

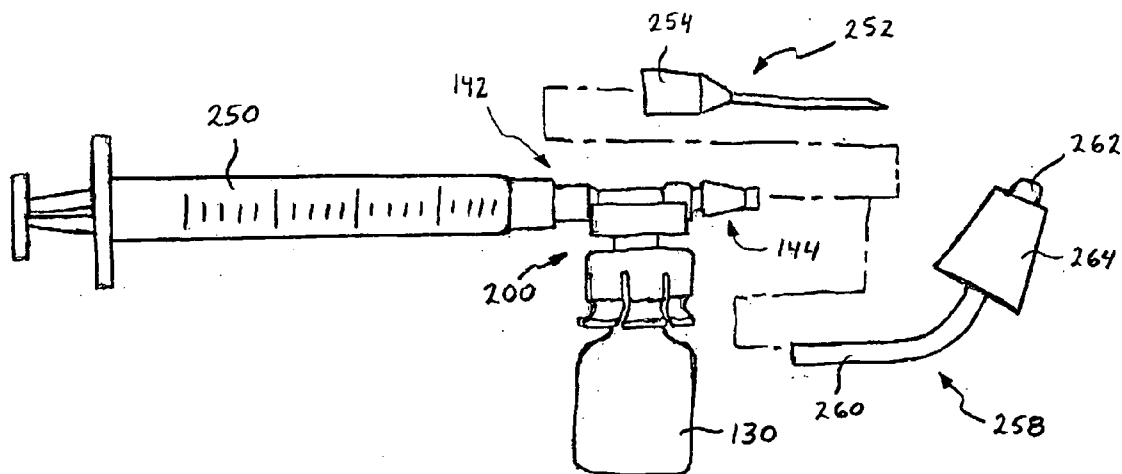


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(19) **United States**(12) **Patent Application Publication**
Denton et al.(10) **Pub. No.: US 2011/0083665 A1**(43) **Pub. Date: Apr. 14, 2011**(54) **VIAL MULTI-ACCESS ADAPTER****Publication Classification**(75) Inventors: **Marshall T. Denton**, Salt Lake City, UT (US); **Timothy R. Wolfe**, Salt Lake City, UT (US); **Mark A. Christensen**, Salt Lake City, UT (US)(51) **Int. Cl.**
A61M 11/00 (2006.01)(52) **U.S. Cl.** **128/200.21**(57) **ABSTRACT**(73) Assignee: **Wolfe Tory Medical, Inc.**(21) Appl. No.: **12/928,523**(22) Filed: **Dec. 13, 2010****Related U.S. Application Data**

(62) Division of application No. 10/737,656, filed on Dec. 16, 2003.

A multi-access adapter operable to dispense doses of a medicament in succession from a bulk container, such as a vial. A preferred adapter may be used alone, or in combination with various discharge devices. A first preferred combination includes the adapter paired with a needle for injection of the medicament into one or more patients. A second preferred combination includes an atomizing nozzle affixed to the adapter and arranged for discharge of the medicament there-through. Sometimes the atomizing nozzle carries a nostril guide structure that can be absorbent and may operate as a splash guard.



