July 15, 1969 W. LE ROY BUSLER 3,455,010

BAG CLIP APPLICATOR

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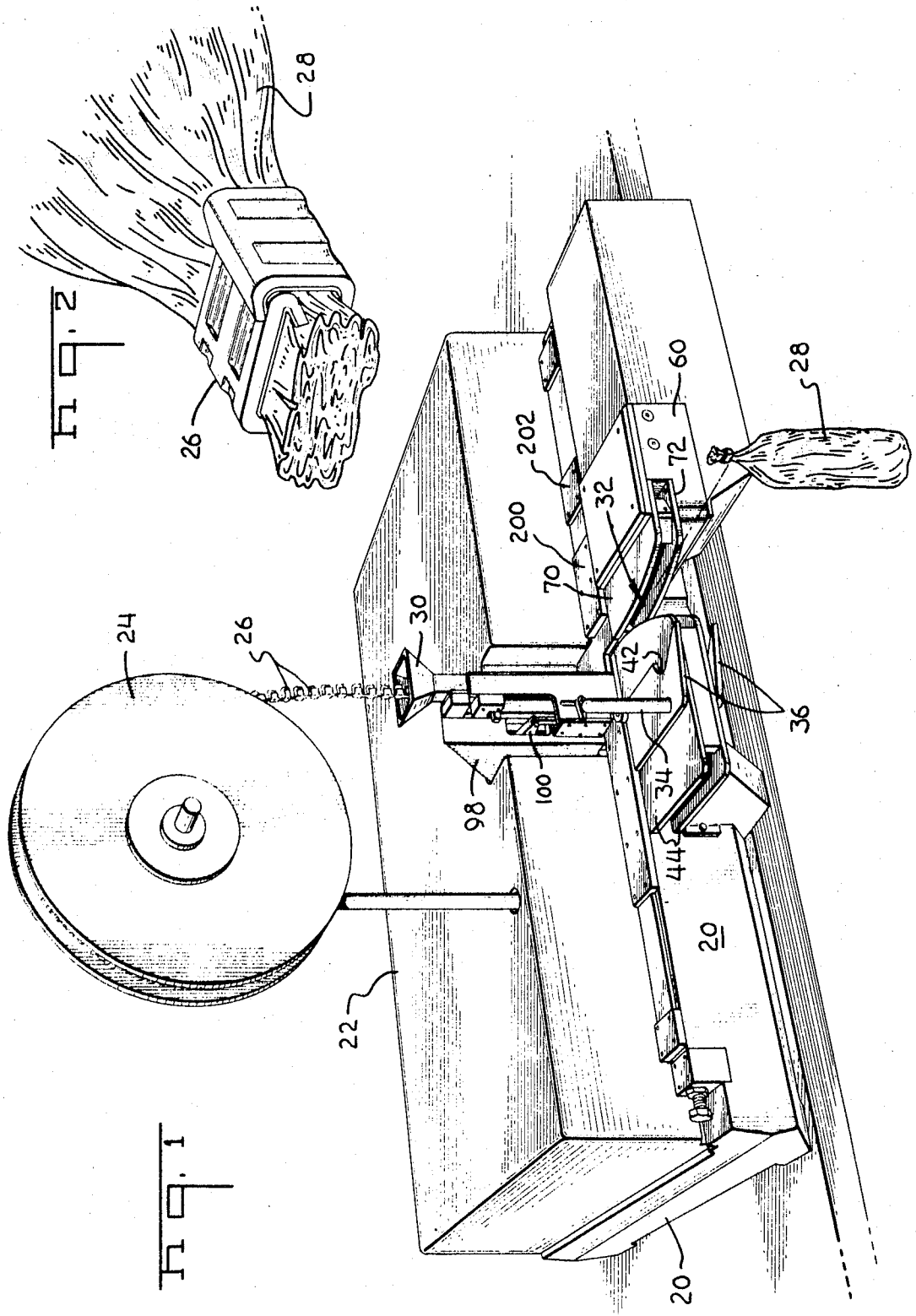


