Oct. 9, 1962 N. A. LEIBREICH 3,057,265

METHOD AND APPARATUS FOR PRODUCING A CONTAINER

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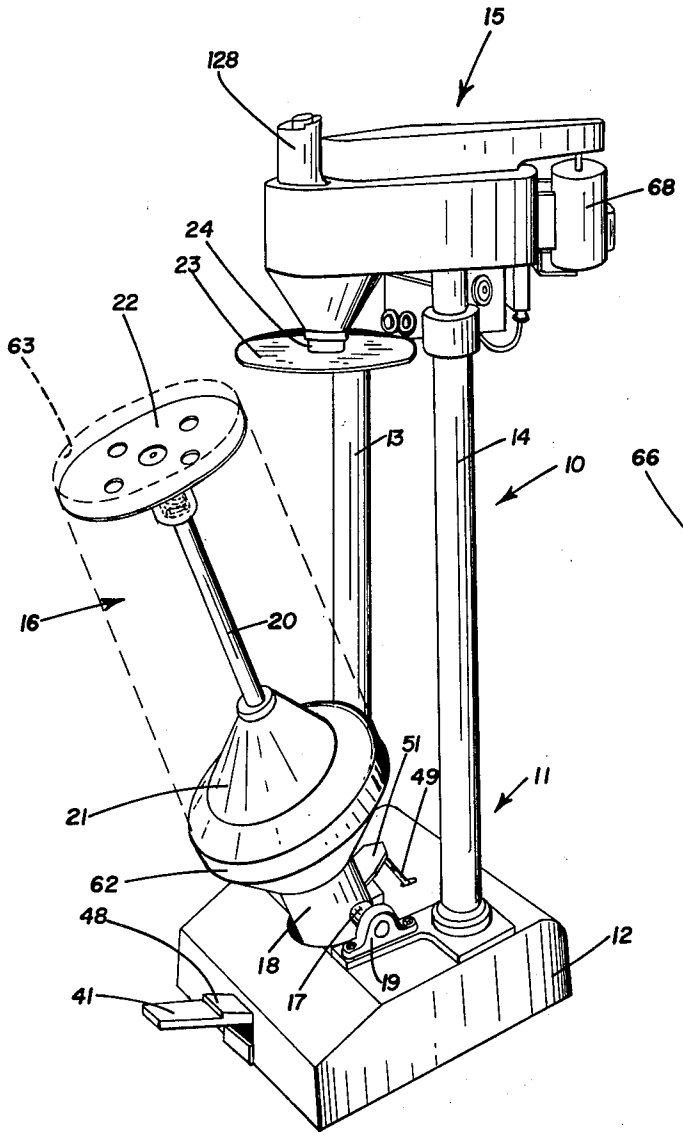


FIG. 1

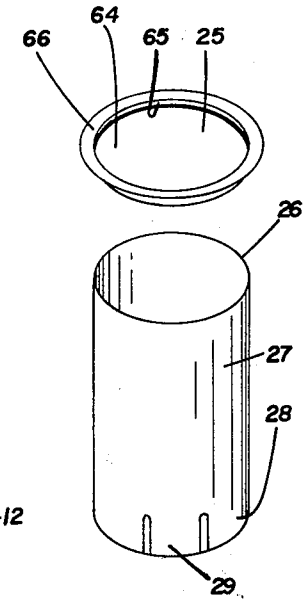


FIG. 2

INVENTOR.
NORMAN A. LEIBREICH
BY
ATTORNEY

Oct. 9, 1962 N. A. LEIBREICH 3,057,265

METHOD AND APPARATUS FOR PRODUCING A CONTAINER

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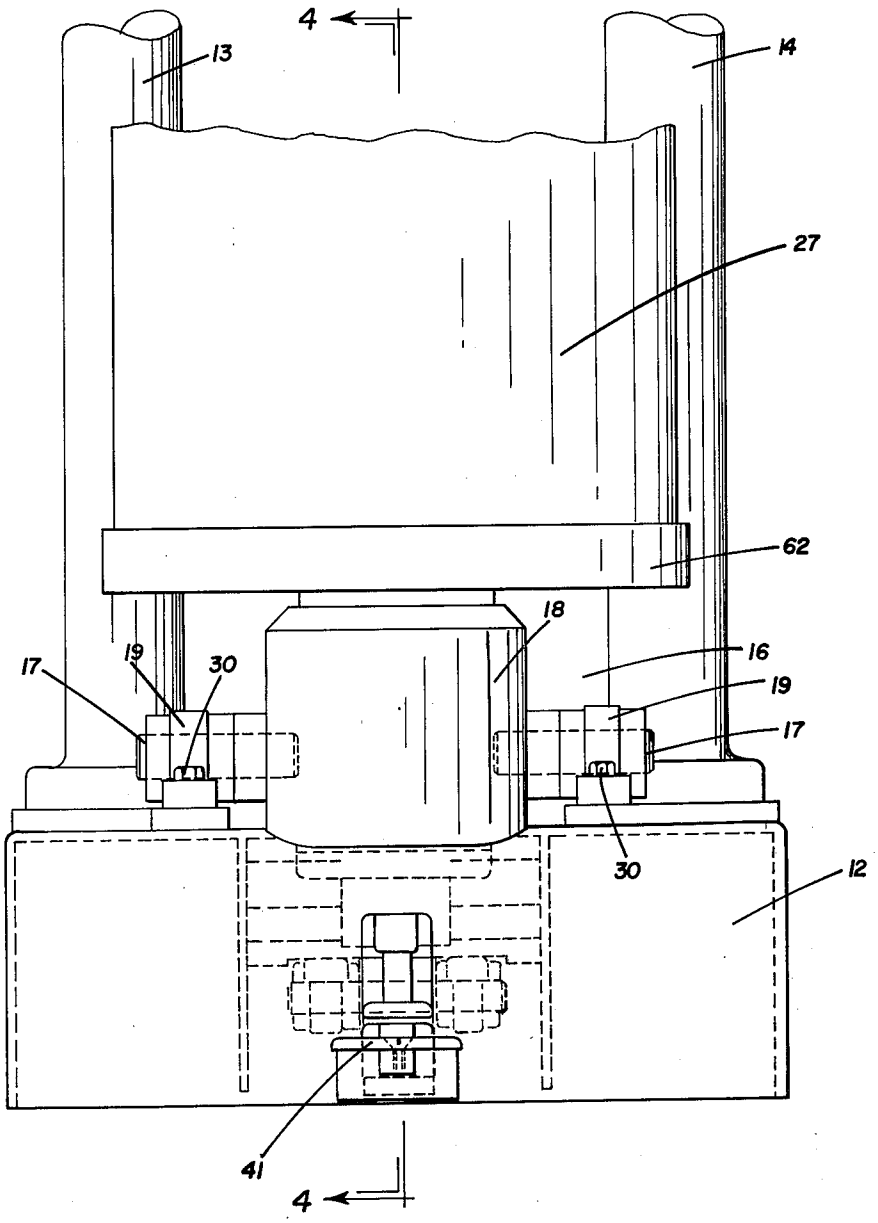


