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Le commissaire aux brevets a accordé un brevet pour l'invention décrite dans le mémoire descriptif portant le numéro de brevet susmentionné. Le mémoire descriptif est accessible dans la Base de données sur les brevets canadiens sur le site Web de l'Office de la propriété intellectuelle du Canada.

The Commissioner of Patents has granted a patent for the invention described in the specification under the above-noted patent number. The specification is accessible in the Canadian Patents Database on the website of the Canadian Intellectual Property Office.

**Commissaire aux brevets
Commissioner of Patents**

Titre de l'invention / Title of invention
PISTOLET DE PULVERISATION A DEUX BUSES

DUAL NOZZLE SPRAY GUN

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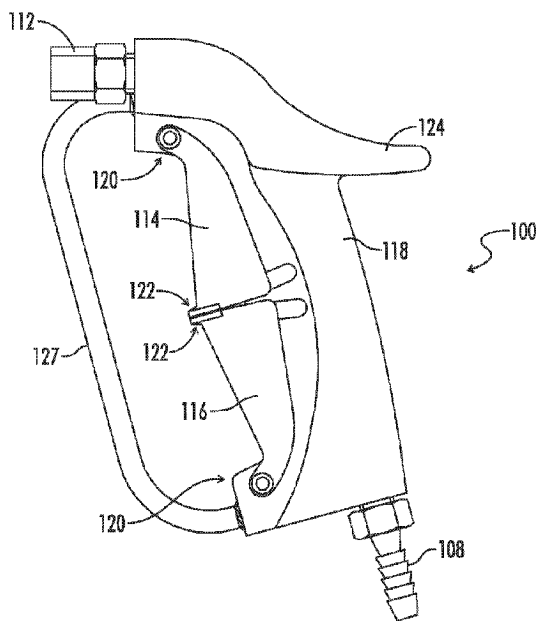
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 (54) Title: DUAL NOZZLE SPRAY GUN



(57) **Abrégé/Abstract:**

A fluid spray apparatus (100) includes an inlet (102) and first and second outlets (104, 106). A first actuator (114) may communicate the inlet with at least one of the outlets. A second actuator (116) also may communicate the inlet with at least one of the outlets. A passage network (126) of the fluid spray apparatus communicates the first and second actuators with the first and second outlets. A diverter structure is disposed in the passage network. The diverter structure includes a first diverter structure arrangement. In the first diverter structure arrangement, the first actuator communicates the inlet with the first outlet and the second actuator communicates the inlet with the second outlet. The diverter structure also includes a second diverter structure arrangement. In the second diverter structure arrangement, the first actuator communicates the inlet with the second outlet and the second actuator communicates the inlet with the first outlet.

DESCRIPTION**DUAL NOZZLE SPRAY GUN****TECHNICAL FIELD**

[0001] The present disclosure relates generally to a fluid spray apparatus. More particularly, the present disclosure pertains to a fluid spray gun including multiple outlets.

BACKGROUND ART

[0002] Fluid spray guns are known in the art. In herbicide applications, spray guns with adjustable nozzles designed to be twisted back and forth by a user are available. A user may wish to apply herbicide to a nearby target with a fan-type pattern and to a distant target with a straight stream pattern that will break up into smaller droplets near the target. To adjust the nozzle to either setting, the user must remove his or her hand from the backpack pumping lever to twist the adjustable nozzle. This method also requires the user to make contact with parts covered in the herbicide. Furthermore, the method can become tiresome to a user, prompting the user to leave the nozzle on the straight stream pattern. If left on the straight stream pattern, the spray will over-penetrate the nearby targets and cause poor performance, environmental problems, and wasted herbicide.

DISCLOSURE OF THE INVENTION

[0003] Some embodiments of the current disclosure may allow for spraying different patterns using only one hand, transitioning from one pattern to another quickly and easily, and optionally reversing the actuator-output relationship.

[0004] Briefly, the present disclosure relates, in one embodiment, to a fluid spray apparatus. The fluid spray apparatus includes an inlet and first and second outlets. The fluid spray apparatus further includes a first actuator. The first actuator is configured to communicate the inlet with at least one of the outlets. The fluid spray apparatus also includes a second actuator. The second actuator is also configured to communicate the inlet with at least one of the outlets. A passage network of the fluid spray apparatus communicates the first and second actuators with the first and second outlets. A diverter structure is disposed in the passage network. The diverter structure includes a first diverter structure arrangement. In the first diverter structure arrangement, the first actuator communicates the inlet with the first outlet and the second actuator communicates the inlet with the second outlet. The diverter structure also includes a second diverter structure arrangement. In the second diverter structure arrangement, the first actuator communicates the inlet with the second outlet and the second actuator communicates the inlet with the first outlet.

[0005] In an alternative embodiment, the diverter structure includes a plurality of plugs removably disposed in one of a plurality of positions blocking a portion of the passage network.

- [0006] In still another embodiment, the diverter structure includes a selector valve.
- [0007] In yet another embodiment, the first diverter structure arrangement and the second diverter structure arrangement are mutually exclusive.
- [0008] In another embodiment, the first outlet and the second outlet are each configured to receive a variety of fluid spray nozzles.
- [0009] In a further embodiment, the first outlet includes a diffuse spray nozzle and the second outlet includes a solid stream nozzle.
- [0010] In a further still embodiment, at least one of the first outlet and the second outlet includes an adjustable spray nozzle.
- [0011] Yet another embodiment includes a handle, and the first and second actuators are hingedly and opposingly disposed on the handle.
- [0012] In still another embodiment, each of the first and second actuators includes a hinge end and a free end opposite the hinge end. The actuators are positioned such that the free ends are nearer each other than the hinge ends.
- [0013] In an even further embodiment, the handle includes a pistol grip handle.
- [0014] The present disclosure also relates, in one embodiment, to a fluid spray apparatus including an inlet, a first outlet, and a second outlet. A first actuator is configured to communicate the inlet with at least one of the outlets. A second actuator is configured to communicate the inlet with at least one of the outlets. The fluid spray apparatus also includes a selector valve. The selector valve includes a first position wherein the first actuator communicates the inlet with the first outlet and the second actuator communicates the inlet with the second outlet. The selector valve also includes a second position wherein the first actuator communicates the inlet with the second outlet and the second actuator communicates the inlet with the first outlet.
- [0015] In another embodiment, the first outlet and the second outlet are each configured to receive one of a variety of fluid spray nozzles.
- [0016] In one embodiment, the first actuator includes a first trigger and the second actuator includes a second trigger.
- [0017] In a further embodiment, the first and second triggers are configured to be aligned with each other and opposed to each other.
- [0018] In a further still embodiment, the handle includes a pistol grip handle.
- [0019] In an even further embodiment, each of the first and second actuators is further configured to prevent communication between the inlet and at least one of the outlets when the actuators are unactuated.
- [0020] In another embodiment, the selector valve is configured to be rotated to the first position and to the second position by a user.

[0021] The present disclosure also relates, in an embodiment, to a method of operating a fluid spray apparatus having a fluid inlet and first and second fluid outlets. The method includes placing a diverter structure in a first arrangement. With the diverter structure in the first arrangement, a first trigger is actuated to flow fluid from the inlet to the first outlet. Also with the diverter structure in the first arrangement, a second trigger is actuated to flow fluid from the inlet to the second outlet. The method further includes placing the diverter structure in a second arrangement. With the diverter structure in the second arrangement, the first trigger is actuated to flow fluid from the inlet to the second outlet. Also with the diverter structure in the second arrangement, the second trigger is actuated to flow fluid from the inlet to the first outlet.

[0022] In a further embodiment, placing the diverter structure in the first arrangement includes removably placing a plurality of plugs in the first arrangement to block a portion of a passage network of the fluid spray apparatus. Placing the diverter structure in the second arrangement includes removably placing the plurality of plugs in the second arrangement to block a different portion of the passage network.

[0023] In another embodiment, placing the diverter structure in the first arrangement includes placing a selector valve in a first position. Placing the diverter structure in the second arrangement includes placing the selector valve in a second position.

BRIEF DISCRIPTION OF THE DRAWINGS

[0024] Fig. 1 is a side view of one embodiment of the fluid spray apparatus.

[0025] Fig. 2 is a top view of the fluid spray apparatus of Fig. 1.

[0026] Fig. 3 is a rear view of the fluid spray apparatus of Fig. 1.

[0027] Fig. 4 is a front view of the fluid spray apparatus of Fig. 1 with the actuators removed.

[0028] Fig. 5 is a side cross-sectional partially exploded view of the fluid spray apparatus of Fig. 1.

[0029] Fig. 6 is a side view of the fluid spray apparatus of Fig. 1 with the actuators removed.

[0030] Fig. 7 is a front cross-sectional view of the fluid spray apparatus of Fig. 1.

[0031] Fig. 8 is a top cross-sectional partially exploded view of the fluid spray apparatus of Fig. 1.

[0032] Fig. 9 is a top cross-sectional view of the fluid spray apparatus of Fig. 1 with the diverter structure in a first arrangement and the bottom actuator actuated.

[0033] Fig. 10 is a top cross-sectional view of the fluid spray apparatus of Fig. 1 with the diverter structure in a second arrangement and the bottom actuator actuated.

[0034] Fig. 11 is a side cross-sectional view of the fluid spray apparatus of Fig. 1 with the bottom actuator actuated.

[0035] Fig. 12 is a top cross-sectional view of the fluid spray apparatus of Fig. 1 with the diverter structure in a first arrangement and the top actuator actuated.

[0036] Fig. 13 is a top cross-sectional view of the fluid spray apparatus of Fig. 1 with the diverter structure in a second arrangement and the top actuator actuated.

[0037] Fig. 14 is a side cross-sectional view of the fluid spray apparatus of Fig. 1 with the top actuator actuated.

[0038] Fig. 15 is a rear view of one embodiment of the fluid spray apparatus.

[0039] Fig. 16 is a front cross-sectional view of the fluid spray apparatus of Fig. 15.

[0040] Fig. 17 is a side view of a selector valve of the fluid spray apparatus of Fig. 15.

