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SYRINGE VALVE

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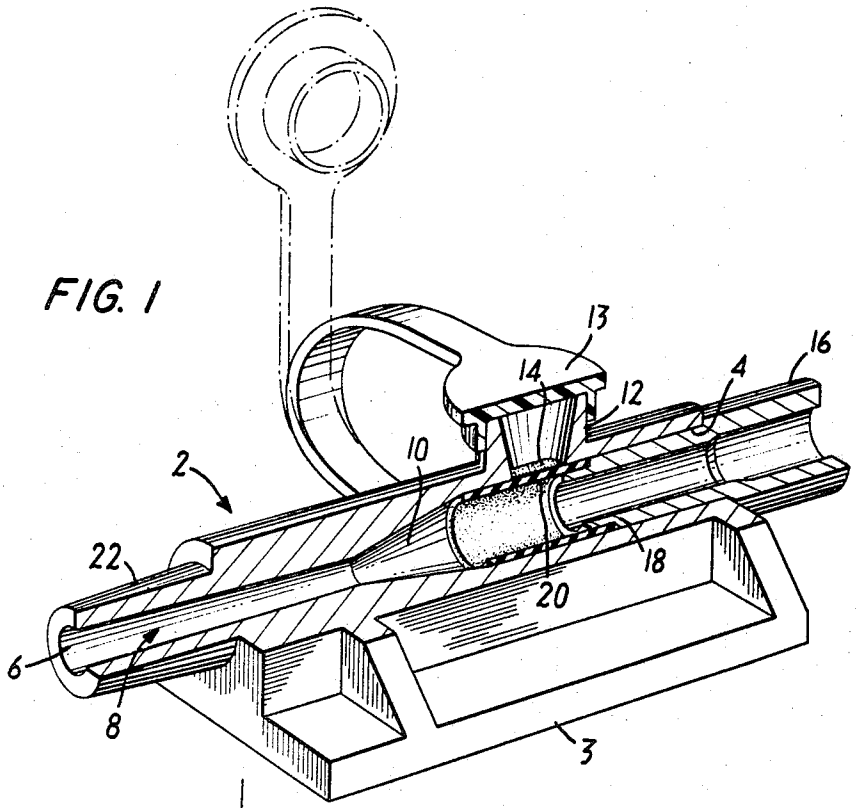
FIG. 1



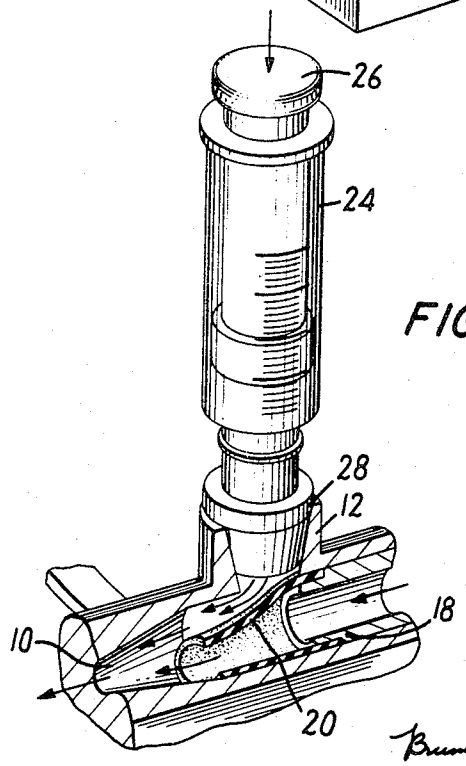


FIG. 2

INVENTORS.
GEORGES OTTO VON DARDEL,
HANS GÖSTA ENSTRÖM &
OLLE ROBERT TAUBERMAN
BY
Brumbaugh, Free, Graves & Donahue
their ATTORNEYS

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SYRINGE VALVE

Georges Otto von Dardel, Stockholm, Hans Gosta Enstrom, Ostertalje, and Olle Robert Tauberman, Djursholm, Sweden, assignor, by mesne assignments, to Viggo Aktiebolag, Halsingborg, Sweden

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ABSTRACT OF THE DISCLOSURE

The specification discloses a syringe valve for infusion assemblies for simultaneous administration of two fluids, comprising a housing having a mixing chamber intermediate an inlet and an outlet and an inlet for a second fluid provided with a pressure responsive sealing closure.

