Jan. 1, 1952 H. C. NOE 2,580,456

PACKAGING MACHINE

Filed Oct. 22, 1945 7 Sheets-Sheet 1

Fig. 1.

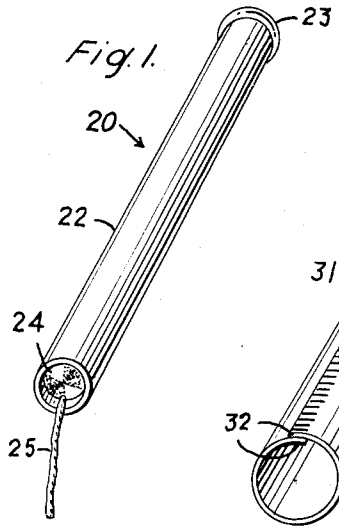


Fig. 2.

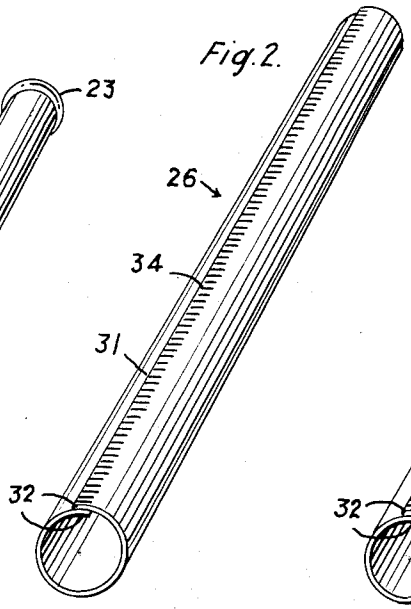


Fig. 3.

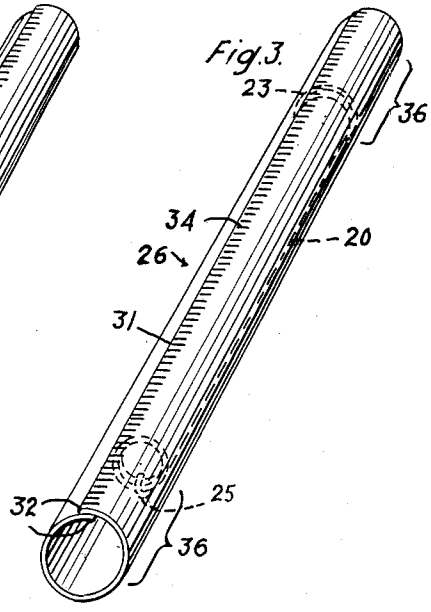


Fig. 4.

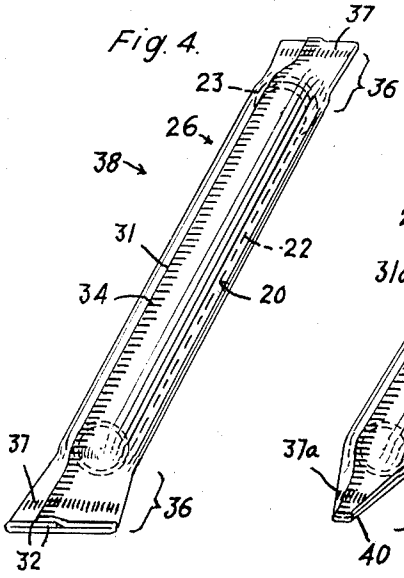


Fig. 5.

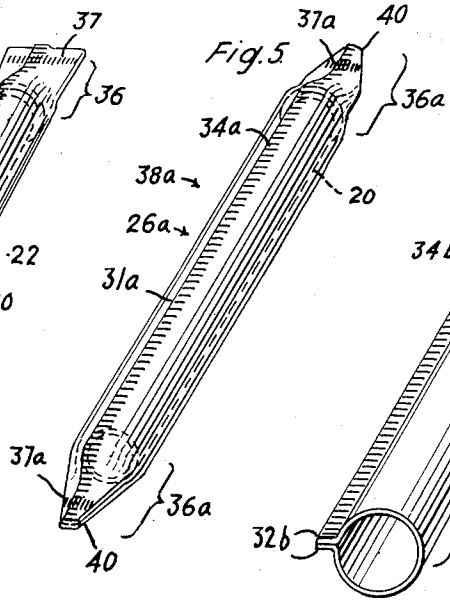
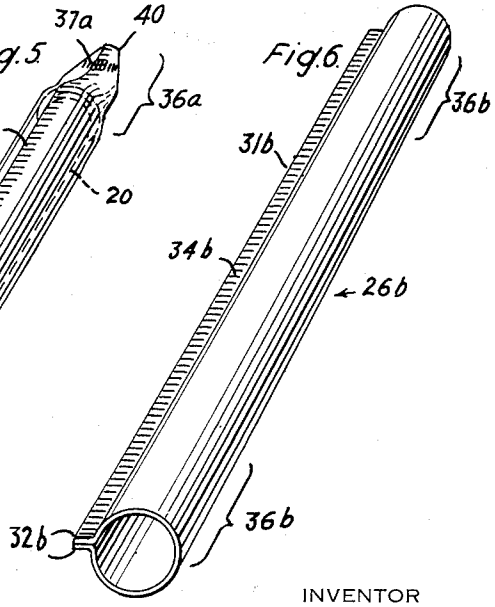


Fig. 6.



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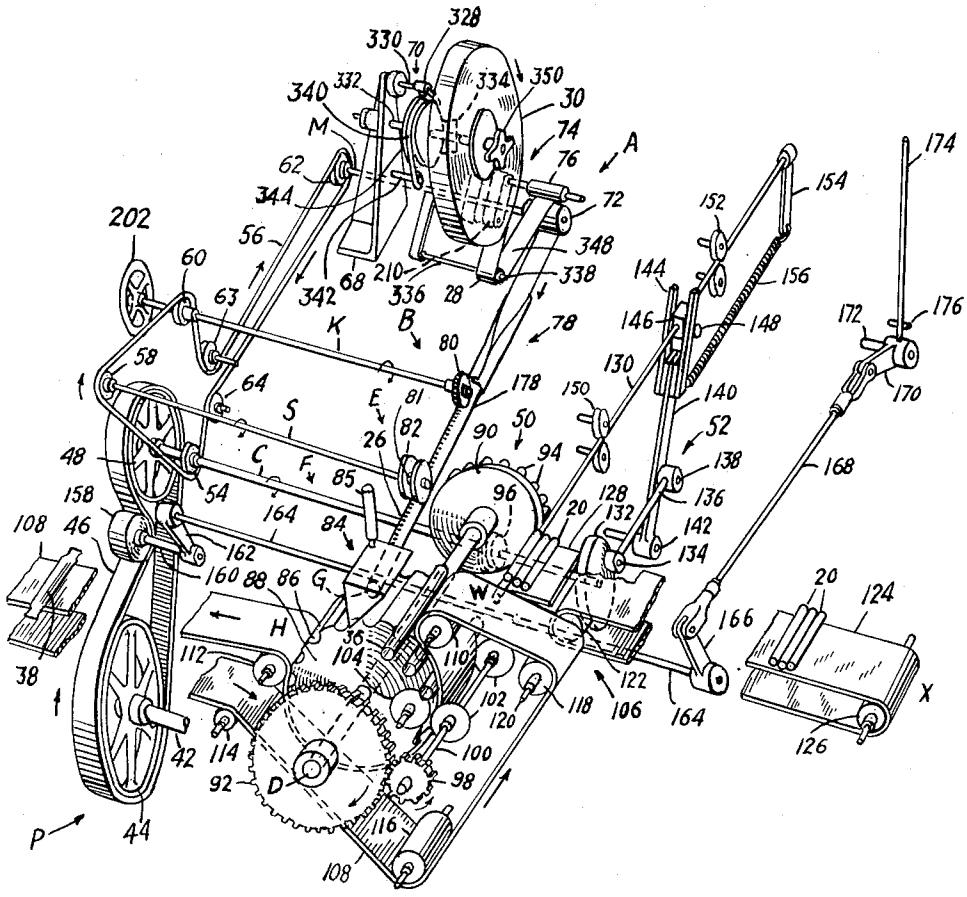
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Jan. 1, 1952 H. C. NOE 2,580,456

PACKAGING MACHINE

Filed Oct. 22, 1945 7 Sheets-Sheet 2

Fig. 7.



