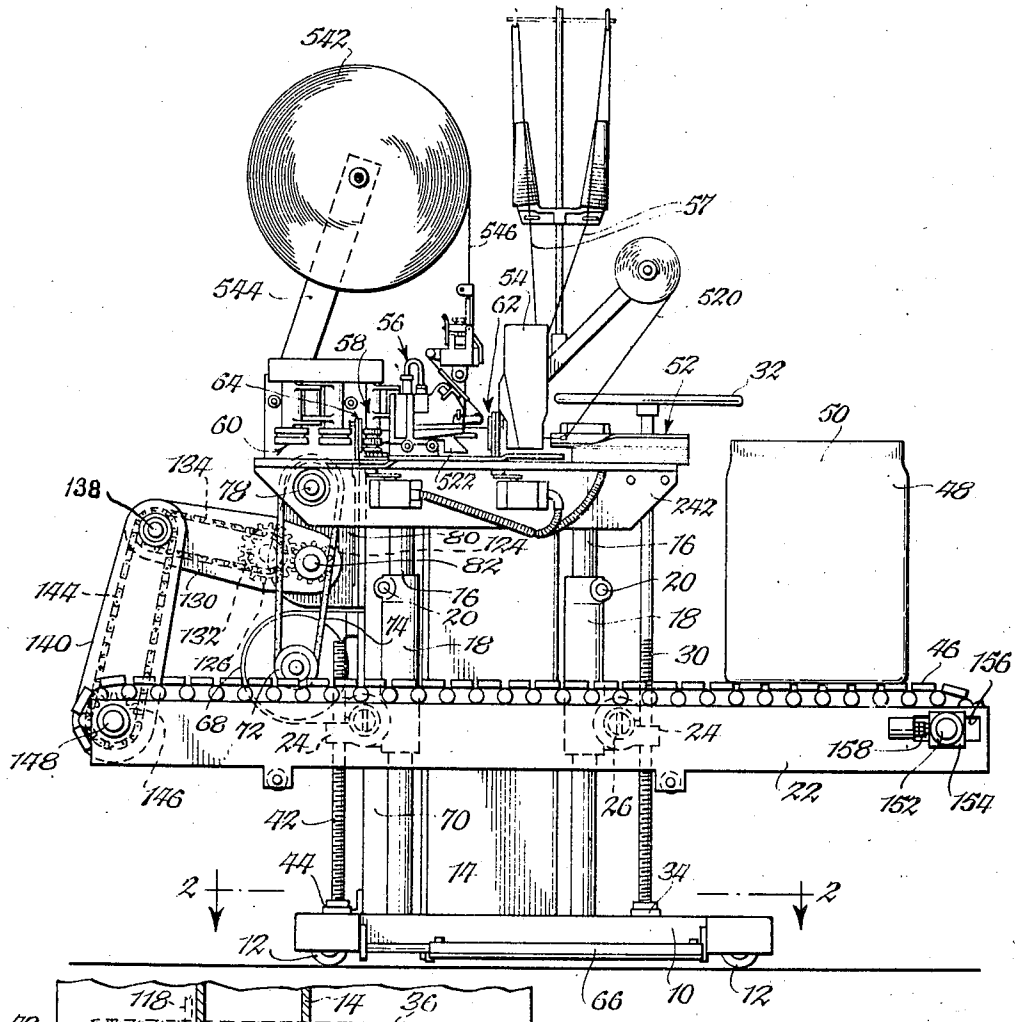
Aug. 18, 1942. H. G. ALLEN 2,293,687

BAG CLOSING MACHINE

Original Filed Sept. 13, 1939 7 Sheets-Sheet 1

Fig. 1.



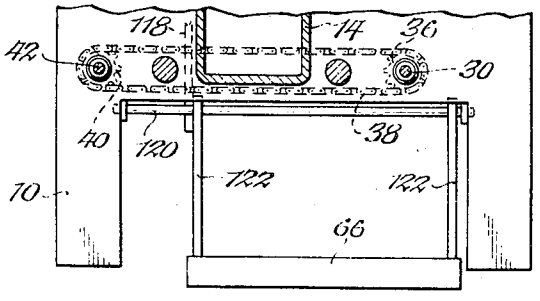


Fig. 2.

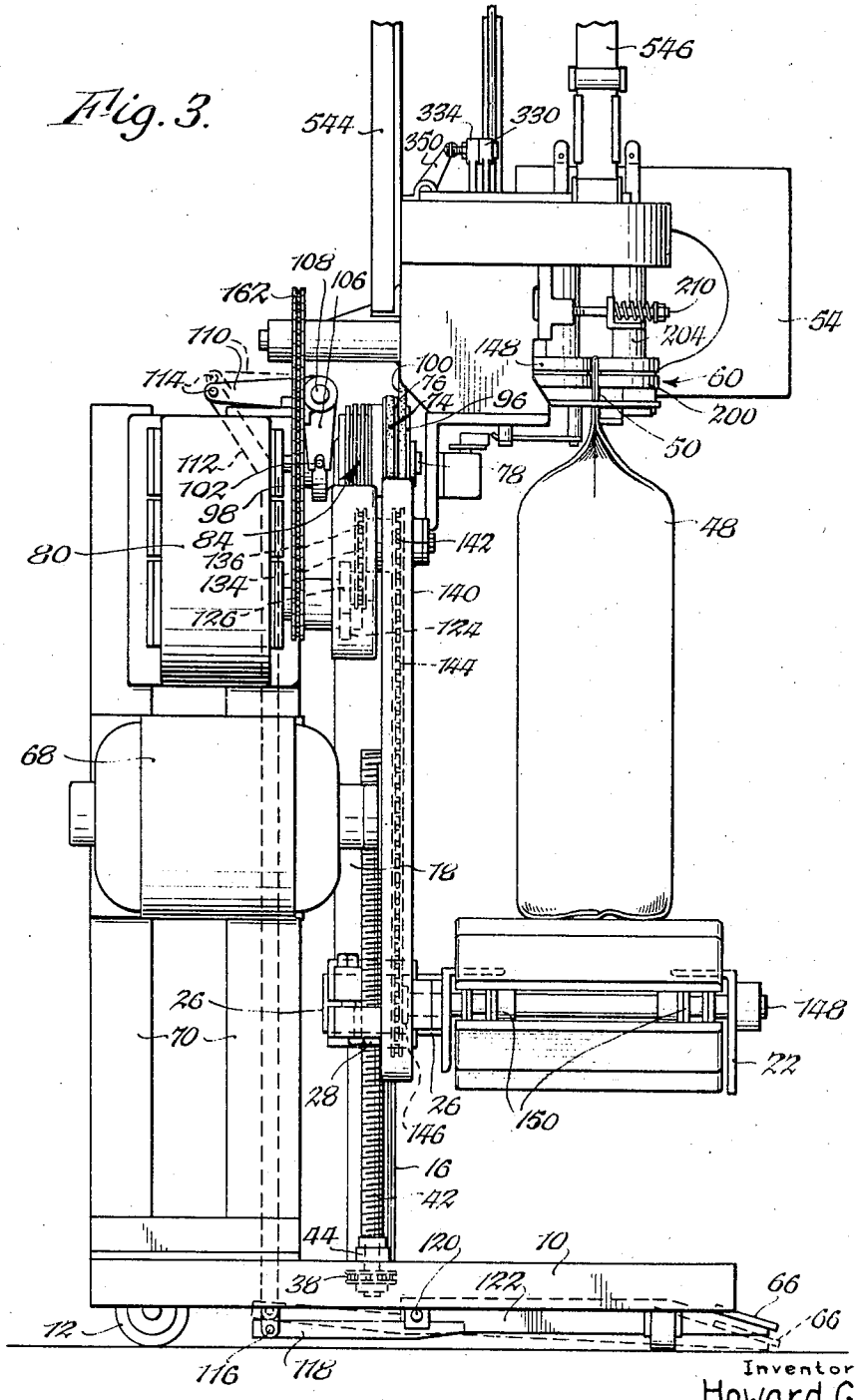
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Fig. 3.



