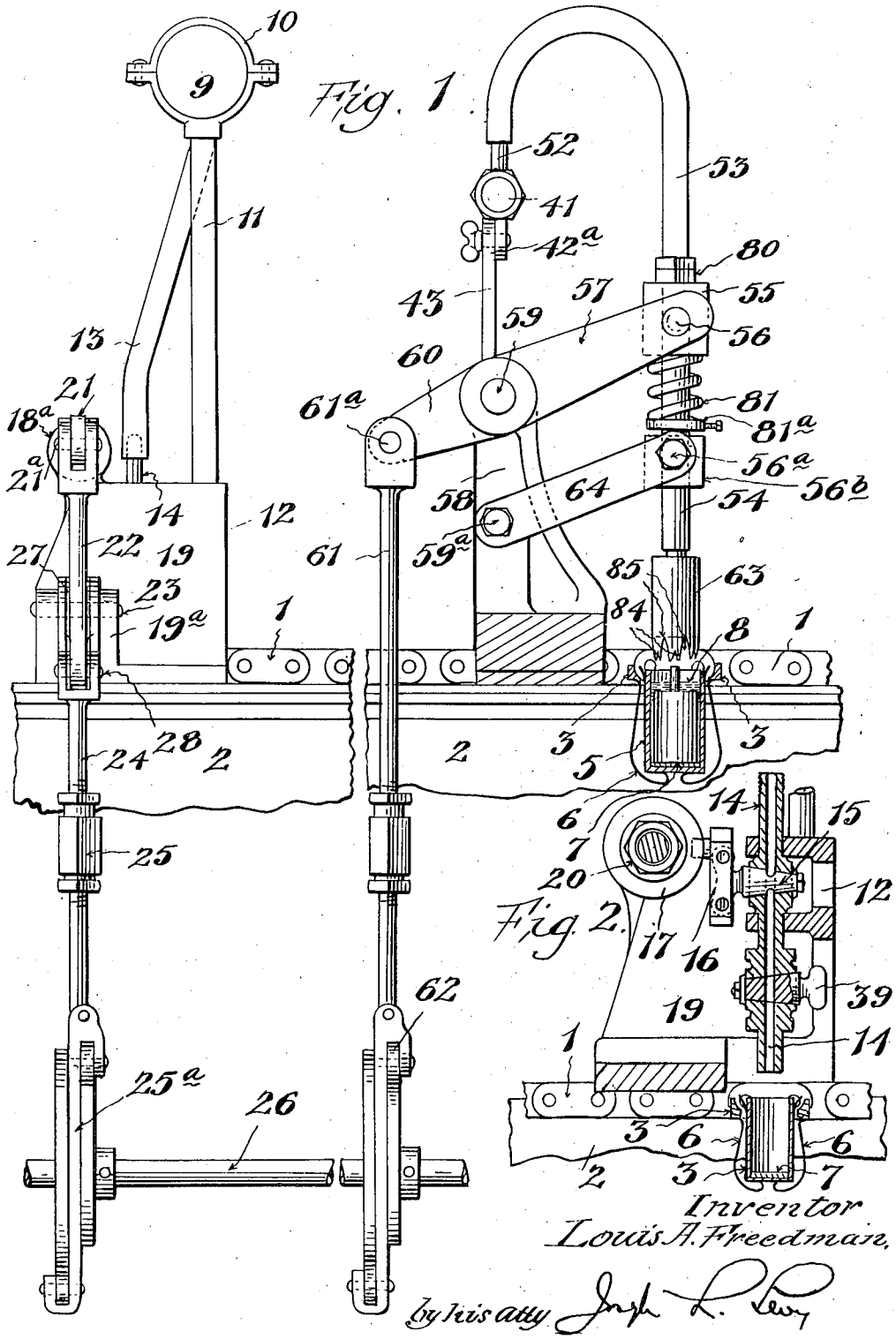
Jan. 2, 1923. 1,440,669

L. A. FREEDMAN.

MACHINE FOR FILLING RECEPTACLES.

ORIGINAL FILED MAY 13, 1916.

