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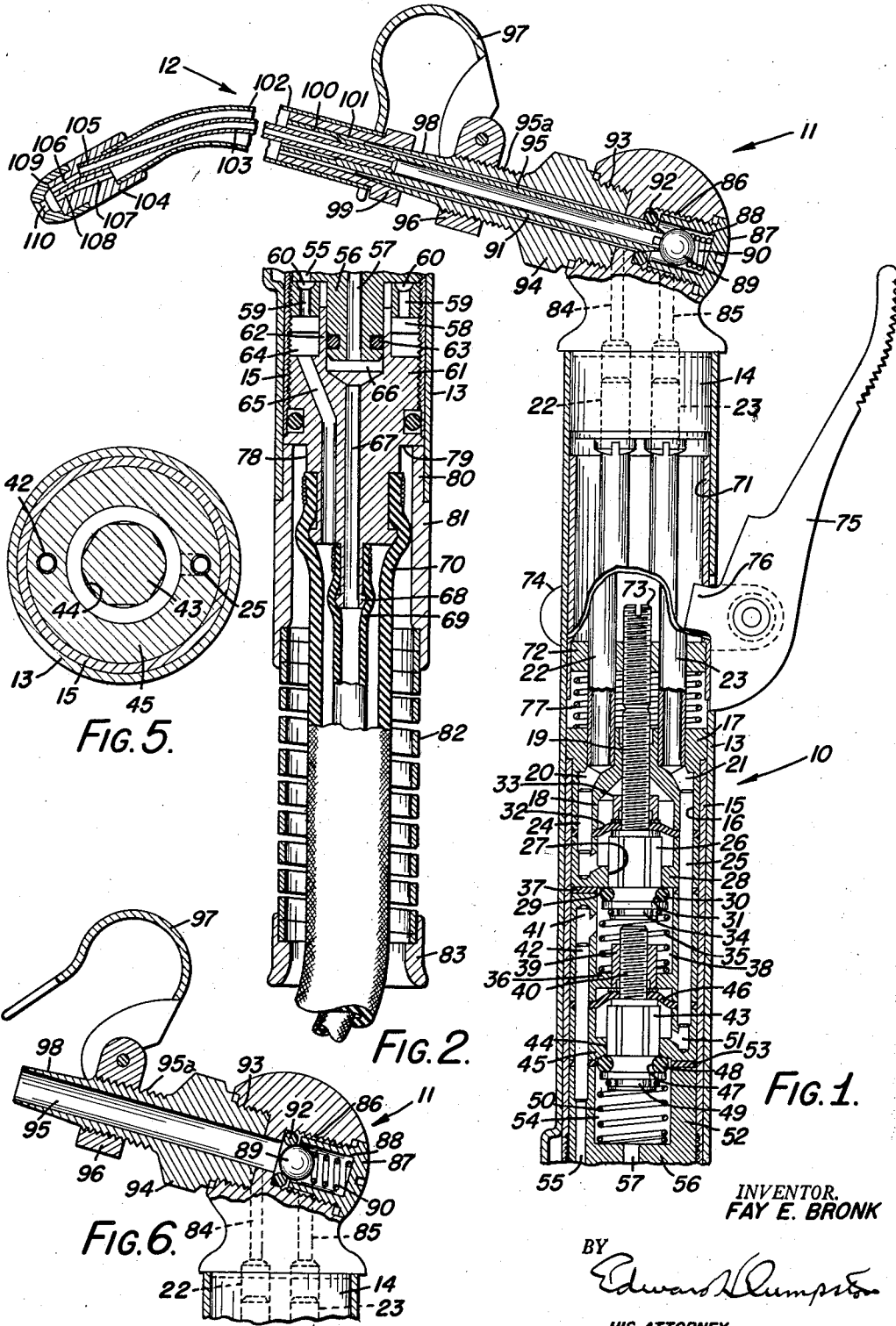


FIG. 5.

FIG. 2.

FIG. 1.

FIG. 6.

