

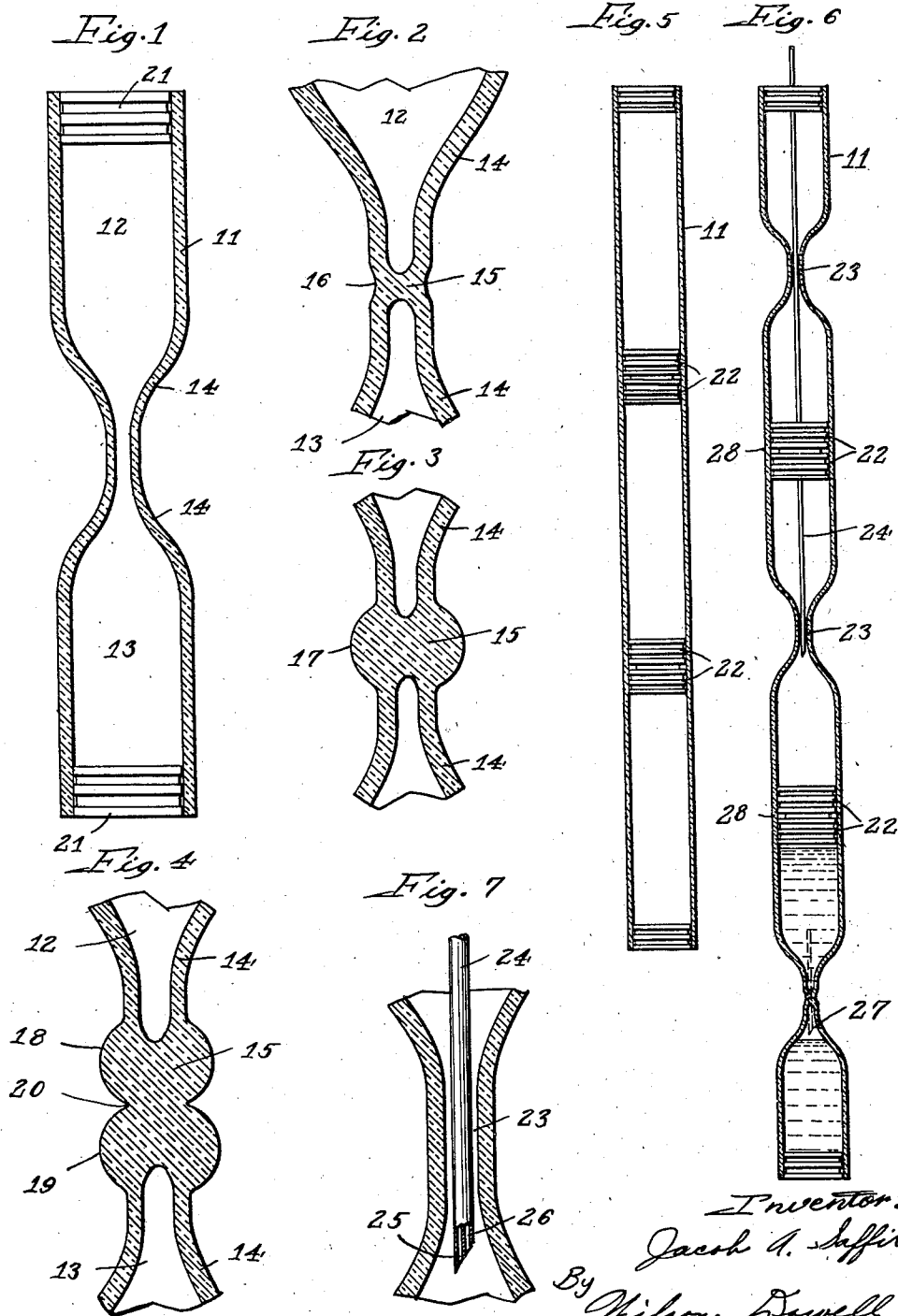
Oct. 10, 1939.

