

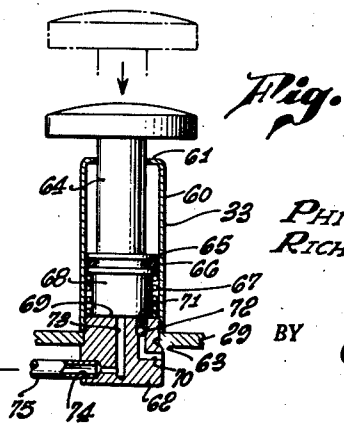
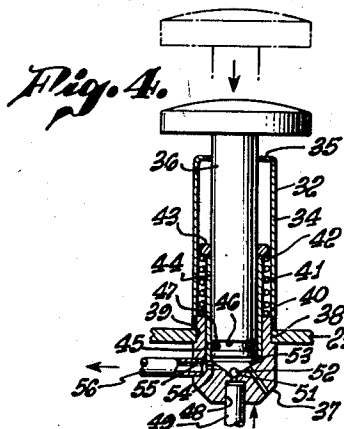
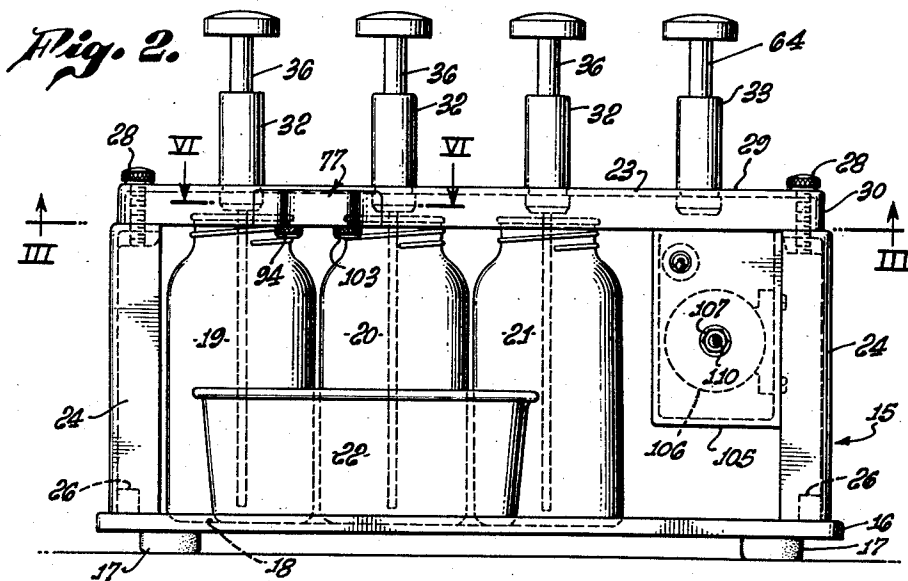
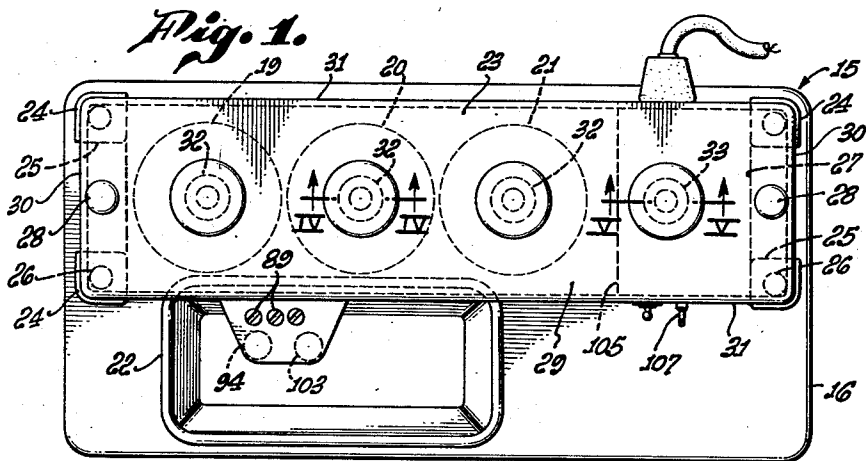
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P. M. CASADY ET AL
APPARATUS FOR CLEANING OPEN ENDED
HOLLOW TUBULAR ELEMENTS

