

June 8, 1954

S. L. FOX
HYPODERMIC UNIT

2,680,440

Filed March 27, 1951

2 Sheets-Sheet 1

Fig. 1.

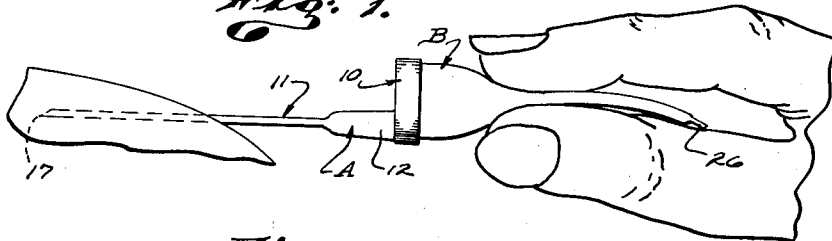


Fig. 2.

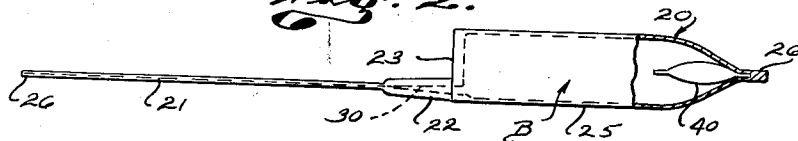


Fig. 3.

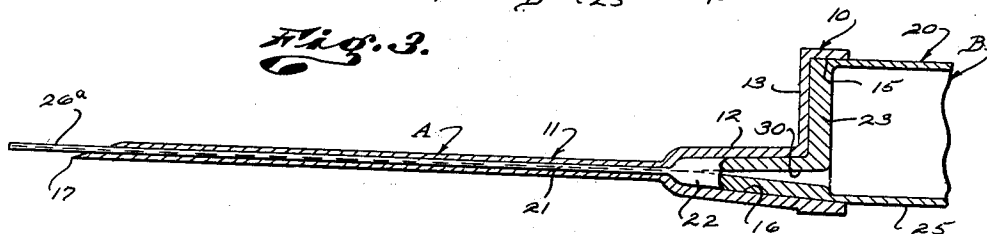


Fig. 4.

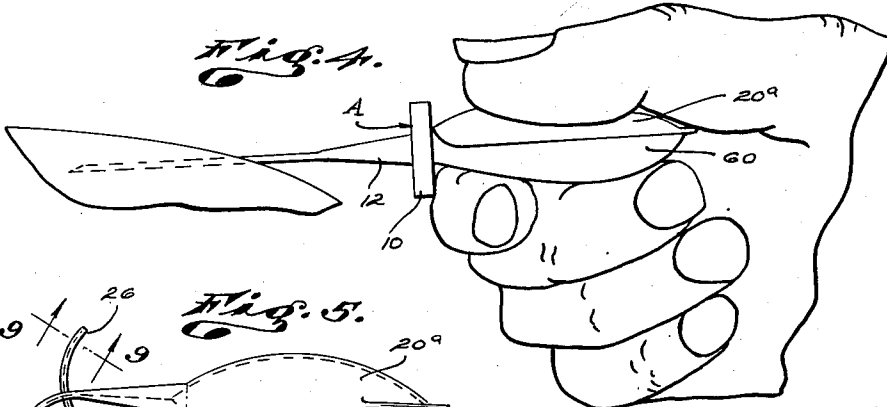


Fig. 5.

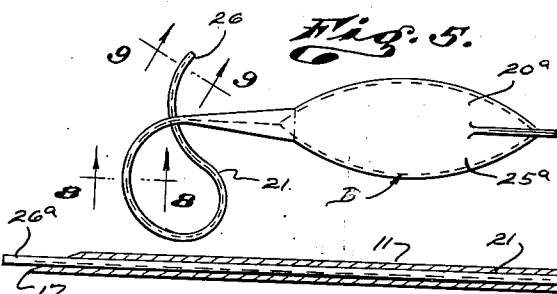


Fig. 6.

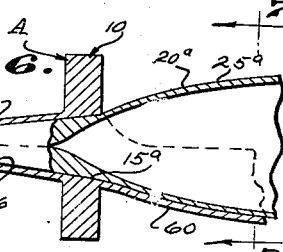


Fig. 7.

