

Aug. 1, 1961

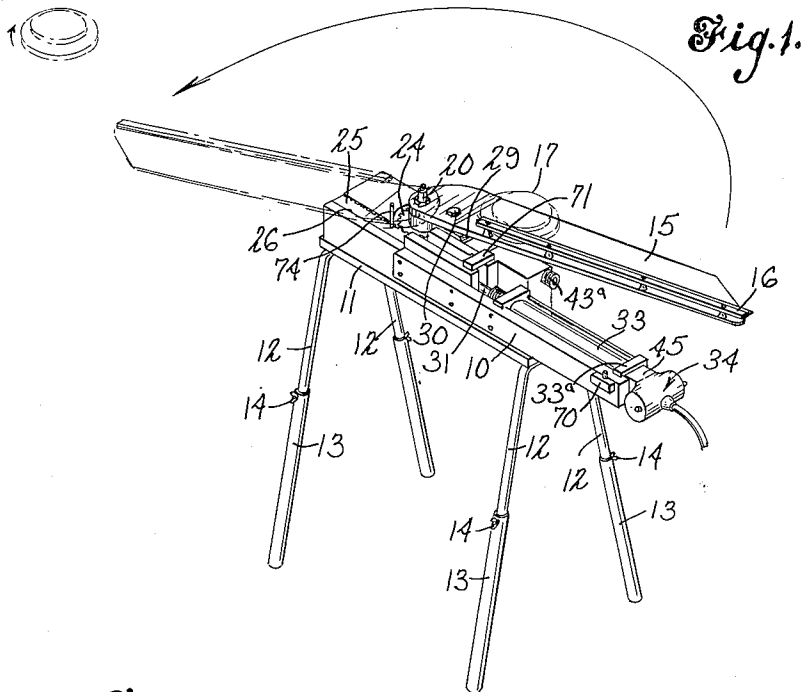
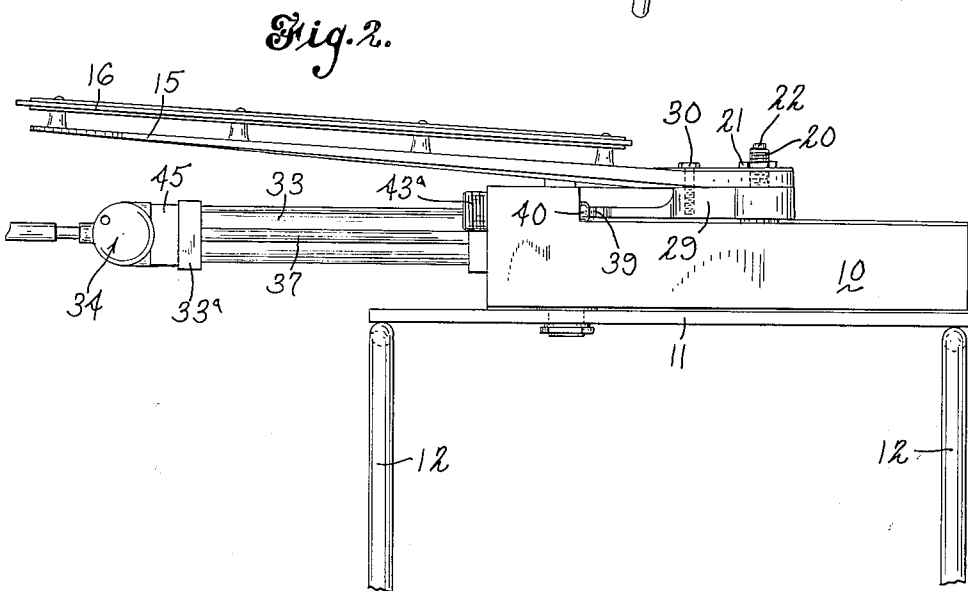
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2,994,313

