L. A. BAKER.

FILLING MACHINE.

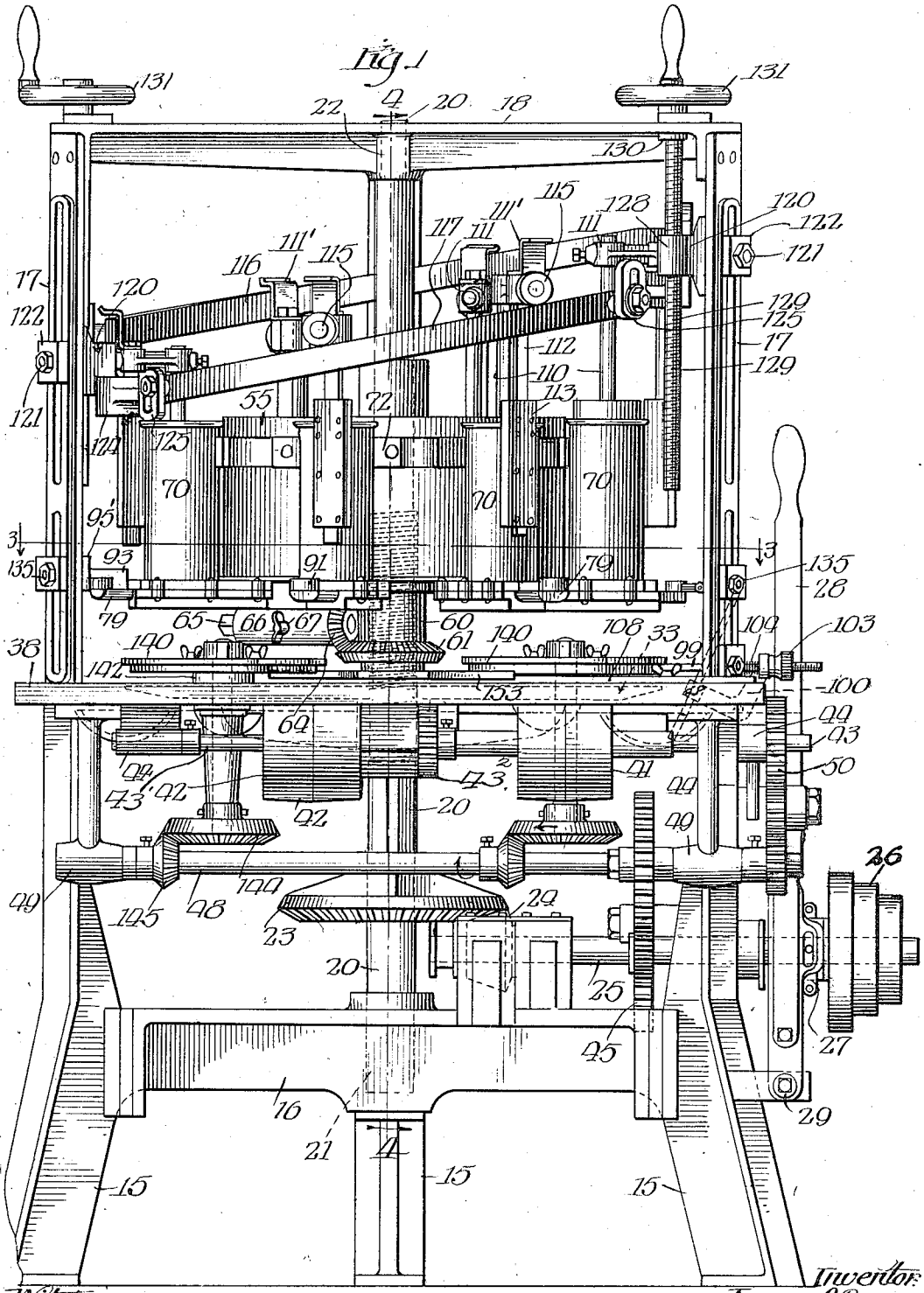
APPLICATION FILED APR. 19, 1916.

1,254,190.

Patented Jan. 22, 1918.

6 SHEETS—SHEET 1.

Fig. 1



Witnesses:

M. L. Ady

Inventor:

Lewis A. Baker.

By Wilson & Fahy.

Atty.

L. A. BAKER.

FILLING MACHINE.

APPLICATION FILED APR. 19, 1916.

1,254,190.

Patented Jan. 22, 1918.

6 SHEETS—SHEET 2.

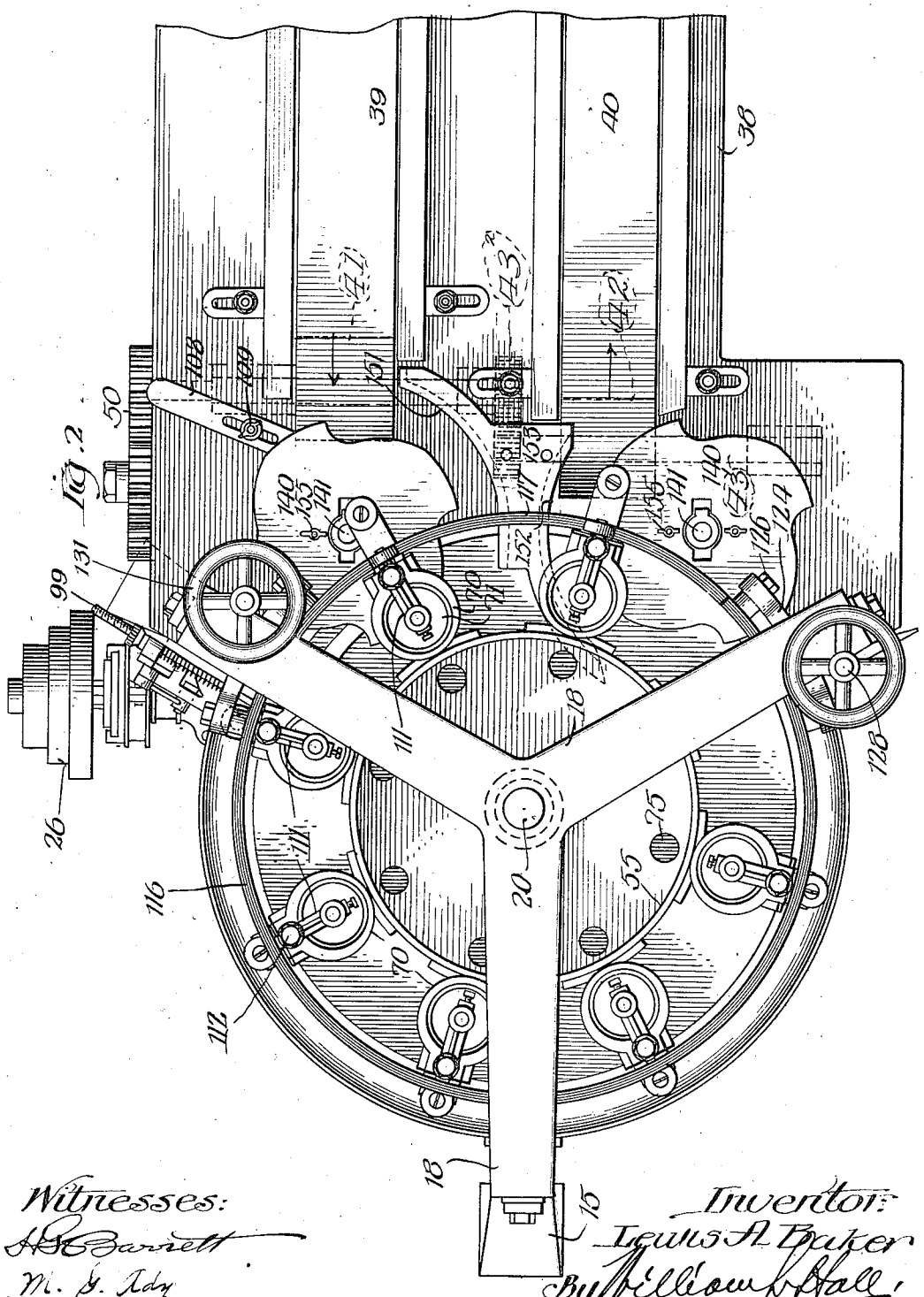


Fig. 2.

