Feb. 9, 1943. L. F. PARKER ET AL 2,310,746

TARGET THROWING APPARATUS

Filed Oct. 20, 1941 7 Sheets-Sheet 1

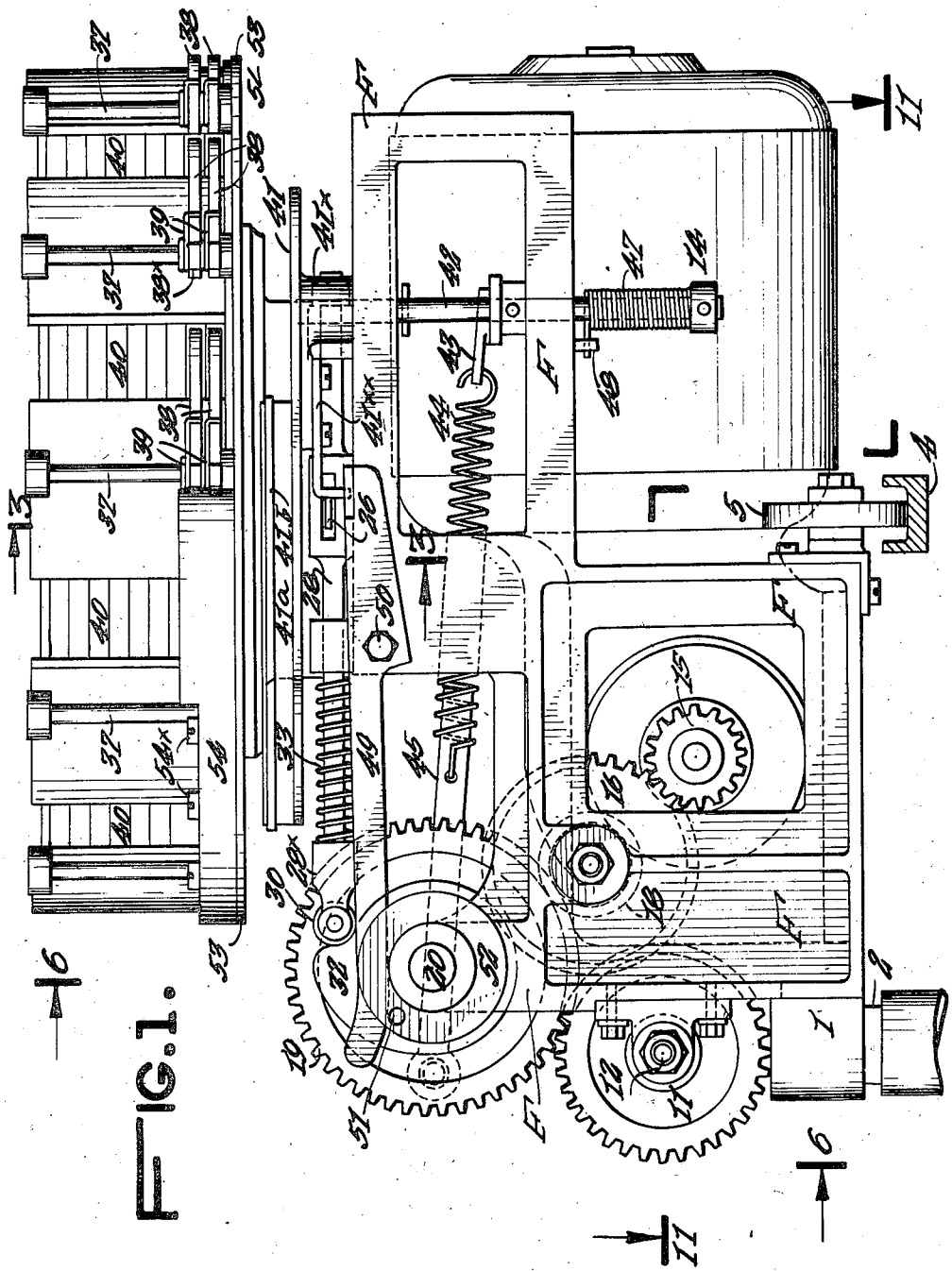


FIG. 1.

INVENTOR.
Laurie F. Parker and
Arnold Haugner
BY H. Lee Helms
ATTORNEY.