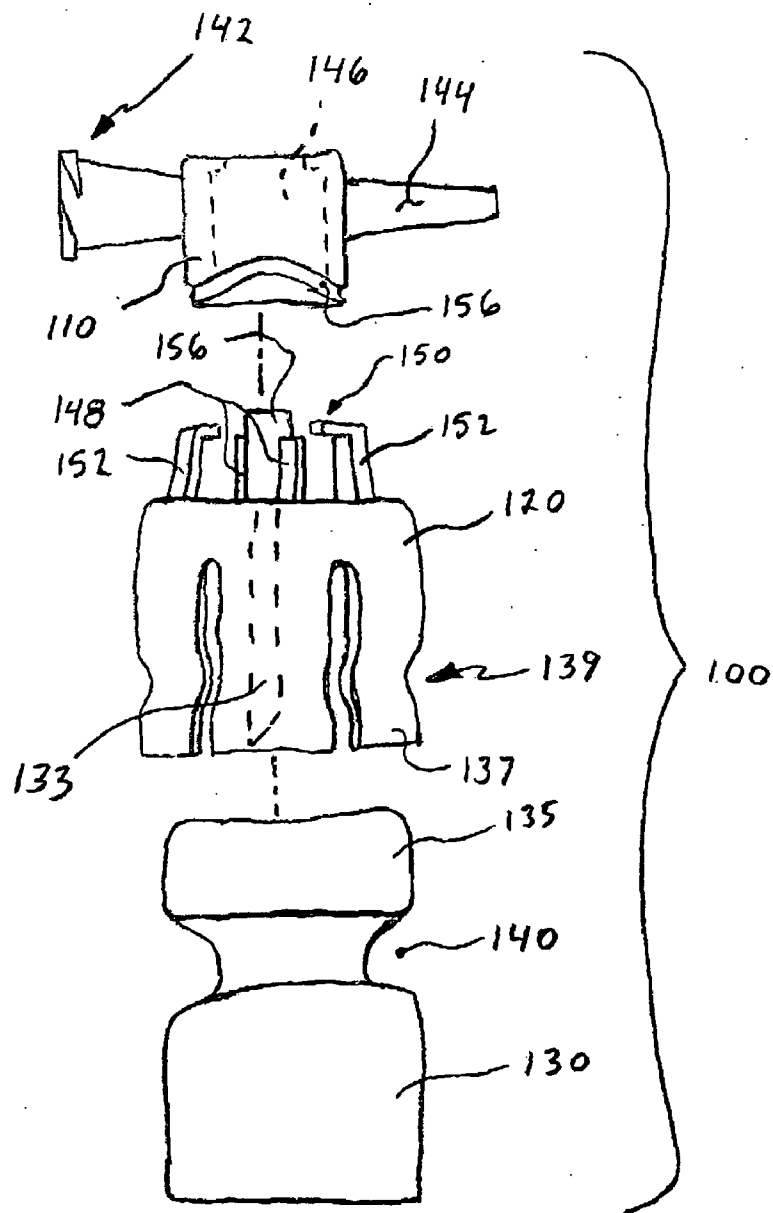


FIG. 1

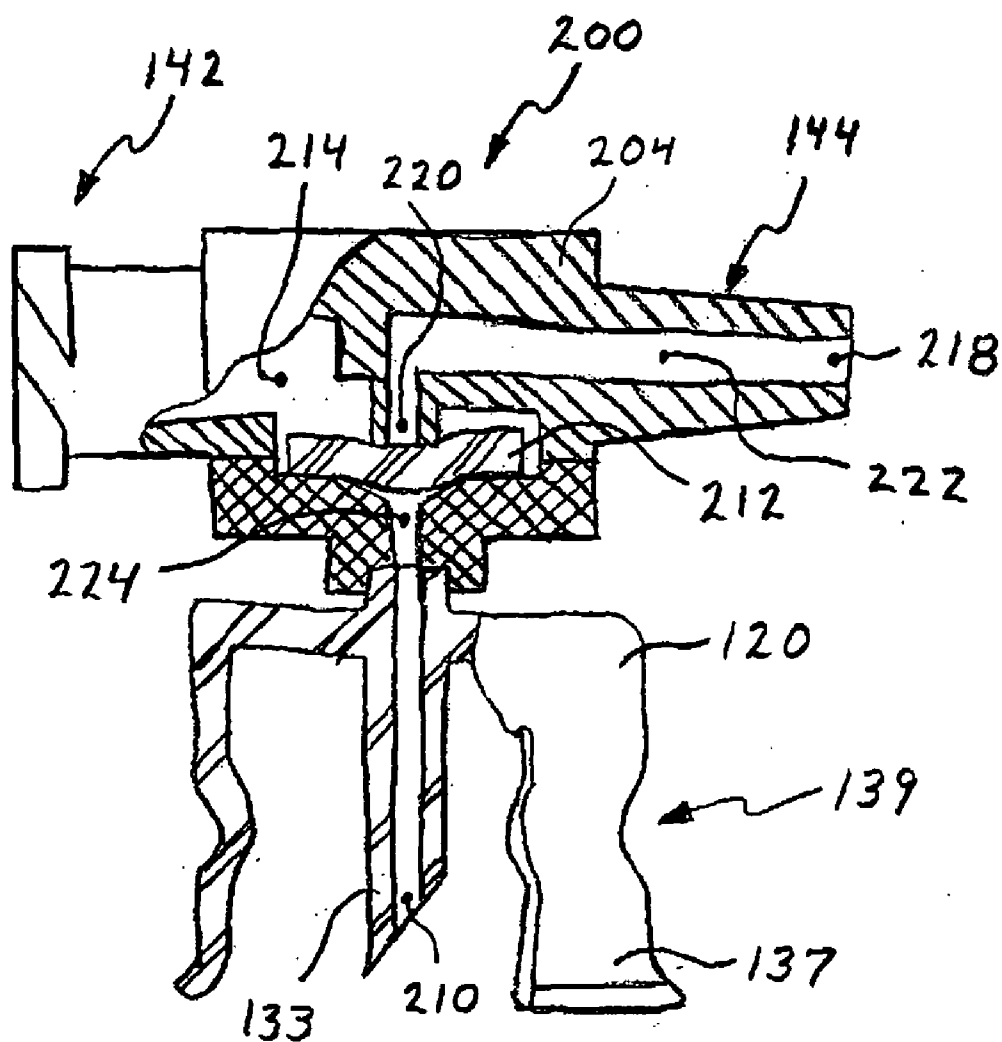
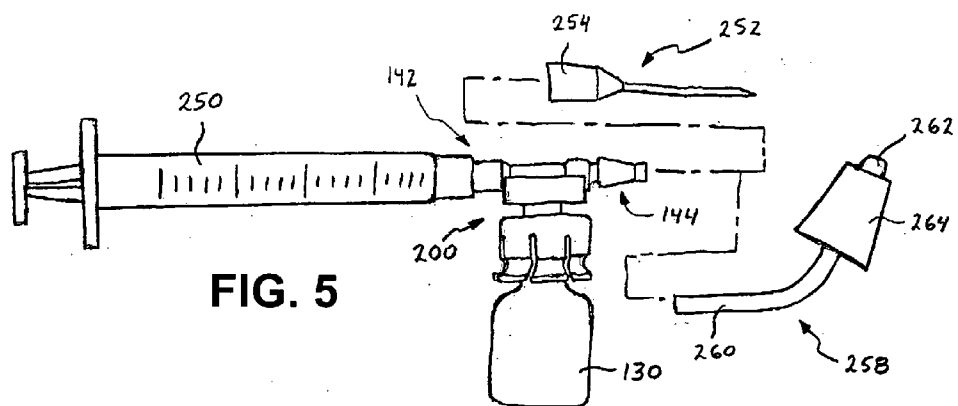
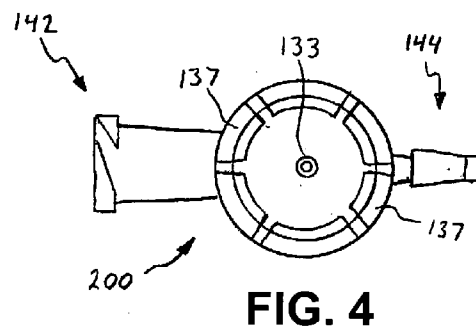