J. A. SAFFIR

2,175,365

HYPODERMIC SYRINGE AND CARTRIDGE AND METHOD OF MAKING CARTRIDGE

Original Filed Nov. 20, 1934 2 Sheets-Sheet 1



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Fig. 8

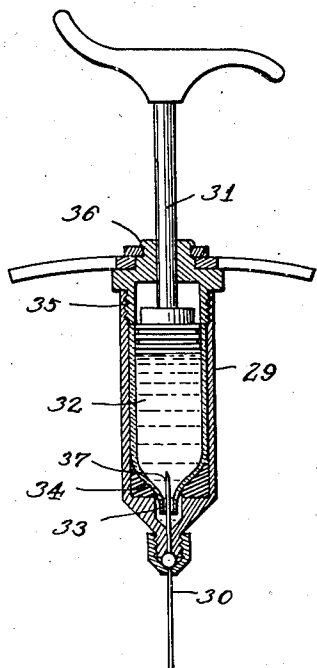


Fig. 9

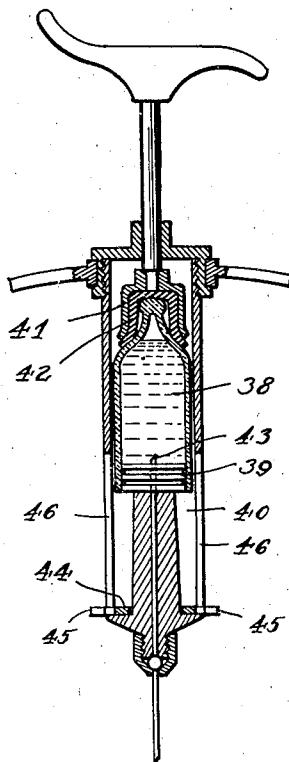
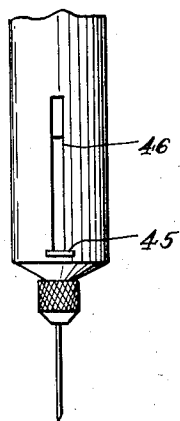


Fig. 10



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UNITED STATES PATENT OFFICE

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HYPODERMIC SYRINGE AND CARTRIDGE
AND METHOD OF MAKING CARTRIDGEJacob A. Saffir, Chicago, Ill., assignor to Multipule
Corporation, Chicago, Ill., a corporation of Il-
linoisApplication November 20, 1934, Serial No. 753,825
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6 Claims. (Cl. 128—218)

This invention relates to hypodermic syringes and to medicament containing cartridges or ampules adapted for use in such syringes.

One of the objects of my invention is to provide
5 a new and improved cartridge or package containing medicament for use in a hypodermic syringe, characterized by the provision of a single cartridge divisible into two or more medicament
10 containing ampules adapted for independent use. My invention contemplates a single cartridge constructed to embody a plurality of self-contained ampules, the cartridge being, in effect, a unitary structure divisible into separate and distinct ampule units at the time of use.
15 Another object of my invention is to provide a novel method of making cartridges of the kind herein disclosed.

Another object of my invention is to provide a new and improved hypodermic syringe particularly adapted for handling ampules of the kind
20 herein disclosed.

Still another object of my invention is to provide for certain advantages and conveniences in the use of these cartridges by reason of the novel
25 constructions herein disclosed.

My invention in its broader aspect contemplates improvements in the manufacture and use of cartridges or ampules of the kind adapted for
30 us in hypodermic syringes, although it should be understood that my invention in all of its phases is not restricted to this use.

Other objects and attendant advantages will be appreciated by those skilled in this art as the invention becomes better understood by reference
33 to the following description when considered in connection with the accompanying drawings, in which—

Figure 1 is a longitudinal section through a cartridge illustrating one embodiment of my invention;
40

Figs. 2, 3 and 4 are enlarged fragmentary views illustrating modifications of the cartridge at the juncture between two ampules;

Figs. 5 and 6 are somewhat diagrammatic views
45 illustrating different steps in the process of manufacturing cartridges in accordance with my invention;

Fig. 7 is an enlarged sectional view of a portion of Fig. 6;

50 Fig. 8 is a vertical section through a hypodermic syringe illustrating one form of use of an ampule unit;

Fig. 9 is a vertical section through another form of hypodermic syringe illustrating another
55 embodiment of my invention, and

Fig. 10 is a side view of the lower portion of the syringe shown in Fig. 8.