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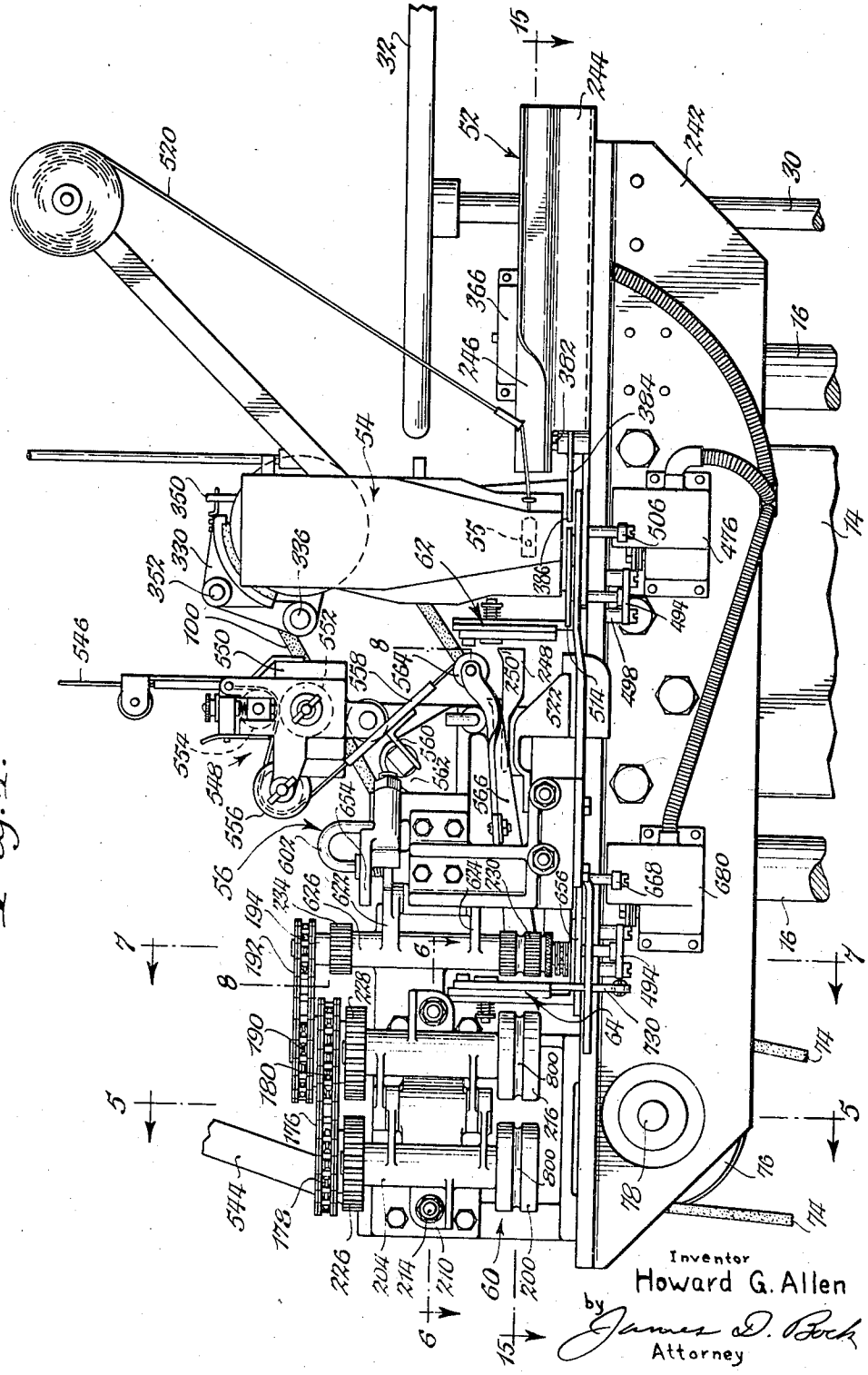


Fig. 4.

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Fig. 6.

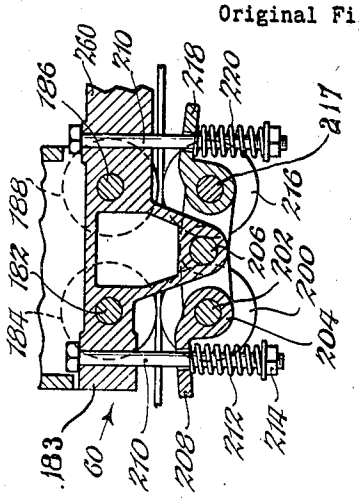


Fig. 7.

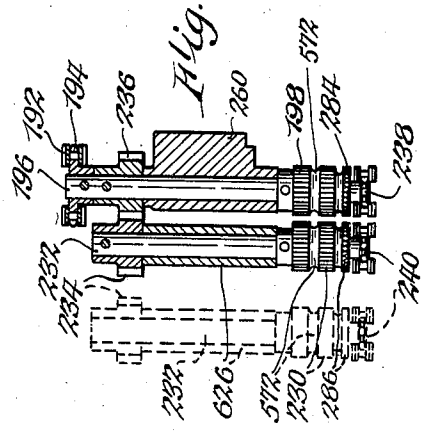
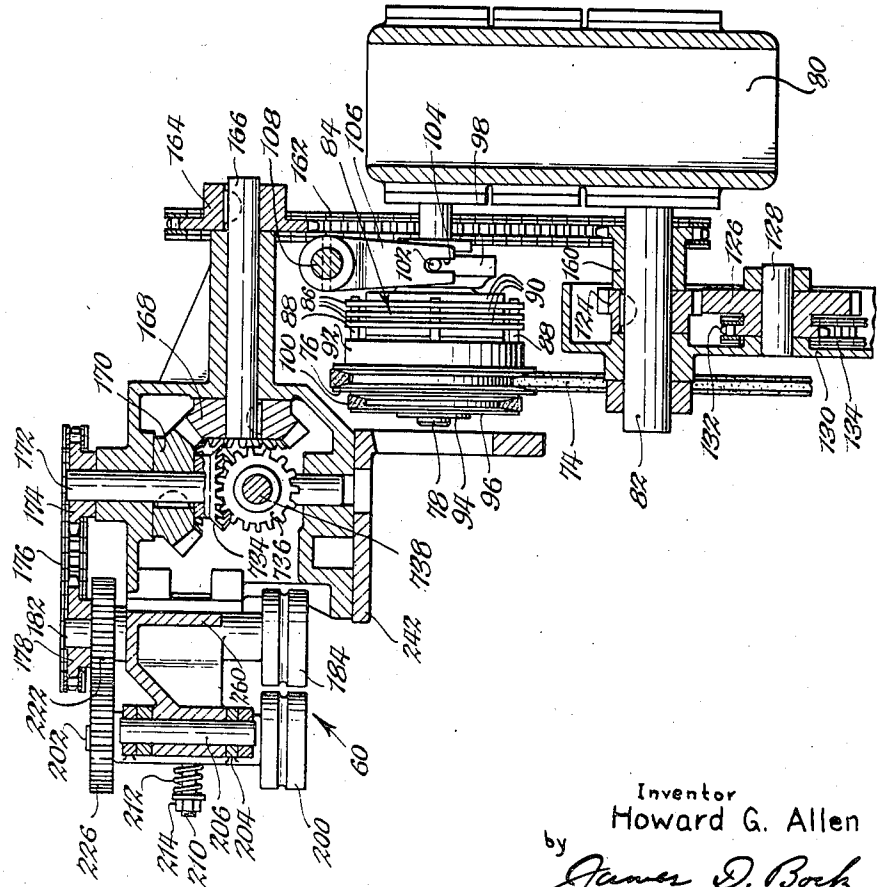


Fig. 5.



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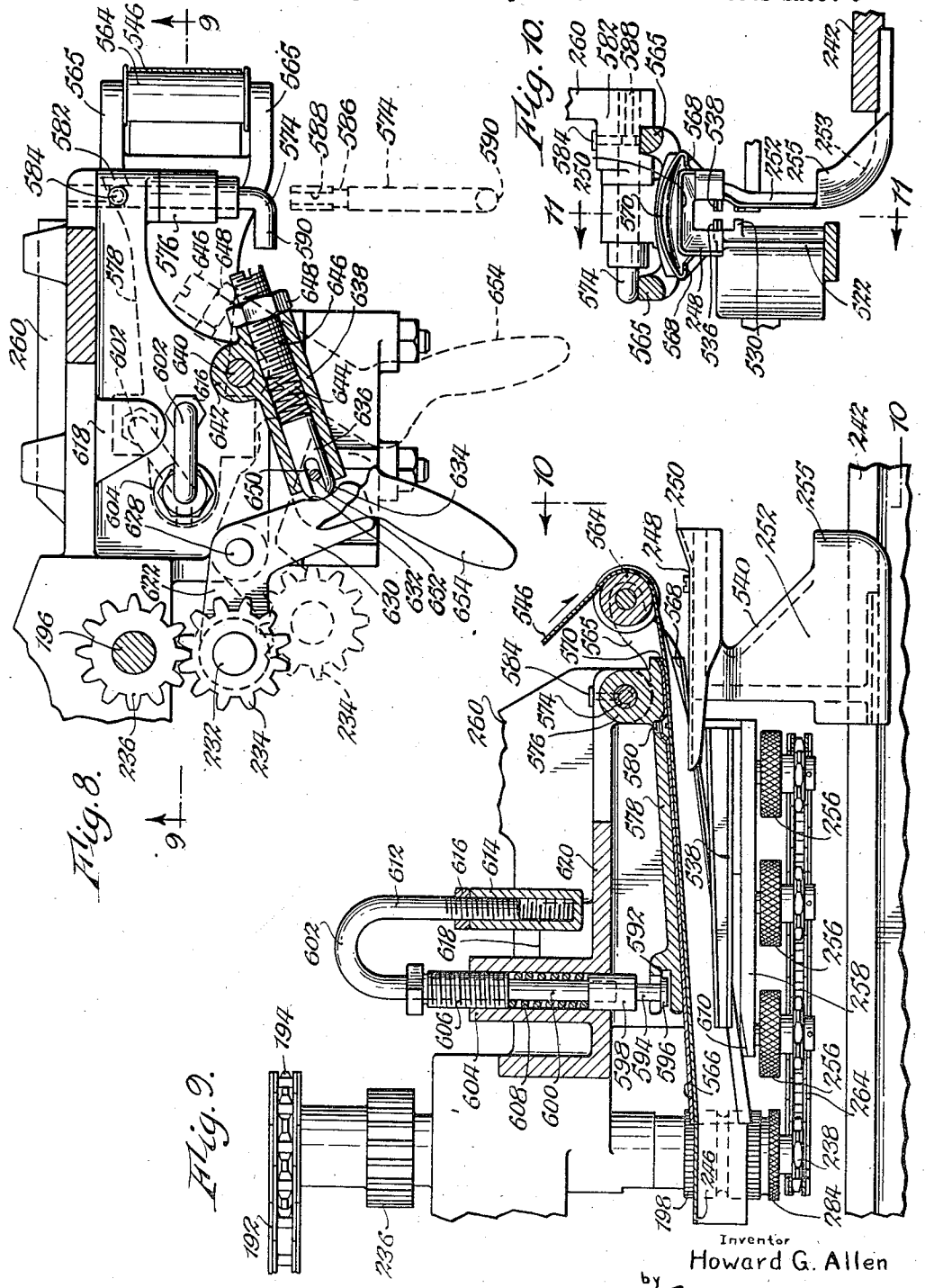


Fig. 8.