Witnesses:
H. B. Barnett
M. G. Tidy

Inventor:
Lewis A. Baker
By Pillsbury & Hall,
Atty

L. A. BAKER.

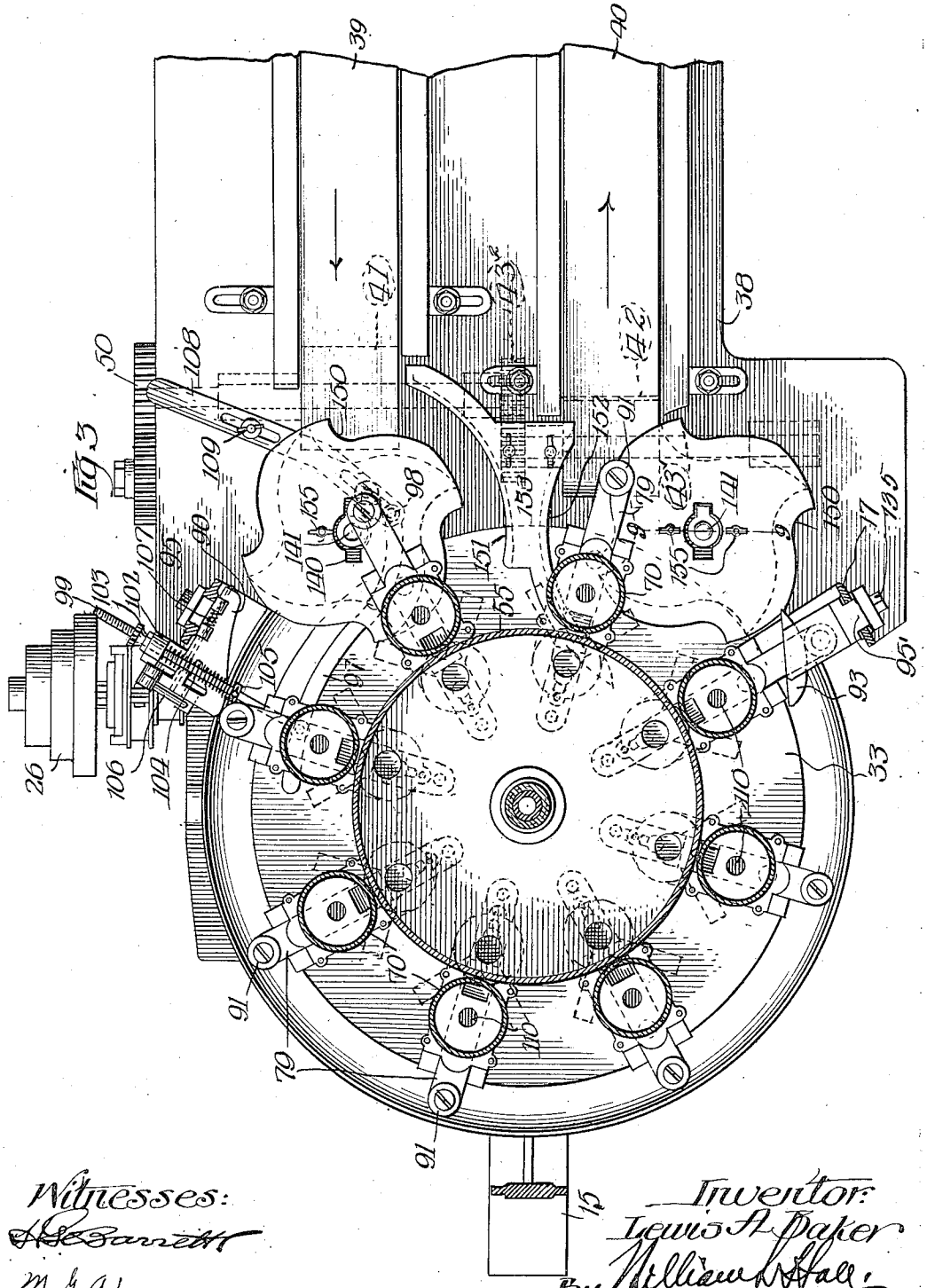
FILLING MACHINE.

APPLICATION FILED APR. 19, 1916.

1,254,190.

Patented Jan. 22, 1918.

6 SHEETS—SHEET 3.



Witnesses:

H. E. Barrett

M. G. Ady

Inventor:

Lewis A. Baker

By William L. Hall,

Atty

L. A. BAKER.

FILLING MACHINE.

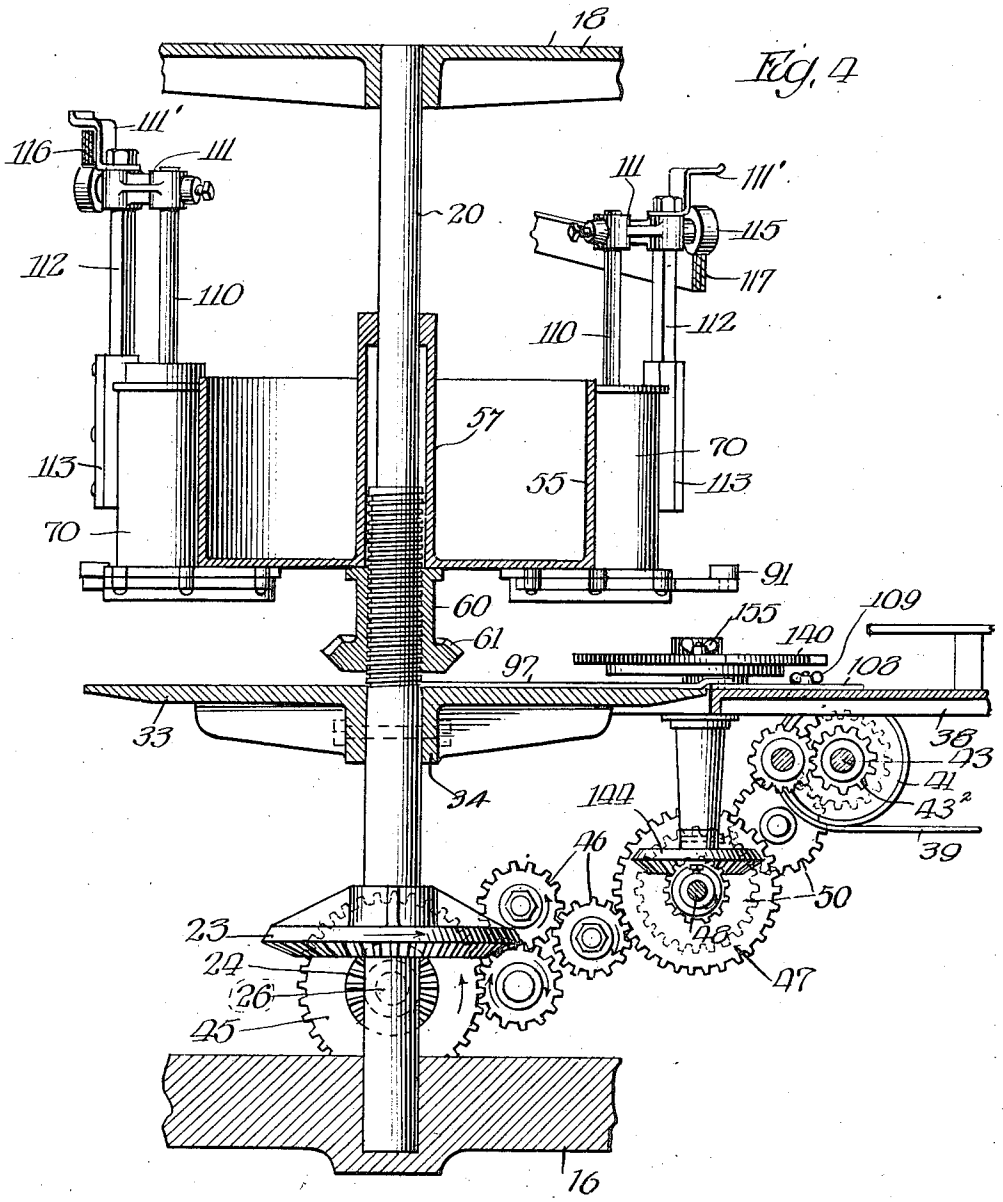
APPLICATION FILED APR. 19, 1916.

