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(54) **Shooting target apparatus**

(57) Shooting target apparatus (100) has a portable base (110) capable of staying put on a surface and a target holder (120) for holding a target (T1) for shooting. The target holder (120) is supported by the base (110) for pivotal movement. There is a battery-operated drive mechanism (130) in the base (110) for causing movement of the target holder (120) between a concealed position concealing a target (T1) held by the target holder (120) and a revealed position revealing the target (T1). Also included is a control circuit (160) controlling the drive mechanism (130), which includes a wireless signal receiver (162) for receiving a wireless control signal to activate the drive mechanism (130) to cause movement of the target holder (120) from the concealed position to the revealed position and later from the revealed position back to the concealed position.

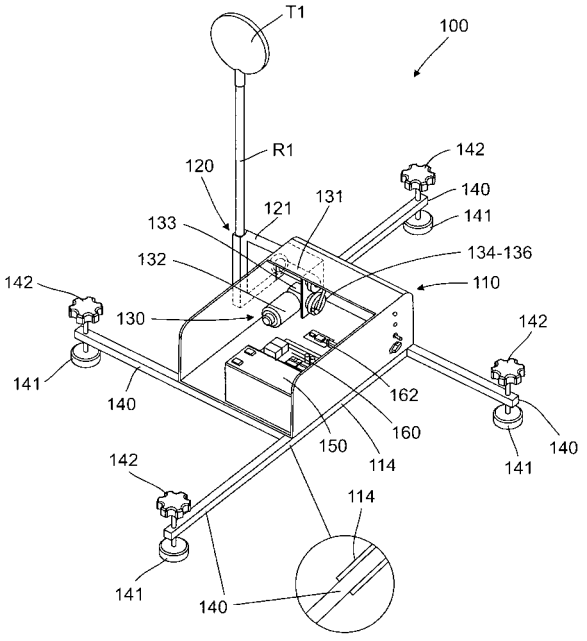


FIG. 3

EP 1 985 964 A2

Description

[0001] The present invention relates to shooting target apparatus for handgun and rifle shooting.

BACKGROUND OF THE INVENTION

[0002] Handgun and rifle shooting are popular sports but shooting ranges are limited or lack variations in terms of location and/or arrangement.

[0003] The invention seeks to mitigate or at least alleviate such problems by providing new or otherwise improved shooting target apparatus.

SUMMARY OF THE INVENTION

[0004] According to the invention, there is provided shooting target apparatus which comprises a portable base capable of staying put on a surface and a target holder for holding a target for shooting. The target holder is movably supported by the base for movement relative thereto. There is a battery-operated drive mechanism in the base for moving the target holder between a concealed position concealing a target held by the target holder and a revealed position revealing said target held by the target holder. Also included is a control circuit for controlling the drive mechanism, which includes a wireless signal receiver for receiving a wireless control signal to activate the drive mechanism to cause movement of the target holder from the concealed position to the revealed position and later from the revealed position back to the concealed position.

[0005] Preferably, the target holder is supported for pivotal movement between the concealed position in which said target lies on a first imaginary plane co-planar with a general viewing direction of a shooter, and the revealed position in which said target lies on a second imaginary plane perpendicular to said general viewing direction.

[0006] In one option, the target holder is pivotable between the concealed position that is horizontal and the revealed position that is vertical.

[0007] Preferably, the target holder is supported on a lateral side of the base for pivotal movement about a horizontal axis.

[0008] In another option, the target holder is pivotable between the concealed position that is vertical and the revealed position that is also vertical.

[0009] Preferably, the target holder is supported above the base for pivotal movement about a vertical axis.

[0010] In a preferred embodiment, the drive mechanism comprises an electric motor, a drive transmission system for transmitting output drive of the motor, and an output member driven via the drive transmission system and attached to the target holder such that the target holder is movable by the motor in at least one of two opposite directions.

[0011] More preferably, the target holder is resiliently biased by a spring to move in a first direction between the concealed position and the revealed position, and the drive mechanism is arranged to move the target holder in a second direction opposite to the first direction between the concealed position and the revealed position and the drive mechanism includes releasing means for releasing the target holder in the first direction to allow the target holder to be moved by the spring.

[0012] More preferably, the base supports a rechargeable battery pack for powering the electric motor.

[0013] In a preferred embodiment, the base incorporates a plurality of legs which project outwardly for stabilizing the overall shooting target apparatus on said surface.

[0014] More preferably, at least one of the legs is telescopically extendable and retractable to a suitable length.

[0015] More preferably, at least one of the legs includes a foot for engaging said surface, the foot being adjustable upwardly and downwardly to a suitable position.

[0016] In a preferred embodiment, the base has a handle to facilitate carrying of the overall shooting target apparatus.

[0017] More preferably, the control circuit further includes an antenna connected to the receiver for receiving said wireless control signal, the antenna being located in the handle.

[0018] Preferably, in general, the control circuit further includes an antenna connected to the receiver for receiving said wireless control signal.

[0019] In a preferred embodiment, the shooting target apparatus is provided with a remote controller that includes a wireless signal transmitter for transmitting said wireless control signal to the receiver.

[0020] More preferably, the remote controller includes a key to initiate transmission of said wireless control signal.

[0021] More preferably, the remote controller includes one or more keys to determine a period of time from the moment the drive mechanism causes movement of the target holder to the revealed position to the moment the drive mechanism causes movement of the target holder back to the concealed position.

[0022] More preferably, the remote controller includes a plurality of keys identifying respective shooting target apparatus for simultaneous operation thereof.

[0023] It is preferred that the transmitter comprises a radio frequency signal transmitter.

[0024] It is preferred that the receiver comprises a radio frequency signal receiver.

BRIEF DESCRIPTION OF DRAWINGS

[0025] The invention will now be more particularly described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a first embodiment of shooting target apparatus in accordance with the invention, with a target holder thereof pivoted downwards concealing a target;

Figure 2 is a front view of the shooting target apparatus of Figure 1, with the target holder pivoted upwards revealing the target;

Figure 3 is a perspective view of the shooting target apparatus of Figure 2, showing its internal components;

Figure 4 is a front view of the shooting target apparatus of Figure 3;

Figure 5 is a perspective view of a drive mechanism of the shooting target apparatus of Figure 1, for pivoting the target holder;

Figure 6 is a functional block diagram representing a control circuit of the shooting target apparatus of Figure 1;

Figure 7 is a perspective view of a second embodiment of shooting target apparatus in accordance with the invention, with a target holder thereof pivoted sideward concealing a target;

Figure 8 is a front view of the shooting target apparatus of Figure 7, with the target holder pivoted forwards revealing the target;

Figure 9 is a perspective view of the shooting target apparatus of Figure 7, showing its internal components;

Figure 10 is a front view of the shooting target apparatus of Figure 9;

Figure 11 is a perspective view of a third embodiment of shooting target apparatus in accordance with the invention, with a target holder thereof pivoted downwards concealing a target;

Figure 12 is a perspective view of the shooting target apparatus of Figure 11, showing its internal components and with the target holder pivoted upwards revealing the target;

Figure 13 is a front view of a remote controller for controlling the operation of the shooting target apparatus of Figures 1, 7 and 11; and

Figure 14 is a functional block diagram representing an operating circuit of the remote controller of Figure 13.

DETAILED DESCRIPTION OF BEST MODE EMBODIMENT

[0026] Referring initially to Figures 1 to 6 of the drawings, there is shown a first shooting target apparatus 100 embodying the invention, which apparatus 100 is self-contained and is portable so that it can easily be transported and carried around and can be used in a variety of shooting environments and especially in the countryside.

[0027] The shooting target apparatus 100 generally comprises a portable, generally flat rectangular box-like base 110 capable of staying put on a surface and in particular the ground under the action of gravity, a target holder 120 supported by the base 100 for holding a shooting target T1, and a drive mechanism 130 in the base 110 for moving the target holder relative to the base 110 between a concealed position concealing the target T1 (Figure 3) and a revealed position revealing the target T1 (Figure 1). A central top handle 111 on the base 110 facilitates carrying of the overall apparatus 100.

[0028] The target holder 120 is in the form of a triangular frame 121 which is supported on a lateral side, i.e. rear left corner, of the base 110 and is attached to a horizontal shaft 131 of the drive mechanism 130. The frame 121 is pivotable about a horizontal axis, i.e. that of the shaft 131, between the concealed position that is horizontal and the revealed position that is vertical. The target T1 is held at a distance apart by means of a rod R1 attached to the frame 121.

