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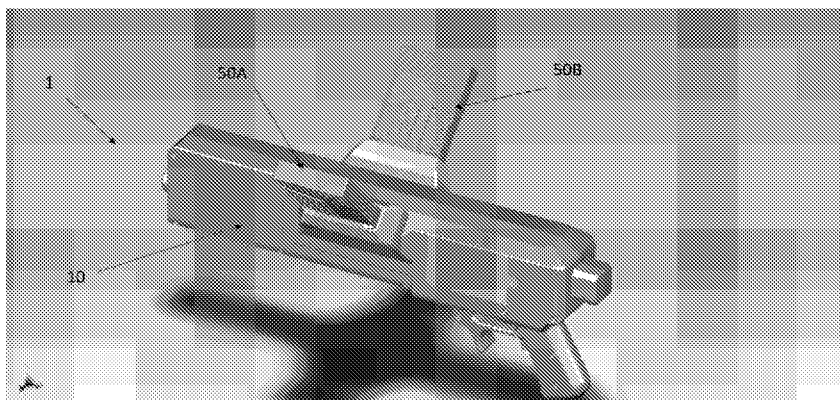


FIG. 1

(57) **Abstract:** A toy launcher for launching projectiles including a main body, two or more cartridges removably attached to the main body, each of the two or more cartridges configured to hold a plurality of projectiles, a casing moveably attached to the main body, two or more push rods moveably attached to the casing, flywheels disposed within the main body in the front of the two or more cartridges, and a stop member disposed between the two or more push rods and the two or more cartridges, the stop member being biased towards the first side of the main body. The stop member operates to block one of the two or more push rods depending on whether the two or more cartridges are inserted, empty and/or at least partially full.



TOY PROJECTILE LAUNCHER AND METHOD OF USING SAME

FIELD

[0001] The present invention is generally related to a toy projectile launcher, such as a toy dart launcher, with a high capacity magazine.

BACKGROUND

[0002] Toy launchers that discharge soft projectiles, such as toy foam darts or toy foam balls — commonly referred to as toy “guns” or “shooters”— are well known in the art. The toy projectiles are designed to safely impact upon a target without causing injury or damage.

[0003] Toy launchers may use one of various different mechanisms for launching the projectiles. One common mechanism for launching toy projectiles from a toy launcher involves the application of compressed air on the projectiles to launch them. The compressed air must be carefully controlled so as to only be in fluid contact with the projectile or projectiles that are intended to be launched at a particular time. Another known mechanism to launch toy projectiles is to feed the toy projectiles to contact one or more rotating flywheels and thereby propel the projectiles forward toward a target.

[0004] Prior art launchers use one of a variety of different types of magazines for toy darts. For example, one type of magazine has a clip or cartridge for feeding darts to a barrel of the launcher. Another type of magazine holds the darts and advances the darts to a firing position with a biasing spring when released upon activation of a trigger.

[0005] As another example, a straight magazine may hold darts in one or more rows of dart holders, with a possible offset between the rows. A straight magazine may, for example, be input horizontally into a compatible toy launcher and passes sideways through the launcher as darts are launched. Such a magazine has been used with a compatible compressed air toy launcher, but is not ideal because a magazine that moves sideways requires a clearance on either side of the launcher and must be reinserted each time that it is reloaded.

[0006] Another known type of magazine is a circular drum-style magazine, an example of which is described in U.S. Patent No. 10,533,821, the contents of which are incorporated herein by reference in their entirety.

[0007] Prior straight magazines or cartridges have generally been employed in launchers that use compressed air to launch projectiles. However, the use of compressed air requires specific components such as a piston assembly and associated nozzle, which in turn limits the space within the launcher that might otherwise be used for insertion of a cartridge so that only small capacity cartridges can be used. Also, the manual nature of such launchers requires removal of an empty cartridge and replacing with a full cartridge before firing of projectiles can proceed.

[0008] What is needed is an improved toy launcher with one or more cartridges that may hold a relatively large number of toy darts within a compact space and allow the launching of the toy darts in quick succession, while at the same time maintaining a relatively modest form factor, which is useful to enable for children to be able to handle the toy launcher and is helpful for shipping and storage of the launcher. It is further desirable that such a toy launcher be manufactured without the use of compressed air for launching, which, as noted above, would limit the number of darts that can be simultaneously stored in the cartridges, and which may

increase the complexity of the toy launcher to ensure proper alignment of a nozzle and appropriate compressed air reservoirs.

SUMMARY

[0009] The present invention is generally related to an improved toy launcher for launching projectiles, such as soft projectiles like toy darts or toy balls.

[0010] A toy launcher for launching projectiles according to an exemplary embodiment of the present invention comprises: a main body; two or more cartridges removably attached to the main body, each of the two or more cartridges configured to hold a plurality of projectiles, the two or more cartridges comprising a first cartridge disposed on a first side of the main body and a second cartridge disposed on a second side of the main body; a casing moveably attached to the main body; two or more push rods moveably attached to the casing; flywheels disposed within the main body in the front of the two or more cartridges; and a stop member disposed between the two or more push rods and the two or more cartridges, the stop member being biased towards the first side of the main body, wherein during operation of the launcher the casing reciprocates back and forth within the main body and, depending on whether or not the first cartridge is attached to the main body, the first cartridge is attached to the main body but is empty or the first cartridge is attached to the main body and is at least partially full and also depending on whether or not the second cartridge is attached to the main body, the second cartridge is attached to the main body but is empty or the second cartridge is attached to the main body and is at least partially full, the two or more push rods operate to first eject projectiles one by one from the first cartridge and then eject projectiles one by one from the second cartridge, only eject projectiles one by one from the first cartridge, or only eject projectiles one by one

from the second cartridge, towards a firing position at which the flywheels fire the projectiles from the launcher.

[0011] In an exemplary embodiment the two or more push rods comprise a first push rod disposed at the first side of the main body and a second push rod disposed at the second side of the main body.

[0012] In an exemplary embodiment, when the first cartridge is attached to the main body and is at least partially full, the stop member is pushed away from the first side so that the first push rod operates to first eject projectiles one by one from the first cartridge.

[0013] In an exemplary embodiment, when both the first cartridge and the second cartridge are attached to the main body and are at least partially full, the stop member is pushed away from the first side so that the first push rod operates to first eject projectiles one by one from the first cartridge and then the stop member is pulled back to the first side so that the second push rod operates to then eject projectiles one by one from the second cartridge.

