May 28, 1957 A. J. SAMUEL 2,793,794

EDUCTION VALVE FOR PRESSURE DISCHARGE DISPENSERS

Filed March 25, 1955

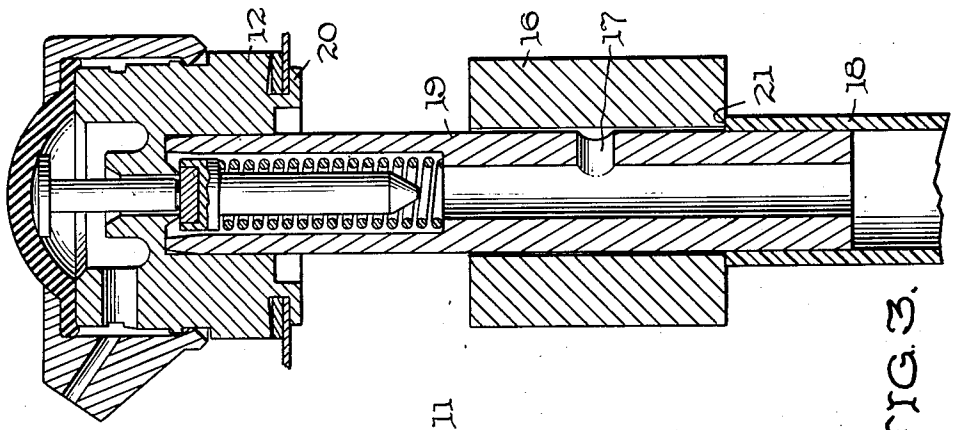



FIG. 3.

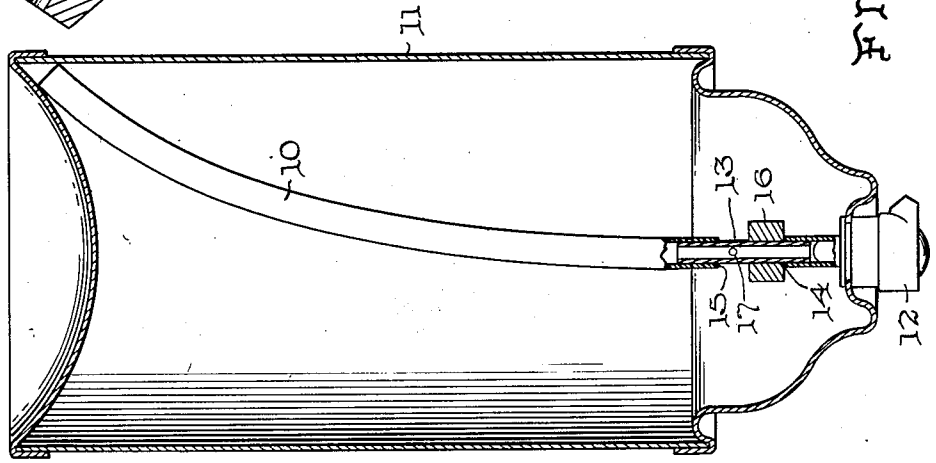



FIG. 2.

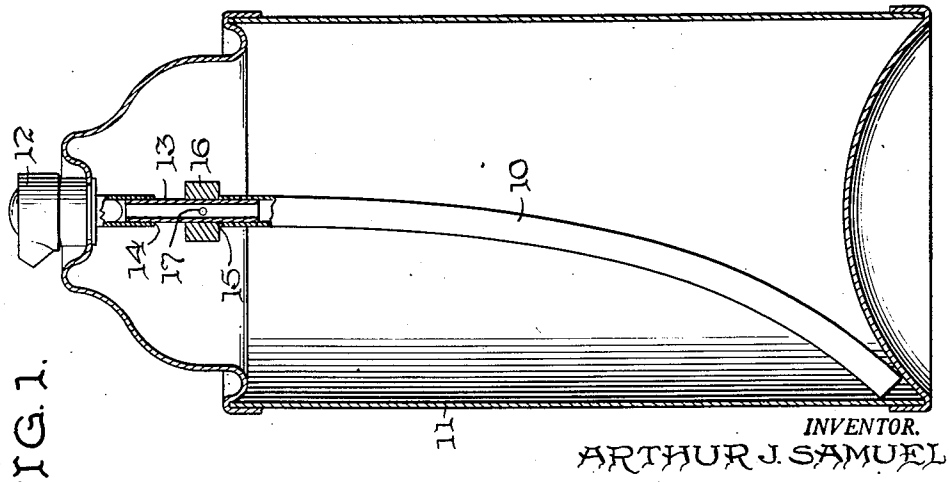



FIG. 1.

