor 13. When screw 53 has been set to a proper position, mechanism 24 may be secured in that adjusted position by the tightening of screw 51 (Fig. 2). With the apparatus properly located, conveyor 13 is then set in motion by energizing the motor driving rollers 20 and 21, and the main switch 176 (Fig. 8) is closed to start motor 62 and to energize the rest of the electrical apparatus.

As each bag 11 nears the apparatus 24, the operator makes sure that the contents of the bag are properly positioned, and then manually feeds the leading edge of the bag neck into the space between the two rollers 25 and 26 and the two opposed rollers 27 and 28. Immediately these rapidly turning rollers act to advance the bag neck forwardly between the rollers to the full line position of Fig. 14, to gather the neck in front of pressure members 29 and 30. The springs 107 and 108 allow relative separation of the rollers to pass the bag material, while at all times causing the rollers to bear tightly against and thus properly confine and hold the bag material.

The hook unit 120 is deflected laterally as the bag material passes toward the Fig. 14 full line position, and the hook unit then returns to its full line position of that figure after the bag has moved far enough to allow such return. The lateral deflecting movement closes switch 172 to energize solenoid 174 and thus close switch 183 (which is then held closed by latch 184). The returning movement of hook unit 120 closes switch 173, which is in series with switch 183, to energize solenoid 161 for swinging arm 149 to its released broken line position of Fig. 2, and thus allow arm 143 to swing upwardly to be engaged and turned through one revolution by one of the pins 146. Such turning of arm 143 correspondingly

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turns shaft 137 and member 135, to cause crank rod 132 to move hook unit 120 and the contained bag neck 122 to the right as seen in Figs. 2 and 14, following which the hook unit returns toward the left. This actuation of the hook unit forces the bag neck through the space between pressure members 29 and 30, and the associated tapes, so that the tapes are caused to extend about and tightly hold the bag neck. Being pressure sensitive, the tapes readily adhere to the bag material and to each other, as desired. During the bag movement, the pressure member 30 is of course yieldingly urged toward pressure member 29, to apply the tapes, by spring 216. As member 30 is deflected away from member 29 by the passing bag material, cutter unit 219—33 moves laterally with member 30, being held by spring 226 in the Fig. 4 position relative to member 30.

When the bag neck reaches the position 22a of Fig. 4, cam roller 196 engages and deflects arm 232 to move cutter 33 laterally through tapes 12, and cut off the short applied portions of the tapes as seen in Fig. 10. About this time, member 135 engages and deflects roller 242, to swing element 116 upwardly to the broken line position of Fig. 13 and thus free the bag neck for entirely unrestrained advancement. Until that time, the upper portion of the bag neck is confined between member 116 and the upper sides of rollers 25 and 27, as previously discussed. The formation of the rollers to have interfitting peripheral recesses and projections (Fig. 11) assists the rollers in properly supporting the engaged bag necks.

Before one revolution of shaft 137 has been completed, rod 400 is deflected by element 126 in a manner actuating latch 184 to or beyond its Fig. 2 position, to thereby allow solenoid armature 182 to be spring urged to its Fig. 2 position in which switch 183 is opened to de-energize solenoid 161. This allows arm 149 to return to its full line Fig. 2 position in which its cam surface 152 is able to engage and deflect downwardly the roller 153 as the single revolution of shaft 137 is completed. This swings arm 143 out of the path of pins 146, so that the turning movement of shaft 137 and the associated parts stops until the next bag is fed to the rollers.

If it is desired to allow the roller 153 and the various parts controlled thereby to move through a cycle of operation without passing a bag through the apparatus, this may be effected by manually actuating armature 162 of solenoid 161, the armature being actuated by pressing inwardly on a connected push rod 500 (see Fig. 7). This manually swings part 149 to its released position to thus free roller 153 for one cycle of operation.

We claim:

1. Apparatus for closing the neck of a flexible bag comprising a pair of pressure elements between which a gathered bag neck may be forced and operable to apply adhesive tape to said neck to fasten it in closed condition, a pair of opposed rollers adapted to engage opposite sides of an initially opened bag neck and to advance the material thereof between the rollers and toward said pressure elements so that the neck is gathered to closed condition in front of the pressure elements, means for driving at least one of said rollers to advance and gather the bag neck, means for feeding tape to said pressure elements, an advancing member movable relative to said rollers and said pressure elements and operable to engage a neck which has been gathered by the rollers and to force the neck between said pressure elements to apply the tape thereto, means for actuating said advancing member at least one of said pressure elements being free for lateral deflection away from the other pressure element by said bag neck as it is forced between said pressure elements by said advancing member, and means yieldingly resisting said deflection of said one pressure element by the advancing bag neck and thereby tightly pressing said tape into fastening relation with the bag neck.

