Dec. 25, 1951 A. J. TACCHELLA 2,580,256

DISPENSING DEVICE HAVING SOLENOID OPERATED PLUNGER AND VALVE

Filed April 11, 1946 2 SHEETS—SHEET 1

Fig. 1

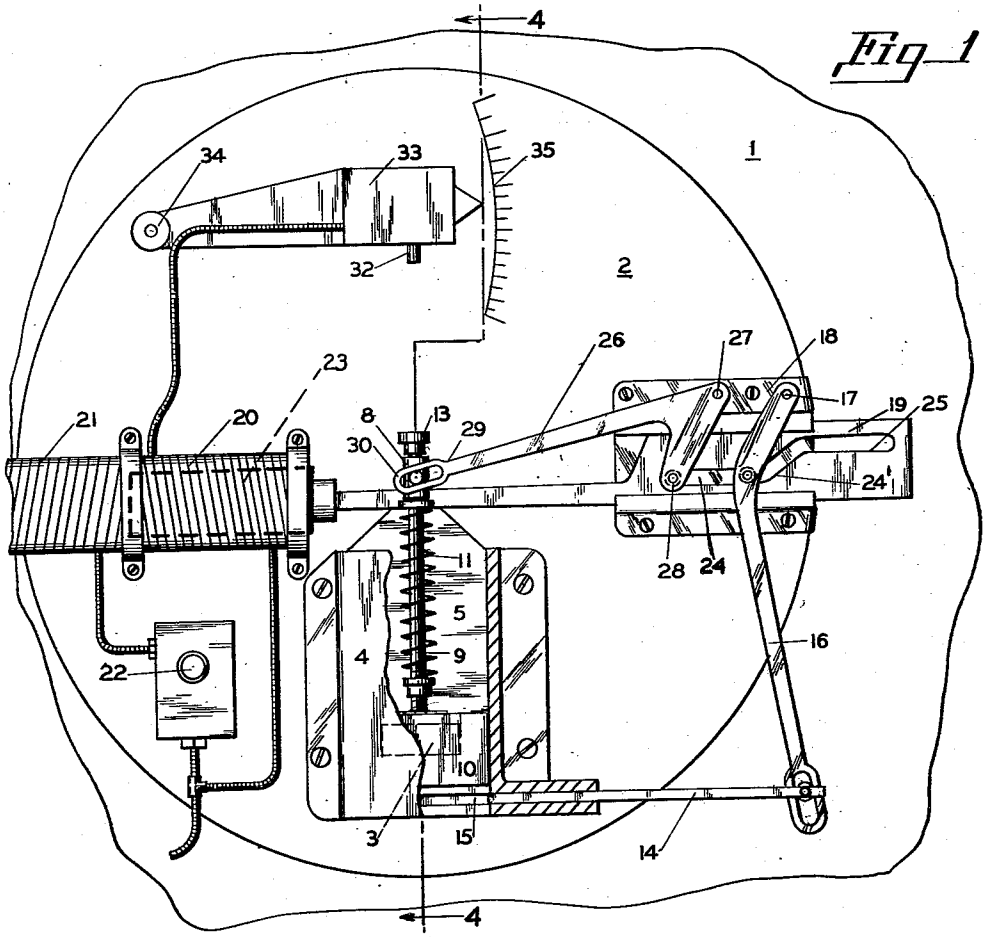
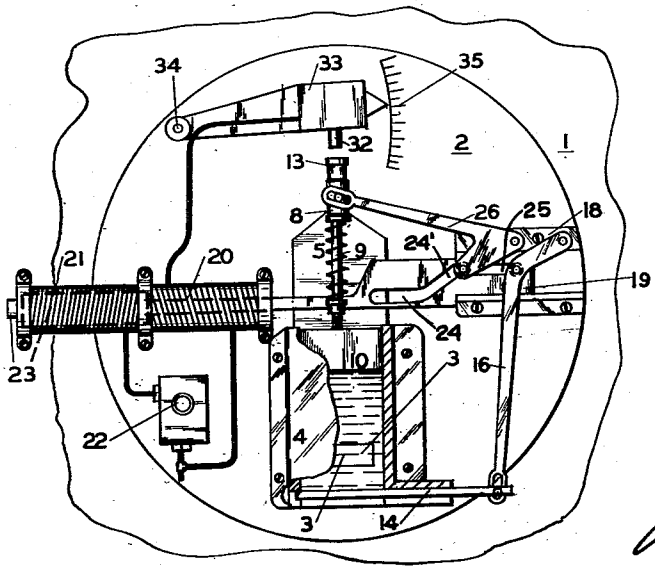