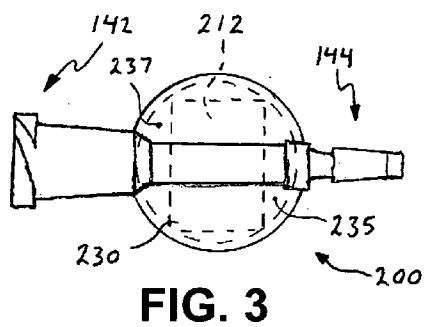
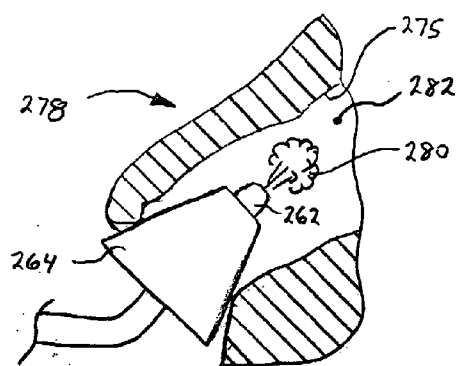
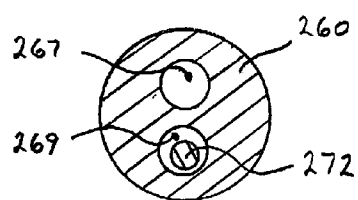
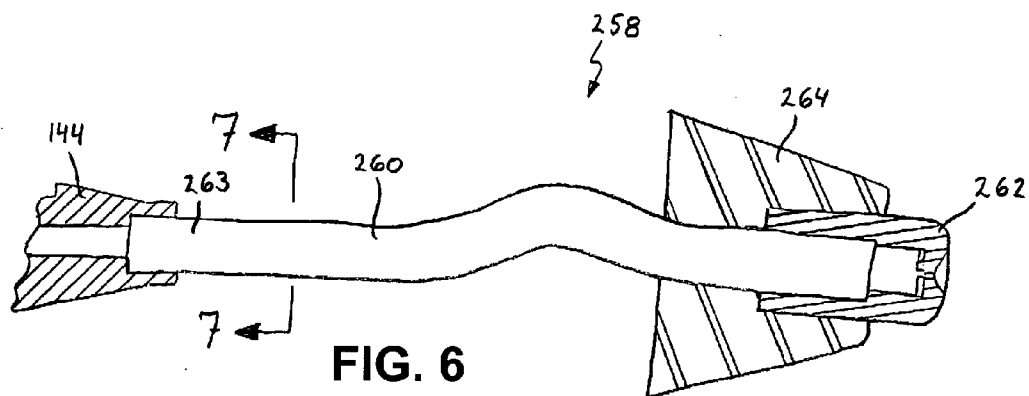
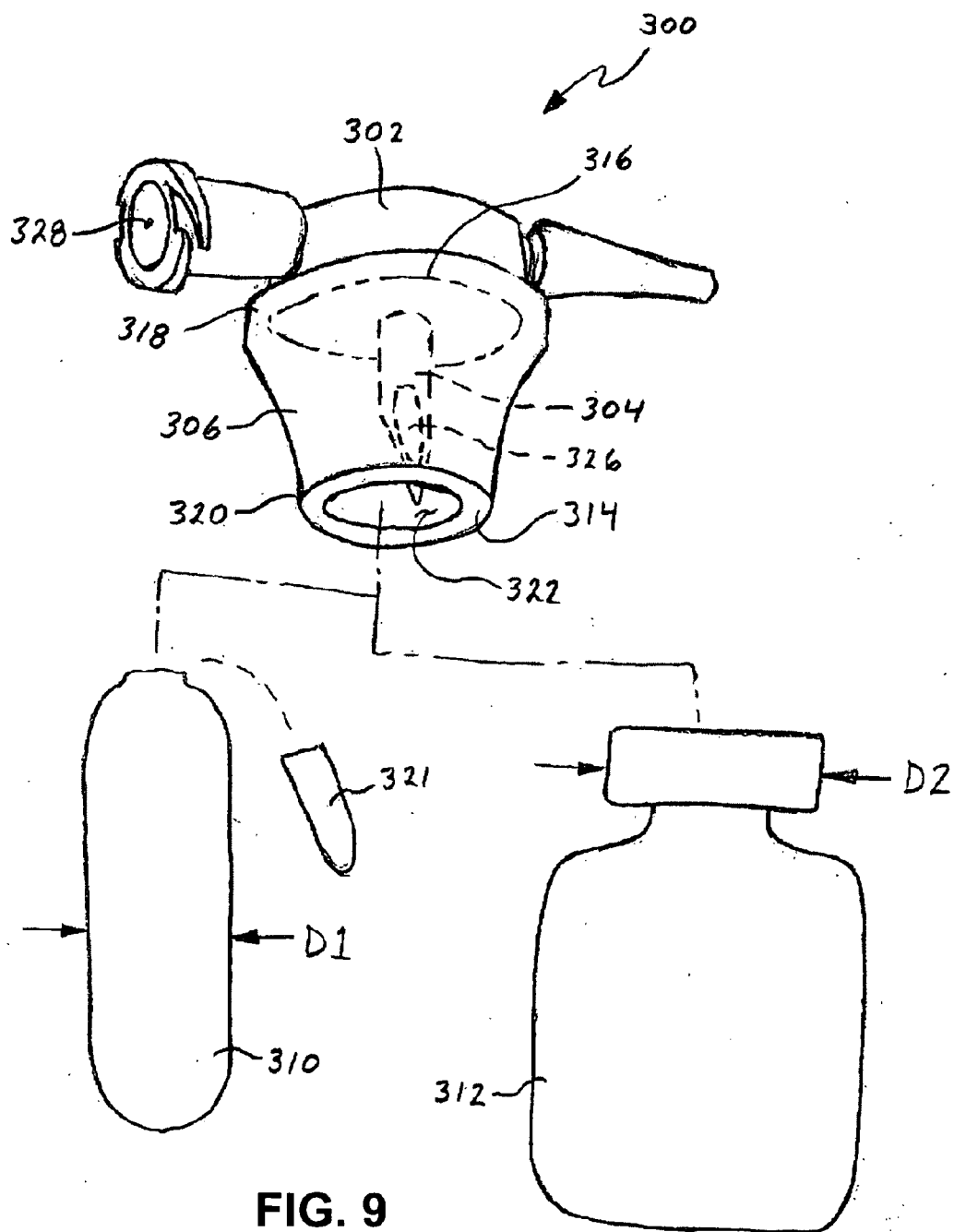


