

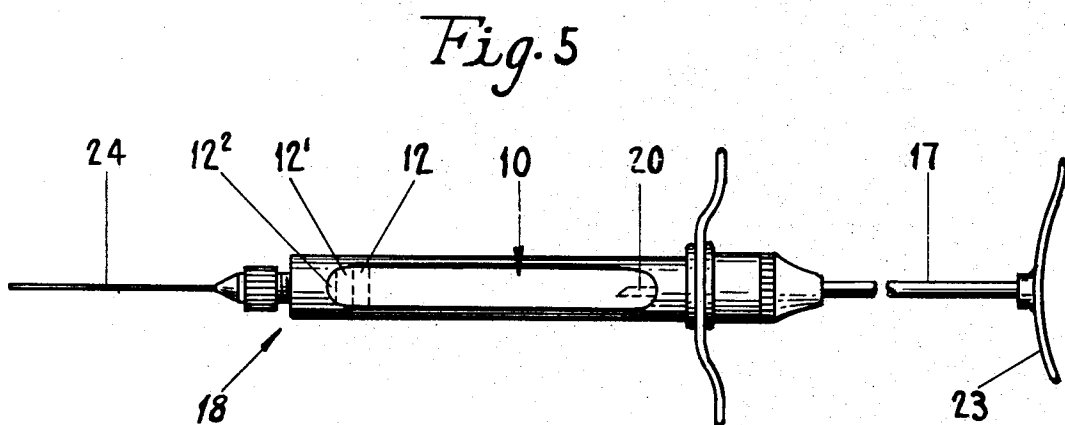
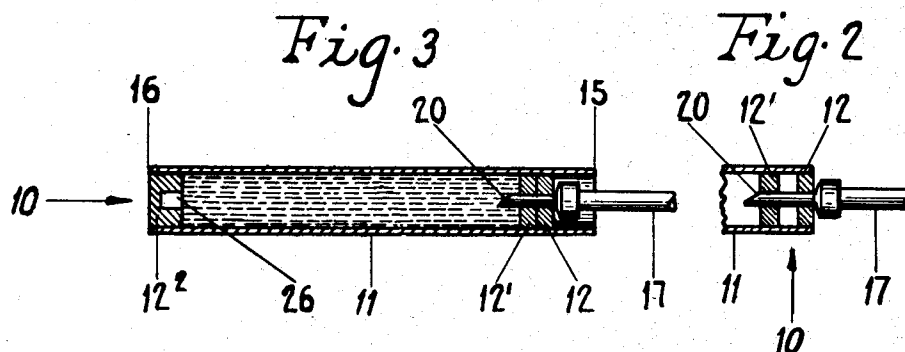
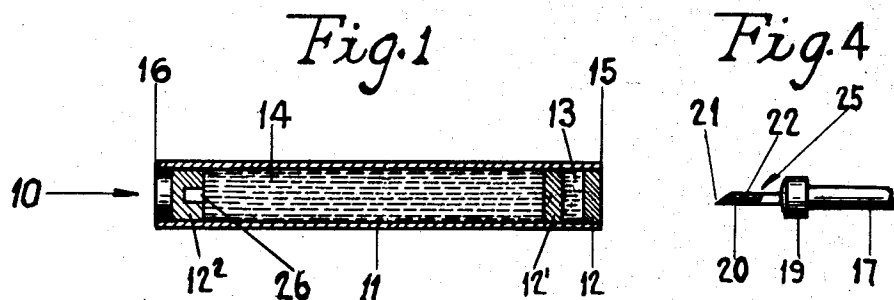
May 3, 1938.

M. LOZIER ET AL

2,115,731

MULTIPLE COMPARTMENT AMPULE AND HYPODERMIC SYRINGE

Filed Feb. 4, 1937



MATTHEW LOZIER
CLAYTON H. FROST
INVENTORS

BY *Joseph Blaeker*
ATTORNEY

UNITED STATES PATENT OFFICE

2,115,731

MULTIPLE COMPARTMENT AMPULE AND
HYPODERMIC SYRINGE

Matthew Losler, Brooklyn, N. Y., and Clayton H. Frost, Union, N. J., assignors, by direct and mesne assignments, to Cook Laboratories, Inc., New York, N. Y., a corporation of Delaware

Application February 4, 1937, Serial No. 124,010

8 Claims. (Cl. 128—215)

This invention relates to a multiple compartment ampule and to a hypodermic syringe designed for use with said ampule.

