

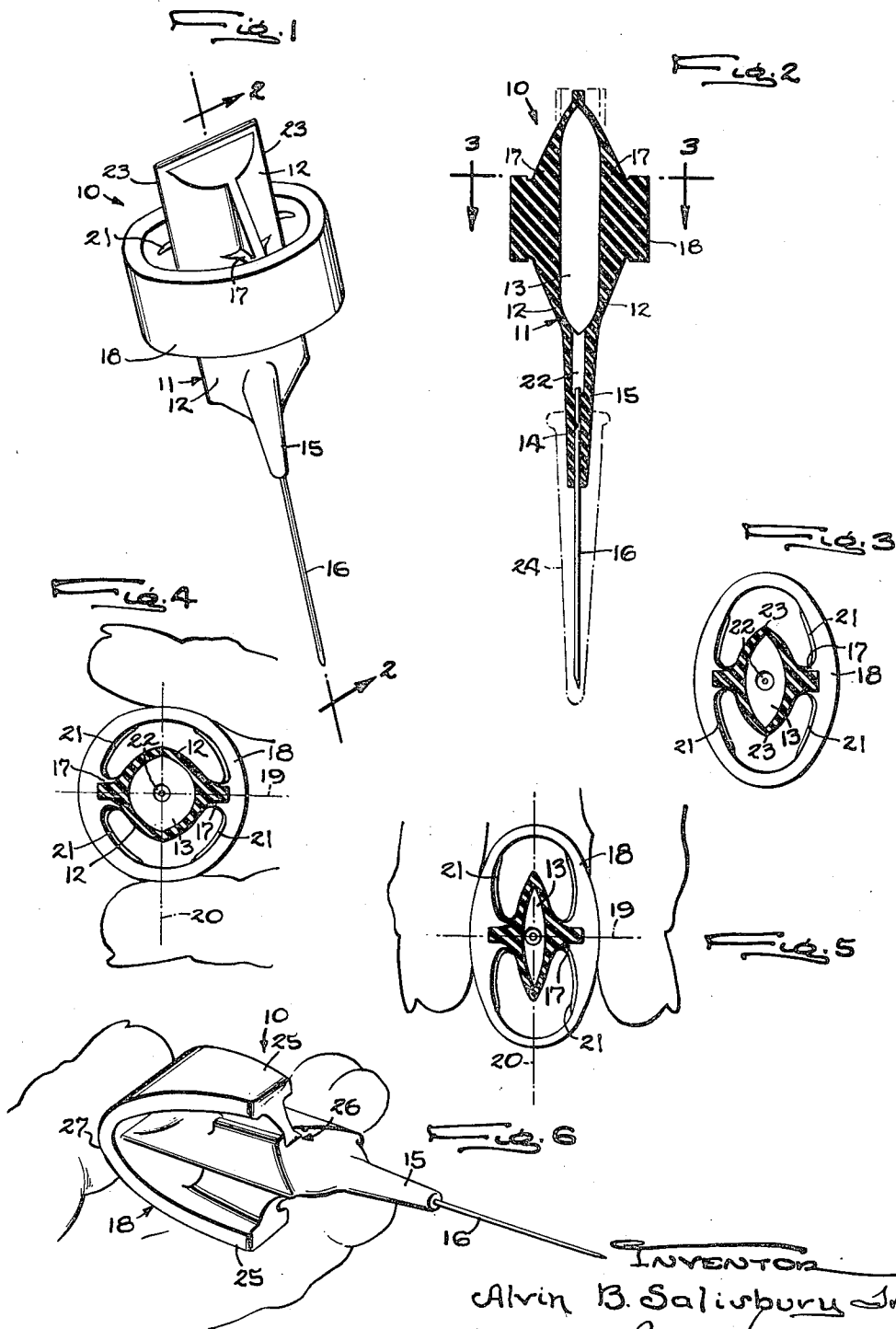
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DISPOSABLE SYRINGE

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DISPOSABLE SYRINGE

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This invention relates to syringes of the type having a needle for injecting medicine into the flesh of a patient and adapted for aspiration, that is, capable of drawing liquid from the patient's flesh into a transparent or translucent body portion of the syringe to indicate whether the needle has pierced a blood vessel of the patient.

The primary object of the invention is to provide a syringe of the above character of such simple manufacture and low cost that it may be disposed of economically after a single use.