3 SHEETS-SHEET 1



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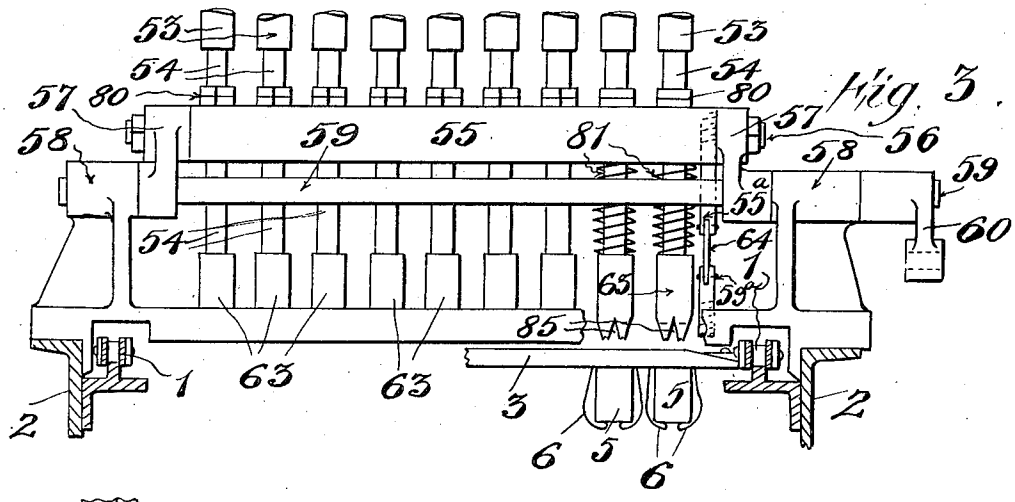

Fig. 3.

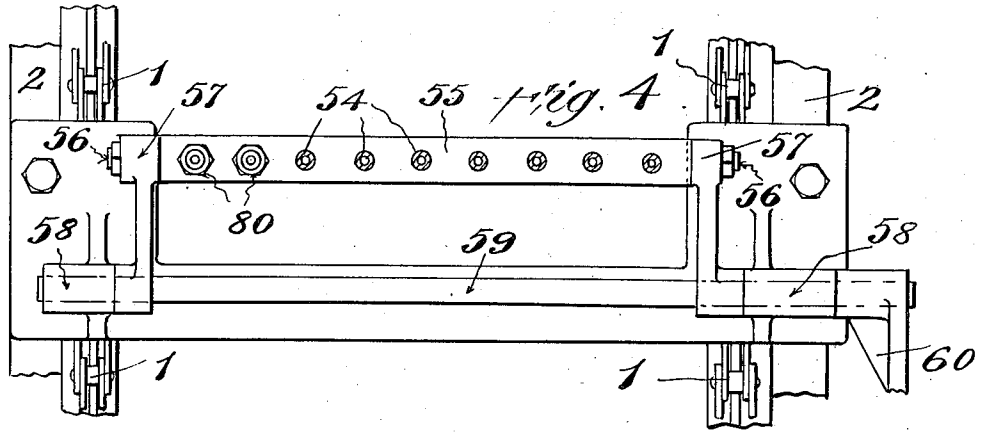

Fig. 4.

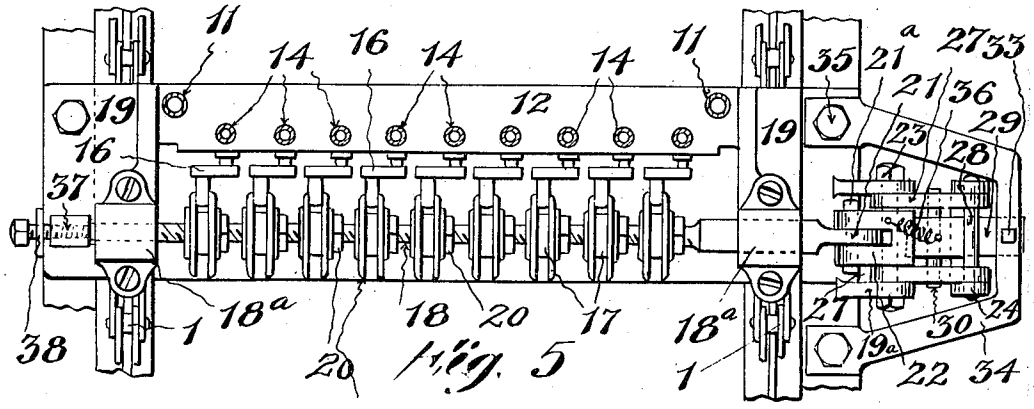

Fig. 5.

