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M. LOZIER ET AL

2,159,217

CONTROLLABLE TRANSFER ELEMENT FOR MULTIPLE AMPULES

Filed Nov. 5, 1937

2 Sheets-Sheet 1

Fig. 1

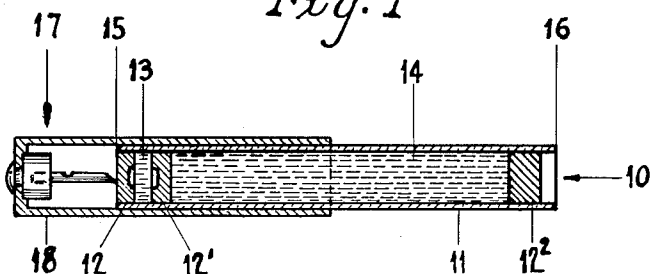


Fig. 2

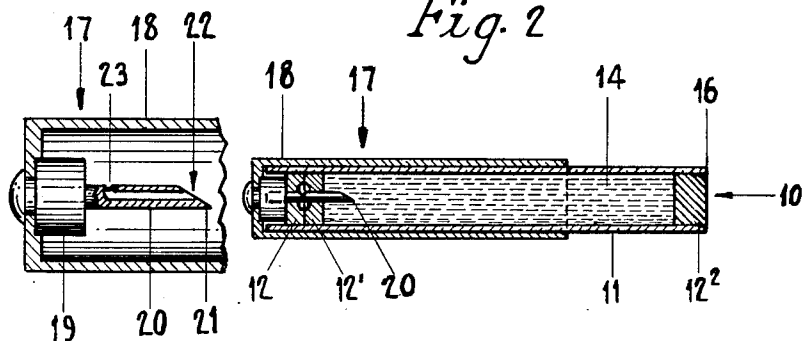
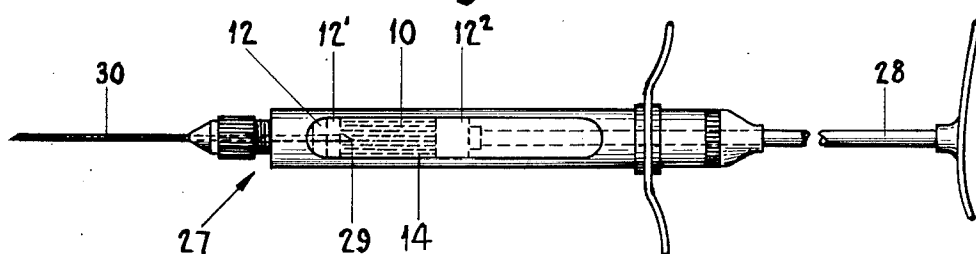


Fig. 4

Fig. 3



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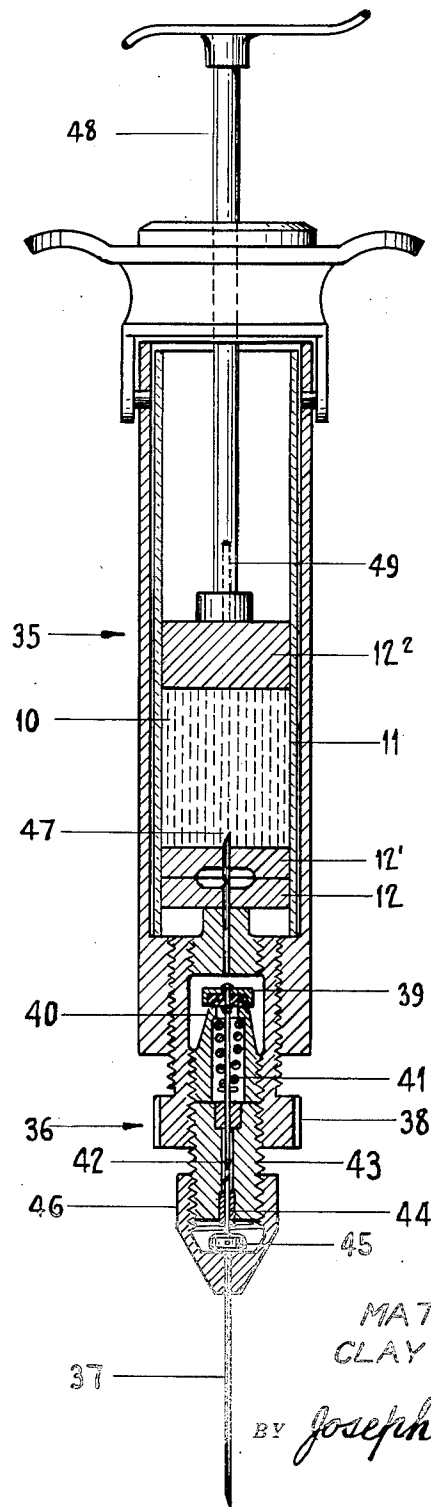