Another object is to provide a novel syringe construction in which the body is formed of a resilient translucent material and the body and the liquid containing chamber are shaped in a novel manner to provide aspiration and expulsion of liquid from the chamber respectively when pressure is applied to the body in different directions.

A more detailed object is to shape the liquid chamber as an oval in cross section which is made more circular to increase the chamber volume when external pressure is applied to the body.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

Figure 1 is a perspective view of a disposable syringe embodying the novel features of the present invention.

Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1.

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 2.

Figs. 4 and 5 are views similar to Fig. 3 showing different conditions of the syringe.

Fig. 6 is a perspective view of a modified syringe construction.

In the drawings, the invention is shown for purposes of illustration embodied in a syringe 10 comprising a body 11 having opposed walls 12 defining a closed liquid containing chamber 13 which communicates with the exterior of the body through a passage 14 formed in a reduced neck portion 15 and adapted to receive a hollow needle 16. Where, as in the present instance, the syringe is to be used to inject medicine through the needle into the flesh of a patient, it is desirable to determine first whether the needle has pierced a blood vessel of the patient since some medicines are to be injected into the blood stream while the latter is to be avoided when other medicines are used. Determination of whether the needle has pierced a blood vessel upon being inserted into the patient's flesh is made by aspiration, that is, creating a suction in the needle to draw fluid from the flesh through the needle and into a translucent or transparent part of the syringe where it may be observed.

The present invention contemplates the provision of a novel syringe construction which is of simple manufacture and low cost so as to be disposable economically after a single use and which also is capable of aspiration as well as injection. This is accomplished by forming the

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body 11 of a resilient material and shaping the chamber defining walls 12 in a novel manner with thickened or reinforced portions 17 to provide expansion of the chamber volume and create suction in the needle passage 14 when external pressure is applied to the body in one direction and to reduce the chamber volume for injection by collapsing the walls toward each other in response to the application of external pressure to the body in a different direction. To effect such changes in the volume of the chamber 13, the latter is made of oval cross section and an aspirating member 18 is connected to the reinforced wall sections 17 to collapse the walls 12 toward each other to reduce the chamber volume when pressure is applied along the shorter axis 19 of the oval chamber cross section as shown in Fig. 5 and to separate the walls to make the chamber more circular in cross section thereby increasing its volume when the member is pressed along a line in a plane normal to the shorter axis of the chamber cross section as shown in Fig. 4. The reinforcing sections 17 are located on the longer sides of the chamber oval to insure that these sides remain convex during aspiration. To permit observation of the fluid drawn into the needle 16 and the passage 14 by aspiration, the material of the body also is translucent or transparent.

Low cost and simple manufacture of the syringe 10 are achieved by molding the body 12 of a suitable resilient and translucent thermosetting resin such as polyethylene. In the preferred construction shown in Figs. 1 to 5, the aspirating member 18 is an oval ring molded integrally with the body to form a single piece and encircling the chamber 13 with the longer axis 20 and the shorter axis 19 of the chamber oval respectively aligned with the longer and shorter axes of the ring. While the latter may be connected around its entire periphery to the chamber walls, it is preferred as shown to connect the two together only on the longer sides of the chamber oval by extending the thickened or reinforcing sections 17 outwardly to constitute ribs joining the walls and the ring. To avoid inward buckling of the longer sides of the ring 18, the sides preferably are reinforced by internal circumferential ribs 21.

In the present instance, the chamber 13 is elongated and the walls 12 defining the same are generally rectangular shape and are curved longitudinally away from each other to provide the oval or generally elliptical cross section of the chamber 13. At one end, the walls taper inwardly to the neck portion 15 which is of circular cross section. To insure collapse of the walls throughout substantially their entire lengths during fluid injection, the ribs 17 extend longitudinally of the walls beyond the ring 18 and over a major portion of the wall length. The passage 14 in the inner end of the neck portion 15 is of enlarged cross sectional area to provide an aspiration pocket 22 (Fig. 2) where fluid is drawn into the passage by aspiration.

To facilitate formation and assembly of the syringe, the outer end of the neck portion 15 is molded around the needle 16, the latter extending a short distance into the pocket 22. In the molding operation, the walls 12 are sealed around their side edges 23 and to the neck portion 15 but are spaced from each other as shown in phantom in Fig. 2 at the other end of the chamber. The syringe then is sterilized and, after the chamber is filled with a measured quantity of medicine, the end edges of the walls are sealed shut to close the open end of the chamber pressing the walls together between heated sealing elements in a manner well known in the art. To maintain the needle sterile, a sheath or cover 24 may be provided to enclose the needle and the lower end of the neck as shown in phantom in Fig. 2.