Feb. 9, 1943. L. F. PARKER ET AL 2,310,746

TARGET THROWING APPARATUS

Filed Oct. 20, 1941 7 Sheets-Sheet 2

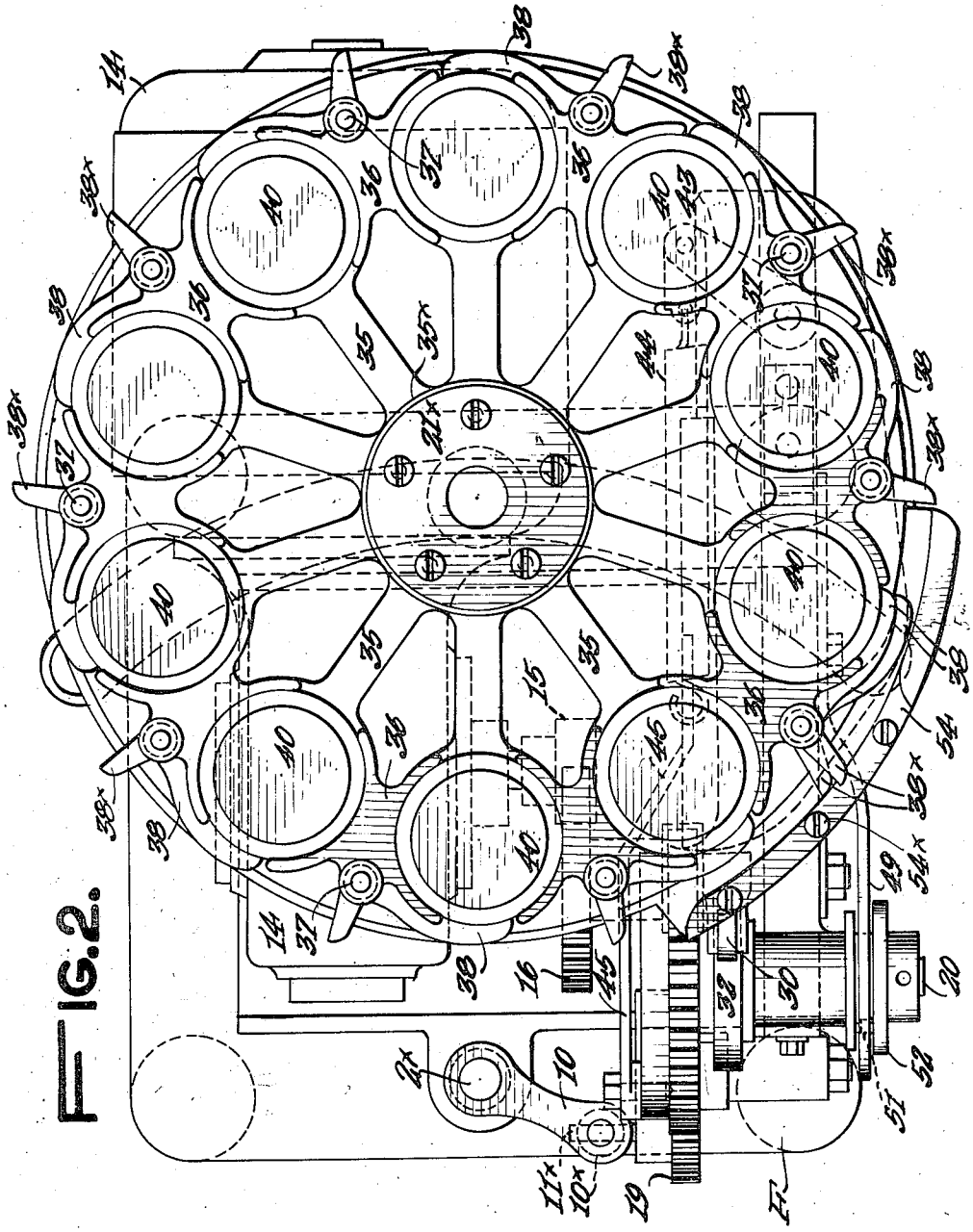


FIG. 2.

INVENTOR

BY

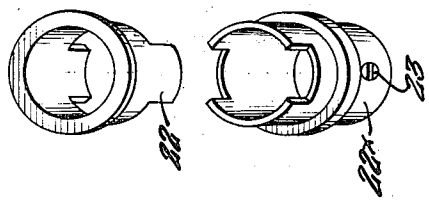
ATTORNEY

Feb. 9, 1943. L. F. PARKER ET AL 2,310,746

TARGET THROWING APPARATUS

Filed Oct. 20, 1941 7 Sheets-Sheet 3

FIG. 5.



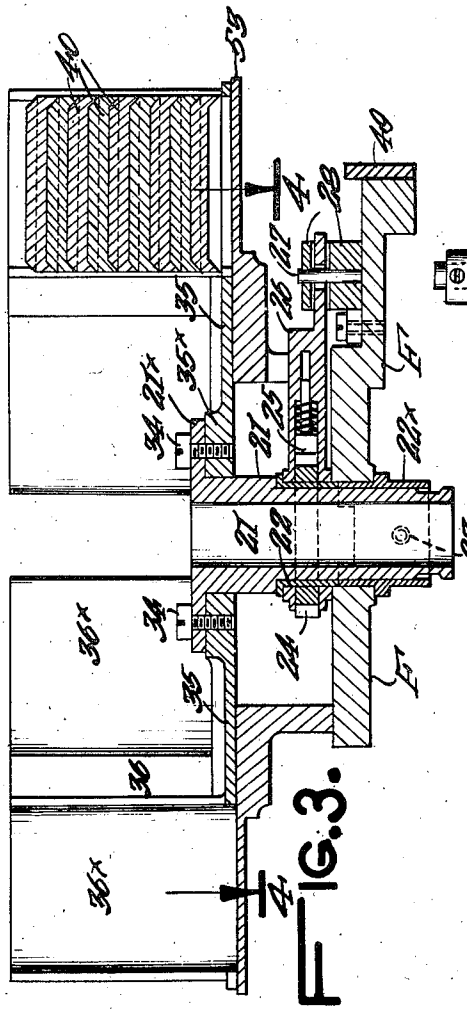
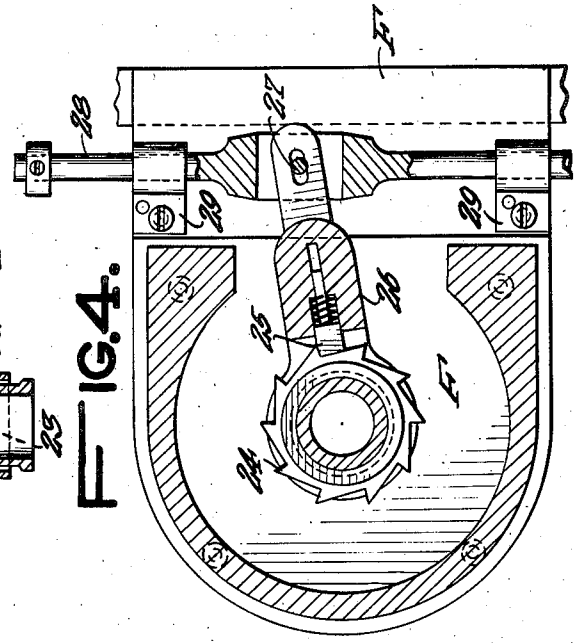


FIG. 3.

FIG. 4.



INVENTOR.
Lawrie F. Parker and
Arnold Hauquer
BY H. Lee Helms
ATTORNEY.