FIG. 2







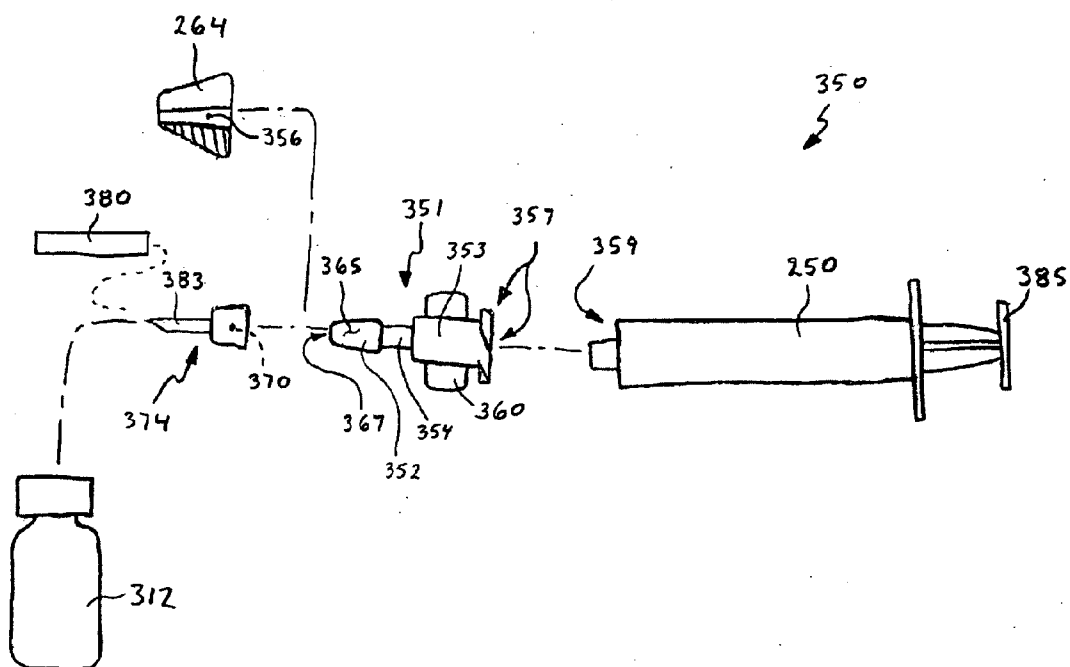


FIG. 10

VIAL MULTI-ACCESS ADAPTER

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is a divisional of U.S. patent application Ser. No. 10/737,656, filed Dec. 16, 2003, pending, the disclosure of which is hereby incorporated herein by this reference in its entirety.

TECHNICAL FIELD

[0002] The invention relates to devices for extracting a dose of a fluid from a sealed fluid container. The invention finds particular application in the medical field, providing multiple-dose extraction from vials or ampules, by incorporating a syringe as a cyclical pump.

BACKGROUND

[0003] Several devices have been developed to facilitate transfer of a dose of a liquid from a bulk container. In the medical field, certain of such devices may be used to transfer a dose of a medicament from a vial, or a bulk container of medicament, to a syringe for injection or administration of the dose to a patient. In some situations, it is desirable to transfer more than one dose of medicament from the container in rapid succession. Ogle, in U.S. Pat. No. 4,253,501, discloses a transfer system having a manually controlled valve and permitting successive withdrawals of a medicament from a bulk container using a syringe for administration of the medicament to a patient. Ogle's manual valve requires adjustment to a first position to permit withdrawal of a dose, or filling the syringe. Then, the valve must be adjusted, manually, to a second position to permit fluid flow from the loaded syringe for administration of the fluid to a patient. While operable, Ogle's device suffers from the requirement that a user must make manual valve adjustments to load and discharge a syringe.

[0004] Synnett discloses an apparatus in U.S. Pat. No. 5,334,163 that is adapted to withdraw doses of a pressurized gas from a bulk container for injection of that gas into body tissue with a syringe. Synnett provides a three-way valve that requires a manual adjustment to select a desired flow path between the container, the syringe, and an ejection conduit.

[0005] Zinger, in U.S. Pat. No. Des. 427,308, discloses an ornamental design for a vial adapter operable to pierce a seal carried by a container of a medicament. Zinger's vial adapter includes a spike that could be operable to pierce a seal membrane, and also has gripping structure that appears to be disposed to hold the container. The adapter disclosed in this patent is of the type that may be connected directly to a syringe, through a LUER-LOK™ type of connection, for withdrawal of a dose of fluid to fill the syringe with the desired dose of medicament fluid. Then, the adapter is removed from the syringe, and a discharge element may be affixed to the syringe, prior to administering the dose to a patient.

[0006] In U.S. Pat. Nos. 6,238,372 ("the '372 patent") and 6,379,340, Zinger discloses a fluid control device adapted for attachment to a syringe and operable to withdraw a dose of medicament from a container, such as a vial having a punch-through sealing membrane. The disclosures of these patents are hereby incorporated herein, as if set forth in their entirety, for their teachings of vials and adapters. Zinger's disclosed embodiments include a valve member having a core that is

manually positioned, by rotating it, to select a fluid flow path between the container, syringe, and an ejection conduit.

[0007] A commercially available embodiment of Zinger's device is generally indicated at 100 in FIG. 1. A flow path through conduit 110 is selected either by attaching the conduit 110 to, or removing it from, socket 120. Socket 120 can be placed into engagement with a vial 130 to pierce spike 133 through a membrane seal (not illustrated) in cap 135. A plurality of legs 137 each carry gripping structure, generally indicated at 139, arranged to hold vial 130 at a neck area 140 to resist removal of spike 133 from engagement with the vial 130. A first end of conduit 110 carries connection structure, generally indicated at 142, adapted for attachment to a syringe. A second end of conduit 110 carries a surface 144 adapted to form a slip fit with a needle, or other discharge device.

[0008] The flow path through conduit 110 is selected by a rotated position of core 146. As conduit 110 is placed into engagement with socket 120, wrench structure 148 engages into receiving socket structure (not illustrated) in core 146, and causes core 146 to rotate. Male thread structure, generally indicated at 150, carried by cantilevered arms 152 engages female thread 156 to alternately engage, and release, conduit 110 with respect to socket 120. At a first attached position, fluid can be extracted through nipple 158 to fill a syringe attached to structure 142. Successive 180 degree rotations of socket 120 with respect to conduit 110 can either release or re-engage the two components. Such rotations effect corresponding rotations of core 146, and thereby also select a flow path through the conduit 110. At a second attached position, with core 146 rotated 180 degrees from the first position, the core 146 blocks the flow path from the syringe. A syringe attached to structure 142 can only be discharged if conduit 110 is removed from the socket 120.

[0009] One embodiment of a vial adapter disclosed in the '372 patent, and illustrated in its FIGS. 3 and 4, can be oriented for discharge of a syringe while the syringe is attached to a vial. However, a manual adjustment must be effected to change a valve orientation. The device must be manually rotated to change a valve configuration subsequent to filling the syringe with the desired dose of fluid.