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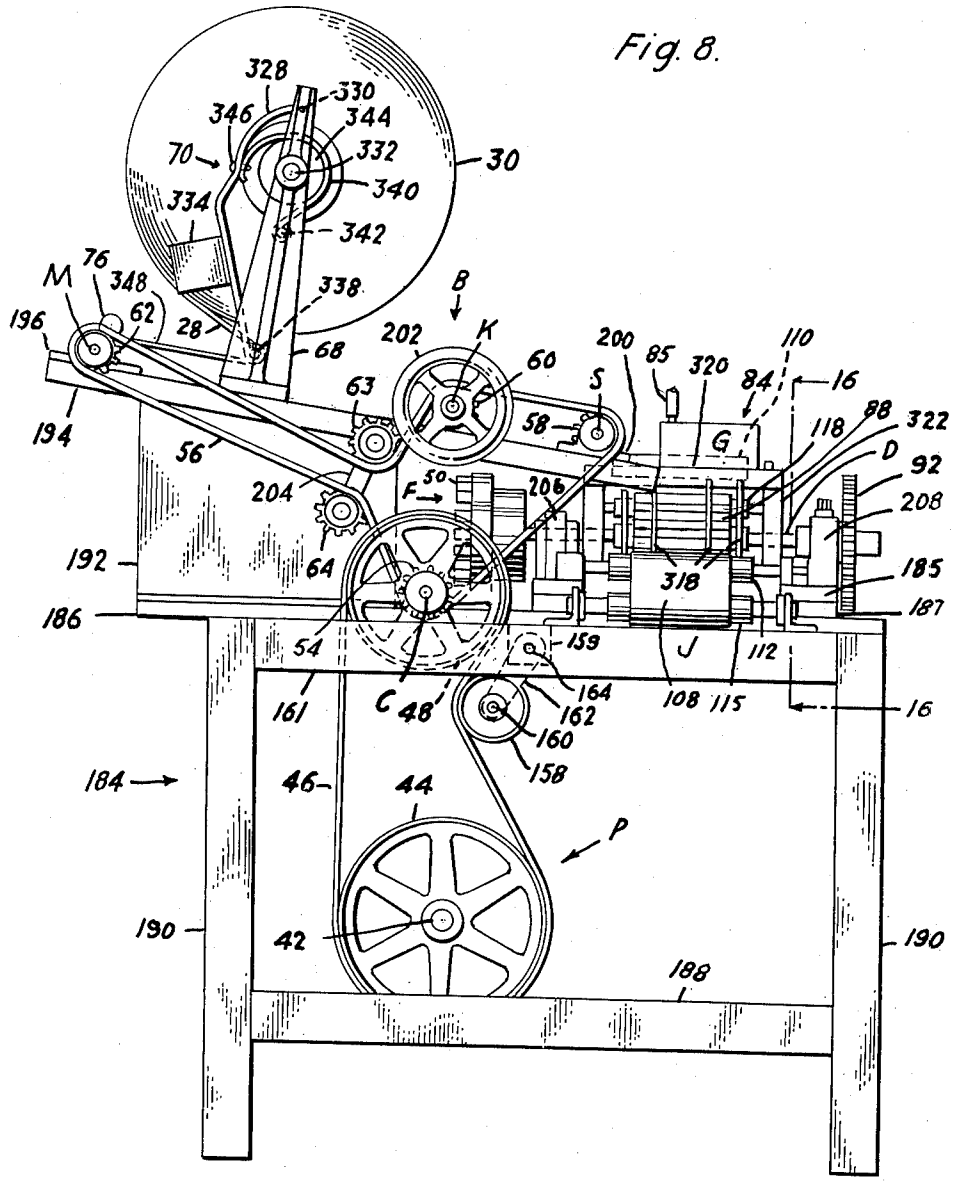
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Jan. 1, 1952 H. C. NOE 2,580,456

PACKAGING MACHINE

Filed Oct. 22, 1945 7 Sheets-Sheet 3

Fig. 8.



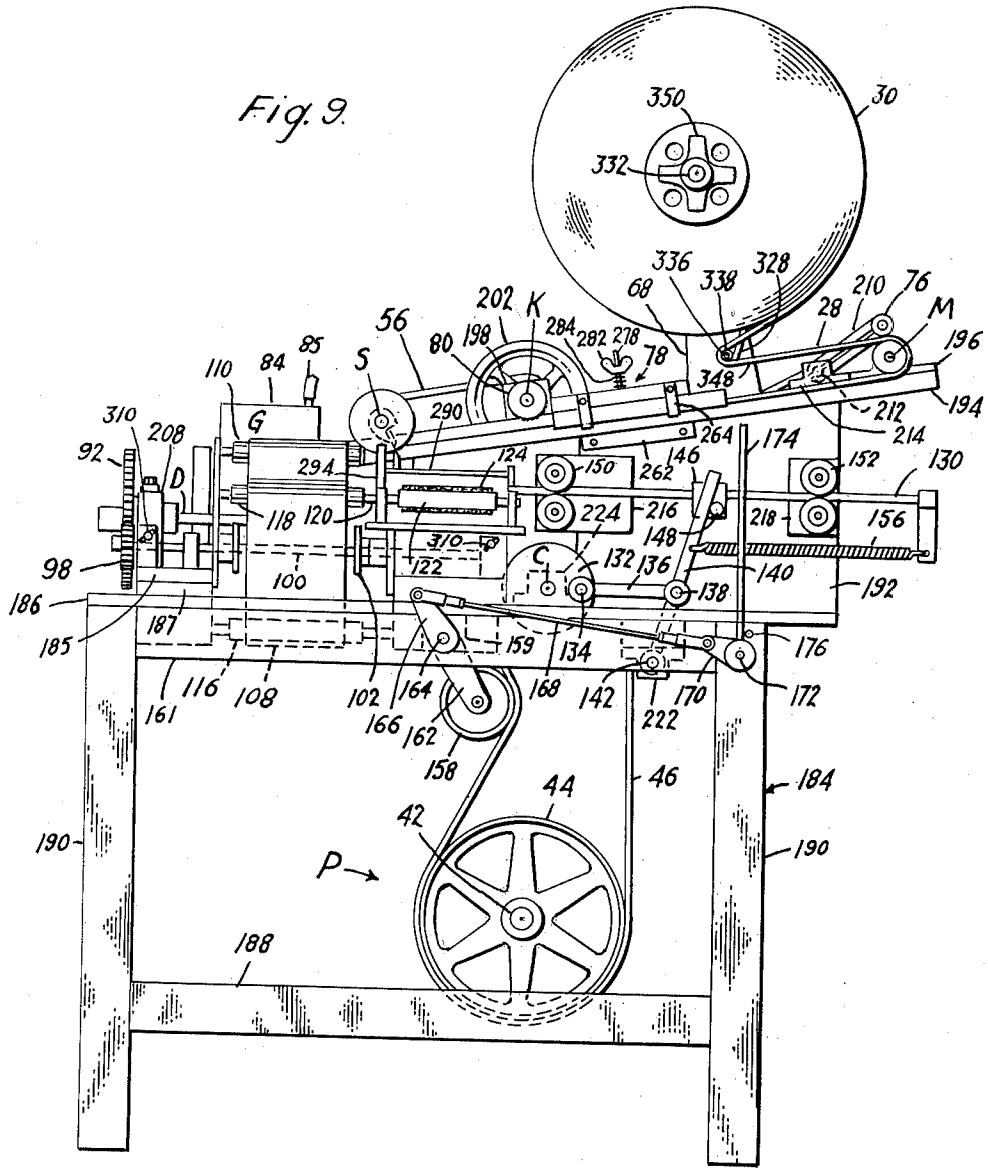
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Jan. 1, 1952 H. C. NOE 2,580,456

PACKAGING MACHINE

Filed Oct. 22, 1945 7 Sheets-Sheet 4

Fig. 9.



