Jan. 3, 1933. M. NEVIN 1,892,993

SYRINGE

Filed May 7, 1927

Fig. 1.

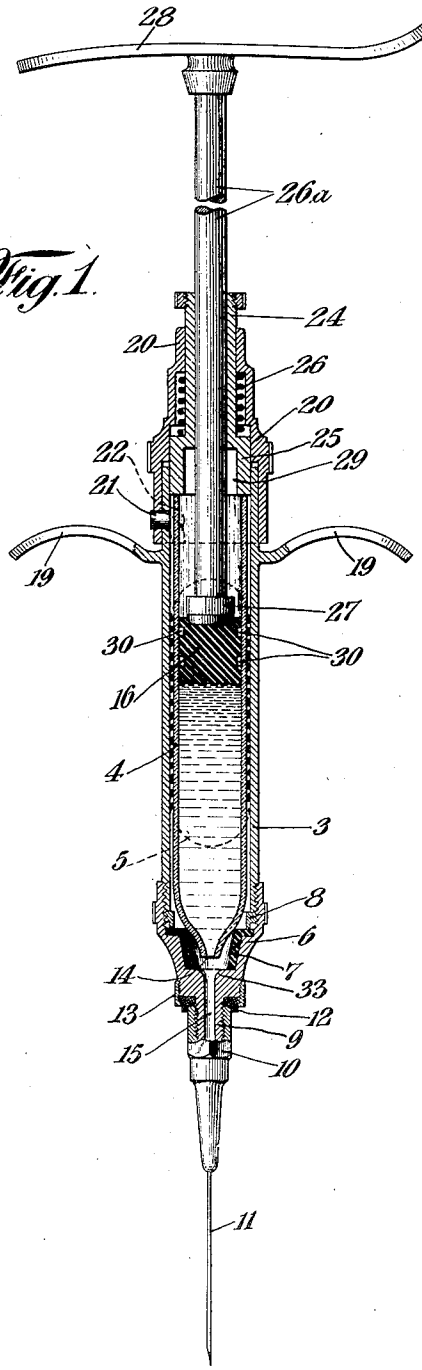


Fig. 2.

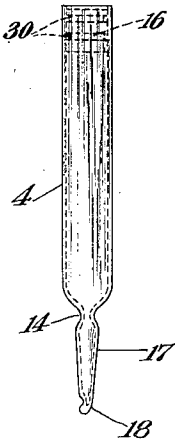
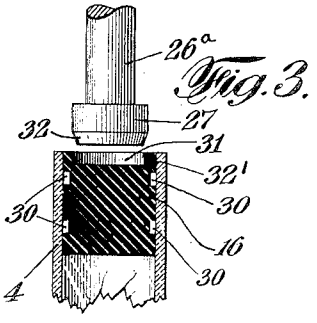


Fig. 3.



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UNITED STATES PATENT OFFICE

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SYRINGE

Application filed May 7, 1927. Serial No. 189,489.

My invention relates to improvements in syringes and while particularly adapted for use in connection with hypodermic syringes for injecting local anæsthetics and the like, the same may nevertheless be found useful in connection with other types of syringes. The invention more particularly relates to that type of syringe in which the medicament is previously prepared in liquid form and placed in ampules, the ampules as needed to be placed in the body of the syringe and the contents expelled therefrom.

The main object of the invention is to provide an arrangement of this class which is more efficient in operation than those heretofore used. Further and more specific objects, features and advantages will more clearly appear from the detail description given below taken in connection with the accompanying sheet of drawing which forms a part of this specification.

Referring to the drawing, Fig. 1 is a section through a hypodermic syringe embodying my invention in a preferred form thereof, the ampule therein having its tip broken off and the contents thereof partially ejected. Fig. 2 is a side view of one of the ampules in which the medicament is put up preparatory to use in the syringe. Fig. 3 is a sectional detail of the rear end of the ampule and the forward end of the plunger which cooperates therewith.

