United States Patent [19]

Von Bredow

[11] **3,740,821**

[45] **June 26, 1973**

[54] **METHOD FOR ASSEMBLING CONFECTION-SERVING CONTAINERS OF THE PUSH-UP TYPE**

[75] Inventor: **Hans D. Von Bredow**, Galena, Ohio

[73] Assignee: **Big Drum, Inc.**, Columbus, Ohio

[22] Filed: **Nov. 5, 1971**

[21] Appl. No.: **196,156**

[52] **U.S. Cl.** ..... **29/407**, 29/208 B, 29/453

[51] **Int. Cl.**... **B23q 17/00**, B23p 19/04, B23p 11/02

[58] **Field of Search** ..... 29/453, 208 B, 429, 29/407, 400

[56] **References Cited**

UNITED STATES PATENTS

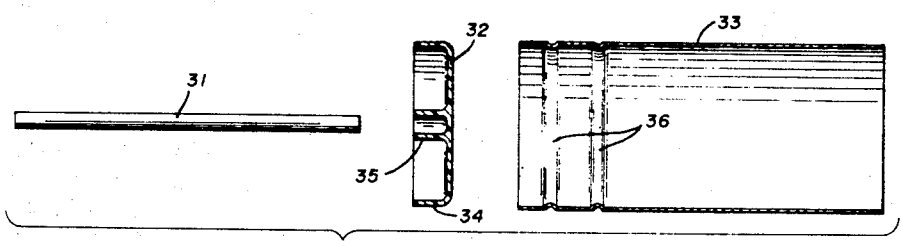
970,669	9/1910	Vallone et al.	29/208 B
2,852,899	9/1958	Murrell	29/208 B
3,251,260	5/1966	Serdechny	29/453 X
3,398,769	8/1968	Guenin	29/453 X
3,597,826	8/1971	Shields	29/208 B

Primary Examiner—Thomas H. Eager
Attorney—William V. Miller et al.

[57] **ABSTRACT**

A method for assembling a push-up type serving container consisting of three parts, namely, a tubular container body or cylinder for a confection or other edible substance, a piston for pushing the confection upwardly to expose it at the upper open end of the cylinder, and a separate actuating rod which fits into a downwardly-opening socket at the lower side of the piston and extends downwardly through the lower end of the cylinder. The tubular container body also has axially spaced piston-stop ribs on its inner surface. The assembly is made by successively mounting the piston on the stick, and then moving the piston into the tubular container body to angle it into position between the stop ribs.

