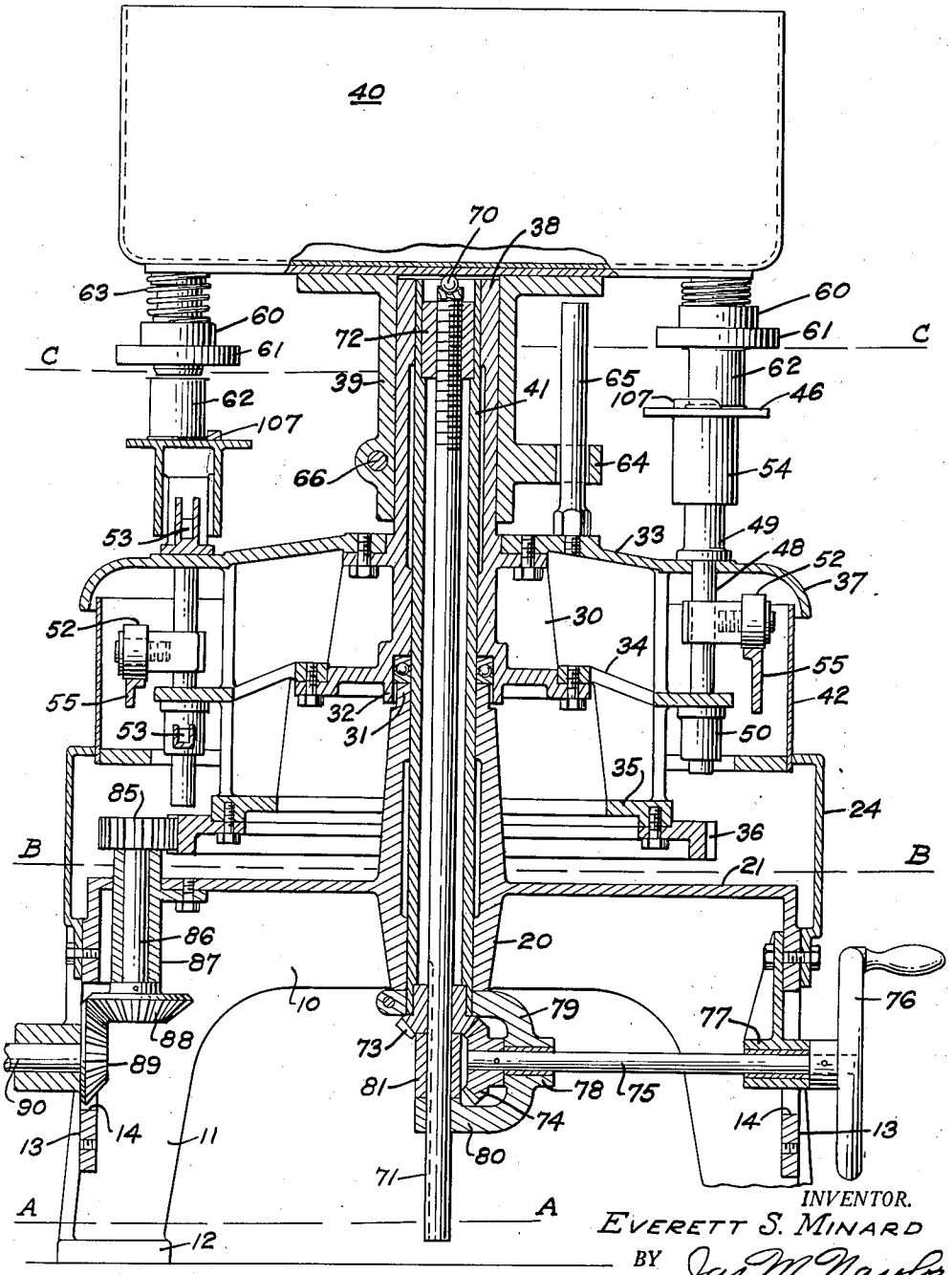
May 13, 1941. E. S. MINARD 2,241,672

FILLING MACHINE

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Fig. 1.