2,647,526

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2 Sheets-Sheet 1



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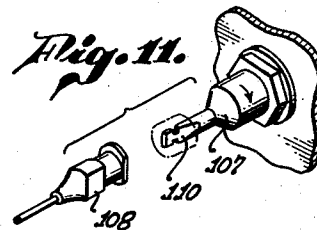
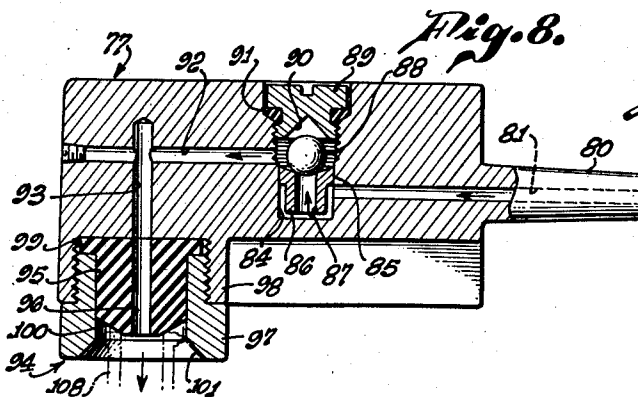
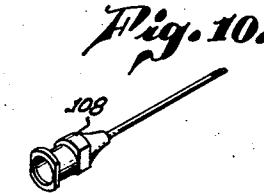
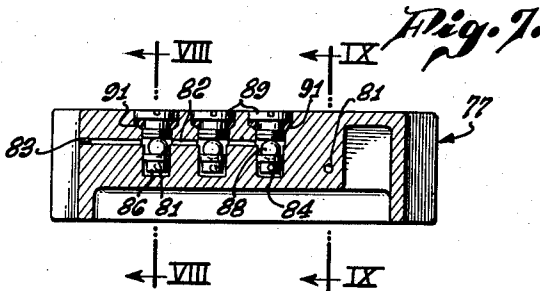
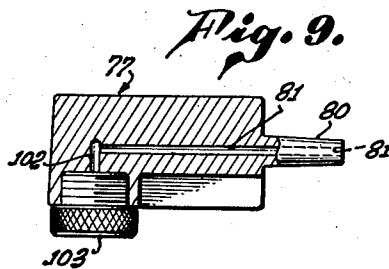
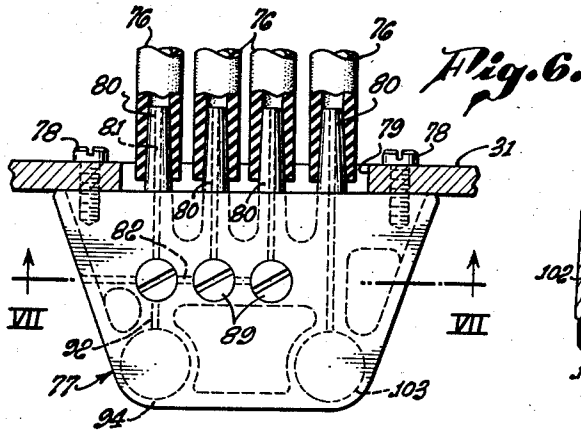
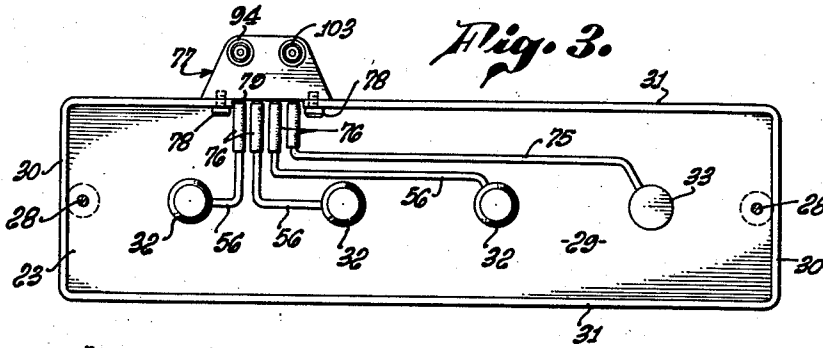
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2 Sheets-Sheet 2



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APPARATUS FOR CLEANING OPEN ENDED
HOLLOW TUBULAR ELEMENTSPhilip M. Casady and Richard R. Casady,
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Application July 17, 1950, Serial No. 174,224

7 Claims. (Cl. 134—94)

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This invention relates to an improved apparatus for cleaning open-ended, hollow, tubular elements such as hypodermic needles. In particular, this invention is concerned with an apparatus for cleaning and drying one needle at a time in an especially efficient and effective manner.