The present invention is directed to a syringe valve for use in the parenteral administration of fluids. More specifically, this valve is directed to the facilitation of the administration of supplementary medicaments during the parenteral administration of fluid such as blood, and other infusion solutions.

The syringe valve is to be used in conjunction with cannulae or hypodermic needles of the kind which are inserted into the vein of a patient to whom an infusion solution is to be administered. One end of the cannula is inserted into the patient's vein and the other end is provided with means for connecting the cannula to an infusion apparatus containing a reservoir of an infusion solution. Hitherto known cannula devices have been provided with a tube extending from the body of the cannula proper, the opening of which is covered with a rubber membrane. After the penetration of the cannula into the patient and commencement of the infusion, supplementary medicaments can be simultaneously administered by piercing the rubber membrane with a hypodermic needle and introducing the supplementary medicament into the flowing infusion solution. However, in these devices there is a risk of contamination of the unprotected membrane. A further disadvantage is that particles of rubber loosened from the rubber membrane by the penetration of the needle may be introduced into the infusion solution and thence into the body of the patient.

It is an object of this invention to provide a syringe valve for the administration of supplementary medicaments simultaneously with the administration of a primary medicament.

These and other related objects are achieved by a novel and improved syringe valve construction characterized by a feed-in orifice adapted to engage the discharge element of a reservoir of a supplementary medicament or fluid, such as the tenon cone of a hypodermic type syringe, and a normally closed resilient member which seals the feed-in orifice and which is responsive to pressure.

For a better understanding of the present invention, reference may be had to the accompanying drawing, in which:

FIGURE 1 is a sectional view of a valve assembly incorporating the invention and showing a construction of an exemplary embodiment of the invention for the simultaneous administration of a first and second fluid; and

FIGURE 2 is a view partially in section of the valve of FIGURE 1 in communication with a hypodermic type syringe.

Referring now to FIGURE 1, there is shown a syringe

valve comprising a valve housing **2** having a base **3**, an inlet orifice **4**, an outlet orifice **6**, and a passageway **8** of circular cross-section, extending through the housing and connecting the inlet and outlet orifices. The passageway is shown to be substantially wider at the inlet orifice end of the housing and defines a frustoconical mixing chamber **10**, the small end of which communicates with an outwardly flaring portion of the passageway approaching the outlet orifice. The housing is provided with an upwardly directed conical tube **12** which surrounds a feed-in orifice **14** communicating with the passageway **8** which serves as an inlet for the supplementary medication. The conical tube **12** is adapted to receive and engage the tenon cone of a hypodermic syringe or other similar reservoir of supplementary medication. A closure member **13** for the tube **12** is provided for use when supplementary medication is not to be given.

The housing is further provided with a tubular insert **16** adapted to extend through the inlet orifice and which serves as an inlet for the infusion solution and which is adapted to be connected to an infusion apparatus. The insertable end **18** of the tubular insert **16** of rigid material is fitted with a resilient sleeve **20** arranged to contact the internal edges of the feed-in orifice **14** and thereby seal the feed-in orifice when the tubular insert is properly seated within the housing **2**. The outlet end **22** of the housing is adapted to form a liquid-tight connection with a cannula by insertion into a tenon-receiving connection on the cannula.

FIGURE 2 shows the barrel **24** and plunger **26** of a hypodermic type syringe, the tenon cone **28** of which is inserted into tube **12**. Depression of the plunger **26** will cause the fluid in the syringe to flow through the feed-in orifice **14** into contact with sleeve **20** and depress the upper wall of the sleeve, thus opening the passageway **8** to the fluid which flows into the mixing chamber **10**.

When a cannula has been attached to the outlet end of the housing and inserted in a vein, the housing is attached to the patient's body in such a way that the entire device is fixed. Suitable means for fastening the device to the patient include the use of bandages or adhesive tape. The inlet orifice of the housing is in communication with an infusion apparatus (not shown) by means of a hose connected to the tubular insert.

When the infusion solution is fed to the patient, it streams through the passageway. When a supplementary medication is to be administered the closure member is opened and a reservoir of medication such as a syringe without a cannula is inserted in the tube. When pressure is applied such as by the depression of a plunger, the supplementary medication is pressed out of the reservoir through the feed-in orifice. In response to the pressure from above the resilient valve member opens the feed-in orifice and the supplementary medication flows into the mixing chamber and is thence transported together with the infusion liquid to the patient's body. As soon as the injection pressure ceases, the resilient valve member is again brought into sealing relation with the feed-in orifice partly as a result of its own resiliency and partly by the outwardly exerted pressure of the flowing infusion solution.