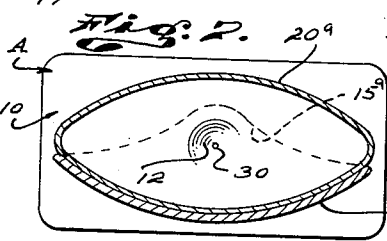


Fig. 8.



Fig. 9.



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Fig. 10.

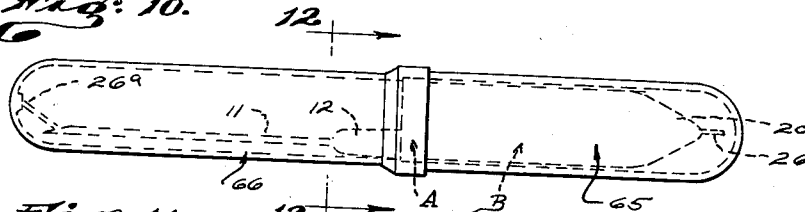


Fig. 11.

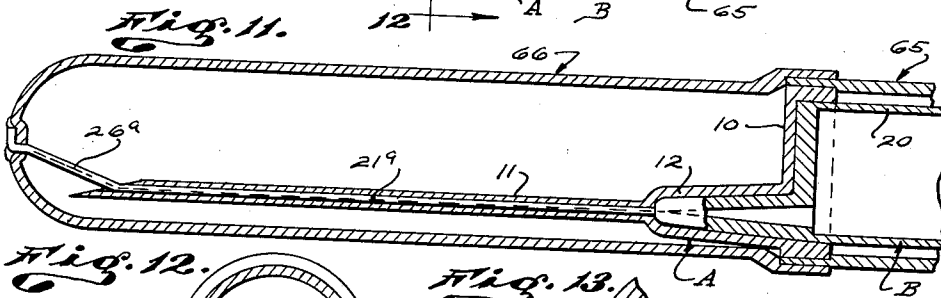


Fig. 12.

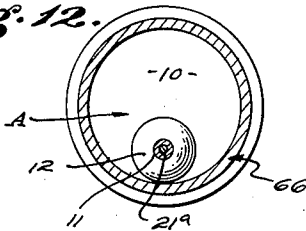


Fig. 13.

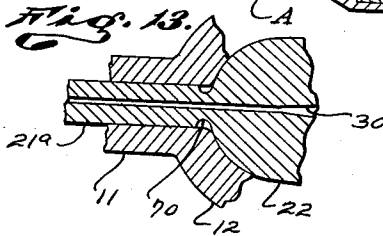


Fig. 14.

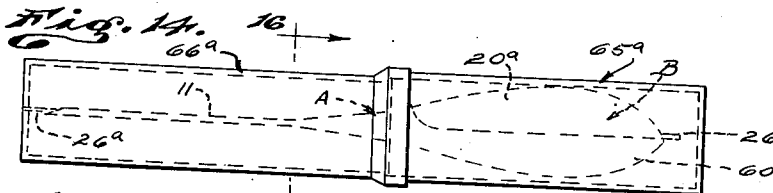


Fig. 15.

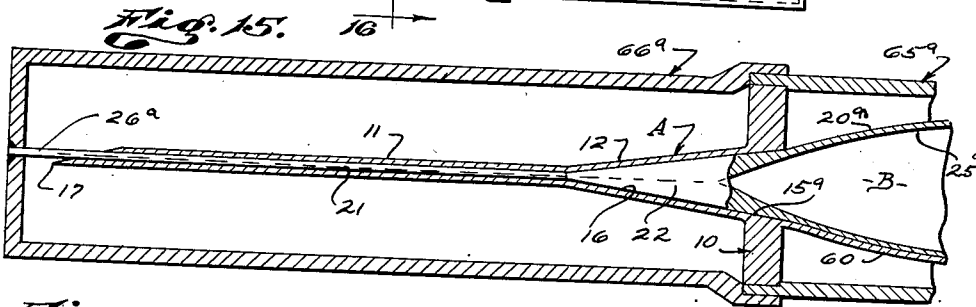


Fig. 16.

