Sept. 6, 1966 J. G. RABINOWITZ ETAL 3,271,032

PHOTOELECTRIC TARGET PRACTICE PISTOL

Filed Sept. 7, 1962 3 Sheets-Sheet 1

FIG. 1

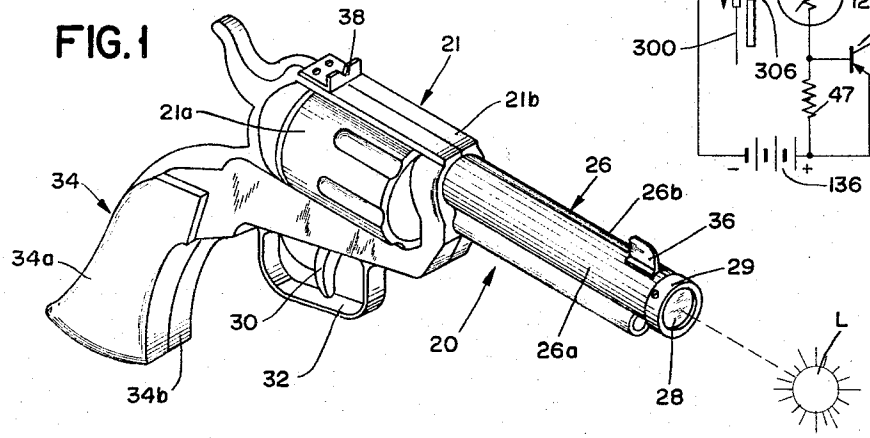

FIG. 13

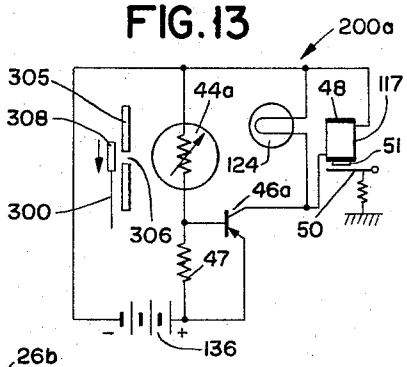

FIG. 4

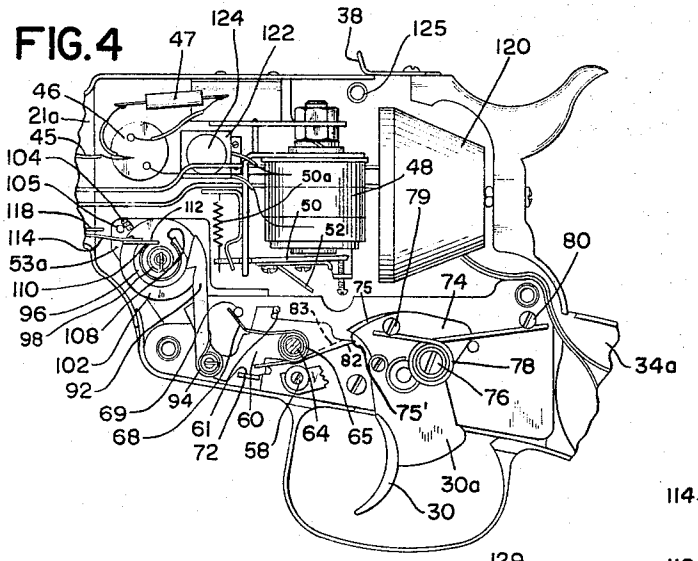

FIG. 3

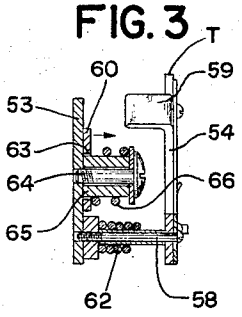

FIG. 9

