United States Patent

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[54] **PROPORTIONAL DISPENSING APPARATUS**
2 Claims, 4 Drawing Figs.

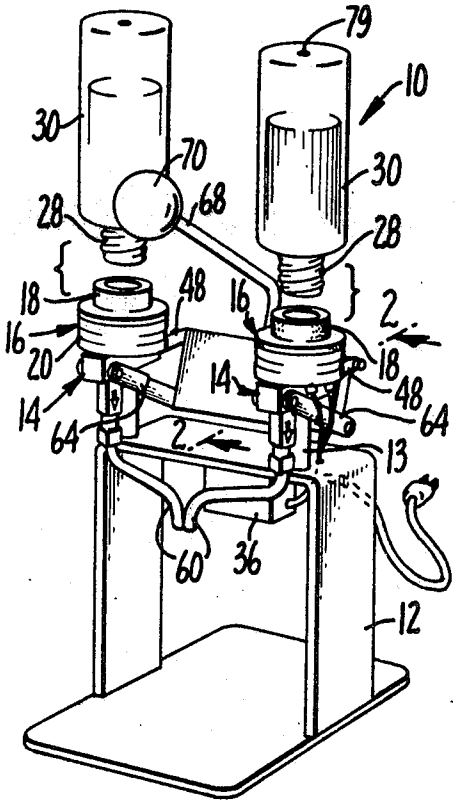
[52] **U.S. Cl.** **222/82,** 222/137
[51] **Int. Cl.** **B67b 7/26**
[50] **Field of Search** 222/66, 81, 82, 83, 108, 137, 145, 159, 181, 185; 221/95

[56] **References Cited**
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ABSTRACT: An apparatus for dispensing the resin and hardener ingredients of a chemically reactive system involving the reaction of 2 or more components in fixed proportions. The ingredients are packaged in containers which are attached directly to the apparatus. In another embodiment, the containers are punctured when attached to establish drip-free fluid communication therewith. Associated with each container is a reservoir, in which the materials are heated to lower their viscosity and to hasten the reaction time of the ingredients, and a positive displacement pump.



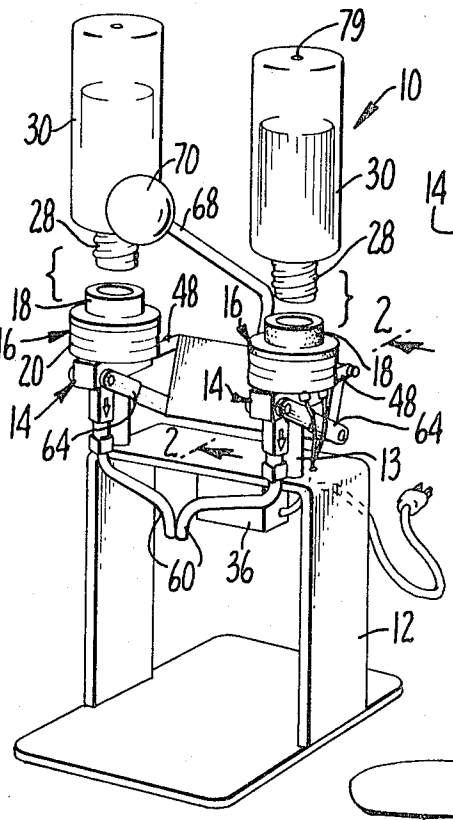


FIG. 1.

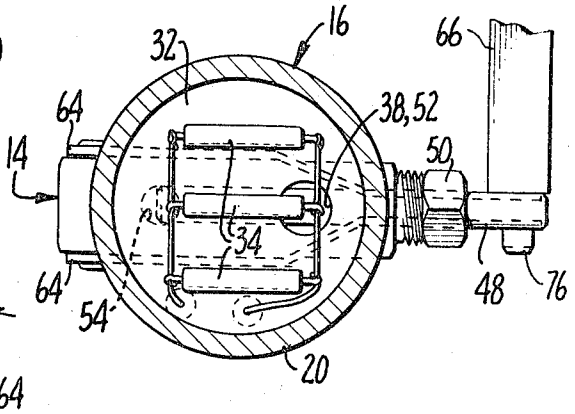


FIG. 3.