[0014] In an exemplary embodiment, when the first cartridge is attached to the main body and is empty and the second cartridge is attached to the main body and is at least partially full, the stop member remains on the first side of the main body so that the second push rod operates to eject projectiles one by one from the second cartridge.

[0015] In an exemplary embodiment, the toy launcher further comprises a spring that biases the stop member towards to the first side.

[0016] In an exemplary embodiment, the toy launcher further comprises a gear disposed between the first and second push rods that engage with teeth of the first and second push rods, so that when one of the first and second push rods is stopped by the stop member the other of the first and second push rods is pushed forward relative to the casing by the gear.

[0017] In an exemplary embodiment the stop member is hingedly attached to the main body.

[0018] In an exemplary embodiment, the stop member is pushed away from the first side by a lead projectile within the first cartridge.

[0019] In an exemplary embodiment, the first and second cartridges are spring-loaded.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] Exemplary embodiments of the present invention will be described with references to the accompanying figures, wherein:

[0021] FIG. 1 is a perspective view of a toy projectile launcher in accordance with an exemplary embodiment of the present invention;

[0022] FIG. 2 is a schematic partial cross-sectional side view of key elements of a toy projectile launcher in accordance with an exemplary embodiment of the present invention;

[0023] FIG. 3 is a schematic partial cross-sectional top view of key elements of a toy projectile launcher in accordance with an exemplary embodiment of the present invention;

[0024] FIGS. 4A and 4B are photographs showing operation of push rods of a toy projectile launcher in accordance with an exemplary embodiment of the present invention;

[0025] FIGS. 5A and 5B are photographs showing details of a stop mechanism of a toy projectile launcher in accordance with an exemplary embodiment of the present invention;

[0026] FIG. 6 is a photograph showing operation of a toy projectile launcher in accordance with an exemplary embodiment of the present invention upon insertion of an empty cartridge;

[0027] FIG. 7 is a photograph showing operation of a toy projectile launcher in accordance with an exemplary embodiment of the present invention upon insertion of a full cartridge;

[0028] FIG. 8 is a photograph showing details of flywheels of a toy projectile launcher in accordance with an exemplary embodiment of the present invention; and

[0029] FIG. 9 is a schematic partial cross-sectional rear view of a toy projectile launcher in accordance with an exemplary embodiment of the present invention.

DETAILED DESCRIPTION

[0030] The present invention is generally related to an improved toy projectile launcher with dual cartridges. In embodiments, the cartridges are adapted to hold one or more types of projectiles, such as toy foam darts, foam balls, or other objects. Multiple push rods, one for each of the cartridges, are operated in sequence so that first all projectiles from one of the cartridges are ejected and fired one at a time and then all projectiles from the other cartridge are ejected and fired one at a time. In exemplary embodiments, the push rod associated with the cartridge that is not firing is blocked from ejecting projectiles from that cartridge, while the push rod associated with the cartridge that is firing operates to eject projectiles from that cartridge towards flywheels that launch the projectile from the launcher.

[0031] For the purposes of the present disclosure, the term “right side” refers to the right side of the launcher when viewed down the launch barrel of the launcher from back to front, and the term “left side” refers to the left side of the launcher when viewed down the launch barrel of the launcher from back to front.

[0032] FIG. 1 is a perspective view of a toy projectile launcher, generally designated by reference number 1, according to an exemplary embodiment of the present invention. The launcher 1 includes a main body 10 and two cartridges 50A and 50B. The cartridges 50A and 50B are insertable into corresponding openings in the main body 10 and, as shown, when inserted, project outwardly from the main body 10 at opposite angles from one another. For example, the cartridges 50A, 50B may project upwards at an angle of 45° from the respective sides of the main body 10, so that the cartridges 50A, 50B form a 90° angle between one another. It should be appreciated that the angles at which the cartridges 50A, 50B project relative to the main body 10 are not limited by these amounts, and in other exemplary embodiments the cartridges 50A, 50B may extend outward from the sides of the main body 10 at other angles, such as, for example, 90° or 30° . In exemplary embodiments, the cartridges 50A, 50B may be attached to the main body 10 through corresponding openings by virtue of, for example, a friction fit or a snap fit. It should be appreciated that the present invention is not limited to two cartridges, and the launcher in accordance with other exemplary embodiments of the present invention may include three or more cartridges, with corresponding components as described below that eject and fire projectiles from the three or more cartridges.

[0033] In exemplary embodiments, the cartridges 50A, 50B may be spring-loaded in that, for example, projectiles are loaded from a forward end of each cartridge and pressed downward over one another in a stacked configuration against a spring at a rearward end of each cartridge. Spring-loaded cartridges are generally known in the art. As best shown in FIGS. 6 and 7, the lead projectile in each cartridge 50A, 50B is exposed through a projectile housing 51A, 51B.

[0034] As shown, projectile launcher 1 is shaped to resemble a pistol. In exemplary embodiments, launcher 1 may be in various other shapes and arrangements without departing

from the spirit and the scope of the disclosure. The main body 10 includes a handle 12, a launch barrel 14 and a trigger assembly 16. As explained in further detail below, operation of the trigger assembly 16 results in sequential firing of all projectiles from first one of the cartridges 50A, 50B and then sequential firing of all projectiles from the other of the cartridges 50A, 50B. In exemplary embodiments, the launcher 1 is configured to launch foam darts having a substantially cylindrical shape made up of a main body and cap. The cap may be made of a rubber material, or the like. In exemplary embodiments, the darts may have a total length, e.g., within a range of approximately 33 mm to 45 mm, such as 35 mm, 36 mm, 37 mm, or 40 mm, to name a few. The darts may have an outer cross-sectional diameter at its widest point of 12.9 mm. In alternative exemplary embodiments, darts may have an outer cross-sectional diameter at their widest point of, for example, 12.5 mm, 13 mm, 14 mm, or 15 mm, to name a few. In exemplary embodiments, the darts may incorporate one or more recesses and corresponding ridges on their foam bodies—for example, as disclosed in U.S. Patent Application No. 16/895,172 filed on June 8, 2020, the entire contents of which are incorporated by reference herein.