Prior devices for cleaning hypodermic needles usually require repeated positioning and removal of a needle to be cleaned with respect to several discharge ports for injecting different cleaning fluids into and through the needle. A multitude of distinct bimanual operations were required. It was often difficult in such prior devices to quickly provide flow-tight relationship between an end of the needle and a discharge port. Unless the needle was in proper position, cleaning by prior devices was incomplete, ineffective and time-consuming.

Furthermore, prior means for providing proper positioning of the needle, with respect to a discharge outlet from which a cleaning fluid was ejected, usually included a tip or nozzle portion partially inserted into the head of the needle in contact with interior walls of the needle. Such an arrangement was inefficient and ineffective because the interior surface of the needle head was not completely cleaned and dried, and all traces of a solution which had been used in the needle were not removed. Such prior devices rendered unsatisfactory cleaning of hypodermic needles a slow, tiresome, and bothersome task.

There is a definite need for an efficient and effective single hypodermic needle cleaner for use in doctors' offices, small dispensaries or first aid stations, where a relatively few needles are used but wherein considerable time is expended in cleaning the needles because of the prior inefficient methods and devices employed. Such a needle cleaner must be operable without requiring auxiliary equipment, such as a compressed air supply and pressure regulators.

The primary object of this invention, therefore, is to design and provide an improved apparatus for cleaning open-ended, hollow, tubular elements which may be efficiently manually operable and very effective to clean a single needle in a minimum of time.

Another object of this invention is to design and provide an improved apparatus for cleaning open-ended, hollow, tubular elements wherein the apparatus is portable and is not dependent upon auxiliary equipment such as a compressed air source.

Another object of this invention is to design

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and provide a one-position hypodermic needle cleaner wherein a plurality of cleaning liquids may be forcibly and successively injected into a needle for passage therethrough without changing the position of the needle.

A further object of this invention is to design and provide a readily manually operable hypodermic needle cleaner which is easy to manufacture, inexpensive to operate, and is capable of thoroughly cleaning interior surfaces of a needle.

Still another object of this invention is to design and provide an improved apparatus for cleaning open-ended tubular elements wherein a single discharge port is provided for a plurality of cleaning fluids so that the element need be positioned only once for passage therethrough of each cleaning fluid under pressure and a second discharge port is provided for passage therethrough of air under pressure for thoroughly drying interior surfaces of the needle.

This invention contemplates an apparatus as mentioned above wherein discharge port means includes a hollow, yieldable gasket member and a hollow retaining nut, both arranged to not only center a needle positioned against the gasket member but also to aid in holding the needle in fluid-tight relation to the gasket without introducing a portion of the gasket member into the end of the needle in contact with internal walls thereof.

Still another object of this invention is to provide an improved discharge port means which is adapted for cleaning virtually any type of open-ended, hollow, tubular element of the general character of hypodermic needles.

Generally speaking, this invention comprises a plurality of open-top receptacles positioned on a base for supplying different cleaning liquids, a plurality of pump means including manually operated pumps operatively positioned above the receptacles for pumping liquid therefrom and a pump for manually compressing air, a plurality of conduits connecting said pump means with an outlet housing located at one side of a horizontal rack member supporting the pump means, said outlet housing being provided with a duct in fluid communication through the conduits with each of the liquid pump means, said duct having a discharge port; and a second discharge port positioned adjacent the liquid discharge port for passage of air therethrough compressed by the air pump means.

Other objects and advantages of this invention will be readily apparent from the following description of the drawings.

In the drawings:

Fig. 1 is a top plan view of an apparatus embodying this invention.

Fig. 2 is a side elevational view of the apparatus shown in Fig. 1.

Fig. 3 is a plan view taken from the plane indicated by the line III—III of Fig. 2.

Fig. 4 is a fragmentary sectional view taken in the plane indicated by the line IV—IV of Fig. 1 and showing the structure of a liquid pump means employed in this invention.

Fig. 5 is a fragmentary sectional view taken in the plane indicated by the line V—V of Fig. 1 showing in detail an air pump means.

