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(54) IMPROVEMENTS IN AND RELATING TO INJECTORS FOR MEDICATION

(71) We, IMS LIMITED, a Delaware corporation of the United States of America, of 408 South Spring Street, Suite 510, Los Angeles, California 90013, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to injectors for medication.

The invention provides a holder for a cylindrical vial comprising a hollow cylindrical member having one closed end, a needle extending outwardly from said closed end and having a sharp end point, a thin long fluid passage communicating with said needle and extending inwardly of said cylindrical member and having a sharpened end terminating within the wall of said cylindrical member adjacent the other end thereof, said thin long fluid passage being arranged concentrically with respect to said cylindrical member, and lateral support means positioned adjacent the said other end of said cylindrical member between said wall of said cylindrical member and said thin long fluid passage in proximity to said sharpened end, said lateral support means being arranged to provide rigid lateral support for said fluid passage to prevent said sharpened end being displaced to any substantial degree from its concentric position.

The holder may be combined with a vial having a plug therein to form an injector for medication. The construction of the holder of the invention prevents the fluid passage from being displaced from a central or concentric relationship with respect to the cylindrical member. The importance of maintaining this concentric relationship resides in the fact that an eccentric relationship can result in the sharpened inner end of the fluid passage engaging the plug in a vial in such a way as to core or remove a rubber chip from the plug, which rubber chip can subsequently block the fluid passage or, more seriously, pass through the fluid passage along with the medicament into the patient.

Advantageously, the cylindrical member is provided with threaded interlocking means for engagement with co-operating threaded interlocking means on a plug of a vial.

In previously proposed vial injectors wherein the vial stopper has sealing rings for engaging the vial, it has been recognized by the present inventor that the rings on the vial stopper tend to seize up in the vial during storage. This condition interferes with the smooth and easy operation of the device at the time of use. United States Patent No. 3,376,866 discloses a solution to this problem in the form of interlocking teeth on the vial stopper and the end of a holder for the vial. According to an advantageous feature of the present invention, the cylindrical member has threaded interlocking means for engagement with co-operating threaded interlocking means on a plug in a vial, and the lateral support means and the interlocking means on the cylindrical member are so arranged that, on interlocking of such a plug of a vial with the cylindrical member, said lateral support means provides a stop for the plug to allow further relative rotational force between said vial and said cylindrical member to break any seizure of the plug to the walls of the vial. This provides a new and altogether different approach to the problem referred to.

Although the fluid passage may be a metal needle, the holders according to the present invention have the advantage that a metal needle can be dispensed with if desired. Thus, a translucent fluid passage may be provided within the cylindrical member. Such a fluid passage (which may be a hollow length of plastics material) enables a nurse to observe by simple aspiration whether the end of the outwardly extending needle has been inserted in the vein of the patient. Most injectable medication is intended for either intramuscular or intravenous injection. To establish whether the device has been appropriately inserted, it is concentional to aspirate and watch for the appearance of blood in the vial or syringe. An opaque needle involves the possibility that a substantial

amount of blood will be aspirated. This problem is overcome with a translucent fluid passage since the presence of blood as evidencing injection in the vein can be immediately detected in the fluid passage.

The invention also provides an injector for medicament comprising a holder as defined hereinbefore, and a cylindrical vial, the vial having an open end and a closed end and a resilient plug inserted at least partially through the open end engaging the wall of said vial with a press fit, co-operating threaded interlocking means being provided on said cylindrical member and said plug, the arrangement being such that, upon threadably interlocking the said plug with the said cylindrical member, said vial is first held in an assembled but non-operating position and upon further threadable interlocking of said plug with said cylindrical member, said plug is pierced by said long thin fluid passage and said passage communicates with said vial and said plug is locked securely to said cylindrical member to permit aspiration upon withdrawal of said vial or to permit expulsion of the contents of said vial upon exertion of pressure on said vial.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 shows a sectional view of an injector according to the invention is assembled condition;

Figure 2 shows a part, namely a holder for a vial, of a further injector according to the invention; and

Figure 3 shows a sectional view of a further injector according to the present invention.

