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Foster

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[54] **TARGET THROWING DEVICE HAVING AUTOMATICALLY VARYING TARGET THROWING ANGLES**

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[21] Appl. No.: **303,752**

Related U.S. Application Data

[63] Continuation of Ser. No. 57,206, July 22, 1970, abandoned.

[52] **U.S. Cl.** **124/9,** 124/36, 124/43, 124/32

[51] **Int. Cl.** **F41b 3/04**

[58] **Field of Search** ..... 124/9, 8, 36, 43, 30 R, 124/32

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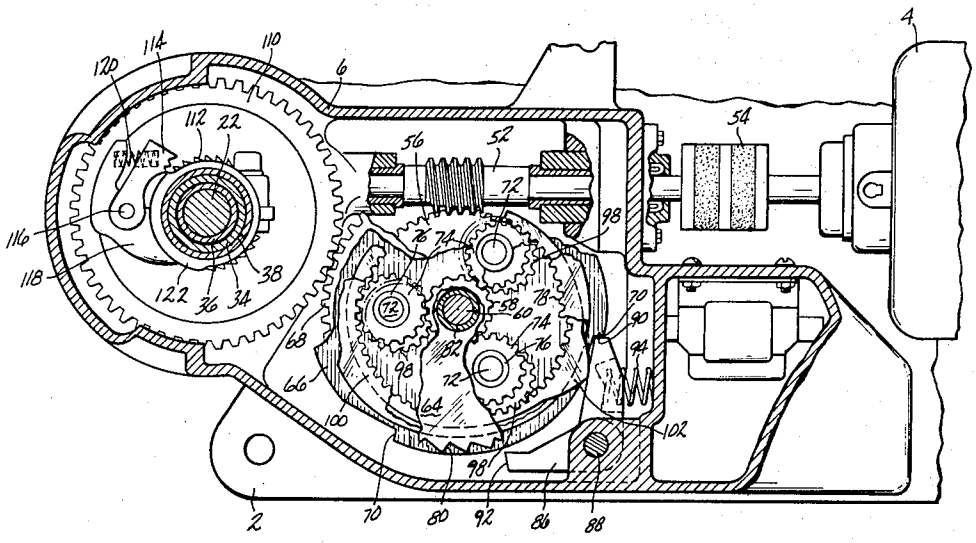
[57] **ABSTRACT**

A target launching device that as a target throwing arm that is held in a cocked position during the oscillation of the throwing arm. A control device is used to engage and disengage the drive mechanism that is used to oscillate the throwing arm. A sun gear is drivingly connected to the motor, the planetary gears and the interrupter gear. The interrupter gear is rotatable and interrupts for a short period of time the operation of the control device so that the drive mechanism ceases to operate, resulting in the stopping of the oscillation of the throwing arm.

