VIAL FOR USE AS SYRINGE ACCESSORY

FIELD OF THE INVENTION

This invention relates to a vial for holding drugs, and mixtures which can optionally serve as a syringe accessory.

BACKGROUND TO THE INVENTION

It is known to use a syringe barrel as a prepackaged container for drugs. The barrels in these cases are of the type which are moved relative to a piston which has a fluid pathway through it. The barrels normally have one opening which has a removable seal, and after unsealing, the open end is located over a piston head for use.

OBJECT OF THE INVENTION

It is an object of this invention to provide a vial of the type described above.

SUMMARY OF THE INVENTION

In accordance with this invention there is provided a vial comprising a tubular syringe barrel closed at one end and open at the other, a stopper in the open barrel end formed by a piston head of a syringe, and valve means in the barrel between the stopper and the closed barrel end, the valve means being normally closed and actuatable to an open condition by movement of the stopper into the barrel, and the valve means being slidable with the piston head to the closed barrel end.

Preferably, the valve means is actuatable by hydraulic pressure from a liquid being operated on by the stopper when pressed into the barrel.

There is provided for the valve means to have a body which is slidable within a sealing surround, with the body having openings in it and being slidable from a

closed position in which the openings are sealed by the sealing surround, to an open position where the openings in the body move passed the sealing surround.

Preferably, the body is a blind ended tube with an outwardly extending annular skirt located at the open tube end, the tube having radial openings between the skirt and the blind end, and an annular seal around the blind end.

The seal may alternatively extend axially from the blind end, spaced from and around the tube, to seal around the skirt.

BRIEF DESCRIPTION OF THE DRAWING

Preferred embodiments of the invention are described below by way of example only, and with reference to the accompanying drawings, in which:

Figures 1 to 3 are cross-sectional side views of a first embodiment of the invention in stages of use; and,

Figures 4 to 5 are cross-sectional side views of a second embodiment of the invention in stages of use.

DETAILED DESCRIPTION OF THE DRAWINGS WITH REFERENCE TO THE DRAWING

Referring to Figures 1 to 3, a syringe barrel (1) is tubular with an open end (2) and a closed end (3). The barrel has a piston head (4) located in the open end, operating as a stopper. The piston head (4) has a blind passageway (5) formed therein running from the interior piston end where it is open, to the blind end facing out of the barrel, at the external end of the piston. As will be appreciated by those who are skilled in the art, this piston is pressed in use into the sharp end of a needle passageway as part of a syringe. The blind end of the piston passageway is pierced to create a path for liquid to be discharged.

A valve means (10) is located in the barrel between the piston head (4) and the closed end (2). The valve means divides the barrel interior into a chamber (11)

nearest the piston head, and a chamber (12) nearest the closed end (3). The chamber (11) is filled with a liquid component, and the chamber (12) is filled with a granular or powder component in a form that is at least partially compressible, or which does not completely fill the chamber (12). Normally, the liquid is a sterile solution which must be mixed with a powdered drug, normally an antibiotic.

The valve means (10) has a body (11) in the form of a short blind ended tube, having an open end (12) leading to the blind end (13). The wall (14) of the tube is spaced away from the barrel walls, and at the open end a radially outwardly extending skirt (15) provides a sliding fit for the valve means body within the barrel interior. At the blind end (13) is located sealing means (16) in the form of an O-ring. The O-ring locates in a sealing manner around the blind end (13). Radial openings (17) are located in the wall (14) between the skirt (15) and the installed position of the O-ring.

In use, the piston head (4) is pressed into the barrel and the compression force on the liquid in the chamber (11) forces the valve means towards the second chamber, and passed the O-ring (16). The O-ring has sufficient frictional engagement with the interior of the barrel to cause it to roll past the openings (17), thus connecting the two chambers through the radial openings (17). This position is shown in Figure 2.

The barrel can now be shaken up gently to ensure that the liquid and solid components are properly mixed. The barrel is then connected with the syringe as described above, and the contents injected. During the course of injection the piston head moves to the rear interior of the barrel and in doing so engages the body (11). The body (11) is slid together with the piston head to abut the interior of the closed end (3) of the barrel, as indicated by numeral (20) in Figure 3.

Referring now to Figures 4 to 5, an alternative embodiment of a valve means is shown. In this embodiment a valve means (30) has a sealing surround (31) in the form of a band of sealing material which locates around and extends between an open end (32) and a closed end (33) of a valve body (34). The valve body is similar in configuration to that described with reference to Figures 1 to 3, having openings (35) in the walls of a short blind ended tube, and a radially outwardly

extending skirt (36) around the open tube end (32). The skirt however does not abut the barrel interior but locates against one axial end (37) of the sealing ring. The opposite axial end (40) of the sealing ring is radially thicker, extending inwardly to locate and seal around the blind end (33) of the body.

The valve means is fitted within a syringe barrel (50) having a piston head (51) closing the open end thereof, and having an opposite closed end (52). The valve means divides the barrel into two chambers, being a chamber (53), normally filled with liquid and located between the valve means and the piston head (51), and a chamber (54) between the valve means and the closed end (53). The chamber (54) is normally provided with a solid material for mixing with the liquid in chamber (53).

In use, the piston head (51) is pressed into the barrel causing the liquid in the chamber (53) to action the valve body and slide it into the chamber (54) and passed the sealing means (37). In this position the radial openings (35) move passed the sealing means and allow the two chambers to communicate with each other.

As described above with reference to Figures 1 to 3, the barrel is now shaken up to mix the contents of the two chambers and connected to a syringe for discharge.

Variations may be made to the above embodiments without departing from the scope of the invention. A removable plug may be located over the piston head to keep the head sterile prior to mixing, and the piston may be replaced by a movable stopper.

* C L M S *

CLAIMS

1. A vial comprising a tubular syringe barrel closed at one end and open at the other, a stopper in the open barrel end formed by a piston head of a syringe, and valve means in the barrel between the stopper and the closed barrel end, the valve means being normally closed and actuatable to an open condition by movement of the stopper into the barrel, and the valve means being slidable with the piston head to the closed barrel end.

2. A vial as claimed in claim 1, in which the valve means is actuatable by hydraulic pressure from a liquid being operated on by the stopper when pressed into the barrel.

3. A vial as claimed in claim 2, in which the valve means has a body which is slidable within a sealing surround, with the body having openings in it and being slidable from a closed position in which the openings are sealed by the sealing surround, to an open position where the openings in the body move passed the sealing surround.

4. A vial as claimed in claim 3, in which the body is a blind ended tube with an outwardly extending annular skirt located at the open tube end, the tube having radial openings between the skirt and the blind end, and an annular seal around the blind end.

5. A vial as claimed in claim 4, in which the seal extends axially from the blind end, spaced from and around the tube, to seal around the skirt.

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