Feb. 9, 1943. L. F. PARKER ET AL 2,310,746

TARGET THROWING APPARATUS

Filed Oct. 20, 1941 7 Sheets-Sheet 4

FIG. 7.

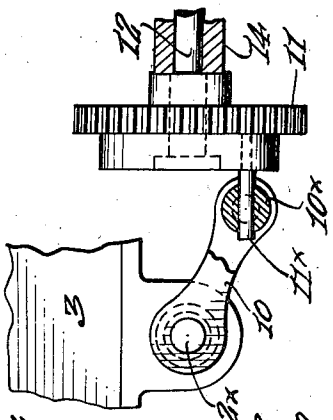


FIG. 8.

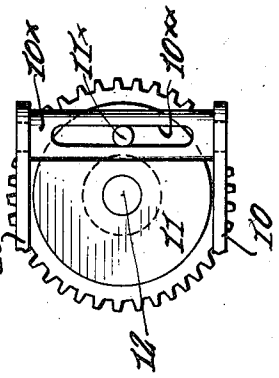
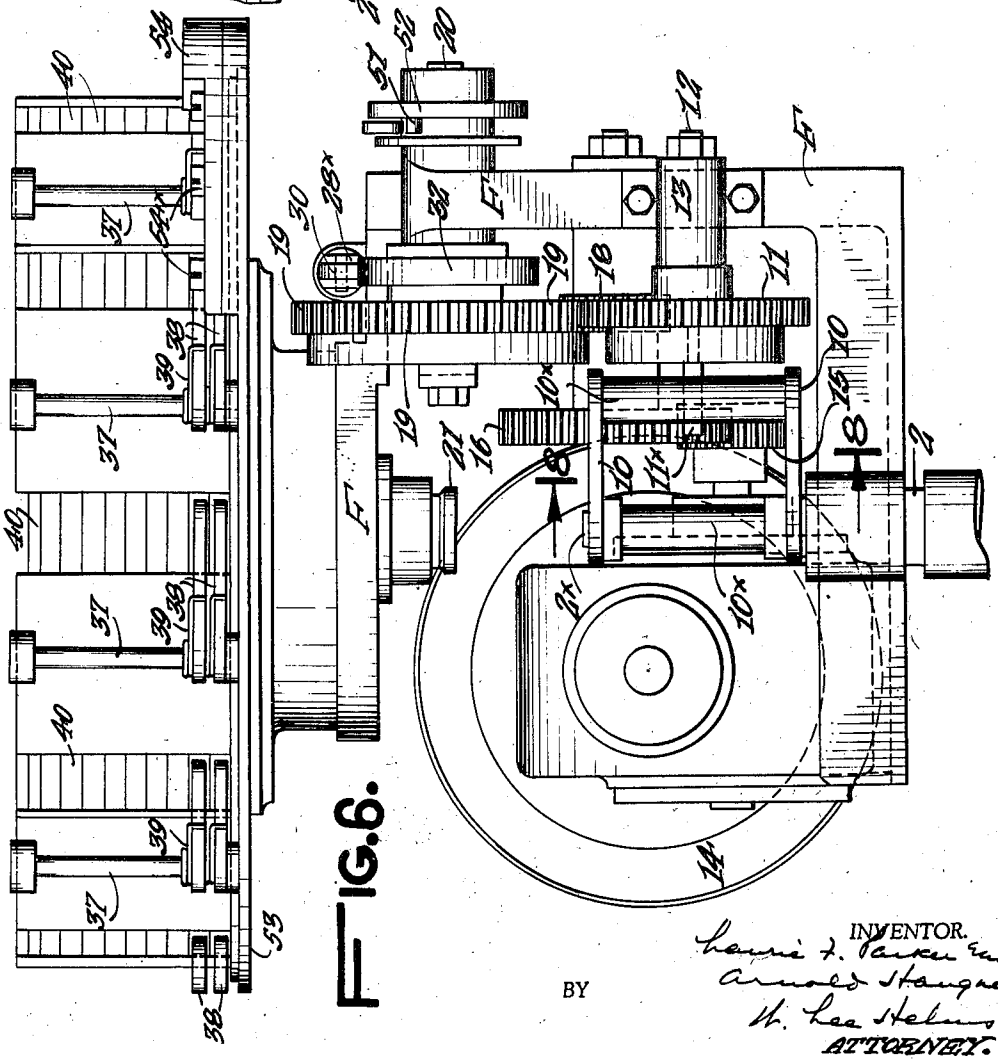


FIG. 6.



INVENTOR.
Laurie F. Parker et al
Arnold Haugen
H. Lee Helms
ATTORNEY.