2. Apparatus as recited in claim 1 in which said advancing member has a hook shaped portion which receives

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and engages said neck and forces it between said pressure elements.

3. Apparatus as recited in claim 1 in which said advancing member is positioned in the path of advancement of a bag neck and is deflectible laterally by the bag neck, said actuating means including means operable in response to said lateral deflection of the advancing member to move said advancing member in a direction for forcing the gathered neck between said pressure elements.

4. Apparatus as recited in claim 3 including a spring urging said advancing member into the path of said neck and resisting said lateral deflection of the advancing member by the neck.

5. Apparatus as recited in claim 1 including a carrier part to which said advancing member is mounted and movable with the advancing member in a direction to force the neck between the pressure elements, and a connection pivotally mounting said advancing member to said carrier part for relative lateral deflection into and out of the path of said neck, said advancing member being deflectible out of said path by an advancing bag neck, and said actuating means including means operable in response to lateral pivotal deflection of said advancing member to commence movement of the carrier part and advancing member in a direction to force the neck between said pressure elements.

6. Apparatus as recited in claim 1 including a carrier part to which said advancing member is mounted and movable with the advancing member in a direction to force the neck between the pressure elements, and a connection pivotally mounting said advancing member to said carrier part for relative lateral deflection into and out of the path of said neck, said advancing member being deflectible out of said path by an advancing bag neck, and said actuating means including means operable in response to lateral pivotal deflection of said advancing member to actuate said advancing member through a single cycle of operation to advance one bag through the pressure elements and then stop until the next lateral deflection of said advancing member.

7. Apparatus as recited in claim 6 in which said means responsive to lateral deflection of said advancing member comprise electric switch means actuable by said deflection, and electrically operated control means actuated by said switch means.

8. Apparatus as recited in claim 1 including means operating in timed relation to said actuating means for cutting off said tape from a strip thereof after application to a bag neck.

9. Apparatus as recited in claim 1 in which said pressure elements have converging portions forming a progressively constricted area within which said rollers gather the bag neck.

10. Apparatus as recited in claim 1 including a conveyor for successively advancing a series of bags along a path to have their necks gathered by said rollers, and then advanced by said advancing member through said pressure elements.

11. Apparatus for closing the neck of a flexible bag comprising a pair of gathering units between which the neck of a bag may pass and operable to gather said neck to a closed condition, a pair of pressure elements beyond said gathering units and between which said gathered neck may be forced and operable to apply adhesive tape to said neck to fasten it in closed condition, means for feeding tape to said pressure elements, an advancing member movable relative to said gathering units and said pressure elements and operable to engage the gathered neck and force it between said pressure elements to apply the tape thereto, means for actuating said advancing member at least one of said pressure elements being free for lateral deflection away from the other pressure element by said bag neck as it is forced between said pressure elements by said advancing member, and means yieldingly resisting said deflection of said one pressure element by

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the advancing bag neck and thereby tightly pressing said tape into fastening relation with the bag neck.

12. Apparatus as recited in claim 11 in which said gathering units have a pair of endlessly moving surfaces engaging opposite sides of the bag neck, there being means for driving at least one of said units to advance said surface thereof endlessly to thereby advance the bag neck between said surfaces.

13. Apparatus for closing the necks of a series of flexible bags which are carried by and are being advanced by an essentially horizontally moving conveyor, said apparatus including a support structure, mechanism for engaging the necks of said bags and fastening them in closed condition, an upstanding part adjustably carrying said mechanism and adjustably mounted to said support structure, means mounting said mechanism to said part for upward and downward adjusting movement relative thereto to allow adjustment to the height of the conveyor and bags, and means mounting said upstanding part for swinging adjusting movement relative to the support structure to positions of different inclination relative thereto.

14. Apparatus as recited in claim 13 in which said upstanding part is an externally essentially cylindrical member, and said first mounting means comprise a sleeve received about said cylindrical member and adjustable therealong, said second mounting means including a plate from which said cylindrical member projects upwardly and mounted for upward swinging movement relative to said support structure to differently inclined positions.

