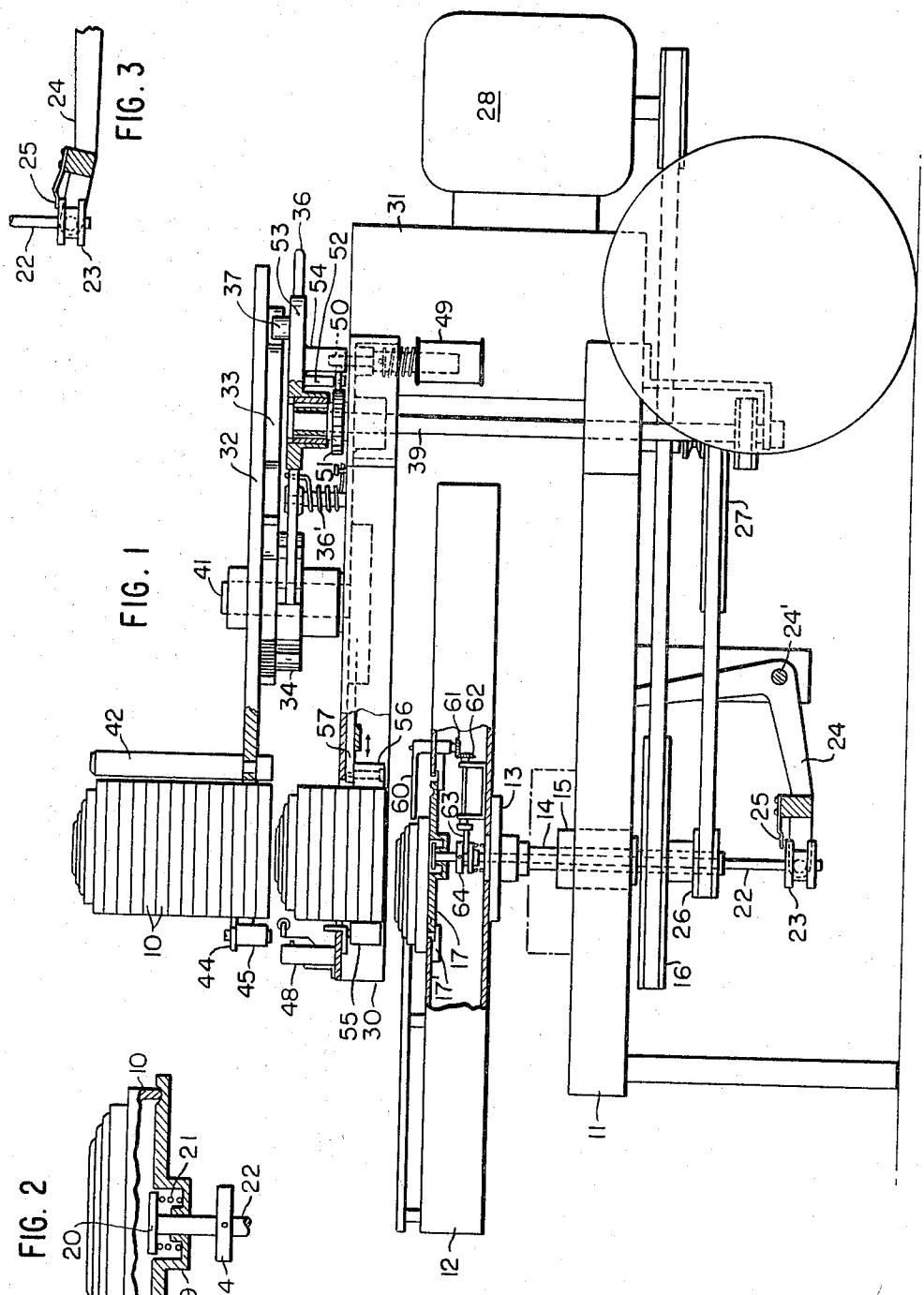
Feb. 21, 1967 G. H. DARRELL 3,304,928

ROTARY TRAP MAGAZINE WITH TWO-STAGE TARGET FEED

Filed March 31, 1964 2 Sheets-Sheet 1



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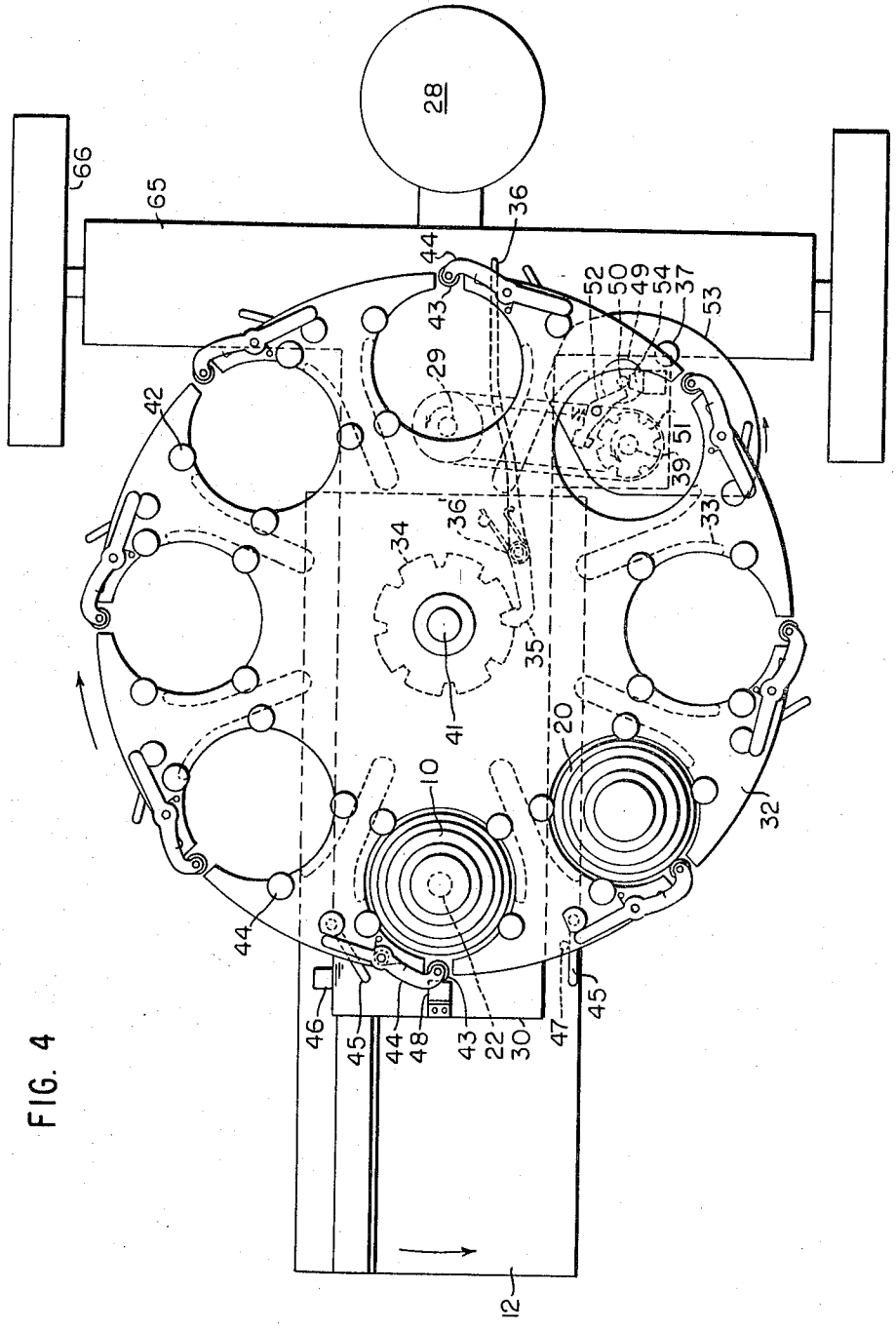


FIG. 4

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United States Patent Office 3,304,928
Patented Feb. 21, 1967

3,304,928

ROTARY TRAP MAGAZINE WITH TWO-STAGE TARGET FEED

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Filed Mar. 31, 1964, Ser. No. 356,111
5 Claims. (Cl. 124—47)

This invention relates to machines or traps for throwing clay pigeon targets for trap or skeet shooting. In one aspect it comprises improvements upon the target throwing trap of my United States Patent 3,108,582 October 29, 1963. In another aspect it comprises new and improved magazine mechanism of the turret type particularly adapted for use in association with the machine of my said patent but having many features of more general application.

In general it is the object of the present invention to provide a trap with an ample supply of targets presented in stack formation by a mechanically operated turret and to insure the transfer of successive targets from the turret to the throwing member of the trap by easy stages and with such gentle handling as to obviate damage to the fragile structure of the targets.