BY

Feb. 9, 1943. L. F. PARKER ET AL 2,310,746

TARGET THROWING APPARATUS

Filed Oct. 20, 1941 7 Sheets-Sheet 5

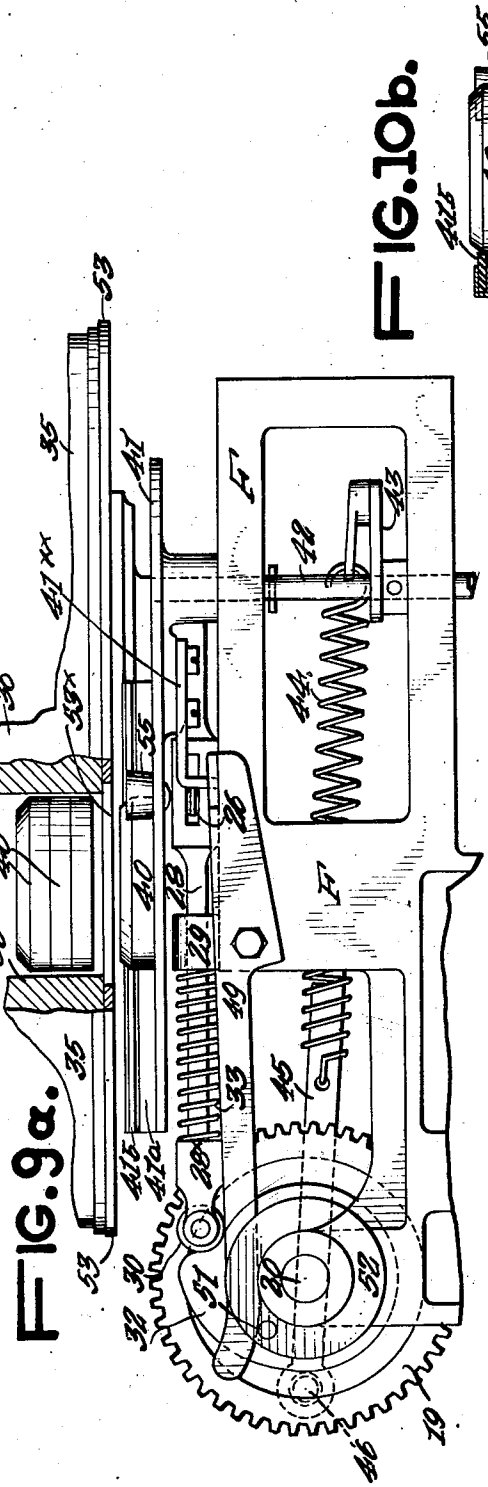


FIG. 9a.

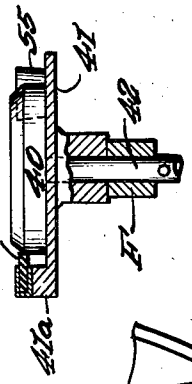


FIG. 10b.

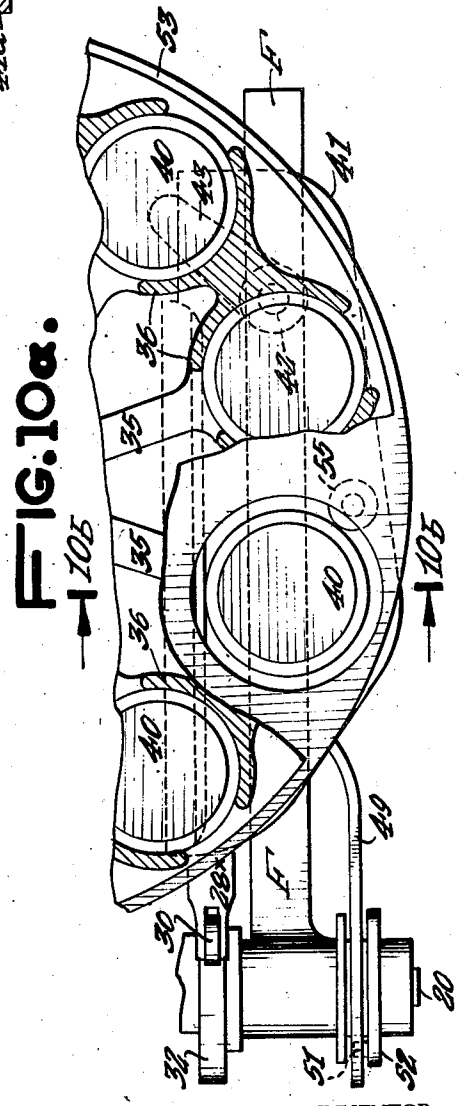


FIG. 10a.

INVENTOR.
Lennie F. Parker
Arnold Stanton
A. Lee Stevens
BY
ATTORNEY.

Feb. 9, 1943. L. F. PARKER ET AL 2,310,746

TARGET THROWING APPARATUS

Filed Oct. 20, 1941 7 Sheets-Sheet 6

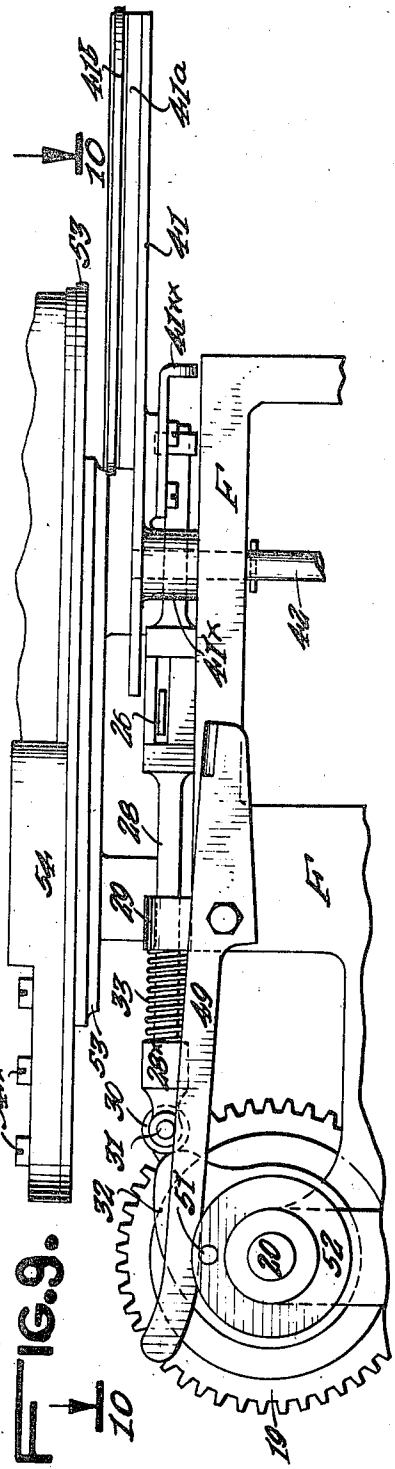


FIG. 9.