5 An object of this invention is to provide a container having separate compartments containing dissimilar ingredients, the said compartments being defined by spaced stoppers of pierceable material and which are slidably positioned in the container.

10 Another object of this invention is to provide a multiple compartment ampule which may be inserted into a hypodermic syringe for surgical or dental use.

15 Another object of this invention is to provide a hypodermic syringe having a plunger with a piercing element, the said element having a channel designed to provide communication between the compartments in the said ampule when the piercing element is pushed through adjacent stoppers.

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

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

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

40 Figure 2 is a cross-sectional view of a fragmentary portion of the ampule with the piercing element inserted in two adjoining disks therein and with the said disks remaining in the position shown in Figure 1.

45 Figure 3 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 element inserted through two adjoining disks in the ampule.

50 Figure 4 shows a fragmentary portion of a slidable plunger having the piercing element and forming part of a hypodermic syringe shown in Figure 5.

55 Figure 5 is a plan view of a hypodermic syringe adapted for use with our multiple compartment ampule, showing all the disks in position when the liquid in the ampule has been

discharged and shows the piercing element withdrawn.

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 a plurality of disk-shaped stoppers 12, 12¹ and 12² inserted. The stoppers 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 tubular member 11 in sealing relation.

Figure 1 shows the ampule with the stoppers positioned therein in spaced relation so as to form two compartments 13, 14, which may contain dissimilar liquids and is hermetically sealed from each other by the disks 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 the stopper 12¹ is governed by the length of the compartment 13. 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 stoppers must be positioned entirely inside and frictionally slidable in the tubular member 11. Figure 1 shows the ampule 10 with three stoppers or disks of the same diameter throughout their length positioned before the liquid in the compartment 13 has been transferred into the compartment 14.

Figure 2 shows a fragmentary portion of an ampule 10 having the piercing element 20 of a hypodermic syringe plunger inserted in the disks 12 and 12¹.

Figure 3 shows a cross-sectional view of an ampule 10 having the piercing element 20 inserted in the disks 12 and 12¹ and the said disks moved inwardly of the casing 11.

Figure 4 shows a fragmentary portion of the plunger 17 forming part of the hypodermic syringe 18 shown in Figure 5. It will be noted that the head 19 of the plunger 17 has secured thereto a hollow piercing element 20 having a sharp

and tapering end portion 21 and an axially positioned channel 22 adapted to communicate with an aperture 25 in the side of the element 20.

As will be seen from Figures 1 and 4 the aperture 25 is positioned from the head or collar 19 a distance substantially equal to the thickness of the end disk 12.

Due to the sharpness of the piercing element and the frictional resistance of the disks 12, 12¹ and 12² in the tubular member 11, it is possible to pierce the stoppers or disks 12 and 12¹ by exerting manual pressure against the handle 23 of the plunger 17 without altering the position of the said disks. It is to be noted that the piercing element 20 may also be utilized independently of the plunger of the hypodermic syringe 18.

When the compartments 13 and 14 contain liquids, due to the incompressibility of the liquids, when further pressure is exerted against the plunger 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 element 20 connects the compartments 13 and 14 and permits transfer of the liquid from the compartment 13 into the compartment 14. It is 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.

Further outer movement of the disk 12² is prevented by the front inner end of the hypodermic syringe 18 in which the ampule 10 may be confined during the transferring operation.

Further movement of the plunger 17 will cause the discharge of the combined liquids from the compartment 14 when the inner end of a hypodermic needle 24 passes through the disk 12².

As shown in Figure 1, the disk 12² has a cavity 26, to permit the piercing element to enter therein and thus allow the disk 12¹ to get into substantially contacting relation with the disk 12² in the position when the element 17 has already passed through the disks 12 and 12¹ and the ampule has been discharged of its liquids.

It is to be noted that while it is preferable to provide a cavity in the disk 12², as above mentioned, it is possible for the ampule to be operable when the disk 12² is without a cavity. Also when the disks 12 and 12¹ are provided with cavities similar to cavity 26.

It is to be noted that when the compartments 13 and 14 contain liquids, that all three separators will move during the discharging operation. However, when one of the ingredients is in powder form or semi-solid form only two of the separators will be moved.

It is also to be noted that while we have disclosed separators in solid disk form and also in a form showing a cavity in the disk, that, these separators may take the form of cup washers (not shown).