4 Claims, 29 Drawing Figures



PATENTED JUN 26 1973

3,740,821

SHEET 01 OF 15

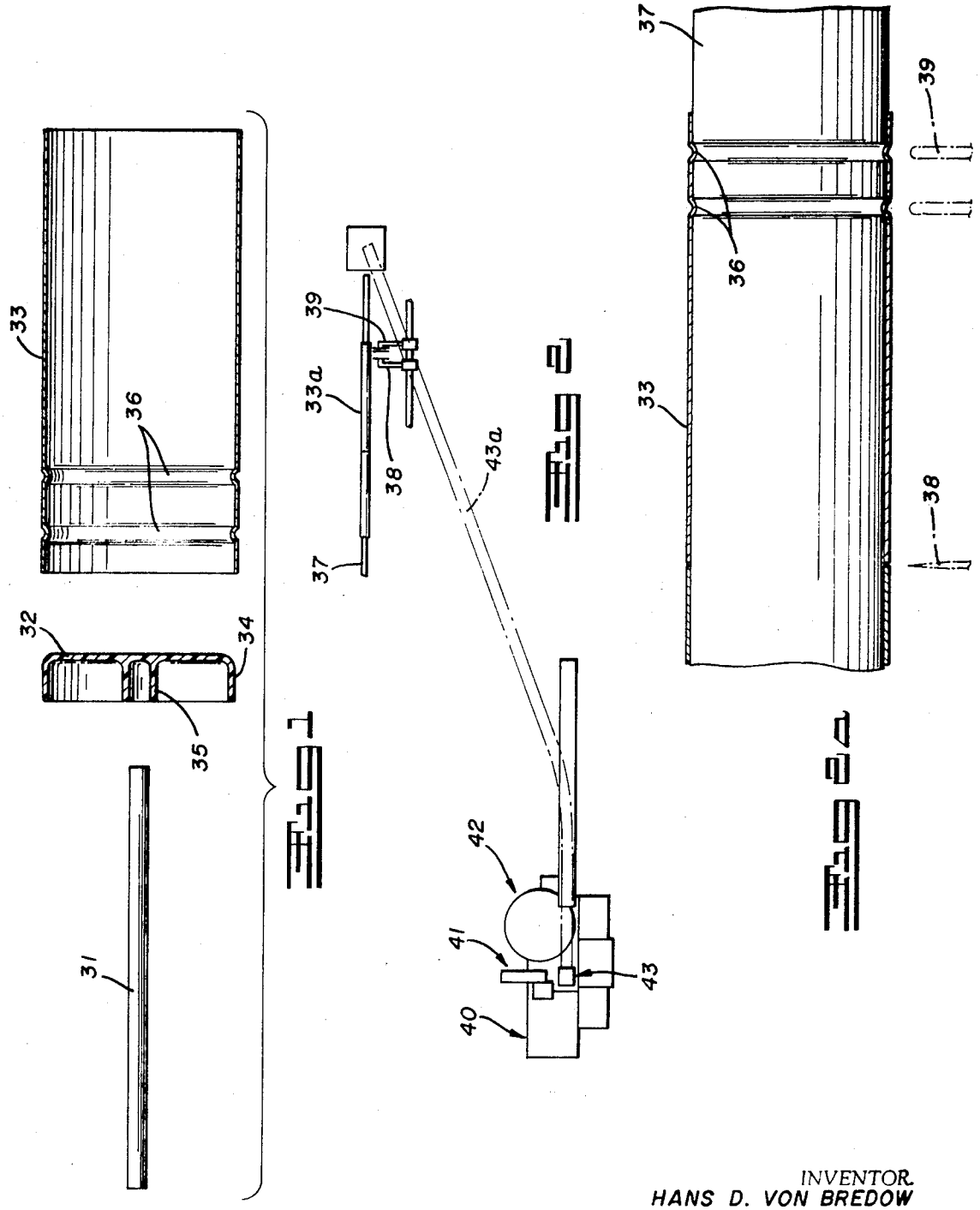


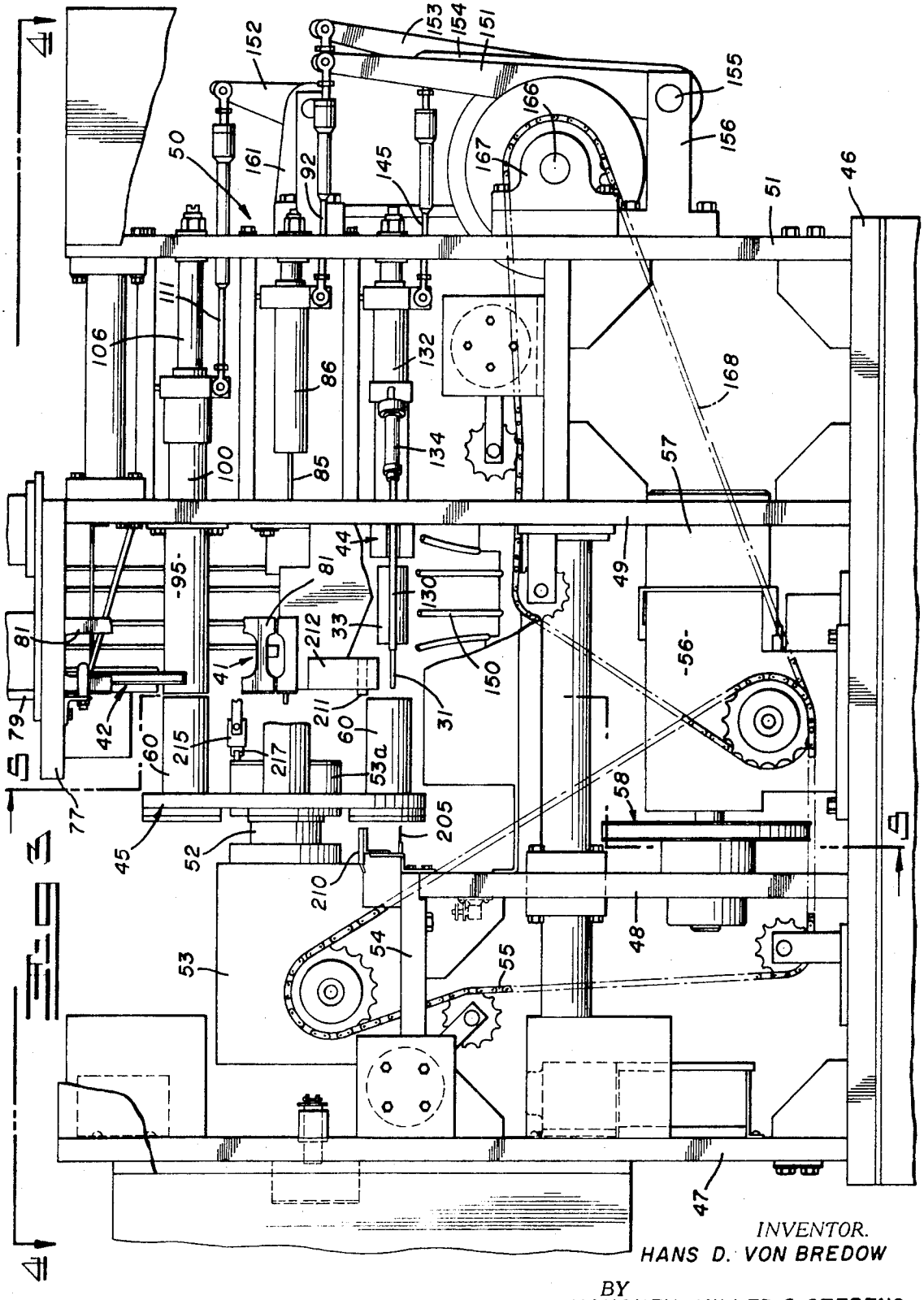
FIG 1

FIG 2

FIG 3

INVENTOR.
HANS D. VON BREDOW

BY
MAHONEY, MILLER & STEBENS
BY Wm. V. Miller
ATTORNEYS



INVENTOR.
HANS D. VON BREDOW

BY
MAHONEY, MILLER & STEBENS
BY
ATTORNEYS

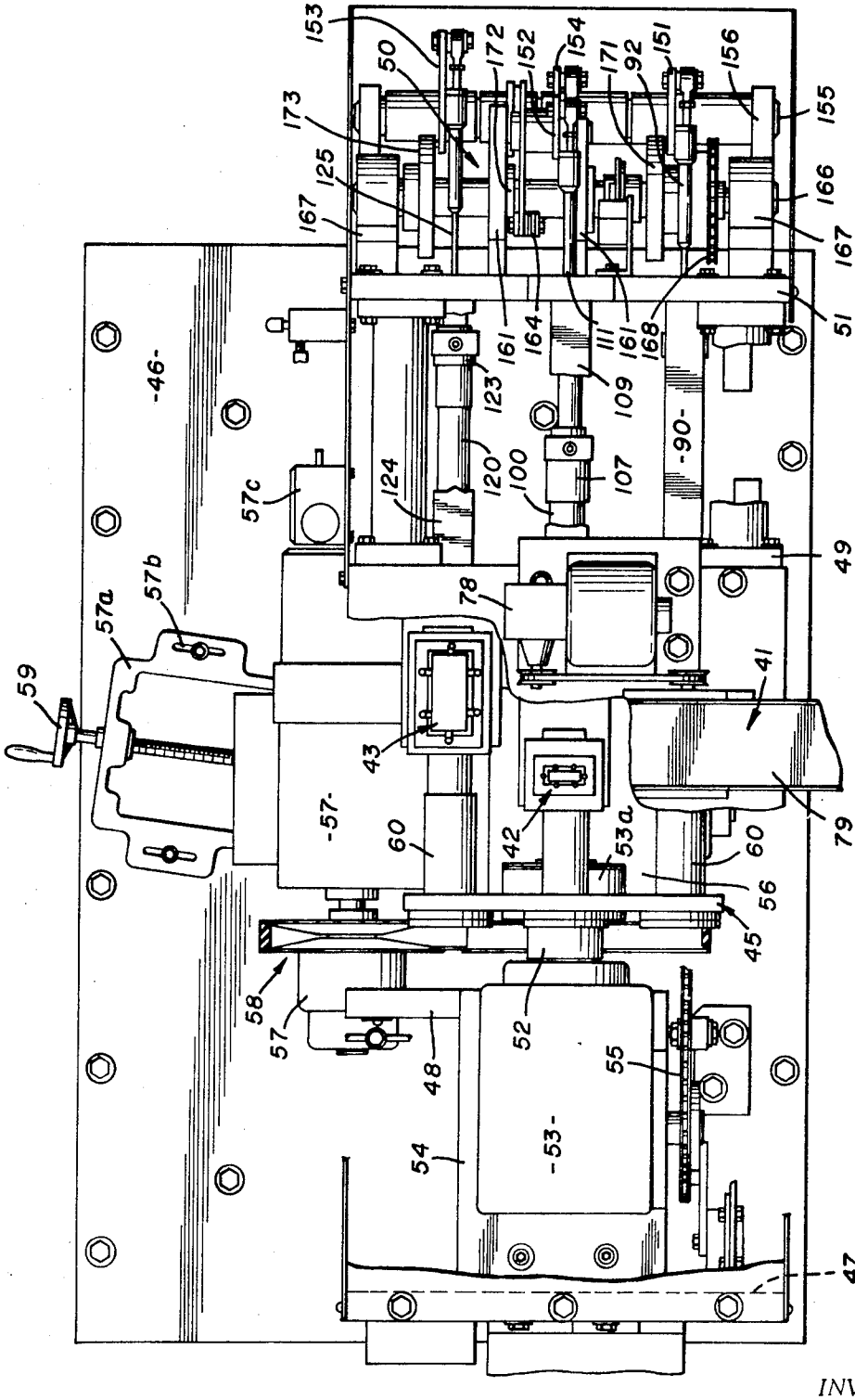
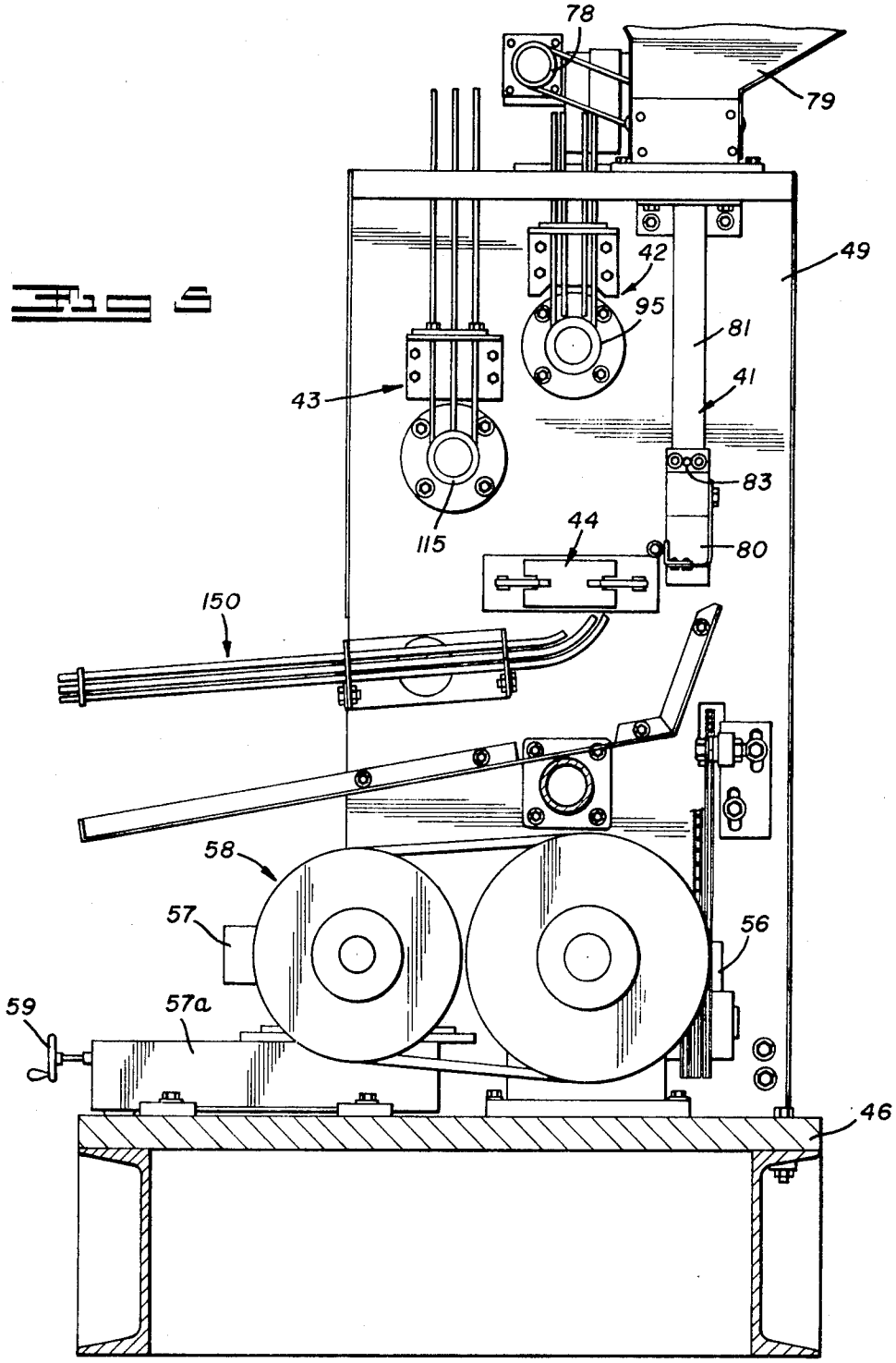