[0010] Situations occur that require dispensing successive doses of the same medicament to one or more patients. In a military application, repetitive injections may be required by needle during battlefield conditions, or to administer mass inoculations. In nasal therapy, an atomizer is typically employed to dispense multiple applications of a medicament, e.g., to one nostril, then to the other nostril for the same patient.

[0011] It would be an improvement in the art of dispensing medicaments to provide an adapter to interface with a bulk container of medicament and operable to permit dispensing successive doses of that medicament simply by operation of a syringe. It would be a further improvement to provide an adapter operable either as a nasal treatment device, or as an injection dispensing apparatus. A further improvement would include a guide structure at a discharge end of the nasal treatment device to space the discharge orifice from a nostril wall. A still further improvement would provide an absorbent guide structured as a splash shield.

BRIEF SUMMARY OF THE INVENTION

[0012] A multi-access adapter operable to dispense doses of a fluid in succession from a bulk container is provided

herein. The adapter may be used alone, or in combination with various discharge orifices. A first preferred combination includes the adapter paired with a needle for injection of the fluid into one or more patients. A second preferred combination includes an atomizing nozzle affixed to the adapter and arranged for discharge of the medicament therethrough. Sometimes the atomizing nozzle carries a nostril guide structure that can be absorbent and may operate as a splash guard. Preferred atomizers include a nozzle carried at an end of an extension conduit that can be configured, by bending, to orient a direction of discharge from the atomizer nozzle.

[0013] A currently preferred multi-access adapter is adapted to withdraw consecutive doses of fluid from a vial. Such an adapter includes a spike configured for insertion into a vial access port and operable to withdraw fluid from inside the vial. Holding structure may be configured as a socket carrying the spike and adapted to grip the vial to resist withdrawal of the spike from the access port. The adapter also includes a first automatic check valve attachable to the socket and disposed in a first flow path between the spike and a staging zone. The adapter typically is used in combination with a syringe affixed in fluid communication with the staging zone.

[0014] Conduit structure is provided to define a second flow path from the staging zone to a discharge orifice. In general, a second automatic check valve is included in the second flow path. Certain embodiments include a needle as a portion of the second flow path. Alternative embodiments include an atomizing nozzle in the second flow path. Sometimes, the second flow path includes an extension conduit having a user-configurable shape. A shape in such a conduit may be defined, at least in part, by a deformable element associated with, and operable to maintain a shape in, the extension conduit. A currently preferred extension conduit includes a deformable wire disposed in one of a plurality of lumens through the extension conduit. The wire maintains a deformed shape in the extension conduit whereby to define a direction of fluid discharge from a nozzle discharge orifice.

[0015] When embodied as an atomizer for nasal treatment, a nostril guide may be arranged to space a conduit portion of the atomizing nozzle apart from structure forming an entrance to a nostril. Portions of certain nostril guides are sometimes capable of absorbing fluid. Nostril guides may also be configured for their operation as a splash guard. A polymer material, such as a porous, hydrophilic, Styrene-Butylene-Rubber copolymer can be arranged to form an exemplary nostril guide.

[0016] Desirable nostril guides provide a distal portion having a shape with an increasing cross-section size corresponding to increased insertion depth, whereby to adapt to a variety of nostril sizes, and to form a brace against nostril structure operable to maintain an orientation of the nozzle while operating the syringe. Workable nostril guides can be arranged to form a substantially bullet shape. One preferred guide is arranged as a conical plug with a diameter ranging between about 0.2 inches and about 0.8 inches.

[0017] The invention can also be embodied as an adapter of the type including a base carrying a spike that provides access through which to withdraw a fluid from a container. The base of the adapter further carries holding structure depending from the base and structured as a socket operable to resist separation between the spike and a container into which the spike is inserted. Such an adapter generally has a base formed from a first material and a socket formed from a second

material. The second material desirably is more resilient than the first material to permit an increase in a diameter of a circumferentially oriented wall of the socket to form a self-biased holding interface between the socket wall and held portions of containers. The tubular socket can expand to hold different sized containers.

[0018] Typically, an adapter's base is formed from a substantially rigid medical grade plastic configured and arranged to provide a foundation. A workable socket can be formed from a length of resilient tubing affixed to the foundation to expose an open end of the tubing. A container can then be jammed into the open end of the tubing to expand a diameter of the socket and to form a holding interface between the tube wall and a held portion of the container. In one currently preferred embodiment permitting multi-dose extraction from the container, the base further includes a valve operable as a double check valve arranged to permit fluid flow in a first flow path from an orifice of the spike toward a staging area and to resist fluid flow in a reverse direction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] In the drawings, which illustrate what are currently considered to be the best modes for carrying out the invention:

[0020] FIG. 1 is an exploded assembly view in elevation of a prior art vial adapter assembly;

[0021] FIG. 2 is a view in elevation, partially in section, of a currently preferred embodiment of a multi-access adapter;

[0022] FIG. 3 is a top view of the embodiment illustrated in FIG. 2;

[0023] FIG. 4 is a bottom view of the embodiment illustrated in FIG. 2;

[0024] FIG. 5 is a view in elevation of combinations illustrating alternative aspects of the invention;

[0025] FIG. 6 is a view in elevation, partially in section, of a currently preferred discharge nozzle attached to a discharge portion of the invention;

[0026] FIG. 7 is a view of a cross-section of the embodiment illustrated in FIG. 6, taken through the section designated 7-7;

[0027] FIG. 8 is a portion of the embodiment of FIG. 6 in use to dispense a mist into a nostril that is illustrated in cross-section;

[0028] FIG. 9 is a bottom view in perspective of an embodiment of a vial multi-access adapter with alternative holding structure that is adapted for gripping either an ampule or a vial, the latter containers being illustrated in side views in elevation; and

[0029] FIG. 10 is an exploded assembly view, partially in section, of a preferred multi-access arrangement.

DETAILED DESCRIPTION OF THE INVENTION

[0030] A currently preferred embodiment of the invention, indicated generally at **200**, is illustrated in FIG. 2. The vial multi-access adapter **200** includes a socket **120** carrying a spike **133** and a plurality of cantilevered legs **137**. Legs **137** include gripping structure **139** adapted to hold a vial to help maintain its reception on a spike **133**. While the plurality of legs **137** are illustrated in the FIGs. as forming a substantially complete circle, even a single opposed pair of legs **137** can be operable as gripping structure. A valve **204**, operable as a double check valve, is attached in fluid communication with the spike **133**. A first end of valve **204** carries connection structure, generally indicated at **142**, adapted for attachment

to a syringe. A second end of valve **204** carries a surface **144** that typically is adapted to form a conventional slip fit with the luer of a needle, or other discharge device.