[0041] Fig. 18 is a top cross-sectional view of the fluid spray apparatus of Fig. 15 with the diverter structure in a first arrangement and the top actuator actuated.

[0042] Fig. 19 is a top cross-sectional view of the fluid spray apparatus of Fig. 15 with the diverter structure in a second arrangement and the top actuator actuated.

[0043] Fig. 20 is a side cross-sectional view of the fluid spray apparatus of Fig. 15 with the top actuator actuated.

[0044] Fig. 21 is a top cross-sectional view of the fluid spray apparatus of Fig. 15 with the diverter structure in a first arrangement and the bottom actuator actuated.

[0045] Fig. 22 is a top cross-sectional view of the fluid spray apparatus of Fig. 15 with the diverter structure in a second arrangement and the bottom actuator actuated.

[0046] Fig. 23 is a side cross-sectional view of the fluid spray apparatus of Fig. 15 with the bottom actuator actuated.

BEST MODE FOR CARRYING OUT THE INVENTION

[0047] Reference will now be made in detail to embodiments of the present disclosure, one or more drawings of which are set forth herein. Each drawing is provided by way of explanation of the present disclosure and is not a limitation. In fact, it will be apparent to those skilled in the art that various modifications and variations can be made to the teachings of the present disclosure without departing from the scope of the disclosure. For instance, features illustrated or described as part of one embodiment can be used with another embodiment to yield a still further embodiment.

[0048] Thus, it is intended that the present disclosure covers such modifications and variations as come within the scope of the appended claims and their equivalents. Other objects, features, and aspects of the present disclosure are disclosed in, or are obvious from, the following detailed description. It is to be understood by one of ordinary skill in the art that

the present discussion is a description of exemplary embodiments only and is not intended as limiting the broader aspects of the present disclosure.

[0049] The words "connected" and "attached" should be interpreted to mean any manner of joining two objects including, but not limited to, the use of any fasteners such as screws, nuts and bolts, bolts, pin and clevis, and the like allowing for a stationary, translatable, or pivotable relationship; welding of any kind such as traditional MIG welding, TIG welding, friction welding, brazing, soldering, ultrasonic welding, torch welding, inductive welding, and the like; using any resin, glue, epoxy, and the like; being integrally formed as a single part together; any mechanical fit such as a friction fit, interference fit, slidable fit, rotatable fit, pivotable fit, and the like; any combination thereof; and the like.

[0050] Unless specifically stated otherwise, any part of the apparatus of the present disclosure may be made of any appropriate or suitable material including, but not limited to, metal, alloy, polymer, polymer mixture, wood, composite, or any combination thereof.

[0051] Referring to the Figures, one embodiment of a fluid spray apparatus, or spray gun, **100** is shown. As can best be seen in Fig. 5, the spray gun **100** includes an inlet **102**, a first outlet **104**, and a second outlet **106**. The spray gun **100** optionally includes a hose attachment barb **108** on the inlet **102**. The inlet **102** could alternatively include a quick-release connector, a threaded male or female coupler, and the like. The spray gun **100** may also include a first nozzle **110** disposed on the first outlet **104** and a second nozzle **112** disposed on the second outlet **106**. Both first nozzle **110** and second nozzle **112** may be permanently connected or removably connected to the spray gun **100**. The first and second nozzles **110**, **112** may include commonly available standard spray tips that are threadedly received in the first and second outlets **104**, **106** respectively. In other embodiments, the nozzles **110**, **112** are retained in the outlets **104**, **106** with quick-release, snap-on, latching, or other releasable attachment configurations. First nozzle **110** and second nozzle **112** may be of varying spray patterns such that the spray gun **100** may operate with any of a plurality of spray patterns. One embodiment of the spray gun **100** includes the first outlet **104** including a diffuse spray nozzle and the second outlet **106** including a solid stream nozzle. Another embodiment of the spray gun **100** includes at least one of the first outlet **104** and second outlet **106** including an adjustable spray nozzle.

[0052] In an embodiment, a first actuator **114** is configured to communicate the inlet **102** with at least one of the outlets **104**, **106** such that communication is prevented when the first actuator is unactuated. A second actuator **116** is also configured to communicate the inlet **102** with at least one of the outlets **104**, **106** such that communication is prevented when the second actuator is unactuated. Each actuator **114**, **116** may actuate valves **115** that are normally biased toward the closed position by springs **117**. Each valve **115** may be accessible for replacement or repair by removing a spring retainer plug **119** with common tools, including, but

not limited to, a hex key. The actuators **114**, **116** may be hingedly connected to the handle **118** such that the actuators include triggers. In some embodiments, the handle **118** may be a pistol grip handle. The actuators **114**, **116** may be aligned with each other and opposingly disposed on the handle **118**. The actuators **114**, **116** may be configured such that the first actuator **114** may be actuated with the index finger and middle finger of a user and the second actuator **116** may be actuated with the ring finger and little finger of the user. Each actuator **114**, **116** may include a hinge end **120** and a free end **122**. The free ends **122** of the actuators **114**, **116** may be nearer each other than the hinge ends **120**.

[0053] The handle **118** of the spray apparatus may, in some embodiments, include guide channels **123** configured to receive a portion of a respective trigger/actuator **114**, **116**. The guide channels **123**, in conjunction with the curved free ends **122** of the triggers **114**, **116**, may prevent pinching a user's fingers when one or more of the triggers are actuated. In at least one embodiment, the trigger free ends **122** remain in contact with each other during actuation. The channels **123** also may function to prevent over-actuation of the actuators **114**, **116**. The channels **123** may further function to hold the actuators in close readiness to the valve assembly.

[0054] In some embodiments, the handle **118** is angled from the spray direction of the nozzles **110**, **112** such that the handle and the spray direction of the nozzles forms an angle of between 90 and 180 degrees. More specifically, the handle **118** and the spray direction of the nozzles **110**, **112** form an angle of between 90 and 120 degrees. Even more specifically, the handle **118** and the spray direction of the nozzles **110**, **112** form an angle of 105 degrees. These angles may be desirable to allow for ergonomic and comfortable use for a user's wrist when holding the spray apparatus **100**. Furthermore, the spray apparatus **100** may include a flat or contoured protrusion **124** extending from the handle. The protrusion **124** may be configured such that a user's hand between the thumb and index finger may rest against the protrusion to aid in supporting the weight of the spray apparatus **100**. Another ergonomic feature optionally included in the spray apparatus **100** is the location of the inlet **102** at the bottom of the handle **118**. This location allows for any hose attached to the hose attachment barb **108** to extend below the wrist of a user so the hose does not get in the way of the user's arm and so the weight of the hose and the spray gun **100** may be close to the user's hand.

[0055] Some embodiments of the fluid spray apparatus **100** may include a passage network **126** including multiple paths connecting the inlet **102** with the first outlet **104** and second outlet **106**. The paths may be, but are not limited to, one or more paths defined in the handle **118** of the spray apparatus **100**, one or more tubes **127** exterior to the handle of the spray apparatus, and the like.

[0056] In one embodiment of the fluid spray apparatus **100**, a diverter structure including a plurality of plugs **128** may be removably disposed in one of a plurality of positions blocking a portion of the passage network **126**. Threaded covers **129** may be removed with common tools including, but not limited to, a hex key to access the plugs **128** or to clean the passage network **126**. The plurality of positions may form a first diverter structure arrangement and a second diverter structure arrangement. In some embodiments, the first diverter structure arrangement and the second diverter structure arrangement may be mutually exclusive.

[0057] As shown in Figs. 9 and 12, the plurality of plugs **128** may be placed in a first diverter structure arrangement wherein the first actuator **114** may communicate the inlet **102** with the first outlet **104** and the second actuator **116** may communicate the inlet with the second outlet **106**. In embodiments including the hose attachment barb **108** and the first and second nozzles **110**, **112**, the first actuator **114** may communicate the opening of the hose attachment barb with the opening of the first nozzle and the second actuator **116** may communicate the opening of the hose attachment barb with the opening of the second nozzle.

[0058] As shown in Figs. 10 and 13, the plurality of plugs **128** may be placed in a second diverter structure arrangement wherein the first actuator **114** may communicate the inlet **102** with the second outlet **106** and the second actuator **116** may communicate the inlet with the first outlet **104**. In some embodiments, the first actuator **114** may communicate the opening of the hose attachment barb **108** with the opening of the second nozzle **112** and the second actuator **116** may communicate the opening of the hose attachment barb with the opening of the first nozzle **110**.

[0059] In some embodiments of the fluid spray apparatus **100**, the diverter structure may include a selector valve **130**. As can best be seen in Fig. 17, the selector valve **130** may include a plurality of pathways **132** to direct fluid flow. The selector valve **130** may also include one or more sealing portions, or O-rings, **134** to aid in directing fluid flow. In some embodiments, the selector valve **130** may also include a user control portion **136**. The user control portion **136** may include, but is not limited to, a hex head, a lever, a button, and the like. In some embodiments of the fluid spray apparatus **100**, the selector valve **130** may be configured to be rotated to a first position, or first diverter structure arrangement, and to a second position, or second diverter structure arrangement, by a user.

[0060] As shown in Figs. 18 and 21, the selector valve **130** may be placed in a first position, or first diverter structure arrangement, wherein the first actuator **114** may communicate the inlet **102** with the first outlet **104** and the second actuator **116** may communicate the inlet with the second outlet **106**. In some embodiments, the selector valve **130** may be placed in the first position and the first actuator **114** may communicate the opening of the hose attachment barb **108** with the opening of the first nozzle **110** and the second

actuator **116** may communicate the opening of the hose attachment barb with the opening of the second nozzle **112**.

[0061] As shown in Figs. 19 and 22, the selector valve **130** may be placed in a second position, or second diverter structure arrangement, wherein the first actuator **114** may communicate the inlet **102** with the second outlet **106** and the second actuator **116** may communicate the inlet with the first outlet **104**. In some embodiments, the selector valve **130** may be placed in the second position and the first actuator **114** may communicate the opening of the hose attachment barb **108** with the opening of the second nozzle **112** and the second actuator **116** may communicate the opening of the hose attachment barb with the opening of the first nozzle **110**.