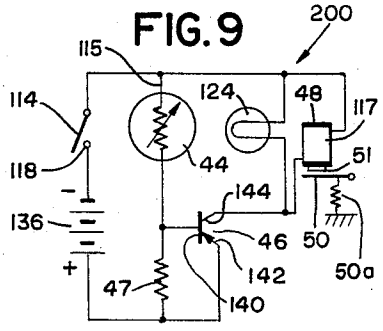

FIG. 6

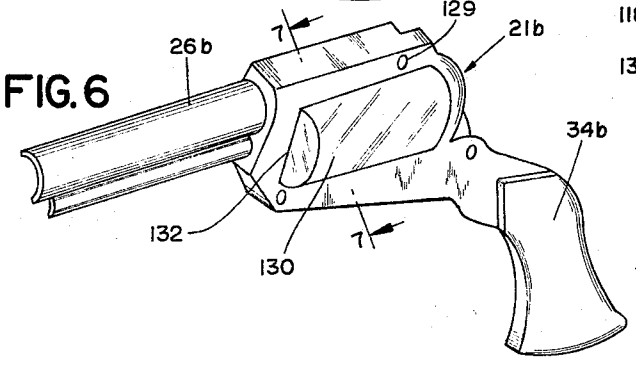

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FIG. 5

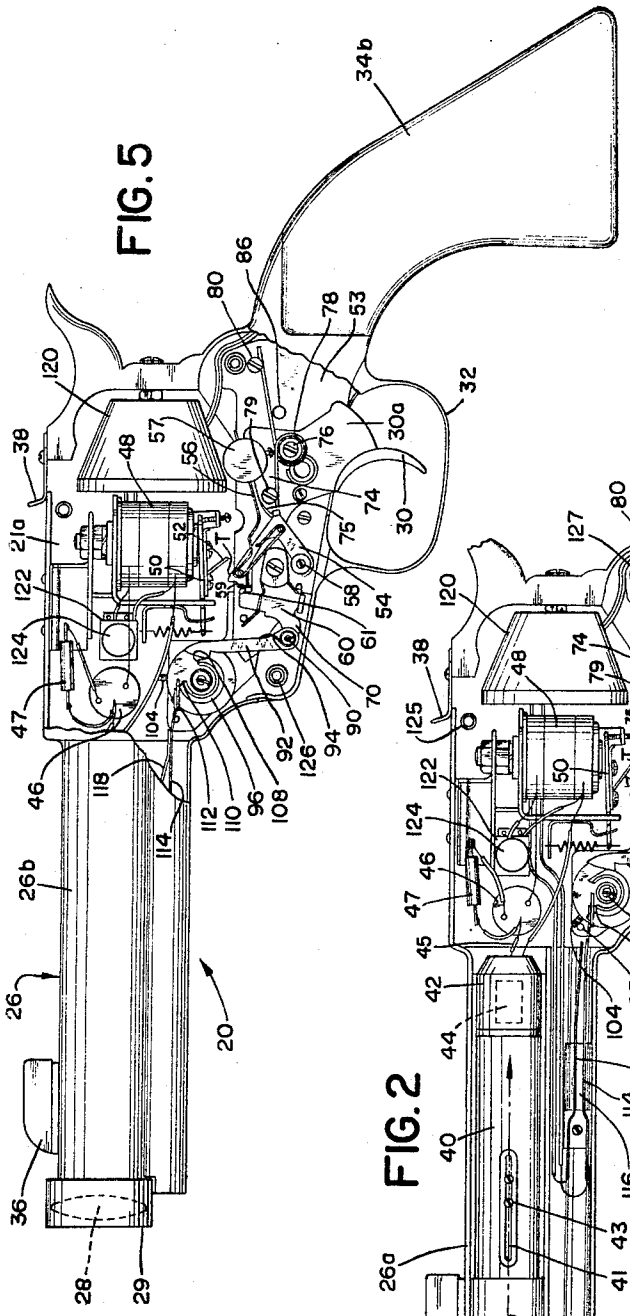

FIG. 2

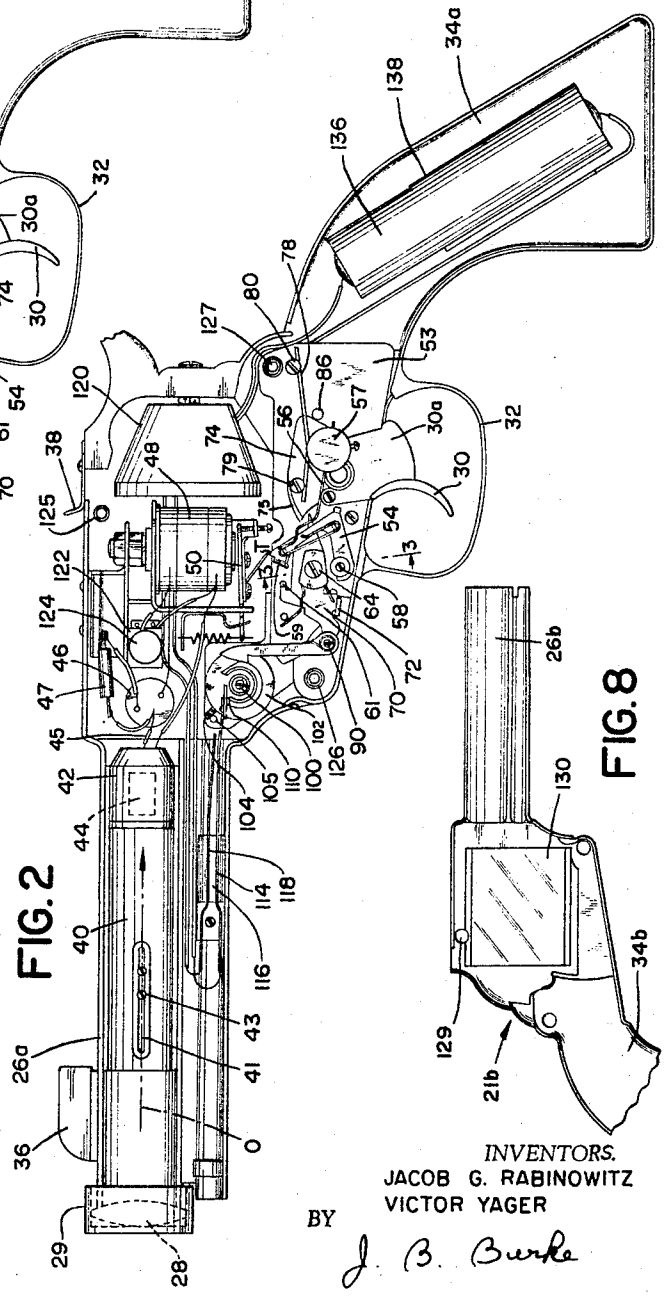

FIG. 8

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PHOTOELECTRIC TARGET PRACTICE PISTOL