[0035] As best shown in FIGS. 2, 4A and 4B, a casing 52 is housed within the main body 10 and positioned behind the cartridges 50A, 50B. The casing 52 in turn houses two push rods 54A and 54B. The casing 52 is slidably attached to the main body 10 so that the casing 52 is movable in translation between a first, backward position and a second, forward position along a path generally parallel to a longitudinal axis of the main body 10. The casing 52 may be slidably attached to an outer casing 56 that is fixed to the main body 10. The outer casing 56 may form a track within which the casing 52 slides. The casing 52 slides within the outer casing 56 by operation of a motor 58 that is operatively attached to the casing 52 by a mechanical linkage,

such as, for example, a series of gears. In exemplary embodiments, the motor 58 may be supplied power from one or more replaceable and/or rechargeable batteries (not shown) housed within the main body 10.

[0036] The push rods 54A, 54B in turn are slidably attached to the casing 52 and are movable in translation relative to the casing 52 between first, backward positions and second, forward positions also along a path generally parallel to the longitudinal axis of the launcher 1. In this regard, push rods 54A, 54B may be slidably disposed within respective tracks 53A, 53B formed within the casing 52. The push rod 54A is disposed on the left side of the main body 10 and in alignment with the position at which the leading projectile is exposed through the projectile housing 51A of the cartridge 50A. The push rod 54B is disposed on the right side of the main body 10 and in alignment with the position at which the leading projectile is exposed through the projectile housing 51B of the cartridge 50B. Each push rod 54A, 54B includes a series of teeth 55A, 55B at the rear portion of the push rod.

[0037] A gear 60 is disposed within the casing 52 between the push rods 54A, 54B and in engagement with the series of teeth 55A, 55B. As explained in further detail below, when the casing 52 is moved forward by operation of the motor 58 and one of the push rods 54A, 54B encounters an obstacle at the front end of the push rod 54A, 54B, the gear 60 is caused to rotate, which in turn pushes the other push rod 54A, 54B forward relative to the casing 52. Thus, with each forward movement of the casing 52, the forward push rod 54A, 54B pushes a projectile out of one of the cartridges 50A, 50B (i.e., the cartridge 50A, 50B that is on the same side of the main body 10 as the forward push rod 54A, 54B) and into a launch position.

[0038] A stop member 62 is disposed between the casing 52 and the cartridges 50A, 50B. The stop member 62 is generally triangular shaped with a maximum width that is slightly wider

than that of a projectile. The top portion of the stop member 62 is hingedly attached to an upper wall within the main body 10. The stop member 62 includes a protrusion 63 that extends outward towards the front of the launcher 1. As best shown in FIGS. 5A and 5B, the stop member 62 is attached to an inner side wall on the right side of the launcher 1 by a spring 64. Thus, the stop member 62 is biased by the spring 64 towards the right side of the launcher 1. The stop member 62 is positioned such that, when a projectile is exposed through the projectile housing 51B of the cartridge 50B (i.e., the right-side cartridge), the projectile pivots the stop member 62 to the left against the bias of the spring 64.

[0039] As best shown in FIGS. 2 and 8, a first set of flywheels 70A, 71A and a second set of flywheels 70B, 71B are disposed within the main body 10 at the front of the cartridges 50A, 50B. First set of flywheels 70A, 71A is disposed laterally next to second set of flywheels 70B, 71B, with flywheels 70A, 71A in the first set aligned with one another in the vertical direction and flywheels 70B, 71B in the second set aligned with one another in the vertical direction. During operation of the launcher 1, the top flywheels 70A, 70B within each set of flywheels continuously rotate in the clockwise direction as viewed from the left side of the launcher while the bottom flywheels 71A, 71B within each set of flywheels continuously rotate in the counter-clockwise direction as viewed from the left side of the launcher. In exemplary embodiments, the flywheels 70A, 71A, 70B, 71B may be operated by the motor 58 or by a second, separate motor. The first set of flywheels 70A, 71A are aligned with the position at which the leading projectile is exposed through the projectile housing 51A of the cartridge 50A such that the push rod 54A operates to push the leading projectile from the cartridge 50A to a position between the flywheels 70A, 71A, at which point the flywheels 70A, 71A launch the projectile through the launch barrel 14. Likewise, the second set of flywheels 70B, 71B are

aligned with the position at which the leading projectile is exposed through the projectile housing 51B of the cartridge 50B such that the push rod 54B operates to push the leading projectile from the cartridge 50B to a position between the flywheels 70B, 71B, at which point the flywheels 70B, 71B launch the projectile through the launch barrel 14. In this way, the launcher 1 seamlessly and continuously fires projectiles one at a time to the extent there are projectiles remaining in the cartridges 50A, 50B.

[0040] FIG. 6 illustrates operation of the launcher 1 when only cartridge 50B is inserted into the launcher 1 and the cartridge 50B is empty (*i.e.*, cartridge 50B does not hold any projectiles). Because the cartridge 50B is empty, the stop member 62 remains in position on the right side of the launcher 1, undisturbed by a projectile that would otherwise be present and exposed through the projectile housing 51B if the cartridge 50B was at least partially full. When the trigger assembly 16 is activated, the casing 52 begins to reciprocate by operation of the motor 58, and with the first forward movement of the casing 52, the push rod 54B makes contact with the stop member 62, thereby pushing the push rod 54B back relative to the casing 52. The backward movement of the push rod 54B in turn causes the gear 60 to rotate clockwise, which in turn results in movement of the push rod 54A forward relative to the casing 52. However, since the cartridge 50A is not inserted into the launcher 1, no projectiles will be launched.

[0041] FIG. 7 illustrates operation of the launcher 1 when only cartridge 50B is inserted into the launcher 1 and the cartridge 50B is at least partially full. Because a projectile 100 (leading projectile) is now exposed through the projectile housing 51B of the cartridge 50B, the stop member 62 is pushed to the left by the projectile 100 against the bias of the spring 64. When the trigger assembly 16 is activated, the casing 52 begins to reciprocate by operation of the motor 58, and with the first forward movement of the casing 52, the push rod 54A makes contact

with the stop member 62 (now moved to the left side by the projectile 100 in the cartridge 50B), thereby pushing the push rod 54A back relative to the casing 52. The backward movement of the push rod 54A in turn causes the gear 60 to rotate counter-clockwise, which in turn results in movement of the push rod 54B forward relative to the casing 52. The push rod 54B is then able to make contact with the projectiles in the cartridge 50B and sequentially eject them from the cartridge 50B towards the flywheels 70B, 71B for launching with each forward movement of the casing 52 until the cartridge 50B is empty.

