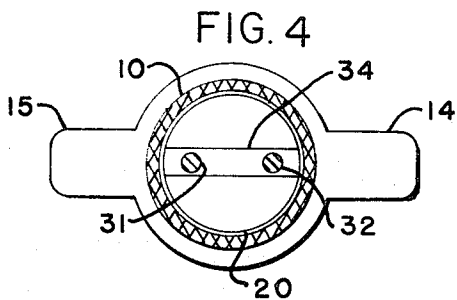


3,373,906

Filed Feb. 10, 1967



INVENTORS
Edward G. DeHart
Miner D. Allen
BY *Jack Lusen*
ATTORNEY

1

3,373,906

SYRINGE WITH STIRRER

Edward G. De Hart and Miner D. Allen, Cambridge, Mass., assignors to De Haart, Inc., Arlington, Mass., a corporation of Massachusetts

Filed Feb. 10, 1967, Ser. No. 615,144

4 Claims. (Cl. 222-235)

ABSTRACT OF THE DISCLOSURE

A plastic syringe with a stirrer which telescopes into the piston as the syringe is discharged is described. This device permits the use of syringe as sales package and dispensing device for preparations which must be mixed or blended just prior to use. The embodiment shown employs a hairpin-like loop, the legs of which slip into longitudinal holes in the piston or plunger of the syringe. Mixing requires the rotation of stirrer and piston within the syringe cylinder.

This invention relates to packaging, and more particularly to dispensing packages for pastes, paints and other mixtures which tend to segregate into components in storage.

In medical practice, disposable plastic syringes and hyperdermic needles have come into common usage. These syringes, often made of polyethylene plastic with a rubber piston seal are practical and inexpensive. Syringes of this kind are somewhat more manageable and reliable than tooth paste-type tubes for the dispensing of adhesives and similar materials in industrial processes. The sale of such syringes pre-filled with the material to be dispensed has become an accepted practice. The use of such syringes has also been found to be most convenient for the measured dispensing of the special and expensive paste preparations used to deposit resistive, conductive, and capacitive films in the manufacture of cermet integrated thick-film circuits.

It has not been practical heretofore to pre-package such pastes in syringes because they require stirring prior to use. It is an object of the present invention to provide an improved syringe suitable for the prepackaging of such pastes. It is a further object of the invention to provide a syringe for such materials that may be partially discharged, stored, and subsequently further discharged as its filling material is needed.

A feature by which these objects are achieved in the present invention is the incorporation of a stirring means within the syringe. A particular feature is a stirrer which extends into the filling from the face of the plunger and stirs the contents as the plunger is rotated relative to the cylinder. A further feature is a telescoping relationship between stirrer and plunger whereby the stirrer slips into the plunger or piston as the latter is advanced to discharge the contents.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

FIG. 1 is a cut-away and exploded isometric sketch of the preferred embodiment of the invention,

FIG. 2 is a section through the connecting rod of the syringe of FIG. 1 on the line 2-2,

FIG. 3 is a section through the syringe of FIG. 1 taken along line 3-3 through the piston head, and

2

FIG. 4 is a further section along line 4-4 through the head.

The syringe is made of five pieces, a cylinder 10, a piston 20, a thumb-piece 22 and O-ring seal 24 for the piston, and a stirrer 30. The cylinder 10 is a conventional syringe part with an exit-tip and orifice 12 at one end and extensions 14 and 15 at the other end for grasping with the fingers. There is a short conical transition 16 between the cylindrical bore 17 and the tip 12. There is no particular novelty in this part of the syringe; and it is usual to use cylinders manufactured for use with ordinary syringes, whether glass or plastic in composition.

The piston 20 has a generally cylindrical head 21 at one end. The head has a peripheral O-ring groove 23 in the plane of the section 3-3 of FIG. 1 into which is snapped an O-ring 24 to provide a tight seal between piston and cylinder bore. The piston is pushed by a connecting rod-portion 25 which generally figure of 8 in cross section as shown in the section, FIG. 2. The connecting rod 25 is fastened at its outer end to the thumb-piece 22 which has two pins 26 and 27 which plug the outer ends of the smooth, parallel, cylindrical holes 28 and 29 which receive the legs 31 and 32 of the stirrer 30.