1,254,190.

Patented Jan. 22, 1918.

6 SHEETS—SHEET 4.

Fig. 4



Witnesses:

H. C. Barrett

M. G. Ady

Inventor

Lewis A. Baker

By Williamson & Hall

Atty

L. A. BAKER.

FILLING MACHINE.

APPLICATION FILED APR. 19, 1916.

1,254,190.

Patented Jan. 22, 1918.

6 SHEETS—SHEET 5.

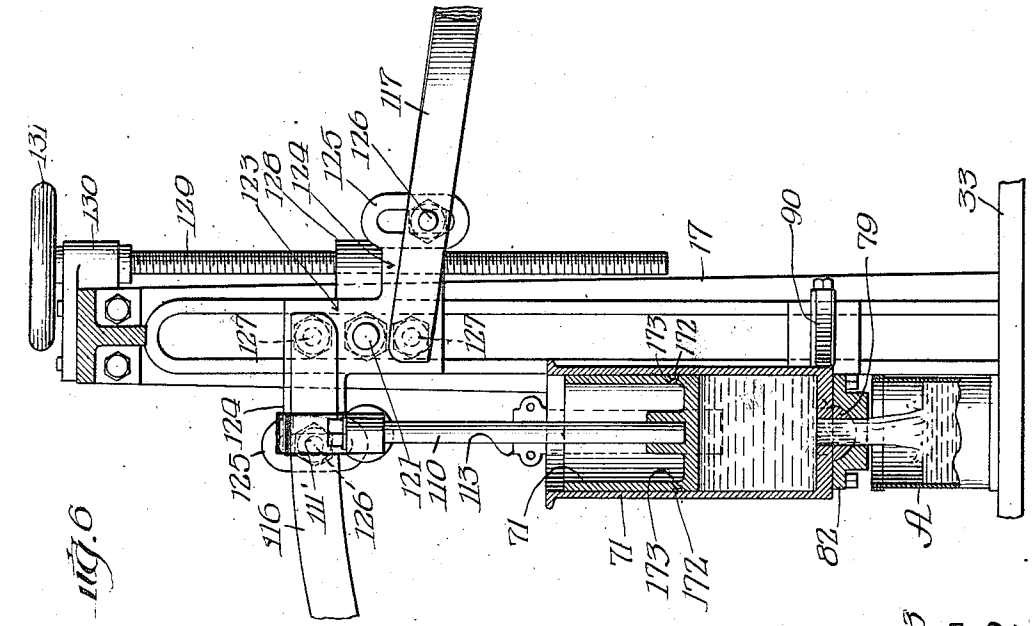


Fig. 6

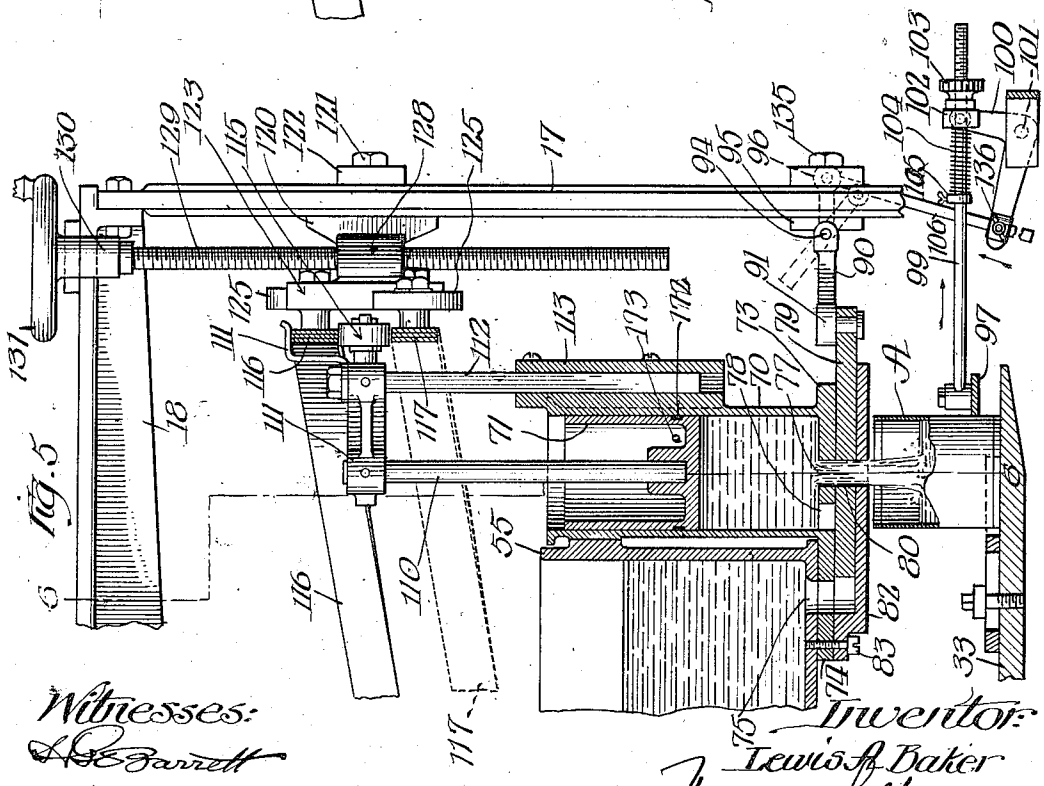


Fig. 5

Witnesses:

A. E. Barrett

M. B. Ady

Inventor:

Lewis A. Baker

By William L. Hall

Atty.

L. A. BAKER.

FILLING MACHINE.

APPLICATION FILED APR. 19, 1916.

1,254,190.

Patented Jan. 22, 1918

6 SHEETS—SHEET 6.

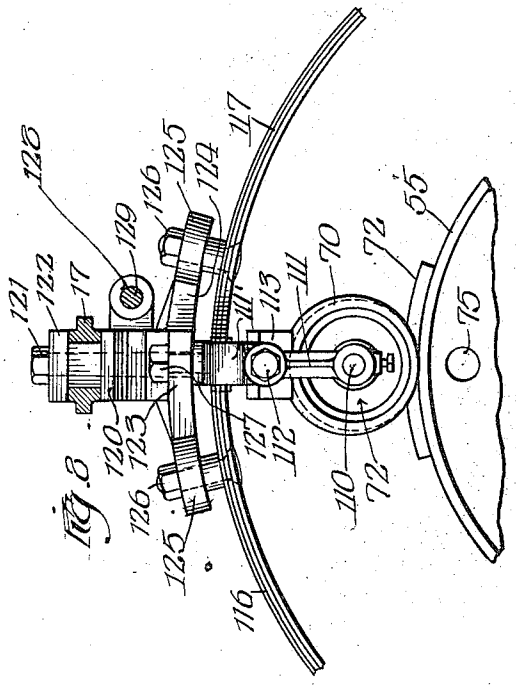


Fig. 8.

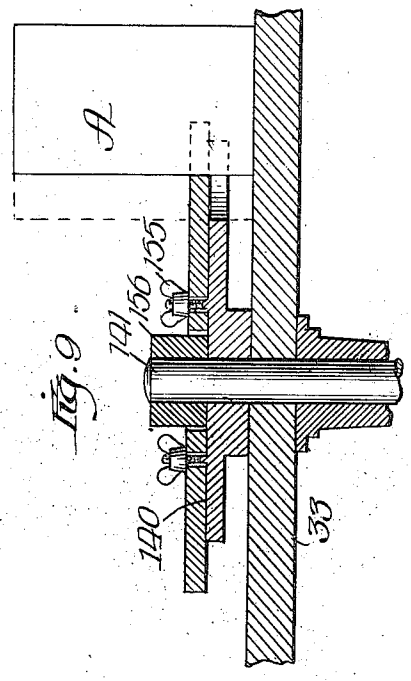


Fig. 9.