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Jan. 1, 1952 H. C. NOE 2,580,456

PACKAGING MACHINE

Filed Oct. 22, 1945 7 Sheets-Sheet 5

Fig. 10

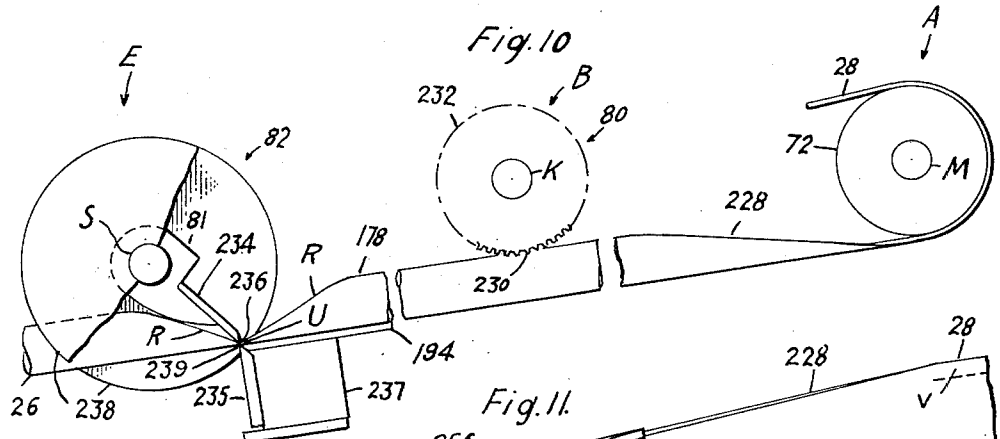


Fig. 11.

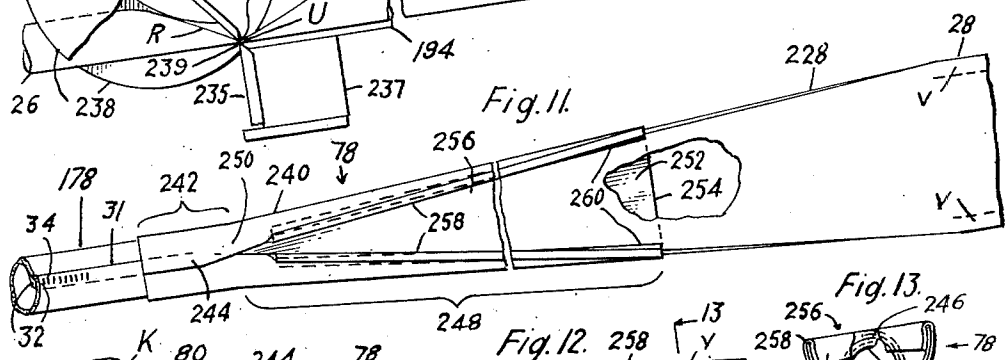


Fig. 12.

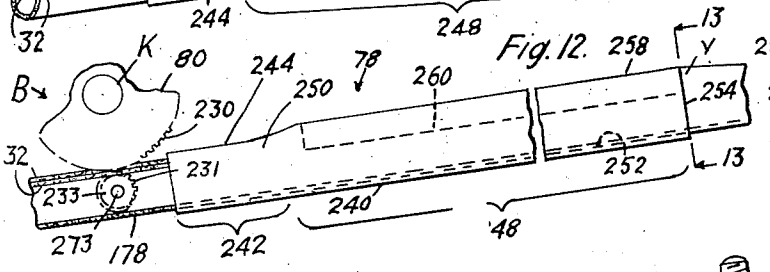


Fig. 13.

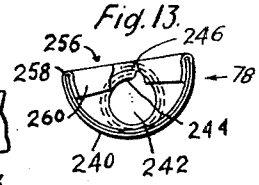


Fig. 14.

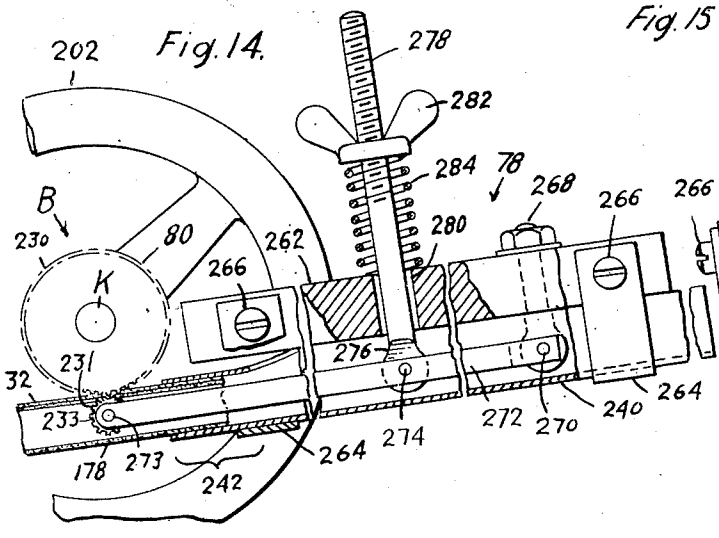
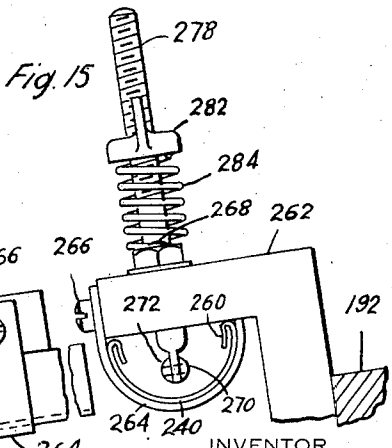


Fig. 15



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Jan. 1, 1952 H. C. NOE 2,580,456

PACKAGING MACHINE

Filed Oct. 22, 1945 7 Sheets-Sheet 6

Fig. 16.

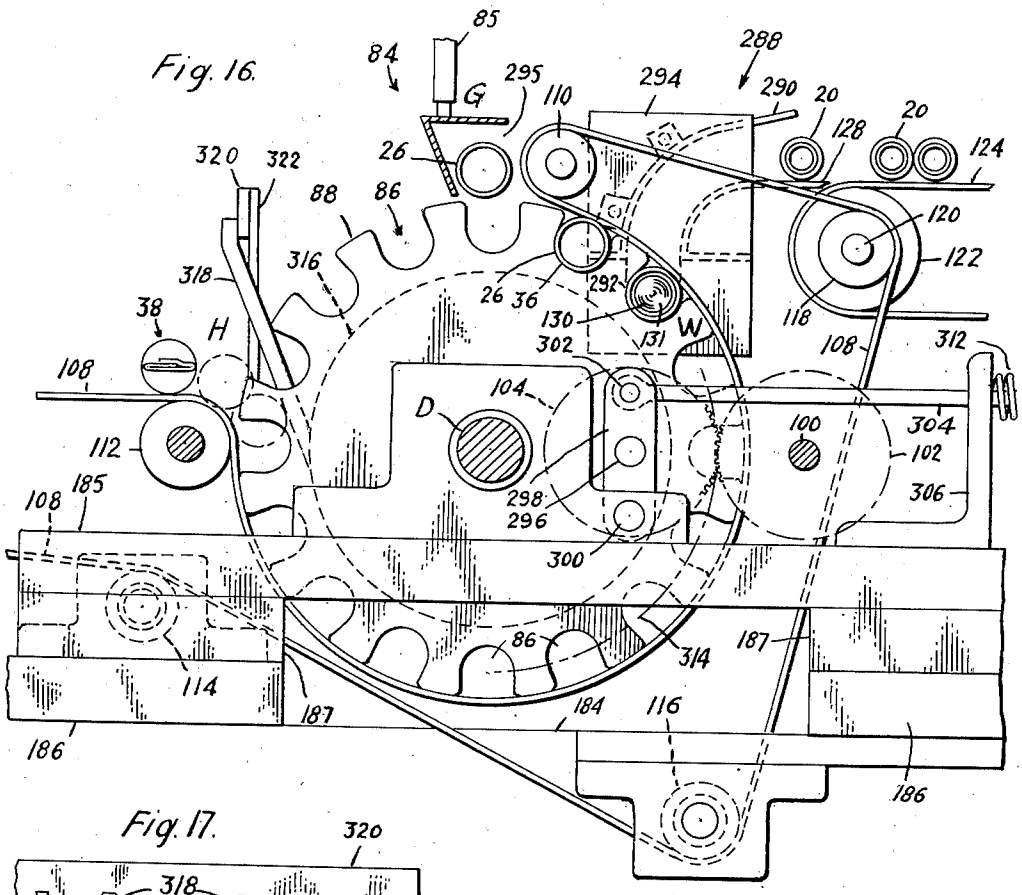


Fig. 17.

