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(54) FLUID DISPENSING APPARATUS

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Description

Technical Field

[0001] The present invention relates to apparatus and a method for dispensing fluid. In particular, but not exclusively, the apparatus is configured to provide a plurality of optional dispensing modes including for example a dual mode for dispensing a jet or stream of fluid (e.g. water) and a mist of fluid simultaneously. Certain embodiments of the present invention relate to a hand held branch together with a fixed, e.g. vehicle mounted, nozzle for use in fighting fires. Methods of dispensing fluids e. g. water are also included in the present invention including for example methods of dispensing fluids in a fire-fighting situation.

Background to the Invention

[0002] In order to fight fires, hand held or mounted devices such as nozzles or branches are typically connected to a fluid source (e.g. a source of water or the like), and the device is used to direct the fluid discharged from the source. The device is typically provided with an on/off mechanism for controlling the discharge of fluid from the nozzle or branch.

[0003] US2,389,642A (Schellin) describes an example of a prior art hose nozzle for a fire hose, for producing a straight stream and spray either single or in combination.

[0004] Conventionally, fire fighting nozzles or branches can be used to dispense a stream of fluid. These branches typically generate relatively large droplets in an annular O-shaped stream. The pattern of dispensed fluid may be varied between a wide spray pattern and a concentrated jet.

[0005] Conventionally mist-only branches are known. The mist may be generated in several ways. One such technique is to use high or ultra-high pressure fluid sources to force fluid (e.g. water) through small orifices to atomise the spray. Other methods involve the use of paired interference streams to generate mist.

[0006] Mist is acknowledged as a more efficient fire-fighting media compared to the relatively larger droplets of a stream dispensed by conventional branches, as the larger surface area to volume ratio of the smaller particles of the mist allow the mist to absorb more energy from the fire.

[0007] More of the water turns to steam and hence less water is required for the same effect on the fire. As a result, branch or nozzle size and flow may therefore be reduced.

[0008] Prior art mist-only systems have several disadvantages associated with their use. In instances when very small orifices are used, they can be prone to blocking. In addition, the throw (i.e. the distance over which the mist is urged so as to be able to suppress fire) is limited as compared to the throw of larger droplets dispensed in a jet or spray pattern and therefore the fire-fighter has to get closer to the fire with a hand held device in order to direct the water onto the fire or fixed systems e.g. systems mounted on vehicles can be limited in their reach. Both situations can be dangerous and potentially life-threatening. As a result, there is reluctance amongst fire-fighters to use mist-generating branches in certain circumstances, despite their potential improved efficiency in putting fires out compared to jet or spray branches.

[0009] It is an aim of the present invention to at least partially mitigate the above-mentioned problems.

[0010] Certain embodiments of the present invention aim to provide apparatus which are configured to dispense a fluid mist which is capable of improved throw.

[0011] Certain embodiments of the present invention aim to provide apparatus which are configured to be switchable between a plurality of dispensing modes when desired by a user.

[0012] Certain embodiments of the present invention aim to provide a multi-mode hand held or fixed position fire suppression system with at least three modes of operation which can be operated efficiently by a fire-fighter either directly or remotely.

Summary of Certain Embodiments of the Invention

[0013] In a first aspect of the present invention, there is provided apparatus for dispensing fluid at a desired location, comprising;

a delivery device comprising:

a first fluid communication pathway and a further fluid communication pathway;
at least one first fluid outlet port and at least one further fluid outlet port at least partly surrounding the first fluid outlet port wherein the first fluid communication pathway is for connecting each first fluid outlet port to a first fluid source and the further fluid communication pathway is for connecting each further fluid outlet port to a further fluid source;
a first control member for selectively connecting the first fluid source to the first fluid outlet port; and

a further control member for selectively connecting the further fluid source to the further fluid outlet port;
wherein the first fluid outlet port is configured to dispense fluid in a first dispensing mode and wherein the further fluid outlet port is configured to dispense fluid in a further dispensing mode;
characterised in that the delivery device can selectively provide a spray or jet pattern alone or a mist pattern alone, or both a spray or a jet pattern and a mist pattern simultaneously in which a mist pattern is entrained via a surrounding spray or jet pattern to enhance the throw of the mist.

[0014] In certain embodiments, the delivery device is a hand-held device.

[0015] Aptly, the delivery device is configured to be mounted on a vehicle. Alternatively, the delivery device is configured to be fixed.

[0016] In certain embodiments, the first fluid outlet port and the further fluid outlet port are configured to expel liquid, e.g. water, therefrom.

[0017] Aptly, the apparatus further comprises a first fluid source and a further fluid source. In one embodiment, the first fluid source and the further fluid source comprise a common fluid source. In a further embodiment, the first fluid source is separate and distinct from the further fluid source.

[0018] In certain embodiments, the first fluid source and the further fluid source are each configured to supply a fire-fighting liquid to the respective first and further fluid outlet ports. Aptly, the fire-fighting liquid is water.

[0019] Aptly, the delivery device is operable to dispense fluid in a plurality of dispensing modes. In certain embodiments, the delivery device comprises a first actuating member operably connected to the first control member to selectively connect or disconnect the first fluid source to the first fluid outlet port.

[0020] Aptly, the first fluid communication pathway comprises a first conduit and wherein the first control member comprises a first valve member provided in the first conduit.

[0021] In certain embodiments, the first valve member is moveable between an open position and a closed position to selectively connect the first fluid source to the first fluid outlet port.

[0022] Aptly, the delivery device comprises a pistol-like body. In certain embodiments, the first actuating member is a trigger member and the first valve member is moveable between the open position and the closed position by actuation of the trigger member.

[0023] In a further embodiment, the delivery device comprises a generally elongate body. Aptly, the first valve member is moveable between the open position and the closed position by actuation of a non-trigger first actuation member e.g. a handle member.

[0024] Aptly, the device comprises a further actuating member operably connected to the further control member to selectively connect or disconnect the further fluid source to the further fluid outlet port.

[0025] In one embodiment, the further fluid communication pathway comprises a further conduit and wherein the further control member comprises a further valve member provided in the further conduit.

[0026] Aptly, the further valve member is moveable between an open position and a closed position to selectively connect the further fluid source to the further fluid outlet port. In certain embodiments, the further valve member comprises a first portion comprising a first through bore and a further portion comprising a further through bore. In certain embodiments, the further valve member is rotatable between an open position in which the first through bore and further through bore are each axially aligned with a respective longitudinal axis of an annular portion of the further conduit and a closed position in which the first through bore and the further through bore are provided generally perpendicular to a respective longitudinal axis of an annular portion of the further conduit.

[0027] In certain embodiments, the further valve member comprises a central portion having a smaller diameter than the first portion and the further portion. Aptly, the central portion connects the first portion and the second portion. Aptly, the narrowed central portion is locatable in the first conduit. Aptly, the narrowed portion is configured to permit fluid to be dispensed through the first conduit when the further valve member is either in an open position or a closed position with respect to the further conduit.

[0028] In certain embodiments, the first valve member comprises a central portion comprising a first central through bore, wherein the central portion is locatable in the first conduit. In certain embodiments, the first valve member is rotatable between an open position in which the first central through bore is axially aligned with a longitudinal axis of the first conduit and a closed position in which the first central through bore is provided generally perpendicular to a longitudinal axis of the first conduit.

[0029] In certain embodiments, the first valve member comprises a first narrowed portion and a further narrowed portion, the first narrowed portion and the further narrowed portion being connected by the central portion. Aptly, the first narrowed portion and the further narrowed portion each have a diameter which is smaller than a diameter of the central portion.

[0030] Aptly, the first narrowed portion and the further narrowed portion are locatable in a respective annular portion of the further conduit. Aptly, the narrowed portions are configured to permit fluid to be dispensed through the annular portions of the further conduit when the first valve member is in both an open position and a closed position with respect to the first conduit.

[0031] Aptly, the delivery device comprises a body and the further actuating member is a handle member. In certain embodiments, the handle member is actuatable to selectively move the valve member between the open position and the closed position. In an embodiment, the body is a pistol-like body.

[0032] Aptly, the handle member is pivotably connected to the further valve element and rotation of the handle member around a pivot axis selectively connects the further fluid source to the further fluid outlet port.

[0033] In certain embodiments, the delivery device comprises a body portion and wherein the further control member comprises a rotatable sleeve member mounted on the body portion.

[0034] Aptly, the first conduit and the further conduit are coaxially arranged. Aptly, the first conduit and the further conduit are provided in a generally parallel arrangement. In one embodiment, the first and/or the fur-

ther conduit are provided with at least one bend.

[0035] In one embodiment, the further fluid outlet port is annular and entirely surrounds said first fluid outlet port. Aptly, the outer mist pattern may provide a protective barrier between a fire and a user of the device.

[0036] Aptly, the mist pattern comprises fluid droplets having an average diameter less than about 100 μm e. g. less than 65 μm e.g. less than 45 μm. Aptly, the droplets of the mist pattern have an average diameter of less than about 1 μm.

[0037] In one embodiment, the device comprises a body portion which accommodates at least a portion of the first fluid communication pathway and at least a portion of the further fluid communication pathway.

[0038] Aptly, the device further comprises a grip member which extends from the body portion. In one embodiment, the handle member extends from the body portion.

[0039] Aptly, the device further comprises a pattern sleeve rotatably coupled to the body portion, and wherein the first dispensing mode may comprise a plurality of patterns, the pattern of fluid being established by the rotational position of the pattern sleeve with respect to the body.

[0040] In an embodiment, the further control member comprises a control sleeve rotatably coupled to the body portion. Aptly, the control sleeve and the pattern sleeve are the same.

[0041] Aptly, the device further comprises a flow rate control element.

[0042] In certain embodiments, the device further comprises at least one filter element. Aptly, the filter element prevents blocking of one or more orifices of the first fluid outlet port. Aptly, the device further comprises a filter element positioned in an inlet region of the first fluid communication pathway. In certain embodiments, the filter element comprises a mesh which comprises a plurality of pores each having a diameter which is smaller than a diameter of one or more orifices provided by the first fluid outlet port. Aptly, the filter element acts to prevent material of a size which may clog the orifices of the first fluid outlet port from travelling to the first fluid outlet port. Aptly, the filter element may be flushed of trapped material by a flow of fluid in the second fluid communication pathway adjacent thereto.

[0043] Certain embodiments thus provide a way of dislodging material e.g. particulate debris, from one or both fluid communication pathways which may otherwise block the pathway thus preventing fluid e.g. water from exiting the device. Certain embodiments may therefore provide a device which is less likely to malfunction in potentially dangerous fire-fighting situations.

[0044] In certain embodiments, the further fluid outlet port is a second fluid outlet port and wherein the device comprises a third fluid outlet port which at least partly surrounds the second fluid outlet port.

[0045] In certain embodiments, the further fluid communication pathway is a second fluid communication pathway and the further fluid source is a third fluid source and wherein the device further comprises a third fluid communication pathway which is for connecting the third fluid communication pathway to the third fluid source. The third fluid source may be separate from the first and second fluid sources or may be a common fluid source.

[0046] In certain embodiments, the further dispensing mode is a second dispensing mode and the third fluid outlet port is configured to provide a third dispensing mode. Aptly, the third dispensing mode provides a pattern selected from a mist pattern, a spray pattern or a jet pattern.

[0047] Aptly, the device is a fire branch or a fire nozzle. Aptly, the device is for dispensing one or more fire-fighting fluids. Aptly, the fire-fighting fluid is water.

[0048] In a further aspect of the present invention, there is provided a method of fighting a fire, comprising the steps of:

selectively dispensing fluid from a delivery device at a desired location where a fire is located via a selected one of at least three possible modes of dispensing, comprising:

delivering fluid mist alone via at least one central fluid outlet port of the delivery device;

delivering fluid, via at least one annular fluid outlet port, in a jet or spray alone, wherein the at least one annular fluid outlet port at least partially surrounds said central fluid outlet port; and

simultaneously delivering fluid mist via said central fluid outlet port and fluid jet or fluid spray via said annular fluid outlet port.

[0049] Aptly, the method further comprises:

selecting said a selected one mode of operation by selectively actuating one or both of a first control member and a further control member of the delivery device.

[0050] Aptly, the spray is a frusto-conical spray. Aptly, the fluid delivered via the at least one annular fluid outlet port is adjustable between the jet and the spray. Aptly, the jet is a solid stream of fluid. Aptly, the fluid is water.

[0051] Aptly, the delivery device is the delivery device as described herein. Aptly, the central fluid outlet port is a first fluid outlet port as described herein. Aptly, the annular fluid outlet port is a further fluid outlet port as described herein.

[0052] Certain embodiments of the present invention provide a device e.g. a branch with only two hand operated selection actuators which can provide a spray or jet pattern alone or a mist pattern alone or both a spray or jet pattern and mist pattern simultaneously in which a mist pattern is entrained via a surrounding spray or jet pattern to enhance the throw and effect of the mist.

[0053] Certain embodiments of the present invention provide a device, e.g. a monitor or a turret, which is mounted on a vehicle or is deployed from the ground.

[0054] In certain embodiments, the device is configured to provide a single mode of fluid dispensing. For example, a user may wish to dispense a fluid in a mist-

only mode or a jet-only mode. Thus, the device of certain embodiments described herein provides the advantage that a single device can be used to dispense fluid in multiple dispensing patterns. The same device can be used to dispense fluid in a different mode when for example the situation changes. For example, in a fire fighting situation, a mist may be appropriate to begin with but environmental conditions may change e.g. there may be an increase in wind speed which would make a mist less effective and therefore a jet mode of dispensing becomes more appropriate. The user can operate the control members of the device of certain embodiments to switch from one mode of dispensing to another without having to change to a different device or to change fluid sources.

[0055] In a further aspect of the present invention, there is provided apparatus for delivering a fluid or a powder at a desired location, comprising:

a fluid delivery device comprising at least a first fluid outlet port and at least a further fluid outlet port;
a first fluid delivery conduit providing a central bore for communicating a first fluid from a first fluid source to the first fluid outlet port; and
a further fluid delivery conduit, coaxial with the first fluid delivery conduit for at least a portion of a length of the first fluid delivery conduit, defining an annular passage between the first and further fluid delivery conduits for communicating a further fluid to the further fluid outlet port.

[0056] Aptly, the fluid is a gas.

[0057] Aptly, the apparatus comprises a hose, connectable to the fluid delivery device, comprising a first hose conduit and a further hose conduit each having a substantially cylindrical shape when fluid is communicated along a length of the hose.

[0058] In one embodiment, the first fluid delivery conduit is integrally formed with a hose conduit. In one embodiment, the further fluid delivery conduit is integrally formed with a further hose conduit, wherein the first hose conduit is provided within the further hose conduit. Thus, in some embodiments, the first fluid source and the further fluid source are co-axially arranged.

[0059] Aptly, the first hose conduit and the further hose conduit are each flexible and collapsible.

[0060] Aptly, the first and further hose conduit are manufactured from a reinforced rubber or reinforced plastic material. Aptly, the hose comprises an outer layer manufactured from a metal e.g. steel or aluminium.

[0061] In certain embodiments, the apparatus comprises:

at least one delivery device connection member at a connection end of the fluid delivery device; and
at least one hose connector member at an end of the hose for connecting a hose to the delivery device; wherein
a first and further hose passage are locatable in fluid communication with a respective one of the central bore and annular passage of the fluid delivery device when the hose is connected to the delivery device.

[0062] Certain embodiments of the invention provide an apparatus which is capable of delivering one or more, e.g. two fluids, to a target location. A first fluid can be dispensed via the first fluid outlet port and a further fluid can be dispensed via the further fluid outlet port. The fluids may be different or the same. The first fluid and the second fluid may be dispensed essentially simultaneously or may be dispensed sequentially.

[0063] Certain embodiments of the present invention provide an apparatus which is for dispensing at least two fire-fighting fluids to a desired location. In one embodiment, the first or further fluid is water. Aptly, the water comprises one or more additives. Exemplary additives include for example, a surfactant, a gelling agent, a foam composition and/ or an abrasive material.

[0064] In one embodiment, the fluid may be a gas such as for example carbon dioxide. Aptly, the gas is air. In one embodiment, the apparatus is for delivering a powder to a desired location.

[0065] Certain embodiments of the present invention provide a multi-mode fluid dispensing system for wholly or at least partially extinguishing fire at a desired location. Certain embodiments of the present invention may provide a hand held fluid delivery device (e.g. a branch) which can provide any one of at least three different and distinct modes of operation via a convenient to use selection system. Aptly, the delivery devices is pistol-like.