[0042] In exemplary embodiments, grooved platforms 66A, 66B or other types of guiding mechanisms may be disposed within the main body 10 below respective ones of the cartridges 50A, 50B, and projectiles may be pushed along the grooved platforms 66A, 66B by the push rods 54A, 54B towards the flywheels 70A, 71A, 70B, 71B.

[0043] Table 1 below indicates how the launcher 1 will operate depending on the state of the left side cartridge (cartridge 10A) and the state of the right side cartridge (cartridge 10B) in accordance with an exemplary embodiment of the present invention in which the stop member 62 is biased towards the right side of the launcher 1. However, it should be appreciated that in other exemplary embodiments the stop member 62 may be biased towards the left side, in which case operation of the launcher 1 would differ in that the projectiles would fire from the left side cartridge first, followed by firing of projectiles from the right side cartridge.

LEFT CARTRIDGE	RIGHT CARTRIDGE	OPERATION
Empty/Not inserted	Empty/Not inserted	No firing of projectiles
Empty/Not inserted	At least partially full	Projectiles from right cartridge fire only
At least partially full	At least partially full	Projectiles from right cartridge fire first, then projectiles from left cartridge fire
At least partially full	Empty/Not inserted	Projectiles from left cartridge fire only

TABLE 1

[0044] As seen in Table 1, the launcher in accordance with exemplary embodiments of the present invention will continuously launch darts regardless of whether only one cartridge is inserted or both cartridges are inserted, so long as one or both cartridges are at least partially loaded with projectiles. This obviates the need for the user to insert both cartridges for the launcher to operate and also, in the case where both cartridges are inserted, obviates the need to manually switch from one cartridge to the other during operation of the launcher.

* * * * *

[0045] While particular embodiments of the present invention have been shown and described in detail, it would be obvious to those skilled in the art that various modifications and improvements thereon may be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such modifications and improvements that are within the scope of this invention.

CLAIMS:

1. A toy launcher for launching projectiles according to an exemplary embodiment of the present invention comprises:

a main body;

two or more cartridges removably attached to the main body, each of the two or more cartridges configured to hold a plurality of projectiles, the two or more cartridges comprising a first cartridge disposed on a first side of the main body and a second cartridge disposed on a second side of the main body;

a casing moveably attached to the main body;

two or more push rods moveably attached to the casing;

flywheels disposed within the main body in the front of the two or more cartridges; and

a stop member disposed between the two or more push rods and the two or more cartridges, the stop member being biased towards the first side of the main body,

wherein during operation of the launcher the casing reciprocates back and forth within the main body and, depending on whether or not the first cartridge is attached to the main body, the first cartridge is attached to the main body but is empty or the first cartridge is attached to the main body and is at least partially full and also depending on whether or not the second cartridge is attached to the main body, the second cartridge is attached to the main body but is empty or the second cartridge is attached to the main body and is at least partially full, the two or more push rods operate to first eject projectiles one by one from the first cartridge and then eject projectiles one by one from the second cartridge, only eject projectiles one by one from the first

cartridge, or only eject projectiles one by one from the second cartridge, towards a firing position at which the flywheels fire the projectiles from the launcher.

2. The toy launcher of claim 1, wherein the two or more push rods comprise a first push rod disposed at the first side of the main body and a second push rod disposed at the second side of the main body.

3. The toy launcher of claim 1, wherein, under the condition that the first cartridge is attached to the main body and is at least partially full, the stop member is pushed away from the first side so that the first push rod operates to first eject projectiles one by one from the first cartridge.

4. The toy launcher of claim 1, wherein, under the condition that the first cartridge and the second cartridge are attached to the main body and are at least partially full, the stop member is pushed away from the first side so that the first push rod operates to first eject projectiles one by one from the first cartridge and then the stop member is pulled back to the first side so that the second push rod operates to then eject projectiles one by one from the second cartridge.

5. The toy launcher of claim 1, wherein, under the condition the first cartridge is attached to the main body and is empty and the second cartridge is attached to the main body and is at least partially full, the stop member remains on the first side of the main body so that the second push rod operates to eject projectiles one by one from the second cartridge.

6. The toy launcher of claim 1, further comprising a spring that biases the stop member towards to the first side.

7. The toy launcher of claim 1, further comprising a gear disposed between the first and second push rods that engage with teeth of the first and second push rods, so that when one of the first and second push rods is stopped by the stop member the other of the first and second push rods is pushed forward relative to the casing by the gear.

8. The toy launcher of claim 1, wherein the stop member is hingedly attached to the main body.

9. The toy launcher of claim 1, wherein the stop member is pushed away from the first side by a lead projectile within the first cartridge.

10. The toy launcher of claim 1, wherein the first and second cartridges are spring-loaded.

11. The toy launcher of claim 1, further comprising a trigger assembly configured so that activation of the trigger assembly results in the reciprocal movement of the casing.

12. The toy launcher of claim 1, further comprising a motor that is operable to cause the reciprocal movement of the casing.