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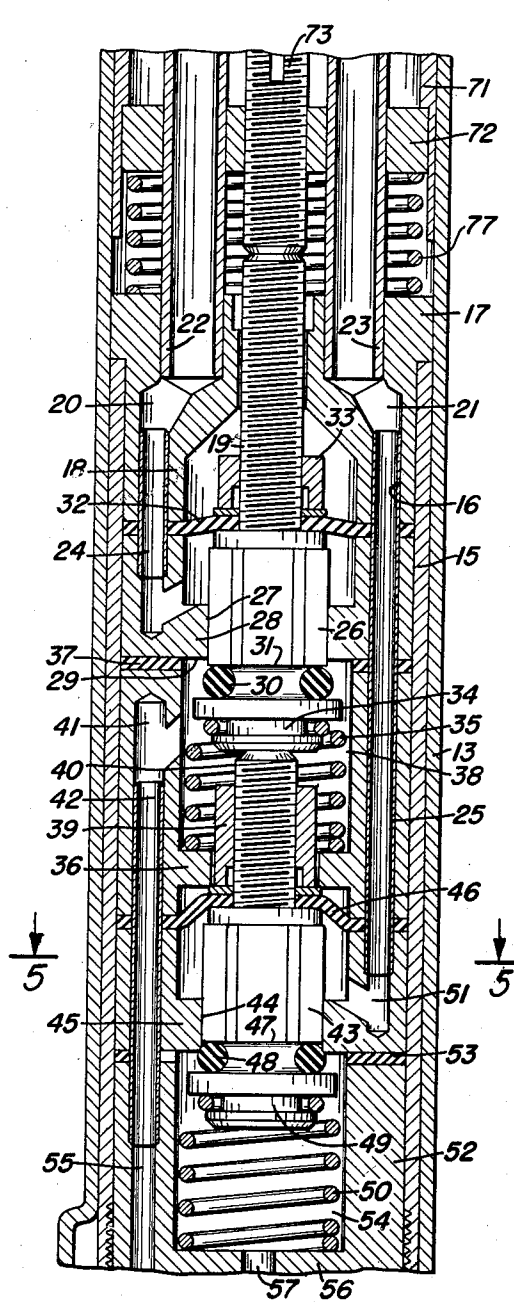


FIG. 3.

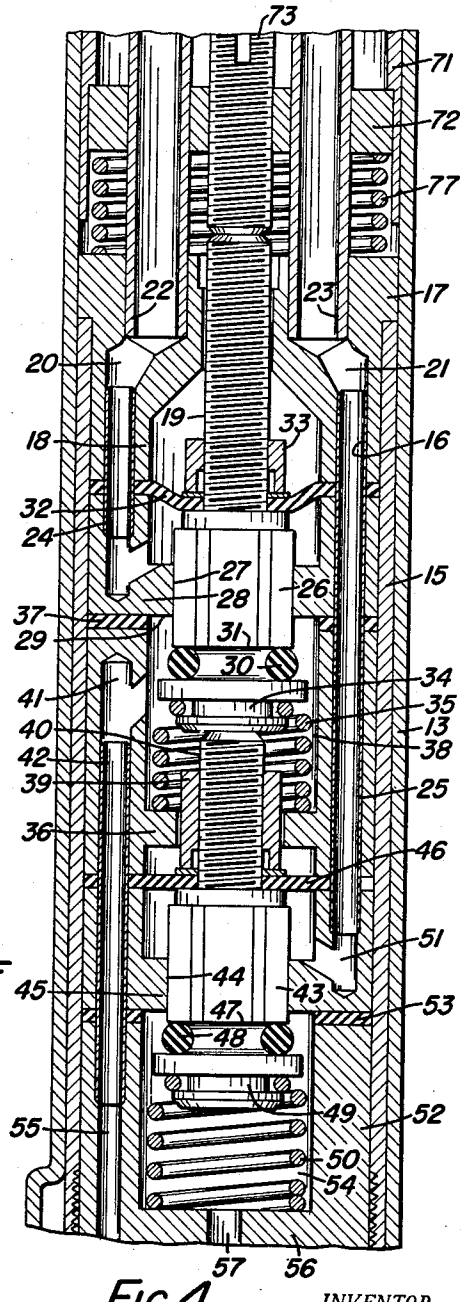


FIG. 4.

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23 Claims. (Cl. 128—173)

This invention relates to syringes, and more particularly to those of the type for projecting a liquid in a mist or spray created by a jet of air under pressure, as employed in dental and other medical practices, one object of the invention being to provide an improved syringe of this character having a more simple and practical type of construction capable of operation in a more reliable and efficient manner.

Another object is to supply a syringe of the above character which is more economical to manufacture and assemble, and more conveniently maintained in satisfactory operation.

A further object is to provide a syringe having the above advantages and including a readily demountable nozzle having automatic valve means for preventing inadvertent discharge of the liquid while the nozzle is detached.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is a central longitudinal sectional view of a syringe embodying the present invention, partly broken away and with the upper portion shown as turned through a small angle in a clockwise direction (when viewed from the top of the syringe) about the longitudinal axis of the syringe, for better illustration of the parts, the valves being shown in closed position.