[0031] When adapter **200** is mated to a vial, fluid from the vial may be suctioned by an attached syringe through an entrance orifice **210** of spike **133**, past a resilient seal element **212** disposed in a first flow path, to a staging zone or area **214**. A staging zone or area **214** may generally be regarded as being defined by a volume in which to hold a dose of treatment fluid extracted from a vial in preparation for ejection of the dose from the device. Pressure at the staging area typically alternates between a relative low value and a relatively high value under the influence of an attached syringe employed as a pump. A dose of fluid extracted from the vial can then be ejected from the staging area **214**, past the resilient seal element **212** disposed in a second flow path, and toward a discharge orifice **218**.

[0032] Valve **204** operates automatically as a double check valve under conditions of its typical use. Valve **204** may also be characterized as a check-bypass valve, in that fluid flow may be caused through one flow path in either direction by appropriate pressure conditions. For purpose of this disclosure, "automatic operation" means that actuation of the valve occurs under the influence of hydraulic pressure. The illustrated valve **204** operates without requiring manual manipulation of valve elements to permit fluid flow.

[0033] In an assembled valve **204**, seal element **212** is self-biased into engagement of one surface over an entrance **220** to discharge conduit **222**. An opposite side of seal element **212** is simultaneously biased to cover an entrance port **224** to the valve **204**. A suction applied by a syringe tends to further urge the seal element **212** into sealing engagement over opening **220**, and also urges fluid to flow through entrance port **224**, past a perimeter of seal element **212**, and toward the staging zone **214**. A pressure applied by a syringe to fluid in the staging zone **214** can cause a deflection of seal element **212** into enlarged entrance port **224** sufficient to cause an opening between discharge entrance **220** and seal element **212**, thereby permitting fluid flow toward the discharge orifice **218**.

[0034] With reference to the structure illustrated in FIG. 2, it should be recognized that high pressure fluid applied to discharge conduit **222** may flow past seal element **212** toward a lower pressure at the staging zone **214**. Therefore, the illustrated valve **204** may properly be regarded as a check-bypass valve. However, in conditions of typical use, the valve **204** operates as a double check valve. Valves having other configurations, including true double check valves that resist fluid flow in one direction, are operable in the invention. An operable automatic valve arrangement desirably permits cyclic operation of a syringe to dispense successive doses of fluid without requiring direct manual manipulation of valve structure. For purpose of this disclosure, the term "double check valve" is intended to include any valve arrangement operable as a double check valve, including a plurality of cooperating single check valves and the aforementioned check-bypass valve.

[0035] FIGS. 3 and 4 illustrate top and bottom views of a currently preferred adapter, respectively. Proximal connection structure **142** typically is arranged as a portion of a LUER-LOK™ type joint, although any other structure operable to connect to a syringe can be used. Distal attach surface **144** can be arranged to form a conventional slip fit with an

extension structure, or may be configured to receive extension structure in substantially permanent attachment.

[0036] With reference to FIGS. 2 and 3, seal element **212** may be embodied as a wafer having a multi-sided cross-sectional shape for reception in an ovaloid chamber. Corners **230** of seal element **212** assist in maintaining seal element **212** somewhat centered in the chamber **235**. Gaps **237** between seal element **212** and chamber **235** permit fluid flow under suction from entrance orifice **210** toward the staging area **214**. An exemplary seal element **212** may be made from silicone rubber, or from a similarly resilient material. Housing portions of valves **204** and sockets **120** of adapters **200** may be made from medical grade plastics. Adapters **200** typically include injection molded components. While the embodiment illustrated in FIG. 2 is assembled to form a unitary, substantially rigid structure, it is also within contemplation to provide an extension conduit or tube (which may be flexible) disposed between vial adapter socket **120** and a double check or check-bypass valve, such as a valve **200**.

[0037] FIG. 5 illustrates alternative assemblies that can benefit from use of the invention **200**. A syringe **250** is attached to a vial adapter **200** at proximal connection structure **142**. Such an assembly may be used with extension conduit structure adapted to perform many desired tasks. As a first example, needle **252** may be affixed by way of a slip fit between a bore in hub **254** and distal attach surface **144** to permit injecting one or more patients with one or more doses extracted from a vial **130**. As a second example, an atomizer **258** may be affixed to distal surface **144** to administer successive doses of fluid from vial **130** in a misted form. Other alternative extension conduits may be adapted to form a discharge stream like a squirt gun, rather than a mist.

[0038] With reference to FIGS. 5 and 6, a currently preferred atomizer includes a conduit extension **260** carrying an atomizing nozzle **262** at a distal end. A proximal end **263** can be attached to a distal end of attach surface **144** by adhesive bonding, or welding, as illustrated in FIG. 6. An alternative attachment structure (e.g., a luer slip-fit arranged similarly to hub **254** of illustrated needle **252**), may also be employed removably to attach conduit extension **260** to a valve **200**. Nozzle **262** is configured to impart a rotational component of velocity in discharged fluid in accordance with known atomizing nozzles.

[0039] A nostril guide **264** may be included for embodiments used in nasal therapy. A guide and nozzle arrangement as illustrated in FIG. 6 can be used in nasal therapy for patients having nostrils sized between newly born to large adult. A nostril guide **264** may be installed onto conduit extension **260** with a press fit, or may be bonded. Guides **264** desirably are absorbent, or include an absorbent portion, to soak up dripping or excess fluid. A currently preferred nasal guide is made from a polymer material, such as a porous, hydrophilic, Styrene-Butylene-Rubber copolymer. Other materials are also workable, such as cotton, or other natural or man-made materials.