TARGET TRAPS

Filed Sept. 26, 1958

3 Sheets-Sheet 1



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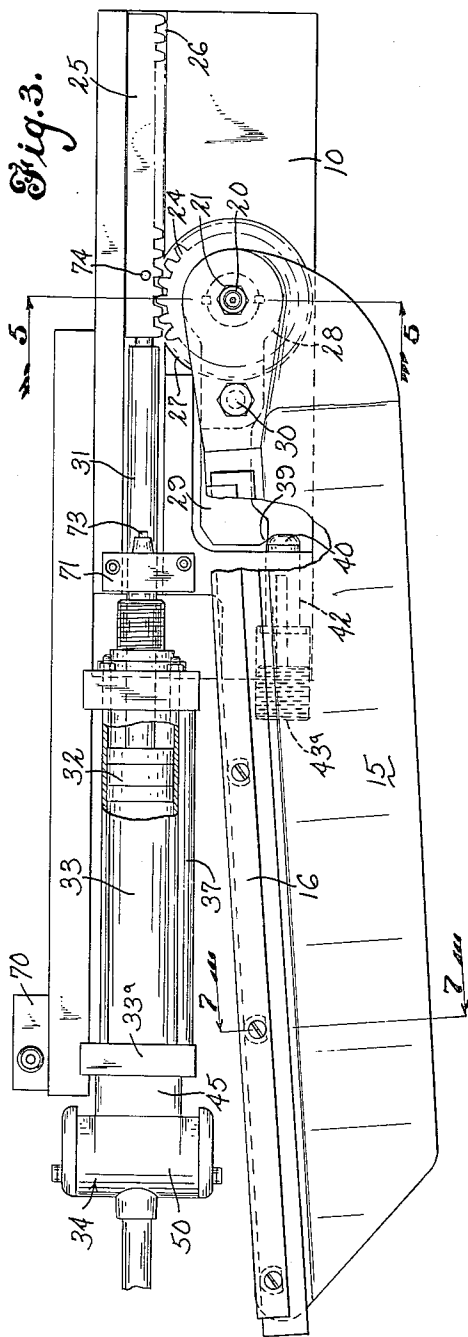
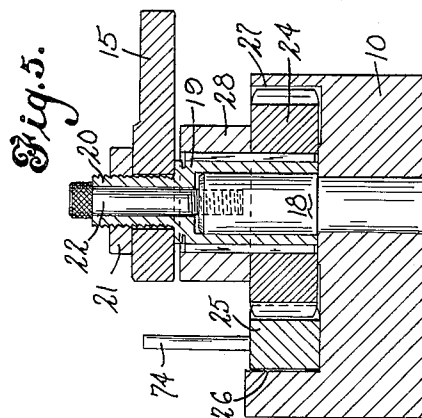
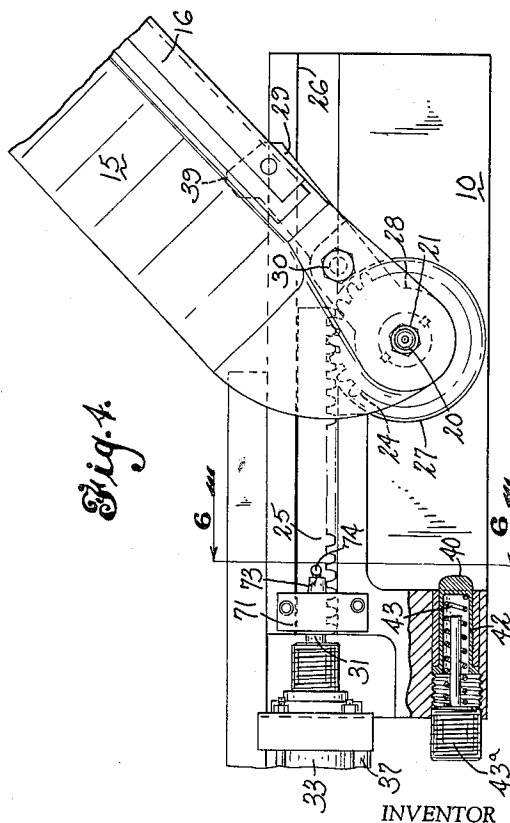
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2,994,313

TARGET TRAPS

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3 Sheets-Sheet 2



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TARGET TRAPS

2,994,313

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3 Sheets-Sheet 3

Fig. 6.

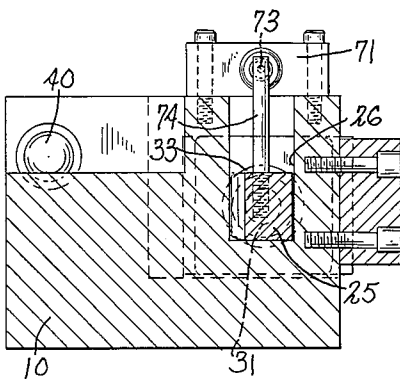


Fig. 7.

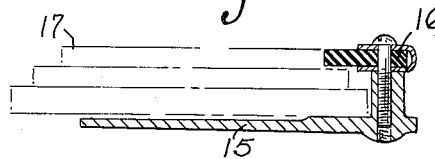


Fig. 8.

