

- [54] **MANUAL SYRINGE FILLING APPARATUS**
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- [73] Assignee: **Sherwood Medical Industries, Inc.**, St. Louis, Mo.
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- [52] U.S. Cl.141/27, 141/114, 141/378
- [51] Int. Cl.**B65b 3/14**
- [58] Field of Search.....141/27, 375, 279, 141/369, 267, 25, 26, 28, 114, 116, 378, 18, 1, 2, 94, 119; 222/181, 209; 206/46 FC; 248/206 A; 128/214, 218 C; 23/259

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[57] **ABSTRACT**

A syringe filling apparatus consisting of an upright frame having a platform for supporting a tray adapted to hold a plurality of syringe cartridges in either a horizontal storage or vertical filling position, there being provided below the platform a manually operated squeeze bubble defining a pump for pressurizing a removable medicament unit. The medicament unit includes a flexible outlet tube from a disposable medicament bottle having a nozzle at the end of the tube. A pinch-type handle valve is fixed to the end of the flexible outlet tube adjacent the nozzle that may be manually grasped and actuated to fill each of the cartridges supported on the tray on the work supporting platform.

[56] **References Cited**

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4 Claims, 5 Drawing Figures

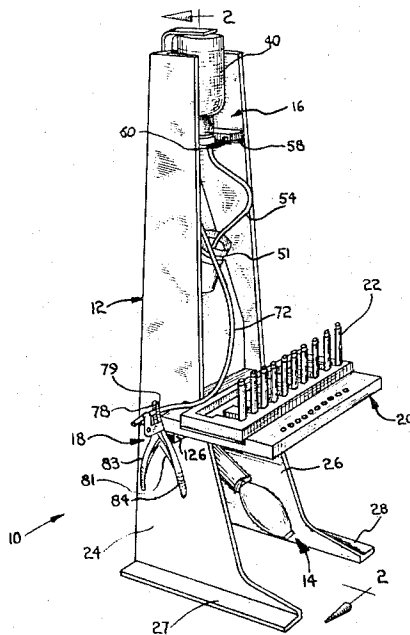


FIG - 1

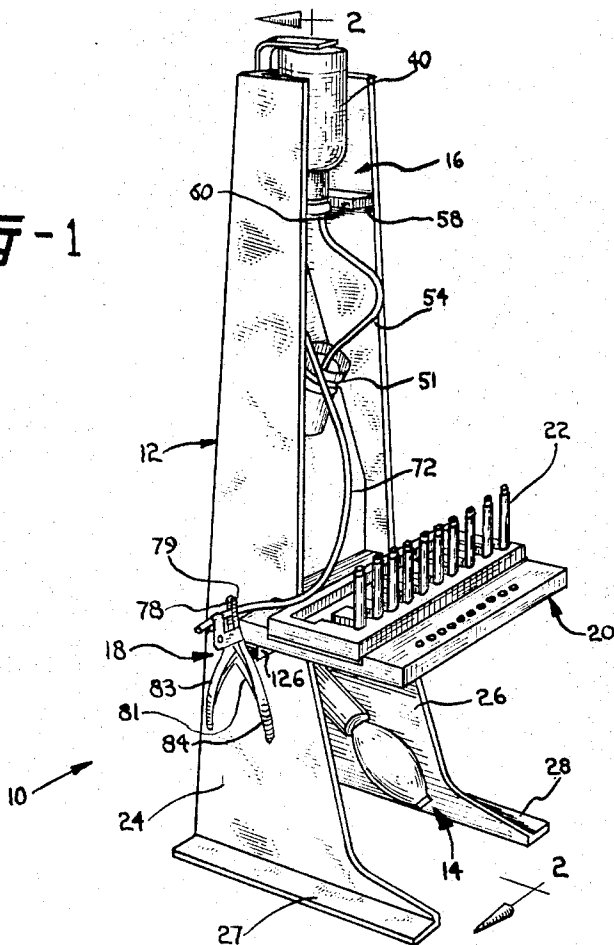
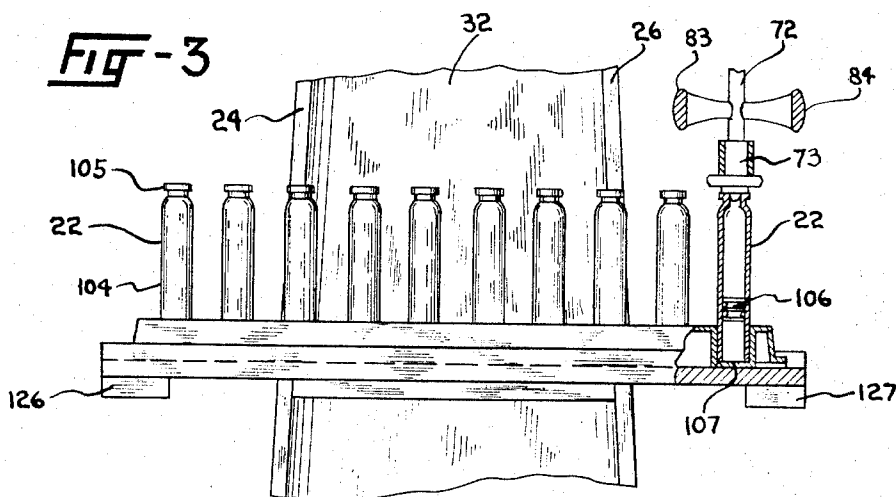