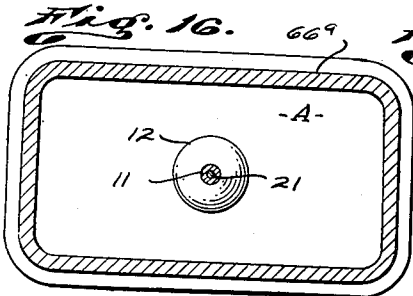
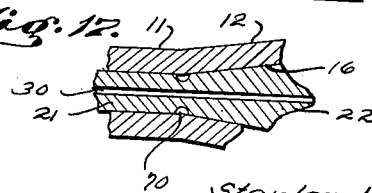


Fig. 17.



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Application March 27, 1951, Serial No. 217,752

16 Claims. (Cl. 128—216)

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This invention relates to a fluid handling device or hypodermic unit and is more specifically concerned with a device useful for taking fluid samples or as a hypodermic injector adapted to handle fluids or medicaments of various kinds. It is a general object of the present invention to provide a device of the character mentioned which is exceedingly simple and inexpensive of manufacture and at the same time simple and practical to use, and such as to be effective in taking a sample of fluid or to be used to carry a body or supply of material ready for use whenever desired and yet separated from or maintained out of contact with the needle or other like parts of the device.

It is a general object of this invention to provide a device of the general character referred to characterized by two elements, preferably unitary, one in the form of an applicator and the other a fluid carrier, the applicator having a tubular hollow needle and the carrier having a stem engaged in and normally occupying the passage through the needle. With the construction that I have provided the needle can be used to enter a body or object and pass fluid therefrom into the carrier which then serves to draw such fluid through the needle and hold it when received.

Another object of this invention is to provide a device of the general character mentioned in which the stem of the fluid carrier is integral with a cell portion that normally carries the supply of fluid and has a tubular part engaged in the needle and sealed at its outer or terminal end, which is adapted to be detached or severed when the device is made ready for use.

Another object of the invention is to provide a structure of the general character referred to in which the stem portion of the fluid carrier engaged in the needle is joined to the cell portion of the fluid carrier by a coupling subject to being broken, as by tension applied to the end of the stem that projects from the forward or pointed end of the needle.

Another object of the invention is to provide a device of the general character referred to wherein the applicator unit or element has a head cooperating with the cell or collapsible portion of the fluid carrier and serving to support the cell in a manner to assure and facilitate proper operation or collapsing of the cell, as by squeezing between the fingers of a person using the device.

It is a further object of the invention to provide a device of the general character referred to in which the assembly formed by the applicator and fluid carrier is effectively enclosed and

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sealed by a case, an element of which may, if desired, be employed as a medium by which pressure is applied to cause collapsing of the cell of the fluid carrier.

The device that I have provided although useful both for receiving and holding fluids and for carrying and applying fluids will be described in detail in the latter connection. It is believed that the other or reverse operation of the structure will be apparent from the details that I set forth.

The device of the present invention involves generally two principal elements, namely, an applicator and a fluid carrier, and it may further include a case applied to or combined with these elements. The applicator is preferably a unit formed of metal or the like, and is characterized by a head from which a tubular needle projects. In a preferred form the head has a forwardly projecting socket portion that carries the needle, and it may have an extension forming a cup-like holder for the collapsible element or cell of the fluid carrier. The fluid carrier is preferably a unit formed of a so-called plastic material which is deformable or somewhat flexible in nature and which has characteristics making it useful in this particular situation. The fluid carrier is characterized by a collapsible cell, preferably elongate in form, and the forward end of the cell, which is adapted to seat or engage in the head of the applicator, is provided with a forwardly projecting stem that extends through the needle of the applicator. Where the applicator has a forwardly projecting socket carrying the needle the carrier has a projecting neck that seats in the socket, and the stem projects forward from the neck. The stem projects from the forward end of the needle and it may be tubular except where it is sealed or closed to provide against passage or leakage of fluid until such time as the stem has been operated as by cutting away the forward end portion, or by parting it from the neck by the application of tension. When a case is provided it is preferably sectional and has a rear section that completely encloses or encases the cell portion of the fluid carrier, the forward open end of this rear section being such as to receive and tightly embrace the head of the applicator. Such a case section may be made detachable from the head of the applicator rendering the cell directly engageable by the hand of the user, or it can be tight or sealed to the head and made in part or wholly collapsible, so that it can be operated in a manner to create pressure upon the cell within it and thereby

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cause the cell to be flexed or collapsed in a manner to force the contents therefrom. The structure may be employed so that the case section is collapsed to in turn collapse the cell within it whereupon release of the case section will allow it to return to its original shape and reduce pressure on the cell so that material is, in effect, drawn into the cell. The case further includes a front or forward section which completely encloses or houses the forwardly projecting needle portion of the applicator, and this section of the case preferably receives the forward end of the rear section to which it can be tightly fitted or possibly sealed, if desired. When a front or forward cap section is employed the forward projecting end of the stem of the fluid carrier can be anchored or fixed to this cap section so that when the cap section is removed the stem is put under tension and withdrawn in the desired manner.

