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COMBINATION OF SEVERAL SOLUTIONS  
FOR THE HYPODERMIC INJECTION  
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2,687,728

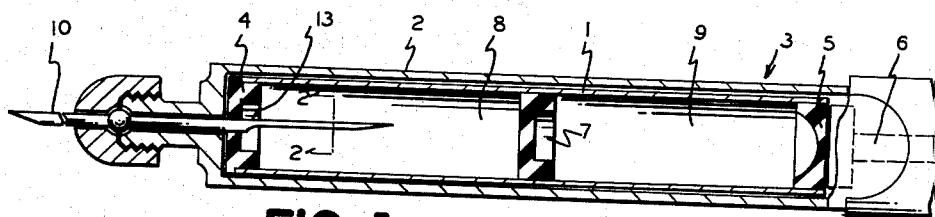


FIG. 1



FIG. 2

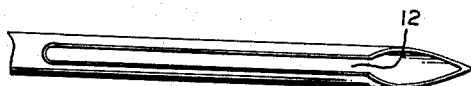


FIG. 3

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# UNITED STATES PATENT OFFICE

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## COMBINATION OF SEVERAL SOLUTIONS FOR THE HYPODERMIC INJECTION

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Application April 25, 1951, Serial No. 222,907

1 Claim. (Cl. 128-218)

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The present invention relates to an improvement upon my copending patent application, Serial No. 209,403, filed February 5, 1951 for combination of several solutions for one hypodermic injection.

In the arrangement as described in the above application, a cartridge is shown in which there is a fixed plug at one end, a movable piston plug at the other end and a partition somewhere within the cartridge separating two different solutions. One or several such partitions may be used for separating different solutions and each of these partitions has a piston in nature in that when the piston at one end of the cartridge is forced inward, the partition itself will move as a piston for expelling the liquid in the chamber in which the end of the needle projects.

In the present invention the improvement relates more specifically to the needle inasmuch as the inventor has found that a certain type of needle may be used which in some cases provides a distinct improvement over the type shown previously.

Without further describing the merits and advantages of the present invention, the invention will be described in connection with the drawings illustrating an embodiment of the same, in which:

Figure 1 shows a cross section through the hypodermic syringe containing the cartridge and needle of the present invention.

Figure 2 shows a section on the line 2-2 of Figure 1, and,

Figure 3 shows a fragmentary perspective view of the end of the needle within the cartridge.

In the hypodermic syringe shown in section in Figure 1, the removable cartridge 1, which is placed in position within the barrel 2 of the syringe 3, may be of the same type as disclosed in my copending application above referred to, in which various forms of diaphragms and plugs for the ends of the cartridge are disclosed.

The cartridge in Figure 1 of the present application has a forward end plug 4 of rubber or rubber-like material which is secured in the end of the cartridge and fixed in position and a rear piston plug 5 which is moved by the piston 6 of the syringe in the usual fashion. The cartridge 1 also has an inner piston diaphragm 7 separating

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the solutions in the two chambers 8 and 9. When the cartridge 1 is put in position, the fixed plug end 4 is pierced by the needle 10. The needle 10 may be like any of the ordinary needles up to the region where it passes into the cartridge beyond the plug 4. At this point a slot may be formed along the whole of the needle as indicated at 11, Figure 2, which slot may continue down to the point 12 where it merges in the pointed or pierced end. In other words, the slot will continue from the vicinity of the region 13 of the needle to its very end. This slot should be less in arc width than 180° as indicated by the angle A. Under these conditions as the end 12 of the needle pierces the center of the diaphragm 7, the flap of material which is pushed out by the needle piercing the diaphragm will remain outward at all times and permit the liquid in the chamber 9 to flow through the open channel into the chamber 8. In this way an even flow of liquid from the chamber 9 to the chamber 8 will be obtained as the contents of the chambers are being forced out through the needle 10.

Having now described my invention, I claim:

In combination with a hypodermic syringe employing a cartridge type container having a fixed end cap at its forward end, a piston plug at its other end adapted to be moved by the plunger of the syringe and a slidable diaphragm within the cartridge adapted to be forced forward by the liquid in the cartridge behind the diaphragm when the piston plug is forced into the cartridge, a hypodermic needle piercing the cartridge at its forward end, said hypodermic needle having a slot extending through its wall commencing just rear of the fixed end cap within the syringe and extending to the point within the syringe.

### References Cited in the file of this patent

#### UNITED STATES PATENTS

Number	Name	Date
1,529,659	Marcy	Mar. 17, 1925
1,705,763	Hasbrauck	Mar. 19, 1929
2,009,393	Falla	July 30, 1935
2,362,165	Smith	Nov. 7, 1944
2,549,417	Brown	Apr. 17, 1951
2,591,706	Lockhart	Apr. 8, 1952