Jan. 6, 1970 H. PESCH ET AL 3,488,243

TAPE APPLYING APPARATUS

Filed June 1, 1966 3 Sheets-Sheet 1

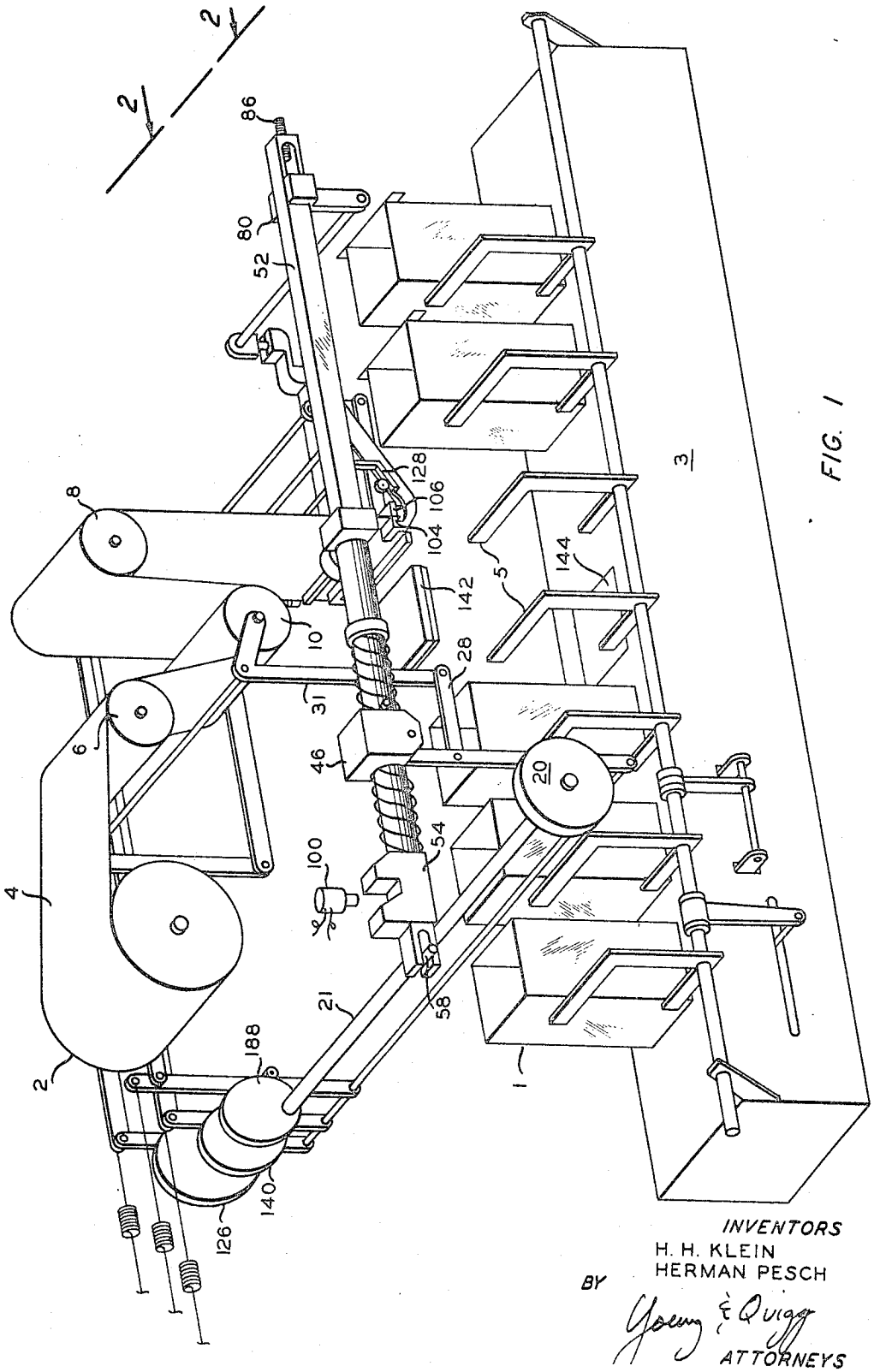



FIG. 1