[0062] The current disclosure also relates to a method of operating the fluid spray apparatus **100** including the fluid inlet **102** and first and second fluid outlets **104**, **106**. The method may include placing a diverter structure, including, but not limited to, the plurality of plugs **128** or the selector valve **130**, in a first arrangement. With the diverter structure in the first arrangement, the user may actuate the first actuator, or first trigger, **114** to flow fluid from the inlet **102** to the first outlet **104**. With the diverter structure in the first arrangement, the user may also actuate the second actuator, or second trigger, **116** to flow fluid from the inlet **102** to the second outlet **106**. The user may place the diverter structure in a second arrangement. With the diverter structure in the second arrangement, the user may actuate the first actuator **114** to flow fluid from the inlet **102** to the second outlet **106**. With the diverter structure in the second arrangement, the user may also actuate the second actuator **116** to flow fluid from the inlet **102** to the first outlet **104**.

[0063] In one embodiment, the method of operating the fluid spray apparatus **100** may include removably placing the plurality of plugs **128** in the first arrangement to block a portion of the passage network **126** and placing the plurality of plugs in the second arrangement to block a different portion of the passage network.

[0064] In another embodiment, the method of operating the fluid spray apparatus **100** may include placing the selector valve **130** in a first position such that the diverter structure is in the first arrangement and a second position such that the diverter structure is in the second arrangement.

[0065] While the present disclosure has been described with particularity in relation to spraying herbicide, the present disclosure may also apply to any fluid spray apparatus used for any purpose including, but not limited to, distributing paint, detergents, pesticides, disinfectants, and the like.

[0066] This written description uses examples to disclose the invention and also to enable any person skilled in the art to practice the invention, including making and using any

devices or systems. The patentable scope of the invention is defined by the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they have structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal language of the claims.

[0067] Although embodiments of the disclosure have been described using specific terms, such description is for illustrative purposes only. The words used are words of description rather than limitation. It is to be understood that changes and variations may be made by those of ordinary skill in the art without departing from the spirit or the scope of the present disclosure, which is set forth in the following claims. In addition, it should be understood that aspects of the various embodiments may be interchanged in whole or in part. While specific uses for the subject matter of the disclosure have been exemplified, other uses are contemplated. Therefore, the spirit and scope of the appended claims should not be limited to the description of the versions contained herein.

What is claimed is:

1. A fluid spray apparatus comprising:

an inlet;

a first outlet;

a second outlet;

a diverter structure disposed in a passage network that connects the inlet with the first and second outlets;

a first actuator configured to communicate the inlet with either of the outlets;

a second actuator actuatable to communicate the inlet with either of the outlets via the diverter structure and the passage network; and

wherein the diverter structure is configured to be placed in:

a first diverter structure arrangement wherein actuation of the first actuator communicates the inlet with the first outlet and actuation of the second actuator communicates the inlet with the second outlet; and

a second diverter structure arrangement wherein actuation of the first actuator communicates the inlet with the second outlet and actuation of the second actuator communicates the inlet with the first outlet.

2. The fluid spray apparatus of claim 1, wherein the diverter structure includes a plurality of plugs removably disposed in one of a plurality of positions blocking a portion of the passage network.

3. The fluid spray apparatus of claim 1, wherein the diverter structure includes a selector valve.

4. The fluid spray apparatus of claim 3, wherein the selector valve is configured to be rotated by a user to a first position corresponding to said first diverter structure arrangement and a second position corresponding to said second diverter structure arrangement.

5. The fluid spray apparatus of claim 1, wherein the first diverter structure arrangement and the second diverter structure arrangement are mutually exclusive.

6. The fluid spray apparatus of claim 1, wherein the first outlet includes a diffuse spray nozzle and the second outlet includes a solid stream nozzle.

7. The fluid spray apparatus of claim 1, wherein at least one of the first outlet and the second outlet includes an adjustable spray nozzle.

8. The fluid spray apparatus of any one of claims 1-7, further comprising:

a handle; and

wherein the first and second actuators are hingedly and opposingly disposed on the handle.

9. The fluid spray apparatus of claim 8, wherein each of the first and second actuators includes a hinge end and a free end opposite the hinge end, the actuators positioned such that the free ends are nearer each other than the hinge ends.

10. The fluid spray apparatus of claim 8 or 9, wherein the first actuator includes a first trigger and the second actuator includes a second trigger.

11. The fluid spray apparatus of claim 10, wherein the first and second triggers are configured to be aligned with each other and opposed to each other.

12. The fluid spray apparatus of any one of claims 7-11, further comprising a pistol grip handle.

13. The fluid spray apparatus of any one of claims 1-12, wherein each of the first and second actuators is further configured to prevent communication between the inlet and the diverter structure when the actuators are unactuated.

14. A method of operating a fluid spray apparatus having a fluid inlet and first and second fluid outlets, the method comprising:

(a) placing a diverter structure in a first arrangement, and with the diverter structure in the first arrangement:

actuating a first trigger to flow fluid from the inlet to the first outlet; and

actuating a second trigger to flow fluid from the inlet to the second outlet; and

(b) placing the diverter structure in a second arrangement, and with the diverter structure in the second arrangement:

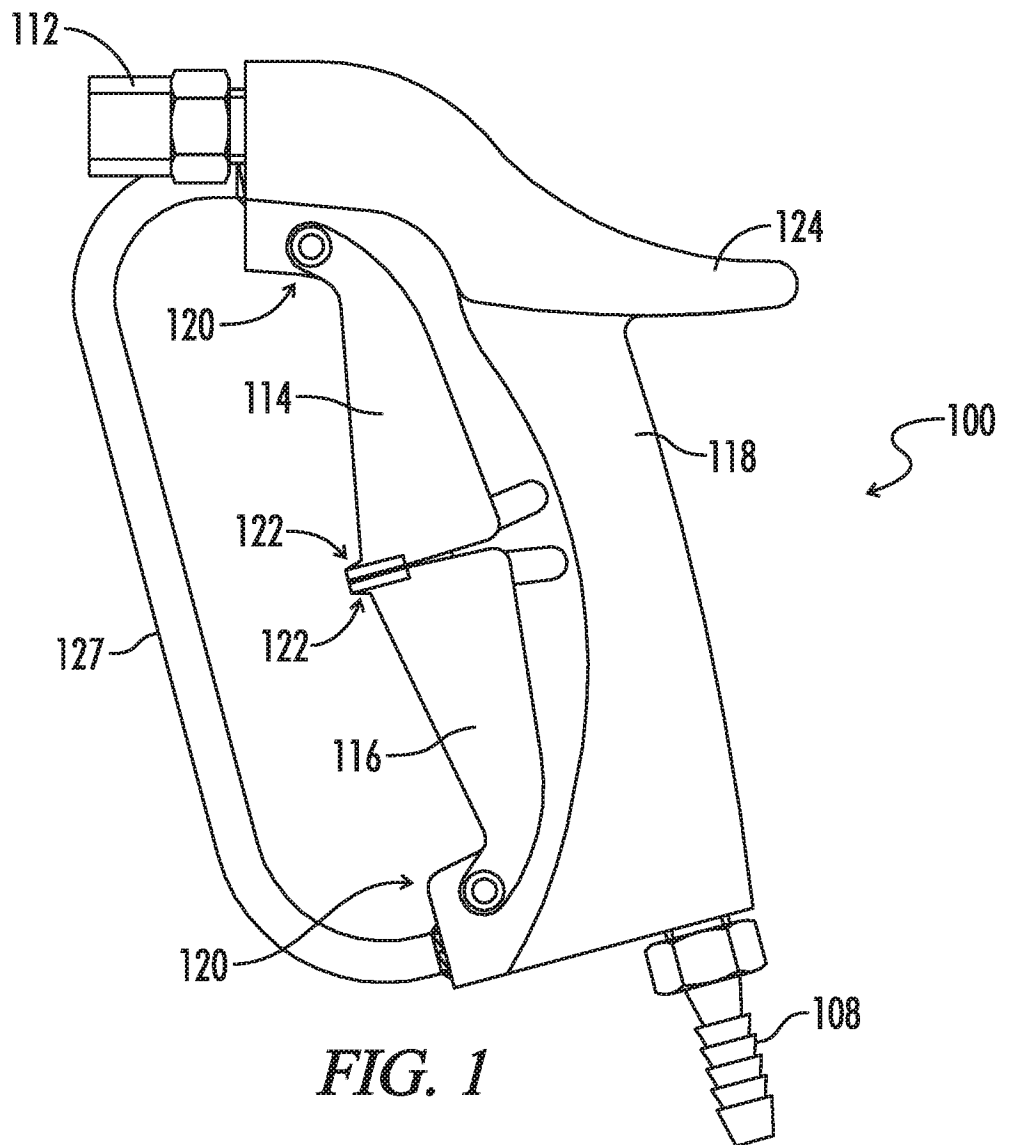
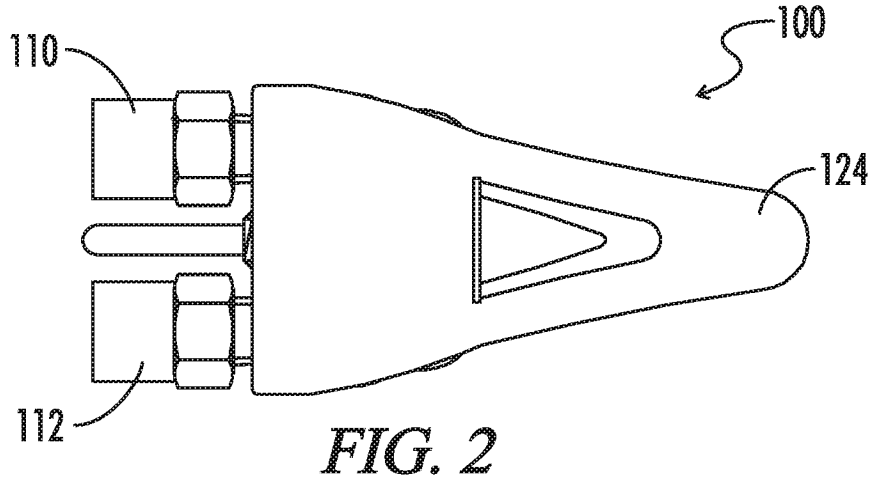
actuating the first trigger to flow fluid from the inlet to the second outlet; and

actuating the second trigger to flow fluid from the inlet to the first outlet.