[0040] Conduit extension **260** may be any convenient length, although many will have a length between about 1½ and about 6 inches. The length of conduit extension **260** may be based upon a particular application. For example, in tracheal therapy applications, conduit extension **260** may be about 6 inches to about 12 inches long, or more. In nasal therapy applications, a convenient length may be significantly shorter; perhaps only about ½ inch. Certain conduit extensions **260** are deformable to permit orienting a direction

of discharge from the nozzle **262**. As illustrated in FIG. 7, one operable deformable conduit extension **260** includes a plurality of lumens **267** and **269**, with a deformable element **272** being carried in lumen **269**. Of course, conduit extension **260** may have any number of internal lumens, including just one lumen. Element **272** can be a metal wire, or any structure capable of holding a deformed shape, and holding a deformed shape in conduit extension **260**. A deformable element may also be affixed to an exterior of conduit extension **260**, or may even constitute the conduit extension **260**.

[0041] With reference now to FIG. 8, a nostril guide **264** is illustrated in use to position a discharge from nozzle **262** spaced apart from wall **275** of a nostril, generally indicated at **278**. Guide **264** desirably is employed to stabilize nozzle **262** during actuation of a syringe to spray a discharge mist **280** into nasal passage **282**, and to avoid spraying mist **280** directly into the wall **275**. Desirable guides **264** are configured at their distal portions to brace against nostril structure, in a structural interference, to hold an atomizing nozzle steady while a syringe is operated.

[0042] A distal portion of a guide **264** desirably is structured to provide a variable sized cross-section that increases in correspondence with an insertion depth into the nostril **278** to space a conduit portion apart from an entrance to the nostril. One desirable shape for guide **264** distal structure is similar to that of a bullet. Workable guides **264** can even have distal portions that are substantially round, like a ball. A guide **264** can be arranged as a conical stopper or plug with a diameter ranging between about 0.2 inches on a distal end and about 0.8 inches at a proximal portion. Certain preferred guide shapes also function as a splash shield to resist splash back of an administered dose of fluid.

[0043] As illustrated in FIG. 9 and generally indicated at **300**, the invention can also be embodied as an adapter of the type including a base **302** carrying a spike **304** that provides access through which to withdraw a fluid from a container. The base **302** further carries holding structure **306** depending from the base **302**. Holding structure **306** is structured as a socket operable to resist separation between the spike **304** and a container, such as ampule **310** or vial **312**, into which the spike **304** is inserted. The base **302** typically is formed from a first material and the holding structure **306** generally is formed from a second material. The second material desirably is more resilient than the first material to permit an increase in a diameter of circumferentially oriented wall **314** of the holding structure **306** to form a self-biased holding interface between the socket wall **314** and held portions of containers. Therefore, tubular socket or holding structure **306** can expand to form a self-biased interface with different size held portions D1 and D2 of different containers.

[0044] Typically, base **302** is formed from a medical grade plastic configured and arranged to provide a foundation **316**. Typically, a base **302** will be injection molded. A workable holding structure **306** can be formed from a length of tubing affixed at end **318** to the foundation **316** to expose an open end **320** of the tubing. Illustrated holding structure **306** is adhesively bonded to foundation **316**. A molded-in capture lip arrangement between a base **302** and holding structure **306** is also within contemplation. Holding structure **306** can be formed as a segment cut from a length of a "stretchy" material, such as silicone rubber or urethane tubing. It is also within contemplation for a socket to be molded or cast. A container, such as ampule **310** (after neck closure **321** is snapped-off) or vial **312**, can be jammed into the open end

320 of the tubing to expand a diameter of the holding structure **306** and to form a holding interface between an inner surface **322** of the tube wall **314** and a held portion of the container.

[0045] In one currently preferred embodiment permitting multi-dose extraction from the container, the base **302** further includes a valve, such as valve **200** (see FIG. 2), operable as a double check valve. The valve **200** desirably is arranged to permit fluid flow in a first flow path from an orifice **326** of the spike **304** toward a staging area **328** and to resist fluid flow in a reverse direction.

[0046] It should be noted that the adapters illustrated in FIGS. 2-5 and 9 are operable as illustrated, and particularly for small treatment doses. However, it has been found that performance of the illustrated devices can further be improved by the addition of an automatic bypass valve (not illustrated) arranged as a check valve to permit entrance of replacement air into a vial to facilitate extraction of treatment fluids. Such a bypass valve is particularly beneficial when the treatment dose to be extracted constitutes a significant percentage of the volume of the vial (e.g., more than about 3-5 ml). In the absence of an air bypass valve, the syringe tends to entrain air along with the fluid dose. While the entrained air may preferentially be ejected from the device prior to dispensing the dose of fluid, such an extra step is less convenient than that generally desired.

[0047] FIG. 10 illustrates an alternative and currently preferred embodiment of a multi-access adapter arrangement, generally indicated at **350**. The arrangement **350** includes some sort of atomizer, such as the atomizer generally indicated at **351**, in fluid-flow association with a pump, such as syringe **250**. Sometimes, a nostril guide **264** is included and may be installed by placing tunnel **356** over the distal end of the atomizer **351**.

[0048] Illustrated atomizer **351** includes an atomizing nozzle **352** spaced apart from a hub **353** by an extension conduit **354**. Conduit **354** can have a range in length and conformation corresponding to the intended use of the adapter arrangement **350**, similarly to the conduit extension **260** (FIGS. 5 and 6). A fluid-flow association between a syringe **250** and an atomizer **351** typically is accomplished by connecting cooperating female and male structure, generally indicated at **357** and **359** respectively, forming a slip-fit connection, such as the illustrated luer-locking joint. Wings **360** facilitate twisting threaded luer-locking structure into and out-of engagement.

[0049] The illustrated atomizer **351** provides a seal surface **365** disposed near a discharge orifice, generally indicated at **367**. Seal surface **365** is adapted to form a slip-fit connection with cooperating structure, such as socket **370**, carried at one end of the extraction device generally indicated at **374**. Illustrated surface **365** has a taper to fit a common luer taper typically provided in a socket **370**. Of course, it is within contemplation simply to jam a suitably sized nozzle into receiving structure of an extraction device, such as socket **370** of device **374**. A cooperating taper is not even required between the extraction device and an atomizing nozzle or other fluid conducting structure associated with a syringe. A vacuum formed as the syringe is loaded helps to maintain a fluid-tight connection between the components.