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TAPE APPLYING APPARATUS

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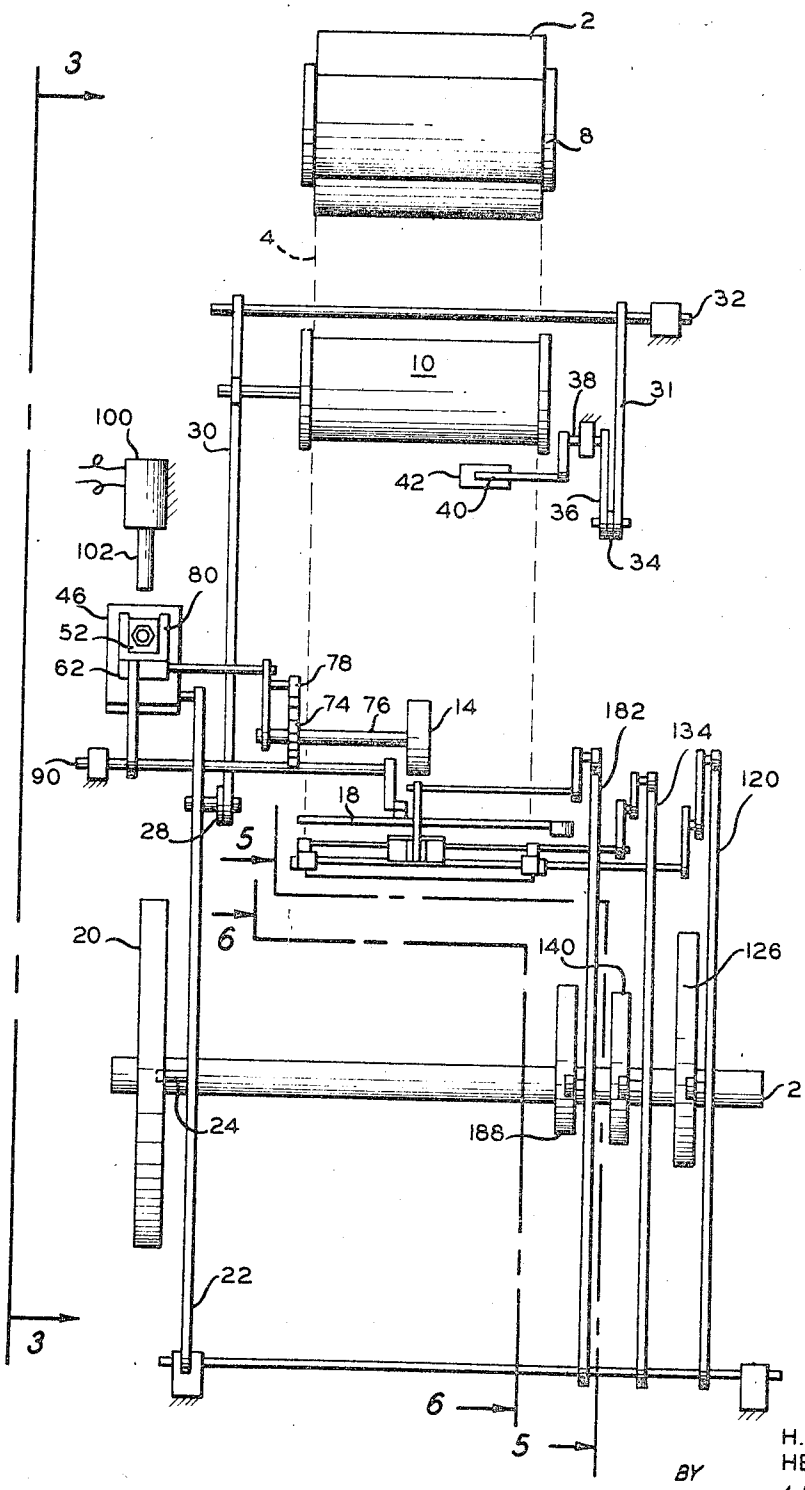