Fig. 10.

Fig. 9.

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Fig. 13.

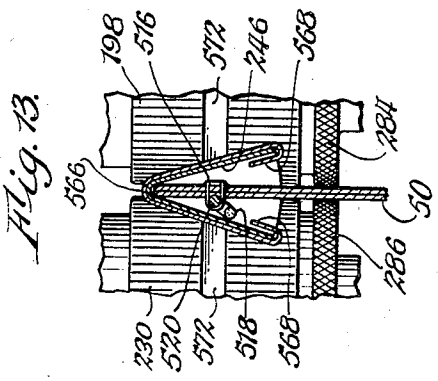


Fig. 14.

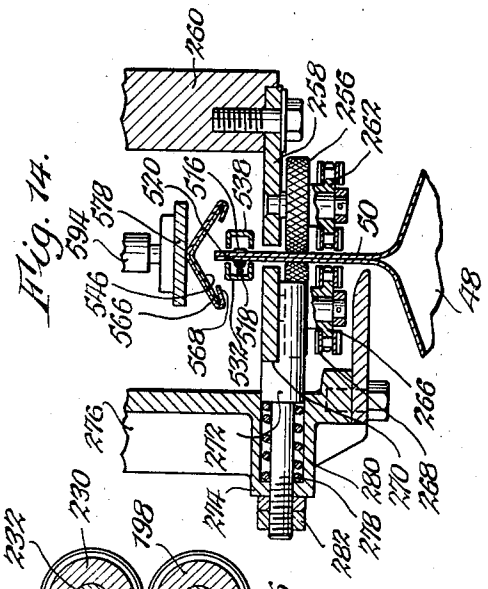


Fig. 11.

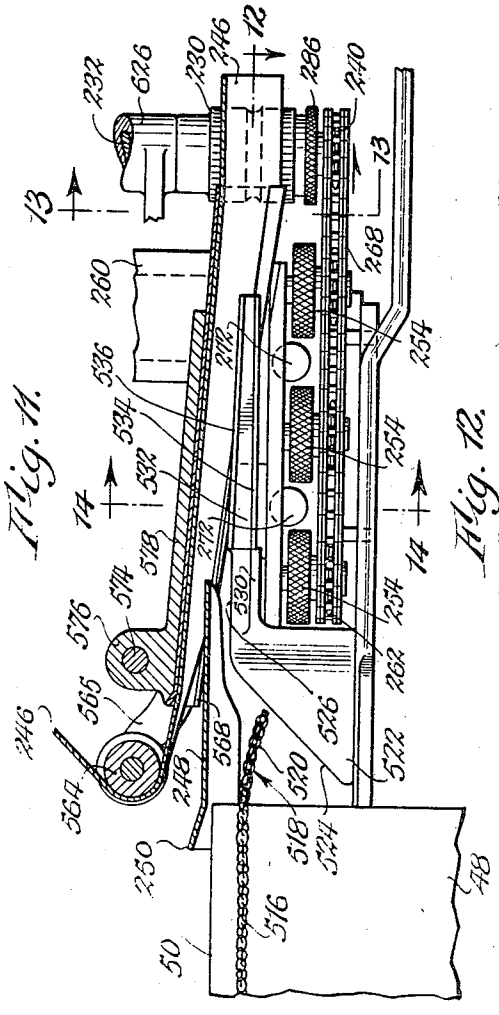
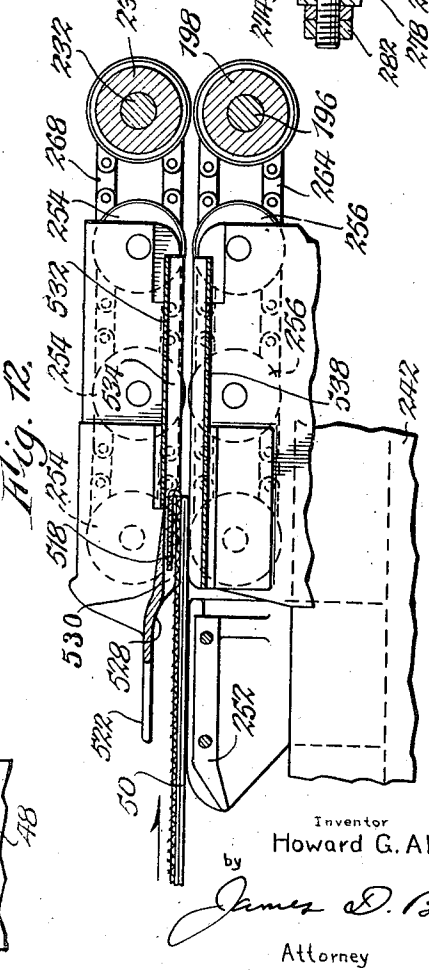


Fig. 12.



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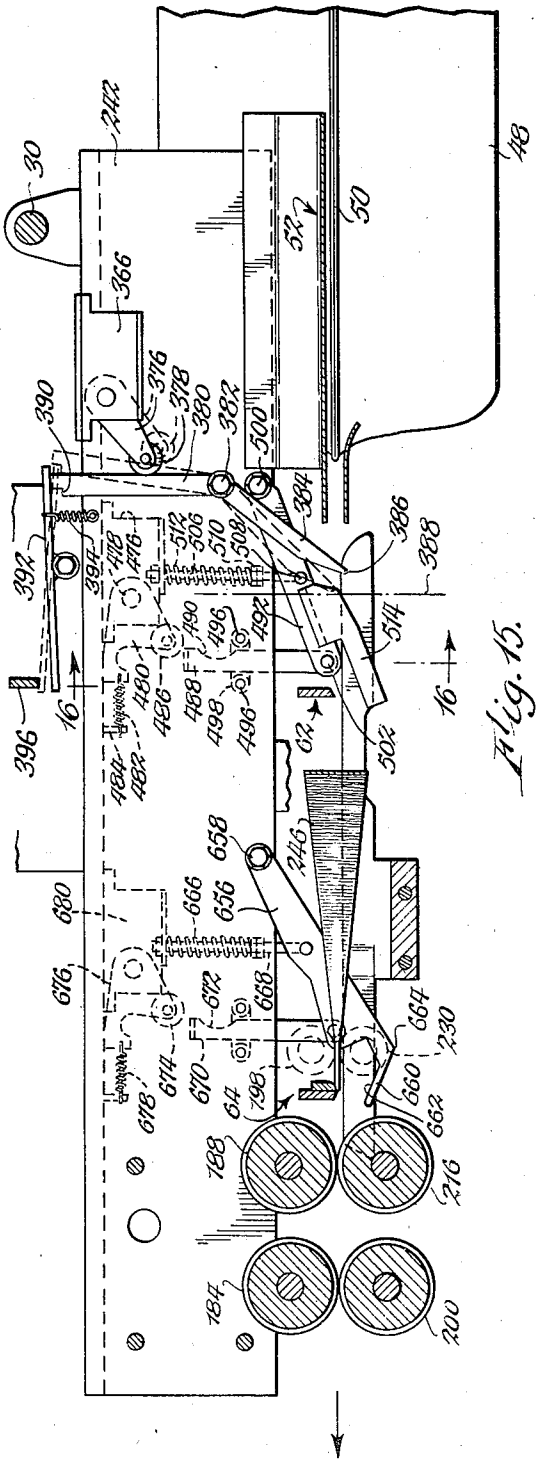


Fig. 15.

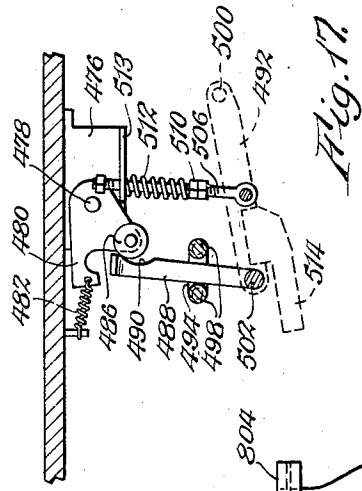


Fig. 17.

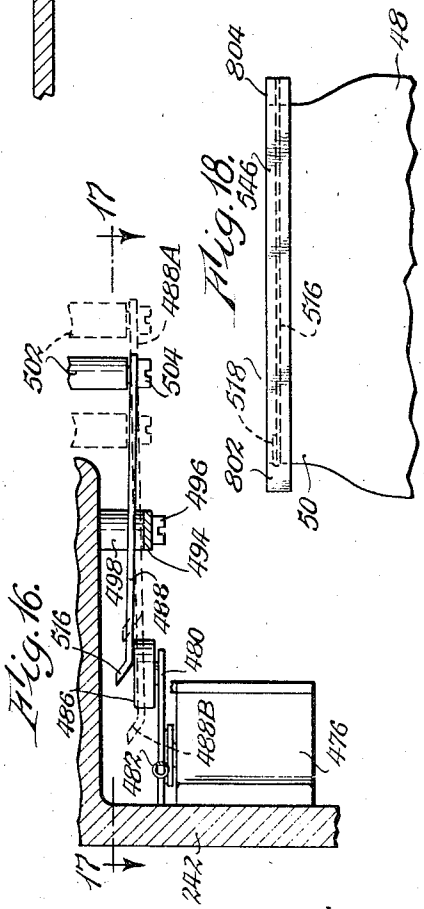


Fig. 18.

Fig. 16.