The various objects and features of my invention will be fully understood from the following detailed description of typical preferred forms and applications of the invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a view illustrating a device of the present invention in the course of being used, the cell of the device being shown partially collapsed and the needle engaged in a typical manner. Fig. 2 is a side elevation of the fluid carrier provided by the present invention, showing it apart from the case and applicator, a portion of the cell being broken away to show in section. Fig. 3 is an enlarged longitudinal detailed sectional view of a form of applicator showing the fluid carrier in connection therewith. Fig. 4 is a view similar to Fig. 1, illustrating a somewhat different form of construction where the applicator has an extension affording support for the collapsible portion of the fluid carrier. Fig. 5 is a view of the fluid carrier shown in Fig. 4, showing it separated from the applicator. Fig. 6 is a longitudinal detailed sectional view of a portion of the structure shown in Fig. 4, and showing the structure before being prepared for use. Fig. 7 is a transverse sectional view taken as indicated by line 7-7 on Fig. 6. Fig. 8 is an enlarged detailed sectional view taken as indicated by line 8-8 on Fig. 5. Fig. 9 is an enlarged detailed sectional view taken as indicated by line 9-9 on Fig. 5. Fig. 10 is a side elevation of an embodiment of the invention such as is shown in Fig. 1, wherein the structure is carried in a case, the case being shown in elevation. Fig. 11 is an enlarged detailed sectional view of a portion of the structure shown in Fig. 10. Fig. 12 is an enlarged detailed transverse sectional view taken as indicated by line 12-12 on Fig. 10. Fig. 13 is an enlarged detailed view of a portion of the structure shown in Fig. 11. Fig. 14 is a view similar to Fig. 10 showing the device illustrated in Fig. 4 carried in a case. Fig. 15 is an enlarged detailed sectional view of a portion of the structure shown in Fig. 14. Fig. 16 is an enlarged detailed transverse sectional view taken as indicated by line 16-16 on Fig. 14, and Fig. 17 is an enlarged detailed view of a portion of the structure shown in Fig. 15.

Referring first to the form of the invention shown in Figs. 1 to 3, inclusive, the structure includes, generally, two principal elements or units, one an applicator A and the other a fluid carrier B. The applicator A in this case is such

that it can be advantageously formed of metal and it is characterized by a head 10 and a needle 11 carried by and projecting forward from the head. In the particular case illustrated the needle is an elongate tubular element and it projects forwardly from a socket portion 12 that projects forward from the main portion 13 of the head. In this particular case the main portion 13 of the head 10 is round and substantially disc-shaped in form, and an opening 15 enters it from its rear side to receive the forward end of the collapsible cell of element B. The socket portion 12 projects a suitable distance forward from the portion 13 and has a socket opening 16 somewhat forwardly convergent in form. The socket portion 12 is preferably integral with the main portion 13 and the needle 11 is preferably integral with the socket portion 12. The needle is of the desired form and length and at its forward end it is dressed or beveled away so that it presents a sharp end or point 17.

The element or unit B has a collapsible cell portion 20, and a stem 21 is connected with and projects forward from the cell 20. In the case illustrated a neck 22 is joined to and projects forward from the front end 23 of the cell 20 and the stem 21 is joined to and projects forward from the neck. The cell portion 20 is characterized by a tubular body 25 closed at its rear end as by being pinched together and sealed at 26, and the front end of the wall 23 at the forward end of the cell 20 closes the body 25 and this portion of the cell is adapted to seat or fit into the opening 15 provided in the head 10. The neck 22 is preferably an integral extension or projection on the end 23 and seats in the opening 16 in the socket 12, and the stem 21 continues from the neck through the needle 11 to have a terminal end portion 28 projecting forward from or beyond the pointed end 17 of the needle. In the particular case illustrated an opening 30 formed longitudinally through the neck 22 is in communication with the body 25 of the collapsible cell and the stem 21 is hollow or tubular, except at the forward end portion 28 where it is closed or sealed so that no fluid can escape therefrom.