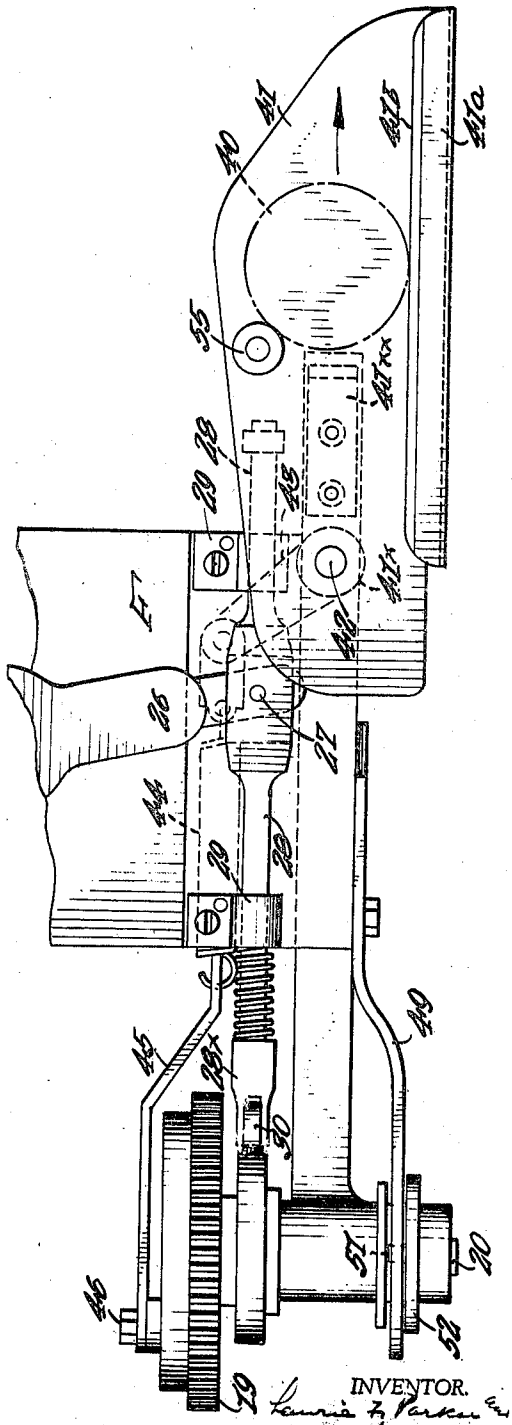


FIG. 10.

INVENTOR.
Laurie F. Parker et al
by Arnold Hanguist
H. Lee Helm
ATTORNEY,

Feb. 9, 1943. L. F. PARKER ET AL 2,310,746

TARGET THROWING APPARATUS

Filed Oct. 20, 1941 7 Sheets-Sheet 7

FIG.12.

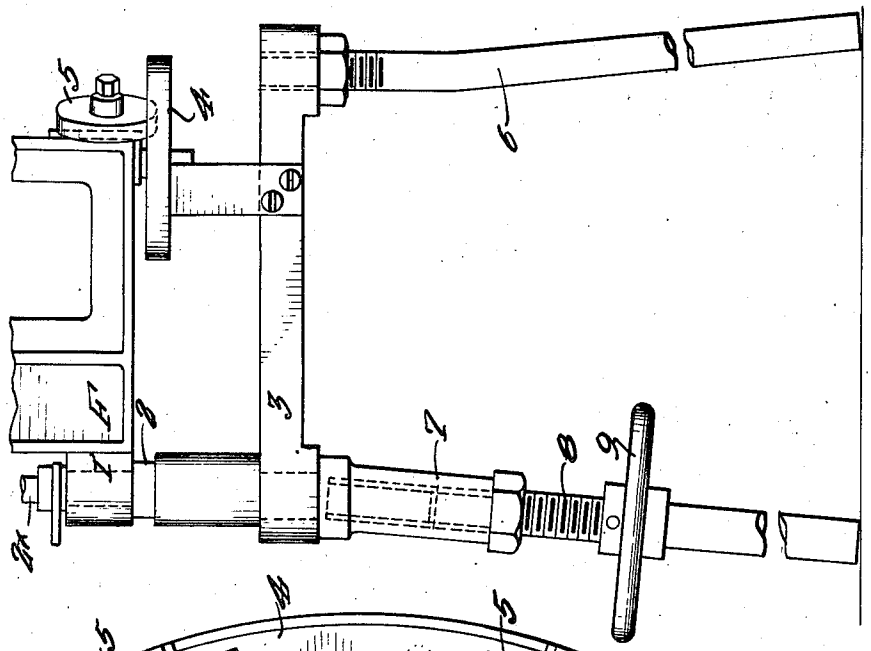
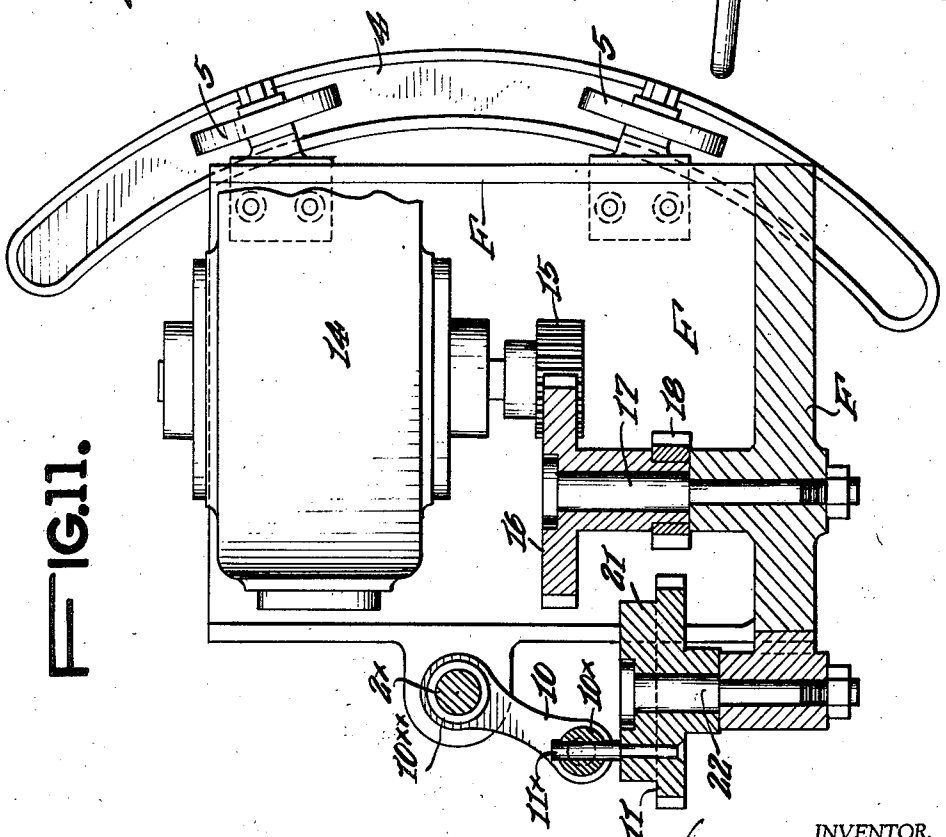