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Patented Aug. 18, 1942

2,293,687

UNITED STATES PATENT OFFICE

2,293,687

BAG CLOSING MACHINE

Howard G. Allen, Niagara Falls, N. Y., assignor to Bagpak, Inc., New York, N. Y., a corporation of Delaware

Original application September 13, 1939, Serial No. 294,650. Divided and this application October 8, 1941, Serial No. 414,057

4 Claims. (Cl. 216—30)

The present invention relates to bag closing mechanism and more particularly to mechanism suitable to rapidly and effectively close and seal the open mouths of large heavy duty paper bags of the type capable of containing upwards of 100 pounds or more of a commodity.

This application is a division of my prior application Serial No. 294,650, filed September 13, 1939.

It is an object of the present invention to provide machine of the type described which is exceedingly compact and which may be constructed at a relatively low cost.

It is a further object of the present invention to provide a machine which will apply an adhesive coated tape over a bag mouth having a line of stitching therein in order to form a strong, air-tight and sift-proof closure.

It is a further object of the present invention to provide in a bag closing machine which includes a sewing head adapted to close the mouth of the bag by a line of stitching, a device for applying sealing tape to the closed mouth and devices for severing the line of stitching and the length of tape applied to the bag, a main control device which may be operated to stop all elements of the machine which may be operating at any given time.

It is a further object of the invention to provide, in a machine of the type described, devices for facilitating and rethreading of the tape applying portion of such machine.

It is a further object of the present invention to provide means for disposing an excess length of thread chain into a position wherein it will be concealed by a sealing tape.

Other and further objects of the present invention will appear more fully upon consideration of the following detailed description of a preferred, but not necessarily the only form of the invention, taken in connection with the drawings accompanying and forming a part of the present specification.

In the drawings:

Fig. 1 is an elevational view showing the general organization of the machine;

Fig. 2 is a horizontal section taken along the line 2—2 in Fig. 1 and showing details of the conveyor elevating mechanism;

Fig. 3 is an end elevation of the machine shown in Fig. 1;

Fig. 4 is a detailed front elevation of the bag closing stations in the machines shown in Fig. 1;

Fig. 5 is a vertical section taken along the line 5—5 of Fig. 4 and showing details of the driving mechanism;

Fig. 6 is a horizontal section taken along the line 6—6 of Fig. 4;

Fig. 7 is a vertical section taken along the line 7—7 of Fig. 4;

Fig. 8 is an irregular horizontal sectional view taken along the line 8—8 of Fig. 4 and showing details of the tape applying station of the machine;

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

Fig. 10 is a vertical section taken along the line 10—10 of Fig. 9 showing the tape guiding mechanism and thread guiding mechanism in elevation;

Fig. 11 is a vertical section taken along the lines 11—11 of Fig. 10;

Fig. 12 is a horizontal sectional view taken along the line 12—12 of Fig. 11;

Figs. 13 and 14 are detailed sectional views taken along the lines 13—13 and 14—14 respectively of Fig. 11 illustrating the operation of the mechanism shown in Figs. 8 to 12 inclusive;

Fig. 15 is a horizontal section taken along the line 15—15 of Fig. 4 illustrating the various bag actuated control devices for the machine;

Fig. 16 is a vertical section taken along the line 16—16 of Fig. 15;

Fig. 17 is a horizontal section taken along the line 17—17 of Fig. 16; and

Fig. 18 is a front elevation of a filled bag having a completed closure thereon formed in the machine constituting the present invention.

Similar characters of reference indicate similar parts throughout the several views. Each of the sections have been taken in the direction indicated by the arrows accompanying the section lines.

General Organization

Referring now to Fig. 1 wherein there is shown a machine embodying the present invention, a base plate 10, which may be mounted upon suitable casters 12, has rising thereform a pedestal 14 which serves as a main support for the bag closing mechanism. The base plate 10 has also rising therefrom a pair of cylindrical columns 16 upon each of which is mounted a sleeve 18 adapted for vertical sliding movement upon the column. Each of the sleeves 18 is provided with a suitable locking collar which may be clamped by a bolt 20 to secure the sleeve in vertical position relative to the column 16. The sleeves 18 serve as supports for a conveyor frame 22 and vertical adjustment of the sleeves 18 relative to

the columns 16 adapts the machine for operation upon filled bags of different heights.

The sleeves 18 are each provided with outward extension 24 which have suitable openings thereing for the reception of support rods 26 (see Fig. 3) which extend forwardly to support the conveyor frame 22. The outward extensions 24 are each provided with a vertical bore which may be threaded internally, or, as shown in Fig. 3, may have seated therein a nut 28 adapted to threadably engage a vertically extending threaded rod passing therethrough. In Fig. 1 the right hand threaded rod 30 extends upwardly and carries in a convenient position a hand wheel 32. The lower end of the threaded rod 30 may be mounted in a suitable thrust bearing 34 carried by the base plate 10. As shown in the detailed Fig. 2, the threaded rod 30 extends below the thrust bearing 34 and carries at its lower extremity a sprocket wheel 36 about which is conducted a sprocket chain 38 which meshes with a sprocket wheel 40 carried on the lower extremity of the left hand vertically extending threaded rod 42. The threaded rod 42 rests upon a suitable thrust bearing 44 carried by the base plate 10 and extends upwardly into threadable engagement with the extension 24 of the left hand sleeve 18.

The structure just described provides for convenient vertical adjustment of the conveyor frame 22 relative to the base plate 10. It will be understood that when it is desired to make a vertical adjustment of this frame, the lock bolts 20 on the sleeves 18 will be loosened and that the hand wheel 32 will be rotated in an appropriate direction to raise or lower the right hand sleeve 18. The sprocket and chain connections 36, 38 and 40 will cause the left hand threaded rod 42 to rotate with the rod 30 and, accordingly, both of the sleeves 18 may be vertically moved as desired. When proper adjusted position has been reached, the lock nuts 20 may be reset to avoid accidental displacement.

The conveyor frame 22 and the conveyor 46 thereon may be of any suitable type or design. The particular mechanism shown in the drawings will be described hereinafter. For the purposes of a general understanding of the machine, it may be here stated that the conveyor 46 should preferably be continuously driven toward the left as viewed in Fig. 1 whenever the machine is in actual operation. It is also preferred to provide means for stopping the conveyor simultaneously with the other element of the machine at any desired time. The mechanism for driving the conveyor and stopping the same when so desired will be explained in detail hereinafter.

In Fig. 1, a filled bag 48 is shown in position upon the conveyor 46. It will be understood that the conveyor frame 22 will have been adjusted to such a vertical position as to position the open mouth 50 of the bag 48 in proper alignment with the closure forming elements of the machine. In the operation of the machine the bag 48 is carried to the left as viewed in Fig. 1 and the open mouth thereof is conducted into a generally U-shaped guiding channel 52 which serves to guide the mouth 50 into proper alignment with a sewing head 54. As the bag is conducted to the sewing head, the leading edge of the bag mouth engages a control lever which is moved thereby to start the sewing head. As the bag moves through the sewing head 54, the mouth 50 is closed by a line of stitching. The stitching applied by the sewing head 54 may be of any type found suitable but it is preferred to apply a reinforcing cord and to form the stitches around the reinforcing cord and through the bag mouth as shown in United States Letters Patent No. 1,913,825 granted June 13, 1933. From the sewing head 54 the bag is conducted into a tape applying station indicated generally at 56 at which station a tape of crinkled kraft or other suitable paper or textile material is folded over and adhered to the sides of the bag mouth whereby to seal the open end of the bag and to seal the holes formed in the bag during the stitching operation. The bag mouth and the tape bent thereover are drawn through this station by suitable tape feeding rollers indicated generally at 58 which are so spaced from one another as to grip the combined thickness of a bag mouth and folded tape but to be incapable of gripping the tape alone. From the tape feeding rollers 58 the bag mouth is conducted through a series of squeezing rolls indicated generally at 60 which serve to apply sufficient pressure to the tape and bag mouth to permanently secure the tape in sealing position. When the trailing end of the bag mouth leaves the sewing head a control device is moved to stop the sewing head and to reset the starting control. A severing device, indicated generally at 62, is provided to clip the thread chain, comprising stitching and reinforcing cord, extending behind the bag mouth. The operation of this severing device may be initiated substantially simultaneous with stopping of the sewing head and to this end may be controlled by the control device provided for stopping of the sewing head. The bag then continues through the tape applying and squeezing stations as aforesaid and as the trailing end of the mouth 50 passes a suitably located control device an additional severing device, indicated generally at 64, is operated to clip the tape at a suitable distance from the trailing end of the bag mouth. After the bag passes completely through the squeeze rolls 60 the closure is complete and the bag may be removed from the conveyor.

Driving mechanism

The driving mechanism comprises a motor 68 suitably mounted upon brackets 70 rising from the base plate 10. The motor 68 is provided with a pulley 72 about which is conducted a V-belt 74 which serves to drive a pulley 76 freely rotatable upon a shaft 78 (see Fig. 5) which extends into a speed reducer 80 containing suitable gearing for driving a shaft 82 at a suitably reduced speed. The gearing within the speed reducer 80 has not been shown as it is obvious that any desired type of speed reducing mechanism may be used. The slow speed shaft 82 is utilized to drive, through mechanism to be later described, the conveyor 46, the tape feeding rollers 58, squeeze rolls 60 and the energy storing mechanisms for the severing devices.