Referring to Fig. 1, 3 represents a cylindrical barrel of a syringe adapted to hold the ampule 4. The barrel 3 is open at opposite sides as indicated at 5 in order that the contents of the ampule in the syringe may be viewed therethrough from the outside. At its forward end there is screwed on to the barrel 3 a head 6 carrying a soft rubber seat 7 against which the end of the ampule 4 is adapted to be seated and cushioned. A ring 8 screw-threaded into the head 6 holds the seat 7 in position. The head 6 is provided with a reduced screw-threaded extension 9 on which is adapted to be screwed a hub 10 of a hypodermic needle 11. The hub 10 is adapted to be screwed down upon a packing 12 held in place on the head 6 by a ring member 13 screwed on the outer end of the head 6. As shown in Fig. 1 the end of the ampule 4 is broken off at 14 so that the contents thereof may flow out and through the passageway 15 in the head 6 and into and out through the hollow needle 11. The resilient cushion seat 7 has an unobstructed opening therethrough communicating with the passageway 15 in the head 6 and it is unnecessary to extend the needle through the head and resilient seat 7.

At the opposite end the ampule 4 is provided with a piston member 16 of rubber or other suitable composition. The piston member 16 closes and seals the rear end of the ampule as shown in Fig. 2. The ampules previously prepared and containing the medicament as shown in Fig. 2 are drawn out at their opposite ends to form a reduced or tapered portion 17 which is sealed off as at 18 and this reduced portion is provided with a constriction therein both external and internal forming a weakened neck as indicated at 14, near the cylindrical body portion of the ampule. The reduced portion is adapted to be broken off the body portion of the ampule at 14, and for this purpose the same may be nicked or notched as with a file, at 14.

Rigidly secured to the barrel member 3 are finger grips 19 and removably attached to the rear end of the barrel 3 is a head 20 which head is provided with a bayonet slot 22 adapted to cooperate with a pin 21 fixed in the rear end of the barrel 3 so that the head 20 may be easily slipped over the rear end of the barrel 3 and forced forward thereon by turning the same so that the outer end of the pin 21 slides along the bayonet slot 22 thereby carrying the head 3 forward. Slidably mounted within the head 20 is a sleeve member 24 enlarged at its lower end as at 25. A coil spring 26 located within the head 20 and bearing against the enlargement 25 tends to force the same toward the ampule 4 and resiliently engage the same so as to force the ampule 4 resiliently against its seat 7 at the opposite end. Slidably mounted in the sleeve member 24 is a plunger member 26a carrying a plunger 27 which is unattached to but adapted to engage the piston 16 in order to move the same lengthwise of the ampule and expel the contents thereof. The plunger

member 26a is provided with a hand piece 28 and the enlargement 25 on the sleeve 24 is recessed at 29 in order to receive the plunger 27 when it is retracted and so that the plunger 27 may be entirely withdrawn from the ampule.

The body portion of the ampule 4 is cylindrical in shape and the piston 16 is also cylindrical in shape and is provided with two circular grooves 30 extending circumferentially thereabout near the rear end of the piston (see Fig. 3) which grooves are preferably filled with glycerine or some other lubricating material. The piston 16 is also provided with a circular recess 31 in its rear face which is engaged by the plunger 27. The depth of said recess 31 is relatively small as compared with the length of the piston 16, the side walls of the said recess 31 are substantially parallel to the line of movement of the piston 16, the bottom of said recess 31 extends substantially at right angles to the line of movement of the piston 16 and the plunger 27 is beveled off to form a frustro-conical portion 32 adapted to engage within said recess, the smaller part of said frustro-conical portion being of less diameter than the recess and the larger part of the frustro-conical portion being of greater diameter than the recess whereby upon being forced into said recess the rear edge of the piston at 32′ is forced outwardly against the inside of the ampule and it is found that as the plunger 32 is forced forward this makes an extremely tight joint between the piston and the ampule and liquid is prevented from being forced past the piston 16 and out at the rear of the ampule. That is, the forward face of the plunger 27 which engages within the recess 31 is of less diameter than said recess, while the rear portion of the plunger 27 is of larger diameter than said recess, whereby the plunger acts to force the rear edge of the piston outwardly against the inside of the ampule as the plunger is forced into said recess and the piston forced forwardly in the ampule. This results in an extremely simple and efficient arrangement tending to prevent the liquid from being ejected or leaking past the piston 16 and out of the rear end of the ampule during the operation of the syringe. This arrangement also tends to prevent the turning over of the piston 16 when considerable pressure is applied thereto by the plunger 27.

