

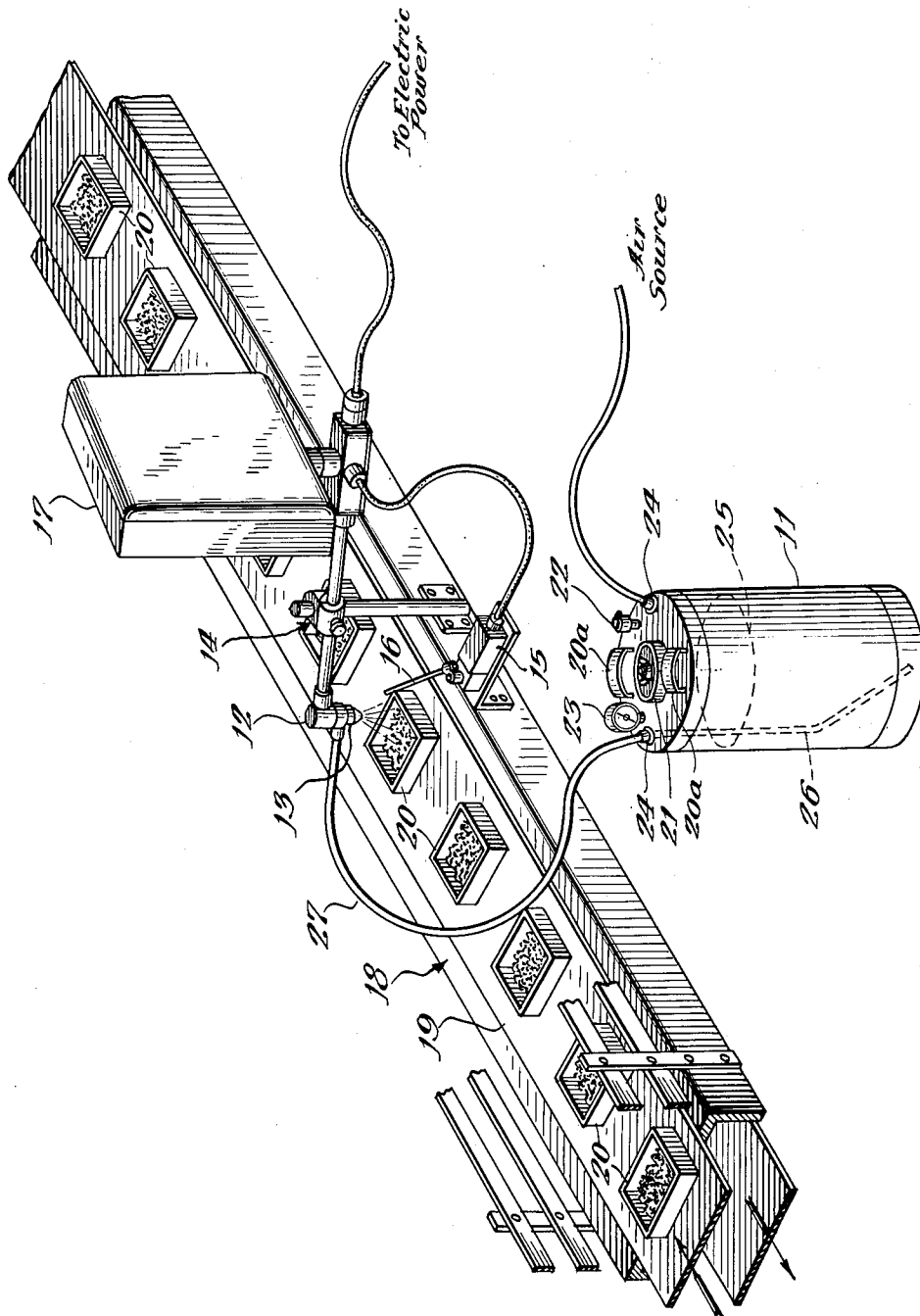
May 1, 1962

C. W. GARRISON

3,032,005

LIQUID DISPENSING DEVICE

Filed Jan. 20, 1959



Inventor:  
Clair W. Garrison  
By: *Ernest F. Smith*  
Attorney:

1

3,032,005

## LIQUID DISPENSING DEVICE

Clair W. Garrison, San Jose, Calif., assignor to International Minerals & Chemical Corporation, a corporation of New York

Filed Jan. 20, 1959, Ser. No. 787,995

1 Claim. (Cl. 118-2)

The present invention relates to the dispensing of liquids, and more particularly to the dispensing of liquids in a precisely controlled manner.

It is desirable in many technical fields, particularly in the large-scale preparation of packaged foods, to be able to dispense a liquid into a container in a precisely controlled and regulated manner. In the packaging of meat in sealed cans, for example, it is conventional to spray lard over the interior surface of the can in order to prevent the meat from sticking thereto. In the packaging of canned soups, it is desirable to introduce a controlled quantity of monosodium glutamate solution into the cans just before they are sealed to improve the flavor thereof. Similarly, in the preparation of fresh vegetables for freezing, it is desirable to add a regulated quantity of monosodium glutamate to each package before it is closed and frozen to maintain the color and to improve the flavor thereof. In the packaging of orange juice and other food materials which are deleteriously affected by the oxidizing action of air, it is desirable to add a quantity of an aqueous solution of a reducing agent such as ascorbic acid or isoascorbic acid to minimize the effect of air in the head space of the container.

For dispensing liquids in such cases, the art has devised a number of types of apparatus, all of which are either quite complex in construction or open to objection in one respect or another. The problems associated therewith arise in two areas—viz., the accurate measurement of the quantity of material dispensed, and the prevention of overfilling in case of interference with the normal operation of the apparatus.

In one commercially available device, called the "Flocron," a continuous spray of liquid is maintained, the spray being intercepted by a deflector at all times except when it is desired to discharge the spray into a food container. Precise measurement of liquid volume is readily achieved by the Flocron, but the device is complex, and the liquid is constantly exposed in finely divided condition to contact with air, so that the avoidance of oxidation is a problem in some cases and the maintenance of sterility in all cases.

The problem of overfilling is the concern of Mero U.S. Pat. 2,453,527 (November 9, 1948). The Mero device was designed to dispense lard into cans moving on a conveyor belt. Each can, as it passes under the spray head, actuates a lever, which closes a switch and thereby opens a solenoid valve in the spray head, permitting the lard to flow therefrom. The flow continues until the passing of the can is completed, releasing the switch lever, opening the switch, and closing the valve. Owing to the switching arrangement employed, the dispensing of the lard continues so long as the switch remains closed. Hence, if the conveyor belt stops at any time, it is possible for the can to become overfilled and in fact to overflow. Mero attacked this problem by providing an auxiliary device which is also set in operation by the can-operated switch, and which, after a predetermined time interval, opens a second switch in the solenoid valve circuit, thereby closing the valve and preventing overfilling.

The present invention is a comparatively simple device which permits dispensing a precisely measured amount of liquid into a container moving on a conveyor belt, while

2

minimizing contact of the liquid with air and avoiding any possibility of dispensing more than the desired amount.

One object of the invention is to dispense a liquid in precisely regulated amounts.

Another object is to dispense a liquid at a precisely regulated place and time, and in a precisely measured quantity.

Another object is to avoid overfilling in the dispensing of a liquid.

Another object is to dispense a liquid while minimizing contact thereof with air.

Other objects of the invention and its advantages over the prior art will be apparent from the following description.