[0029] The drive mechanism 130 is battery-operated, including an electric motor 132 and a drive transmission system for transmitting the output drive of the motor 132. The transmission system is formed by a speed-reduction gearbox 133 and a pair of wheels 134 and 135 interconnected by a link 136, with the first wheel 134 coupled to the gearbox 133 and the second wheel 135 coupled to the shaft 131, such that the shaft 131 and hence the target holder 121/target T1 may be turned by the motor 132 via the transmission system and at a much reduced speed.

[0030] In the horizontal concealed position, the target T1 lies on a first imaginary plane co-planar with a general viewing direction of a shooter such that the target T1 is hidden from sight. In the vertical revealed position, the target T1 lies on a second imaginary plane perpendicular to the shooter's general viewing direction such that the target T1 becomes visible.

[0031] The base 110 houses a rechargeable battery pack 150 for powering the motor 132, located at the front right corner of the base 110. The battery pack 150 and the target holder 120 with the drive mechanism 130 are arranged at opposite corners of the base 110 for balancing of weight. On the right side wall of the base 110, there are a pilot lamp, a power on/off switch and a recharging jack for the battery pack 150.

[0032] To enhance stability of the overall shooting target apparatus 100 on the ground, the base 110 incorpo-

rates four legs 140 which project horizontally outwardly from respective corners of the base 110. Each leg 140 is supported by a fixed sleeve 114 running horizontally along a respective side of the bottom of the base 110, and is telescopically extendable and retractable to a suitable length, generally as long as possible for maximum stability. The legs 140 include respective feet 141 for engaging the ground, with each foot 141 being connected by a screw with knob 142 such that it is adjustable upwardly and downwardly to a suitable position or level to accommodate any unevenness of the ground.

[0033] The drive mechanism 130 operates under the control of an electronic control circuit 160 (Figure 6) which is also housed in the base 110. The control circuit 160 incorporates a wireless RF (radio frequency) receiver 162 for receiving a wireless RF control signal from a remote controller 200 (as hereinafter described) to activate the drive mechanism 130 to pivot the target holder 120 to pop up the target T1 from the concealed position to the revealed position and later, upon expiry of a predetermined period of time, return them back to the concealed position.

[0034] As part of the control circuit 160, an antenna 161 is connected to the receiver 162 for detecting the RF control signal. The antenna 161 is located within the handle 111 of the base 110, where it is positioned outermost for best reception of signal.

[0035] The control circuit 160 further includes an MCU 163 for operation and control and in particular processing the control signal received by the receiver 162 and based on that controlling the motor 132 via a relay 164. The receiver 162 and MCU 163 are powered by the battery pack 150 via a voltage regulator 151.

[0036] Referring now to Figures 7 to 10 of the drawings, there is shown a second shooting target apparatus 100A embodying the invention. The second apparatus 100A has almost the same general construction as the first apparatus 100, with equivalent parts designated by the same reference numerals suffixed by a letter "A", and it operates in essentially the same manner.

[0037] The major difference in construction lies in the target holder 120A. The holder 120A comprises a rectangular U-shaped frame 121A which is supported directly above the base 110A and is connected to the uppermost end of a vertical shaft 131A of the drive mechanism 130A. Screws with knobs on opposite sides of the frame 121A hold a thin rectangular target board T2 in the frame 121A by its lower end. The drive mechanism 130A is identical to that of the first shooting target apparatus 100, but it is 90°-turned such that the shaft 131A extends upright for turning about a vertical axis.

[0038] The frame 121A is pivotable about a vertical axis, i.e. that of the shaft 131A, between a concealed position (Figure 7) and a revealed position (Figure 9). In the concealed position, the target T2 lies on a vertical imaginary plane co-planar with a general viewing direction of a shooter such that the target T1 is hidden from sight. In the revealed position, the target T2 turns to lie on another vertical imaginary plane perpendicular to the shooter's general viewing direction such that the target T2 becomes visible.

[0039] The base 110A likewise is generally flat rectangular box-like and is portable and capable of staying put on the ground, incorporating the same four legs 140A to enhance stability, which are extendable for use and retractable for storage and whose feet 141A are adjustable. Inside the base 110A, the drive mechanism 130A and the rechargeable battery pack 150A therefor are located on opposite front and rear sides for balancing of weight.

[0040] The drive mechanism 130A is controlled by an electronic control circuit 160A, which is practically the same as the control circuit 160 (Figure 6) of the first embodiment, to pivot the target holder 120A/target T2 from the concealed position to the revealed position and later, upon expiry of a predetermined period of time, from the revealed position back to the concealed position.

[0041] Reference is then made to Figures 11 and 12 of the drawings depicting a third shooting target apparatus 100B embodying the invention, which has a very similar general construction as the first apparatus 100 with equivalent parts designated by the same reference numerals suffixed by a letter "B", and it operates in essentially the same way. Similarly, in particular, a rod R3 holding a disc-like target T3 of the third apparatus 100B is mounted on a triangular frame 121B of the target holder 120B, which in turn is supported on the left side of the base 110B for pivoting upwards and downwards about a horizontal shaft 131B by the motor drive mechanism 130B in the base 110B.

[0042] The major difference lies in the way the drive mechanism 130B manipulates the target holder 120B, in co-operation with a coil spring S. The spring S is stretched and sprung across the triangular frame 121B at a position above the shaft 131B and a fixed protrusion F on the base 110B ahead, thereby resiliently biasing and applying a torque to turn the frame 121B and hence the target T3 upwards into a vertical revealed position (Figure 12) in which the target T3 is revealed for shooting.

[0043] The drive mechanism 130B is controlled by the control circuit 160B to pivot the target holder 120B/frame 121B and hence the target T3 from the revealed position back to a horizontal concealed position (Figure 11), in which the target T3 is hidden from sight, upon expiry of a predetermined interval of time.

[0044] The drive mechanism 130B is unidirectional and only pivots the target T3 in one direction as described i.e. from the revealed position to the concealed position, against the action of the spring S.

[0045] From the concealed position, the target holding frame 121B and hence target T3 may be released or set free at any time such that it can immediately be pivoted or jerked by the spring S to the revealed position. Such a pivoting action by the spring S is quick and the target T3 may appear almost instantly.

[0046] The target holding frame 121B may be released from the concealed position in one of a number of differ-

ent ways, for movement by the spring S. For example, the drive mechanism 130B may be constructed to lose drive or grip upon turning off of electrical power, whereupon the spring S takes control and it jerks the target T3 upwards. As a second example, the frame 121B may be rotationally engaged with the shaft 131B (i.e. driving shaft of the drive mechanism 130B) by means of a clutch or a latch that is releasable by an element of the drive mechanism 130B for example, such as an electromagnetic solenoid or actuator.

[0047] The control circuits 160/160A/160B of the subject shooting target apparatus 100/100A/100B are operated by the same remote controller 200 of Figures 13 and 14, which has a flat and slim rectangular body 210. The controller 200 includes an internal electronic operating circuit 260 and a number of press keys arranged on the body 210 for controlling the operating circuit 260. Such control keys comprise an array 220 of ten device keys "1" to "10", a set 230 of five time keys "½s", "1s", "2s", "3s" and "5s", a SEND key 240 and an on/off key 250.

[0048] The operating circuit 260 incorporates a wireless RF transmitter 262 for transmitting the aforesaid RF control signal, via a built-in antenna 261, to the RF receiver 162/162A/162B of the apparatus 100/100A/100B. It further includes an MCU 263 for operation and control and in particular processing input from the device and time keys 220 and 230 and based on that generating a control signal(s) for transmission by the RF transmitter 262. The transmitter 262 and MCU 263, etc. are powered by one or more battery cells 264 via a voltage regulator 265.

[0049] The remote controller 260 can be used to control up to ten of the shooting target apparatus 100/100A/100B, which are selectable by the corresponding device keys 220. Their RF receivers 162/162A/162B are tuned to different carrier frequencies (or channels) or identified by distinctive device codes (e.g. header bits) in the control signals. Each selected apparatus 100/100A/100B is indicated by an LED located at the corresponding device key 220.

[0050] The time keys 230 are used to determine a period of time, i.e. half a second or one, two, three or five seconds or the sum of any combination thereof, during which the target holder 120/120A/120B of each selected apparatus 100/100A/100B stays in the revealed position presenting the target T1/T2/T3, i.e. from the moment the drive mechanism 130/130A/130B causes movement of the target holder 120/120A/120B to the revealed position to the moment the drive mechanism 130/130A drives the target holder 120/120A/120B back to the concealed position.

