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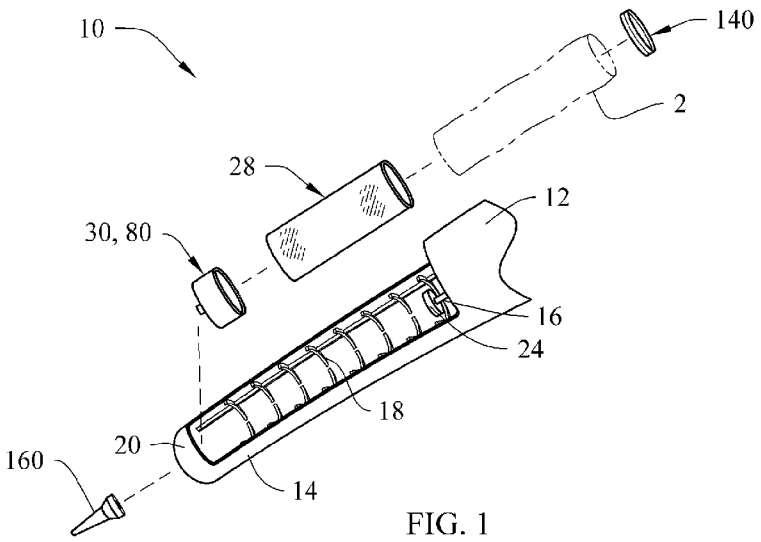


FIG. 1

(57) Abstract: A system for dispensing material contained in a collapsible package from a dispensing device. The system includes a piercing nozzle attachable to a dispensing end of the dispensing device, and a plunger attachable to a plunger rod of the dispensing device configured to compress the package against the piercing nozzle. The piercing nozzle includes a nozzle sidewall and a nozzle end wall defining an internal nozzle cavity configured to receive a first end of the package. One or more recessed members extend into the internal nozzle cavity in part from a recessed member. The piercing projection pierce the package when compressed thereagainst, allowing the material in the package to be dispensed through a nozzle opening. An internal nozzle rib can extend across a nozzle opening defined through the nozzle end wall.

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SAUSAGE PACKAGE DISPENSING SYSTEM, DEVICE AND METHOD

TECHNICAL FIELD

[001] The present technology relates to a sausage package dispensing system, device and method for use in connection with controllably dispensing material from a chub or sausage package and more specifically to methods and apparatuses related to hand-held caulking guns that can pierce the sausage package. The present technology can further relate to an adapter system for use in connection with a dispensing device for dispensing material from the sausage package.

BACKGROUND ART

[002] Material dispensing systems are desirable for providing an ergonomic hand-held device controllably dispensing a material with a desired bead size and shape. The use of caulking or sealing materials to fill gaps between constructions is known. The caulking materials can be utilized indoors and outdoors, and can further be paintable to seamlessly blend between the constructions. There are many different types of caulking materials, along with different types of systems to dispense them.

[003] Squeezable packaging with a nozzle top can be employed to store and then dispense the caulking material. These types of packaging's typically hold a small amount of material, and controlling the dispensing of the material can be difficult.

[004] Hand-held material dispensing devices, such as caulking guns, are well known and generally rely on the action of a piston to push caulk material out of a caulk tube. The motion of the piston is induced by the advancement of a piston rod in the direction of the caulk tube, with the piston rod being advanced in the direction of travel by the operator's squeezing of a trigger.

[005] These known devices are designed to receive and carry a disposable caulk tube. The housing of these caulking guns and the trigger are generally formed of stamped metal plate for manufacturing economy. The caulk tube generally includes a rigid cylindrical tube featuring a sliding piston (plunger), and a nozzle tip, with material stored inside the tube. The caulk tube is commonly more expensive to manufacture than a sausage package because of the different structural elements. While a sausage package is considerably less expensive and easier to manufacture since it is a type of container formed by a tube of flexible packaging material crimped at the ends after filling.

[006] To overcome the disadvantages of caulking tubes, manufacturers developed so called "sausage package" or "chub packs" for the sealant compositions. Sausage packages use less material for the manufacture of the package as compared to caulking tubes, and can be made to be impermeable to air and moisture. They also take up less space in the case package. This allows for a sealant composition stored therein to maintain its consistency and useability and reduce curing of the material. Overall this leads to less waste in both packaging and in preservation of the product in the packaging.

[007] While the above-described devices fulfill their respective, particular objectives and requirements, the aforementioned devices or systems do not describe a sausage package dispensing system that allows controllably dispensing material from a sausage package.

[008] A need exists for a new and novel sausage package dispensing system that can be used for controllably dispensing material from a sausage package. In this regard, the present technology substantially fulfills this need. In this respect, the sausage package dispensing system according to the present technology substantially departs from the conventional concepts and designs of the prior art, and in doing so provides an apparatus primarily developed for the purpose of controllably dispensing material from a sausage package.

DISCLOSURE OF TECHNOLOGY

[009] In view of the foregoing disadvantages inherent in the known types of sausage package dispensing devices now present in the prior art, the present technology provides a novel sausage package dispensing system, and overcomes one or more of the mentioned disadvantages and drawbacks of the prior art. As such, the general purpose of the present technology, which will be described subsequently in greater detail, is to provide a new and novel sausage package dispensing system and method which has all the advantages of the prior art mentioned heretofore and many novel features that result in a sausage package dispensing system which is not anticipated, rendered obvious, suggested, or even implied by the prior art, either alone or in any combination thereof.

[010] According to one aspect, the present technology can include an adapter system for dispensing material contained in a collapsible package from a dispensing device. The adapter system can include a piercing nozzle and a plunger. The piercing nozzle can be attachable to a dispensing end of the dispensing device. The piercing nozzle can include one or more piercing projections configured to pierce the collapsible package and allow the material in the collapsible package to be dispensed when a compression assembly associated with the dispensing device pushes

the package towards the piercing nozzle. The plunger can be operably associated with a plunger rod of the dispensing device. The plunger can be configured to be slidably receivable in a hollow interior of a package tube and push the collapsible package toward the piercing projections.

[011] According to another aspect, the present technology can include an adapter system for dispensing material contained in a collapsible package from a dispensing device. The adapter system can include a piercing nozzle and a plunger. The piercing nozzle can be attachable to a dispensing end of the dispensing device. The piercing nozzle can include a nozzle sidewall and a nozzle end wall defining an internal nozzle cavity configured to receive a first end of the package. One or more recessed members can extend into the internal nozzle cavity. One or more piercing projections can extend in part from the one or more recessed members. The one or more piercing projections can be configured to pierce the package allowing the material in the package to be dispensed when a compression assembly associated with the dispensing device pushes the package towards the piercing nozzle. An internal nozzle rib can extend across a nozzle opening defined through the nozzle end wall. The plunger can be operably associated with a plunger rod of the dispensing device. The plunger can be configured to be slidably receivable in a hollow interior of a package tube and push the collapsible package toward the piercing projections.

[012] According to yet another aspect, the present technology can include an adapter system for dispensing material contained in a collapsible package from a dispensing device. The adapter system can include a piercing nozzle, a package tube and a plunger. The piercing nozzle can be attachable to a dispensing end of the dispensing device. The piercing nozzle can include a nozzle sidewall and a nozzle end wall defining an internal nozzle cavity configured to receive a first end of the package. One or more recessed members can extend into the internal nozzle cavity. One or more piercing projections can extend in part from the one or more recessed members. The one or more piercing projections can be configured to pierce the package allowing the material in the package to be dispensed when a compression assembly associated with the dispensing device pushes the package towards the piercing nozzle. An internal nozzle rib can extend across a nozzle opening defined through the nozzle end wall. The package tube can define a hollow interior therethrough that can be configured to receive the sausage package therein. The plunger can be operably associated with a plunger rod of the dispensing device. The plunger can include a plunger sidewall featuring a medial point having a width or diameter greater than any other part of the plunger sidewall so that the medial point is in slidable contact with an interior surface of the package tube

that defines the hollow interior of the package tube. The plunger can be configured to push the collapsible package toward the piercing projections.

[013] According to still yet another aspect, the present technology can include a system or device for dispensing material contained in a collapsible package from a dispensing device. The system or device can include a piercing nozzle attachable to a dispensing end of the dispensing device. The piercing nozzle can include a nozzle sidewall and a nozzle end wall defining an internal nozzle cavity configured to receive a first end of the package. One or more recessed members can extend into the internal nozzle cavity. One or more piercing projections can extend in part from the one or more recessed members. The one or more piercing projections can be configured to pierce the package allowing the material in the package to be dispensed when a compression assembly associated with the dispensing device pushes the package towards the piercing nozzle. An internal nozzle rib can extend across a nozzle opening defined through the nozzle end wall.

[014] According to yet another aspect, the present technology can include a system for dispensing material contained in a collapsible package from a dispensing device and a plunger attachable to a plunger rod of the dispensing device. The system can include a piercing nozzle attachable to a dispensing end of the dispensing device. The piercing nozzle can include a nozzle sidewall and a nozzle end wall defining an internal nozzle cavity configured to receive a first end of the package. One or more recessed members can extend into the internal nozzle cavity. One or more piercing projections can extend in part from the one or more recessed members. The one or more piercing projections can be configured to pierce the package allowing the material in the package to be dispensed when a compression assembly associated with the dispensing device pushes the package towards the piercing nozzle. An internal nozzle rib can extend across a nozzle opening defined through the nozzle end wall. The plunger can be configured to travel along a longitudinal axis of the dispensing device toward the piercing nozzle to compress the package against the one or more piercing projections.

[015] According to still another aspect, the present technology can include a system for dispensing material contained in a collapsible package from a dispensing device. The system can include a dispensing device, a piercing nozzle and a plunger. The dispensing device can be configured to receive package between a dispensing end and the plunger. The dispensing device can include a plunger rod driving system configured to advance a plunger rod toward a dispensing end. The piercing nozzle can be attachable to the dispensing end of the dispensing device. The piercing nozzle can include a nozzle sidewall and a nozzle end wall defining an internal nozzle cavity

configured to receive a first end of the package. One or more recessed members can extend into the internal nozzle cavity. One or more piercing projections can extend in part from the one or more recessed members. The one or more piercing projections can be configured to pierce the package allowing the material in the package to be dispensed when a compression assembly associated with the dispensing device pushes the package towards the piercing nozzle. An internal nozzle rib can extend across a nozzle opening defined through the nozzle end wall. The plunger can be attachable to the plunger rod of the dispensing device. The plunger can be configured to travel along a longitudinal axis of the dispensing device toward the piercing nozzle to compress the package against the one or more piercing projections.

[016] According to yet another aspect, the present technology can include a method of using a system for dispensing material contained in a collapsible package from a dispensing device. The method can include the steps of placing the collapsible package in the dispensing device between and a piercing nozzle and a plunger. Moving the plunger to compress a first end of the collapsible package into a nozzle cavity defined in the piercing nozzle and against one or more piercing projections of the piercing nozzle. The nozzle cavity can be defined by a nozzle sidewall and a nozzle end wall of the piercing nozzle. Piercing the first end of the collapsible package by the one or more piercing projections. Comprising the collapsible package to flow the material out from the first end of the collapsible package across an internal nozzle rib and through a nozzle opening defined through the nozzle end wall. The internal nozzle rib extending across the nozzle opening.

[017] According to still yet another aspect, the present technology can include an adapter system for dispensing material contained in a collapsible package from a dispensing device. The system includes a piercing nozzle and a plunger. The piercing nozzle can be attachable to a dispensing end of the dispensing device, and can include a nozzle sidewall, one or more recessed members, one or more piercing projections and an internal nozzle rib. The nozzle sidewall and a nozzle end wall can define an internal nozzle cavity configured to receive a first end of the collapsible package. The recessed members can extend into the internal nozzle cavity. The piercing projections can extend in part from the one or more recessed members, and can be configured to pierce the collapsible package and allowing the material in the collapsible package to be dispensed when a compression assembly associated with the dispensing device pushes the collapsible package towards the piercing nozzle. The internal nozzle rib can be connected between the one or more piercing projections, the internal nozzle rib including a central portion and a piercing projection. The central portion can extend across a nozzle opening defined through the nozzle end wall. The piercing projection portion

can extend at an angle from opposite ends of the central portion toward and connecting to at least one of the one or more piercing projections. The plunger can be operably associated with a plunger rod of the dispensing device. The plunger can include a plunger sidewall featuring a medial point having a width or diameter greater than any other part of the plunger sidewall so that the medial point is in slidable contact with an interior surface that defines a hollow interior of a package tube. The plunger can be configured to push the collapsible package in the package tube toward the one or more piercing projections.