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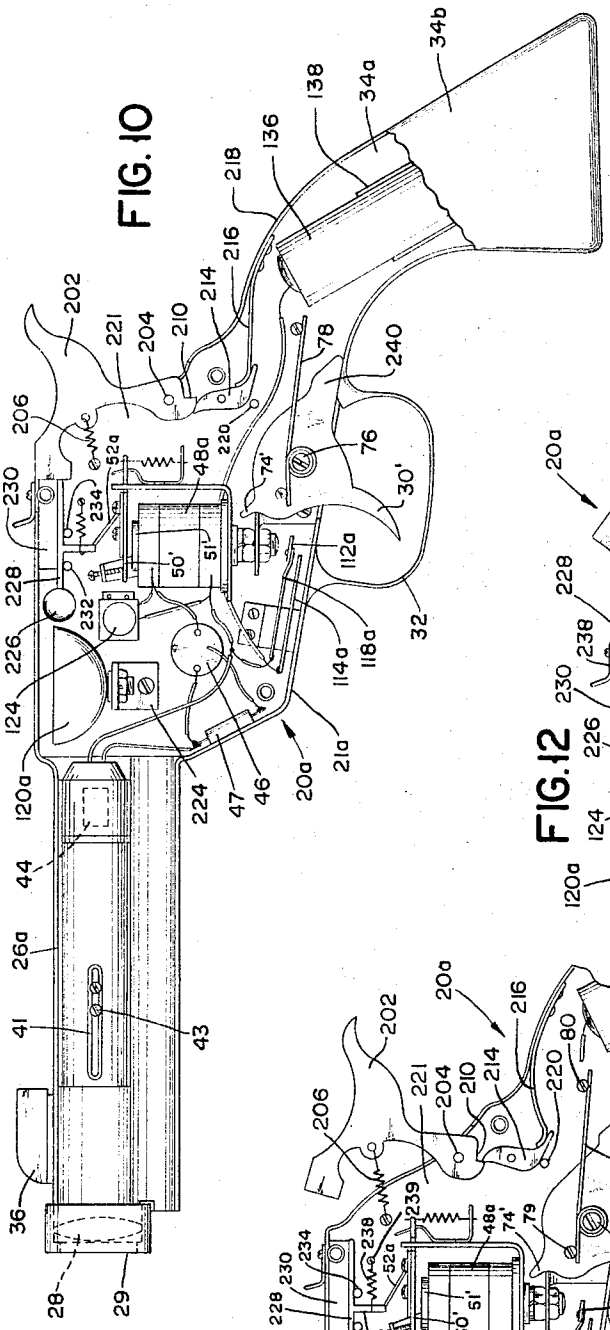

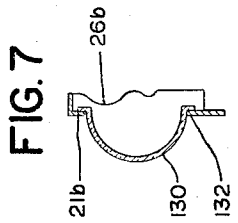

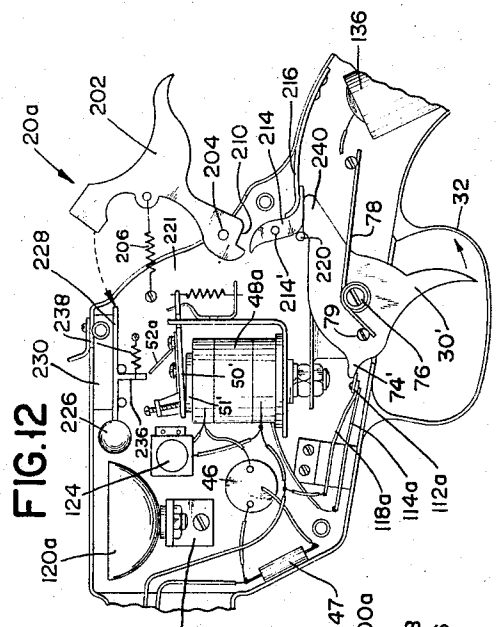

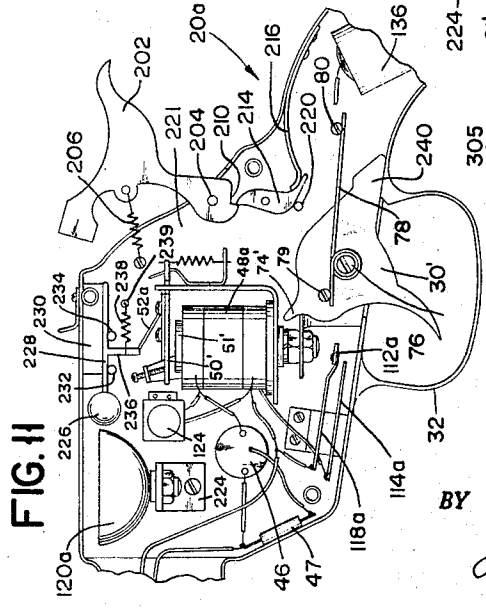

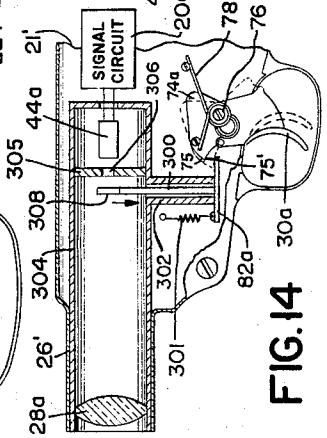

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3,271,032

PHOTOELECTRIC TARGET PRACTICE PISTOL

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Filed Sept. 7, 1962, Ser. No. 222,095
5 Claims. (Cl. 273—101.1)