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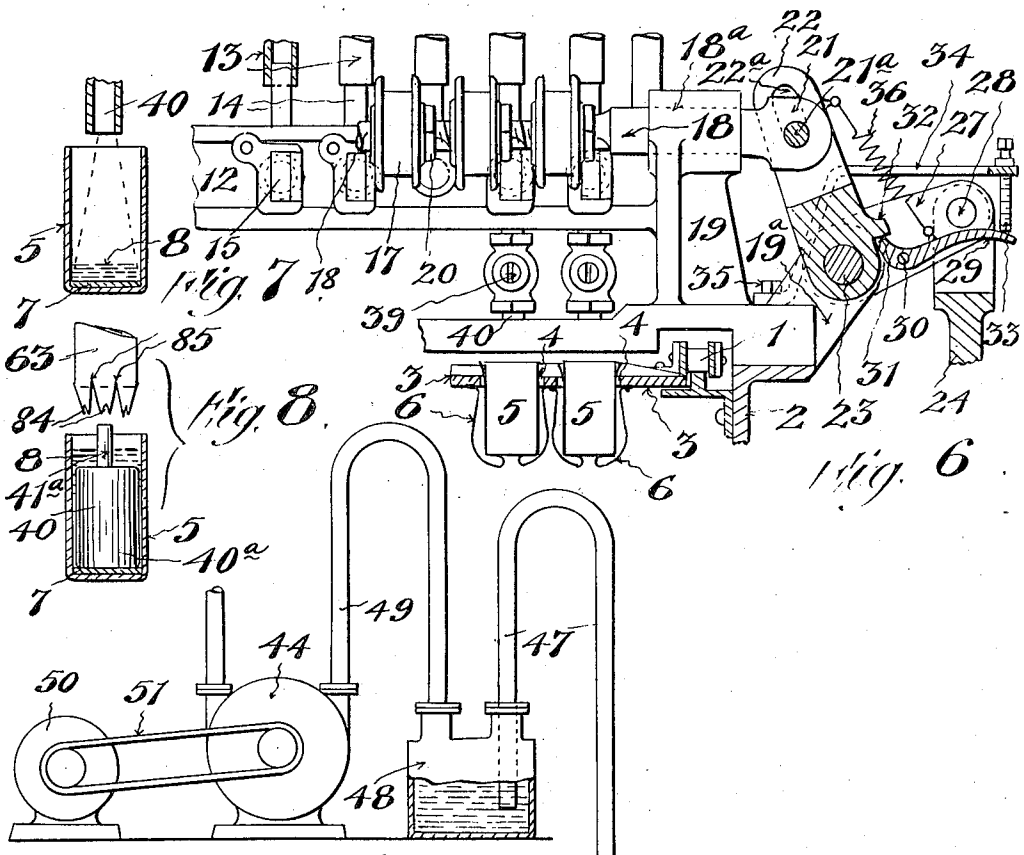

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

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UNITED STATES PATENT OFFICE.

LOUIS A. FREEDMAN, OF NEW YORK, N. Y.

MACHINE FOR FILLING RECEPTACLES.

Original application filed May 13, 1916, Serial No. 97,441. Renewed May 27, 1922, Serial No. 564,219. Divided and this application filed December 31, 1919, Serial No. 348,637. Renewed September 2, 1922. Serial No. 586,022.

To all whom it may concern:

Be it known that I, LOUIS A. FREEDMAN, a citizen of the United States, and a resident of the city, county, and State of New York, have invented a certain new and useful Improvement in Machines for Filling Receptacles, of which the following is a specification.

This invention relates to a machine for filling receptacles, and particularly to the shells used in the manufacture of dry batteries, and the object of this invention is to provide a machine of this character which will rapidly and accurately fill a number of these shells with a liquid solution with the greatest possible speed, and which will fill each of the shells to a desired predetermined level.

