May 7, 1963 H. C. FOSTER 3,088,452

TARGET THROWING APPARATUS

Original Filed June 12, 1958 5 Sheets-Sheet 1

FIG. 1

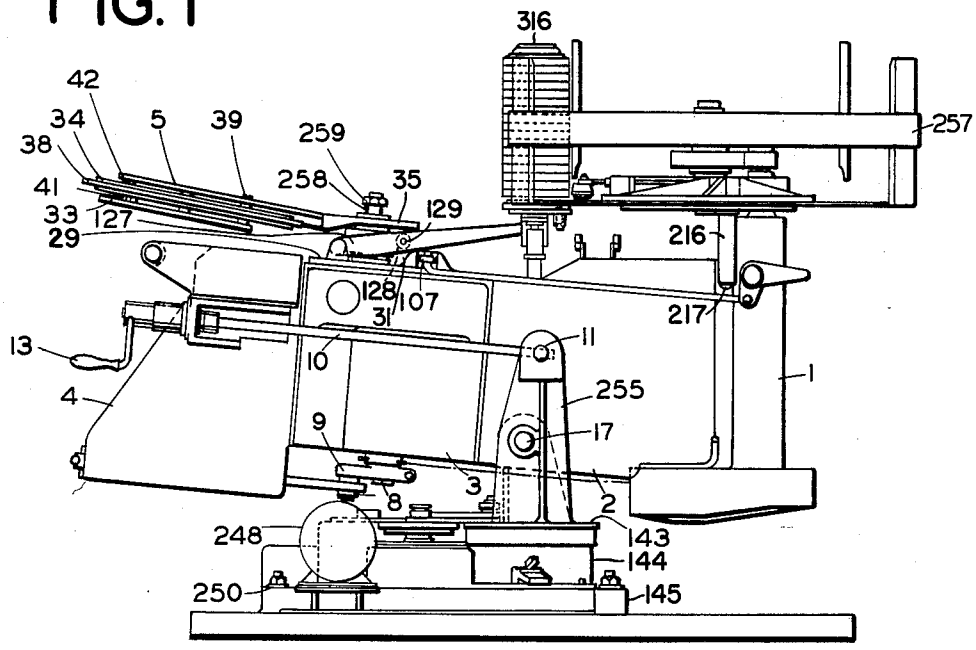
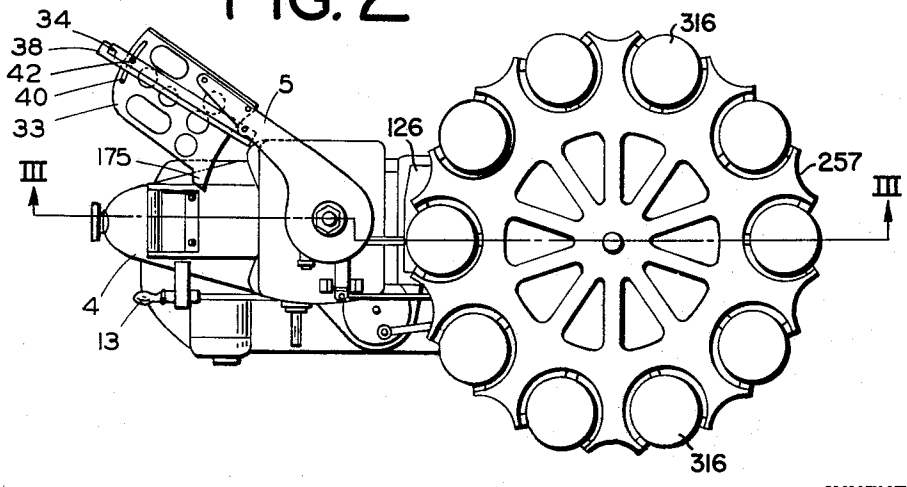