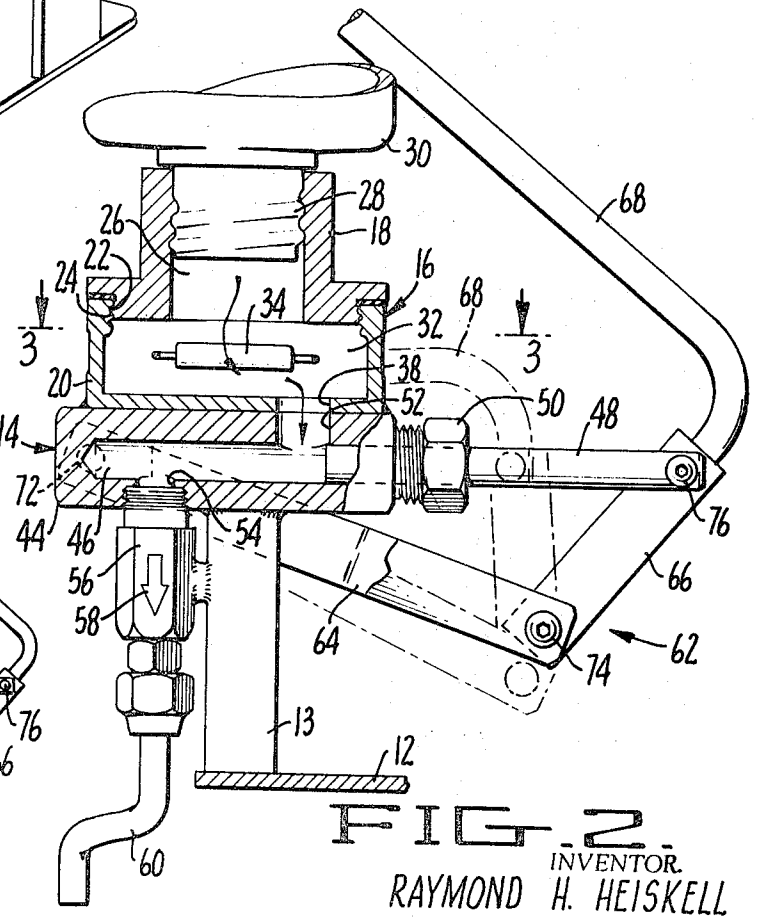


FIG. 2.

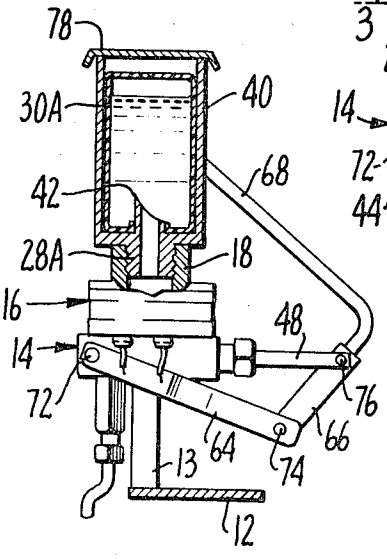


FIG. 4.

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PROPORTIONAL DISPENSING APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to a liquid dispensing apparatus, and particularly to a proportioning apparatus for delivering quantities of a plurality of liquid ingredients in predetermined proportion to each other. This invention is specifically suited for dispensing the resin and hardener components of a chemically reactive system which must be mixed prior to use. When these two components are mixed together in a predetermined proportion, the mixture will react to produce a final state. The attainment of uniformity from batch to batch of the curved mixture requires accurate proportioning of the constituents. Furthermore, due to its short reaction time, or "pot life," the mixed material must be used almost immediately after it is mixed, and therefore the components must be mixed either in small batches that can be used in a short period of time or mixed continuously at a rate approximating the rate of use.