[0066] The co-axial arrangement of the apparatus of certain embodiments enables a single hose or other fluid source to be used to dispense two or more fluids from a device. Thus, the use of two or more hoses, which can be unwieldy and heavy for a user to manoeuvre and handle, can be avoided. This may be particularly important in potentially dangerous situations such as fire-fighting situations in which fire-fighters must be able to move quickly in response to changes in their environment and the fire they are trying to extinguish. Aptly, the fluid is water.

[0067] In a further aspect of the present invention, there is provided a vehicle comprising an apparatus as described herein. Aptly, the vehicle is a fire-engine or fire truck. Aptly, the vehicle is a marine vehicle e.g. a ship.

[0068] Further details of certain embodiments of the present invention are provided below.

Brief Description of the Figures

[0069] Embodiments of the present invention will now be described hereinafter by way of example only, with reference to the accompanying drawings in which:

Figure 1 illustrates a portion of a device according to certain embodiments of the present invention;

Figure 2 illustrates an outlet region of a device according to certain embodiments of the present invention in a first dispensing mode;

Figure 3 illustrates an outlet region of a device according to certain embodiments of the present invention in a further dispensing mode;

Figure 4 illustrates an outlet region of a device according to certain embodiments of the present invention in a yet further dispensing mode;

Figure 5 is a representation of a device according to certain embodiments of the present invention;

Figure 6 is a representation of a portion of a device according to certain embodiments of the present invention in a first dispensing mode;

Figure 7 is a representation of a portion of the device according to certain embodiments of the present invention in a further dispensing mode;

Figure 8 is a representation of a portion of the device according to certain embodiments of the present invention in a yet further dispensing mode;

Figure 9 illustrates an embodiment of certain embodiments of the present invention;

Figure 10 illustrates a co-axial arrangement of certain aspects of the present invention;

Figure 11 illustrates co-axial conduits according to certain embodiments of the present invention;

Figure 12A illustrates a device according to certain embodiment of the present invention;

Figure 12B illustrates a cross-sectional view of the device illustrated in Figure 12A;

Figure 13A illustrates the device illustrated in Figure 12A in a further dispensing mode;

Figure 13B illustrates a cross-section view of a device in the dispensing mode shown in Figure 13A;

Figure 14A illustrates a device in a further dispensing mode;

Figure 14B illustrates a cross-sectional view of a device in the dispensing mode shown in Figure 14A;

Figure 15A illustrates a device in a further dispensing mode;

Figure 15B illustrates a cross-section view of a device in the dispensing mode shown;

Figure 16 illustrates a control element in a closed position according to certain embodiments of the present invention;

Figure 17 illustrates a control element in an open position according to certain embodiments of the present invention;

Figure 18A schematically illustrates a device according to certain embodiments of the present invention;

Figure 18B is a cross-sectional view of the device illustrated in Figure 18A;

Figure 19A schematically illustrates a device according to certain embodiments of the present invention in a further dispensing mode;

Figure 19B is a cross-sectional view of the device illustrated in Figure19A;

Figure 20A schematically illustrates a device according to certain embodiments of the present invention in a further dispensing mode;

Figure 20B is a cross-sectional view of the device illustrated in Figure 20A;

Figure 21A schematically illustrates a device according to certain embodiments of the present invention in a further dispensing mode;

Figure 21B is a cross-sectional view of the device illustrated in Figure 21A; and

Figure 22 illustrates a flow rate control element according to certain embodiments of the present invention.

Detailed Description of Certain Embodiments of the Invention

[0070] Certain embodiments of the present invention relate to apparatus for dispensing fluids. In certain embodiments, the apparatus is for dispensing fire-fighting fluid. Aptly, the fire-fighting fluid is water. Alternatively, or in addition, the fluid source may be a source of a combination of a foam composition and water. Thus in some embodiments, the apparatus is for dispensing a water-foam mixture. Fire-fighting foam compositions are well known in the art and may be for example protein-based compositions or synthetic foam compositions. Alternatively, the device may be for dispensing a water-additive composition.

[0071] Aptly, the apparatus comprises a device as described herein. The device may be a hand-held device

such as for example a branch or a nozzle. In certain embodiments a delivery device is a branch, a turret, a monitor or a nozzle. In certain embodiments, the device is a branch. The term "branch" is well-known in the art.

[0072] In certain embodiments, the device is a mounted or fixed structure device such as for example, a turret or a monitor. The device may be positioned on a surface and operated automatically without the need for a firefighter. The device may be mounted to a vehicle for example or a ship and operated therefrom. In use, the apparatus further comprises a fluid source connected to the device. The fluid source may be a water source for example.

[0073] Aptly, the device may be actuated using a variety of different actuation methods, including manual, electric, hydraulic, or radio frequency controlled or the like.

[0074] In certain embodiments, the fluid is dispensed in a dispensing pattern. Aptly, as used herein the terms "dispensing pattern" and "pattern" is used to describe the pattern generated by the fluid being dispensed.

[0075] In certain embodiments, the dispensing pattern may be for example a jet pattern. A jet pattern is formed when relatively large droplets or a solid stream of fluid are dispensed from the device in a confined manner. The droplets dispensed in a jet pattern may have an average diameter of greater than about 100 μm e.g. about 150 μm, 200 μm, 300 μm, 400 μm or greater or be in a solid stream.

[0076] As used herein, the term "average diameter" is the average diameter of at least about 90% of the droplets being dispensed in a particular dispensing mode.

[0077] A spray pattern is formed when relatively large droplets of fluid are dispensed from the device in The droplets dispensed in a spray pattern may have an average diameter of greater than about 100 μm e.g. about 150 μm, 200 μm, 300 μm, 400 μm or greater.

[0078] A mist pattern is formed when small droplets of fluid are dispensed from the device. The term "small" may be relative to the size of droplets generated in a jet or spray pattern. Furthermore, aptly, the size of fluid droplets dispensed in a mist pattern may be determined according to the type of device. For example, a hand held device may be configured to dispense mist in which the fluid droplets have an average diameter of less than about 100 μm e.g. 90 μm, 80 μm, 70 μm or 60 μm. In one embodiment, the mist droplets have an average diameter of between less than about 1 μm to about 60 μm.

[0079] Mist droplets dispensed by a device larger than a hand held branch e.g. a monitor or turret may have a greater average diameter. For example, in certain embodiments the mist droplets have an average diameter greater than about 100 but less than about 1000 μm.

[0080] In certain embodiments, the device is configured to simultaneously dispense fluid in both a mist pattern and spray pattern. Aptly, the fluid is dispensed as a mist from the first outlet port which is provided inside an annular further outlet port. Aptly, a spray or jet is dispensed from the annular further outlet port which is provided around the outlet perimeter of the first outlet port. As such, when the mist and the spray or jet are dispensed at the same time, the spray or jet acts to entrain the mist which increases the distance the mist may travel. Thus, certain embodiments of the present invention may allow users, i.e. fire-fighters to be positioned further away from a fire than prior art mist-only branches would allow.

[0081] The water source may deliver water to the device at a pressure ranging from about 2 bar to about 1000 bar or more. In certain embodiments, e.g. when the device is used to dispense fluid in a mist-only mode, the fluid source may provide the fluid at a high or ultra-high pressure. Aptly, high pressure may be considered to be between about 20-50 Bar. Aptly, very high pressure is between about 50-100Bar and ultra-high pressure may be greater than 100Bar.

[0082] In an embodiment, the device is adapted to receive fluid, e.g. water, at two or more different pressures. Aptly, the water source delivers water at two or more pressures. In certain embodiments, the water source is a plurality of water sources.

[0083] Turning to the embodiments illustrated in the Figures, a device e.g. a branch 1 is shown in Figure 5.

[0084] The device 1 comprises a body portion 3 which includes an outlet region 5. The device also includes an inlet region 7 which connects the device to a fluid source (not shown).

[0085] The device may be configured to connect at its inlet region to one or more than one fluid sources. In certain embodiments, the device may be connectable to two fluid sources simultaneously such as a high pressure or ultra-high pressure fluid source as well as a low pressure source. The connection may be a coaxial connection as described further below.

[0086] The device also includes a grip member 9 for a user to hold the device. The grip member extends downwardly from the body portion 3. The grip member may be a pistol-type grip, as shown in Figure 5. Other types of grip or handles are envisaged and encompassed by certain embodiments of the present invention.

[0087] The device also includes a handle member 11. The handle member 11 extends generally upwardly from the body portion. The handle member is pivotably mounted on an external surface of the body portion and thus rotatable by a user. In certain embodiments, the handle member is a bale arm control member. The handle member may be used to selectively control flow of a fluid from a fluid source to the outlet region. Further details of the control members are provided below.

[0088] The device may also include a further control element for example a control member 13. The control member 13 as shown in Figure 5 is a trigger control member. The trigger control member is connected to one or more further control members housed in the body portion, as described in more detail below.

[0089] The outlet region of the device can be seen in detail in Figure 1 for example. The outlet region compris-

es a first fluid outlet port 15 which has an outer surface 16. The first fluid outlet port 15 has a circular cross section and is generally solid. The first fluid outlet port is in fluid communication with a first conduit as shown in Figure 6 for example. The first fluid outlet port comprises an outer surface 16 which includes a plurality of small orifices 19 for dispensing fluid therefrom. The orifices may be provided in a paired orientation, as shown in Figure 1 for example. The pairs of orifices may provide an interference pattern to fluid being dispensed from the first fluid outlet port, thus forming a mist of fluid. Alternatively, the first fluid outlet port may comprise one or more orifices sized to atomise fluid being dispensed therefrom.

[0090] In a further alternative embodiment (not shown), the first fluid outlet port may comprise a central bore in place of having an essentially solid surface as described above. In this embodiment, a misting tip element may be secured in place above the outer surface of the first fluid outlet port. The first fluid outlet port may comprise a screw thread which corresponds to a screw thread provided on the misting tip element in order to removably secure the misting tip element to the first fluid outlet port. Alternatively, the misting tip element may be secured to the first fluid outlet port by a bayonet fitting.

[0091] The misting tip element may comprise one or more orifices for dispensing fluid from the first conduit, the orifices being sized and shaped to dispense the fluid in a mist.

[0092] The outlet region further comprises a second fluid outlet port 21. The second (or further) fluid outlet port 21 is annular and surrounds the first fluid outlet port, as shown in Figure 1 and Figure 5 for example. Thus, the second fluid outlet port has an annular cross-sectional area. The second fluid outlet port is provided around an outer periphery of the first fluid outlet port. The second fluid outlet port may be separated from the first fluid outlet port by a solid annular region 23.

[0093] The outlet region may also include a collar 25. The collar 25 provides an outer longitudinal surface of the outlet region. The collar is rotatable and, when rotated, slides a sleeve longitudinally downstream from a distal end of the outlet region. Sliding the sleeve when a fluid is being provided to the device switches the dispensing mode of the second outlet port between a jet and a spray. In certain embodiments of the invention, e.g. as shown in Figure 9, rotation of the collar can also control fluid flow to the second outlet port and therefore can either prevent or enable fluid from being dispensed from the second outlet port, depending on the direction of rotation. In this embodiment, the collar and sleeve together form a further or second control member as described herein, the sleeve being rotatable to between an "off" position in which fluid is not dispensed and an "on" position in which fluid is dispensed.

[0094] The second outlet port may further comprise an annular structure comprising a plurality of spaced apart tooth elements 140 as shown in Figure 9 for example. The annular structure may be positioned around the outer perimeter of the first outlet port and extend outwardly from the distal surface of the outlet region. The tooth elements may spin during use to break up droplets of fluid exiting the second fluid outlet port. This acts to reduce droplet size of the fluid exiting the second fluid outlet port and may also result in the fluid being dispensed in a wider angle of divergence.

[0095] The teeth may be bevelled or angled so the water exerts an uneven pressure in order to spin the annular structure. Each tooth element is secured to or is an integral part of the annular structure which is located in a recessed ring groove region located within the distal surface of the fluid outlet region.

[0096] Alternatively, the annular structure may be fixed and may not spin.

[0097] The device provides one or more fluid communication pathways. Aptly, the device comprises a first conduit 27 providing a bore, as shown in Figure 6. Figures 6 to 8 illustrates the control members and fluid flow control of various embodiments of the present invention and are not to scale.

[0098] The first conduit 27 has a first end 29 which is proximal to, and connectable, to a fluid source. The first conduit 27 may comprise a filter element (not shown) at its first (inlet) end. The first conduit 27 terminates at an opposing end at the outlet region and is in fluid communication with the first fluid outlet port. The first conduit connects the first fluid outlet port with a fluid source such that fluid is delivered to the first fluid outlet port and dispensed. The embodiment shown in Figure 6 illustrates a first conduit which comprises at least one bend therein. The first conduit may comprise a curve or bend in it in order to accommodate a control member provided in the second conduit as described below. The first conduit may be housed entirely within the body portion or alternatively at least a portion of the first conduit may be housed outside the body portion.

[0099] Aptly, the first conduit comprises one or more control members for selectively controlling the flow of fluid from the fluid source to the first fluid outlet port. As shown in Figure 6, an exemplary control member comprises a valve element 33. The valve element 33 can be for example a ball valve. Aptly, the valve element 33 can be moved between an open position and a closed position by operation of the trigger member 13 (shown in Figure 5). Thus, when the trigger member is in a first position, the valve is in a first position e.g. an open position. When the trigger member is in a second position, i.e. when it has been actuated and moved towards (or away from) the grip member, the movement of the trigger member moves the valve into a second position e.g. a closed position. In addition, movement of the trigger member between the first position and the second position may act to control the flow rate of the fluid. When the valve element is in a closed position, fluid is prevented from flowing to the first fluid outlet port and therefore is not dispensed.

[0100] The valve element 33 may be for example a ball valve, as shown in Figure 6. Aptly, the ball valve com-

prises a ball with a bore 39 extending through its diameter. When the valve is in an open position, the bore 39 is generally axially aligned with the longitudinal axis of the conduit 27 so as to allow fluid to pass along the conduit.

[0101] The valve is moved to a closed position, e.g. by actuation of the trigger member and the ball is rotated so that the hole is no longer aligned with the longitudinal axis of the conduit. Instead, the hole is generally perpendicular with the longitudinal axis of the conduit and therefore fluid is not permitted to flow along the conduit.

[0102] Flow rate through the ball valve may be reduced but flow is not completely stopped by partial rotation of the ball valve. Aptly, the valve element is formed from any suitable material such as for example stainless steel.

[0103] It will be appreciated that in an alternative arrangement, the valve element 33 is operated by movement of an alternative control member in place of the trigger, for example, a handle member as described herein.

[0104] As shown in Figure 6, the device further comprises a second conduit 35 comprises a control element for controlling flow of a fluid in the second conduit. The second conduit may be housed with the body portion of the device. Aptly, the conduits are constructed from aluminium alloy, bronze or a composite material.

[0105] As illustrated in Figure 6, the control element comprises a second valve element 37. The second valve element may be a ball valve comprising a through bore 41 as described above in respect of the first valve element. Thus, rotation of the ball valve 37 controls the flow of fluid to the second fluid outlet port.

[0106] The second control element may further comprise an element which can be actuated so as to move the second valve element between an open position and a closed position. In one embodiment, movement of the second valve element between an open position and a closed position is controlled by movement of the handle member 11. In alternative embodiments, the second valve element may be actuated by an alternative control member for example a trigger member 13. In this embodiment, the first valve element may be actuated via a control member other than the trigger member.

[0107] In Figure 6, the first valve element provided in the first conduit is in a closed position and the second valve element is in an open position. Thus, fluid is only permitted to flow from a fluid source along the second conduit to the second fluid outlet port. In this embodiment, the device dispenses fluid in a jet or spray pattern. The dispensing pattern which forms as a result of the arrangement of Figure 6 is shown in Figure 2. Rotation of the collar alters the dispensing pattern between a jet and a spray pattern as required.

[0108] Figure 7 illustrates an embodiment in which the first valve element is in an open position thus permitting flow of a fluid along the first conduit from a fluid source to the first fluid outlet port. The second valve element is in a closed position and therefore fluid is blocked from flowing to the second outlet port.

[0109] Thus, in the dispensing mode illustrated in Figure 7, fluid is dispensed from the first fluid outlet port only. The first fluid outlet port is configured to dispense fluid in a mist pattern and therefore only mist is dispensed. The dispensing pattern formed from this arrangement is shown in Figure 3.

[0110] Figure 8 illustrates an embodiment in which both the first and the second valve elements are in an open position and as such fluid flows along the first and the second fluid conduits to the respective fluid outlet ports. In this embodiment, the device simultaneously dispenses fluid in two different dispensing patterns, one of which is a mist pattern. This arrangement provides the advantage that the mist once dispensed is constrained by the jet or spray and therefore may travel a greater distance compared to mist dispensed without an outer "O-spray" of a jet or spray of fluid. The dispensing patterns formed from this arrangement are shown in Figure 4.