A main clutch 84 is provided for optionally connecting the constantly rotating pulley 76 to the high speed shaft 78. The clutch 84 comprises a set of relatively movable driving rings 86 mounted for sliding movement parallel to the axis of shaft 78 upon a plurality of pins 88 secured to the driving pulley 76. The driving rings 86 are therefore mounted for rotation with the pulley 76 and constitute the driving side of the clutch. The driven side of the clutch comprises a plurality of relatively movable rings 90 in alternate relation with the driving rings 86 and mounted for sliding movement upon a plurality

of pins, not shown, secured to a flange 92 keyed to the shaft 78. A retaining ring 94 and a pulley 96 are keyed to the shaft 78. The pulley 96 and driven rings 90 are thus mounted for rotation with the shaft 78. A clutch collar 98 is mounted for axial sliding movement upon the shaft 78 and serves, when shifted to the left as viewed in Fig. 5, to frictionally interengage the driving and driven rings 86 and 90 respectively. Suitable springs, not shown, serve to normally maintain the clutch collar in its leftward position illustrated in Fig. 5. Suitable control mechanism is provided to shift the clutch collar 98 to the right as viewed in Fig. 5 to disengage the clutch. The structure thus described provides for optional driving connection between the motor driven pulley 76 and the gear box 80 and pulley 96. The pulley 96 serves through a V belt 100 to drive the sewing head 54.

In Fig. 3 there is shown the control mechanism for operation of the clutch 84. The clutch collar 98 is keyed against rotation upon a suitable non-rotatable collar surrounding the shaft 78, not shown, and is provided with radially extending pins 102 which are received in slots 104 formed in the ends of a yoke 106 pivoted at 108 to a suitable bracket on the main frame of the machine. A lever 110 is fixed to the yoke 106 and forms therewith a bell crank rotatable about the pivot 108. A link 112 is pivoted as at 114 to the end of lever 110 and extends downwardly through the base plate 10 where its lower end is pivoted at 116 to a rock arm 118 fixed for rotation with a rock shaft 120 extending transversely of the base plate 10. The rock shaft 120 has also fixed thereto for rotation therewith a pair of arms 122 which serve as supports for a foot treadle 66. Downward pressure upon the foot treadle 66 will rock the frame 122, 120, 118 to move the link 112 upwardly and thereby to rock the bell crank 110, 106 in a clockwise direction as viewed in Fig. 3. This will result in a movement of the clutch collar 98 to the left as viewed in said figure and will cause separation of the driving and driven clutch rings 86 and 90 respectively whereby to disengage the driving motor from the speed reducer 80 and sewing head pulley 96. When pressure is released from the foot treadle 66 the clutch is permitted to reengage whereupon the various elements of the machine are connected in driving relation with the motor 68.

The mechanism for driving the conveyor 46 comprises a gear 124 keyed, as shown in Fig. 5, to the low speed shaft 82 and meshing with a gear 126 mounted for rotation upon a suitable stub shaft 128 carried by a housing 130. The housing 130 is pivotally supported by the low speed shaft 82 and may extend upwardly and over the gear 124. Fixed for rotation with the gear 126 is a sprocket wheel 132 about which is conducted a sprocket chain 134. As shown in Figs. 1 and 3 the chain 134 extends within the housing 130 about a sprocket wheel 136 mounted for rotation upon a stub shaft 138 carried by the outer extremity of the housing 130. The stub shaft 138 extends forwardly from the housing 130 and pivotally supports a housing 140 within which is located a sprocket wheel 142 fixed upon the shaft 138. A sprocket chain 144 extends around the sprocket wheel 142 and within the housing 140 to a sprocket wheel 146 keyed to a drive shaft 148 extending through the conveyor frame 22. The drive shaft 148 has keyed thereon a pair of conveyor driving sprockets 150 which serve to drive the conveyor 46. At its opposite end the conveyor 46 may be conducted around suitable sprockets carried by an idler shaft 152 mounted in adjustable bearing blocks 154 horizontally slidable within slots 156 in the conveyor frame 22. Suitable mechanism indicated at 158 may be provided for securing the adjustable idler shaft 152 in proper adjusted position.

The mechanism just described provides for a constant driving relationship between the low speed shaft 82 and the conveyor 46 irrespective of the vertical position of the conveyor upon the frame of the machine. It will be seen that vertical movement of the conveyor frame 22 will result in rocking of the housings 130 and 140 together with the sprocket and chain devices therein about the shafts 82, 138 and 148 and that no disturbance of the driving relationship will occur.

Referring again to Fig. 5, it will be seen that the low speed shaft is also availed of to drive the tape feeding and squeezing stations of the machine. To this end the shaft 82 has fixed thereto a sprocket 160 which drives, through a sprocket chain 162 and sprocket wheel 164, a shaft 166 to which the sprocket wheel 164 is keyed. The shaft 166 carries at its opposite end a bevelled gear 168 which meshes with a similar bevelled gear 170 keyed to a vertically extending shaft 172. At its upper end the shaft 172 carries a sprocket wheel 174 which drives a sprocket chain 176. The chain 176 passes around a sprocket 178 shown in Figs. 5 and 4 and around an additional sprocket wheel 180 shown in Fig. 4. The chain 176 describes a generally triangular path around the three sprocket wheels with which it meshes and suitable chain tightener mechanism may be provided if so desired. The sprocket 178 is fixed upon the upper end of a vertically extending shaft 182 mounted for rotation within suitable bearings formed in a bracket 183. At its lower end the shaft 182 carries one of the rear squeeze rolls 184 (see Fig. 5). The sprocket 180 is similarly fixed upon the upper end of a shaft 186 (see Fig. 6) which carries at its lower end another rear squeeze roll 188. The driving mechanism just described provides for the transmission of rotation from the low speed shaft 82 to the rear squeeze rolls 184 and 188.

The shaft 186 is extended upwardly beyond the sprocket 180 and carries a sprocket 190 about which is conducted a sprocket chain 192 which serves to drive a sprocket 194 mounted upon the upper end of a vertically extending shaft 196 (see Fig. 7) at whose lower end is mounted the rear tape feeding roller 198. The ratio between the diameters of the squeeze rolls and tape feeding rollers is taken in consideration in the design of the sprockets 190 and 194 in order that the peripheral speed of the rolls 184, 188 and 198 may be equal.

Each of the rear squeeze rolls 184 and 188 has resiliently pressed thereagainst a front squeeze roll. As shown in Fig. 6 a front squeeze roll 200 is mounted on the lower end of a vertically extending shaft 202 mounted for rotation within a bracket 204 pivoted at 206 to the bracket 183. The bracket 204 is provided with a perforated ear 208 in which is loosely received a bolt 210 extending through the bracket 183. An expansive spring 212 is confined between the ear 208 and a suitable nut 214 threadably received on the outer end of the bolt 210. The nut 214 may be adjusted to cause the spring 212 to exert a desired amount of resilient pressure upon the ear 208

and thus to press the squeeze roll 200 against the rear squeeze roll 184.

A front squeeze roll 216 is mounted upon a vertical drive shaft 217 and a spring pressed bracket 218 similar to the bracket 204. A spring 220 mounted in the same manner as the spring 212 serves to press the front squeeze roll 216 resiliently against the rear squeeze roll 186.

The drive shafts 202 and 217 are driven by gears 222 mounted upon the drive shafts 182 and 186 of the rear squeeze rolls. To this end, the shafts 202 and 217 are provided respectively with gears 226 and 228 (see Fig. 4) which mesh with the gears 222. The teeth of these intermeshing gears are made sufficiently deep to maintain driving relationship during normal operation of the squeeze rolls. The resilient mounting of the front squeeze rolls above described is provided to permit the rolls to exert pressure upon the completed bag closure and it is apparent that as the bag mouths are conducted between the rolls they will be separated against the force of the springs 212, 220. As above described, the gears maintain driving relationship during such operation.

As shown in Fig. 7 a front tape feeding roller 230 is provided. The front roller is mounted upon a movable frame which will be hereinafter described. The roller 230 is mounted upon a vertical drive shaft 232 which carries at its upper end a gear 234 adapted to mesh with a gear 236 upon the vertical drive shaft 196 for the rear tape feeding roller 198. At the lower end of each of the shafts 196 and 232 there is mounted respectively a sprocket wheel 238 and 240. As shown in Figs. 11 and 12 these sprockets serve to drive a series of bag feeding rollers which operate to feed the bags through the tape forming station. These rollers will be described in detail hereinafter.

Bag guiding and feeding mechanism

Referring now to Fig. 4 there is shown an angle 242 mounted upon the upper end of the pedestal 14. The angle 242 serves as the main support or table upon which most of the mechanism heretofore described is supported. The intake bag guide 52 is mounted upon the angle 242 and comprises a generally vertical rear wall 244 against which the bag mouth may be manually pressed. Adjacent the sewing head 54 the guide 52 has formed thereon a forwardly projecting down-turned lip 246 which forms, with the rear wall 244, a U-shaped channel through which the bag mouth may be conducted and accurately guided into proper position relative to the sewing head. It will be understood that the conveyor 46 will be adjusted to proper vertical position with respect to the particular size of the bag wherein the top of the bag mouth 50 will be lightly pressed upwardly into contact with the inner surface of the channel thus formed. The horizontal level of the bag mouth 50 is thus established by the intake guide and the closure forming devices of the machine are positioned to form a proper closure upon a bag mouth maintained at the level thus established.

The conveyor 46 progresses the bag to the left as viewed in Fig. 4, through the intake guide 52 and through the sewing head 54. The sewing head 54 may be of any suitable type. The particular head chosen for illustration is shown in full detail in Patent No. 2,043,149 granted June 2, 1936, and the particular design thereof forms no part of the present invention. The stitch-forming mechanism is indicated at 55 in Fig. 4 and it will be understood that the mechanism 55 is operative to form suitable threads 57 (Fig. 1) into a chain of stitching. As the leading edge of the bag mouth 50 leaves the sewing head it enters an intermediate guide 248 which serves to maintain the bag in proper horizontal and vertical alignment for its travel through the tape applying station 56. The intermediate guide 248 is preferably formed as an inverted U-shaped channel and may be flared outwardly at the intake end as indicated at 250. The position of the guide 248 is shown in Fig. 4 and enlarged detail views are shown in Figs. 9 and 10. In Fig. 10 the intermediate guide 248 is shown in elevation from its intake end. As shown in Figs. 9 and 10 a suitable bracket 252 rising upwardly from the angle 242 serves to support the guide 248. Preferably the bracket 252 is curved as shown at 253 and is provided with a guide flange 255 outwardly flared to generally conform to the rounded shoulder of a filled bag.