In the drawings, like parts have been given like reference numerals throughout each of the Figures.

Turning to Figure 1 in detail, a vial 10 is provided with a press-fit rubber stopper (or plug) 12 which has sealing rings 14 sealing on the inside of said vial and which is slidable therein in piston-like fashion. The stopper 12 has a thin central diaphragm portion 16 concentrically disposed therein. The stopper 12 also has a projection 18 thereon having a plurality of male threads 20.

A holder for the vial comprises a cylindrical member 22, a barrel 32, a metal cannula or needle 26, and a lateral support disk 38. The cylindrical member 22 has a closed end 24. The cannula 26 has a sharpened end point 28 extending outwardly from the closed end of the cylindrical member 22. A thin long fluid passage formed integrally with the cannula 26 communicates with the outwardly-extending cannula and extends inwardly of the cylindrical member and has a sharpened end 36.

The cylindrical member 22 is provided with female threads 30 for engagement with threads 20.

Around the cylindrical member 22, there is provided the barrel 32 which has at its open end external gripping means 34. The barrel 32 may be omitted if desired.

The sharpened end 36 of the fluid passage terminates within the walls of the cylindrical member 22. The fluid passage is externally supported and held by an apertured disk 38 through which the fluid passage passes; the disk 38 provides rigid lateral support for the fluid passage. The disk 38 is held around its periphery by the ledge 40 on the inside of cylindrical member 22 adjacent the open end thereof. The disk 38 may be held by a press-fit, glued in place, or spun-welded to the cylindrical member 22.

The disk 38 can be disposed within the cylindrical member 22 so that it acts as a stop for the projection 18, although the invention is not limited to this configuration. If the disk 38 is arranged to act as a stop, the projection 18 when interlocked with the threads 30 on cylindrical member 22 abuts the disk 38. This prevents the further advance of stopper 12 into the cylindrical member 22, and any seizure of the stopper 12 in the vial can be broken by further rotational movement of the vial with respect to the holder.

As shown in the holder of Figure 2, the needle 26 may have a threaded fitting 42 which engages a Luer taper boss 44 and an internally threaded Luer skirt 46 whereby the needle is securely held to the cylindrical member 22. The holder of Figure 2 is otherwise similar to the holder of Figure 1, except that the needle 26 and fluid passage are not integral with each other.

The fluid passage extending inwardly of the cylindrical member may be a hollow length of plastics material, as shown in Figure 3, and separate from the outwardly-extending needle. In this case, the lateral support disk 50 can be formed integrally with the fluid passage. The plastics member 48 in the Figure 3 embodiment has a tapered end 52 which is snugly received in the tapered hole 54 and held there by a press fit or a glued joint. Otherwise, the embodiment of Figure 3 is assembled and used in the same manner as the embodiments of Figures 1 and 2.

The outwardly-extending needle in Figure 3 has a thread fitting 42 for engagement with a Luer skirt as in Figure 2.

The lateral disk-like support in proximity to the sharpened end of the fluid passage prevents misalignment of the fluid passage in the cylindrical member 22 both in assembly and subsequent thereto. As a consequence, the sharpened end 36 is so disposed that it will pierce the diaphragm portion 16 when the threads are made up. Thus, there

is no coring or chipping of rubber such as might occur if the sharpened end were to pierce the heavier section of the rubber stopper.

WHAT WE CLAIM IS:—

1. A holder for a cylindrical vial comprising a hollow cylindrical member having one closed end, a needle extending outwardly from said closed end and having a sharp end point, a thin long fluid passage communicating with said needle and extending inwardly of said cylindrical member and having a sharpened end terminating within the wall of said cylindrical member adjacent the other end thereof, said thin long fluid passage being arranged concentrically with respect to said cylindrical member, and lateral support means positioned adjacent the said other end of said cylindrical member between said wall of said cylindrical member and said thin long fluid passage in proximity to said sharpened end, said lateral support means being arranged to provide rigid lateral support for said fluid passage to prevent said sharpened end being displaced to any substantial degree from its concentric position.