[0111] Figure 9 illustrates an alternative embodiment in which the device 100 comprises a body portion 110 in which the first valve element (not shown) is actuated by a handle member 120. The handle member is pivotably mounted on the body portion. The handle member actuates a valve element in the first conduit to control flow of fluid from a fluid source (not shown) to the first fluid outlet port 140. The first fluid outlet port is configured to dispense fluid in the form of mist, as described above.

[0112] Control of fluid from the fluid source to a second fluid outlet port 150 is controlled by a control member comprising a rotatable collar 160. Rotation of the collar changes the dispensing pattern of fluid being dispensed from the second fluid outlet port between a jet and a spray pattern as well as controlling flow between "on" and "off".

[0113] The device 1, 100 may further comprise a flow rate control element. The flow rate control element may be for example an adjustable collar 180 which is mounted circumferentially on the body portion.

[0114] In certain embodiments, the device may further comprise a pressure reducing or pressure balancing valve which may be provided in the first and/or further fluid communication pathway (not shown). Pressure reducing valves are known in the art.

[0115] Figures 6 to 8 illustrate an embodiment in which the first conduit and the further conduit are provided in a generally parallel and separate relationship along at least a portion of their respective lengths. In an alternative embodiment, the first and the second conduits may be co-axially arranged. A co-axial arrangement of the first and further conduits is described below with reference to Figure 10 and Figure 11.

[0116] Thus, there is provided a fluid delivery device comprising at least a first fluid outlet port and at least a further fluid outlet port. The first fluid delivery conduit provides a central bore for communicating a first fluid from a first fluid source to said first fluid outlet port. The device also comprises a further fluid delivery conduit, coaxial

with the first fluid delivery conduit for at least a portion of a length of the first fluid delivery conduit, defining an annular passage between the first and further fluid delivery conduits for communicating a further fluid to said further fluid outlet port. In an alternative embodiment, one or more of the fluids may be replaced by a powder. In an alternative embodiment, one or more of the fluids may be replaced by a gas.

[0117] This arrangement is shown in Figure 10. A first fluid delivery conduit 200 is positioned inwardly from a second fluid delivery conduit 210. The first fluid delivery conduit provides a bore for a first fluid 220 to flow through. A second fluid 230 flows between an outer surface of the first fluid delivery conduit 200 and an inner surface of the second fluid delivery conduit.

[0118] It will be appreciated that the co-axial arrangement shown in Figure 10 may be applicable to devices other than the apparatus for delivering a fluid described herein.

[0119] Figure 11 illustrates the arrangement depicted in Figure 10 in a device for dispensing fluids as described herein. A first conduit 300 provides a bore along which fluid may flow. As illustrated the first conduit is in fluid communication with a first fluid outlet port 310.

[0120] A second conduit 320 is in fluid communication with a second fluid outlet port 330 which is annular and dispenses fluid in an "O-shaped" jet or stream. The first conduit 300 and the second conduit 320 are integrally formed with a hose conduit (not shown) along which one or more fluids can travel. The hose conduit may comprise a corresponding co-axial arrangement such that only a single hose conduit is required to provide two fluid pathways and therefore can be used to provide two fluids simultaneously. In the embodiment shown in Figure 11, the first and second conduits are in a co-axial relationship along only a portion of their length. The first conduit comprises a curve or a bend to accommodate the valve provided in the second conduit. In alternative embodiments, the first and second conduits are in a co-axial arrangement along their respective lengths.

[0121] A further embodiment is shown in Figures 12 to 15. These figures illustrate a device 1000 according to an alternative embodiment. The device 1000 comprises a housing 1005 and a pistol grip handle 1010 as described above. The device also comprises a first conduit 1020 which is provided in a co-axial arrangement with a second conduit 1030. The second conduit at least partially surrounds the first conduit. The first conduit connects a first fluid supply (not shown) to a first outlet port 1040. The second conduit connects a further fluid supply (not shown), which may be the same as the first fluid supply or different, to a second fluid outlet portion 1050.

[0122] The device may comprise a first handle 1060 which is rotatably connected to the housing about an axis which is at a right angle to the flow path of the device. The first handle is connected to a control element 1070 according to certain embodiments of the invention. The control element 1070 is located within the first conduit and the second conduit and is provided to control e.g. allow, reduce or prevent flow of fluid along one or both of the first and second conduits.

[0123] The control element is shown in more detail in Figures 16, 17 and 22. The control element 1070 comprises a first cylindrical element 1080 comprising a through bore 1090 which is locatable in a first portion of the second conduit. The control element also includes a second cylindrical element 1110 locatable in a portion of the second conduit which is provided on an opposing side of the first conduit. The second cylindrical element comprises a through bore 1120 locatable in the second conduit.

[0124] The control element additionally includes a third cylindrical portion 1130 which is locatable in the first conduit. The third cylindrical portion 1130 comprises a narrowed waist portion 1140.

[0125] The first cylindrical portion, the second cylindrical portion and the third cylindrical portion may be integrally formed.

[0126] The control element also comprises a pair of lugs 1150, 1160 which are located in corresponding recesses 1170, 1180 in the housing. The lugs are connected to the first handle such that when the handle is actuated i.e. rotated, the flow control element is also rotated.

[0127] Figure 16 shows the control element in a first position in which the first and second cylindrical elements are positioned such that their respective through bores are perpendicular to the long axis of the second conduit. As a result, the side walls of the cylindrical elements are located within the lumen of the second conduit to block fluid flow along the second conduit.

[0128] The third cylindrical element 1140 comprises a narrowed waist portion which is smaller than area of the lumen of the first conduit and therefore which allows fluid flow past the control element in the first conduit. Thus, in this position, the control element prevents fluid flow along the second conduit but allows fluid flow along the first conduit. As a result, fluid is expelled via the first (inner) outlet port only. Fluid may be emitted in the form of a jet, a spray or a mist depending on the control of fluid droplet size provided (as described above). This single dispensing mode is shown schematically in Figure 14B. Figure 14A illustrates the positioning of the handle.

[0129] Rotation of the handle about its axis rotates the control element from the first position, as shown in Figure 16, to a second dispensing position as shown in Figure 12B and Figure 17. Thus, the first and second cylindrical elements are rotated to position their respective through bores in alignment with the long axis of the second conduit portions. In this position, fluid is permitted to flow along the second conduit to the second outlet port. Fluid can then be expelled from the second outlet port as a jet, a spray or a mist for example. In this dispensing mode, fluid is also permitted to flow along the first conduit due to the narrowed waist portion having a smaller diameter than the diameter of the first conduit. Thus, the dispensing mode shown in Figure 12B is a dual-dispensing mode.

[0130] As shown in Figures 12 to 15, a second handle 1190 is provided which control flow of fluid in the first conduit. In the illustrated embodiments, the second handle is provided downstream from the first handle, although it is envisaged that in other embodiments the second handle may be upstream from the first handle.

[0131] The second handle is rotatably connected to the housing and to a second control element 1200. The second control element comprises a first cylindrical element 1210 positioned in a first portion of the second conduit and a second cylindrical element 1220 positioned in a second portion of the second conduit. Each of the first cylindrical element and the second cylindrical element comprise a narrowed waist portion which has a diameter that is less than the diameter of the respective portions of the second conduit. As a result, fluid is permitted to flow along the second conduit and past the narrowed waist portion towards the second outlet port. The second control element additionally comprises a third cylindrical portion 1230 which comprises side walls defining a through bore.

[0132] Figure 13A and 13B illustrate a dispensing mode in which the second handle is rotated to a position which rotates the second control element and causes the through bore of the third cylindrical element to be positioned perpendicular to the long axis of the first conduit. In this position, the third cylindrical element prevents fluid from flowing past in the first conduit and therefore no or minimal fluid is expelled from the first fluid outlet port. The first and second cylindrical element allow fluid to pass due to the respective narrowed waist portions. Whether fluid passes through to the second fluid outlet port will depend on whether the first control element is positioned to allow fluid to pass, as described above.

[0133] Thus, the embodiment shown in Figures 12 to 15 provides a plurality of dispensing modes depending on actuation of the first and/or second handles. The device may be in a dual dispensing mode in which fluid is expelled from both the first and the second fluid outlet ports. Alternatively, the device may be in a single dispensing mode in which fluid is permitted to pass to either the first fluid outlet port or the second fluid outlet port. A yet further dispensing mode is provided in which fluid is prevented from passage to both the first and the second fluid outlet ports.

[0134] A device 2000 according to certain embodiments is shown in Figures 18 to 21 in which control of fluid flow along the first conduit 2005 is controlled by a trigger element 2010. The trigger element 2010 is mounted on the housing and is connected or integrally formed with a valve element provided in the first conduit 2005. Movement of the trigger e.g. in a linear direction towards or away from the pistol grip moves the valve element 2020 within the lumen of the first conduit. The valve element 2020 comprises an elongate portion 2040 and a ball like portion 2050. The lumen of the first conduit may comprise an inner surface having a constricted region 2060. The lumen of the first conduit has a smaller diameter at the constricted region than at the adjacent regions of the conduit.

[0135] When the trigger is actuated, i.e. moved towards the grip portion, the valve element 2020 and thus the ball portion 2050 moves away from the constricted region, as shown in Figure 19B and 21B. Aptly, movement of the ball portion away from the constricted region allows fluid to pass through the constricted region and to exit the device via the first fluid outlet port. Thus, Figure 19B shows the device in a dispensing mode in which the valve element 2020 is moved away from the constricted region thus allowing fluid delivery via the first conduit.

[0136] Actuation of the trigger in an opposing direction, e.g. a result of a release of pressure on the trigger by a user, causes the valve element to move towards the constricted region. The valve element abuts the constricted region causing flow of fluid past the constricted region of the first conduit to be restricted and therefore fluid does not flow to the first fluid outlet port to be expelled. Trigger-operated mechanisms are known in the art and other arrangements are envisaged.

[0137] As shown in Figures 18 to 21, the control system comprising the trigger and the valve element may be provided in combination with a handle system as described above to control fluid flow in a second conduit. Thus, a handle 2070 can be actuated to restrict or allow fluid flow along a second conduit 2080 whilst the trigger element can be actuated to restrict or allow fluid flow along a first conduit. Thus, the device of Figures 18 to 21 may offer a plurality of dispensing modes, which a user can choose depending on environmental conditions.

[0138] Throughout the description and claims of this specification, the words "comprise" and "contain" and variations of them mean "including but not limited to" and they are not intended to (and do not) exclude other moieties, additives, components, integers or steps. Throughout the description and claims of this specification, the singular encompasses the plural unless the context otherwise requires. In particular, where the indefinite article is used, the specification is to be understood as contemplating plurality as well as singularity, unless the context requires otherwise.

[0139] Features, integers, characteristics or groups described in conjunction with a particular aspect, embodiment or example of the invention are to be understood to be applicable to any other aspect, embodiment or example described herein unless incompatible therewith. All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of the features and/or steps are mutually exclusive. The invention is not restricted to any details of any foregoing embodiments. The invention extends to any novel one, or novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of

any method or process so disclosed.

[0140] The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

Claims

1. Apparatus for dispensing fluid at a desired location, comprising;
a delivery device (1, 100, 1000, 2000) comprising:

a first fluid communication pathway (27, 200, 300, 1020, 2005) and a further fluid communication pathway (35, 320, 1030, 2080);
at least one first fluid outlet port (15, 310) and at least one further fluid outlet port (21, 150, 330, 1050) at least partly surrounding the first fluid outlet port wherein the first fluid communication pathway is for connecting each first fluid outlet port to a first fluid source and the further fluid communication pathway is for connecting each further fluid outlet port to a further fluid source;
a first control member (11, 33) for selectively connecting the first fluid source to said first fluid outlet port; and
a further control member (13, 25, 37, 160) for selectively connecting the further fluid source to said further fluid outlet port;
wherein the first fluid outlet port is configured to dispense fluid in a first dispensing mode and wherein the further fluid outlet port is configured to dispense fluid in a further dispensing mode;
characterised in that the delivery device can selectively provide a spray or jet pattern alone or a mist pattern alone, or both a spray or a jet pattern and a mist pattern simultaneously in which a mist pattern is entrained via a surrounding spray or jet pattern to enhance the throw of the mist.

2. Apparatus according to claim 1, wherein the delivery device is a hand-held device; or wherein the delivery device is configured to be mounted on a vehicle or fixed to a structure.

3. Apparatus according to any preceding claim, further comprising:

a first fluid source and a further fluid source;
and wherein either the first fluid source and the further fluid source comprise a common source, or wherein the first fluid source is separate and distinct from the further fluid source.

4. Apparatus according to any preceding claim, wherein the delivery device is operable to dispense fluid in a plurality of dispensing modes; wherein optionally the delivery device comprises a body portion (3, 110) and wherein the further control member comprises a rotatable sleeve member mounted on the body portion.

5. Apparatus according to any preceding claim, wherein the delivery device comprises a first actuating member (13, 2010) operably connected to the first control member to selectively connect or disconnect the first fluid source to the first fluid outlet port; wherein optionally, the first conduit and the further conduit are provided in a generally parallel arrangement.

6. Apparatus according to any preceding claim, wherein the first fluid communication pathway comprises a first conduit (27, 200, 300, 1020, 2005) and wherein the first control member comprises a first valve member (33, 2020) provided in the first conduit; wherein optionally, the first conduit and the further conduit are coaxially arranged.

7. Apparatus according to claim 5 or claim 6, wherein the first valve member is moveable between an open position and a closed position to selectively connect the first fluid source to the first fluid outlet port; wherein optionally, the delivery device comprises a pistol-like body and the first actuating member is a trigger member (13) and wherein the first valve member is moveable between the open position and the closed position by actuation of the trigger member.

8. Apparatus according to any preceding claim, wherein the device comprises a further actuating member (13, 11) operably connected to the further control member to selectively connect or disconnect the further fluid source to the further fluid outlet port; and/or wherein the further fluid communication pathway comprises a further conduit (35, 320, 1030, 2080) and wherein the further control member comprises a further valve member (37) provided in the further conduit.

9. Apparatus according to claim 8, wherein the further valve member is moveable between an open position and a closed position to selectively connect the further fluid source to the further fluid outlet port.

10. Apparatus according to claim 9, wherein the delivery device comprises a pistol-like body and the further actuating member is a handle member (11), wherein the handle member is actuatable to selectively move the valve member between the open position and the closed position; wherein optionally, the handle member is pivotably connected to the further valve element and rotation of the handle member around

a pivot axis selectively connects the further fluid source to the further fluid outlet port.

11. Apparatus according to any preceding claim, wherein said further fluid outlet port is annular and entirely surrounds said first fluid outlet port.

12. Apparatus according to claim 1, wherein the mist pattern comprises dispensing fluid droplets having an average diameter of between less than about 1μm to about 100μm.

13. Apparatus according to any preceding claim, wherein the device comprises a body portion (3, 110) which accommodates at least a portion of the first fluid communication pathway and at least a portion of the further fluid communication pathway;
and/or, wherein the device further comprises a grip member (9) which extends from the body portion;
and/or, wherein the device further comprises a pattern sleeve rotatably coupled to the body portion, and wherein the first dispensing mode may comprise a plurality of patterns, the pattern of fluid being established by the rotational position of the pattern sleeve with respect to the body
and/or, wherein the apparatus is for dispensing a fire-fighting fluid and further wherein the device is a fire branch or a fire nozzle.

14. A method of fighting a fire, **characterised by** the steps of:
selectively dispensing fluid from a delivery device (1, 100, 1000, 2000) at a desired location where a fire is located via selected one of at least three possible modes of dispensing, comprising:

delivering fluid mist alone via at least one central fluid outlet port (15, 310) of the delivery device;
delivering fluid, via at least one annular fluid outlet port (21, 150, 330, 1050), in a jet or spray alone, wherein the at least one annular fluid outlet port at least partially surrounds said central fluid outlet port; and
simultaneously delivering fluid mist via said central fluid outlet port and fluid jet or spray via said annular fluid outlet port.

15. The method according to claim 14, which further comprises:

selecting said a selected one mode of operation by selectively actuating one or both of a first control member (11, 33) and a further control member (13, 25, 37, 160) of the delivery device;
and/or wherein the spray is a frusto-conical spray;
and/or wherein the method further comprises adjusting the fluid delivered via the at least one annular fluid outlet port between the jet and the spray;
and/or wherein the method further comprises selecting said a selected one mode of operation by selectively actuating one or both of a first control member (11, 33) and a further control member (13, 25, 37, 160) of the delivery device.

