

A TABLE TENNIS LAUNCHER

FIELD OF INVENTION

The present invention relates to a table tennis launcher. More particularly, the
5 present invention relates to a table tennis launcher that can be controlled by wireless
controlling device.

BACKGROUND OF THE INVENTION

There are many types of strokes in playing table tennis such as backhand,
10 forehand, chop, and counter loop. The most important stroke is the kill stroke which
is an attacking stroke. A player needs to practice in order to master all these strokes.
Therefore, a table tennis launcher is usually used by beginners or even semi-
professional athletes to practice either on their own or with other players. Besides,
the table tennis launcher may also be used by inexperienced coaches to train their
15 players.

An example of a table tennis launcher is disclosed in US 2007/0221187 A1
which relates to a service machine mountable on a court for table tennis. The service
machine comprises of a service machine body, wherein a micro-controller is used to
20 control a ball-positioning mechanism built in the service machine body and a ball-
projecting mechanism coupled with the ball-positioning mechanism. The ball-
positioning mechanism further comprises an elevation control motor and a sway
control motor, while the ball-projecting mechanism comprises a ball-conveying
device and a ball-projecting device. A ball-collecting tray is arranged to collect a
25 plurality of balls, which will be delivered via a conveyer from the service machine
body to the ball-projecting device sequentially through the ball-positioning
mechanism and a spin control motor for projection. However, the service machine
requires a player to manually set the micro-controller or use a provided preset
program to enable the service machine to shoot spun balls one after another at
30 various angles or directions in continuous or intermittent mode automatically or
manually.

Although many table tennis launchers have been widely used for table tennis
practice, most of the table tennis launchers are inconvenient as players need to stop
35 in a middle of a game to enable them to change the program. Therefore, there is still

a need of a system that can control a table tennis launcher from a distance without affecting a game.

5 SUMMARY OF INVENTION

The present invention relates to a table tennis launcher. The table tennis launcher (100) comprising a feeding assembly (10) for feeding table tennis ball one by one to a shooting assembly (20), the shooting assembly (20) for shooting and controlling direction of the table tennis balls, a support assembly (30) for supporting the structure of the feeding assembly (10) and the shooting assembly (20), and an electronic processing unit (40) for controlling the feeding assembly (10) and the shooting assembly (20), wherein the electronic processing unit (40) having a controller. Moreover, the electronic processing unit (40) further comprises a connecting module for connecting the controller to the wireless controlling device that controls the operation of the table tennis launcher (100).

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention.

FIG. 1 illustrates a table tennis launcher (100) according to an embodiment of the present invention.

25 **FIG. 2 (a)** illustrates a detailed view of a feeding assembly (10) of the table tennis launcher (100).

FIG. 2 (b) illustrates a connecting shaft (13) of the feeding assembly (10).

30 **FIG. 2 (c)** illustrates a feeder disc (14) of the feeding assembly (10).

FIG. 3 illustrates a detailed view of a shooting assembly (20) of the table tennis launcher (100).

FIG. 4 (a) illustrates a detailed view of a support assembly (30) of the table tennis launcher (100).

FIG. 4 (b) illustrates an inner casing (31) of the support assembly (30).

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FIG. 4 (c) illustrates an outer casing (32) of the support assembly (30).

FIG. 5 illustrates a flowchart of a method to control motors of the table tennis launcher (100).

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DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment of the present invention will be described herein below with reference to the accompanying drawings. In the following description, well known functions or constructions are not described in detail since they would obscure the description with unnecessary detail.

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FIG. 1 illustrates a table tennis launcher (100) according to an embodiment of the present invention. The table tennis launcher (100) comprises of four main assembly parts - a feeding assembly (10), a shooting assembly (20), a support assembly (30), and an electronic processing unit (40). The feeding assembly (10) feeds a plurality of table tennis balls one by one to the shooting assembly (20). The shooting assembly (20) controls the direction and launches the table tennis balls in high speed. The support assembly (30) supports the structure of the feeding assembly (10) and the shooting assembly (20). The electronic processing unit (40) controls a plurality of motors located at the feeding assembly (10) and the shooting assembly (20). Besides, the electronic processing unit (40) connects the table tennis launcher (100) to a wireless controlling device, and allows the wireless controlling device to control the operation of the table tennis launcher (100). The wireless controlling device is preferably a mobile device having an application to remotely communicate and control the table tennis launcher (100).