FIG. 2



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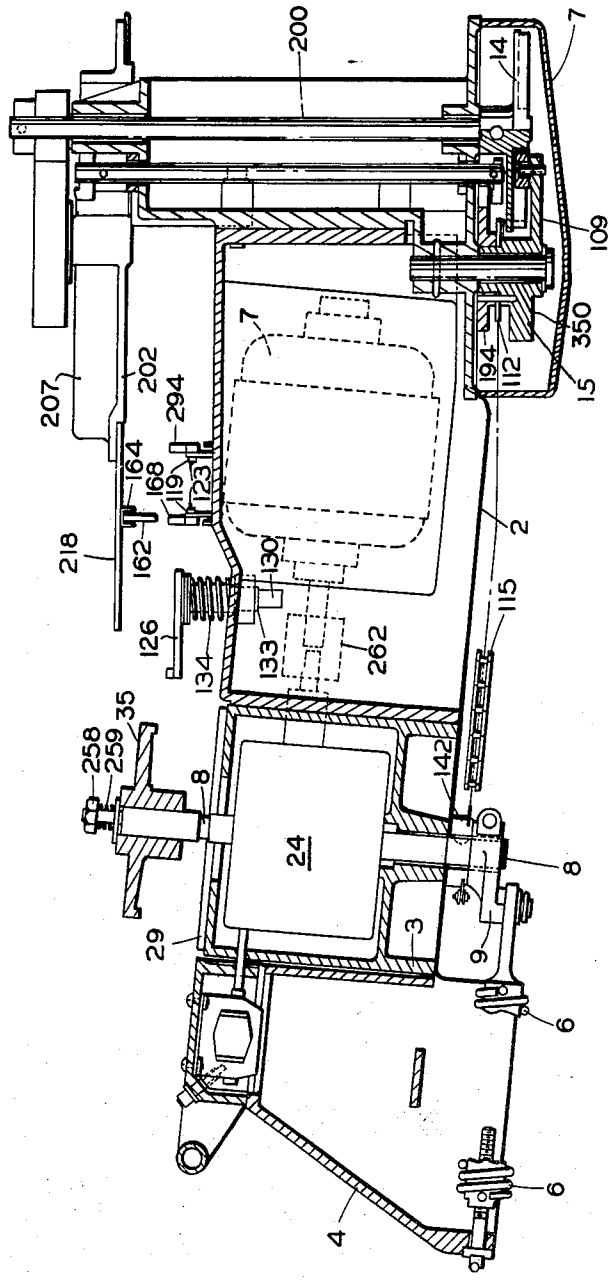


