ABSTRACT
A dispenser is disclosed for the precise metering of a plurality of viscous fluids, such as the components of an epoxy adhesive in which small amounts to be metered are desired and the proportion of components is critical. The dispenser includes a cartridge, a plurality of pistons operatively located in cylindrical compartments in the cartridge, and means for connecting the ends of the pistons and maintaining the pistons in alignment during dispensing. The cartridge includes a plurality of adjacent cylindrical compartments having adjoining walls, a rear wall at one end of the compartments and having annular openings therein of a diameter equal to the diameter of the respective cylindrical compartments, and forward end closures having orifices leasing through channels to adjacent nozzles. The pistons include a piston drive tab, longitudinal ribs and radial ribs, and a piston head providing sealing means in engagement with the walls of its respective cylindrical compartment. An important aspect is that the longitudinal and radial ribs extend radially from the axis of the piston substantially as far as the radius of the respective cylindrical compartment, in order to reduce the possibility of misalignment of the pistons during dispensing. In addition, misalignment forces are also minimized by the provision of finger tabs on each side of the cartridge spaced equally from the mean thrust axis of the pistons and positioned adjacent to the rear wall of the cartridge.

1 Claim, 9 Drawing Figures
DISPENSER FOR PRECISELY METERED DISPENSING OF VISCOUS FLUIDS

BACKGROUND OF THE INVENTION

Epoxy adhesives and other multi-component adhesives have been available for some time, and many attempts have been made to package them in dispensers which facilitate dispensing of the product components in proper ratio. A particular problem is the metering of very small amounts because often only a drop is required, but the chance of human error in metering the correct proportion increases drastically as the amounts decrease. This has resulted in the past in much needless waste of adhesive. Although many devices have been suggested for this purpose, none have proved successful for the mass scale consumer and industrial markets for epoxy adhesives, and even today virtually all of these products are sold in two separate tube units. With such separate tube units, the user must use his judgment to dispense equal amounts from each tube and mix the components prior to application of the product. In order to do this he must squeeze out a fairly substantial quantity of both ingredients, and then mix them. It is practically impossible by the two tube method to accurately dispense the necessary amounts close to each other to avoid the need for a mixing step.

It is therefore a major objective of the present invention to provide a dispenser which may be employed by the average user, for epoxy adhesives and other multi-component systems in the accurate dispensing of extremely small quantities, and to avoid the need for a mixing step in certain cases.

U.S. Pat. No. 3,166,221, issued in 1965 to H. Nielsen, is directed to a double-tube dispensing container, which in several superficial aspects is similar to the dispenser of the present invention. The dispenser disclosed therein consists of a rigid tube or cartridge member, and a housing member. As the product is dispensed, the housing member slides over the cartridge member, forcing two shafts through the compartments of the cartridge member and expelling the contents thereof. We have found that the Nielsen device, while capable of dispensing multi-component products, is not completely satisfactory, and is difficult to use for several reasons. First, proper alignment of the two pistons depends upon proper engagement of the housing member and the cartridge member during dispensing, which engagement is not sufficient for accurate alignment at the start of the piston stroke. At the start of the stroke the user must stretch his fingers to span the entire length of the cartridge member and housing member, in order to apply squeezing pressure along the mean drive axis of the housing. This is virtually impossible to do with one hand and without simultaneously obstructing the line of sight to the point of application.

We have found in the dispenser of the present invention, due to the cooperative relationship between the longitudinal and radial ribs which extend radially substantially across the full radius of the cylindrical compartments, the rigid connecting means between the pistons, and the finger tabs at the sides of the rear wall of the cartridge spaced equally from the mean drive axis of the pistons, that it is possible to obtain accurate dispensing of very small amounts, using one hand only and without interfering with the line of sight to the point of application, and that this accurate dispensing is feasible throughout the full stroke of the pistons.

BRIEF SUMMARY OF THE INVENTION

The dispenser of the present invention consists of three parts: (a) a cartridge having two or more cylindrical compartments; (b) a corresponding number of pistons; and (c) means for connecting the pistons during dispensing.

The cartridge includes adjacent cylindrical compartments having adjoining walls, a rear wall at one end of the compartments and having annular openings of a diameter equal the cylindrical compartment diameters, and forward end closures for the compartments. An orifice is located in each forward end closure leading to a nozzle through channels. As sold the nozzles are sealed and the seals are broken by the user before use. The product can then be dispensed through adjacent nozzles. There may be provided together with the present dispenser, a stopper-type closure to close the respective nozzles after use.

The piston includes a piston drive tab, longitudinal ribs and radial ribs, and a piston head. The piston head, in engagement with the inner walls of a cylindrical compartment, provides sealing means during dispensing of the product. The longitudinal and radial ribs extend radially from the axis of the piston substantially as far as the radius of its respective cylindrical compartment, which is important in ensuring proper alignment of the plural pistons during dispensing.