INVENTOR.
ARTHUR J. SAMUEL
BY Horace Brooks
ATTORNEY

United States Patent Office 2,793,794 Patented May 28, 1957



2,793,794

# EDUCTION VALVE FOR PRESSURE DISCHARGE DISPENSERS

Arthur J. Samuel, Pittsburgh, Pa., assignor to Gulf Research & Development Company, Pittsburgh, Pa., a corporation of Delaware

Application March 25, 1955, Serial No. 496,748

11 Claims. (Cl. 222—394)

This invention relates to improvements in an eduction valve for pressure discharge dispensers. More particularly, it comprises a gravity actuated slide valve which is mounted on the eduction tube of a dispenser to control a port therein in such a way as to permit discharge of the contents without excessive loss of the pressuring gas in either upright or inverted position of the dispenser.

Hair lacquer, cosmetics, lubricants, paints and many other products are packaged for convenient use in sealed receptacles which contain a gas under pressure for discharging the contents in the form of a liquid or dusting spray, or in a solid stream. Such dispensers commonly employ an eduction tube extending from the manually operated discharge valve assembly, which terminates at or near the bottom of the recepacle and which is therefore normally beneath the surface of the contained liquid or powder. The eduction tube may be rigid, but it is frequently made of some pliable material such as rubber or plastic. If the conventional receptacle is inverted or is tilted so far as to expose the end of the eduction tube, as must sometimes be done in applying the spray or stream to a difficultly accessible place, for example in spraying an insecticide into the crevice between a baseboard and floor, the pressuring gas escapes when the manually operated discharge valve is opened, and pressure within the receptacle is rapidly reduced to ineffectiveness. Similar disadvantage exists where there is a natural tendency on the part of the user to invert the receptacle, as in applying hair lacquer to all parts of the coiffure.

It is accordingly an object of the present invention to provide an eduction valve which permits the liquid contents of a dispenser to enter the eduction tube from a point below liquid level, regardless of whether the dispenser is held upright or is inverted in use, and thus to avoid loss of gas and consequent reduction of discharge pressure.

Another object is achieved by providing a slide valve in the form of an imperforate sleeve which covers a port in the upper portion of the eduction tube when the dispensing receptacle is in upright position, but which uncovers the port when the receptacle is inverted or is appreciably tilted to an extent submerging the port, thereby admitting liquid to the eduction tube for discharge with minimum escape of the pressuring gas.

A further object of the invention is to provide a valve for the aforesaid purpose which is readily adaptable to existing dispenser constructions and which is simple in principle and design as well as inexpensive to manufacture and assemble.

The foregoing and other objects and advantages of the invention will be apparent from the following description and drawings, wherein

Fig. 1 is a view, partly in longitudinal section, showing the dispenser in upright position in which the port near the discharge end of the eduction tube is closed by the slide valve.



Fig. 2 is a similar view, showing the dispenser in inverted position, in which the port is open.

Fig. 3 is an enlarged sectional view of a modified form of the invention.

Referring first to Figs. 1 and 2, the eduction tube **10** which extends to the bottom of receptacle **11** and is attached to the manually operated discharge valve **12** at the top of the receptacle is cut a short distance from its upper end and a rigid section of tube **13** is entered into the separated portions of the eduction tube. The ends **14** and **15** of these separated portions of tube thereby constitute shoulders or limiting stops for a slide valve **16** which is mounted on the rigid section **13** and which comprises an annular, imperforate sleeve of sufficient weight to respond readily to gravitational force, which sleeve closely fits, but is slidable on, the rigid tube **13**. A port **17** is formed in the wall of the section **13** to one side of its mid-point as measured between the limiting stops, being so located that when the receptacle is in upright position the slide valve **16** abuts the limiting stop **15** and covers the port, as shown in Fig. 1. In this position, the gas which fills the upper portion of the receptacle exerts a downward pressure which forces the liquid through the entire length of the eduction tube from its lower end, the gas being prevented from escaping through the port **17** by the slide valve **16**.