Fig. 6 is an enlarged fragmentary top view, partly in section, of an outlet housing employed in this invention.

Fig. 7 is a sectional view taken in the plane indicated by line VII—VII of Fig. 6.

Fig. 8 is a sectional view taken in the plane indicated by the line VIII—VIII of Fig. 7.

Fig. 9 is a sectional view taken in the plane indicated by the line IX—IX of Fig. 7.

Fig. 10 is a perspective view of one type of hypodermic needle capable of being cleaned by the apparatus of this invention.

Fig. 11 is a perspective view of a needle and buffing means for cleaning the interior of the head of a hypodermic needle.

Referring to Fig. 1 the apparatus embodying this invention, generally indicated at 15, comprises a flat, rectangular base 16 suitably supported from a surface by spaced pads 17. The top surface of base 16 is provided with an suitable, elongated depression 18 adjacent one side serving to position a plurality of non-sealed containers or receptacles 19, 20 and 21 illustrated in the form of open top bottles. The depression 18 is preferably extended laterally toward the opposite side for positioning a drip pan 22.

Above the receptacles 19, 20 and 21 is supported an elongated rectangular rack member 23 from corner posts 24 of angle section. Each post 24 is provided with a bottom, transverse, rectangular end wall 25 arranged to be secured to the base 16 in any suitable manner as by a screw or a positioning lug 26. At each end of rack member 23 adjacent posts 24 may be connected by a transverse member 27 to which the rack may be conveniently secured by means of threaded stud bolts 28 extending through the rack and in threaded engagement with the member 27.

The rack 23 may include a flat top wall 29, depending end walls 30, and side walls 31. The bottom edges of end walls 30 seat on the transverse members 27.

The rack 23 supports a plurality of manually actuatable fluid pump means in spaced relation along approximately the longitudinal axis of the rack. The fluid pump means include liquid pumps 32 each operably positioned over a respective receptacle 19, 20 and 21 and an air pump 33 supported adjacent one end of the rack.

Each liquid pump 32 (Fig. 4) comprises a cylinder 34 having a ported top end wall 35 through which a spring-biased piston 36 is manually, reciprocally operated. The bottom end of cylinder 34 is threadedly connected to a bottom cylinder head 37 provided with an upwardly directed, reduced extension 38 extending through an aperture 39 provided therefor in top wall 29 of the rack 23. The top annular edge 40 of extension 38 provides a seat for the lower end of a coil spring 41, the upper end of which is adapted to seat as at 42 against an annular flange 43

fitted on piston 36 intermediate ends of the piston. The lower end of piston 36 is reciprocally movable within a cylinder sleeve 44, the upper edge of sleeve 44 serving to limit downward movement of piston 36 by abutment with flange 43 and the lower end portion of sleeve 44 being fitted within an axial recess 45 in cylinder head 37. At its bottom end the piston 36 may be provided with a circumferential groove 46 carrying a seal ring 47 slidably engageable with the interior surface of sleeve 44.

The bottom cylinder head 37 is provided with an axial enlarged bore 48 affording connection to a depending suction pipe or tube 49 extending into a respective receptacle and terminating a short distance above the bottom of the receptacle. Above the enlarged bore 48, head 37 is provided with a reduced bore axially aligned with bore 48. Encircling bore 50 is a tapered downwardly directed conical seat 51 for a ball-type check valve 52. Above seat 51 the bore 45 of the cylinder is provided with inclined converging walls 53 terminating in a circular recess to facilitate seating of the ball check valve.

The converging walls 53 may be interrupted by a horizontal port 54 communicating with a slightly enlarged bore 55 adapted to receive there-within one end of a conduit 56 for conducting flow of fluid discharged from the pump to outlet housing 77.

The air pump 33 (Fig. 5) may also comprise a cylinder 60 having a ported top wall 61 and a bottom portion threaded to a bottom cylinder head 62 which extends upwardly through an aperture 63 provided in top wall 29 of rack 23. Within cylinder 60 is a manually, reciprocally operable piston 64 having a piston head including axially spaced annular flanges or rings 65 and a seal ring 66 secured therebetween for slidable sealing contact with the interior walls of the cylinder 60. Coil spring 67 extending between the top annular edge of cylinder head 62 and the bottom annular surface of the lowermost ring 65 spring biases piston 64 upwardly. The piston head includes an enlarged lower portion 68 which is adapted to seat in closed position as at 69 on the top end face of head 62.