FIG. 3

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TARGET THROWING APPARATUS

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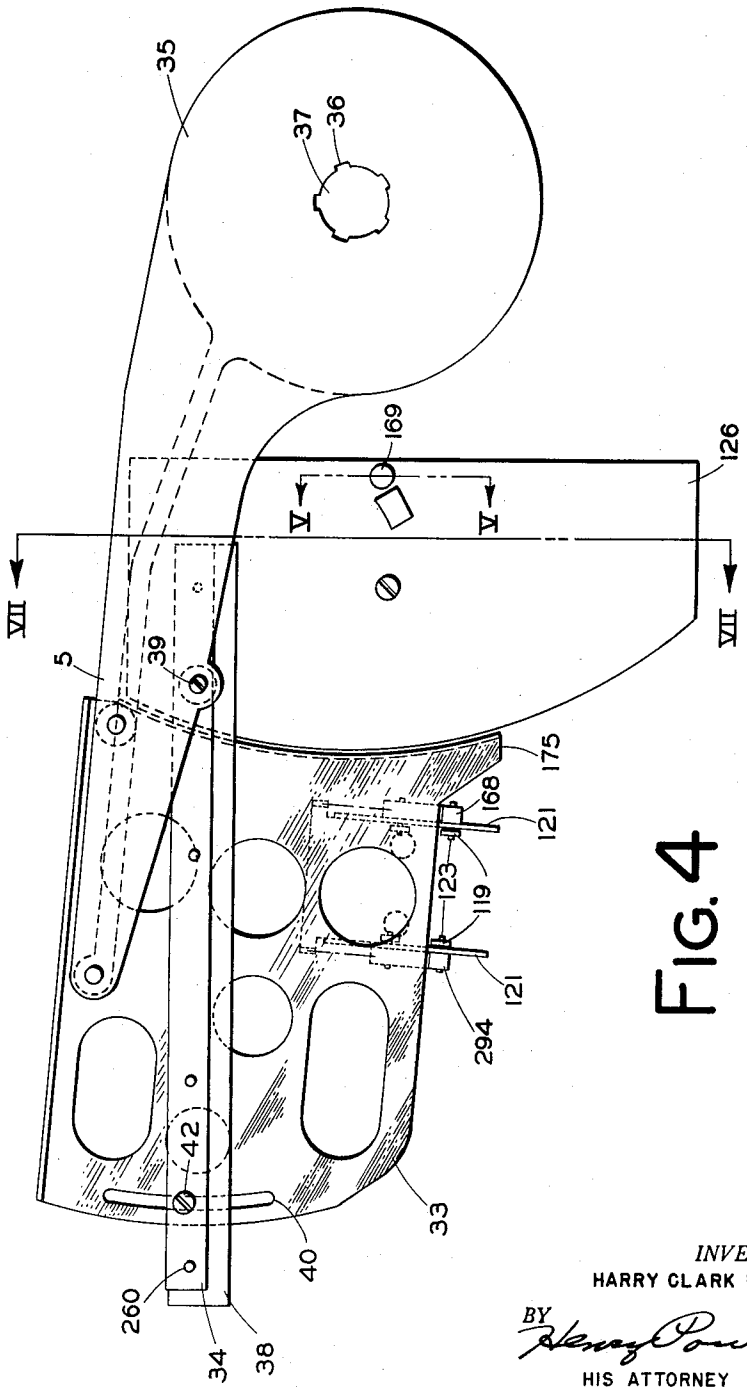


FIG. 4

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TARGET THROWING APPARATUS

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FIG. 5

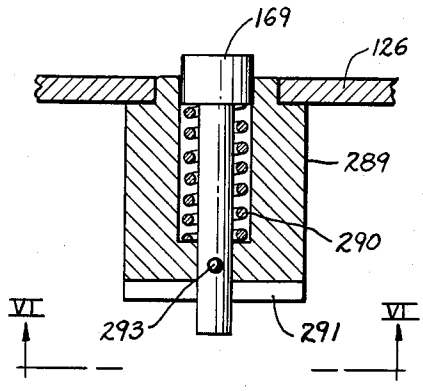
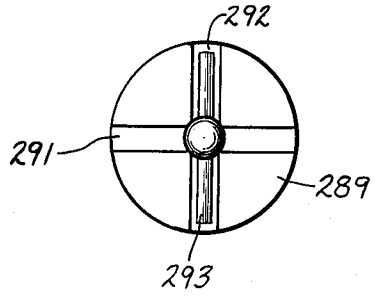