As the leading end of the bag mouth 50 leaves the intermediate guide 248 it is conducted to a series of rear feeding rollers 256 and front feeding rollers 254 (see Figs. 9 to 14 inclusive). The rear feeding rollers 256 are mounted upon stub shafts rotatably carried by a plate 258 which is supported by a bracket 260 fixed to the angle 242. Each of the rear rollers 256 is provided with a driving sprocket 262 of smaller diameter than that of the roller and a sprocket chain 264 extends in driving relation around all of such sprockets and into engagement with the sprocket 238 upon the lower end of the rear tape feeding roller 198.

The front bag feeding rollers 254 are each provided with driving sprockets 266 similar to the sprockets 262 and a sprocket chain 268 extends in driving relationship with said sprockets and with the sprocket 240 on the front tape feed roll shaft 232. The rollers 254 are mounted on vertical stub shafts rotatably carried by a plate 270 (see Fig. 14) carried by a pair of spring plungers 272 received within suitable sockets 274 formed in a bracket 276. The plungers 272 are formed with reduced portions 278 terminating in a threaded portion projecting beyond the bracket 276. Expansive springs 280 are confined within the sockets 274 and serve to urge the front feed rollers 254 rearwardly of the machine and into yieldable contact with the rear feeding rollers 256. Suitable lock nuts 282 may be threaded upon the extension 278 to retain the springs 280 in position upon the bracket 266.

The operation of the feeding rollers 254 and 256 upon the mouth of the bag is illustrated in Fig. 14. As shown in said figure the feeding rollers are pressed into engagement with the bag mouth 50 at a level considerably below the upper edge of the bag mouth. The actual distance from the upper edge of the bag mouth to the level of the feeding rollers is at least sufficient to permit the closure to be completely formed above the feeding rollers. The feeding rollers are preferably knurled on their engaging surfaces in order to increase their effectiveness. As shown in Figs. 9 and 11 the tape feeding rollers 198 and 230 are provided with knurled roller portions which engage the lower portion of the bag mouth and serve as initial feeding rollers whose operation precedes that of the rollers 254 and 256. In Fig. 9 the knurled portion 284 upon the rear tape feeding roll 198 is shown while in Fig. 11 the knurled portion 286 formed upon the front

tape feeding roll 230 is shown. The cooperation of the knurled portions 284 and 286 with the bag mouth 50 is illustrated in Fig. 13.

Thread severing device, tape severing device, and control mechanism therefor

The thread severing device 62 and the tape severing device 64 as well as the control mechanism therefor have been fully described in my application S. N. 294,650 of which the present application is a division and in my application S. N. 414,077 filed October 8, 1941, which is also a division of said application S. N. 294,650. For the purposes of the present disclosure, reference is made to Fig. 15 in which there is shown control levers 384 and 492 which are engaged by the bag mouth for the purpose of starting the sewing head, stopping the sewing head, and operating the thread severing device 62. There is also shown in this figure a control lever 656 which is engaged by the bag mouth for the purpose of controlling the operation of the tape severing device 64.

The operation of the thread severing device 62 is so controlled as to clip the thread chain at a predetermined distance behind the trailing end of the bag mouth. The tape severing device 64 is also controlled to clip the tape a predetermined distance behind the trailing end of the bag mouth. After a bag has passed through the sewing head and tape applying mechanism and the respective severing devices 62 and 64 have been operated, they are reset for operation upon a succeeding bag in a manner fully disclosed in said above identified applications.

Thread chain intucking device

It is obvious that a length of thread chain will extend from the thread chain severing device 62 back to the stitch forming mechanism of the sewing head 54 and that the length of this thread chain will be dependent upon the lateral spacing between the chain severing device and the stitch forming mechanism. From a practical standpoint it has been found that the severing device cannot be conveniently located close enough to the sewing head as to limit the length of this thread chain to a length consistent with good appearance of the bag. From the standpoint of appearance, it is desirable that the length of the thread chain and closure tape extending from the leading and trailing ends of the bag mouth should be substantially equal and not more than 1½ to 2 inches in length. It has been found impractical to locate the shearing mechanism sufficiently close to the stitching mechanism as to leave such a short chain for attachment to the leading edge of a succeeding bag. Accordingly, the present invention includes a device for tucking the necessarily overlong thread chain on the leading edge of each bag backwardly into a substantial parallelism with the line of stitching of the bag mouth and substantially coinciding with said line of stitching whereby the thread chain will be entirely concealed by the sealing tape later applied.

Referring now to Figs. 11, 12, and 14, there is illustrated a form of guiding device for tucking the forwardly extending thread chain into the position above described. In each of Figs. 11 and 12 the bag progresses from left to right while in Fig. 14 the bag is progressing rearwardly of the plane of said figure. In Fig. 11 the bag mouth 50 is illustrated in a position wherein the leading end thereof has just entered the intermediate guide 248. A line of stitching 516 is shown in the bag mouth while a chain of stitching and reinforcing cord 518 is shown protruding from the leading end of the bag mouth. For the purposes of illustration the reinforcing cord 520 is illustrated as positioned upon the front face of the bag although it will be understood that such cord may be applied to the rear face or may be applied to both faces, if so desired. It will also be understood that the reinforcing cord may be omitted entirely. The words "thread chain" as used hereinafter are therefore intended to include a chain of stitching thread alone or a chain of stitching thread associated with one or more reinforcing cords.

The thread chain may protrude forwardly or rearwardly of the plane of the bag mouth and may extend upwardly or downwardly from the level of the line of stitches formed in the bag mouth. Accordingly, means are provided to engage the thread chain and turn it rearwardly irrespective of the particular position it may have assumed. As shown in Fig. 11, an inclined guide shoe 522 is supported upon the forward bag feeding roller frame and the inclined face 524 thereof is positioned for engagement with a thread chain 518 which protrudes forwardly of the bag mouth and which extends either upwardly or downwardly of the line of stitching 516. As the bag progresses through the machine the thread chain may engage some portion of the edge 524 or an upper horizontal portion 526 formed upon the guide shoe 522. As shown in Fig. 12 the guide shoe is flared, as at 528, inwardly toward the path of the bag mouth. Below the plane of the portion 526 there is provided a shelf 530 which extends inwardly toward the bag mouth as closely as practicable. As the bag progresses into the vicinity of the flare 528 frictional drag between the thread chain and the portion of the guide shoe with which it engages will bend the thread chain backwardly from the leading end of the bag mouth, and upon further progress of the bag the thread chain will rest upon the shelf 530 in the reversed position illustrated in Fig. 12. A channel 532 having a lower, inwardly extending flange 534 is secured to the guide shoe 522 in such position that the lower flange 534 forms a substantial continuation of the shelf 530. An upper inwardly extending flange 536 of the channel forms a substantial continuation of the upper surface 526 of the guide shoe. Preferably the upper flange inclines downwardly toward the lower flange 534 as illustrated in Fig. 11 in order to urge the thread chain downwardly into alignment with the line of stitching 516 formed in the bag mouth. It will be understood that the shelf 530 and lower flange 534 will be preferably arranged in a position lying just beneath the line of stitching 516. The channel 532 extends in the direction of travel of the bag mouth for a distance sufficient to insure the maintenance of the thread chain in its reversely bent position until such time as the sealing tape will be formed into substantial contact with the bag mouth. The sealing tape will thereafter serve to maintain the thread chain in the position thus assumed.

In Fig. 14 the thread chain 518 is shown in its position within the channel 532. An inspection of this figure will disclose that the tape forming mechanism has started its operation of folding the tape downwardly for contact over

the line of stitching and the thread chain **518**. In Fig. 13 the bag has progressed to a position wherein the thread chain has passed beyond the channel **534** and wherein the sealing tape has been folded down into a position in which it will serve to maintain the thread chain in its rearwardly tucked position.

In Figs. 9 and 12 there is illustrated an additional channel **538** located on the rearward side of the bag mouth. This channel is provided to control a thread chain which may protrude rearwardly of the bag mouth and is substantially identical in design and support to the channel **532**. The supporting structure **252** for the intermediate guide **248** is provided with an inclined edge **540** similar to the edge **524** of the forward guide shoe **522** (see Fig. 11) to turn a rearwardly protruding thread chain backwardly upon the rear face of the bag mouth **50**. It will be understood that when a reinforcing cord **520** is placed on the forward face of the bag mouth, this cord will be bent around the leading end of the bag mouth and will extend backwardly in close proximity with the line of stitching **516**.

In Figs. 15 and 19 the front channel **532** and the rear channel **538** are shown in relationship to the other parts of the machine. The operation of the rearward channel **538** has not been shown in the drawings since it will be clearly understood from the above description. While in the above description it has been stated that the thread chain **518** might extend upwardly from the level of the line of stitching **516** it will be appreciated that such extension will be quite unlikely to occur. The thread chain with or without a reinforcing cord will be more or less flexible and under ordinary circumstances will tend to extend downwardly as shown in Fig. 11. If the thread chain should extend downwardly and should protrude directly forward of the bag mouth the shelf **530** will engage and turn the thread chain backwardly. If the thread chain should extend upwardly it will be engaged by the leading edge of the upper channel flange of either the front or rear channel. If by chance the thread chain should protrude in such manner as to engage none of the edges the downward inclination of the upper flanges of the channels **532** and **538** will produce sufficient friction upon the chain to turn it backwardly after it has entered one or the other of said channels.