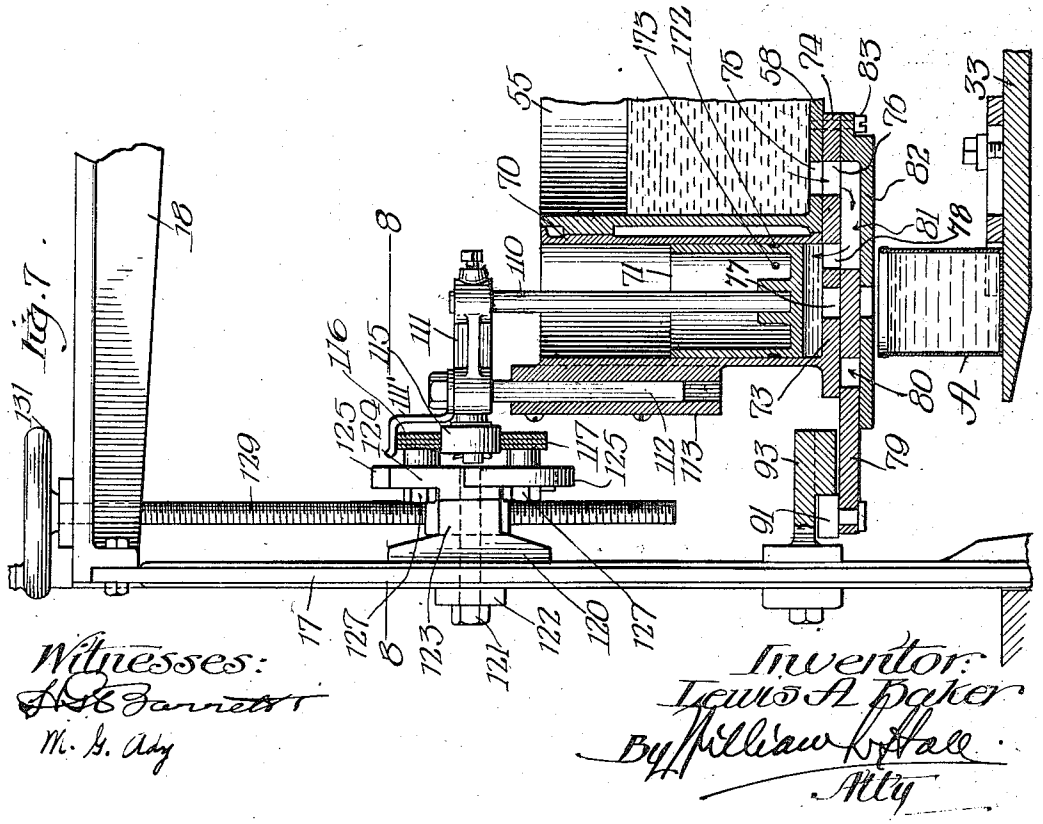


Fig. 7.

Witnesses:

M. G. Ady

Inventor:

Lewis A. Baker

By William L. Hall.

Atty

UNITED STATES PATENT OFFICE.

LEWIS A. BAKER, OF ELGIN, ILLINOIS.

FILLING-MACHINE.

1,254,190. Specification of Letters Patent. Patented Jan. 22, 1918.

Application filed April 19, 1916. Serial No. 92,087.

To all whom it may concern:

Be it known that I, LEWIS A. BAKER, a citizen of the United States, and a resident of Elgin, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Filling-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in filling machines for successively filling receptacles from a tank or reservoir as said receptacles are passed through the machine, and for discharging the filled receptacles from the machine, the receptacles being brought into communication with the reservoir during a portion of the period in which they are passing through the machine, so that predetermined charges of the material may be fed from the reservoir to the receptacles, which communication is closed off after the receptacles have been filled and remains closed until the receptacles are discharged from the machine.

The invention herein shown has been designed more particularly for handling relatively heavy material such as syrups, jellies, preserves, paints, mince-meats and the like.

Among the objects of the invention are to simplify and improve the feed mechanism which controls the flow of material from the common or central tank or reservoir to the receptacles, and to improve and simplify the valve mechanisms therefor and the means for actuating the valve mechanisms.

A further object of the invention is to provide an improved feed mechanism by which the material is fed from the common or central reservoir to the receptacles, so constructed and arranged as to admit of a wide range of adjustment and thereby adapt the machine to receptacles of widely varying capacities.

A further object of the invention is to provide an improved means for actuating the valve mechanisms, so constructed and arranged as to be actuated to open the feed mechanism only by the presence of a continuous series of receptacles delivered to the machine, whereby if a receptacle be not present, the particular valve mechanism which would have otherwise been actuated thereby remains inactive to prevent the discharge of material upon the receptacle carrying table.

Other objects of the invention are to improve and simplify the structural details of filling machines of the general character shown, and the invention consists of the combination and arrangement of elements shown in the drawings and described in the specification and is pointed out in the appended claims.

In the drawings:—

Figure 1 is a side elevation of a filling machine embodying my invention.

Fig. 2 is a plan view thereof.

Fig. 3 is a horizontal section on the line 3—3 of Fig. 1.

Fig. 4 is a vertical section on the line 4—4 of Fig. 1.

Fig. 5 is an enlarged detail section of one of the feed devices, showing the adjacent portion of the feed reservoir and the valve mechanism associated therewith.

Fig. 6 is a fragmentary vertical section on the line 6—6 of Fig. 5.

Fig. 7 is another view of the parts shown in Fig. 5, with the parts in different positions.

Fig. 8 is a fragmentary horizontal section on the line 8—8 of Fig. 7.

Fig. 9 is an enlarged vertical section on the line 9—9 of Fig. 3.

The frame of the machine embraces a plurality of legs or standards 15, 15, three as herein shown, which are connected by a cross brace 16. Said legs terminate in a like number of slotted upright members 17, which are connected at their upper ends by a three-armed connecting frame or spider 18. 20 designates a vertical rotative shaft which is mounted in lower and upper bearings 21, 22, respectively, of said frame. Fixed to said shaft is a downwardly facing beveled gear wheel 23 which meshes with a pinion 24 of the power shaft 25. Said shaft is mounted in suitable bearings in the frame and carries at its outer end a suitable belt pulley 26. Said pulley is adapted to be connected to and disconnected from the power shaft through the medium of a clutch mechanism 27, the details of which are not herein shown, and which is actuated by a shifter lever 28 that is pivoted at 29 to the machine frame.

33 designates a horizontal rotative table which is fixedly attached to the vertical shaft 20 in any suitable manner, as by means

of a hub 34, shown most clearly in Fig. 4. Said table is located in the plane of a horizontal fixed table 38 at the side of the machine at which the receptacles are fed to and discharged from the machine. The fixed table 38 is provided with parallel ways or slots in which the upper laps of the receptacle-feeding and take-off belts 39, 40, respectively, are arranged, said belts being trained about pulleys 41, 42, respectively, that are mounted on transverse horizontal shafts 43, 43′, which are supported in bearings 44, 44 that depend from the horizontal platform 38, and are geared together to rotate in opposite directions by intermeshing gear wheels 43^2. Said pulley shaft 43 is driven from the power shaft 25 through the medium of gears 45, 46, 57, and a shaft 48, one end of which latter shaft is connected to the shaft 43 through the medium of a set of intermeshing spur gears 50.

