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G. A. HOWE ET AL

BOTTLE FILLING MACHINE

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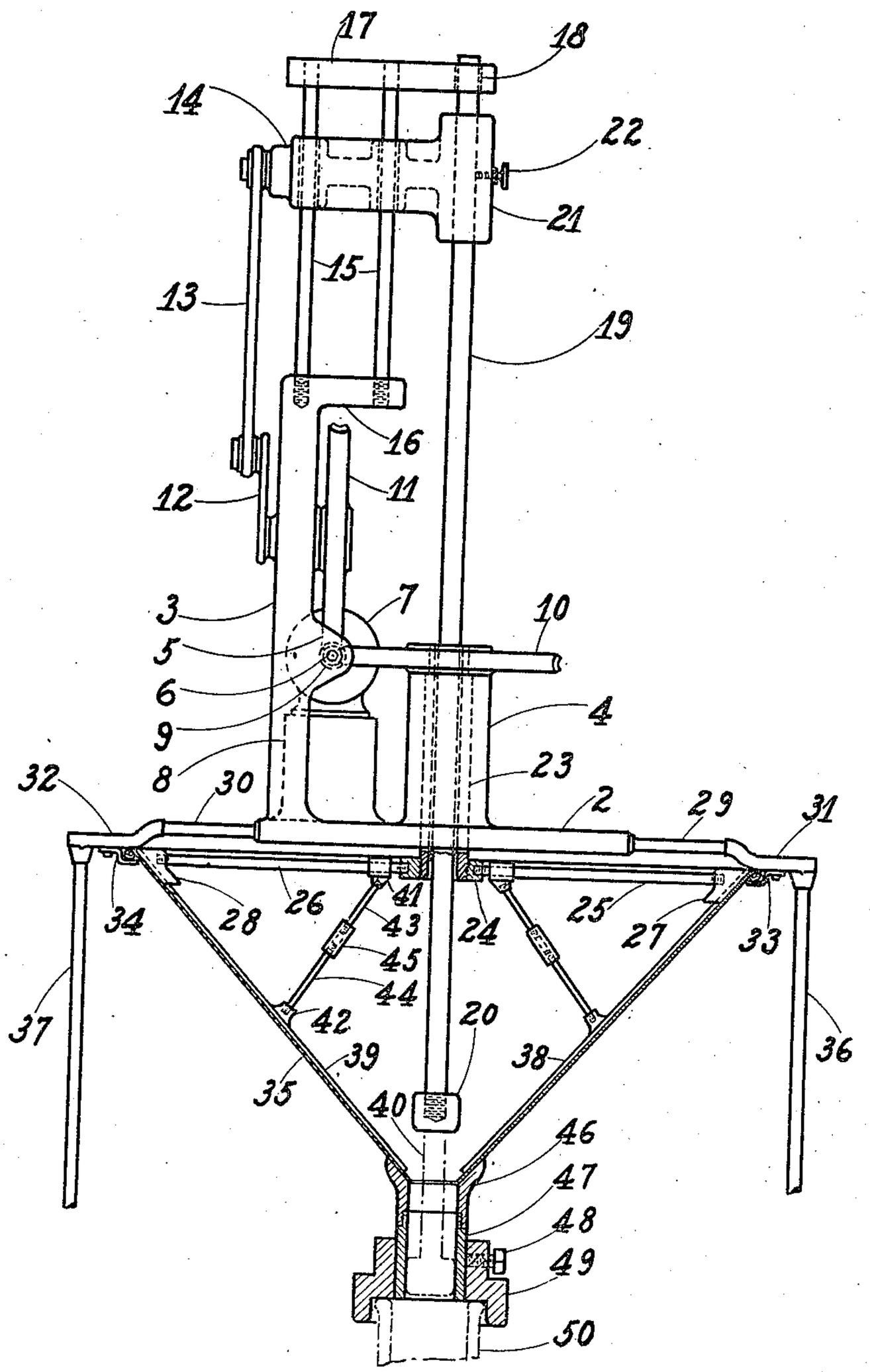

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UNITED STATES PATENT OFFICE.

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BOTTLE-FILLING MACHINE.

Application filed October 22, 1921. Serial No. 509,574.

To all whom it may concern:

Be it known that we, GEORGE A. HOWE and JULIUS L. KOSMANN, citizens of the United States, and residents of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Bottle-Filling Machines, of which the following is a specification.

