Dec. 3, 1929. P. G. HEINEMAN ET AL 1,737,844

MEDICAMENT DISPENSING CARTRIDGE

Filed Jan. 26, 1927

Fig. 1.

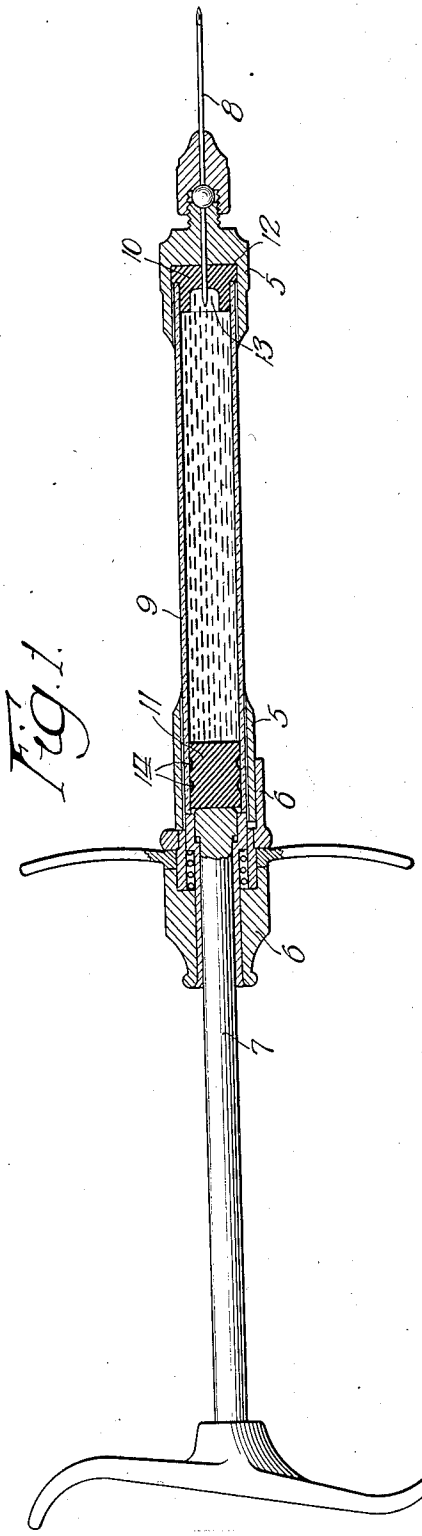
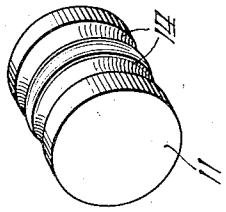



Fig. 2.




Inventors.
Paul G. Heineman.
Henry E. O. Heineman.
Emery, Booth, Jamney & Varney, Attys.

Patented Dec. 3, 1929 1,737,844

# UNITED STATES PATENT OFFICE

PAUL G. HEINEMAN AND HENRY E. O. HEINEMAN, OF CHICAGO, ILLINOIS, ASSIGNORS TO COOK LABORATORIES, INC., A CORPORATION OF DELAWARE

## MEDICAMENT-DISPENSING CARTRIDGE

Application filed January 26, 1927. Serial No. 163,639.

This invention relates to improvements in medicament dispensing cartridges of the type wherein a tube of glass is sealed at opposite ends by rubber composition plugs, one of which is designed to be pierced by a canula to establish communication with the interior of the cartridge, the other plug being slidable through the cartridge body to expel the medicament through the canula. Among other objects, the invention aims to minimize sticking of the slidable plug within the tubular cartridge.

The invention may be understood by reference to one illustrative embodiment shown in the accompanying drawings, in which:

Fig. 1 is a longitudinal section of a medicament dispensing cartridge shown in a commercial form of syringe; and

Fig. 2 is a perspective view of the slidable rubber plug for the cartridge.

Medicament dispensing cartridges of the described type are now established articles of commerce. They are used primarily to provide charges of medicament when associated with a syringe or syringe-like structure having means for securing a cartridge-piercing canula thereon, and having a plunger movable to force the slidable plug through the cartridge to dispense the medicament. In the injection of certain medicaments, for instance local anesthetics, it is sometimes desirable to inject a portion of the contents of the cartridge at one point in the tissue and then withdraw the syringe and make another injection in a different location. For example, in a mandibular injection for the extraction of the molars and bicuspids, from ¼ cc. to ½ cc. of anesthetic is injected into the lingual nerve, 1½ cc. to 2 cc. in the inferior dental nerve, and ½ cc. in the long buccal nerve, this making 2¼ cc. to 3 cc. in all. When using a cartridge syringe in such an injection, considerable pressure is exerted on the plunger to force the medicament through the fine bore of the needle into the tissue. When pressure is exerted on the plunger, the mid portion of an ordinary slidable rubber plug is pushed by the plunger ahead of the peripheral portion of the plug due to the tendency of the compressed plug to adhere to the walls of the tubular cartridge body. Now when pressure is released, the mid portion of the plunger plug, being no longer under pressure, automatically returns to its initial position, and this movement of the mid portion of the plug creates a certain suction which is sometimes effective to draw up a minute quantity of blood into the partially emptied cartridge. This is objectionable in view of using a single cartridge during a series of injections on a patient, and particularly if injections from a single cartridge should be made in more than one patient.