15. The method of claim 14, wherein step (a) includes removably placing a plurality of plugs in the first arrangement to block a portion of a passage network of the fluid spray apparatus and step (b) includes removably placing the plurality of plugs in the second arrangement to block a different portion of the passage network.

16. The method of claim 14, wherein step (a) includes placing a selector valve in a first position and step (b) includes placing the selector valve in a second position.

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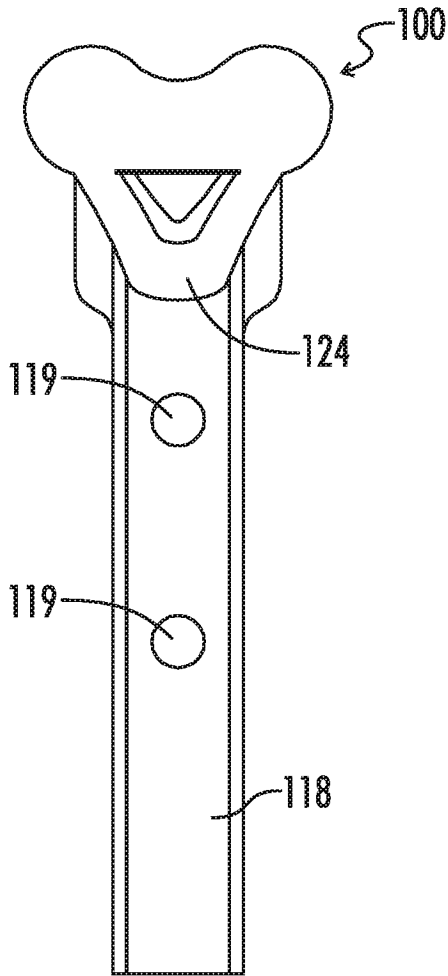


FIG. 3

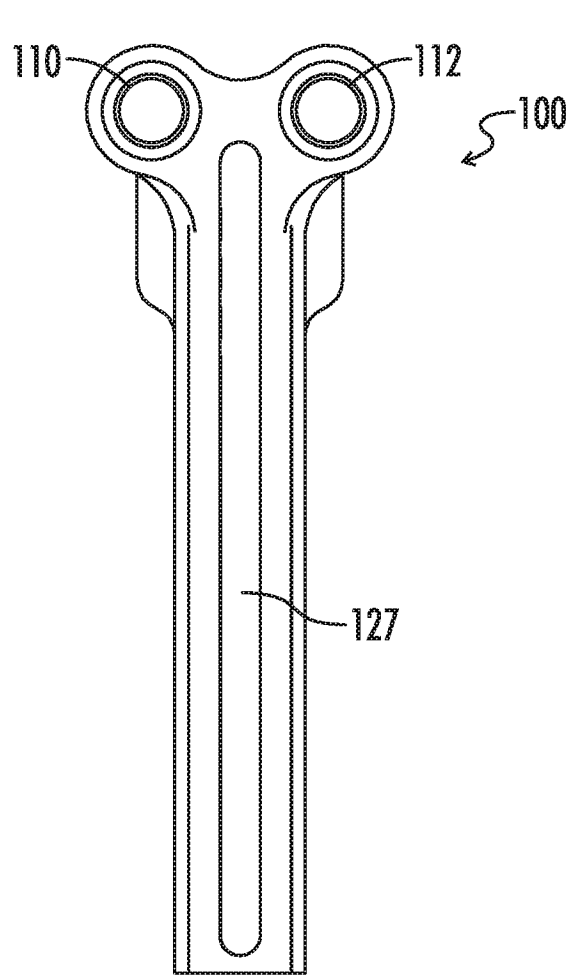


FIG. 4

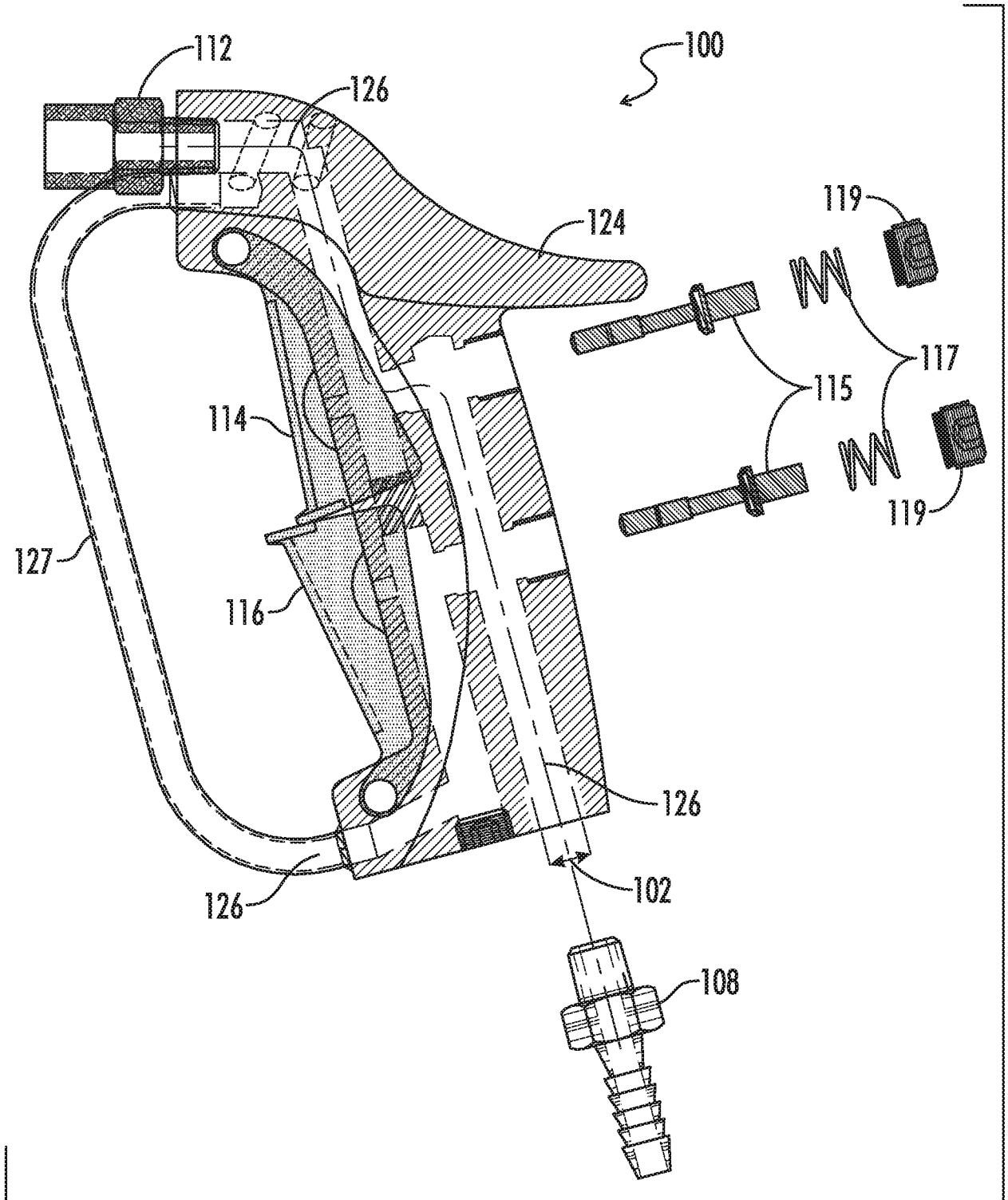
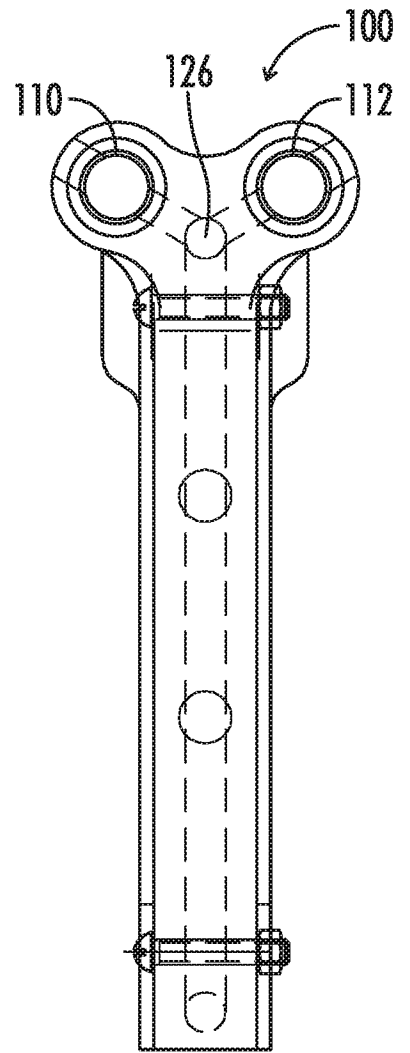
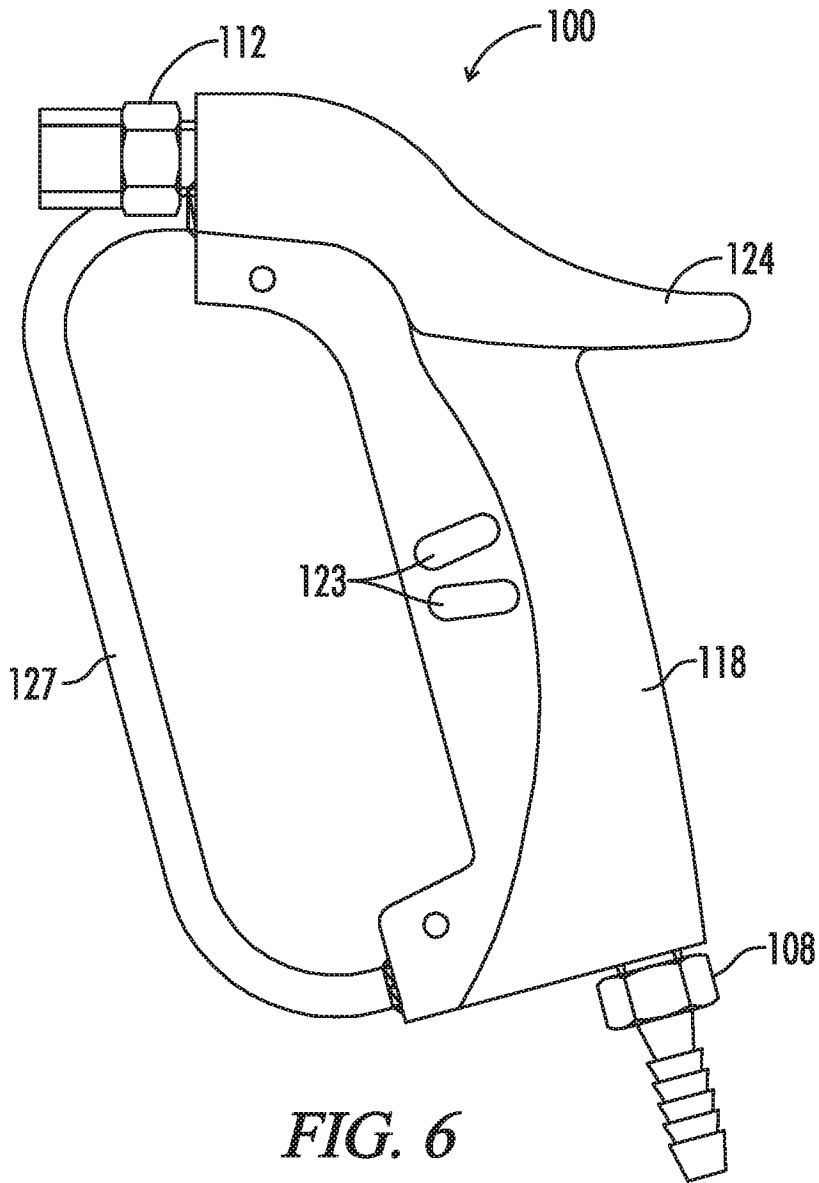