FIG. 3

INVENTOR.
NORMAN A. LEIBREICH
BY
ATTORNEY

METHOD AND APPARATUS FOR PRODUCING A CONTAINER

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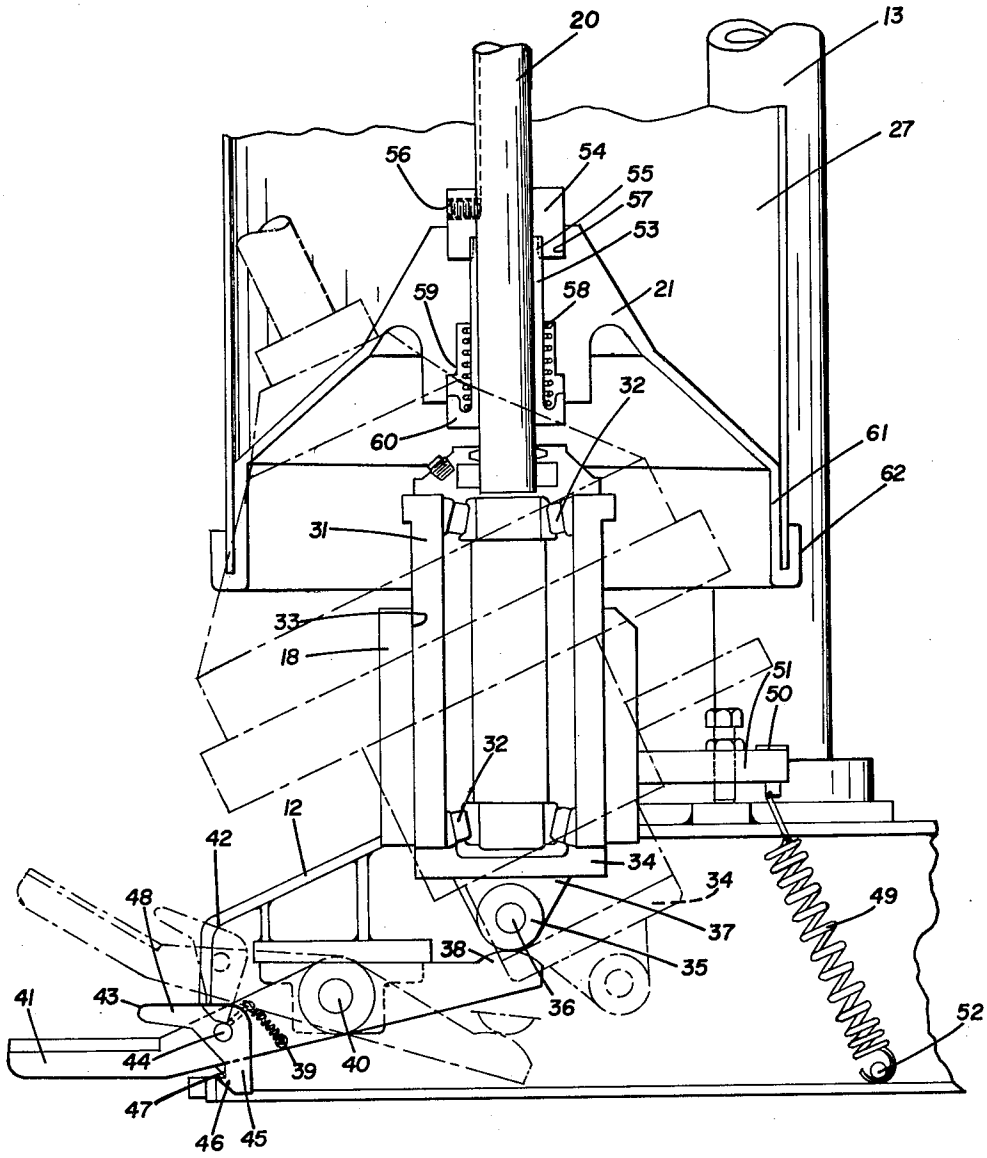


FIG. 4

INVENTOR.
NORMAN A. LEIBREICH
BY Irwin V. Glenn
ATTORNEY

Oct. 9, 1962 N. A. LEIBREICH 3,057,265

METHOD AND APPARATUS FOR PRODUCING A CONTAINER

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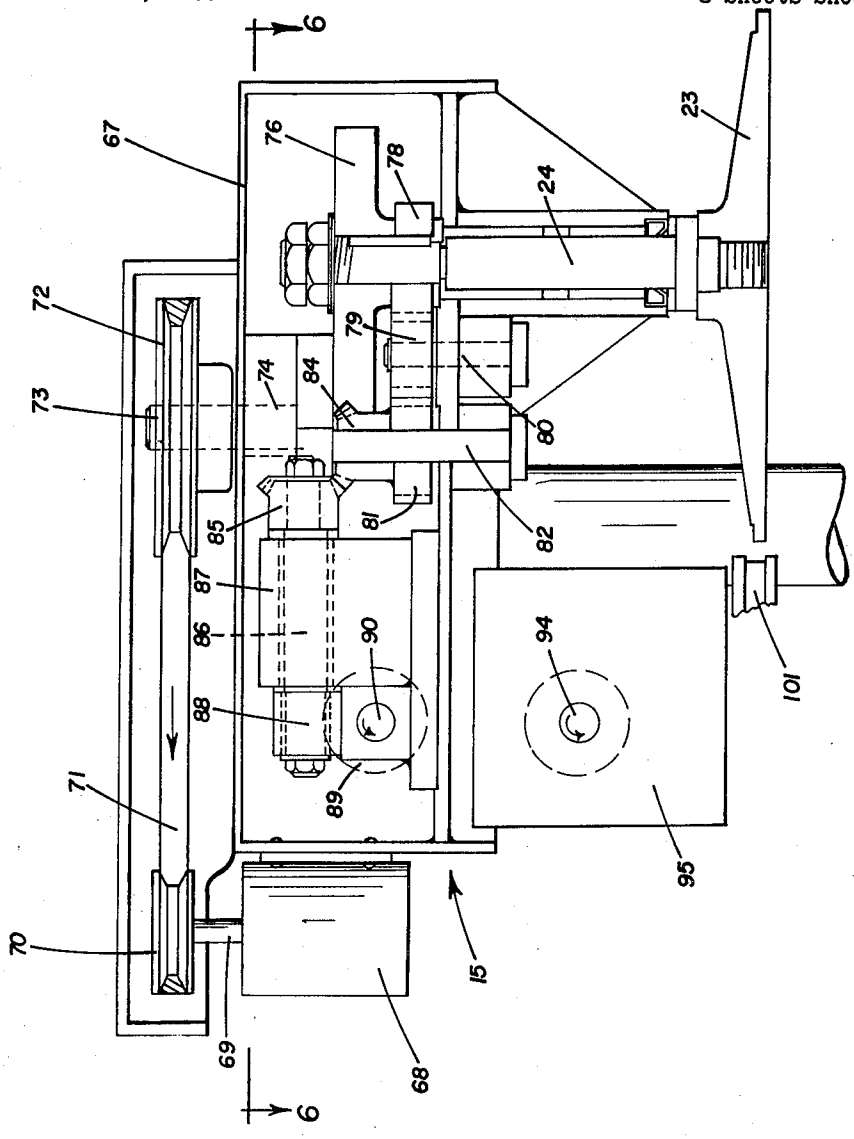