The present invention aims to provide a medicament cartridge whose plunger plug, though adequately long and tight for sealing purposes, is not liable to stick or sc adhere to the glass cartridge tube as to induce such distortion by plunger thruts as would result in "sucking-back" action when the applied pressure is released.

Referring specifically to the drawings, there is shown a syringe-like structure for use with a medicament dispensing cartridge embodying the invention. The syringe-like structure comprises a body 5 having a hinged head 6, a slidable plunger 7 carried by the head and movable through it and entering the body to eject the medicament. At the opposite end of the body a canula or needle 8 is secured, said canula being shown as pointed at both ends and arranged so as to penetrate one wall of the cartridge to establish communication with the interior of the cartridge without admitting air or permitting loss of the medicament. The cartridge shown and syringe embodying it are of substantially the construction disclosed and claimed in the MacGregor applications Serial Nos. 713,902 and 713,903, filed May 17, 1924, and the cartridge consists of a straight tube 9 of glass sealed at the fore end by a pierceable rubber composition plug 10 and sealed at the opposite end by a slidable rubber composition plug 11, the medicament being confined between the two plugs when the cartridge is full. Preferably, the pierceable plug 10 is provided with an integral flange 12 overlapping the end of the glass tube 9 and having a recess 13 to facilitate piercing and to en-

hance the sealing qualities of the plug, particularly under pressure. The plunger plug 11 is preferably provided with one or more circumferential grooves 14 as shown.

If the described plunger plug is of rubber composition which is satisfactory from the standpoint of effectual sealing, and inert relative to medicaments to be packaged, it may nevertheless have a decided sticking tendency which should be eliminated. We have discovered that by incorporating into the rubber composition, at the time the mixture is first made, a small quantity of paraffin or similar wax, when a rubber plug of such composition is inserted under pressure in the end of a cartridge, the paraffin seems to be squeezed out of the invisible pores of the plug, and seems to form an invisible film or coating on the outside surface of the rubber plug, which causes it to slide very freely and easily through a glass tube, so that there is no sucking-back action upon relief of pressure. We prefer to employ about 1.5% by weight of purified paraffin, although variations from this percentage are permissible. However, one must not incorporate a large percentage of paraffin in the rubber, otherwise the physical characteristics of the plug are so greatly modified that it does not satisfactorily seal the cartridge; nor is a much lower percentage of paraffin effectual to eliminate the described sucking-back tendency.

Further to insure free sliding through the glass tube, we prefer to coat each rubber plug, made as described, with a film of pure glycerin, a substance which has been selected because it does not react with most medicaments, nor with the glass and rubber bodies which comprise the cartridge. However, it is possible to use other lubricants and we do not wish to be limited to the use of glycerin for this purpose. The glycerin does not evaporate from between the plug and the glass tube, but remains as a permanent coating on the periphery of the slidable rubber plug, and even after a lapse of considerable time, when all rubber plugs show a tendency to become hard and brittle (probably due to oxidation of the rubber), the glycerin will prevent sticking of the rubber plug to the glass walls of the tube and will therefore greatly facilitate use of the cartridge in an injection. We have found that the use of glycerin is not necessary when the slidable rubber plug is impregnated with paraffin and then inserted under pressure into the end of the glass tube; nevertheless the addition of a coating of glycerin is preferred because it makes the action of the slidable plug somewhat easier. The glycerin also greatly facilitates insertion of the plugs in the ends of the glass tubes, without very frequent breaking of the tubes. Glycerin alone will not prevent the "sucking-back" tendency.

The glycerin may be applied by immersing the plugs in a vessel containing glycerin for twenty-four to forty-eight hours, during which time a certain penetration in the pores of the rubber seems to take place, insuring a sufficient film of glycerin to bring about the substantially permanent free sliding action of the plug which is so greatly to be desired. The circumferential recesses or grooves 14 may act as chambers in which the glycerin will gather as a result of the pressure put upon the plugs during insertion in the glass tube. These chambers, when filled or partially filled with glycerin, apparently enhance the sealing action of the plug. As the plug is pushed through the glass tube an invisible film of glycerin probably spreads over the surface of the glass in advance of the plug, thus making the plug easily slidable, even when it is very tightly compressed within the tube, and has been in position for many months.