FIG. 6



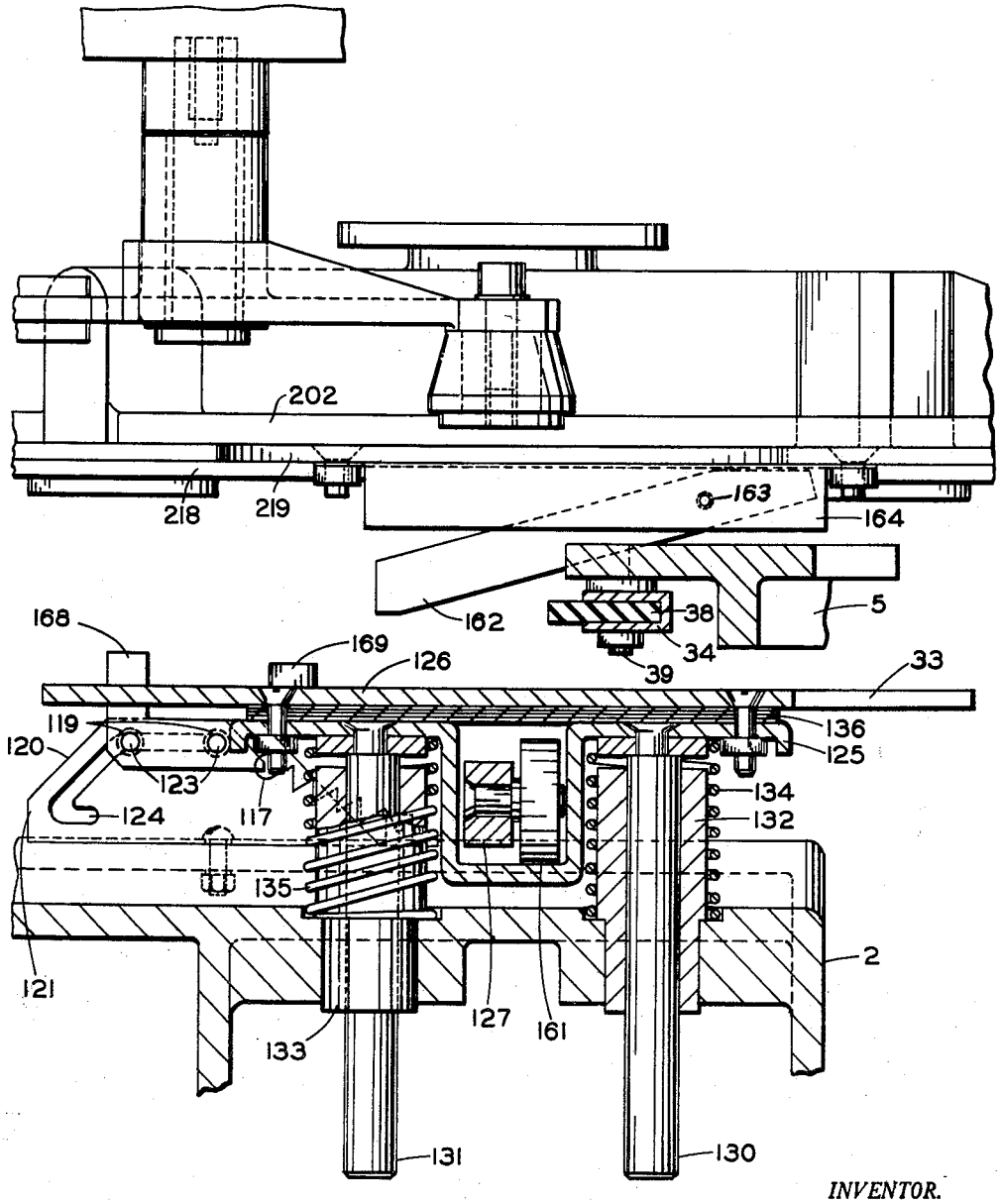
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TARGET THROWING APPARATUS

Original Filed June 12, 1958 5 Sheets-Sheet 5

FIG. 7



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3,088,452

TARGET THROWING APPARATUS

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Original application June 12, 1958, Ser. No. 741,571. Divided and this application Aug. 15, 1960, Ser. No. 61,793

2 Claims. (Cl. 124—43)

This invention relates to target traps such as are used for throwing targets known as clay pigeons and more particularly to power driven traps wherein targets are automatically fed from a magazine to a throwing arm and said trap is adapted to vary automatically the angle at which the targets are thrown. This application is a division of copending application Serial No. 741,571, filed June 12, 1958, which in turn is a continuation-in-part of copending application Serial No. 437,191 filed June 16, 1954, now U.S. Letters Patent No. 2,925,812, granted February 23, 1960.