Fig. 5

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CONTROLLABLE TRANSFER ELEMENT FOR
MULTIPLE AMPULES

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Application November 5, 1937, Serial No. 172,892

3 Claims. (Cl. 128—215)

This invention relates to a multiple compartment ampule and to improved means designed for use with said ampule for transferring and expelling the contents from the ampule.

5 An object of this invention is to provide a container having separate compartments containing dissimilar ingredients, the said compartments being defined by three spaced disks of pierceable material, the two outer disks being slidably positioned in the container while the intermediate disk remains in one fixed position.

10 Another object of this invention is to provide a hypodermic syringe and a piercing element having a through channel designed to provide communication between the compartments in the said ampule when the piercing element is pushed through two adjacent disks and the said element having means to prevent the escape of the mixed fluids through the outer end of said channel during transference.

15 In our prior disclosure it was necessary to move the intermediate disk during the operation of the expulsion of the mixed liquids into the patient's tissue and to facilitate the movement of all the disks, it was necessary to lubricate the outer peripheries of the disks.

20 This lubrication together with the ever present possibility of expansion and contraction of the glass container due to variation in temperature as well as to the slight variations in the internal diameter of the container, presented a possibility of seepage around the intermediate disk from one compartment to the other which is detrimental to the use of the invention since the
25 main object of the invention is to maintain the two dissimilar liquids in hermetic separation until the moment of intermixture of the liquids by the aid of a transfer element.

To prevent the possibility of seepage we have
30 provided a new method of expulsion of the liquid contents of the ampule which does not require the movement of the intermediate disk and it is therefore not necessary to lubricate the outer periphery of said disk, whereby said disk remains
35 practically immovable.

For the expulsion of the mixture from the ampule we have provided an improved controllable transfer element which allows the passage of the mixture from the ampule directly to and through
40 a hypodermic needle into the tissue.

With the above and other objects in view, the invention will be hereinafter more particularly described in connection with the accompanying drawings and pointed out in the claims which
45 form part of this specification.

Reference will now be had to the drawings, wherein like numerals of reference designate corresponding parts throughout the several views, in which:

Figure 1 is a central longitudinal cross-sectional view of our multiple compartment ampule having three disks in predetermined spaced relation therein, and being designed for surgical or dental use, in conjunction with a transfer element having a piercing needle designed for the purpose, the ampule being shown on an enlarged scale.

Figure 2 is a cross-sectional view of the ampule after the liquid in one compartment has been transferred into the other compartment, and shows the piercing needle inserted through two adjoining disks in the ampule.

Figure 3 is a plan view of a standard hypodermic syringe in use with our multiple compartment ampule, showing the three disks in position when the liquid in the ampule has been partly discharged.

Figure 4 is an enlarged fragmentary view of the transfer element shown in Figures 1 and 2.

Figure 5 is a longitudinal cross-sectional view of an improved transfer element mounted on a hypodermic syringe which allows the passage of the two combined liquids from the ampule through a valve mechanism and directly through a hypodermic needle into the tissue.

In the illustrated embodiment of the invention the numeral 10 indicates a cross-sectional view of our double compartment ampule, comprising an elongated tubular outer member or casing 11 preferably made of glass and having three disks 12, 12¹ and 12² inserted therein. The disks are preferably made of a yieldable material such as rubber, and are of sufficiently large external diameter to frictionally engage the internal diameter of the casing 11 in sealing relation.