FIG. 5



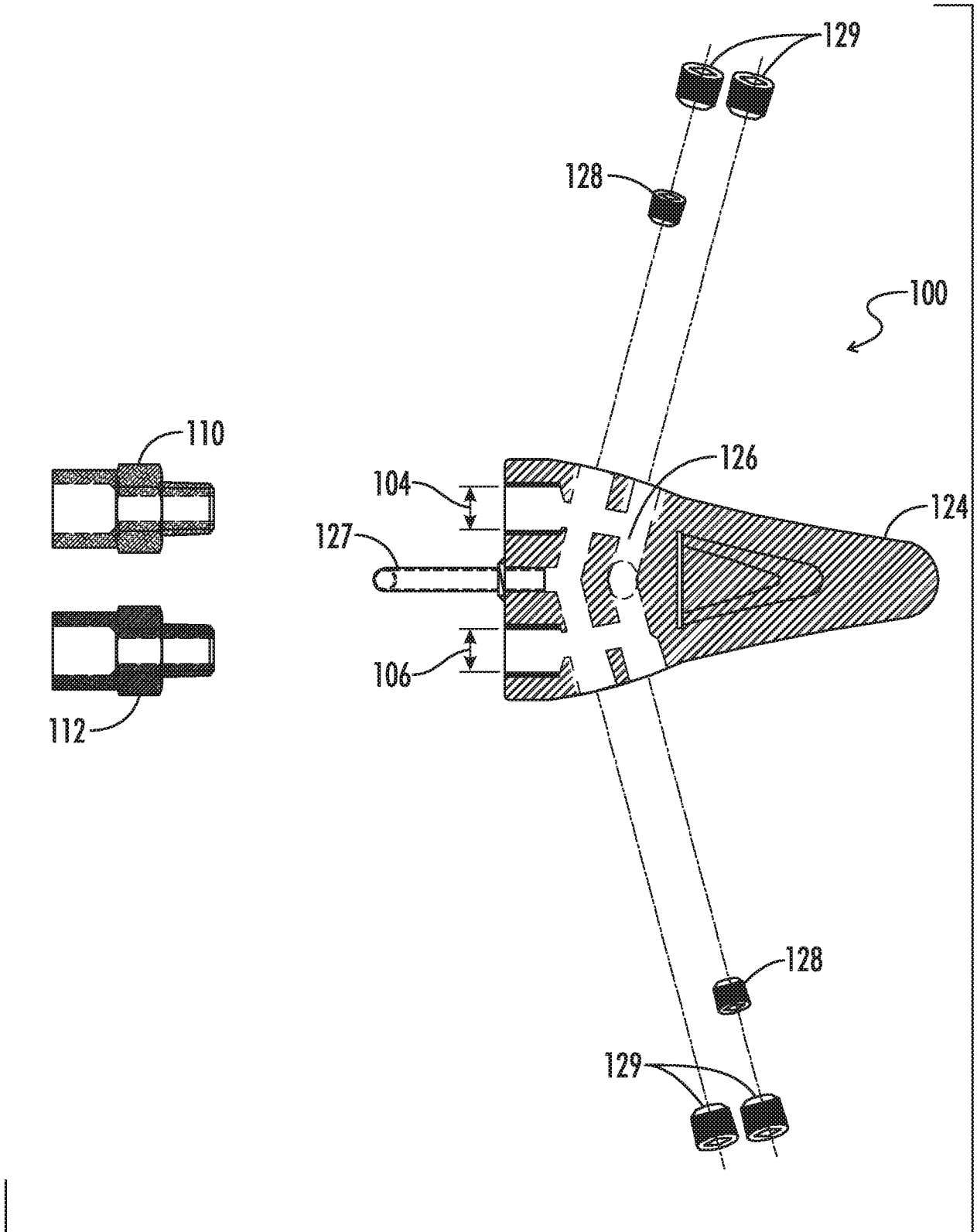


FIG. 8

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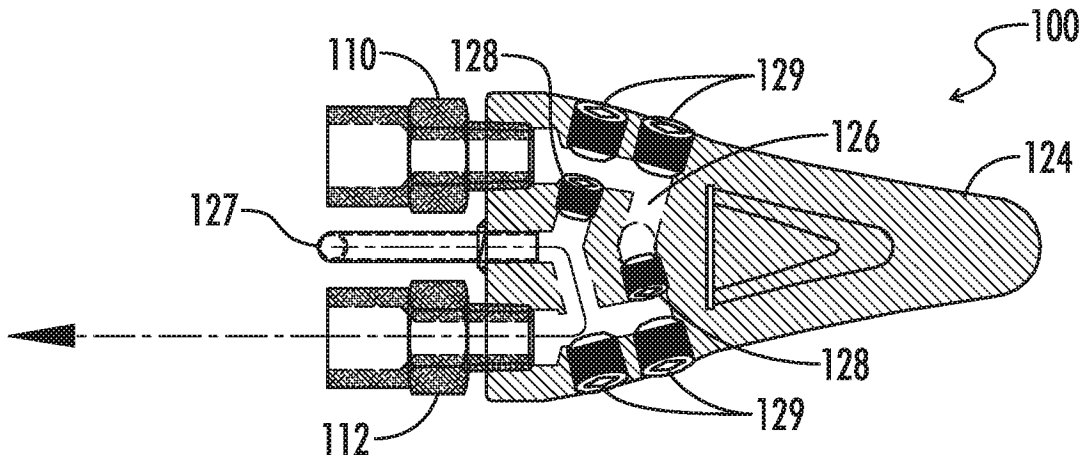