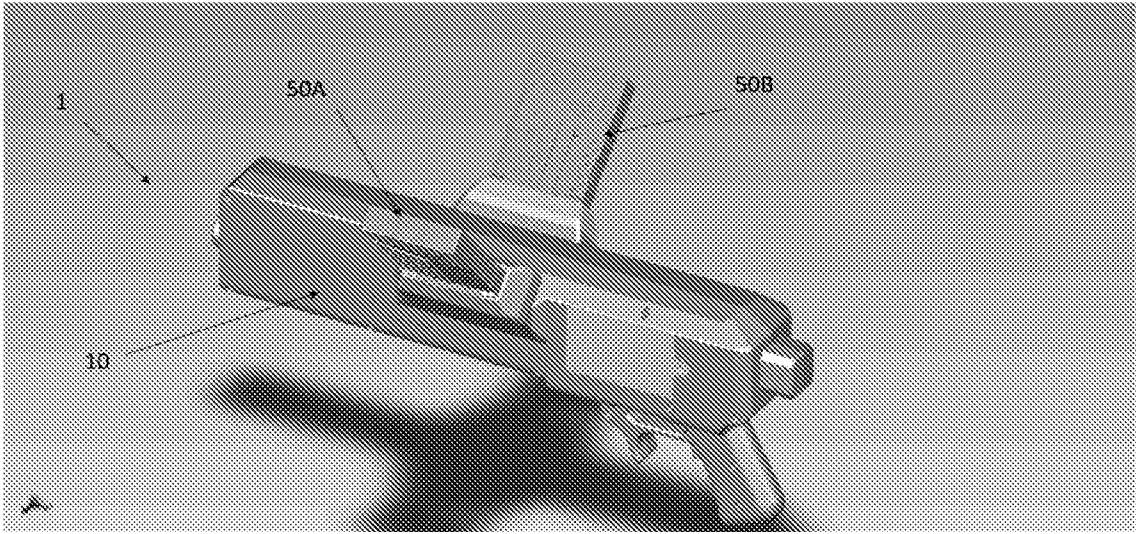


FIG. 1

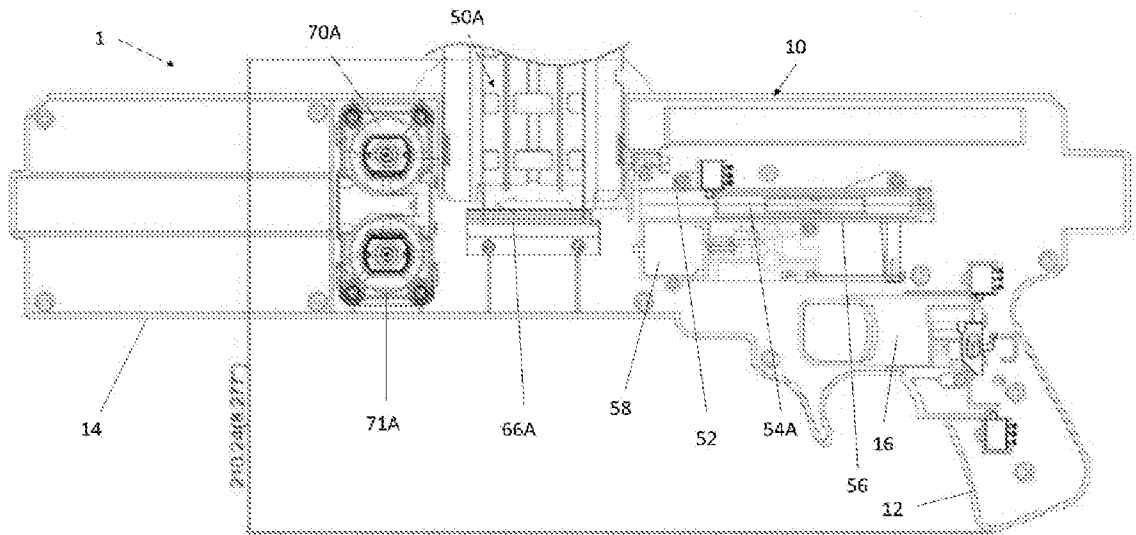


FIG. 2

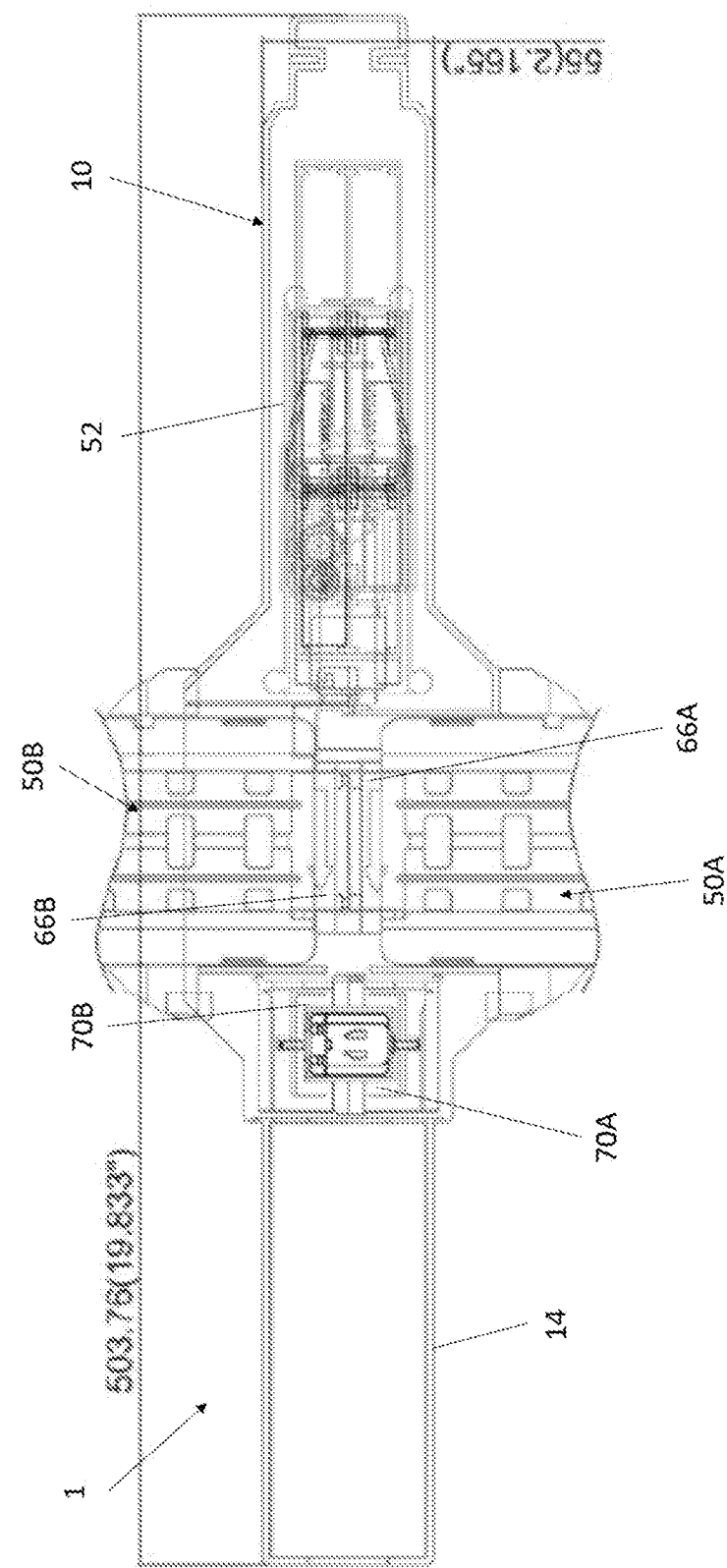