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FIG. 2 illustrates a detailed view of the feeding assembly (10) of the table tennis launcher (100). The feeding assembly (10), which is used to feed the table tennis balls to the shooting assembly (20), comprises of a basket (11), a tube (not shown), a connector (12), a connecting shaft (13), a feeder disc (14), a first feeder motor (not

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shown), a second feeder motor (15), and a feeder motor holder (16). The table tennis balls are fed by a player to the basket (11) where the table tennis balls are contained and held. The basket (11) further comprises of the first feeder motor to stir and unclog the table tennis balls. The first feeder motor and the second feeder motor (15) are preferably stepper motors. When the first feeder motor unclogs the table tennis balls that are contained inside the basket (11), the table tennis balls fall into the tube, and thereon channelled to the connector (12). The tube is preferably in a cylindrical form. The connector (12) connects the tube and the connecting shaft (13) to allow the table tennis balls to pass through from the tube to the connecting shaft (13). The connector (12) is preferably in an elbow shape.

Referring to **FIG. 2 (b)**, the connecting shaft (13) is preferably a cylinder that connects the table tennis balls from the connector (12) to a shooting barrel (21) located in the shooting assembly (20). The connecting shaft (13) has two ends which are a connector end and a shooting barrel end. The connector end is connected to the connector (12), whereas the shooting barrel end is connected to the shooting barrel (21). The connecting shaft (13) has an opening at the shooting barrel end with a length of L and a gap of X that enables the feeder disc (14) to fit through the opening. Referring to **FIG. 2 (c)**, the feeder disc (14) is preferably in a disc form with two concave ends, wherein the feeder disc (14) has a diameter of D and a thickness of H . Preferably, the dimension of length, L is the same as the dimension of diameter, D . Moreover, the dimension of gap, X is bigger than the dimension of the thickness, H . The feeder disc (14), which is used to contain and push the table tennis balls, is attached to the second feeder motor (15). The second feeder motor (15) rotates the feeder disc (14). The rotation speed of the second feeder motor (15) is controlled by a controller which is located in the electronic processing unit (40). The feeder motor holder (16) is attached to the bottom of the connecting shaft (13) to hold the second feeder motor (15) to its place.

FIG. 3 illustrates a detailed view of the shooting assembly (20) of the table tennis launcher (100). The shooting assembly (20), which is used to shoot the table tennis balls, comprises of a shooting barrel (21), two shooter motors (22a, 22b), two shooter wheels (23a, 23b), two motor holders (24a, 24b), two shooting motor holders (25a, 25b), a guide motor (26), a guide motor holder (27), and a shooting guide (28). The table tennis balls are fed by the feeder disc (14) from the connecting shaft (13)

located in the feeding assembly (10) to the shooting barrel (21). The shooting barrel (21) is preferably cylindrical with an opening at two sides that fit each shooter wheel (23a, 23b) at each side. The shooter wheels (23a, 23b) are preferably in disc form having inner and outer parts, wherein the outer parts of the shooter wheels (23a, 23b) are preferably made of rubber to enhance the gripping between the wheel and the table tennis balls. Besides being fit into the shooting barrel (21), each shooter wheel (23a, 23b) is connected to one shooter motor (22a, 22b) respectively for the shooter wheels (23a, 23b) to rotate. Each shooter motor (22a, 22b) on each side of the shooting barrel (21) is securely locked by one motor holder (24a, 24b) and one shooting motor holder (25a, 25b) respectively. The shooting motor holders (25a, 25b) are also attached to the shooting barrel (21). The motor holders (24a, 24b) and the shooting motor holders (25a, 25b) are used to minimise the vibration of the motors (22a, 22b) during operation of the table tennis launcher (100).

When the two shooter motors (22a, 22b) rotate the shooter wheels (23a, 23b), a centrifugal force is produced and consequently the table tennis balls are forced out from the shooting barrel (21). The shooter motors (22a, 22b) operate on direct current (DC) voltage and connected to a motor driver (not shown) located in the electronic processing unit (40). The motor driver controls the operation of the motors (22a, 22b). A continuous unclogging of table tennis balls from the basket (11) and a continuous rotation of the feeder disc (14) by the second feeder motor (15) creates a continuous feeding of the table tennis balls toward the shooting barrel (21). Eventually, the continuous feeding pushes the front most table tennis ball to move in between the shooter wheels (23a, 23b). Once the table tennis balls enter the gap between the shooter wheels (23a, 23b), the rotation of the shooter wheels (23a, 23b) induces the centrifugal force which pushes out the table tennis balls. The speed and the torque of the shooter motors (22a, 22b) determine the speed and distance of table tennis balls launched. The shooting process is continuous as long as the feeder motors keeps rotating.

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The guide motor (26) which is attached to the shooting barrel (21) by using the shooting guide (28) is held to its place by the guide motor holder (27), wherein the guide motor holder (27) is attached at the top of the connecting shaft (13). The guide motor (26) is used to rotate the shooting barrel (21) to left and right directions. The

guide motor (26) which is preferably a servomotor, is controlled by using a controller that is located in the electronic processing unit (40).