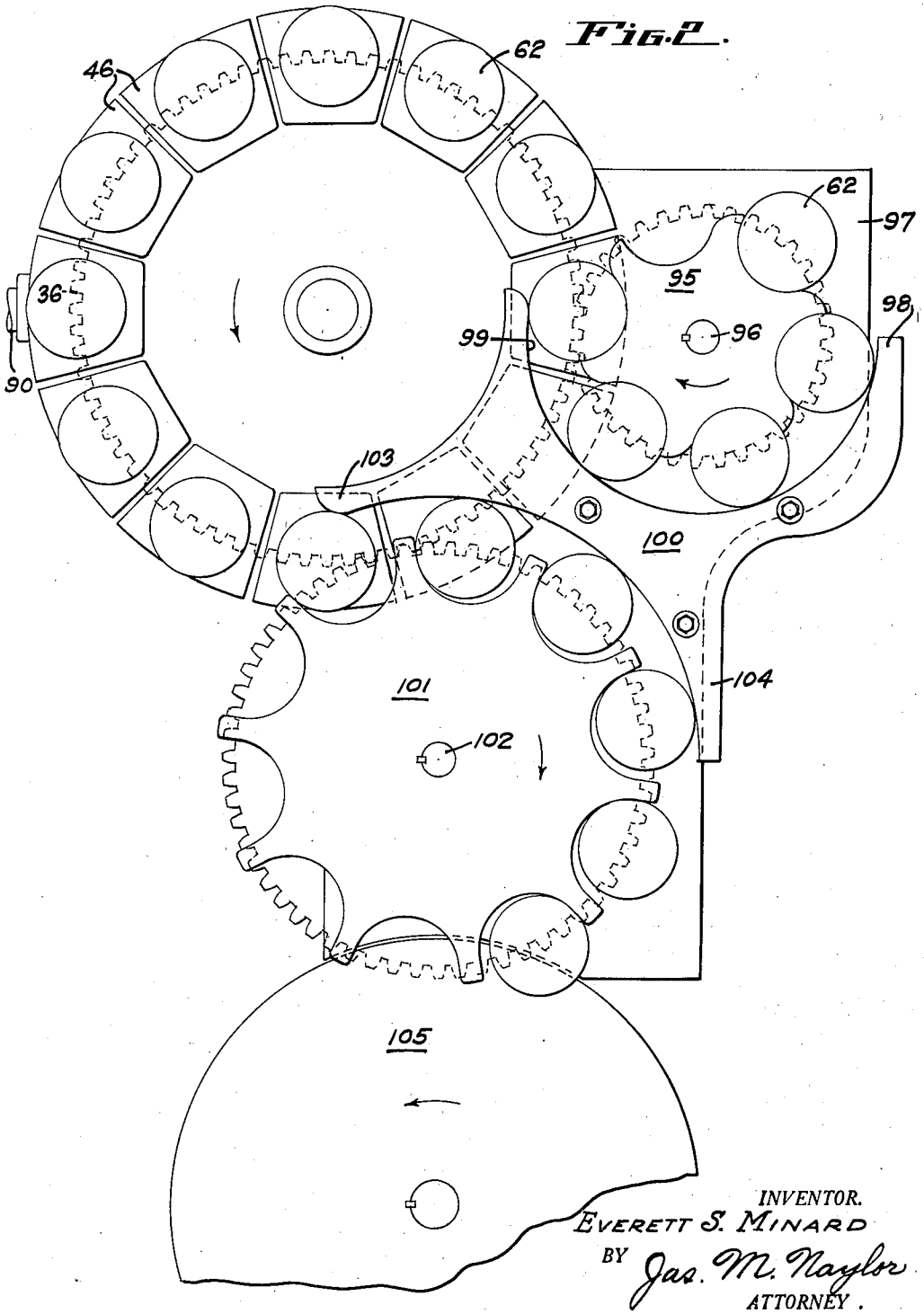
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Fig. 2.