Figure 1 shows the ampule 10 with the disks positioned therein in spaced relation so as to form the compartments 13, 14 which may contain dissimilar liquids. The compartments 13 and 14 are hermetically sealed from each other by the disk 12¹ due to its frictional sealing engagement in the tubular member 11. It will be noted that in Figure 1 the disk 12 is positioned at or near one end 15 of the tubular member 11, and that the disk 12¹ is spaced at a predetermined distance therefrom to form the compartment 13, while the disk 12² has been positioned inwardly from the end 16 of the tubular member 11 so as to form the closed compartment 14. This position of the disk 12² between the end 16 and stopper 12¹ is governed by the length of the compartment 13.
55

The length of the open end space is substantially the same as the length of the compartment 13. The end space is essential to permit the movement of the disk 12² when the liquid in the compartment 13 is transferred into the compartment 14.

For the purpose of our invention, all the disks are positioned entirely inside the casing 11. The end disks 12 and 12² have their outer peripheries lubricated and are frictionally slidable in the casing 11. Figure 1 shows the ampule 10 with three disks of the same diameter throughout their length in the positions they occupy before the liquid in the compartment 13 has been transferred into the compartment 14.

Figure 4 shows an enlarged fragmentary portion of a transfer element 17 which may be employed for transferring the liquid in the compartment 13 into the compartment 14. The transfer element 17 comprises a casing 18 having secured thereto a collar 19 the outer diameter of which is smaller than the inner diameter of the casing 11 of the ampule 10. The collar 19 has a piercing needle 20 secured therein. The needle has a sharp and tapering end portion 21 and an axially positioned channel 22 adapted to communicate with a lateral inlet 23 in the side of the piercing needle.

Figure 2 shows a cross-sectional view of an ampule 10 placed inside the transfer element 17 and shows the piercing needle 20 inserted in the disks 12 and 12¹ and the disk 12 moved inwardly of the casing 11 and the disk 12² moved to the end 16.

Due to the sharpness of the piercing needle 20 and the frictional resistance of the disks 12, 12¹ and 12² in the casing 11, it is possible to pierce the disks 12 and 12¹ by exerting manual pressure against the end of the transfer element 17 without altering the position of said disks.

When the compartments 13 and 14 contain liquids, due to the incompressibility of the liquids, when further pressure is exerted against the transfer element 17 it will cause the disk 12 to be moved into contacting relation with the disk 12¹ and the disk 12² to move simultaneously and equally to the end 16 of the ampule 10, since the channel 22 in the piercing needle 20 connects the compartments 13 and 14 and permits transfer of the liquid from the compartment 13 into the compartment 14. It is also to be noted that both end disks 12 and 12² are movable simultaneously and equally while the intermediate disk 12¹ remains fixed during said liquid transference.

For the expulsion of the two combined liquids from the ampule 10, we may utilize an ordinary hypodermic syringe 27 in which the ampule 10 is placed with the disks 12 and 12¹ facing the inner end 29 of the hypodermic needle 30, as shown in Figure 3. The ampule 10 with the disks 12 and 12¹ in contacting relation is placed in the syringe 27 with the end 29 of the needle 30 penetrating through both of said disks and entering into the compartment 14. The plunger 28 of the hypodermic syringe 27 has been moved into the body of the syringe. The disk 12² is shown part way inside the ampule 10 and the liquid in the ampule has been partly discharged. Further movement of the plunger 28 will cause the complete discharge of the combined liquids from the compartment 14.

Figure 5 shows an enlarged cross-sectional view of a hypodermic syringe 35 having our improved controllable transfer element 36 which makes it possible to combine dissimilar liquids as well as to expel the combined liquid from the ampule 10

directly through a hypodermic needle 37 into the tissue without removing the ampule from the syringe.

The transfer element 36 comprises a metal body 38 having a valve 39 slidably mounted therein. The valve 39 is held against a seat 40 by a coil spring 41 positioned between a projection on the valve stem and an annular shoulder adjoining the valve seat. The valve 39 has a stem 42 which extends into a centrally positioned aperture in the plug 43 where it is in alignment with the inner end of the hypodermic needle, 37. The inner end of the needle extends through a sleeve 44 and is in slightly spaced relation from the end of the stem 42. The sleeve 44 is tightly driven in an aperture in the plug 43 with one end projecting outwardly from said plug to form a tight joint with a soft metal collar 45 secured to the hypodermic needle when said needle is pressed tightly against said sleeve. A housing 46 is in threaded engagement with a threaded end portion of the plug 43.