This invention relates to bottle filling means and particularly to that type used in filling bottles with finely powdered solids, and has for its objects to provide a simple, inexpensive device of the character referred to which is highly efficient in operation.

It is a special object of the invention to provide a device which will at all times operate to deliver the powder being dispensed continuously and uniformly. It is also an object to provide means wherein the substance to be delivered to the bottles is prevented from forming cohering masses or from adhering to the sides of the hopper of the filling machine, being thus maintained in such condition that it will flow readily under the influence of gravity into the discharging nozzle.

It is a further object to provide means not only for maintaining the powdered substance in such condition that it will flow readily but to operate in conjunction therewith a feeding device for positively forcing the powder into the bottles and packing the same therein.

These and other objects of the invention will more readily appear when taken in connection with the following description and appended claims.

The accompanying drawing illustrates the preferred embodiment of the invention, the same being shown in end elevation with parts thereof in section.

The embodiment illustrated comprises a frame consisting of the base plate 2 and upright portion 3 in which or from which the several parts are mounted or supported. 4 designates a vertical bearing surmounting the base plate 2, and 5 bearing lugs projecting from the portion 3 in which is suitably journaled the driving shaft 6 of a motor 7 mounted upon the base 8, also supported by the plate 2. Any type of motor may be used, an electric motor being shown since that is the type preferred, and attached adjacent the end of its shaft 6 is a worm 9 engaging a pair of worm wheels 10 and 11. The worm wheel 11 is attached to a shaft journaled in the upright 3 and is provided with a crank 12 pivotally connected with one end of a link 13 having its opposite end pivoted to a cross head 14 slidable upon guide rods 15 attached to a horizontal extension 16 formed on the upper end of member 3. Fixed to the upper extremity of rods 15 is an overhanging extension 17 which serves to properly space the said rods and which is provided with a guiding aperture 18 for the upper end of rod 19 of a piston 20, the said rod being vertically adjustable in the sleeve 21 formed as a part of the cross head 14 by means of binding screw 22 and is guided adjacent its lower end by passing through a cylindrical sleeve 23 attached to the worm wheel 10 which rests upon the top of bearing 4, the sleeve 23 being journaled in the said bearing. The sleeve extends slightly below the base plate 2 and is threaded into a hub 24 of a spider having the arms 25 and 26 provided with the enlargements 27, 28 at their outer ends.

Fixed to the base plate 2 are laterally extending rods 29, 30, carrying the blocks 31 and 32 respectively. Supported from these blocks by means of clamps as indicated at 33 and 34 is a conical hopper 35. In order to relieve the strain placed upon rods 29 and 30 upright supports such as 36, 37 may be employed.

Fixed to the enlargements 27 and 28 are the downwardly projecting wiper and agitator arms 38 and 39 which are in the form of thin strips disposed adjacent and conforming to the inclination of the wall of hopper 35, the lower extremities of such arms extending down to and in close proximity to the discharge opening 40. A fixed collar 41 surrounds each of the arms 25 and 26 adjacent the hub 24 and a boss 42 is attached to each agitator arm, as by soldering, about midway of its length. Extending from the said collar and boss are the rods 43 and 44, respectively, the inner ends of which are connected by the turn buckle 45. Surrounding the discharge opening and attached to the hopper by any suitable means, as by soldering, is a collar 46 into which is threaded the nozzle 47 to the exterior of which is attached by means of binding screw 48 the guard 49 for surrounding the neck of the bottle 50 being filled.

The diameters of the opening 40 and of the bores of collar 46 and nozzle 47 corre-

spond, and the diameter of the piston 20 is of such dimension as to snugly fit the same yet permit ready reciprocation thereof. It is also noted that the lower extremities of arms 38 and 39 extend very close to opening 40 but terminate sufficiently distant therefrom to prevent obstructing the same and the passage of piston 20.

The mechanism for actuating the piston previously described causes it to traverse the entire length of the nozzle 42 and to rise a substantial distance above the opening 40 and the extremities of arms 38 and 39, in order to permit free entry of the material contained in hopper 35 into the nozzle.