These characteristic problems have led to the development of a variety of proportioning and mixing devices intended to facilitate the wide commercial use which these materials have had. In some of these devices the raw ingredients are stored in a plurality of containers which have to be filled from the bulk containers in which the resin and hardener are originally packaged. This filling is both slow and messy. In addition, a few devices which heat the materials for dispensing heat the entire contents of the containers, thus resulting in temperature loss and considerable delay each time the containers require refilling.

SUMMARY OF THE INVENTION

The present invention is an improved dispensing apparatus employing heating elements in conjunction with small secondary reservoirs and positive displacement proportioning pumps which are gravity fed or pressure fed from the reservoirs and are concurrently actuated to deliver fixed quantities of resin and hardener. Handling of the raw ingredients and container filling from bulk containers is eliminated by employing the bulk containers in which the raw ingredients are packaged to directly feed the reservoirs of the apparatus. To accomplish this, the bulk containers are attached above the reservoirs in gravity-feed fluid communication therewith or a supply line is connected to remotely located bulk containers or tanks which supply the components to the reservoirs by forcing the components through the lines by pressure being applied to the bulk containers.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the apparatus.

FIG. 2 is a view in section taken along the lines 2–2 of FIG. 1.

FIG. 3 is a sectional view taken along lines 3–3 of FIG. 2.

FIG. 4 is a view partly in elevation and partly in section of another embodiment of the apparatus.

DESCRIPTION OF THE EMBODIMENTS

In FIGS. 1—3, the dispensing apparatus **10** comprises a frame **12** having mounting posts **13**, pumps **14** fixedly connected to said posts, and secondary reservoirs **16** fixedly connected to said pumps. Each reservoir **16** comprises an upper adapter body **18** and a lower cup body **20**, said bodies being adapted for sealing interconnection by mating threaded portions **22** and **24** on the respective bodies. The adapter bodies **18** have relatively narrow passages **26** which are threaded to receive the threaded necks **28** of inverted ingredient containers **30**.

A cavity **32** formed within each of the cup bodies **20** contains one or more ceramic-encapsulated wire-wound resistors **34** which serve to heat the contents of the cavity **32**, the value of the resistance being predetermined to provide the desired temperature. For this purpose, the resistors **34** are electrically

connected in parallel to a filament transformer **36** mounted on frame **12**. When the transformer **36** is energized by electrically connecting it to the appropriate source of alternating currents, not shown, the resistors **34** heat the contents of the reservoir cavities **32**. The relatively narrow passages **26** through which the contents of containers **30** flow serve to restrict thermal communication between the cavities **32** and the containers **30**.

The cup bodies **20** are provided with outlets **38** through which the liquid ingredients flow out of the reservoirs **16** under the influence of gravity.

In the embodiment shown in FIG. 4, inverted bottle-shaped screw-on housings **40** are formed with sharpened hollow tubes **42** which extend inwardly from the necks **28***a* and are adapted to puncture ingredient containers **30***a* to thereby establish fluid communication between them and passages **26**.

Immediately beneath the reservoirs **16** are two positive displacement pumps **14**, each pump **14** comprising a cylinder block **44** in which a cylinder **45** opens on one end is formed to receive a rodlike piston **48**. The open end of the cylinder block **44** is adapted to receive a packing nut **50** which ensures that a sliding seal is made between each respective piston **48** and cylinder block **44**. The cylinders may be of different size or diameter to provide dispensing of the two ingredients in other than equal volume proportions.

Aligned with outlets **38** are inlets **52** in the cylinder blocks **44**. The passages thus formed between the cavities **32** and cylinders **46** permits the liquid ingredients to be drawn into to cylinders **46** by the vacuum created when the pistons **48** are partially removed from them, as indicated by the flow arrows in FIG. 2. Near the closed ends of the cylinders **46**, outlets **54** are provided which are in flow communication with check valves **56**. The vales **56** are oriented to allow fluid passage from the cylinders **46** only as indicated by arrow **58** in FIG. 2. Valves **56** are in flow communication with conduits **60** which are adapted to bring the ingredients to a common point of discharge.