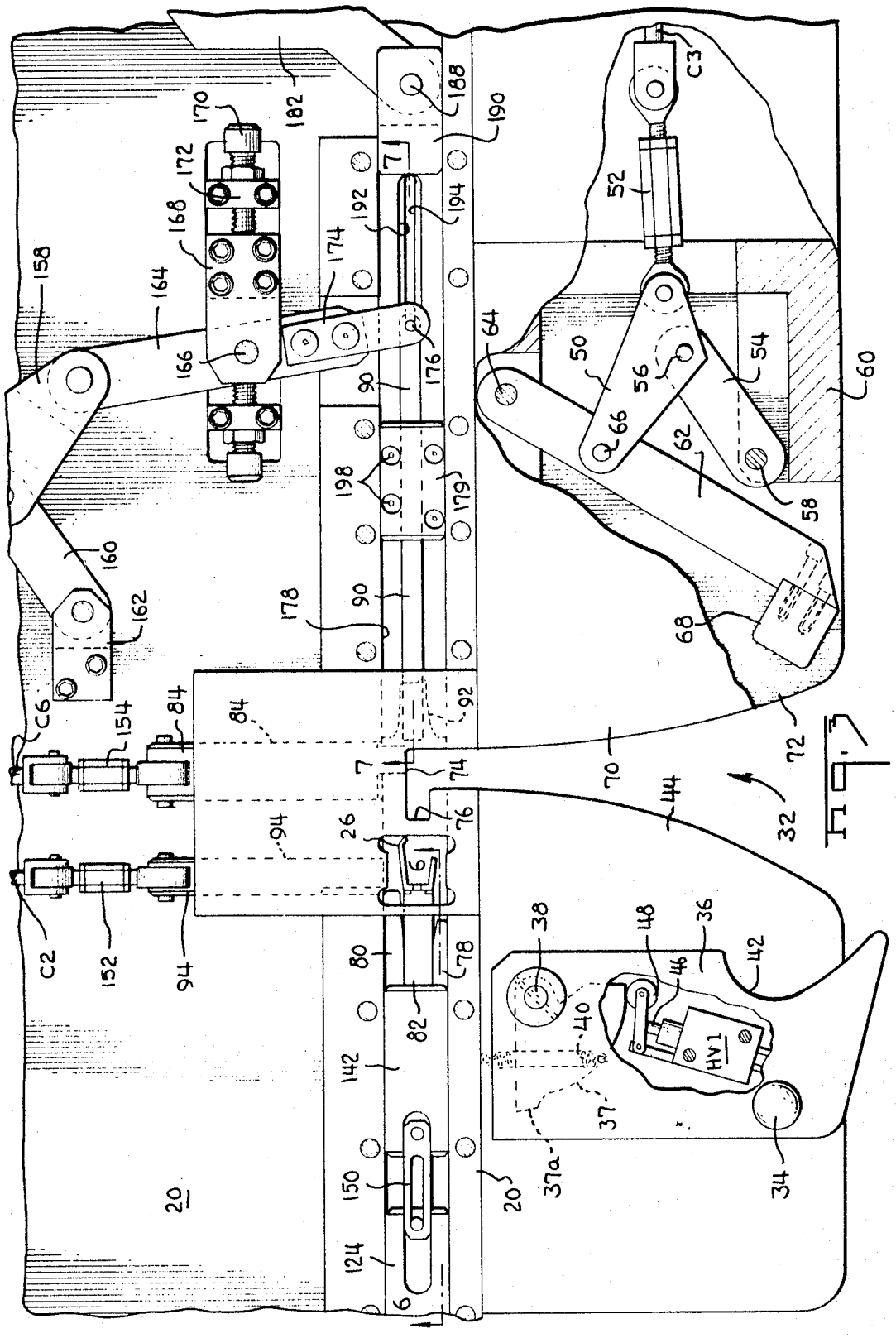
Fig. 2

Fig. 1

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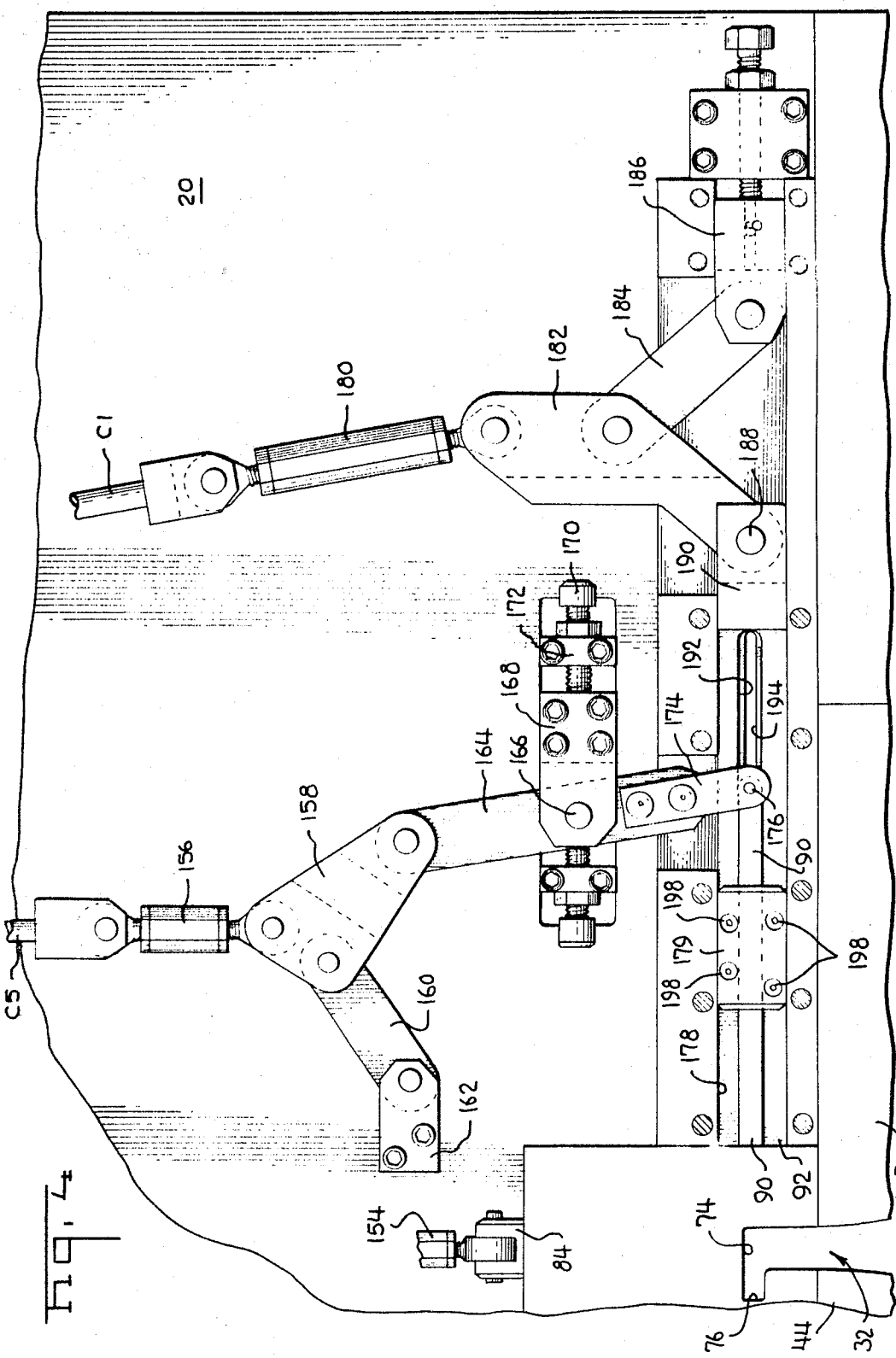


Fig. 4

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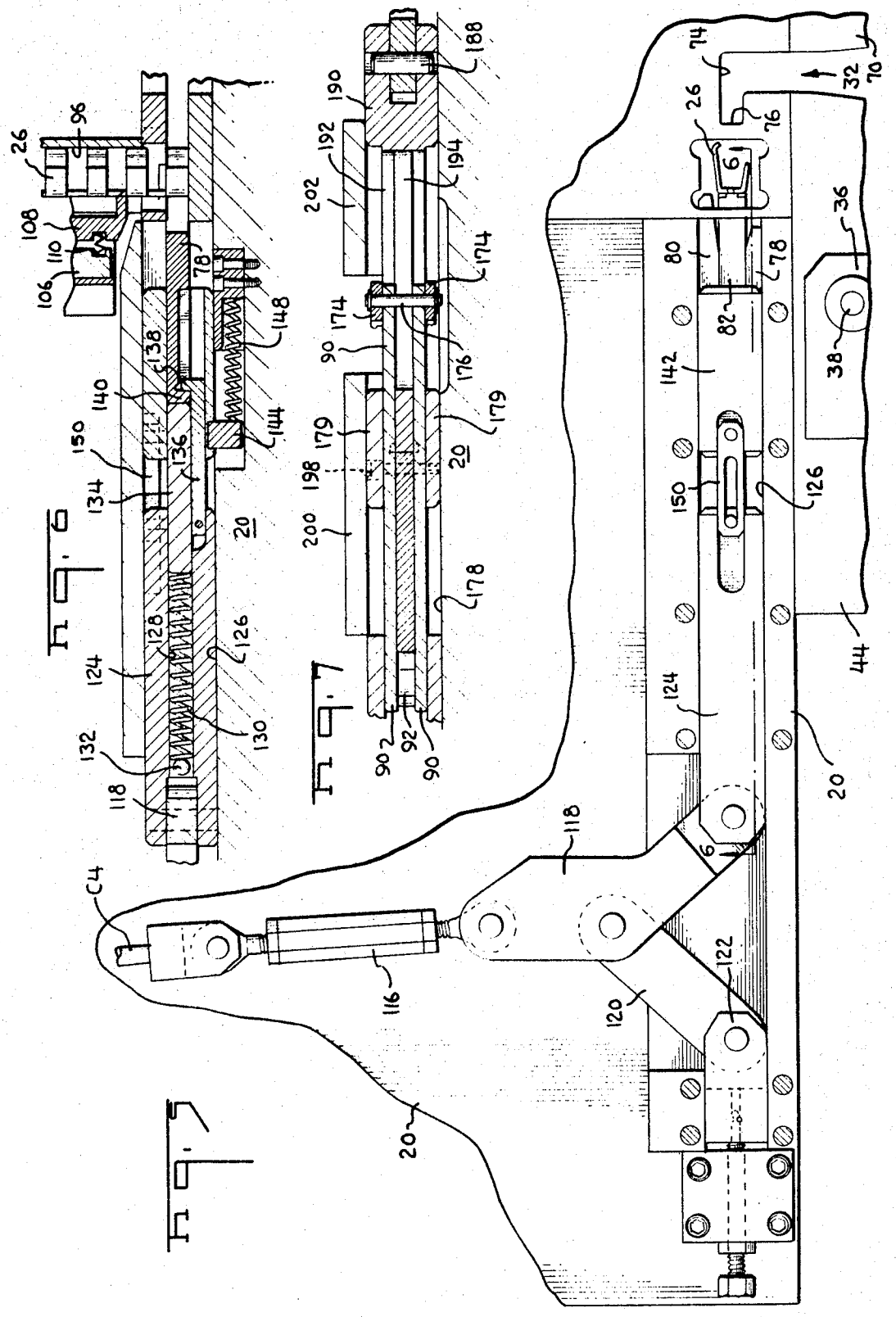