2. A holder as claimed in claim 1, in which the cylindrical member is provided with threaded interlocking means for engagement with co-operating threaded interlocking means on a plug of a vial.

3. A holder as claimed in claim 1 or claim 2, in which the lateral support means surrounds said thin long fluid passage.

4. A holder as claimed in claim 3, in which the lateral support means is an apertured disk.

5. A holder as claimed in any one of claims 1 to 4, in which said fluid passage is translucent.

6. A holder as claimed in any one of claims 1 to 5, in which the fluid passage is a hollow length of plastics material.

7. A holder as claimed in any one of claims 1 to 4, in which the fluid passage is a metal needle.

8. A holder as claimed in any one of claims 1 to 7, in which said cylindrical member is provided with an external surrounding barrel.

9. A holder as claimed in claim 8, in which the barrel has externally extending gripping means.

10. A holder as claimed in any one of claims 1 to 9, in which the cylindrical member has threaded interlocking means for engagement with co-operating threaded interlocking means on a plug in a vial, and the lateral support means and the interlocking means on the cylindrical member are so arranged that, on interlocking of such a plug of a vial with the cylindrical member, said lateral support means provides a stop for the plug to allow further relative rotational force between said vial and said cylindrical member to break any seizure of the plug to the walls of the vial.

11. A holder substantially as hereinbefore described with reference to, and as shown in, Figures 1, 2 or 3 of the accompanying drawings.

12. An injector for medicament comprising a holder as claimed in any one of claims 1 to 10, and a cylindrical vial, the vial having an open end and a closed end and a resilient plug inserted at least partially through the open end engaging the wall of said vial with a press fit, co-operating threaded interlocking means being provided on said cylindrical member and said plug, the arrangement being such that, upon threadably interlocking the said plug with the said cylindrical member, said vial is first held in an assembled but non-operating position and upon further threadable interlocking of said plug with said cylindrical member, said plug is pierced by said long thin fluid passage and said passage communicates with said vial and said plug is locked securely to said cylindrical member to permit aspiration upon withdrawal of said vial or to permit expulsion of the contents of said vial upon exertion of pressure on said vial.

13. A medicament injector substantially as hereinbefore described with reference to, and as shown in, Figure 1, or Figure 3 of the accompanying drawings, or substantially as hereinbefore described with reference to Figure 2 of the accompanying drawings.

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2. A holder as claimed in claim 1, in which the cylindrical member is provided with threaded interlocking means for engagement with co-operating threaded interlocking means on a plug of a vial.

3. A holder as claimed in claim 1 or claim 2, in which the lateral support means surrounds said thin long fluid passage.

4. A holder as claimed in claim 3, in which the lateral support means is an apertured disk.

5. A holder as claimed in any one of claims 1 to 4, in which said fluid passage is translucent.

6. A holder as claimed in any one of claims 1 to 5, in which the fluid passage is a hollow length of plastics material.

7. A holder as claimed in any one of claims 1 to 4, in which the fluid passage is a metal needle.

8. A holder as claimed in any one of claims 1 to 7, in which said cylindrical member is provided with an external surrounding barrel.

9. A holder as claimed in claim 8, in which the barrel has externally extending gripping means.

10. A holder as claimed in any one of claims 1 to 9, in which the cylindrical member has threaded interlocking means for engagement with co-operating threaded interlocking means on a plug in a vial, and the lateral support means and the interlocking means on the cylindrical member are so arranged that, on interlocking of such a plug of a vial with the cylindrical member, said lateral support means provides a stop for the plug to allow further relative rotational force between said vial and said cylindrical member to break any seizure of the plug to the walls of the vial.

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