Fig. 2 is a similar view of parts broken away in Fig. 1;

Fig. 3 is a fragmentary enlarged sectional view of parts shown in Fig. 1 but with the air valve partly opened;

Fig. 4 is a view similar to Fig. 3 but with both valves opened;

Fig. 5 is a sectional view on the line 5—5 in Fig. 3, and

Fig. 6 is a fragmentary sectional view of the syringe head portion with the nozzle detached and the liquid valve closed.

The embodiment of the invention herein disclosed by way of illustration comprises preferably a body indicated generally at 10, a head portion indicated generally at 11, and a nozzle indicated generally at 12. The body or handle portion of the syringe preferably comprises an elongated outer tube 13 receiving in its upper end a cylindrical portion 14 of the head 11 which is detachably secured thereto by screws or other suitable means (not shown). The body or handle is formed with passageways for air and fluid leading through the head to the nozzle from conducting means at the other end of the handle adapted for connection with the fluid sources, as hereafter described.

Telescopically fitted inside of tube 13 is a tubular casing 15 in which are assembled a number of sectional parts supporting the valve means controlling the flow of the liquids. Thus the upper end of casing 15 receives and has soldered within it a reduced portion 16 of a

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part or casing 17 for supporting the stem of the air valve hereafter described and through which the air and liquid passageways are carried. Thus casing 17 has a sleeve portion 18 in which the stem 19 of the air valve is slidably guided. It is also formed with an air passageway 20 and a liquid passageway 21, the upper ends of which receive and have soldered therein the lower ends of air and liquid conducting tubes 22 and 23 respectively, connected at their upper ends with the passageways in the head 11. The passageway 20 receives at its lower end an air conducting tube 24 while the passageway 21 receives the end of a longer liquid conducting tube 25, as shown.

The valve stem 19 carries on its lower end a valve body 26 preferably of hexagonal or other angular shape in cross section and slidably guided in a cylindrical bore 27 in a valve seat section or part 28. The plane shaped lower end 29 of part 28 forms the valve seat which cooperates with an O-ring 30 of natural or synthetic rubber or like resilient material carried in a groove or neck portion 31 in the valve body. The maximum diameter of the O-ring is larger than the diameter of the valve seat bore or opening so as to close the latter when moved in contact therewith, but when moved out of contact, the air is permitted to pass through the spaces between the valve body and its bore and into the passageway 20 of the part 17. A flexible diaphragm 32 of natural or synthetic rubber or the like has its periphery clamped between the parts or sections 17 and 28 so as to form a gasket therebetween, while the central portion of the diaphragm has an opening receiving the valve stem 19 and is clamped around the opening around the stem and to the upper end of the valve body by means of a nut 33 on the threaded valve stem 19, so that the diaphragm also forms a seal for the valve stem, with a minimum frictional resistance to its motion. The lower extremity of valve body 26 is formed with a groove 34 for engagement with a coiled compression spring 35 acting to raise and close the valve.

Below the valve seat part 28 is another casing or valve supporting part 36, a gasket 37 being interposed between these parts 28 and 36. Part 36 is formed with a cylindrical bore 38 containing spring 35 and with a bore of reduced diameter slidably receiving and guiding a nut 39 threadedly engaged with a valve stem 40 of a liquid valve hereafter described. Part 36 is formed with longitudinal passageways, one of which 41, receives the upper end of an air tube 42. The casing is formed also with a longitudinal liquid passageway which receives the liquid tube 25 described above.

The liquid valve body 43 is fixed on the lower end of valve stem 40 and is slidably guided in a cylindrical bore 44 in a valve seat section or part 45, the valve body having a cross section of hexagonal or other angular shape (Fig. 5), like that of air valve 26, to provide passageways for the liquid through the bore 44. A flexible diaphragm 46 has its periphery clamped between the sections 36 and 45 and is formed with a central opening receiving the valve stem 40. The nut 39 clamps the central portion of the diaphragm about the stem and to the upper end of the valve body 43, to seal the valve stem with low frictional resistance, as described in connection with the diaphragm 32 of the air valve.

Valve body 43 is formed below its valve seat with a groove or neck portion 47 carrying an O-ring 48 for cooperation with the valve seat formed by the lower end of its seat part 45 as described above in connection with the air valve. The lower extremity of valve body 43 is formed with a second groove 49 for engagement with a coiled compression spring 50 tending to raise and close the valve. Section 45 is formed with an air passageway receiving the air tube 42 and with a liquid passageway

51 in which is soldered the lower end of the liquid tube 25.