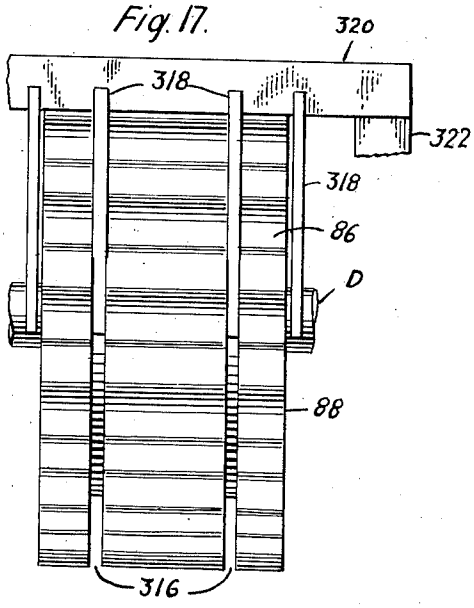
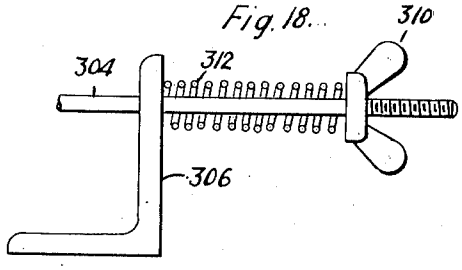


Fig. 18.



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Jan. 1, 1952 H. C. NOE 2,580,456

PACKAGING MACHINE

Filed Oct. 22, 1945 7 Sheets-Sheet 7

Fig. 19

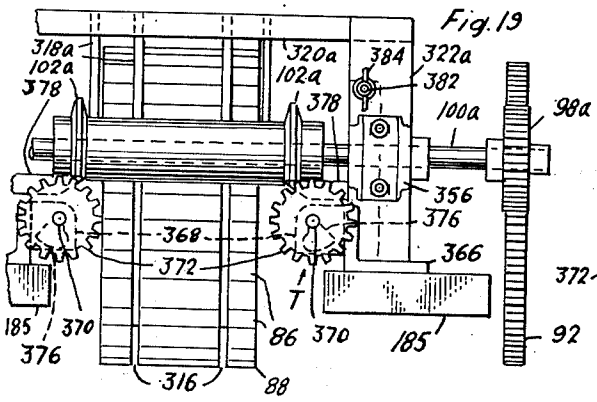


Fig. 20.

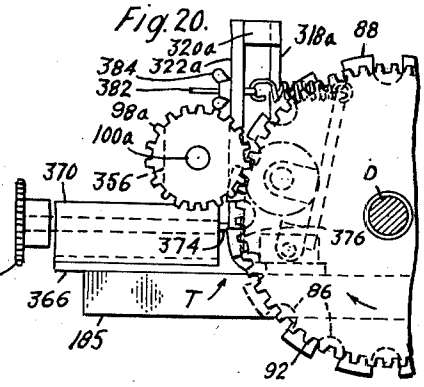


Fig. 23.

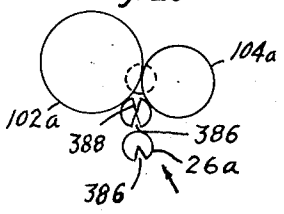


Fig. 24.

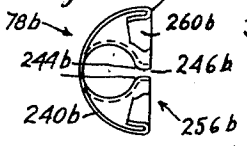


Fig. 25.

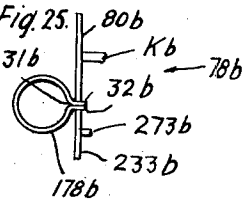


Fig. 21.

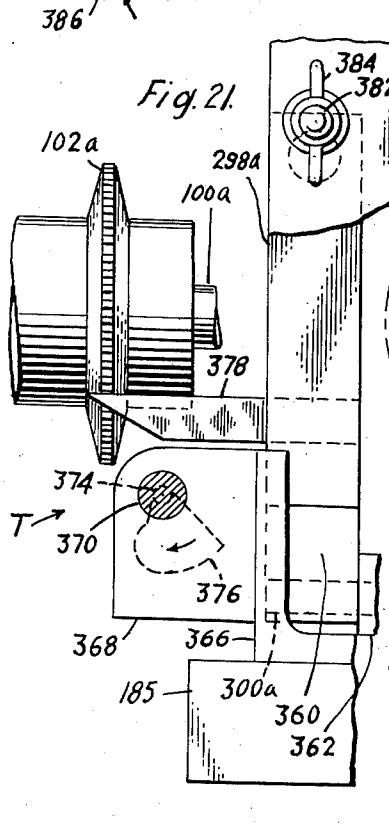
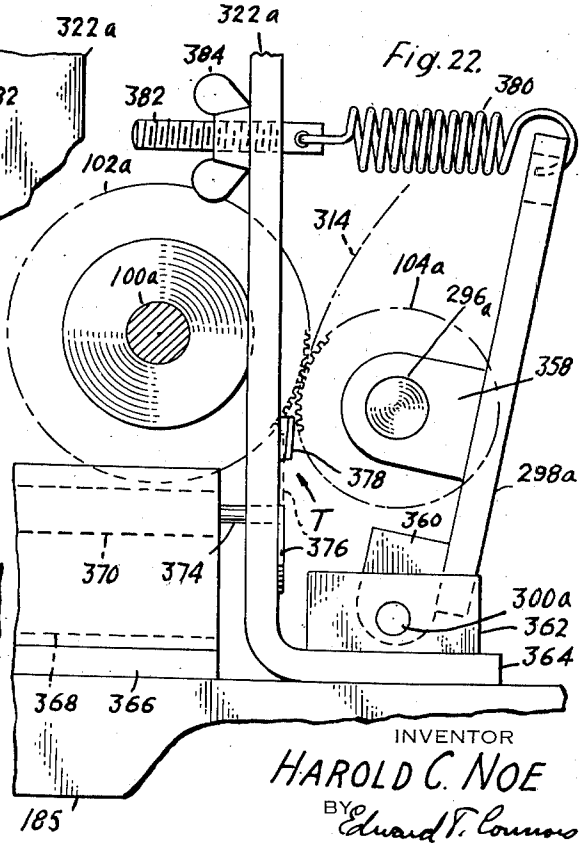


Fig. 22.



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Patented Jan. 1, 1952

2,580,456

UNITED STATES PATENT OFFICE

2,580,456

PACKAGING MACHINE

Harold C. Noe, Upper Montclair, N. J., assignor to Kidde Manufacturing Co., Inc., Bloomfield, N. J., a corporation of New Jersey

Application October 22, 1945, Serial No. 623,748

2 Claims. (Cl. 53—83)

1

This invention relates to packaging machines, and particularly to means for producing completed packages by successively forming, filling and closing the package covers.

One object of the invention is to provide novel means for forming tubular package covers from tape by moving the tape lengthwise, bending it laterally to form a tube, and constituting longitudinal edge margins of the tape as an axially layered seam, or as peripherally overlapping layers of an axial seam, of the tube.

Another object is to provide a mechanism, for producing elements, such as the packages aforesaid, having a plurality of means for performing different operations, the movements of, and between, which are all movements about parallel axes, whereby to eliminate gearing and noise, to simplify the structure, to increase the speed of operation, and to obtain other advantages.