[018] In some or all embodiments, the piercing nozzle can include a nozzle sidewall, a nozzle end wall one or more recessed members and an internal rib. The nozzle sidewall and the nozzle end wall can define an internal nozzle cavity configured to receive a first end of the package. The recessed members can extend into the internal nozzle cavity, with the one or more piercing projections extending in part from the one or more recessed members. The internal nozzle rib can extend across a nozzle opening defined through the nozzle end wall.

[019] In some or all embodiments, the piercing nozzle can further include a male portion defining a male portion bore defined therethrough and in communication with the nozzle opening.

[020] In some or all embodiments, the one or more piercing projections cam include two or more piercing walls angularly oriented with each other to form a V-shape.

[021] In some or all embodiments, the piercing walls can each include an angled edge that converge to form a piercing tip.

[022] In some or all embodiments, the one or more recessed members can each include a pair of opposed recessed member sidewalls, one or more recessed member end walls and a recessed member bottom wall. The piercing walls can extend from any one of or any combination of the recessed member sidewalls, the one or more recessed member end walls and the recessed member bottom wall.

[023] In some or all embodiments, the internal nozzle rib can connect between the one or more piercing projections.

[024] In some or all embodiments, the internal nozzle rib can include a central portion that can extend across the nozzle opening, and a piercing projection portion that can extend at an angle from opposite ends of the central portion toward and connecting to at least one of the one or more piercing projections.

[025] Some or all embodiments of the present technology can include a plunger attachable to a plunger rod of the dispensing device and configured to travel along a longitudinal axis of the

dispensing device toward the piercing nozzle to compress the package against the one or more piercing projections.

[026] In some or all embodiments, the plunger can include a plunger sidewall and a plunger base wall defining a plunger cavity. The plunger cavity can be configured to receive a second end of the package.

[027] In some or all embodiments, the plunger can include multiple plunger protrusions each including plunger protrusion walls extending from the plunger base wall into the plunger cavity. The plunger protrusion walls and the plunger base wall can define a plunger protrusion cavity in communication with the plunger cavity.

[028] In some or all embodiments, the plunger protrusion walls can have a length from the plunger base wall greater than a length of the nozzle sidewall from the plunger base wall.

[029] In some or all embodiments, the plunger sidewall can include an interior side in part defining the plunger cavity and an angled exterior side creating a first thickness of a free end of the plunger sidewall less than a second thickness of the plunger sidewall adjacent the plunger base wall.

[030] In some or all embodiments, the plunger sidewall of the first plunger section and the second plunger section can meet at an exterior medial point that is wider than a free end of the plunger sidewall, respectively. The medial point can slidably contact an interior surface of the package tube that defines the hollow interior of the package tube.

[031] In some or all embodiments, the plunger can include a plunger sidewall featuring a medial point having a width or diameter greater than any other part of the plunger sidewall so that the medial point is in slidable contact with an interior surface of the package tube that defines the hollow interior of the package tube.

[032] In some or all embodiments, the plunger can include a second plunger sidewall inverted to and extending from the plunger sidewall. The plunger can further include second plunger protrusions inverted to the plunger protrusions and extending from the plunger base wall.

[033] In some or all embodiments, the plunger protrusion walls can be configured to form the plunger protrusions in a geometric shape.

[034] In some or all embodiments, the plunger rod can include a plunger adapter including male protrusions that can be configured to be receivable in an open space defined in the plunger protrusions of the plunger.

[035] In some or all embodiments, the piercing nozzle and/or the plunger can be integrally formed with the dispensing device.

[036] In some or all embodiments, the piercing nozzle and/or the plunger can be removably attachable to the dispensing device.

[037] There has thus been outlined, rather broadly, features of the present technology in order that the detailed description thereof that follows may be better understood and in order that the present contribution to the art may be better appreciated.

[038] Numerous objects, features and advantages of the present technology will be readily apparent to those of ordinary skill in the art upon a reading of the following detailed description of the present technology, but nonetheless illustrative, embodiments of the present technology when taken in conjunction with the accompanying drawings.

[039] As such, those skilled in the art will appreciate that the conception, upon which this disclosure is based, may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present technology. It is, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present technology.

[040] It is therefore an object of the present technology to provide a new and novel sausage package dispensing system that has all of the advantages of the prior art sealant dispensing systems and none of the disadvantages.

[041] It is another object of the present technology to provide a new and novel sausage package dispensing system that may be easily and efficiently manufactured and marketed.

[042] An even further object of the present technology is to provide a new and novel sausage package dispensing system that has a low cost of manufacture with regard to both materials and labor, and which accordingly is then susceptible of low prices of sale to the consuming public, thereby making such sausage package dispensing system economically available to the buying public.

[043] Still another object of the present technology is to provide a new sausage package dispensing system that provides in the apparatuses and methods of the prior art some of the advantages thereof, while simultaneously overcoming some of the disadvantages normally associated therewith.

[044] These together with other objects of the present technology, along with the various features of novelty that characterize the present technology, are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the present technology, its operating advantages and the specific objects attained by its uses, reference should be made to the accompanying drawings and descriptive matter in which there are illustrated

embodiments of the present technology. Whilst multiple objects of the present technology have been identified herein, it will be understood that the claimed present technology is not limited to meeting most or all of the objects identified and that some embodiments of the present technology may meet only one such object or none at all.

BRIEF DESCRIPTION OF THE DRAWINGS

[045] The present technology will be better understood and objects other than those set forth above will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

[046] FIG. 1 is an exploded rear-right perspective view of an embodiment of the sausage package dispensing system constructed in accordance with the principles of the present invention and utilized with a caulking gun, with the phantom lines depicting environmental structure and forming no part of the claimed invention.

[047] FIG. 2 is a cross-sectional view of the caulking gun utilizing the sausage package dispensing system of the present technology.

[048] FIG. 3 is a top-right perspective view of the piercing nozzle of the sausage package dispensing system of the present technology.

[049] FIG. 4 is a bottom-left perspective view of the piercing nozzle of the sausage package dispensing system of the present technology.

[050] FIG. 5 is a bottom elevational view of the piercing nozzle of the sausage package dispensing system of the present technology.

[051] FIG. 6 is a cross-sectional view of the piercing nozzle taken along line 6-6 in FIG. 5 showing the piercing members puncturing the sausage package.

[052] FIG. 7 is a cross-sectional view of the piercing nozzle taken along line 7-7 in FIG. 5 showing the support member and the nozzle openings.

[053] FIG. 8 is a top-right perspective view of the alternate embodiment piercing nozzle of the sausage package dispensing system of the present technology.

[054] FIG. 9 is a bottom-left perspective view of the alternate embodiment piercing nozzle of the sausage package dispensing system of the present technology.

[055] FIG. 10 is a bottom elevational view of the alternate embodiment piercing nozzle of the sausage package dispensing system of the present technology.

[056] FIG. 11 is a cross-sectional view of the alternate embodiment piercing nozzle taken along

line 11-11 in FIG. 10 showing the piercing members puncturing the sausage package.

[057] FIG. 12 is a cross-sectional view of the alternate embodiment piercing nozzle taken along line 12-12 in FIG. 10 showing the support member, the nozzle openings and the secondary piercing members puncturing the sausage package.

[058] FIG. 13 is a top-right perspective view of the plunger of the sausage package dispensing system of the present technology.

[059] FIG. 14 is a top elevational view of the plunger of the sausage package dispensing system of the present technology.

[060] FIG. 15 is a cross-sectional view of the plunger and the plunger rod adapter taken along line 15-15 in FIG. 14 with an enlarged section showing the inwardly angled sidewalls.

[061] FIG. 16 is a cross-sectional view of the sausage package dispensing system of the present technology in use including the piercing nozzle and the plunger traveling within the tube.

[062] FIG. 17 is an enlarged view of the sliding connection between the medial point of the plunger and the interior surface of the tube.

[063] The same reference numerals refer to the same parts throughout the various figures.

DETAILED DESCRIPTION OF THE TECHNOLOGY

[064] In the following description, for purposes of explanation and not limitation, specific details are set forth, such as particular embodiments, procedures, techniques, etc. in order to provide a thorough understanding of the present technology. However, it will be apparent to one skilled in the art that the present technology may be practiced in other embodiments that depart from these specific details.

[065] Referring now to the drawings, and particularly to FIGS. 1-17, an embodiment of the sausage package dispensing system, device and method of the present technology is shown and generally designated by the reference numeral **10**.

[066] In FIGS. 1 and 2, a new and novel sausage package dispensing system or device **10** of the present technology for controllably dispensing material from a collapsible package or sausage package **2** is illustrated and will be described. More particularly, the sausage package dispensing system **10** can be associated with a sausage dispensing device **12** configured to receive a collapsible package or sausage package **2**, a package tube **28**, a piercing nozzle **30**, **80**, and a plunger **140**. The package tube **28**, the piercing nozzle **30**, **80**, and the plunger **140** can be provided together as an adapter system to the dispensing device **12**, or can be provided separately, or can be provided with

the dispensing device **12** as a single unit.

[067] It can be appreciated that the sausage package **2** can include any cylindrically shaped or sausage-shaped casing package that is collapsible and contains an extrudable material therein. In the exemplary the extrudable material can be, but not limited to, a sealant, grease, a lubricant, food materials, a caulking, a paste, mixable compounds, a filler and the like.

[068] Many advantages come with packaging adhesive and sealant products in the sausage package **2**. A first advantage is that the sausage package **2** itself represents an initial cost savings compared to a conventional cartridge or tubes in manufacturing. As the cost in manufacturing the sausage package is substantially less than manufacturing a conventional cartridge or tube.

[069] Another advantage is the extended shelf life of the material in the sausage package **2**. Sausage packaging uses a flat film that is then formed into a sausage and clipped or sealed with product material stored therein. As a result, no air is introduced during the filling process. The film used to form the sausage package **2** also provides an excellent moisture barrier, such as multi-layered film with a trapped aluminum.

[070] Still another advantage is the increased space savings for storing in warehouses, on store shelves, during transportation or carrying by a user to a job site or location.

[071] Another key benefit of the sausage package **2** is lower disposal costs. Since an empty sausage package is basically a small, compressed, foil disc that is 10% the size of a typical empty cartridge or tube, disposal cost savings can be high. In addition, the sausage package **2** can result in less waste going to the landfill, which is a key component in environmental sustainability.

[072] The present technology provides efficient dispensing of the material in the sausage package **2** by utilizing aftermarket components that can be easily used with existing caulking guns or can be an all in one caulking gun or dispensing device including the components of the present technology.

[073] For exemplary purposes, the sausage dispensing device **12** can have a configuration similar to a gun featuring a main housing **14**, a plunger rod **16**, an internal cavity featuring reinforcing ribs **18**, and a dispensing end section **20**. A hand grip, a trigger and a piston grip can be utilized with the dispensing device **12**. It can be appreciated that the plunger rod **16** of the dispensing device **12** can be manually driven via a rack or ratcheting system or via a motor and gear system. The main housing **14** can be made of, but not limited to, plastic, metal, composite, an alloy or any combination thereof. The dispensing device **12** can be a single molded unit or can be made of separable and attachable sections secured together by, but not limited to, adhesive, welding, fasteners, tabs, locks, clips or other securing means.

[074] The internal cavity of the main housing **14** can be configured to receive the sausage package **2** directly or receive the package tube **28** with the sausage package **2** located inside the package tube **28**. Reinforcing ribs **18** can be configured to provide rigidity to the dispensing device **12**, to support the package tube **28** received in the main housing **14** and/or to assisting in containing or guiding the sausage package **2** while contained in the internal cavity.

[075] The package tube **28** can be a hollow tube with opposite open ends thereby allowing reception of the sausage package **2** inside the package tube **28** from either end. A width or diameter of the package tube **28** can be sized to be received in a caulking gun or the internal cavity of the main housing **14** of the dispensing device **12**. The package tube **28** can be made out of any suitable material such as, but not limited to, plastic, metal, alloys, cardboard and the like. Further, the package tube **28** can be transparent or include a window or opening to easily view the sausage package **2** inside the package tube **28**. It can be appreciated that the package tube **28** can include ribs or grooves to increase rigidity of the package tube **28** and/or to prevent bending or expansion of the package tube **28** during use.

[076] The plunger **140** can be configured to be attachable to the plunger rod **16** or a part associated therewith, and can be further configured to be slidably raceable within the package tube **28**. Alternatively, the plunger **140** can be configured to be slidably receivable along a longitudinal axis of the internal cavity of the main housing **14** so that it can be used without the package tube **28**.

[077] The dispensing end section **20** can be configured to receive the piercing nozzle **30**, **80** therein so that at a male portion **70**, **130** of the piercing nozzle **30**, **80** can be inserted through a dispensing end opening **22** defined through the dispensing end section **20** of the dispensing device **12**.