Below the valve seat section 45 is a spacer section 52, with a gasket 53 sealing the joint between the sections. Spacer 52 has a central recess 54 receiving and guiding the spring 50 and has a passageway 55 in which is received the lower end of the air tube 42. The lower end of spacer 52 has an extension 56 of reduced diameter formed with a central passageway 57 through which liquid is supplied to the recess 54 and the liquid valve. A screw 58 is engaged with the threaded interior of casing 15 and bears against the shoulder of section 52 about its reduced extension 56, to press all the sections together and upwardly against the lower end of section 17 which, as stated, is soldered to the casing 15. The several sectional parts are assembled in orderly succession through the lower end of casing 15 and then clamped in position as described by turning screw 58 which is provided with passageways 59 and a circular groove 60 for supplying air to the passageway 55 in all positions of the screw.

The means for connecting the body with sources of air and liquid comprises preferably a section 61 threadedly engaged in the lower end of casing 15 and having cylindrical extension 62 of reduced diameter embracing the extension 56 of section 52, with an interposed O-ring gasket 63 to seal the joint therebetween. The space 64 between the screw 58 and section 61 communicates with an air passageway 65 extending eccentrically of the section 61 and opening through its lower end (Fig. 2). The space 66 between the extended lower end 56 of spacer 52 and the section 61 communicates with a central liquid passageway 67 opening through a nipple 68 on the lower end of section 61. A flexible inner tube 69 embraces and is secured to the member 68 for connecting its passageway 67 with a source of water, or a liquid solution or compound, while an outer flexible tube 70 embraces and is fixed to the extended lower end of section 61 for connecting its passageway 65 with a source of air under pressure, the concentric inner and outer tubes 69 and 70 being extended to and connected with suitable fluid sources located, for example, on an equipment stand with which the syringe is associated, as well understood in the art.

The means for operating the valves comprises preferably a sleeve 71 sliding telescopically in handle tube 13 and having a lower end of reduced diameter in which is received and soldered a washer 72. The washer is formed with openings slidably receiving the air and liquid tubes 22 and 23, and has a threaded central opening in which is adjustably mounted a screw 73 in longitudinal alignment with the valve stem 19 for engagement therewith to operate the valves.

Handle tube 13 has fixed thereon a mounting member 74 between the spaced ends of which a thumb lever 75 is pivotally supported. The lever has a spur 76 extending freely through an opening in tube 13 and into engagement with an opening in sleeve 71 for sliding the sleeve in the handle tube 13 as the thumb lever 75 is moved against the tension of a spring holding it in its outward inoperative position (Fig. 1). When the lever is depressed, sleeve 71 and its washer 72 are moved downwardly by the lever spur 76 against the resistance of a spring 77 resting at its lower end on the section 17 of sleeve 15. Screw 73 is adjusted in washer 72 for suitably timed engagement with valve stem 19 and the lower end of its air valve 26 is slightly spaced from the upper end of the liquid valve stem 40 (Fig. 1) so that the air valve is first opened, as shown in Fig. 3, followed by subsequent opening of the liquid valve as shown in Fig. 4, for producing concomitant flow of air and liquid to the nozzle. The described arrangement, however, by which the air valve is first to open and last to close, insures the supply of air at all times while the liquid valve is open so that the liquid is always supplied in atomized condition.

The extended lower end of section 61 (Fig. 2), reduced in diameter as at 78, forms a shoulder 79 which is seated

against the reduced upper end 80 of a ferrule 81 which is received in and soldered to the lower end of the handle tube 13. An opposite end of the ferrule receives and is soldered to one end of a spring hose protector 82 having soldered to its opposite end a finishing ring 83 to form a guard for the flexible hose, as well understood in the art.

It is evident from the above description that the several valve supporting and valve seat sections or parts may be assembled in orderly sequence in sleeve 15 and secured therein by means of the screw 58. Then after screwing into the sleeve the hose attaching section 61, the sleeve and its assembled parts may be assembled telescopically in the handle tube 13, together with the sleeve 71, washer 72 and spring 77, the spring serving to urge sleeve 71 upwardly to allow the valves to close and to urge the sleeve 15 downwardly to seat its section 61 on the upper end of the ferrule 80 as described. The assembly of thumb lever 75 holds washer 72 and sleeve 71 in properly located position with the valves closed.