FIG - 3



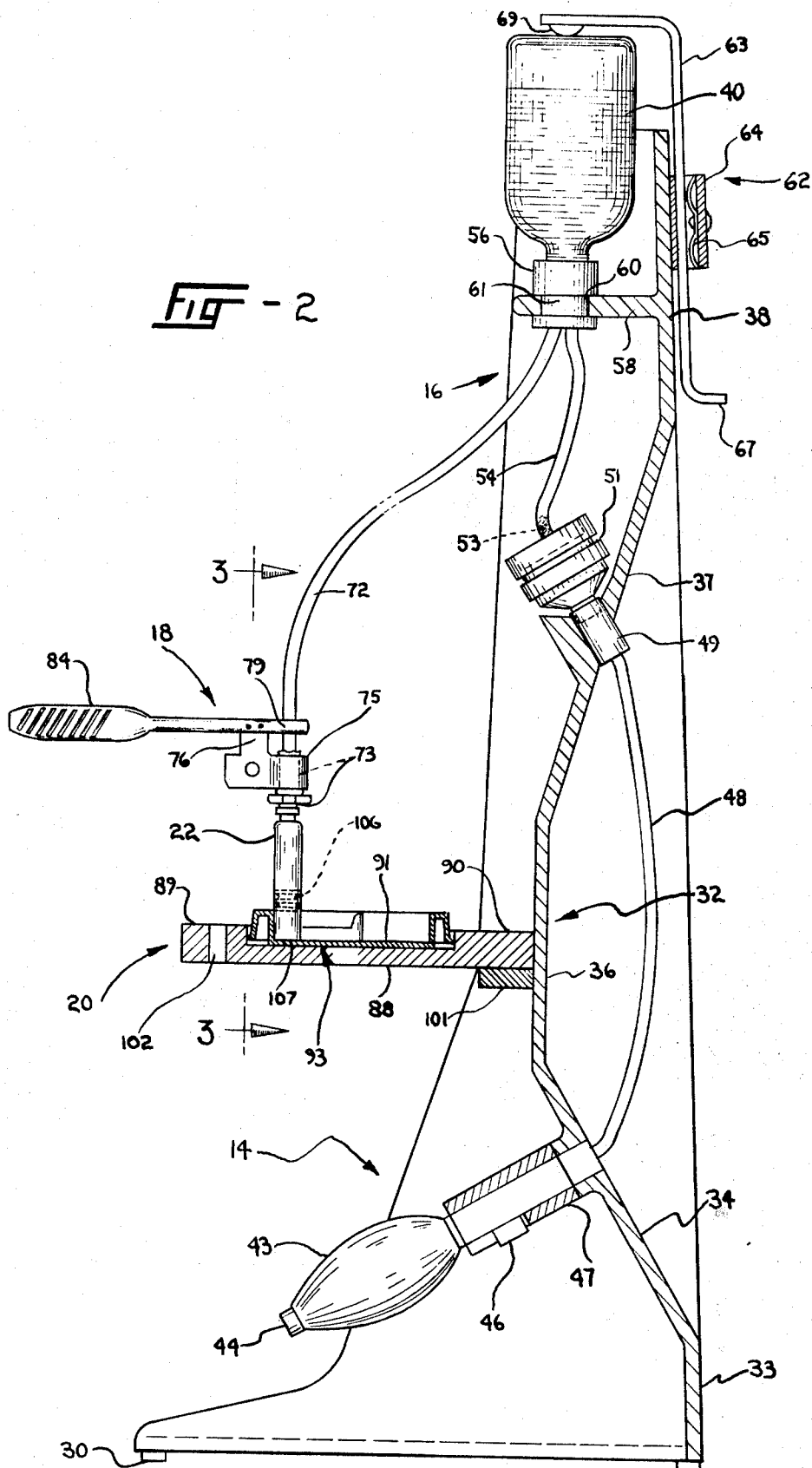
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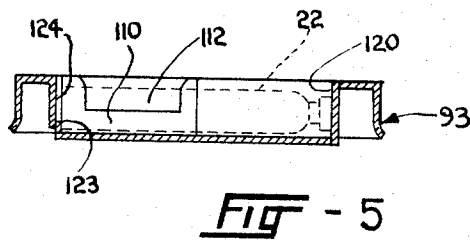
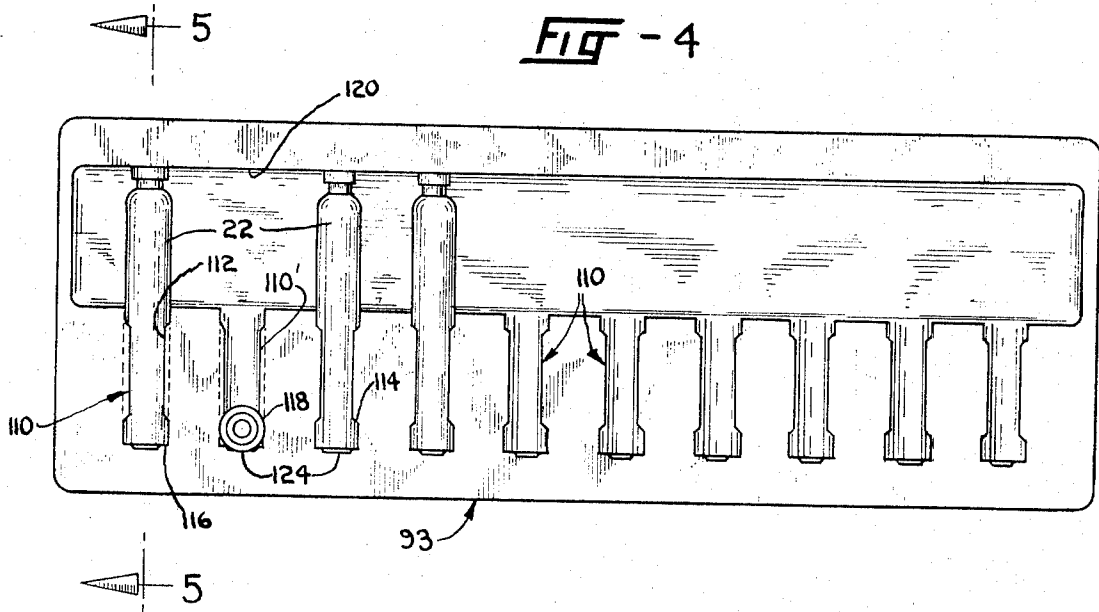
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FIG - 2





MANUAL SYRINGE FILLING APPARATUS

BACKGROUND OF THE PRESENT INVENTION

There are a plurality of techniques employed in present day hospitals for filling syringes with medicament. One such technique involves the use of a prefilled medicament container having a seal over the open end thereof. The nurse or technician manually fills a plurality of syringes by inserting the needle of each syringe, one at a time, through the medicament bottle seal and thereafter withdrawing the syringe plunger until the desired level of medicament is observed in the syringe barrel at which time the technician terminates syringe plunger withdrawal and removes the syringe needle from the medicament container seal. This operation is repeated until medicament in the prefilled container is exhausted.

There are several disadvantages to this technique, one being the slowness in filling, another being the probability of inaccurate barrel filling resulting from technician error, and still another and perhaps the most important is the possibility of contamination. The contamination may result from the insertion of different needles into the same container seal and may also result from the manual handling of the syringes and needles by the technician.