FIG. 5

INVENTOR.
NORMAN A. LEIBREICH
BY
ATTORNEY

Oct. 9, 1962 N. A. LEIBREICH 3,057,265

METHOD AND APPARATUS FOR PRODUCING A CONTAINER

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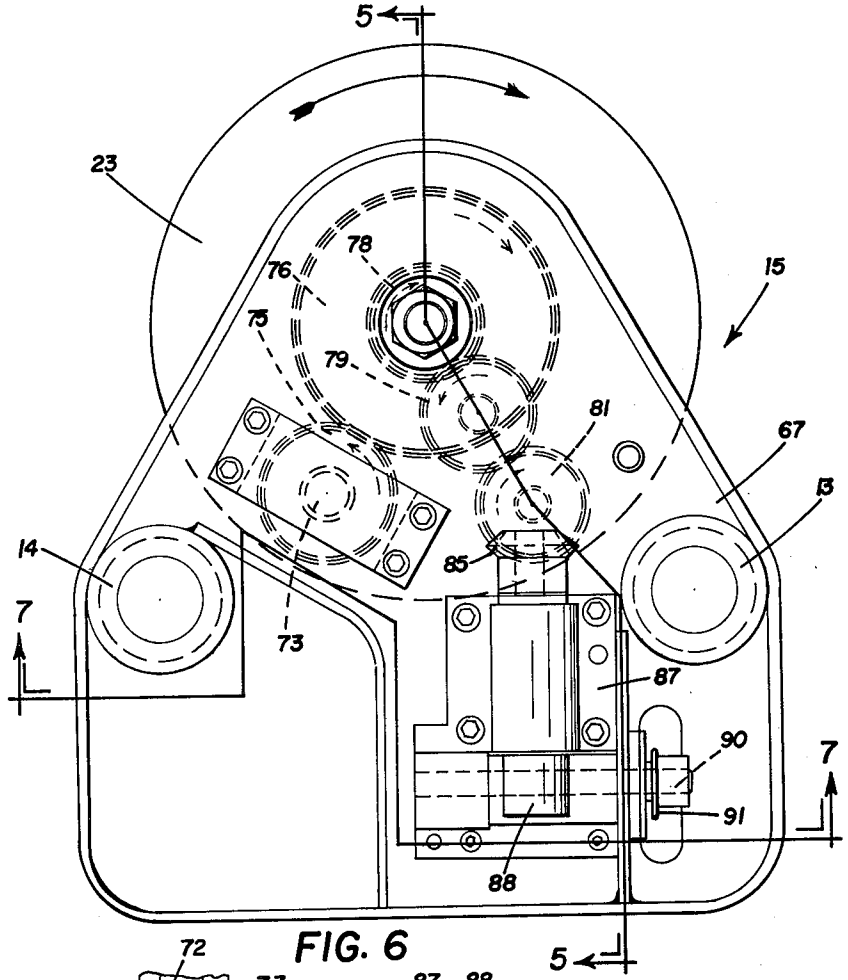


FIG. 6

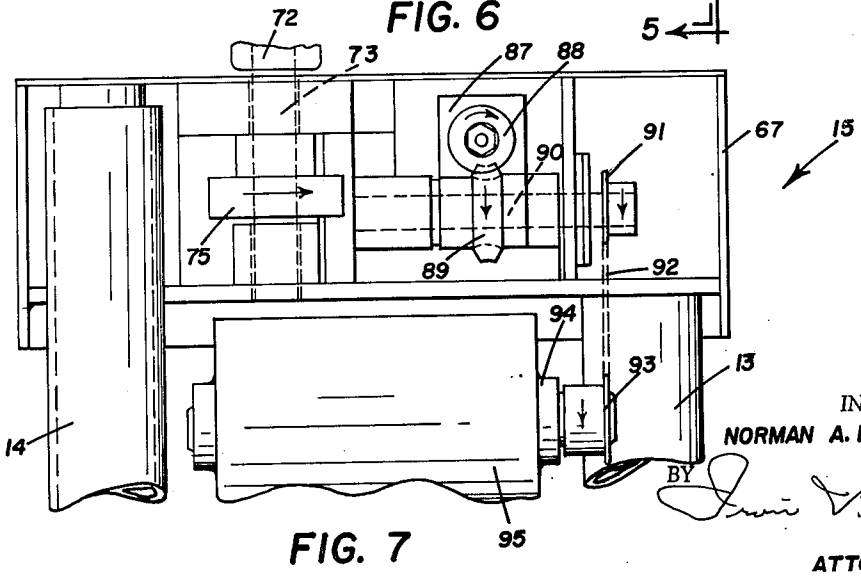


FIG. 7

INVENTOR.
NORMAN A. LEIBREICH
BY
ATTORNEY

Oct. 9, 1962 N. A. LEIBREICH 3,057,265

METHOD AND APPARATUS FOR PRODUCING A CONTAINER

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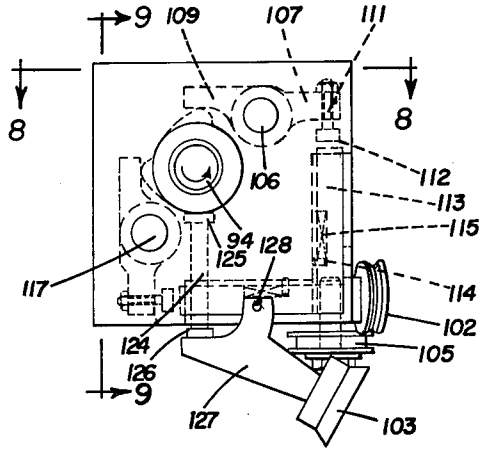


FIG. 10

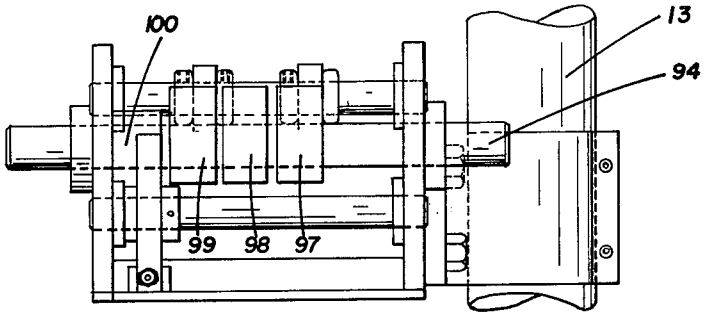


FIG. 9

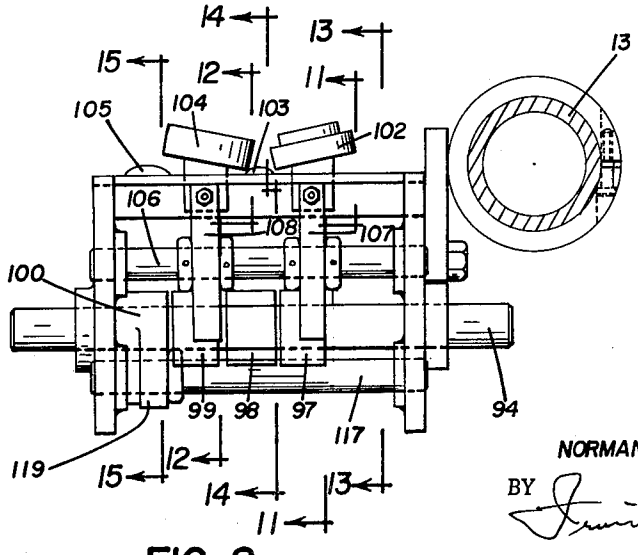


FIG. 8

INVENTOR.
NORMAN A. LEIBREICH
BY
ATTORNEY

Oct. 9, 1962 N. A. LEIBREICH 3,057,265

METHOD AND APPARATUS FOR PRODUCING A CONTAINER

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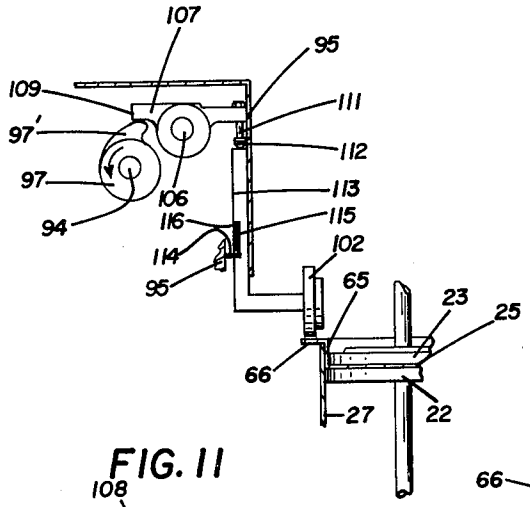