It is also to be noted that the gist of our invention is to make it possible to bring dissimilar materials confined in separated compartments into contacting relation. As shown in Figure 1, the separated compartments 13 and 14 are in one casing 11; it is, however, within the scope of our invention to house the dissimilar materials in independent casings and to join them into operative relation (not shown) so as to carry out the objects of our invention which are carried out in the embodiment shown.

In accordance with the patent statutes we have

described and illustrated the preferred embodiment 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 a multiple compartment ampule of the class described comprising a tubular outer member and three spaced disks frictionally secured in sealing relation therein to form separated liquid compartments hermetically sealed from each other, said disks being at least partially centrally intact and being pierceable, all of said disks being of the same diameter throughout their length and being entirely inside said tubular member, two of said disks being in closely spaced relation at one end and one of said disks being positioned inwardly of the opposite end to form an open space at said end, the length of said end space being substantially the same as the distance between said closely spaced disks, said end space being substantially filled by said inwardly positioned disk by outward movement thereof to permit transference of the liquid from the compartment between said closely spaced disks into the lengthened adjacent compartment when said closely spaced disks are successively perforated, both end disks being movable simultaneously and equally while the intermediate disk remains fixed during said liquid transference.

2. A multiple compartment ampule having a plurality of disks and being adapted for use in a syringe having two needles for piercing the disks from opposite ends of said ampule, comprising a tubular outer member and three spaced disks frictionally secured in sealing relation therein to form separated compartments hermetically sealed from each other, two of said disks being respectively positioned substantially at the ends of said tubular member and one of said disks being positioned in spaced relation between said end disks, one of said end disks being at one end of said tubular member and the other end disk being positioned inwardly of the opposite end to form an open space at said end, said open space being substantially closed by said inwardly positioned disk during operation of said ampule.

3. A multiple compartment ampule of the class described, comprising a tubular outer member and three spaced disks frictionally secured in sealing relation therein to form separated compartments hermetically sealed from each other, all of said disks being pierceable and normally imperforate, all of said disks being of the same diameter throughout their length and being entirely inside said tubular member, two of said disks being in closely spaced relation at one end and one of said disks being positioned inwardly of the opposite end to form an open space at said end, the length of said end space being substantially the same as the distance between said closely spaced end disks, said end space being substantially filled by outward movement of said inwardly positioned disk during said transference when said closely spaced disks are successively perforated, both end disks being movable simultaneously and equally while the intermediate disk remains fixed during said liquid transference.

4. A multiple compartment ampule having a plurality of disks and being adapted for use in a syringe having two needles for piercing the disks from opposite ends of said ampule, comprising a tubular outer member and a plurality of spaced disks frictionally secured in sealing rela-

tion therein to form separated compartments hermetically sealed from each other, all of said disks being of the same diameter throughout their length and being entirely inside said tubular member, two of said disks being in close relation at one end and one of said disks being positioned inwardly of the opposite end to form an open space outside the disk at said end, said open space being substantially filled by said inwardly positioned disk during operation of said ampule, and said disk having a cavity in one face thereof.

5. In combination with a multiple compartment ampule of the class described, a hypodermic syringe plunger having a piercing element at one end and said element having a channel positioned lengthwise thereof, one end of said channel being open laterally of said piercing element and the other end of said channel being open at one end of said piercing element, said element having one piercing end, said ampule having three disks in spaced relation therein and one of said disks being positioned inwardly at one end to form an open space outside the disk at said end, said open space being substantially filled by said inwardly positioned disk during operation of said ampule.

6. In combination with a multiple compartment ampule of the class described, said ampule having three disks in spaced relation therein, a hypodermic syringe plunger having a piercing element at one end, two of said spaced disks being positioned at one end of said ampule to be successively penetrated by said piercing element, said element having a channel positioned axially thereof, said channel having inlet means laterally and intermediate the ends of said piercing element and having an outlet at one end of said

element, a collar fixed to 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.

7. In combination with a multiple compartment ampule of the class described, a piercing element having one piercing end and a collar at the end opposite the piercing end, said element having a channel positioned axially thereof, said channel having inlet means laterally and intermediate the ends of said element, 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 operation of said ampule.

8. A multiple ampule having a plurality of disks and being adapted for use in a syringe having two needles for piercing the disks from opposite ends of said ampule, comprising tubular outer confining means and a plurality of spaced separators frictionally secured in sealing relation in said confining means to form separated compartments hermetically sealed from each other, all of said separators being of the same diameter throughout their length and slidable in said tubular confining means throughout its length.

MATTHEW LOZIER.
CLAYTON H. FROST.