Patentansprüche

1. Vorrichtung zum Ausgeben von Fluid an einer gewünschten Stelle, umfassend;
eine Zuführvorrichtung (1, 100, 1000, 2000) umfassend:

einen ersten Fluidkommunikationsweg (27, 200, 300, 1020, 2005) und einen weiteren Fluidkommunikationsweg (35, 320, 1030, 2080);
mindestens eine erste Fluidauslassöffnung (15, 310) und mindestens eine weitere Fluidauslassöffnung (21, 150, 330, 1050), die die erste Fluidauslassöffnung zumindest teilweise umgibt, wobei der erste Fluidkommunikationsweg zum Verbinden von jeder ersten Fluidauslassöffnung mit einer ersten Fluidquelle ist, und der weitere Fluidkommunikationsweg zum Verbinden von jeder weiteren Fluidauslassöffnung mit einer weiteren Fluidquelle ist;
ein erstes Bedienelement (11, 33) zum selektiven Verbinden der ersten Fluidquelle mit der ersten Fluidauslassöffnung; und
ein weiteres Bedienelement (13, 25, 37, 160) zum selektiven Verbinden der weiteren Fluidquelle mit der weiteren Fluidauslassöffnung;
wobei die erste Fluidauslassöffnung konfiguriert ist, um Fluid in einem ersten Ausgabemodus auszugeben, und wobei die weitere Fluidauslassöffnung konfiguriert ist, um Fluid in einem weiteren Ausgabemodus auszugeben;
dadurch gekennzeichnet, dass die Zuführvorrichtung selektiv ein Sprüh- oder Strahlmuster allein oder ein Nebelmuster allein, oder sowohl ein Sprüh- oder ein Strahlmuster als auch ein Nebelmuster gleichzeitig bereitstellen kann, bei dem ein Nebelmuster über ein umgebendes Sprüh- oder Strahlmuster mitgeführt wird, um den Auswurf des Nebels zu verstärken.

2. Vorrichtung nach Anspruch 1, wobei die Zuführvorrichtung ein handgehaltenes Gerät ist; oder wobei die Zuführvorrichtung konfiguriert ist, um an einem Fahrzeug montiert oder an einer Struktur befestigt zu werden.

3. Vorrichtung nach einem vorherigen Anspruch, ferner umfassend:

eine erste Fluidquelle und eine weitere Fluidquelle;
und wobei entweder die erste Fluidquelle und die weitere Fluidquelle eine gemeinsame Quelle umfassen oder wobei die erste Fluidquelle von der weiteren Fluidquelle getrennt und verschieden ist.

4. Vorrichtung nach einem vorherigen Anspruch, wobei die Zuführvorrichtung zum Ausgeben von Fluid in einer Vielzahl von Ausgabemodi betrieben werden kann; wobei optional die Zuführvorrichtung einen Körperabschnitt (3, 110) umfasst und wobei das weitere Bedienelement ein drehbares Hülsenelement umfasst, das an dem Körperabschnitt montiert ist.

5. Vorrichtung nach einem vorherigen Anspruch, wobei die Zuführvorrichtung ein erstes Betätigungselement (13, 2010) umfasst, das funktionsfähig mit dem ersten Bedienelement verbunden ist, um die erste Fluidquelle selektiv mit der ersten Fluidauslassöffnung zu verbinden oder davon zu trennen; wobei optional die erste Leitung und die weitere Leitung in einer generell parallelen Anordnung bereitgestellt sind.

6. Vorrichtung nach einem vorherigen Anspruch, wobei der erste Fluidkommunikationsweg eine erste Leitung (27, 200, 300, 1020, 2005) umfasst und wobei das erste Bedienelement ein erstes Ventilelement (33, 2020) umfasst, das in der ersten Leitung bereitgestellt ist; wobei optional die erste Leitung und die weitere Leitung koaxial angeordnet sind.

7. Vorrichtung nach Anspruch 5 oder Anspruch 6, wobei das erste Ventilelement bewegbar zwischen einer offenen Position und einer geschlossenen Position bewegbar ist, um die erste Fluidquelle selektiv mit der ersten Fluidauslassöffnung zu verbinden; wobei optional die Zuführvorrichtung einen pistolenartigen Körper umfasst und das erste Betätigungselement ein Auslöseelement (13) ist, und wobei das erste Ventilelement durch Betätigung des Auslöseelements zwischen der offenen Position und der geschlossenen Position bewegbar ist.

8. Vorrichtung nach einem vorherigen Anspruch, wobei die Vorrichtung ein weiteres Betätigungselement (13, 11) umfasst, das funktionsfähig mit dem weiteren Bedienelement verbunden ist, um die weitere Fluidquelle selektiv mit der weiteren Fluidauslassöffnung zu verbinden oder davon zu trennen; und/oder wobei der weitere Fluidkommunikationsweg eine weitere Leitung (35, 320, 1030, 2080) umfasst, und wobei das weitere Bedienelement ein weiteres Ventilelement (37) umfasst, das in der weiteren Leitung bereitgestellt ist.

9. Vorrichtung nach Anspruch 8, wobei das weitere Ventilglied zwischen einer offenen Position und einer geschlossenen Position bewegbar ist, um die weitere Fluidquelle selektiv mit der weiteren Fluidauslassöffnung zu verbinden.

10. Vorrichtung nach Anspruch 9, wobei die Zuführvorrichtung einen pistolenartigen Körper umfasst und das weitere Betätigungselement ein Griffelement (11) ist, wobei das Griffelement betätigt werden kann, um das Ventilelement selektiv zwischen der offenen Position und der geschlossenen Position zu bewegen; wobei optional das Griffelement schwenkbar mit dem weiteren Ventilelement verbunden ist und eine Drehung des Griffelements um eine Schwenkachse die weitere Fluidquelle wahlweise mit der weiteren Fluidauslassöffnung verbindet.

11. Vorrichtung nach einem vorherigen Anspruch, wobei die weitere Fluidauslassöffnung ringförmig ist und die erste Fluidauslassöffnung vollständig umgibt.

12. Vorrichtung nach Anspruch 1, wobei das Nebelmuster ein Ausgeben von Fluidtröpfchen mit einem durchschnittlichen Durchmesser zwischen weniger als etwa 1 μm bis etwa 100 μm umfasst.

13. Vorrichtung nach einem vorherigen Anspruch, wobei die Vorrichtung einen Körperabschnitt (3, 110) umfasst, der mindestens einen Abschnitt des ersten Fluidkommunikationswegs und mindestens einen Abschnitt des weiteren Fluidkommunikationswegs aufnimmt;
und/oder, wobei die Vorrichtung ferner ein Griffelement (9) umfasst, das sich von dem Körperabschnitt erstreckt;
und/oder, wobei die Vorrichtung ferner eine Musterhülse umfasst, die drehbar mit dem Körperteil gekoppelt ist, und wobei der erste Ausgabemodus eine Vielzahl von Mustern umfassen kann, wobei das Fluidmuster durch die Drehposition der Musterhülse in Bezug auf den Körper festgelegt wird
und/oder wobei die Vorrichtung zum Ausgeben eines Feuerlöschfluids ist und ferner wobei die Vorrichtung ferner eine Feuerlöschspritze oder eine Feuerlöschdüse ist.

14. Verfahren zur Brandbekämpfung, **gekennzeichnet durch** die folgenden Schritte:
selektives Ausgeben von Fluid aus einer Zuführvorrichtung (1, 100, 1000, 2000) an einer gewünschten Stelle, an dem sich ein Feuer befindet, über eine Auswahl von einer von mindestens drei möglichen Ausgabemodi, umfassend:

Zuführen von Fluidnebel allein über mindestens eine mittlere Fluidauslassöffnung (15, 310) der Zuführvorrichtung;

Ausgeben von Fluid über mindestens eine ringförmige Fluidauslassöffnung (21, 150, 330, 1050) in einem Strahl oder Sprühnebel allein, wobei die mindestens eine ringförmige Fluidauslassöffnung die mittlere Fluidauslassöffnung mindestens teilweise umgibt; und
gleichzeitiges Zuführen von Fluidnebel über die mittlere Fluidauslassöffnung und Fluidstrahl oder -sprühnebel über die ringförmige Fluidauslassöffnung.

15. Verfahren nach Anspruch 14, das ferner Folgendes umfasst:

Auswählen eines ausgewählten Betriebsmodus durch selektives Betätigen von einem oder beiden eines ersten Bedienelements (11, 33) und eines weiteren Bedienelements (13, 25, 37, 160) der Zuführvorrichtung;
und/oder wobei der Sprühnebel ein kegelstumpfförmiger Sprühnebel ist;
und/oder wobei das Verfahren ferner ein Einstellen des Fluids umfasst, das über die mindestens eine ringförmige Fluidauslassöffnung zwischen dem Strahl und dem Sprühnebel zugeführt wird;
und/oder wobei das Verfahren ferner ein Auswählen eines ausgewählten Betriebsmodus durch selektives Betätigen von einem oder beiden eines ersten Bedienelements (11, 33) und eines weiteren Bedienelements (13, 25, 37, 160) der Zuführvorrichtung umfasst.

Revendications

1. Appareil destiné à distribuer un fluide à un emplacement souhaité, comprenant ;
un dispositif de distribution (1, 100, 1000, 2000) comprenant :

une première voie de communication fluidique (27, 200, 300, 1020, 2005) et une voie de communication fluidique supplémentaire (35, 320, 1030, 2080) ;
au moins un premier orifice de sortie de fluide (15, 310) et au moins un orifice de sortie de fluide supplémentaire (21, 150, 330, 1050) entourant au moins partiellement le premier orifice de sortie de fluide, ladite première voie de communication fluidique étant destinée à raccorder chaque premier orifice de sortie de fluide à une première source de fluide et ladite voie de communication fluidique supplémentaire étant destinée à raccorder chaque orifice de sortie de fluide supplémentaire à une source de fluide supplémentaire ;
un premier élément de commande (11, 33) destiné à raccorder sélectivement la première source de fluide audit premier orifice de sortie de fluide ; et
un élément de commande supplémentaire (13, 25, 37, 160) destiné à raccorder sélectivement la source de fluide supplémentaire audit orifice de sortie de fluide supplémentaire ;
ledit premier orifice de sortie de fluide étant conçu pour distribuer un fluide dans un premier mode de distribution et ledit orifice de sortie de fluide supplémentaire étant conçu pour distribuer un fluide dans un mode de distribution supplémentaire ;
caractérisé en ce que le dispositif de distribution peut fournir sélectivement un motif de jet ou de pulvérisation seul ou un motif de brouillard seul, ou un motif de jet ou de pulvérisation et un motif de brouillard simultanément dans lesquels un motif de brouillard est entraîné par l'intermédiaire d'un motif de jet ou de pulvérisation environnant pour améliorer la projection du brouillard.

2. Appareil selon la revendication 1, ledit dispositif de distribution étant un dispositif portatif; ou ledit dispositif de distribution étant conçu pour être monté sur un véhicule ou fixé à une structure.

3. Appareil selon l'une quelconque des revendications précédentes, comprenant en outre : une première source de fluide et une source de fluide supplémentaire ;
et ladite première source de fluide et ladite source de fluide supplémentaire comprenant une source commune, ou ladite première source de fluide étant séparée et distincte de la source de fluide supplémentaire.

4. Appareil selon l'une quelconque des revendications précédentes, ledit dispositif de distribution servant à distribuer un fluide dans une pluralité de modes de distribution ; éventuellement, ledit dispositif de distribution comprenant une partie corps (3, 110) et ledit élément de commande supplémentaire comprenant un élément de manchon rotatif monté sur la partie corps.

5. Appareil selon l'une quelconque des revendications précédentes, ledit dispositif de distribution comprenant un premier élément d'actionnement (13,2010) raccordé fonctionnellement au premier élément de commande pour raccorder ou séparer sélectivement la première source de fluide au premier orifice de sortie e fluide ; éventuellement, le premier conduit et le conduit supplémentaire étant disposés selon un agencement globalement parallèle.

6. Appareil selon l'une quelconque des revendications

précédentes, ladite première voie de communication fluidique comprenant un premier conduit (27, 200, 300, 1020, 2005) et ledit premier élément de commande comprenant un premier élément soupape (33, 2020) disposé dans le premier conduit ; éventuellement, ledit premier conduit et ledit conduit supplémentaire étant agencés coaxialement.

7. Appareil selon la revendication 5 ou 6, ledit premier élément soupape étant mobile entre une position ouverte et une position fermée pour raccorder sélectivement la première source de fluide au premier orifice de sortie de fluide ; éventuellement, ledit dispositif de distribution comprenant un corps de type pistolet et ledit premier élément d'actionnement étant un élément déclencheur (13) et ledit premier élément soupape étant mobile entre la position ouverte et la position fermée par actionnement de l'élément déclencheur.

8. Appareil selon l'une quelconque des revendications précédentes, ledit dispositif comprenant un élément d'actionnement supplémentaire (13, 11) raccordé fonctionnellement à l'élément de commande supplémentaire pour raccorder ou séparer sélectivement la source de fluide supplémentaire à l'orifice de sortie de fluide supplémentaire ; et/ou ladite voie de communication fluidique supplémentaire comprenant un conduit (35, 320, 1030, 2080) supplémentaire et ledit élément de commande supplémentaire comprenant un élément de soupape supplémentaire (37) disposé dans le conduit supplémentaire.

9. Appareil selon la revendication 8, ledit élément soupape supplémentaire étant mobile entre une position ouverte et une position fermée pour raccorder sélectivement la source de fluide supplémentaire à l'orifice de sortie de fluide supplémentaire.

10. Appareil selon la revendication 9, ledit dispositif de distribution comprenant un corps de type pistolet et ledit élément d'actionnement supplémentaire étant un élément poignée (11), ledit élément poignée pouvant être actionné pour déplacer sélectivement l'élément soupape entre la position ouverte et la position fermée ; éventuellement, ledit élément poignée étant raccordé de manière pivotante à l'élément soupape supplémentaire et ladite rotation de l'élément poignée, autour d'un axe de pivotement, reliant sélectivement la source de fluide supplémentaire à l'orifice de sortie de fluide supplémentaire.

11. Appareil selon l'une quelconque des revendications précédentes, ledit orifice de sortie de fluide supplémentaire étant annulaire et entourant entièrement ledit premier orifice de sortie de fluide.

12. Appareil selon la revendication 1, ledit motif de brouillard comprenant la distribution de gouttelettes de fluide possédant un diamètre moyen allant de moins environ 1 μm jusqu'à environ 100 μm.

13. Appareil selon l'une quelconque des revendications précédentes, ledit dispositif comprenant une partie corps (3, 110) qui reçoit au moins une partie de la première voie de communication fluidique et au moins une partie de la voie de communication fluidique supplémentaire ;
et/ou, ledit dispositif comprenant en outre un élément de préhension (9) qui s'étend depuis la partie corps ;
et/ou, ledit dispositif comprenant en outre un manchon de motif couplé en rotation à la partie corps, et ledit premier mode de distribution pouvant comprendre une pluralité de motifs, le motif de fluide étant établi par la position de rotation du manchon de motif par rapport au corps et/ou, ledit appareil étant destiné à distribuer un fluide de lutte contre l'incendie et en outre ledit dispositif étant une branche d'incendie ou une buse d'incendie.

14. Procédé de lutte contre un incendie, **caractérisée par** les étapes de :
distribution sélective de fluide en provenance d'un dispositif de distribution (1, 100, 1000, 2000) à un emplacement souhaité où un incendie est situé par l'intermédiaire d'un mode de distribution choisi parmi au moins trois modes de distribution possibles, comprenant :

la distribution du brouillard de fluide seul par l'intermédiaire d'au moins un orifice de sortie de fluide central (15, 310) du dispositif de distribution ;
la distribution du fluide, par l'intermédiaire d'au moins un orifice de sortie de fluide annulaire (21, 150, 330, 1050), dans un jet ou une pulvérisation seul(e), ledit au moins un orifice de sortie de fluide annulaire entourant au moins partiellement ledit orifice de sortie de fluide central ; et
la distribution simultanée d'un brouillard de fluide par l'intermédiaire dudit orifice de sortie de fluide central et d'un jet ou d'une pulvérisation de fluide par l'intermédiaire dudit orifice de sortie de fluide annulaire.