Fig. 6

Fig. 7

Fig. 5

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BAG CLIP APPLICATOR

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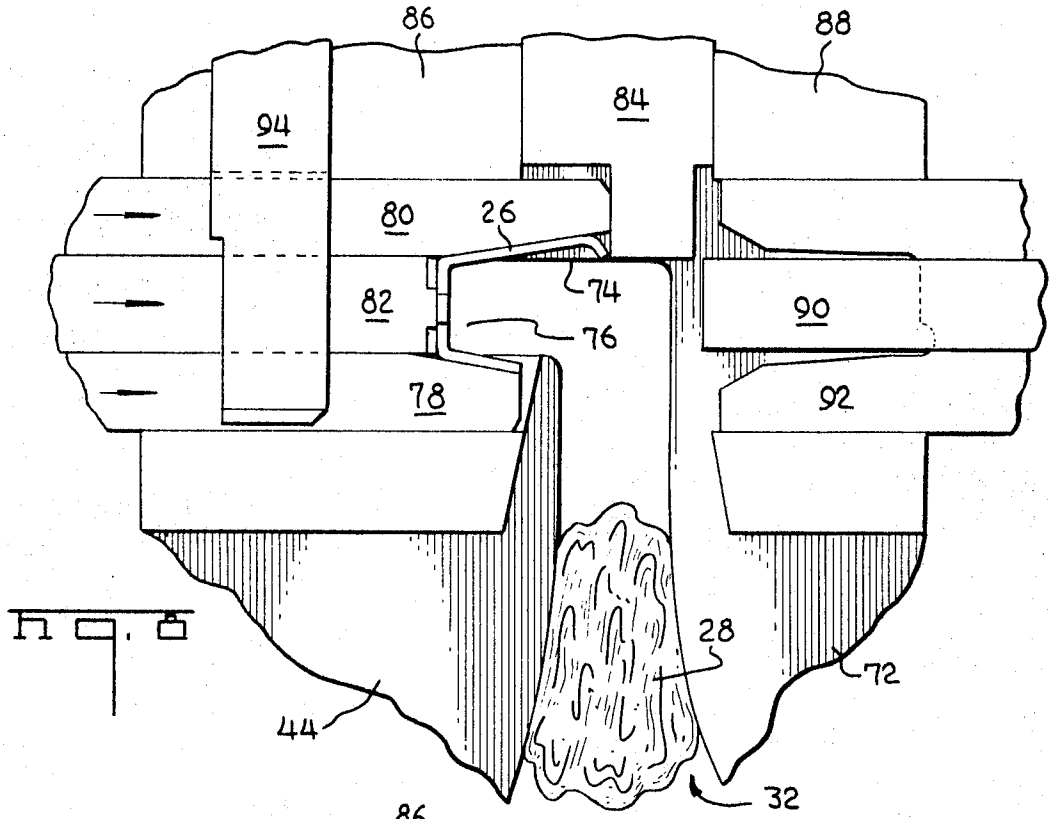


Fig. 8

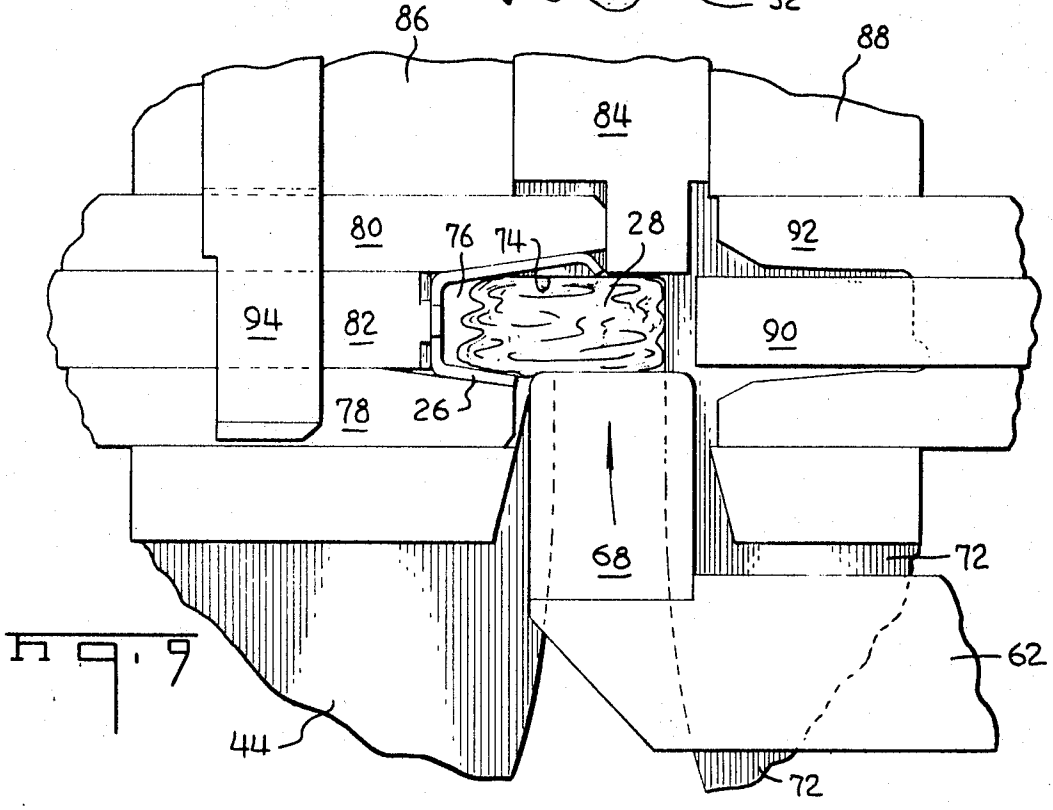


Fig. 9

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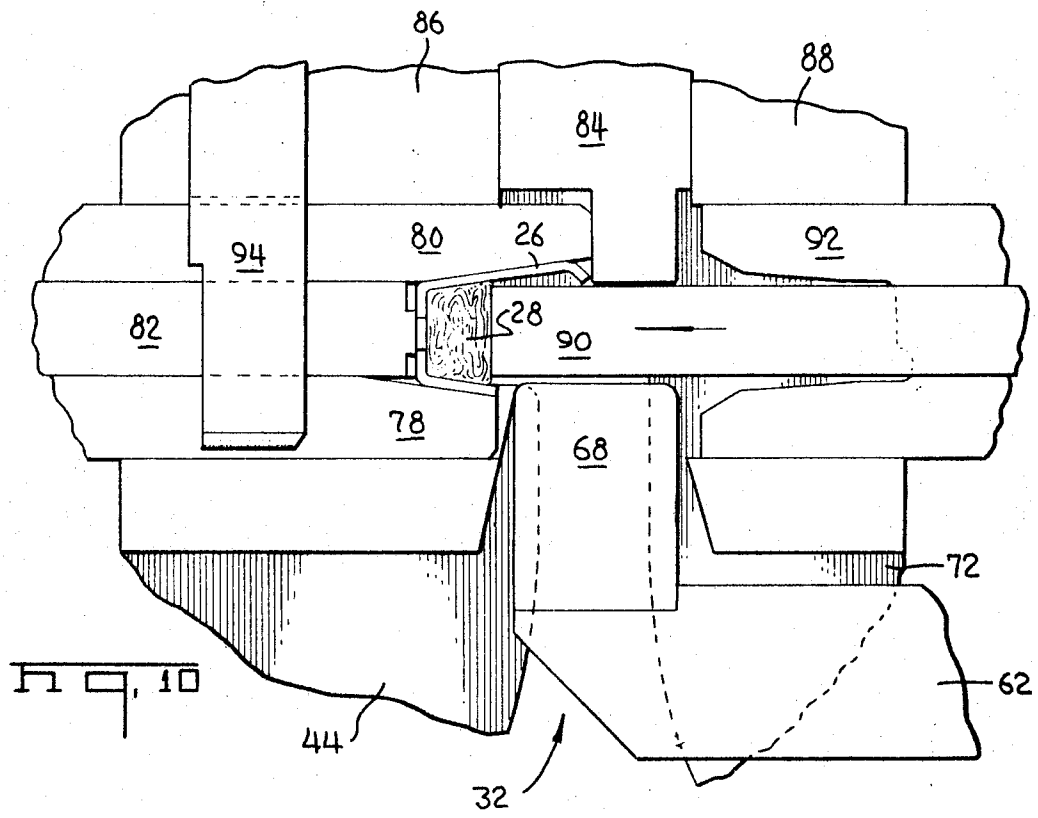