FIG. 11

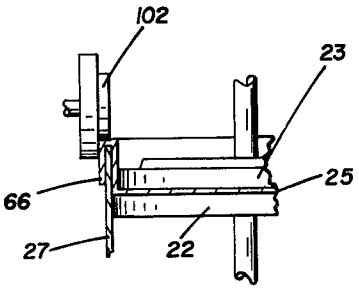


FIG. 11A

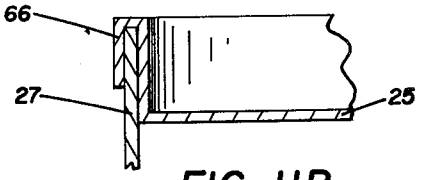


FIG. 11B

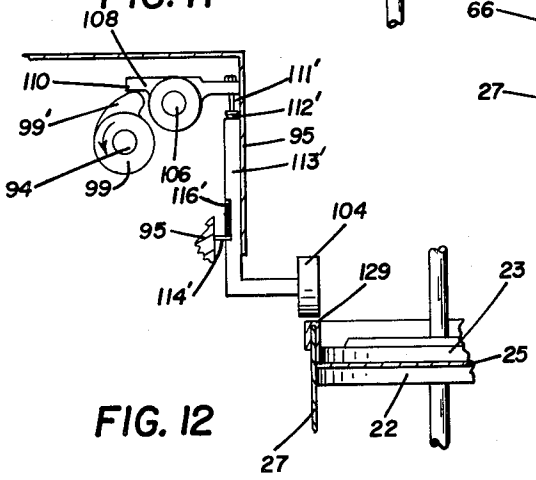


FIG. 12

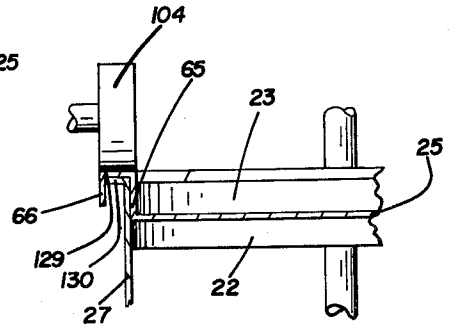


FIG. 12A

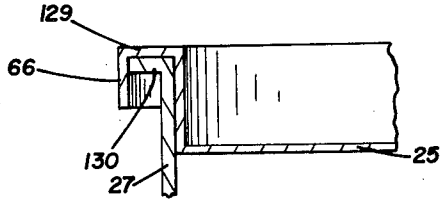


FIG. 12B

INVENTOR.
NORMAN A. LEIBREICH
BY
ATTORNEY

Oct. 9, 1962 N. A. LEIBREICH 3,057,265

METHOD AND APPARATUS FOR PRODUCING A CONTAINER

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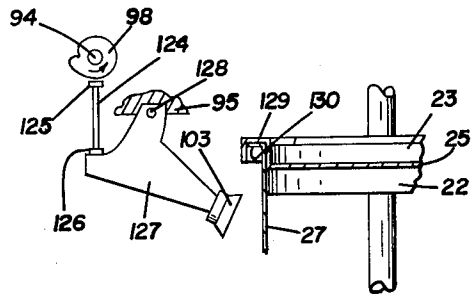


FIG. 13

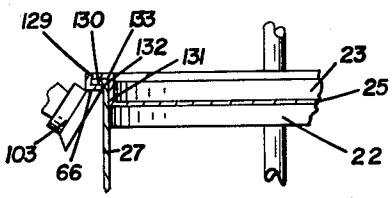


FIG. 13A

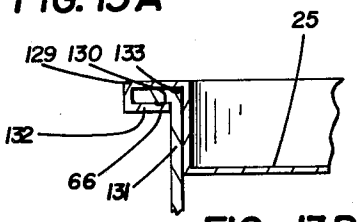


FIG. 13B

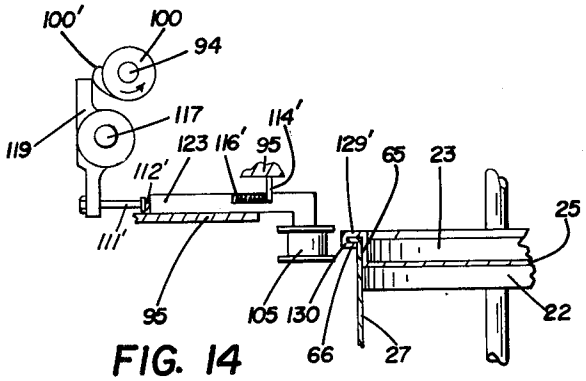


FIG. 14

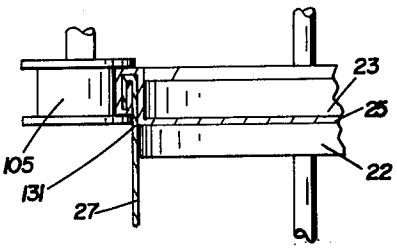


FIG. 14A

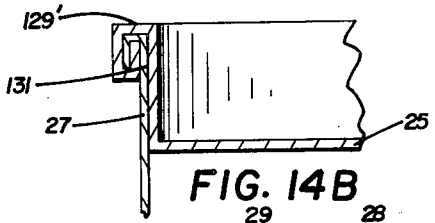


FIG. 14B

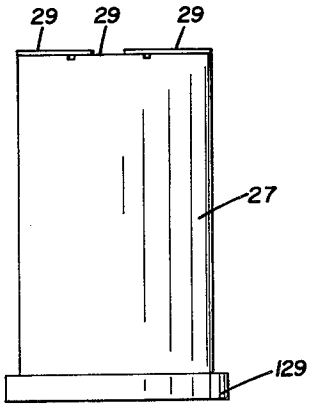


FIG. 16

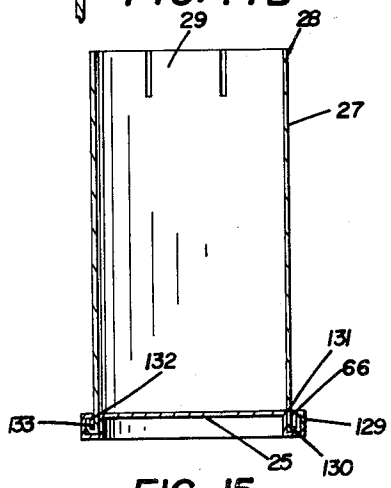


FIG. 15

INVENTOR.
NORMAN A. LEIBREICH
BY
ATTORNEY

United States Patent Office

3,057,265

Patented Oct. 9, 1962

3,057,265
METHOD AND APPARATUS FOR PRODUCING A CONTAINER

Norman A. Leibreich, Cincinnati, Ohio, assignor to The Mead Corporation, Dayton, Ohio, a corporation of Ohio

Filed June 3, 1959, Ser. No. 817,893
3 Claims. (Cl. 93—39.1)

This invention relates to an improved method and apparatus for securing the closure member on the open end of a container body.