FIG. 2

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TAPE APPLYING APPARATUS

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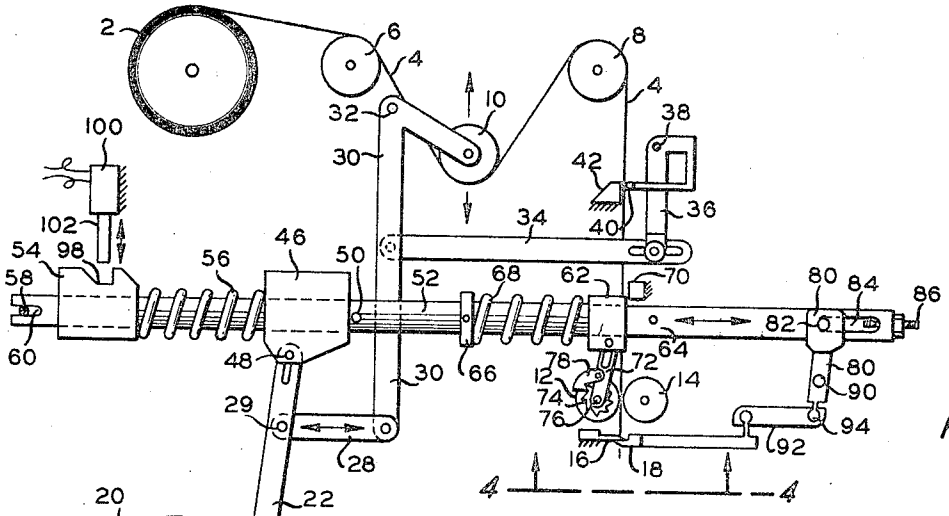
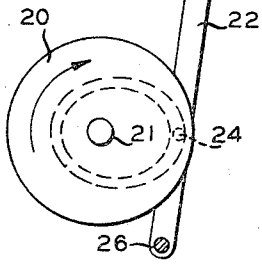



FIG. 3



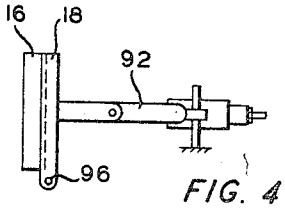




FIG. 4

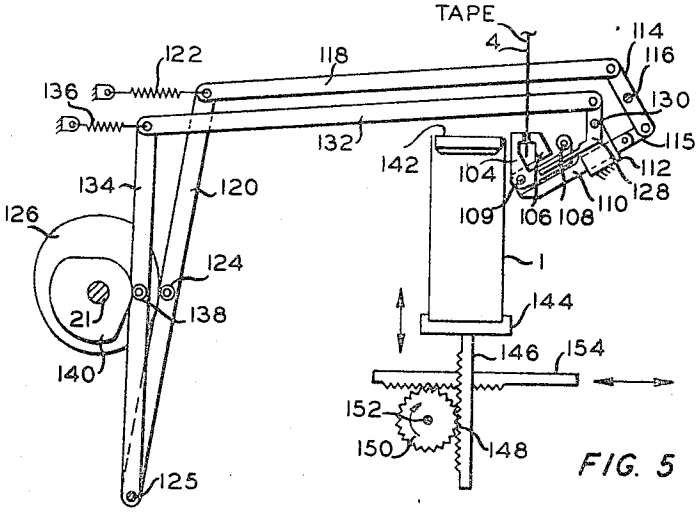



FIG. 5

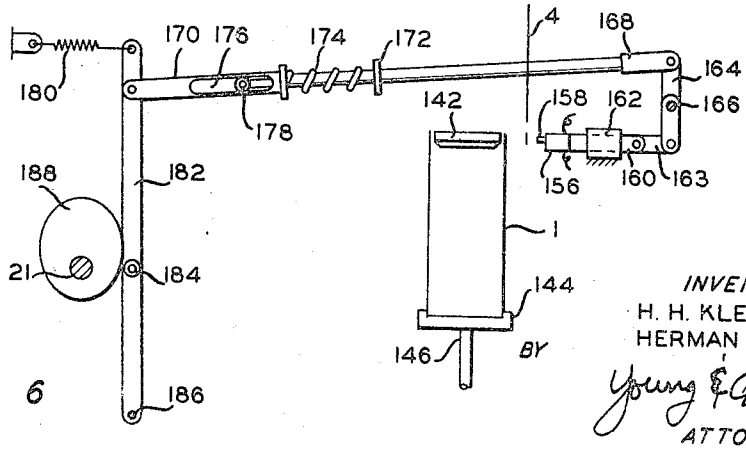



FIG. 6

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United States Patent Office 3,488,243
Patented Jan. 6, 1970