9 Claims, 7 Drawing Figures



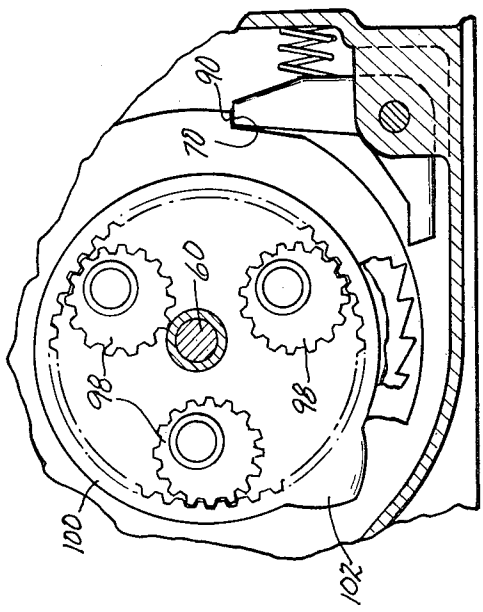


FIG-3

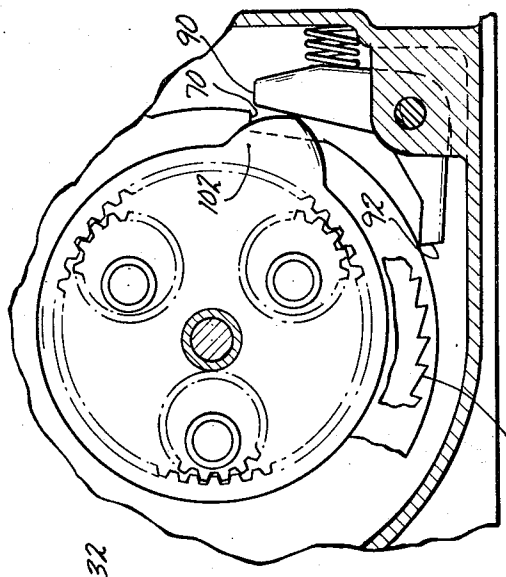


FIG-4

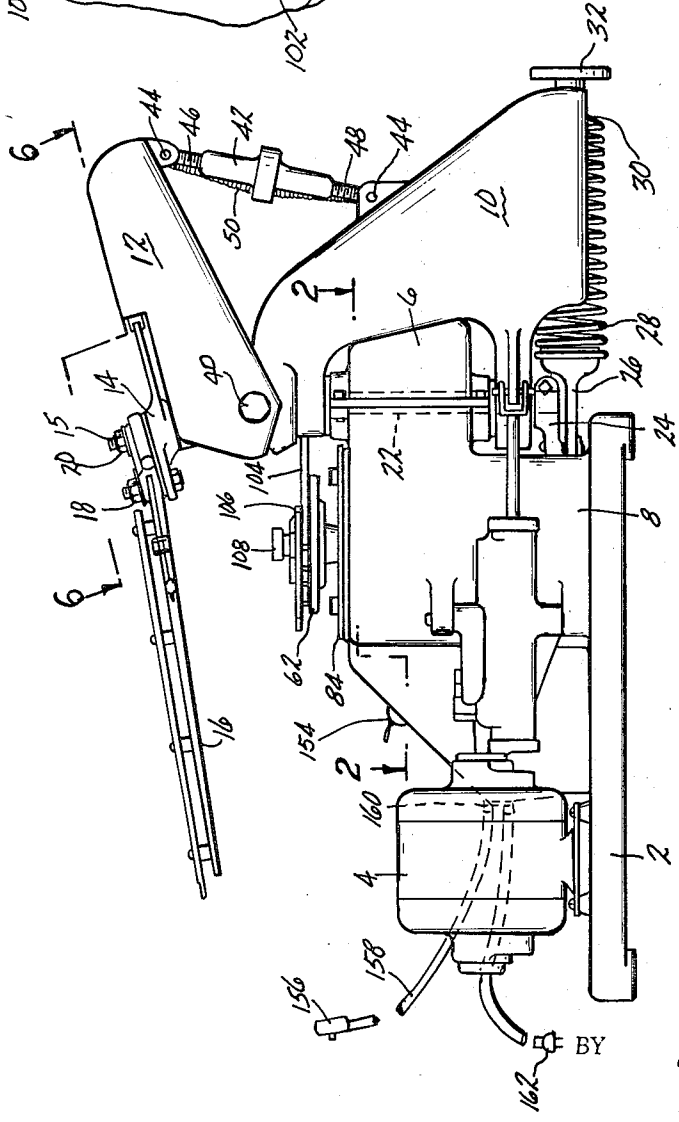


FIG-1

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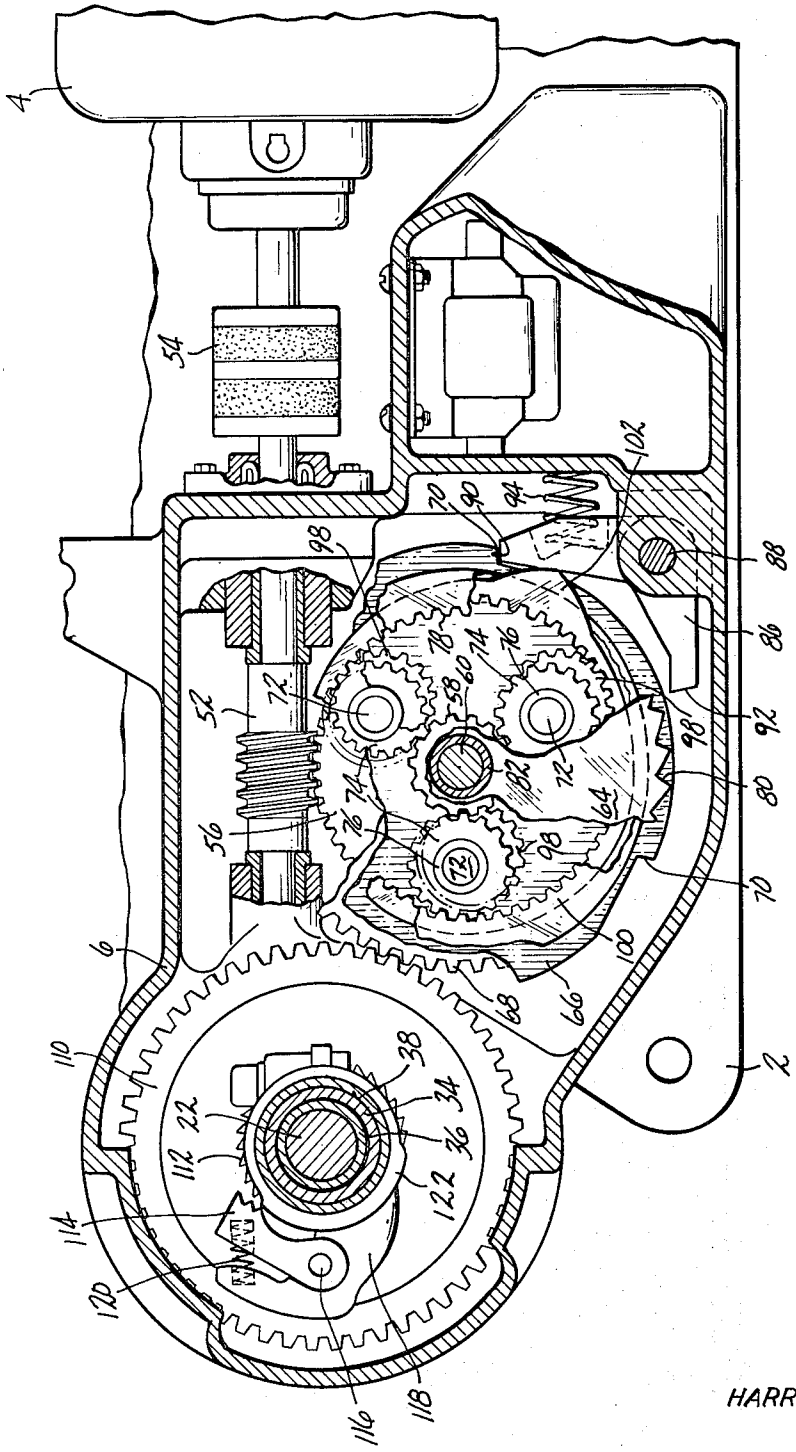

