

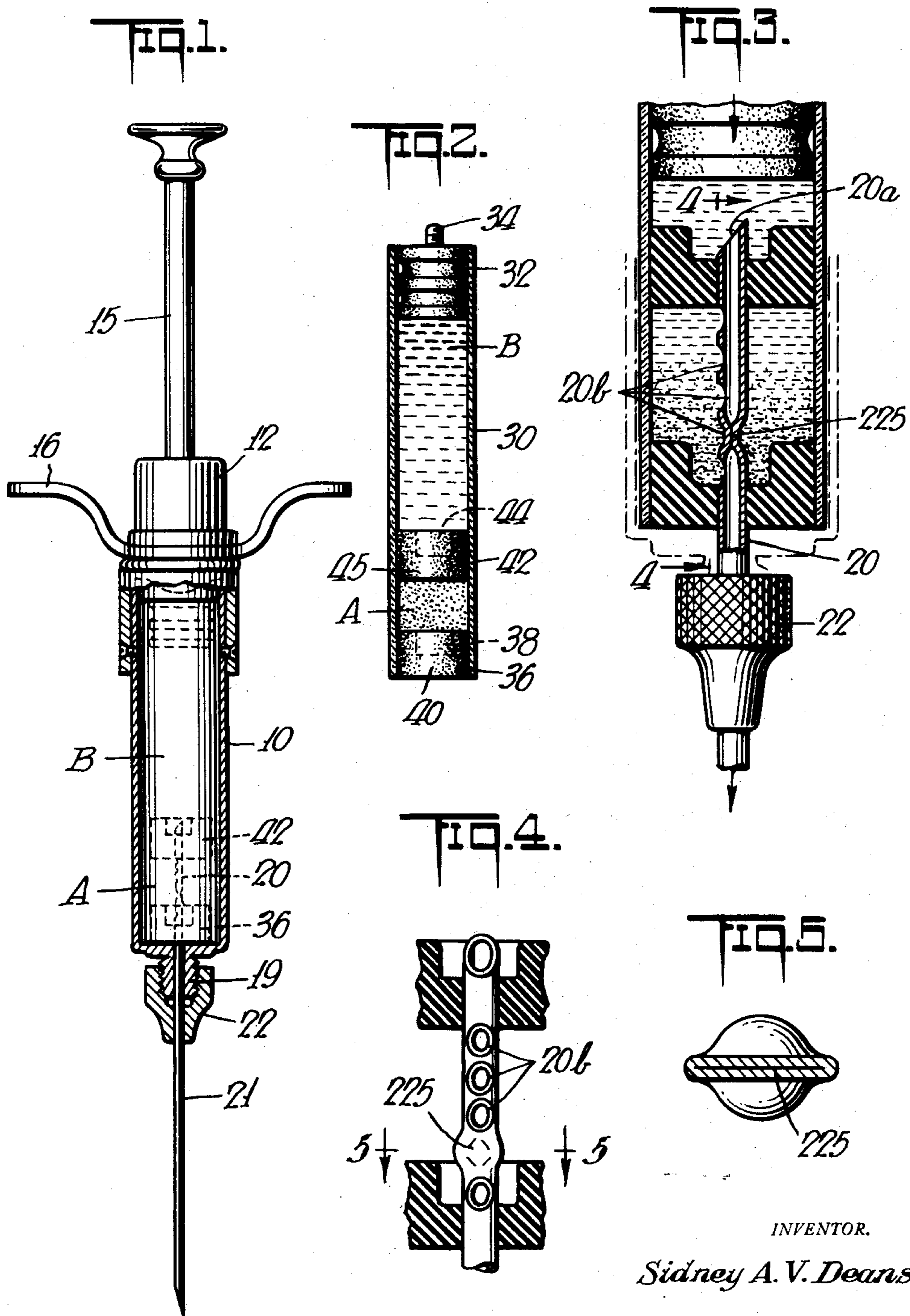
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S. A. V. DEANS

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INJECTION APPARATUS

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INVENTOR.

Sidney A. V. Deans

BY Wiley Browne

ATTORNEY

UNITED STATES PATENT OFFICE

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INJECTION APPARATUS

Sidney Alfred Vindin Deans, Rosemount, Quebec,
Canada, assignor to Ayerst, McKenna & Har-
rison, Limited, St. Laurent, Quebec, Canada

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This invention relates to the art of injecting fluid medicinal substances into an organic subject and is particularly concerned with injecting fluid containing a substance which is unstable in such fluid, and also relates to improved apparatus for this purpose.

Various special types of cartridge or cartridge-syringe combinations have been developed for the direct injection by syringe of a component dry material and a component fluid in which the dry material is unstable. These devices suffer from the disadvantage that they are not standard and special equipment must be purchased in addition to the normal injection equipment which the doctor already has.

Applicant's development

The applicant has now developed means by which the components of a fluid mixture of which one is unstable can be packed in a standard-sized cartridge and administered by the use of a standard syringe. One phase of the invention involves a special cartridge. This cartridge has the usual cylindrical case, generally of glass, the movable plunger-cap usually of rubber at the head, and the perforable resilient plug usually also of rubber at its base.

According to the invention, the cartridge is divided into separate cells by a stopper. One cell contains the fluid, for example a suspension of procaine penicillin, and the other the fluid-unstable component, for example, dry potassium penicillin. The stopper is preferably of rubber and normally maintains a liquid-tight seal between the two cells.