FIG. 9

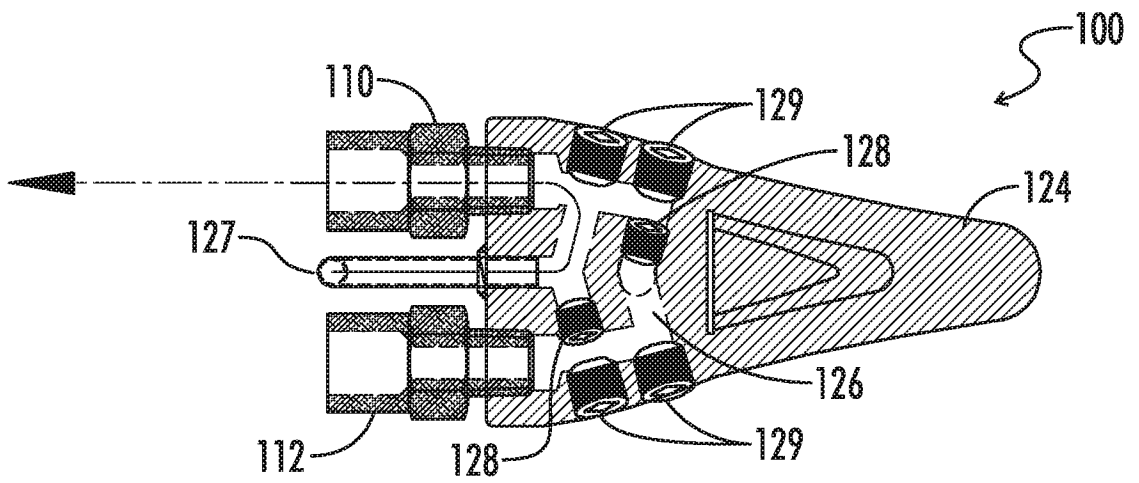


FIG. 10

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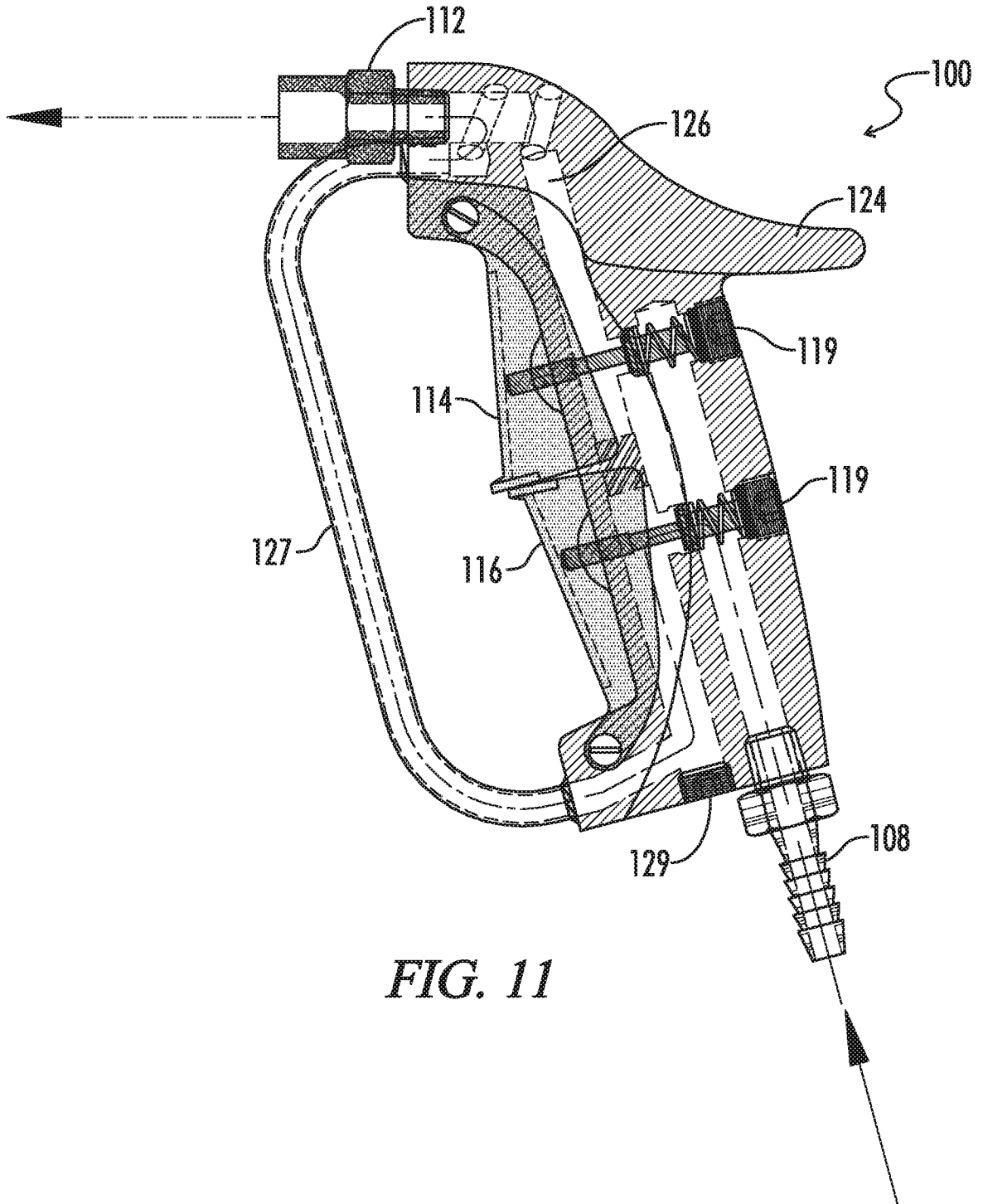


FIG. 11

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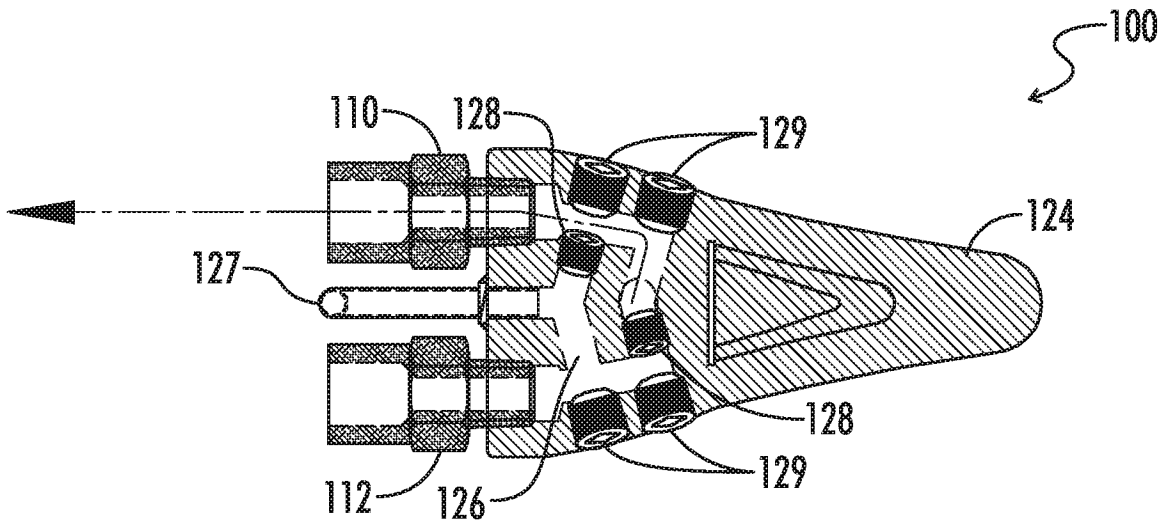


FIG. 12

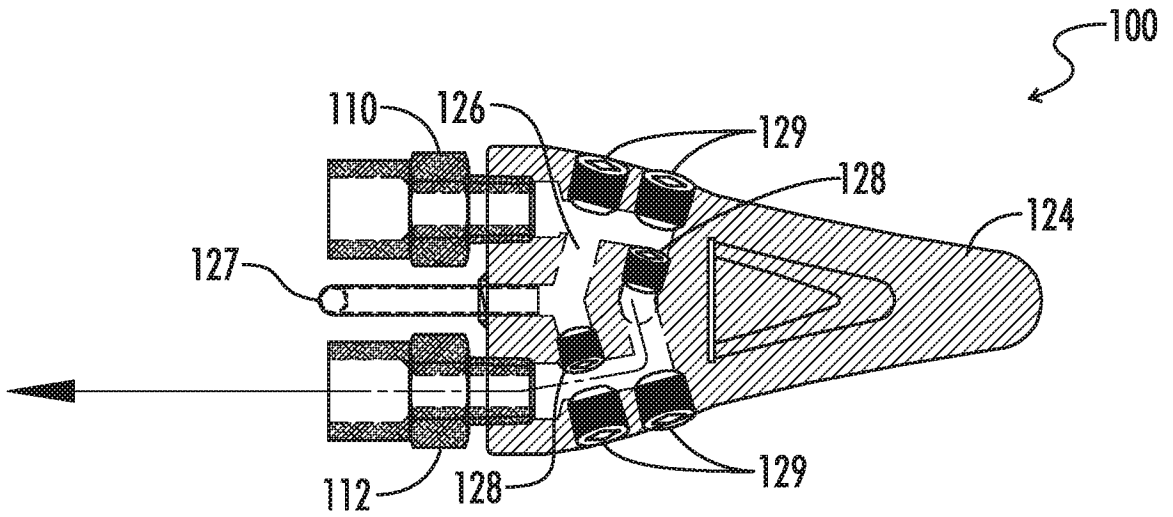


FIG. 13

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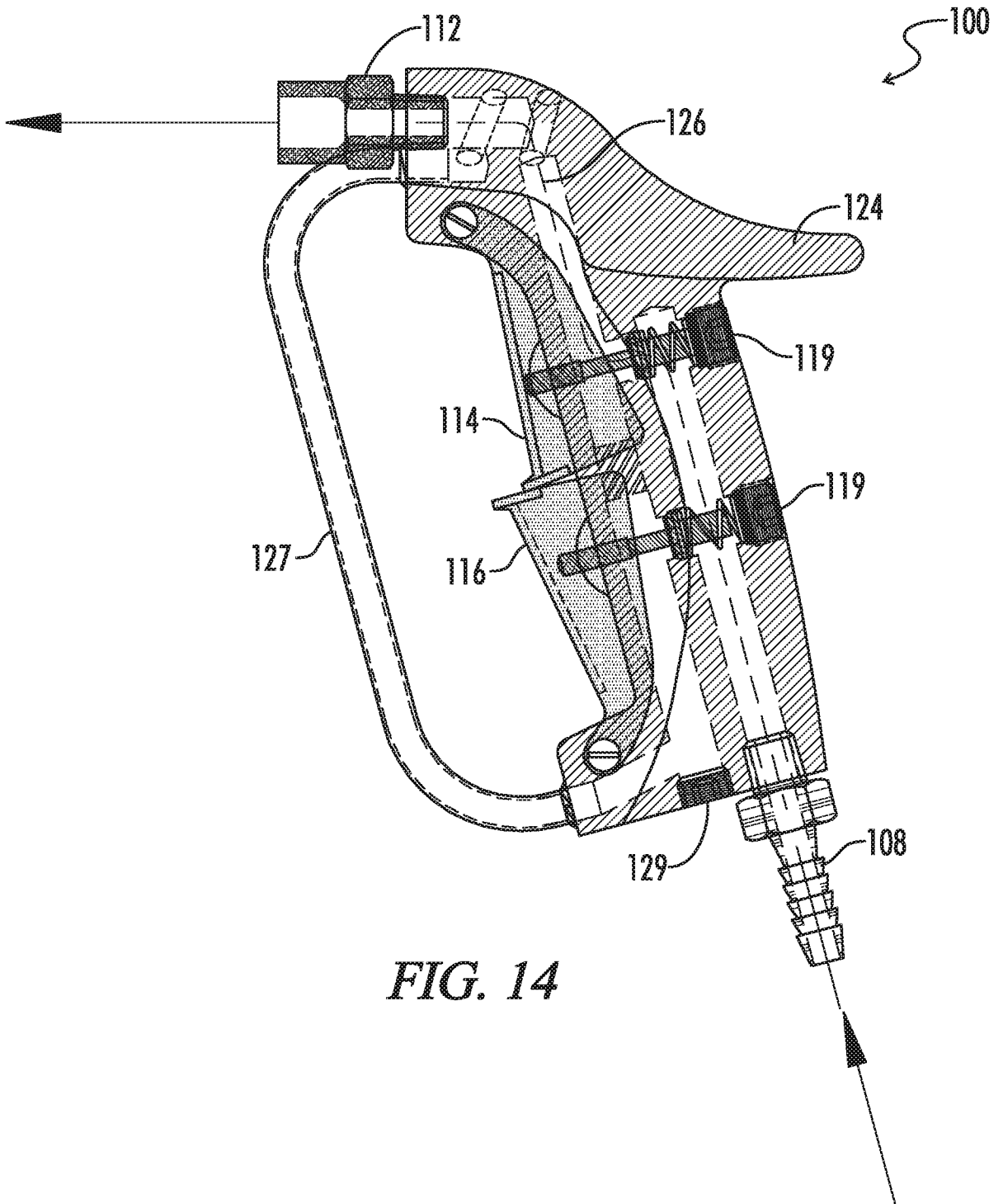