FIG-2

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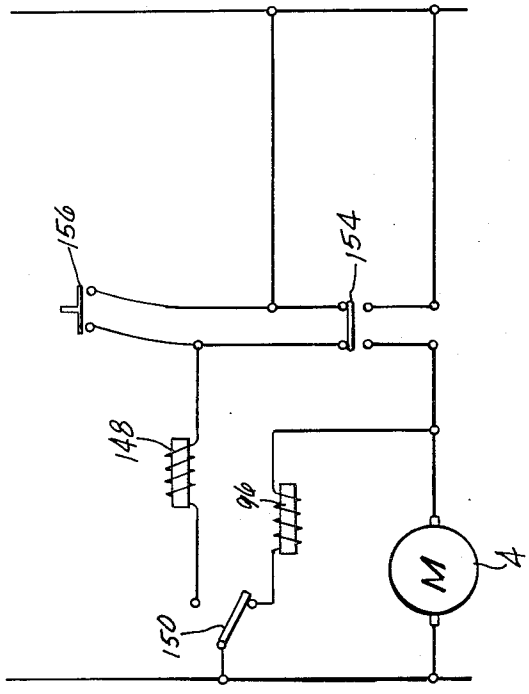

FIG-7

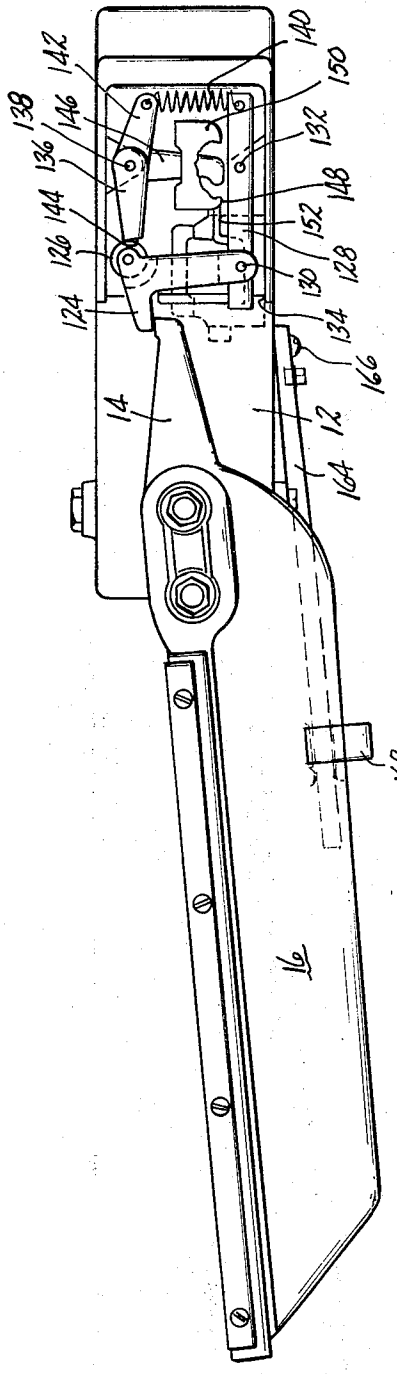

FIG-6

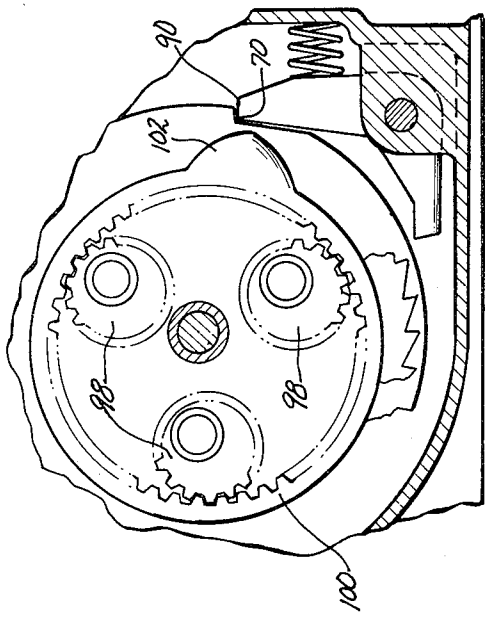

FIG-5

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TARGET THROWING DEVICE HAVING AUTOMATICALLY VARYING TARGET THROWING ANGLES

This is a continuation of application Ser. No. 57,206, filed July 22, 1970, now abandoned.

This invention pertains to target traps of the general type used to launch targets such as clay pigeons, and more specifically to power driven traps having a launch angle-varying mechanism. This invention, more specifically, is an improvement of a trap of the type shown in my U.S. Pat. No. 2,666,424, issued Jan. 19, 1954, and the disclosure thereof is specifically incorporated herein by reference.