This invention concerns a photoelectrically controlled target practice pistol.

According to the invention there is provided a pistol type of gun in which is a photoelectric cell responsive to light of predetermined minimum brightness reaching the cell from an external light source. The cell may be connected in a circuit including an amplifier, a suitable bell, lamp, counter or other signaling or indicating device, and an electromagnet for actuating the signaling or indicating device. The cell which may be a photoconductor or other photosensitive device is mounted behind an aperture set at the focal point of a positive lens. This optical assembly is lined up or collimated with the gun sights. The cell serves as the sensor or input to the signal actuating circuit. The amplifier receives and amplifies the input signal, and applies an output signal to the electromagnet for actuating the signaling or indicating device. The gun has a trigger which momentarily operates a switch in the circuit or momentarily opens an optical shutter in front of the sensor. If the gun is aimed directly on target at the light source, a hit is indicated by sounding of the bell, flashing of the lamp or other signal. The signal indicating a hit may be actuated directly by the electromagnet in the circuit or may be tripped by the electromagnet after having been cocked by initial trigger movement. The trigger may be arranged to connect a battery to the circuit momentarily or to expose the cell momentarily to the target light. The bell may be struck by a hammer cocked by the trigger and released by an electromagnet armature which acts as a sear, in a double-action type of pistol. In a single-action type of pistol the hammer may be cocked manually. When a hit is scored, the electromagnet armature is actuated and allows a firing pin to be struck by the hammer. The hammer is released by the trigger which also makes a momentary contact to activate the electromagnet circuit. The struck pin impinges on the bell or gong to indicate the hit audibly.

It is therefore one object of the invention to provide a pistol type of gun of single or double trigger action, with a photoelectric sensor in the gun arranged to receive light from a light target, the sensor being in circuit with a signal actuating device for producing a signal when the gun is fired by trigger actuation simultaneously with impingement of light from the light target upon the sensor.

Another object is to provide a gun as described, wherein the trigger momentarily closes a switch to apply an electric pulse to a signal actuating electromagnet or momentarily opens a shutter in front of the light sensor to apply an electric pulse to the signal actuating electromagnet.

Still another object is to provide a gun as described wherein the signal device is struck by a member actuated by the electromagnet.

A further object is to provide a gun as described wherein the signal actuating member is cocked manually in a single-action type of pistol or is cocked by the trigger in a double-action type of pistol.

The invention will be best understood from the following detailed description taken together with the drawings, wherein:

FIG. 1 is a perspective view of a pistol embodying the invention shown aimed at a light target.

FIG. 2 is a side elevational view on an enlarged scale of the pistol, showing the interior thereof, part of the pistol case being removed.

FIG. 3 is a fragmentary sectional view on an enlarged scale taken on line 3—3 of FIG. 2.

FIG. 4 is a fragmentary side elevational view similar to part of FIG. 2, certain parts being broken away to show internal construction.

FIG. 5 is another side elevational view of the pistol similar to FIG. 2, parts of the pistol case being broken away, and the pistol being in firing condition.

FIG. 6 is a perspective view of a part of the pistol case.

FIG. 7 is a sectional view taken on line 7—7 of FIG. 6.

FIG. 8 is a side elevational view showing the inner side of the part of the pistol case of FIG. 6.

FIG. 9 is a diagram of an electric circuit which may be employed in the pistol.

FIG. 10 is a side elevational view similar to FIG. 2 of another pistol according to the invention.

FIG. 11 and FIG. 12 are fragmentary sectional views similar to parts of FIG. 10, showing the pistol in cocking and firing positions respectively.

FIG. 13 is a diagram of another signal actuating circuit for a pistol according to the invention.

FIG. 14 is a sectional view partially diagrammatic in form of part of the pistol employing the circuit of FIG. 13.

Referring to the drawing, there is shown in FIG. 1 a pistol having a case **21** formed by two separable hollow parts or sections **21***a*, **21***b*. The pistol has a barrel **26** formed by casing sections **26***a*, **26***b*. At the front of the barrel is lens **28** in mounting **29**. The lens passes light from a target light L to the interior of the barrel. The gun has a movable trigger **30** extending into trigger guard **32**. The gun has a handle or stock **34** at the rear of the case. The stock is formed by casing sections **34***a*, **34***b*. Front sight **36** is secured to the top of the front end of the barrel section **26***a*. Rear sight **38** is mounted at the upper rear edge of the case sections. Rear sight **38** has a central notch aligned with front sight **36** which has an offset upper portion extending axially of the barrel coplanar with mating edges of sections **26***a*, **26***b*.