3,488,243

# TAPE APPLYING APPARATUS

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Filed June 1, 1966, Ser. No. 554,583
Int. Cl. B26d 5/00; B65h 25/00
U.S. Cl. 156—354 10 Claims

## ABSTRACT OF THE DISCLOSURE

A tape applying apparatus for a container in which there is provided a means to advance the tape from a supply roll at preselected times to produce a slack between the supply roll and the work area, and a means to advance only the slack tape to the work area at times different from those in which slack is created.

Many machines have been devised for applying tape to articles and packages. The machine requires that there be a means for advancing the tape into the work area, and a means for cutting off tape, from a roll of tape, for example. When the tape to be applied is taken from a large roll, there is a problem in advancing the tape accurately since the tape advancing means must overcome the inertia of the roll. When small segments of tape are to be cut from a large roll, this problem becomes more severe since a small slippage due to tape roll inertia could create a large error in the tape to be applied.

We have now discovered that this problem of tape slippage due to the inertia of the tape roll while feeding the tape can be overcome by creating a tape slack between the feed roll and the work area and advancing the tape by taking up only the slack which has been created.

In a mechanized operation in which a plurality of containers are fed to a tape applying apparatus, occasionally due to a mechanical problem there will be no container to have tape sealed thereon. When no container is present, and the machine operates to cut a piece of tape and place the same on the container, it is possible for some of the tape slivers or the tape itself to fall into other containers. We have discovered this problem can be eliminated by providing a means for sensing the absence of a container and responsive to the sensing of the absence of a container to prevent feeding of tape to the work area and also prevent actuation of the cutting means for the tape.

Accordingly, it is an object of this invention to provide a tape applying apparatus in which the means to advance the tape to the work area need not overcome the inertia of the feed roll.

It is a further object of this invention to provide a tape applying apparatus in which tape is fed to a feed area and cut from a strip of tape wherein there is provided a means to sense the absence of a container and responsive thereto the feeding of the tape and cutting of the tape is prevented.

Other aspects, objects, and the several advantages of this invention are apparent to one skilled in the art from a study of this disclosure, the drawings, and the appended claims.



According to the invention, there is provided an apparatus for feeding a roll of tape to a cutting area in which the tape is cut into a plurality of smaller pieces. The tape is advanced by first creating slack between the feed roll and the work area and then advancing the tape by taking up the slack area. When fed into the cutting area, the tape is gripped on either side, severed, and transported to a heat sealing area in which a heat sealer seals the tape onto a container.

In one embodiment, a sensing means detects the absence of a container to be sealed and accordingly stops the tape feeding and cutting operation responsive thereto.

The invention will now be described with reference to the accompanying drawings in which FIGURE 1 is an axonometric view of a tape applying apparatus according to the invention; FIGURE 2 is an end view of the apparatus shown in FIGURE 1 taken along lines 2—2 of FIGURE 1; FIGURE 3 is a partial sectional view looking along lines 3—3 of FIGURE 2 showing the tape feeding, cutting, and safety cut-off means; FIGURE 4 is a view along lines 4—4 of FIGURE 3; FIGURE 5 is a partial section along lines 5—5 of FIGURE 2 showing the gripping end tape transportation means; and FIGURE 6 is a partial section along lines 6—6 of FIGURE 2 showing the heat sealing means and container elevation means.

Referring now to the drawings, especially FIGURES 1–4, a plurality of containers 1 are fed intermittently along a conveyor platform 3 and one by one raised into sealing position on a mandrel wherein a piece of tape is heat sealed thereon. Each container is lowered after heat sealing and passed down the conveyor to a further operation. The conveyor comprises a plurality of fingers 5 which slide all containers intermittently along a platform. After a one space movement, the fingers are retracted, shifted backward one space and then swing into position to move all containers again.