When the receptacle is inverted, as shown in Fig. 2, the slide valve **16** falls to the opposite limiting stop **14**, in which position it uncovers port **17**, and the port, now lying below the level of liquid, admits the liquid to the eduction tube for discharge.

In the modification shown in Fig. 3, the manually operated discharge valve **12** carries an eduction tube **18** which fits over the end of the extended tubular spring retainer **19**. In this form of the invention the flange **20**, which secures the manually operated discharge valve to the head of the receptacle, serves as one stop for the slide valve **16** while the end **21** of the eduction tube **18** serves as the other stop. Port **17** is so located in the tubular body **19** that it is covered by the slide valve abutting stop **21** and is uncovered when the slide valve abuts the flange **20** in the inverted position of the receptacle.

There is no necessity for providing additional valve means at the open end of the eduction tube, notwithstanding that it is exposed when the receptacle is inverted, for the liquid phase is more dense than the gas phase and when the receptacle is inverted the liquid phase will naturally and effectively flow from it in preference to gas. Furthermore, the slide valve need only be long enough to cover the port **17** and provide adequate contact area for sealing the port when the valve rests against the stop at the extremity of its movement with the receptacle in upright position. Consequently, it slides freely on the eduction tube under gravitational force and responds easily to changes of angle as the dispenser is tilted.

I claim:

1. An eduction valve for dispensers, which permits discharge from such dispenser in both upright and inverted positions under pressure of a contained gas, comprising, in combination with a receptacle having a manually operated discharge valve assembly, an eduction tube extending from the discharge valve assembly into the receptacle and having a straight section in proximity to the said discharge valve assembly, such straight section being formed with a lateral port in its wall, an imperforate annular member constituting a slide valve mounted on said straight section of tube, means providing a shoulder on said tube against which said slide valve abuts at the extremity of its movement when the receptacle is in upright position and in which position the valve thereby covers the port, the port being so located in the straight

section of tube that upon inversion of the receptacle the slide valve in moving to its other extreme position uncovers the port for admission of the pressurized contents into the eduction tube.

2. A valve for permitting eduction of the pressurized contents of a dispensing receptacle in both upright and inverted positions without excessive loss of pressuring gas, comprising an eduction tube leading to a manually operated discharge valve assembly which includes a discharge nozzle located on a dispensing receptacle, said eduction tube being formed of spaced, aligned sections connected by a straight, tubular member which is entered into the ends of the aligned sections and which thereby defines annular shoulders at its juncture therewith, an imperforate tubular sleeve slidable on the straight tubular member between said shoulders, a port in the wall of said straight tubular member so located between the spaced sections of said eduction tube as to be covered by the sleeve when the dispenser is upright and the sleeve abuts the shoulder limiting its movement in one direction and to be uncovered by the sleeve at the limit of its movement in the opposite direction when the dispenser is inverted.

3. A valve for pressure discharge dispensers which adapts the same for use in both upright and inverted positions without waste of a contained pressuring gas, comprising in combination with a receptacle and a manually operated discharge valve assembly which includes a nozzle, said assembly having a tubular spring retainer extending into the dispensing receptacle and communicating with the nozzle, an enlarged bore in one end of said spring retainer for mounting a spring seated discharge valve, an eduction tube received upon the other end of said spring retainer, an imperforate sleeve mounted for sliding movement on said spring retainer to an extent limited by its abutment with the end of the eduction tube, said spring retainer being formed with a lateral port in proximity to the end of the eduction tube fitted thereon, to be covered by said sleeve when the receptacle is upright and uncovered by movement of the sleeve in the opposite direction when the receptacle is inverted.

4. In a pressure discharge dispenser, a valve controlled discharge nozzle and an eduction tube leading thereto from within the dispensing receptacle, said eduction tube comprising separated sections adjacent the nozzle and a connecting, rigid tube of smaller external diameter entered into the separated sections, said rigid tube having a port in the wall thereof located between the separated sections and remote from a nozzle, an imperforate slide valve on said rigid tube limited in its movement by the ends of the separated sections, said slide valve being adapted to cover the port in the eduction tube when the dispenser is upright and to uncover it when the dispenser is inverted.