[0051] Pressing of the SEND key 240 will initiate transmission of the RF control signals which are generated according to the settings of the device and time keys 220 and 230 for operating the selected shooting target apparatus 100/100A/100B simultaneously. In response, the relevant apparatus 100/100A/100B present the corresponding targets T1/T2/T3 for shooting within the predetermined period of time, at the end of which the targets T1/T2/T3 will be retrieved.

[0052] Each shooting target apparatus 100/100A/100B is self-contained, in the sense that it incorporates its own drive mechanism 130/130A/130B for manipulating the target T1/T2/T3 and its independent power source such that it is ready to operate wherever it is put by a remote control signal without any wire connection. This in conjunction with portability offer virtually unlimited flexibility in where and how the shooting target apparatus are arranged, thereby adding variations and fun to shooting training and competitions.

[0053] It is envisaged that the target holders (and hence the targets) may be moved or slid along a linear path between the concealed and revealed positions, as is generally known in the art. Also, any other suitable types of electric actuators may be used for moving or causing movement of the targets, in place of electric motors. As to the remote control, other possible ways of transmitting and receiving the wireless control signals include infrared and Wi-Fi.

[0054] The invention has been given by way of example only, and various other modifications of and/or alterations to the described embodiments may be made by persons skilled in the art without departing from the scope of the invention as specified in the appended claims.

Claims

1. Shooting target apparatus comprising:

a portable base capable of staying put on a surface;
a target holder for holding a target for shooting, the target holder being movably supported by the base for movement relative thereto;
a battery-operated drive mechanism in the base for moving the target holder between a concealed position concealing a target held by the target holder and a revealed position revealing said target held by the target holder; and
a control circuit for controlling the drive mechanism, the control circuit including a wireless signal receiver for receiving a wireless control signal to activate the drive mechanism to cause movement of the target holder from the concealed position to the revealed position and later from the revealed position back to the concealed position.

2. The shooting target apparatus as claimed in claim 1, **characterized in that** the target holder is supported for pivotal movement between the concealed position in which said target lies on a first imaginary plane co-planar with a general viewing direction of a shooter, and the revealed position in which said

target lies on a second imaginary plane perpendicular to said general viewing direction.

3. The shooting target apparatus as claimed in claim 2, **characterized in that** the target holder is pivotable between the concealed position that is horizontal and the revealed position that is vertical.

4. The shooting target apparatus as claimed in claim 3, **characterized in that** the target holder is supported on a lateral side of the base for pivotal movement about a horizontal axis.

5. The shooting target apparatus as claimed in claim 2, **characterized in that** the target holder is pivotable between the concealed position that is vertical and the revealed position that is also vertical.

6. The shooting target apparatus as claimed in claim 5, **characterized in that** the target holder is supported above the base for pivotal movement about a vertical axis.

7. The shooting target apparatus as claimed in any one of claims 1 to 6, **characterized in that** the drive mechanism comprises an electric motor, a drive transmission system for transmitting output drive of the motor, and an output member driven via the drive transmission system and attached to the target holder such that the target holder is movable by the motor in at least one of two opposite directions.

8. The shooting target apparatus as claimed in claim 7, **characterized in that** the target holder is resiliently biased by a spring to move in a first direction between the concealed position and the revealed position, and the drive mechanism is arranged to move the target holder in a second direction opposite to the first direction between the concealed position and the revealed position and the drive mechanism includes releasing means for releasing the target holder in the first direction to allow the target holder to be moved by the spring.

9. The shooting target apparatus as claimed in claim 7, **characterized in that** the base supports a rechargeable battery pack for powering the electric motor.

10. The shooting target apparatus as claimed in any one of claims 1 to 6, **characterized in that** the base incorporates a plurality of legs which project outwardly for stabilizing the overall shooting target apparatus on said surface.

11. The shooting target apparatus as claimed in claim 10, **characterized in that** at least one of the legs is telescopically extendable and retractable to a suitable length.

12. The shooting target apparatus as claimed in claim 10, **characterized in that** at least one of the legs includes a foot for engaging said surface, the foot being adjustable upwardly and downwardly to a suitable position.

13. The shooting target apparatus as claimed in any one of claims 1 to 6, **characterized in that** the base has a handle to facilitate carrying of the overall shooting target apparatus.

14. The shooting target apparatus as claimed in claim 13, **characterized in that** the control circuit further includes an antenna connected to the receiver for receiving said wireless control signal, the antenna being located in the handle.

15. The shooting target apparatus as claimed in any one of claims 1 to 6, **characterized in that** the control circuit further includes an antenna connected to the receiver for receiving said wireless control signal.

16. The shooting target apparatus as claimed in claim 1, **characterized in** combining with a remote controller that includes a wireless signal transmitter for transmitting said wireless control signal to the receiver.

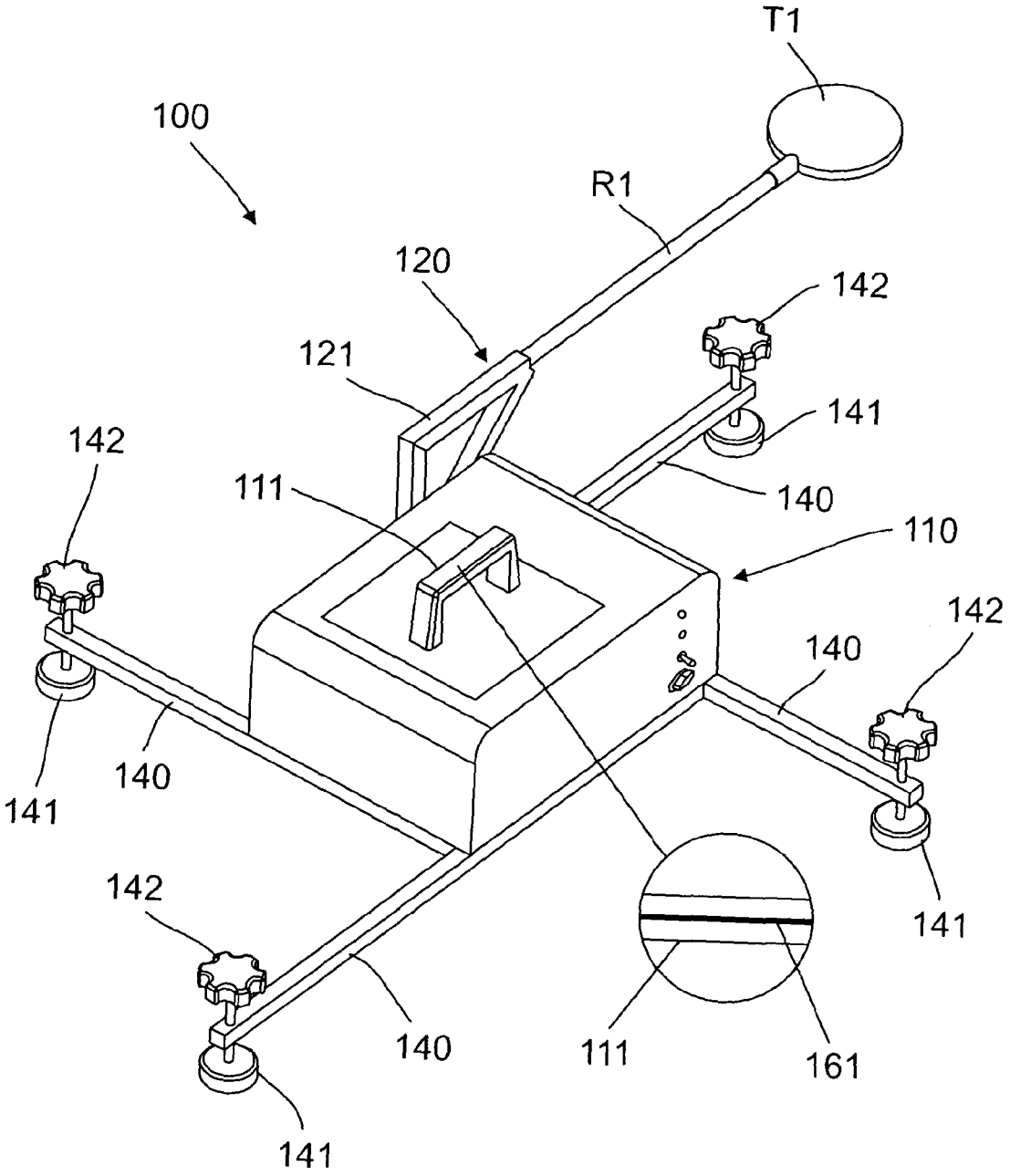
17. The shooting target apparatus as claimed in claim 16, **characterized in that** the remote controller includes a key to initiate transmission of said wireless control signal.