A further object of this invention is to provide a machine which will fill receptacles with a liquid or semi-liquid material or substance, thereafter which a solid body is inserted into the receptacles, either manually or by suitable mechanism, and after the insertion of said body, I provide a suitable mechanism which removes liquid from each receptacle, leaving therein an amount of liquid which reaches to a desired height with reference to the variable elevation of a certain point on the solid body in each receptacle.

With these objects, and other objects which may hereinafter appear, in view, I have devised the particular arrangement of parts hereinafter set forth, and more particularly pointed out in the claims appended hereto.

This application is a division of my copending application, Serial No. 97,441, filed May 13, 1916.

Reference is to be had to the accompanying drawing, forming a part hereof, in which—

Figure 1 is a side elevation, partly in section, of a portion of a dry battery making machine, provided with my improved mechanism for filling the battery shells;

Figure 2 is a vertical sectional view of the filling mechanism;

Figure 3 is a front elevation, partly in section, of the mechanism for removing surplus filling solution from the battery shells;

Figure 4 is a plan view of the same;

Figure 5 is a plan view of the filling mechanism;

Figure 6 is a front elevation, partly in section, of the filling mechanism;

Figure 7 is a sectional elevation of one of the battery shells and a portion of a filling nozzle;

Figure 8 is a sectional view of one of the battery shells and a portion of one of the nozzles for removing surplus solution;

Figure 9 is a side elevation, partly in section, of the means for recovering surplus solution;

Figure 10 is a vertical sectional view of one of the battery shells and nozzle for removing surplus solution therefrom.

Throughout the various views of the drawing, similar reference characters designate similar parts.

The battery shells or other receptacles to be filled are preferably carried on a conveyor while the filling operation takes place. In the preferred embodiment of my invention, as disclosed in the accompanying drawings, the conveyor consists of a pair of parallel chains 1, which extend substantially the length of the machine, and are mounted on sprockets not shown, which sprockets are mounted on the frame 2 of the machine in any suitable way, and are driven from a motor or otherwise.

The two chains 1 which comprise the shell conveyor and which move in the direction of the length of the machine, are connected by cross members 3, which extend transversely of the machine. Each of these cross members 3 is provided with a plurality of openings 4 (see Figure 6) and in each of these openings a battery shell 5 is adapted to fit, the shell 5 being supported by three spring fingers 6 fixed to the cross member 3 beneath each opening 4.

At one end of the machine the shells are thus placed in position on the conveyor. The feeding of shells to the conveyor may be done by hand or by means of any suitable mechanism. When the conveyor reaches the mechanism comprising the subject matter of this specification, the battery shells are in position on the cross members 3 of the conveyor with their mouths or open ends uppermost and inserted in the bottom

of each of the shells 3 is a disk 7 of cardboard or the like, on top of which the filling mechanism pours the filling solution, 8.

The filling solution 8 is contained within a suitable reservoir or tank 9 which is supported in clamps 10 fixed on uprights 11 which extend upwardly from a bracket 12 mounted on top of the frame members 2 of the machine.

The filling solution flows downwardly from the reservoir 9 through a plurality of tubes 13 to the measuring mechanism now to be described.

The measuring mechanism has a number of tubes 14 and the upper end of each of these tubes 14 connects with the tubes 13. In each of the tubes 14 is mounted a shut off valve or cock 15. Each of the valves 15 is provided with a crank 16 having its end engaged by a grooved disk 17 fixed upon a threaded shaft 18 which is adapted to shift or reciprocate in the direction of its length in bearings 18^a, located near its ends and formed on the side members 19 of the bracket 12.

The grooved disks 17 are threaded upon the shaft 18 and are thus adjustable thereon. To secure them in place it is preferable to use lock nuts 20.

At one end of the shaft 18 is secured a clevis 21 which is connected to a lever 22. The lever 22 is provided with an elongated slot 22^a that engages a pin 21^a mounted in the clevis 21. The lever 22 is fulcrumed on a pin 23 mounted in a projecting clevis 19^a which extends from one of the brackets 19.