Another object is to provide measuring-feed and knurling means which, by reason of the peripheral measurement and rate of rotation of a feed roller to the pitch diameter and rate of rotation of a knurling wheel, maintain flexible material taut, such as the tape, between the feed and knurling rollers through means for forming the material, as into the aforesaid tube, and accurately measure it relative to severing means for separating the formed material into uniform lengths.

Another object is to provide an elongated member including a bore of smaller circumference than the width of the tape through which the tape passes longitudinally in one direction, a portion providing an axial slot in the wall of the bore in which the edge margins are formed into a layered seam, and a length adjoining the bore having an inner surface gradually changing in the opposite direction from the adjoining contour of the bore to a contour approaching the contour of the tape, whereby the latter may be moved longitudinally at a high rate of speed and effectively formed into a tube.

Another object is to provide novel means for moving elements, such as the severed tube lengths, including a rotatable drum having means for carrying the elements on the periphery thereof between element receiving and discharging positions on a fixed path defined by a portion of the drum periphery, and endless-loop or belt means, constantly having a perimetral length defined by such path, movable with the drum for holding the elements thereon, and a reversely movable perimetral length between the ends of the aforesaid first length spaced outwardly from the latter relative to the drum.

2

Another object is to provide novel means for tucking closed an open hollow end of a hollow flexible tubular portion of a package cover, as by means for pressing such tubular portion laterally inwardly along axial lines spaced peripherally thereabout from each other to form the tuck folds, and fixing the folds to close the cover.

Another object is to provide novel means for maintaining tension in a flexible element or tape between a supply thereof and a position of application of withdrawal force, including means for braking movement of the tape that is responsive to starting movement of the tape for releasing the braking effect and to stopping of such movement for causing the braking effect.

Further objects, not specifically enumerated above, will be apparent as the invention is described in greater detail in connection with the accompanying drawings, wherein:

Figure 1 is a perspective view of a filler for a package produced by the machine of the invention.

Figure 2 is a similar view of a cover produced by the machine for the filler of Figure 1.

Figure 3 is a view showing the filler of Figure 1 as placed by the machine in the cover of Figure 2.

Figure 4 is a view of the completed package, in one form.

Figure 5 is a view of a completed package of modified form.

Figure 6 is a view of a cover of modified form for finishing as in Figures 4 and 5.

Figure 7 is an expanded perspective view, or general line diagram, of a machine embodying the invention for producing the package of Figure 4.

Figure 8 is a side elevation of the machine of Figure 7 as actually constructed.

Figure 9 is a view of the opposite side of the machine of Figure 8.

Figure 10 is an enlarged side elevation, partially in section and having distance breaks, of measuring, knurling and severing means embodied in the invention.

Figure 11 is a top plan detail of a cover-tube-forming means of the invention.

Figure 12 is a side elevation of the structure of Figure 11, showing the relation of the knurling means of Figure 10 thereto.

Figure 13 is a view taken substantially along the line 13—13 of Figure 12.

Figure 14 is a side view, partially in section and partially in elevation, of the cover-tube-forming means as viewed in Figure 12, but also showing backing means for a knurling wheel thereof.

Figure 15 is an end view of the structure of Figure 14.

Figure 16 is an enlarged detail end elevation of a drum and associated parts embodied in the invention, taken substantially along the line 16—16 of Figure 8.

Figure 17 is a view of portions of the structure of Figure 16, as seen from the left.

Figure 18 is a side elevation completing a view of elements partially shown at the right of Figure 16.

Figure 19 is a side elevation of a modification of the structure viewed at the right of Figure 8 on a table structure thereof.

Figure 20 is an end elevation, corresponding somewhat to Figure 16, of the structure of Figure 19.

Figure 21 is an enlargement of portions at the right center of Figure 19, parts having been omitted.

Figure 22 is an end elevation of Figure 21, corresponding to portions of Figure 20.

Figure 23 is a sequence diagram to the scale of Figure 20, but illustrating operations better understood from Figure 22.

Figure 24 is a view similar to Figure 13 of a modification of the structure thereof for producing the modified cover of Figure 6.

Figure 25 is a view of structure behind Figure 24 as seen in the drawing.

Referring to the drawings, Figure 1 illustrates an elongated cylindrical filler 20 adapted to be thrust endwise by the machine into a tubular cover. The filler 20, in this instance, comprises an outer cylindrical shell 22, of cardboard or the like, having a radially outwardly extending flange 23 at one end, and removably containing a solid cylinder 24 of highly compressed absorbent material, such as sterilized medicated cotton which, when subjected to a liquid, becomes several times its compressed size and extremely soft. A string 25 is secured to the cylinder 24, and normally protrudes from the end of the shell 22 opposite the end flange 23, as indicated.

Figure 2 shows a cover 26 produced by the machine in the form of a thin paper tube made from tape 28 on a roll 30 of Figures 7, 8 and 9, and having an axial seam 31 made up of peripherally lapped layers 32 crimped together, as indicated by knurling marks 34.

Figure 3 illustrates the filler 20 os having been thrust by the machine into the cover 26 to an intermediate position, leaving end lengths 36 of the cover protruding beyond the ends of the filler, and the string 25 folded between the side walls of the filler 20 and the cover 26.

Figure 4 shows the arrangement of Figure 3 after it has had its end lengths 36 squeezed shut and knurled or crimped closed by the machine, as indicated by marks 37, to form a completed package 38

The above structure and procedure are to be described in connection with Figures 7 to 18 showing the machine of the invention in one form.

Figure 5, in which corresponding parts are designated by corresponding reference numerals having the suffix (*a*), shows a modified form of finished package 38*a* in which a cover 26*a* is formed exactly as in Figures 2 and 3, but which, instead of having its end lengths 36*a* merely flattened and provided with the crimps 34, as in Figure 4, has its end lengths 36*a* of substantially

wedge shape provided with tucks 40 which are crimped closed, as indicated by marks 37*a*.

The package of Figure 5, which is also adapted to receive the filler 20, is illustrated in connection with Figures 19 to 23, showing a modified portion of the machine of Figures 7 to 18 for this purpose, the machine otherwise being the same as for handling and forming the parts of Figures 1 to 4.

Figure 6, in which corresponding parts are designated by corresponding reference numerals having the suffix (*b*), shows merely a cover 26*b*, which is a modification of the covers 26 and 26*a*. Instead of having a seam, such as the seams 31 and 31*a* of the previous figures having layers disposed in peripheral lapped relation to each other, the cover 26*b* is provided with an axial seam 31*b* having layers 32*b* protruding from the side of the cover 26*b* crimped together, as indicated by the knurling marks 34*b*. The cover 26*b* is adapted to receive the filler 20 in the same manner as in the previous figures, and to have its end lengths 36*b* finished either as in Figure 4 or as in Figure 5.

The structure in general

Referring to Figure 7, in which various of the mechanisms have parts omitted and are shown diagrammatically or in outline, to be described in detail later, and which omits practically all superstructure or stationary supports whereby the sequence operations and results may more readily be understood, the machine comprises, in general, driving means P including a power shaft 42, a pulley 44 on the shaft 42 and a belt 46 operating between the pulley 44 and a driven pulley 48, on a shaft C, of means F having the combined functions of driving an index mechanism 50 and a mechanism 52 for pushing the fillers 20 into the covers 26.

The shaft C also carries, in this instance, a sprocket 54 for a chain 56, which rides on a sprocket 58 on a shaft S, a sprocket 60 on a shaft K, a sprocket 62 on a shaft M, and on idler sprockets 63 and 64.

The machine further comprises, in its sequence of operation, a standard 66 supporting the tape roll 30 and a tape tensioning device 70, cover length measuring means A including a measuring or feeding roller 72 on the shaft M, a holding device 74 including an idler roller 76 for holding the tape on the measuring roller 72, a tube former 78, seam knurling means B including a knurling wheel 80 on the shaft K, cover length severing means E including a cutter 82 having a hub 81 on the shaft S, an air chamber device 84 for urging the covers 26 into axially extending peripheral recesses 86 on a drum 88, and a drum shaft D carrying in addition to the drum 88, an indexing disc 90 of the mechanism 50, and a gear wheel 92. The air chamber device 84 is supplied with air by a conduit 85.