[0050] Extraction devices **374** are operable to conduct fluid from the inside of a storage container, such as vial **312** or ampule **310** (see FIG. 9), toward the syringe **250**. Workable extraction devices include metal and plastic needles and connectors, with needles of the "stickless" type being most pre-

ferred for increased safety of health practitioners. One such stickless needle/connector is commercially available from Emergency Medical Products, Inc. under the catalog No. NF9285 and the trade name "Medic® Plastic Anti-stick Needle." An alternative workable extraction device 374 can be made from a straw or a length of tubing.

[0051] Atomizers, such as illustrated atomizer 351, operate by imparting a spin to a fluid stream prior to ejecting the stream through a discharge orifice to form a mist. Atomizers typically have small diameter discharge orifices to help create a fine mist of discharged fluids by providing a pressure drop across the orifice. Surprisingly, it has been determined that it is neither too difficult nor too slow to load a fluid dose into an atomizer by suction of the dose (backwards) through the atomizer's discharge orifice.

[0052] During a portion of the operation of certain embodiments of the instant invention, a fluid dose may be regarded as following a flow path from a storage vial 312 or ampule 310 toward a suction device, such as a syringe 250. A portion of the flow path may be regarded as being defined by structure provided by an element such as tunnel 356 in guide 264, discharge orifice 367 in atomizer 351, or conduit 224 of automatic check valve 200 (FIG. 2).

[0053] Typically, the multi-access arrangement 350 will be used as follows: A syringe 250 is attached to an atomizer 351. An extraction device 374 is placed into engagement on seal surface 365, and a protective sleeve 380 (if so equipped) is removed to expose the needle 383. Needle 383 is placed through a rubber-like seal at the top of vial 312, and plunger 385 of syringe 250 is retracted to suction a dose of fluid from the vial 312. Seal surface 365 is removed from socket 370, and the dose of treatment fluid may then be dispensed to a treatment site of a patient by aiming the discharge mist and depressing the plunger 385. In certain cases, a nostril guide 264 may be placed over the dispensing end of the atomizer 351 prior to extracting a dose of fluid from vial 312. It should be noted that typically at least a sufficient portion of surface 365 will protrude distally from, or be accessible in, the guide 264 to permit joining to an extraction device 374. In general, the device 374 can be left in engagement in the vial 312. A second or subsequent dose conveniently may be extracted from the storage container by reconnecting seal surface 365 to the extraction device 374 and repeating the dose extraction procedure.

What is claimed is:

1. In an atomizer of the type adapted to deliver treatment fluid in a misted form to a patient, the improvement comprising:

a seal surface disposed near a fluid discharge orifice of said atomizer, said seal surface being arranged to couple with cooperating structure of a fluid extracting device that is operable to conduct fluid from the inside of a bulk fluid container effective to permit withdrawal of a dose of treatment fluid from said bulk fluid container for transfer of said dose through said discharge orifice and into a staging zone associated with said atomizer.

2. The improvement of claim 1, wherein:

said fluid extracting device comprises a needle carrying a female portion of a luer-locking joint at one end.

3. The improvement of claim 1, wherein:

said fluid extracting device comprises a needle of the stickless type.

4. The improvement of claim 1, wherein:

said fluid extracting device comprises a needle formed from a plastic material.

5. The improvement of claim 1, wherein:

said seal surface is structured to form a slip-fit connection between said seal surface and said cooperating structure.

6. The improvement of claim 1, wherein:

said seal surface comprises a male portion of a luer-locking joint.

7. The improvement of claim 1, in combination with:

a nostril guide comprising a passageway extending there-through from a proximal end to a distal end thereof, said passageway being structured and arranged to permit travel of said seal surface from said proximal end toward said distal end.

8. The improvement of claim 7, wherein:

a length of said passageway is sized to permit a portion of said seal surface to protrude distally therefrom.

9. The improvement of claim 1, wherein:

said atomizer comprises:

a length of fluid-communicating conduit;

said discharge orifice disposed in fluid communication through a swirling chamber to receive fluid provided from one end of said conduit; and

connection structure disposed at an opposite end of said conduit, said connection structure being configured and arranged to couple with a source of pressurized fluid.

10. The improvement of claim 9, wherein:

said connection structure comprises a female portion of a luer-locking joint.

11. The improvement of claim 10, wherein:

said connection structure comprises a thread of a luer-locking joint and a wing structured to facilitate twisting luer-locking structure into and out of engagement.

12. The improvement of claim 1, wherein:

said staging zone comprises a syringe.

13. The operable combination of a syringe, an atomizer, an extraction adapter, and a container capable of holding treatment fluid, wherein:

fluid conducting structure that may be placed in fluid communication with said syringe is arranged to couple with said extraction adapter operably to extract a dose of said treatment fluid from within said container for passage of said dose along a flow path, a portion of said path extending through a discharge orifice of said atomizer, in a direction from said container toward said syringe as a plunger of said syringe is retracted.

14. A method for use of a combination structured according to claim 13, comprising the steps of:

placing said syringe in fluid communication with said atomizer;

coupling a seal surface of said atomizer with cooperating structure of said extraction device;

placing a fluid-communicating opening of said extraction adapter into said container;

using said syringe to draw a first quantity of treatment fluid from said container through said extraction adapter, at least a portion of said first quantity of treatment fluid being drawn through said discharge orifice;

de-coupling said atomizer from engagement with said extraction adapter; and

dispensing a dose of said treatment fluid to a treatment site of a patient by aiming a mist discharged from said atomizer while depressing a plunger of said syringe.

15. The method according to claim **14**, further comprising: re-coupling said atomizer with said extraction device;

using said syringe to draw a second quantity of treatment fluid from said container through said extraction adapter, at least a portion of said second quantity of treatment fluid being drawn through said discharge orifice;

de-coupling said atomizer from engagement with said extraction adapter; and

dispensing a dose of said treatment fluid to a treatment site of a patient by aiming a mist discharged from said atomizer while depressing a plunger of said syringe.

16. The method according to claim **14**, further comprising: placing a nostril guide over the dispensing end of said atomizer.

17. The method according to claim **14**, wherein: said extraction adapter comprises a needle.

18. The method according to claim **14**, wherein: said syringe is coupled directly to structure of said atomizer.

19. The method according to claim **15**, wherein: said extraction adapter is left in an installed position in said container during the time increment between drawing said first quantity and drawing said second quantity.

20. The method according to claim **19**, wherein: said container is a normally-sealed container; and said extraction adapter is structured to pierce a re-sealable portion of said container.

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