It is an object of this invention to provide a novel, relatively simple, inexpensive loading device operated in conjunction and in timed relation with and by the cocking and throwing mechanism of a target trap.

A still further object of this invention is to provide a novel loading device capable of being used in conjunction with the target trap of the type wherein the throwing arm is returned to its cocked position by power means, and wherein the loading device operates in timed relation to movement of the throwing arm to initiate operation of the loading device.

Another object of this invention is to provide in a target trap a novel throwing arm of improved construction and function.

Other objects and advantages of this invention will be apparent from the following description and drawings in which:

FIGURE 1 is a side elevation view of a preferred embodiment of the invention taken at the moment immediately after a target has been thrown;

FIGURE 2 is a plan view of the embodiment of FIGURE 1;

FIGURE 3 is a fragmentary cross-sectional view in elevation taken on line III—III of FIGURE 2;

FIGURE 4 is a partial plan view of the throwing arm in the cocked position in the embodiment shown in FIGURE 1 in cocked relation to the target feed shelf;

FIGURE 5 is a partial side view taken on line V—V of FIGURE 4;

FIGURE 6 is a partial bottom view taken on line VI—VI of FIGURE 5; and

FIGURE 7 is an elevational fragmentary view partly in cross-section taken along line VII—VII of FIGURE 4, and additionally showing button **169**.

In accordance with this invention, there is provided a trap powered by a continuously running motor which engages the trap mechanism through a clutch system to cock a spring which upon being released rotates the target throwing arm mounted upon a rotatable shaft located in the clutch system, to effect throwing of the target which is then followed by automatic loading of another target to the throwing arm as the result of continued movement of the mechanism. The loading of targets is facilitated by means of a rotary magazine containing a plurality of targets in annular arrangement in said magazine which is indexed by the rotation of the aforesaid shaft through a linkage arrangement interconnecting the magazine and the shaft. The sequence of target throwing, cocking of the mainspring of the trap, indexing of the magazine and reloading of the target throwing arm occurs substantially

automatically in the apparatus upon release of the target throwing arm by the operator.

A second motor is provided which engages a novel gear arrangement which creates and transmits a non-uniform motion embodying intermittent acceleration, deceleration, reversing and hesitating motions to the target trap thereby continuously and independently oscillating the target trap in order to vary the distribution of the released targets.

The apparatus of this invention may be described generally as comprising a base **145**, a sub-base **144**, a frame support **143**, a gear housing **3**, a mainspring housing **4**, a target carrier or throwing arm **5**, a mainspring **6**, an electric motor **7** which supplies power for cocking the trap, a magazine support housing **1**, a frame **2**, and an electric motor **248** supplying power for the self angling mechanism. Frame **2**, and housing **1**, **3**, and **4** are fixed together by any suitable fastening means so as to constitute in effect a single frame. Base **145** contains the angle changing mechanism and has mounted on it sub-base **144**. Frame support **143** is rotatably mounted on sub-base **144** and supports the composite frame described above. Power is supplied by the continuously operating motor **7** to the cocking mechanism and the holding mechanism, releasing mechanism, and sprocket **142** of the indexing mechanism, which mechanisms are contained in gear housing **3**. The target carrier or throwing arm **5** is mounted for rotation upon the upper end of a shaft **8** to which is imparted a rotational thrust for throwing the target by means of the mainspring **6** disposed protectively under the mainspring housing **4**. A rotatable magazine assembly **257** is detachably mounted on housing **1** and through appropriate mechanism is indexed by power supplied through the rotation of shaft **8**.