The indexing disc 90 carries cam follower elements 94 protruding axially from one side thereof for cooperation with a cam 96 on the shaft C for imparting intermittent rotating movement to the shaft D and the drum 88.

The gear wheel 92, on the shaft D, engages a pinion 98 on a shaft 100, which also carries knurling wheels 102 at opposite sides of the drum 88 for effecting the end knurls 37 of Figure 4. The wheels 102 receive the cover ends 36, which protrude from the sides of the drum 88 for position between the wheels 102 and idler backing wheels 104 to effect closing and knurling of the ends 36.

The covers 26 are held on the drum 88 by belt means 106 including an endless loop belt 108 which, in this instance, rides on a roller 110, near a drum receiving position G of the covers 26, a roller 112 near a drum discharge position H of the packages 38, another roller 115 to the left of Figure 7, see Figure 8, at a point J of disposal of the packages, a roller 114 below the roller 112, a roller 116 below and to the right of the drum, and a roller 118 on a shaft 120 outwardly to the right from the roller 110.

The drum 88 thus, has means for carrying the cover and package elements on the periphery thereof, between element-receiving and discharge positions G and H, on a fixed path defined by a portion of the drum periphery, and the belt 108, although always progressing during its operation, constantly has a perimetral upper length defined by such path, and extending from the roller 110 to the roller 112. The belt also has a reversely movable bottom length, between the ends of its upper length, which is spaced radially outwardly from the latter relative to the drum.

In this instance, the shaft 120, which is driven by the belt 108 and carries the roller 118, also carries a roller 122 for an endless belt 124, which extends to, and around, a roller 126 at a position X for receiving the fillers 20. The belt 124 conveys the fillers 20 to a receiving apron 128, see also Figure 16, beyond which they are pushed, one at a time, to drop into the path of a push rod 130 in the filler pushing mechanism 52 for successive lengthwise thrusting into the covers 26, as they arrive and stop at a position W in line with the rod 130.

The mechanism 52 further comprises a circular disc crank 132, on the shaft C, having a stub shaft 134, parallel and eccentric to the shaft C, on which a connecting rod 136 is journalled, at one end, and has its other end pivoted on a pin 138 intermediate the ends of a lever 140.

The lever 140 is pivoted, at its lower end, on a pin 142 mounted on a stationary part of the machine, and has, at its upper end, a fork 144, the arms of which embrace a block 146 fixed to the rod 130 and carrying side rollers 148.

The rod 130 is supported, and guided, by wheels 150 and 152 mounted on stationary parts of the machine, and has a depending arm 154 between which and the lever 140 extends a spring 156 for constantly urging the rollers 148 against the fork 144 in the operative pushing direction, and for positive pushing by these rollers in the reverse, or withdrawing, direction. Thus, if, for any reason, the machine jams at or near the position W, the rod 130 will stop, while the lever 140 continues to operate until the machine is stopped, which may be quickly effected, as will appear.

A tensioning idler pulley 158, at the left of Figure 7, for tightening the belt 46 relative to the pulleys 44 and 48, rotates on a shaft 160 fixed at one end of a crank arm 162 having its other end secured to one end of a shaft 164, which is journalled in bearing blocks 159 at the inner side of crosspieces 161 of the table 184, see Figures 8 and 9. The other end of the shaft 164, at the right of Figure 7, carries a crank arm 166 for a connecting rod 168 extending to a lever 170 on a shaft 172 mounted on a stationary part of the machine. An operating handle 174, for the lever 170, normally engages a stationary stop pin 176 in the operating position illustrated, in which the rod 168 and the lever 170 have upward-buckled out-of-line relation to each other, and in which they are held by pressure of the belt 46 on the idler pulley 158. By moving the handle 174 to the left, as viewed in Figures 7 and 9, the rod 168 and the lever 170 are reversely or downwardly buckled, and release of the idler 158 is effected by a substantially snap action under pressure by the belt 46.

General operation

In operation, generally, as to Figure 7, with further details of construction and operation of the various parts to be given hereinafter, the machine is indicated as in operation, it being a point of particular note that the movements of, and between, the driving means P, the cover length measuring means A, the seam knurling means B, the cover length severing means E, and the means F are all movements about parallel axes.

The tape 28 is drawn, by the measuring wheel 72, from the roll 30, and directed, through the tube former 78, to the knurling wheel 80. The wheels 72 and 80 have a relation, to be described later, whereby both measure the length of the covers 26 before the latter is severed and, at the same time, maintain the tube length taut between the wheels.

In passing through the former 78, the tape is gradually laterally bent from its flat tape form into a blank or uncut tube 178 having the edge margins 32 as spirally overlapped longitudinal seam layers, which are knurled, or secured, together by the wheel 80. The tube 178 is pushed by the wheel 80, past the severing means E, to the position G in the air chamber device 84. The position G corresponds to the leading end of each successive cover length 26, which is cut at its trailing end by the cutter 82.

Upon this cutting, each cover 26 is blown gently, by the device 84, into one of the recesses 86 in the drum 88 which, at the time is stationary, but which resumes its movement by operation of the indexing mechanism 50, to be carried under the belt 108 to be held thereby.

Upon reaching the position W opposite, or aligned with, the push rod 130, with the drum 88 again stopped, the cover 26 receives the filler 20 which is pushed by the rod 130 longitudinally endwise into the cover to a position, corresponding to that of Figure 3, having the end lengths 36 protruding beyond each end of the filler, and beyond each side of the drum.

As the covers 26, thus filled, pass between the knurling wheels 102 and the backing idler wheels 104, at opposite sides of the drum 88, the cover ends 36 are folded together by the wheels in layer relation along the cover axis, and the layers knurled or secured together by the wheels, to close and complete the finished packages 38, indicated in Figure 4.

The above description, in this instance, completes the general cycle of operation of successively producing finished packages 38, which are then carried by the drum 88 to the drum discharge position H and the roller 112, where they are discharged from the drum, with the assistance of means not shown in Figure 7, but which will be later described in connection with Figures 16 and 17. Thus discharged, the packages are deposited onto the top side of the upper section of the belt 108, and carried by the latter to the above-mentioned point J of disposal, to the left of Figure 7 and shown in Figure 8.

The reciprocating motion of the push rod 130 is effected by the rotation of the shaft C, which turns the disc 132 and causes the connecting rod 136 to oscillate the lever 140 about its stationary

pivot pin 142, this operation also being effected with precision in relation to the intermittent rotation of the drum 88.

The rotations of the measuring wheel 72, the knurling wheel 80, and the cutting wheel 82 are continuous, and the intermittent actions of the drum 88, the push rod 130 timed to operate during the interval of travel of each successive cover 26 from the cutting wheel 82 to the position in the air chamber device 84 and onto the drum 88.

In case it is desired to stop the operation of the machine suddenly, as may occur upon the entry into the mechanism of a defective or damaged section of the delicate tape 28, or for other reason, in connection with the delicate materials and precise handling required, it is only necessary to move the handle 174 to the left, as aforesaid relative to Figures 7 and 9. This movement immediately downwardly buckles the toggle formed between the lever 170 and the connecting rod 168 under the combined action of the handle movement and the force exerted by the belt 46 on the idler pulley 158, and the machine stops, except for the driving means P, which continues to operate for immediate resumption of operation of the machine, when such resumption is ready or desired.

Detail structure

Referring to Figures 8, 9 and 16, the machine parts above set forth are assembled on a table 184, having a pair of elongated top plates 186, a lower shelf 188 for supporting a motor and reduction gearing of the driving means P, and legs 190. A bracket 192, on the table 184, supports a base plate 194 sloping downward from left to right in Figure 8, and from right to left in Figure 9, on which the shaft M is supported by bearings 196, the standard 68 is secured, as by bolts, and the shafts K and S are supported, as by bearings 198 and 200, respectively. The shaft K is provided with a handwheel 202 for a purpose later appearing. The idler pulleys 62 and 64 are secured to the bracket 192, as by a bar 204. The drum shaft D is journalled in bearings 206 and 208 on bars 185 spanning the table top bars 186 over blocks 187.