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Fig. 3.

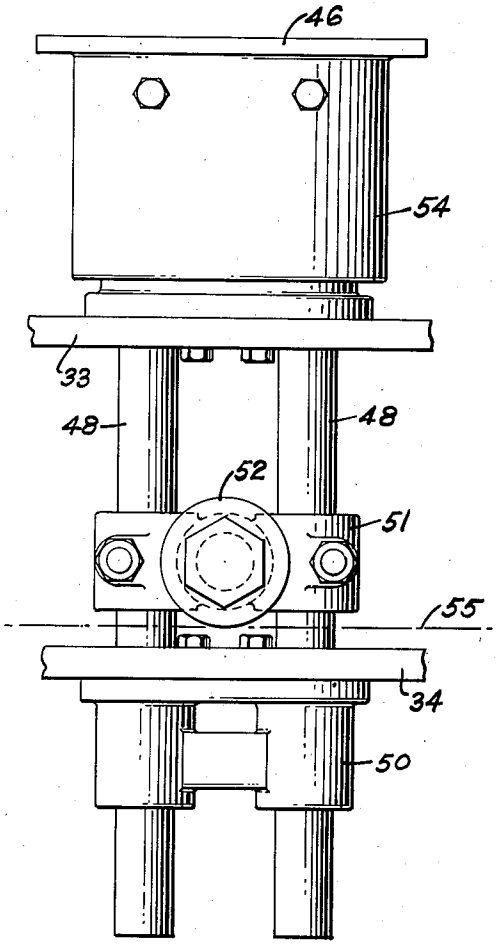
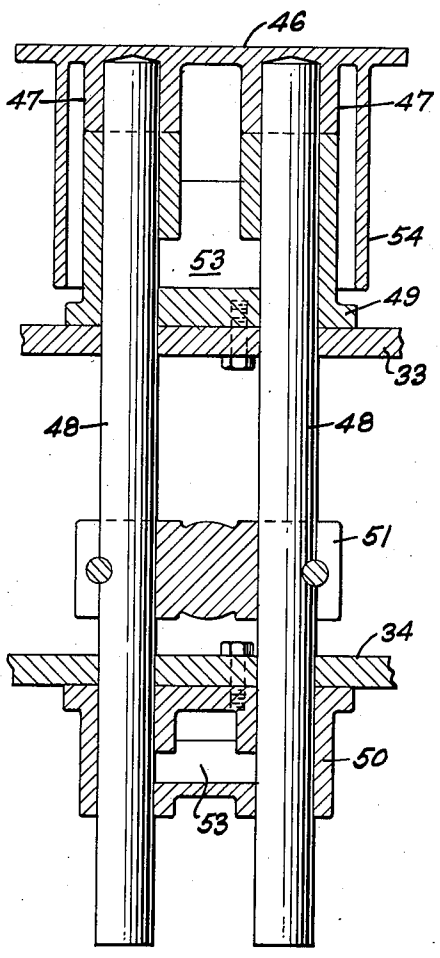


Fig. 4.



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UNITED STATES PATENT OFFICE

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FILLING MACHINE

Everett S. Minard, Oakland, Calif., assignor to Walter King, San Francisco, Calif.

Application August 26, 1938, Serial No. 226,943

7 Claims. (Cl. 226—97)

This invention relates to a filling machine of the gravity type such as are used in the handling of free-flowing liquids.

It is an object of this invention to provide a gravity type filler for the handling of all free-flowing or thin liquids such as tomato juice, brine, wines, fruit juices, soups and the like, whether hot or cold, having regard for present day needs for sanitary, high speed operations. It is a further object of this invention to provide a filling machine which will successfully handle liquids having a tendency to foam. Moreover, it is an object of the subject matter hereof to provide a device with which receptacles, such as cans, may be accurately filled with any desired head space and to provide means whereby such head space will be positively maintained.