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In service use of the syringe, the aspirating ring 18 constitutes a handle which may be grasped between the thumb and index finger of one hand for inserting the needle 16 into the flesh of a patient after the sheath 24 is removed. The cross sectional shape of the chamber 13 and the aspirating ring at this time when the resilient parts are in a relaxed condition is oval as shown in Fig. 3. To aspirate, the thumb and index finger are placed on the shorter sides or ends of the ring and are squeezed together to make the ring more circular as shown in Fig. 4. The longer sides of the ring thus are separated and, acting through the ribs 17, pull the walls 12 on the longer sides of the chamber oval away from each other to expand the chamber volume and draw body fluid into the pocket 22 where it may be observed through the translucent material.

If the needle is correctly positioned in the patient's flesh, the position of the fingers is changed to the longer sides of the ring 18 as shown in Fig. 5, the syringe being held in place during such position change by grasping the neck portion 15 with the other hand. Then, the longer sides of the ring are squeezed and, acting through the ribs 17, press the walls toward each other to flatten the oval as shown in Fig. 5 and reduce the volume of the chamber to expel the contents thereof through the needle. In this case, the external pressure for aspirating is applied along the short axes 19 of the ovals. The ring, acting as a handle, then is pulled away from the patient to extract the needle.

The aspirating member 18 also may be formed separately from the body 11 as a U-shaped part having legs 25 straddling the chamber and removably fastened to the ribs 17 by dovetailed connections 26 extending longitudinally of the legs and the chamber walls 12 as shown in Fig. 6. In this modified construction, the U-shaped member is formed of resilient material, herein molded polyethylene, and its rounded end 27 extends around the end of the chamber remote from the neck 15. As in the preferred construction of Figs. 1 to 5, the aspirating pressure is applied along a line in a plane normal to the shorter axis of the oval shaped chamber. However, instead of extending along the longer axis of the chamber oval, this line extends longitudinally of the chamber, such aspirating pressure being applied by placing the middle and index fingers of one hand on the respective ends of the member legs 25 and pressing the thumb against the closed end 27 of the U and toward the other fingers. The legs thus are shifted away from each other and, acting through the ribs 17, separate the chamber walls 12 to expand the chamber volume. To expel the fluid contents of the chamber, the legs are pressed toward each other by squeezing the same along the shorter axis of the chamber oval as in the preferred construction.

The improved syringe construction described above not only has few parts which may be formed easily by inexpensive molding operations, but also may be filled easily under sterile conditions thereby rendering the total cost of the filled syringe sufficiently low that it is economical to dispose of the syringe after one use thereof. Due to the novel shaping of the chamber walls 12 with the reinforcing ribs 17, aspiration may be effected simply by applying external pressure to the aspirating member 18 in a plane normal to the shorter axis of the oval of the chamber. Since aspiration and injection may be performed simply by changing the positions of the fingers and squeezing in different directions on the aspirating member of both the preferred and modified constructions, the danger of shifting the needle in the patient's flesh are reduced thereby making the syringe desirable for injection of medicine.

I claim as my invention:

1. A disposable syringe comprising a body of resilient material having a closed liquid containing chamber of oval cross section and a passage extending between the latter and the exterior of the body for expelling the con-

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tents of the chamber when the volume of the latter is reduced, and an aspirating ring of oval shape encircling said body on the exterior thereof and having its longer sides connected to the portions of said body defining the longer sides of said oval shaped chamber to flatten the latter and decrease the volume thereof when the longer sides of the ring are collapsed by pressure applied along the long axis of the ring and to make the chamber more circular in cross section to increase the volume thereof and create suction in said passage when the ring is made more circular by pressure applied to the ends of the ring along its shorter axis, said material being translucent for observation of liquid drawn into said passage by said suction.

2. A disposable syringe comprising a body of resilient translucent material having a closed liquid containing chamber of oval cross section and a passage extending between the chamber and the exterior of the body, a resilient ring of oval shape encircling said body with the longer and shorter axes of the ring aligned respectively with the longer and shorter axes of the oval of said chamber, and ribs extending outwardly from said body on the longer sides of said chamber and connected to the longer sides of said ring for collapse of said chamber to expel the contents thereof when the ring is flattened by inward pressure on the longer sides thereof and for expansion of the chamber to create suction in said passage when the ring is made more circular by inward pressure exerted on the ends of the ring.