As seen in Figure 9, the idler roller 76 is journalled at the outer ends of arms 210, the inner ends of which are pivoted on a shaft 212 in a bearing 214 on the base plate 194.

The rollers 150 and 152, supporting the push rod 130, are mounted on blocks 216 and 218, respectively, secured to a side of the bracket 192. The lever 140 is pivotally mounted by the pin 142 in a block 222 secured to the underside of the table top 186, and the shaft 164 is journalled in the blocks 159 on the table cross pieces 61. The shaft C is journalled in bearings 224 on the table top. The pin 172 is mounted in one of the table legs 190.

Measuring—knurling—severing

Referring to Figure 10, the measuring means A comprises the measuring roller 72, the circumferential or peripheral extent of which, during one revolution, is a measure of the length of each cover 26, whereby, with each revolution, it draws such length of the tape 28 from the tape roll 30, and directs it toward the tube former 78. The tape 28 is transformed from its flat shape, at the roller 72, to the shape of the tube blank 178, at the knurling means B, by the tube former 78, later to be described, a tapered section 228 of the tape in Figure 10 indicating progress of this transformation.

The knurling wheel 80 has knurls or peripherally spaced radial projections 230, the diameter of a pitch circle 232 of which is identical with the diameter of the roller 72. The teeth of knurls 230 cooperate with corresponding projections 231 on an idler or backing knurling wheel 233, see Figure 14, to be further described in connection with Figures 14 and 15.

Therefore, with the roller 72 and the wheel 80 rotating at the same speed, the projections 230 and 231 indent the flexible tape of the blank tube 178, whereby the tape, by reason of its flexibility, is pulled slightly in advance of its delivery from the roller 72 at a constant rate and maintains the tape taut between the roller 72 and the wheel 80 in the progress of the tape through the former 78. By this action and means, uniform cover lengths are assured, as they would not be if the flexible tape were allowed irregular flexibility or play between the roller 72 and the wheel 80. The roller 72 and the wheel 80 may, of course, be constructed each to rotate more or less than once to measure any given cover length, so long as the pitch diameter of the teeth of the wheel 80 is the same as the diameter of the roller 72 and the rates of rotation of the roller and the wheel are the same.

After having been formed into the tube blank 178, the latter is less flexible than the flat tape, and it is pushed by the wheel 80 to the severing means E.

The severing means E, therefore, at each revolution, cuts off a uniform and predetermined length of the blank, which length is determined by the relative speeds and circumferences of the feed roller 72 in relation to one revolution of the shaft S.

A stationary knife or shear blade 235, supported by a block 237, secured to the underside of the base plate 194, has its edge 239 at a line U across the blank 178 substantially tangent to the bottom surface of the blank and substantially meeting an edge 236 of the knife 234 at this point after the edge 236, while moving with the blank, has collapsed the top of the blank along lines R, such that the blank, at the meeting edges 236 and 239, has its entire periphery flattened for shearing by the edge 236 as backed by the edge 239.

The cutting wheel 82 further comprises side discs 238 of slightly greater radius than the knife 234 and embracing the blank 178 and the covers 26, whereby to act as shields for the knife and as guides for the tube and covers.

Tube former

Referring to Figures 11, 12 and 13, the tube former 78 comprises, in this instance, an elongated, one-piece sheet-metal member 240, including a bore portion 242 of smaller circumference than the width of the flat tape, peripherally-overlapping radially-spaced portions 244 providing an axial slot 246, Figure 13, in the wall of the bore 242, in which edge margins V of the tape, indicated by dotted lines in Figure 11, are formed into the seam 31 having the layers 32. The member 240 has a length 248, adjoining the bore portion 242 at a position 250, an inner surface 252 of which gradually changes its form, in direction opposite to that of the tape travel, from the contour of the bore, at the position 250, to a contour at an opposite end 254 of the member 240, which approaches the contour of the flat tape. In other words, the member 240 is of substantially horn-shape having the inner

surface of its length 242 generally defining the outer contour of the blank 178, but having the portions 244 in peripherally or spirally overlapping spaced relation to each other to provide the axially extending slot 246, in which one of the layers 32 of the seams 31 is laid over the other layer.

The length 248 of the member 240 has, in this instance, an upper slot or opening 256 of substantially V-shape, edges 258 of which diverge from a point substantially coincident with the position 250 to the end 254, and provided with laterally inwardly and downwardly sloping, and generally axially extending, edge margins 260 spaced from adjacent portions of the member 240 to embrace and guide the edge margins V of the flat tape 28, such that they will become the layers 32.

After the tape has been changed into the tubular form, at about the position 250, the bore portion 242 holds this form for a distance such that the tube is set against quick lateral separation of the layers 32 before they are knurled together. The outlet of the bore just about clears the knurling wheels 80 and 233, which quickly grip the layers before the latter can separate.

Referring to Figures 14 and 15, which correspond to Figures 12 and 13, but which include elements omitted from Figures 12 and 13, the former 78 further comprises an angle member 262, see also Figure 9, for mounting the former 78 on the bracket 192, to which member 262 the member 240 is secured, as by clips 264 and screws 266. A stud 268, secured in the angle member 262, supports a pivot pin 270, on which is pivotally mounted, at one end, a rod or bar 272 extending from the stud 268 to a position at which it supports a pivot pin 273 for the wheel 233.

The rod 272 is pivoted, by a pin 274, to an inner end 276 of a screw 278 extending loosely through an opening 280 in the member 262 and carrying a thumb nut 282 for moving the rod 272 upwardly, as illustrated, through the intermediary of a spring 284, surrounding the screw and bearing between the nut 282 and the member 262. The cooperatively knurled wheel 233 acts as backing means against which the knurling wheel 80 presses the layers 32 in knurling or crimping the layers together.

In initially threading the tape 28 through the former 78, the screw 282 is turned to relax the compression of the spring 284, and to lower the backing wheel 233 away from the layers 32, whereby the tape may be threaded past the wheel 233. After this threading, the nut 282 is reversely turned to yieldably tighten the wheel 233 against the layers 32 by just the right amount of pressure to insure effective knurling.

The handwheel 202 is provided on the shaft K to pull the blank 178, after threading, to determine the exactness of the adjustment of the wheel 233 by the nut 282, before starting the machine by turning the handle 174 to the right to its operative position shown in Figures 7 and 9.

Drum

Figures 16, 17 and 18 illustrate, in further detail, parts above set forth, in association with the drum 88, showing, amongst other items, that the belt 124 conveys the fillers 20 onto the apron 128, which constiutes a portion of a chute 288 having a top baffle or deflector 290, see also Figure 9, which, with the apron 128, curves inwardly to the left, and downwardly, to a semi-cylindrical

bottom 292 axially aligned with the head 131 of the push rod 130 and with one of the drum recesses 86. The chute 288 is supported between end blocks 294, indicated also in Figure 9.

The air chamber device 84 is indicated of substantially Z-section, with an open side 295 directed downwardly and forwardly to direct each cover 26 into one of the drum recesses 86 at the receiving position G, after which the covers pass under the roller 110 and the belt 108 to be held in position by the belt as it is driven by the drum 88.

The idler backing knurling wheels 104 are mounted on shaft portions 296 carried by upright levers 298 at opposite sides of the drum 88, which levers 298 are pivotally mounted, at the lower ends, on pivot pins 300, and are pivotally connected, at the upper ends, as by pins 302, to horizontal rods 304. The rods 304 are slidably mounted in angle members 306, and have screw threaded outer end portions on which thumb nuts 310, see Figures 9 and 18, are mounted. Springs 312, around the rods 304, extend between the angle members 306 and the thumb nuts 310 to urge the wheels 104 toward the wheels 102 by forces determined by adjustment of the nuts 310. The wheels 104 may be moved away from the wheels 102, at any time, by pushing the rods 304 to the left, as viewed in Figures 16 and 18.

The point of tangency, between the wheels 102 and 104, is on a pitch circle 314 of the peripherally-spaced axially-extending drum recesses 86 such that, as the protruding ends 36 of the covers 26 pass between the wheels, these lengths 36 are flattened and provided with the crimps 37, as shown in Figure 4.