[078] A nozzle tip **160** can be attachable to the male portion **70**, **130** of the piercing nozzle **30**, **80** thereby securing the piercing nozzle **30**, **80** to the dispensing end section **20**, as best illustrated in FIG. 2. The nozzle tip **160** can be configured to assist in dispensing and/or spreading material dispensed from the sausage package **2** onto a surface or into a gap. The nozzle tip **160** can be made of, but not limited to, plastic, metal, composite, an alloy or any combination thereof.

[079] With reference to FIGS. 3-7, an embodiment of the piercing nozzle **30** is illustrated and will be described. The piercing nozzle **30** can be removably attachable to or integrally formed with the dispensing end section **20**. The piercing nozzle **30** can include a housing featuring a nozzle sidewall **32** defining a nozzle cavity **34** therein configured to receive an end of the sausage package **2**. The piercing nozzle **30** can be made of, but not limited to, plastic, metal, composite, an alloy or any combination thereof.

[080] A width or diameter of the sidewall **32** can be substantially the same as the width or diameter of the package tube **28**, so that they contact each other during use and allowing the end of the sausage package **2** to easily travel through the open end of the package tube **28** and into the nozzle cavity **34**. Alternatively, the width or diameter of the sidewall **32** can be greater than the width or diameter of the package tube **28** thereby allowing either end of the package tube **28** to be received in the nozzle cavity **34**. In another alternative, the width or diameter of the sidewall **32** can be less than the width or diameter of the package tube **28** thereby allowing the sidewall **32** portion of the piercing nozzle **30** to be received in at least a portion of the hollow interior of the package tube **28**.

[081] A ledge **36** can extending from a perimeter of the nozzle sidewall **32** at a location where the nozzle sidewall **32** transitions to a nozzle end wall **38**. The ledge **36** can have a width or diameter greater than nozzle sidewall **32**. The ledge **36** can be configured to prevent the piercing nozzle **30** from being completely inserted into the hollow interior of the package tube **28**.

[082] An angled or curved section **40** can transition from the ledge **36** to the nozzle end wall **38**. The section **40** can be indented toward the nozzle cavity **34**, thereby creating a recessed spaced in relation to the ledge **36** and the nozzle end wall **38**. A nozzle opening **41** can be centrally defined through the nozzle end wall **38** and configured to allow material from the sausage package **2** to pass therethrough.

[083] The male portion **70** can extend from the nozzle end wall **38** in a direction away from the nozzle sidewall **32**. The male portion **70** can defined a longitudinal male portion bore **72** therethrough, and can include external threads **74**. The male portion bore **72** is in direct fluid communication with the nozzle opening **41**, thereby allowing material from the sausage package **2** to be received from the nozzle opening **41** and exit the male portion **70**. Further, the male portion bore **72** can convergingly taper in a direction toward the nozzle end wall **38** so that a first width or diameter of the male portion bore **72** adjacent the nozzle opening **41** is less than a second width or diameter of an exit end of the male portion bore **72** opposite the nozzle opening **41**.

[084] It can be appreciated that the male portion **70** can be integrally formed with and extending out from the dispensing end section **20**.

[085] A width or diameter of the male portion **70** including the external threads **74** can be configured to be inserted through the dispensing end opening **22**, as best illustrated in FIG. 7. It can be appreciated that the dispensing end opening **22** is configured to prevent the housing of the piercing nozzle **30** from passing therethrough. When the piercing nozzle **30** is assembled in the dispensing end section **20**, the ledge **36** and/or the nozzle end wall **38** can abut or contact an end

wall of the dispensing end section **20** that includes the dispensing end opening **22**.

[086] The nozzle tip **160** can include an attachment end configured to secure the nozzle tip **160** to the male portion **70**. This can be accomplished, but not limited to, by utilizing internal threads of the nozzle tip **160** that are engageable with the external threads **74** of the male portion **70**. It can be appreciated that other securing mechanisms can be utilized instead of threads such as, but not limited to, ratchets, clips, latches, locks or magnets. The width or diameter of the attachment end of the nozzle tip **160** can be greater than the dispensing end opening **22**, thereby clamping the piercing nozzle **30** to the end wall of the dispensing end section **20** when the nozzle tip **160** is secured to the male portion **70**.

[087] One or more recessed members **42** can extend from the nozzle end wall **38** and/or the curved section **40** and into the nozzle cavity **34**. The recessed members **42** can include a recessed member end wall **44**, recessed member sidewalls **46** and a recessed member bottom wall **48**, thereby defining a recessed cavity. The recessed cavity can in part be further defined by the nozzle sidewall **32** of the housing, as best illustrated in FIGS. 3 and 6. In the exemplary, the piercing nozzle **30** can include two recessed members **42** located opposite each other with the male portion **70** located therebetween. It can be appreciated that any number of recessed members **42** can be utilized with the present technology.

[088] One or more piercing projections **50**, as best illustrated in FIGS. 4-7, can extend from the recessed member sidewalls **46** and/or the recessed member bottom wall **48** of each of the recessed members **42** and into the nozzle cavity **34**. In the exemplary, the piercing projections **50** can include two or more piercing walls **52** that extend from the recessed member sidewalls **46** and/or the recessed member bottom wall **48**. The piercing walls **52** can be at an angular orientation with each other forming a generally V-shape when viewing into the nozzle cavity **34**. An internal angle between the piercing walls **52** can be less than 180°. Further, the converging angle of each of the piercing projections **50** can be facing each other so that an opened portion of the V-shape faces the nozzle sidewall **32**.

[089] Each of the piercing walls **52** can include an angled edge **54** that converge toward each other to form a piercing tip **56** of the piercing projections **50**. The piercing tip **56** can be configured to easily pierce or puncture a casing of the sausage package **2** when pressed thereagainst.

[090] In the exemplary, the recessed members **42** and/or the piercing projections **50** can be configured to not extend into or obstruct the longitudinal male portion bore **72** of the male portion **70**, thereby creating a clear path for material to pass or travel through.

[091] An internal rib **60** can extend between the piercing projections **50** passing over the nozzle opening **41**. The internal rib **60** can include a middle portion **62** that extends over the nozzle opening **41**, thereby dividing the nozzle opening **41** into two opposite areas. The internal rib **60** can further include a piercing projection portion **64** that extends at an angle from opposite ends of the middle portion **62** toward the piercing tip **56** of each of the piercing projections **50**. The piercing projection portion **64** can meet the piercing projections **50** either directly at the piercing tip **56**, or adjacent thereto or offset therefrom to make a separation from the piercing tip **56**, as best illustrated in FIG. 6. This separation can be configured to assist in separating a pierced portion of the casing of the sausage package **2** away from the remaining portion of the sausage package **2**. Such a separation can allow for the creation of a larger pierced opening in the sausage package **2**, thereby providing easier flow of material out from the sausage package **2** when the dispensing device **12** is operated.

[092] At least one channel can be defined along a longitudinal axis of each of the piercing projections **50** and/or the piercing projection portion **64** of the internal rib **60**. Further, the channel can be defined as the open area between each of the piercing walls **52** and the piercing projection portion **64**. The channel can be in communication with the nozzle opening **41**. Once the sausage package **2** is punctured by the piercing projections **50**, the piercing projections **50** are inserted/received into the interior of the sausage package **2** so that any material in the sausage package **2** is allowed to flow through the channel and into the nozzle opening **41**, and then into the male portion bore **72**.

[093] The internal rib **60** can further provide structural support for the piercing nozzle **30** and/or resist against collapsing of the nozzle sidewall **32**. Still further, the internal rib **60** can assist in guiding the end of the sausage package **2** toward the piercing projections **50** and/or preventing the pierced portion of the casing of the sausage package **2** from entering or obstructing the nozzle opening **41** and/or the male portion bore **72**, as best illustrated in FIG. 7 with the flow of material being represented by arrows.

[094] It can be appreciated that the nozzle sidewall **32**, the piercing projections **50**, the internal rib **60** and the male portion **70** can be integrally formed to create the piercing nozzle **30**.

[095] With reference to FIGS. 8-12, an embodiment of the piercing nozzle **80** is illustrated and will be described, which is similar to the embodiment illustrated in FIGS. 3-7 and as described above. The piercing nozzle **80** can be removably attachable to or integrally formed with the dispensing end section **20**. The piercing nozzle **80** can include a housing featuring a nozzle sidewall **82** defining a nozzle cavity **84** therein configured to receive an end of the sausage package **2**. The piercing nozzle

80 can be made of, but not limited to, plastic, metal, composite, an alloy or any combination thereof.

[096] A width or diameter of the sidewall **82** can be substantially the same as the width or diameter of the package tube **28**, so that they contact each other during use and allowing the end of the sausage package **2** to easily travel through the open end of the package tube **28** and into the nozzle cavity **84**. Alternatively, the width or diameter of the sidewall **82** can be greater than the width or diameter of the package tube **28** thereby allowing either end of the package tube **28** to be received in the nozzle cavity **84**. In another alternative, the width or diameter of the sidewall **82** can be less than the width or diameter of the package tube **28** thereby allowing the sidewall **82** portion of the piercing nozzle **80** to be received in at least a portion of the hollow interior of the package tube **28**.

[097] A ledge **86** can extending from a perimeter of the nozzle sidewall **82** at a location where the nozzle sidewall **82** transitions to a nozzle end wall **88**. The ledge **86** can have a width or diameter greater than nozzle sidewall **82**. The ledge **86** can be configured to prevent the piercing nozzle **80** from being completely inserted into the hollow interior of the package tube **28**.

[098] The nozzle end wall **88** can be planar extending to the ledge **86**. A nozzle opening **89** can be centrally defined through the nozzle end wall **88** and configured to allow material from the sausage package **2** to pass therethrough.

[099] The male portion **130** can extend from the nozzle end wall **88** in a direction away from the nozzle sidewall **82**. The male portion **130** can defined a longitudinal male portion bore **132** therethrough, and can include external threads **134**. The male portion bore **132** is in direct fluid communication with the nozzle opening **89**, thereby allowing material from the sausage package **2** to be received from the nozzle opening **89** and exit the male portion **130**. Further, the male portion bore **132** can convergingly taper in a direction toward the nozzle end wall **88** so that a first width or diameter of the male portion bore **132** adjacent the nozzle opening **89** is less than a second width or diameter of an exit end of the male portion bore **132** opposite the nozzle opening **89**.

[0100] A width or diameter of the male portion **130** including the external threads **134** can be configured to be inserted through the dispensing end opening **22**, as best illustrated in FIG. 12. It can be appreciated that the dispensing end opening **22** is configured to prevent the housing of the piercing nozzle **80** from passing therethrough. When the piercing nozzle **80** is assembled in the dispensing end section **20**, the ledge **86** and/or the nozzle end wall **88** can abut or contact an end wall of the dispensing end section **20** that includes the dispensing end opening **22**.

[0101] The nozzle tip **160** can include an attachment end configured to secure the nozzle tip **160** to the male portion **130**. This can be accomplished, but not limited to, by utilizing internal threads of

the nozzle tip **160** that are engageable with the external threads **134** of the male portion **130**. It can be appreciated that other securing mechanisms can be utilized instead of threads such as, but not limited to, ratchets, clips, latches, locks or magnets. The width or diameter of the attachment end of the nozzle tip **160** can be greater than the dispensing end opening **22**, thereby clamping the piercing nozzle **80** to the end wall of the dispensing end section **20** when the nozzle tip **160** is secured to the male portion **130**.

[0102] One or more recessed members **90** can extend from the nozzle end wall **88** and into the nozzle cavity **84**. The recessed members **90** can include opposed recessed member sidewalls **92**, opposed recessed member end walls **94** and a recessed member bottom wall **96**, thereby defining a recessed cavity. The recessed members **90** can be offset from the nozzle sidewall **82** to provide a portion of the nozzle end wall **88** between the recessed members **90** and the ledge **86**, as best illustrated in FIG. 8. In the exemplary, the piercing nozzle **80** can include two recessed members **90** located opposite each other with the male portion **130** located therebetween. It can be appreciated that any number of recessed members **90** can be utilized with the present technology.

[0103] One or more piercing projections **100**, as best illustrated in FIGS. 9-12, can extend from one of the recessed member sidewalls **92**, one or more of the recessed member end walls **94** and/or the recessed member bottom wall **96** of each of the recessed members **90** and into the nozzle cavity **84**. In the exemplary, the piercing projections **100** can include a two or more piercing walls **102** that extend from one of the recessed member sidewalls **92**, one or more of the recessed member end walls **94** and/or the recessed member bottom wall **96**. The piercing walls **102** can be at an angular orientation with each other forming a generally V-shape when viewing into the nozzle cavity **84**. An internal angle between the piercing walls **52** can be less than 180°. Further, the converging angle of each of the piercing projections **100** can be facing each other so that an opened portion of the V-shape faces the nozzle sidewall **82**.