A pair of links 27 straddle the lever 22 and are mounted on the pivot pin 23. The outer ends of these links 27 are pivotally connected together by a pin 28 which joins them to a cam-connecting link 24. This link 24 is preferably adjustable in length by means of the turn buckle 25. The link 24 extends downwardly to the cam mechanism 25^a which is actuated by means of the main or cam shaft 26 of the machine driven in any suitable manner. By means of this cam mechanism the respective filling valves 15 are opened and closed at the proper time. The lever 22 turns freely upon its pivot 23, as do the parallel links 27 which are pivotally connected at their outer ends to the link 24 by pivot 28 as heretofore set forth. A latch or trigger 29 is pivotally mounted between the two arms 27 on a pivot 30. This latch 29 has a toe 31 which is adapted to engage a shoulder 32 formed on the lever 22. The other end of the latch 29 is adapted to contact with a set screw 33 which is mounted in a bracket 34, and depends downwardly therefrom.

The bracket 34 is preferably fixed to the frame of the machine by a screw 35, or otherwise, as desired.

A spring 36 connects the latch 29 and the upper end of the lever 22. When the toe 31 of the latch 29 is forced clear of the shoulder 32 on the lever 22 by an upward movement of the link 24, the spring 36 returns said latch 29 promptly to its position to again contact with the shoulder 32.

The valves are opened by the transverse shifting of the shaft 18 and are held open until the latch 29 moves out of engagement with the shoulder 32 on the lever 22. As the cam connecting link 24 moves upwardly the latch 29 engages with the set screw 33 with the result that the latch 29 is brought out of engagement with the shoulder 32 on the lever 22. This releasing action of the latch 29 from the shoulder 32 disconnects the rigid connection between the links 24 and 27 with the link 22 and permits the return shifting movement of the shaft 18 with the result that the valves are closed. This closing movement of the valves may be caused by any desired spring arrangement or other resilient means. A quick closing of the valves may be further facilitated by means of a cushion 37 which is of rubber or similar material which is held by a bracket 38 so that it is compressed by the end thrust of the rod or shaft 18 when the valves are opened and when the closing operation of the valves begins this rubber cushion aids in promptly closing the same. Hand shut off valves 39 are mounted adjacent the lower ends of the pipes 14 which have their openings directly over the conveyor. When the conveyor carries a set of receptacles on one of the cross members 3 and a cross member pauses directly beneath the pipes 14, the valves 15 are caused to be opened by means of the cam mechanism 25^a heretofore described, and by means of said cam mechanism they are held open the desired length of time to permit the necessary amount of filling material to be discharged therefrom and are then closed.

If for any reason the automatic mechanism for filling the cups refuses to properly operate the manually operative shut off valves 39 can be utilized to prevent waste of the material.

After the cups have been filled as above described, they are carried further by the conveyor to a mechanism which removes a surplus amount of the liquid from them, leaving an amount therein which comes up to a predetermined height. After the paste or liquid supplying mechanism has filled the receptacles, a core 40 is deposited in each receptacle. This may be done manually or by any suitable mechanism interposed between the liquid supplying mechanism and a surplus liquid removing mechanism now to be described. These cores 40 each comprise a cylindrical body portion 40^a which loosely fits within the receptacle and through this body portion longitudinally

extends a narrow central electrode 41ª, which projects above the upper end of the body portion 40ª.

These cores are in many instances of varying sizes as to heights and diameters thereby causing a variation in their cubical contents displacement. When placed within the receptacles they thus cause the liquid which has been previously supplied to the receptacles to rise to varying heights. To produce uniform batteries, it is necessary that the liquid in each receptacle be kept at a uniform height with reference to the upper end of the core. For this reason the surplus liquid removing mechanism is utilized which reduces the amount of liquid in each receptacle to a predetermined and desired level. The surplus removing mechanism consists essentially of a system of traps or surplus reclaiming chambers in connection with a vacuum chamber or suction manifold 41 which is supported upon suitable clamps 42ª extending upwardly from brackets 43 mounted upon the machine. This manifold 41 is exhausted by any suitable means such as a vacuum pump 44 disclosed in Figure 9.