There have in the past been attempts to automate syringe filling and one such apparatus is disclosed in the copending application of Edward R. Tascher and Elmer A. Koenig, Ser. No. 26,683, filed Apr. 8, 1970, now U. S. Letters Patent 3,662,517 assigned to the assignee of the present invention.

In this prior application, a turret-type completely automatic syringe filling device is disclosed. The turntable indexes, carrying the syringes from one station to another, until all of the syringe barrels are filled automatically with medicament to the level sensed by a photocell. While this automatic apparatus is extremely rapid, efficient, and accurate, it is not practical to use this machine for filling a small number of syringes such as 100 or 200. Thus there arises a need for a less expensive, but accurate and reliable filling apparatus for syringes.

It is a primary object of the present invention to eliminate or minimize the problems in the prior art devices described above.

SUMMARY OF THE PRESENT INVENTION

In accordance with the present invention a syringe filling apparatus is provided that is manually operable but yet has the capability of the rapid and aseptic filling of a plurality of syringes or syringe cartridges. The apparatus includes an upright stand having a manually operable bubble pump that is squeezed repeatedly to pressurize a medicament container supported at the top of the apparatus frame in an inverted position.

The medicament container along with a self-piercing cap, tubing and nozzle are disposable items that preclude contamination of any permanent part of the filling apparatus with medicament. There are two tubes extending from the self-piercing cap connected to the medicament container. One of these communicates with the manually operable bubble pump through a filter fixed to the upright apparatus frame. This tube thus carries the air from the pump into the medicament container for the purpose of pressurizing the same. The second tube extending from the medicament container

cap is the discharge tube for delivering medicament through a nozzle at the distal end thereof.

Attached adjacent the nozzle is a manually operable pinch valve and handle combination, similar to, or having a pliers-type action, and when actuated manually opens the occluded discharge tube permitting medicament from the container to flow into the syringes. When the proper level of medicament has been observed by the technician in each container, the manual pinch valve is simply released occluding the discharge tube and thereby terminating medicament flow. The adjacent syringes or syringe cartridges are filled with the same matter.

When not in use the pinch valve and discharge nozzle are held in a readily reached position on a syringe supporting platform by a permanent magnet.

To support the syringe barrels or syringe cartridges in an upright position, a removable storage tray is provided which is received in a recess on the work supporting platform. The tray includes a plurality of parallel recesses having gripping portions that hold the syringe cartridges in the recesses in a plane parallel to the plane of the tray. This is the storage position for the cartridges. Each of these recesses also has another gripping portion at the end of the recesses which hold the cartridges in an upright position during filling without the technician holding the syringe barrels or cartridges in any way.

Also provided on the work supporting platform are a plurality of apertures which may receive syringe barrels when it is not desired to use the removable supporting tray.

The present syringe filling apparatus is designed to provide the hospital pharmacy with a filling device that is comparatively inexpensive to install, requiring a minimum of maintenance. This apparatus discourages the common practice of returning partially used multi-dose vials or medicament containers to the shelf where they frequently are placed in rear positions and eventually lost through expired shelf life. Moreover, the present filling apparatus saves the time of both pharmacists and nurses while at the same time reduces the possibility of miscalculations, mismeasurement and other errors.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a filling apparatus in accordance with the present invention;

FIG. 2 is an enlarged cross-section taken generally along line 2—2 of FIG. 1;

FIG. 3 is a fragmentary view of the work supporting platform and tray;

FIG. 4 is an elevation view of the syringe supporting tray; and

FIG. 5 is a cross-section of the tray taken generally along line 5—5 of FIG. 4.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, the present syringe filling apparatus 10 is seen to consist generally of an upright frame member 12, a manual squeeze pump 14, a disposable medicament unit 16, a manually operated pinch valve 18 and a syringe supporting platform 20.

It should be understood that while the present filling apparatus is illustrated as being applied to the filling of syringe cartridges 22 that the device is also usable for

filling syringe barrels directly or for filling containers for oral liquid unit doses. The filling apparatus has the same advantages of minimum contamination, efficiency and accuracy of filling regardless of the specific configuration of the receptacle to be filled.