Supported on the vertical shaft 20 above the rotative platform 33 is a feed or storage tank 55, it being herein shown as disposed centrally of the axis of said shaft and mounted thereon to rotate therewith. As herein shown, a central sleeve 57 is formed integral with or is attached to the bottom wall 58 of the reservoir centrally thereof, the sleeve extending above the rim of the reservoir. The shaft 20 extends through the sleeve 57 and the sleeve has a bearing on the shaft at 59. The shaft 20 is screw-threaded from a point above the table 33 to a distance within the sleeve, and is reduced above its screw-threaded portion, on which reduced portion the sleeve has bearing. Screw-threaded to the shaft, below the reservoir, is a nut 60 which carries an integral beveled gear 61. Said nut bears upwardly against the bottom of the reservoir. The construction described provides means whereby the reservoir may be raised and lowered, with respect to the table 33, thus enabling the machine to be adjusted to receive receptacles of varying heights to be filled. The means herein shown for rotating said nut to thus adjust the machine for receptacles of different heights consists of a pinion 64 which meshes with the gear 61, the shaft 65 of which pinion is rotatively mounted in a bearing 66 that is carried by a bracket which depends from and is attached to the bottom of the reservoir. The outer end of the shaft 65 is fashioned to receive an adjusting implement whereby it may be turned. The parts may be locked in adjusted position in any suitable manner, as, for instance, by means of a set screw 67 which is screw threaded through the bearing sleeve 66 and impinges against the adjusting shaft 65.

Arranged about the reservoir thus supported upon the upright shaft 20 are a plurality of upwardly opening pump barrels 70 which coöperate with pistons 71, hereinafter to be described, to draw the material from the reservoir at properly timed intervals and to thereafter force the material into the receptacles supported on the rotative table 33 therebelow. One phase of my invention resides, in combination with the pump barrels described, of a single valve mechanism for each barrel arranged to control both the inflow of the material from the reservoir to said barrel and the outflow of the material from the barrel to the receptacle therebelow. The parts associated with each barrel constitute in effect a single valve for controlling both the inflow and the outflow of the material.

The said barrels are herein shown as fastened to the exterior of the reservoir by flanges or arms 72 which are curved to fit the exterior curvature of the reservoir rim and may be bolted or otherwise fastened thereto. Each barrel is closed at its lower end by an end wall 73, and the end wall of each barrel is continued radially inwardly to constitute a flange 74 that fits beneath the bottom wall or floor 58 of the reservoir. Said floor of the reservoir is provided with a plurality of outlet openings 75, arranged, one adjacent to each pump barrel, and the flange 74 of the bottom wall of the adjacent barrel is provided in line therewith with a port or opening 76. The bottom of each barrel is provided with two ports 77, 78, the former disposed centrally thereof and the latter at one side of its center. 79 designates a sliding valve member which is formed with a flat upper face that fits the flat lower face of the bottom of each barrel and its extension 74, and is provided with a port 80. The sliding valve member 79 is confined against the bottom of the barrel and its extension by a guide plate 82 which is fixed in place by means of a bolt 83, or other suitable fastening device, in such manner as to leave a free space for the valve member 79 to slide inwardly and outwardly between the outer end of the guide plate and the bottom of the barrel. The lower face of the valve member fits closely on the guide plate, the contacting surfaces being particylindric as herein shown. The extended metallic bearings between said valve member and the upper and lower guide surfaces enable said parts to be fitted together to produce fluid tight joints and, at the same time, to avoid the use of stuffing boxes or other special joints. Moreover, said construction permits the valve member to be directly removed from its seat for purposes of cleaning the valve and the upper and lower bearing surfaces.

When the valve is in the position shown in Figs. 5 and 6, the pump barrel 70 is in communication with a subjacent receptacle, so that the contents of the barrel are discharged into the receptacle A both by grav-

ity and by the action of the piston 71; means being provided, as hereinafter described, for lowering the piston upon the registration of the ports 77 and 80. When the parts are in the position shown in Fig. 7, with the ports 75, 76 in registration, the material is free to flow through said ports, through the passage 81 between the guide plate 82 and the bottom of the barrel and thence through the port 78 into the bottom of the barrel. It will be noted from comparison of Figs. 5, 6 and 7 that the valve which controls the passage of the material from the reservoir to the pump barrel and from the pump barrel to the receptacle below is a self-cleaning or self-clearing valve, in that the only space available to retain the material after each operation of the valve is that determined by the diameters of the ports 80 and 75 and the space immediately below the latter port. Furthermore, these spaces are in the direct line of flow of the material in the succeeding operation of the valve. In other words,—there are no pockets which are out of the direct line of flow which would tend to clog the passage through the valve. Such material as may be contained in the passage 81 after the operation illustrated in Fig. 7 is forced inwardly by the valve and back into the reservoir when the valve is moved to the position shown in Fig. 5: and the only material which does not find its way to the receptacle below when the valve is shifted from the position shown in Fig. 5 to that shown in Fig. 7 is the small amount which will remain in the port 80 of the valve piece. Therefore the valve cannot become clogged or obstructed so as to thereby limit the flow of the material from the reservoir to the pump barrel or from the pump barrel to the receptacle below. The piston-actuating mechanism is so arranged as to lift the piston when the parts are in the position shown in Fig. 7, as will be hereinafter described, so as to effect the displacement of the material from the reservoir to the feed pump barrels. The valve members 79 of the various pump devices are adapted to be actuated during rotation of the series of pumps to open and close the same by mechanism made as follows:

First, referring to the valve-opening mechanism, or that which moves the valves inwardly into position to afford communication between the pump barrels and the receptacles there-below, said mechanism is best shown in Figs. 2, 3 and 5. As therein shown, 90 designates a cam-shaped valve-actuating plate which is arranged just above the plane of the valve members 79, and in such position that its cam-shaped edge is successively engaged by bearing rollers 91 on the valve members as the empty receptacles are fed into the machine to force them inwardly. The cam plate 90 is arranged a distance in advance of the point at which the receptacles enter the machine so that said receptacles are properly positioned beneath the feed pumps when the valves are thus moved inwardly to establish communication between the feed pump barrels and the receptacles; gage plates of familiar form being employed to properly locate the receptacles. The said valves remain open throughout the greater portion of the travel of the receptacles through the machine and are adapted to be closed or moved to the position shown in Fig. 7 by a normally fixed cam plate 93 which is located just in the rear of the mechanism which discharges the filled receptacles from the machine. During the time the pumps are passing from the valve-actuating cam 93 to the valve-actuating cam plate 90, the filled receptacles are being discharged from the machine and the pump barrels are receiving fresh charges of material.

In the event of failure to feed an empty receptacle to the machine, means are provided for moving the valve-actuating cam plate 90 out of the path of the bearing roller 91 of the associated pump, so that said valve will remain closed during the subsequent cycle of travel of said pump in the machine. Thereby material is prevented from escaping onto the rotating table. To this end said valve-actuating cam plate 90 is shown as pivoted between its ends at 94 to a bracket 95 which is carried by the adjacent upright frame member 17, the outer end of the said plate constituting a tail piece 96 for connection to a controlling device hereinafter to be described. The means herein shown for throwing the valve-opening cam plate 90 into its operative position are made as follows:

97 designates a horizontally arranged curved throw-out arm that is pivoted at one end at 98, as indicated in dotted line in Fig. 3, and extends at its other end toward the direction of travel of the rotating series of feed pumps. Said arm is located in a plane just above that of the table 33. It is connected near its forward end by means of a link or rod 99 with one arm of a bell crank lever 100 which is fulcrumed at 101 to a fixed part of the machine frame. As herein shown, said rod 99 extends through a swiveled head 102 carried by one arm of said bell crank lever and is adjustably fixed thereto between a nut 103 screw-threaded to the rod and a helical cushioning spring 104 interposed between said swiveled head and a collar 105 on the rod. 106 designates a link connected at its lower end to a swiveled head carried by one arm of the bell crank lever and at its upper end to the tail piece 96 of said cam plate 90.