15. Apparatus as recited in claim 1 including means mounting said rollers for relative bodily shifting movement laterally toward and away from each other, and means yieldingly urging said rollers relatively toward one another to tightly engage a bag neck being advanced thereby.

16. Apparatus for closing the neck of a flexible bag comprising a pair of pressure elements between which a gathered bag neck may be forced and operable to apply adhesive tape to said neck to fasten it in closed condition, a pair of opposed rollers adapted to engage opposite sides of an initially opened bag neck and to advance the material thereof between the rollers and toward said pressure elements so that the neck is gathered to closed condition in front of the pressure elements, means for driving at least one of said rollers to advance and gather the bag neck, means for feeding tape to said pressure elements, an advancing member movable relative to said rollers and said pressure elements and operable to engage a neck which has been gathered by the rollers and to force the neck between said pressure elements to apply the tape thereto, means for actuating said advancing member, a carrier part to which said advancing member is mounted and movable with the advancing member in a direction to force the neck between the pressure elements, and a connection pivotally mounting said advancing member to said carrier part for relative lateral deflection into and out of the path of said neck, said advancing member being deflectible out of said path by an advancing bag neck, and said actuating means including switch means responsive to lateral deflection of said advancing member, a solenoid actuable by said switch means, and a single cycle clutch controlled by said solenoid and operable upon deflection of said advancing member to drive said advancing member through a single cycle of operation to force one bag neck between said pressure elements and then stop until the advancing member is deflected laterally again.

17. Apparatus for closing the neck of a flexible bag comprising a pair of pressure elements between which a gathered bag neck may be forced and operable to apply adhesive tape to said neck to fasten it in closed condition, a pair of opposed rollers adapted to engage opposite sides of an initially opened bag neck and to advance the material thereof between the rollers and toward said pressure

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elements so that the neck is gathered to closed condition in front of the pressure elements, means for driving at least one of said rollers to advance and gather the bag neck, means for feeding tape to said pressure elements, an advancing member movable relative to said rollers and said pressure elements and operable to engage a neck which has been gathered by the rollers and to force the neck between said pressure elements to apply the tape thereto, and means for actuating said advancing member, said tape feeding means including means for holding two rolls of tape and passing tape from the two rolls to inner sides of said two pressure elements respectively.

18. Apparatus for closing the neck of a flexible bag comprising a pair of pressure elements between which a gathered bag neck may be forced and operable to apply adhesive tape to said neck to fasten it in closed condition, a pair of opposed rollers adapted to engage opposite sides of an initially opened bag neck and to advance the material thereof between the rollers and toward said pressure elements so that the neck is gathered to closed condition in front of the pressure elements, means for driving at least one of said rollers to advance and gather the bag neck, means for feeding tape to said pressure elements, an advancing member movable relative to said rollers and said pressure elements and operable to engage a neck which has been gathered by the rollers and to force the neck between said pressure elements to apply the tape thereto, means for actuating said advancing member, a movable structure carrying said pressure elements and said tape feeding means, and means mounting said structure for shifting movement relative to said rollers between an active position and a retracted position in which said pressure elements and tape feeding means are accessible for initially threading the tape from said feeding means to said elements.

19. Apparatus for closing the neck of a flexible bag comprising a pair of pressure elements between which a gathered bag neck may be forced and operable to apply adhesive tape to said neck to fasten it in closed condition, a pair of opposed rollers adapted to engage opposite sides of an initially opened bag neck and to advance the material thereof between the rollers and toward said pressure elements so that the neck is gathered to closed condition in front of the pressure elements, means for driving at least one of said rollers to advance and gather the bag neck, means for feeding tape to said pressure elements, an advancing member movable relative to said rollers and said pressure elements and operable to engage a neck which has been gathered by the rollers and to force the neck between said pressure elements to apply the tape thereto, and means for actuating said advancing member, said advancing member being positioned in the path of advancement of a bag neck and being deflectible laterally by the bag neck, said actuating means including means operable in response to said lateral deflection of the advancing member to actuate said advancing member through a single cycle of operation to advance one bag between the pressure elements and then stop until the next lateral deflection of said advancing member.