5 **FIG. 4 (a)** illustrates a detailed view of the support assembly (30) of the table tennis launcher (100). The support assembly (30), which is used to support the structure of the feeding assembly (10) and the shooting assembly (20), comprises of two inner covers (31a, 31b) having a front side and a rear side, a first outer casing (not shown) and a second outer casing (32b) having a front side and a rear side, an insert (not shown), two supports (33a, 33b), and a holder (34). Referring to **FIG. 4 (b)**, the inner covers (31a, 31b) are in rectangular-channel shape, wherein the front side of each inner cover (31a, 31b) has a stream with a width of W_i and a height of H_i , and flanges on right and left edges. Additionally, the inner covers (31a, 31b) also include a plurality of holes on the left and right flanges to adjust the table tennis launcher (100) height. This is done by inserting the insert which is preferably a rod at a desired height, thus providing a different base height support to first outer casing, and second outer casing (32b). Referring to **FIG. 4 (c)**, the first outer casings (not shown) and the second outer casing (32b) includes a block with a width of W_o and a height of H_o , and a concave part on top of the block that holds the connecting shaft (13). Preferably the dimension of the width of the stream, W_i is the same as the dimension of the width of the block, 10 W_o . Moreover, the dimension of the height of the stream, H_i is shorter than the dimension of the height of the block, H_o .

A first inner cover (31a) is attached to the first outer casing, whereas a second inner cover (31b) is attached with the second outer casing (32b), providing a stand for the table tennis launcher (100). To attach the inner covers (31a, 31b) and the outer casings together, the blocks of first outer casing and second outer casing (32b) are fitted into the streams of the inner covers (31a, 31b). The front side of the block of the first outer casing is fitted into the stream at the front side of the first inner cover (31a), whereas the front side of the block of the second outer casing (32b) is fitted into the stream at the front side of the second inner cover (31b). The rear side of the first inner cover (31a) facing the rear side of the second inner cover (31b). When the first outer casing and the second outer casing (32b) are fitted into the inner casings (31a, 31b), the two concave parts facing each other forming a hole that fits the connecting shaft (13). The bottom parts of the inner covers (31a, 31b) are attached to the supports (33a, 33b) and the holder (34) preferably by using a plurality of self-embedded screws. The 25 30 35

first inner cover (31a) is attached to a first support (33a), whereas the second inner cover (31b) is attached to a second support (33b). The supports (33a, 33b) are attached to the inner covers (31a, 31b) with a gap from the holder (34), wherein the gap between the supports (33a, 33b) and the holder (34) is used for clamping the table tennis launcher (100) to a table tennis table. Furthermore, the supports (33a, 33b) act as the base for the table tennis launcher (100) to stand.

The electronic processing unit (40), which is used to control a plurality of motor, connects the table tennis launcher (100) to a wireless controlling device wirelessly and allows the wireless controlling device to control the motors, comprises of a controller (not shown), a connecting module (not shown), and a motor driver (not shown). The electronic processing unit (40) is placed inside an outer cover (not shown), which is preferably a box that is attached to second outer casing (32b). The controller, which is preferably a microcontroller, is programmed to control electronic components of the table tennis launcher (100) such as the shooter motors (22a, 22b), the first feeder motor, the second feeder motor (15), the guide motor (26), the connecting module, and the motor driver. The motor driver controls the operation of the shooter motors (22a, 22b), the first feeder motor, the second feeder motor (15), and the guide motor (26). The motors receive current from a power adapter since current from the controller is very low. The controller is used to control the motor driver to determine on which motor is activated. For example, when the player executes right spin motion launch, the controller receives the instruction from the wireless controlling device, and instructs the motor driver to activate the first shooter motor (22a) but not the second shooter motor (22b). Therefore, the rotation of the first shooter motor (22a) at the right side of the shooting barrel (21) causes the table tennis ball to launch in right spin motion. The connecting module is used to connect the wireless controlling device and the controller; wherein the connecting module is preferably a Bluetooth module.

FIG. 6 illustrates flowchart of a method to control the shooter motors (22a, 22b), the first feeder motor, the second feeder motor (15), and the guide motor (26) in the table tennis launcher (100). Once the table tennis launcher (100) is powered on as in step 1000 and the connecting module is paired with the wireless controlling device as in step 2000, the controller is capable to take instruction from the wireless controlling device. The controller is programmed in such way that it can take instructions in terms of numbers. Thus, for every different task, different number is assigned and this set of

numbers is programmed in the controller. However, in the user interface shown in the wireless controlling devices, each button is designed to show the function rather than the number. For example, 'LEFT' button represents number '1', 'BOTH' button represents number '2', 'RIGHT' button represent number '3', 'ROTATE RIGHT', 'ROTATE MIDDLE', and 'ROTATE LEFT' buttons represent number '4','5', and '6' respectively, and 'STOP' button represents number '0'.