18. The shooting target apparatus as claimed in claim 16 or claim 17, **characterized in that** the remote controller includes one or more keys to determine a period of time from the moment the drive mechanism causes movement of the target holder to the revealed position to the moment the drive mechanism causes movement of the target holder back to the concealed position.

19. The shooting target apparatus as claimed in claim 16 or claim 17, **characterized in that** the remote controller includes a plurality of keys identifying respective shooting target apparatus for simultaneous operation thereof.

20. The shooting target apparatus as claimed in claim 16 or claim 17, **characterized in that** the transmitter comprises a radio frequency signal transmitter.

21. The shooting target apparatus as claimed in any one of claims 1 to 6, **characterized in that** the receiver comprises a radio frequency signal receiver.


T1
100
R1
120
142
121
141
142
111
140
110
142
140
141
140
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141
142
140
111
161
141

FIG. 1

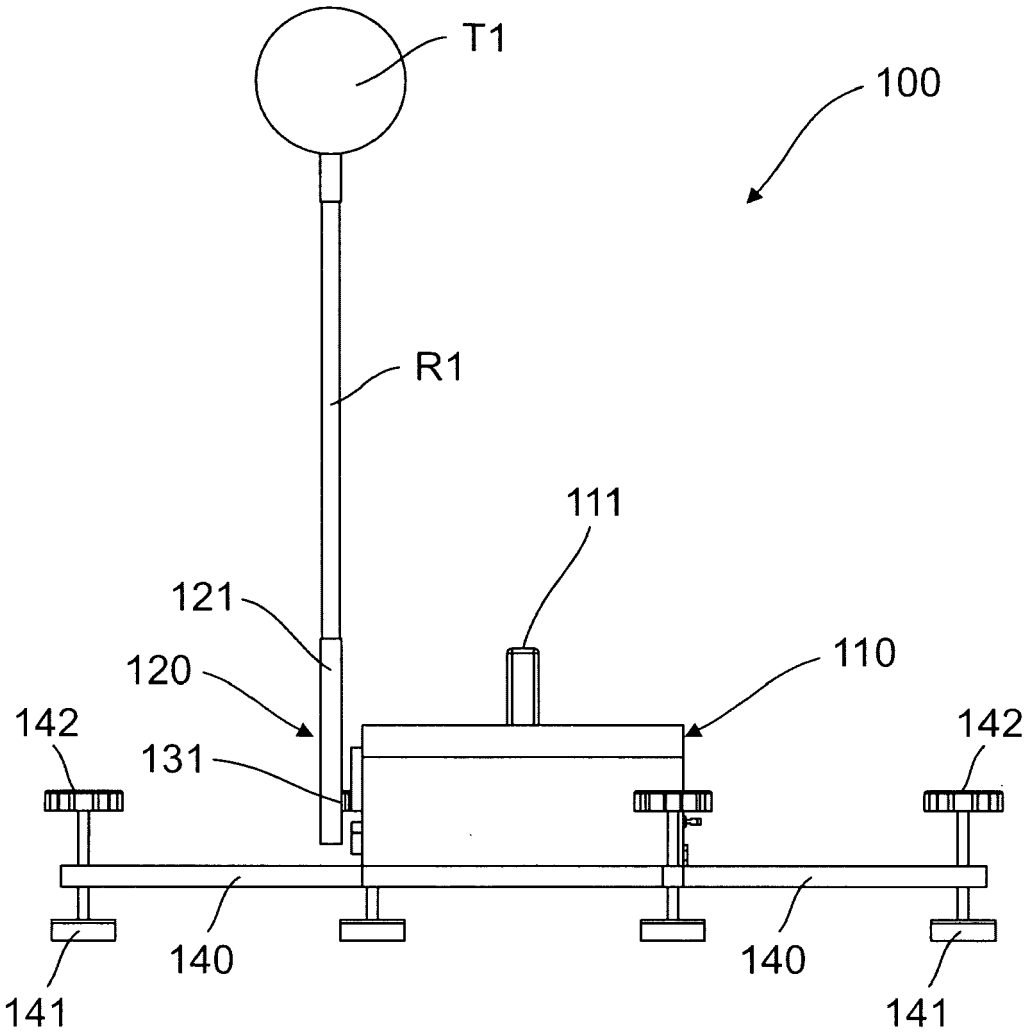
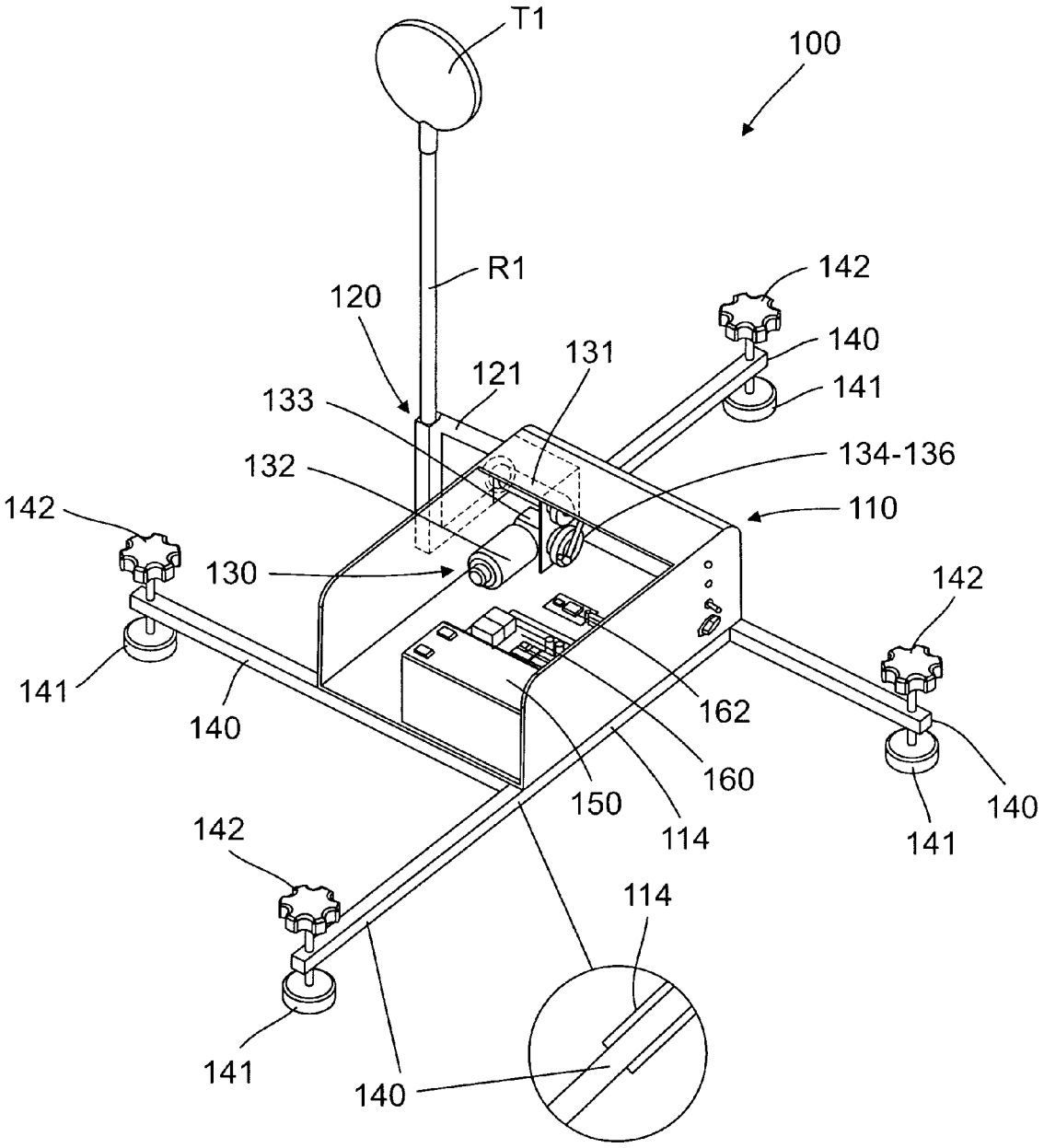