FIG.11.



INVENTOR.
Henry F. Parker 2nd
Arnold Haugen
M. Lee Helms
ATTORNEY,

BY

Patented Feb. 9, 1943 2,310,746

UNITED STATES PATENT OFFICE

2,310,746

TARGET THROWING APPARATUS

Laurie F. Parker, Noroton, Conn., and Arnold Hanger, Richmond, Ky.

Application October 20, 1941, Serial No. 415,786

10 Claims. (Cl. 124—8)

This invention relates to apparatus for throwing targets, such as clay, composition, or wooden targets of any size. The specific object of the invention is to provide an apparatus which will hold a large number of stacks of targets and which will bring the stacks into successive register with the target-striking or throwing element, means being provided for securing adjustment in the elements controlling angles, height and lateral spread of the target flights. The apparatus is particularly adapted for heavy duty use, i. e., for operation continuously over long periods of time and with relatively large or heavy targets, so that the apparatus is adapted for military training of marksmen.

The invention will be described with reference to the accompanying drawings, in which:

Figure 1 is a view in elevation, partly broken away, illustrating an embodiment of the invention.

Figure 2 is a plan view of said embodiment.

Figure 3 is a partial vertical section, taken on the line 3—3, Figure 1.

Figure 4 is a detail view in horizontal section, taken on the line 4—4, Figure 3, and showing the step by step rotational drive of the target stack carrier.

Figure 5 is an isometric view of the two interfitting coupling members for the target stack drive.

Figure 6 is a view in elevation, the view being to the right of the line 6—6, Figure 1.

Figure 7 is a detail view, partly broken away, showing elements of the means for oscillating the apparatus on its supporting frame.

Figure 8 is a detail view on the line 8—8, Figure 6, looking in the direction of the arrows.

Figure 9 is a fragmentary view, in elevation, showing the means for oscillating the target stack carrier at the end of a positive stroke of its actuating cam.

Figure 9*a* is a fragmentary elevation, partly broken away, showing a target on the throwing arm, the parts being in position for throwing action.

Figure 10*a* is a plan view, partly broken away, of the elements illustrated in the preceding figure.

Figure 10*b* is a transverse section through the throwing arm, showing its cushion contact face for the targets, a target being shown ready for the throwing action.

Figure 10 is a horizontal view, partly broken away, on the line 10—10, Figure 9, the target throwing arm being at the end of a throwing stroke and at the instant that the target leaves the arm, the target still being engaged by the positioning button therefor.

Figure 11 is a horizontal section on the line 11—11, Figure 1. In this view the primary elements for oscillating the apparatus on its supporting frame are shown at the left, it being understood that the lever arm 10 is swung about a fixed fulcrum carried by said supporting frame.

Figure 12 is a view in elevation showing the supporting frame and the manner in which the apparatus is mounted for oscillation thereon.

Referring to Figures 1 and 12, it will be seen that the apparatus is carried by a frame generally indicated at F, the frame having a bearing boss 1 which receives the reduced upper end of a post or vertical shaft 2 carried by the supporting frame 3 upon which the apparatus oscillates.

Referring to Figure 12, it will be seen that supporting frame 3 carries an arcuate table 4, a plan view thereof being shown in Figure 11. Frame F is provided with rollers 5 supported by and movable upon table 4.

Frame 3 is supported upon legs such as a plurality of legs of the type indicated at 6, Figure 12, and an opposite adjustable leg construction which may comprise an internally threaded tubular member 7 depending from supporting frame 3 and into which is threaded a leg 8 which may carry an annular handle 9 by means of which the height of the leg as a whole may be adjusted. This adjustment will determine the angle of operation of the apparatus and hence the angle at which the targets are thrown.

In the operation of the apparatus frame F and hence all of the operating parts will be oscillated. To such end the upper extension of post 2, shown at 2*x*, Figures 6 and 12, pivotally supports the arms 10 of a link comprising said arms and the tubular connecting end members 10*x*, the outermost of said members relatively to post extension 2*x* being formed with an elongated raceway shown in Figure 8 at 10*x*x. In this raceway is projected a stud 11*x* carried by and eccentrically of a gear wheel 11 which rotates on a shaft 12, the latter being journalled in a bearing boss 13 carried by a member of frame F (Figure 6).

Frame F carries a motor 14 having a drive gear 15 (Figure 11) which drives a gear 16 on a shaft 17 carried by frame F (Figure 11), the hub of gear 16 carrying a pinion 18. Pinion 18 drives a large gear 19 on a shaft 20 (Figure 1) and gear 19 is in mesh with said gear 11.

As gear wheel 11 rotates stud 11*x* will operate to pull the target throwing apparatus to the

left and to the right in an oscillatory movement, the apparatus thus having a pivotal movement on post 2 of the supporting frame 3 whilst rollers 5 of frame F move back and forth in the raceway 4 of said supporting frame 3.

With reference to the "motor" 14, it will be understood that this term may include a motor per se and a reduction gear assembly from which drive gear 15 is immediately driven, and that this is the preferred arrangement.