Fig. 2



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Fig. 4

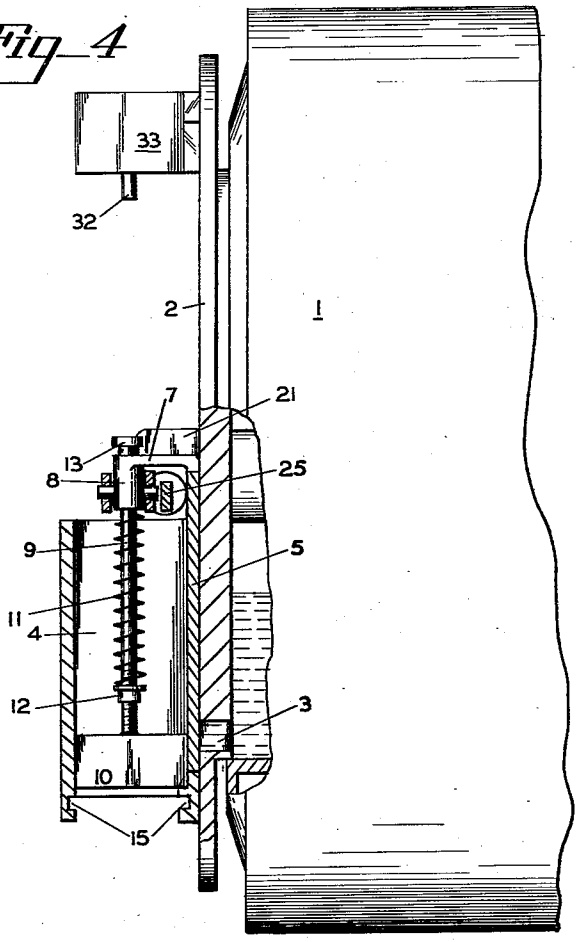


Fig. 3

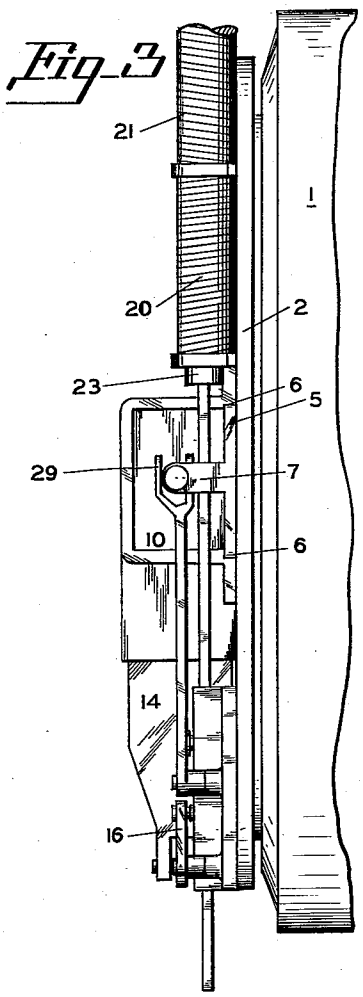
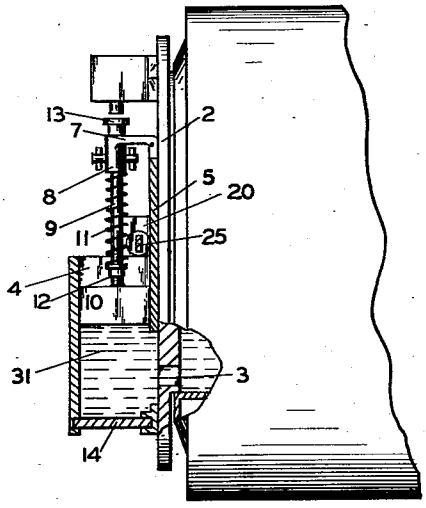


Fig. 5



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UNITED STATES PATENT OFFICE

2,580,256

DISPENSING DEVICE HAVING SOLENOID OPERATED PLUNGER AND VALVE

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Application April 11, 1946, Serial No. 661,284

12 Claims. (Cl. 222—76)

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This invention relates to dispensing devices and more particularly to such devices which are adapted for dispensing semi-fluent material, such as ice cream, in measured quantities.

The primary object of the invention is to provide a dispensing device that is capable of dispensing a liquid or semi-liquid product, as for instance soft ice cream, in a measured amount.