Many attempts have been made to produce a sturdy container comprising a fiber container body having an open end and a closure member secured to the open end of the container body in such a manner that the closure member provides a bottom for the container and is adapted to support a relatively large weight and remain firmly secured to the container body. However, it has been found that a fiber bottom closure member is not readily suitable for such a container as the means for firmly securing the same to the open end of the container body is relatively expensive since the fiber closure member must be secured by stitching, stapling and the like to the container body. Further, such a container is not adapted to support a relatively large weight and the securing means provides small openings through which the contents of the container tend to seep out of the container when the contents comprise granular, powdered, or liquid products and the like. And the container industry for many years has been unsuccessfully attempting to utilize various closure members for securely closing fiber container bodies.

In order to secure a metal bottom closure member to an open end of a fiber container body, it has been found in the past, that the metal closure member can either be crimped to the open end of the container body or have an outer peripheral portion thereof folded and compressed between a flanged portion extending from the open end of the container body and an adjacent portion of the container body. However, some of the prior known methods for securing a metal closure member to a fiber container body produce structures wherein the fibers of the container bodies are weakened, deformed, broken and the like by the seaming operations and, therefore, result in inferior products.

It is an object of this invention to provide an improved method and apparatus for securing a closure member on the open end of such a container body.

Another object of this invention is to provide an improved method and apparatus for securing a closure member to the open end of a container body by simultaneously flanging the closure member and the open end of the container body and folding and compressing an outer peripheral portion of the closure member between the flanged portion of the container body and an adjacent section of the container body.

Other objects, uses and advantages of this invention will become apparent upon a reading of the following specification and the appended claims taken in conjunction with the accompanying drawings forming a part thereof and wherein:

FIGURE 1 is a perspective view of a seaming apparatus formed in accordance with the teachings of this invention;

FIGURE 2 is an exploded perspective view of a disassembled container, with or without score lines or with reverse score lines, formed in accordance with the teachings of this invention;

FIGURE 3 is a fragmentary front view of the lower portion of the apparatus illustrated in FIGURE 1;

FIGURE 4 is a fragmentary cross-sectional view of the

lower portion of the apparatus illustrated in FIGURE 1 and is taken on line 4—4 of FIGURE 3;

FIGURE 5 is a fragmentary cross-sectional view of the upper portion of the apparatus illustrated in FIGURE 1 and is taken on line 5—5 of FIGURE 6;

FIGURE 6 is a broken away top view of the apparatus illustrated in FIGURE 1 and is taken on line 6—6 of FIGURE 5;

FIGURE 7 is a fragmentary axial cross-sectional view of the top portion of the apparatus illustrated in FIGURE 1 and is taken on line 7—7 of FIGURE 6;

FIGURE 8 is a broken away top view of one of the components of the apparatus illustrated in FIGURE 1 and is taken on line 8—8 of FIGURE 10;

FIGURE 9 is a broken away end view of the component illustrated in FIGURE 8 and is taken on line 9—9 of FIGURE 10;

FIGURE 10 is a side elevation view of the component illustrated in FIGURE 8;

FIGURE 11 is a fragmentary cross-sectional view of the component of FIGURE 8 and illustrates a first die element, the view being taken on line 11—11 of FIGURE 8;

FIGURE 11A illustrates the die element of FIGURE 11 in the lowered position;

FIGURE 11B illustrates diagrammatically the results of the first seaming step in accordance with this invention;

FIGURE 12 is a view similar to FIGURE 11 illustrating a second die element and is taken on line 12—12 of FIGURE 8;

FIGURE 12A illustrates the die element of FIGURE 12 in the lowered position;

FIGURE 12B illustrates diagrammatically the results of the second seaming step in accordance with the invention;

FIGURE 13 illustrates a third die element and is taken on line 13—13 of FIGURE 8;

FIGURE 13A illustrates the die element of FIGURE 13 in its operating position;

FIGURE 13B illustrates diagrammatically the results of the third seaming step in accordance with the invention;

FIGURE 14 illustrates a fourth die element and is taken on line 14—14 of FIGURE 8;

FIGURE 14A illustrates the die element of FIGURE 14 in its operating position;

FIGURE 14B illustrates diagrammatically the results of the fourth seaming step in accordance with the invention;

FIGURE 15 is an axial cross-sectional view of an improved container formed in accordance with the teachings of this invention; and

FIGURE 16 is an elevation view of the container of FIGURE 15 and illustrates the same being closed.

Reference is now made to the accompanying drawings wherein like reference numerals are used throughout the various figures thereof to designate like parts where appropriate, and particular reference is made to FIGURE 1 illustrating a seaming apparatus formed in accordance with the teachings of this invention and generally indicated by the reference numeral **10**. The seaming apparatus **10** includes a frame, generally indicated by the reference numeral **11**, comprising a base member **12**, a pair of parallel cylindrical supports **13** and **14** extending vertically from the base member **12**, and a top member **15** carried at the upper ends of the supports **13** and **14**.

A lower support member, generally indicated by the reference numeral **16**, is pivotally connected to the base member **12** by a pair of opposed trunnions **17** extending outwardly from a frame **18** and being respectively received within suitable bearing supports **19** secured to the base member **12**. The frame **18** of the support **16** rotatably supports a shaft **20** carrying a substantially conically-shaped stock holding member **21** at the lower end thereof as shown in FIGURE 1 and a flat disc-like spring

loaded mandrel 22 at the upper end thereof. The lower support member 16 is adapted to cooperate with an upper support member 23 in a manner later to be described, the upper support member 23 comprising a rotatably driven disc-like mandrel 23 rigidly secured to a rotatably driven shaft 24 extending vertically downwardly from the top member 15. The seaming apparatus 10 illustrated in FIGURE 1 is adapted to secure a metal closure member 25 (see FIGURE 2) to an open end 26 of a cylindrical container body 27 which may, for example, comprise a cellulose fiber, glass fiber, certain metal or plastic materials. One example of the container body 27 illustrated has another opposed end 28 provided with a plurality of outwardly extending flaps 29 adapted to close the open end 28 in a manner described hereinafter.

As shown in FIGURES 3 and 4, the lower support member 16 is pivotally secured to the base member 12 by a pair of trunnions 17 carried by the frame 18 and being rotatably received within bearing supports 19 secured to the base member 12 by a plurality of bolts 30. In this manner, the lower support member 16 is adapted to be pivoted from the position illustrated in FIGURE 1 and in dashed lines in FIGURE 4 to the position illustrated in dotted lines in FIGURE 4. The support member 16 is also adapted to be raised vertically upwardly from the position shown in dotted lines in FIGURE 4 to the position shown in full lines in FIGURE 4 in the following manner.

As shown in FIGURE 4, the shaft 20 is rotatably carried in a sleeve 31 by a plurality of bearings 32. The sleeve 31 is slidably and telescopically received within a bore 33 passing through the frame 18. In this manner, the lower support member 16 is adapted to be rotated relative to the frame 18 when rotated in the bearings 32 and is also adapted to be moved vertically relative to the frame 18 by sliding the sleeve 31 relative to the frame 18.

The sleeve member 31 has a retainer 34 suitably secured to the lower end thereof. The retainer 34 carries a roller element 35 rotatably supported on a shaft 36 extending between a pair of ears or lugs 37 extending downwardly from the retainer 34. The roller element 35 engages an arcuately shaped end 38 of a lever 39 pivotally mounted on a shaft 40 carried by the base member 12. The other end 41 of the lever 39 extends through an opening 42 formed in the front of the base member 12 and serves as a foot pedal for raising and lowering the lower support member 16 in a manner later to be described.