To this end the present invention is characterized, in its application to a trap having a throwing member or arm rotatable about an upright axis, by the provision of a magazine turret rotatable about an independent axis and having means for presenting one stack after another above the throwing arm and in line with its axis, and means for supporting a reserve or auxiliary stack of relatively few targets in position between the turret and throwing arm and in line with the axis of the latter. The transfer of targets is thus effected in two stages, i.e. first by a step from one of the stacks carried by the turret to the auxiliary stack, and then by a second step from the auxiliary stack to the throwing arm. It will be apparent that by this step-by-step procedure the danger and shock of any abrupt drop of a target is avoided.

Other features of the invention, as will be hereinafter pointed out, consist in novel mechanism for indexing, rotating and locking the turret, for holding and releasing the stacked targets thereon, and for transferring the individual targets so that they will be automatically deposited one after another in quick succession upon the throwing arm. In practice this mechanism is so efficient and rapid in its operation that three targets may be placed in orbit at the same time, thus setting up a severe and unusual test for a skillful gunner.

These and other features of the invention will be best understood and appreciated from the following description of a preferred embodiment thereof selected for purposes of illustration and shown in the accompanying drawings in which:

FIG. 1 is a view in elevation, partly in section, of the complete machine and magazine,

FIGS. 2 and 3 are fragmentary views of portions of the machine shown in FIG. 1, and

FIG. 4 is a plan view of the magazine.

The illustrated machine is adapted for throwing clay pigeon targets **10** of conventional shape of which a divided stack of twenty-one targets is shown in FIG. 1 with a single target shown as delivered to the throwing arm. A portion of the machine frame **11** is shown in this figure.

The throwing arm of the trap comprises a rectangular box-shaped arm **12** constructed of upper and lower interfitting sections and secured to a hub **13** fast to the upper end of a tubular shaft **14**. The shaft **14** is journaled in bearings **15** secured in the main frame **11** and is provided at its lower end with a driven pulley **16** by which the shaft **14** and the throwing arm are rotated at high speed about the vertical axis of the shaft.

The upper surface of the throwing arm **12** is provided with a circular aperture disposed concentrically with respect to the shaft **14** and this is initially occupied by a transfer disk **17** resting upon underlying stops **17'** that are secured to the underside of the arm and maintain the surface of the disk exactly in flush relation with the upper surface of the throwing arm **12**. The disk **17** is provided with a downwardly offset concentric chamber **19** in which is contained a smaller flat disk **20** fast to the upper end of the shaft **22** and mounted for movement within the chamber **19**. Beneath the disk **20** is a spring **21** and this spring serves to hold the disk **17** yieldingly downwardly in position upon its stops and to permit lost motion of the shaft **22** in respect to the transfer disk **17** when the shaft is moved upwardly.

The shaft **22** is arranged concentrically within the tubular shaft **14**. It is provided near its lower end with a flanged spool **23** which is engaged between bosses on the end of an arm **24** of a bell crank lever pivotally mounted at **24'** in a bracket depending from the frame **11**. The upwardly projecting end of the lever **24** is operated from a cam (not shown) carried by a cam shaft **29** journaled in the machine frame directly behind a vertical shaft **39** which will be described hereinafter.

It is desirable to hold the transfer disk **17** against rotation during the operation of transfering a target from the stack to the throwing arm and to leave the disk with its target free to rotate with the arm as soon as a target transferring operation has been completed. To this end the lever arm **24** is provided with a spring **25** so shaped as to clear the upper flange of the spool **23** when the transfer disk **17** is in its lowermost postion and while the disk **17** tends to rotate during its period of resting on the underlying stops **17'** of the throwing arm as shown in FIG. 1. However when the lever arm **24** is rocked to elevate the shaft **22** and the transfer disk the spring **25** will engage the upper flange of the spool **23** and impart sufficient retarding frictional contact to the spool to prevent rotation of the shaft and transfer disk.

The transfer disk is thus frictionally held at rest against rotation during its complete transfer movement up and down. In its upward movement the transfer disk is brought into proximity with the lowermost target **10** of the reserve stack and that target is designed to be centered upon the disk **17** by fitting into a concentric groove **18** formed in its upper surface. The target is thus held in a position concentric with the axis of the rotation of the shaft **22** while it is moved downwardly and deposited upon the upper surface of the throwing arm **12**. The target then remains in alignment with the axis of the throwing arm until it is pushed out of its concentric position by mechanism corresponding substantially to that described in my prior patent above identified. This mechanism as herein shown comprises a pair of squeeze arms **60** initially disposed in divergent relation adjacent to the periphery of a target as delivered and pivotally mounted on the throwing arm. Each squeeze arm is secured to the upper end of a short vertical shaft provided at its lower end with a beveled gear **61**. This meshes with a beveled gear **62** on the outer end of a short horizontal shaft mounted beneath the upper wall section of the arm **12** and carrying at its inner end a crank disk and pin **63**.