A further object of the invention is to provide a dispensing device that is readily adjustable during operation to vary the amount of product dispensed in each cycle of operation. In the case of ice cream, it is desirable to dispense an exact amount in each dispensing operation.

The foregoing objects, in accordance with the present invention, are accomplished by using a float mechanism in combination with a mechanism for opening and closing an intake and discharge port of a measuring chamber.

The novel features that are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in connection with the accompanying drawings, wherein like reference characters indicate like parts throughout the several figures and in which:

Figure 1 is a front view of the head of a typical ice cream freezer having my new and improved dispensing device mounted thereon, partially broken away for convenience of illustration.

Figure 2 is the same view as that of Figure 1 except that the intake port into the measuring chamber is opened and the frozen product is being discharged from the freezer into the measuring device prior to being dispensed from the measuring device.

Figure 3 is a fragmentary plan view of my new and improved measuring device mounted to the front end of a freezer.

Figure 4 is a sectional view taken on line 4—4 of Figure 1.

Figure 5 is a sectional view similar to Figure 4, except that the parts are shown in the positions illustrated in Figure 2.

Referring now to the drawings, a container 1, such as an ice cream freezing unit, is provided with the usual front gate 2 having an opening 3 for discharging the contained product. The usual means for discharging and dispensing the product is simply a pivotal gate covering this opening and selectively operated by a lever to uncover the opening.

The present invention comprises a measuring chamber defined by a box-like container 4 to be operatively mounted on the front of the gate 2 and open to the opening 3. A valve or gate 5 is slidable within suitable grooves 6 of the box 4

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which position the gate valve 5 against the face of the gate 2 for efficient cooperation with the opening 3. A bracket 7 extends forwardly from the top of the gate valve 5 and has a bearing or boss 8 formed on its outer end for slidably supporting a rod 9 which is adapted to move vertically up and down within the container 4. The lower end of the rod is fixedly mounted to a float, plunger or piston 10, which is of a size and shape to snugly fit and seal with the inner walls of the container 4, but which slides freely along said walls.

A spring 11 is mounted to the rod 9 and rests on the flange nut 12, which is adjustable on the rod 9. The upper end of the spring bears against the underside of the boss 8. The rod 9 has a knob or enlarged portion 13 formed on its upper end to retain the rod in the boss 8 when the gate 5 is raised. The bottom of the box container 4 is open for dispensing the product discharged through the opening 3, and a second gate valve 14 closes the bottom of the container 4, said valve 14 working within grooves 15 along the bottom edges of the container 4. The box container 4, piston 10 and gate valve 14 cooperate in defining a measuring chamber 31.

When a dispensing operation takes place, it is desirable to first close the dispensing valve gate 14. This is accomplished by the operation of the lever 16, which is pivotally mounted at 17 to a guideway 18. Working within the guideway 18 is a cam, which is operated by solenoids 20 and 21, each wound in the opposite direction to provide two-way movement of their core 23 which is connected with the cam 19.

When the switch 22 is closed by an operator, it closes an electric circuit through the solenoid 21, pulling the core 23 and the cam 19 to the left from the position shown in Figure 1 to the position shown in Figure 2. The cam slot 24 is provided with a cam surface 24' which is operative, first, to move the lever 16 from the position shown in Figure 1 to that shown in Figure 2, closing the gate 14, after which the cam slot surface 25 will maintain the lever in this position. On further travel of the cam 19, the lever 23 will be raised by the cam surface 24' to the position of that shown in Figure 2 raising and opening the gate 5, and at the same time raising the float or piston 10 therewith.

The lever 26 is pivotally mounted at 27 to the guideway 18 and has a cam follower 28 working within the cam slot 24 and as the cam slot surface 24' contacts the follower 28 it will also raise the lever 26. The end 29 of the lever 26 co-acts with the bearing or boss 8 by way of the wrist pins 30 raising or lowering the gate 5 therewith.

When the gate 14 is closed, then the gate 5 is opened simultaneously with the raising of the float, causing a vacuum within the lower part of the chamber 31 which creates a suction that assists in moving the product into this said cham-

ber through the port 3. As the product continues to rise in the chamber 31, being fed through the port 3 under a pressure from within, the product will lift the float 10 and its rod 9 until the knob 13 engages a plunger 32 of the switch 33. This will close an electric circuit through the solenoid 20 which will pull the core 23 to the right, returning the cam from the position shown in Figure 2 to the position shown in Figure 1. This cam movement will first close the gate 5, after which it will open the gate 14. The lowering of the gate 5 will compress the spring 11 between the boss 8 and the nut 12 of the float 10, causing a resilient pressure on the float, forcing it down and thereby assisting in dispensing the product. This spring tension, in the case of ice cream, should be very light because it is not desirable to force or compress the product to any great degree, but on this I do not wish to be limited to any particular degree of pressure.