Tape 4 on roll 2 is passed over idle rollers 6, 8 and 10, through advancing rollers 12 and 14 and is cut with cutter blades 16 and 18. A power shaft 21 has attached thereto cam 20. Cam 20 actuates rod 22 through follower 24. Rod 22 is pivoted about point 26. Near its other end, rod 22 has pivotably attached thereto member 28 at pin 29. Rod 28 is also pivotably attached to rod 30 which is pivotably secured to fixed shaft 32. As rod 22 reciprocates back and forth about point 26, member 30 will reciprocally rotate about shaft 32, thereby causing idler roller 10 to reciprocate generally in a vertical plane. Shaft 32 extending back across roller 10 has linkage 31 attached thereto and directly behind member 30. Linkage 31 moves in unison with member 30. Linkage 31 has attached to it rod 34 which is frictionally attached by a slot to member 36 which is fixed at point 38. Member 36 can rotate about point 38 then has attached to the end of it a clamping means 40. Clamping means 40 cooperates with anvil 42 to clamp the tape 4 during a portion of that period of time in which rod 22 is moving toward shaft 21 and at which time roller 10 moves downwardly. A spring loaded tension adjustment can be provided on clamping means 40 to adjust the clamping tension.

At the upper portion of rod 22 a collar 46 is attached at 48. Collar 46 is slidably attached to rod 52. Rod 22 can be slotted at 48 and/or collar 46 can be loosely attached to rod 52 to allow for rotation of rod 22. Under normal

operation, as rod **22** reciprocates, collar **46** will cause rod **52** to reciprocate in a horizontal direction as shown by the arrow in FIGURE 3. Pin **50** and spring **56** which is attached to fixed collar **54**, prevent collar **46** from sliding relative to rod **52**. Fixed pin **58** in slot **60** of rod **52** supports rod **52** in its reciprocating motion. Rod **52** also has attached thereto collar **62** which is slidably attached to rod **52** restrained thereon at one side by pin **64** and at the other side thereof by spring **68** and attached collar **66**. The forward motion of collar **62** is limited by stop member **70** which is fixedly attached to the machine. Collar **62** has attached thereto rod **72** which is rotatably attached to a shaft **76** which supports and is fixed to ratchet wheel **74**, and drive roll **12**. Pawl member **78** is also attached to rod **72**. As rod **52** moves in the direction to the right shown on FIGURE 3, collar **62** is carried to point **70**. The movement of collar **62** rotates shaft **76** through pawl **78** thereby rotating drive roll **12**. A slot in member **72** and/or in collar **62** can be provided to compensate for rotation of member **72**. As the rod **52** moves further to the right, spring **68** will be compressed and collar **62** will remain stationary, thus preventing further movement of feed roll **12**. During the return stroke, rod **52** will carry collar **62** back to the left thereby rotating member **72** about shaft **76** and rotating pawl **78** to a new tooth on ratchet wheel **74**. Thus, by the ratchet arrangement of rod **72** and pawl **78** on shaft **76** and ratchet wheel **74**, drive roll **12** turns only in the clockwise direction shown in FIGURE 3.

Slidably attached in the end of shaft **52** is yoke **80**. Pin **82** attached to yoke **80** slides in slot **84** of shaft **52**. During the first portion of the stroke of shaft **52**, yoke **80** will remain stationary. A screw and bolt arrangement **86** at the end of slide **84** adjusts the degree to which yoke **80** is moved to the left on the return stroke of shaft **52**. Yoke **80** is rotatably fixed at pin **90** and has attached to it at **94** a ball joint connecting member **92** having attached thereto cutter blade **18**. As can be seen in FIGURE 4, cutter blade **18** rotates about point **96** responsive to the reciprocation of member **92**. Thus, blade **18** in combination with blade **16** causes a scissor-type effect for cutting the tape. During the last part of the movement of shaft **52** to the right, pin **82** catches in the end of slide **84** closest to tape **4**. This causes a clockwise rotation of yoke **80** thereby actuating blade **18** to close and cut tape **4**.