20. Apparatus for closing the neck of a flexible bag comprising a pair of pressure elements between which a gathered bag neck may be forced and operable to apply adhesive tape to said neck to fasten it in closed condition, a pair of opposed rollers adapted to engage opposite sides of an initially opened bag neck and to advance the material thereof between the rollers and toward said pressure elements so that the neck is gathered to closed condition in front of the pressure elements, means for driving at least one of said rollers to advance and gather the bag neck, means for feeding tape to said pressure elements, an advancing member movable relative to said rollers and said pressure elements and operable to engage a neck which has been gathered by the rollers and to

force the neck between said pressure elements to apply the tape thereto, means for actuating said advancing member, a second pair of said neck gathering rollers spaced axially from the first pair so that the two pairs of rollers engage and gather a bag neck at two axially spaced locations, said pressure elements being engageable with the bag neck intermediate said two roller engaged locations.

21. Apparatus as recited in claim 20, in which one of the rollers of each pair has a peripheral recess into which the other roller of that pair projects.

22. Apparatus for closing the neck of a flexible bag comprising a pair of pressure elements between which a gathered bag neck may be forced and operable to apply adhesive tape to said neck to fasten it in closed condition, a pair of opposed rollers adapted to engage opposite sides of an initially opened bag neck and to advance the material thereof between the rollers and toward said pressure elements so that the neck is gathered to closed condition in front of the pressure elements, means for driving at least one of said rollers to advance and gather the bag neck, means for feeding tape to said pressure elements, an advancing member movable relative to said rollers and said pressure elements and operable to engage a neck which has been gathered by the rollers and to force the neck between said pressure elements to apply the tape thereto, and means for actuating said advancing member, one of said rollers having a peripheral recess into which the other roller projects.

23. Apparatus for closing the neck of a flexible bag comprising a pair of pressure elements between which a gathered bag neck may be forced and operable to apply adhesive tape to said neck to fasten it in closed condition, a pair of opposed rollers adapted to engage opposite sides of an initially opened bag neck and to advance the material thereof between the rollers and toward said pressure elements so that the neck is gathered to closed condition in front of the pressure elements, means for driving at least one of said rollers to advance and gather the bag neck, means for feeding tape to said pressure elements, an advancing member movable relative to said rollers and said pressure elements and operable to engage a neck which has been gathered by the rollers and to force the neck between said pressure elements to apply the tape thereto, means for actuating said advancing member, a holding member overlying portions of said rollers in closely spaced relation and forming a restricted passage between said holding member and the rollers within which the upper portion of the bag material is turned generally horizontally to assist in supporting the bag, and means for retracting said holding member upwardly to free the bags in timed relation to the operation of said advancing member.

24. Apparatus for closing the neck of a flexible bag comprising a pair of pressure elements between which a gathered bag neck may be forced and operable to apply adhesive tape to said neck to fasten it in closed condition, a pair of opposed rollers adapted to engage opposite sides of an initially opened bag neck and to advance the material thereof between the rollers and toward said pressure elements so that the neck is gathered to closed condition in front of the pressure elements, means for driving at least one of said rollers to advance and gather the bag neck, means for feeding tape to said pressure elements, an advancing member movable relative to said rollers and said pressure elements and operable to engage a neck which has been gathered by the rollers and to force the neck between said pressure elements to apply the tape thereto, means for actuating said advancing member, means mounting one of said pressure elements for swinging movement toward and away from the other to pass a bag neck therebetween, a cutter mounted for swinging movement with said one pressure element and for swinging movement relative thereto to cut said tape, and means for actuating said cutter.

25. Apparatus for closing the neck of a flexible bag comprising a pair of pressure elements between which a gathered bag neck may be forced and operable to apply adhesive tape to said neck to fasten it in closed condition, a pair of opposed rollers adapted to engage opposite sides of an initially opened bag neck and to advance the material thereof between the rollers and toward said pressure elements so that the neck is gathered to closed condition in front of the pressure elements, means for driving at least one of said rollers to advance and gather the bag neck, means for feeding tape to said pressure elements, an advancing member movable relative to said rollers and said pressure elements and operable to engage a neck which has been gathered by the rollers and to force the neck between said pressure elements to apply the tape thereto, means for actuating said advancing member, an element engaging said bag neck upwardly beyond the roller and holding it down against the upper side of the roller, and means for actuating said last mentioned element in timed relation to the operation of said advancing element between a lowered position overlying the rollers in closely spaced relation thereto and an elevated retracted position for releasing the bag.

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