In accordance with the invention, the desired liquid is stored in a suitable tank under a substantially constant elevated pressure of air or other gas, preferably an inert gas such as nitrogen, from which it is forced by the gas pressure through a solenoid valve to a spray head or other type of distributor nozzle, positioned over the conveyor belt. Each container, as it moves on the conveyor belt into position under the spray head, moves a lever to actuate a switch, which sets a control device into operation. The control device, which includes an interval timer, first opens the solenoid valve, permitting the liquid to flow therethrough, simultaneously begins to measure a predetermined time interval, and then closes the valve at the end of the predetermined interval. The desired quantity of liquid is thus discharged into the container. At the same time, the control device renders the container-operated switch inoperable (i.e., incapable of affecting the sequence of operations or of initiating a new sequence of operations) until after the entire sequence of operations has been completed and until the said switch has been released by the container thereafter. Thus, the discharge is initiated, timed, and cut off automatically by the control device alone, without reliance upon the operation of any other portion of the equipment, and overfilling is thereby completely avoided.

The attached drawing is an isometric view of a typical example of the present invention, installed for operation in connection with a conveyor belt.

The primary components of the device include a storage tank 11 for the liquid to be dispensed, a solenoid valve 12, a spray nozzle 13, a mounting bracket assembly 14, a switch 15 with actuating lever 16, and a control cabinet 17 containing a timing device. The entire device is mounted upon and used in association with a typical conveyor-belt assembly 18, including belt 19, which carries open packages 20 from left to right under the spray nozzle for treatment with the desired quantity of liquid.

The storage tank 11 is a vessel large enough to accommodate an adequate supply of the liquid, and is constructed of suitable materials to withstand the pressure employed and to resist any chemical action by the liquid therein. In a typical example, the tank is made of 20-gauge stainless steel, and is 18 inches in diameter and 30 inches high. The tank may be supported by legs, if desired, equipped with wheels for convenience in rolling it from one place to another (these details being omitted from the drawing). It is convenient also to include a drain plug at the bottom of the tank to facilitate cleaning. The top of the tank includes handles 20a, a safety filling cap 21, a pressure release valve 22, a pressure gage 23, and quick-coupled fittings 24 for attachment of suitable tubes to an air source and to the solenoid valve. Air or other gas from any convenient source is supplied to the tank under a pressure ordinarily around 10 to 20 pounds per square inch. It should desirably be supplied through a filter, a pressure-regulating valve, and a shut-off valve, not shown, in order to insure constant pressure (a vital ele-

ment in precise control of the volume of liquid dispensed), and to insure complete cleanliness.

The liquid, 25, contained in the tank is forced out by the superimposed pressure through a pipe 26 extending nearly to the bottom of the tank, and flows through a suitable pipe or tube 27 through solenoid valve 12 to spray nozzle 13. The solenoid valve is normally closed. Beneath the spray nozzle 13 moves a series of open packages (cans, cardboard cartons, or the like) on conveyor belt 19. As each package comes fully under the spray pattern, it moves lever 16, which closes switch 15, thereby completing an electrical circuit which actuates a control unit of commercially available design, comprising an electronic interval timer and associated switching devices, contained in cabinet 17. The control unit, immediately upon being actuated, completes the circuit to solenoid valve 12, opening the valve and permitting the liquid to flow from spray nozzle 13 into the container situated below the nozzle. Simultaneously, the control unit closes a hold circuit to render switch 15 inoperable until after the full program of operations has been completed and until switch 15 has thereafter been released by the package. At the same time, the timer begins to measure a time interval of predetermined length, so chosen as to allow precisely the desired quantity of liquid to be discharged from the spray nozzle, at the end of which the timer closes solenoid valve 12 and terminates the flow of liquid. The package meanwhile continues its passage under spray nozzle 13, eventually moving out from under the nozzle and releasing lever 16. The unit is then ready to be set into operation by the next package approaching on the conveyor belt.