FIGS. 2–5 show the hollow interior of pistol casing section **21***a*. In the semicylindrical barrel portion **26***a* is a semicylindrical bracket **40** adjustably secured longitudinally of the barrel by two screws **43** engaging the barrel wall and passing through slot **41** in the bracket. At the rear end of the bracket is a hollow housing **42** in which is disposed a photoelectric cell **44**. This cell is aligned with the optical axis O of the lens **28**. The cell has leads **45** connected to a transistor **46**, resistor **47** and an electromagnet **48**. The electromagnet has a movable armature **50** provided with a depending finger **52** which engages one end of a hammer lever **54** carrying a flexible arm **56** on which is mounted a hammer **57**. Lever **54** pivots on a pin **58** fixed in the side of a mounting plate **53** in the pistol case; see FIGS. 2 and 3.

Lever **54** has an outwardly extending finger **59** normally contacting an inwardly extending finger **61** of a cocking lever **60**. A spring **62** on pin **58** biases the lever **54** counterclockwise as viewed in FIG. 2 against finger **61**. Cocking lever **60** pivots about a pin **64** secured to the plate **53**. Lever **60** has a hole **63** through which pin **64** extends. Around the pin is a sleeve **65**; see FIG. 3. Coil spring **66** is coaxial with the sleeve **65** and bears on the body of lever **60**. The spring **66** has one end **68** engaged with a fixed pin **69** carried by plate **53**; see FIG. 4. The spring **66** biases the lever **60** counterclockwise as viweed in FIG. 2. Rotation of the lever is stopped by an extension **70** of the lever bearing against a finger **72** at the bottom edge of the plate **53**. Lever **60** can be tilted at an angle to plate **53** and moved axially of pin **64** laterally away from the plate **53** against tension in spring **66**, as indicated by the arrow in FIG. 3.

The cocking lever **60** is pivotable in a clockwise direc-

tion by slidable engagement of a flat pawl **74** carried by trigger plate **30***a*. The trigger plate pivots around a pin **76** and is biased in a clockwise direction by a spring **78** on pin **76**. One end of the spring **78** engages a pin **79** on the pawl. The other end of the spring engages a pin **80** on plate **53**. Pawl **74** has an upwardly and outwardly facing edge **75** slanted with respect to the plane of pawl **74**. Tail **82** of lever **60** has an inwardly and downwardly facing bottom edge **83** slanted with respect to the plane of lever **60** and located near edge **75**. When trigger **30** is retracted rearwardly, pawl **74** advances counterclockwise so that its tip **75'** engages the tail **82** of lever **60** and turns the lever clockwise. The tip **75'** of pawl **74** passes the tail **82** on complete retraction of trigger **30** while lever **60** rotates clockwise. On release of the trigger, the slanted edge **75** of the pawl **74** rotating clockwise slips past the slanted edge **83** of the lever tail **82** while the lever **60** is moved laterally slightly axially of pin **64** against tension in spring **66** to permit the pawl edge **75** to pass the lever tail **82**. A fixed pin **86** on plate **53** serves as a stop element to prevent trigger **30** from moving too far forwardly while the pawl is rotated clockwise after the trigger is released.

At the forward end of cocking lever **60** is a pin **90** on which is pivotally engaged the bottom end of a hook **92** which can move up and down as well as pivot angularly. A coil spring **94** on pin **90** biases the upper end of the hook against the side of a rotatable drum **96**. This drum is biased counterclockwise as viewed in FIGS. 2–5 by a coil spring **98** on shaft **100**. The drum has a bottom flange **102** carrying a pin **104** which contacts a pin **105** supported by stationary plate extension **53***a*. Pin **105** stops rotation of the drum in a counterclockwise direction. The drum has a circumferential cut-out defining two opposing lands **108** and **110**. Land **110** abuts the underside of an insulated piece **112** carried by a movable spring contact **114**. The contact is mounted in a stationary insulated holder **116** which also carries a leaf spring contact **118** normally spaced from contact **114**. Land **108** is near the upper end of hook **92**.

Hook **92** is raised and engages land **108** when lever **60** turns clockwise. Hook **92** descends and rotates the drum **96** clockwise when the lever **60** turns counterclockwise. Then land **110** raises the contact **114** to close an electric circuit with contact **118**. The circuit closure is only momentary since the hook slips down past the land **108** as the drum is rotated sufficiently clockwise by the descending hook to clear land **108**. Disengagement of the hook from land **108** occurs just after the tip **75'** of pawl **74** disengages from the tail **82** of clockwise rotated lever **60** upon retraction of the trigger. The released lever **60** then rotates counterclockwise and hook **92** descends to turn drum **96**. While hook **92** descends it slips clear of land **108**.

A gong or bell **120** is mounted in the casing just to the rear of electromagnet **48**. The bell is positioned to be struck by hammer **57** during firing operation of the pistol. Just to the front of the bell is a socket **122** in which is a lamp bulb **124**. The socket is connected in the circuit of the assembly.