[0104] Each of the piercing walls **102** can include an angled edge **104** that converge toward each other to form a piercing tip **106** of the piercing projections **100**. The piercing tip **106** can be configured to easily pierce or puncture a casing of the sausage package **2** when pressed thereagainst.

[0105] In the exemplary, the recessed members **90** and/or the piercing projections **100** can be configure to not extend into or obstruct the longitudinal male portion bore **132** of the male portion **130**, thereby creating a clear path for material to pass or travel through.

[0106] An internal rib **110** can extend between the piercing projections **100** passing over the nozzle opening **89**. The internal rib **110** can include a central portion **112** that extends over the nozzle

opening **89**, thereby dividing the nozzle opening **89** into two opposite areas. The internal rib **110** can further include a piercing projection portion **114** that extends at an angle from opposite ends of the central portion **112** toward the piercing tip **106** of each of the piercing projections **100**. The piercing projection portion **114** can meet the piercing projections **100** either directly at the piercing tip **106**, or adjacent thereto or offset therefrom to make a separation from the piercing tip **106**, as best illustrated in FIG. 11. This separation can be configured to assist in separating a pierced portion of the casing of the sausage package **2** away from the remaining portion of the sausage package **2**. Such a separation can allow for the creation of a larger pierced opening in the sausage package **2**, thereby providing easier flow of material out from the sausage package **2** when the dispensing device **12** is operated.

[0107] At least one channel can be defined along a longitudinal axis of each of the piercing projections **100** and/or the piercing projection portion **114** of the internal rib **110**. Further, the channel can be defined as the open area between each of the piercing walls **102** and the piercing projection portion **114**. The channel can be in communication with the nozzle opening **89**. Once the sausage package **2** is punctured by the piercing projections **100**, the piercing projections **100** are inserted/received into the interior of the sausage package **2** so that any material in the sausage package **2** is allowed to flow through the channel and into the nozzle opening **89**, and then into the male portion bore **132**.

[0108] The internal rib **110** can further provide structural support for the piercing nozzle **80** and/or resist against collapsing of the nozzle sidewall **82**. Still further, the internal rib **110** can assist in guiding the end of the sausage package **2** toward the piercing projections **100** and/or preventing the pierced portion of the casing of the sausage package **2** from entering or obstructing the nozzle opening **89** and/or the male portion bore **132**, as best illustrated in FIG. 7 with the flow of material being represented by arrows.

[0109] One or more secondary piercing members **120** can extend from the nozzle end wall **88** and/or the nozzle sidewall **82** into the nozzle cavity **84**. The secondary piercing members **120** can be located in a spaced apart relationship between the recessed members **90** and/or between the piercing projections **100**. The secondary piercing members **120** can each include an internal rib section **122** and a puncture tooth **124** pointing in a direction away from the nozzle end wall **88** and into the nozzle cavity **84**. The secondary piercing members **120** can be configured to not obstruct the flow of material into the male portion bore **132**.

[0110] The secondary piercing members **120** or any portion thereof can be configured to provide

additional strength and/or rigidity to the piercing nozzle **80** during use. Collapsing of the nozzle sidewall **82** and/or the nozzle end wall **88** can be reduced by configuring a width, a height and/or a location of the internal rib section **122** or any portion of the secondary piercing members **120**.

[0111] The puncture tooth **124** can have a first wall or edge extending at an angle from the internal rib section **122** and a second wall or edge **126** extending at an angle from the nozzle end wall **88**, an area of the nozzle end wall **88** that in part defines the nozzle opening **89** or an end of the male portion **130** adjacent to the nozzle opening **89**. The angle of the first edge and the second edge **126** converge to form the puncture tooth **124**.

[0112] The puncture tooth **124** can be configured to further puncture the sausage package **2** in combination with the piercing tip **106** to create a larger opening in the sausage package **2**, thereby allowing material to flow more easily from the sausage package **2**, as best illustrated in FIG. 12

[0113] The piercing nozzle **80** can include any number of the secondary piercing members **120** radially arranged about a longitudinal axis of the piercing nozzle **80** or the male portion bore **132**.

[0114] It can be appreciated that the nozzle sidewall **82**, the piercing projections **100**, the internal rib **110**, the secondary piercing members **120** and the male portion **130** can be integrally formed to create the piercing nozzle **80**.

[0115] Referring to FIGS. 13-15, the plunger **140** of the sausage package dispensing system is illustrated and will be described. The plunger **140** can be attachable to the plunger rod **16** of the dispensing device **12**. This can be accomplished utilizing an adapter **24** that is part of or is attached to the plunger rod **16**, which then is configured to fit with or attached to the plunger **140**. Movement of the plunger rod **16** translates into longitudinal movement of the plunger **140** within the hollow interior of the package tube **28** or the internal cavity of the dispensing device **12**. The plunger **140** can be made of, but not limited to, plastic, metal, composite, an alloy or any combination thereof.

[0116] The plunger **140** can include a pair of identical or similarly configured halves, with each half including a plunger sidewall **142** meeting at a radially arranged medial point **150** that further includes a plunger base wall **152** extending across the medial point **150** and therebetween thereby dividing the plunger **140** into two mirrored halves.

[0117] Each plunger sidewall **142** can including an exterior side **144** and an interior side **146**, as best illustrated in the enlarged section of FIG. 15. Each half of the plunger **140** includes a plunger cavity **148** defined within the interior side **146** of the plunger sidewall **142** and the plunger base wall **152**. The plunger cavity **148** can be configured to receive an end of the sausage package **2** therein.

[0118] A plurality of plunger protrusions **154** can extend from the plunger base wall **152** into the

plunger cavity **148**. The plunger protrusions **154** can be formed by a plurality of plunger protrusion walls **156** that extend away from the plunger base wall **152** in a generally geometrical shape. Each of the plunger protrusions **154** can defined its own internal cavity defined by the plunger protrusion walls **156** and the plunger base wall **152** or one or more of the plunger protrusion walls **156**, the plunger base wall **152** and the plunger sidewall **142**. It can be appreciated that some of the plunger protrusions **154** defined in part by the plunger sidewall **142** can have a geometric shape different to that of the plunger protrusions **154** defined by only the plunger protrusion walls **156** and the plunger base wall **152**.

[0119] The geometric shape of the plunger protrusions **154** can be, but not limited to, square, triangle, circular, oval, polygonal and the like.

[0120] The plunger protrusion walls **156** can have a height or length extending from the plunger base wall **152** less than a height or length of the plunger sidewall **142** for that particular half of the plunger **140**. This difference in height or length can further in part define the plunger cavity **148**. Further, it can be appreciated that the one or more plunger protrusion walls **156** can have a height or length different to that of other plunger protrusion walls **156**.

[0121] Referring to FIG. 15, the exterior side **144** of the plunger sidewall **142** can be angle **θ** in relation to a longitudinal axis of the plunger **140** or the medial point **150**. This angle **θ** can result in a free end or edge of the plunger sidewall **142** to have a thickness less than a thickness near or at the medial point **150**. The angle **θ** can assist in insertion of the plunger **140** into and out of the open end of the package tube **28** and/or into the nozzle cavity **34**, **84** of the piercing nozzle **30**, **80**. Further, the angle **θ** can assist in the longitudinal travel of the plunger **140** through the hollow interior of the package tube **28** and/or across the reinforcing ribs **18** of the dispensing device **12** if the package tube **28** is not utilized. During travel of the plunger **140** through the package tube **28**, the medial point **150** can contact the interior surface of the package tube **28** thereby acting as a sliding seal thereagainst to prevent seepage of material past the plunger **140**.

[0122] An interior side of the nozzle sidewall **32**, **82** that defines the nozzle cavity **34**, **84** can be angled to complement the angle **θ** of the exterior side **144** of the plunger sidewall **142**. This complementary angle allows for either side or half of the plunger **140** to be fully receivable in the nozzle cavity **34**, **84**.

[0123] The interior side **146** of the plunger sidewall **142** can be parallel with the longitudinal axis of the plunger **140** or can be angled so that a width or diameter of the plunger cavity **148** at the free end of the plunger **140** is less than a width or diameter of the plunger cavity **148** adjacent the plunger

protrusions **154**. The angle of the interior side **146** can be configured to assist in insertion of the end of the sausage package **2** into the plunger cavity **148** when the plunger **140** is pressed against that end of the sausage package **2**.

[0124] The plunger protrusions **154** can be configured to provide rigidity to the plunger **140** and/or air pockets to prevent a vacuum lock against the end of the sausage package **2**. The air pockets can be utilized for easy removal of the sausage package **2** from the plunger cavity **148** or withdrawal of the plunger **140** away from the sausage package **2**.

[0125] Further, the adapter **24** attached to the end of the plunger rod **16** can include an exterior side featuring male protrusions **26** that are configured to be received in an open space defined in the plunger protrusions **154** of the plunger **140**, as best illustrated in FIG. 15. This arrangement can be configured to provide a press or friction fit of the plunger **140** to the adapter **24**, allowing for removal and/or replacement of the plunger **140**. Alternatively, the protrusions **26** can be omitted from the adapter **24** so that a planar or flat exterior side of the adapter **24** contacts the plunger protrusions **154**, as best illustrated in FIG. 16.

[0126] It can be appreciated that the dispensing device **12** of the present invention can include draw back system (not shown) to ensure bead flow or flow of the material from the sausage package **2** ceases activation of the plunger rod **16** is ceased. The draw back system can have a configuration capable of drawing back of pressure to avoid unwanted flow of material out the piercing nozzle **30, 80** or the nozzle tip **160**. The draw back system can include, but not limited to: a biasing assembly which is capable of pushing back against a part of the packaging compression assembly or against the sausage package **2**; a retraction assembly which is capable of retracting at least a portion of the packaging compression assembly or the sausage package **2**; or a nozzle tip moving assembly which is capable of moving the piercing nozzle **30, 80** away from the sausage package **2**.

[0127] Referring to FIGS. 16 and 17, it can now be understood that the sausage package dispensing system **10** of the present invention can be used to dispense a material, such as but not limited, caulk, adhesive, sealant, paste, cement and the like, from a sausage package **2**. In exemplary use, a user can insert the sausage package **2** inside the package tube **28**. The plunger **140** can be attached to the plunger rod **16** or the adapter **24**, if not already part thereof. With the plunger rod **16** retracted, access to the internal cavity of the dispensing device **12** is allowed, and the piercing nozzle **30**, **80** can be inserted into the dispensing end section **20** so that the male portion **70**, **130** is received through dispensing end opening **22** of the dispensing end section **20**.

[0128] The nozzle tip **160** can then be fitted with the male portion **70**, **130** so that the piercing

nozzle **30**, **80** is clamped or secured to the dispensing end section **20**.

[0129] While the plunger rod **16** is retracted, the sausage package **2** or the package tube **28** with the sausage package **2** therein can be inserted into the internal cavity of the dispensing device **12** so that a first end of the sausage package **2** is received in the nozzle cavity **34**, **84** of the piercing nozzle **30**, **80** or one of the open ends of the package tube **28** is adjacent the nozzle cavity **34**, **84**.

[0130] It can be appreciated that the piercing nozzle **30**, **80** can be inserted into the interior space of the main housing **14** first, and after which the sausage package **2** or the package tube **28** with the sausage package **2** therein can be inserted into the interior space of the main housing **14** so that the first end of the sausage package **2** is receivable in the nozzle cavity **34**, **84** of the piercing nozzle **30**, **80**.

[0131] With the piercing nozzle **30**, **80** and sausage package **2** or the package tube **28** with the sausage package **2** therein installed in the interior space of the main housing **14**, the user can then operate the dispensing device **12** to advance the plunger rod **16** which advances the plunger **140** toward a second end of the sausage package **2**.

[0132] Operation of the dispensing device **12** advances the plunger **140** into the hollow interior of the package tube **28** so that a free end of the plunger **140** contacts a second end of the sausage package **2** so that the second end of the sausage package **2** is received in the plunger cavity **148** of the plunger **140**. The second end of the sausage package **2** can be in contact with the plunger protrusions **154** extending into the plunger cavity **148**. It can be appreciated that the angle **θ** associated with both halves of the plunger **140** allows for easy insertion of the plunger through the open end and into the hollow interior of the package tube **28**. It can be further appreciated that the angle **θ** can acts as an insertion guide of the plunger **140** into the package tube **28**.