By drawing out the forward end of the ampule to form a reduced portion and providing a weakened, narrowed, short, annular neck 14 therein near the body portion of the ampule, this forms a weak point in the reduced portion near the body portion of the ampule which may be easily broken off and which in ordinary use will always be broken in substantially the same place so that the ampule after being broken off may be inserted in the syringe barrel upon removal of the head 20, etc., and the broken end of the ampule at 14 will always come into substantially the same position in the head 6 when the head 20 of the syringe is replaced and the sleeve member 23 with the spring 26 thereon acts to force the ampule 4 into position with its forward end against the seat 7. If the reduced portion 17 were broken at some other point nearer the tip 18, then, if the ampule be inserted in the syringe body, the reduced end would likely come in contact with the metallic portion of the head 6 as at 33 and thus prevent the forward end of the ampule from being properly seated against the packing seat 7 so as to prevent leakage of the fluid back around the outside of the ampule. That is said constriction is so positioned that the broken end of the ampule will be back of the passageway 15 and permit the end of the ampule to be sealed against the seat 7. In other words by providing a constriction as at 14 the users will invariably be caused to break off the reduced portion 17 at the point 14 so that when so broken the ampule will be received in the syringe barrel 3 in its proper operative position. By permitting the ampule to be constricted at 14 both externally and internally the constriction may be formed in a more simple and efficient manner.

While I have described my improvements in great detail and with respect to a preferred form thereof, I do not desire to be limited to such details and forms since many changes and modifications may be made and the invention embodied in widely different forms without departing from the spirit and scope thereof in its broader aspects. Hence I desire to cover all modifications, forms and embodiments coming within the language or scope of any one or more of the appended claims.

What I claim as new and desire to secure by Letters Patent, is:

1. The combination of a syringe and an ampule, said ampule having a stopper movable therein, said stopper having a central recess therein, a plunger including a head and a shank mounted on said syringe, said plunger head being of a larger size than its shank and of less size than the bore of the ampule, said head having a flat lower extremity and having at least a portion of its sides tapered, said plunger having its end arranged to seat in said recess, and an ampule engaging member surrounding said plunger shank and including a part movable within the syringe to engage the ampule in the barrel.

2. A cartridge type ampule for bodily insertion in a hypodermic syringe, the ampule having one end of the body portion closed by a plunger, the ampule at its other end being narrowed and merging directly in a

smooth curve into a weakened, narrowed, short, annular neck at the base of the ampule, the ampule enlarging slightly and being tapered for a substantial distance beyond said neck for providing a portion of sufficient length to be grasped readily by the fingers of the user, for breaking the ampule at said neck.

3. In a hypodermic syringe having a barrel for a cartridge type ampule, a plunger member and an annular gasket of resilient material positioned at the end of the barrel opposite the plunger member and engageable with the base of a cartridge type ampule at a shoulder above the neck of the ampule, the gasket being adapted to form a liquid tight seal against said shoulder when the ampule is placed in operative position in the syringe, an ampule comprising a tubular body portion closed at one end by a plunger inserted therein, the tubular portion at the other end rapidly decreasing in diameter in a smooth curve directly to a weakened, narrowed, short, annular neck, the portion of decreasing diameter above the neck forming a shoulder adapted to seat against said gasket, an elongated portion of the ampule of a diameter substantially less than that of the tubular body portion and of slightly greater diameter than said neck extending beyond said weakened, narrowed, short, annular neck thereby providing a member of sufficient length to be grasped readily by the fingers of the user for breaking the ampule at said weakened neck, which member is broken off at the neck before insertion of the ampule into the barrel of the syringe.

In testimony whereof I have signed my name to this specification.

MENDEL NEVIN.