The crank pins **63** from each of these disks is engaged between collars **64** on the shaft **22**. Accordingly when the shaft is drawn downwardly and while the transfer disk **17** is held in its flush position the crank pins **63** are oscillated and the squeeze arms **60** operate to advance the just-delivered target from its concentric position to an off-center position as shown in FIG. 1. In this displaced off-center position the target becomes subject for the first

time to centrifugal force by reason of its eccentric position on the rotating throwing arm **12**.

The machine includes in its framework a stationary horizontal platform **30** supported by a post **31** from the lower elements of the frame **11**. The platform is provided with a circular aperture in line with and between a target stack and the transfer disk **17**. Above the platform is mounted a rotary magazine turret **32** to the lower surface of which is attached a series of U-shaped members **33** forming slots for the driven disk of a Geneva stop motion. Below these members is mounted an index disk **34** having eight notches and normally held at rest by a dog **35** which is formed on the inner end of a lever **36** pivotally mounted on the platform **30** and normally urged into locking position by a torsion spring **36'**. The magazine turret **32** and the index disk **34** are mounted to rotate upon a short stationary shaft **41** projecting upwardly from the platform **30** and offset with respect to the axis of the throwing arm.

The magazine turret **32** is rotated step by step in clockwise direction by a driving pin **37** which projects upwardly from a flat cam **53** on a vertically driven shaft **39** journaled in the frame and driven by a belt from a pulley **26** connected to the hub of the main driven pulley **16**. The cam **53** is free to rotate on the shaft **39** except when it is clutched by a pawl **52** to a toothed disk **51** fast on the upper end of the shaft. The pawl **52** is pivotally mounted on the cam **53** and normally held out of engagement with the toothed disk **51** by a pin **54** arranged to be retracted by a solenoid **49**. The solenoid is in circuit with a micro switch **48** mounted at the outer end of the platform **30**. The arm of the switch **48** is arranged to engage targets in the main stack so long as any remain therein. When the stack is exhausted the switch arm moves inwardly as suggested in FIG. 1, the solenoid **49** is actuated, the pin **50** retracted and the pawl **52** released from the notched disk **36**. The pin **50** thereupon engages the rotating toothed disk **51** and a single revolution is imparted to the cam **53**. The Geneva motion is thus operated to advance the turret 45° bringing a fresh stack into line with the axis of the throwing arm.

The turret **32** as herein shown is provided with eight nests of upright posts **42** each holding a full stack of fourteen targets and each of these stacks is prevented from dropping through the turret by a gripper roll **43** carried by an arm **44** pivotally mounted on the turret and urged into gripping engagement by a torsion spring.

Each gripper arm **44** is associated with a pivoted cam arm **45** that normally projects beyond the rim of the turret in position to be engaged by a fixed stop **46** when a fresh stack arrives in position above the axis of the throwing arm. When this occurs the stack is released and drops into contact with the uppermost target of the auxiliary stack held in the platform **30**.

As herein shown the auxiliary or reserve stack comprises seven targets which are maintained throughout the operation of the machine and from which the bottom target is transferred by the disk **17** to the throwing arm. The auxiliary stack is held in the platform **30** between fixed gripper rolls **55** and a movable gripper roll **56** carried by a slide **57** and operated by a cam, not shown, on the upper end of the cam shaft **29**.

As each successive stack comes into line with the axis of the throwing arm its cam arm **45** is rocked in a counterclockwise direction thereby retracting the arm **44** and its gripping roll **43**. This releases the main stack in the turret so that it may drop upon the reserve stack beneath it and form one continuous stack of twenty-one targets.

The transfer disk is now timed to rise and contact the lowermost target in the combined stack and at the same time the gripper roll **56** is retracted. The transfer disk then descends followed by the whole stack but as soon as the lowermost target has cleared the platform **30** the gripping roll **56** is again advanced as the stack is arrested

in the position shown in FIG. 1. The downward movement of the transfer disk **17** terminates with a single target separated from the bottom of the stack and deposited upon the throwing arm.