The cocking, holding, releasing, target loading and the driver for the indexing mechanism is a compact unit, generally indicated as **24** in FIGURE 3, contained in and associated with gear housing **3**. The motor **7**, through a flexible coupling **262**, continuously turns one gear of an epicyclic gear train in the gear housing **3** while the rest of the train may be set into operation to cock the throwing arm intermittently following each throwing operation. Upon actuation of the release mechanism the cocking mechanism is adapted to transmit power from the motor **7** through the entire gear train at a suitable speed reduction through the main shaft **8** to the mainspring **6** and through sprocket **142**, mounted on the mainshaft, by appropriate linkages to the rotary magazine **257**. The gear train rotates the main shaft **8** to tension the mainspring **6** until the mainspring crank **9** attached to the lower end of shaft **8** is beyond the out dead center after which the shaft **8** and carrier arm **5** are turned ahead some further distance, without shock, to the cocked position whereupon the target carrier is held cocked and the gearing is again set to idle. The rotation of main shaft **8**, in addition, during cocking rotates an escapement cam **194** by means of an appropriate linkage from sprocket **142** to release a target for transfer to a target feed shelf **126**. As the target carrier proceeds to the cocked position, a target is then automatically fed to the carrier plate **33** ready for launching. The target is thrown when the release mechanism is actuated electrically from a remote position. In a travel of the throwing arm **5** from the cocked to the firing position the main shaft **8** traverses the same angle as the aforesaid arm thereby rotating sprocket **142** through a corresponding angle which activates by appropriate linking means the indexing mechanisms for the rotary target carrier.

In order that the elevation at which the targets are ejected may be controlled, there is provided an elevation adjustment screw **10** mounted rotatably but not slidably on housing **4** and passing threadedly through a swivel **11** pivotally carried by the upright **255** of frame support

143 and the other end of which is provided with a crank handle 13.

Main shaft 8 through sprockets 112 and 142, link chain 115 and a Geneva gear assembly 350, comprising an indexing arm 109, an indexing gear 14, transmit through drive shaft 200 and other appropriate gearing, an indexing rotary movement to the target carrier. This indexing movement imparts to the carrier, step by step, a rotary motion, bringing successive stacks of targets 316 into register with feed shelf 126 to which a target is transferred by appropriate means. Mounted fixedly to the indexing member 15 and sprocket 112 is an escapement cam 194 operating a follower which controls the discharge of targets from the bottom of each successive stack when in register with the feed shelf 126.

The invention will be better understood from the following more detailed description with reference to the embodiment of the invention illustrated in the drawing.

As is shown most clearly in FIGURES 1 and 2, the entire trap is mounted upon a base 145 which is provided with means such as holes 250 and for attaching the base to any suitable support, and upon which is pivotally mounted a sub-base 144.

Pivotally mounted on sub-base 144 is a swivel base 143 which is provided with upright supports 255.

Mounted pivotally on upright supports 255 is the frame housing 2 by means of elevation pivot shaft 17 which passes through the upper part of the uprights 255. Frame 2 carries motor 7, the gear housing 3 and also the magazine support housing 1. Integral with the upper part of support housing 1 are magazine supports 216 into which is inserted suitable means such as pins 217 for attaching a magazine assembly 257. Attached to the front of the gear housing 3 is the mainspring housing or apron 4 which protectively covers and also provides a mount for one end of the mainspring 6 which provides the sudden thrust of throwing power needed to project a target in desirable fashion. The other end of the mainspring 6 is attached to the mainspring crank 9 which in turn imparts a rotational thrust to the main shaft 8 passing through the gear housing 3 and journaled at its lower end in the bottom of housing 3. The upper end of main shaft 8 is indirectly journaled in the gear housing cover 29 from which the shaft protrudes sufficiently to carry the carrier or throwing arm 5 with its other components by means of a splined fitting at the upper end of the shaft 8 mounted in the opening 37 of the hub portion 35. The arm and hub portion are retained on shaft 8 by spring 259 and nut 258 by means of screw threads also at the upper end of shaft 8.