FIG. 4

INVENTOR.
HANS D. VON BREDOW

BY
MAHONEY, MILLER & STEBENS
BY Wm. V. Miller
ATTORNEYS

FIG 5



INVENTOR.
HANS D. VON BREDOW

BY
MAHONEY, MILLER & STEBENS
BY
ATTORNEYS

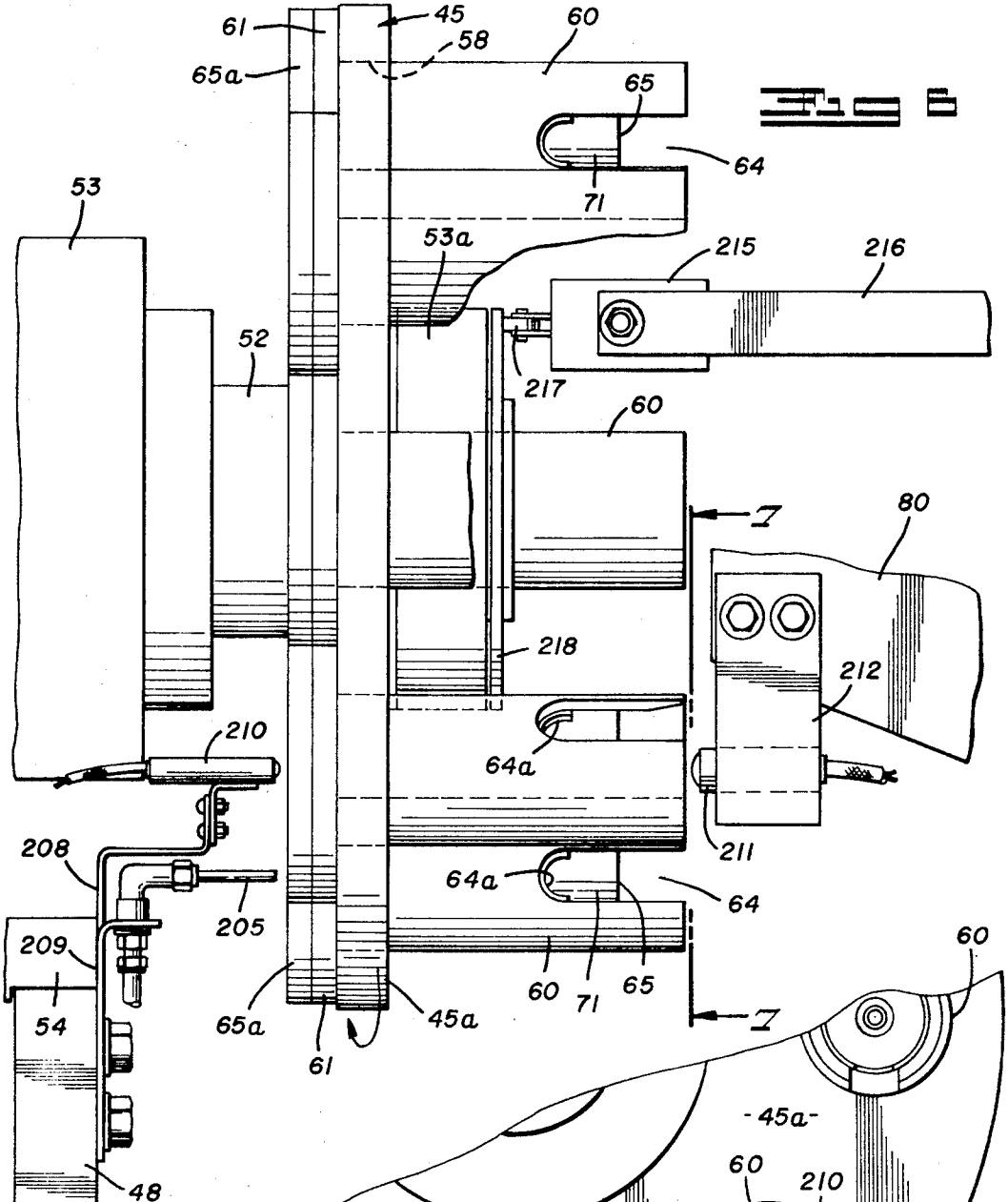


Fig 6

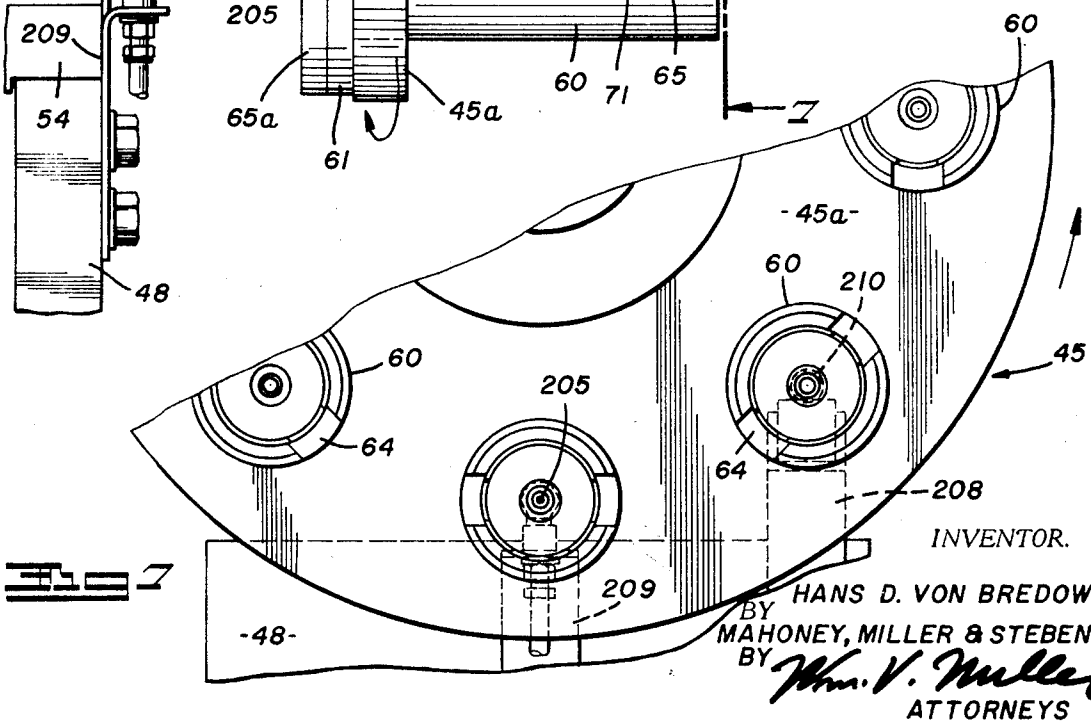
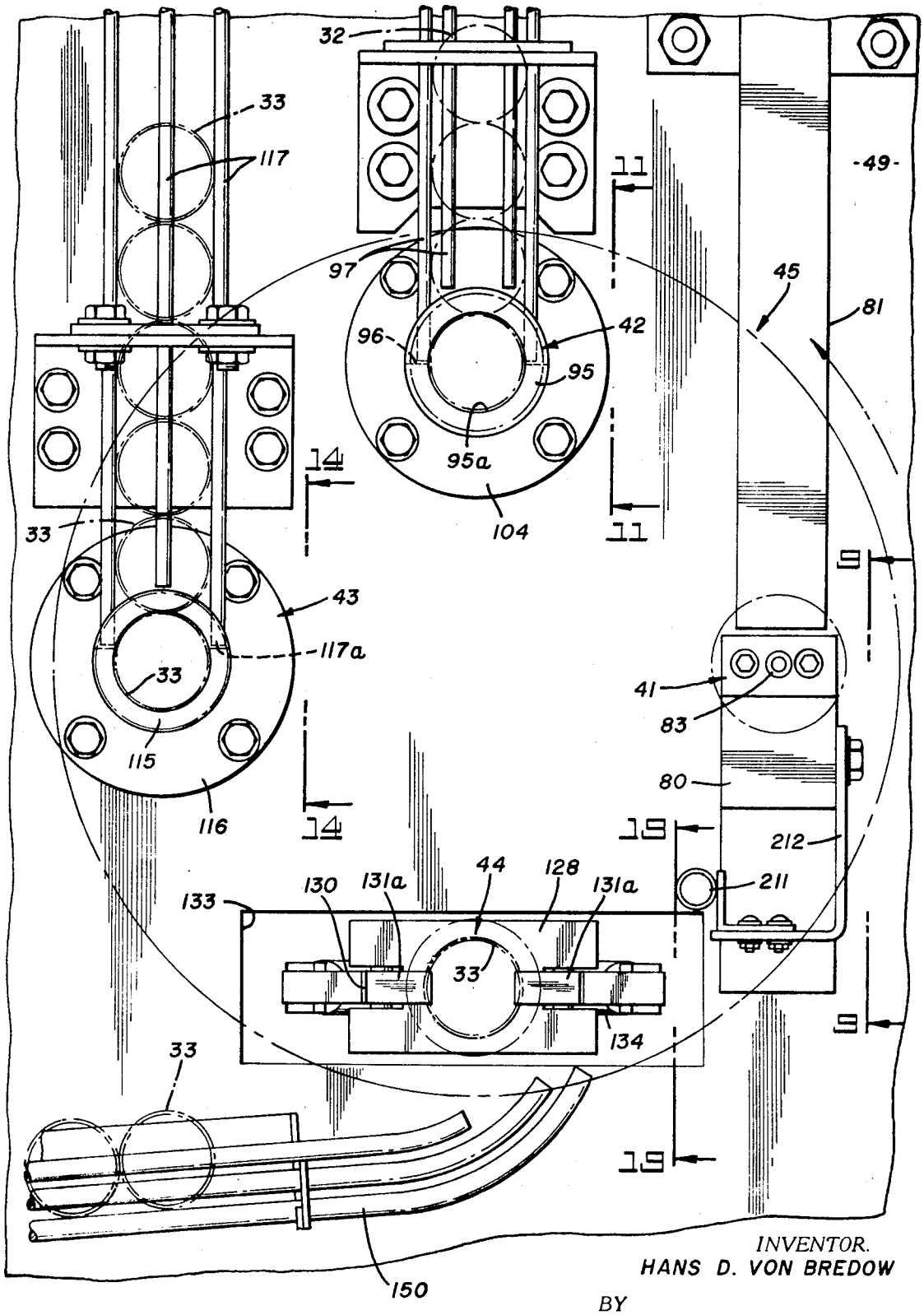