This pump and its connections are disclosed in detail in Figure 9 where the suction manifold 41 is connected to a pipe 42 which runs to the solution reclaiming system comprising a closed receiving container 43 which has a drain pipe 44ª running through a valve 45 to a storage vessel 46. The pipe 42 has its lower end extending in close proximity to the bottom of the receiving container 43. Air is exhausted through a pipe 47 which extends from the top of the container 43 and extends within a closed safety vessel 48 and terminates near the bottom thereof. From the top of the vessel 48 extends a pipe 49 which runs to the exhaust pump 44 which exhausts air from the apparatus. This pump is run from a motor 50 by means of a belt 51, or any other suitable means. By closing the drain valve 45 and disconnecting the vessel 46 surplus liquid may be removed by emptying the vessel 46 and reused later, and this may be done at any time without disturbing the exhaust by means of the valve 45. Extending from the manifold 41 are a plurality of upwardly projecting outlet tubes 52 onto which are connected flexible tubes 53 which extend downwardly and have their lower ends connected to tubes 54 slidably mounted in a crossing 55, the ends of said crossing being pivotally connected as at 56 to rocket arms 57. These rocker arms 57 are pivotally mounted on a shaft 59 which has its ends mounted in brackets 58. On one end of the shaft 59 is fixed an arm 60 which is connected to an adjustable cam connecting link 61 extending downwardly to cam mechanism 62 mounted on the main shaft 26 of the machine. This cam mechanism causes the link 61 to be vertically reciprocated whereby the rocker arm 57 through its pivotal connection at 61ª is thusly oscillated. The pipes 54 project through the crossing 55 and are slidably mounted therein as heretofore explained and extend downwardly therefrom. Each pipe is provided at its lower end with a nozzle 63. The pipes 54 are also connected to the bracket 58 by means of a connecting link 64. This connecting link 64 is pivoted at one of its ends on the bracket 58 at a point 59ª directly vertically below the pivot point 59. At its other end the link 64 is pivoted at 56ª on a cross bar 56ᵇ through which the pipes 54 slidably extend. The distance between the pivotal points 56ª and 59ª of the link 64 is the same as the distance between the pivotal points 56 and 59 of the rocker arm 57. Thus the rocker arm 57 and the link 64 move in parallelism whereby the nozzles 54 are always guided directly vertical in their upward and downward movement. This construction of the links 64 and 57 is shown in Figure 1. In Figure 3, this construction is slightly modified, in that the link 64, instead of being pivotally connected to the cross member 56ᵇ, is connected to a bracket 55ª which depends downwardly from the cross bar 55.

The nozzles 63 have the normal position of their lower ends determined by means of suitable lock nuts 80 which press against the cross member 55 by the tension of suitable coil springs 81 which function against collars 81ª fixed on the pipes 54 so that the nozzles will be resiliently supported with their lower ends at the proper level. This resiliency is necessary because of the variable heights of the cores, and is also necessary should the cores 40 in the receptacles be in an improper position with reference to the center of the nozzle then the nozzle 63 would accidently strike the same upon its downward movement, and the unintentional contact would not be hard enough to break the nozzle or the core.

By means of the mechanism above described, the receptacles 5 are carried on the conveyor, after they have been filled with the liquid solution, towards the surplus removing mechanism. At an intermediate position the cores 40 are inserted so that when the cups reach the surplus removing mechanism each cup contains the liquid filling preparation and the core, with possibly a substantial amount of the liquid in excess of what is actually desired to remain in the cup. By means of the mechanism just described, the nozzles 63 then descend, and enter into the mouths of the cups until the lower end of each nozzle 63 rests upon the core. Each nozzle 63 is provided with vertically extending passages 83 which extend from arched recesses 84 in the lower end of the nozzle. These recesses 84 are concave so

that the contact of the lower end of the nozzle 83 with the core 40 will not shut off the passage for the solution and thus prevent the removal of the solution from out of the cup. The solution is removed to a distance slightly above the upper end of the body portion 40[a] of the core, this distance being determined by the height of the recesses 84 in the lower end of the nozzle. The surplus filling preparation is drawn through the passages 83 by suction and from thence through the tubes 54 to the manifold 41 and from thence to the reserve tanks 48, 43 and 46, as heretofore described, from which it may be removed and reused.