To actuate the pistons **48** in unison, a lever mechanism **62** is attached to the ends of the pistons **48**. The mechanism **62** comprises a pair of links **64**, an actuator plate **66**, and an actuator rod **68** with a knob **70** on the end. These elements are adapted for pivotal movement around pins **72**, **74** and **76** (FIG. 4) thereby adapting the mechanism **62** to move both pistons **48** in unison by the movement of actuator rod **68**. The movement of the mechanism **62** is depicted in FIG. 2 which illustrates the position of the mechanism, rod **68** being shown in solid outline in its highest position and being shown in phantom outline in its lowest position.

OPERATION

Filling the apparatus **10** with the ingredients is accomplished by uncapping the bottles **30** in which they are packaged and threadably connecting the bottles with adapter bodies **18**. Due to the molasses like consistency of these ingredients, an open container **40** can be inverted over a passage **26** and attached thereto without spillage and before overfilling the reservoir **16** can take place.

In the embodiment of FIG. 4, housings **40** are uncovered by removing lids **78**. Closed containers **30***a* containing the appropriate ingredients are then placed into the housing **40** and forced down and over tubes **42** which puncture containers **30***a* and create a sealed fluid communication therewith.

In both embodiments, once the resin and hardener have been brought into flow communication with the balance of the apparatus, air breather apertures **79** are punched through the upper ends of the containers.

Once the containers **30** or **30***a* are so attached, the resin and hardener flow into their reservoirs **16** through passages **26**. Heating elements **34** elevate the temperature of the resin and/or hardener to reduce viscosity. When the actuator rod **68** is moved to its highest position, the pistons **48** are withdrawn from the cylinders **46** to thereby fill the cylinders **46** with resin and hardener. As the actuator rod **68** is moved downwardly to

its lowest position by manual pressure on knob **70**, the pistons **48** are forced inwardly of the cylinders to dispense fixed amounts of resin and hardener through valves **56** and conduits **60**.

In order to ensure that a hardener container will not be connected to the resin reservoir and that the resin container will not be connected to the hardener reservoir, various means may be employed, including: color coding of containers and reservoirs; different neck diameters for the hardener and resin containers and correspondingly different diameters for the adapter body passages which receive the container necks; different threading as between the two sets of adapter body passages and container necks.

I claim:

1. Apparatus for dispensing in a predetermined proportion of components of a resinous material admixture comprising a plurality of reservoirs, one for each of said components, a plurality of containers, one for each of said reservoirs, in fluid flow communication therewith, each of said reservoirs having an inlet through which its associated component may flow into the reservoir under the influence of gravity from its container and having an outlet through which its associated component may flow out of the reservoir under the influence of gravity, a plurality of pumps, one for each reservoir, each of said pumps having a piston slidably disposed within a complementary shaped cylinder within a cylinder block, each of said cylinders having a cross-sectional area which is in predetermined proportional relationship to the total cross-sectional area of the cylinders of all the pumps, each cylinder being in communication with the outlet of its associated reservoir whereby its associated component may enter the cylinder under the influence of gravity and atmospheric pressure when the piston is withdrawn from said cylinder to a predetermined degree, each of said cylinders having an outlet and outlet control means therefor which is adapted to permit the outward flow of fluid from said cylinder when its piston is moved inwardly thereof and to prevent the flow of fluid into said cylinder through the outlet of said cylinder when the piston is moved outwardly in said cylinder, and actuator means for each of said pistons to move the pistons outwardly of the cylinders and inwardly of the cylinders.

2. The apparatus of claim **1** further comprising heating means in thermal communication with said reservoirs for elevating the temperature of the respective components contained therein before the passage of the same into said pumps.