Once the player presses the button shown in the wireless controlling device as in step **3000**, the controller receives the signal thus executes the command according to the coding that is programmed in the controller. When the player presses 'LEFT' button to run left motor, the controller receives the respective number in the signal form and the controller commands the motor driver to activate the second shooter motor (**22b**) as in step **3100**. On the other hand, when the player presses 'RIGHT' button to run right motor, the controller receives the respective signal and commands the motor driver to operate the first shooter motor (**22a**) as in step **3200**. Furthermore, if the player presses 'BOTH' button to run both left motor and right motor, the controller receives the input signal and controls the motor driver for operating both the shooter motors (**22a, 22b**). However, if the 'ROTATE' button is pressed to rotate the shooting barrel (**21**), the controller receives the signal and commands the motor driver to operate the guide motor (**26**) as in step **3300**. Finally, when the player presses 'STOP' to stop all the operation, the controller receives the signal and executes the signal by commanding the motor driver to stop the operation of all the motors including the shooter motors (**22a, 22b**), the guide motor (**26**), first feeder motor, second feeder motor (**15**) as in step **3400**.

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While embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all possible forms of the invention. Rather, the words used in the specifications are words of description rather than limitation and various changes may be made without departing from the scope of the invention.

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CLAIM

1. A table tennis launcher (**100**) comprising:
- a) a feeding assembly (**10**) for feeding table tennis ball one by one to a shooting assembly (**20**),
 - 5 b) the shooting assembly (**20**) for shooting and controlling direction of the table tennis balls,
 - c) a support assembly (**30**) for supporting the structure of the feeding assembly (**10**) and the shooting assembly (**20**), and
 - 10 d) an electronic processing unit (**40**) for controlling the feeding assembly (**10**) and the shooting assembly (**20**), the electronic processing unit (**40**) having a controller;
- characterised in that the electronic processing unit (**40**) further comprises of:
- 15 e) a connecting module for connecting the controller to the wireless controlling device that controls the operation of the table tennis launcher (**100**).

A TABLE TENNIS LAUNCHER**ABSTRACT**

5 The present invention relates to a table tennis launcher (**100**) that can be controlled by a wireless controlling device. The table tennis launcher (**100**) comprises a feeding assembly (**10**), a shooting assembly (**20**), a support assembly (**30**) and an electronic processing unit (**40**). The feeding assembly (**10**) is used for feeding table tennis ball one by one to the shooting assembly (**20**). The shooting assembly (**20**) is used for shooting table tennis balls and control their direction. The support assembly (**30**) is used for supporting the structure of the feeding assembly (**10**) and the shooting assembly (**20**). The electronic processing unit (**40**) is used for controlling the feeding assembly (**10**) and the shooting assembly (**20**). The electronic processing unit (**40**) is further comprises a connecting module for connecting a controller to the wireless
10 controlling device that controls the operation of table tennis launcher (**100**).
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FIG. 1