The target carrier or throwing arm 5 has a carrier plate 33 and a rubber or other resilient material faced rail 34. The arm 5 is formed with an upward tilt of about 5° as an extension of the circular hub portion 35 which is provided with the opening 37 internally splined at 36 for attachment to the splined fitting of the main shaft 8. At the outer end of arm 5 and supported underneath it is a carrier plate 33 which supports the target in its initial travel during the throwing operation from the moment of firing to the moment when the target leaves the arm. Although plate 33 in this embodiment is attached to arm 5, it is to be understood that plate 33 could be a separate stationary member mounted on frame 2 and of suitable arcuate length to support the target while it is propelled by the rail 34. In this embodiment described, the leading edge of the plate 33 adjacent shelf 126 in cocked position is formed with a projection 175 to prevent interference with the trailing edge of the target in throwing. Depending from the carrier arm 5 is the angularly adjustable rail 34, having attached to it by means of fasteners 260, the resilient leading edge 38, and which is pivotally attached at the inner end to arm 5 at the fastener 39 to extend outwardly above the carrier plate 33 at least to the slot 40. Angular control of the target trajectory and control of the levelness of the trajectory is attained by angular movement of the adjustable carrier rail 34 about pivot 39 to a desired position of the outer carrier rail support 41 as determined by the position of support fastener 42 in the arcuate slot 40 in the carrier plate 33. Slot 40 is of such length as to permit the rail 34 to be adjusted to an angle of lead or lag as necessary to correct for the effect of windage on levelness and direction. For example, a lagging rail causes a target discharge to the right with a tendency to a right tilt, whereas a leading rail causes a target discharge to the left with a tendency to a left tilt. To reduce the moment of inertia, the arm 5 is cast of a light metal such as a suitable magnesium alloy or the like and the light metal carrier plate 33, it will be noted from FIGURES 2 and 4 in particular, has a number of openings or cut out sections. It is to be noted that the rail 34 is adapted to be reversibly mounted to compensate for wear.

Mounted above magazine support housing 1 and in supports 216, by means of support pins 217, is a magazine assembly comprised of a circular base and raised reinforcing members 207. Base 202 has mounted to it and extending from it an annular plate portion 218. Annular plate 218 contains an aperture 219 which defines the opening for a target from a plurality of stacks supported above the base.

Suspended below annular plate 218 is a single bracket 164 having mounted within it by means of a pin a target feed finger 162 which is yieldably held in position by gravity.

Mounted on the feed shelf operating bracket 125 below the magazine is a target feed shelf 126 which coacts with the target feed arm 127 one end of which is pivoted on the gear housing cover 29 and carries rotatably intermediate the ends of arm 127 a feed cam roll 128 mounted on arm 127 by means of stud 129 which follows the profile of the target feed cam 31 and thereby controls the operation of the target feed shelf by means of feed shelf roll 161. Depending from and attached to bracket 125 are a pair of spaced feed shelf guide rods 130 and 131 which slidably engage with feed shelf guide bushings 132 and 133 which are mounted on and protrude from the upper surface of frame 2 at the feed shelf. Disposed about each bushing and guide rod is a feed shelf lifting spring such as springs 134 and 135 mounted in compression between bracket 125 and frame 2. Accurate positioning of the feed shelf 126 is obtained by interposition of feed shelf shims 136 between the shelf 126 and the bracket 125. It is evident that the feed shelf 126 is raised by feed shelf lifting springs 134 and 135 and is lowered by target feed cam 31 in timed relationship with the rotation of carrier arm 5.

Depending and protruding below feed shelf 126 is a guide 289 into which is mounted a target guide button 169. Guide 289 has at its lower end a slot 292 and a groove 291. Fixedly attached to the lower end of button 169 and perpendicular to its cylindrical axis is a cross-member 293 which in normal use is engaged in slot 292. Disposed about button 169 is a lifting spring 290 which maintains cross-member 293 in slot 292 and forces button 169 to protrude above feed shelf 126 (FIGURES 5 and 6). In the use of the trap for doubles, button 169 is pushed in against spring 290 until cross-member 293 is below guide 289 and out of engagement with slot 292; the button is then rotated until cross-member 293 is in alignment with groove 291, wherein the cross-member is engaged upon release of button 169. In this position the top surface of the button is flush, or slightly below, the face of shelf 126 to permit the inner target, of doubles, to ride across the shelf without hindrance.