Referring more particularly to Figs. 1-4, I have here shown in somewhat diagrammatic fashion a number of embodiments of a cartridge or package constructed in accordance with my invention. It will be noted that each cartridge is a unitary structure constituting a single package adapted for shipping and handling as such. It will also be noted that each cartridge embodies in its structure a plurality, two in this instance, of medicament containing ampules, each ampule being a self-contained unit ready for use at the will of the practitioner and being rendered in condition for such use by simple and easy breaking of one ampule from the other at the juncture of the ampules. In actual practice, I prefer to use a glass tube, designated generally by 11, for the body of the cartridge and to constrict the tube medially for the purpose of providing separate chambers 12 and 13 each having a tapered discharge neck 14 for each such chamber. In the form shown in Fig. 1, the juncture between the neck portions 14 provides an open passage between the respective ampules. In the forms shown in Figs. 2, 3 and 4, the glass body at the juncture between the tapered necks provides a dividing wall 15 between the chambers 12 and 13, closing one from the other, although this closure may be effected by other suitable fractile means. In the preferred embodiment of my invention, this portion of the glass body is shaped or fashioned to provide for breaking transversely at one or more definite points preparatory to using the ampules, or either of them. In the form shown in Fig. 1, the practitioner would break the cartridge at the medial point, leaving both ampules open and ready for use. In the form shown in Fig. 2, the tapered neck of one of the ampules is peripherally impressed as at 16 or it may be scored by any suitable means to provide for breaking off the upper ampule at this point, leaving both ampules closed. The impression or scoring 16 may, however, be definitely located opposite the channel in the neck above or below the dividing wall 15 so that the ampules will be definitely broken at this point, leaving one open and the other closed. In the form shown in Fig. 3, I have shaped the juncture portion to provide an enlargement or bead 17 so that breakage will occur either above or below this bead, leaving one ampule open and the other closed. In Fig. 4 I have shown two enlargements or beads 18 and 19 forming a definite stopper at the end of each ampule neck and also providing a line of breakage 20 which might also

be termed a scoring. In this form the first breakage definitely leaves both ampules closed. Each beaded end may then be broken off at will by the practitioner when he is ready to use either ampule. My invention contemplates that in the manufacture of the cartridge body the shaping and scoring of the intermediate or constricted portion will be performed by suitable means, and that the shaping and scoring, or either, may be suitably arranged so that either or both ampules remain open, or both ampules are closed when fractured at a given point, and so that the closed ampule or ampules may be subsequently opened by a subsequent fracture.

A suitable closure or stopper is applied to the outer end of each chamber 12 and 13, for example, such as a rubber piston 21. Each chamber is filled with any desired medicament, the filling being done in any suitable manner, as through the rubber piston. According to my invention, the ampules of each cartridge may be of the same or different volumetric capacities and may contain the same or different medicaments. This affords a range of variation and usage not possible with the ordinary single chamber cartridges.

In Figs. 5 and 6, I have illustrated diagrammatically certain steps of a method whereby my improved cartridges may be manufactured in a series from a single glass tube, although it should be understood that my invention in its broader aspect is not restricted to this particular method. As shown in Fig. 5, pairs of piston closures, designated by 22, are arranged in the glass tube 11, with the pistons of each pair in closely spaced relation and with the pairs of pistons so spaced apart that the intermediate portion of the glass tube may be subsequently shaped to provide separately ampule chambers, such as the chambers 12 and 13 above described. Each end of the tube will also be closed by a piston. In Fig. 6, I have shown the glass tube constricted intermediate the pairs of pistons as well as intermediate each pair and the adjoining end piston. This step of constricting the tube may be suitably performed as by drawing, in the well known manner, leaving an opening 23 of sufficient diameter for passage of a filling needle 24. This filling needle may have inlet and outlet passages 25 and 26, respectively, for supplying medicament and for venting or evacuating the chambers. The needle is passed downwardly through all of the stoppers but the lowermost, approximately to the position 27 shown in dotted lines in Fig. 6, where the lowermost chamber is filled except for a small space at the top. The needle is then withdrawn upwardly and the constricted portion is sealed by means of a pin flame or by heating and suitable closing and shaping at this point to effect any of the juncture shapes shown in Figs. 2, 3 and 4, or the like. The chamber next above is then filled, the needle being withdrawn to the top of the chamber. The remaining chambers are filled in succession in the manner described. When the ampules of each cartridge are to be in communication as shown in Fig. 1, the step of sealing or closing the constriction would, of course, be omitted. It will be apparent that either a single cartridge or a series of cartridges may be made as a unit. Here I have shown a series of three cartridges, each having two ampules, constituting a unit or package adapted to be sold, shipped and handled as such. The tube is peripherally scored at 28 so that the practitioner may conveniently break off the cartridges at will. In Fig. 8 I have shown one form of hypodermic

syringe in accordance with my invention. The syringe has a suitable barrel body 29 equipped at its lower end with a hypodermic needle 30 and at its upper end with a plunger 31. The ampule here designated generally by 32, is discharged through its open end 33, this end being suitably sealed in its contact with the barrel body, in this instance by means of a rubber seat 34. The ampule is held against the rubber seat 34 by suitable means such as the end thrust collar 35, which in this instance is integral with a cap 36 threaded onto the barrel and serving as a guide for the plunger. This cap also carries the usual finger grips. An ampule of this form may be used in syringes of the type having a canula 37 communicating with the hypodermic needle and adapted to pierce a stopper or piston. It will be obvious that when a syringe of this type is used, the canula passes through the discharge opening in the ampule as shown in Fig. 7.