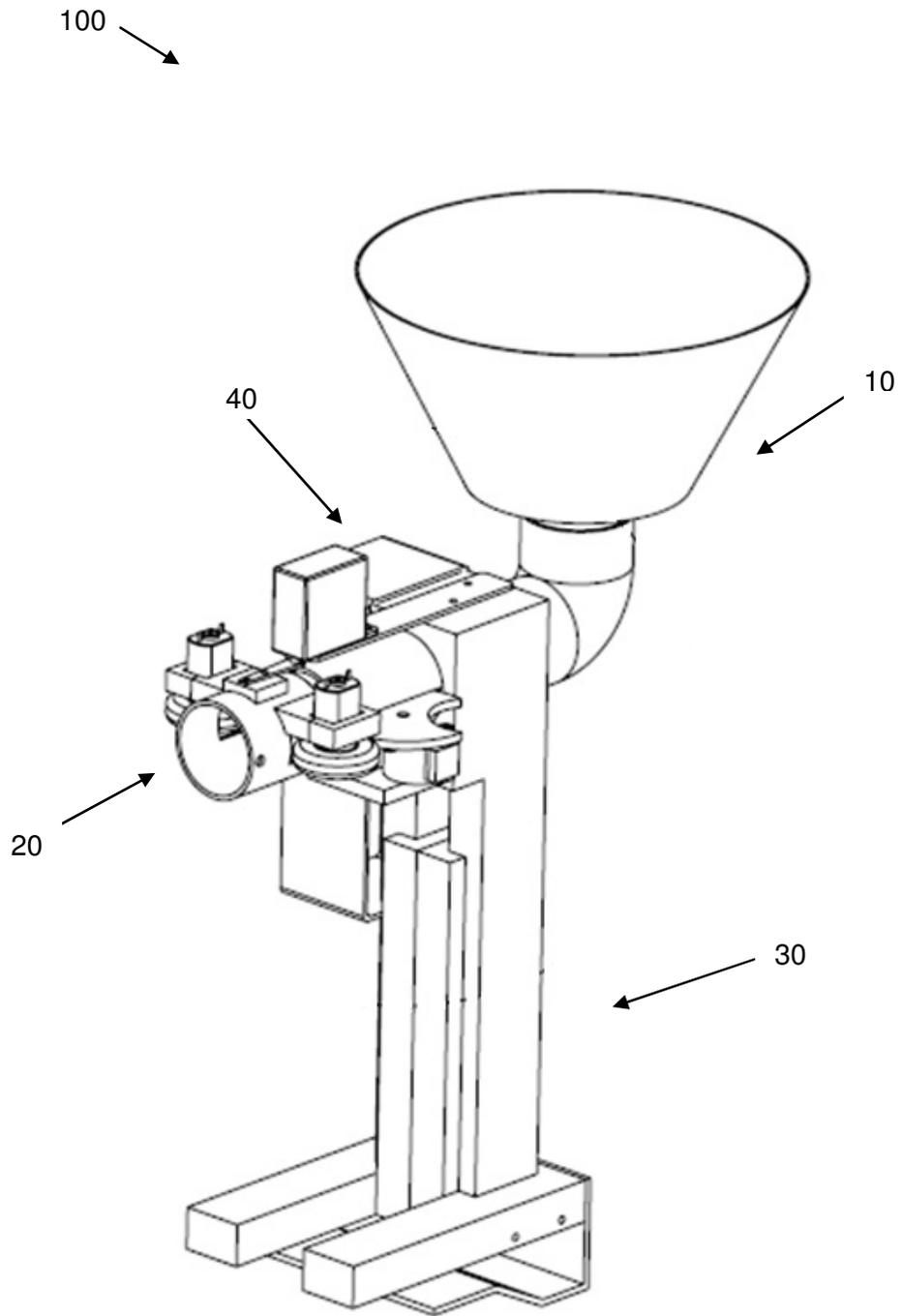


FIG. 1

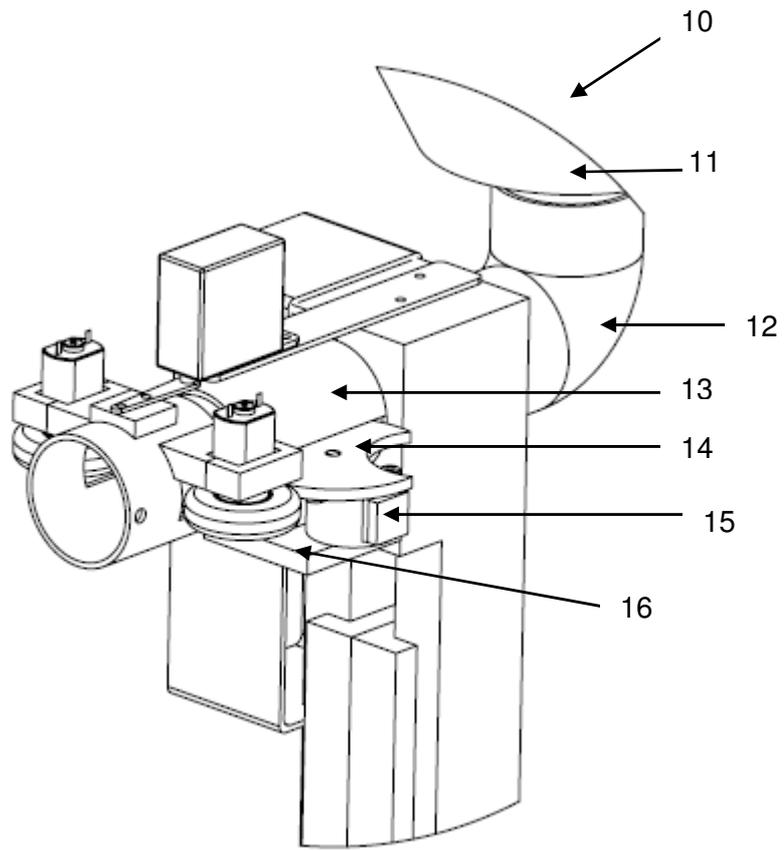


FIG. 2 (a)