From the foregoing, it will be seen that the amount of liquid left in each cup is governed by the height of the core placed within the cup as by means of the arrangements of the nozzles heretofore described the surplus liquid is withdrawn, leaving a predetermined amount in each cup at a height just above the height of the body portion 40 of each core. Each nozzle is also provided with recesses 85 which allows the nozzle to enter the cup without splashing the mixture out of the receptacles, and also allows the air to reach the interior of the nozzle and aid in removing the surplus liquid solution.

After the surplus solution mechanism has acted, the cups are then carried by the conveyor to any other suitable mechanism which may form part of the machine, or they may be ejected from the machine.

From the foregoing, it is obvious that my invention is not to be restricted to the exact embodiment shown, but is broad enough to cover all structures coming within the scope of the annexed claims.

Having described my invention, what I claim is:

1. A machine of the class described comprising mechanism for filling receptacles adapted to contain liquid and a solid body, mechanism for removing surplus liquid therefrom and means on said surplus liquid removing means for causing the amount of liquid left in each receptacle to be regulated by the height of the solid body contained therein.

2. In a machine of the class described means for supplying liquid to a receptacle adapted to contain a solid body, means for withdrawing surplus liquid from said receptacle, and means on said surplus liquid removing means for causing the amount of liquid to be permitted to remain in the receptacle to be regulated by the height of the solid body contained therein.

3. In a machine of the class described, means for supplying liquid to a receptacle containing a solid body, means for removing surplus liquid therefrom and means on said surplus liquid removing means for contacting with the solid body within the receptacle and causing the amount of liquid to be permitted to remain in said receptacle to be determined by said contact.

4. In a machine of the class described, means for removing surplus liquid from a container having a solid body provided with a shoulder, a suction nozzle adapted to be moved into said container to contact with said shoulder, and means on said nozzle for causing a removal of the surplus liquid to a predetermined height with respect to said shoulder.

5. In a machine of the class described, means for removing surplus liquid from a container having a central solid body, a nozzle adapted to enter said receptacle and contact with said body, said nozzle having a suction bore and recesses leading to said bore to regulate the height of the liquid permitted to remain in said receptacle over the height of the body within the same.

6. In a machine of the class described, means for filling a plurality of receptacles with a liquid solution each of which receptacles contains a central solid core, mechanism for removing surplus liquid solution from said receptacles comprising a plurality of suction nozzles adapted to enter into the receptacles and means on said nozzles for contacting with the solid body in each receptacle to limit the amount of surplus liquid removed therefrom.

7. In a machine of the class described, mechanism for removing surplus liquid from receptacles containing a solid body, comprising a plurality of vertically movable suction nozzles adapted to enter into the receptacles and contact with the solid body contained therein, a central suction bore in each of said nozzles, a plurality of suction passages extending therefrom to the lower end of said nozzles said suction passages terminating in arched recesses.

8. In a machine of the class described, mechanism for removing surplus liquid from a receptacle comprising a suction tube, a suction nozzle thereon, said nozzle having a plurality of arched recesses in its lower end with suction passages leading therefrom to the suction tube.

9. In a machine of the class described, mechanism for removing surplus liquid solution from containers holding a liquid and a solid, comprising a nozzle adapted to enter into a container and contact with the solid therein and means on said nozzle for gauging the amount of liquid to be left in said container by contact with the solid in the container.

10. In a machine of the class described, means for removing surplus liquid from containers comprising a plurality of nozzles adapted to enter said containers to a predetermined depth, each of said nozzles having a central recess and suction ports surround-

ing the same, said suction ports terminating in arched recesses, and means for causing suction through said nozzles to remove liquid from said cups to a depth regulatable by the recesses in the nozzles.

11. In a machine of the class described, a filling mechanism comprising a plurality of filling nozzles, valves in said nozzles, projections on said valves, a reciprocating shaft, means on said shaft for engaging said projections to open and close the valves, means for reciprocating said shaft comprising a cam shaft, a link adapted to be raised thereby, a pivoted arm engaging the upper end of said link, a latch on said arm, another arm adapted to be engaged in said latch, said second arm being connected to the reciprocating shaft, and a spring connecting the last mentioned arm and latch.

Signed at the city, county and State of New York, this 30th day of December, 1919.

LOUIS A. FREEDMAN.