The frame 12 consists of two tapered upright side panels 24 and 26 having flanges 27 and 28 respectively that define the supporting feet for the device, although rubber feet such as indicated at 30 in FIG. 2 may be added thereto. The sides 24 and 26 converge somewhat to provide stability for the device and are joined by a back panel 32 shown best in FIG. 2. The back panel 32 has a lower vertical portion 33, a forwardly directed portion 34, a central vertical portion 36, a rearwardly extending portion 37 and an upper vertically extending portion 38.

For the purpose of pressurizing container 40 in the medicament unit 16 the manually operable bubble pump 14 is provided consisting of a rubber bubble 43 having an end 44 communicating with atmosphere, with a bayonet connection 46 received in a fitting 47 in housing back portion 34.

Air pumped by squeezing bubble 43 is delivered through a flexible conduit 48 connected at one end to a fitting associated with bayonet connection 46 and at the other end to a fitting 49 fixed to housing back portion 37.

Also removably seated within fitting 49 is a filter 51 for filtering the air pumped to the container 40. The filter 51 has a fitting 53 projecting upwardly therefrom for releasably receiving a flexible tube 54 defining a part of the disposable medicament container unit 16. It should be understood that the bubble pump 14 and the filter 51 are angularly related downwardly and upwardly, respectively, to both reduce the required depth of the unit and also to facilitate manual accessibility to these parts. The pump 14 delivers air through tube 54 to the container 40.

The disposable medicament unit 16 includes a self-piercing cap 56 which has needles, not shown, which are self-inserting into a rubber seal on the top of medicament container 40 when the cap 56 is inserted thereover.

To support the cap 56 and medicament container 40 on the frame 12, a cross-member 58 is provided adjacent the upper ends of the side panels 24 and 26. The cross-member 58 has a recess 60 having a width sufficient to receive and hold a necked-down portion 61 on cap 56 and in this manner hold the container in the inverted position shown in FIGS. 1 and 2.

To assist in holding the bottle 40 in its inverted position shown, a bracket assembly 62 is provided having an L-shaped bracket 63 frictionally held in position by a recessed member 64 fixed to the back of the frame with a spring member 65 frictionally engaging bracket 63 to hold it in its set position. The bracket 63 is vertically adjusted by grasping projecting portion 67 and raising and lowering a bottle engaging portion 69 until it securely engages the top of bottle 40.

The medicament unit cap 56 has a flexible plastic discharge tube 72 extending therefrom with a nozzle 73 at the distal end thereof for discharging medicament from bottle 40 into the syringe cartridges 22.

Pinch valve 18 serves the purpose of occluding the distal end of tube 72 to initiate and terminate discharge flow from tube 72 relative to the syringe cartridges 22. Toward this end the pinch valve 18 includes a bracket

75 surrounding the base of the nozzle 73 and gripping the same for the purpose of holding the pinch valve on the end of tube 72. Bracket 75 has a transverse projection 76 fixed to one of the pinch valve members 78 and 79. The pinch valve members 78 and 79 are biased to an occluding position on the end of tube 72 by a spring 81 and have handle portions 83 and 84 that permit the pinch valve to be operated in a manner similar to a pair of pliers.

The syringe supporting platform 20 includes a horizontally disposed member 88 having forward and rear raised portions 89 and 90 defining a recess 91 for holding a syringe cartridge supporting tray 93. The platform member 88 extends from rear wall portion 36 and is supported on cross-member 101.

The forward raised portion 89 has a plurality of apertures 102 therein for alternatively supporting the syringe barrels during filling, i.e., rather than employing tray 93.

The sides of platform member 88 carry magnets 126 and 127, either of which may hold the pinch valve 18 in an easily accessible position depending upon the hand of the technician.

The tray 93 is a one-piece plastic molding adapted to hold syringe cartridges 22 in either a horizontal position such as shown in the left recess in FIG. 4 or a vertical position as shown in FIG. 2. As shown in FIG. 3, the syringe cartridges 22 have cylindrical portions 104 with open lower ends forming the breech of the syringe cartridge and necked-down distal end portions 105 which receive a sealing cap, in a suitable capping machine after filling is complete. The cartridge 22 is then inserted into a syringe casing and a plunger (not shown) is attached to a prepositioned rubber piston 106 in the syringe cartridge 22. It should be understood that the piston 106 is initially positioned to provide the proper level of medicament in the cartridge 22 and also prevents medicament from flowing out the open end 107 of the cartridge 22.