The syringe valve housing and tubular insert may be constructed of any material suitable for use in medical apparatus of the type described such as stainless steel, heat-resistant plastic, and the like.

The valve may be made of any resilient and inert substance capable of selectively sealing and opening the feed-in orifice in response to the pressure used to expel a liquid from a reservoir of the type generally used in parenteral administration of medicaments. Illustrative resilient materials include, elastomeric materials includ-

ing rubber, resilient plastic, such as polyethylene, polyvinyl chloride, and the like.

The resilient member employed to seal the feed-in orifice may, of course, take many shapes without departing from the scope of the invention. For example, the resilient member may be in the form of a semicircular lip carried on the end of the tubular insert. It would also be possible to provide a resilient member of varying shape permanently fixed within the passageway.

It will be appreciated by those skilled in the art that the above-described embodiment is intended to be illustrative of the invention and is susceptible to modification and variation without departing from the concept of the invention. The invention is deemed to be limited only by the scope of the appended claims.

We claim:

1. A syringe valve for the simultaneous feeding of two liquids to be injected into the body and adapted to be affixed to the body of a patient, comprising a housing having an inlet orifice, and an outlet orifice which is designed to be connected to a cannula; a passageway connecting the inlet and outlet orifices, a mixing chamber in said passageway; upwardly directed tenon-receiving means on the housing surrounding a feed-in orifice in the housing wall, said tenon-receiving means being adapted to be connected to a reservoir of liquid medication to be injected, said feed-in orifice communicating with the mixing chamber by a conduit; a yieldable resilient member positioned in said mixing chamber in sealing contact with the feed-in orifice, said resilient member being adapted to be displaced away from said periphery and partially collapsed under liquid pressure applied through said feed-in orifice so as to admit the liquid medication through said feed-in orifice and another liquid through said inlet orifice simultaneously to said mixing chamber, and means for connecting the syringe valve to an infusion apparatus.

2. A syringe valve for the simultaneous feeding of two liquids comprising: a valve housing having an inlet orifice and an outlet orifice, the outlet orifice being adapted to be connected to a cannula, and the passageway extending through the housing connecting the inlet and outlet orifices, a mixing chamber in said passageway; an upwardly directed conical tube on the top of the housing surrounding a feed-in orifice in the wall of the housing communicating with the mixing chamber by a conduit, said conical tube being adapted to be connected to a reservoir of liquid medication to be injected; a closure member for the conical tube; a tubular insert adapted to be inserted into the mixing chamber through the inlet orifice; a resilient member carried on the end of the tubular insert and positioned within the mixing chamber so as to contact the periphery of the feed-in orifice, said resilient member being adapted to be displaced away from said periphery and partially collapsed under liquid pressure applied through said feed-in orifice from said reservoir so as to admit liquid medication through said feed-in orifice and another liquid through said inlet orifice simultaneously to said mixing chamber.

3. A syringe valve device for infusion assemblies, comprising a valve housing having an inlet for the reception of a tubular insert and for the connection of a hose leading from an infusion apparatus; an outlet on said housing for mounting a cannula; the wall of said housing defining a first cylindrical passageway portion communicating with said inlet, a second cylindrical passageway portion communicating with said outlet and having a smaller diameter than said first passageway portion, and a tapered passageway portion connecting said first and second passageway portions; said inlet, outlet and tapered passageway portions being aligned; a syringe connection socket defining a feed-in orifice in said housing communicating with said first passageway portion intermediate said tapered passageway portion and said inlet, said syringe connection socket being adapted to be connected to a syringe containing liquid medication to be injected; a resilient sleeve inserted in said first passageway portion and extending between said tapered passageway portion and said feed-in orifice, said sleeve pressing resiliently against the wall defining said first passageway portion for normally sealing said feed-in orifice from said first passageway portion and being deflectable from said wall defining said first passageway and partially collapsible by liquid pressure exerted by a syringe inserted in said syringe connection socket, thereby to provide for simultaneous mixing of medication from said infusion apparatus and from said syringe in said passageway.

4. The syringe valve of claim **2** wherein said resilient member is a resilient sleeve carried on the end of the tubular insert.

5. The syringe valve of claim **2** wherein said resilient member is a resilient lip carried on the end of the tubular insert.

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WILLIAM F. O'DEA, *Primary Examiner.*

D. LAMBERT, *Assistant Examiner.*

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