In Fig. 9, I have shown another form of hypodermic syringe in accordance with my invention, in which the medicament is discharged through the piston as distinguished from discharging through the tapered neck. Here, the closed end of the tapered neck is not broken off and the ampule, designated generally by 38, is inverted when positioned in the barrel. The piston 39 rests on an abutment 40 positioned above the bottom of the barrel a distance approximately that of the piston travel in the ampule. The plunger is provided with a special bead 41 shaped to generally conform to the tapered upper end of the ampule and having a correspondingly shaped rubber face 42 providing a cushion for the irregular end of the ampule. A canula 43 communicating with the hypodermic needle extends upwardly beyond the abutment 40 and pierces the piston 39 when the ampule is placed in position in the barrel. It will be apparent that by operation of the plunger the ampule will be bodily moved downwardly in the barrel in a medicament discharging stroke. In the bottom of the barrel I have provided an ejector 44 which may be of suitable form, such as an annular thrust plate. Means is provided for moving the ejector lengthwise in the barrel to correspondingly move the ampule body for ejection thereof. This means in the present embodiment comprises finger grips 45 located outside of the barrel body and attached to the plate 44, the attaching means extending through longitudinal slots 46 in the barrel. It being obvious that by manipulation of these finger grips 45 the ejector plate may be moved lengthwise in the barrel in an ampule ejecting stroke.

It is believed the foregoing conveys a clear understanding of the principles of my invention, it being particularly noted in respect to the cartridge that it provides plural ampules adapted for independent use at the will of the practitioner, and that each ampule is, in effect, a self-contained unit having individual characteristics and properties. Thus, there is provided for the profession a single cartridge or a series of cartridges in a unit having increased facilities and advantages. The present embodiment illustrates double ampule facilities in a single cartridge which promotes greater economy to the practitioner because of lower cost per ampule. Cartridges and ampules of this kind also afford greater convenience in use. My invention further promotes a wider range of uses by reason of the different capacities and medicaments which may be embodied in a single cartridge which is particularly desirable

in the treatment of certain diseases requiring a series of ejections. It should be apparent that changes and modifications may be made in the construction of the cartridges and syringes as well as in the method of making the cartridges, without departing from the spirit and scope of the invention as expressed in the appended claims,

I claim:

10 1. A double ampule, each ampule having a constricted neck at one end and a piston closure in the opposite end, said necks being joined together, the juncture closing the ampules one from the other and being shaped to provide at least one enlarged portion fractible at the adjoining narrow portion.

2. A double ampule, each ampule having a constricted neck at one end, said necks being joined together and having an enlarged intermediate portion closing one ampule from the other.

3. The method of making ampules including the steps of inserting closely positioned pairs of piston closures into a glass tube at widely spaced points and peripherally scoring the tube intermediate the closures of each pair for subsequent fracture of the glass at such scoring into ampule units.

4. The method of making ampules including the steps of inserting closely positioned pairs of

piston closures into a glass tube at widely spaced points and peripherally scoring the tube intermediate the closures of each pair for subsequent fractures of the glass at such scoring into ampule units, and constricting the glass tube medially between the widely spaced closures to form separate ampule units.

5. The method of making ampules including the steps of inserting closely positioned pairs of piston closures into a glass tube at widely spaced points and peripherally scoring the tube intermediate the closures of each pair for subsequent fracture of the glass at such scoring into ampule units, constricting the glass tube medially between the widely spaced closures to form separate ampule units, and closing each constricted portion for subsequent fracture whereby each said unit is separated into two ampule units each for independent use.

6. The method of making ampules consisting in arranging piston closures in a glass tube in pairs with the closures of each pair relatively close together and the pairs spaced apart sufficiently to provide two intermediate chambers, forming a transverse dividing wall in the tube medially between each pair of closures, filling said chambers with medicament, and scoring the tube between the closures of each pair.

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