The switch 33 is pivotally mounted at 34 and can be moved closer or farther away from the knob 13, to thereby vary the amount of product being measured. A suitable scale 35 will indicate relative amounts.

The switch 22 may be operated manually or by a coin actuator, as it is only necessary for this switch to be momentarily operated. When the product rises in the container 4 it raises the float so that the knob 13 is raised and thereby closes the switch 33. When this circuit is closed the solenoid 20 will have no resistance from the solenoid 21 in operating the cam.

I do not wish to be limited to the exact structure as other forms of mechanical equivalents may be substituted still coming within the scope of my claims.

What I claim is:

1. In a dispensing device for fluent material from a supply container having a discharge opening, a measuring chamber for receiving the material from the discharge opening, a valve for closing the discharge opening, a dispensing opening in said measuring chamber, a valve for closing said dispening opening, a piston in said measuring chamber for forcing the material from said measuring chamber through said dispensing opening, cam means for operating said valves and said piston, and means for operating said cam means, the combination with said piston of a spring between said piston and said cam means, said cam means including reciprocal means operative upon reciprocal movement in one direction for positively retracting said piston to draw material into said chamber and operative upon reciprocal movement in the other direction for compressing said spring to resiliently actuate said piston to force the material from said chamber through said dispensing opening.

2. In a dispensing device for fluent material from a supply container having a discharge opening, a measuring chamber for receiving the material from the discharge opening, a valve for closing the discharge opening, a dispensing opening in said measuring chamber, a valve for closing said dispensing opening, a piston in said measuring chamber for forcing the material from said measuring chamber through said dispensing opening, cam means for operating said valves and said piston, means for operating said cam means, the combination with said cam operating means of solenoid means for actuating said cam means, a switch for controlling said solenoid means, a movably mounted member supporting said switch for operative engagement by said piston and being selectively movable relative to said piston to vary the stroke of said piston and thereby the quantity of material discharged into said measuring chamber.

3. In a dispensing device for fluent material from a supply container having a discharge opening, a measuring chamber for receiving the material from the discharge opening, a valve for closing the discharge opening, a dispensing opening in said measuring chamber, a valve for closing said dispensing opening, a piston in said measuring chamber for forcing the material from said measuring chamber through to said dispensing opening, cam means for operating said valves and said piston, and means for operating said cam means, the combination with said discharge valve of a support carried by said valve and supporting said piston whereby said discharge valve and piston are unitarily actuated simultaneously.

4. In a dispensing device for fluent material from a supply container having a discharge opening, a measuring chamber for receiving the material from the discharge opening, a valve for closing the discharge opening, a dispensing opening in said measuring chamber, a valve for closing said dispensing opening, a piston in said measuring chamber for forcing the material from said measuring chamber through to said dispensing opening, cam means for operating said valves and said piston, and means for operating said cam means, the combination with said discharge valve of a support carried by said valve and slidably supporting the rod of said piston, a spring on said rod between the piston and the support, and a head on said rod to limit the movement of said rod relative to said support.

5. In a dispensing device for fluent material from a supply container having a discharge opening, a measuring chamber for receiving the material from the discharge opening, a valve for closing the discharge opening, a dispensing opening in said measuring chamber, a valve for closing said dispensing opening, a piston in said measuring chamber for forcing the material from said measuring chamber through said dispensing opening, cam means for operating said valves and said piston, and means for operating said cam means, the combination with said cam means of a reciprocally slidable cam member, solenoid means for said cam operating means, and a connection between said cam member and the armature of said solenoid means.

6. In a dispensing device for fluent material from a supply container having a discharge opening, a measuring chamber for receiving the material from the discharge opening, a valve for closing the discharge opening, a dispensing opening in said measuring chamber, a valve for closing said dispensing opening, a piston in said measuring chamber for forcing the material from said measuring chamber through said dispensing opening, reciprocal cam means for operating said valves and said piston, means for operating said cam means and including solenoid means for reciprocating said cam means, a selectively operable switch for initiating operation of said solenoid means, and a switch engageable by the piston and operable upon engagement with the piston for controlling the operation of said solenoid means.