The trap disclosed in my above-noted U.S. Pat. No. 2,666,424 was designed to launch or throw targets at a variety of different angles which were intended to be unpredictable by a shooter, thereby severely testing the skill of the shooter. It has been discovered, however, that certain shooters had studied the delay and rhythm of the trap sufficiently to be able to predict the approximate direction of successive target launchings to a greater degree than could be expected by mere chance. This ability thus gave them an advantage over othe shooters who were less skillful in this respect, which advantage was not based on their shooting ability alone. The Amatuer Trapshooting Association has thus ruled that all traps used in registered shoots must be equipped with an interrupting device to prevent shooters from predicting the direction of successive launches.

This invention is intended to nullify the ability of a shooter to predict the launch angle by studying the rhythm of the trap, by providing a mechanism which randomly interrupts the oscillation of the target launching arm support so that successive launches are not the result of any predictable movement of the launching arm support. The ability of the device of this invention to interrupt the launching arm support oscillation is accomplished by a surprisingly simple mechanical modification of the trap disclosed in U.S. Pat. No. 2,666,424 which does not harmfully affect the operation or durability of the trap.

The trap employs a pawl which selectively engages one of two driving dics, engagement of the pawl with one of the discs causing the trap to be cocked, and engagement of the pawl with the other of the discs causing the cocked throwing arm and its support to oscillate, thus continuously changing the angle of the next launch. The trap further employs an interrupter which is operative to selectively move the pawl out of engagement with this last mentioned disc to stop oscillation of the launch arm support, the interrupter being operative at varying intervals. Thus a given launch sequence may include no interruption of oscillation, or may include an interruption having a duration which is unpredictable in length and which occurs at an unpredictable time.

It is, therefore, an object of this invention to provide a trap for launching targets at a number of different angles which are not predictable by a shooter who has studied previous target launches by the trap.

It is a further object of this invention to provide a trap of the character described having a mechanism for oscillating the launching arm support of the trap after cocking the launching arm thereon, and further having

an interrupter mechanism operable to stop the oscillation for a variable timed period.

It is yet another object of this invention to provide a trap of the character described wherein the interrupter mechanism may operate or may be prevented from operating in any given launch cycle thereby making previous launch observations no critereon for predicting the angle at which a subsequent launch will be made.

These and other objects and advantages of this invention will become more readily apparent from the following detailed description of a preferred embodiment of the invention when taken in conjunction with the accompanying drawings, in which:

FIG. **1** is a side elevational view of a preferred embodiment of the trap of this invention;

FIG. **2** is a sectional view of the trap taken along line **2—2** of FIG. **1** with parts broken away for clarity;

FIG. **3** is a sectional view similar to FIG. **2** but at a lower level with parts removed for clarity, and showing the position of the various parts as they appear when the launch arm support is oscillating;

FIG. **4** is a sectional view similar to FIG. **3,** but showing the interrupter as it acts to stop oscillation of the launching arm support;

FIG. **5** is a sectional view similar to FIGS. **3** and **4** but showing the interrupter as it passes the pawl without interrupting the oscillation of the launch arm support;

FIG. **6** is a plan view partly in cross section taken along line **6—6** of FIG. **1,** showing the target carrier or launching arm in a cocked position and the release mechanism on the target carrier or launching arm support; and

FIG. **7** is a diagrammatic view showing the electrical control system for the trap of FIG. **1.**

Referring now to FIG. **1,** the trap has a base **2** on the rear end of which is mounted an electric motor **4.** A gear housing **6,** which encloses the entire gear mechanism, is attached to the base **2** by means of a gear housing support **8.** On frame **10,** which is journalled for oscillatory movement about a vertical axis on the forward portion of the housing **6,** there is mounted a carrier arm support **12.** A carrier arm **14** is mounted on a shaft **15** which is journalled in the carrier arm support **12.** The target carrier or throwing arm **16** is mounted on the carrier arm **14** by means of bolts **18** and **20,** the latter of which is threaded onto the upper end of the carrier shaft **15.** The carrier shaft **15** is keyed to the carrier arm **14** to prevent any rotary movement of the carrier arm **14** about the shaft **15.** The carrier shaft **15** is connected to a main shaft **22,** having a vertical axis, by means of a universal joint (not shown) so that elevation of the target carrier can be adjusted.

The main shaft **22** extends through the bottom of the frame **10** and at the bottom end of the main shaft **22** there is mounted a crank **24.** A connecting member **26** is movably connected at one end to the crank **24,** with the other end of the connecting member **26** being secured to one end of a main spring **28.** The other end of the mainspring **28** is secured to a plug **30** carrying an adjusting screw **32,** having a T-shaped head. The adjusting screw **32** can be turned to vary the tension in the spring **28.** The main shaft **22** at its upper end is journaled in a sleeve **34** having shaft bearings **36** fixed to the sleeve **34** and sleeve bearing **38** fixed to the housing **6,** the sleeve **34** being keyed to the frame **10** (see FIG. **2**). The frame **10** is therefore mounted for oscillation on the housing **6.** The frame **10** and support **12** are

joined by means of trunnion bearings **40.** The trunnions **40** thus permit the support **12** to be moved with respect to the frame **10** so as to adjust the angle of the carrier shaft **15** with respect to the main shaft **22.**

An internally threaded adjustment member **42** is fastened at one end to the carrier arm support **12** and to the frame **10** at the other end by means of pins **44** and adjustment screws **46** and **48** respectively. A spring **50** is stretched between the frame **10** and the carrier arm support **12** and fastened at its ends by the pins **44.** The spring **50** rests in a notch in the member **42** and prevents it from turning except when an adjustment in elevation of the carrier arm is to be made by turning the member **42,** at which time the spring **50** is readily snapped out of the notch.