FIG. 2


T1
100
R1
120
142
140
141
131
121
133
134-136
132
110
142
130
142
141
140
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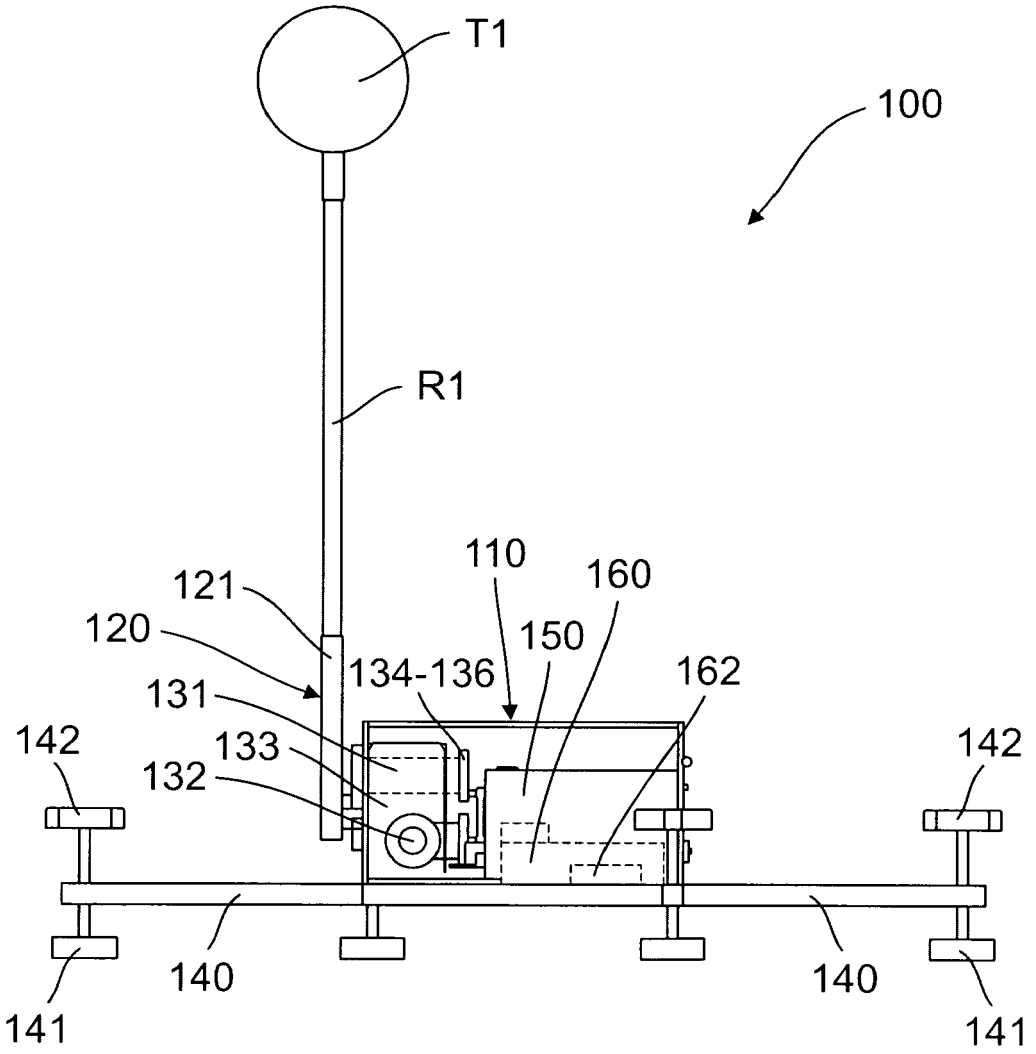
150
114
140
141
142
114
141
140

FIG. 3


T1
100
R1
110
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121
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120
134-136
162
131
142
133
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141

FIG. 4

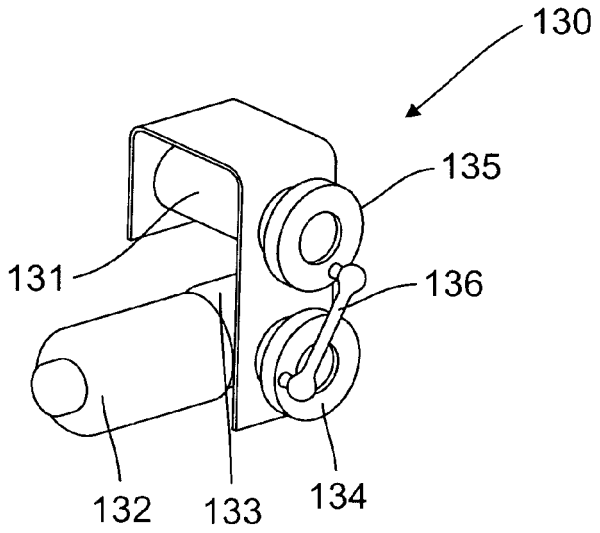
130
135
131
136
132
133
134

FIG. 5

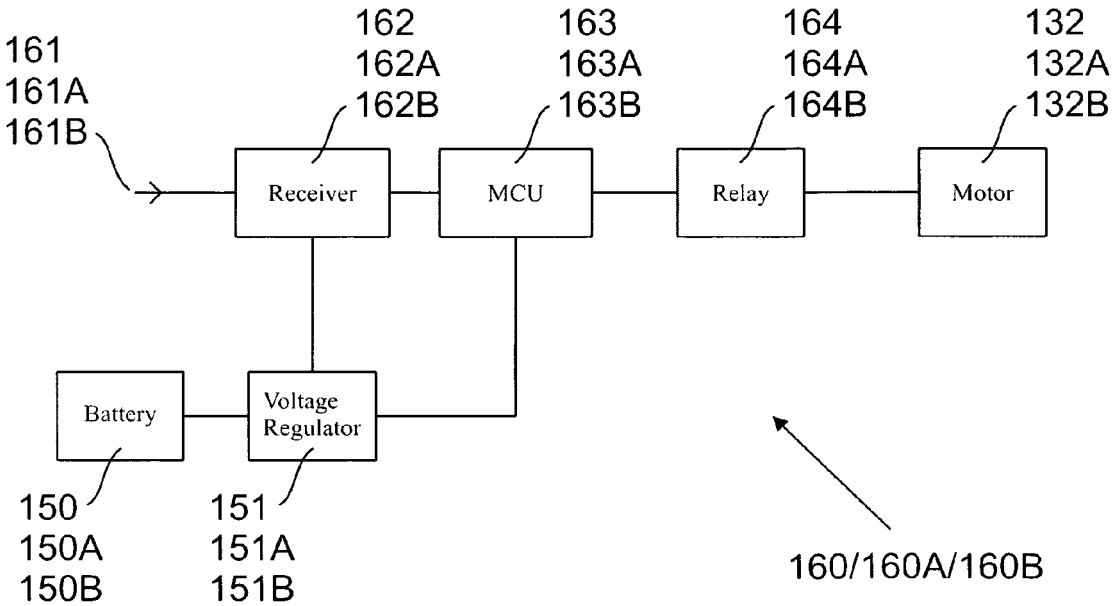
161
161A
161B
162
162A
162B
163
163A
163B
164
164A
164B
132
132A
132B
Receiver
MCU
Relay
Motor
Battery
Voltage Regulator
150
150A
150B
151
151A
151B
160/160A/160B