Fig 7

INVENTOR.
HANS D. VON BREDOW
BY MAHONEY, MILLER & STEBENS
BY Wm. V. Miller
ATTORNEYS



INVENTOR.
HANS D. VON BREDOW

BY
MAHONEY, MILLER & STEBENS
BY Wm. V. Miller
ATTORNEYS

Fig 8

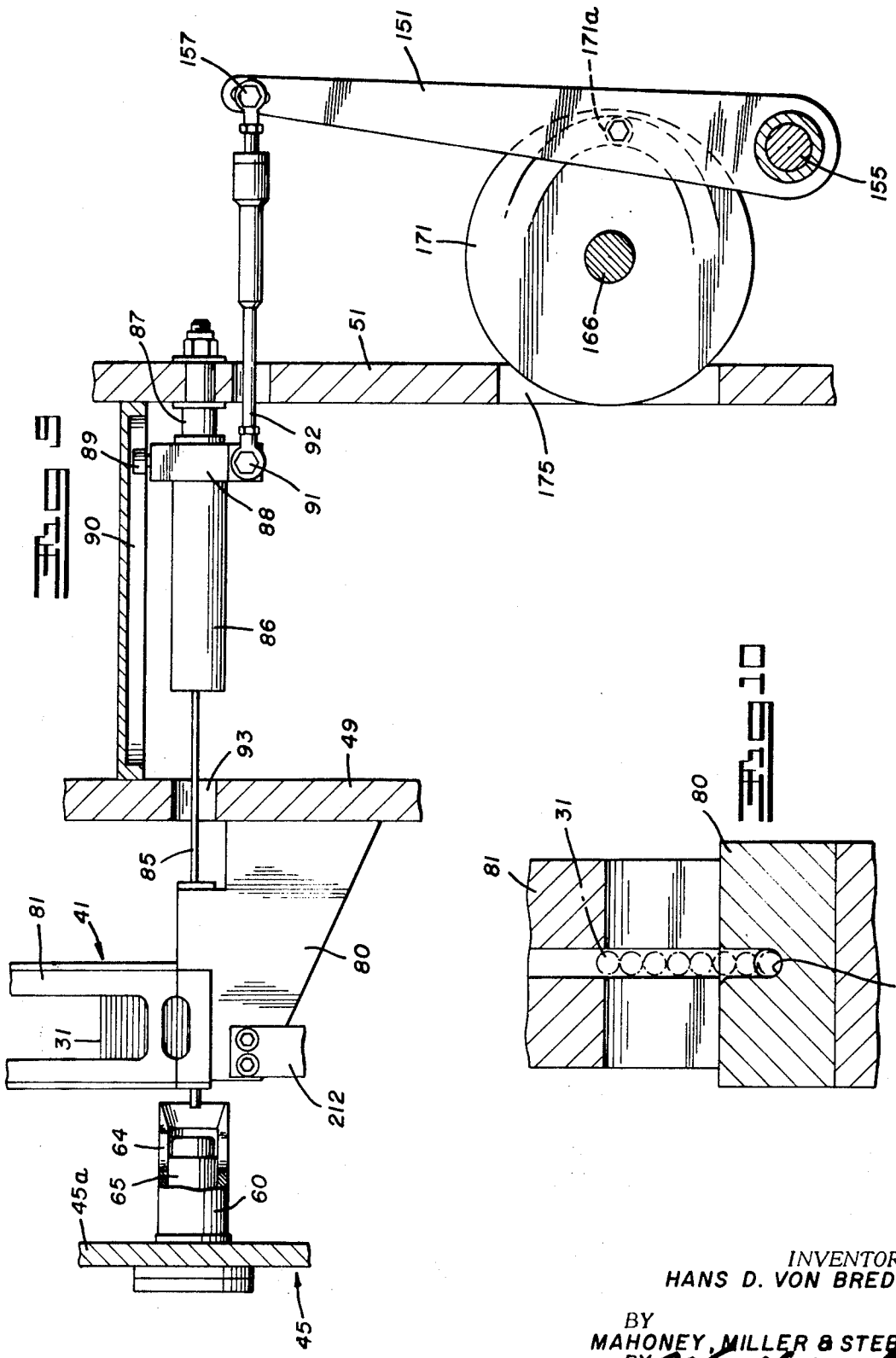


FIG 9

FIG 10

INVENTOR.
HANS D. VON BREDOW

BY
MAHONEY, MILLER & STEBENS
BY
ATTORNEYS

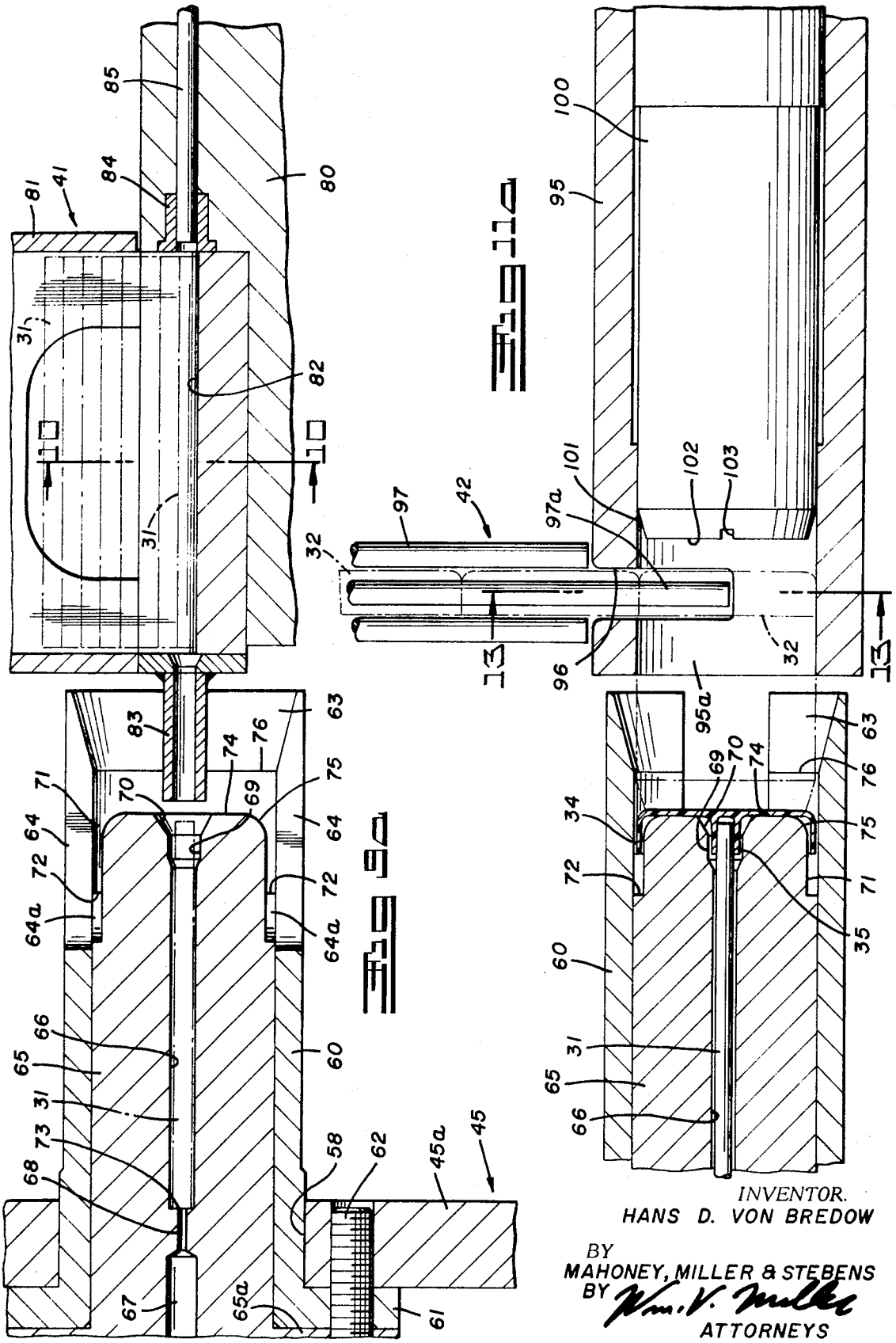


FIG. 11a

FIG. 9a

INVENTOR.
HANS D. VON BREDOW

BY
MAHONEY, MILLER & STEBENS
BY Wm. V. Miller
ATTORNEYS

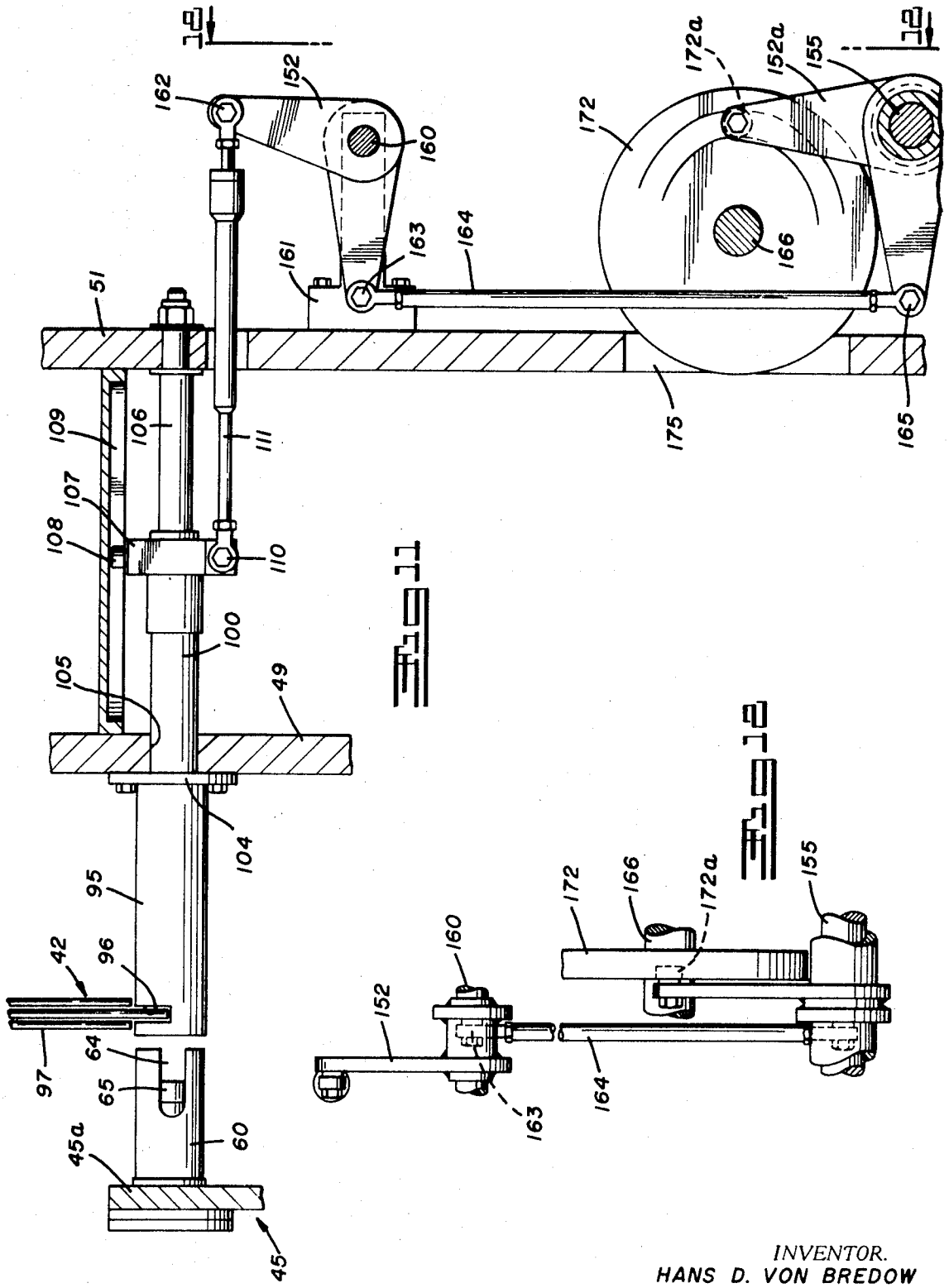


Fig 11

Fig 12

INVENTOR.
HANS D. VON BREDOW

BY
MAHONEY, MILLER & STEBENS
BY Wm. V. Miller
ATTORNEYS

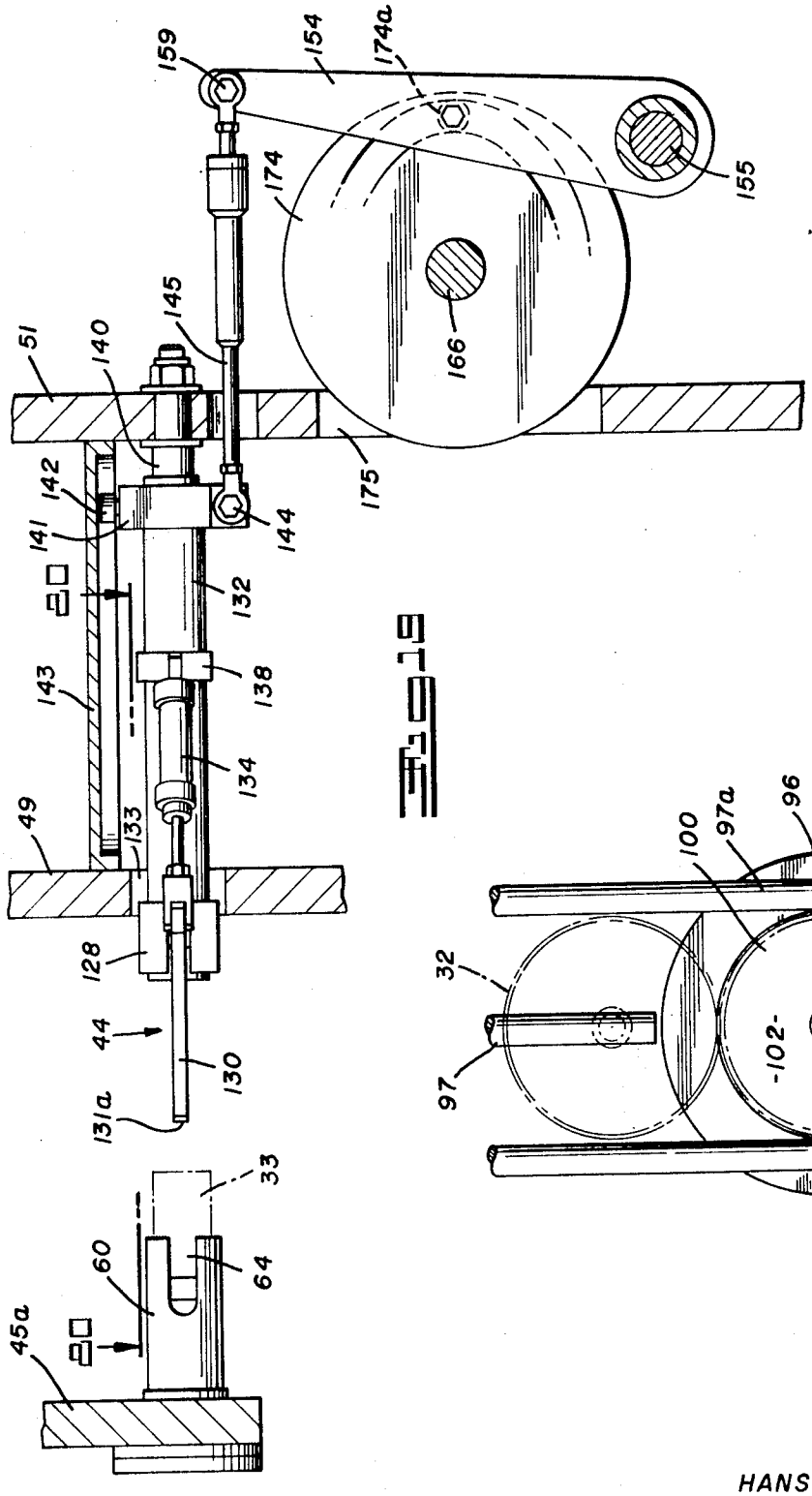


FIG 1B

FIG 1A

INVENTOR.
HANS D. VON BREDOW

BY
MAHONEY, MILLER & STEBENS
BY Wm. V. Miller
ATTORNEYS

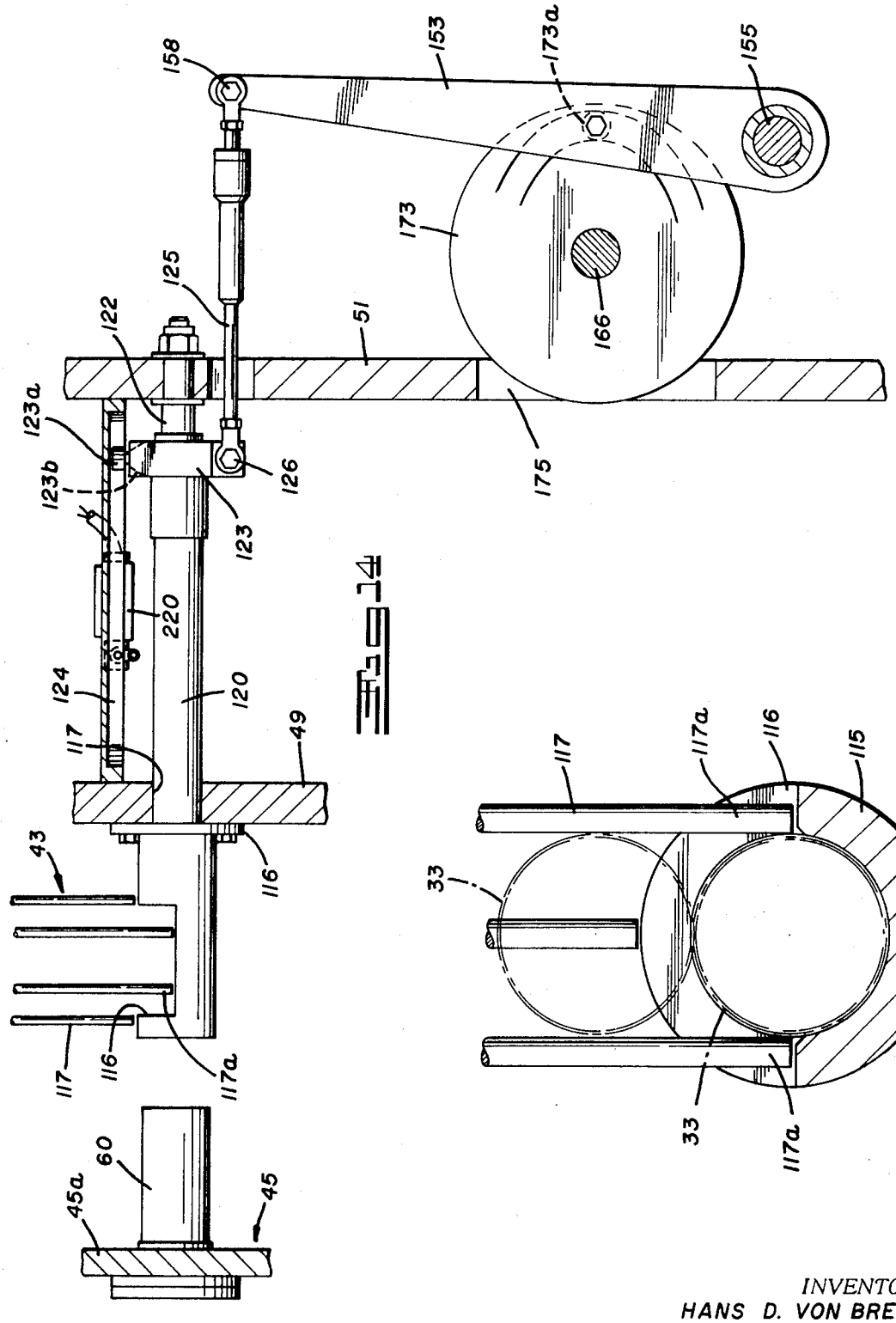
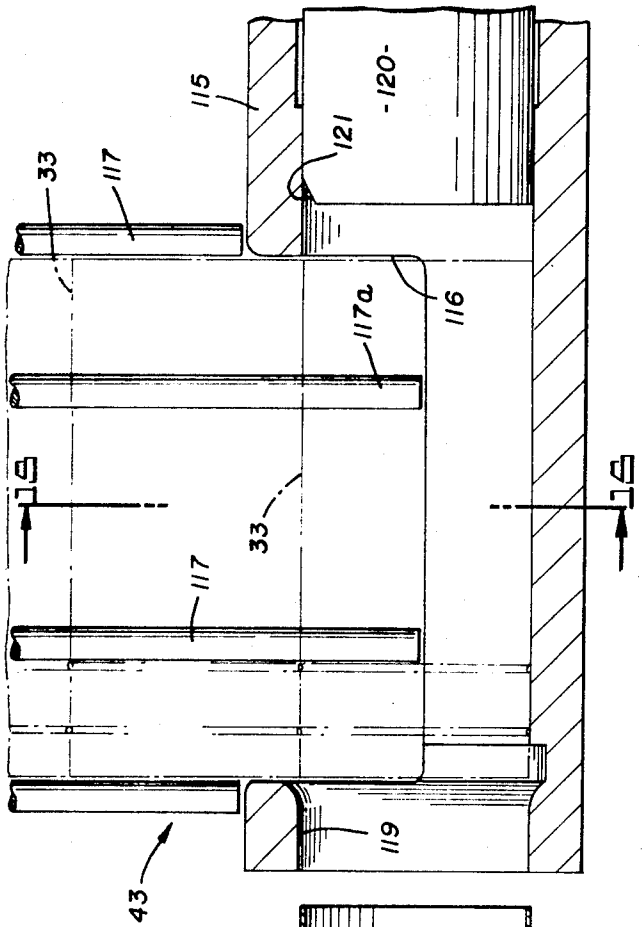