FIG. 3

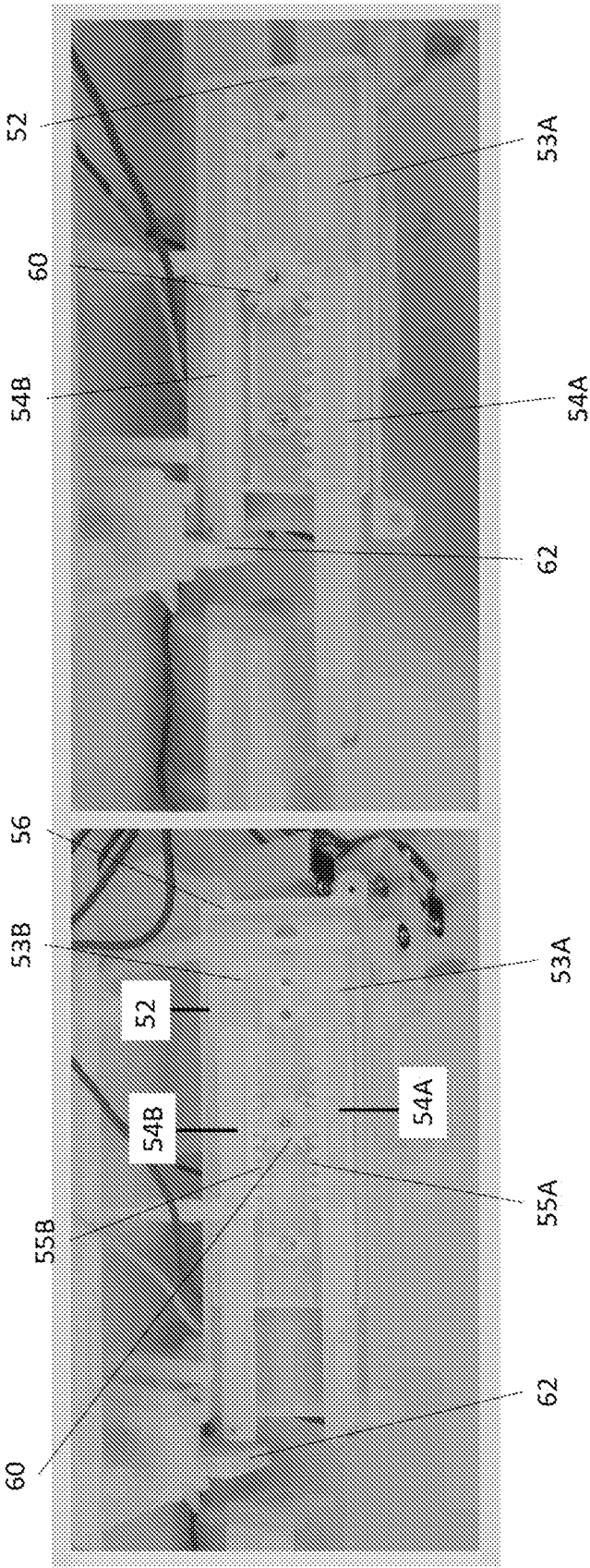


FIG. 4A

FIG. 4B

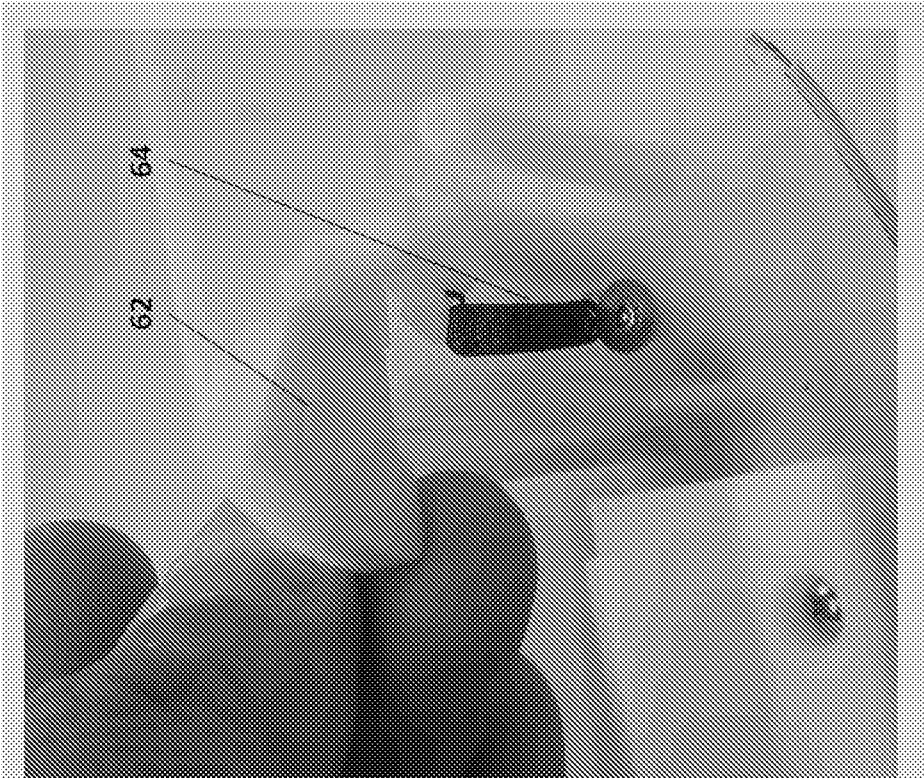