As shown, the inner end of the hypodermic needle is in slightly spaced relation from the end of the valve-stem 42 when the valve 39 is in seating relation with the seat 40.

The housing 46, in the disclosure shown, must be partly unscrewed by the user before transfer, thereby seating the valve 39 on its seat 40 and preventing the escape of the liquid through the hypodermic needle 37.

It is thus possible, by slightly rotating the housing 46 in one direction to move the hypodermic needle 37 inwardly of the syringe 35 and cause unseating of the valve 39 from the seat 40 and permit outflow of the contents of the ampule 10 through a hollow piercing needle 47 in the inner end of the body 38 and entirely through the transfer element 36 and the hypodermic needle 37. The soft metal collar 45 serves to prevent leakage through the housing 46.

It is to be noted that while we have shown a controllable transfer element 36 having a disk valve and seat, that we may utilize an ordinary ball-and-spring valve in which the ball may be unseated by the end of the hypodermic needle 37.

By using an intermediate disk 12¹ having a slightly larger diameter than the inner diameter of the casing 11 and by pressing same to its permanent position in the ampule we are enabled to secure a permanently sealed joint in which the disk has a tendency to adhere to the glass in permanent intimate union thereby preventing the moving of said disk 12¹ and securing against leakage between the two compartments.

It is also to be noted that the piercing needle 47 shown in Figure 5 is constructed with an axially positioned channel and a lateral inlet similar to the piercing needle 20, best shown in Figure 4. The axially positioned channel of the needle 47 extends entirely through said needle from end to end.

From the above description it will be seen that we have provided a transfer element 17 having a tubular casing 18 serving to centralize the ampule 10 therein during transfer. The length of the collar 19 is made equal to the length of the compartment 13 so as to expel the entire contents from said compartment. Also that by the use of the transfer element 17 we are enabled to utilize an ordinary syringe for expelling the contents of the ampule 10 into the tissue through the hypodermic needle 30. Also that we have provided a controllable transfer element 36 mounted on a hypodermic syringe 35 by the use of which it is

possible to expel the combined contents of the ampule 10 directly through a hypodermic needle into the tissue without removing the ampule from the instrument. The controllable transfer element 36 may be easily removed from the syringe 35 for sterilization or replacement.

The syringe 35 has a plunger 48 having an elongated axial aperture 49 which permits the inner end of the piercing needle 47 to enter therein when the plunger is in its maximum stroke inwardly.

Our improvements are applicable for the easy and instantaneous alkalization of local anaesthetic solutions which are ordinarily unstable. This allows for nascent alkaline anaesthetic solution to be available immediately prior to its use.

In accordance with the patent statutes we have described and illustrated two preferred embodiments of our invention, but it will be understood that various changes and modifications can be made therein without departing from the scope of the invention as defined by the appended claims.

We claim:

1. In combination with a multiple compartment ampule having two movable end disks and a permanently fixed intermediate disk, a transfer element for transferring the contents from one compartment to the other, said transfer element comprising a tubular casing having a needle mounted therein, said needle having one piercing end and a collar at the end opposite the piercing end, the said needle having a channel positioned axially thereof, said channel having inlet means laterally and intermediate the ends of said needle, said ampule having three disks in

spaced relation therein, two of said spaced disks being positioned at one end of said ampule to be successively penetrated by said piercing element, said lateral inlet means being spaced from said collar a distance substantially equal to the thickness of the end disk to be initially penetrated, one disk being positioned inwardly at one end of said ampule to form an open space outside the disk at said end, said open space being substantially filled by said inwardly positioned disk during said transference.

2. In combination with a hypodermic syringe, a transfer element having a hypodermic needle with a through passage axially thereof and having a hollow piercing needle, said hypodermic needle being in spaced relation from said piercing needle and being operatively connected with an end of said piercing needle, said transfer element having a spring actuated valve for closing the passage, said transfer element having a threaded end portion, said hypodermic needle having a collar fixed thereto, and a hollow threaded member housing said hypodermic needle and being in threaded engagement with said threaded end portion whereby rotation of said housing in one direction will cause the said hypodermic needle to move said valve from its seat to permit outflow of the contents of said ampule.

3. The invention as defined in claim 1, wherein said tubular casing is integral and concentric with said piercing needle and said collar to centralize said ampule in said transfer element during said transference.

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