Finally, rigid connecting means are provided for connecting the piston tabs rigidly in a common plane, substantially throughout the stroke of the pistons.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric view, partially cut away, of a two-compartment dispenser of the present invention.

FIG. 2 is a view taken in cross section along lines 2—2 of FIG. 1.

FIG. 3 is an isometric view of one of the pistons shown in FIG. 1.

FIGS. 4 and 5 illustrate the rigid connecting means employed in the embodiment shown in FIG. 1.

FIGS. 6a and 6b illustrate two alternative orientations of the two pistons in a embodiment, such as shown in FIG. 1; 6a showing an oblique alignment of the longitudinal ribs with respect to the plane formed by the axes of the two compartments, and 6b showing perpendicular alignment.

FIGS. 7 and 8 illustrate a closure stopper for use with the dispenser shown in FIG. 1, after the original orifices have been cut by the user.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 illustrates in detail the present dispenser, in the form of a two-component dispenser, partially cut away.

The dispenser includes a cartridge 10, two pistons 11 and connecting means 12 for the pistons 11. Cartridge 10 has a rear wall 13 with cylindrical openings 14 and 15, cylindrical compartments 16 and 17, and forward end closures 18 and 19. End closures 18 and 19 have orifices 20 and 21 respectively leading into central channels 23 and 24 to nozzle orifices 25 and 26 respectively. The nozzle orifices 25 and 26 are initially sealed at 27 and 28 respectively. These seals will be cut off by...
the user along the plane of nozzle orifices 25 and 26, prior to use.

Dispensing pistons 11 (see also FIG. 3) include piston drive tabs 30 and 31, sets of longitudinal ribs 32 and 33, sets of radial ribs 34 and 35, and piston heads 36 and 37. Piston head 36, shown cut away in FIG. 1, is constructed of ribs 38 and piston seal 39, conveniently made of flexible rubber material.

Rigid connecting means 12 holds piston drive tabs 30 and 31 in a common plane during dispensing.

Referring now to FIG. 2, it can be seen that longitudinal ribs 32 and 33 and radial ribs 34 and 35 extend radially from the axis of the piston substantially as far as the radius of the respective cylindrical compartments 16 and 17. In other words, the outer edges of the radial and longitudinal ribs are nearly in contact with the inner surface of cylinder walls 40 and 41. It can also be seen in FIG. 2 that the orifices 20 and 21 are substantially adjacent and lie on either side of common wall 42 between the two cylindrical compartments 16 and 17.

The relationship between the longitudinal and radial ribs of the piston 11 is shown more clearly in isometric perspective in FIG. 3. It can be seen also (FIGS. 1 and 2) that the ribs provide support to prevent tilting or radial displacement of the piston during dispensing. Preferably, the radial ribs 34 are spaced equally along the length of the piston, and longitudinal ribs 32 are oriented at right angles to one another.

FIGS. 4 and 5 illustrate the details of the rigid connecting means 12. Connecting means 12 is composed of a rear wall 43 and two front walls 44 which together define grooves 45, for engagement with the edges of piston drive tabs 30 and 31. Preferably, piston connector 12 is extruded from rigid plastic material, such as high density polyethylene. Conveniently, the cartridge 10 may be injection molded, and the connecting means 12, may be extruded and cut from a long extruded portion. One particular advantage of material such as polyethylene for the dispenser is that, because of poor adhesion between epoxy and polyethylene, it is quite simple for the user to remove a plug of cured material from the ends of nozzles 25 and 26. Piston heads 36 and 37 are preferably of a resilient rubber-like material, such as commonly used in similar syringe pistons, in order to provide a secure seal with the inner wall surface of the cylindrical compartments, during dispensing of the material.

We claim:

1. A dispenser for precisely metered dispensing of small quantities of a plurality of viscous fluids stored therein within segregated compartments, which comprises:
   a. a cartridge including a plurality of adjacent cylindrical compartments having adjoining walls, a rear wall at one end of said compartments and having annular openings communicating with and of diameter equal to the diameter of the respective compartments, forward end closures for said compartments each having an orifice, leading through a channel to a nozzle;
   b. a corresponding plurality of pistons of corresponding length to said compartments including a piston drive tab, longitudinal ribs and radial ribs, and a piston head, wherein said piston head provides sealing means in engagement with its respective compartment, and wherein said longitudinal and radial ribs extend radially from the axis of said piston substantially as far as the radius of the respective cylindrical compartment; and
   c. means for maintaining said pistons in fixed relationship in said compartments throughout the stroke of said pistons comprising means for connecting the piston drive tabs rigidly in a common plane wherein said means is extruded plastic and comprises a rear wall and two front walls defining two grooves for engagement with the edges of said piston tabs.

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