The face 33 of the piston is conical to fit the transition 16 and is modified as shown in section FIG. 3 by a transverse groove 34 which joins and extends beyond the inner ends of the holes 28 and 29.

The stirrer 30 is a length of wire bent in a hairpin shape having a loop 36 and two equal-length parallel legs 31 and 32 which are spaced apart to fit the holes 28 and 29 in the piston. The loop 36 of the stirrer is broadened laterally to extend substantially the full diameter of the bore, and its arch is flattened to fit into the groove 34.

The syringe is loaded with tip down, the piston 20 raised to accommodate a predetermined volume, and the stirrer 30 fully extended. With the thumb-piece off, the desired filling fluid is pumped into the syringe through the tip 16. The enclosed air vents through the holes 28 and 29. When the volume is filled, and the fluid reaches the constricted space between the legs 31 and 32 and the holes 28 and 29, there is a markedly increased resistance to further filling. This increase provides a reliable indication of filling. The thumb-piece 22 is then applied and cemented in place. The holes 28 and 29 may either be filled with the filling fluid, or left filled with air. In either case there must be provision for the air or fluid to leak from the holes either past the legs 31 and 32, or otherwise, so that the legs may advance into the holes 28 and 29 as the piston is pushed in to deliver the filling fluid for use. For use with silk screening pastes on machines of the type described in the copending patent application of E. G. De Hart and D. Froehling Ser. No. 559,975, filed June 23, 1966, the holes are filled with air which leaks into the transverse groove 34 as the piston advances.

After filling the syringe as described, it is removed from the filling machine, and the tip 12 capped.

The syringes as filled may be stored until needed for use. At that time, the piston 20 is rotated with respect to the cylinder 10. This may be done by hand, or by an appropriate mechanism. The stirrer is rotated with the piston and serves to mix the components of the filling fluid or paste to a uniform consistency and composition. Such stirring has been found to be necessary in the case of the pastes containing heavy metals which are used in the silk-screen process of manufacturing hybrid circuits.

It will be noted that the stirrer telescopes into the piston as the paste is used. Therefore a tube may be partially used, then set aside for an indefinite period before being stirred again preparatory to use. From original packaging

3

until used up, the pastes are never exposed to contamination. The proportions of the constituents delivered will remain substantially constant through the period of use of the packaged quantity of paste.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained, and since certain changes may be made in the above construction without departing from the scope of the invention, it is intended that all matter contained or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

We claim:

1. A syringe for the dispensing of mixtures comprising: a cylindrical body, open at one end to a cylindrical bore having at the other end means for connecting to a discharge means
- a piston fitting said cylindrical bore, said piston having a substantially cylindrical head, a face toward said other end, a connecting rod for pressing said head

4

toward said other end, a pair of longitudinal guide holes extending through said rod, head, and face, and

a stirrer having a pair of legs fitting said holes and constrained by said holes to rotate with said piston and extending from said face toward said other end, said legs being slidable in said holes

to permit said stirrer to foreshorten its extension toward said other end when said piston is advanced toward said other end.

2. A syringe as defined by claim 1 wherein said holes are centered at opposite sides of the center axis of said bore.

3. A syringe as defined by claim 2 wherein said stirrer comprises a hair-pin shaped loop of wire having substantially straight parallel legs to fit into said holes.

4. A syringe as defined by claim 3 wherein said connecting rod is terminated by a thumb-piece fitting into and closing off said holes.

References Cited

UNITED STATES PATENTS

1,449,571	3/1923	Younger	222—246
2,831,606	4/1958	Alters	222—246

ROBERT B. REEVES, *Primary Examiner.*

HADD S. LANE, *Assistant Examiner.*