The switch 15 and the mounting bracket assembly 14 are attached to the side of the conveyor belt assembly in any convenient manner. The control cabinet 17 is conveniently supported upon an electrical coupling box 28, which is in turn attached to the mounting bracket assembly 14. Appropriate electrical connections are made via coupling unit 28 to the solenoid valve 12, switch 15, the interval timer in the control cabinet 17, and to an external source of electrical power.

The control device employed in the present invention comprises an interval timer of any type capable of measuring the time interval desired, which is set into operation by an external switch and which, after being set into operation, completes its cycle independently of the external switch. The control device also includes switching means effective to open the solenoid valve controlling the flow of liquid immediately when the control device goes into operation, to simultaneously close a hold circuit, deactivating the external switch, and to close the said solenoid valve at the end of the desired time interval. The interval timer is preferably of a conventional electronic type, employing one or more vacuum tubes and/or transistors, suitably Electronic Timer type 30HL1, marketed by Photoswitch Division of Electronics Corporation of America. The structural features embodied in the type 30HL1 timer are disclosed in the P. J. Cade Patent 2,574,618 of November 13, 1951. Alternatively, it can be a conventional pneumatic or hydraulic type, operating by controlled flow of fluid through an orifice. Or it can comprise a motor-actuated series of rotating contacts or cams, suitably adjustable to measure the desired time interval. Numerous variants will be readily apparent.

The present invention is adapted to the controlled dis-

pensing of any type of liquid substance, so long as it does not deleteriously affect the component parts of the apparatus, and so long as it is sufficiently fluid to be dispensed at a substantially constant rate of flow through a spray nozzle, orifice, tube, nipple, or other discharge means. Suitable liquids include water, salt brine, aqueous monosodium glutamate solutions, solutions of ascorbic acid, isoascorbic acid, sodium bisulfite, sodium benzoate, and the like; soy sauce and other flavoring and seasoning extracts (e.g., vanilla); ethyl alcohol; and others, too numerous to mention. The device is especially advantageous for dispensing many of these substances in that it minimizes contact of the liquid with air, thereby to a large extent avoiding any adverse effect by the oxidizing action of the oxygen in the air.

While the invention has been described by reference to a specific embodiment thereof, illustrated in the drawing, it will be apparent to those skilled in the art that many modifications can be made therein without departing from the spirit of the invention.

The following claim particularly points out and distinctly claims the subject matter of the invention:

Apparatus for dispensing predetermined increments of liquid into containers moved on a conveyor in succession past a dispensing station comprising a liquid spray nozzle, means for mounting said nozzle to overlie the conveyor for discharge of liquid into containers moved past the dispensing station, conduit means for supplying liquid at substantially constant pressure to said nozzle, a solenoid valve in said conduit means and operable to control flow of liquid to said nozzle, an initiating switch having an actuating element for operating said switch, means for mounting said initiating switch with said actuating element mounted to be engaged by containers moving on the conveyor past the dispensing station, a control circuit including said initiating switch and operable to open said solenoid valve for a predetermined time interval initiated by a first operation of said switch, interval timing means interconnected in said control circuit to be initiated by said first operation of said initiating switch, said interval timing means once initiated by said first operation of said switch being interconnected in said control circuit to override control of said solenoid valve by said switch in the absence of operations of said switch occurring subsequent to said predetermined time interval and thus maintain said solenoid valve open for only one said predetermined time interval responsive only to said first operation of said switch whereby the first operation of said initiating switch caused by initial engagement with a container is effective to initiate a predetermined time interval of liquid discharge and repeated operations of said switch during such interval or holding of said switch in the first operated condition will not lengthen said predetermined time interval or initiate a second predetermined time interval.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

2,072,948	Geffis	Mar. 9, 1937
2,281,169	Pattison	Apr. 28, 1942
2,383,023	Sykes et al.	Aug. 21, 1945
2,453,527	Mero	Nov. 9, 1948
2,529,291	Graham	Nov. 7, 1950
2,616,390	Klinck	Nov. 4, 1952
2,777,419	Paasche	Jan. 15, 1957