The sequence of operation for the apparatus parts shown in FIGURE 3 is as follows beginning at that period of time when the shaft **52** is farthest to the left in FIGURE 3. As the rod **22** begins to move to the right, this causes at the same time shaft **52** to move to the right, thereby causing rotation of feed rolls **12** and **14** to feed tape down through blades **16** and **18**, the latter of which is in retracted position at this time. After a portion of the travel of shaft **52**, collar **62** is stopped by member **70** and rollers **12** and **14** stop. Simultaneously with the rotation of the feed rolls **12** and **14**, rotation of member **30** about shaft **32** in a counter clockwise direction causes idler roller **10** to move upwardly, thus releasing slack material which is pulled by rollers **12** and **14**. As can be seen from the drawings, roller **12** only pulls that amount of slack material which is left by the upward movement of idler roller **10**, and thus does not have to overcome any inertia due to supply roll **2**. With the tape now in position, further travel to the right of rod **52** actuates cutter element **18** to cut off a strip of tape **4**. It is also noted that during this movement of rod **52** to the right, clamping means **40** and **42** will be open. During the return of rod **52** to the left, the rotation clockwise of linkage **31** causes clamping means **40** and **42** to hold film **4** in place. Further movement of member **30** in a clockwise position pulls idler roller **10** down and creates slack in tape **4** by unrolling more tape from feed roller **2**.

It is obvious that the amount of tape fed can be adjusted by adjusting collar **66**, collar **62** and pin **64** on rod **52**. Or adjustment of more or less tape could be made by moving stop member **70**.



In the above description of the operation of feed rollers **12** and **14** in connection with the operation of idler **10**, it is obvious that idler roller **10** will continue to move up after feed rollers **12** and **14** discontinue their feeding operation. Thus, as rod **52** returns to the left, roller **10** will move downwardly a short distance before creating more slack in tape **4**. This short distance of travel allows gripping means **40** and **42** to set in position so that idler roller **10** will not pull tape **4** back through feed rollers **12** and **14**. It is within the scope of the invention to make clamping means **40** and **42** spring loaded in position. Alternately, there can be provided a frictional link between member **30** and jaw **40** so that after a short initial movement on the unclamping or clamping portion of the stroke the clamps are actuated. During the remainder of the stroke, the motion is simply lost in a friction linkage as illustrated in FIGURE 3.

The safety cut-off means which is schematically shown in FIGURE 3 operates as follows. A micro switch (not shown) senses the absence of a container on the conveyor in the position for sealing. The absence of a container will trip the micro switch which actuates solenoid **100** to push pin **102** into slot **98** of collar **54**. This movement of pin **102** into slot **98** will restrict relative movement of rod **52**. As can be seen from the drawing, rod **22** will continue to reciprocate but will cause collar **46** to reciprocate to some extent back and forth on rod **52**. The restricted movement of rod **52** will maintain the tape in its position due to the fact that the return stroke of rod **52** will bring pawl **78** back an insufficient distance to engage another tooth in ratchet wheel **74**, and will prevent cutting means **16** and **18** from being actuated. The restricted return motion of rod **52** will be insufficient to open cutters **16** and **18**. Pin **82** will merely reciprocate in slot **84**. The prevention of cutters **16** and **18** from being actuated is significant since it prevents any small slivers from being cut off the tape **4** in the event that a portion of the tape extends down into the cutting area. The prevention of slivers from being cut off will make sure that no slivers get into the bottom of the container thus contaminating the contents thereof.