A latch member 43 is pivotally connected by a pin 44 to the lever 39 and has an end 45 provided with a tang or latch projection 46 adapted to be received under a complementary tang or projection 47 formed on the base member 12 when the lever 39 is in the position illustrated in FIGURE 4. A spring 43' tends to rotate the latch member 43 into the locking position. The other end 48 of the latch member 43 projects through the aperture 42 in the base member 12 whereby the same can be unlatched from the tang 47 by pressing downwardly on the end 48 thereof. Therefore, when the support member 16 is in the vertical position and the end 41 of the lever 39 is pushed downwardly, the lower support member 16 is raised vertically by the end 38 of the lever 39 to the position illustrated in full lines in FIGURE 4 and the latch member 43 locks against the tang 47 by the action of the spring 43' whereby the support member 16 is maintained in the up position.

A counter-balancing spring 49 is connected at one end thereof to a pin 50 carried by a flange 51 suitably secured to the frame 19. The other end of the spring 49 is secured to the base member 12 by a pin 52. The spring 49 is so constructed and arranged that when the lower support member 16 is pivoted outwardly to the position illustrated in FIGURE 1, the weight of the support member 16 is sufficient to slightly overcome the force of the spring 49 and maintain the support member 16 in the position illustrated in FIGURE 1. However, the counter-balancing spring 49 has a sufficient force to maintain the support member 16 in the vertical position after the same has been pivoted to that position.

As shown in FIGURE 4, a sleeve 53 is telescopically disposed around the rotatable shaft 20 and is secured thereto in a predetermined telescoped position by a retainer 54 encompassing a splined end 55 of the sleeve 53 and being secured to the shaft 20 by a set screw 56. The stock holding member 21 is also telescopically disposed around the shaft 20 and the sleeve 53 and is provided with annular groove 57 adapted to telescopically receive the retainer 54 when the member 21 is in the position illustrated in full lines in FIGURE 4. A compression spring 58 is disposed between the member 21 and the sleeve 53 and tends to force the member 21 upwardly against the retainer 54. The member 21 is adapted to be moved vertically downwardly on the shaft 20 until an abutment 59 thereof engages a shoulder 60 formed on the sleeve 53.

The stock holding member 21 includes an annular cylindrical portion 61 and an outwardly and upwardly directed peripheral portion 62 interconnected therewith. As shown in FIGURES 1, 3, and 4, the cylindrical container body 27 is adapted to be telescoped onto the lower support member 16 in the manner illustrated in dotted lines in FIGURE 1 when the support member 16 is in the position illustrated. The open end 28 of the container body 27 rests against the peripheral portion 62 of the member 21 and the annular wall 61 is so constructed and arranged that the same closely receives the internal peripheral surface of the body 27 and maintains the container body 27 in its cylindrical shape. The annular wall 61 is of a sufficient length to encompass and prevent the flaps 29 thereof from buckling whereby the other open end 26 remains at a predetermined distance from the member 21.

When the container body 27 has been completely telescoped onto the lower support member 16, an annular section 63 thereof (see FIGURE 1) extends above the disc-like mandrel 22 which is preferably spring-loaded as shown in dotted lines, the mandrel 22 also closely engaging the internal peripheral surface of the container body 27 and maintaining the upper portion of the body in its cylindrical shape. In this manner, the support member 16 forces the container body 27 into the desired cylindrical shape. After the container body 27 has been telescoped onto the lower support member 16, a metal closure member 25 comprising a flat circular central portion 64, an annular vertically extending wall 65, and a radially outwardly extending peripheral portion 66, is assembled on the open end 26 of the container body 27 whereby the circular portion 64 and the annular wall 65 of the closure member 25 are closely received within the open end 26 of the container body 27. The outer peripheral portion 66 of the closure member 25 engages the open end 26 of the container body 27 and the central portion 64 is disposed slightly spaced from the disc-like mandrel 22.

When the closure member 25 has been assembled to the open end 26 of the container body 27 in the above manner, the lower support member 16 is pivoted to its vertical position and raised vertically upwardly by the lever 39 whereby the upper disc-like mandrel 23 is telescopically received within the annular wall 65 of the closure member 25 and forces the circular portion 64 of the closure member 25 into frictional engagement with the disc-like mandrel 22. The length of the rod 20 is so designed that when the assembled closure member 25 and container body 27 are raised upwardly against the disc-like mandrel 23, the mandrel 23 forces the closure member 25, container body 27, and member 21 downwardly relative to the shaft 20 until the central portion 64 of the closure member 25 makes contact with the lower spring loaded disc-like mandrel 22. The spring 58 is slightly compressed and tends to force the container body 27 and closure member 25 into fric-

tional engagement with each other and the closure member **25** into frictional engagement with the upper mandrel **23**. In this manner, the frictional engagement of the disc-like mandrels **22** and **23** with the closure member **25** and the frictional engagement between the closure member **25** and the container body **27** permits the disc-like member **23**, when rotated, to simultaneously rotate the closure member **25**, container body **27**, and the lower support member **16** relative to the frame **18** in a manner later to be described.

As shown in FIGURES 5 and 6, the top portion **15** of the apparatus **10** includes a frame **67** secured to the vertical rods **13** and **14**. A suitable motor **68** is secured to the rear portion of the frame **67** and has a drive shaft **69** projecting vertically therefrom. The shaft **69** carries a pulley **70** at one end thereof which is adapted to drive a continuous V-shaped belt **71** which passes over the pulley **70** and another pulley **72** spaced therefrom and carried on the end of a drive shaft **73** rotatably mounted in the frame **67** by bearing means **74**.

The shaft **73** drives a gear **75** interconnected therewith and meshing with a larger gear **76** splined at one end of the shaft **24** rotatably supported in the frame **67** and carrying the upper disc-like mandrel **23**.

The pulleys **70** and **72** and the gears **75** and **76** are designed to provide a desired speed of rotation of the disc-like mandrel **23** relative to the speed of rotation of the shaft **69** of the motor **68**.

A smaller gear **78** is carried on the shaft **24** below the gear **76** and meshes with an intermediate gear **79** supported on one end of a shaft **80** rotatably carried by the frame **67**. The intermediate gear **79**, in turn, meshes with a gear **81** secured to a shaft **82** rotatably supported by the frame **67** and carrying a bevel gear **84**. The bevel gear **84** meshes with another bevel gear **85** interconnected to a shaft **86** rotatably supported within a frame member **87**. The shaft **86** carries a worm gear **88** at the other end thereof which meshes with another worm gear **89** supported on a shaft **90** rotatably carried by the frame member **87**.

As shown in FIGURES 6 and 7, the shaft **90** carries a driving sprocket **91** at one end thereof which drives a suitable continuous chain or belt **92** passing over the sprocket **91** and another sprocket **93** spaced therefrom and secured to an end of a cam shaft **94** rotatably supported within a cam box **95**. In this manner, the gears **78, 79, 81, 84, 85, 88, 89** and driving chain **92** provide a desired speed of rotation of the cam shaft **94** relative to the speed of rotation of the disc-like mandrel **23**, the cam shaft **94** rotating at a lower speed than the speed of rotation of the mandrel **23**. It is to be understood, of course, that the various gear trains previously described could be modified in any manner without departing from the teachings of this invention as the same are merely illustrative of one means for rotating the disc-like mandrel **23** and the cam shaft **94** in a predetermined ratio.

As shown in FIGURES 8, 9, and 10, the cam shaft **94** carries a plurality of cams **97, 98, 99**, and **100**, disposed within the cam box **95** and being adapted to respectively operate a plurality of roller dies **102, 103, 104**, and **105**, in a manner later to be described.