A plurality of threaded posts **125**, **126** and **127** are provided for receiving screws which pass through holes **129** in the casing section **21***b* to secure the sections together; see FIGS. 6–8. A transparent plastic window **130** is fitted in an opening **132** in the casing section **21***b*. This window forms a transparent wall adjacent to the lamp bulb to make the flash of the lamp visible during firing of the pistol. If desired, the lamp can be mounted on the outside of the casing **21**. A battery **136** is removably held in a spring bracket **138** in stock section **34***a*. This battery is connected in the circuit of the pistol assembly.

FIG. 9 illustrates one form of circuit **200** which may be employed in operation of the pistol. Battery **136** is connected to contact **118** which, with movable spring

contact **114**, constitutes a momentary closing switch. The switch contact **114** is connected to one terminal **115** of the photoelectric cell **44** which, in this instance, is a photoconductive element whose electrical resistance varies upon change in incident light. The cell has the characteristic that its resistance is normally quite high and the resistance drops instantly when light of sufficient brightness impinges thereon. One terminal of coil **117** of the electromagnet **48** and one terminal of the lamp **124** are connected to terminal **115** of the cell **44** and to switch contact **114**.

Armature **50** is normally biased away from the pole **51** of the electromagnet by spring **50***a* shown in FIGS. 2–5. Transistor **46** has its base **140** connected to the other terminal of the cell **44** and to one terminal of resistor **47** which is connected in series with the cell across the terminals of battery **136**. The emitter **142** of the transistor is connected to the positive terminal of the battery and the collector **144** is connected to the other terminals of both the electromagnet coil **117** and lamp **124**.

FIGS. 2 and 5 show two successive stages of operation of the pistol. In FIG. 2, the assembly is shown in condition for firing. Suppose the pistol is aimed at a light source L of sufficient brightness and trigger **30** is retracted or squeezed slowly. The tip **75'** of pawl **74** will engage tail **82** of the cocking lever **60** which will pivot hammer lever **54** until the upper tip T of the lever **54** passes the depending finger **52** carried by armature **50**. At this instant the tip T will engage the finger **52** as shown in FIG. 2. This constitutes cocking of the pistol since hammer **57** is then turned away from the bell and is in a position to strike the bell when the lever **54** is released. As the trigger is retracted, the cocking lever **60** turning clockwise moves the hook **92** longitudinally upward until the hooked end engages on land **108**. Then after lever **60** is released by the pawl **74** and turns counterclockwise, the hook **92** moves down and turns the drum **96** clockwise until the hook slips past land **108**, so that land **110** momentarily closes contacts **114**, **118** as shown in FIG. 5. If light of sufficient brightness is reaching the photoelectric cell **44** through lens **28**, electric current will be passed by the cell and the transistor will be biased to conduct. An amplified pulse will be applied to the lamp **124** which will flash and the armature **50** will be attracted to pole **51**. This will disengage finger **52** from tip T of the hammer lever **54** and the hammer **57** will strike the bell. The lamp provides a visual signal of a hit visible through window **130** while the bell audibly signals a hit. As the tip **75'** of pawl **74** passes the tail **82** of the cocking lever **60**, the lever **60** is released to rotate counterclockwise and hook **92** is pulled down. The drum **96** after release from the hook rotates counterclockwise to its original position shown in FIGS. 2 and 4, and the contacts **114**, **118** open to open the lamp and electromagnet circuits and deenergize the transistor.

If insufficient light has been impinging on cell **44** at the instant when the switch contacts **114**, **118** closed, then the hammer lever **54** would remain cocked on finger **52** until the next time of firing. The lever would remain cocked until a hit was finally accomplished, whereupon the armature **50** would be retracted and the bell would be struck. Due to the momentary closure of the switch contacts **114**, **118**, it is possible to effect a hit indicated by sounding of the bell and lighting of the lamp only at the proper instant of firing. If the pistol is "panned" or swept around in an arc while the trigger is being squeezed, a hit will not be accomplished unless the pistol is actually directly aimed on the light target at the firing point of the pistol mechanism, i.e., when contacts **114**, **118** momentarily close.

FIGS. 10–12 illustrate a single-action type of pistol **20***a*. Parts of pistol **20***a* corresponding to those of the double-action pistol **20** are identically numbered. Pistol **20***a* has a hammer **202** which is pivotable on a pin **204** and is manually retractable for cocking. The hammer

is urged inwardly counterclockwise as viewed in FIGS. 10–12 by a spring **206**. At its lower end near pin **204** the hammer has a notch **210** which is engageable by a sear **21**. The rear is a lever pivotable on a pin **214'** and urged clockwise by a leaf spring **216** secured to the inner side of the stock wall **218**. The leaf spring engages the lower end of the rear while the upper end of the sear abuts the bottom end of the hammer. The upper end of the sear engages at notch **210** as shown in FIG. 11 when the hammer is retracted. A fixed pin **220** extending inwardly of the casing wall **221** prevents clockwise rotation of the sear when it is engaged by the hammer notch.