Referring now to FIGURE 5, gripping jaws **104** and **106** secure tape **4** in the cutting area. There are two pairs of grippers **104** and **106**, only one pair being shown in FIGURE 5. The grippers grip the tape on each side. Gripper **106** is fixed on member **110** whereas gripper **104** is pivotable about pin **109** on member **110** and is spring biased in the closed position. That is, jaw member **104** is spring biased against jaw member **106**. Member **110** is slidably held in collar **112** which is fixed to a stationary support. Member **110** is connected to linkage **115** and **115** is connected to linkage **114** which is pivotable about fixed pin **116**. Linkage **114** is connected to linkage **118** which is in turn connected to linkage **120**. A cam **126** actuates movement of linkage **120** through cam follower **124** attached to linkage **120**, which movement through linkage **118**, **114**, and **115** and **110** actuates movement of jaw members **104** and **106** to carry the tape from the cutting area to the heat sealing area adjacent mandrel **142**. Linkage **120** is pivotable about point **125**. The opening and closing of the jaw members is actuated by the movement of member **128** which exerts upward pressure on follower **108** which is connected to the other end of jaw member **104**. The upward pressure on follower **108** opens jaw member **104**, rotating the member **104** about point **109** in the counter clockwise direction. Member **128** is pivotable about point **130** which is fixedly attached to collar **112**. Member **128** is actuated by cam **140** through cam follower **138**, linkage **134** and linkage **132**. A spring **136** biases cam follower **138** against cam **140** as does spring **122** bias cam follower **124** against cam **126**. Linkage **134** is pivotable about fixed point **125**. Both cams **140** and **126** are rotated by shaft **21** which also rotates cam **20**. It is within the scope of the invention to provide separate shafts to rotate one or more of cams **20**, **140** and **126**. The container to which the tape is ap-

plied is lifted up to mandrel **142** from the conveyor by an elevator having a platform **144** and shaft **146** which has at the lower end thereof a rack portion **148** which engages a pinion **150** which is rotated about shaft **152** by another rack **154**. Rack **154** is actuated by a separate means such as a pneumatic cylinder which causes reciprocation of rack **154** at predetermined times.

Referring now to FIGURE 6 in which the heat sealing device is shown, a heating means **156** having heat sealing head **158** is attached to shaft **160** which is slidably held by collar **162**. Collar **162** is fixedly attached to a portion of the machine. Shaft **160** is attached to linkage **163**. Linkage **163** is attached to linkage **164**, which is pivotable about fixed pin **166** and is attached to linkage **168** which is slidably attached to receiving collar **170** having slide **176** for guiding pin **178** on the end of linkage **168**. Receiving collar **170** and linkage **168** are spring biased in the extended position, i.e. with pin **178** in the righthand end of slot **176** as seen in FIGURE 6, the spring biasing being accomplished by spring **174** which acts against the end of receiving collar **170** and disc **172** which is fixed to linkage **168**. The heat sealing means is actuated to slide in collar **162** by cam **188**, which is rotated by shaft **21**, the cam **188** acting against cam follower **184** attached to linkage **182** which is in turn attached to the end of receiving collar **170**. Linkage **182** is spring biased against cam **188** by means of spring **180** and is pivotable about fixed point **186**. As is understood by one skilled in the art, cam **188** could be rotated by a different shaft other than shaft **21**.

In operation, a plurality of containers **1** move down a conveyor platform **3** as shown in FIGURE 1. As each container comes under mandrel **142**, it is lifted onto the mandrel by elevator platform **144**. Shaft **52** moving to the right as shown in FIGURE 4 releases tape clamping jaws **40** and **42** and actuates roller **12** to move a segment of tape, left slack by upward movement of roll **10**, into the cutting area. As rod **52** continues to move to the right, and collar **62** contacts stop means **70**, the tape ceases to be fed into the work area. The tape is gripped by grippers **104** and **106** which are in the position shown in FIGURE 5. Cutting means **18** is actuated to cut off a portion of the tape. When the tape is severed, cutting means **18** begins to retract. At this time, grippers **104** and **106** on the tape transport means **110** move to the left as shown in FIGURE 5 to place the tape in position over container blank on mandrel **142**. During this time, member **22** rotating counter clockwise causes the tape clamping jaws **40** and **42** to grip the tape and causes downward movement of roll **10** thus pulling more tape from the supply roll **2**. At this same time, heat sealing means **156** is actuated to move to the left thus causing heating head **158** to come in contact with the cut film strip which is held in place adjacent the container, which is backed by mandrel **142**, by grippers **104** and **106**, thereby sealing the tape member to the container **1**. The heat sealing head is maintained firmly in place by the action of cam **188** pushing to the right receiving collar **170** which exerts continual pressure through spring **174** against linkage **168** and through member **164** and member **163** to member **160**. During the heat sealing operation, cam **140** actuates member **128** to lift follower **108** thereby opening jaw **104**. The jaw means is then free to move back into the position shown in FIGURE 5. Heat sealing head **156** then moves back to the position shown in FIGURE 6. The elevator platform **144** retracts downwardly and the container moves on to a filling operation. Another container moves onto platform **144** which is raised into position on mandrel **142** as a new cycle begins.