FIG. 6

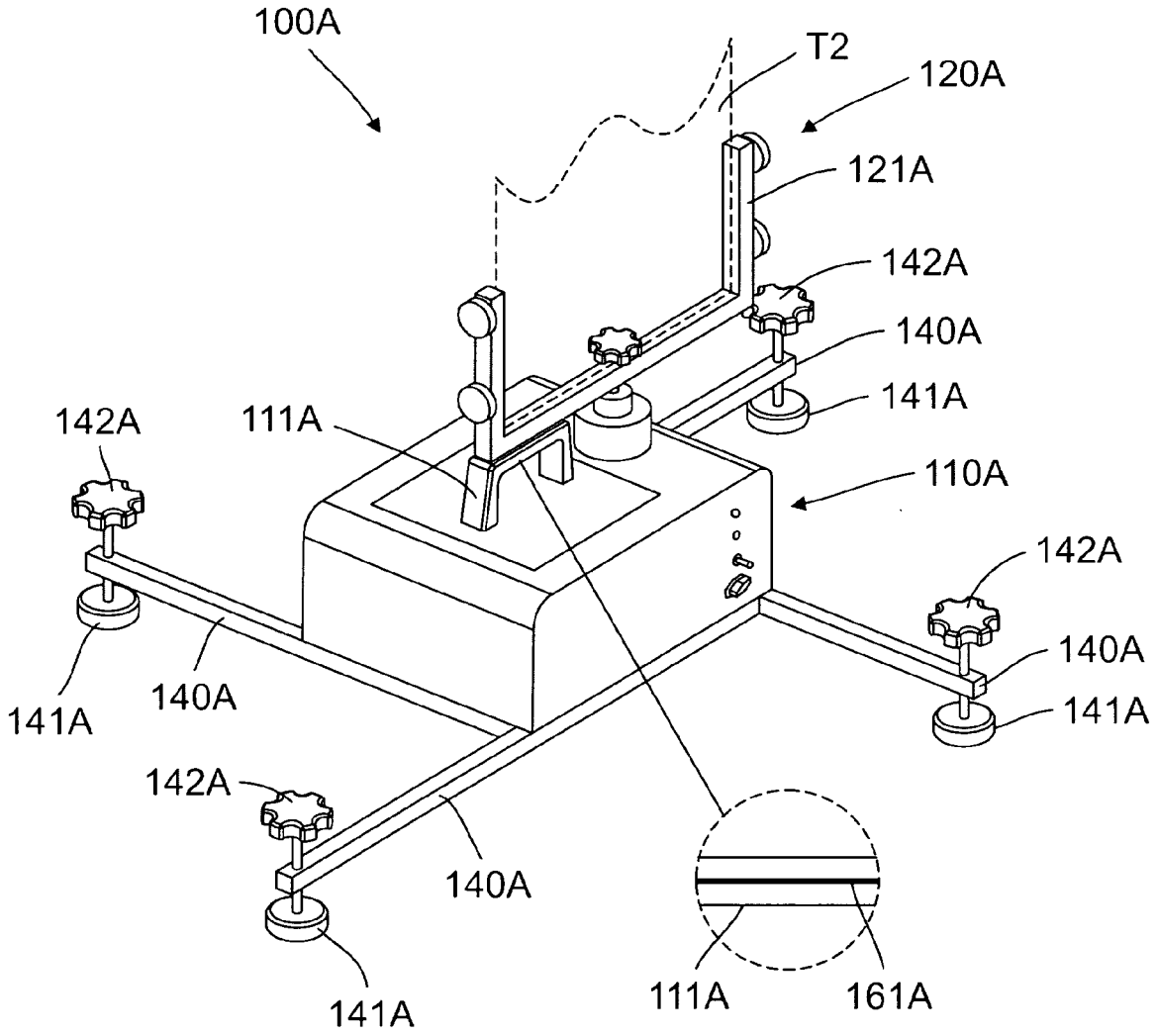
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FIG. 7

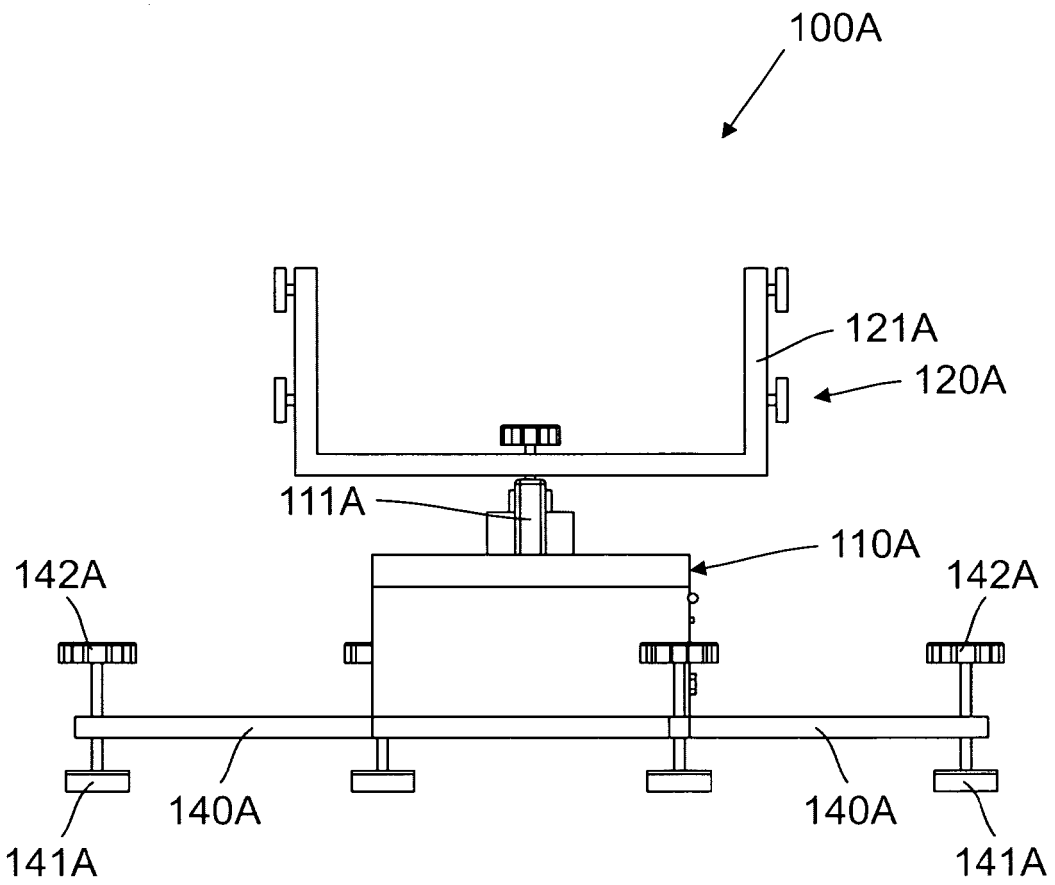
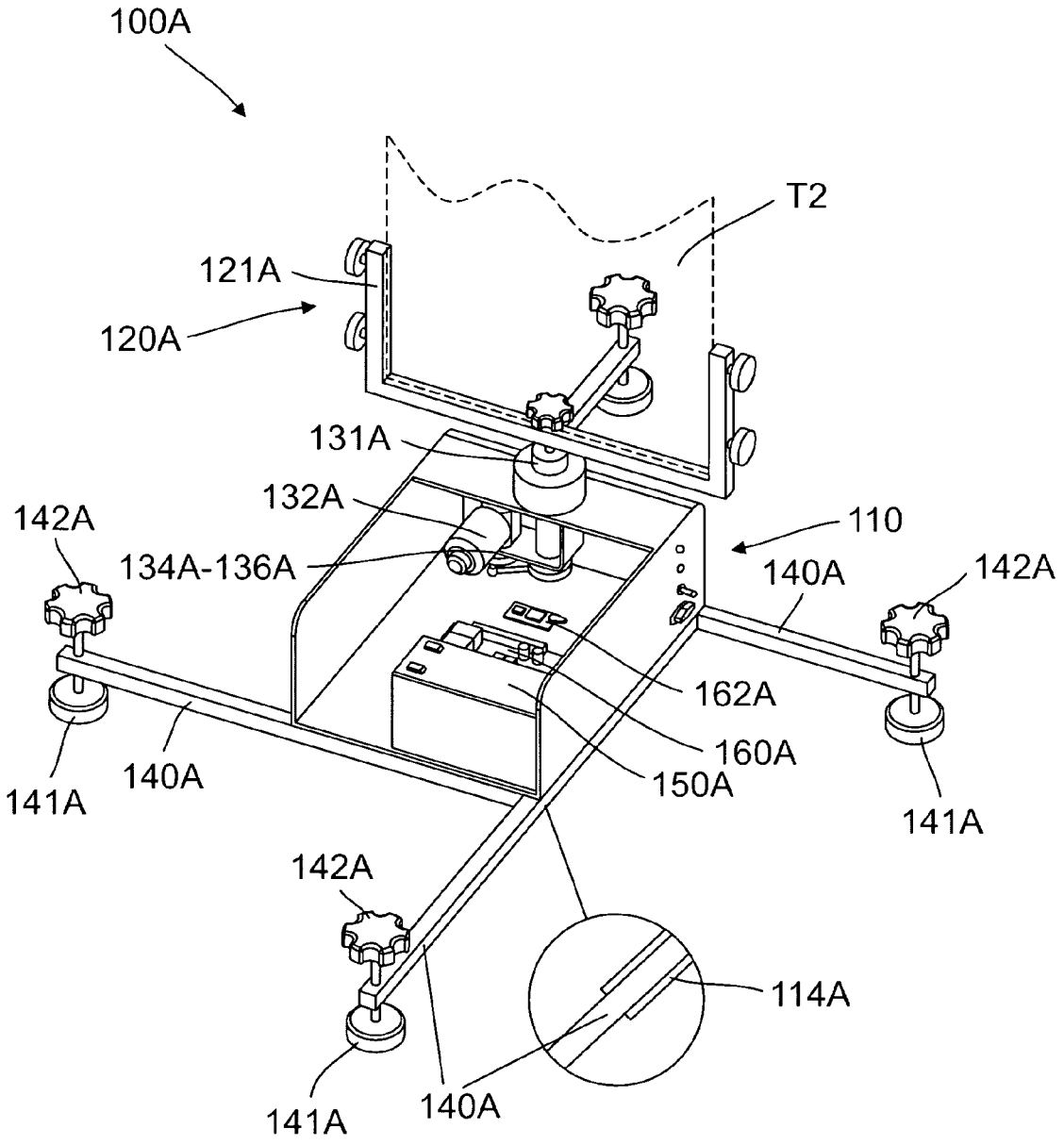