With the construction just described the material to be handled can be filled into the collapsible cell 20, whereupon the cell can be sealed or closed at 26 in any suitable manner. It is desirable, generally, to form the unit B, just described, of a so-called plastic, such as polyethylene or polyvinyl as such materials are recognized as having physical characteristics or properties lending themselves for use in a device of the character under consideration. In such case the seal at 26 can be effected by the application of heat and pressure, and the wall of body 25 can be made of such thickness as to have the desired strength and yet be subject to deformation or flexure necessary for exertion of the desired pressure on the material in the cell.

It is desired that more than one material be handled or carried by the cell and that the materials be kept separate, one or more fracturable envelopes 40 can be located within the cell 20 in the manner illustrated in Fig. 2 of the drawings. In this case the envelope 40 carrying a second material may be formed of a thin-walled sheet that will fracture under suitable pressure. Any such envelope of material may be loose or free or, as shown, it may be anchored or secured in a predetermined position in the cell by having a portion held at 25 where the rear end portion of the cell body 25 is sealed. It is to be under-

stood, of course, that such secondary container or envelope 40 need not be incorporated in the construction unless circumstances so require.

With the construction just described the carrier or unit B can be easily formed as by extrusion, drawing or molding or a combination of such operations, and it will be apparent how it can be advantageously filled and sealed so that the material applied thereto is completely confined and held out of contact with anything other than the material of the unit B. When the material is required to be injected the stem can be slid through the needle 11 and the forward end 23 of the cell 20 can be seated in the head 10. To open the structure so that the material can be discharged from the collapsible cell the stem can be engaged by the closed projecting end portion 26 and can be pulled forward somewhat from the needle, the material of the stem being such as to stretch enough to allow for such action. The stem can then be broken or cut at a point to remove the closed or sealed portion 26, whereupon the needle can be inserted wherever desired and the cell 20 collapsed, causing the material therein to be forced out through the stem and needle.

In the form of the invention shown in Figs. 4 to 9, inclusive, the structure is essentially the same as that above described, except that the opening 15^a in the head 10 of the applicator merges with the opening 16 in the socket portion 12 of the applicator and the unit B is shaped and proportioned at the forward end of the collapsible cell 20^a so that it fits into the openings 15^a and 16, as clearly shown in Fig. 6 of the drawings. The cell 20^a in this case is formed of a body 25^a, the wall of which may be thin or fragile, and in the particular case illustrated it is shown flattened transversely and tapered or converging toward its ends. The head 10 of the indicator in this case has a rearward extension 60 which is shell or cup-shaped and is so shaped and proportioned that the collapsible cell 20^a, or at least about one-half thereof, seats or rests in it, as clearly shown in the drawings. In other particulars the structure shown in Figs. 4 to 9, inclusive, may be substantially like the structure shown in Figs. 1 to 3, and it will be apparent that the action of the structure is substantially the same as that above described, except that the extension 60 of the head 10 affords support for the collapsible cell and gives the user a rigid part or handle that facilitates insertion of the needle and, further, affords support for the collapsible cell making it possible to form this portion of the element B with a thin or delicate wall that might be impractical in the case of the structure first described.

It is to be noted that in the form of the invention shown in Figs. 4 to 9, inclusive, the forwardly projecting socket 12 and the parts passed or accommodated thereby are located centrally of the longitudinal axis of the device, whereas in the form of the invention shown in Figs. 1 to 3 the socket 12 and the parts passed or accommodated thereby are on an axis centrally offset from the longitudinal axis of the collapsible cell 20. It will be apparent that either the central or offset arrangement can be used with either form of construction.

In the form of the invention shown in Figs. 10 to 13, inclusive, a structure such as is shown in Figs. 1 to 3 is provided with a case, and the stem 21^a in this case is slightly different from that above described. The case, when employed,

preferably involves sections such, for example, as a rear section 65 and a front section 66. The rear section 65 is preferably shaped and proportioned to completely enclose or house the entire assembly of unit B from the head 10 to the rear end of the collapsible cell. In the case illustrated the open forward end of the case 65 snugly or tightly receives the head 10 of the applicator so that the case section 65 is, in effect, supported by or from the head 10 and projects rearwardly therefrom to encase or house the collapsible cell 20. If desired the head 10 can be tightly fitted into the forward open end of case section 65 or may even be sealed therewith, and the case section 65 may be provided with a portion or may be formed as a whole so that it can be collapsed by the application of pressure from the exterior thereof, to the end that the structure can be operated without removal of the case section 65 and by the mere application of pressure to the case section 65.