Fig. 10

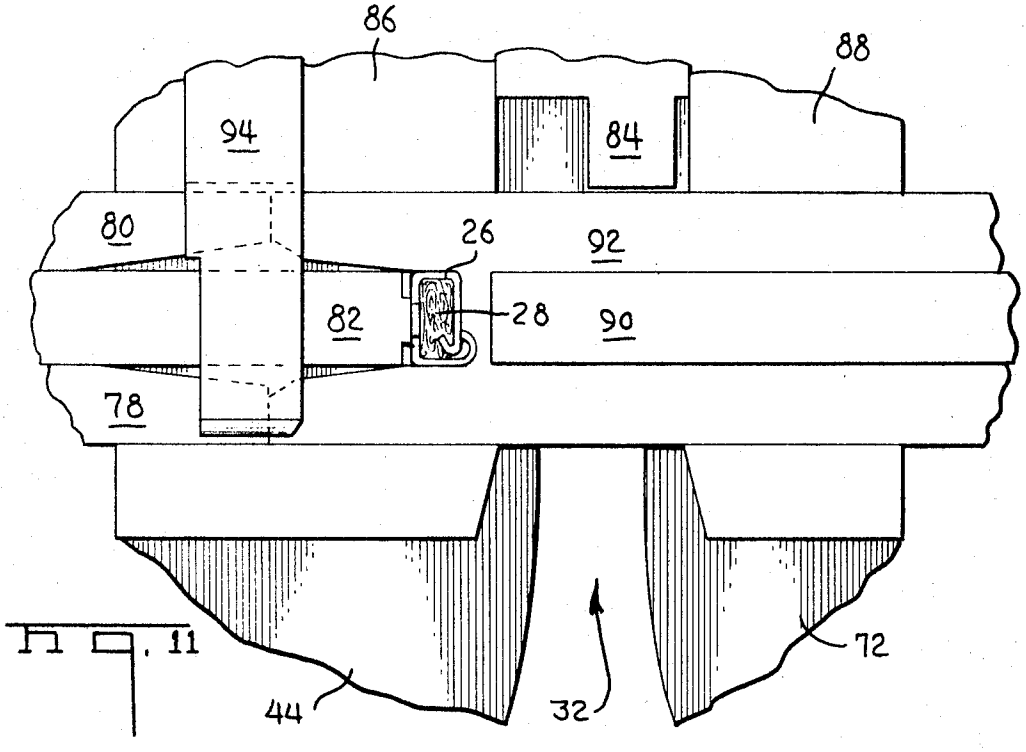


Fig. 11

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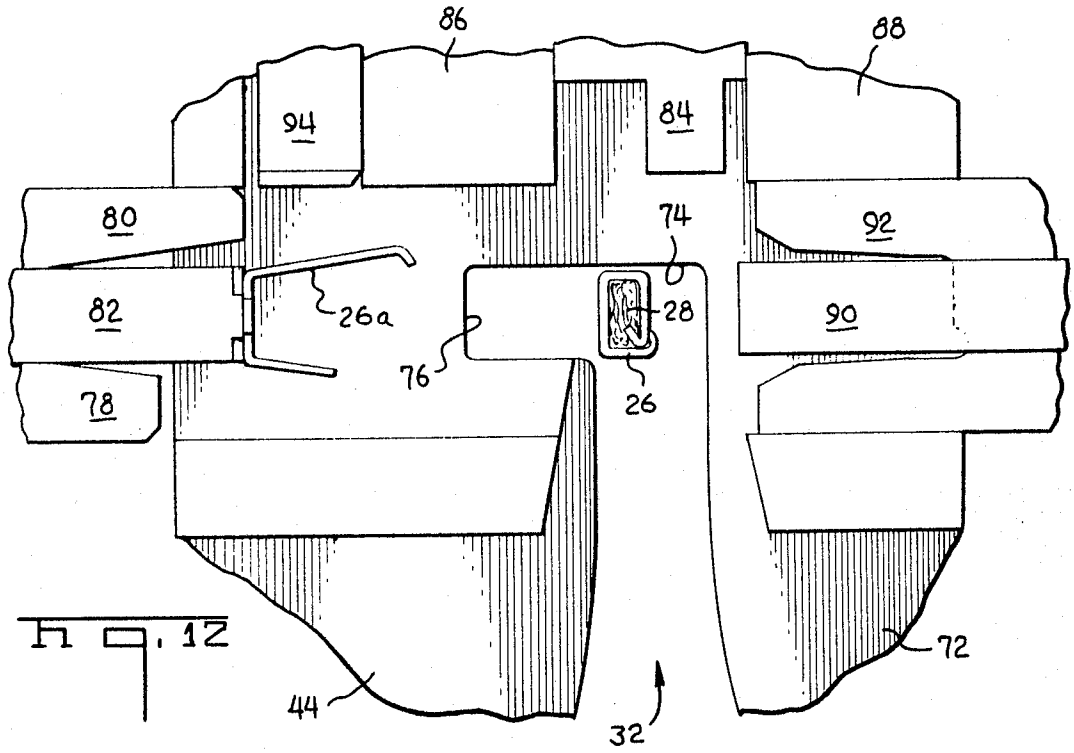