The operation of the device is as follows:

The powdered material to be dispensed is placed in the hopper 35 and the neck of a bottle to be filled is brought into alignment with the nozzle by any suitable means, either automatic or manual, but as such mechanism forms no part of the present invention the same has not been illustrated. Motor 7 drives gears 10 and 11 through the worm 9, gear 11, causing reciprocation of piston 20 by means of crank 12, link 13, cross head 14 and rod 19, while gear 10 rotates sleeve 23, the spider 25—26 and depending arms 38 and 39. Arms 38, 39 may be adjusted by actuating the turn buckle 45 so as to secure a setting between the same and the inner surface of the hopper giving the best results and not only prevent the powdered material from adhering to the side of the hopper but keep the same in an agitated and pulverized condition preventing the particles thereof from cohering and forming agglomerated masses. The material is thus kept in such condition that the finely divided particles do not either stick to each other or to the sides of the hopper, the same flowing freely through the opening 40 into the nozzle 47 whenever the piston 20 rises above the discharge opening and ends of arms 38, 39 on its upward stroke, the extreme limit of which is indicated by the full lines in the drawings. On the downward stroke of the piston the same positively discharges whatever material has previously entered the nozzle and remains therein.

In actual practice the piston 20 is caused to reciprocate one or more times after the bottle has been filled with the discharged powder so as to partially pack the same therein, care being taken not to prolong the packing operation to such extent as to subject the bottles to sufficient pressure to cause breakage.

The guard 49 acts as a shroud around the neck of bottle 50 preventing spilling or waste of the powder during the filling operation. After the plunger has been reciprocated a sufficient number of times to effect the desired filling and packing, and the required number for various sized bottles is determined by experiment, the filled bottle is removed and an empty one brought under the nozzle for filling in a similar manner. The filled bottle is replaced by an empty one during the upward movement of piston 20 from the lowest point in its stroke, as indicated in dotted lines, to the discharge opening 40, the said piston during the said portion of its stroke acting as a valve preventing discharge through the nozzle.

By arranging the parts in the manner described a very compact device is provided in which a single drive shaft actuates both means for rotating the wiper and agitator arms as well as reciprocating the discharge piston and in which parts of the former aid in accurately guiding the reciprocating plunger. It is thus seen that the device described provides a simple, inexpensive and highly efficient construction for the purpose intended.

We claim:

1. In a device of the kind described, the combination of a conical hopper provided with a discharge opening therein, a rotary spider, arms attached to said spider and projecting into the hopper, the entire length of said arms lying adjacent and at a substantially uniform distance from the inner surface of the hopper and constantly extending into the proximity of the discharge opening, a reciprocating plunger in the hopper disposed between the lower extremities of said arms for discharging material therefrom.

2. In a device of the kind described, the combination of a conical hopper provided with a discharge opening therein, a rotary spider, arms attached to said spider and projecting into the hopper, the entire length of said arms lying adjacent the inner surface of the hopper and constantly extending into the proximity of the discharge opening, means for adjusting the clearance between the said arms and surface, and a reciprocating plunger in the hopper disposed between the lower extremities of said arms for discharging material therefrom.

3. In a device of the kind described, the combination of a conical hopper having a discharge opening at the center of its lower end, a rotary spider, downwardly projecting arms at all times conforming to the inclination of the hopper wall and lying at a substantially uniform distance and adjacent thereto, said arms constantly extending into the region of the discharge opening but unobstructing the same, a reciprocating plunger in the hopper fitting the discharge opening, said plunger during its upward stroke moving above the lower extremities of the said arms whereby the material in the hopper will flow under its own weight into the discharge opening.

4. In a device of the kind described, the combination of a frame, a hopper disposed there-beneath having a discharge opening, a spider rotatable in the hopper and provided with a central threaded aperture, a bearing on the frame, a gear supported thereby, a sleeve depending from the gear journaled in the bearing and attached to the spider for supporting the same, inclined arms fixed to the spider lying adjacent the hopper wall and extending into the region of said discharge opening, a piston fitting the discharge opening, a rod therefor passing through and guided by the said sleeve, and means for driving the said gear and piston rod.

5. In a device of the kind described, the combination of a conical discharge hopper provided with a discharge opening, a collar fixed to the hopper and surrounding the discharge opening, a cylindrical nozzle whose internal diameter corresponds to that of the said opening fixed to the collar, arms lying at a substantially uniform distance from and conforming at all times to the inclination of the hopper wall and constantly extending into the region of the nozzle, a reciprocating plunger fitting the discharge opening and nozzle, means for rotating said arms and for reciprocating the plunger, the plunger on its upward stroke moving to a point above the lower extremities of the arms and on its downward stroke to the lower end of the nozzle.

In testimony whereof, we hereunto sign our names.

GEORGE A. HOWE.
JULIUS L. KOSMANN.

Witness:
EDWIN O. JOHNS.