Fig. 14

Fig. 15

INVENTOR.
HANS D. VON BREDOW

BY
MAHONEY, MILLER & STEBENS
BY Wm. V. Miller
ATTORNEYS



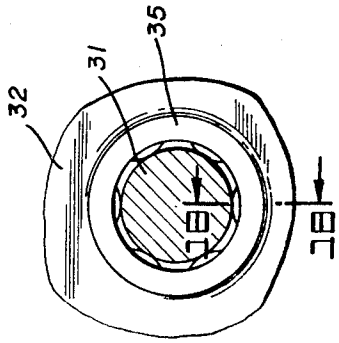


FIG 17

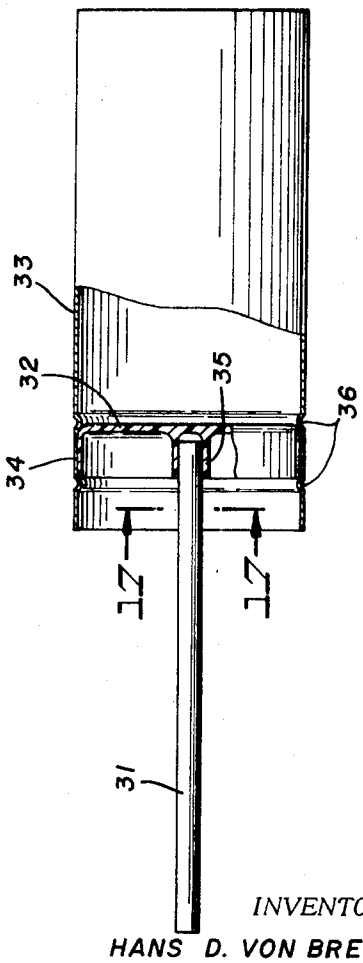


FIG 16

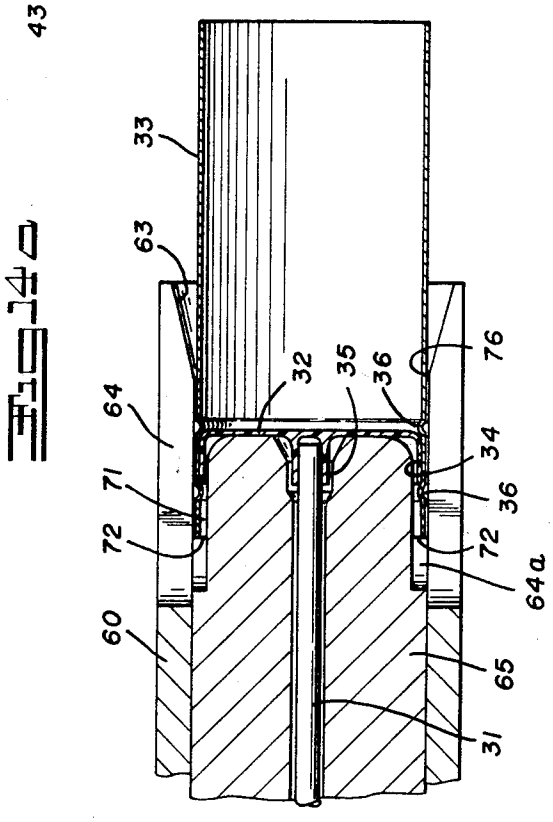


FIG 14a

INVENTOR.
HANS D. VON BREDOW
BY
MAHONEY, MILLER & STEBENS
BY Wm. V. Miller
ATTORNEYS

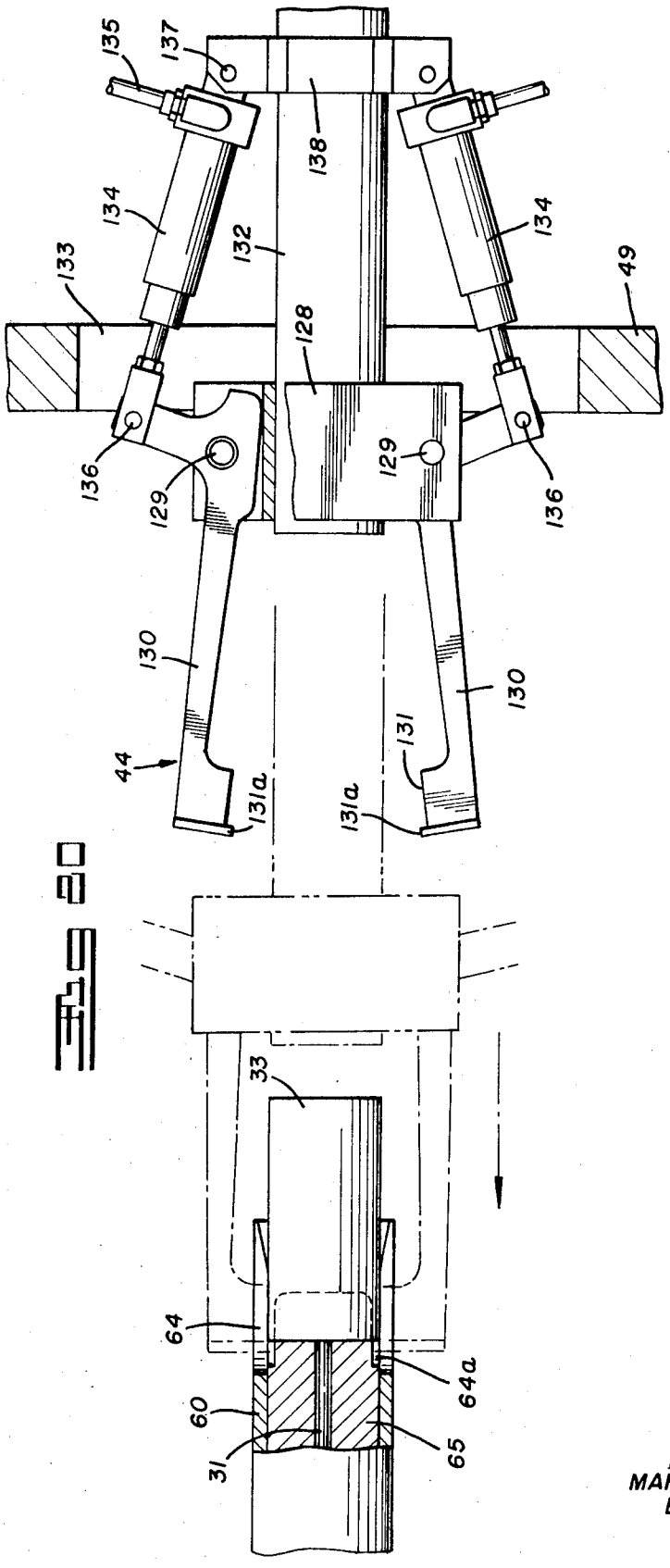


FIG 20

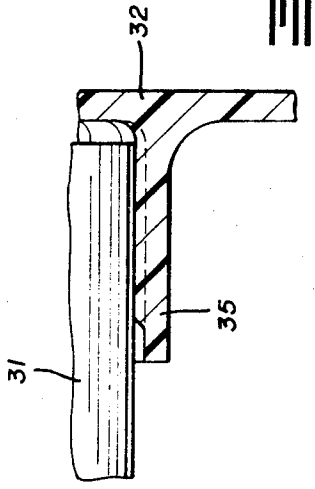


FIG 18

INVENTOR.
HANS D. VON BREDOW

BY
MAHONEY, MILLER & STEBENS
BY Wm. V. Miller
ATTORNEYS

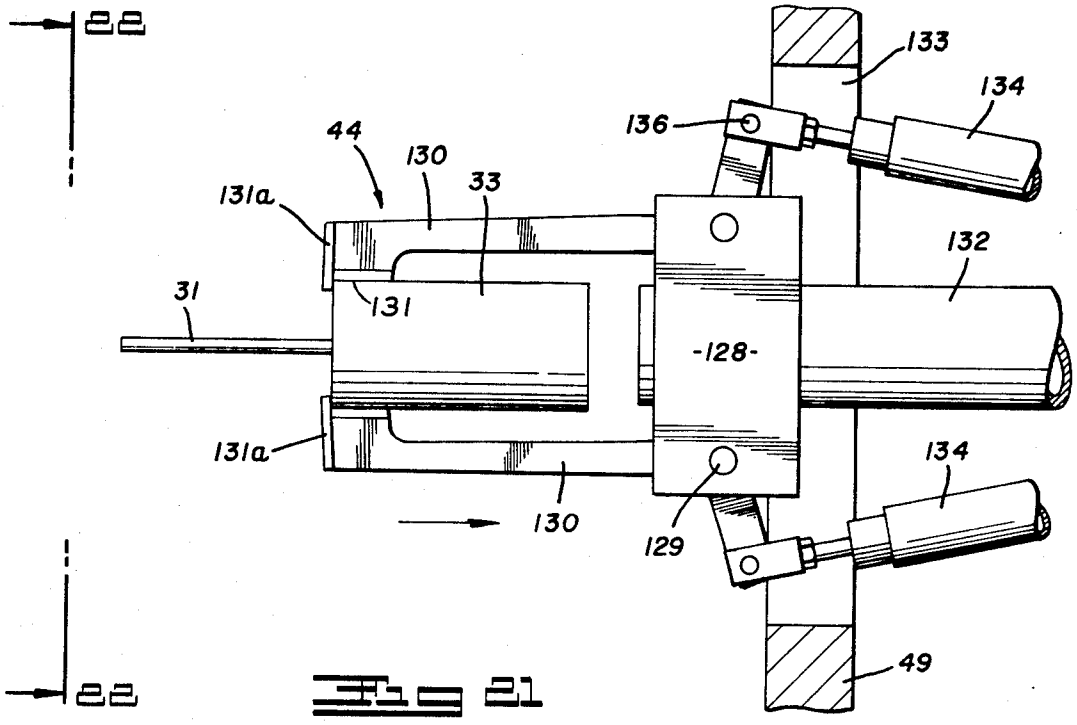


Fig 21

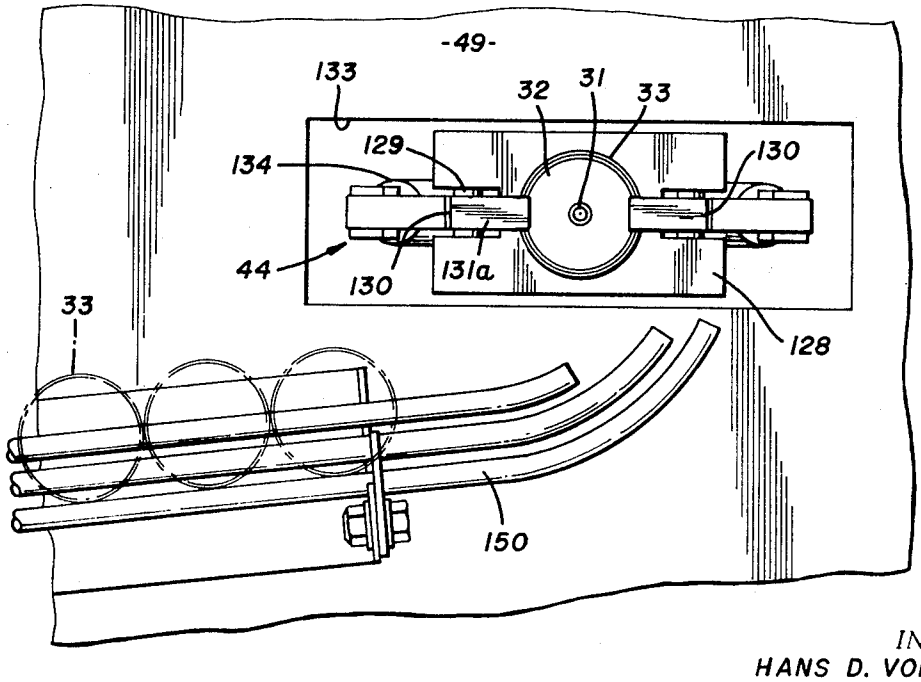


Fig 22

INVENTOR.
HANS D. VON BREDOW

BY
MAHONEY, MILLER & STEBENS
BY Wm. V. Miller
ATTORNEYS

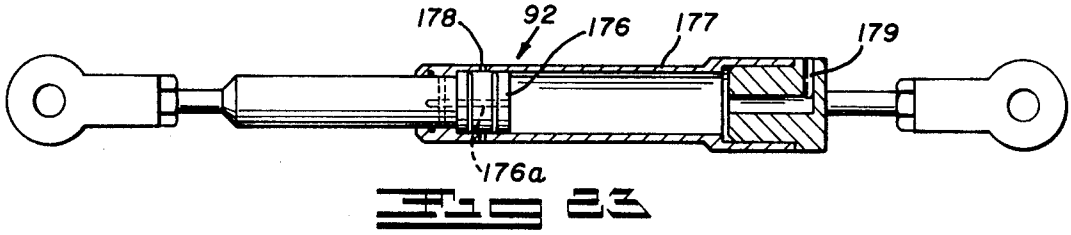


FIG 23

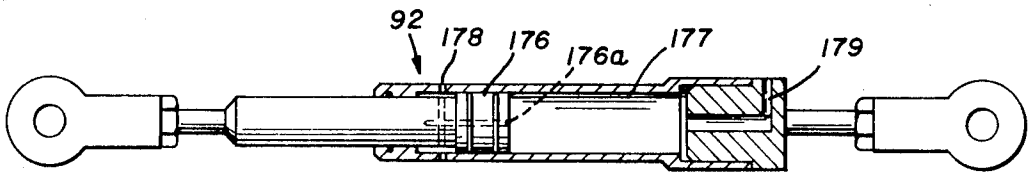


FIG 24

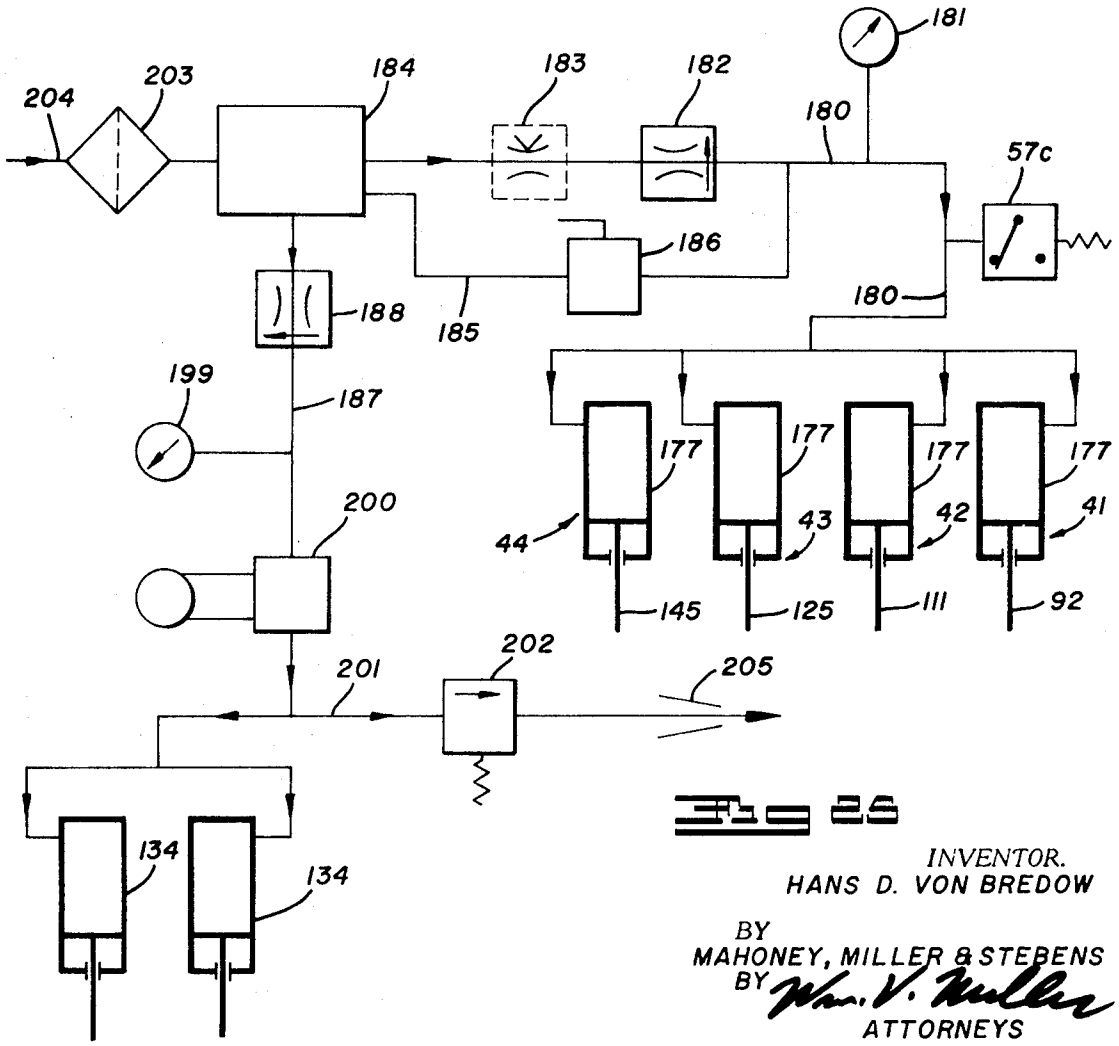


FIG 25

INVENTOR.
HANS D. VON BREDOW

BY
MAHONEY, MILLER & STEBENS
BY Wm. V. Miller
ATTORNEYS

METHOD FOR ASSEMBLING CONFECTION-SERVING CONTAINERS OF THE PUSH-UP TYPE

In the last several years, an individual serving container knows as a "push-up" container has become popular in providing individual servings of frozen confections and other edible substances. These containers have taken various forms, but one that has become quite popular recently consists of an annular tubular body of cylinder with open upper and lower ends which is designed to receive the confection, a piston which fits below the confection in the cylinder and is slidable upwardly to push the confection to gradually completely expose it at the upper end of the cylinder, and an actuating stick or rod which has its upper end fitting in a downwardly-opening socket in the piston and extends from the lower end of the cylinder. These three members are manufactured separately and must be assembled into the complete package before receiving the confection or other product to be sold and served. It has been customary to do this assembling by hand which requires considerable time and labor thereby resulting in a more costly package. Furthermore, handling by personnel is undesirable for sanitary reasons.

The present invention provides an automatic process for assembling the three parts of a push-up container of the type indicated thereby resulting in a less costly package. The machine described herein which is used for performing the method is completely automatic in feeding the parts successively into an assembling chamber, properly orienting the parts relatively in that chamber, and removing the properly assembled container from that chamber. Therefore, the parts are not contacted by the hands of the operator and sanitation is ensured. Safety means are preferably provided on the machine for stopping its operations if there is any jamming of parts in the chamber during assembly or if all parts of the assembled container are not removed from the chamber after assembly.

The best mode contemplated in carrying out this invention is illustrated in the accompanying drawings in which:

FIG. 1 is a schematic axial sectional view showing the three parts to be assembled into the push-up container.

FIG. 2 is a plan view illustrating schematically apparatus used according to the method of this invention in producing the push-up container assembly.

FIG. 2*a* is an axial sectional view through a tube used in producing the tubular portion of the container assembly and indicating schematically how a pair of annular piston stop ribs is formed at a predetermined axial position on the interior thereof.

FIG. 3 is a side elevational view, partly cut away, of a push-up container assembling machine for assembling the three parts of the container assembly according to the method of this invention.

FIG. 4 is a plan view, partly cut away, of the assembling machine, taken from the position indicated at line 4—4 of FIG. 2.

FIG. 5 is a transverse vertical sectional view taken along line 5—5 of FIG. 3 shwing the various units for feeding the three parts into the successive receiving chambers of the indexing table and for removing the container assemblies successively therefrom.

FIG. 6 is an enlarged side elevational view, partly cut away, of the indexing table assembly.

FIG. 7 is a view of a portion of the indexing table looking into the container parts receiving and assembling chambers thereof and taken from the position indicated at line 7—7 of FIG. 6.

FIG. 8 is an enlarged view of the various units shown in FIG. 5 and illustrating schematically the position of the indexing table relative thereto and its direction of rotation.

FIG. 9 is an enlarged vertical sectional view taken along line 9—9 of FIG. 8 and showing the stick-feeding unit.

FIG. 9*a* is an enlarged axial sectional view through one of the parts-receiving and assembling chambers of the indexing table and showing in section the associated lower end of the stick-feeding unit.

FIG. 10 is a sectional view taken along line 10—10 of FIG. 9*a*.

FIG. 11 is an enlarged sectional view taken along line 11—11 of FIG. 8 and showing the piston-feeding unit.