FIG. 14

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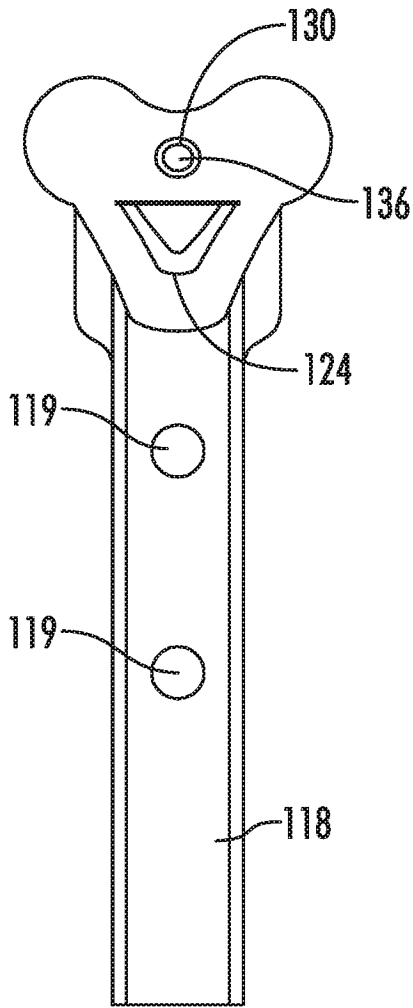


FIG. 15

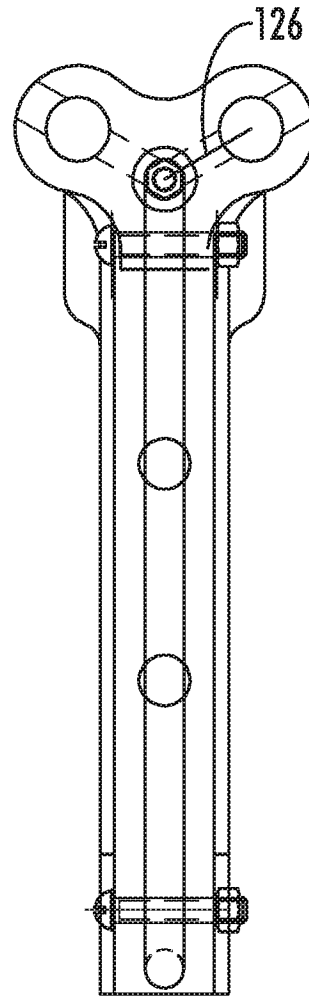


FIG. 16

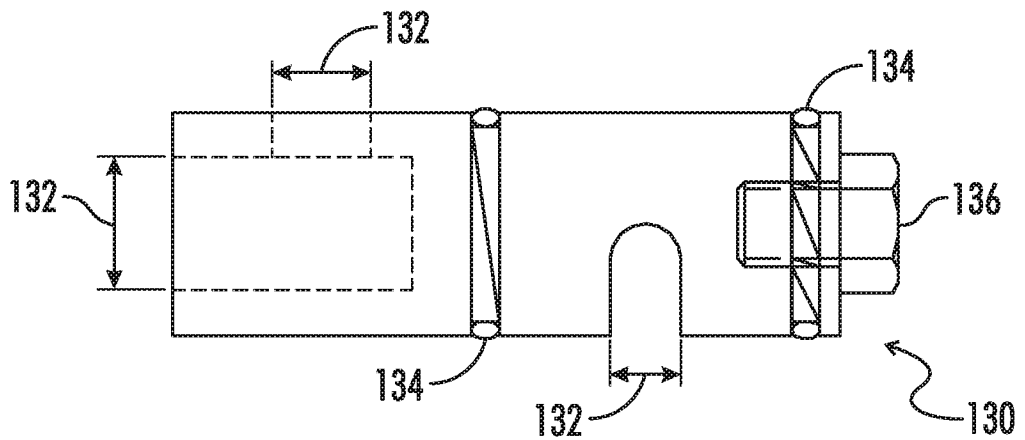


FIG. 17

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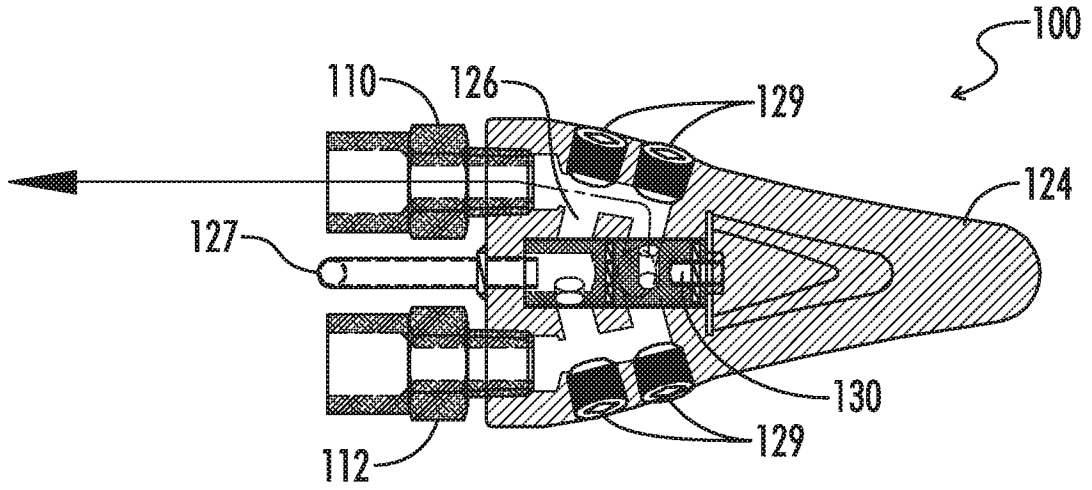