[0133] Continued operation of the dispensing device **12** further advances the plunger **140** and pushes the sausage package **2** through the hollow interior of the package tube **28** so that a first end of the sausage package **2** is received in the nozzle cavity **34**, **84** and pressed against the piercing projections **50**, **100**. This advancement of the sausage package **2** by the plunger **140** allows for the piercing tip **56**, **106** to puncture through the first end of the sausage package **2**, thereby opening a passage between the interior of the sausage package **2** and the nozzle cavity **34**, **84** and the nozzle opening **41**, **89** of the piercing nozzle **30**, **80**.

[0134] Further continued advancement of the plunger **140** by the plunger rod **16** through the hollow interior of the package tube **28** and against the second end of the sausage package **2** could expand the sidewalls of the sausage package **2**. However, the package tube **28** is configured to contain any

radial or outward expansion of the sausage package **2**. Further, expansion of the package tube **28** can be contained by the reinforcing ribs **18** of the main housing **14**.

[0135] During advancement of the plunger **140** through the hollow interior of the package tube **28**, it can be appreciated that the medial point **150** of the plunger **140** can act as a radially or perimeter seal against the interior side of the package tube **28** that defines its hollow interior. This contact provided by the medial point **150** prevents seepage of material from the sausage package **2** past the plunger **140**, as best illustrated in FIG. 17. Accordingly, reducing waste of the material and providing an efficient pushing force to extrude the material from the sausage package **2**. It can be appreciated that the plunger **140** can be utilized in either direction due to its mirrored structural nature.

[0136] This continued advancement of the plunger **140** can force the material out of the sausage package **2**, over through the piercing projections **50**, **100** and over the internal rib **60**, **110**, and then through the nozzle opening **41**, **89** of the piercing nozzle **30**, **80**. The material can then be forced through the hollow interior of the nozzle tip **160** and dispensed out an opening defined or cut in a dispensing end of the nozzle tip **160**.

[0137] In the exemplary, the user can visually determine the amount of material remaining in the sausage package **2** through the transparent package tube **28**.

[0138] The sausage package **2** can be removed and replaced by operating the dispensing device **12** or the plunger rod **16** to withdraw the plunger **140** away from the piercing nozzle **30**, **80**. The user can then remove the sausage package **2** or the package tube **28** with the sausage package **2** therein from the internal cavity of the main housing **14**. The emptied or used sausage package **2** can then easily be removed from the package tube **28** and discarded.

[0139] After which, the nozzle tip **160** can be removed from the male portion **70**, **130** so that the piercing nozzle **30**, **80** can be removed from the dispensing end section **20** for cleaning or replacement. Further, the plunger **140** can be removed from the plunger rod **16** or adapter **24** for cleaning or replacement.

[0140] According to one aspect, the present technology can include an adapter system for dispensing material contained in a collapsible package **2** from a dispensing device **12**. The adapter system can include a piercing nozzle **30**, **80** and a plunger **140**. The piercing nozzle **30**, **80** can be attachable to a dispensing end **20** of the dispensing device **12**. The piercing nozzle **30**, **80** can include one or more piercing projections **50**, **100** configured to pierce the collapsible package **2** and allow the material in the collapsible package **2** to be dispensed when a compression assembly

associated with the dispensing device **12** pushes the package **2** towards the piercing nozzle **50**, **100**. The plunger **140** can be operably associated with a plunger rod **16** of the dispensing device **12**. The plunger **140** can be configured to be slidably receivable in a hollow interior of a package tube **28** and push the collapsible package **2** toward the piercing projections **50**, **100**.

[0141] According to another aspect, the present technology can include a system or device for dispensing material contained in a collapsible package **2** from a dispensing device **12**. The system or device can include a piercing nozzle **30**, **80** attachable to a dispensing end section **20** of the dispensing device **12**. The piercing nozzle **30**, **80** can include a nozzle sidewall **32**, **82** and a nozzle end wall **38**, **88** defining an internal nozzle cavity **34**, **84** configured to receive a first end of the package. One or more recessed members **42**, **90** can extend into the internal nozzle cavity **34**, **84**. One or more piercing projections **50**, **100** can extend in part from the one or more recessed members **42**, **90**. The one or more piercing projections **50**, **100** can be configured to pierce the sausage package **2** allowing the material in the sausage package **2** to be dispensed when a compression assembly associated with the dispensing device **12** pushes the sausage package **2** towards the piercing nozzle **30**, **80**. An internal nozzle rib **60**, **110** can extend across a nozzle opening **41**, **89** defined through the nozzle end wall **38**, **88**.

[0142] According to yet another aspect, the present technology can include a system for dispensing material contained in a collapsible package **2** from a dispensing device **12** and a plunger **140** attachable to a plunger rod **16** of the dispensing device **12**. The system can include a piercing nozzle **30**, **80** attachable to a dispensing end of the dispensing device **12**. The piercing nozzle **30**, **80** can include a nozzle sidewall **32**, **82** and a nozzle end wall **38**, **88** defining an internal nozzle cavity **34**, **84** configured to receive a first end of the package. One or more recessed members **42**, **90** can extend into the internal nozzle cavity **34**, **84**. One or more piercing projections **50**, **100** can extend in part from the one or more recessed members **42**, **90**. The one or more piercing projection can be configured to pierce the package allowing the material in the package to be dispensed when a compression assembly associated with the dispensing device **12** pushes the package towards the piercing nozzle **30**, **80**. An internal nozzle rib **60**, **110** can extend across a nozzle opening **41**, **89** defined through the nozzle end wall **38**, **88**. The plunger **140** can be configured to be slidably receivable in a hollow interior of a package tube **28** and push the collapsible package **2** toward the piercing projections **50**, **100**.

[0143] According to yet another aspect, the present technology can include a method of using a system for dispensing material contained in a collapsible package **2** from a dispensing device **12**.

The method can include the steps of placing the collapsible package **2** in the dispensing device **12** between and a piercing nozzle **30**, **80** and a plunger **140**. Moving the plunger **140** to compress a first end of the collapsible package **2** into a nozzle cavity **34**, **84** defined in the piercing nozzle **30**, **80** and against one or more piercing projections **50**, **100** of the piercing nozzle **30**, **80**. The nozzle cavity **34**, **84** can be defined by a nozzle sidewall **32**, **82** and a nozzle end wall **38**, **88** of the piercing nozzle **30**, **80**. Piercing the first end of the collapsible package **2** by the one or more piercing projections **50**, **100**. Comprising the collapsible package **2** to flow the material out from the first end of the collapsible package **2** across an internal nozzle rib **60**, **110** and through a nozzle opening **41**, **89** defined through the nozzle end wall **38**, **88**. The internal nozzle rib **60**, **110** extending across the nozzle opening **41**, **89**.

[0144] Some or all embodiments of the present technology can include a package tube **28** that can define a hollow interior therethrough configured to receive the sausage package **2** therein.

[0145] In some or all embodiments, the plunger **140** can be operably associated with a plunger rod **16** of the dispensing device **12**. The plunger **140** can include a plunger sidewall **142** featuring a medial point **150** having a width or diameter greater than any other part of the plunger sidewall **142** so that the medial point **150** is in slidable contact with an interior surface of the package tube **28** that defines the hollow interior of the package tube. The plunger **140** can be configured to push the collapsible package **2** toward the piercing projections **50**, **100**.

[0146] In some or all embodiments, the piercing nozzle **30**, **80** can further include a male portion **70**, **130** defining a male portion bore **72**, **132** defined therethrough and in communication with the nozzle opening **41**, **89**.

[0147] In some or all embodiments, the one or more piercing projections **50**, **100** can include two or more piercing walls **52**, **102** angularly oriented with each other to form a V-shape.

[0148] In some or all embodiments, the piercing walls **52**, **102** can each include an angled edge **54**, **104** that converge to form a piercing tip **56**, **106**.

[0149] In some or all embodiments, the one or more recessed members **42**, **90** can each include a pair of opposed recessed member sidewalls **46**, **92**, one or more recessed member end walls **44**, **94** and a recessed member bottom wall **48**, **96**. The piercing walls **52**, **102** can extend from any one of or any combination of the recessed member sidewalls **46**, **92**, the one or more recessed member end walls **44**, **94** and the recessed member bottom wall **48**, **96**.

[0150] In some or all embodiments, the internal nozzle rib **60**, **110** can connect between the one or more piercing projections **50**, **100**.

[0151] In some or all embodiments, the internal nozzle rib **60**, **110** can include a middle portion **62**, **112** that can extend across the nozzle opening **41**, **89**, and a piercing projection portion **64**, **114** that can extend at an angle from opposite ends of the middle portion **62**, **112** toward and connecting to at least one of the one or more piercing projections **50**, **100**.

[0152] Some or all embodiments of the present technology can include a plunger **140** attachable to a plunger rod **16** of the dispensing device **12** and configured to travel along a longitudinal axis of the dispensing device **12** toward the piercing nozzle **30**, **80** to compress the sausage package **2** against the one or more piercing projections **50**, **100**.

[0153] In some or all embodiments, the plunger **140** can include a plunger sidewall **142** and a plunger base wall **152** defining an internal plunger cavity **148**. The internal plunger cavity **148** can be configured to receive a second end of the sausage package **2**.

[0154] In some or all embodiments, the plunger **140** can include multiple plunger protrusions **154** each including plunger protrusion walls **156** extending from the plunger base wall **152** into the plunger cavity **148**. The plunger protrusion walls **156** and the plunger base wall **152** can define a plunger protrusion cavity in communication with the plunger cavity **148**.

[0155] In some or all embodiments, the plunger protrusion walls **156** can have a length from the plunger base wall **152** greater than a length of the nozzle sidewall **32**, **82** from the plunger base wall **152**.

[0156] In some or all embodiments, the plunger sidewall **142** can include an interior side **146** in part defining the plunger cavity **148** and an angled exterior side **144** creating a first thickness of a free end of the plunger sidewall **142** less than a second thickness of the plunger sidewall **142** adjacent the plunger base wall **152**.

[0157] In some or all embodiments, the plunger **140** can include a second plunger sidewall **142** inverted to and extending from the plunger sidewall **142**. The plunger **140** can further include second plunger protrusions **154** inverted to the plunger protrusions **154** and extending from the plunger base wall **152**.

[0158] In some or all embodiments, the plunger protrusion walls **156** can be configured to form the plunger protrusions **154** in a geometric shape.

[0159] In some or all embodiments, the plunger rod **16** can include a plunger adapter **24** including male protrusions **26** that can be configured to be receivable in an open space defined in the plunger protrusions **154** of the plunger **140**.

[0160] While embodiments of the sausage package dispensing system have been described in detail,

it should be apparent that modifications and variations thereto are possible, all of which fall within the true spirit and scope of the present technology. With respect to the above description then, it is to be realized that the optimum dimensional relationships for the parts of the present technology, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present technology. For example, any suitable sturdy material may be used instead of the above-described. And although controllably dispensing material from a sausage package have been described, it should be appreciated that the sausage package dispensing system herein described is also suitable for dispensing any material stored in a packaging or container by piercing the packaging using advancing pressure supplied by a moving piston.

[0161] Therefore, the foregoing is considered as illustrative only of the principles of the present technology. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the present technology to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the present technology.

CLAIMS

What is claimed is:

1. An adapter system for dispensing material contained in a collapsible package from a dispensing device, the system comprising:

a piercing nozzle attachable to a dispensing end of the dispensing device, the piercing nozzle including one or more piercing projections configured to pierce the collapsible package and allow the material in the collapsible package to be dispensed when a compression assembly associated with the dispensing device pushes the collapsible package towards the piercing nozzle; and

a plunger operably associated with a plunger rod of the dispensing device, the plunger being configured to be slidably receivable in a hollow interior of a package tube and push the collapsible package toward the one or more piercing projections.

2. The system according to claim 1, wherein the piercing nozzle comprising:

a nozzle sidewall and a nozzle end wall defining an internal nozzle cavity configured to receive a first end of the collapsible package;

one or more recessed members extending into the internal nozzle cavity, with the one or more piercing projections extending in part from the one or more recessed members; and

an internal nozzle rib extending across a nozzle opening defined through the nozzle end wall.

3. The system according to claim 2, wherein the piercing nozzle further comprising a male portion defining a male portion bore defined therethrough and in communication with the nozzle opening.

4. The system according to claim 2, wherein the one or more piercing projections includes two or more piercing walls angularly oriented with each other to form a V-shape.

5. The system according to claim 4, wherein the two or more piercing walls each include an angled edge that converge to form a piercing tip.