FIG. 5B

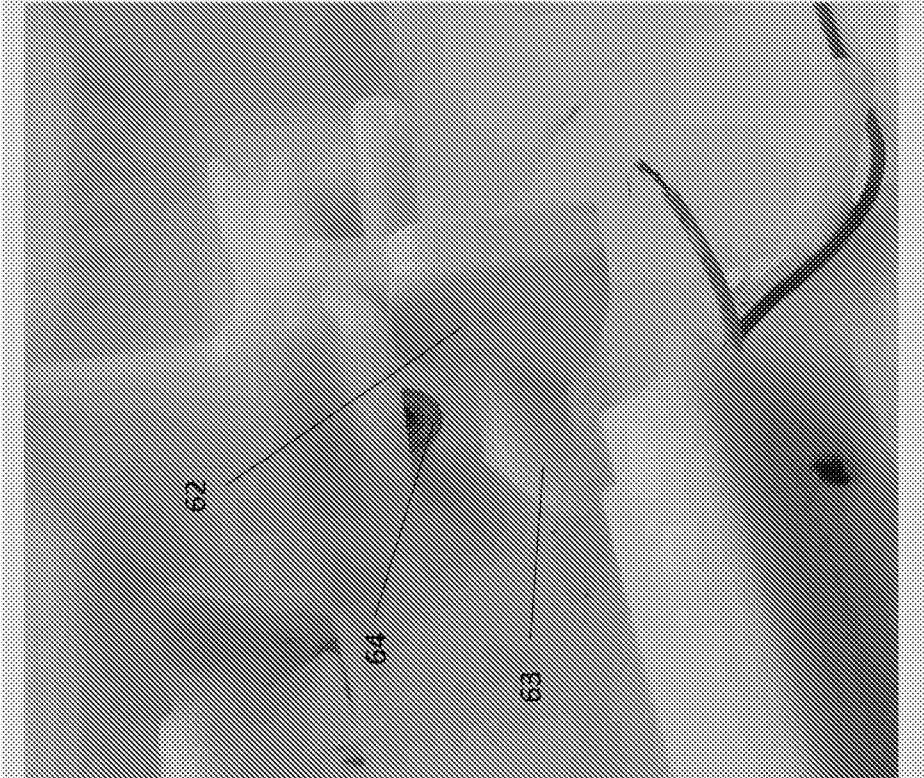


FIG. 5A

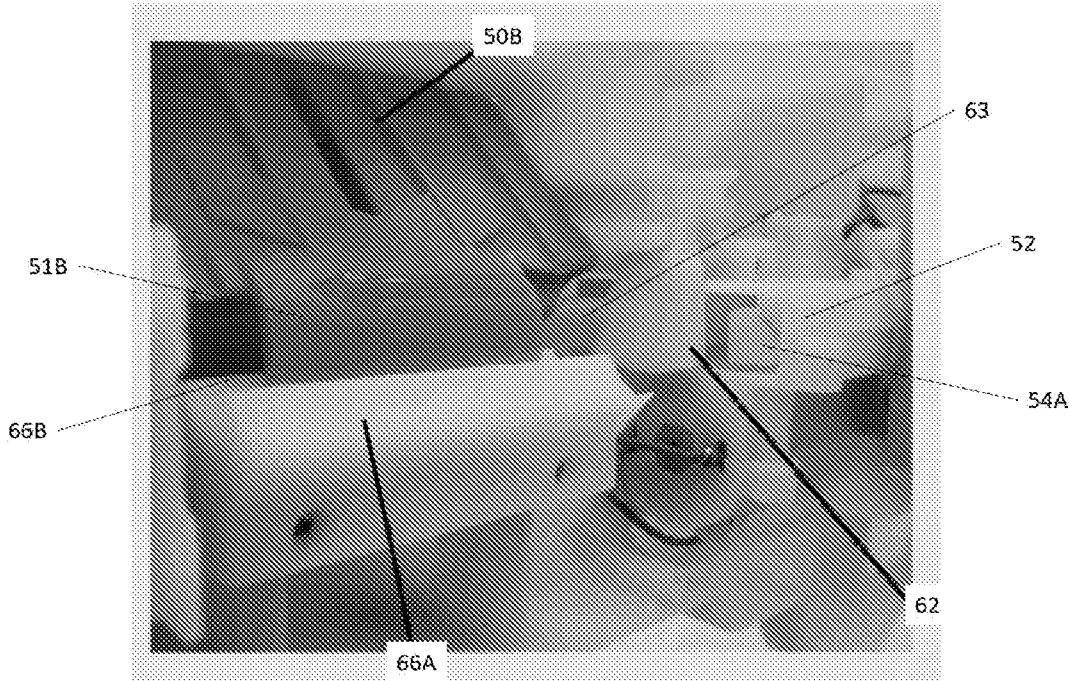


FIG. 6

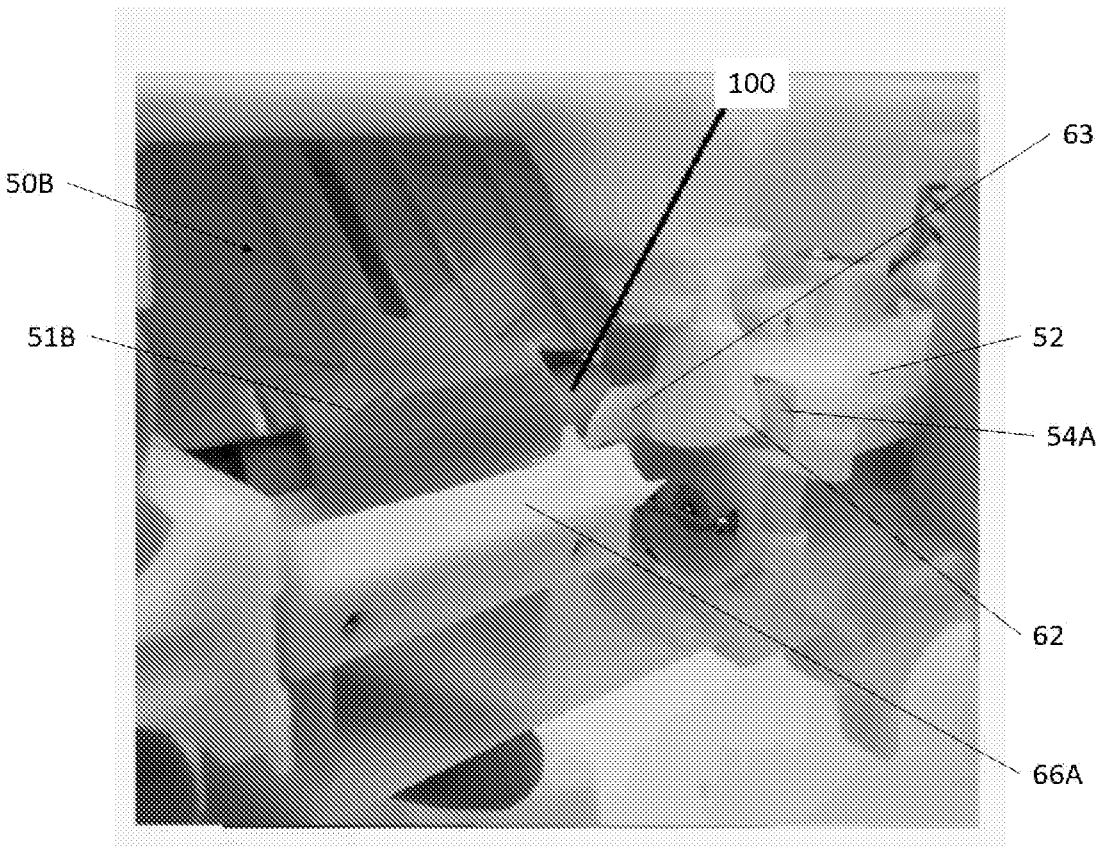