The head portion 11 is provided with passageways 84 and 85 (Figs. 1 and 6), the lower ends of which receive the upper ends of the fluid tubes 22 and 23, respectively, preferably with any known and suitable gasket means (not shown) for insuring leakproof joints. Passage 85 communicates with a threaded recess 86 in which is inserted a hollow screw 87 formed with a valve chamber 88 containing a ball valve 89 actuated by a compression spring 90. The spring presses the ball against the notched inner end of a tube 91 forming part of the nozzle assembly and when a nozzle is in place on the syringe, the liquid passing upwardly through passageway 85 enters recess 86 around the reduced inner end of screw 87 into the chamber 88 and thence into the nozzle tube 91 through the notches in its inner end pressing against the valve. The inner end of recess 86 contains an O-ring 92 sealing the joint between the recess and tube 91 and serving also as a valve seat for the valve 89 when the nozzle tube is withdrawn. This construction thus affords automatic valve means for closing the fluid passageway except when a nozzle is assembled with the syringe head and the valve is opened by the nozzle tube, as shown.

The head is formed also with a threaded recess 93 into which one end of a base member 94 is screwed. The base has a bore 95 somewhat larger in diameter than the outer diameter of the nozzle tube 91 so as to leave an air passageway therearound, and the upper end of passageway 84 of the head communicates with this annular space. Base 94 has a threaded portion 95a for the reception of a block 96 carrying a usual locking spring 97 of known construction and releasably holding the nozzle in connection with the head. Base 94 has its outer end tapered inwardly as at 98 for reception in the tapered bore of a nozzle sleeve 99.

The nozzle preferably comprises the sleeve 99 in which the outer end of the nozzle tube 91 is fitted and supported as by forming the end of the tube with transversely spaced, outwardly flared portions 100 for positioning engagement with the bore 101 of sleeve 99, while leaving spaces between the portions 100 for the passage of air outwardly from the sleeve into a tube 102 fitted to the outside of the sleeve as shown. Nozzle sleeve 91 thus has its outer end supported in spaced relation with the walls of the bore 101 of sleeve 99 while its remaining portion and inner end are positioned in spaced relation with the bore of base 94 by the O-ring 92 of the valve chamber in the head, so that the air has a passageway around the outside of the nozzle tube 91, through the sleeve 99 and into the tube 102.

Within the tube 102 and soldered within the nozzle sleeve 91 is a smaller tube 103 for conducting the liquid to the nozzle tip. The tip 104 has a recessed inner end fitted over the outer end of tube 102 and the tip is formed with a socket 105 to receive and hold the outer end of the inner tube 103 in position for communication with a jet

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opening 106 eccentrically positioned in the tip. The tip is formed also with a passageway 107 communicating with the tube 102 and discharging through a central jet opening 108 in the tip. A hollow cap 109 receives the air and liquid jets for discharge through its outlet 110 in the form of a mist or spray, as well understood in the art. It is evident from this construction that when a nozzle such as described is assembled with a syringe head, the insertion of its tube 91 through the passageway in the head serves to engage and open the valve 89 and condition the syringe for operation. When a nozzle is removed, however, and tube 91 withdrawn, the valve is seated by its spring 90 against the O-ring 92 and all flow of liquid is prevented until the nozzle is again properly assembled with the instrument.

It is apparent from the above description that the invention provides a relatively simple construction with comparatively few parts and valve members operating with straight line longitudinal motions, the amplitude of which is readily controlled by adjusting the position of the actuating abutment or screw 73. These parts are readily put together in a sub-assembly in sleeve 15 and then located in the outer handle sleeve 13. The O-ring valves and their flexible sealing diaphragms insure efficient valve action with a minimum of frictional resistance, while the several parts are effectively sealed against leakage of air or liquid. The arrangement of the parts facilitates successive operation of the air and liquid valves to insure a flow of atomizing air whenever liquid is supplied, so as to prevent the discharge of liquid except in the form of a mist or spray. The construction complements this feature with a practical and highly convenient combination of nozzle and head structure including automatic valve means for preventing any flow of liquid except when a nozzle is properly assembled and seated in the head. The operation of the instrument is thus doubly secured against inadvertent discharge or leakage of the liquid alone as distinguished from a mist or spray form.

It will thus be seen that the invention accomplishes its objects and while it has been herein disclosed by reference to the details of a preferred embodiment, it is to be understood that such disclosure is intended in an illustrative, rather than a limiting sense, as it is contemplated that various modifications in the construction, arrangement and operation of the parts will readily occur to those skilled in the art, within the spirit of the invention and the scope of the appended claims.

I claim:

1. A syringe comprising a handle provided with a nozzle and with a pair of fluid passageways leading there-through to said nozzle, fluid conducting means connected with said passageways and adapted for connection, respectively, with a pair of fluid sources, valve means in said handle for controlling each of said passageways, said valve means being located in aligned relation to each other longitudinally of said handle, manually operable means on said handle for actuating one of said valve means, and means actuated by the first valve means for actuating the other valve means and supplying the fluids concomitantly to said nozzle.