As the target throwing apparatus is oscillated to the left and right by the means above described, the target stack carrier will be given intermittent movement to bring the stacks in succession into register with the target throwing or striking element. For the said purpose the target stack carrier comprises a vertical hub 21 which rotates in two interlocking bushing members 22, 22*x*, Figures 3 and 5, which are carried in an upper horizontal member of frame F. At an intermediate portion bushing 22*x* is shouldered to abut the said horizontal frame section and also is provided with a set screw at 23 by means of which it is secured to hub 21 so as to rotate therewith. The hub itself is shouldered immediately above bushing 22 so as to engage the flanged upper periphery of the latter. Swaged upon bushing 22 is an annular ratchet 24, Figure 4 the ratchet being engaged by the spring-pressed pawl 25 of a pawl lever 26 having a slotted outer end which receives a pin 27 carried by reciprocatory pawl drive arm 28 which is mounted in the apertures of straps 29 carried by said horizontal frame section of frame F.

As illustrated in Figures 9 and 10, the pawl actuating rod 28 is provided at one end with a forked extension 28*x* in which is mounted a roller 30 on a stud shaft 31 (Figure 9). Roller periodically is met by the actuating area of a cam 32, on shaft 20, which shaft also carries gear wheel 19. In each rotation of shaft 20 an actuating movement is imparted to rod 28, and the stack carrier thereby is given a movement to carry one stack away from the target striking arm, later to be described, and move a fresh stack into register therewith. After each active movement of rod 28 the latter is returned to initial position by a spiral spring 33 at one end abutting actuating member 28*x* and at its opposite end abutting one of the two members 29.

The hub 21 is formed at its top with an annular flange 21*x* having a plurality of threaded apertures to receive screws 34 connecting the hub with the disk-like center 35*x* of the primary rotatable target carrying member. In the present embodiment this member is formed with spokes 35 extending radially from member 35*x*, and between each spoke and its adjacent spoke is held an upwardly projected target stack holder having opposed curvilinear target engaging faces 36*x*. The assembly of spacer members provides a plurality of target holding cups which do not completely encircle the targets, each cup exposing the edges of its stack of targets for engagement therewith by latch pawls. Each target holding cup is associated with a latch-pawl holding rod 37 carrying two superposed latch-pawls 38 normally impelled by springs 39 into engagement with two lowermost targets 40.

As shown in Figure 2, each latch-pawl 38 is formed with an angular operating finger 38*x* for a purpose to be hereinafter explained.

The target throwing arm is best shown in Figures 9, 9*a* and 10 at 41. It comprises a plate having a depending hub 41*x* adapted to oscillate on the frame F, a vertical shaft 42 entering the hub and being fixed thereto. As shown by Figure 9*a*, the shaft has fixed thereto a lever arm 43 connected to a spiral spring 44, one end of the spring being secured to a pull rod 45 pivotally connected at 46 to gear wheel 19.

In each rotation of the gear wheel spiral spring 44 is put into tension. Prior to such tensioning of spring 44, however, pull rod 45 will have been moved to the right of its position in Figure 9*a*, releasing the tension of spring 44 and a relatively light spiral spring, shown at 47, Figure 1, one end of said spring 47 engaging shaft 42 and the other end a stop 48 on frame F will rotate shaft 42 in a clockwise direction so that target throwing arm 41 is brought to the position of Figure 1 and also Figure 9*a*, and to target receiving position. At this point a latch arm 49 pivoted at 50 on frame F will be released by its actuating pin 51 (which pin is carried by a disk 52 on shaft 20) and the latch arm will have gravitational movement to the position of Figure 1 and Figure 9*a* the latch arm engaging a finger 41*xx* on the target throwing arm 41 to hold the arm in target receiving position.

The stack carrier rotates immediately above a table-like disk 53 formed with an aperture at 53*x*, Figure 9*a*, for the targets from each stack. Secured to table 53 by screws 54*x* is a pawl-releasing cam 54 for the target latching-pawls, having a low area and a higher area at 54*x*. Thus when a stack of targets is brought over target passageway 53*x* in table 53 the lowermost pawl 38 will have its actuating finger 38*x* so engaged by the low area of cam 54 as to release the lowermost target which will drop down onto the target throwing arm 41 to the position of Figure 9*a* and against the side of a positioning disk 55 on said target throwing arm. The target immediately above the lowermost target of the stack will still be engaged by the upper of the two latch-pawls 38 which, in turn, will be released to drop the stack of targets when the stack is moved away from the target passageway in the said table and the finger of the said upper latch pawl meets the higher area 54*x* of cam 54.

A target now being in throwing position on target throwing arm 41, the continued rotation of shaft 20 and its disk 52 will carry pin 51 to the position of Figure 9 thereby imparting a releasing movement to latch arm 49 and the target throwing arm will be impelled by spring 44 with a sharp throwing movement and the target will be thrown into the air at the angle for which the apparatus has been adjusted.

The targets are, in many cases, very frail and to avoid any striking or fracturing thereof by the target throwing arm, we provide the vertically extending target engaging ledge 41*a* with a cushioning strip 41*b* of rubber or the like, for direct engagement with the target to avoid fracturing the same in the throwing movement.

In the present embodiment the rotary stack holder is provided with ten stacking holding units each adapted to hold ten targets, more or less, and thus the device illustrated has been designed for throwing 100 targets without re-loading. Shaft 20 will be given a rotation for each target thrown. In such rotation the stack carrier will be advanced one step, the target throwing spring 44 will be placed under full tension, the latch lever 49 will be moved to release the target throwing arm so that the tension of said spring will im-

part operative movement to the arm, and thereupon the spring pull rod 45 will be moved in a direction toward the axis of the target throwing arm to permit spring 47 to return the target throwing arm to latched position.