A worm shaft **52** (see FIG. 2) is journaled in the gear housing **6** and is coupled to the motor **4** by means of a flexible coupling **54.** The worm shaft **52** engages a worm gear **56.** A sun gear **58,** having a sleeve extension to which the worm gear **56** is keyed, has internal bearings with which it is journaled upon an angle-changing disc shaft **60.** Angle-changing disc **62** (FIG. **1**) is keyed to a ring gear disc **64** and to the angle-changing disc shaft **60.** The sun gear **58** has a bearing upon which is journaled a driving gear disc **66** having a hub on which is mounted the driving gear **68.** The edge of the driving gear disc **66** is provided with a plurality of notches **70** unevenly spaced about its periphery. For example, one notch may be separated 110° from a first notch to one side, and 140° form a second notch to the other side.

The driving gear disc **66** carries three studs or posts **72** on each of which is mounted a planet gear **74** which turns on a planet gear bearing **76.** The planet gears **74** engage an internal ring gear **78** which is fixed to the ring gear disc **64,** the latter of which is provided with circumferentially spaced teeth or serrations **80.** The ring gear disc **64** is keyed to the hub **82** the angle-changing disc **62** and to the angle-changing disc shaft **60,** as noted above. The hub **82** is journaled in a top closure plate **84** of the gear housing **6.** A control pawl **86** is fixed to a shaft **88** which is journaled in the gear housing **6.** The control pawl **86** has a first pawl tip **90** which is adapted to engage the notches **70** in the driving gear disc **66,** and a second pawl tip **92** adapted to engage the teeth **80** of the ring gear disc **64.** The control pawl **86** is so constructed that either pawl tip **90** may engage notches **70,** or pawl tip **92** may engage teeth **80,** but so that both tips **90** and **92** are never simultaneously in such engagement. It will be noted, however, that both tips **90** and **92** can be simultaneously out of such engagement, as will be further explained hereinafter. A pawl operating lever (not shown) is fixed to the lower end of the shaft **88.** A control operating spring **94** is a compression spring bearing between the housing **6** and the pawl tip **90** tending to force the latter at all times into engagement with the notches **70.** A control solenoid **96** (see FIG. **7**), which is mounted on the gear housing support **8,** is operative, when activated, to act upon the pawl operating lever to withdraw the tip **90** from engagement with the notches **70** and engage the tip **92** with teeth **80.**

A plurality of auxliary planet gears **98** are secured to and rotate with the planet gears **74.** The auxiliary planet gears **98** each has a toothed exterior which is eccentric with respect to the axis about which they rotate, each gear **98** having an axial plane of maximum eccentricity. Each gear **98** is oriented so that the axes of the axial planes of maximum eccentricity are at all times parallel to each other, as is apparent from FIGS. **2, 3, 4** and **5.** The teeth of the auxiliary eccentric planet gears **98** mesh with an internal interrupting ring gear **100** having a radially enlarged protuberance **102** on the exterior thereof. Rotation of the gears **98,** due to the eccentricity of their toothed exteriors, cause the interrupting gear **100** to rotate and oscillate with respect to the axis of the shaft **60.** FIGS. **3, 4** and **5** illustrate different relative positions that the interrupting gear **100** can assume as the auxiliary planet gears **98** rotate. FIG. **4** shows the operation of the interrupting gear **100** as it acts to bring the protuberance **102** into contact with the pawl tip **90** thereby moving the latter out of engagement with the notch **70.** It is noted that the pawl tip **92** is not sufficiently moved to bring it into engagement with the teeth **80.** FIGS. **2, 3** and and **5** show various other positions of the interrupting gear **100** wherein it is not operative to disengage the pawl tip **90** from the notch **70.** It is noted that, while eccentric planet gears cooperating with the interrupting gear are preferred to lift the pawl tip **90** out of engagement with the notch **70,** other mechanisms, such as non-eccentric planet gears associated with an interrupting gear could be used without departing from the spirit of the invention. Furthermore, while three eccentric planet gears are preferred, othe numbers of such gears may be used without departing from the spirit of the invention. When three auxiliary planet gears are used, the number of teeth on the planet gears and the number of teeth on the interrupting ring gear must all be divisible by three in order that the axes of maximum eccentricity on the planet gears will at all times during rotation remain parallel.

An angle-changing link **104** is attached at one end to a frame **10** (see FIG. **1**), and at the other end carries a windage-adjusting hub **106** having an eccentric hole in which an adjusting screw **108** is journaled. The angle-changing disc **62** includes a number of spaced holes into which the screw **108** can be threaded. By changing the screw **108** from one hole to another, the eccentricity through which the link **104** operates can be changed. More specific details of the angle changing mechanism of the trap are disclosed in my above-noted U.S. Pat. No. 2,666,424.