Fig. 12

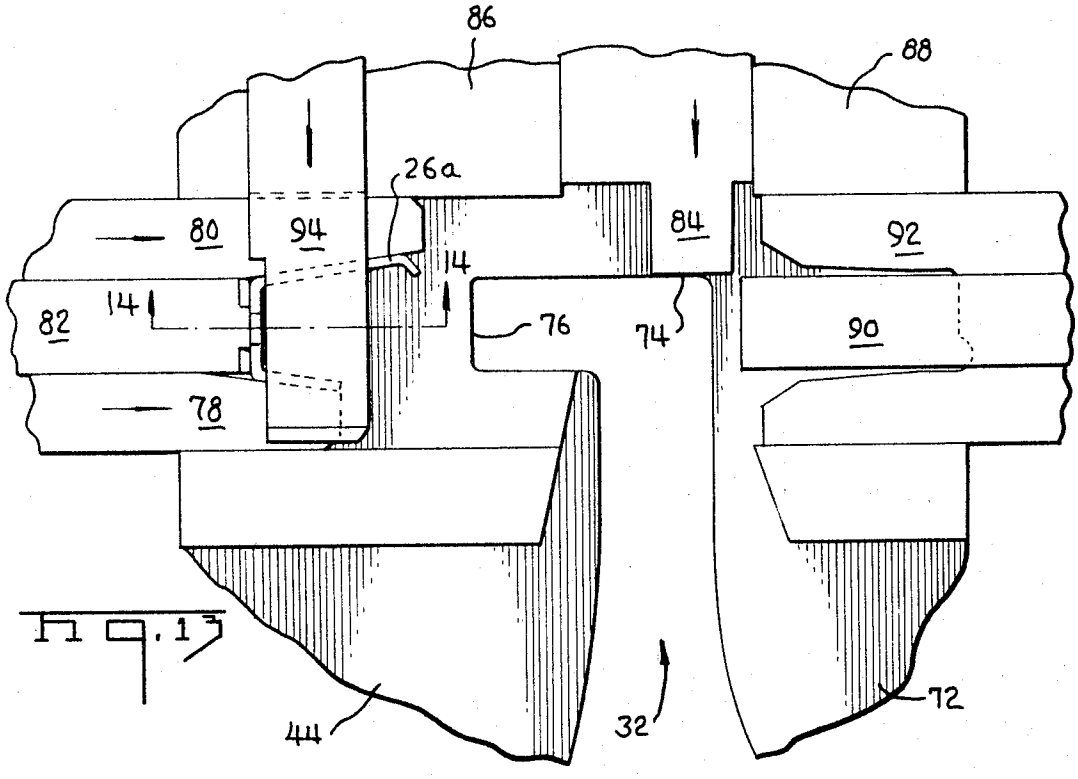


Fig. 13

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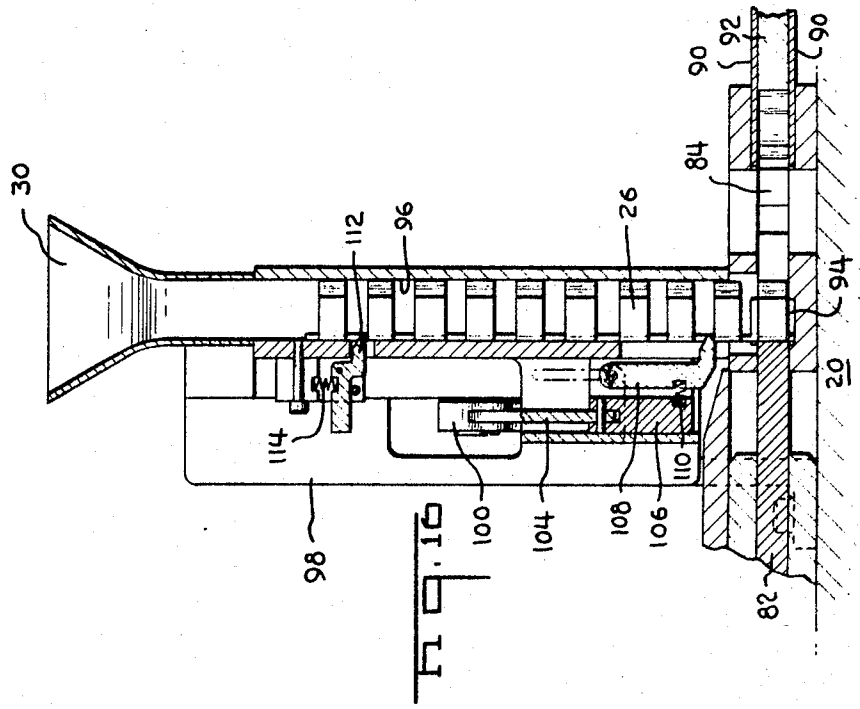


FIG. 16

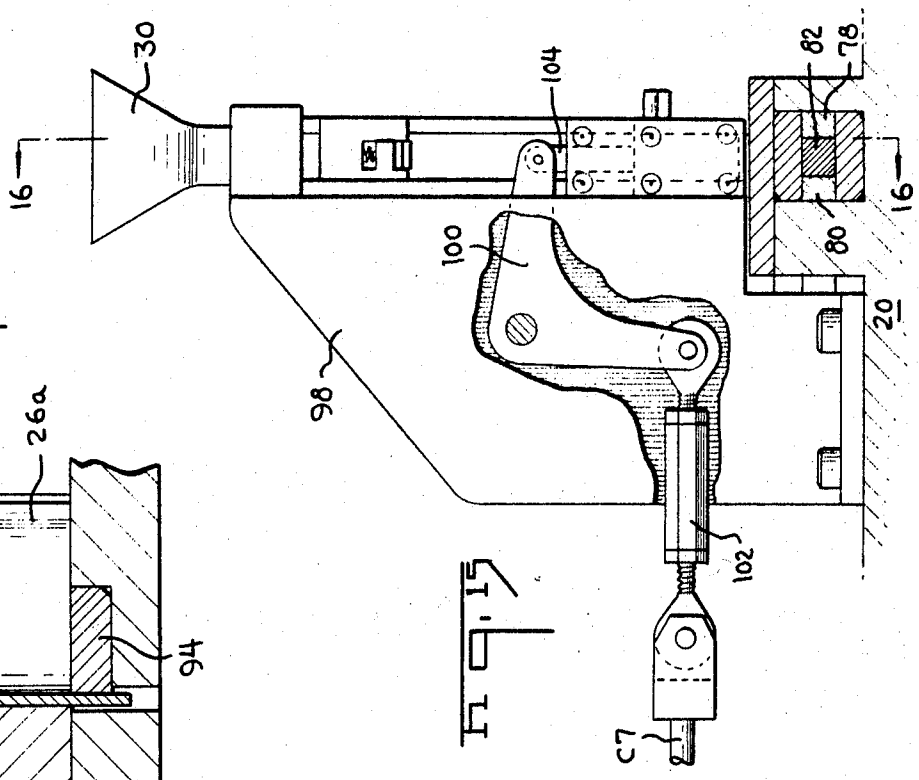


FIG. 15

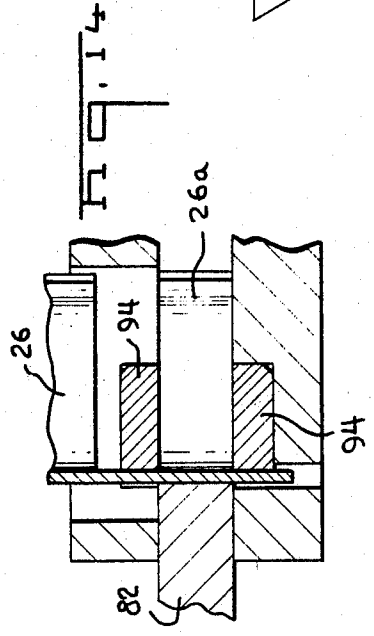


FIG. 14

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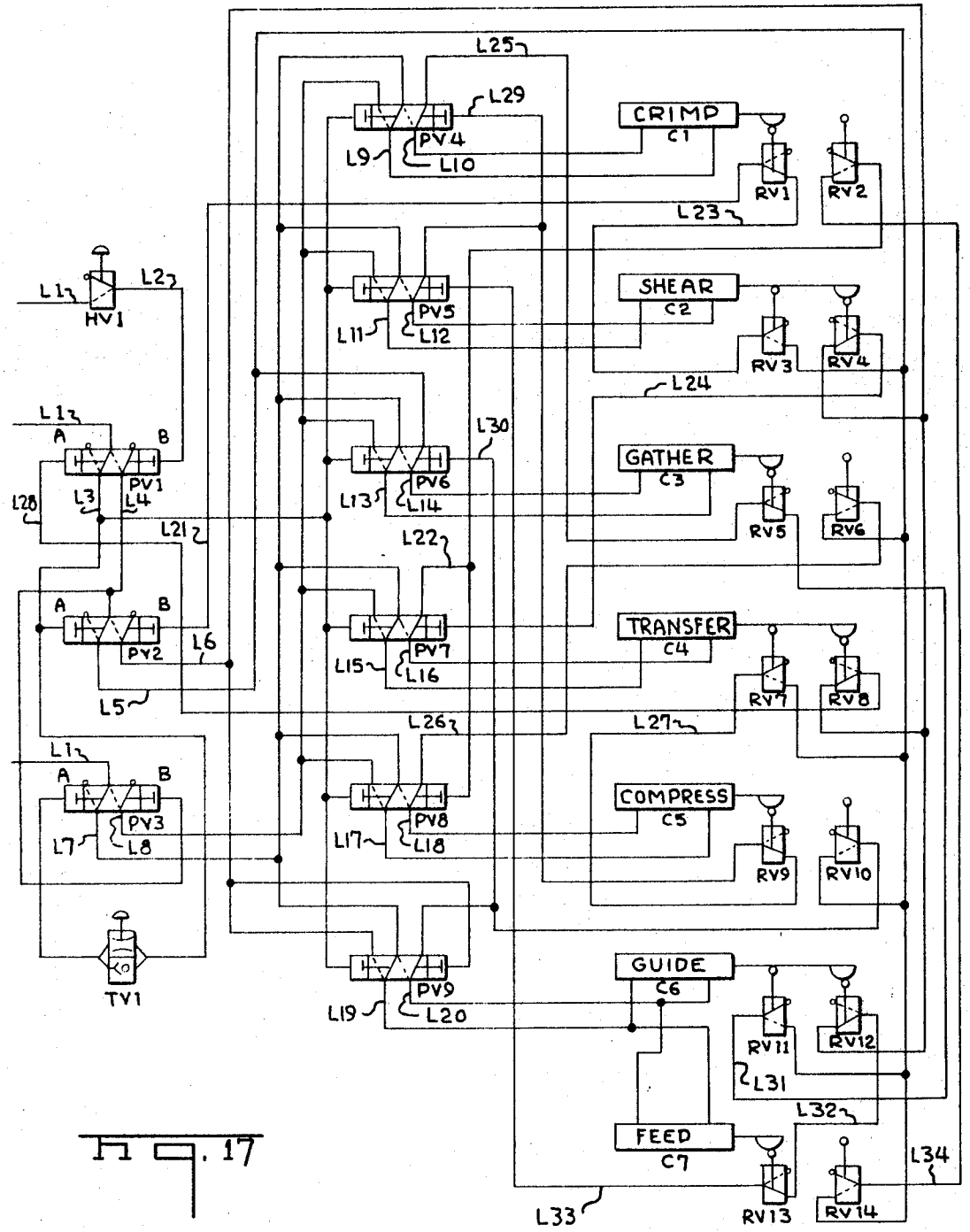


FIG. 17

United States Patent Office 3,455,010 Patented July 15, 1969

3,455,010

BAG CLIP APPLICATOR

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Filed Aug. 22, 1966, Ser. No. 574,090
Int. Cl. B65b 61/00
U.S. Cl. 29—211 10 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus is disclosed for applying a closure member to a bag or the like. A constricting passageway is provided in a frame through which a bag is moved to effect compression of a discrete portion of the bag. The compressed portion is nestled within an open closure member and subsequently the closure member is secured around the bag to yield an air tight and moisture tight seal.