6. The system according to claim 4, wherein the one or more recessed members each having a pair of opposed recessed member sidewalls, one or more recessed member end walls and a recessed member bottom wall, and the two or more piercing walls extend from any one of or any combination of the opposed recessed member sidewalls, the one or more recessed member end walls and the recessed member bottom wall.

7. The system according to claim 2, wherein the internal nozzle rib connects between the one or more piercing projections.

8. The system according to claim 7, wherein the internal nozzle rib including a central portion that extends across the nozzle opening, and a piercing projection portion that extends at an angle from opposite ends of the central portion toward and connecting to at least one of the one or more piercing projections.

9. The system according to claim 1, wherein the plunger includes a plunger sidewall and a plunger base wall defining a plunger cavity, the plunger cavity being configured to receive a second end of the collapsible package.

10. The system according to claim 9, wherein the plunger including multiple plunger protrusions each including plunger protrusion walls extending from the plunger base wall into the plunger cavity, the plunger protrusion walls and the plunger base wall defining a plunger protrusion cavity in communication with the plunger cavity.

11. The system according to claim 10, wherein the plunger protrusion walls having a length from the plunger base wall greater than a length of a nozzle sidewall from the plunger base wall.

12. The system according to claim 11, wherein the plunger sidewall including an interior side in part defining the plunger cavity and an angled exterior side creating a first thickness of a free end of the plunger sidewall less than a second thickness of the plunger sidewall adjacent the plunger base wall.

13. The system according to claim 10, wherein the plunger including a second plunger sidewall inverted to and extending from the plunger sidewall, and wherein the plunger further including second plunger protrusions inverted to the plunger protrusions and extending from the plunger base wall.

14. The system according to claim 13, wherein the plunger sidewall and the second plunger sidewall each include an exterior side extending from the plunger base wall at an angle thereby creating a medial point that contacts an interior surface of the package tube that defines the hollow interior of the package tube.

15. An adapter system for dispensing material contained in a collapsible package from a dispensing device, the system comprising:

a piercing nozzle attachable to a dispensing end of the dispensing device, the piercing nozzle comprising:

a nozzle sidewall and a nozzle end wall defining an internal nozzle cavity

configured to receive a first end of the collapsible package;

one or more recessed members extending into the internal nozzle cavity;

one or more piercing projections extending in part from the one or more recessed members, the one or more piercing projections being configured to pierce the collapsible package and allowing the material in the collapsible package to be dispensed when a compression assembly associated with the dispensing device pushes the collapsible package towards the piercing nozzle; and

an internal nozzle rib connecting between the one or more piercing projections, the internal nozzle rib including a central portion and a piercing projection, the central portion extends across a nozzle opening defined through the nozzle end wall, the piercing projection portion extends at an angle from opposite ends of the central portion toward and connecting to at least one of the one or more piercing projections;

a plunger operably associated with a plunger rod of the dispensing device, the plunger including a plunger sidewall featuring a medial point having a width or diameter greater than any other part of the plunger sidewall so that the medial point is in slidable contact with an interior surface that defines a hollow interior of a package tube, the plunger being configured to push the collapsible package in the package tube toward the one or more piercing projections.