A cocking gear **110,** which is mounted for rotary movement about the main shaft **22** (see FIGS. **1** and **2**), is keyed to a cocking ratchet **112.** A cocking pawl **114** is mounted for movement about a pivot **116** on a cocking pawl arm **118** which is keyed to the main shaft **22.** A cocking pawl compression spring **120** bearing between the cocking pawl arm **118** and the pawl **114** tends to force the latter into engagement with the cocking ratchet **112.** The bottom part of sleeve **38** is formed as a cam **122** which serves to hold the pawl **114** out of engagement with the ratchet **112** when the target carrier or launching arm is in its cocked position.

Referring now to FIG. **6,** a sear **124** is provided with a roller **126** and is hinged to a bar **128** by means of a pin **130.** The bar **128** is mounted for movement about a pivot **132** on the carrier arm support **12** for a short distance permitted by a slot **134** in the carrier arm support **12.** In the cocked position, the trigger **136** bears against the roller **126** holding the sear **124** in position against an extension of the carrier arm **14,** the trigger **136** being mounted for movement about a pivot **138** on the carrier arm support **12.** A tension spring **140** is fas-

tened at one end to a trigger spring arm **142** and at the other end to the sear bar **128** thus tending to hold the trigger end **144** in contact with the roller **126.** A trigger operating arm **146,** when pushed by a release solenoid **148,** which is mounted on the carrier arm support **12,** moves the trigger **136** about the pivot **138** causing the trigger end **144** to move out of contact with roller **126.** The sear **124** is then free to pivot on the pin **130** to release carrier arm **14** and launch the target. The control switch **150,** mounted on the carrier arm support **12,** has an arm **152** bearing on the bar **128** so that switch **150** is operated as bar **128** moves to its two positions.

The master switch **154** is mounted on the gear housing support **8** (see FIG. 1). A release switch **156,** which is hand-operated and designed to permit momentary electrical connection to fire the trap, is provided with a cord **158** and a plug **160** adapted to fit a receptacle mounted on the gear housing support **8.** A power inlet plug **162** is adapted to fit a receptacle mounted in the gear housing support **8.** One side of the power supply is connected to the switch **150** and to one side of the motor **4** (see FIG. **7**). The other side of the motor **4** is connected to one side of the control switch **150,** which is a double pole-double throw switch. The opposite contact of the control switch **150** is connected to one side of the release switch **156** and to the release solenoid **148.** The other side of the release switch **156** and the other side of the master switch **154** are connected to the other side of the power supply. The master switch **154** is a double throw switch which when not connecting the power source to the motor, shunts the release switch **156,** as illustrated in FIG. **7.**

The trap includes a snubber mechanism identical to that disclosed in my aforementioned U.S. Pat. No. 2,666,424. By positioning the target on the target carrier **16,** a rod **164** is secured to the carrier arm support **12** by means of a bolt **166** (see FIG. 6). A pivoted target-stop finger **168** is adjustably mounted on the bar **164** for contact with the target. The finger **168** thus serves as a stop for the target on the target carrier **16.**

The trap operates in the following manner. The plug **162** is plugged into the trap receptacle after connecting to an electric power line, and the master switch **154** is turned on. The motor **4** is thus started, driving the worm shaft **52,** the worm gear **56,** and the sun gear **58.** When the switch **154** is turned on, the solenoid **96** is also energized causing the pawl tip **92** to engage the teeth **80** and hold the ring gear **78** stationary. With the sun gear **58** rotating and the ring gear **78** held stationary, the planet gears **74** are caused to revolve about the sun gear **58** thus turning the driving gear **68,** cocking gear **110,** and the cocking ratchet **112.** Furthermore, the auxiliary planet gears **98** revolve about the sun gear **58** with the planet gears **74** causing the interrupting gear **100** to rotate and oscillate about the axis of the shaft **22.** The crank **24** keyed to the bottom of the main shaft **22** stretches the main spring **28** during such rotation, and the carrier shaft **15,** carrier arm **14,** and target carrier **16** are rotated until the projection on the arm **14** engages the sear **124.** When the sear **124** is thus engaged, the bar **128** moves the arm **152** of the control switch **150** disconnecting the control solenoid **96** from the power source and connecting the release switch **156** and release solenoid **148** to the power circuit. When the control solenoid **96** is cut out of the circuit by the switch **150,** the spring **94** acting on the pawl **86,** disengages the pawl tip **92** from the teeth **80** of the ring gear **78** thus permitting the ring gear **78** to turn and simultaneously brings the pawl tip **90** toward a position to engage a notch **70** in the driving gear disc **66** to stop movement of the driving gear **68** and ratchet **112** on the cocking gear **119.** The pawl tip **90** will thus be moved into a position where it can engage a notch **70** unless the protuberance **102** on the interrupter **100** is in position, such as is shown in FIG. **4,** to block such movement.