107 designates a spring which is mounted

on the hinge pintle of the cam plate and normally tends to hold the cam plate upwardly out of the path of the bearing rollers 91, and also acts through the bell crank lever 100, link 106 and rod 99 to normally hold the curved arm 97 inwardly toward the path of the receptacles. When a receptacle enters the machine, it engages the swinging arm 97 before the valve of the feed pump associated with said receptacle is brought into position to be actuated by the cam plate 90. Therefore the free end of the arm is swung outwardly and operates through the system of rod, lever and link to swing the valve-actuating plate 90 downwardly into the path of the bearing rollers 91 of the valve members 79. Therefore the engagement of the bearing roller with the cam plate serves to force the valve member inwardly to the position shown in Figs. 5 and 6, and thus establish communication between the pump barrel 70 and the subjacent receptacle. In the event of a failure to feed one or more receptacles to the rotating table 33, the valve associated with the feed pump not having a receptacle thereunder passes the valve-actuating plate 90 without being actuated. In order to adjust this part of the machine to receptacles of different diameters, the throw-out cam 97 is shown as pivoted to an adjusting bar 108 that is slotted and is attached to the frame of the machine by clamping bolts 109. By loosening said clamping bolts and shifting the bar outwardly the pivot of the throw-out arm will be adjusted radially outwardly to accommodate receptacles of larger diameter. A corresponding adjustment will be made between the threaded end of the rod 99 and the bell crank lever 101.

The mechanism for actuating the pistons 70 of the feed pumps are so timed as to raise each piston when the associated pump barrel is in communication with the reservoir 55 (position shown in Fig. 7), so as to draw a charge of the material from said reservoir into the pump barrel, and to depress said piston to force the said charge therefrom into a subjacent receptacle A when the parts are in position indicated in Figs. 5 and 6. Said piston-actuating mechanism is made as follows:

The pistons are provided with upwardly extending piston rods 110, to the upper ends of which are rigidly fixed cross heads 111. Fixed also to said cross heads are downwardly directed guide bars 112 which engage with suitable guides 113 formed on or carried by the pump barrels. This construction insures the maintenance of parallel movement of the pistons relatively to the axes of the pump barrels. Each of said cross heads carries a laterally directed bearing roller 115, which travels on descending and ascending cam bars 116, 117, respectively, which are supported on the machine frame. The rollers 115 associated with said pistons travel along the under side of the descending cam bar 116 during the time the pumps are passing through their cycle of movement from the position of the valve-opening cam plate 90 to that of the valve-closing cam plate 93; said cam bar 116 serving to depress the pistons and expel the material therefrom into the subjacent receptacles. The ascending cam bar 117 is so related at its ends to the ends of the descending cam bar that the said bearing rollers 115 pass freely from the under side of the descending cam bar to the upper side of the ascending cam bar 117 at their lowermost ends, and also pass freely from the upper side of the upper end of said ascending cam bar to the lower side of the upper end of the descending cam bar, said bars slightly overlapping at their meeting ends. The meeting ends of the ascending and descending cam bars are located closely adjacent to the valve-actuating cam plates 90 and 93, or just sufficiently in advance of said cam plates so that, at the opening side of the machine the valves are opened before the pistons descend, and at the closing side of the machine the valves are moved to bring the pump barrels into communication with the reservoir before the pistons begin to ascend. The cross heads 111 carry hook members 111′ which engage over the upper side of the descending cam bar 116 to prevent the bearing roller 115 falling away from the lower edge of the cam bar 116 in the event the machine should be turned around with no material in the reservoir.

The said piston-actuating cam bars 116, 117 are attached at their ends to the upright members 17 of the frame through the medium of brackets 120, 120 that are clamped to the slotted posts 17 by clamping bolts 121 and washers 122. To said clamping bolts, inside said brackets, are swiveled Z-shaped blocks 123; the arms 124, 124 of which are located in different horizontal planes, as most clearly shown in Fig. 6. The ends of said arms are provided with slotted terminals 125 which receive clamping bolts 126, 126 that attach the ends of the cam bars to said brackets. The cam bars are also attached at their ends to the swiveled blocks 123 by means of bolts or studs 127, whereby the ends of said bars are maintained at fixed distances apart.

One of the features of my invention resides in making said piston-controlling cam bars flexible so as to permit wide ranges of adjustment thereof to produce various lengths of stroke of the pistons 70, depending upon the volume of charge to be fed into the receptacles therebelow. To this end, said bars are made of a construction possessing considerable flexibility, so that the up-

per ends of the bars may be raised and lowered relatively to the lower ends thereof, notwithstanding the fact that the movement thereof is in the direction of their width. To produce such flexibility, the bars are shown as made of laminated construction, consisting of a plurality of metal bars laid flatwise upon each other.

For the purpose of said adjustment, the brackets 120 are provided with vertically-apertured internally screw-threaded enlarged portions 128 which receive vertical screw-threaded shafts 129 that are rotatably mounted in bearings 130 carried by the upper member 18 of the machine frame and are provided with hand wheels 131. When it is desired to adjust the cam bars, the clamping bolt or screw 121 is loosened so that the brackets are free to slide upwardly and downwardly in the frame members 17. The clamping bolts 126 are also loosened to permit them to shift in the slotted terminals 125. Thereafter the screw-threaded shafts 129 are turned in the proper direction and to the required extent to vertically adjust the cam bars, whereupon the clamping bolts are again tightened to rigidly fix the brackets to the frame. By reason of the fact that the ends of the cam bars are pivotally connected to the swiveled block and that they are loosely connected to the arm terminals 125 when an adjustment is being made, the swiveled head is permitted to turn about the axis of the bolt 121 and to permit the effective lengths of the cam bars to be increased or decreased, while maintaining the ends of said bars at the same distance apart in all adjustments. The flexibility of the cam bars permits them to bend to accommodate the raising of the bar at one end relatively to the other end thereof. While there may be a slight tendency for the bars to turn as the ends thereof at one side of the machine are raised relatively to the ends of the other side of the machine, this will not be objectionable. In this connection, it will be also noted that the construction described provides means for adjusting the machine to fill receptacles of varying heights; and in this use of the adjusting means the cam bars are raised equally at both sides of the machine by the simultaneous adjusting of both screw shafts 129. In such latter adjustment the clamping bolts 126 need not be loosened.

An important feature of advantage of the use of a single sliding valve for each pump barrel is that this type of valve renders the valve mechanism self-cleaning and prevents clogging of the ports and passages thereof when operating with relatively heavy or lumpy material, such as thick paints, heavy jellies, mince meat or the like. Such self-cleaning action of the valve also insures extreme accuracy in the delivery of a predetermined quantity of the material from the reservoir to the receptacle in each operation, so that a given adjustment of the cam bars, with respect to the capacity of the receptacle below, always insures the delivery of a pre-determined quantity of material in each operation. Accuracy of measurement of the material is important inasmuch as the weight and measure requirements of the different States are very rigid, and a machine which does not accurately measure the charges delivered at all times will be condemned. A further advantage of the construction described lies in the ease with which the valve member may be removed, it being freely withdrawable from place when away from the cams 90 and 93, and all parts of the valve mechanism are readily accessible for cleaning when the valve member is so removed.

The reservoir and the pumps are adjusted vertically on the central shaft 20 by rotation of the adjusting shaft 65 in the manner before described, and thereafter tightening the set screw 67 against said shaft. In order to provide for such vertical adjustment, it is necessary to also raise the valve-actuating cam members 90 and 93. This may be effected by providing the brackets 95, 95′ of the cam members 90, 93, respectively, with clamping studs or screws 135, by which they may be adjusted vertically in the slotted frame members 17 and locked in adjusted positions. The connecting link 106 has sliding engagement with the swiveled head of the bell crank lever 101, whereby it may slide up and down relatively to said bell crank lever when the cam plate 90 is vertically adjusted, and the parts are normally locked together by a thumb screw 136.

The receptacles are fed into and discharged from the machine by means of rotative feed disks 140 which are mounted on the upper ends of shafts 141 at the entering and discharge sides of the machine. Said shafts are rotatively mounted in vertical bearings 142 carried by the machine frame. They are provided at their lower ends with beveled gear wheels 144 that mesh with beveled pinions 145 on the countershaft 48, whereby said disks are driven in opposite directions. The said disks are provided with irregular peripheries constituting recesses 150 which coöperate with the curved guiding surfaces 151, 152 of a fixed guide plate 153 located between the disks to direct the receptacles to and from the machine. The feed disk receives the receptacles from the feed belt 39 and directs them over the platform 38 to the table 33, and the discharge disk receives the receptacles from the table and directs them to the take-off belt 40.