2. A syringe comprising a handle provided with a nozzle and with a pair of fluid passageways leading there-through to said nozzle, fluid conducting means connected with said passageways and adapted for connection, respectively, with a pair of fluid sources, valve means in said handle controlling each of said passageways, respectively, a member slidable longitudinally in said handle and provided with an adjustable abutment in aligned relation with one of said valve means, manually operable means on said handle for actuating said member to actuate said one of said valve means, and means actuated by the actuation of the first valve means for actuating the other valve means and supplying the fluids successively and concomitantly to said nozzle.

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3. A syringe comprising a handle provided with a nozzle and with a pair of fluid passageways leading there-through to said nozzle, fluid conducting means connected with said passageways and adapted for connection, respectively, with a pair of fluid sources, valve means in said casing for controlling each of said passageways, said valve means being located in spaced and aligned relation to each other longitudinally of said handle, manually operable means on said handle for actuating one of said valve means, and means actuated by the first valve means for actuating the other valve means and supplying the fluids successively and concomitantly to said nozzle.

4. A syringe comprising a handle having fixed to one end thereof a head provided with a nozzle, said handle and head having a pair of passageways leading there-through to said nozzle, fluid conducting means fixed to the other end of said handle in communication with said passageways and adapted for connection with a pair of fluid sources, respectively, valve means in said handle for controlling said passageways, respectively, a member slidable longitudinally in said handle and provided with an adjustable abutment in aligned relation with one of said valve means, manually operable means on said handle for actuating said member to actuate said one of said valve means, and means actuated by the actuation of the first valve means for actuating the other valve means and supplying the fluids concomitantly to said nozzle.

5. A syringe comprising a handle having fixed to one end thereof a head provided with a nozzle, said handle and head having a pair of passageways leading there-through to said nozzle, fluid conducting means fixed to the other end of said handle in communication with said passageways and adapted for connection with a pair of fluid sources, respectively, valve means in said handle for controlling each of said passageways, said valve means being located in aligned relation to each other longitudinally of said handle, manually operable means on said handle for actuating one of said valve means, and means actuated by the first valve means for actuating the other valve means and supplying the fluids concomitantly to said nozzle.

6. A syringe comprising a tubular handle having fixed to one end thereof a head provided with a nozzle, said handle and head having a pair of passageways leading there-through to said nozzle, fluid conducting means fixed to the other end of said handle in communication with said passageways and adapted for connection with a pair of fluid sources, respectively, valve means in said handle for controlling each of said passageways, said valve means being located in aligned relation to each other longitudinally of said handle, a member slidable longitudinally in said handle and provided with an adjustable abutment in aligned relation with one of said valve means, manually operable means on said handle for actuating said member to actuate one of said valve means, and means actuated by the first valve means for actuating the other valve means and supplying the fluid concomitantly to said nozzle.

7. A syringe comprising a tubular handle provided with a nozzle and with a pair of fluid passageways leading there-through to said nozzle, fluid conducting means connected with said passageways and adapted for connection, respectively, with a pair of fluid sources, valve means in said handle for controlling each of said passageways, said valve means being located in aligned relation to each other longitudinally of said handle, a member slidable longitudinally in said handle and provided with an adjustable abutment aligned with one of said valve means longitudinally of said handle, manually operable means on said handle for actuating said member to actuate one of said valve means, and means actuated by the first valve means for actuating the other valve means for supplying the fluids concomitantly to said nozzle.

8. A syringe comprising a tubular handle provided with a nozzle and with a pair of fluid passageways leading

therethrough to said nozzle, fluid conducting means connected with said passageways and adapted for connection, respectively, with a pair of fluid sources, a pair of valves in said handle for controlling each of said passageways, means in said handle supporting said valves for movement longitudinally thereof in aligned relation with each other, a member slidable longitudinally in said handle and provided with an adjustable abutment aligned with one of said valves longitudinally of said handle, manually operable means on said handle for actuating said member to actuate one of said valves, and means actuated by the first valve for actuating the other of said valves for supplying the fluids concomitantly to said nozzle.

9. A syringe comprising a tubular handle having fixed to one end thereof a head provided with a nozzle, said handle and head having a pair of passageways leading therethrough to said nozzle, fluid conducting means fixed to the other end of said handle in communication with said passageways and adapted for connection with a pair of fluid sources, respectively, valves in said handle for controlling said passageways, means in said handle supporting said valves for movement longitudinally of said handle in aligned relation with each other, a member slidable longitudinally in said handle and having an adjustable abutment aligned with one of said valves, manually operable means on said handle for moving said member to move one of said valves, and means actuated by the first valve for moving the other of said valves for supplying the fluids concomitantly to said nozzle.