It will be understood how the pressure applied to case section 65, causing it to collapse will, in turn, cause collapse of the collapsible material-carrying cell within the case section. Through this construction the collapsible cell 20 of unit or element B may be of thin walled or delicate construction, such as would not be safe to employ in a case where it is intended to be directly engaged and operated, as in the cases illustrated in Figs. 1 and 4 of the drawings.

The front section 66 of the case encloses or houses the needle 11 and it may be such that its open rear end receives the forward end portion of the rear section 65. These parts can be slidably engaged or snugly fitted together and, if desired, a suitable seal can be established between the case sections so that the structure formed by units A and B, when once sterilized and housed in the case, remains in condition for use and will need no further sterilization. When a forward or front case section 65 is used, as shown in Figs. 10 to 13, the stem 21^a of the unit B may have its forwardly projecting end portion 26^a fixed or anchored to the forward end portion of the case section 66 and the stem can be provided with a weakened point or break joint 70, so that when the case section 65 is removed or disengaged by moving it forward from or over the needle, the stem 21^a is pulled out and broken away, leaving the needle open and the structure ready for immediate operation. The break joint or weakened point 70 may be formed or established at any point along the length of the stem 21^a that is within the needle. In the particular case illustrated and as shown in Fig. 13, the break joint 70 is shown at the point where the stem 21^a joins or connects to the neck 22 which is engaged in the socket 12. In this case when the stem is removed, as by removal of the case section 66, the needle is left completely open or unoccupied by the stem. It is to be understood, of course, that if desired a break joint, such as the structure shown at 70 in Fig. 13, can be incorporated in the stems shown on sheet 1 of the drawings so that by mere pulling on the end portion 26 the stem breaks at any desired point lengthwise thereof.

In the form of the invention illustrated in Figs. 14 to 17, inclusive, a structure of the form shown in Figs. 4 to 9, inclusive, is provided with a case, the case being formed of a rear section 65^a and a front section 66^a. The case sections 65^a and 66^a may be essentially the same as those shown in Figs. 10 to 13, inclusive, except that they are

preferably varied in cross-sectional configuration to suitably accommodate the particular or peculiar shape of the structure shown in Figs. 4 to 9, inclusive.

It will be apparent that when either of the structures above described is to be used to receive a sample or body of fluid, the cell is collapsed, either directly or by operation of the case section engaged over it, and the needle is inserted. As the cell is freed or is expanded the fluid will fill into the cell.

Having described only typical preferred forms and applications of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art and fall within the scope of the following claims.

Having described my invention, I claim:

1. A device of the character described including, two elements, one an applicator having a head and a tubular needle carried by and projecting from the head, and the other a continuous integral unit including a fluid carrier supported by the combined needle and head and having a sealed collapsible cell portion carrying a supply of fluid and a stem projecting from the cell and slidably engaged through the needle, the stem being held by a break joint and adapted to be removed by withdrawal from the forward end of the needle.

2. A device of the character described including, two elements, one an applicator having a head and a tubular needle carried by and projecting from the head, and the other a continuous integral unit including a fluid carrier supported by the combined needle and head and having a sealed collapsible cell portion carrying a supply of fluid and a tubular stem projecting from the cell and slidably engaged through the needle to project from the forward end thereof, the projecting portion of the stem being closed and being severable so the forward end of the needle is unobstructed and delivers fluid passed by the stem.

3. A device of the character described including, two elements, one an applicator having a head and a tubular needle carried by and projecting from the head, and the other a continuous integral unit including a fluid carrier supported by the combined needle and head and having a sealed collapsible cell portion carrying a supply of fluid and a stem projecting from the cell and slidably engaged through the needle, the stem being connected to the cell by a part forming a break and being adapted to be removed from the needle and to open the cell by withdrawal from the forward end of the needle following breaking of said part.

4. A device of the character described including, two elements, one an applicator having a head and a tubular needle carried by and projecting from the head, and the other a continuous integral unit forming a fluid carrier engaging the head and having a sealed collapsible cell portion carrying a supply of fluid and a stem fixed to and projecting from the cell and slidably engaged through the needle, the head having a portion supporting the carrier.