During the rotation of the main shaft **22** just prior to the time that the projection on the carrier arm **14** engages the sear **124,** the crank **24** keyed to the bottom of the main shaft **22** reaches a point past center and the cocking pawl **114** reaches a position where the cam **122** disengages the pawl **114** from the ratchet **112,** and the completion of the cocking stroke bringing the projection on the arm **14** into contact with the sear **124** is accomplished through the action of the main spring **28.** The spring **140** is under tension at all times and returns the trigger **136** to its normal position blocking the roller **126,** immediately upon release of the switch **156** and prior to completion of the cocking cycle. When the arm **14** contacts the sear **124,** the roller **126** moves across the flat end **144** of the trigger **136** and moves the bar **128** to operate the switch **150** and de-energize the solenoid **96.** At this point, therefore, the drive gear disc **66** is held stationary by the pawl tip **90** (provided that the protuberance **102** has not prevented this), and the disc **66** also holds the driving gear **68,** cocking gear **110,** and the ratchet **112** stationary, while the pawl **114** is held out of engagement with the ratchet **112** by the cam member **122.**

When the spring **94** operates to move the pawl tip **90** into position to engage a notch **70** on the disc **66,** the pawl tip **92** is pushed out of engagement with the teeth **80** on the ring gear disc **64** thereby permitting the latter and the ring gear **78** to turn and be driven by the planet gears **74,** whose studs **72** are mounted on the disc **66,** and no longer revolve about the shaft **60.** It is noted that the disengagement of the pawl tip **92** from the teeth **80** will occur even when the protuberance **102** blocks the pawl tip **90** from engaging a notch **70,** however, when the latter occurs, the ring gear **78** will not be driven by the planet gears **74** because the disc **66** will not be locked against rotation itself. At such time when the pawl tip **92** is disengaged from the teeth **80,** and the pawl tip **90** is engaging a notch **70,** the trap will be cocked and the sun gear **58** through the planet gears **74** will drive the ring gear **78** thus turning the disc **64** and the angle-changing disc **62.** Rotation of the angle-changing disc oscillates the frame **10** through action of the angle-changing link **104.** The main shaft **22,** cocking pawl arm **118,** carrier shaft **15,** carrier arm support **12** and all parts mounted thereon, including the target carrier **16,** oscillate with the frame **10** through a large or small angle depending upon the position of the spread adjusting screw **108.** With the trap in the cocked position and the frame **10** oscillating, a target is placed on the target carrier **16** against the stop **168** and the trap is ready for firing. The target is thrown merely by momentarily closing the release switch **156.**

As previously noted, the frame **10** will oscillate so long as the pawl tip **90** engages a notch **70** on the disc **66** to hold the latter against rotational movement. As the planet gears **74** cause the ring gear **78** and the ring gear disc **64** to rotate, the auxiliary planet gears **98** also cause the interrupter ring gear **100** to rotate about the

axis of the shaft **60.** If during movement of the interrupter ring gear **100,** the protuberance **102** thereon is moved into contact with the pawl tip **90,** the latter will be lifted out of engagement with the notch **70** and the disc **66** will then be free to rotate. The latter condition is shown in FIG. **4.** Various friction forces will prevent rotation of gear **78** and disc **64** and cause the interrupter ring gear **100** to reverse its movement so that the protuberance will be moved out of contact with the pawl tip **90** and the spring **94** will move the pawl tip **90** back into position to engage the next notch **70;** however, when the protuberance **102** has acted upon the pawl tip **90** to disengage it from a notch **70,** the oscillation of the frame **10** will stop because of said friction forces, until the next notch **70** is engaged by the pawl tip **90.** In this manner, oscillation of the frame **10** will be interrupted in a random manner so that a shooter cannot determine the rhythm of the trap oscillation based on observation of previous launches. For any given launch, the oscillation of the frame **10** may or may not be interrupted, and if interrupted, the interruption can occur at any time period after the trap is cocked. More than one interruption can occur in any given launch. It is noted that the exact angle at which the target is thrown depends upon the position to which the frame **10** and target carrier **16** have oscillated at the instant the carrier **14** is freed through actuation of the trigger **136.**

When the release switch **156** is momentarily closed, the release solenoid **148** is energized pushing on the arm **146** of the trigger **136,** further tensioning the spring **140** and moving the trigger end **144** out of contact with the roller **126** on the sear **124.** The sear **124** then moves about the hinge pin **130** momentarily out of engagement with the carrier arm **14,** leaving the latter free to rotate and throw the target from the target carrier **16** through the action of the main spring **28** rotating the main shaft **22** and the carrier shaft **15.** When the arm **14** leaves the sear **124,** the spring **140** causes the bar to move about the pivot **132** for a short distance permitted by the slot **134,** which movement permits action of the control switch **150** to connect the control solenoid **96** into the circuit and to cut the switch **156** and release solenoid **148** out of the circuit. The instant that current to the solenoid **148** is turned off, the tension on the spring **140** operates to move the trigger **136** so that the end **144** thereof, by its cam action on the roller **126,** again moves the sear **124** into position for engaging the carrier arm **14.** When the solenoid **96** is energized, it pulls the pawl-operating lever thus rotating the shaft **88** and pawl **86** to pull the pawl tip **90** from the notch **70** and cause the pawl tip **92** to engage the teeth **80.** The ring gear **78** is thus held stationary and oscillation of the frame **10** is stopped. After the carrier arm **14** has completed its target throwing movement, the trap is ready to be cocked again in the manner previously described or automatically when the pawl **114** engages the revolving ratchet **112.**

It is apparent that the angle and direction of target launch, which are controlled by the frame oscillation, will be unpredictable by a shooter who has observed previous launches because the interrupter gear will interrupt oscillation of the frame at various times and for various durations. Furthermore, certain launch cycles will include no interruption at all of the frame oscillation. Presently existing traps of the type shown in my U.S. Pat. No. 2,666,424 can be readily adapted to include the interrupting gear and auxiliary planet gears used to drive the interrupting gear at minimal cost. The combination of eccentricity of the auxiliary planet gears, the odd ratios of gearing, the uneven spacing of the notches, and the normal but often unequally spaced interruptions during firing and cocking all contribute to make the sequence of target launch directions quite random and unpredictable. The interrupter is smoothly operating and imposes minimal wear on the various components of the trap.