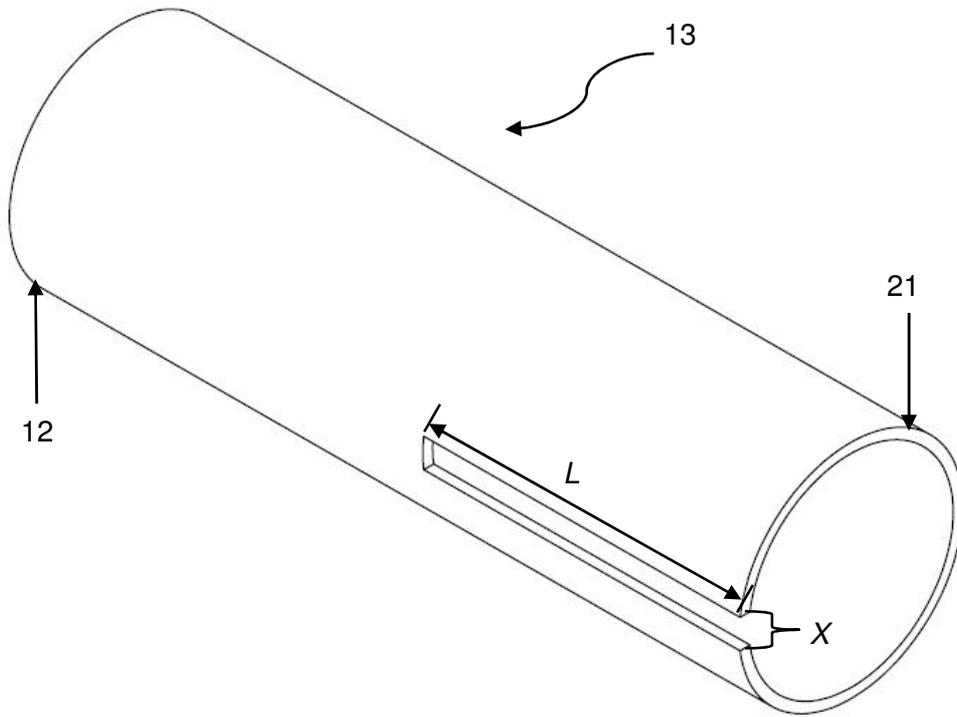


FIG. 2 (b)

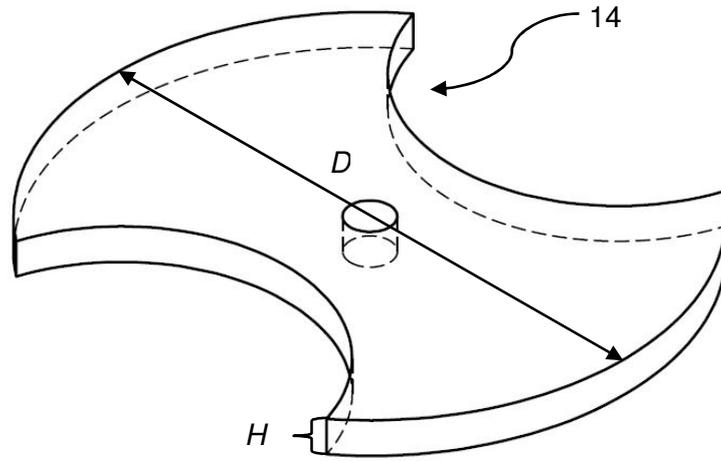


FIG. 2 (c)