Cylinder head 62 is provided with an inlet passageway 70 having an enlarged upper and inner portion 71 defining an inclined shoulder providing a seat for a ball check valve 72. The cylinder head 62 is provided with an air outlet passageway 73 terminating in a radially disposed enlarged recess 74 adapted to receive an end of an air conduit 75.

As best seen in Fig. 3 conduits 56 and conduit 75 lie closely beneath the top wall 29 and are each connected at their outer ends to a coupling sleeve 76 for connection to an outlet housing generally indicated at 77 disposed above drip pan 22.

The outlet housing 77 is illustrated as of generally trapezoidal plan and of thick section, the long side of said housing being secured to a side wall 31 opposite receptacles 19 and 20 by any suitable means such as stud bolts 78. Wall 31 is provided with an aperture 79 adjacent outlet housing 77 affording passage therethrough of horizontal, tapered, tubular protuberances or nipples 80 adapted to be connected to sleeves 76. Each nipple 80 is provided with an axial passageway 81, the passageways 81 in fluid communication through conduits 56, with receptacles 19, 20 and 21 being extended inwardly into housing 77 for intersection with a transverse common duct 82 lying in a plane slightly above the plane of the

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passageways 81. Duct 82 may extend to one edge of housing 77 to permit cleaning, the outer end of duct 82 having threaded connection with a removable clean-out plug 83.

Check valve means are provided at the intersection of each passageway 81 with duct 82 for regulating passage of selected liquids through outlet housing 77. Each check valve means includes a vertically disposed recess 84 provided with a bottom lying below the axis of passageway 81. A tubular element 85, positioned within recess 84, is provided with a headed portion closely fitting the walls of recess 84 just above passageway 81 and has a shank 86 of reduced diameter to permit flow of fluid therearound from passageway 81. The lowermost end of shank 86 is spaced from the bottom of recess 84, and element 85 is provided with an axial passageway 87 closed at its upper end by a ball check valve 88 seated on a radially inwardly tapered top face of element 85.

Above check valve 88 recess 84 is formed with an enlarged upper internally threaded portion for threaded connection with a screw plug 89. The plug 89 is provided on its lowermost face with an upwardly directed conical recess 90 adapted to receive ball check valve 88 when fluid is pumped through the associated passageway 81 and duct 82. A suitable sealing ring 91 may be provided for plug 89.

The common duct 82 provides fluid communication for liquids flowing from receptacles 19, 20 and 21 through the check valve means to a horizontal passageway 92 formed generally in prolongation of passageway 81 associated with receptacle 19, as seen in Fig. 6. Passageway 92 terminates in a vertical passageway 93 connected to discharge port means generally indicated at 94. Thus liquid pumped from each of the receptacles 19, 20 and 21 is conducted to a single discharge port means for injection into a needle to be cleaned.

The discharge port means 94 includes a resilient, yieldable, elongated, thimble-like gasket 95 positioned within an internally threaded, circular, depending, hollow boss 96 formed on housing 77 by an externally threaded hollow retainer nut 97. The gasket 95 is provided with an axial passageway or port 96 aligned with passageway 93 and is provided with an annular radially outwardly extending flange 99 compressed between the top annular edge of nut or retainer 97 and the bottom wall of the hollow boss 98.

Gasket 95 and retainer nut 97 are cooperable to center and sealably position the butt end of a needle to be cleaned in fluid-tight position against gasket 95. The bottom face of gasket 95 is provided with slightly downwardly radially inwardly directed converging surfaces 100 terminating in a transverse annular face encircling the bottom opening of passageway 96. The nut 97 is provided with a bore and an outwardly flared lower end face 101 adapted to guide and center an end of a needle inserted therein into communication with passageway 96 of gasket 95. It should be noted that the opening to passageway 96 is disposed in a plane slightly above the termination of tapered walls 101 so that the butt end of a needle guided into nut 97 may be slightly received within the bore of hollow nut 97 so as to positively position the needle end on the downwardly slightly pointed end portion of gasket 95. It should also be noted that converging surfaces 100 contact the inner edge of the hollow needle end to provide fluid-

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tight relation, extend only slightly within the needle end, and do not contact any of the interior surfaces of the needle to be cleaned.