This invention relates to the art of bag closures and more particularly to a new and novel apparatus for applying a closure means to a bag or the like.

In the commercial world there is an ever increasing use of plastic bags (e.g. polyethylene or the like) within which various products will be placed for shipment. The particular products contained in the bags are often of such a character that the bags must be effectively sealed against the ingress of air or moisture in order to protect the contents of the bag. The products within such bags may be typically food, various powder substances, explosive materials, etc.

Various closure means for such bags are known in the prior art. However, there has been extreme difficulty in providing suitable apparatus for applying the closure means to the bags in an effective manner. This operation is usually performed by hand. The problem arises when it is considered that the bag material within the closure means must be compressed to a degree whereat the bag material is essentially a solid mass in order to insure an airtight and watertight seal. It is extremely difficult, if not impossible, to sufficiently compress the bag materials by hand. When the contents of the bags are explosive powders the bag material is extremely tough, making the compressing step all the more difficult.

It is therefore an object of the present invention to provide apparatus for rapidly and effectively applying a closure means to a bag or similar article.

A further object is to provide a means for exerting large compressive forces on the bag material within the closure member while protecting the bag material from rupture, tearing or the like.

A further object of the present invention is to provide closure applying apparatus which will effect an airtight and moisture tight seal on a bag or similar article.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there is shown and described an illustrative embodiment of the invention; it is to be understood, however, that this embodiment is not intended to be exhaustive nor limiting of the invention but is given for purpose of illustration in order that others skilled in the art may fully understand the invention and the principles thereof and the manner of applying it in practical use so that they may modify it in various forms, each as may be best suited to the conditions of a particular use.

In the drawings, in which like reference numerals refer to like parts:

FIGURE 1 is an overall perspective view of the apparatus of the present invention;

FIGURE 2 is a perspective view of a bag or similar article having a closure means applied by the apparatus of FIGURE 1;

FIGURE 3 is a top plan view illustrating the bag gathering means, parts being removed for clarity;

FIGURE 4 is a top plan view showing the drive mechanism for the bag compressing means and the closure applying means;

FIGURE 5 is a top plan view of the closure transfer mechanism;

FIGURE 6 is a cross-sectional view taken along the line **6—6** of FIGURES 3 and 5 showing further details of the transfer mechanism;

FIGURE 7 is a cross-sectional view taken along the line **7—7** of FIGURE 3 showing details of the compressing mechanism;

FIGURE 8 is an enlarged plan view showing the various parts in their at rest position;

FIGURE 9 is an enlarged plan view showing a bag being gathered in the work zone;

FIGURE 10 is an enlarged plan view showing the bag being compressed into the closure means;

FIGURE 11 is an enlarged plan view showing the closure means being applied to the bag;

FIGURE 12 is an enlarged plan view showing the parts in position after a closure has been effected;

FIGURE 13 is an enlarged plan view showing the parts just prior to completion of a cycle;

FIGURE 14 is a cross-sectional view taken along the line **14—14** of FIGURE 13 and showing details of the shearing mechanism for removing the closure means from its carrier strip;

FIGURE 15 is a side elevational view of the closure feeding means;

FIGURE 16 is a cross-sectional view taken along the line **16—16** of FIGURE 15; and

FIGURE 17 is a flow diagram shown schematically illustrating the control for the various moving parts of the apparatus.

With reference to FIGURE 1 there is shown the overall apparatus of the present invention and comprises a frame **20** which will sit along the edge of a table, shelf or the like. A cover **22** is fitted over the frame to conceal the majority of the working parts of the apparatus. A supply reel **24** is located above the cover **22** and holds a supply of bag closure members **26** in strip form. The particular bag closure means employed, by way of example, is best shown in FIGURE 2 wherein the closure is shown in its final position about a bag **28** providing an effective airtight and moisture tight seal. The closure members **26** are fed through a guide means **30** which leads the closure members to the working area of the apparatus.

At the beginning of a cycle of operation an open bag is led by hand into the entrance way **32** of the machine. With the bag in position the operator will grasp a handle **34** (see also FIGURE 3) secured to a pair of upper and lower gather plates **36**. The gather plates are pinned to and pivot about a shaft **38** and are normally biased in a clockwise direction by means of spring **40**. By means of handle **34** the operator will swing the gather plates **36** in a counterclockwise direction whereby the open bag will be caught by the recessed portion **42** in the gather plates to urge the bag further into the entrance **32**. The gather plates are spaced from each other in parallel relationship by a pair of fixed plates **44** secured to the machine frame **20**.

Between the gather plates a cam **37** is secured to shaft **38**, the cam having a raised surface **37***a* at its trailing edge. The upper plate **44** has an air valve HV1 secured therein having an actuator **46** and a cam roller **48** which

rides along the surface of cam **37**. Counterclockwise movement of the gather plates **36** causes like movement of cam **37**. When raised surface **37***a* contacts roller **48** the roller will be displaced causing movement of actuator **46** thus actuating the valve HV1 to thereby actuate cylinder C3 (see also FIGURE 17). Cylinder C3 is pivotally connected to a toggle link **50** through an adjustment means **52**. A connecting link **54** is pivotally connected to the toggle link at **56** and is pivotally connected at **58** to a link mount **60** which is fixed relative to the machine frame. A gather arm **62** is pivotally connected to the frame at **64** and is connected at **66** to the toggle link **50**. A gathering block **68** is secured to the free end of gather arm **62** and is movable between a top and bottom plate **70** and **72** respectively, which plates confine the gathering block for movement between the gather plates **36**.

Turning now to FIGURE 8 there is shown an open bag **28** positioned in the entrance way **32** by means of the gather plates **36**. With the bag in this position the gathering block **68** will swing behind the bag and force the bag against the rearward wall **74** of the entrance way **32** (see FIGURE 9). The entrance **32** has a dogleg portion **76** surrounding which is located the lowermost closure member **26** of the strip being fed.

In FIGURE 8 the various moving parts of the apparatus are shown in their initial position when the machine is at rest. The closure member **26** is positioned between a front terminal support **78** and a rear terminal support **80**, the supports having inclined surfaces corresponding to the configuration of the closure member. An anvil **82** is positioned between the front and rear terminal supports and abuts the base of the closure member. In line with the rearward wall **74** is a guide **84** which serves to additionally locate the closure member in position. The guide **84** reciprocates between a pair of support plates **86** and **88**. To the right of dogleg **76** as seen in FIGURE 8 there is located a compressor **90** and a crimping member **92**. Straddling the front and rear terminal supports and the anvil **82** is a shear member **94** having a bifurcated end as further seen in FIGURE 14. A sequence of movement of the front and rear terminal supports **78** and **80** respectively, the anvil **82**, the guide **84**, the compressor **90**, the crimping member **92**, and the shear member **94** will now be described. The driving mechanisms for these various moving parts will be described hereafter.

As seen in FIGURE 9 the gathering block **68** has forced the bag into the end of passage **32**. At this time a compressor **90** is actuated and reciprocates through the dogleg **76** to the position shown in FIGURE 10 whereat the bag **28** is compressed under high force to an essentially solid mass. The compressed bag is located now within the closure member in position to be sealed.