Another object of the invention is to provide a machine of the character mentioned which is assembled in a minimum number of compact units to facilitate quick diasssembling of the machine for cleaning purposes. Furthermore, with the idea of cleanliness in mind, one of the features of this invention is that the working parts thereof and the lubrication means therefor are fully enclosed.

In general terms the present invention contemplates the use of a rotary supply tank having a plurality of filling openings in the bottom thereof; receptacle actuated valves dependent from the bottom of the tank in registry with the filling openings; a plurality of reciprocal receptacle supports or lifters disposed beneath the valves; driving means for maintaining a constant speed in the movement of the receptacle through the apparatus and attaining a highly desirable degree of smoothness of operation; means for quick adjustment of the machine to accommodate receptacles of various sizes, and the divisibility of the machine into three units for speedy assembling and disassembling.

It is believed indisputable that the secret of successfully handling containers of liquids when open at the top is to obviate any abrupt change of the direction or speed of movement of the container. In the present machine this constancy of direction and speed is accomplished by having the gear ratios between the receptacle feeding means, the filling machine and discharge means, such that the speed and spacing of the container never changes from the time it enters the machine until it is delivered at the discharge end thereof. In my device the can is always traveling in a true arc and at the points where it changes direction these arcs are tangent with each other. The result is that the containers are moved through the apparatus in a manner which may be likened to the reverse curves prescribed by a figure skater moving alternately on the outside edges of his right and left skates and therefore free of all jerkiness.

In addition to the foregoing I have sought in the present machine to reduce to a negligible amount vibration of the apparatus in that zone or area in which the filled receptacle is uncovered as a means of overcoming the quite vexatious and annoying problem of the contents of the filled receptacles being splashed over the machine.

These and other objects of the invention will be more particularly pointed out as this specification proceeds and the novelty thereof will be particularly pointed out in the appended claims.

In the drawings forming a part hereof:

Figure 1 is a vertical section of the filling machine forming the subject matter hereof,

Figure 2 is a top plan view of my machine with reservoir tank removed, showing receptacle feed and discharge means therefor and the direction of movement of a receptacle through the device,

Figure 3 is a front elevation of the reciprocal receptacle lifters employed in my machine, and

Figure 4 is a vertical section of the subject matter of Figure 3.

It has been hereinbefore stated that the filling machine of my invention is conveniently divisible into three units. They may be said to comprise (A) the main base, (B) the turret assembly and (C) the supply tank. In Figure 1 of the drawings these three units have been designated generally by the lines A—A, B—B and C—C, respectively.

(A) *Main base*

The main base 10 is provided with legs 11 having feet 12 for suitable floor mounting. A plurality of machined surfaces 13 are provided on the base 10, each such surface having an aperture 14 therethrough. Through the provision of these surfaces the range of permissible hook-ups with power means or power take-off means in the operation of associated and related mechanisms is materially increased.

A centrally disposed bearing member 20, is formed as a part of and projects above and below the top plate 21. The main base 10 is provided with an annular cover plate 24, having an inwardly turned top edge, which, in conjunction

with the band or shield 42, serves as a seal against any material dropping from the filling elements as well as a cover for take-off of power from spur gear 36 in driving allied devices, as will hereinafter be made more clear.

Turret assembly

The turret assembly frame 30 is revolubly supported by a conventional ball bearing on the reduced upper end 31 of bearing member 20, there being a boss 32 in the bottom of frame 30 for the purpose. Frame 30 has, in addition, three superposed flanges or bosses secured thereto, there being an upper flange 33 and middle flange 34, to support the receptacle lifter shaft bearings, presently to be described, and a lower flange 35 to support the main drive gear 36. It will be noted that upper flange 33 extends outwardly and is curved downwardly to define a convex splashproof top 37 for the whole of the turret assembly. A band or shield 42, disposed between the top 37 and annular cover 24 of main base 10, serves with the latter elements to provide a complete housing for the turret assembly and main base. Thus liquids falling on the top 37 are prevented from reaching the mechanisms within the turret assembly or the main base and fall to the floor from whence they may be suitably drained away.