FIG. 18

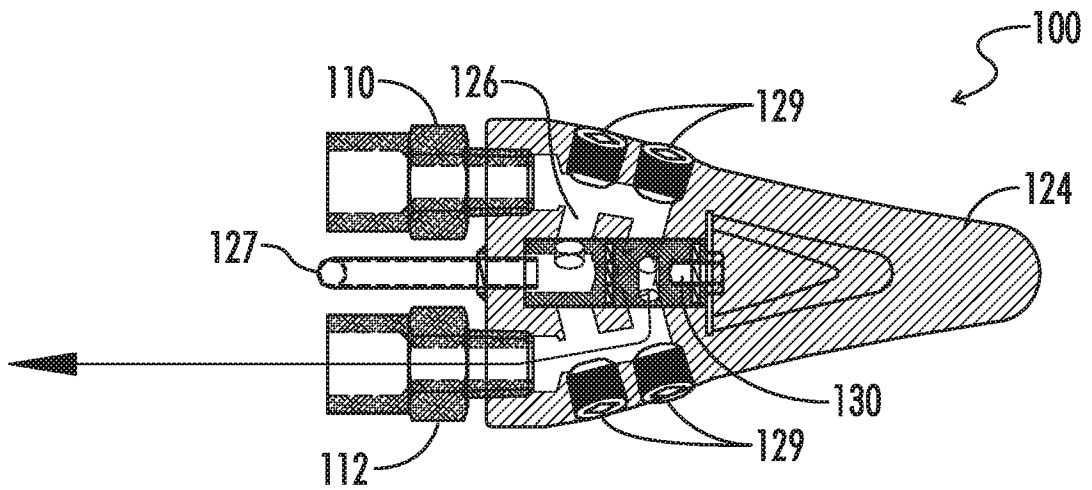


FIG. 19

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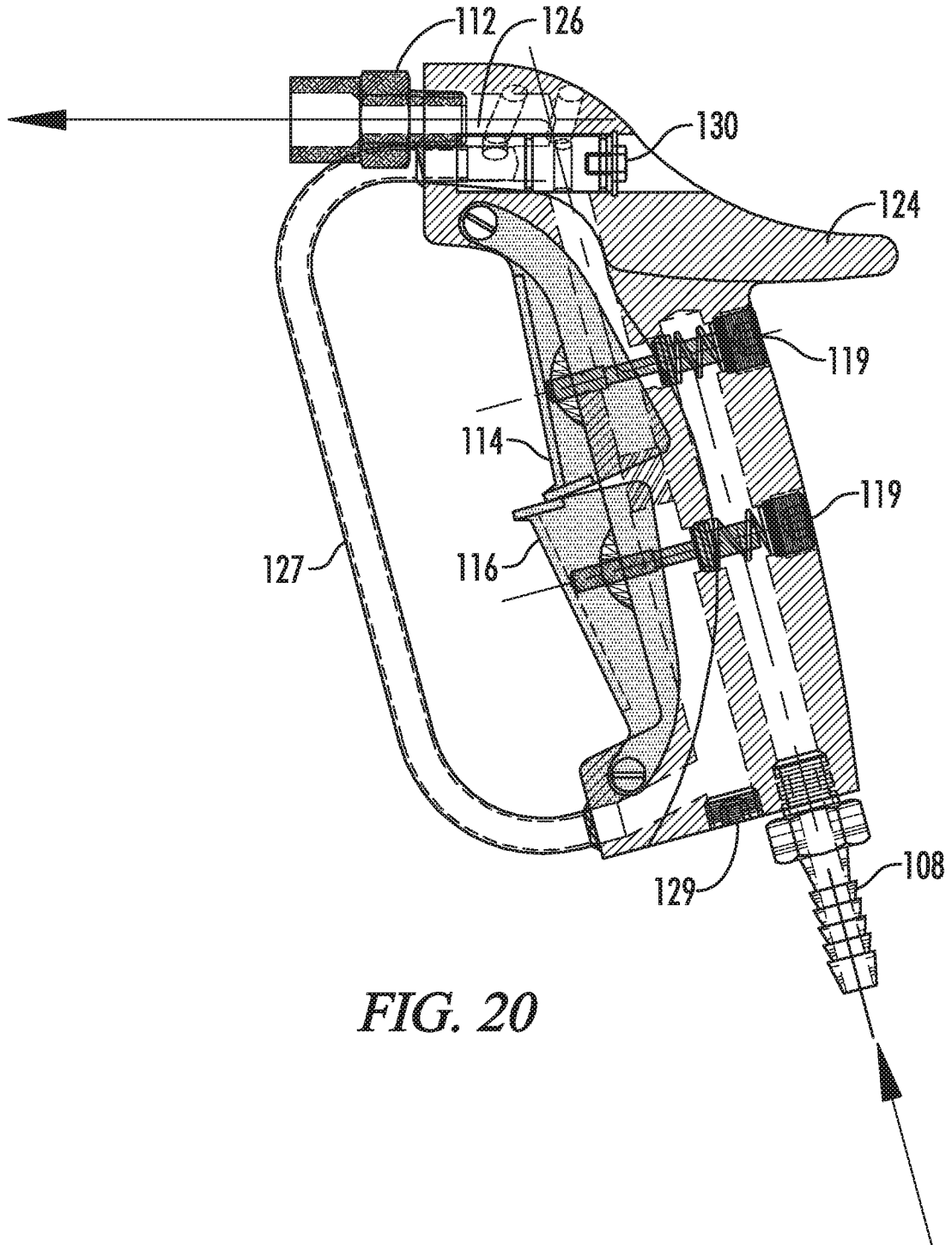


FIG. 20

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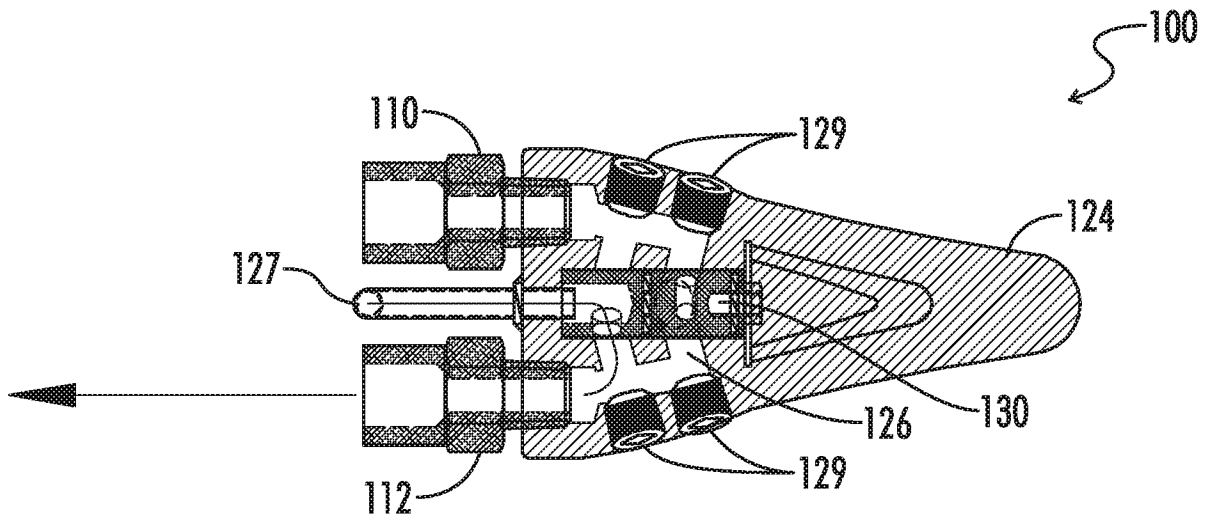


FIG. 21

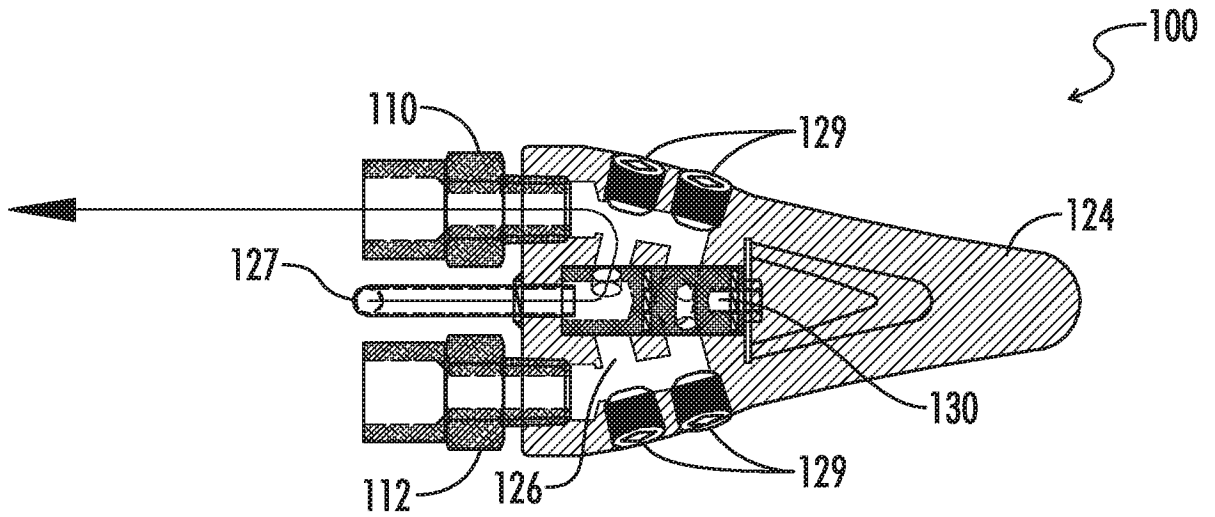


FIG. 22

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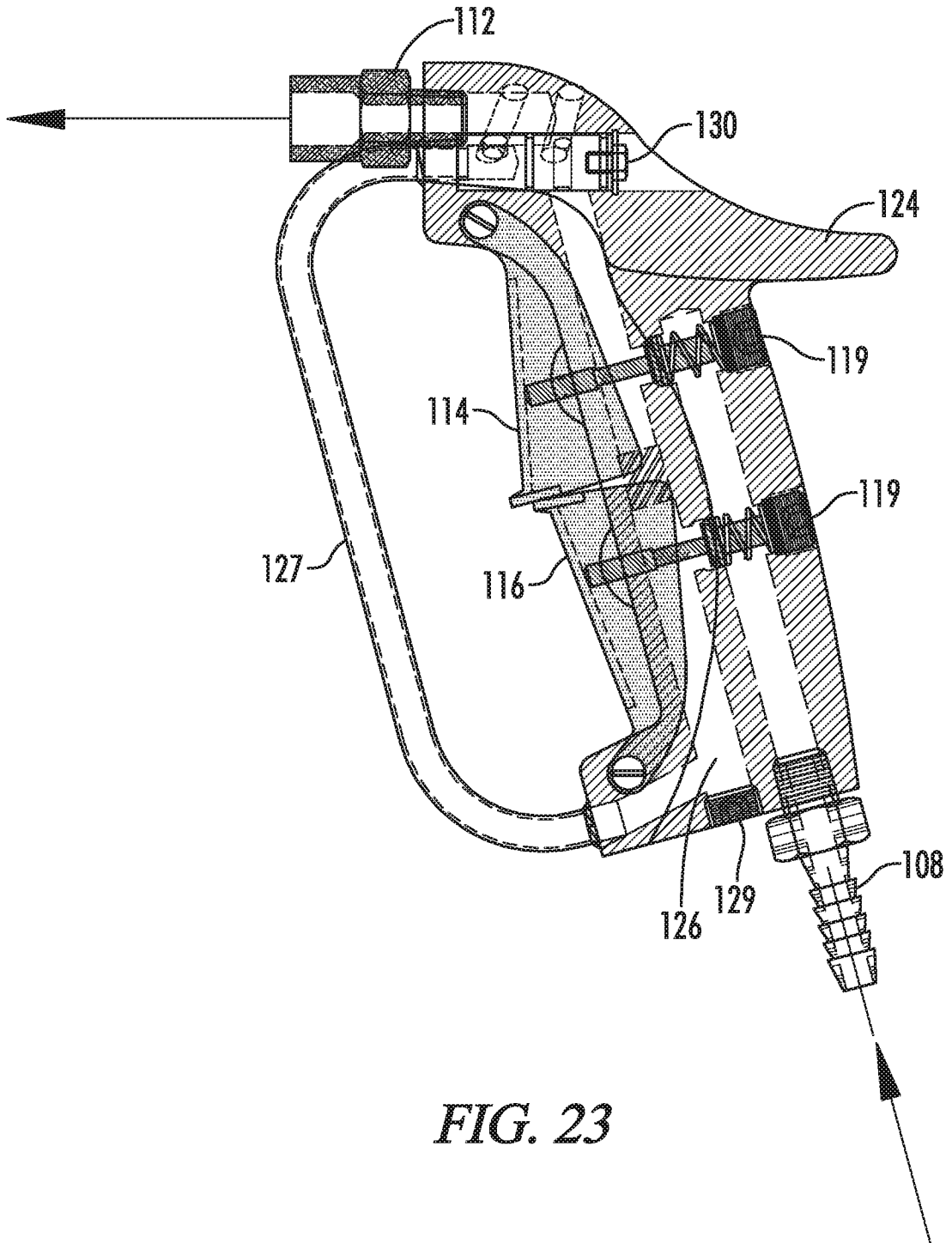


FIG. 23