A shaft **106** is carried by the cam box **95** and is disposed parallel to the rotatable cam shaft **94**. A pair of levers **107** and **108** are pivotally carried on the shaft **106** and have ends **109** and **110** respectively adapted to be engaged by the respective cam surfaces **97'** and **98'** of the cams **97** and **98** which causes the respective levers **107** and **108** to pivot about the shaft **106**. As shown in FIGURES 10 and 11, the lever **107** carries a pin **111** at the other end thereof, the pin **111** having a hemispherical end **112** adapted to engage a lever **113** carried by the cam box **95**. A pin **114** carried by the cam box **95** projects into a slot **115** formed in the lever **113** and thus limits vertical movement of the lever **113** relative to the cam box **95** and maintains the lever **113**

against the side of the cam box **95**. A compression spring **116** (see FIGURE 11) is disposed in the slot **115** of the lever **113** and engages the lever **113** at one end thereof and the pin **114** at the other end thereof whereby the compression spring **116** tends to maintain the lever **113** in the position illustrated in FIGURE 11. When the cam surface **97'** of the cam **97**, rotating in the direction illustrated by the arrow in FIGURE 11, causes the lever **107** to pivot about the shaft **106**, the lever **107** causes the lever **113** to move vertically downwardly whereby the roller die **102**, rotatably carried on the end of the lever **113**, is moved vertically downwardly into engagement with the assembled closure member **25** and container body **27** in a manner later described. After the cam surface **97'** of the cam **97** has rotated out of engagement with the lever **107**, the spring **116** returns the lever **113** and **107** to the position illustrated in FIGURE 11 whereby the roller die **102** is raised vertically out of engagement with the assembled closure member **25** and container body **27**.

The roller die **104** is operated in substantially the same manner as the roller die **102** and, therefore, the particular details of the lever arrangement will not be described. However, the particular elements for operating the roller die **104** are indicated by the same reference numerals with a prime in FIGURE 12.

A second shaft **117** is carried by the cam box **95** and is disposed spaced from and parallel to the rotatable cam shaft **94**. A lever **119** is pivotally mounted on the shaft **117** and is adapted to be pivoted about the shaft **117** by the cam surface **100'** of the cam **100** in substantially the same manner as the levers **107** and **108** previously described.

As shown in FIGURE 14, the lever **119** also carries a pin **111'** having a hemispherical end **112'** adapted to engage a horizontally movable lever **123** carried by the cam box **95** and being supported by the bottom of the cam box **95**, the lever **123** carrying the roller die **105**. The lever **123** is maintained in the position illustrated in FIGURE 14 by a pin **114'** and spring **116'** arrangement in the manner previously described.

As shown in FIGURES 10 and 13, a vertically movable pin **124** is carried by the cam box **95** and has one end **125** thereof adapted to be engaged by the cam surface **98'** of the cam **98** whereby the pin **124** is moved vertically downwardly relative to the cam box **95**. The other end **126** of the pin **124** projects from the cam box **95** and is adapted to engage a lever **127** pivotally conceted to the cam box **95** at **128**. In this manner, the lever **127** is adapted to be rotated about the pivot point **128** and carry the roller die **103** substantially vertically upwardly as shown in FIGURE 13.

The cams **97–100** are so constructed and arranged on the cam shaft **94** that the roller dies **102–105** are operated in a predetermined sequence and the respective cam surfaces **97'** and **100'** thereof move the respective roller dies **102–105** throughout predetermined distances.

The operation of the seaming apparatus **10** illustrated in FIGURE 1 will now be described. As previously stated, the container body **27** is mounted upon the lower support member **16** and the closure member **25** is assembled on the open end **26** thereof when the support member **16** is in the position illustrated in FIG. 1. After the closure member **25** has been assembled on the open end **26** of the container body **27**, the support member **26** is pivoted to its vertical position and raised vertically upwardly by the pedal **41** whereby the upper disc-like mandrel **23** is telescopically received within the annular wall **65** of the closure member **25** and compresses the closure member **25** between the disc-like mandrels **23** and **22** in the manner previously described.

The operator then starts the cycle of the seaming apparatus **10** by pressing suitable timing switching means **128** (see FIGURE 1) whereby the motor **68** is energized and drives the belt **71** and the various gear trains previ-

ously described in order to rotate the disc-like mandrel 23 and the cam shaft 94. The disc 23, now rotating, rotates the assembled closure member 25 and the container body 27 in unison relative to the frame 11 of the seaming apparatus 10.

The cam shaft 94 being rotated by its particular gear train, rotates the cam surface 97' of the cam 97 against the lever 107 whereby the roller die 102 is moved progressively and vertically downwardly into engagement with the outer peripheral portion 66 of the closure member 25. As shown in FIGURE 11A, and diagrammatically in FIGURE 11B, the roller die 102 bends a portion 129 of the outer peripheral portion 66 of the closure member 25 downwardly relative to the container body 27.

After the roller die 102 has performed its function, and the cam surface 97' of the cam 97 has rotated past the end 109 of the lever 107, the spring 116 returns the lever 113 vertically upwardly whereby the roller die 102 is moved vertically out of engagement with the closure member 25.

The cam surface 99' of the cam 99, rotating in the direction illustrated in FIGURE 12, then engages the end 110 of the lever 108 and causes the same to pivot about the shaft 106 whereby the lever 113' is moved vertically downwardly toward the closure member 25. The roller die 104 rotatably carried on the end of the lever 113' progressively engages the annular wall 65 of the closure member 25 and simultaneously bends a portion 129' of the annular wall 65 of the closure member 25 and a flanged portion 130 of the container body 27 to a substantial right angle relative to the container body 27 as shown in FIGURE 12A and diagrammatically in FIGURE 12B. The roller die 104 causes the flanged portion 129' of the closure member 25 and the flanged portion 130 of the container body 27 to be bent only in the region adjacent the top surface of the disc-like mandrel 23 whereby only the stock material interconnecting the flanged portion 130 to the container body 27 is bent.

After the roller die 104 has performed its function, the cam surface 99' of the cam 99 is rotated past its operating position whereby the spring 116' moves the lever 113' vertically upwardly and, thus, moves the roller die 104 vertically out of engagement with the closure member 25.

The cam shaft 94 then rotates the cam surface 98' of the cam 98 into engagement with the end 125 of the pin 124 whereby the pin 124 is moved vertically downwardly. The end 126 of the pin 124 pushes against the lever 127 and causes the same to be pivoted about the point 128 whereby the roller die 103, rotatably carried on the end of the lever 127, is moved substantially vertically upwardly. The roller die 103 is so constructed and arranged that the roller die 103 engages the portion 129 of the outer peripheral portion 66 of the closure member 25 and bends the same into parallel and concentric engagement with the flanged portion 130 of the container body 27 as shown in FIGURE 13A and diagrammatically illustrated in FIGURE 13B. In this manner, the portion 129 of the outer peripheral portion 66 of the closure member 25 is not cammed against the outer peripheral surface of the container body 27 as in the prior known methods. Further, the outer peripheral portion 66 has been fully disposed between the flanged portion 130 and an adjacent annular section 131 of the container body 27.

After the roller die 103 has performed its function, as described, the cam surface 98' of the cam 98 is rotated out of its operating position by the cam shaft 94 whereby the weight of the roller die 103 causes the lever 127 to pivot downwardly out of engagement with the outer peripheral portion 66 of the closure member 25.