A bell **120***a* is mounted on wall **221** by a bracket **224**. Adjacent to this bell is a massive weight **226** carried at one end of a pin or rod **228**. The rod is slidably engaged between a fixed guide block **230** and a pair of spaced fixed pins **232**, **234** secured to the upper edge of wall **221**. The rod carries a depending finger **236** to which is secured one end of a spring **238**. The other end of the spring **238** is engaged on a fixed pin **239**. The spring **238** urges the rod **228** axially to the rear. The upwardly extending finger **52***a* of the electromagnet's armature **50'** engages the finger **236** and prevents full retraction to the rear of the rod. When the electromagnet **48***a* is energized and armature **50'** is attracted to pole **51'** of the electromagnet, then the finger **236** is disengaged from **52***a* and the free end of the rod projects rearwardly beyond block **230** as shown in FIG. 12. The rod is stopped by pin **234**.

Trigger **30'** has a foot **240** at its rear end which contacts the bottom end of the sear **214** when the trigger is retracted or turned counterclockwise against tension in spring **78**. The trigger pivots the sear counterclockwise to release it from the hammer as shown in FIG. 12. The trigger has a pawl **74'** disposed to contact insulation member **112***a* on spring contact **118***a*. When the trigger is retracted pawl **74'** depresses contact **118***a* to close a circuit with contact **114***a*. The closure is momentary since the pawl slips past member **112***a* as the trigger is further retracted toward the rear of the trigger guard **32** and the contacts open. When the trigger is released the pawl moves upwardly and brushes past member **112***a* to the position shown in FIG. 11 without touching or closing the contacts **114***a*, **118***a*.

In operation of the pistol **20***a*, the hammer will first be manually cocked from the position of FIG. 10 to the position of FIG. 11 where the sear is engaged. Then if the trigger is retracted hammer **202** will be released. If light of insufficient brightness impinges on photoelectric cell **44**, the electromagnet **48***a* will now be energized and the armature finger **52***a* will remain engaged with finger **236** of the rod **228**. The released hammer **202** will not strike the rod since the rod will not project beyond stop block **230**. If the trigger is retracted and closes contacts **114***a*, **118***a* at the instant when light of sufficient brightness impinges on the cell **44**, then the rod **228** will be released and will retract to firing position. Then as the trigger releases the hammer, the hammer will strike the rearwardly projecting end of rod **228** and the rod will be driven forwardly so that weight **226** strikes the bell. At the same time lamp **124** will light since it is connected in parallel with the energized electromagnet.

As the rod **228** is driven forwardly, the electromagnet **48***a* becomes deenergized and armature **50'** is released by pole **51'** so that the finger **52***a* again engages finger **236** and prevents retraction of rod **228** beyond the block **230**. If desired, weight **226** can be omitted so that the rod or pin **228** can strike the bell **120***a* directly after it is positioned to be struck by the hammer, upon energization of the electromagnet.

FIGS. 13 and 14 illustrate another circuit and firing mechanism. The trigger pawl **74***a* which turns on pin **76** is arranged to engage tail **82***a* at one end of a shutter bar **300**. The shutter bar is biased by a coil spring **301** upwardly axially in a tube **302** extending radially in pistol casing **21'** of a tube **304** extending through barrel **26'**. In tube **304** is mounted lens **28***a* and photoelecttric cell **44***a*. In front of the cell is a partition **305** having an aperture **306**. Bar **300** carries a shutter disk **308** normally blocking light from reaching the cell **44***a*. Cell **44***a* is connected in signal circuit **200***a*. Other parts of the circuit **200***a* correspond to those of circuit **200** (FIG. 9) except that switch contacts **114**, **118** are omitted.

As the trigger **30***a* is retracted against bias of spring **78** the pawl **74***a* will engage tail **82***a* as shown by dotted lines in FIG. 14 and will momentarily retract the shutter **308** away from the aperture. As soon as the shutter clears the aperture the pawl tip **75'** passes the tail **82***a* and the shuter tail is released to close the aperture. If at the instant that the shutter is clear of aperture **306** the pistol is aimed at a light target, then the signal circuit will be actuated. The resistance of cell **44***a* will decrease. Transistor **46***a* will be energized. The lamp **124** will flash and the armature **50** of electromagnet **48** will be attracted to pole **51** to release the hammer lever and sound the bell **120**. On release of the trigger the slanted edge portion **75** of the pawl will deflect the shutter tail **82***a* laterally slightly to permit the pawl to pass the tail **82***a* and return to the solid line position shown in FIG. 14.

The lamp **124** in all forms of the pistol described may be mounted on the exterior of the case, if desired, so as to be visible on both sides of the pistol when it flashes.

The invention as described above can be embodied in a single-action type of pistol or a double-action type of pistol. The trigger can be arranged to operate in conjunction with an electro-optical circuit to activate the circuit momentarily either by closing a switch in the circuit or by operating a shutter in the circuit. The signal device controlled by the electro-optical circuit can be a bell, lamp, counter, or other indicating means.

Although a limited number of embodiments of the invention have been described, the invention is not limited thereto and many modifications may be made without departing from the scope of the appended claims.