In order to adjust the machines to receptacles of different diameters, the said feed disks are preferably of multiple construc-

tion, being made of two or more superposed members, with the lower members provided with deeper feeding recesses. The said members are herein shown as locked together by locking screws 155. The upper ends of the shafts 140 carry collars 156 that are provided with lugs 157 which are adapted to enter notches 158 in the disk to afford an interlocking connection between the shafts and disks. The guide plate may likewise be made of a number of superposed members or laminæ of different dimensions in their curved parts so as to coöperate with different adjustments of the disks.

It will be observed that by making the cam bars 116, 117 of a construction to give a wide range of vertical adjustment to adjacent ends thereof relatively to the other ends, it becomes possible to widely vary the stroke of the pistons and to feed widely varying charges of material to the receptacles below. For instance, if it be desired to fill a receptacle of much greater diameter than illustrated in the drawings and of the same height, and one which therefore would receive a greater quantity of material, the higher ends of the cam bars are raised while the lower ends thereof remain at the same level of adjustment as before. Likewise the machine may be again adjusted for a receptacle of the same or less dimensions but of greater height. In making adjustment for the latter receptacles, both the higher and lower ends of the cam bars are simultaneously raised. It is also obvious that the same variety of adjustments may be made with the taller receptacles as they increase in diameter and dimensions by raising or adjusting the higher ends of the cam bars relatively to the lower ends thereof. It will thus be apparent that the machine is adapted to accurately fill a great range of receptacles, the accuracy of the charge being as great in the smaller receptacles as in the larger receptacles. It is also apparent that the machine is capable of operating on a wide variety of materials, running from a relatively thin liquid, such as jellies, paints, varnishes and the like, up to materials of a heavier nature, as, for instance, preserves, mince-meats, etc.

When operating on relatively heavy or semifluid materials, it becomes desirable to lubricate the pistons. This may be effected by making the pistons hollow and providing them on their cylindric faces with grooves 172 which communicate with the hollow pistons by one or more transverse openings 173. When operating on food stuffs, the lubricant may consist of water or other neutral liquid. When operating on paints or varnishes, the lubricating medium may be turpentine. The openings 173 are made of a size to permit the lubricating liquid to escape but slowly into the recesses or grooves, through the medium of which it is distributed to the contacting pistons and cylindric bearing surfaces.

It will be understood that the structural details of the machine are capable of some variation within the spirit and scope of the invention, and the invention is not limited to the details shown except as the same are hereinafter made the subject of specific claims and as imposed by the prior art.

I claim as my invention:—

1. In a filling machine, the combination with a reservoir; a series of pump barrels communicable therewith; pistons within said barrels, and means to reciprocate them, of a single endwise sliding ported valve member associated with each pump barrel and slidable on and having continuous metal to metal contact with upper and lower guide faces, to control the withdrawal of material from the reservoir to the pump barrel and the passage of material from the pump barrel to a receptacle therebelow, and means to actuate said valves.

2. In a filling machine, the combination with a rotative reservoir; a series of pump barrels supported on the reservoir; pistons reciprocable in said barrels, and means to reciprocate them, said reservoir being provided with a series of ports adjacent to said pump barrels and the pump barrels being each provided with two bottom ports, with the two ports of each barrel arranged radially in line with an adjacent reservoir port, of a single sliding valve for each barrel provided with a port adapted to register with one of the ports of said barrel and with a part to cover the other port of said barrel.

3. In a filling machine, the combination with a reservoir having a series of ports; a series of pump barrels each having two ports adjacent to each reservoir port, and pistons within said barrels, with means to reciprocate them, of a single ported sliding valve beneath each pump barrel and having sliding contact with the bottoms of the barrel and reservoir to control the withdrawal of material from the reservoir to the pump barrel, and the passage of material from the barrel to a receptacle therebelow, and means to successively actuate said valves.

4. The combination with a reservoir provided at its bottom with an outlet port, a pump barrel at the side thereof provided with two bottom ports, one of which is adapted to be connected by a passage with said reservoir and a piston in said barrel, with means to actuate the same, of a valve member slidable in said passage toward and from the reservoir port and having extended metal to metal contact at its upper and lower sides with the upper and lower walls of said passage to provide liquid tight

joints, and provided with a through port adapted to register with one of said bottom ports, with means to actuate said valve member.

5. In a filling machine the combination with a reservoir provided at its bottom with an outlet port, a pump barrel at the side thereof provided with two bottom ports, arranged in radial alinement with the reservoir port, and a guide plate applied to the bottom of the reservoir and extending outwardly beneath the bottom of said barrel to provide a passage through which the reservoir port communicates with one of said bottom ports, and itself provided with a port in register with the other of said bottom ports, of a valve piece slidable in said passage and having metal to metal contact throughout its length with said plate and the bottom of the reservoir and barrel and provided with a port adapted to register with said registering ports.

6. The combination with a reservoir provided at its bottom with an outlet port, a pump barrel provided at its bottom with ports, there being formed beneath said barrel and adjacent portion of the reservoir a passage through which the reservoir port communicates with one of the pump barrel ports, and a piston in said barrel, with means to actuate it, of a sliding valve member in said passage and having extended contact at its upper and lower faces with the upper and lower walls of said passage to provide fluid tight joints, and provided with a port adapted to register with the other of said pump barrel ports and adapted by its movement to control the flow of material from the reservoir to the pump barrel, said passage being freely open at its end to permit the valve member to be removed.

7. The combination with a reservoir provided with an outlet port, a pump barrel provided with two bottom ports, one of which is adapted to be connected by a passage with said reservoir port and a piston in said barrel, with means to actuate the same, of a valve member slidable in said passage toward and from the reservoir port and provided with a through port adapted to register with another of said barrel bottom ports and having a part adapted to close the first mentioned barrel bottom port, said valve member extending beyond the pump barrel and provided with a contact member adapted for engagement with an actuating device.

8. In a filling machine, the combination with a frame; a rotative reservoir; a pump barrel carried by and communicable with the reservoir; a piston in said barrel, and a controlling valve device for said barrel, of rising and descending cam bars supported on the machine frame for positively reciprocating the piston in both directions during rotation of the reservoir, and means to adjust the ends of the cam bars relatively to each other to vary the stroke of the pistons.

9. In a filling machine, the combination with a frame; a rotative reservoir; a series of pump barrels surrounding and communicable with the reservoir; pistons in said barrels, and controlling valves for said barrels, of means carried by the machine frame for positively raising and lowering said pistons during rotation of the series of barrels, and means acting on the raising and lowering means for varying the strokes of said pistons.

10. In a filling machine, the combination with a frame; a rotative reservoir; a series of pump barrels surrounding and communicable with the reservoir; pistons in said barrels, and controlling valves for said barrels, of flexible rising and descending cams connected to the frame by means spacing the upper and lower ends respectively of said cams, and means to raise and lower the upper ends of said cams relatively to the lower ends thereof.

11. In a filling machine, the combination with a frame; a rotative reservoir; a series of pump barrels surrounding and communicable with the reservoir; pistons in said barrels, and controlling valves for said barrels, of flexible rising and descending cams connected to the frame by means spacing the upper and lower ends respectively of said cams, and means at both the upper and lower ends of said cams to raise and lower the same constructed to raise and lower the upper ends of said cams relatively to the lower ends thereof.

12. In a filling machine, the combination with a frame; a rotative reservoir; a series of pump barrels surrounding and communicable with the reservoir; pistons in said barrels, and controlling valves for said barrels, of rising and descending cam bars with the upper and lower ends thereof meeting in respective overlapped, spaced relation; brackets vertically adjustable in the frame to which the ends of said cam bars are connected, and means for raising and lowering said brackets.