The frame 30 is also provided with an integral, axially disposed tubular column 38 projecting above the upper boss 33. The tubular column 38 is provided with an external bearing surface for the dependent boss or collar 39 on supply tank 40 and an internal bearing surface for the tubular shaft 41, there being a conventional oil reservoir in connection with the latter.

The receptacle lifters supported by the turret assembly each comprises a top plate 46 having a pair of bosses 47 on its under side, bored to receive the ends of the parallel lifter shafts 48. The shafts 48 extend downwardly through a top bearing member 49 secured on the top of the boss 33, and a bottom bearing member 50 suitably fixed on the under side of boss 34, the two bearing members serving as upper and lower guides for the shafts 48. The bearings 49 and 50 are located equi-distant from the vertical center of the machine.

A bracket 51, having a cam track roller 52 extending outwardly therefrom, connects the shafts 48 between the bosses 33 and 34, the position of the bracket 51 being such that there will be no interference in the required raising and lowering of the top plate 46.

Both the upper and lower bearing members 49 and 50 are provided with open cavities, such as 53, into which a lubricant, such as oily waste or its equivalent, may be packed. As a means of covering the oil cavity in top bearing 49, during normal operation of the machine, I provide a skirt 54 integral with and dependent from top plate 46. The length of this skirt is such that when the machine is idle the lifter plate may be raised sufficiently to permit ready access to the cavity 53 for oiling purposes.

A cam track 55 (see Figure 1) is provided for rollers 52 and mounted in the machine in any conventional manner (not shown) so as to impart the desired reciprocal movement to the lifter plates 46.

The supply tank

The supply tank 40 (see Fig. 1) is cylindrical in cross-section and has an open top and closed bottom. A plurality of filling valves 60 of the receptacle actuated type are secured to the bottom of the tank above and in registry with the lifter plates 46, each being in communication with the interior of the tank, and there being one valve for each lifter. The valve illustrated is of the type having a head 61 adapted to cover the receptacle 62, a discharge nozzle which enters the receptacle and a coil spring 63 normally urging the valve into its closed position (see valve at left of Fig. 1).

It will be appreciated from Fig. 1 that the tank 40 is adapted to revolve with the turret assembly and that the receptacle lifter plates 46 and filling valves 60 must be in constant alignment. The connection between the two elements for these purposes consists in an apertured arm 64, integral with and projecting at right angles to the boss 39, and a post 65 screwed into the top of boss 33 adjacent its point of connection with frame 30. The post 65 is loosely received in the aperture in arm 64 and therefore the connection is operative at all normal adjustments of the position of the tank 40 for receptacles of different heights. The preferred form of connecting means between tank 40 and turret assembly is desirable in high speed filling operations. Where slower speeds are permissible, the mere tightening of lock bolt 66 will suffice.

Adjustment for various receptacles

The following novel means are provided for raising and lowering the tank 40 and the subjoined valves 60 to adjust the machine for containers of different heights. A single ball 70 seated in the concave end of a rod 71 co-axially arranged within the tubular shaft 41 bears against the bottom of tank 40. Rod 71 is threaded for a portion of its length from its upper end and thereby engages a nut 72 retained in the upper enlarged end of tubular shaft 41. A bevel gear 73, having a sliding key fit on the lower end of rod 71 and a collar received by the enlarged lower end of tubular shaft 41, meshes with a bevel gear 74, pinned to end of shaft 75, at the other end of which a hand wheel 76 is provided. Shaft 75 is suitably journaled at its outer end in a bearing member 77, attached to the base member 21, and adjacent its inner end in a spider 78. The upper leg 79 of spider 78 constitutes a clamp on the lower end of tubular shaft 41 to align gears 73 and 74, and the lower leg of spider 78 is apertured to receive the end of rod 71, acting as a retainer for a spacing member 81 disposed between said leg 80 and bevel gear 73.