Since many changes and variations of the disclosed embodiment of the invention may be made without departing from the inventive concept, it is not intended to limit the invention otehrwise that as required by the appended claims.

What is claimed is:

1. A target launcher comprising:

a. target launching arm means for launching a target into the air;

b. means connected to said arm means for cocking the latter;

c. sear means engageable with said arm means for releasably retaining said arm in a cocked position;

d. oscillator means connected to said arm for imparting continuous oscillatory movement to said arm means when the latter is in said cocked position;

e. a motor;

f. first means powered by said motor for driving said oscillator means;

g. control means for engaging said first means to cause the latter to drive said oscillator means; and

h. automatic interrupter means powered by said motor and operable for automatically causing temporary disengagement of said control means from said first means during continuous operation of said motor so as to temporarily stop oscillation of said arm means while the arm means remains in said cocked position.

2. The target launcher of claim **1,** wherein said interrupter means includes a sun gear driven by said motor and a plurality of planet gears driven by said sun gear, and further includes an interrupter ring gear in engagement with and rotatably driven by said planet gears about the axis of said sun gear, said ring gear having protuberance means of limited circumferential extent operative for contacting said control means during rotation of said ring gear and deflecting said control means out of engagement with said first means for a limited time period.

3. The target launcher of claim **2,** wherein each of said planet gears has a toothed periphery which is eccentric with respect to the axis thereof, and which toothed periphery meshes with said ring gear to provide means for imparting both orbiting and oscillatory movement to said protuberance means during rotation of said ring gear.

4. A target-throwing trap comprising:

a. a target-throwing arm movable from a cocked position through a target-throwing stroke;

b. spring means connected to said arm to move the latter through said target-throwing stroke;

c. cocking means connected to said arm and operable to cock the latter;

d. oscillating means connected to said arm for continuously oscillating the latter to vary the angle and direction at which a target will be launched at any given time;

e. control means for engagement with said oscillating means for causing the latter to oscillate said arm; and

f. automatic interrupter means for automatically interrupting the operation of said control means, said automatic interrupter means including an interrupter gear, said interrupter gear including means forming a restricted portion thereof for engaging said control means at periodic intervals to disengage said control means from engagement with said oscillating means, and said interupter gear having a plurality of rotatable planetary gear means drivingly connected to said interrupter gear for rotating said interrupter gear.

5. The target trap of claim **4,** wherein said planetary gear means includes a pluralty of planetary gears, each of which has an eccentric toothed periphery engaging said interrupter gear to oscillate as well as rotate said interrupter gear.

6. The target trap of claim **5,** wherein said planetary gears each have an axial plane of maximum eccentricity, and said planes are parallel at all times during rotation of said planetary gears.

7. The target trap of claim **6,** wherein said planetary gears are three in number and each of said planetary gears has a total number of peripheral teeth which number is divisible by three.

8. A target launcher comprising:

a. target launching arm means for launching a target into the air;

b. means connected to said arm means for cocking the latter;

c. sear means engageable with said arm means for releasably retaining said arm in a cocked position;

d. oscillator means connected to said arm for imparting oscillatory movement to said arm means when the latter is in said cocked position;

e. a motor;

f. first means powered by said motor for driving said oscillator means;

g. control means for engaging said first means to cause the latter to drive said oscillator means; and

h. automatic interrupter means for automatically interrupting the operation of said control means, said automatic interrupter means including an interrupter gear, said interrupter gear including protuberance means of limited circumferential extent for engaging said control means at periodic intervals to disengage said control means from engagement with said first means, said interrupter gear having a plurality of rotatable planetary gear means drivingly connected to said interrupter gear for rotating said interrupter gear, a sun gear, said motor drivingly connected to said sun gear, and said sun gear being drivingly connected to said planetary gear means.

9. The target launcher of claim **8,** wherein each of said planetary gear means includes a plurality of planetary gears each of which has a toothed periphery which is eccentric with respect to its axis, and each of said planetary gears having a toothed periphery which meshes with said ring gear to provide means for imparting both orbiting and oscillatory movements to said protuberance means during rotation of said interrupter gear.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,821,945 Dated July 2, 1974

Inventor(s) Harry C. Foster

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Abstract, line 1, please delete "as" and insert --has--;

In Col. 1, line 25, please delete "othe" and insert --other--;

line 46, please delete "dics" and insert --discs--;

In Col. 3, line 37, after "82" please insert --of--;

In Col. 4, line 27, please delete "othe" and insert --other--;

In Col. 6, last line, after "rotate" please insert --and oscillate--;

In Col. 7, line 27, after "carrier" please insert --arm--;

In Col. 8, line 14, please delete "otehrwise that" and insert --otherwise than--;

In Claim 1, line 23, after "arm" please insert --means--;

line 24, after "arm" please insert --means--;

In Claim 9, line 29, please delete "ring" and insert --interrupter--.

Signed and sealed this 29th day of October 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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