Conduit 75 is similarly connected to outlet housing 77 by a coupling sleeve 76 fitted over a respective nipple 80 on the outlet housing. The passageway 81 connected with air pump 33 through conduit 75 extends horizontally to a vertical passageway 102 connected to a discharge port means 103 of the same character as discharge port means 94 and comprising a gasket 95 and retainer nut 97.

Beneath the air pump 33 may be provided a housing 105 for a suitable high torque, slow speed, electric motor 106 adapted to slowly rotate a motor shaft extension 107. The extension 107 may be provided with a pair of oppositely directed notches 110 for conveniently securing cotton fibers fed to the turning shaft extension and spun thereon to provide a suitable cotton pad or swab of selected diameter for insertion into a head 108 of a hypodermic needle for cleaning the interior surface thereof to remove and loosen matter which may have accumulated therein.

Receptacles 19, 20 and 21 may be filled with any suitable cleaning fluids such as, for example, a detergent and distilled water in receptacles 19 and 21 respectively and a cleaning solvent or detergent of any suitable type (such as alcohol) contained in receptacle 20. Before subjecting the needle to be cleaned to the cleaning fluids and drying air, the inner surface of head 105 may be swabbed by pushing such head on the rotating cotton swab carried on the shaft extension to loosen and remove any foreign matter collected therein during use. A needle to be cleaned may be then manually positioned with the headed end centered and in fluid-tight contact with gasket 95 in the discharge port means 94 and held with one hand. Actuation of pump 32 above receptacle 19 by the other hand of the operator will raise liquid into the pump cylinder, the pump cylinder check valve closing for discharge of said liquid through conduit 56 past the respective check valve 88, through the discharge port means 94 and into the needle to be cleaned. The check valves 88, associated with receptacles 20 and 21, remain in closed position. Normally, only one stroke of pump 32 will force sufficient liquid from receptacle 19 through the needle for an initial cleaning step. A similar pumping operation is performed with each of pumps 32 positioned above respective receptacles 20 and 21. The pumps 32 are preferably designed to eject about 5 cc. of liquid for each full stroke of the piston. Normally this quantity is more than sufficient to flush the hypodermic needle. In each instance the hand positioning the needle is not moved, whereas the other hand is used to operate the three liquid pumps by a simple vertical up-and-down pumping motion. After the interior surfaces of the needle have been flushed and washed by each cleaning liquid the needle head may be removed from discharge port means 94 and positioned in discharge port means 103 for quickly drying the interior surfaces of the needle by actuation of air pump 33. It should be noted that discharge port means 103 is closely adjacent to discharge port means 94 and the repositioning of the needle being cleaned is simply and effectively accomplished.

It is understood that this invention contemplates that air and liquid conduit means may be conveniently and suitably connected to only one of the discharge port means so as to provide flow

of pumped air to the needle through a single discharge port means. Thus, only one positioning of a needle to be cleaned is required for simple, effective and rapid cleaning thereof.

The check valve arrangement in the outlet housing is such that a minimum length of passageway is provided between each check valve 88 and the discharge port means 94. Only minute quantities of fluid from prior pumping operations will remain in these passageways and be carried by fluid from the successively actuated pump means to and through the needle being cleaned. It may also be noted that the pumps 32 and 33 are designed to considerably increase the pump force applied to the fluid so that the fluid is forcibly passed through the apparatus and through a needle being cleaned without subjecting receptacles 19 and 21 to pressure. Thus, positive cleaning is provided because all interior surfaces of a needle are subjected to forcible washing and flushing by the pumped cleaning fluid and all interior surfaces of the needle are reached by the cleaning fluid because of the design of the gasket 95.

The simplification of the bi-manual operations required to operate this improved hypodermic needle cleaner is obvious. One hand holds a needle while the other hand pumps each different cleaning fluid through the needle without repositioning of the needle.

It should be particularly noted that while the illustration above describes a sealing gasket and a hypodermic needle in fluid-tight contact therewith, the gasket and retainer nut are arranged to accommodate a needle or tubular element having a hose type end or male type end in fluid tight relation and in such a manner that all interior surfaces of the tubular element are flushed and washed. In the male type end, an extension is provided of a tubular element above a collar, the extension being readily received within the passageway 96 of the gasket and the collar of the needle is held against the end face of the gasket in sealing engagement therewith. The passageway 96 is of sufficient diameter to receive needles having male type ends such as those now in use in hospitals, and of course may be made of any selected diameter. This passageway 96 is also of sufficient depth so that such an extension will not extend into contact with the metal outlet housing, a condition which might damage the end of the extension when the collar is held in fluid-tight contact with the gasket.