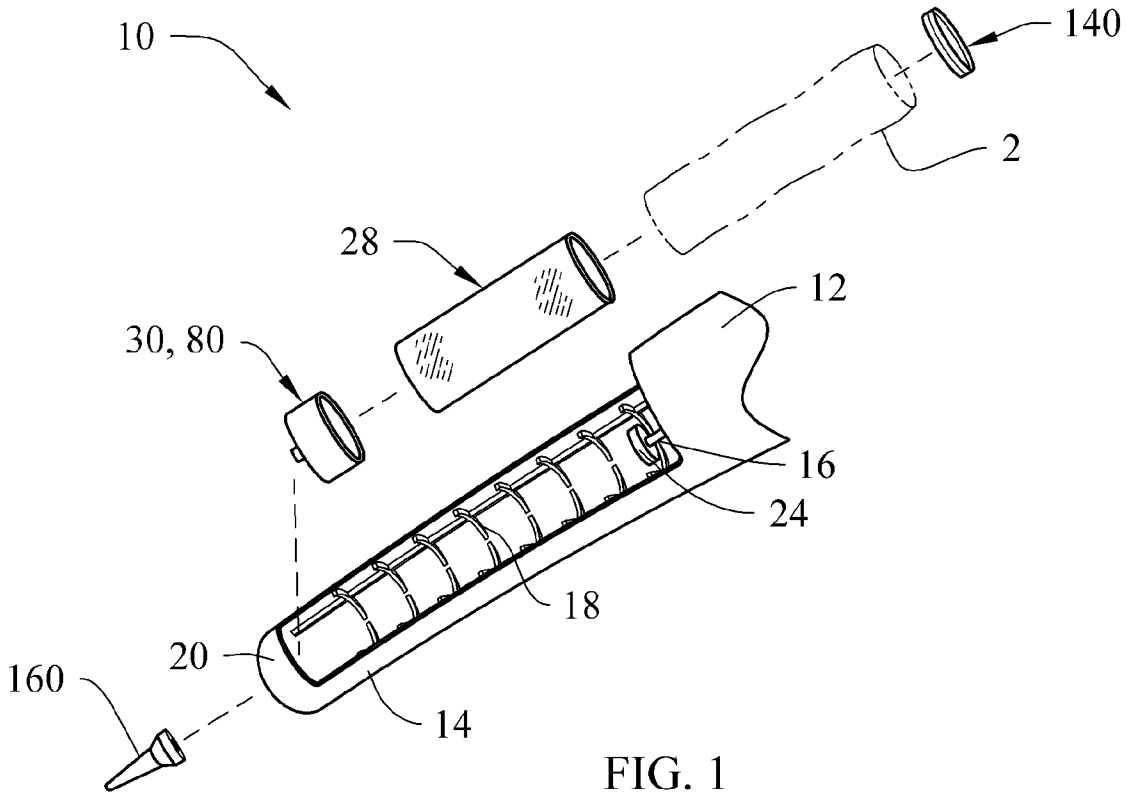

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FIG. 1

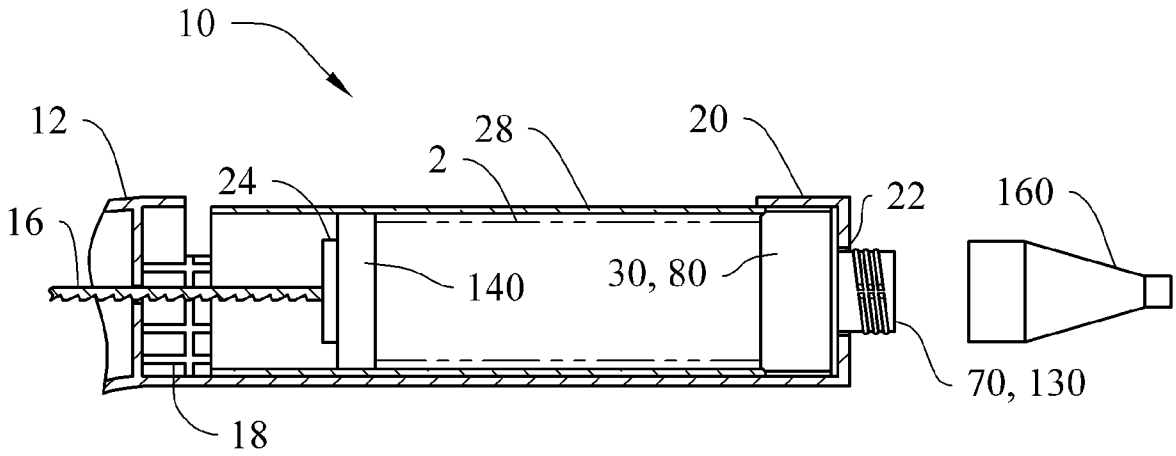

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FIG. 2

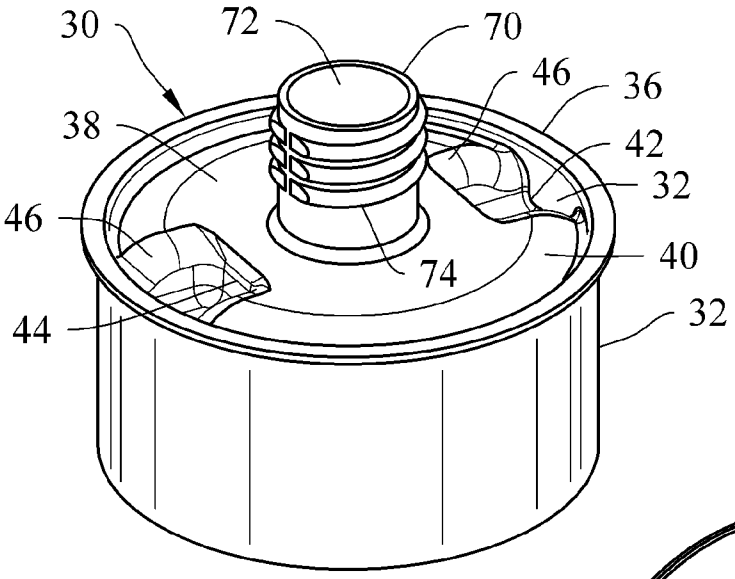


FIG. 3

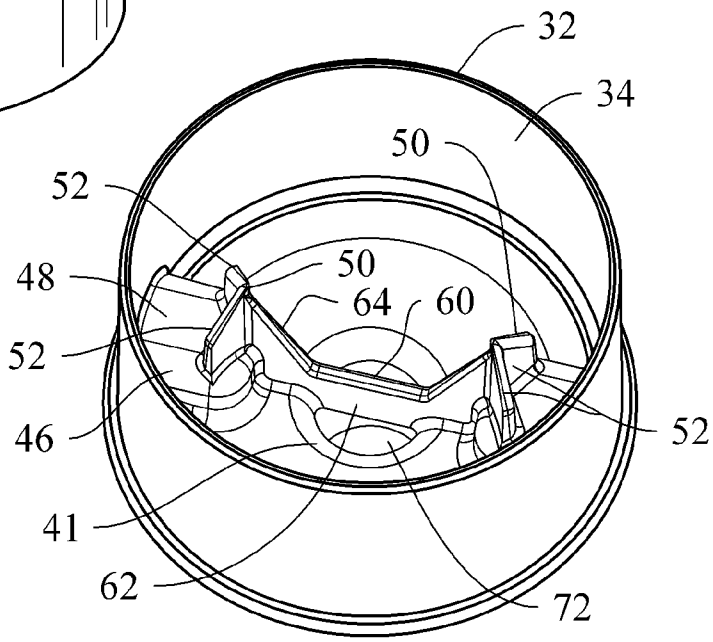


FIG. 4

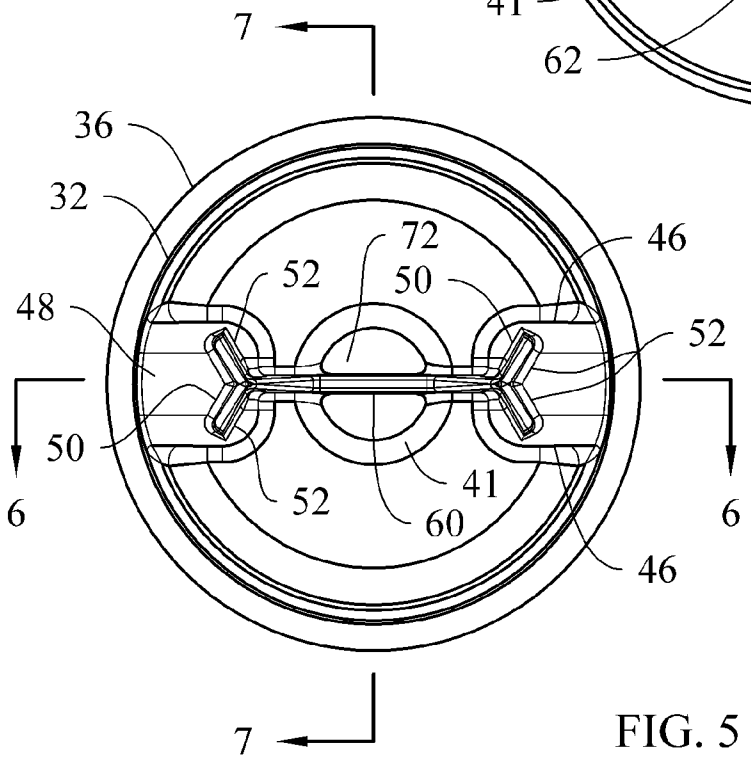


FIG. 5

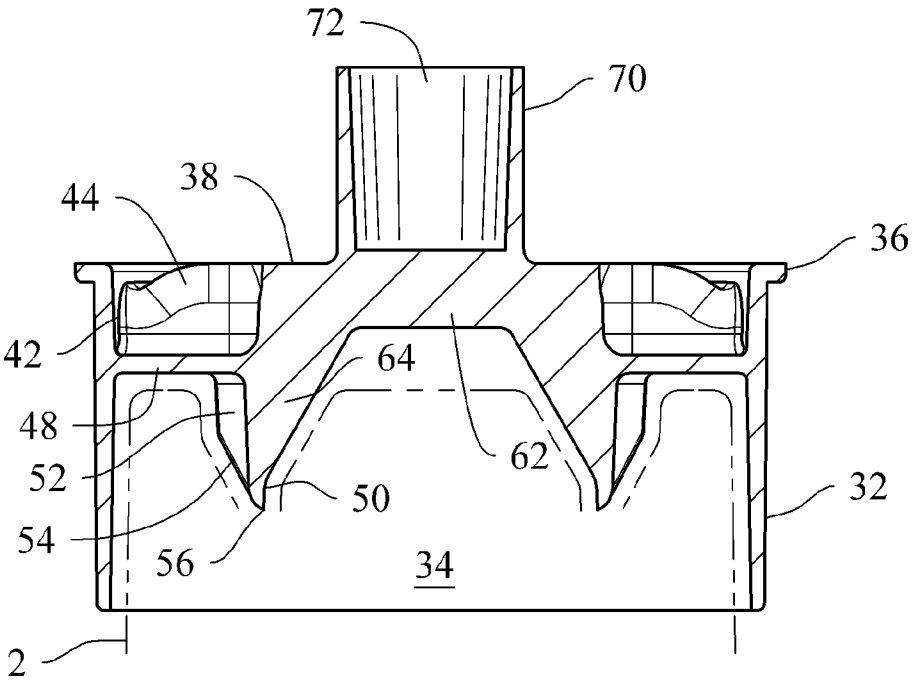

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FIG. 6

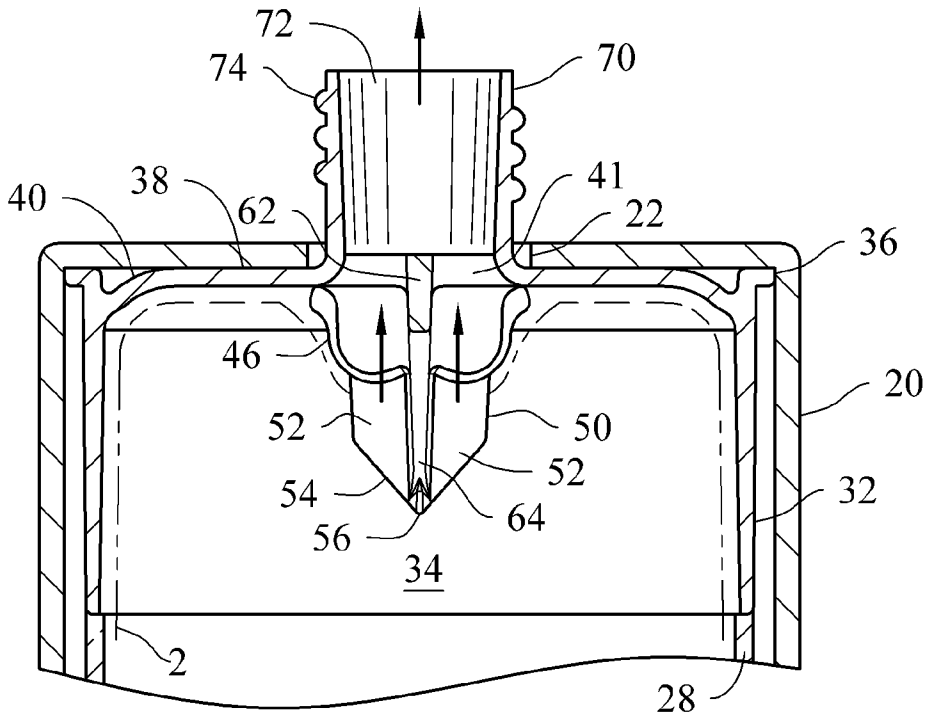

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FIG. 7

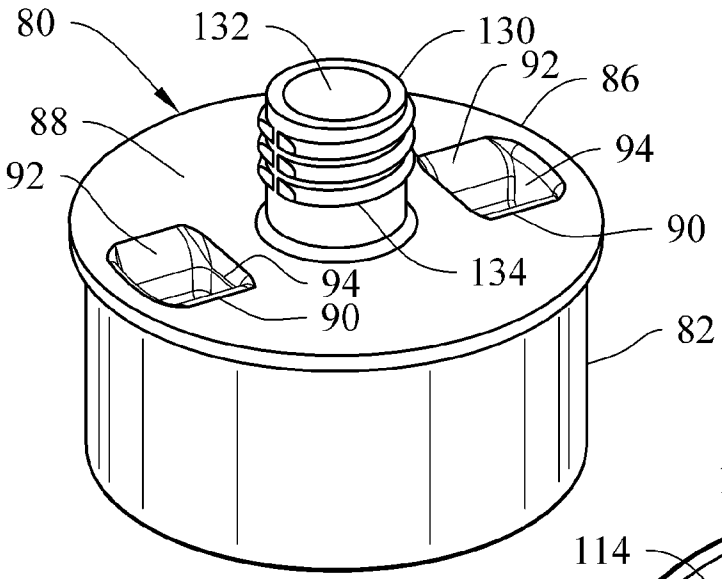


FIG. 8

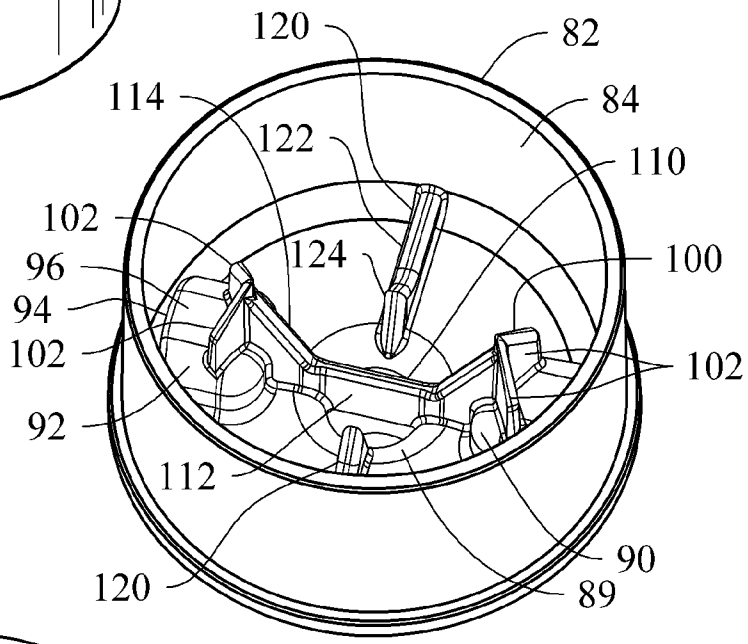


FIG. 9

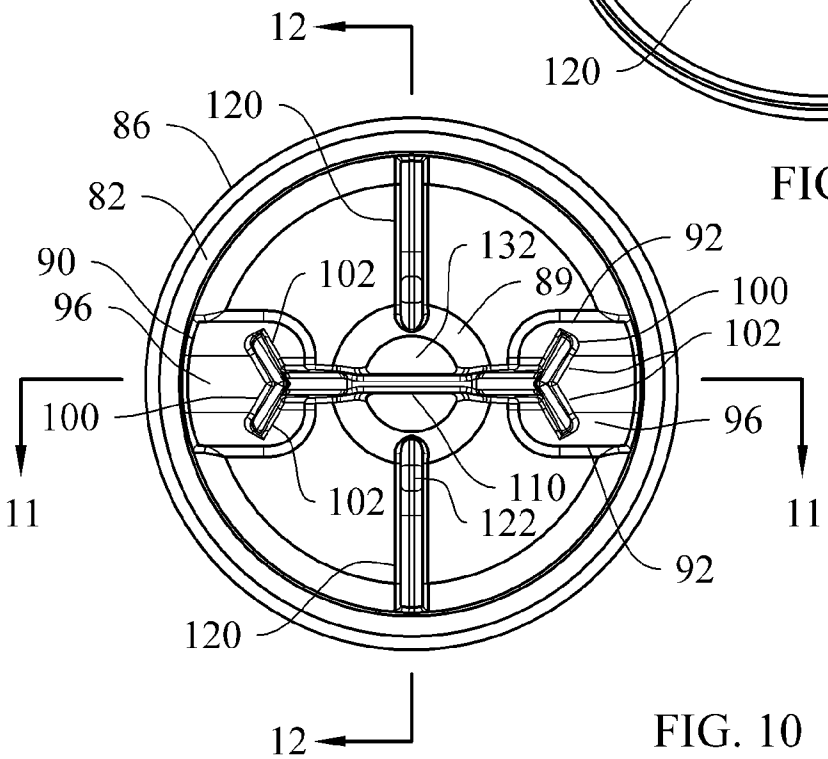


FIG. 10

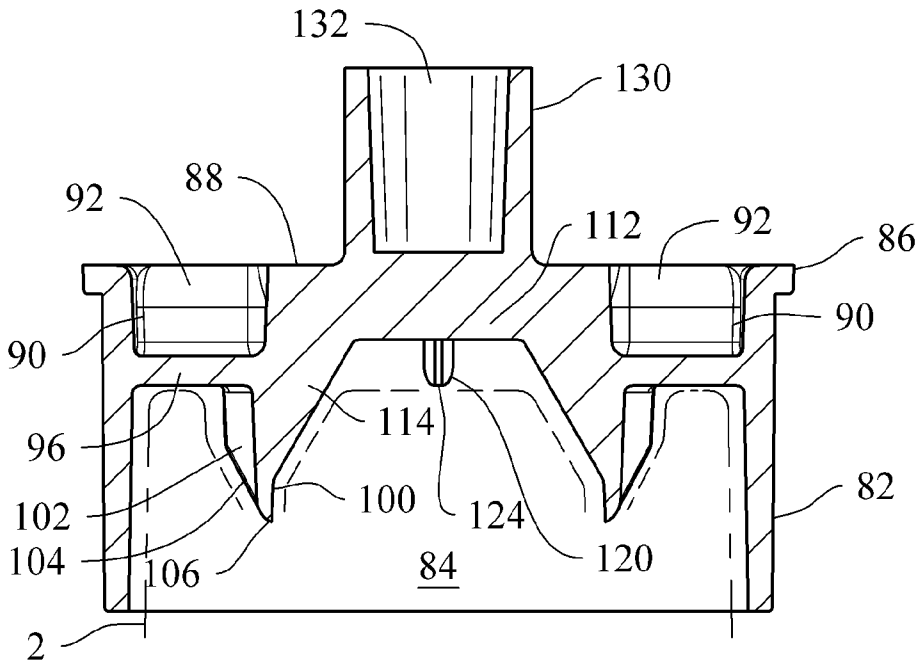

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FIG. 11

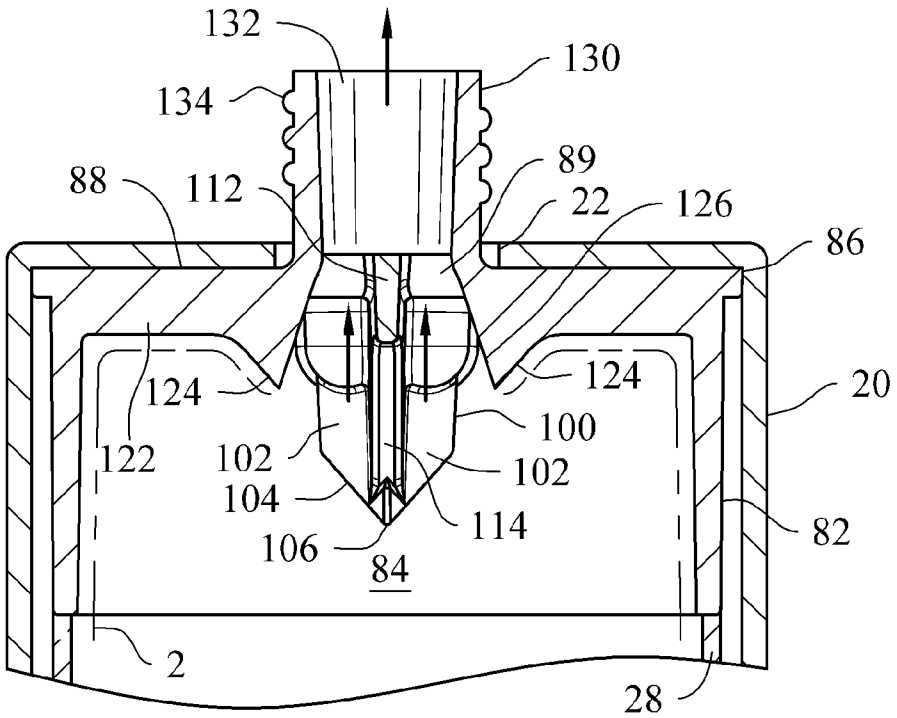

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FIG. 12

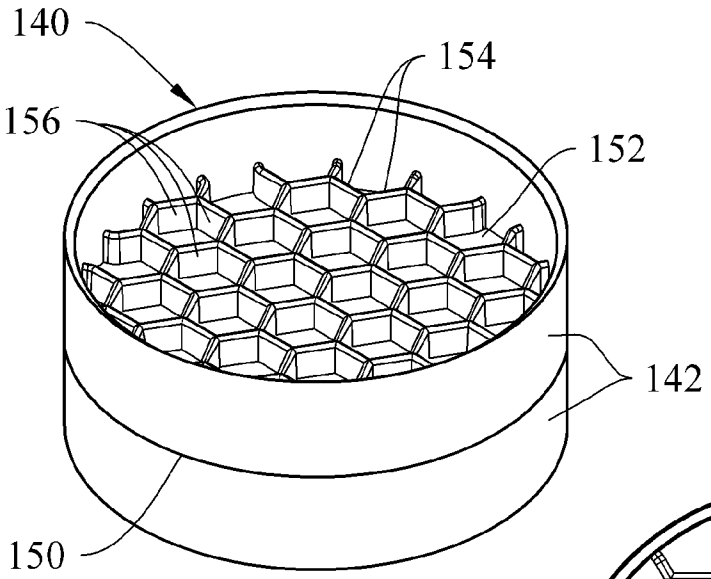


FIG. 13

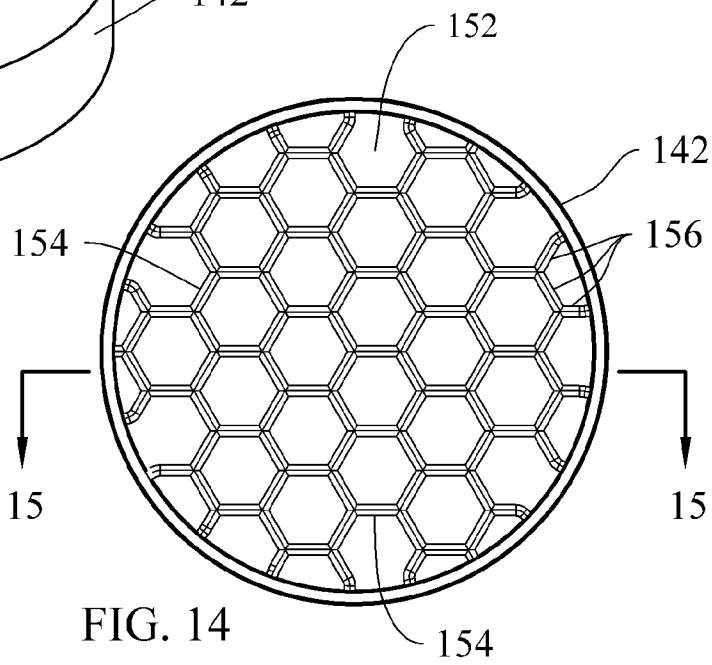


FIG. 14

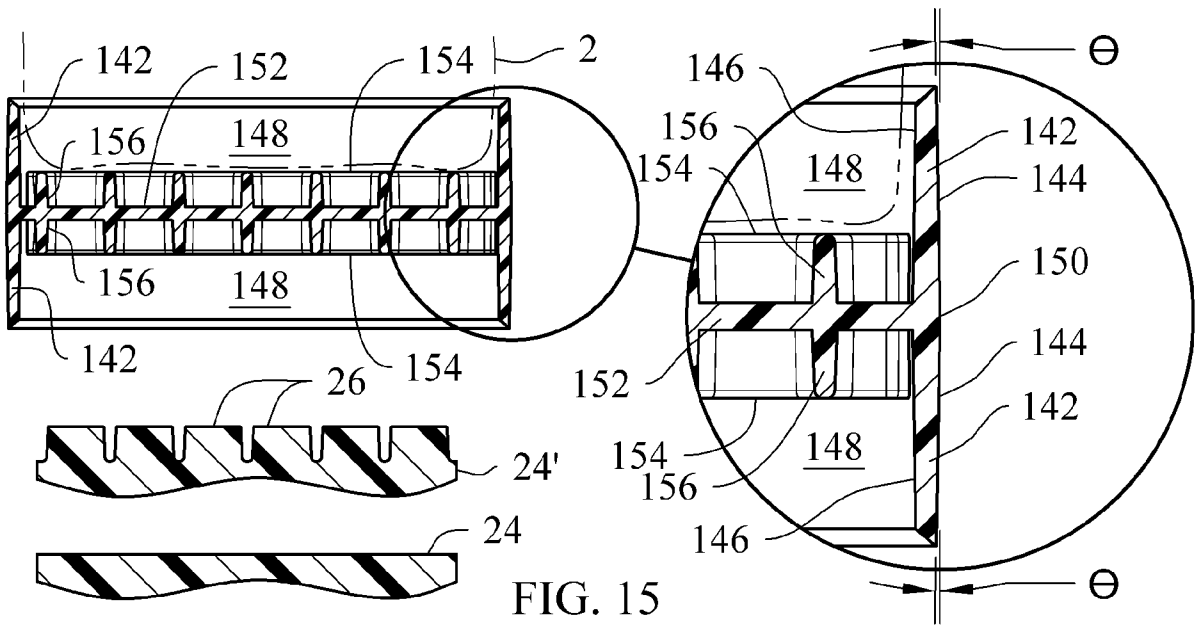


FIG. 15

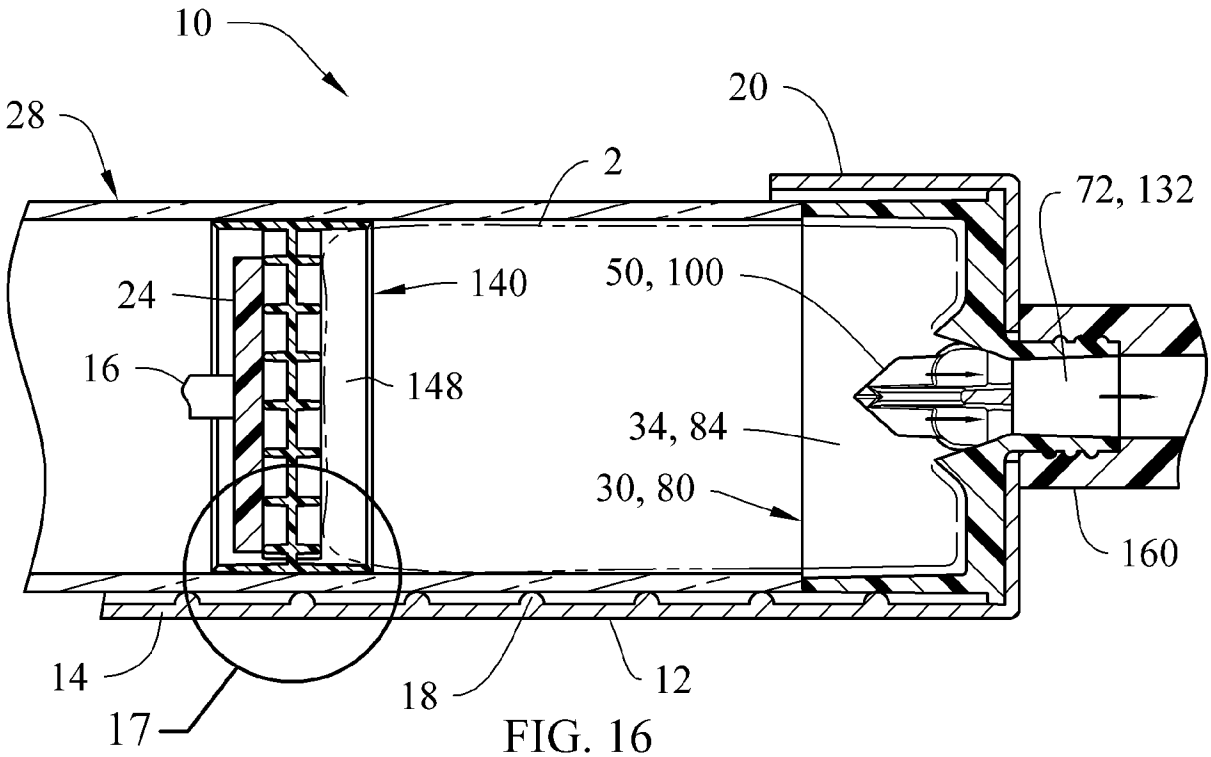

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FIG. 16

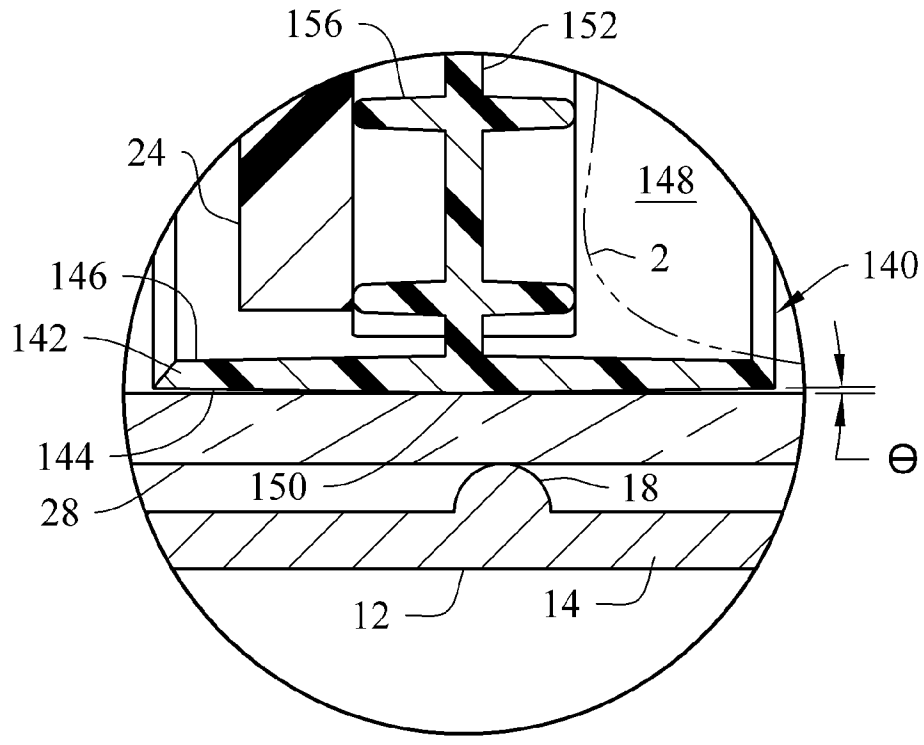

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FIG. 17

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 22/79685