Turning now to FIGURE 11 the guide **84** is retracted and the crimping member **92** is actuated and cooperates with the anvil **82** to crimp closure member **26** into an interlocking configuration to effect the permanent seal of the bag. Movement of the crimping member **92** has forced the front and rear terminal supports **78** and **80** out of the path of movement of the crimping member, these terminal supports being spring loaded in a fashion to be later described. With the closure having been effected the crimper **92**, compressor **90**, shear member **94**, anvil **82**, and the front and rear terminal supports **78** and **80** are moved to their retracted position shown in FIGURE 12. The retracting motion of the crimper **92** has a stripping effect on the completed closure causing the closure member **26** with its now sealed bag **28** to move into the main portion of the passageway **32** in position for removal from the machine. A new closure member **26***a* is now fed into position in front of the anvil **82**, the member **26***a* still being connected to its strip as shown in FIGURE 1. The shear member **94**, the front and rear terminal supports **78** and **80**, and the guide **84** now move to their extended position as shown in FIGURE 13. As the anvil **82** moves from its position shown in FIGURE 13 to its next position shown in FIGURE 8, there is effected a shearing of the lowermost closure member from its strip, thus completing a cycle of operation of the machine. This shearing is best seen in FIGURE 14. The anvil **82** moves between the bifurcated ends of the shear member **94**, with the upper and lower surfaces of the anvil **82** constituting shearing surfaces which cooperate with the inner surfaces of the shear member **94** to effect the shear.

Turning now to FIGURES 15 and 16 the closure member feed will be described. The strip of closure members is led downwardly through the terminal guide **30** into a feeding tube **96**. The tube **96** is secured to a feed mount **98** fixed to the machine frame. Pivoted to the feed mount **98** is a feed lever **100**. The lever **100** is connected to an air cylinder C7 through an adjusting means **102**. The other end of the lever **100** is connected to a feed slide link **104**, the slide link **104** being connected at its lower end to a feed slide **106**. A pivoting finger **108** is connected to the slide **106** and is biased in a counterclockwise direction by means of spring **110**. It can be seen that movement of the cylinder C7 causes oscillating movement of the lever **100** thereby imparting reciprocating movement to the feed slide **106**. Downward movement of slide **106** causes the finger **108** to engage in a closure member **26** and feed the said closure member into the position shown in FIGURE 12. Upward movement of slide **106** causes the finger **108** to be cammed clockwise against the bias of spring **110** to allow the finger to ride over the next closure member in position for feeding during the next machine cycle. During the upward movement of slide **106** the strip of closure members is prevented from moving upwardly by means of a stop member **112** which is biased in a counterclockwise direction by the spring **114**. The closure members will ride over the stop **112** during feeding movement of the strip.

Turning now to FIGURES 5 and 6 the anvil and the terminal supports will be described in detail. An air cylinder C4 is connected through an adjustment means **116** to a toggle lever **118**. A toggle link **120** is pivotally secured at one end to the lever **118** and at its other end is adjustably secured to the machine frame by means of the adjustable clevis **122**. The toggle lever **118** is pivotally secured within the bifurcated end of a transfer ram **124** slidable within a guideway **126** on the machine frame. The transfer ram **124** is provided with front and rear channels **128** within which are located springs **130** and spring stop members **132**. The free end of springs **130** abut jaw sliders **134** which abut the rear surfaces of the front and rear terminal supports **78** and **80** respectively. It can be seen that rightward movement of the ram **124** causes the rightward movement of supports **78** and **80**, this movement being effected by the resilient force exerted by the springs **130**. A pickup jaw **136** is secured to the ram **124** and has an end **138** which cooperates with a depending portion **140** of the front and rear supports **78** and **80** to limit the forward movement of the supports **78** and **80** and also to effect retrograde movement of the supports upon retraction of the ram **124**.

A two-part anvil ram **142** is provided and has secured thereto the anvil **82**. The ram **142** carries a depending block **144** which engages a biasing spring **148**, which spring urges the anvil ram **142** to the left or retracted position as seen in FIGURE 6. Rightward movement of the left upon retraction of transfer cylinder C4 the anvil ram **142** thus driving the anvil ram to the right to move the anvil **82** from the position shown in FIGURE 13 to that of FIGURE 8. As the transfer ram **124** is moved to the left upon retraction of transfer cylinder C4 the anvil ram **142** will move to the left under the influence of spring **148**. Should the anvil ram become hung up in its slide way there is provided a return link **150** which insures that the anvil ram **142** will move to its retracted leftward position at the completion of a machine cycle.

Turning now to FIGURE 3 there is shown a drive

means for the shear member **94** and the guide member **84**. An air cylinder C2 is connected through an adjusting means **152** to the rear end of the shear member **94**. Reciprocation of cylinder C2 will cause like reciprocation of the shear member **94** causing the shear member to move between its position shown in FIGURE 12 and that shown in FIGURE 8.

An air cylinder C6 is connected through adjusting means **154** to the rear end of the guide member **84**. Reciprocation of air cylinder C6 will cause like reciprocation of the guide **84** between its position shown in FIGURE 12 and that shown in FIGURE 8.

Turning now to FIGURES 4 and 7 there is shown the drive mechanisms for the compressor **90** and the crimping member **92**. An air cylinder C5 is secured through adjusting means **156** to a compressor link **158**. The link **158** is connected in toggle like fashion to an anchor link **160** pivotally secured to an anchor block **162** fixed to the machine frame. The compressor link **158** is also pivotally secured to a compressor lever **164** carrying a bearing **166** which is adjustably positioned relative to the machine frame. A clevis **168** cooperates with a threaded member **170** which extends through a positioning block **172** to effect an adjustment of the clevis **168** to thereby adjust the position of bearing **166** and thus the throw of lever **164**. A pair of plates **174** are secured to the outer end of lever **164** and carry a pin **176** which engages the ends of the pair of bag compressors **90**. In FIGURES 8 through 13 only one compressor **90** is shown whereas in reality there are two parallel compressors which straddle the crimping member **92**. The compressors **90** are guided for rectilinear movement by a guideway **178** formed in the machine frame and by a pair of compressor guides **179** located on opposite sides of the compressors.

An air cylinder C1 is connected through adjusting means **180** to a toggle lever **182**. The lever **182** is pivotally connected to a toggle link **184** which is pinned to the machine frame by an adjustable clevis **186**. The lever **182** is further pivotally secured at **188** to the crimper ram **190**. The crimper ram **190** has a first pair of slots **192** within which the compressors **90** reciprocate and a second slot **194** within which reciprocates the pin **196** which connects the plates **174** to the compressors **90**. The compressor guides **179** are secured to the crimper ram **190** by screws or the like **198**. A pair of retaining plates **200** and **202** are provided for guiding the reciprocation of the crimper ram **190** and the compressor guides **179**. The crimping member **92** is secured to the forward end of crimper ram **190** by bolts or the like whereby reciprocation of the ram **190** causes direct reciprocation of the crimping member **92**.

With reference now to FIGURE 17, the flow diagram and operational sequence of the apparatus will be described. Air is introduced into the system via lines **L1**. When the machine is at rest the hand valve HV1 is released and is in the position shown in the figure. This places air in lines **L1**, **L3**, **L7**, **L9**, **L11**, **L13**, **L15**, **L17**, and **L19**. The pilot valves PV1 through PV9 are all shifted to their B end. All the remaining lines are vented. Cylinder C1 is retracted causing relay valve RV1 to be actuated and relay valve RV2 to be released. Cylinder C2 is extended causing relay valve RV3 to be released and relay valve RV4 to be actuated. Cylinder C3 is retracted causing relay valve RV5 to be actuated and relay valve RV6 to be released. Cylinder C4 is extended causing relay valve RV7 to be released and relay valve RV8 to be actuated. Cylinder C5 is retracted causing relay valve RV9 to be actuated and relay valve RV10 to be released. Cylinder C6 is extended causing relay valve RV11 to be released and relay valve RV12 to be actuated. Cylinder C7 is retracted causing relay valve RV13 to be actuated and relay valve RV14 to be released. This establishes all the elements in their at rest position as shown in the figure.