The pierceable plug 10 should not be impregnated with paraffin or any other substance calculated to facilitate movement relative to the glass tube, nor should it be coated with glycerin or any other lubricant. It should be immovable during ejection of the medicament, otherwise part or all of the medicament may escape past it and be lost.

Obviously the present invention is not restricted to the particular embodiment thereof herein shown and described. Moreover, it is not indispensable that all the features of the invention be used conjointly since they may be employed advantageously in various combinations and subcombinations as defined in the claims.

What we claim is:

1. A medicament dispensing cartridge comprising, in combination, a straight tube of glass; a readily pierceable rubber composition plug inserted in and sealing one end of said tube and having an axial recess facing inwardly of the cartridge and also having an integral flange projecting radially to overlap the end of the glass tube; said plug being free from lubricants, whether coated thereon or impregnated therein; and another rubber composition plug initially sealing the opposite end of the cartridge and slidable through the tube; said slidable plug impregnated with paraffin in sufficient quantity to minimize sticking of the plug to the inside of the glass tube or such adherence of the plug to the glass tube as will cause a "sucking-back" action when pressure, put on the plug to dispense the medicament, is relieved.

2. A medicament dispensing cartridge comprising, in combination, a straight tube of glass; a readily pierceable rubber composition plug inserted in and sealing one end of said tube; said plug being free from lubricants, whether coated thereon or impregnated therein; and another rubber composition plug initially sealing the opposite end of the

cartridge and slidable through the tube; said slidable plug impregnated with paraffin in sufficient quantity to minimize sticking of the plug to the inside of the glass tube or such adherence of the plug to the glass tube as will cause a "sucking-back" action when pressure, put on the plug to dispense the medicament, is relieved.

3. A medicament dispensing cartridge comprising, in combination, a straight tube; a readily pierceable closure sealing one end of said tube; and a rubber composition plug initially sealing the opposite end of the cartridge and slidable through the tube; said slidable plug impregnated with paraffin in sufficient quantity to minimize sticking of the plug to the inside of the tube or such adherence of the plug to the tube as will cause a "sucking-back" action when pressure, put on the plug to dispense the medicament, is relieved; said slidable plug also coated with a neutral liquid lubricant such as will materially facilitate sliding through the tube.

4. A medicament dispensing cartridge comprising, in combination, a straight tube; a readily pierceable closure inserted in and sealing one end of said tube; and a rubber composition plug initially sealing the opposite end of the cartridge and slidable through the tube; said slidable plug impregnated with paraffin in sufficient quantity to minimize sticking of the plug to the inside of the tube or such adherence of the plug to the tube as will cause a "sucking-back" action when pressure, put on the plug to dispense the medicament, is relieved; said slidable plug having a circumferential groove and having a film of glycerin theron to facilitate its sliding.

5. As an article of manufacture, a syringe cartridge stopper of composition rubber impregnated with about 1.5% by weight of paraffin, said stopper adapted to be inserted under compression in a cartridge tube and to be slidable therein.

6. A syringe cartridge comprising a glass tube having liquid-confining stoppers, one adapted to be pierced by and to seal around a needle, the other slidable in the tube and adapted to be pushed inward by a plunger to eject the liquid through the needle; said inwardly-pushable stopper being of a rubber composition impregnated with a neutral waxy substance in insufficient amount to impair desired resiliency and sealing capability of the stopper but sufficient to prevent such adherence of the stopper to the glass as would cause sucking-back action when the applied pressure is relieved.

7. A syringe cartridge comprising a glass tube having sealing stoppers one of which is slidable in the tube and adapted to be pushed inward by a plunger for ejecting the contained fluid through a needle thrust through the opposite stopper, said slidable stopper comprising a rubber composition plug impregnated with paraffin in sufficient quantity to minimize sticking of the plug or such adherence thereof to the tube as would cause sucking-back action when the pressure applied on the plug by the plunger is relieved.

8. A syringe cartridge comprising a glass tube having liquid-confining stoppers, one adapted to be pierced by and to seal around a needle, the other adapted to be pushed inward to eject the liquid through the needle; said inwardly-pushable stopper being of a rubber composition impregnated with a neutral waxy substance in insufficient amount to impair desired resiliency and sealing capability of the stopper but sufficient to minimize tendency of the stopper to stick to the glass, and having also an exterior lubricating film inert to the said composition and the liquid.

9. A syringe cartridge comprising a glass tube having liquid-confining stoppers, one adapted to be pierced by and to seal around a needle, the other adapted to be pushed inward to eject the liquid through the needle; said inwardly-pushable stopper being of a rubber composition inpregnated with a small amount of paraffin in appropriate amount for the purpose described, and having also a lubricating film of glycerin.

In testimony whereof, we have signed our names to this specification.

PAUL G. HEINEMAN.
HENRY E. O. HEINEMAN.