The cartridge, according to the invention, requires a special needle. This cartridge employs as the stopper-sealing member a relatively thick cylinder preferably of rubber. In this case, the needle is provided with a shank long enough to reach and go through the stopper as well as the base plug. The needle is designed to allow access of the fluid from the head cell to the base cell where it mixes with the unstable component. The mixture then passes out through the injection channel in the needle. This needle is a feature of the invention.

The hollow shank of the needle is provided with a number of perforations which permit access of the fluid to the bore of the needle as it passes from the head cell to the base cell. There is a constriction in the bore of the needle in a position adapted to lie towards the base of the base cell and an opening in the needle on the base side of the constriction. The fluid passes into the

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bore of the needle on the head side of the dividing stopper, through the bore past the dividing stopper, and out through the openings to mix with the unstable component. The mixture then passes into the bore of the needle on the base side of the constriction and out through the injection channel past the base plug.

Detailed description

A detailed description follows in which the preferred form of the invention is illustrated. Reference is made to the accompanying drawing in which,

Figure 1 is a side elevation partly in section, showing a standard syringe in which one form of cartridge according to the invention is inserted ready for injection.

Figure 2 is a side elevation of a cartridge like that shown in Figure 1.

Figure 3 is an enlarged fragmentary vertical cross section through a syringe-cartridge combination showing the special form of syringe needle.

Figure 4 is an enlarged cross section along the line 4—4 of Figure 3.

Figure 5 is an enlarged cross section along the line 5—5 of Figure 4.

Figure 1 shows a cartridge in a syringe. The cartridge is made according to the invention. The syringe is of a standard type, but, the base shank of the needle is longer and perforated. As usual the syringe is made up of a barrel 10, a body 12 and a piston 15, slidably operating through the body 12 into the barrel 10. 16 is a finger rest. The barrel 10 is provided with a screw-threaded projecting perforated nub 19. The hub 22 of the needle is screwed on to the nub 19. The shank of the needle extends from a hole in the nub 19 up into the cartridge.

The cartridge, see Figure 2, includes a glass case 30. A rubber plunger plug 32 having an axially placed, screw-threaded metal projection 34 for engagement with the piston 15 of the syringe closes the head of the case. The other end of the case is closed by a rubber closure plug 36. This plug is cylindrical and has an axially formed depression 38 to leave a thin perforable portion 40. Spaced from the plug 36 is a rubber stopper 42, also provided with an axial depression 44 to provide a thin perforable portion 45. The stopper divides the case into two cells, A and B.

According to the invention, the cell B contains a fluid, for example, a suspension of procaine penicillin, and the cell A a substance which is unstable in the fluid, for example, potas-

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sium penicillin. The contents of cell A must be kept apart from those of cell B until just before the injection, when they are mixed in accordance with the invention.

Operation

The injection apparatus is operated as follows. The cartridge is placed in the syringe, as shown in Figure 1. The elongated shank 20 of the needle penetrates both the closure plug 36 and the stopper 42. Fluid from cell B, for example, a suspension of procaine penicillin, can now pass through the bore channel in the needle past the stopper 42 into cell A. If potassium penicillin is present in cell A, it dissolves rapidly in the fluid from cell B. As the piston 15 is depressed, it moves the plunger plug 32 axially in the case 30. This forces the fluid from cell B through the bore of the needle into cell A and then out through the bore of the needle, through the injection shank 21 into the subject.

The form of needle shown in Figure 1, is illustrated in more detail in Figures 3 and 4. The shank 20 includes a point 20a and a plurality of orifices 20b. When the needle penetrates the stopper 42, the shank displaces the rubber of the stopper to maintain a passage between the two cells.

A constriction 225 is formed by indenting the needle.

The method and apparatus of the invention can be used to dispense and administer various solutions and fluid mixtures, one component of which is unstable in solution or suspension. Examples of antibiotics which can be dispensed and administered in this manner are: dry potassium or sodium penicillin with procaine penicillin in aqueous suspension; dry potassium or sodium penicillin with water; dry potassium or sodium penicillin with procaine penicillin in water or other suspending medium (this medium might be, for example, water containing a suspending agent like carboxy methyl cellulose, a buffer like sodium citrate and a preservative like phenol, or a mixture of methyl and propyl para-hydroxy benzoate).

Examples of hormone products which can be dispensed and administered in this manner are, any dry steroid, say testosterone or testosterone

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propionate, progesterone, oestrone, oestradiol benzoate in cell A with water or a suspending medium in cell B; dry anterior pituitary-like hormone or other gonadotrophin in cell A with water in cell B; estrogenic sulfates (water-soluble) in cell A with water in cell B.

Examples of vitamin products which can be dispensed and administered in this manner are water-soluble, water-labile vitamins in cell A with water in cell B; water-insoluble vitamins in cell A with an aqueous suspending medium in cell B; vitamin B complex in cell A with a sterile diluent in cell B.

I claim:

15 A needle for a syringe adapted for use with a medicinal cartridge, comprising, a hub adapted to be connected to the end of the syringe, a hollow needle extending through said hub and having a part extending to one side of the hub for injection into the subject and a part integral with said first part extending to the other side of the hub for piercing the sealing member of a cartridge, the second-mentioned part being sufficiently long to pierce an end plug member in the cartridge and a sealing member within the cartridge spaced from the end plug and separating the cartridge into cells, a plurality of orifices opening into the bore spaced apart at a position to open into the cell of the cartridge closest to the perforable end, and baffle means constituted by inward deformations of the walls of the needle blocking the bore of the needle between said openings and the end adjacent to the plug, one of said orifices opening into the bore beyond said baffle means.

SIDNEY ALFRED VINDIN DEANS.

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