A. CLASSIFICATION OF SUBJECT MATTER

IPC - INV. B05C 17/005 (2023.01)
ADD. B05C 17/01, B67B 7/86 (2023.01)

CPC - INV. B05C 17/00576, B05C 17/00583, B05C 17/00586, B05C 17/0123
ADD. B05C 17/01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
See Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
See Search History document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y --- A	US 2021/0299695 A1 (Inno-Cons Thailand Co. Ltd) 30 September 2021 (30.09.2021), entire document, especially Fig. 1, para [0020], [0022], [0026], [0030]	1 --- 9 --- 2-8, 10-15
Y --- A	US 2008/0011784 A1 (Schneider et al.) 17 January 2008 (17.01.2008), entire document, especially Fig. 1-4, para [0026], [0027], [0030]	9 --- 10-15
A	US 6,564,970 B1 (Walch et al.) 20 May 2003 (20.05.2003), entire document, especially Fig. 1-2, col. 2 ln. 63, 67, col. 3 ln. 14, 46-47	1-15
A	EP 1247746 A1 (Adshead Ratcliffe and Company Limited) 9 October 2002 (09.10.2002), entire document	1-15
A, P	EP 3936454 A1 (Soudal) 12 January 2022 (12.01.2022), entire document	1-15

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
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"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 January 2023	FEB 21 2023
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer Kari Rodriquez Telephone No. PCT Helpdesk: 571-272-4300