It will thus be seen that rotation of handwheel 76 will cause tank 40 to be raised or lowered as desired, without changing the driving connection between tank 40 and turret assembly due to the fact that post 65 is loosely received in the aperture of arm 64.

I have previously indicated that a power hookup for the machine of this invention may be made through any one of the four sides of the main base 10. In the form herein illustrated the main spur or drive gear 36 is meshed with a smaller spur gear 85 keyed to shaft 86 which has been suitably journaled in a bearing member 87 secured to or (as shown) forming an integral part of main base 10. A bevel gear 88 keyed to the lower end of shaft 86 meshes with a bevel gear 89 on shaft 90 journaled in frame 10 and connected with any desired source of power (not shown).

Receptacle feed and discharge

In Figure 2 of the drawings there is shown a novel arrangement of my filling machine in conjunction with conventional feed and discharge star wheels. The feed star 95, keyed to a shaft 96, is rotated in any conventional way in timed relation to rotation of the turret assembly, possible reference being a direct driving connection with the drive of the turret assembly. Receptacles 62 are fed to the star wheel 95 over a plate 97 therebeneath and directed upon the lifter plate 46 by the arms 98 and 99 of guide member 100. A conventional receptacle guide 107 on lifter plate 46 serves to correctly position the receptacle 62 beneath the filling valve 60.

At the conclusion of the filling operation the receptacles are removed from the lifter plates 46 by means of the discharge star wheel 101, keyed to shaft 102, also rotated in timed relation to the rotation of the turret assembly either by direct connection to the drive thereof or in any other desirable manner. In this movement the receptacles 54 are steered away from the filler by arms 103 and 104 of guide member 100, to a rotary transfer plate 105 for further processing or the lidding operation.

It will be noted from Fig. 2 (particular reference being had to the dotted lines) that the gear ratios between feed star wheel 95, turret assembly and discharge star wheel 101 are such that the speed and spacing of the container 62 do not change from feed to discharge and that the can is always traveling in a true arc. It will also be noted that at the points where the container 54 changes direction the arcs are tangent with one another. The importance of this arrangement cannot be over-emphasized when consideration is given to the fact that it provides the answer to the problem of successfully handling containers of liquid, by avoiding all abrupt changes of direction and speed of the movement of the containers.

Operation

Receptacles 62 are fed by star wheel 95 into position on lifter plates 46 directly beneath the filling valves 60. As the turret assembly and supply tank 40 revolve away from the point of receptacle feed, the rollers 52 on the lifter elements follow the contour of cam track 55. Rising on the inclined section of the cam track 55 the roller 52 causes the lifter plates 46 and receptacles 62 to rise to contact and actuate filling valves 60. When the container has been filled, roller 52 following the down slope of cam trackway 55 lowers the lifter plate 46 and receptacle 62 to the level at which it was fed into the machine and the receptacle is swept off the lifter plate 46 by discharge star wheel 101, from whence it is passed to the transfer plate 105.

The disassembling of the filler for cleaning purposes is greatly facilitated by the unitary construction of the various elements, as hereinbefore set forth. For instance, at the conclusion of a particular run unit C is removed by merely lifting tank 40 and subjoined valves clear of tubular column 38 and post 64. Unit B is then removed by lifting turret frame 30, carrying with it bosses 33, 34 and 35, with the connected lifter means and spur gear 36, clear of tubular shaft 41. These operations are accomplished without the necessity of removing a single nut or screw and it will be readily appreciated that care and adjustment of the machine is thereby made a simple task.

It is believed apparent from the foregoing disclosure that the machine forming the subject matter hereof possesses many advantages and is capable of high speed, efficient operation. It is also believed obvious that the principles of this invention may be availed of in many different forms than that illustrated and described. For that reason it is not my wish to be limited to only the form disclosed but to be fully protected according to the scope of the appended claims.