It will also be understood that the target throwing spring acts in opposition to the weaker spring 47 so that when the target throwing arm is given an axial movement spring 47 will serve as a cushion and shock-producing member having its primary action toward the end of the target throwing movement of the arm.

It will also be seen that during the target throwing action of the device the latter will be oscillated back and forth and at a predetermined angle.

Having described our invention, what we claim and desire to secure by Letters Patent, is as follows:

1. A target throwing apparatus comprising a rotary carrier having in annular arrangement a plurality of holders for stacks of targets, the carrier being apertured at the base of each stack holder, means for imparting rotary movement to the carrier step by step with a dwell intermediate each two steps, a throwing arm adapted to receive a lowermost target from one of the stacks at each dwell interval of the stack carrier, a spring attached to the throwing arm and means for placing the spring under tension prior to each dwell of the stack carrier, latching and latch-releasing means for the throwing arm, and means for returning the throwing arm to latching position following an active movement of the throwing arm, in combination with target holding and releasing means for the targets of each stack, comprising two spring-pressed latches for each stack, and means for successively releasing and applying said latches during a partial rotation of the stack carrier.

2. A target throwing apparatus comprising a rotary carrier having in annular arrangement a plurality of holders for stacks of targets, the carrier being apertured at the base of each stack holder, means for imparting rotary movement to the carrier step by step with a dwell intermediate each two steps, a throwing arm adapted to receive a lowermost target from one of the stacks at each dwell interval of the stack carrier, a spring attached to the throwing arm and means for placing the spring under tension prior to each dwell of the stack carrier, latching and latch-releasing means for the throwing arm, and means for returning the throwing arm to latching position following an active movement of the throwing arm, the tensioning means for the throwing arm spring comprising a driven wheel, a pull rod eccentrically mounted on said wheel and connected to the spring, and means for rotating the wheel.

3. A target throwing apparatus comprising a rotary carrier having in annular arrangement a plurality of holders for stacks of targets, the carrier being apertured at the base of each stack holder, means for imparting rotary movement to the carrier step by step with a dwell intermediate each two steps, a throwing arm adapted to receive a lowermost target from one of the stacks at each dwell interval of the stack carrier, a spring attached to the throwing arm, a wheel to which the spring is eccentrically connected, means for rotating the wheel, a latch lever adapted to engage the throwing arm, means for returning the throwing arm to latching position when the spring is released from tension in the rotation of said wheel, and a latch-releasing device operative when the wheel has reached a point of rotation at which the spring is under substantially maximum tension.

4. A target throwing apparatus comprising a rotary carrier having in annular arrangement a plurality of holders for stacks of targets, the carrier being apertured at the base of each stack holder, means for imparting rotary movement to the carrier step by step with a dwell intermediate each two steps, a throwing arm adapted to receive a lowermost target from one of the stacks at each dwell interval of the stack carrier, a spring attached to the throwing arm, a shaft and means for rotating the same, a wheel on the shaft to which the spring is eccentrically connected, a latch lever for the throwing arm, and means carried eccentrically of the shaft for moving the latch lever to releasing position, a cam on the shaft, and means operative by reciprocatory motion to connect the cam with the carrier rotating means, the latter comprising a ratchet wheel on the stack carrier, a pawl engaging the ratchet wheel, and a pawl-carrying lever.

5. A target throwing apparatus constructed in accordance with claim 1, in which the target throwing arm is a vertically pivoted member having a cushioned ledge adapted to engage the edge of the target, the arm having a throwing movement of approximately 180°.

6. A target throwing apparatus constructed in accordance with claim 1, in which the target throwing arm is a vertically pivoted member having a cushioned ledge and a table area adapted to support the target throughout the area of its base, and a target-positioning member carried by the arm on its table area opposite said cushioned ledge.

7. In a target throwing apparatus, and in combination with means for successive release of targets from a carrier for a plurality of targets, of a target throwing arm and operating means therefor, the target throwing arm having a table-like area adapted to directly receive the targets, and a cushioned ledge extending angularly of the table area, a shaft pivotally supporting the target throwing arm, a link attached to the shaft, a coil spring connected to the link, a wheel mounted for rotation and to which the spring is eccentrically connected, means for rotating the wheel, a latch lever and means for imparting a releasing movement thereto, and a combined return and cushioning spring applied to the throwing arm shaft.

8. A target throwing apparatus comprising a rotary carrier having in annular arrangement a plurality of holders for stacks of targets, the carrier being apertured at the base of each stack holder, means for imparting rotary movement to the carrier step by step with a dwell intermediate each two steps, a throwing arm adapted to receive a lowermost target from one of the stacks at each dwell interval of the stack carrier, a spring attached to the throwing arm and means for placing the spring under tension prior to each dwell of the stack carrier, latching and latch-releasing means for the throwing arm, means for returning the throwing arm to latching position following an active movement of the throwing arm, a supporting standard, and means connecting the standard and the target throwing apparatus by which the angular position of the apparatus relative to the standard may be varied, and means for oscillating the target throwing apparatus on its supporting standard.

9. A target throwing apparatus constructed in accordance with claim 8, in which the oscillating

means for the apparatus comprises a lever arm movable about the fixed axis about which the apparatus is oscillated, a wheel carried by the apparatus, means for rotating the wheel, and means connecting the lever and the wheel eccentrically of the wheel axis.

10. A target throwing apparatus constructed in accordance with claim 1, in which the rotary stack holder is movable upon an underlying table having an aperture for the downward passage of targets from each stack, a pair of spring-engaged latching fingers pivotally mounted on the said carrier adjacent each stack holder, the latter being apertured for passage of the latch fingers into engagement with the two lowermost targets of the stack, and a latch finger releasing cam carried adjacent the rotary carrier and having two cam faces, one for each latch finger, the first cam face being operative to release the latch finger for the lowermost target of a stack whilst the second finger remains in engagement with the stack, the second cam face thereafter releasing the second latch finger so that the stack being wholly released will have bodily downward movement.

LAURIE F. PARKER.
ARNOLD HANGER.