From the above description it will be seen that there is provided a plurality of stationary elements against one or more of which the thread chain will necessarily be engaged. It is only necessary that the chain engage any one of these elements in order that it may be turned backwardly and guided by the channels into the desired position.

Tape applying mechanism

Referring back to Fig. 1 there is shown a tape supply spool **542** which is mounted for rotation upon a suitable bracket **544** supported on the frame of the machine. The tape **546** is of sufficient width to be creased longitudinally of its center line and to extend downwardly on either side of the bag mouth for a distance sufficient to completely cover the line of stitching and to provide sufficient area for secure adhesion to the walls of the bag mouth. A brief reference to Fig. 18 will disclose the tape **546** in its final position upon a completed bag closure. Referring now to Fig. 4 the tape **546** is conducted through a suitable adhesive applying device **548** which may comprise an adhesive supply well **550** in which a suitable quantity of adhesive may be maintained. A dip roller **552** is arranged to dip into the adhesive within the well **550** while a cooperating spring mounted pressure roller **554** is adapted to press the tape **546** into contact with the upper surface of the dip roller **552**. Adhesive is transferred from the well to one face of the tape **546** by the cooperating rollers **552** and **554** in an old and well known manner. From the adhesive applying rollers the tape is guided over a suitable guide roller **556** rotatably mounted upon the adhesive well body **550**. The tape **546** is then conducted through a guide tube **558** of suitable rectangular cross section supported upon a bracket **560** rotatably carried by a fixed bracket **562** mounted upon the machine frame. Rotation of the bracket **560** relative to the frame is provided for the purposes of adjustment of the guide tube **558** into proper alignment with the tape. From the tube **558** the tape **546** is conducted around a freely rotatable guide roller **564** mounted upon brackets **565** to be hereinafter described, and is turned by this roller into a generally horizontal position overlying the path of the bag mouths with the adhesive carrying side facing downwardly.

Referring to Figs. 9 to 14 the tape former will now be described. The tape former comprises an inverted generally U-shaped channel whose walls progressively converge upon one another from a substantially flat condition at the introductory end shown in Fig. 10 to the closely converged condition at the trailing end illustrated in Fig. 13. The main body of the tape former is indicated by the reference numeral **566** and the outer edges thereof are preferably turned inwardly upon themselves to form guide flanges **568** within which the edges of the tape are supported and guided. As shown in Fig. 9, the tape **546** is conducted from the guide roller **564** into the leading end of the tape former **566** and at this point is substantially transversely flat. Reference to Fig. 10 will disclose that the leading end of the tape former **566** is provided with an upwardly flared lip **570** to facilitate passage of the tape into the former. The former **566** is supported by mechanism to be hereinafter described in a downwardly inclined position in which the trailing end is yieldably urged into contact with the top of the bag mouth **50** whereby as the tape is progressively bent along its longitudinal center line it is also progressively projected downwardly into contact with the top of the bag mouth. Thus, in Fig. 14 the tape **546** is illustrated as partially bent along its longitudinal center and has partially moved downwardly toward the bag mouth while in Fig. 13 the tape has been sharply creased along its longitudinal center and has been projected downwardly into contact with the upper edge of the bag mouth.

The tape feeding rollers **198** and **230** are supported upon their vertical drive shafts **196** and **232** respectively at a fixed horizontal spacing such that the thickness of the tape alone will be insufficient to fill the gap between the feeding rollers and consequently the constant rotation of said rollers will be ineffective to produce movement of the tape alone. However, when a bag mouth is progressed through the tape forming station and into the tape feeding rollers the combined thickness of the bag mouth and the doubled tape will be sufficient to fill the gap between the rollers **198** and **230** whereupon said rollers will be effective to grip and feed the bag mouth

and tape positioned thereon. Preferably, the rollers 198 and 230 are annularly grooved as indicated at 572 in a vertical position coinciding with the vertical position of the line of stitching applied to the bag mouth. These annular grooves are provided to relieve the pressure along the line of stitching and to permit the rollers 198 and 230 to grip and apply pressure to the portions of the bag mouth and sealing tape lying above and below such line of stitching.

The mechanism thus described provides for automatic application of tape to a bag mouth as the same progresses through the tape applying station and provides for feeding of the taped bag mouth while avoiding the feeding of tape alone.

Tape former support

The tape former is supported by mechanism which is designed to facilitate removal of the tape former for cleaning and for threading tape therethrough when it is necessary to start a new supply roller 542 of tape into the machine. To this end, as shown particularly in Figs. 8 and 9, the leading end of the tape former 566 is pivotally supported upon a shaft 574 passing through a boss 576 formed upon a casting 578, to which the tape former 566 may be secured as by screws 580, and into a boss 582 formed upon the bracket 260. A locking pin 584 extends through the boss 582 and into the opening therein which receives the shaft 574. The shaft 574 is formed with an annularly reduced portion 586 and an axially extending slot 588 extending from the reduced portion 586 to the rear end of the shaft 574. The forward end of the shaft 574 is provided with a handle 590. The shaft 574 is adapted to be inserted through the boss 576 and, with the slot 588 aligned with the pin 584, the shaft may be projected through the boss 582. If the shaft 574 be turned to move the slot 588 out of alignment with the pin 584 the shaft 574 is thereupon locked in position to pivotally support the tape former.

The casting 578 extends along the upper surface of the former 566 and terminates at its trailing end in a forked extension 592 having an open ended slot therein of a width substantially conforming to the diameter of a plunger 594 having an enlarged head 596 adapted to be positioned beneath the forked extension 592 to serve as a support for the trailing end of the tape former 566. The plunger 594 has an enlarged collar 598 thereon which is secured to the lower end of a leg 600 of a U-shaped handle 602. The leg 600 and collar 598 extend through a boss 604 formed upon the bracket 260. The inner surface of the boss 604 is threaded to receive an externally threaded sleeve 606 whose inner bore is of a diameter to permit the leg 600 to freely slide therethrough. An expansive spring 608 is confined between the lower end of the sleeve 606 and the upper surface of the collar 598 and this spring serves to resiliently urge the tape former 566 downwardly toward the bag mouth. The bag feed roller support plate 258 is chamfered as shown at 610 in Fig. 9 and this chamfered portion serves as a limiting stop in the absence of a bag. The spring 608 is relatively light and is adapted to yield upwardly when a mouth 50 of a bag is progressed through the tape forming station. Thus, the tape is resiliently urged downwardly into contact with the upper edge of the bag mouth. The brackets 565 may conveniently be formed as a part of the casting 578 in order that the tape former 566 and guide roller 564 may be removed from the machine as a unit.

Since, as pointed out above, it is desirable to remove the tape former 566 on relatively frequent occasions, specific provisions have been made for locking the spring 608 and elevating the trailing end of the tape former to a position in which it may be withdrawn to the right as viewed in Fig. 9 upon removal of the pivot shaft 574. From an inspection of Figs. 9 and 10 it will be seen that under the influence of spring 608 the trailing end of the tape former is pressed downwardly into such position as to prevent horizontal withdrawal, and it is obvious that it would be difficult to align the forked extension 592 with the plunger 594 if it were attempted to insert the tape former into the machine. Accordingly, the handle 602 has threaded on the lower end of the leg 612 thereof a sleeve 614 which may be locked in adjusted position upon the threaded end of the leg 612 by a suitable lock nut 616. A shelf 618 is formed upon the bracket 260 and the upper surface of this shelf is substantially above the upper surface of the portion 620 upon which the boss 604 is formed. Thus, while the handle 602 is in the position illustrated in Fig. 9 the spring 608 is free to press the tape former downwardly for the purpose described, the lower end of the sleeve 614 being adjusted to permit ample downward movement for this purpose. The handle 602 may be grasped and pulled upwardly against the spring 608 to bring the lower end of the sleeve 614 to the level of the shelf 618. The handle may then be rotated into the dotted line position illustrated in Fig. 8 to rest the lower end of the sleeve 614 upon the shelf 618. This upward movement and the resting of the sleeve 614 upon the shelf 618 to lock the handle 602 in its upward position will result in lifting of the trailing end of the tape former to a substantially horizontal position. If the shaft 574 be now removed the tape former may be drawn to the right and thus removed from the machine while the plunger 594 remains stationary and free from influence of the spring 608. The tape former may be replaced by moving the same in a horizontal plane to the left as viewed in Fig. 9 and aligning the forked extension 592 in proper relationship with the plunger 594 and head 596 thereof. The shaft 574 may now be replaced and the handle 602 may be rotated to remove the sleeve 614 from the shelf 618 and thus free the spring 608 to urge the tape former downwardly into its operative position.

Tape feeding roller support

The tape feeding rollers 198, 230 engage and grip the tape 546 in its sealing position upon the bag mouth. Since the tape has had adhesive applied to one side thereof by the means above described the rollers 198 and 230 are very likely to become fouled with adhesive. Occasional breakage of the tape and occasional formation of defective closures make it desirable that the feeding rollers may be separated for rearrangement of the tape or for cleaning the rollers. It may also be desirable to separate the rollers when a new tape is being threaded into the machine. Accordingly, the present invention includes a supporting means for the front tape feeding roller 230 which is pivoted in such manner as to permit separation of the roller 230 from the roller 198. Supporting means according to the present invention is disclosed in Fig. 8.