What is claimed and sought to be protected by Letters Patent of the United States is:

1. A target practice pistol, comprising a hollow casing having a tubular barrel at one end, a photoelectric cell in the casing exposable through said barrel to a light target external of said casing, said light target emitting light of sufficient brightness to activate said cell, circuit means connected to said cell, power supply means in said casing connected to said circuit means to energize the same, signal means connected to said circuit means and controllable thereby to indicate when said circuit means is energized, said circuit means including a switch having normally open contacts to keep said circuit means in a normally deenergized state, whereby said circuit means is energized only momentarily while light from said target impinges on said cell simultaneous with momentary closure of the switch contacts, a manually movable trigger disposed to cause the contacts of said switch to close automatically for only an instant at a time during each operative movement of the trigger and then to permit the switch contacts to open automatically and remain open during the remainder of said movement, so that said circuit means is energized by said power supply means only momentarily while the contacts of said switch are momentarily closed and while the light from said target impinges on said cell, whereby said signal means is actuated only during the momentary instants of closure of the switch contacts occurring while the light from said target impinges on said cell to indicate that the axis of said barrel is precisely aligned with said light target; said signal means comprising an electromagnet having a movable armature, a cocking lever pivotable by said trigger, means actuated by the cocking lever for closing

the contacts of said switch momentarily, a hammer lever pivotable by the cocking lever and engageable by said armature when the trigger is moved in one direction, a hammer carried by said hammer lever, and a bell disposed adjacent the hammer, whereby the hammer strikes the bell when the electromagnet is energized to move the armature and release the hammer lever, said electromagnet being energized only during the instants when said circuit means is energized.

2. A target practice pistol according to claim 1, wherein the cocking lever is movable laterally on its pivot, and wherein the trigger has means slidably engageable with the cocking lever to move the same laterally when the trigger is moved in a direction opposite from said one direction so that the trigger clears the cocking lever to return to its original position prior to movement.

3. A target practice pistol according to claim 1, wherein said circuit means and said signal means are entirely contained within said casing, so that aiming and firing of said pistol substantially precisely simulates aiming and firing of a bullet discharging pistol.

4. A target practice pistol, comprising a hollow casing having a tubular barrel at one end, a photoelectric cell in the casing exposable through said barrel to a light target external of said casing, said light target emitting light of sufficient brightness to activate said cell, circuit means connected to said cell, supply means in said casing connected to said circuit means to energize the same, signal means connected to said circuit means and controllable thereby to indicate when said circuit means is energized, said circuit means including a switch having normally open contacts to keep said circuit means in a normally deenergized state, whereby said circuit means is energized only momentarily while light from said target impinges on said cell simultaneous with momentary closure of the switch contacts, a manually movable trigger disposed to cause the contacts of said switch to close automatically for only an instant at a time during each operative movement of the trigger and then to permit the switch contacts to open automatically and remain open during the remainder of said movement, so that said circuit means is energized by said power supply means only momentarily while the contacts of said switch are momentarily closed and while the light from said target impinges on said cell, whereby said signal means is actuated only during the momentary instants of closure of the switch contacts occurring while the light from said target impinges on said cell to indicate that the axis of said barrel is precisely aligned with said light target; said signal means including an electromagnet having a movable armature, a rod having a portion engageable by said armature when the electromagnet is deenergized to hold the rod in a retracted position, a weight carried by said rod, a bell disposed adjacent the weight for sounding when the weight is driven against the bell, a manually pivotable hammer disposed to strike the rod when the rod is in an extended position near the hammer, the rod assuming the extended position when the electromagnet becomes energized to move the armature out of engagement with the rod, and a sear pivotable by the hammer and engageable therewith to hold the hammer apart from said rod, said trigger having a portion disposed to pivot the sear and release the hammer during movement of the trigger in one direction thereof.

5. A target practice pistol, comprising a hollow casing having a tubular barrel at one end, a photoelectric cell in the casing exposable through said barrel to a light target external of said casing, said light target emitting light of sufficient brightness to activate said cell, circuit means connected to said cell, power supply means in said casing connected to said circuit means to energize the same, signal means connected to said circuit means and controllable thereby to indicate when said circuit means is energized, said circuit means including a switch having normally open contacts to keep said circuit means in a normally deenergized state, whereby said circuit means is energized only momentarily while light from said target impinges on said cell simultaneous with momentary closure of the switch contacts, a manually movable trigger disposed to cause the contacts of said switch to close automatically for only an instant at a time during each operative movement of the trigger and then to permit the switch contacts to open automatically and remain open during the remainder of said movement, so that said circuit means is energized by said power supply means only momentarily while the contacts of said switch are momentarily closed and while the light from said target impinges on said cell, whereby said signal means is actuated only during the momentary instants of closure of the switch contacts occurring while the light from said target impinges on said cell to indicate that the axis of said barrel is precisely aligned with said light target; said signal means comprising an electromagnet, a movable member adjacent the electromagnet, said electromagnet having an armature engaged with said member when the electromagnet is deenergized, a bell disposed adjacent to the movable member, a manually pivotable hammer disposed to strike said movable member for sounding the bell, spring means engaged with said member for positioning the same to be struck by the hammer when the electromagnet becomes energized to release said member, a sear pivotable by the hammer and engageable therewith to hold the hammer apart from said member, said trigger having a portion disposed to pivot the sear and release the hammer during movement of the trigger in one direction thereof.

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