In FIG. 1 a gap which would not occur in practice is shown between the reserve stack and the turret main stack of the target. The operating arm of the switch **48** is shown in the position it occupies only when the main stack has become completely exhausted for it is only then that the solenoid **49** will be energized to retract the pin **50** and initiate the cycle of the turret to bring a fresh stack into transferring position upon the throwing arm.

It will be understood that when the pin **50** is retracted the cam **53** makes a single revolution as the switch **48** is opened by contact of its arm with the targets passing downwardly from the turret. The pin **50** is immediately returned to its operating position where it engages the tail of the pawl **52** and releases the pawl from the rotating index disk **51**, at the same time contacting a block or stop **54** fixed to the under side of the cam thus preventing over running of the cam.

The magazine may be loaded apart from the trap, or while in place thereon, by manually supporting the bottom of the reserve stack in the aperture of the platform **30** and meanwhile temporarily retracting by hand one of the gripping rolls **43**. The loaded magazine turret may then be placed on the stationary shaft **41**.

As herein shown the machine frame includes a transverse housing **65** in which is journaled a shaft carrying wheels **66** by which the machine as a whole may be trundled from one place to another.

The trap may be set in operation by first starting the motor **28** which drives the cam shaft **29** through a clutch and belt connections, not shown. The cam shaft **29** drives the shaft **39** with the toothed disk **51** by means of V-belt connections. The trap will now operate without interruption until the current stack of targets is used up. When this happens the switch **48** operates to withdraw the pin **50** and the turret is advanced to deliver a new stack of targets as already explained.

When the stack is drawn down to seven targets, or whatever the number of the reserve stack, the switch **48** is closed to effect retraction of the solenoid pin **50**. Thereupon the rotating toothed disk **51** picks up the cam **37**, the turret is revolved 45°, a fresh stack is advanced to the transfer point and the gripper roll **43** is retracted to release the stack from the turret. The cam **53** in its rotation contacts the lever **36** and withdraws the dog **35** thus unlocking the turret.

Having thus disclosed my invention and described in detail an illustrative embodiment thereof, I claim as new and desire to secure by Letters Patent:

1. A target trap having a frame, a rotary throwing arm mounted thereon and having an aperture concentric with its axis of rotation, a stationary holder located above the throwing arm and having means for holding an auxiliary stack of relatively few targets and releasing them one by one to the throwing arm, and a magazine turret rotatable above said stationary holder and provided with means for presenting a stack of targets in line with and above the auxiliary stack of said holder, and power operated means for transferring targets intermittently from the stack in the turret to the auxiliary stack in said holder, a transfer disk rotatable in an aperture of the throwing arm, means for moving the disk from said throwing arm to the auxiliary stack and brake means connected to said disk for retarding its rotation while transferring a target.

2. In a target trap having a throwing member rotatable about a vertical axis and having an aperture concentric with its said axis, stationary means for supporting a stack of targets above the throwing member and in line with its axis of revolution; transfer mechanism which includes a disk means mounting said disk for vertical movement between the stack and the aperture of the throwing member and for normal rotation with said throwing member,

together with brake means connected to the disk for retarding rotation of the disk in its upward movement toward the stack and releasing the disk for rotation at the conclusion of its movement toward the throwing member.

3. A target trap having a rotary throwing arm and a turret rotatable about an axis offset with respect to the axis of the throwing arm and carrying a series of target stacks, target-gripping means carried by the turret and arranged to be automatically released when a target stack is presented by the turret in line with the axis of the throwing arm, means for supporting an auxiliary stack in line with and between a turret stack and the throwing arm, means for delivering targets from the turret stack to the auxiliary stack, and separate gripping means for the lowermost target of the auxiliary stack arranged to be intermittently released for the transfer of successive targets from the auxiliary stack to the throwing arm.

4. A target trap as described in claim 3, further characterized in that said target gripping means includes a releasing means which projects beyond the periphery of the turret and is arranged in position to be moved to stack-releasing position by contact with a fixed stop encountered in the revolution of the turret.

5. In a target trap having a throwing member rotatable about an upright axis and having an aperture concentric with its said axis, a magazine for holding a stack of targets above the throwing member and in line with its

axis of rotation, and transfer mechanism including a disk, means mounting said disk for vertical movement between the stack and the aperture of the throwing member and having a concentric groove in its upper surface for receiving a target from the stack and operating to deliver targets for normal rotation with the throwing member, together with spring means operatively connected to the disk for preventing rotation of the disk in approaching the stack and releasing the disk for rotation when it is returned to the throwing member.

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