FIG. 8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T2
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FIG. 9

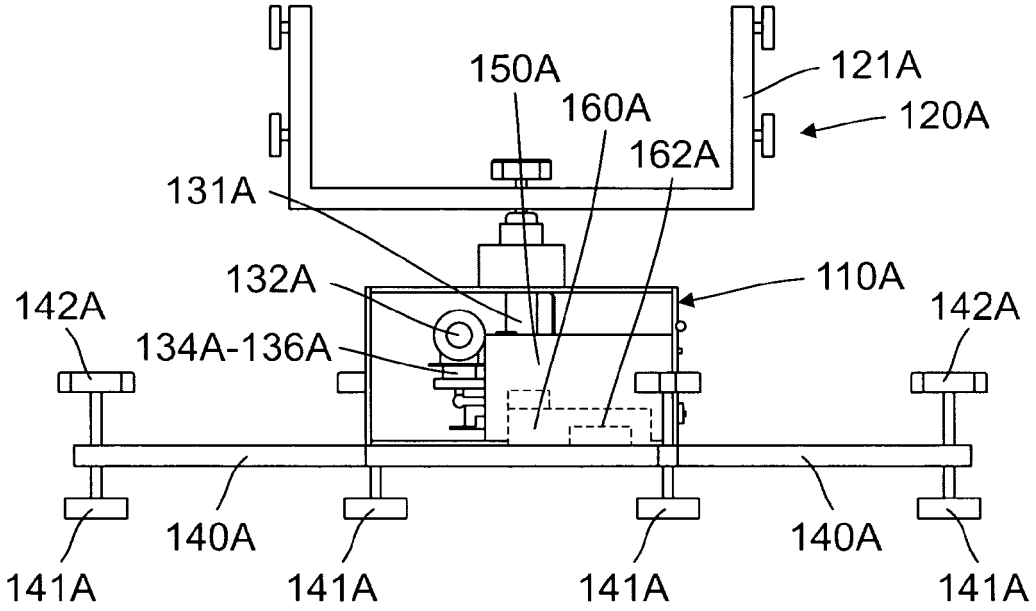
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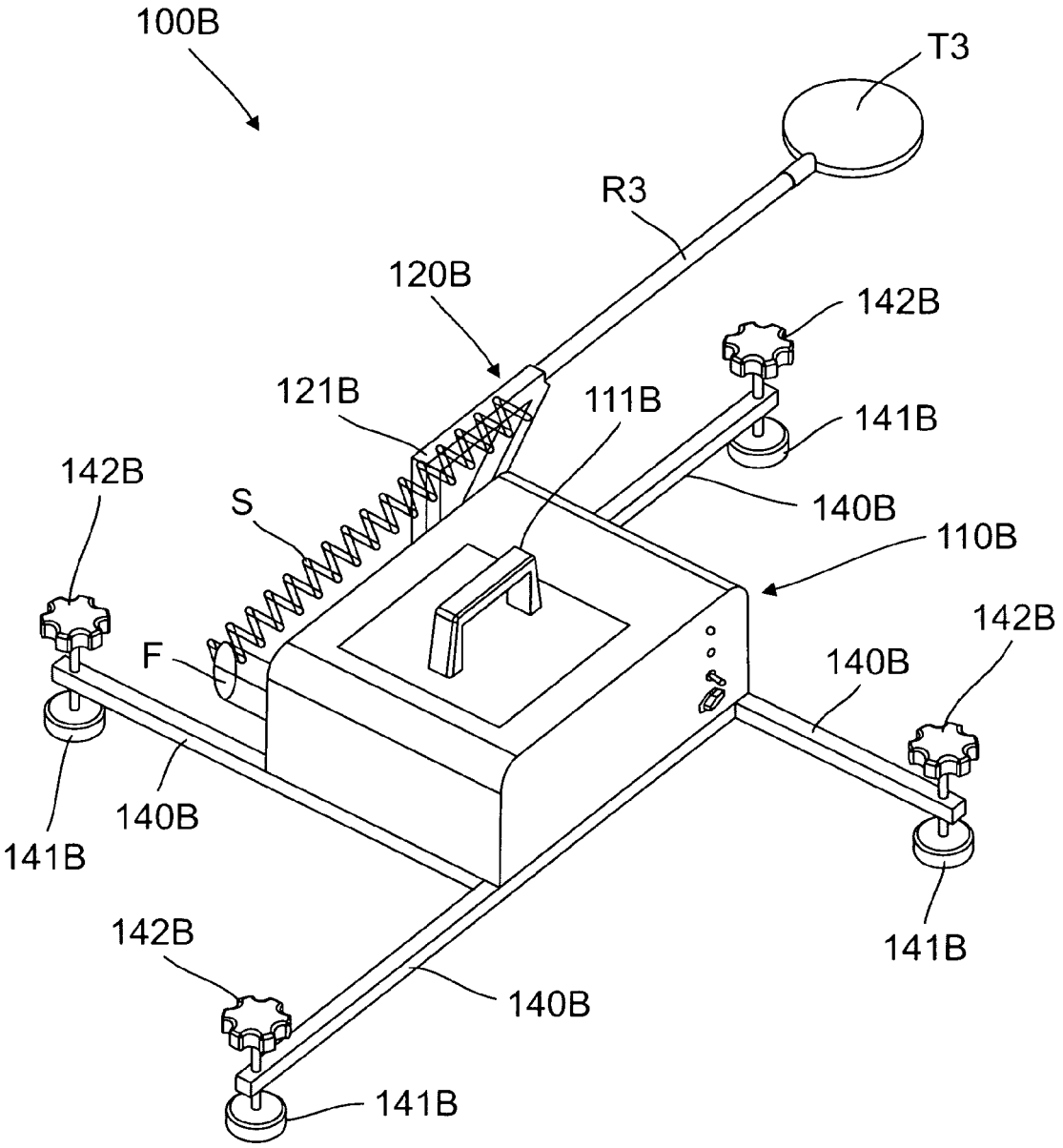
FIG. 10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T3
R3
120B
142B
121B
111B
141B
142B
S
140B
110B
142B
F
140B
140B
141B
141B
142B
140B
141B