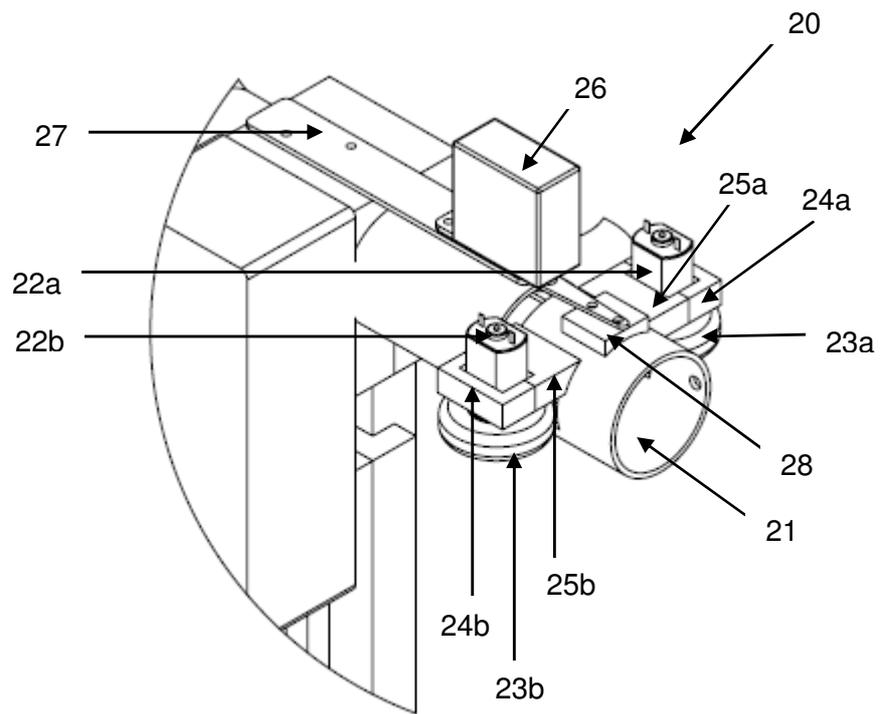


FIG. 3

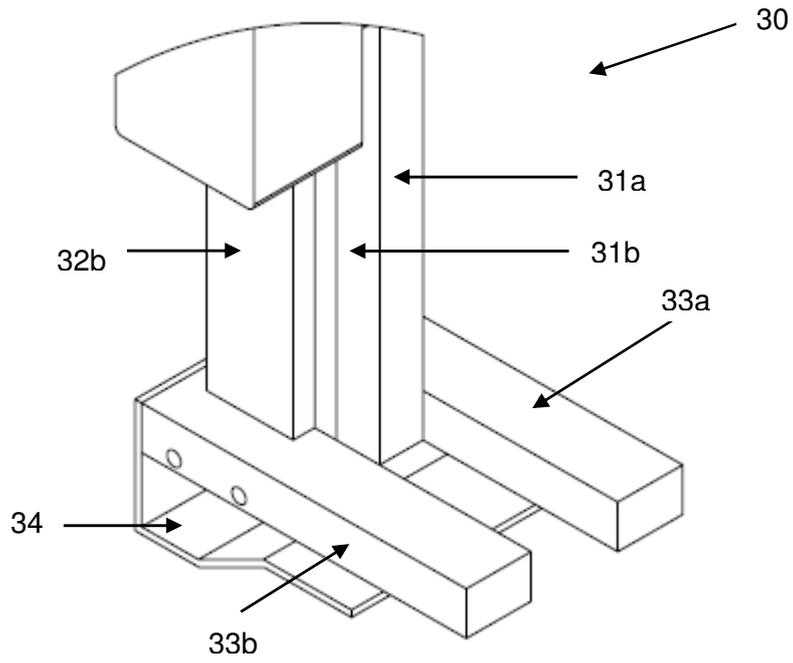


FIG. 4 (a)

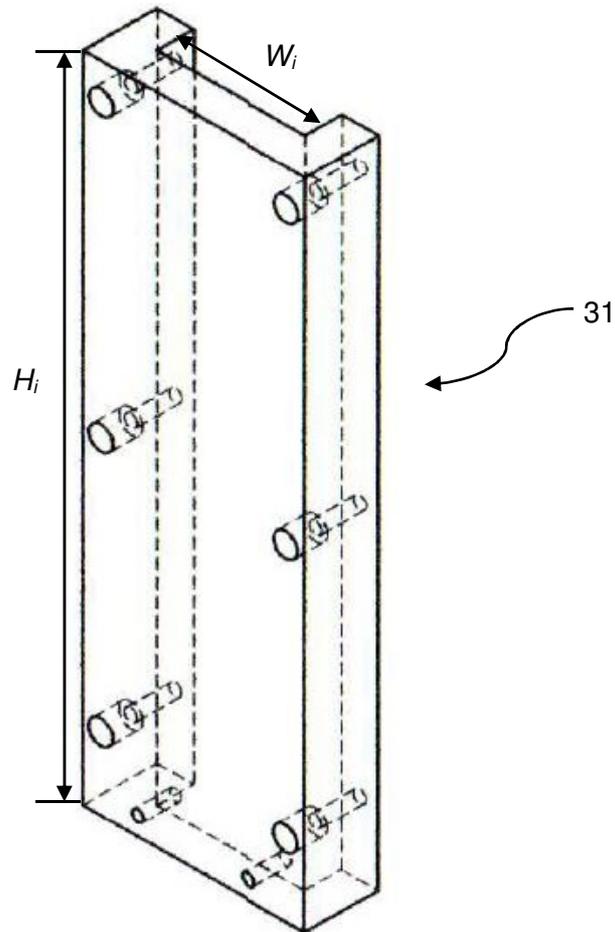


FIG. 4 (b)