FIG. 11*a* is an enlarged axial sectional view showing the indexing table chamber which has previously received a stick, loaded with a piston from the piston-feeding unit, the lower end of which is shown in axial section in cooperation therewith.

FIG. 12 is an elevational view of the piston-feeding unit taken from the position indicated at 12—12 of FIG. 11.

FIG. 13 is a sectional view taken along line 13—13 of FIG. 11*a*.

FIG. 14 is an enlarged sectional view taken along line 14—14 of FIG. 8 and showing the tube-feeding unit.

FIG. 14*a* is an axial sectional view taken through the indexing table chamber in which a stick and piston were previusly assembled, with a tube from the tube-feeding unit inserted therein, the lower end of such unit being shown in axial section in cooperation therewith.

FIG. 15 is a sectional view taken along line 15—15 of FIG. 14*a*.

FIG. 16 is an axial sectional view, partly cut away, of the final container assembly.

FIG. 17 is an enlarged transverse section taken along line 17—17 of FIG. 16.

FIG. 18 is an enlarged sectional view taken along line 18—18 of FIG. 17.

FIG. 19 is an enlarged sectional view taken along line 19—19 of FIG. 8 and showing the container assembly removal tong unit.

FIG. 20 is a horizontal sectional view taken along line 20—20 of FIG. 19 and illustrating schematically the action of the removal unit.

FIG. 21 is a similar horizontal sectional view of the removal unit showing the container assembly gripped thereby and removed from the indexing table chamber.

FIG. 22 is an end elevational view taken from the position indicated at line 22—22 of FIG. 21.

FIG. 23 is an axial sectional view through one of the cylinder and piston-type actuating rods, with the rod shown in extended condition.

FIG. 24 is a similar view, but showing the rod in collapsed condition.

FIG. 25 is a schematic illustration of the air system of the machine.

With reference to FIG. 1 of the drawings, the container parts to be assembled are indicated as consisting of a stick 31, a piston 32 and a tube 33. The stick 31 which may be of any suitable material, usually a plastic, is of considerable length and of solid annular or tubular

cross-section. The piston **32** is also usually of plastic and is of annular cup-like form with an annular flared flexible skirt **34** and a concentric ribbed socket **35** for receiving one end of the stick **31**, which will have a tight fit therewith when forced axially therein. The tube **33** may be of any suitable material, such as paper or plastic, being of annular hollow cross-section and open at both ends. The tube is of such a diameter that the piston **32** will tightly fit in sealing relationship therein but can be moved axially thereof under suitable force.

The three parts are manufactured separately for subsequent assembling into the container. Various manufacturing methods can be used. A particular form of tube **33** is illustrated which is provided with a pair of axially spaced annular stop ribs **36** on the interior thereof adjacent one of the open ends thereof. This arrangement provides additional problems in assembling the three parts, but it is to be understood that this invention is not necessarily limited to this type of tube. As indicated, the tube may be produced in various ways, such as illustrated in FIG. **2**, where a long tube section **33a** is severed into suitable lengths, while it is supported on a mandrel **37**, by a unit **38** and simultaneously the ribs **36** are rolled therein by a roller unit **39**. The enlarged schematic view of FIG. **2a** illustrates this action more clearly.

A preferred machine for assembling the three parts of the container according to the method of this invention is illustrated schematically in FIG. **2** at **40**. The sticks **31** will be supplied by a stick-feeding unit **41** on the machine **40**, the pistons **32** will be supplied by a piston-feeding unit **42** on the machine, and the tubes **33** will be supplied by a tube-feeding unit **43** on the machine. The units **41**, **42** and **43** of the machine **40** are indicated schematically in FIG. **2**. The tubes **33** will be supplied to the tube-feeding unit **43** on the machine by a suitable conveyor **43***a*. The assembling machine **40** is illustrated in detail in most of the remaining figures of the drawings.

With reference mainly to FIGS. **3**, **4** and **5**, it will be noted that the assembling machine **40** consists mainly of the units **41**, **42** and **43**, previously mentioned, which are associated with an indexing table **45**, that has a container assembly removal unit **44** also associated therewith. For actuating these various units **41**, **42**, **43** and **44** in timed relationship to the movement of the indexing table **45**, a cam-controlled actuating unit **50** is provided on the machine.

The machine is shown supported by a longitudinally extending base member **46** which has upstanding transverse frame sections **47**, **48**, **49** and **51** disposed therealong at intervals. The particular forms of the base **46** and the upstanding frame sections are not important, but will be of such a nature as to adequately support the various units and associated parts of the machine.