The drum 88 is provided with circumferential recesses or grooves 316 into which rods 318, shown in Figures 8 and 17, and at the left of Figure 16, protrude from a bridge 320 having end piers 322, which bridge also carries rods 318 at the sides of the drum. The rods 318 are arranged, as shown, such that, as the completed packages 38 are carried by the drum past the rods 318, the packages are urged out of the drum recesses 86 onto the belt 108 at the point H of discharge for conveyance to the point J of disposal. From the latter point, the belt 108 returns over the roller 114, past the lower side of the drum 88, in spaced relation thereto, to the roller 116, under the latter, past the right-hand side of the drum, as seen in Figure 16, in spaced relation to the drum, to the roller 118, and over the latter to the roller 110.

Tape tensioning means

The tape tensioning means 70, see Figures 7, 8 and 9, comprises an arm 328 depending from a pivot pin 330 at the upper end of the standard 68 above the axle 332 on which the tape roll 30 is mounted. The arm 328 carries a weight member 334 intermediate its ends, and, at its lower end, carries a pin 336 on which a roller 338 is mounted. A brake band 340 is fixed at one end, as by a pin 342 on the standard 68, and extends part way around a brake drum 344 to means 346, such as a rivet, securing the band to the arm 328.

The arrangement is such that the roller 338, tends, at all times, to rotate the roll 30 in its unwinding direction, which rotation is stopped by the setting of the brake band 340 against the brake drum 344, when the machine is stopped, and maintains a length 348 of the tape 28 between the roll 30 and the measuring wheel 72. The adjustment is such that the tension in the length 348 is maintained substantially constant

at all times when the machine is operating, and the weight member 344 absorbs the shock of a sudden start.

The device 70 further comprises usual means for mounting and removing the roll 30 including a hand knob 350, Figure 9, and other elements.

Tucking means

Figures 19 to 23, inclusive, illustrate a modification of parts of the machine above set forth, as to the pinion 98, the shaft 100, the knurling wheels 102 and the backing means 104, which are for producing the ends 36 of the package in Figure 4.

The mechanism of Figures 19 to 23 is for producing the tucks 40 and the crimping 37*a* in the ends 36*a* of Figure 5, the machine being otherwise the same as above set forth. Accordingly, corresponding parts are designated by corresponding reference characters, and modified similar parts are designated by corresponding reference characters having the subscript (*a*), as in Figure 5.

In this instance, instead of having the pinion 98, and associated parts, at the right of the gear wheel 92, as viewed in Figure 7, a pinion 98*a* is located at the left of the wheel 92, and knurling wheels 102*a*, backing wheels 104*a*, and tucking means T are correspondingly located to produce the tucks 40 and the crimping 37*a* of Figure 5.

The pinion 98*a* is fixed to a shaft 100*a* which is journalled in bearings 356 on piers 322*a* of a bridge 320*a*, and carries knurling wheels 102*a*.

The backing wheels 104*a* are each mounted on a shaft 296*a* carried in a block 358 on a lever 298*a* having a lower end block 360 pivotally mounted by a pin 300*a*. The latter is mounted in a block 362 on a lower horizontal end length 364 of the pier 322*a* secured to the cross bar 185.

An angle member 366, on the bar 185, supports a journal 368 for a shaft 370 carrying a sprocket wheel 372 at one end and having a portion 374 of reduced diameter carrying a vane 376, this vane being just below the wheels 102*a* and 104*a* and directed generally tangentially to the pitch circle 314 of the recesses 86 of the drum 88 tangent to which circle the pitch circles of the wheels 102*a* and 104*a* are located. The shafts 370 are parallel to each other and to the shafts C, M, S, K, and P. A stationary vane or blade 378 is mounted on the pier 322*a* at an angle thereto corresponding to the change in direction of the pitch circle 314 from the direction of the latter at the point where the movable vane 376 engages the cover 26*a*, the upper edge of the stationary vane 378 also being located as close as possible to the point of tangency between the wheels 102*a* and 104*a* and still clear the knurls or teeth of these wheels.

The pressure, of each backing wheel 104*a* against its wheel 102*a*, is effected by a tension spring 380 connected between the lever 298A and a screw 382 held in the pier 322*a* by a thumb nut 384 for adjusting the tension of the spring.

The sprocket wheel 372, to the left of Figure 19, rotates counterclockwise, and the wheel 372, to the right, rotates clockwise, such that the vanes 376 thereof approach the corresponding end length 36*a* of the covers 26*a* from beneath, as may be better understood by reference to the diagram of Figure 23.

As each cover 26*a* passes the vanes 376, each of the latter moves upwardly, from below the cover, to press the end of the latter laterally inwardly or upwardly along an axial line of the cover, making an inverted substantially V-dent or fold 386, the vane 376 moving with the cover, but faster, while so doing and until after the cover meets the stationary vane 378 which forms a V-dent 388. The vane 376 just clears the wheel 102*a* and the vane 378 to the left of the latter, as viewed in Figure 22.

The vanes complete the V-dents 386 and 388, which draws or flattens the sides of the cover inwardly to substantially wedge shape at its end beyond the filler in a plane directed toward the meeting edges of the wheels 102*a* and 104*a*, which grasp the tucked end for crimping it closed before the paper expands to relax the tuck.

With the tucks and the packages thus completed, the packages are discharged as above described, with the aid of rods 318*a* in the recesses 316 of the drum 88, which pushes the covers along the rods for movement by the rods out of the drum recesses 86.

Modified tube former

Figures 24 and 25, in which corresponding parts are designated by corresponding reference characters having the suffix (*b*), show a modification 78*b* of the tube former 78 of Figures 11, 12 and 13, for producing the cover 26*b* of Figure 6.

The elongated member 240*b*, although it could be positioned such as to have the opening 256*b* at the top, as in the case of the corresponding opening 256 of Figure 13, or in other position, is turned about ninety degrees clockwise relative to the member 240 as shown in Figure 13, to have the opening 256*b* facing to the right in Figure 24. This feature provides for having slot-forming portions 244*b* projecting to the right such that the seam 31*b* and its layers 32*b* also project to the right of a blank tube 178*b*, whereby a knurling wheel 80*b* and its backing wheel 233*b* may have the shafts K*b* and 273*b* thereof, respectively, also parallel to each other and to the shafts C, M, S and P.

From the foregoing description, it is apparent that a packaging machine has been provided which is entirely free from bevel gear wheels, in that all the movements in its transmission at each side of the indexing mechanism 50 are about axes parallel to each other, rendering the machine extremely simple in construction and quiet and effective in operation, in which the covers are accurately and rapidly measured, formed and seamed, in which the fillers are inserted, the cover ends are closed and secured, and all of the aforesaid advantages, as well as many others, are obtained in a manner rendering the invention a distinct advancement in its field.

As various changes may be made in the form, construction and arrangement of the parts herein, without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in any limiting sense.

It is also to be understood that the following claims are intended to cover all the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim:

1. In a packaging machine for forming tubular cover members and inserting filler bodies therein, the combination of a drum rotated about a substantially horizontal axis and having trans-

verse recesses in the periphery thereof for receiving a cover member, means for forming a continuous tube and delivering a length thereof towards said drum, cutting means including a pair of cooperating cutting elements adjacent said drum arranged for severing the tube length crosswise and thereby provide cover members, a chamber construction adjacent said drum partially enclosing the cover members upon delivery to said drum, and air blast means including an opening in said chamber construction for directing such cover members into said recesses of said drum.

2. In a packaging machine for forming tubular cover members and inserting filler bodies therein, the combination of a drum rotated about a substantially horizontal axis and having transverse recesses in the periphery thereof for receiving a cover member, means for forming a continuous tube and delivering a length thereof towards said drum, cutting means including a pair of cooperating cutting elements adjacent said drum arranged for severing the tube length crosswise and thereby provide cover members, one of said cutting elements being arranged to move in a direction towards said drum while engaging the tube and thereby move the cover members severed from the tube length towards said drum, a chamber construction adjacent said drum partially enclosing the cover members upon delivery

to said drum, and air blast means including an opening in said chamber construction for directing such cover members into said recesses of said drum.

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