5. In a pressure discharge dispensing receptacle, a valve controlled discharge nozzle on the receptacle and an eduction tube leading to said nozzle from within the receptacle, said eduction tube including a rigid, straight section of smaller external diameter than that of the eduction tube located in proximity to the discharge nozzle and providing a shoulder at its juncture with the continuation of the eduction tube, an annular, imperforate sleeve constituting a slide valve mounted on the rigid section of tube and limited in its movement in a direction away from the nozzle by abutment with said shoulder, in which position it covers an inlet port in said rigid section of tube, the port being uncovered by movement of the slide valve in opposite direction when the receptacle is tilted sufficiently to submerge the port in the liquid contents to be discharged.

6. In a pressurized dispensing receptacle having a discharge valve assembly and an eduction tube connected thereto, an imperforate valve member mounted to slide along said eduction tube between spaced limiting stops, the said eduction tube being formed with a side opening so located that it is covered by the valve member at one extreme of its travel and is uncovered as the valve member moves when the receptacle is inverted.

7. A valve for pressure discharge dispensers which adapts the same for use in both upright and inverted positions without waste of a contained pressuring gas, comprising in combination with a receptacle and a manually operated discharge valve assembly which includes a tubular part extending into the dispensing receptacle, an eduction tube received upon the said tubular part within the receptacle, an imperforate annular valve member closely fitting the eduction tube and guided thereby for movement therealong to an extent limited in one direction by its abutment with the discharge valve assembly, a spaced shoulder forming an abutment for limiting travel of the valve member in the opposite direction, said eduction tube having a port in its wall so located as to be covered by said valve member at one extreme of its travel and uncovered by the valve member when the receptacle is inverted.

8. An eduction valve for dispensers, which permits discharge from the dispenser in both its upright and inverted positions under pressure of a contained gas, comprising in combination with a receptacle having a manually operated discharge valve assembly mounted thereon, an eduction passageway comprising a tube extending from the discharge valve assembly into the receptacle and having a straight section in proximity to the said discharge valve assembly, said straight section being formed with a lateral port in its wall, an imperforate annular valve member closely fitting the straight section of the passageway and slidable therealong, means providing a shoulder against which the valve member abuts at the lower extremity of its movement when the receptacle is in upright position and in which the valve member covers the port, the port being so located in the straight section of passageway that upon inversion of the receptacle the valve member uncovers the port for admission of the pressurized contents of the inverted receptacle into the eduction passageway.

9. An eduction valve for dispensers, which permits discharge from the dispenser in both its upright and inverted positions under pressure of a contained gas, comprising in combination with a receptacle having a manually operated discharge valve mounted thereon, an eduction tube extending from the discharge valve into the receptacle and having a permanently open inlet adjacent the bottom of the receptacle, said eduction tube having a second, controlled inlet adjacent the top of the receptacle, and a gravity actuated valve controlling said second inlet to close the same when the receptacle is held in such position that the level of contents to be dispensed lies below said second inlet.

10. A pressurized dispensing receptacle which is adapted to be discharged in both the upright and inverted positions, said receptacle having a discharge valve assembly mounted thereon, an eduction passageway comprising a tube extending from the discharge valve assembly into the receptacle and terminating adjacent the bottom of the receptacle, said terminal end being permanently open and constituting an inlet to said passageway, a supplementary inlet to said eduction passageway adjacent the top of the receptacle, and a valve member mounted to slide along said passageway and to be guided thereby, the supplementary inlet being so located as to be closed by the valve member at one extreme of its travel when the receptacle is upright and open to the interior of the receptacle when the receptacle is inverted.

11. An eduction valve for dispensers, which permits discharge from such dispenser in both upright and inverted positions under pressure of a contained gas, comprising, in combination with a receptacle having a manually operated discharge valve assembly, an eduction tube extending from the discharge valve assembly into the receptacle and terminating in a permanently open end, said eduction tube having a straight section in proximity to

said discharge valve assembly and remote from said permanently open end of the eduction tube, such straight section being formed with a lateral port in its wall, an annular valve member mounted to slide on said straight section of tube, means for limiting the travel of said valve so located that when the receptacle is in upright position the valve member closes the lateral port in the eduction tube and upon inversion of the receptacle the valve member in moving to its other extreme position opens such port for admission of the pressurized contents of the receptacle into the eduction tube.



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

UNITED STATES PATENTS

| | | |
|---|---|---|
| 2,579,977 | Sjolin | Dec. 25, 1951 |
| 2,580,580 | Nicolle | Jan. 1, 1952 |
| 2,682,356 | Allen | June 29, 1954 |