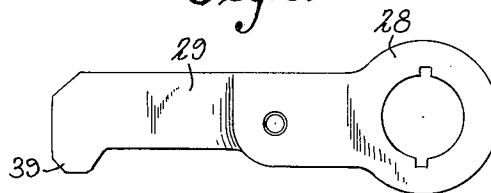


Fig. 9.

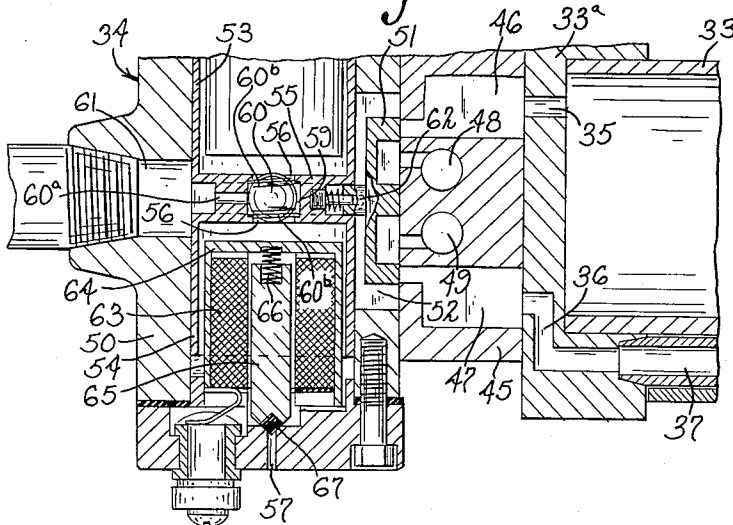
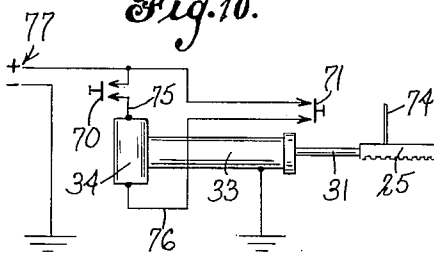


Fig. 10.



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1

2,994,313

TARGET TRAPS

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9 Claims. (Cl. 124—6)

This invention relates to target traps and more particularly to a device for throwing light frangible disklike targets, commonly called clay pigeons, into the air to be used by a marksman. The invention particularly relates to a mechanism of this character which is power operated and particularly operated by fluid pressure such as compressed air both upon its active and return stroke so that no heavy springs are required for this purpose.

In most target traps now employed the throwing arm is pivoted upon a frame and urged in one direction by a relatively heavy spring action between the frame and a crank member or other portion rigid with the arm. With such a mechanism the arm may be returned by power or manually, but in any event must be returned against the tension of the spring to its "cocked" position where it may be held by a catch or latch. Upon release of this catch by the operator when the marksman is ready to fire, the spring swings the arm forcefully about its pivot to discharge the target which is carried upon the arm.

As the throwing arm must be propelled with considerable force, the spring must be relatively heavy and the associated parts of the device must be relatively heavy and strong to withstand the shock occasioned by the movement of the throwing arm. A considerable force is, therefore, required to cock the device as the spring must be either tensioned or compressed, depending upon the type of spring employed, during this movement, and the cocking movement must take place in a direction in opposition to the direction in which the arm is urged by the spring.

It is contemplated by the present invention to provide a target trap which will be operated by a compressed fluid such as compressed air and which may be so operated in both directions so as to be completely automatic. In any event, however, as the arm is propelled by fluid pressure, no springs are required and, as the pressure may be released after a movement of the arm, the latter may be cocked without resistance being offered thereto. Also the parts may be made considerably lighter than when strong springs are employed so that the device is not only more easily transported from place to place, but also may be manufactured more economically.

The fluid pressure may be supplied by a small air compressor or from a tank of compressed gas such as air or nitrogen which is of very light weight so that the entire mechanism may be readily portable and easily moved from place to place.

As illustrated, the throwing arm is actuated by a piston and cylinder structure and the valve mechanism by which the fluid pressure is controlled may be so arranged as to introduce air pressure upon either side of the piston selectively so that the throwing arm may be not only actuated in its operative movement by the piston, but also may be returned or cocked by the piston, and this return movement may be performed automatically at the end of the active stroke of the throwing arm.

One object of the invention is the provision of a new and improved target trap for throwing targets such as clay pigeons, for example.

A further object of the invention is the provision of a target trap which may be operated by fluid pressure and thus avoid the use of heavy springs for this purpose.