5. A device of the character described including, two elements, one an applicator having a head and a tubular needle carried by and projecting from the head, and the other a continuous integral unit forming a fluid carrier having a sealed collapsible cell portion carrying a supply

of fluid and engaged with the head and a stem anchored to and projecting from the cell and slidably engaged through the needle, the head having a rearwardly facing opening receiving and supporting the forward end portion of the cell.

6. A device of the character described including, two elements, one an applicator having a head and a tubular needle carried by and projecting from the head, and the other a continuous integral unit forming a fluid carrier having a sealed collapsible cell portion carrying a supply of fluid and engaged with the head and a stem anchored to the cell and projecting from the cell and slidably engaged through the needle, the head having a rearwardly projecting extension supporting the cell.

7. In combination, an applicator including, a head, a tubular needle rigid with and projecting forward from the head, a collapsible fluid carrying cell, a stem projecting forward from the cell and through the needle and severable to free the needle for passage of fluid from the stem, and a case including a section engaged with the head and encasing the cell.

8. In combination, an applicator including, a head, a tubular needle rigid with and projecting forward from the head, a collapsible fluid carrying cell, a stem projecting forward from the cell and through the needle and severable to free the needle for passage of fluid from the stem, and a case including a section engaged with the head and encasing the cell, said case section being deformable to communicate collapsing pressure to the cell.

9. In combination, an applicator including, a head, a tubular needle rigid with and projecting forward from the head, a collapsible fluid carrying cell, a stem projecting forward from the cell and through the needle and severable to free the needle for passage of fluid from the stem, and a case including a section tightly engaged with the head and completely enclosing the cell.

10. In combination, an applicator including, a head, a tubular needle rigid with and projecting forward from the head, a collapsible fluid carrying cell, a stem projecting forward from the cell and through the needle and severable to free the needle for passage of fluid from the stem, and a case including a rear section engaged with the head and encasing the cell, and a front section engaged over and encasing the needle.

11. In combination, an applicator including, a head, a tubular needle rigid with and projecting forward from the head, a collapsible fluid carrying cell, a stem projecting forward from the cell and through the needle and severable to free the needle for passage of fluid from the stem, and a case including a rear section engaged with the head and encasing the cell, and a front section engaged over and encasing the needle, the rear end portion of the front section being engaged with the forward end portion of the rear section.

12. A device of the character described including, two elements, one a substantially rigid applicator having a tubular needle portion and the other a continuous integral unit forming a fluid carrier having a flexible portion defining a sealed collapsible cell carrying a supply of fluid, the carrier having a stem projecting from the cell and slidably engaged through the needle portion, the cell having a material carrying envelope therein, the envelope being of friable material and adapted to be fractured by manual force communicated thereto through the cell.

13. A device of the character described includ-

ing, two elements, one a substantially rigid applicator having a tubular needle portion, and the other a continuous integral unit including a fluid carrier having a sealed collapsible cell portion carrying a supply of fluid and a stem anchored to the cell and projecting from the cell and slidably engaged through the needle portion of the applicator.

14. A device of the character described including, two elements, one an applicator having a head and a tubular needle carried by and projecting from the head, and the other a continuous integral unit including a fluid carrier supported by the combined needle and head and projecting from the head, and having a sealed collapsible cell portion carrying a supply of fluid and a stem projecting from the cell and slidably engaged through the needle, the stem being tubular and having a closed portion severable to facilitate feed of fluid from the needle by application of pressure to the cell.

15. A device of the character described including, two elements, one an applicator having a head and a tubular needle carried by and projecting forward from the head, and the other a continuous integral unit forming a fluid carrier having a sealed elongate collapsible cell portion carrying a supply of fluid and engaged with the head and a stem projecting forward from the cell and slidably engaged through the needle, the head having an extension defining a cell receiving opening, the center of which is spaced from the longitudinal axis of the needle.

16. A device of the character described including, two elements, one a substantially rigid appli-

cator having a head and a tubular needle carried by and projecting from the head, and the other a continuous integral unit forming a fluid carrier having a flexible portion defining a sealed collapsible cell adapted to carry a supply of fluid and adapted to engage the head, said other element including a stem projecting from the cell defining portions and slidably engaged through the needle, the cell having a material carrying envelope anchored in the rear end portion thereof, the envelope being of friable material and adapted to be fractured by manual force communicated thereto through the cell.

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