13. In a filling machine, the combination with a frame; a rotative reservoir; a series of pump barrels surrounding and communicable with the reservoir; controlling valves for said barrels, with means to actuate the same, and pistons in said barrels, of flexible rising and descending cam bars; brackets having means to vertically adjust the same on the frame, and swiveling means to connect the ends of said cam bars to said brackets.

14. In a filling machine, the combination with a frame; a rotative reservoir; a series of pump barrels surrounding and communicable with the reservoir; controlling valves for said barrels, with means to actuate the same, and pistons in said barrels, of flexible rising and descending cam bars; brackets having means to vertically adjust the same on the frame; heads swiveled to said brackets and provided with oppositely extending, vertically separated arms, and means to connect the ends of said cam bars to said arms.

15. In a filling machine, the combination with a frame; a rotative reservoir; a series of pump barrels surrounding and communicable with the reservoir; controlling valves for said barrels, with means to actuate the same, and pistons in said barrels, of flexible rising and descending cam bars; brackets having means to vertically adjust the same to the frame; heads swiveled to said brackets and provided with oppositely extending, vertically separated arms provided with vertically elongated slots; clamping means for the cam bars extending through said slots, and means to pivotally connect the terminals of said cam bars to said heads and to thereby maintain them spaced apart.

16. The combination with pump barrels and pistons, of flexible rising and descending cam bars to actuate the pistons arranged with their ends overlapping in different planes, brackets mounted in the frame for vertical adjustment, and means to swivelingly connect said cam bars to said brackets and to maintain the ends of the cam bars spaced a fixed distance apart.

17. The combination with pump barrels and pistons, of flexible rising and descending cam bars to actuate the pistons arranged with their ends overlapping in different planes, brackets mounted in the frame for vertical adjustment; heads swiveled to said brackets provided with oppositely extending vertically separated arms having vertically elongated slots; clamping bolts extending through said bars and slots and pivot studs for connecting the terminals of said bars to the heads between said arms.

18. The combination with pump barrels and pistons, of flexible rising and descending cam bars to actuate the pistons arranged with their ends overlapping in different planes, brackets mounted in the frame for vertical adjustment; means to swivelingly connect said cam bars to said brackets and to maintain the ends of the cam bars spaced a fixed distance apart, and means for raising and lowering said cam-bar-supporting brackets in the frame, constructed to permit the two adjacent ends of said bars to be raised and lowered relatively to the other ends thereof.

19. The combination with pump barrels and pistons, of flexible rising and descending cam bars to actuate the pistons arranged with their ends overlapping in different planes, brackets mounted in the frame for vertical adjustment, and means to swivelingly connect said cam bars to said brackets and to maintain the ends of the cam bars spaced a fixed distance apart, said brackets being provided with interiorly screw-threaded members, and upright screw shafts rotatively mounted in the frame and engaging said members.

20. A filling machine comprising a rotative reservoir; a series of pump barrels; pistons in said barrels; valves to control the passage of material from the reservoir to the pump barrels and from the pump barrels to receptacles placed there-below; flexible rising and descending cam bars supported on the machine frame for reciprocating the pistons in the cylinders, and supporting means for said cam bars constructed to permit the higher ends thereof to be vertically adjusted relatively to their lower ends, combined with means for raising both ends of said cams to a like extent.

21. In a filling machine, the combination with a frame, a rotative series of pump barrels, controlling valves for the barrels, with means to actuate them, and pistons in said barrels, flexible, spaced cam bars to control said pistons and members for vertically adjustable and swiveling connection with the frame to which the ends of the cam bars are loosely connected and by which they are fixedly spaced.

22. In a filling machine, the combination with a frame, a rotative series of pump barrels, controlling valves for the barrels, with means to actuate them, and pistons in said barrels, of flexible, spaced cam bars to control said pistons, brackets vertically adjustable on the frame, Z-shaped members pivotally connected to said brackets and provided with means to pivot the ends of the cam bars thereto and to space the ends of the cam bars, there being provided slotted connections between said members and the cam bars inwardly beyond the pivoted ends of said bars.

23. In a filling machine, the combination with a rotatable reservoir; a rotative table there-below; a series of pump barrels rotating with the reservoir, and valve devices therefor, of a valve-actuating device in advance of the receptacle-receiving side of the machine comprising a pivoted cam plate adapted to be swung into the path of the valves to actuate the same, with means to normally hold it out of the path of the valves and means operated through the presence of a receptacle in the machine to swing said plate into its valve-operating position.

24. In a filling machine, the combination

with a frame; a series of rotative pump barrels and a reservoir mounted in the frame; a rotatable table beneath the barrels, and valves to control the flow of material from the reservoir to the barrels and from the barrels to the receptacles below, of a swinging valve-actuating plate, with means to normally hold it out of the path of said valves; a contact bar adapted to be engaged by the receptacles, and operative connections between said contact bar and said swinging plate.

25. In a filling machine, the combination with a frame; a series of rotative pump barrels and a reservoir mounted in the frame; a rotatable table beneath the barrels, and valves to control the flow of material from the reservoir to the barrels and from the barrels to the receptacles below, of a swinging valve-actuating plate, with means whereby it is normally held out of the path of said valves; a contact bar adapted to be engaged by the receptacles, and operative connections between said contact bar and said swinging plate comprising a bell-crank lever; a link connecting one end of the swinging contact arm with one arm of said bell-crank lever, and a link connecting the other arm of the bell-crank lever with said swinging plate.

26. In a filling machine, the combination with a frame; a series of rotative pump barrels and a reservoir mounted in the frame; a rotatable table beneath the barrels, and valves to control the flow of material from the reservoir to the barrels and from the barrels to the receptacles below, of a swinging valve-actuating plate, with means to normally hold it out of the path of said valves; a contact bar adapted to be engaged by the receptacles; a bell-crank lever; a link connecting one end of the contact arm with one arm of said bell-crank lever; a link connecting the other arm of the bell-crank lever with said swinging plate; means whereby said plate may be raised and lowered with respect to the frame, and means whereby said latter link may be raised and lowered with respect to the bell-crank lever and may be locked thereto.

27. A filling machine comprising a frame; a rotative reservoir; a series of pump barrels having valved communication with the reservoir; pistons in said cylinders provided with upwardly extending piston rods, rising and descending cam bars supported on said frame; bearing rollers carried by the upper ends of said piston rods to engage the upper and lower sides, respectively, of the rising and lowering cam bars, and hooks carried also by said piston rods to engage over the descending cam bar.

28. In a filling machine, in combination, a reservoir; a pump barrel having valved communication therewith, and a hollow piston in the barrel, with means to reciprocate it, said piston being provided on its exterior cylindric face with an annular recess or groove and being provided with one or more openings connecting said groove with the interior of the hollow piston.

29. In a filling machine, the combination with a series of pump barrels, pistons therein and valves for said pump barrels, of spaced flexible rising and descending cam bars to actuate said pistons carried by the machine frame, and means to raise the upper ends of said cam bars relatively to the lower ends thereof to vary the lengths of stroke of the pistons.

30. A filling machine comprising a frame, charge measuring pump barrels carried thereby, pistons in the barrels and controlling valves for the barrels, of flexible rising and descending cams one at one side of the machine and the other at the other side thereof and vertically spaced with their ends arranged in overlapping relation, and means to connect the overlapping ends of the cam bars, constructed to permit the upper ends of the bars to be raised and lowered relatively to the lower ends while maintaining the bars spaced and a means to so raise and lower said cam bars.

31. A filling machine comprising a frame, charge measuring pump barrels carried thereby, pistons in the barrels and controlling valves for the barrels, of flexible rising and descending cams one at one side of the machine and the other at the other side thereof and vertically spaced with their ends arranged in overlapping relation, and means to connect the overlapping ends of the cam bars, constructed to permit the upper ends of the bars to be raised and lowered relatively to the lower ends while maintaining the bars spaced and means to so raise and lower said cam bars, in combination with means for simultaneously raising and lowering both the upper and lower ends of the bars.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 21st day of March, A. D. 1916.

LEWIS A. BAKER.

Witnesses:
W. L. HALL,
M. G. ADY.