15. Procédé selon la revendication 14, qui comprend en outre :

le choix dudit mode de fonctionnement choisi en actionnant sélectivement l'un ou les deux d'un premier élément de commande (11, 33) et d'un élément de commande supplémentaire (13, 25, 37, 160) du dispositif de distribution ;
et/ou ladite pulvérisation étant une pulvérisation tronconique ;
et/ou ledit procédé comprenant en outre l'ajus-

tement du fluide délivré par l'intermédiaire du au moins un orifice de sortie de fluide annulaire entre le jet et la pulvérisation ;
et/ou ledit procédé comprenant en outre le choix dudit mode de fonctionnement choisi en actionnant sélectivement l'un ou les deux d'un premier élément de commande (11, 33) et d'un élément de commande supplémentaire (13, 25, 37, 160) du dispositif de distribution.

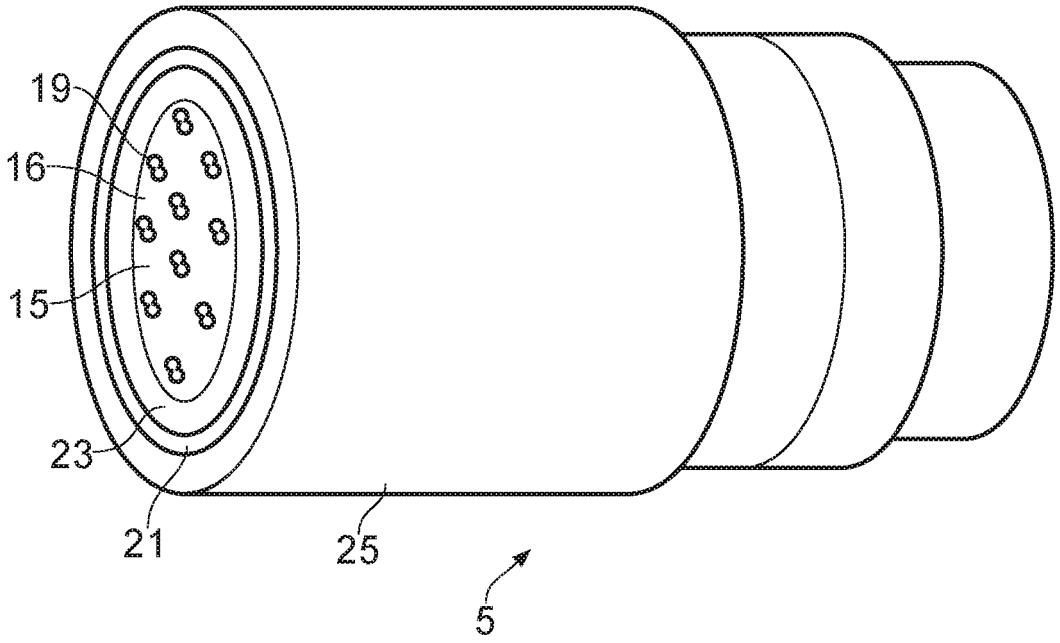

FIG. 1

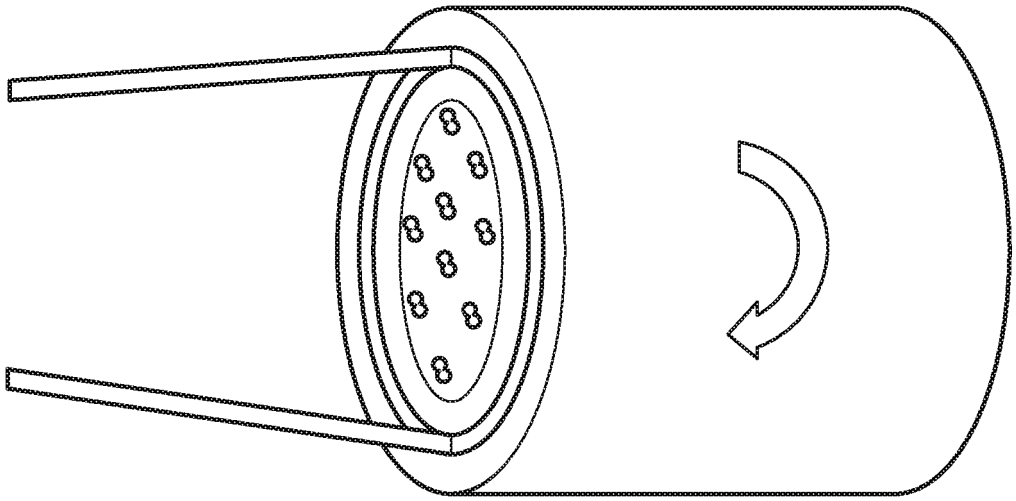

FIG. 2

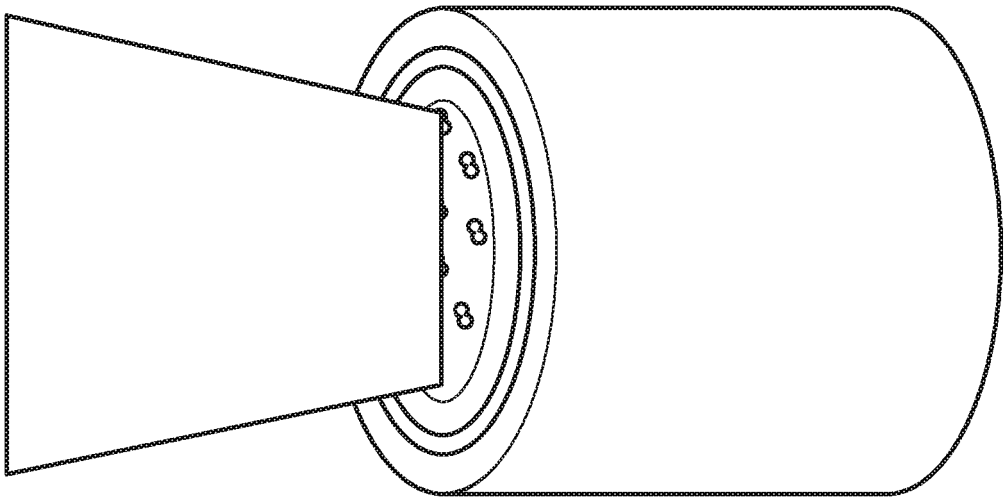

FIG. 3

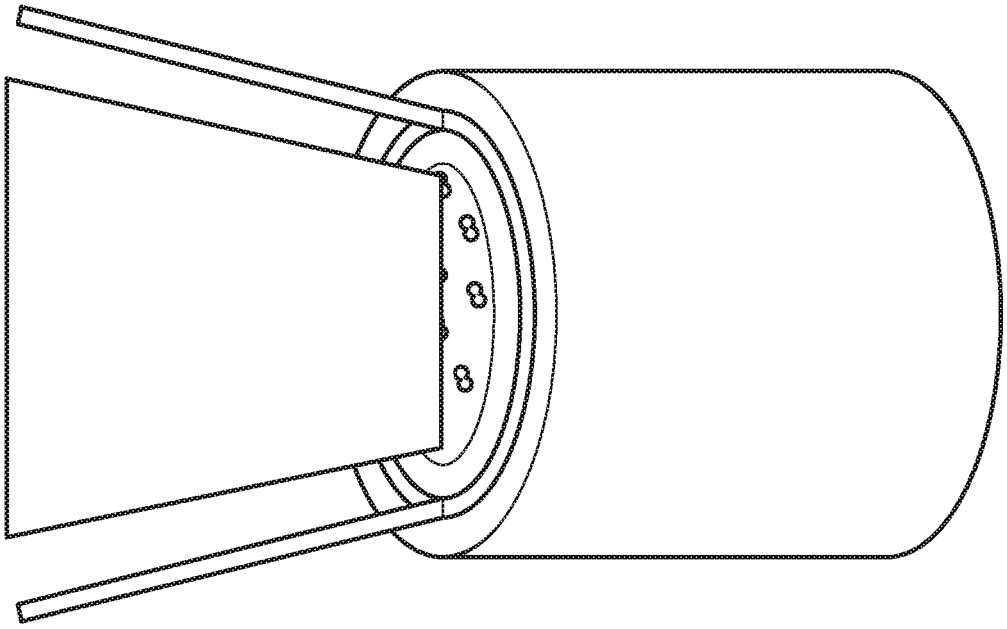

FIG. 4

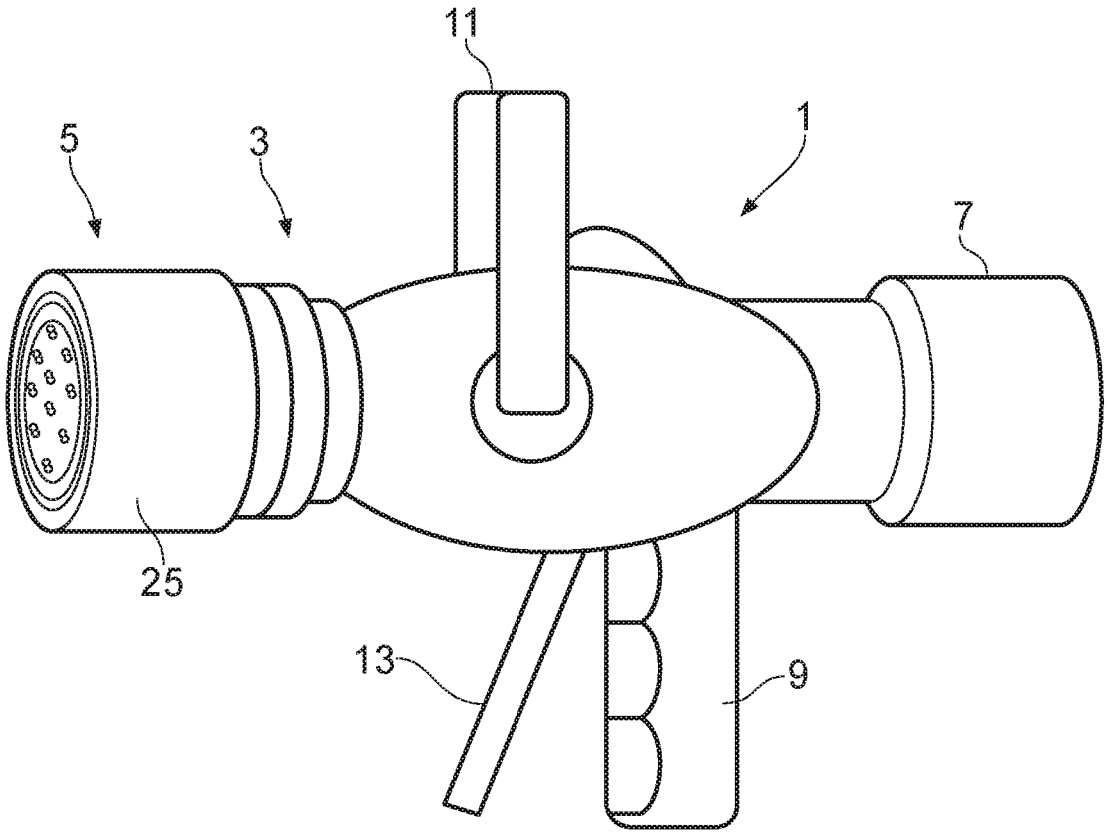

FIG. 5

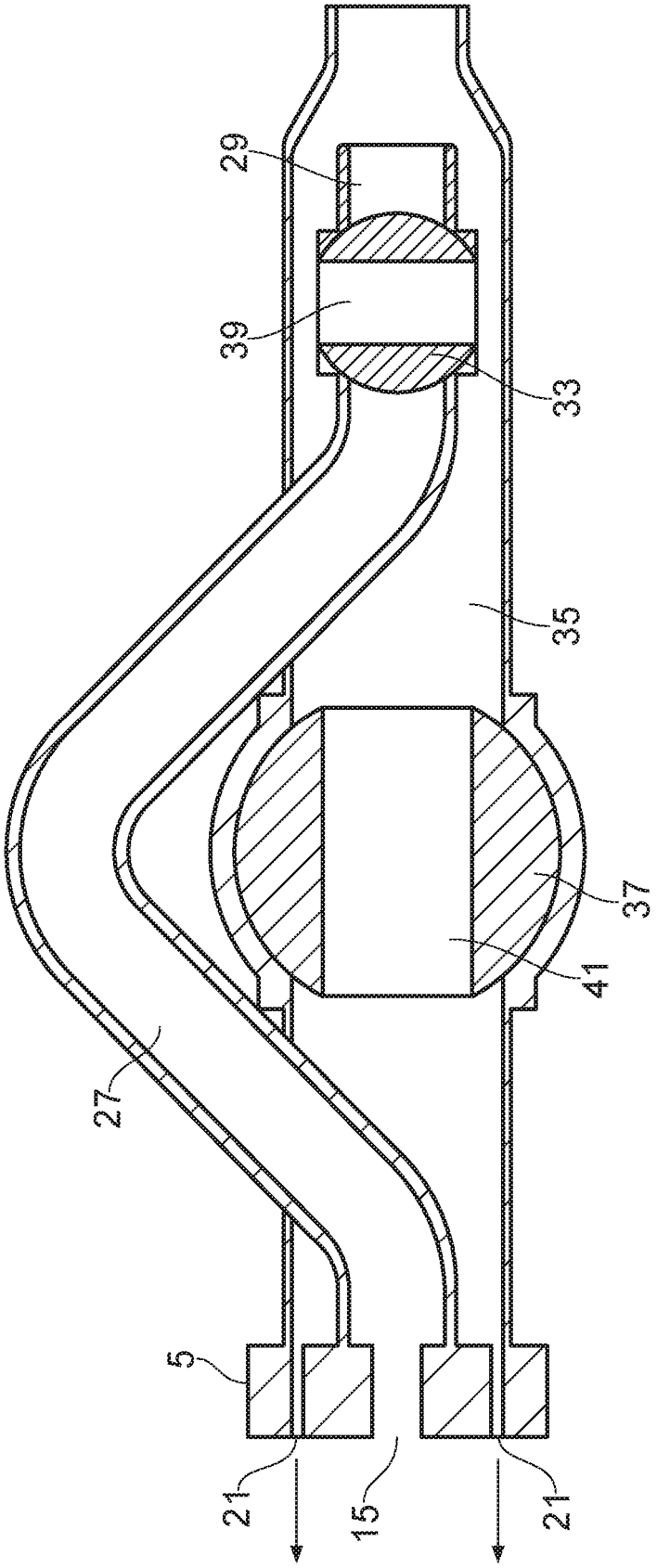

FIG. 6

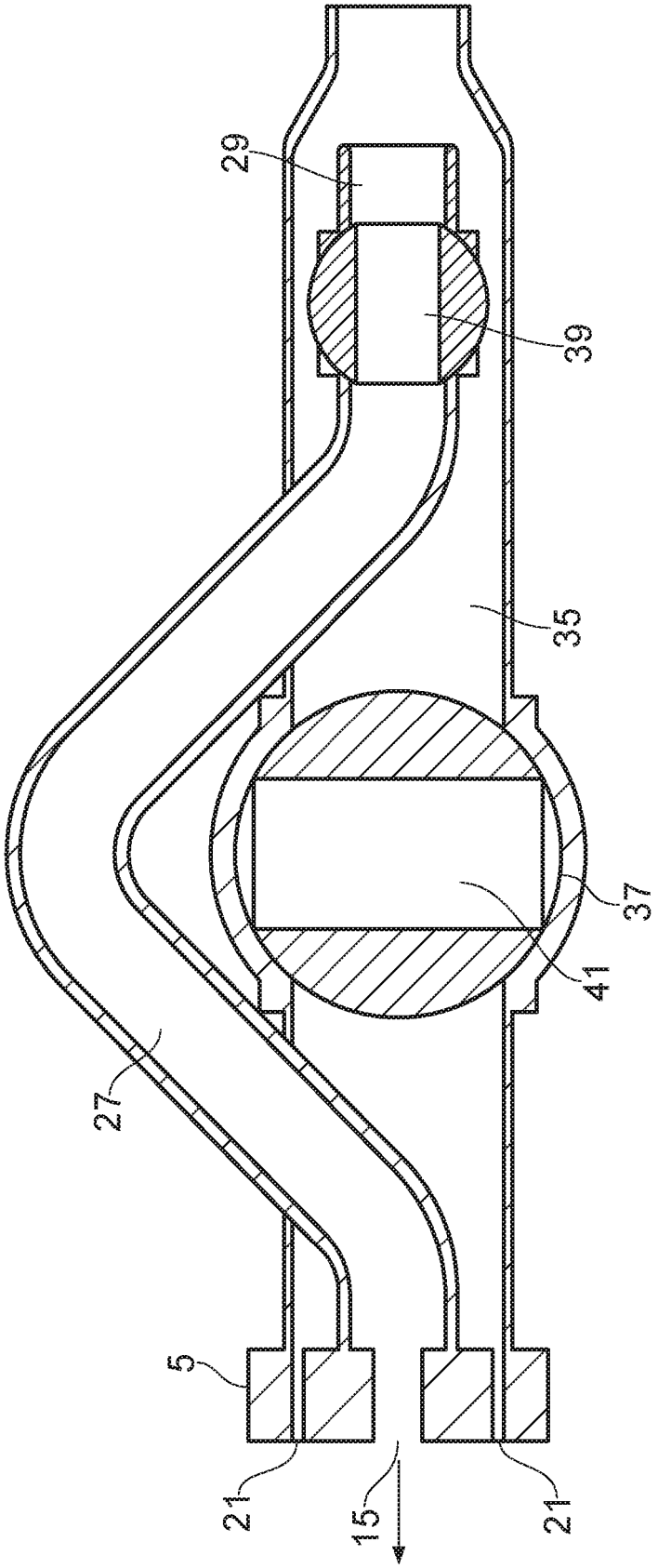

FIG. 7

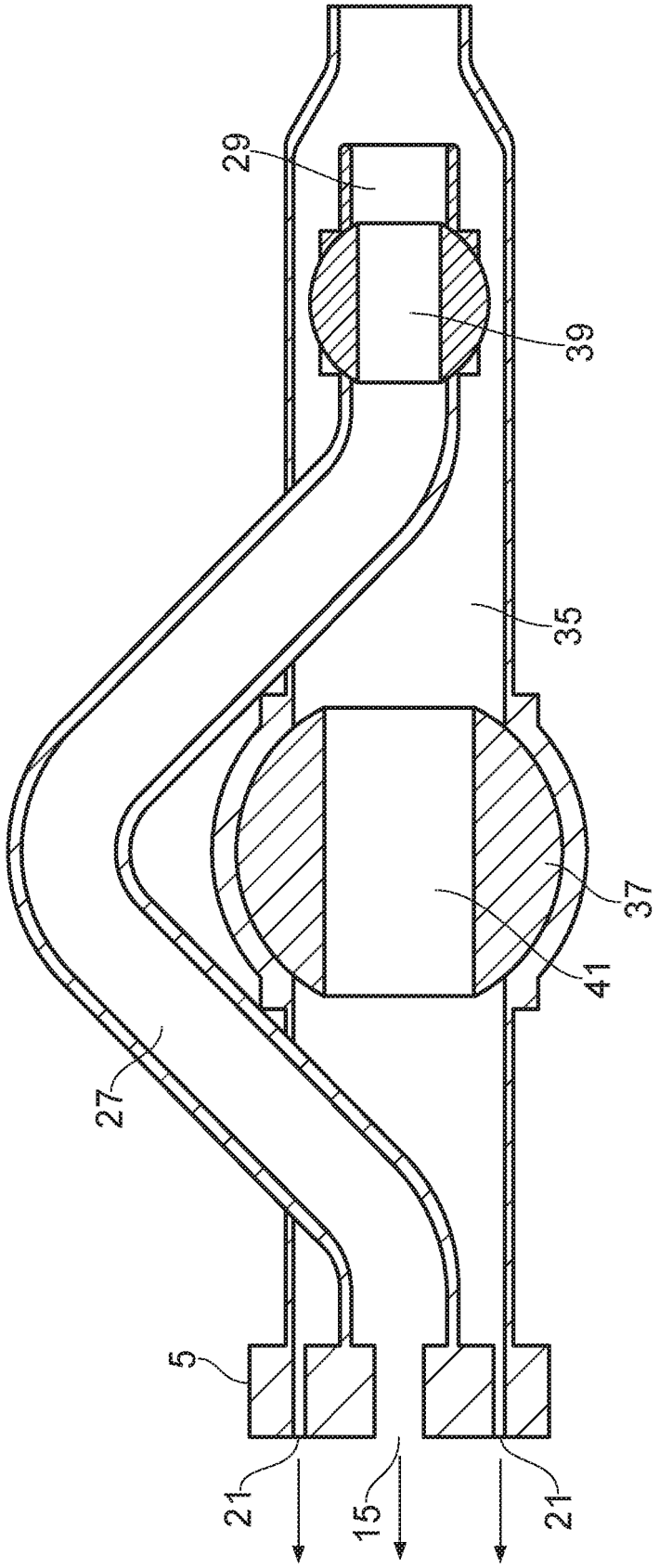

FIG. 8