FIG. 11

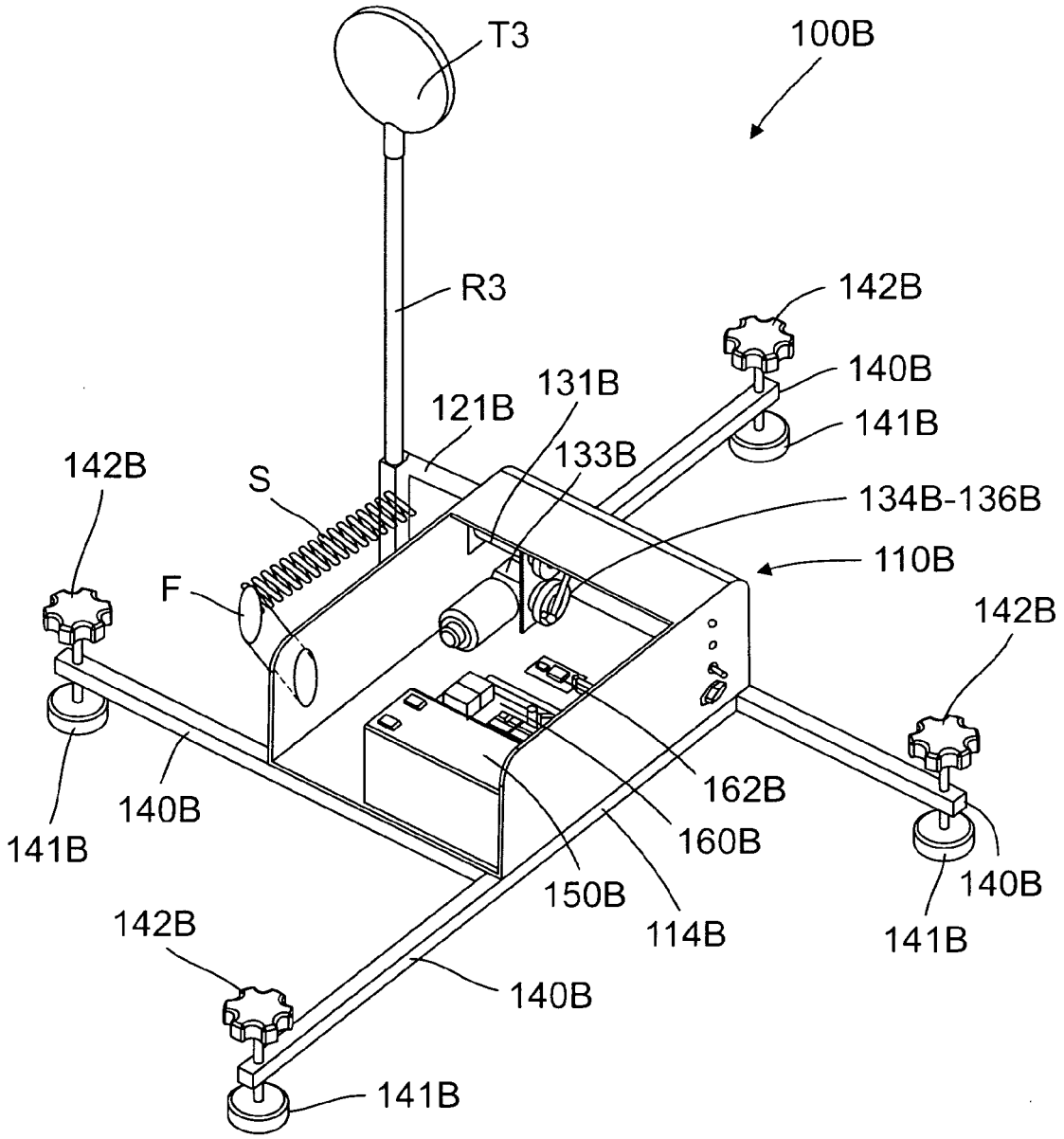
T3
100B
R3
142B
140B
131B
121B
141B
133B
142B
S
134B-136B
110B
F
142B
162B
140B
160B
141B
150B
140B
114B
142B
141B
140B
141B

FIG. 12

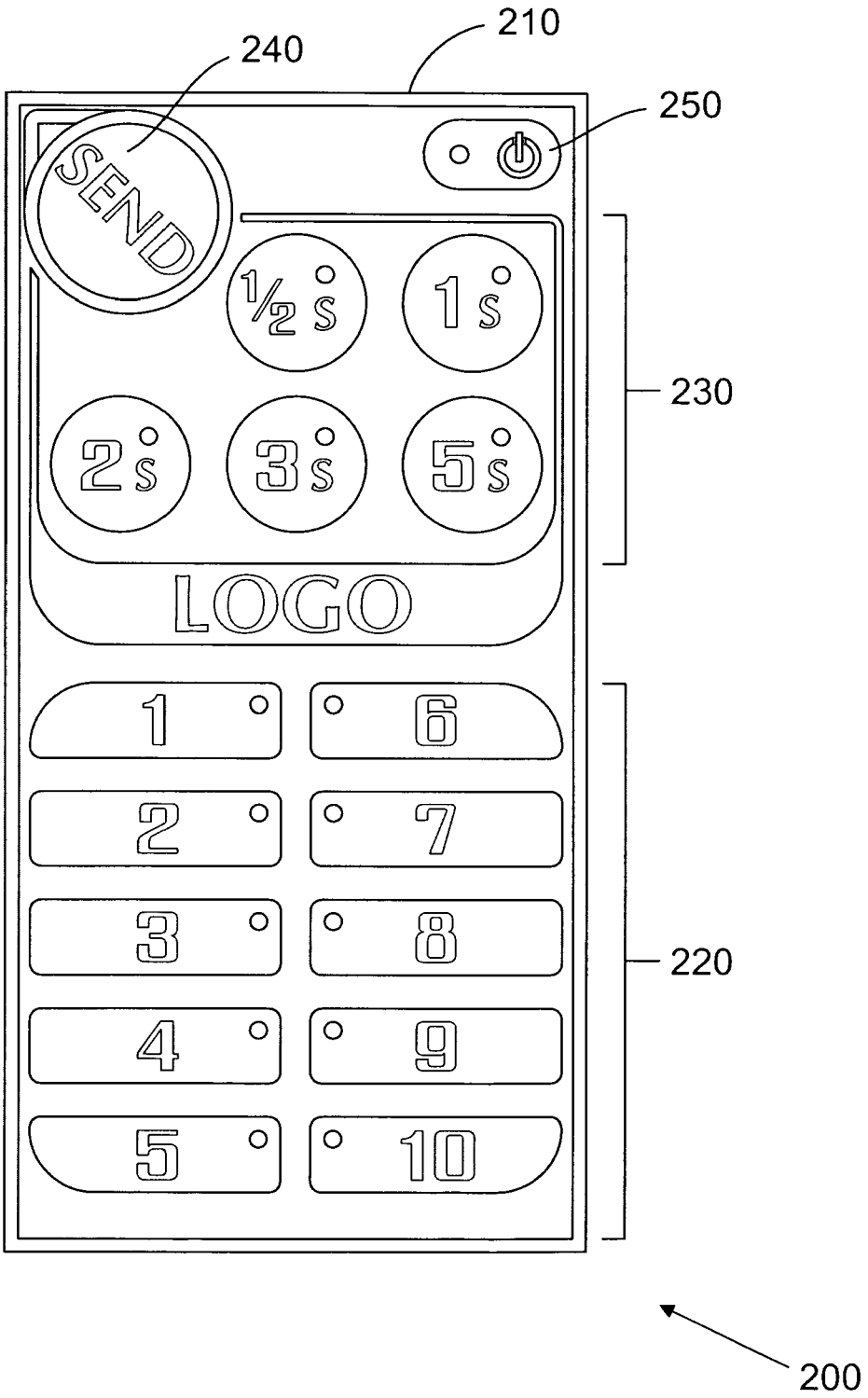

FIG. 13

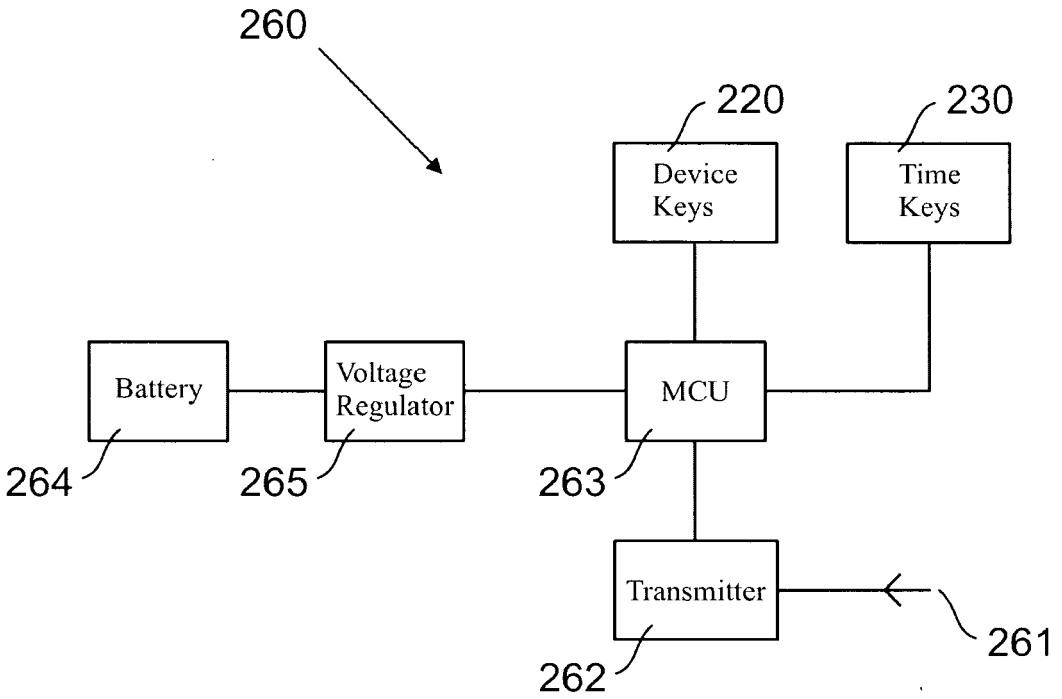
260
220
230
Device Keys
Time Keys
Battery
Voltage Regulator
MCU
264
265
263
Transmitter
261
262

FIG. 14