The invention claimed is:

1. In a can filling machine having a revoluble tank and receptacle actuated valves dependent therefrom and communicable therewith, means revoluble with said tank for lifting a receptacle into actuating contact with said valves comprising in combination, a lifter plate, a pair of rods connected thereto, upper and lower bearing for said rods, supporting means for said bearings, a bracket rigidly interconnecting said rods between said bearings, a cam roller on said bracket, a cam track for said roller, means for causing said roller to progress on said track, and a skirt dependent from said lifter plate covering the uppermost of said bearing members.

2. In a can filling machine having a revoluble tank and receptacle actuated valves dependent therefrom and communicable therewith, means for lifting a receptacle into actuating contact with said valves comprising, a lifter plate, bosses dependent therefrom, a pair of rods connected to said lifter plate being seated in said bosses, upper and lower bearings for said rods, each of said bearings having a well therein for a lubricant, a bracket for said rods, a cam roller on said bracket, a cam track for said roller, means for causing said roller to progress on said track, and a skirt dependent from said lifter plate covering the uppermost of said bearing members.

3. In a can filling machine having a revoluble tank and receptacle actuated valves dependent therefrom and communicable therewith, means for lifting a receptacle into actuating contact with said valves comprising, a lifter plate, bosses dependent therefrom, a pair of rods connected to said lifter plate being seated in said bosses, upper and lower bearings for said rods, each of said bearings having a well therein for a lubricant, a bracket member for said rods disposed between said upper and lower bearings, a cam roller on said bracket, a cam track for said roller, and means for causing said roller to progress on said track.

4. In a can filling machine having a revoluble tank and receptacle actuated valves dependent therefrom and communicable therewith, means for lifting a receptacle into actuating contact with said valves comprising, a lifter plate, bosses dependent therefrom, a pair of rods connected to said lifter plate being seated in said bosses, upper and lower bearings for said rods, a bracket member rigidly interconnecting said rods disposed between said upper and lower bearings, a cam roller on said bracket, a cam track for said roller, means for causing said roller to progress on said track, and a skirt member dependent from said lifter plate covering the uppermost of said bearings.

5. In a can filling machine having a revoluble tank and receptacle actuated valves dependent therefrom and communicable therewith, means revoluble with said tank for lifting a receptacle into actuating contact with said valves compris-

ing, a lifter plate, bosses dependent therefrom, a pair of rods connected to said lifter plate being seated in said bosses, upper and lower bearings for said rods, a bracket member rigidly interconnecting said rods disposed between said upper and lower bearings, a cam roller on said bracket, a cam track for said roller, means for causing said roller to progress on said track, a skirt member dependent from said lifter plate covering the uppermost of said bearings, and cover means for the lowermost bearing member, said cam roller and said cam track.

6. In a can filling machine of the type embodying a revolving turret carrying a filling tank, receptacle actuated valves communicating therewith, and means for lifting a receptacle into actuating contact with said valves, characterized by a reciprocating lifter plate for the receptacle, no less than two vertically disposed reciprocating operating rods connected at their upper ends to the lifter plate, upper and lower bearings for the operating rods carried by the revolving turret, a rigid bracket rigidly interconnecting certain of said rods intermediate their ends and disposed between the bearings, means carried by said bracket adapted for operating the rods and the receptacle lifter plate into actuating contact with a valve, and cam means disposed in the travel path of the second mentioned means and engageable therewith.

7. In a can filling machine of the type embodying a revolving turret carrying a filling tank, receptacle actuated valves communicating therewith, and means for lifting a receptacle into actuating contact with said valves, characterized by a reciprocating lifter plate for the receptacle, no less than two vertically disposed reciprocating operating rods connected at their upper ends to the lifter plate, upper and lower bearings for the operating rods carried by the revolving turret, a rigid bracket rigidly interconnecting certain of said rods intermediate their ends and disposed between the bearings, means carried by said bracket adapted for operating the rods and the receptacle lifter plate into actuating contact with a valve, cam means disposed in the travel path of the second mentioned means and engageable therewith, a cover substantially enveloping the rods and the lower bearing, and a depending skirt on the lifter plate surrounding the upper ends of the rods and the upper bearing.

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