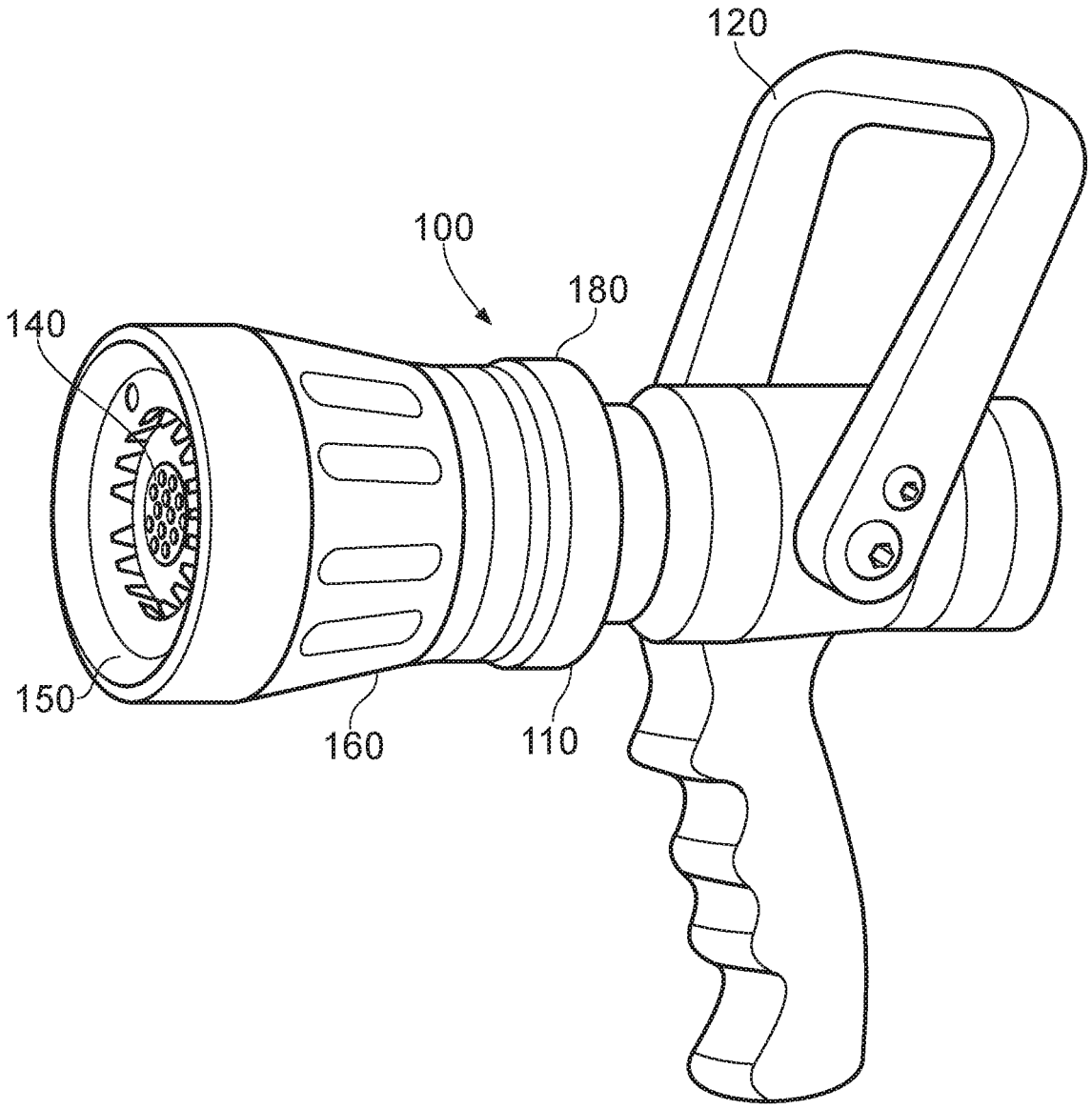

FIG. 9

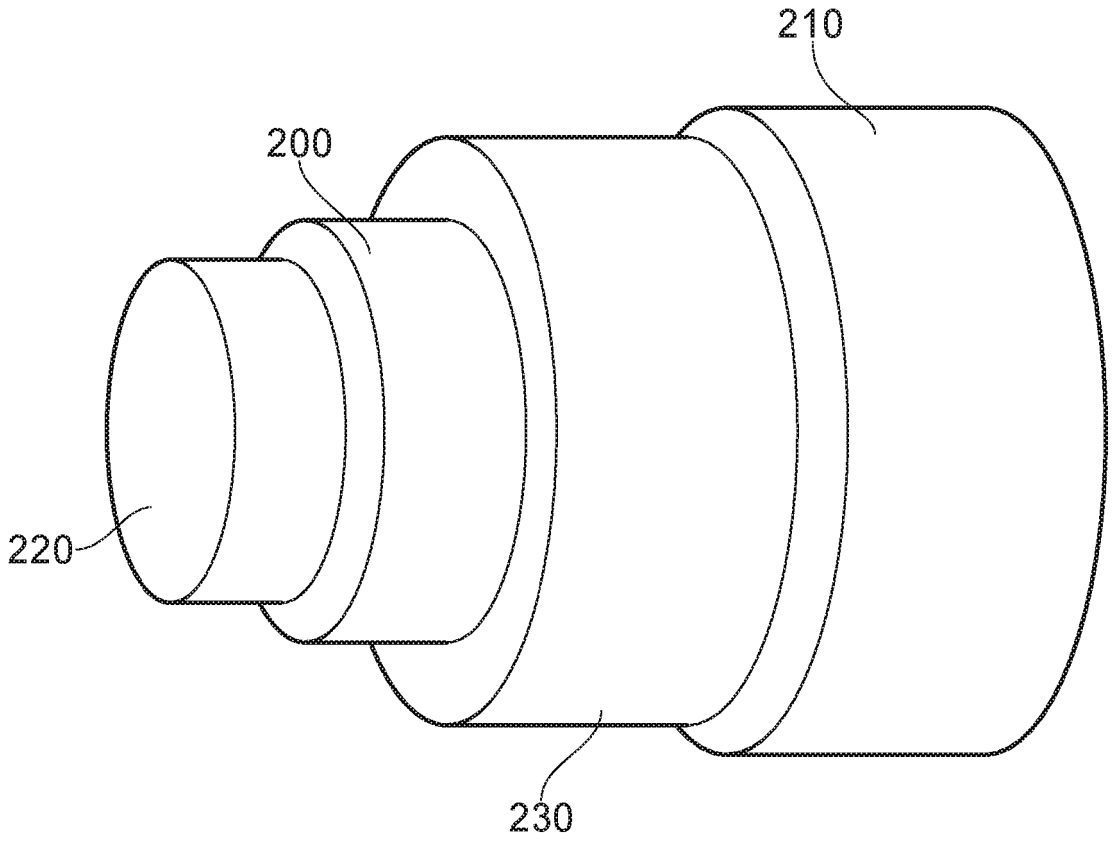

FIG. 10

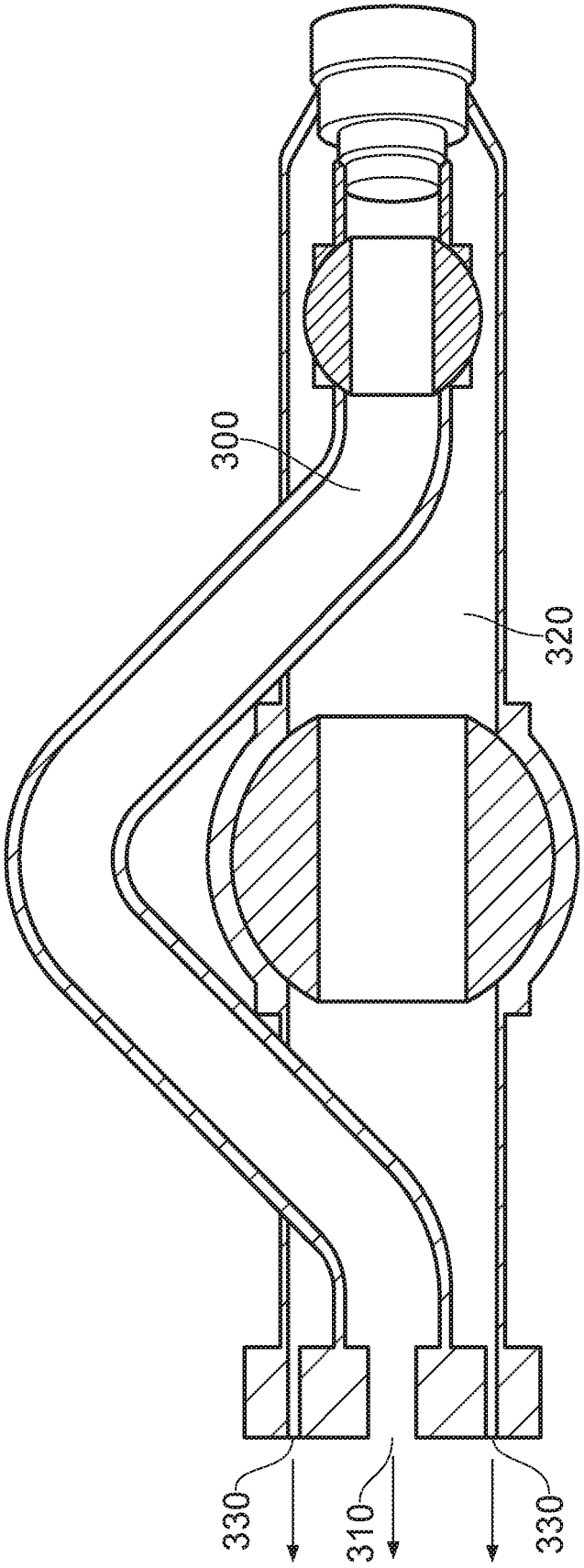

FIG. 11

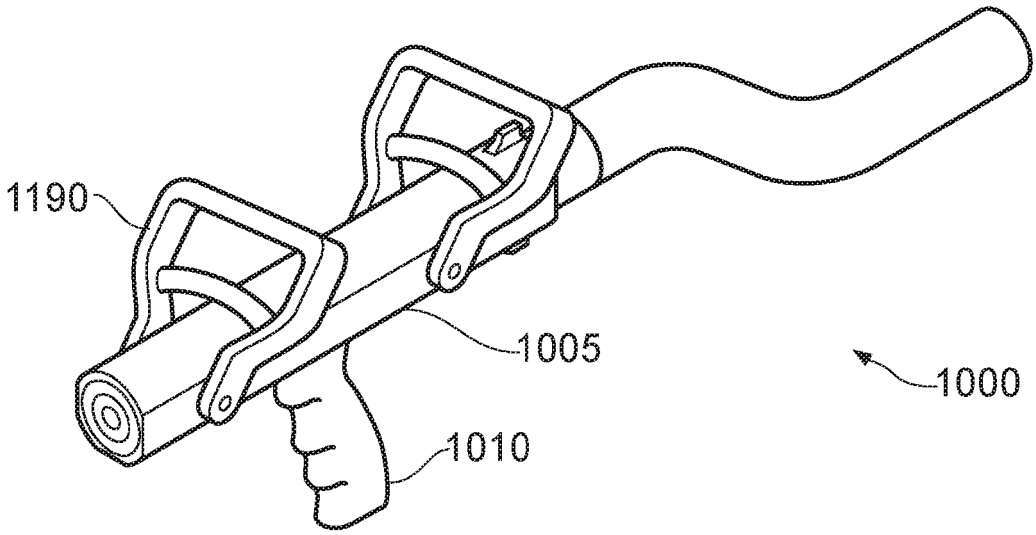

FIG. 12A

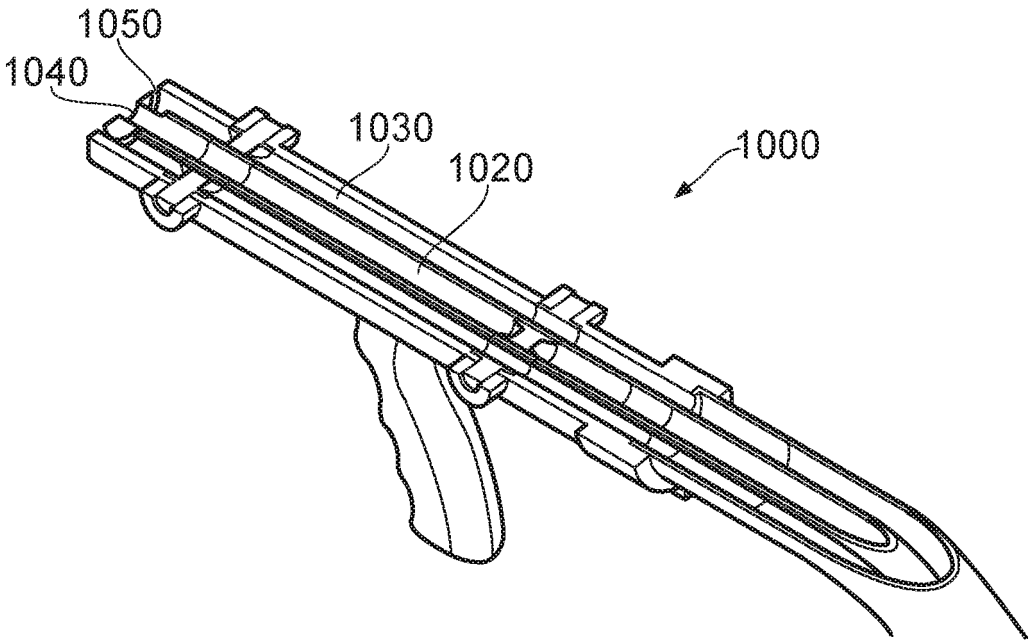

FIG. 12B

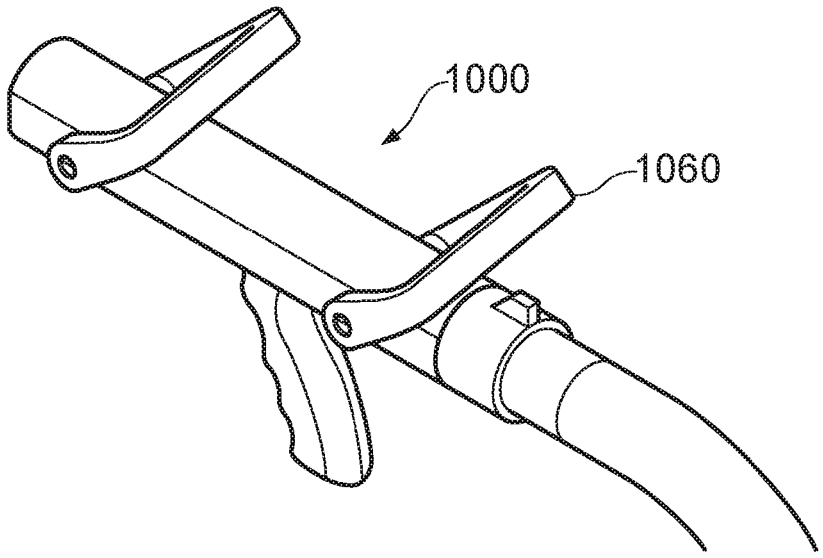

FIG. 13A

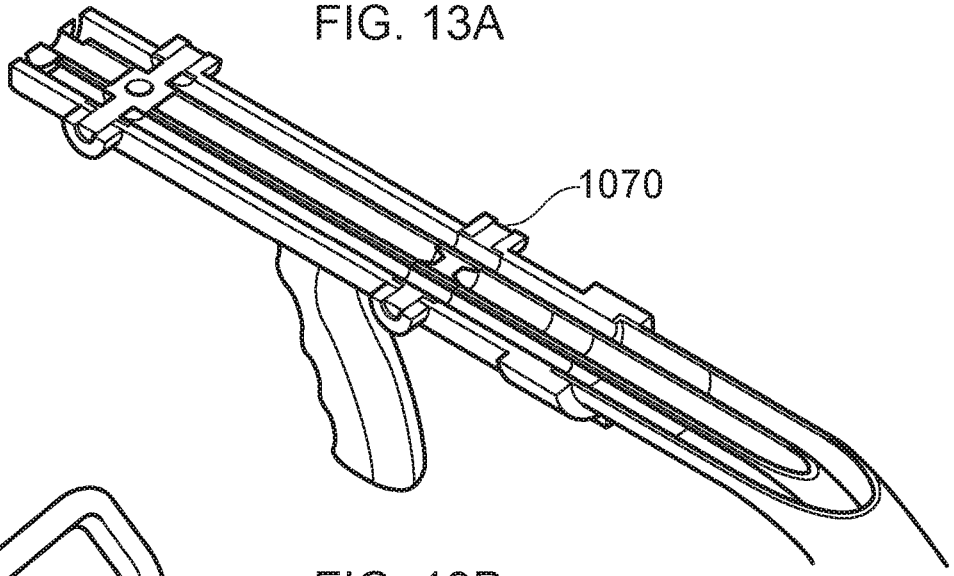

FIG. 13B

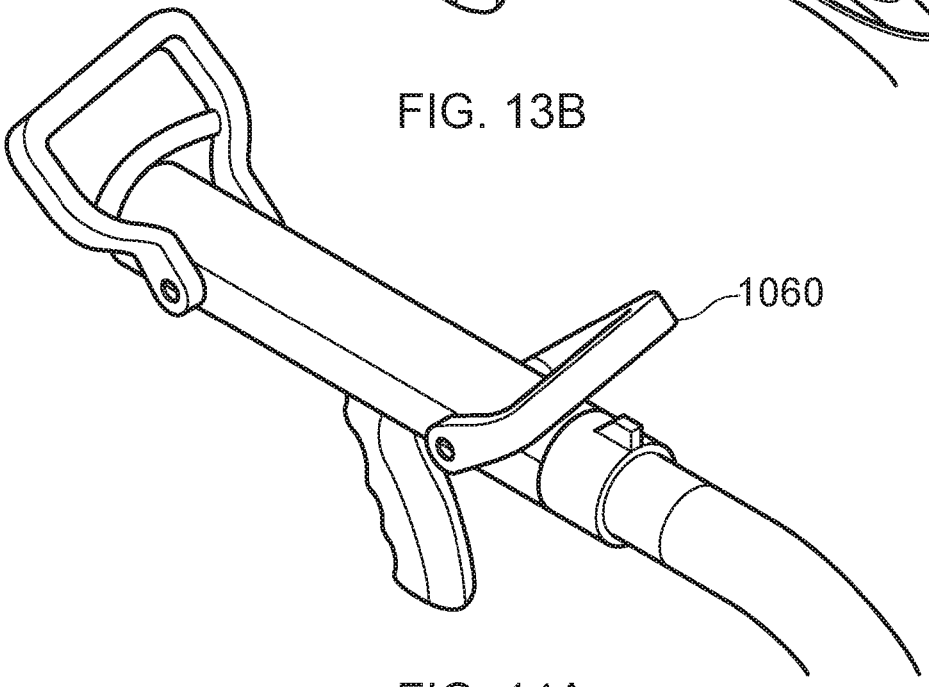

FIG. 14A

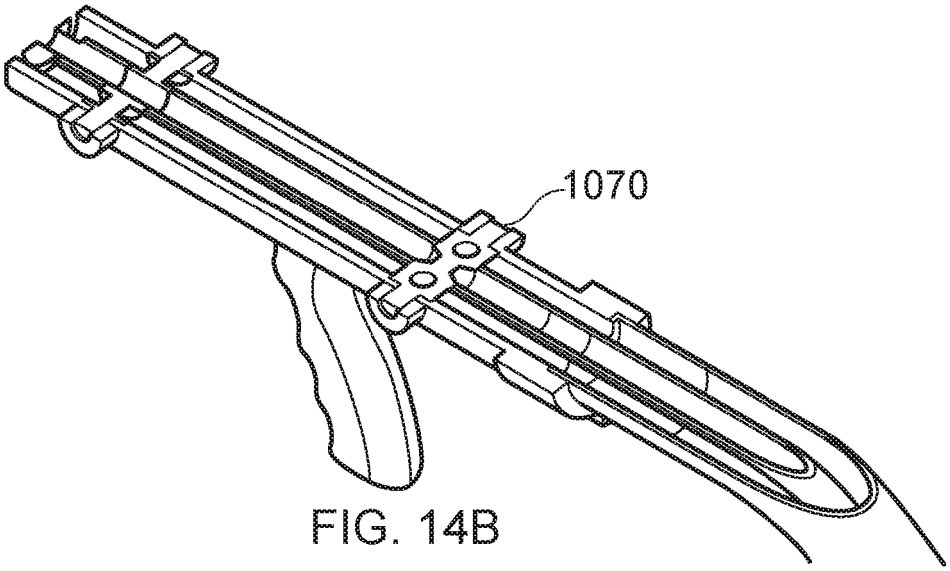

FIG. 14B

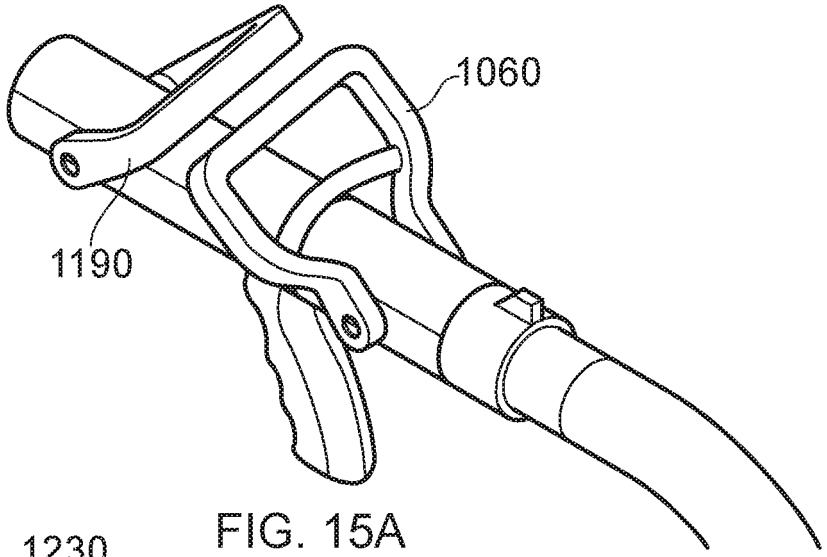

FIG. 15A

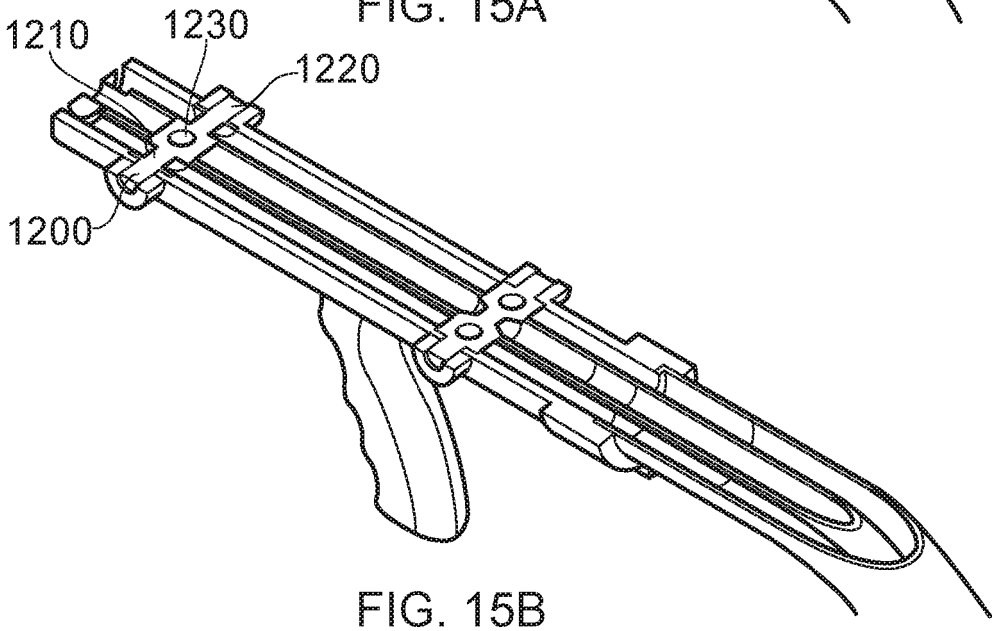

FIG. 15B

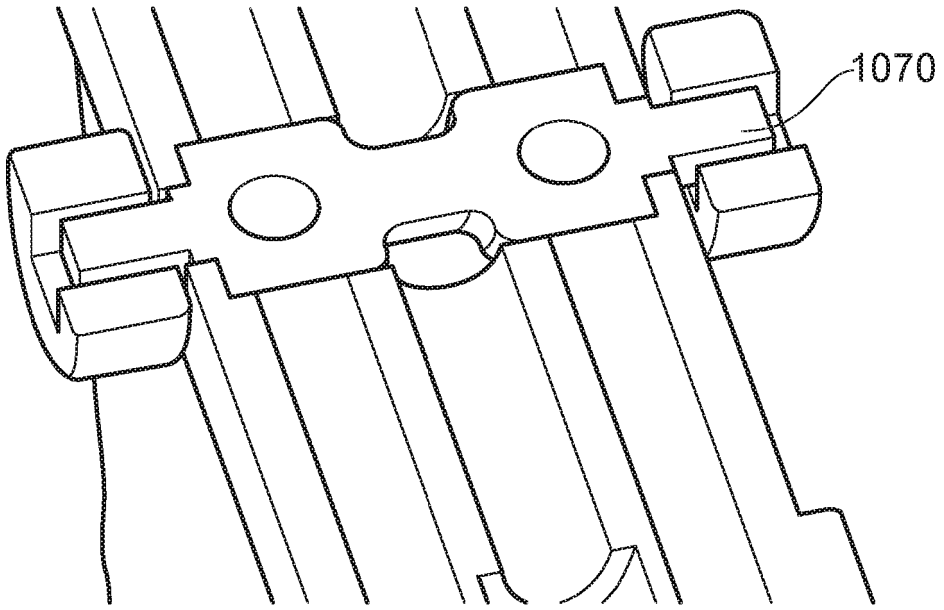

FIG. 16