The indexing table **45** is of disc-like form and is supported for rotation in a transverse plane above the base **46**, toward one end thereof which would be the left end in FIG. **3**. It is carried concentrically on a bearing and shaft **52** which projects to the right from an indexing drive gear unit **53**. This unit **53** may be of any suitable type which will serve to advance and index the table **45** step-by-step in the proper direction which is indicated by the arrow in FIG. **8**. The index unit **53** is connected to the table **45** by a standard overload clutch **53a** shown best in FIG. **6**. The intermittent drive unit **53** is supported by a shelf **54** carried by the upstanding supports **47**, **48** and may be suitably driven, as by a sprocket and chain drive **55** which extends down to the base **46** of the machine where it is driven by a speed-reducer gear unit **56** supported thereby. The unit **56** is driven by an electric motor **57** disposed on the base **46**, inwardly of it, through the medium of a speed adjustment belt and sheave drive **58**. The adjustment is accomplished by hand-wheel arrangement **59** which moves the motor **57** towards and from the speed-reducer **56**, the motor base **57a** being suitably mounted on the base **46** for adjustment by slot guides **57b** and cooperating clamp bolts.

The indexing table **45** has a series of cylindrical chambers or pockets **60** disposed at circumferentially spaced intervals about its periphery. Each of these chambers will successively receive the container parts **31**, **32** and **33** in that order for assembly. These cylinders or pockets project outwardly from the table toward the right. The form of each chamber and the manner in which it is mounted on the table is illustrated best in FIGS. **6**, **7** and **9***a*.

It will be noted that the table comprises the disc **45a** with an opening **58** for receiving each cylindrical member **60** which is of hollow annular tubular cross-section and has a stop flange **61** at its inner end which engages the adjacent surface of the disc **45***a* and is held thereagainst by a bolt **62**. The outer projecting end of the tubular member is open and is provided with an outwardly flared guide mouth extremity **63**. Also, the outer end of the tubular member is provided with a pair of outwardly opening diametrically opposed extractor jaw-receiving slots **64**. Within the tubular member **60** and concentrically fitted therein, is what may be termed a mandrel **65** on which the container parts are to be assembled.

This mandrel **65** is shown in FIGS. **9***a*, **11***a*, and **14***a* is of substantially solid cylindrical form and is fitted tightly within the tubular member **60** having a stop flange **65***a* on its inner end that is clamped against the flange **61** by the bolt **62**. The mandrel **65** has a bore extending centrally completely therethrough. This bore is divided into an outer stick-receiving socket portion **66** and a passageway **67** at its inner end communicating therewith through a smaller passage **68**. The outer end of the socket **66** is provided with an enlarged annular portion **69** joining with an outwardly-flared guide throat **70**. The outer end of the mandrel itself is reduced to provide a skirt-receiving outwardly-opening annular groove **71** between it and the tubular wall of member **60**. It will be noted that an annular shoulder **72** is at the inner end of groove **71** and an annular shoulder **73** is at the inner end of the socket **66**. The extremity **74** of the mandrel **65** is flat and is provided with a rounded annular edge **75**. It will be noted that the flat end **74** is spaced axially inwardly of the line **76** where the flared mouth **63** terminates. Inwardly of the annular shoulder **72** and aligning with the jaw-receiving slots **64** are jaw-receiving slots **64***a* formed in the mandrel **65**.

The units **41**, **42** and **43**, previously mentioned, are provided in cooperation with the indexing table **45** to feed the container parts **31**, **32** and **33**, in that order, into successive chambers **60** where the parts are properly oriented and assembled. The removal or container-extracting unit **44**, for removing the assembled containers from successive chambers **60**, is also provided as previously indicated. These units are supported between the frame section **49** and the indexing table **45**,

as indicated in FIGS. 3, 4 and 5. Their disposition circumferentially relative to the table 45 is indicated in FIG. 8.

The unit 41 is suspended from top plate or shelf 77 (FIG. 3) on the upper side of the frame section 49. It includes the upstanding stick magazine 81 which will contain a stack of the sticks 31 suitably supplied thereto as from a hopper 79 (FIG. 5) which is supported on the shelf 77 and may be equipped with feeding means driven by power means 78. The lowermost stick rests in a cradle chamber 82 (FIG. 10) formed in the bracket 80 which protects from the frame section 49 toward the indexing table 45. Projecting from the outlet end of this cradle chamber is a tubular guide sleeve 83 (FIG. 9a) which will align axially with the chambers 60 as they are successively indexed with the table 45. To permit this alignment, as each chamber 60 moves into stick-receiving position, the sleeve 83 will pass laterally through the leading slot 64 of the chamber wall. A similar guide bushing 84 is provided at the other end of the chamber 82 in a bore bracket 80, for guiding a slidable stick push-rod 85 for successively ejectsticks 31 from the cradle chamber 82 as they drop thereinto.

The rod 85 extends through an opening 93 in the frame section 49 (FIG. 9) and its outer end is anchored in a tubular member 86 which slidably telescopes over a tubular support 87 that is rigidly mounted on the frame section 51 and projects outwardly to the left therefrom. A collar 88 is welded in position around the end of member 86 and has a guide roller 89 disposed in a guide track 90 supported between the frame sections 49 and 51. At a diametrically opposed point, a pivot connection 91 is provided for connecting the member 86 to an actuating rod 92 which will be referred to later. Reciprocation of rod 92 will produce reciprocation of the stick-feed push rod 85.

When the rod 85 is moved to the left (FIG. 9*a*), the lowermost stick 31 is pushed through the guide sleeve 83 into the aligning socket 66. The flared throat 70 will guide the stick into the socket and it will stop only when its inner end reaches the shoulder 73 at the inner end of the socket. At this time, the outer end of the stick will extend beyond the annular socket portion 69 into the flared throat 70. As the chamber 60 is advanced, the tubular guide 83 will pass laterally through the trailing slot 64 thereof. When the rod 85 is withdrawn to the position shown in this Figure, the next stick 31 will drop into the cradle chamber 82 into position to be subsequently pushed therefrom.

The particular chamber 60 with the stick 31 therein as indicated, will next be indexed, by rotation of the table 45, into cooperation with the piston feeding unit 42 which is indicated best in FIGS. 11, 11a and 13. This unit includes a tubular guide sleeve 95 which is carried by the frame section 49 and projects to the left toward the table 45. Its outer end will be so disposed that the chambers 60 will be indexed successively into axial alignment therewith at which time the outer extremities of these members will be closely adjacent, as indicated in these Figures. This guide sleeve 95 is angularly spaced from the sleeve guide 83 of the stick-feeding unit 41, in the direction of advancing rotation of the table 45 as will be apparent from FIGS. 5 and 8. Pistons 32 are adapted to be fed into the outer end of the guide sleeve 95 through a transverse slot 96, greater than a semi-circle, formed in the top thereof adjacent the outer extremity thereof. These pistons are fed successively from the lower end of a magazine which will support a stack of those pistons on edge with their skirts 34 directed to the left toward the table 45. The magazine is formed by a plurality of vertical rods 97 arranged in two pairs, one of which terminates above the sleeve 95 (FIG. 13) and the other of which straddles the member 95 at each side of the slot 96, as indicated at 97*a*, to prevent lateral displacement of the piston from that slot. The magazine may receive the pistons 32 from a suitable supplying and orienting device, but not shown. The lowermost piston 32 will drop through the slot 96 and rest on the wall of the sleeve 95 ready to be pushed outwardly through the open mouth 95*a* thereof and into the cooperating chamber 60.

The pushing of the piston 32 from the sleeve 95 is accomplished by means of a cylindrical pusher member 100 which is slidably mounted in the annular tubular sleeve 95. This member has a tapered forward end 101 with a flat outer piston-engaging face 102 provided with a transverse slot 103 to prevent sticking to the piston 32. The sleeve 95 is provided with an attaching flage 104 which is bolted to the frame section 49 (FIG. 11) around the pilot opening 105 through which the rear end of the pusher member 100 projects. The rear portion of the member 100 is tubular and telescopes slidably over a mounting tubular support 106 that is fixed to the frame section 51 and projects outwardly therefrom to the left. A collar 107 is welded in position around the outer end of member 100 and has a guide roller 108 disposed in a guide track 109 supported between the frame sections 49 and 51. At a diametrically opposite point, a pivot connection 110 is provided for connecting the member 100 to an actuating rod 111 which will be referred to later. Reciprocation of rod 111 will produce reciprocation of the piston push member 100.

When the piston 32 is pushed into the chamber 60, it is guided therein by the flared mouth 63. The skirt 34 of the piston will be guided over the reduced end of the mandrel 65 into the outwardly opening annular groove 71 and will move therein until the flat wall of the piston contacts the flat end 74 of the mandrel but the inner edge of the skirt never engages the shoulder 72. At the same time, the socket member 35 will be advanced over the projecting end of the stick 31, its leading end being guided by the flared throat 70 into the associated exposed end of the stick, the enlargement 69 of the stick socket 65 permitting this advance. The socket will have a tight fit with the stick and will normally be frictionally held thereon. When the piston is finally in position on the end of the stick as shown in FIG. 11*a*, the piston will be axially inwardly of the line 76 a substantial distance. It will be noted that skirt 34 will embrace the reduced outer end of the mandrel 65 so that it will be within the outer circumference of the main part of the mandrel sufficient to produce clearance for the tube 33 to subsequently slip over the skirt. The inner end of the socket 35 also will not engage with the mandrel, so that engagement of the flat outer wall of the piston with the mandrel end 74 is permitted.

The particular chamber 60 with the assembled stick 31 and piston 32 therein as indicated in FIG. 11*a*, will next be indexed by rotation of the table 45 into cooperation with the tube-feeding unit 43 which is indicated best in FIGS. 14, 14*a* and 15. This unit includes a tubular guide sleeve 115 which has an attaching flange 116

(FIG. 14) that is bolted to the frame section 49 around the pilot opening 117 and projects to the left around the table 45. The outer end of the sleeve 115 will be so disposed that the chambers 60 will be indexed successively into axial alignment therewith, at which time the outer extremities of these members will be closely adjacent. This guide sleeve 115 is angularly spaced from the guide sleeve 95 of the piston-feeding unit 42, in the direction of advancing rotation of the table 45, as will be apparent from FIGS. 5 and 8. Tubes 33 are adapted to be fed successively into the outer end of the guide sleeve 115 through a transverse slot 116, greater than a semi-circle, formed in the top thereof adjacent the outer extremity thereof. These tubes are fed successively from the lower end of a magazine, which will support a stack of these tubes with one open end directed to the left toward the table 45. This end will be the one adjacent which the annular stop ribs 36 are formed. The magazine is formed by a plurality of vertical rods 117 arranged in two pairs, one of which terminates above the sleeve 115, (FIG. 15) and the other of which straddles the member 115 at each side of the slot 116, as indicated at 117*a*, to prevent lateral displacement of a tube from that slot. The magazine will receive the tubes from the conveyor 43*a* previously mentioned. The lowermost tube 33 will drop through the slot 116 and rest on the wall of the guide sleeve 115 ready to be pushed outwardly from the open mouth 119 into the cooperating chamber 60, it being noted that the spacing between members 115 and 60 is less than the length of a tube 33. Also, it will be noted that the sleeve 115 has an internal diameter slightly greater than the tube 33 which it receives.

The pushing of the tube 33 from the sleeve 115 is accomplished by means of a cylindrical pusher member 120 (FIGS. 14 and 14*a*) which is slidably mounted in the annular tubular sleeve 115 and extends outwardly through the opening 119. This member 120 has a downwardly tapered or chamfered surface 121 at its upper leading edge to prevent crushing of the tube next above in the magazine. The rear portion of the member 120 is tubular and telescopes slidably over a mounting tubular support 122 that is fixed to the frame section 51 and projects outwardly therefrom to the left. A collar 123 is welded in position around the rear end of member 120 and has a guide roller 123*a* disposed in a guide track 124 supported between the frame sections 49 and 51. At a diametrically opposed point, a pivot connection 126 is provided for connecting the member 120 to an actuating rod 125 which will be referred to later. Reciprocation of the rod 125 will produce reciprocation of the tube push member 120.

Advancing of the member 120 in the guide sleeve 115, pushes the lowermost tube 33 therefrom and into the axially aligning chamber 60. The tapered surface 121 will prevent engagement with the tube above in the magazine. The forward open end of the tube will be projected into the flared mouth 63 of the chamber 60 which will guide it and center it in that chamber. The leading open end of the tube will be moved beyond the line 76 and centered relative to the piston 32 already in the chamber 60. Obviously, tube 33 is slightly greater in diameter than the piston 32 and is of greater axial extent than the spacing of mouth 63 and the adjacent end of the wide sleeve 115. The tube end will be forced over the mandrel-supported piston skirt into the annular groove 71, around the skirt, and will be moved axially therein until the leading edge of the skirt contacts the inner end 72 of the groove. At this time, the leading stop rib 36 will snap ahead of the piston skirt edge and the trailing rib will be located just behind the piston, as shown in FIG. 14a. This locks the piston 32 in a definite axial position within the tube 33.