10. A syringe comprising a handle provided with a nozzle and with a pair of fluid passageways leading therethrough to said nozzle, fluid conducting means connected to said passageways and adapted for connection, respectively, with a pair of fluid sources, valves and valve seats controlling said passageways, said valves having stems extending in aligned relation to each other longitudinally of said handle with the stem of one of said valves extending adjacent the stem of the other of said valves, means supporting said valves and stems for movement longitudinally of said handle, manually operable means on said handle for engaging and moving the stem of one of said valves, and means actuated by the first valve for engaging and moving the stem of the other of said valves for supplying the fluids concomitantly to said nozzle.

11. A syringe comprising a tubular handle provided with a nozzle and with a pair of fluid passageways leading therethrough to said nozzle, fluid conducting means connected with said passageways and adapted for connection, respectively, with a pair of fluid sources, valves and valve seats controlling said passageways, said valves having stems extending in aligned relation longitudinally of said handle with the stem of one valve extending adjacent and movable into engagement with the stem of the other of said valves for moving the same, a member slidable longitudinally in said handle and provided with an adjustable abutment positioned for engagement with one of said valve stems, means on said handle for moving said member and abutment to engage and move said one of said valve stems and thereby engage and move said other of the valve stems for operating said valves to supply the fluids concomitantly to said nozzle.

12. A syringe comprising a tubular handle provided with a nozzle and with a pair of fluid passageways leading therethrough to said nozzle, fluid conducting means connected with said passageways and adapted for connection, respectively, with a pair of fluid sources, valves and valve seats controlling said passageways, said valves having stems extending and movable in aligned relation longitudinally of said handle with one of said valves extending in spaced relation and movable into engagement with the stem of the other valve for moving the same, a member movable longitudinally in said handle to engage the stem of one of said valves and manually operable means on said handle for moving said member to actuate said valves successively, one in advance of the other, and

supply the fluids successively and concomitantly to said nozzle.

13. A syringe comprising a tubular handle provided with a nozzle and with a pair of fluid passageways leading therethrough to said nozzle, fluid conducting means connected with said passageways and adapted for connection, respectively, with a pair of fluid sources, valves and valve seats controlling said passageways, means in said handle supporting said valves for movement in aligned relation with each other longitudinally of said handle and with one of said valves extending adjacent and movable into engagement with the stem of the other of said valves for moving the same, a flexible diaphragm fixed to each of said valves and the walls of said handle and for sealing the space therebetween, a member movable in said handle for engaging and moving one of said valves which in turn moves the other of said valves, and manually operable means on said handle for moving said member to move said valves and supply the fluids concomitantly to said nozzle.

14. A syringe comprising a tubular handle having fixed to one end thereof a head provided with a nozzle, said handle and head having a pair of passageways leading therethrough to said nozzle, fluid conducting means fixed to the other end of said handle in communication with said passageways and adapted for connection with a pair of fluid sources, respectively, valves and valve seats controlling said passageways, said valves having stems extending and movable longitudinally of said handle in aligned relation with each other with one valve extending adjacent and movable into engagement with the other of said valves for moving the same, a sleeve slidable longitudinally in said handle and provided with an abutment for engagement with the stem of said other valve and means for moving said sleeve to move said valves and supply the fluids concomitantly to said nozzle.

15. A syringe comprising a tubular handle having fixed to one end thereof a head provided with a nozzle, said handle and head having a pair of passageways leading therethrough to said nozzle, fluid conducting means fixed to the other end of said handle in communication with said passageways and adapted for connection with a pair of fluid sources, respectively, valves and valve seats controlling said passageways, said valves having stems extending longitudinally of said handle in aligned relation with each other and with one valve extending adjacent and movable into engagement with the stem of the other of said valves for moving the same, spring means for moving said valves in one direction, a sleeve slidable in said handle and having an adjustable abutment aligned with the stem of one of said valves and a lever on said handle for moving said sleeve to thereby move said valves and control the supply of fluids concomitantly to said nozzle.

16. A syringe comprising a tubular body having a head provided with a nozzle, air and liquid valves in said body, a valve supporting part and a valve seat part for each of said valves, said parts being assembled in longitudinally aligned and spaced relation in said body, a flexible diaphragm carried by each of said valves and clamped peripherally between said supporting and valve seat parts thereof to seal said valve against leakage therearound, air and liquid passageways extending through said parts to said head and nozzle and controlled by said valves, respectively, and means on said body for concomitantly actuating said valves.