It is to be noted (FIGURE 7) that the loaded target on carrier arm 5, just before the arm arrives in the ready-to-fire position, comes into contact with the target feed finger 162 pivotally mounted at 163 on a depending feed finger bracket 164 depending below annular portion 218 of the magazine base. Target feed finger 162 is yieldably

held in position by gravity, and is adapted to be turned up out of the way when carrier arm **5** is released to project the target. Until the target however is released feed finger **162** serves to guide the single target upon plate **33** to the ready-to-throw position against target stop finger **168** of assembly **120**, and target guide button **169** located retractably on target shelf **126** (FIGURE 4). Stop finger **168** which serves to hold the target in the ready-to-throw position is pivotally and retractably mounted by means of pins **123** and guides **119** on bracket **121** which in turn is mounted on the frame **2**. Target stop finger **168** is yieldably held to project upwardly into position by means of spring **117** one end of which is attached to finger **168** while the other is attached to bracket **121**. Proper positioning of finger **168** is assured by slot **124** in bracket **121** (FIGURE 7). It is to be observed that when carrier arm **5** and its plate **33** and rail **34** go into throwing operation, feed finger **162** moves up out of the way to clear arm **5** and stop finger **168** is turned down as carrier plate **33** passes over it. Under these circumstances the loaded target is free to commence movement on plate **33** along rail **34** and be thrown.

It is to be noted that slot **124** has a path which permits finger **168** to lock in a retracted position below the angular path of carrier **33**. Finger **294** is similarly attached to bracket **121** and may be set in the retracted position during the operation of the trap for singles. However, in operation of the trap for doubles, the rotary magazine assembly **257** is removed from the trap and stop finger **168** and target guide button **169** are locked in their retracted position, whereas finger **294** is set to yieldingly protrude above the angular path of carrier **33**. On the use of the trap for doubles, while the carrier **33** is in the cocked position, finger **294** together with rail **34** serves as a guide and a holder for the outermost target which is placed against the finger and rail. The inner target is located by placing it against the outermost target and against rail **34**. As can be clearly seen, the retraction of guide button **169** permits the inner target to be set and discharged without hindrance and/or obstruction.

It is to be noted that angling motor **248** is not activated,

and the trap is not oscillated. The trap may be used for doubles by retracting stop finger **168** and guide button **169** and setting stop finger **294** to protrude above the angular path of carrier **33**. In doubles the outermost target is placed on carrier **33** against finger **294** and rail **34**, and the inner target against the outermost target and against rail **34**.

From the foregoing description it is obvious that in accordance with this invention a new target throwing apparatus is provided with desirable operating characteristics. It is quite apparent that the apparatus of this invention is advantageous in the art of trap shooting and that the objects and advantages are accordingly accomplished.

Although the invention has been described with reference to specific embodiments and details, various modifications and changes will be apparent to one skilled in the art. The invention is, therefore, not to be limited by such embodiments and details except as set forth in the appended claims.

What is claimed is:

1. In a target throwing trap a frame, a spring actuated throwing arm rotatably mounted on said frame, and a target positioning means mounted on said frame, said means comprising independently retractable spaced members disposed adjacent to and extending transverse the leading edge of said throwing arm in its ready to fire position, with said members yieldingly extending above the leading edge of said throwing arm, and said throwing arm being rotatable over said members.

2. The target throwing trap of claim 1 wherein there is provided means whereby said members are adapted to be independently retained in a retracted position below the leading edge of said throwing arm.

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