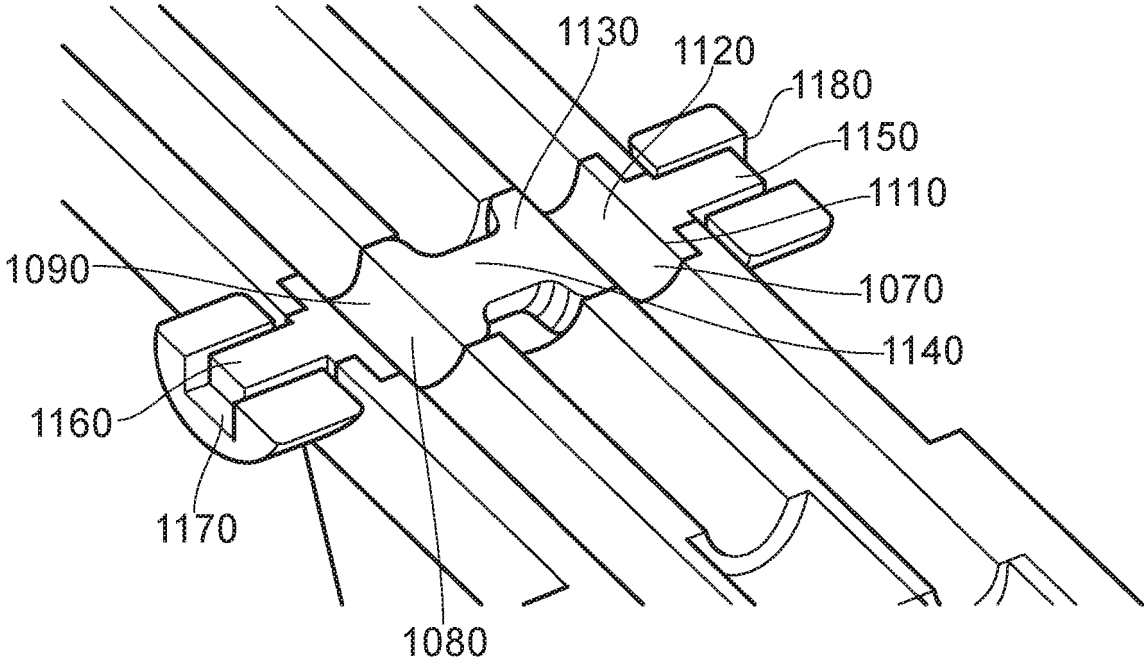

FIG. 17

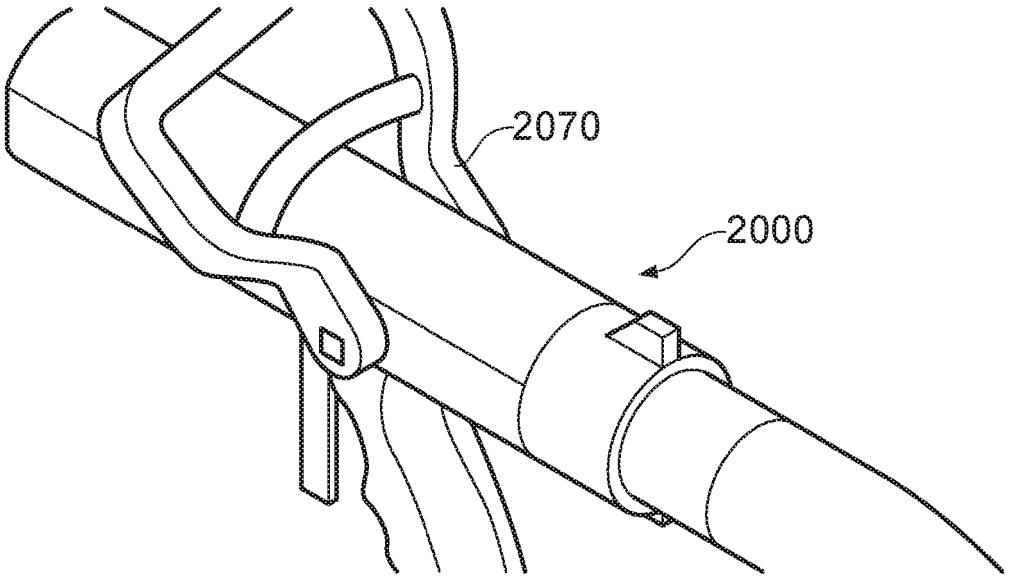

FIG. 18A

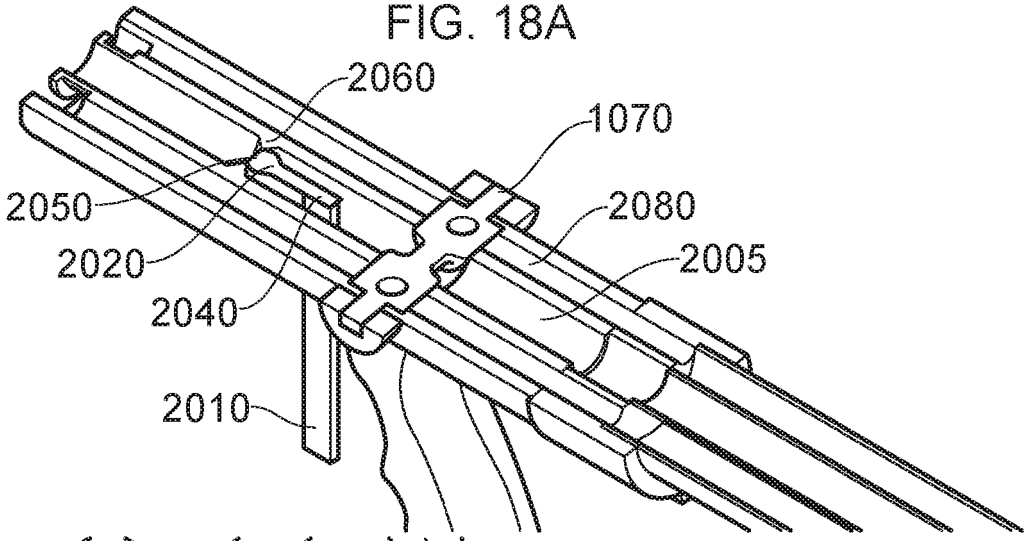

FIG. 18B

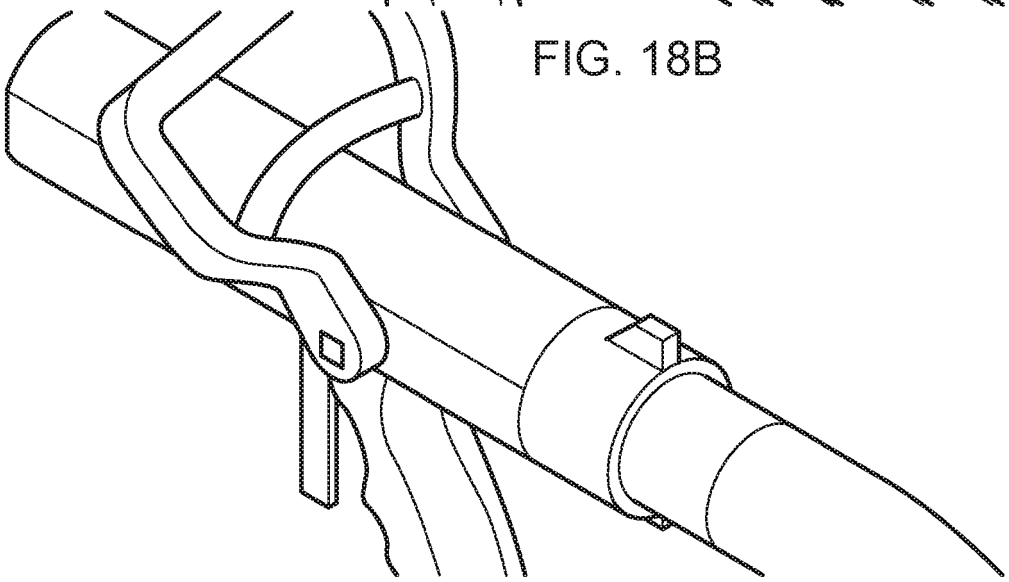

FIG. 19A

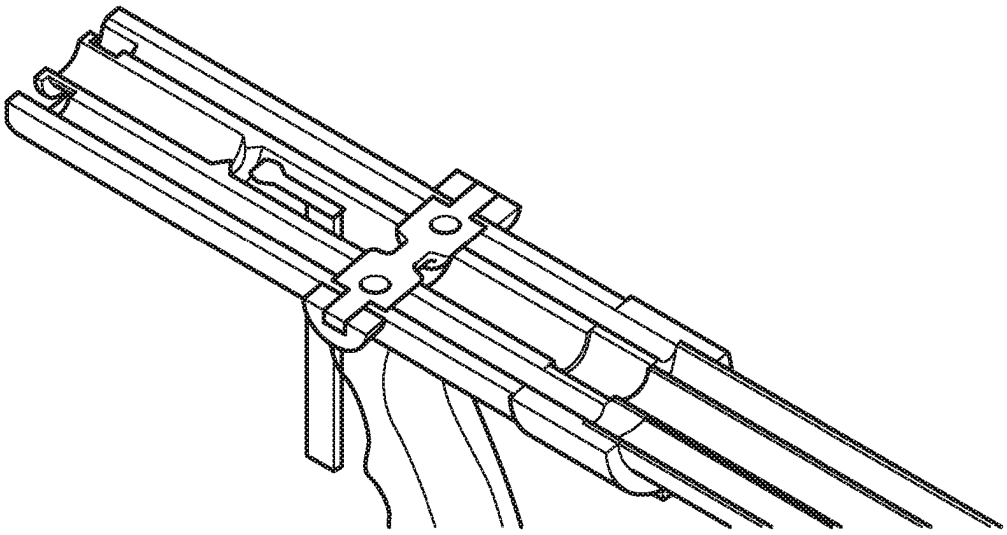

FIG. 19B

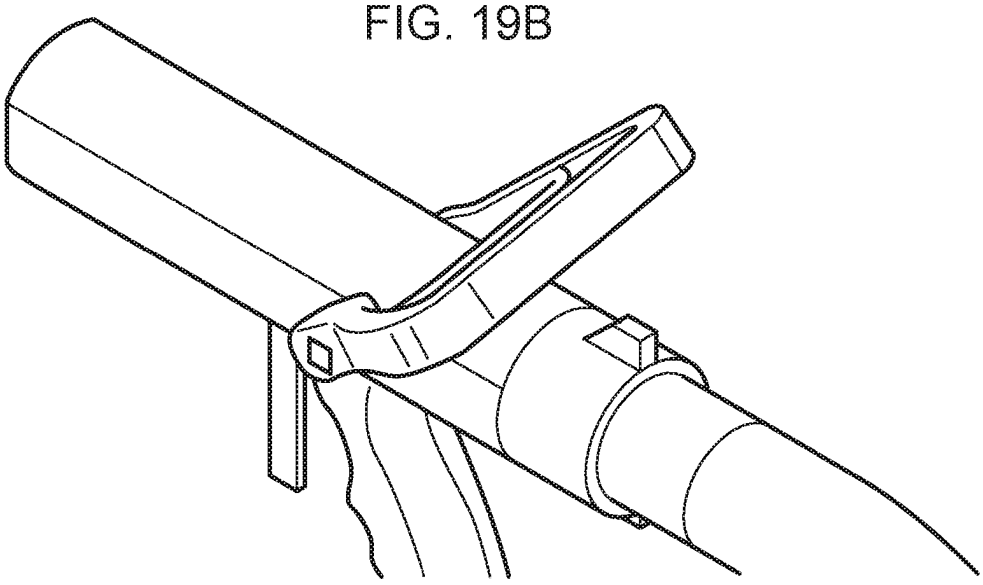

FIG. 20A

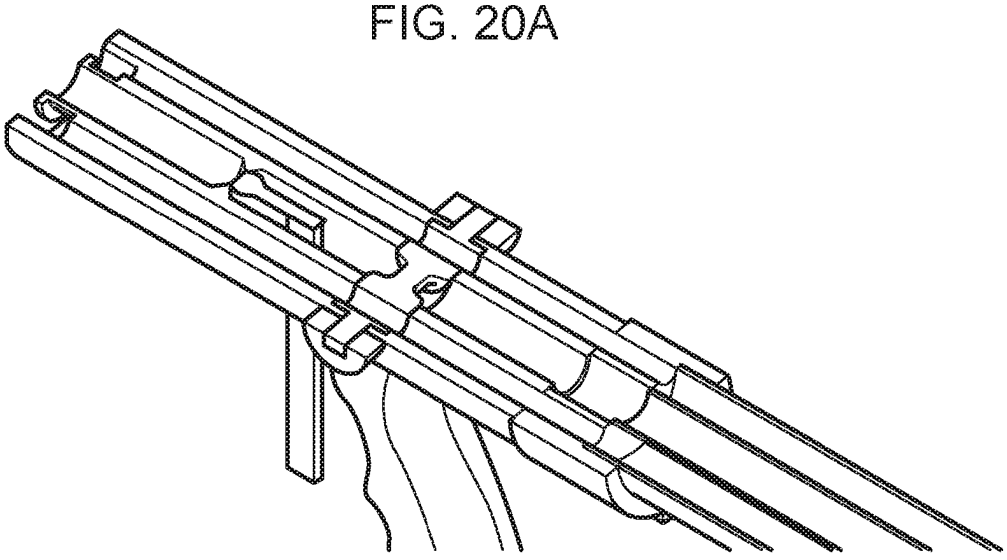

FIG. 20B

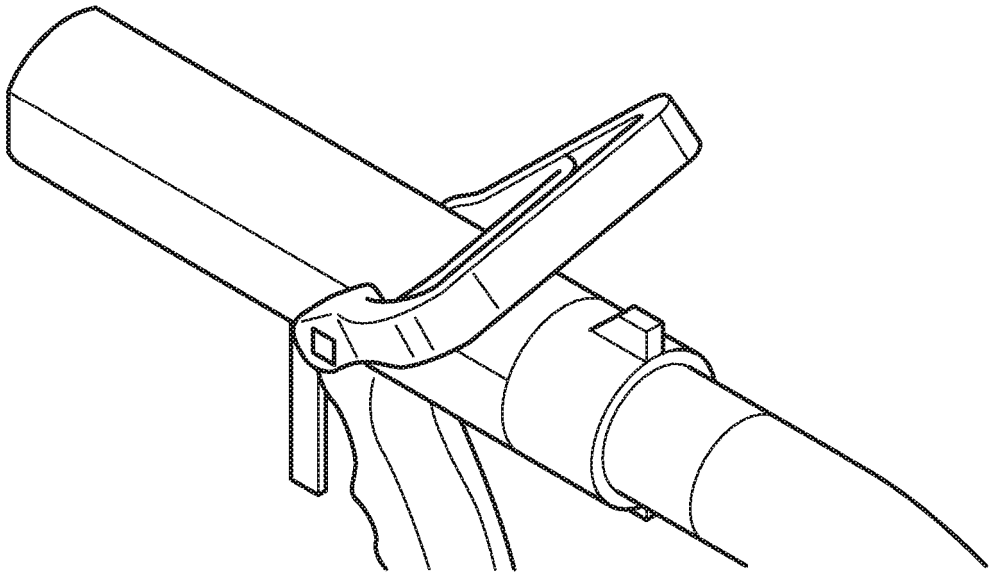

FIG. 21A

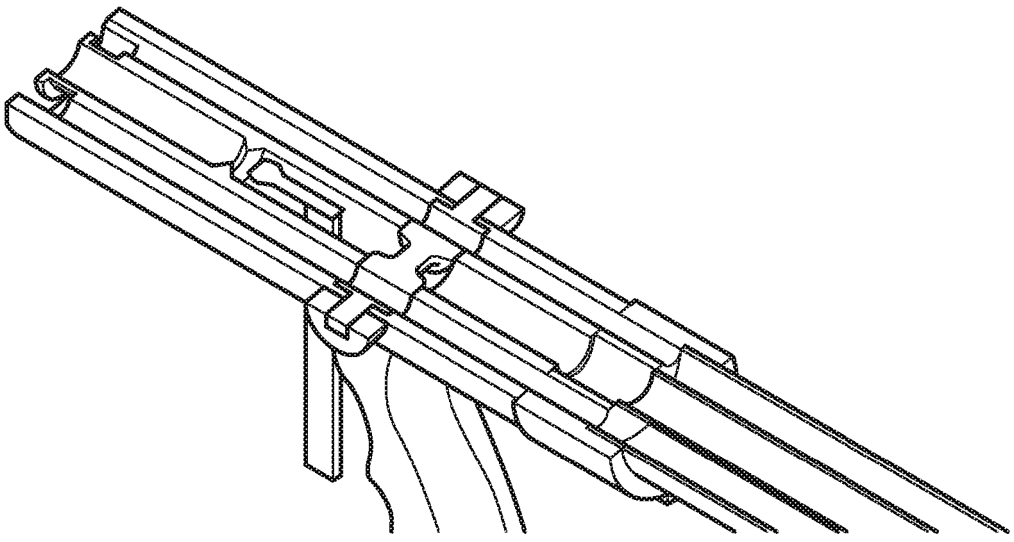

FIG. 21B

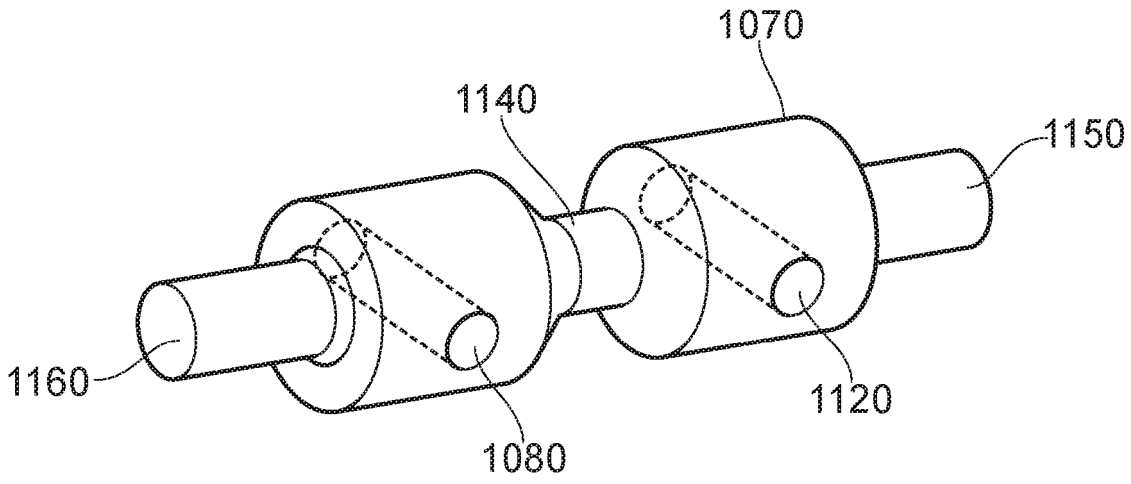

FIG. 22

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2389642 A, Schellin **[0003]**