7. A dispensing device for semi-fluids such as ice cream and the like for a container having an outlet through which the semi-fluid may be

ejected or withdrawn, said device comprising a measuring container into which the semi-fluid is received from the container outlet in the dispensing operation, a gate for controlling the flow through said opening, said measuring container having an outlet port and a gate for controlling the dispensing of the product therethrough, a plunger in said container engageable with the product as it is received into the measuring container and operable to eject the product therefrom, electromagnetic means for operating said gates including a core having connections with the gates for first closing the measuring container outlet gate and opening the fluid container gate, a solenoid operable when energized to move said core for said operations, a second solenoid operable to reverse the movement of the core for successively closing the container outlet gate and opening the measuring container outlet gate, and means for operating said plunger to eject the contents from the measuring container upon the opening of its outlet gate.

8. A dispensing device for semi-fluids such as ice cream and the like from a container having an outlet through which the semi-fluid may be ejected or withdrawn, said device comprising a measuring container into which the semi-fluid is received from the container outlet in the dispensing operation, a gate for controlling the flow through said opening, said measuring container having an outlet port and a gate for controlling the dispensing of the product therethrough, a plunger in said container engageable with the product as it is received into the measuring container and operable to eject the product therefrom, electromagnetic means for operating said gates including a core having connections with the gates for first closing the measuring container outlet gate and opening the fluid container gate, a solenoid operable when energized to move said core for said operations, a starting switch for energizing said solenoid, a second solenoid operable to reverse the movement of the core for successively closing the container outlet gate and opening the measuring container outlet gate, a switch engageable by the plunger when the product fills the measuring container a predetermined amount for energizing said second solenoid, and means for operating said plunger to eject the contents from the measuring container upon the opening of its outlet gate.

9. A dispensing device for semi-fluids such as ice-cream and the like from a container having an outlet through which the semi-fluid may be ejected or withdrawn, said device comprising a measuring container into which the semi-fluid is received from the container outlet in the dispensing operation, a gate for controlling the flow through said opening, said measuring container having an outlet port and a gate for controlling the dispensing of the product therethrough, a plunger in said container engageable with the product as it is received into the dispensing container and operable to eject the product therefrom, electromagnetic means for operating said gates including a core having connections with the gates for first closing the measuring container outlet gate and opening the fluid container gate, a solenoid operable when energized to move said core for said operations, a starting switch for energizing said solenoid, a second solenoid operable to reverse the movement of the core for successively closing the container outlet gate and opening the measuring container outlet gate, a switch engageable by the plunger when the product fills the measuring container a predetermined amount for energizing said second solenoid, means for movably mouning said switch so that it may be moved with respect to its point of engagement by the plunger whereby the amount of the product to be dispensed may be variably adjusted, and means for operating said plunger to eject the contents from the measuring container upon the opening of its outlet gate.

10. A dispensing device for semi-fluids such as ice-cream and the like, comprising an upright container having an entrance opening in its side and a dispensing opening at its bottom, a vertically sliding gate for said entrance opening, a horizontally sliding gate for said dispensing opening, a vertically movable plunger in said container, said plunger being connected by an upright rod in sliding engagement with said entrance gate, means for elevating the gate and the plunger therewith and for closing said gate, means for closing and opening said dispensing opening gate, and a spring on said upright rod between said plunger and said gate connection to depress the plunger after the entrance gate is closed and the dispensing gate is open to eject the contents through the dispensing opening from said container.

11. A device as set forth in claim 10 wherein said means for operating said gates and plunger comprises separate levers operable to reciprocate the gates, a reciprocable cam having cam surfaces cooperating with said levers successively upon movement in one direction and successively in reverse order on movement in the other direction, means for operating said cam comprising a reciprocable magnetic core, and a pair of solenoids having separate energizing circuits for effecting the reciprocation of the core and cam members.

12. A device as set forth in claim 10 wherein said means for operating said gates and plunger comprises separate levers operable to reciprocate the gates, a reciprocable cam having cam surfaces cooperating with said levers successively upon movement in one direction and successively in reverse order on movement in the other direction, means for operating said cam comprising a reciprocable magnetic core, a pair of solenoids having separate energizing circuits for effecting the reciprocation of the core and cam members, a manually operable switch operable to energize one of said solenoids for closing the container outlet gate and opening the inlet gate thereof, and a switch operated by the plunger upon the filling of the container for energizing the other solenoid.

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