Still another object of the invention is to provide a

2

target trap having a pivoted throwing arm actuated by the piston of a cylinder into which fluid pressure may be introduced so that the use of springs may be avoided and the throwing arm will not have to be returned to its cocked position against an opposing force.

A further object of the invention is to provide a target-throwing trap of the character described in which the operation of the device will be completely automatic in that the throwing arm will not only be power propelled in its active movement or throwing direction, but will be automatically returned to a cocked position at the end of its active stroke.

Still another object of the invention is to provide pressure-fluid-actuated means for propelling the throwing arm of the trap and means for permitting the operating pressure to build up prior to the release of the throwing arm so that the latter will be propelled with a sudden and quick movement.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings:

FIG. 1 is a perspective view of a target trap embodying my invention;

FIG. 2 is a side elevational view thereof showing the mechanism in cocked position;

FIG. 3 is an enlarged top plan view of the trap in the position shown in FIG. 2;

FIG. 4 is a view similar to FIG. 3 showing the arm in the position occupied at the end of its active stroke, some parts being shown in section;

FIG. 5 is a sectional view on line 5—5 of FIG. 3;

FIG. 6 is a sectional view on line 6—6 of FIG. 4;

FIG. 7 is a sectional view on line 7—7 of FIG. 3;

FIG. 8 is a detail view of a portion of the latching mechanism for the throwing arm;

FIG. 9 is a sectional view of the valve mechanism controlling the admission of pressure fluid to the power cylinder; and

FIG. 10 is a diagrammatic view of the electrical connections to the valve mechanism shown in FIG. 9.

To illustrate a preferred embodiment of my invention I have shown a target trap comprising a base portion 10 which may be supported in any suitable way such as upon a table or supporting member 11 having depending legs 12. These legs may be telescopically received in sleeve-like end portions 13 and secured by screws 14 so that the height of the table 11 may be adjusted.

Upon the table 11, as shown more especially in FIGS. 2, 3 and 5, is pivoted a throwing arm 15 having a carrier rail 16 thereon against which the target or clay pigeon (shown at 17 in FIG. 7) may rest. This arm and rail are of the usual construction and need not be further described. This arm is pivoted (FIG. 5) upon a pivot pin 18, secured to the base 10, by means of a sleeve 19 rotatably receiving the pin, this sleeve being provided with a post 20 upon which the arm is secured by the nut 21 threaded upon the post.

A screw 22 passes through the post 20 and is threaded into the pivot member 18 to hold the sleeve 19 thereon. Keyed to the sleeve 19 is a pinion 24, the teeth of which are engaged by the teeth of a rack member 25 reciprocally mounted in a groove 26 in the base 10. As will be noted from FIGS. 3 and 5, the gear 24 is disposed in a recess 27 in the upper surface of the base, which recess communicates with the groove 26. Also keyed to the sleeve 19 is the hub 28 (FIG. 8) of a latch arm 29, the purpose of which will be described hereinafter, and this latch arm is also secured to the throwing arm by the bolt 30 (FIG. 3).

The rack member 25 is secured to the piston rod 31

of a piston 32 within a cylinder 33 secured in the bed 10. A valve mechanism designated generally at 34 which will be described more specifically hereinafter is provided at one end of the cylinder to introduce air into either end thereof selectively upon opposite sides of the piston 32 so as to move the rack 25 in either direction and actuate the throwing arm. As shown in FIG. 9, the cylinder 33 is provided with a head 33^a having a fluid inlet passage 35 admitting fluid to the near or left-hand end of the piston as shown in this figure and also an inlet opening 36 communicating with a tube 37 adapted to admit air to the far or right-hand end of the cylinder upon the other side of the piston.

It will be desirable to provide means for effecting a buildup of air pressure when it is admitted to the cylinder in order that the throwing arm will be moved with a positive snap action upon its active stroke which might not be true if the arm were permitted to begin its movement at the instant air was admitted to the cylinder. It is for this purpose that the latch arm 29 is provided and rigidly secured to the throwing arm 15. As shown more especially in FIGS. 3, 4 and 8, this latch arm is provided with a nose 39 adapted to be engaged in its cocked position by the rounded end 40 of a spring-pressed plunger 42 mounted in the base and urged outwardly by a spring 43. When the arm is in its cocked position, as shown in FIG. 3, it will be restrained from rotation in a counterclockwise direction (the direction of an active stroke) by the nose of the plunger 42. However, when sufficient pressure is applied to the arm through the pinion 24, the plunger 42, due to the cam action of the nose 39 of the latch arm upon the rounded end 40 of the plunger, will be cammed inwardly and release the arm for its operative stroke. This momentary restraint of the throwing arm will permit the pressure to build up in the cylinder 33 until it is sufficient to move the arm with the requisite speed.