As shown more clearly in FIGS. 4 and 5, the cartridge tray 93 has a plurality of parallel recesses 110 formed therein which receive the syringe barrels 22, for approximately one-half the length of the cartridge 22. Integrally formed resilient projections 112 formed on both sides of the recesses 110 hold the syringe cartridges 22 in the horizontal or down position shown in the left recess in FIG. 4, for storage both prior to and after filling. The projections 112 terminate at 114 short of the end 116 of the recess defining shoulders 118 that serve to grip and hold the cartridges 22 when in the upright position shown in the second recess 110' in FIG. 4.

Extending transversely of the recess 110 is an elongated recess 120 communicating with all of the recesses 110 and permitting the technician to easily grasp the cartridges 22 when raising them from or lowering them to their horizontal position shown in dotted lines in FIG. 5. The end 116 of recess 110 has a wall 123 with a small recess 124 which assists in seating and locating the cartridges 22 when in an upright position.

While the operation of the present device is believed clear from the above description a narrative description of the operation hereinafter will serve as a summary of the present invention. The medicament unit 16 is inserted in the device by inverting bottle 40 and sliding cap 56 in slot 60, connecting the free end tube 54

to fitting 53 and attaching the bracket 75 of the pinch valve to the nozzle end of tube 72.

Tray 93 with unfilled, uncapped cartridges 22 is then positioned in the recess 91 on platform 20. The cartridges are then raised to their upright position.

To fill the cartridges 22 the squeeze bulb 43 is squeezed, injecting filtered air into the medication bottle 40 creating a positive pressure in the bottle. The pinch valve 18 is then manually grasped to fill the cartridges 22.

After the cartridges 22 are filled the pinch valve 18 is returned to one of its positions held by magnets 126 or 127 on the sides of the platform 20.

After the cartridges 22 are filled, aluminum caps are placed on the cartridges and the cartridges are inserted into a cap crimping device (not shown) where the open distal ends 105 are sealed by crimping the caps therearound. The crimped and capped cartridge is then ready for use or alternatively may be returned to the tray 93 for storage.

We claim:

1. A medicament receptacle filling apparatus, comprising: frame means having front and back sides, and a lower end for supporting the frame means in a generally vertical position, a generally horizontal receptacle supporting platform on said frame means at the front side thereof for supporting a plurality of medicament receiving receptacles, a medicament supply container removably supported on said frame means in an inverted position above said receptacle supporting platform, manually operable pump means supported on said frame means for pressurizing the supply container, air conduit means connected between said pump means and the interior of said supply container, a filter connected in fluid flow communication with said air conduit means between said pump means and said supply container, whereby manual operation of said pump means pressurizes said supply container with positive

pressure filtered air, flexible delivery conduit means extending from said supply container, said flexible delivery conduit means having a discharge nozzle at the free end thereof, and a manually operable pinch valve detachably carried on the free end of the flexible conduit means, said pinch valve normally preventing flow of medicament through said delivery conduit means but being manually operable to permit said flow to initiate the flow of medicament selectively to each of said medicament receiving receptacles and to stop the flow of medicament to each medicament receiving receptacle to control the level of medicament in each medicament receiving receptacle.

2. A medicament receptacle filling apparatus as defined in claim 1 wherein said pump means has first means thereon communicating with the atmosphere for supplying air into said pump means, and second means on said pump means connected in fluid communication with said air conduit means to pump air from the atmosphere into the supply container for pressurizing the supply container with positive pressure.

3. A medicament receptacle filling apparatus as defined in claim 2 wherein said pump means comprises a squeeze bulb, and said platform includes a tray thereon for holding a plurality of said receptacles, said tray including means for frictionally holding the receptacles selectively in horizontal storage and vertical filling positions.

4. A medicament receptacle filling apparatus as defined in claim 2 further including a fitting connected to said frame means, and wherein said air conduit means includes a pair of conduits respectively connected in fluid communication with said supply container and said pump means, said fitting connecting said pair of conduits in fluid communication with each other, and said filter means being connected within said fitting to filter air flowing to said supply container.

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