17. A syringe comprising a tubular body having a head provided with a nozzle, a stop abutment in said body, a sleeve in said body engaging said abutment, air and liquid valves in said sleeve, a valve supporting part and a valve seat part for each of said valves, said valves and parts being assembled in longitudinally aligned and spaced relation in said sleeve, a flexible diaphragm carried by each of said valves and clamped peripherally between said supporting and valve seat part thereof to

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seal said valve against leakage therearound, air and liquid passageways extending through said sleeve and parts to said head and nozzle and controlled by said valves, respectively, means on said body for concomitantly actuating said valves, and spring means interposed between said sleeve and actuating means for holding said sleeve in contact with said abutment and for yieldably holding said actuating means in inoperative position.

18. A syringe comprising a handle having a head, a pair of fluid passageways leading through said handle and head, fluid conducting means connected with said passageways and adapted for connection, respectively, with a pair of fluid sources, valve means in said handle for controlling said passageways, respectively, manually operable means on said handle for actuating said valve means for supplying the fluids to said head, auxiliary valve means in said head for one of said passageways, said head being formed with means for receiving a nozzle, and a nozzle detachably secured to said receiving means and provided with means extending through one of the passageways in said head for engaging and operating said auxiliary valve means.

19. A syringe comprising a handle having a head, a pair of fluid passageways leading through said handle and head, fluid conducting means connected with said passageways and adapted for connection, respectively, with a pair of fluid sources, valve means in said handle for controlling said passageways, respectively, manually operable means on said handle for actuating one of said valve means, means actuated by said first valve means for actuating the other valve means for supplying the fluids concomitantly to said head, an auxiliary valve means in said head for one of said passageways, said head being formed with means for receiving a nozzle, and a nozzle detachably secured to said receiving means and provided with means extending through one of said passageways in said head for engaging and operating said auxiliary valve means.

20. A syringe comprising a handle having a head, a pair of fluid passageways leading through said handle and head, fluid conducting means connected with said passageways and adapted for connection, respectively, with a pair of fluid sources, valve means in said handle for controlling said passageways, respectively, manually operable means on said handle for actuating said valve means for supplying the fluids to said head, auxiliary spring actuated valve means in said head controlling one of said passageways, said head being formed with means for receiving a nozzle, and a nozzle detachably secured to said receiving means and provided with means for engaging and operating said auxiliary valve means.

21. A syringe comprising a handle having a head, a pair of fluid passageways leading through said handle and head, fluid conducting means connected with said passageways and adapted for connection, respectively, with a pair of fluid sources, valve means in said handle for controlling said passageways, respectively, manually operable means on said handle for actuating one of said

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valve means, means actuated by said first valve means for actuating the other valve means and supplying the fluids concomitantly to said head, auxiliary spring actuated valve means in said head for one of said passageways, said head being formed with means for receiving a nozzle, and a nozzle detachably secured to said receiving means and provided with means for engaging and operating said auxiliary valve means.

22. A syringe comprising a handle having a head, a pair of fluid passageways leading through said handle and head, fluid conducting means connected with said passageways and adapted for connection, respectively, with a pair of fluid sources, valve means in said handle for controlling said passageways, respectively, manually operable means on said handle for actuating said valve means for supplying the fluids to said head, one of said fluid passageways in said head being formed with a valve chamber therein, spring actuated valve means in said chamber for closing said one of the passageways, said head being formed with means for receiving a nozzle, a nozzle adapted to be detachably secured to said receiving means and a tube on said nozzle adapted to extend through said one of said passageways in said head and engage and open said valve therein when said nozzle is secured to said head.

23. A syringe comprising a handle having a head, a pair of passageways leading through said handle and head, fluid conducting means connected with said passageways and adapted for connection, respectively, with a pair of fluid sources, valve means in said handle for controlling said passageways, respectively, manually operable means on said handle for actuating one of said valve means, means actuated by said first valve means for actuating the other valve means for supplying the fluid concomitantly to said head, one of said fluid passageways in said head being formed with a valve chamber therein, spring actuated valve means in said chamber for closing said one of the passageways, said head being formed with means for receiving a nozzle, a nozzle adapted to be detachably secured to said receiving means and a tube on said nozzle adapted to extend through said one of said passageways in said head and engage and open said valve therein when said nozzle is secured to said head.

References Cited in the file of this patent

UNITED STATES PATENTS

1,970,845	Dodge	Aug. 21, 1934
2,043,982	Bruneau	June 16, 1936
2,124,937	Whittle	July 26, 1938
2,228,226	Downs	Jan. 7, 1941
2,372,305	Walker	Mar. 27, 1945
2,523,809	Bronk et al.	Sept. 26, 1950

FOREIGN PATENTS

108,796	Sweden	Oct. 19, 1943
582,136	Germany	Aug. 9, 1933