3. A disposable syringe comprising a body of resilient translucent material having opposed wall portions defining a chamber of oval cross section and predetermined volume in original positions of the wall portions and movable toward and away from each other respectively to decrease and increase the volume of the chamber, said body having a passage extending between said chamber and the exterior of the body and adapted to receive a hollow needle, a U-shaped aspirating member having legs straddling said wall portions, and ribs connecting said legs and said wall portions for separation of the latter and increase of the chamber volume when inward pressure is applied longitudinally of the legs on the free ends of the legs and the closed end of the member and for collapse of the chamber to expel the contents thereof when the legs are pressed inwardly toward each other.

4. A disposable plastic syringe comprising a body of resilient translucent material having an elongated liquid containing chamber of oval cross section and a passage extending between one end of the chamber and the exterior of the body and adapted to receive a hollow needle and a U-shaped aspirating member of resilient material having a closed end extending around the body at the other end of said chamber and leg portions straddling and connected to opposed wall portions of said body defining the longer sides of the oval of the chamber, said legs, when the member is compressed longitudinally of the legs by inward pressure applied to the free ends of the legs and the closed end of the member, shifting laterally away from each other to move said body portions away from each other and expand the chamber volume to create suction in said passage and, when the legs are pressed inwardly toward each other, shifting inwardly to collapse the chamber and expel the contents thereof.

5. A disposable syringe comprising a body of resilient translucent material having opposed wall portions defining an elongated liquid containing chamber of oval cross section and having ribs formed integral therewith and extending outwardly therefrom and an aspirating member connected to said ribs and acting, when pressure is applied thereto in one direction, to separate said wall portions and increase the volume of the chamber and, when pressure is applied thereto in a different direction to move said wall portions toward each other to collapse the chamber, said ribs extending longitudinally of said chamber and throughout a major portion of the length

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thereof to insure substantially complete collapse of the chamber when said wall portions are moved toward and into contact with each other.

6. A disposable syringe comprising a body of resilient material having a closed liquid containing chamber of oval cross section and a passage extending between the chamber and the exterior of the body and adapted to receive a hollow needle through which the contents of the chamber is expelled when the chamber volume is reduced, said body including opposed wall portions movable toward each other to reduce the volume of said chamber and away from each other to make the chamber more circular in cross section to increase the chamber volume, and an aspirating member connected to each of said wall portions and acting, when pressure is applied thereto along the shorter axis of the oval, to decrease the chamber volume and expel the contents of the chamber through said passage and, when pressure is applied thereto along a line in a plane normal to the shorter axis of the oval, to separate the wall portions to increase the chamber volume and create suction in the passage.

7. A disposable syringe comprising a body of resilient material having a closed liquid containing chamber of oval cross section and a passage extending between the chamber and the exterior of the body and adapted to receive a hollow needle through which the contents of the chamber is expelled when the chamber volume is reduced, said body including opposed wall portions movable toward each other to reduce the volume of said chamber and away from each other to make the chamber more circular in cross section to increase the chamber volume, and an aspirating member connected to each of said wall portions and acting, when pressure is applied thereto in one direction relative to the body, to move said wall portions toward each other to reduce the chamber volume and, when pressure is applied thereto in another direction relative to the body, to separate the wall portions to increase the chamber volume thereby creating a suction in the passage.

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8. A disposable syringe comprising a body of resilient material having a closed liquid containing chamber of oval cross sectional shape and a passage extending between the chamber and the exterior of the body and adapted to receive a hollow needle through which liquid is expelled when the volume of the chamber is reduced, said body including opposed wall portions movable toward each other to flatten the oval and reduce the chamber volume and away from each other to make the chamber more circular in cross section thereby increasing the chamber volume and creating suction in said passage, and means including thickened sections of said wall portions reinforcing the latter and acting, when pressure is applied thereto in one direction, to move the wall portions toward each other to reduce the chamber volume and expel liquid through said passage and, when pressure is applied thereto in a different direction, to separate the wall portions and create a suction in the passage, said material being translucent to permit observation of liquid drawn into said passage by said suction.

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