As shown in Fig. 8, the front tape feeding roller shaft 232 is rotatably supported in suitable bearings in a pivoted frame work comprising an up-

per arm 622 and a lower arm 624 (see Fig. 4) formed upon a tubular bearing member 626 within which the shaft 232 is freely rotatable. The arms 622 and 624 are pivoted upon a vertical stub shaft 628 carried in a suitable bearing upon the bracket 260. The axis of the pivot 628 is preferably located in substantial vertical alignment with the axis of the front bag feeding roll 254 which is nearest to the tape feeding roller 230. The upper arm 622 is formed with an extension 630 beyond the pivot 628 and the extension 630 is formed with a depression 632 adapted to receive the rounded nose 634 of a spring pressed plunger 636. The plunger 636 is slidably mounted within a barrel 638 pivoted upon a stud 640 passing through an ear 642 formed upon the barrel. An expansive spring 644 is confined within the barrel 638 between the plunger 636 and an adjustable set screw 646 threadably received in one end of the barrel. A suitable lock nut 648 may be provided to secure the screw 646 in adjusted position. The plunger 636 has formed adjacent its rounded end 634 a groove 650 which is adapted to receive the end of a pin 652 extending through the barrel. The groove 650 is of limited length whereby the pin 652 may serve to retain the plunger within the barrel against the force of the spring 644. A handle 654 is formed upon the barrel 638 and extends forwardly of the machine into a position for convenient access.

As shown in full lines in Fig. 8, the front tape feeding roller shaft 232 is adapted to be urged toward the rear tape feeding roller shaft 196 by the action of the spring 644 working through the plunger 636 when the same is seated within the depression 632 in the arm extension 630. When it is desired to separate the front tape feeding roller from the rear tape feeding roller the handle 654 may be grasped and the barrel 638 pivoted above the stud 640 into the dotted line position illustrated in Fig. 8. In this latter position the spring pressed plunger 636 is removed from the arm extension 630 and the entire front tape feeding roller frame may be freely rocked about the shaft 628 into the dotted line position illustrated in Fig. 8. Since, as above described, the axis of the shaft 628 is in substantial vertical alignment with the front bag feeding roller 254 nearest to the tape feeding roller, it will be understood that the sprocket chain 264 may follow the shaft 232 and the sprocket wheel 240 thereon in the course of the movement above described.

As above described, the tape feeding rollers 198 and 230 are not spring pressed into engagement with one another but are maintained at a fixed minimum spacing. As shown in the present disclosure, this minimum spacing may be established by the size of the intermeshing gears 236 and 234. As shown in Figs. 8 and 7, when the front tape feeding roller 230 is urged toward the tape feeding roller 198 by the spring 644 the teeth of gears 234 and 236 meet and intermesh to the limit established by the length of the teeth. The gears 234 and 236 may be so selected that the spacing between the rollers 198 and 230 illustrated in Fig. 7 will be of the desired extent.

Tape squeezing rollers

The tape squeezing rollers 60 and the means for driving the same and for resiliently urging the respective pairs 184, 200 and 188, 216 of such rollers into squeezing relationship have been described above. These rollers are located as shown in Figs. 1 and 4 in a position along the bag path immediately following the tape severing device 64 and as the leading end of a bag mouth proceeds from the tape feeding rollers 198 and 230 through the tape severing device 64 it will enter the bite of the tape squeezing rollers and will be thereafter progressed out of the machine.

Each of the tape squeezing rollers 184, 188, 200 and 216 is provided with an annular groove 800 which serves to accommodate the extra thickness of the bag closure along the line of stitching whereby the peripheral surfaces of the squeezing rollers may exert pressure upon those portions of the tape lying above and below said line of stitching.

Operation

The operation of the several elements of the machine herein disclosed has been described in connection with the detailed description thereof. The operation of the machine as a whole will therefore be but briefly reviewed.

The sewing head is threaded with suitable sewing thread and reinforcing cord if the latter be resired and a roll of tape 546 is positioned in the machine. The tape is threaded through the adhesive applier and is threaded into the tape former 566 which may be removed from the machine as above described for this purpose. The threaded tape former may be replaced in the machine. The driving motor is now started and the machine is ready for operation.

A filled bag 48 whose open mouth has been collapsed to bring the front and rear walls of the mouth together and in which the gussets, if the gussetted type of bag is used, have been tucked inwardly and the mouth has been collapsed upon such gussets, is placed upon the conveyor 46. The operator of the machine guides the bag mouth 50 into the guide 52 and preferably manually assists the bag mouth in its progress through the guide 52. The conveyor 46 progresses the bag through the guide 52 and the leading end of the bag mouth is brought into contact with the control lever 384 which is moved to the dotted line position of Fig. 15 to start the sewing head. The leading end of the bag mouth then is engaged by the stitching mechanism 55 of the sewing head and a line of stitching is progressively applied through said bag mouth as it moves through the sewing head. In normal operation a thread chain 518 will have been previously formed by said sewing head and will be of a length equal to the distance between the stitching mechanism 55 and the thread chain severing device 62. This thread chain 518 will become attached to the leading end of the bag mouth and will proceed therewith through the machine. The leading end of the bag mouth enters the intermediate guide 248 and is guided thereby into proper alignment with the tape applying station. As the bag mouth enters the tape applying station the thread chain 518 will be engaged by one or more of the thread chain intucking devices described above and will be turned backwardly into a position generally parallel with and closely coinciding with the line of stitching 516. The leading end of the bag mouth then progresses through the tape former 566 and into the fixed spacing between the tape feeding rollers 198 and 230. The combined thickness of the bag mouth 50 and the folded tape 546 will fill the space between the tape feeding rollers and the rotation thereof will serve to progress the taped bag mouth through the cocked tape severing device 64 and into the bite of the tape squeezing rollers 188 and 216.

From a consideration of Fig. 4 it will be apparent that the point of severance of the tape by the severing device 64 is somewhat in advance of the tape feeding rollers 198, 230. The length of the tape extending from the active portions of the tape feeding rollers to the point of severance will extend forwardly of the leading end of the bag mouth since the gripping and feeding operation of the rollers 198 and 230 occurs along a line substantially coinciding with a line extending horizontally through the axes of the tape feeding rollers. The leading end of the bag mouth with the tape projecting forwardly therefrom will thus enter the tape squeezing rollers as above described.

As the trailing end of the bag mouth passes the control lever 492, the lever 492 will be moved forwardly as viewed in Fig. 15 to cause operation of the thread chain severing device and to cause stopping of the sewing head. As the trailing end of the bag mouth passes beyond the control lever 656 the lever will move forwardly as viewed in Fig. 15 to cause operation of the tape severing device. The tape severing device control lever is preferably so positioned as to sever the tape at a distance behind the bag mouth substantially equal to the length of tape extending forwardly of the leading end of the bag mouth in order that the tape will be symmetrically positioned over the closure.

In Fig. 18 a completed bag closure is illustrated. The line of stitching 516 is shown and the thread chain 518 is shown in its backwardly tucked position. A forwardly extending portion of sealing tape is identified at 802 and a rearwardly extending portion of tape substantially equal in length to the portion 802 is identified at 804. It is preferred to sever the thread chain 516 at a distance behind the bag mouth substantially equal to the length of the tape extensions 802 and 804 in order that the line of stitching will be completely concealed by the tape. The lengths of the tape extensions 802 and 804 and the rearwardly extending thread chain may be determined by proper positioning of the severing devices and their control levers.

From the above detailed description it will be apparent that the machine herein disclosed accomplishes the objects of the invention.

It will be obvious to those skilled in the art that numerous changes and variations in the specific details of the invention may be made without departing from the essential teaching thereof. The invention is not therefore limited to the details of the illustrative example given hereinabove but may variously be embodied within the scope of the claims hereinafter made.

I claim:

1. A device for sealing a bag mouth which has been closed by a line of stitching and having a thread chain forming an extension of said line of stitching protruding from an end of said mouth, comprising means for folding a tape over said bag mouth and securing said tape over the line of stitching on both sides of said bag mouth; and means for guiding said bag mouth into said tape folding means, said guiding means including means for guiding said thread chain into a plane parallel to and adjacent said line of stitching on one side of said bag mouth prior to the application of said tape over said thread chain.

2. A device for sealing a bag mouth which has been closed by a line of stitching and having a thread chain forming an extension of said line of stitching protruding from an end of said bag mouth, comprising means for folding a tape over said bag mouth and securing said tape over the line of stitching on both sides of said bag mouth; means for guiding said bag mouth into said tape folding means, said guiding means including means for guiding said thread chain into a plane parallel to and adjacent said line of stitching on one side of said bag mouth, and means for maintaining said thread chain in said plane until said tape is applied thereover.

3. A device for sealing a bag mouth which has been closed by a line of stitching and having a thread chain forming an extension of said line of stitching protruding from an end of said mouth, comprising means for folding a tape over said bag mouth and securing said tape over the line of stitching on both sides of said bag mouth; and means for guiding said bag mouth into said tape folding means, said guiding means including a plurality of elements with one or more of which said thread chain may engage for guiding said thread chain into a plane parallel to and adjacent said line of stitching on one side of said bag mouth prior to the application of said tape over said thread chain.

4. A device for sealing a bag mouth which has been closed by a line of stitching and having a thread chain forming an extension of said line of stitching protruding from an end of said mouth, comprising means for folding a tape over said bag mouth and securing said tape over the line of stitching on both sides of said bag mouth; means for guiding said bag mouth into said tape folding means, said guiding means including a plurality of elements with one or more of which said thread chain may engage to guide said thread chain into a plane parallel to and adjacent said line of stitching on one side of said bag mouth; and means to maintain said thread chain in said plane until said tape is applied thereover.

HOWARD G. ALLEN.

CERTIFICATE OF CORRECTION.

Patent No. 2,293,687. August 18, 1942.

HOWARD G. ALLEN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, first column, line 31, after the word "facilitating" insert --cleaning--; page 2, first column, line 4, for "extension" read --extensions--; line 4-5, for "thereing" read --therein--; page 6, first column, line 25, for "Figs. 15 and 19" read --Figs. 10 and 14--; page 8, second column, line 23, for "resired" read --desired--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 29th day of September, A. D. 1942.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.