The particular chamber 60 with the final container assembly therein, as indicated in FIG. 14*a*, will next be indexed, by rotation of the table 45, into cooperation with the container removal or extracting unit 44 which is indicated best in FIGS. 19 and 22. This unit is of the pivoted tong type and includes a pair of extracting jaw members 130 which are of bellcrank form and are pivoted at 129 to a support block 128. The outer or forward end of each of the members 130 is provided with a container-engaging jaw 131. Jaws 131 are adapted to engage the sides of the tube 33 at diametrically opposed points. Lugs 131*a* at the extreme outer ends of the jaws 131 are provided for projecting inwardly over the end of the tube. These jaws will be diametrically opposed and will project inwardly towards each other and when actuated will enter the chamber 60, to grip the tube 33 of the container assembly, through the diametrically opposed slots 64. The jaw member support block 128 is fixed to the outer or forward end of a cylindrical tubular support member 132 which is angularly spaced in the direction of advancing rotation of the table 45, as will be apparent from FIGS. 5 and 8. The member 132 is mounted for axial reciprocation and in its retracted position (FIG. 20) the block 128 will be adjacent the frame section 49 which is provided with a large opening 133 to prevent interference with the members 130 and associated parts. These parts include a cylinder and piston unit 134, preferably air-operated, for actuating each jaw member 130. The unit 134 is supplied with air through a line 135 to swing the jaw 130 inwardly and the jaw may be spring-returned, when the pressure is exhausted. Each unit 134 is pivotally connected at 136 to the bellcrank jaw member 130 and at 137 to a collar 138 which is welded in position around the tubular support 132 at a point spaced axially rearwardly from the member 128.

The member 132 is slidably telescopically mounted on a mounting tubular support 140 (FIG. 19) that is fixed to the frame section 51 and projects inwardly therefrom to the left. A collar 141 is welded in position around the rear end of the member 132 and has a guide roller 142 disposed in a guide track 143 supported between the frame sections 49 and 51. At a diametrically opposed point, a pivot connection 144 is provided for connecting the member 132 to an actuating rod 145 which will be referred to later. Reciprocation of the rod 145 will produce reciprocation of the tong support member 132.

In extracting the assembled container from the chamber 60, the support 132 is moved to the left to the position indicated in broken lines in FIG. 20 where the jaw members 130 are swung inwardly towards each other to cause the jaws 131 thereof to move through the slots 64 and grip the sides of the tube 33 as well as to move the lugs 131a into mandrel slots 64*a* behind the tube. As indicated, the jaws 131 are moved into gripping position by simultaneous actuation of the two units 134. The member 132 is then retracted or moved to the right to the full line position indicated in this Figure to extract the assembled container from the chamber 60. The tong unit, with the extracted container carried

thereby, is illustrated in FIG. 21. At this time, pressure on the units 134 can be released to spread the jaws 131 so as to drop the container. The container will be dropped transversely of a chute 150 which is made up of a plurality of rods and which will be inclined so as to feed the containers by gravity to a suitable point of removal from the machine. This chute is shown supported by the frame section 49 and is indicated in FIGS. 3, 5, 8 and 22.

The controlling and actuating unit for the various units 41, 42, 43 and 44, previously mentioned, is of the cam type and is shown in FIGS. 3, 4, 9, 11, 12, 14 and 19. This unit 50 includes the cam-actuated levers 151, 152, 153 and 154 for actuating the respective units 41, 42, 43 and 44. Each of the levers 151, 153 and 154 is fulcrumed at its lower end on a fulcrum shaft 155 which is carried by a horizontal extension 156 on the end frame section 51. The upper end of the lever 151 is pivoted at 157 (FIG. 9) to the outer end of the rod 92, the upper end of the lever 153 is pivoted at 158 (FIG. 14) to the outer end of the rod 125, and the upper end of the lever 154 is pivoted at 159 to the outer end of the rod 145. The lever 152 is a bellcrank lever pivoted at 160 to a support 161 (FIGS. 11 and 12) extending outwardly from the frame section 51. The upper end of the one arm of the lever 152 is pivoted at 162 to the outer end of the rod 111 whereas the inner end of its other arm is pivoted at 163 to the upper end of a connecting rod 164. The lower end of this rod 164 is pivoted at 165 to the inner end of one arm of a bellcrank lever 152*a* which is mounted on the fulcrum shaft 155. The two bellcranks 152 and 152*a* are used in combination to obtain an increased stroke of the rod 111 as compared to the other rods, so as to obtain sufficient axial movement of piston 32. Cams for swinging the levers positively in both directions about the axis of the fulcrum shaft 155 are provided and are mounted on a single positively driven shaft 166. This shaft is driven by a sprocket and chain drive 168 from the gear unit 56 (FIG. 3). The shaft is carried by bearings 167 supported by the end frame setion 51 above the shaft 155. The cams comprise the closed track cams 171, 172, 173 and 174 disposed adjacent the respective levers 151, 152*a*, 153 and 154 for cooperating therewith. Rollers 171*a*, 172*a*, 173*a* and 174*a* are provided on the respective levers 151, 152*a*, 153 and 154 for fitting into the cam grooves in the respective cams to positively swing the levers about the axis of the fulcrum shaft 155. Openings 175 are provided in the frame section 51, properly located to receive the edge of adjacent cams. Thus, all of the levers 151, 152, 153 and 154 will be positively oscillated to reciprocate the respective rods 92, 111, 125 and 145 to properly actuate the respective units 41, 42, 43 and 44 of the machine.

The four rods 92, 111, 125 and 145 operate the respective units 41, 42, 43 and 44 as previously indicated, the first three pushing parts of the container into a chamber 60 and the last one pulling the assembled container therefrom. If there is a jamming of parts in the chamber 60 or any parts of the units strike an obstruction, the rods will collapse axially and operate a switch which controls the motor 57. This motor is controlled by an air pressure switch 57*c* (FIG. 4) which is connected in the air control system illustrated schematically in FIG. 25. These push rods are of a cylinder and piston type, as indicated in FIGS. 23 and 24, and are connected in the air system as shown in FIG. 25. Axial collapse occurs as the air therein is compressed.

The detailed structure of one of the rods is illustrated in FIGS. 23 and 24 and a description of one will suffice as they are all the same. Assuming this is the rod 92, the forward section of the rod carries a piston 176 which slidably fits in a cylinder 177 which forms the rear section of the rod. Piston 176 is provided with by-pass 176*a* as indicated. In the extended position of the rod, the piston 176 covers a vent hole 178 in the wall of the cylinder and by-pass 176*a* is closed (FIG. 23) and in the collapsed or partially-collapsed condition, the vent hole is uncovered and by-pass 176*a* connects the vent to the pressure end of the cylinder. A pressure inlet passage 179 leads into the cylinder 177. All these passages 179 of the cylinders of the various rods are connected in the air system as shown in FIG. 25. It will be noted that a pressure line 180 connects to all the cylinders 177 of the various rods 92, 111, 125, 145 and also connects to the switch 57*c*. As long as air pressure is maintained in the system, the switch 57*c* remains closed. However, when any one of the rods collapses and exposes the vent 178, the pressure in the system is reduced and the switch opens to deenergize the motor 57 and stop the machine.

The pressure line 180 also has connected in series therein, the pressure gauge 181, the pressure regulator 182 and manually adjustable flow meter 183. The line is connected to a manifold 184. From the manifold 184, a by-pass line 185 leads to the line 180 and connects thereto between the members 181 and 182. This line 185 has a manual valve 186 connected therein which permits application of full pressure to the cylinders 177 and switch 57c if desired. Leading from the manifold 184 is another pressure line 187 which connects to a pressure regulator 188, to a pressure gauge 199, and to a control valve bellows 200. This line 187 connects to another line 201 which supplies pressure to the tong-operating cylinders 134 of the extracting unit 44. The line 201 also connects to a relief valve 202 and to the stick blow-out tube 205 which will be referred to later. The manifold 184 has a supply line 204 connected thereto through a filter 203.

The stick blow-out tube or jet 205 referred to above is supported by a support bracket structure 209 carried by the frame section 48 (FIG. 6) in such a position that it will align axially with a chamber 60 after the chamber is indexed to a position at bottom dead center of the table 45. The jet 205 will align with the passageway 67 of the chamber 60 and if there is a stick still in the socket 66, will serve to blow it therefrom. After the chamber 60 moves beyond this station, it will be subjected to a photoswitch unit prior to stick receiving position which will stop the machine if the stick and all other parts of the container have not been removed from the chamber. This photoswitch comprises receiver 210 carried by the bracket structure 208 and a light-source 211 axially aligned therewith at the other side of the index table 45. This receiver 211 is carried by a bracket 212 that is supported by the stick-feeder support bracket 80. This photoswitch is connected to a switch which controls the motor 57 and will stop it if the light beam is interrupted by a part of the container being in the chamber 60.

Also, connected in the electrical circuit is an overload safety switch 215. This switch is carried on the inner end of an arm 216 (FIGS. 3 and 6) that is

mounted on the frame support **49.** If the index table **45** is kept from advancing to its next station for any reason, the outer plate **218** of the overload clutch will move outwardly by the usual cam action to trigger the safety switch **215** through the cam roller **217.** This action will open the motor control circuit and stop the motor **57** preventing any damage to the machine.

A tube pusher actuated switch **220** (FIG. **14**) is mounted to the guide track **124** and is operated by chamfered surfaces **123***b* at the upper side of the collar **123** on the tube pusher **120.** This switch is connected in the circuit for the motor **57** parallel with the relay of the photoswitch receiver **210.** Its function is to keep the control circuit closed and the motor running while the index table is turning and the light beam from the light source **211** to the receiver **210** is interrupted.

It is not believed necessary to show the electrical circuit for the drive motor **57** since its various parts are referred to above. The overload safety switch **215** operated by the overload clutch **53***a*, the pressure switch **57***c*, and the photoswitch relay of the receiver **210** are connected in series into the motor control circuit. If any of these switches break the control circuit, the motor will stop.

It will be apparent from the above description that this invention provides an automatic process for assembling the three parts of a push-up container of the type indicated thereby resulting in a less costly package. The machine preferably used in performing the method is completely automatic in feeding the parts successively into an assembling chamber, properly orienting the parts relatively in that chamber, and removing the properly assembled container from that chamber. Therefore, the parts are not contacted by the hands of the operator and sanitation is ensured. Safety means preferably are provided on the machine for stopping its oerations if there is any jamming of parts in the chamber during assembly or if all parts of the assembled container are not removed from the chamber after assembly.

Having thus described this invention, what is claimed is:

1. The method of assembling a container comprising a tube with an open end having axially spaced stops on its inner surface within the end, a piston having axially spaced ends to be fitted into the tube between said stops and having a stick-receiving socket opening toward the open end of the tube, and a stick for fitting into said piston socket, which comprises:

holding the stick in a fixture with its end projecting therefrom,

positioning the piston relative to the fixture-supported stick to move the open end of the piston socket over the projecting end of the stick, and

slipping the open end of the tube axially over the exterior of the fixture-supported stick-mounted piston until the tube engages stop means on the fixture so that the axially spaced stops of the tube engage the ends of the piston respectively to locate the piston axially in the tube.

2. The method according to claim **1** in which:

the piston of the container to be assembled has an axially-projecting skirt within its ends and the stick-receiving socket of the piston is located centrally within the skirt and projects axially in the same direction,

said fixture having a stick-receiving socket in which the stick is disposed with its end projecting from said fixture socket and said fixture having a surrounding end portion over which the piston skirt is fitted simultaneously with the positioning of the piston stick-receiving socket over the projecting end of the stick,

the open end of the tube being slipped axially over the supported skirt.

3. The method of claim **2** in which:

the fixture is provided with the tube-engaging stop means in the form of a stop-shoulder for limiting axial movement of the tube over the piston skirt and which is located axially inwardly of the edge of the supported skirt, and

the stick-receiving socket of the fixture is enlarged at its outer end so as not to contact with the inner edge of the piston stick-receiving socket as it is moved onto the stick.

4. The method of claim **3** in which:

the axially spaced stops in the tube are ribs adjacent its open end, and

the open end of the tube is slipped over the skirt of the piston until the leading rib snaps over the inner end of the skirt of the piston and the following rib contacts with the outer extremity of the piston.

* * * * *