It is to be understood that the above description is schematic, bolts and other details within the skill of the art being eliminated. It is within the scope of the invention to rearrange the above described machine such as transposing the position of the cams and sealing area with respect to the tape cutting area without changing the functioning of the machine.

We claim:

**1.** An apparatus for applying a tape to a container comprising

(a) a tape advancing means for advancing tape from a supply roll during a first interval of time, and a means for feeding the thus advanced tape to a work area during a second, subsequent interval of time so that said means for feeding does not rotate the supply roll when feeding.

(b) a cutting means for severing tape in said work area,

(c) a tape gripping and transporting means for transporting the tape from said work area to a sealing area,

(d) a mandrel positioned in said sealing area and over which a container fits in sealing position,

(e) a sealing means to contact tape in said sealing area to seal the thus contacted tape to a container fitted in sealing position over said mandrel.

(f) a conveyor means to intermittently move one-by-one a plurality of open end containers to said sealing area, and

(g) means to move containers one-by-one from said conveyor means onto said mandrel in sealing position.

**2.** An apparatus according to claim **1** wherein said tape advancing means comprises a means for fixedly holding tape in said work area during said first interval of time, and means to create slack in said tape between said tape holding means and said supply roll during said first interval of time; and wherein said means for feeding comprises means for intermittently feeding the thus advanced tape to said work area during said second interval of time.

**3.** An apparatus according to claim **2** wherein said means for intermittently feeding comprises a ratchet-driven roll, said ratchet-driven roll being rotated by a rod actuated by a first cam means.

**4.** An apparatus according to claim **3** wherein said ratchet-driven roll is connected to said rod by a linking means for which is slidably spring loaded on said rod, said first cam means being operable to move said ratchet-driven roll during said second time interval.

**5.** An apparatus according to claim **4** further comprising means responsive to the movement of said rod to actuate said tape cutting means during a third time interval, said rod, said tape holding means, and said slack creating means all being actuated by said first cam means.

**6.** An apparatus according to claim **1** wherein said cutting means is scissor-shaped.

**7.** An apparatus according to claim **1** wherein said tape gripping and transporting means comprises two pairs of jaws, with one jaw of each pair being movable, each said movable jaw being actuated by a cam means, said movable jaws being actuated to clamp said tape before cutting and to release said tape after sealing.

**8.** An apparatus according to claim **1** wherein there is further provided a means for preventing tape feeding and cutting in the event that no container is present to have tape applied thereto.

**9.** An apparatus according to claim **3** further comprising a means for preventing tape feeding and cutting in the event that no container is present to have tape applied thereto, said means for preventing tape feeding and cutting comprising a micro switch which actuates a first pin into a slot in said rod, said first cam means which actuates said rod being attached to said rod by a collar means retained on said rod and spring biased against a second pin on said rod so that when said first pin moves into said slot in said rod the reciprocating motion of said rod will be so restricted as to prevent actuation of said tape feeding means and of said cutting means.

**10.** An apparatus according to claim **2** wherein a first cam actuates said tape feeding means, said tape holding

means, said means to create slack in said tape, and said tape cutting means; a second cam actuates the opening and closing of said tape gripping and transporting means to grip said tape in said work area; a third cam actuates the movement of said tape gripping and transporting means to move the cut tape from said work area to said sealing area; and a fourth cam actuates the movement of said sealing means; said first, second, third and fourth cams all being on the same shaft.

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U.S. Cl. X.R.

93—1; 156—355, 361, 521, 556