To begin a cycle of operation valve HV1 is actuated by the operator. This causes air to flow in line **L2** causing valve PV1 to shift to its A end. The shifting of valve PV1 causes line **L3** to be vented and causes air to flow in lines **L4**, **L5**, and **L14**. The air in line **L4** causes valve PV3 to shift to the A end, placing air in line **L8** and venting lines **L7**, **L9**, **L11**, **L13**, **L15**, **L17**, and **L19**. The air in line **L14** causes cylinder C3 to be extended thereby releasing valve RV5 and actuating valve RV6. Actuation of valve RV6 causes air to flow in line **L26**, thereby placing air in line **L18** to extend cylinder C5. The extension of cylinder C5 causes the release of valve RV9 and the actuation of valve RV10. The actuation of valve RV10 causes air to flow in line **L30** which places air in line **L20** to retract the cylinder C6. The retraction of cylinder C6 causes valve RV12 to be released and valve RV11 to be actuated. Actuation of valve RV11 places air in line **L31**. The air in line **L20** has further caused the cylinder C7 to be extended thereby releasing valve RV13 and actuating valve RV14 to place air in line **L34**. The air in line **L30** causes valve PV6 to shift to its A end which vents line **L14** and places air in line **L13** through its connection with line **L8**. The air in line **L13** causes cylinder C3 to retract which again releases valve RV6 and actuates valve RV5 thereby venting lines **L26** and **L18** and placing air in lines **L25** and **L10**. The air in line **L10** causes cylinder C1 to extend thereby releasing valve RV1 and actuating valve RV2. Valve RV2 places air in line **L22** and thus in line **L16** to retract cylinder C4 thereby releasing valve RV8 and actuating valve RV7. Valve RV7 places air in line **L27** and the air in line **L22** causes valve PV8 to shift to its A end placing air in line **L17** to retract cylinder C5 to once more release valve RV10 and actuate valve RV9. The release of valve RV10 vents the line **L30** and thus the line **L20**. The actuation of valve RV9 places air in line **L29** and thus in line **L12** to retract cylinder C2 thus releasing valve RV4 and actuating valve RV3. Valve RV3 places air in line **L23** while the air in line **L29** causes the valve PV4 to shift to its A end thus venting line **L10** and placing air in line **L9** to retract cylinder C1 thereby again releasing valve RV2 which vents lines **L16** and **L22** and actuating valve RV1 which places air in line **L21**. The air in line **L21** causes valve PV2 to shift to its A end thereby venting lines **L5**, **L12**, **L21**, **L23**, **L25**, **L27**, **L29**, **L31**, and **L34** and placing air in line **L6** which shifts valve PV9 to its A end placing air in line **L19**. The air in line **L19** causes cylinder C6 to be extended thereby releasing valve RV11 and actuating valve RV12 to place air in line **L32**. The air in line **L19** further causes cylinder C7 to retract thereby releasing valve RV14 and actuating valve RV13 to place air in line **L33** thereby causing valve PV5 to shift to its A end to place air in line **L11**. The air in line **L11** causes cylinder C2 to extend to thereby release valve RV3 and actuate valve RV4 placing air in line **L24** to shift valve PV7 to its A end and thus place air in line **L15**. The air in line **L15** causes cylinder C4 to be extended to thereby release valve RV7 and actuate valve RV8 thereby placing air in line **L28**. By this point in the cycle the hand valve HV1 will have been released by the operator to thereby vent line **L2**. The air in line **L28** causes the valve PV1 to shift to its B end and thereby venting lines **L4**, **L6**, **L19**, **L24**, **L28**, **L32**, and **L33**. Air is introduced into line **L3** causing valve PV2 to shift to its B end and causing valve PV4 to shift to its B end thus venting line **L9**. The air in line **L3** also causes valve PV5 to shift to its B end thus venting line **L11**, causes valve PV6 to shift to its B end thus venting line **L13**, causes valve PV7 to shift to its B end thus venting line **L15**, causes valve PV8 to shift to its B end thus venting line **L17**, causes valves PV9 and PV3 to shift to their B end venting line **L8**. Air remains in lines **L7**, **L9**, **L11**, **L13**, **L15**, **L17**, and **L19** thus placing us back in the original condition of rest for the machine system.

The cylinders C1 through C7 are labeled in FIGURE **17** corresponding to the apparatus which they control,

cylinder C1 controlling the crimping apparatus, cylinder C2 controlling the shearing apparatus, etc. Through the above-described sequence of air flow through the system one can readily ascertain the sequence of operation of the various moving parts of the apparatus. A timing valve TV1 is shown in line L3 in FIGURE 17. Similar timing valves may be placed in appropriate lines in order to control the timing of the extension and retraction of the various cylinders.

Changes in construction will occur to those skilled in the art and various apparently different modifications and embodiments may be made without departing from the scope of the invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only. The actual scope of the invention is intended to be defined in the following claims when viewed in their proper perspective against the prior art.

What is claimed is:

1. Apparatus for applying a closure member to a bag or the like comprising a frame, a passageway located in said frame, means for positioning an open closure member in said passageway, compressing means for moving a portion of a bag along said passageway and for compressing said portion into a substantially solid mass within said open closure member, and means for securing said closure member about the compressed portion of said bag subsequent to operation of said compressing means.

2. Apparatus as set forth in claim 1 further comprising additional means to partially compress said bag portion prior to operation of said compressing means.

3. Apparatus as set forth in claim 2 wherein said compressing means is operative to move said bag portion from a first station at which said bag is partially compressed to a second station at which said open closure member is located.

4. Apparatus for applying a closure member to a bag or the like comprising a confined passageway, means for engaging a bag to move said bag into said passageway, means responsive to movement of said engaging means for gathering said bag into position adjacent an end of said passageway, means responsive to movement of said gathering means for compressing a portion of said bag into a substantially solid mass, and means responsive to movement of said compressing means for securing a closure member about the compressed portion of said bag to effect an airtight and moisture tight seal.

5. Apparatus for applying a closure member to a bag or the like comprising a confined passageway, means for feeding a closure member in strip form to a position adjacent said passageway, means for supporting said closure member on opposite sides thereof, means for shearing the said closure member from said strip, means for transferring said closure member into position at said passageway, means for engaging a bag to move said bag into said passageway, means responsive to movement of said engaging means for gathering said bag into position adjacent an end of said passageway, means responsive to movement of said gathering means for compressing a portion of said bag into a substantially solid mass within said closure member, said supporting means being operative to prevent the distortion of said closure member during the compressing operation, and means responsive to movement of said compressing means for securing said closure member about the compressed portion of said bag to effect an airtight and moisture tight seal.

6. Apparatus for applying a closure member to a bag or the like comprising a frame, a passageway located in said frame for permitting entrance of a bag therein, supply means mounted on said frame for supplying bag closure members in strip form, feed means mounted on said frame and operative to feed said strip of closure members in intermittent manner towards said passageway, means slidably mounted on said frame and operative to shear the lower most one of said closure members from said strip, transfer means slidably mounted on said frame and operative to transfer said lower most closure member into bag receiving position at said passageway, gathering means swingably mounted on said frame for urging a bag into said passageway, means responsive to movement of said gathering means for pushing said bag into an end of said passageway at a position adjacent said closure member, compressing means slidably mounted on said frame and operative to push said bag into said closure member to effectively compress a portion of said bag into a substantially solid mass, means located behind said closure member for supporting said closure member during said compressing operation, and means slidably movable along said frame for securing said closure member about the compressed portion of said bag to effect an airtight and moisture tight seal.

7. Apparatus as set forth in claim 6 wherein said closure member supporting means is spring biased into position around said closure member and wherein said securing means is movable past said supporting means to push said supporting means away from said closure member against the bias on said supporting means.

8. Apparatus as set forth in claim 6 wherein said shearing means straddles said supporting means and said transfer means and wherein shearing of the closure member is effected through the cooperation of said shearing means and said transfer means.

9. Apparatus as set forth in claim 6 wherein said compressing means comprises a pair of movable members operative to engage said bag and apply force to said bag on opposite sides of said closure member to thereby compress the portion of said bag lying between said compressing members and within said closure member.

10. Apparatus as set forth in claim 6 further comprising guide means movable into position adjacent said passageway for locating said closure member at said passageway in bag receiving position.

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