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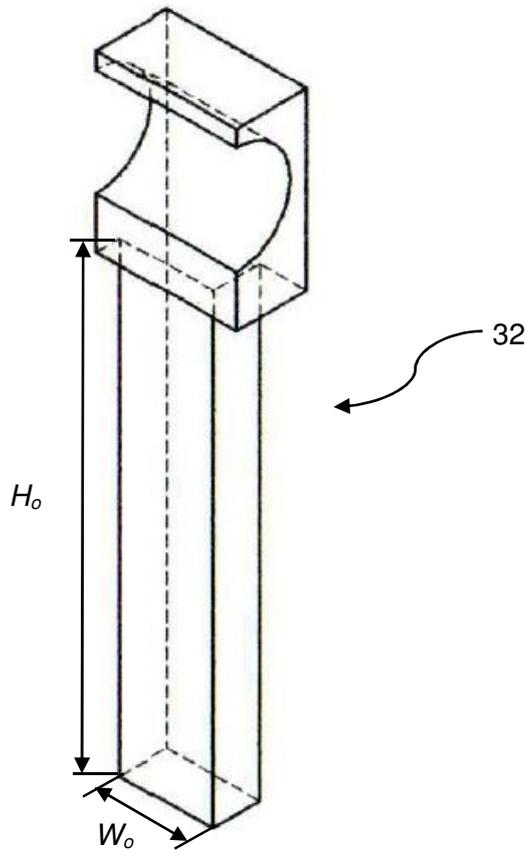


FIG. 4 (c)

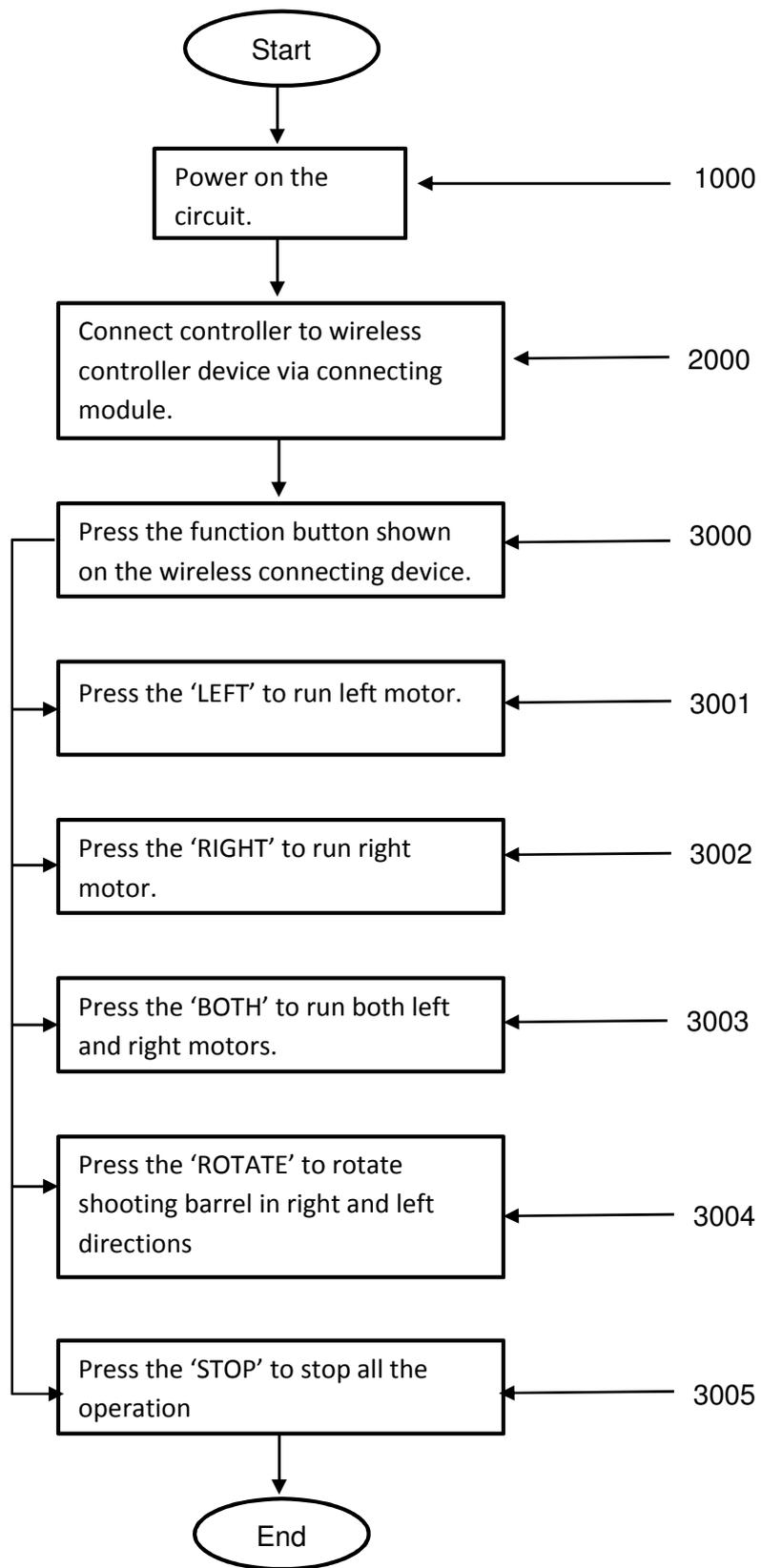


FIG. 5