It is understood, of course, that various modifications and changes may be made in the pump means and design of the outlet housing and of the base and rack supporting the pump means. All such modifications and changes coming within the scope of the appended claims are embraced thereby.

We claim:

1. In an apparatus for cleaning hypodermic needles, the combination of: a base; a plurality of open receptacles carried by the base for containing a supply of different cleaning liquids; a rack member supported from the base above the receptacles; a plurality of liquid pump means carried on the rack member, each liquid pump means being supported over a receptacle for pumping liquid therefrom and including a suction pipe extending into an associated receptacle and a check valve element in each pump means for said suction pipe; an outlet housing projecting outwardly from one side of the rack

member; a plurality of conduits extending between said pump means and said outlet housing; a plurality of passageways in the housing, each in communication with a conduit; a duct in the housing in communication with the passageways connected for carrying liquid from the liquid pump means; check valve means at the intersection of each passageway with the duct; and discharge port means carried by the outlet housing for said duct, said discharge port means having means arranged to guide and position an end of a needle into sealed relationship therewith.

2. An apparatus as defined in claim 1 wherein said discharge port means includes a hollow resilient gasket having a tapered end face arranged to seal, in fluid-tight relation, an end of a needle positioned thereagainst.

3. An apparatus as defined in claim 1 wherein said discharge port means includes a ported gasket and a hollow, retaining nut having an outwardly flaring face arranged to guidably center an end of a needle with respect to the gasket.

4. An apparatus as defined in claim 1 wherein said discharge port means includes a hollow nut and a ported gasket positioned within said nut, said gasket and nut being cooperable to guidably center and position an end of a needle in fluid-tight relation with the gasket.

5. In an apparatus for cleaning open ended, hollow, tubular elements, including a plurality of sources of supply of cleaning fluid substantially at atmospheric pressure, the combination of: a plurality of pump means, each operably connected to a respective cleaning fluid supply and arranged to be sequentially manually actuated; a conduit connected to each pump means for conducting pumped fluid therefrom; and means for discharging cleaning fluid from said conduits into a hollow tubular element to be cleaned, said discharge means including an outlet housing at one side of the pump means having a plurality of passageways, each connected to a conduit; and a single duct intersecting said passageways, said duct being in communication with a single discharge port means; said discharge means having means arranged to guide and position an end of a hollow tubular element into sealed relationship therewith; and check valve means at each intersection of the passageways with the duct.

6. An apparatus as defined in claim 5 wherein the discharge port means includes a resilient thimble-like ported flanged gasket and a hollow gasket-retaining nut cooperable therewith to seal the discharge port means and to position and to center an end of a needle in sealed fluid conducting relation to the ported gasket.

7. In an apparatus for flushing a hypodermic needle with different cleaning fluids sequentially, the provision of: an outlet housing having a passageway for flow of said fluids and provided with a discharge port; an internally threaded portion on the housing extending beyond and encircling said discharge port; an externally threaded retainer cooperable with said internally threaded portion and having a bore; and a resilient thimble-like gasket received within said bore, and having a flange pressed against margins of the discharge port by said retainer to seal said discharge port, said gasket being axially ported in alignment with the discharge port and provided with a rearwardly and outwardly inclined face extending from said axial port; said retainer having an outwardly and forwardly flaring end for guiding the butt end of a hypodermic needle

into the bore and into seating relation with the face of the gasket, the end of said gasket being wholly within the bore of the retainer.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
355,139	Cochran	Dec. 28, 1886
723,792	Wickham	Mar. 24, 1903
1,207,392	Frazier et al.	Dec. 5, 1916
1,235,571	Jensen	Aug. 7, 1917

10

Number
1,343,621
1,752,903
1,955,169
2,012,107
2,109,547
2,259,644

Name	Date
Garver	June 15, 1920
Flagge	Apr. 1, 1930
Bertschinger	Apr. 17, 1934
Papadopoulos	Aug. 20, 1935
Moll	Mar. 1, 1938
Kling	Oct. 21, 1941

FOREIGN PATENTS

Country	Date
Sweden	June 29, 1901
Austria	Feb. 10, 1905
France	Apr. 26, 1923