The rotating cam shaft 94 then rotates the cam surface 100' of the cam 100 into engagement with the end of the lever 119 and causes the same to rotate about the shaft 117 whereby the lever 119 moves the lever 123 radially inwardly toward the assembled closure member 25 and the container body 27. The roller die 105 rotatably carried on the end of the lever 123 is so constructed and arranged that the same progressively engages the flanged portion 129' of the closure member 25 and compresses the flanged portion 129' of the closure member 25, the flanged portion 130 of the container body 27, the portion 129 of the outer peripheral portion 66 of the closure member 25, and the adjacent annular section 131 of the container body 27 together between the roller die 105 and the end of the disc-like mandrel 23 as shown in FIGURE 14A and diagrammatically in FIGURE 14B. The cam surface 100' of the cam 100 is designed to move the lever 123 radially inwardly toward the disc-like mandrel 23 a predetermined distance whereby the roller die 105 compresses the seamed portions of the assembled closure member 25 and the container body 27 into the desired compressed condition whereby leakage of contained fluid materials and the like is eliminated.

After the roller die 105 has performed its function as described, the cam surface 100' of the cam 100 is rotated out of its operating position by the cam shaft 94 whereby the spring 116' returns the lever 123 radially outwardly from engagement with the assembled closure member 25 and container body 27 to the position illustrated in FIGURE 14.

The switching means 128 includes a timing device, not shown, which terminates the supply of energy to the motor 68 after the fourth roller die 105 has completed its function whereby the apparatus 10 is automatically stopped.

When the apparatus 10 has completed its seaming cycle, the operator lowers the lower support member 16 by releasing the locking lever 43 from the tang 47 of the base member 12 whereby the support member 16 is lowered vertically to the position shown in dotted lines in FIGURE 4. After the support 16 has been lowered vertically, the same is pivoted outwardly to the position illustrated in FIGURE 1 whereby the assembled closure member 25 and container body 27 is removed from the lower support member 16. In this manner, the apparatus 10 is adapted to secure another closure member 25 on another container body 27 in the manner previously described.

Although the seaming apparatus 10 has been described as operating with certain manually operated steps, it is to be understood that it is contemplated that such steps could be performed automatically without departing from the scope of this invention.

As shown in FIGURE 15, the closure member 25 provides a bottom for the container body 27 and is rigidly and firmly secured thereto by the interlocked portions 129 and 66 of the closure member 25 and the portions 130 and 131 of the container body 27. The outer peripheral portion 66 of the closure member 25 is disposed between and in parallel and concentric engagement with the adjacent annular section 131 of the container body 27 and the flanged portion 130 of the container body 27 throughout the entire length of the flanged portion 130 of the container body 27. Further, the annular end 132 of the outer peripheral portion 66 of closure member 25 is disposed in abutting engagement with the fold 133 of the container body 27, the fold 133 being defined by the portion of the container body 27 joining the flanged portion 130 thereof to the adjacent annular section 131 of the container body 27.

Since the outer peripheral portion 66 of the closure member 25 is disposed in parallel and concentric engagement between the annular section 131 of the container body 27 and the flanged portion 130 thereof, the load imposed on the bottom closure member 25, when the product is disposed within the open end 28 of the container body 27, is borne evenly by the adjacent section 131 and the flanged portion 130 of the container body 27. Further, only the stock material of the container body 27 in the region of the fold 133 have been bent or deformed

whereas the load bearing flange portion **130** and the adjacent annular section **131** have not been weakened by the seaming operation. In this manner, the closure member **25** is adapted to support a relatively large weight.

One application of the assembled closure member **25** and container body **27** would be to fill the container body **27** with asphalt and the like through the open end **28** thereof whereby the flaps **29** at the open end **28** of the container body **27** are adapted to be folded over as shown in FIGURE 16 in order to close the container body **27**. Because the closure member **25** is secured to the container body **27** in the manner described above, the asphalt is not permitted to seep out of the container body **27** through the seam of the closure member **25** and the container is adapted to support the weight of the asphalt without splitting open.

While the seaming apparatus **10** has been described as operating with four roller dies to effectively secure a closure or bottom member to an open end of a container body, it is to be understood that the novel seaming features of this invention could be performed by various numbers and combinations of roller dies. In particular, the apparatus **10** could operate with five roller dies in the following manner. The first roller die would operate in the same manner as roller die **102** and simultaneously flange a portion of the closure member and a portion of the container body outwardly to an obtuse angle relative to the container body. The second roller die would operate in the same manner as the roller die **102** and bend the flanged portions of the closure member and container body to a right angle relative to the container body. The third roller die would simultaneously bend the outer peripheral portion of the closure member toward the container body and the flanged portions to an acute angle relative to the container body, the third roller die operating in the same manner as the roller die **105**. The fourth roller die would operate in the same manner as roller die **103** to bend the outer peripheral portion of the closure member into parallel and concentric engagement with the flanged portion of the container body. The fifth roller die operating in the same manner as roller die **105** would compress the flanged portion of the closure member, the flanged portion of the container body, the outer peripheral portion of the closure member, and an adjacent section of the container body together whereby the closure member is secured to the container body.

Therefore, it can be seen that there has been described an improved container having a metal closure member secured to a container body in a manner whereby the load bearing portion of the container body is not adversely deformed or broken in order to provide a container which will readily support a relatively large weight. It can be further seen that there has been described, an improved method and apparatus for producing such a container.

While the foregoing presents preferred embodiments of the present invention, it is obvious that other modifications and/or equivalents may be employed without departing from the scope of the invention, which is defined in the appended claims.

What is claimed is:

1. A method for securing a closure member having a circular central portion, an annular wall extending outwardly from said central portion and an outer peripheral portion extending radially outwardly from said annular wall, to an open end of a cylindrical container body comprising the steps of assembling said closure member on said open end of said body whereby said central portion and said annular wall of said closure member are disposed within said body and said outer peripheral portion engages said open end, folding said closure outer peripheral portion over the outer surface of said open end of said container body and substantially parallel to said closure annular wall, simultaneously outwardly flanging the upper portion of said annular wall of said closure member and a contiguous portion of said body, inwardly folding the margin of said outer peripheral portion to underlie the outwardly flanged upper portion of said container body, and simultaneously flattening said flanged portions and said underlying margin of said outer closure peripheral portion against said container body so as to produce interlocking reverse bends in both of the flanged portions of said closure member and said container body.

2. An apparatus for securing a closure member having a dished central portion outer peripheral portion secured to an open end of a container body comprising a frame, support means carried by said frame and being adapted to respectively carry said closure member and said body and maintain said closure member on said open end of said body with said dished portion embraced thereby, and roller means carried by said frame and being adapted to simultaneously flange a portion of the peripheral portion of said closure member and an end portion of said body and to fold said outer peripheral portion of said closure member between said flanged portion of said body and an adjacent section of said body to secure said closure member to said body, said support means including a first mandrel disc adapted to be telescopically received in said body and a second mandrel disc adapted to be telescopically received in both said dished central portion of said closure member and said body, in order to maintain said closure member clamped between said mandrel discs and on said open end of said body.

3. An apparatus as set forth in claim 2 wherein said roller means includes a plurality of movable roller dies connected to said frame, one of said dies being adapted to simultaneously flange said portions of said closure member and said body.

References Cited in the file of this patent

UNITED STATES PATENTS

2,367,419	Morrell	Jan. 16, 1945
2,389,534	O'Brien	Nov. 20, 1945
2,395,754	O'Neil	Feb. 26, 1946
2,633,095	Magill et al.	Mar. 31, 1953
2,651,977	Wilcox et al.	Sept. 15, 1953
2,794,584	Geist	June 4, 1957