FIG. 7

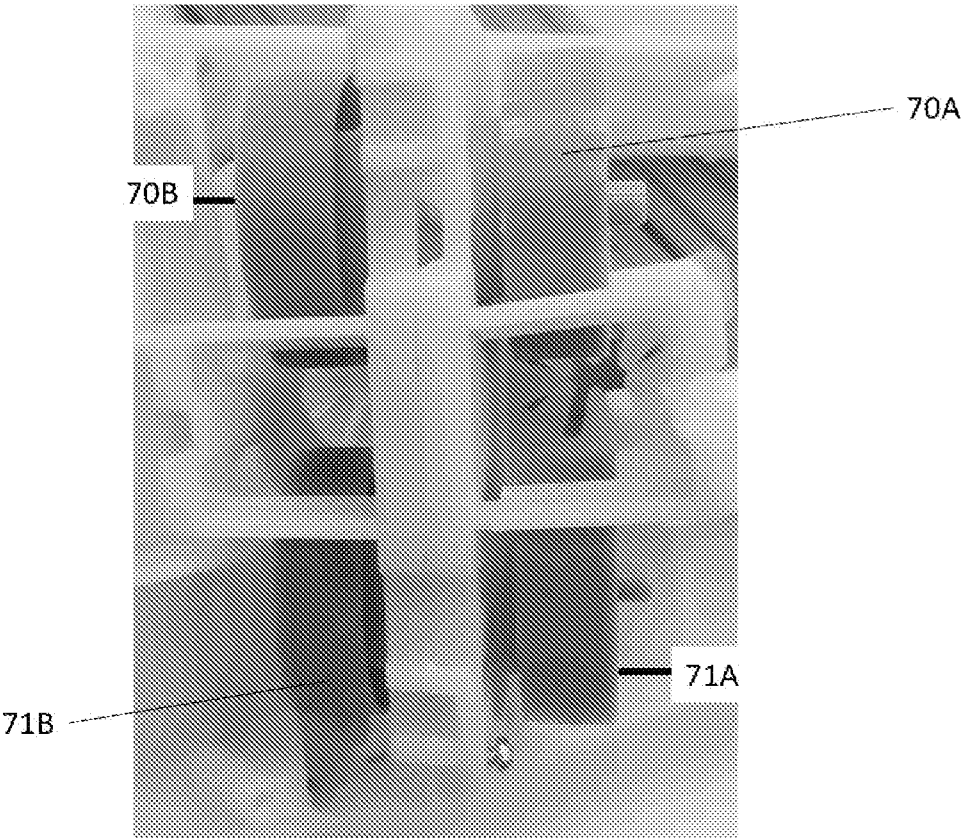


FIG. 8

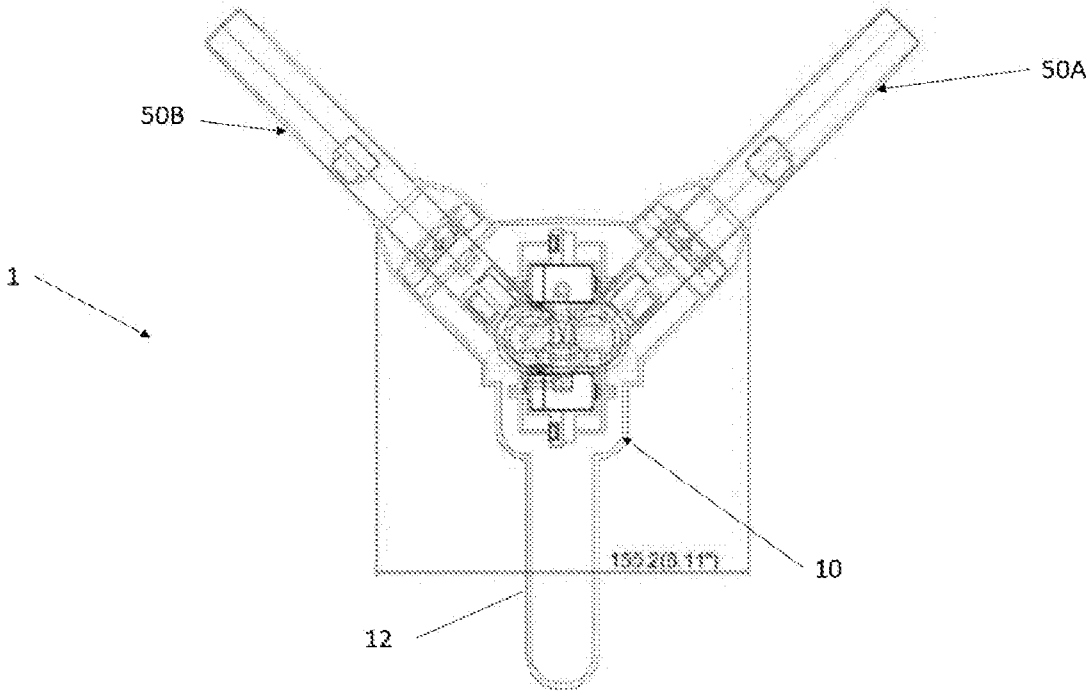


FIG. 9