The springs 43 reacts against a gland screw 43^a (FIG. 4), which may be adjusted to vary the force exerted by the spring against the plunger so as to adjust the force necessary to release the latch arm and the throwing arm to which it is secured.

Any suitable valve mechanism may be employed to control the admission of fluid pressure to the inlet openings 35 and 36 of the cylinder 33. As illustrated, however, the valve mechanism is one of a known type such, for example, as shown in United States Patent No. 2,641,229. As illustrated (FIG. 9), a block 45 is provided upon the cylinder head, this block having chambers 46 and 47 leading to the inlet ports 35 and 36 respectively and also being provided with vent or exhaust ports 48 and 49. A housing 50 is mounted upon the block 45 and a valve 51 slidably mounted in this housing controls communication between a chamber 52 in the housing and the chambers 46 and 47 and also controls communication between the latter chambers and the vent passages 48 and 49.

Within the housing 50 is reciprocally mounted a piston comprising two cylindrical guide members 53 and 54 projecting oppositely from a head 55 and having two outlet ports 56 communicating with vents 57 (only one being shown on the drawing) and a valve chamber 59 in the head 55. A valve comprising a ball 60 is provided in the head 55 to control the ports 56 and a passage 60^a connects the valve chamber 59 and a passage 61 leading to a source of fluid pressure. The ball 60 may be held in a neutral position by springs 60^b so that both ports 56 will normally be open and the ball occupy a neutral or static position in repose. The valve 51 is secured to the head 55 by means of a dowel 62.

Within each of the guides 53 and 54 is a solenoid 63 (only one of which is shown as the construction in both ends of the housing 50 is identical), which solenoids are provided in cylindrical casings 64. Each of the solenoids is provided with a core 65 which it is designed to actuate when energized, the cores being urged outwardly

or toward the ends of the casing by springs 66. Each of the cores carries a valve member 67 upon its remote end to close the vents 57 in the ends of the housing.

When both ports 57 are closed, the piston 53 will stand in its neutral position, as shown in FIG. 9. When, however, the solenoid coil 63 is energized, the core 65, shown in FIG. 9, will be drawn away from the vent 57, thus opening this vent and reducing the pressure upon that side of the valve 60. The latter will be moved in a direction to close the port at this side and air passing through the other port 56 behind the piston guide member 53, urging this member downwardly as shown in the drawing, will move the valve 51 in the same direction, thus effecting communication between the passage 47 and the exhaust port 49. At the same time communication will be effected between the passage 46 and the chamber 52 which will permit fluid pressure to enter the near end of the cylinder through the passage 35.

When the solenoid 63 at the other side of the valve structure is energized, the valve will be moved in the other direction and effect communication between the passage 46 and the vent port 48 and introduce fluid pressure from the chamber 52 into the passage 47 and through the tube 37 to the remote end of the cylinder.

A manually operated switch 70 (FIG. 1) is provided to energize the solenoid which effects movement of the valve 51 in an upper direction to introduce fluid pressure into the tube 37 and thus effect an active stroke of the throwing arm 15. This may be a push-button switch so that the operator need merely push the button to initiate operation of the trap and effect discharge of the target. It will be understood that the plunger 42 will momentarily prevent swinging of the arm until sufficient pressure has built up in the cylinder to cam the plunger inwardly against the action of the spring 43 so as to release the latch member 29.

To effect automatic return of the throwing arm to cocked position, a switch 71 (FIGS. 3 and 6) is provided adjacent and above the plunger 31. This switch energizes the solenoid shown at the lower portion of FIG. 9 of the drawings which moves the valve to a position to introduce air into the near end of the cylinder 33 and move the piston 31 outwardly.

The switch 71 is controlled by a spring-pressed plunger 73 which is adapted to be engaged by a pin 74 on the rack member 25 when the latter reaches a point adjacent the end of its active movement or movement in a direction to effect a target-throwing movement of the arm 15.

When the arm 15 reaches the position shown in FIG. 4, the pin 74 strikes the plunger 73 and closes the switch 71, thus energizing the solenoid coil 63 to move the valve 51 downwardly, thus introducing fluid pressure to the near end of the cylinder 53 and venting the forward or remote end of the cylinder to permit movement of the piston to the right, as shown in FIGS. 3 and 4, and thus return the throwing arm 15 to cocked position where the latch arm 29 is again engaged by the nose 40 of the plunger 42. It will be understood that in the meantime the operator has removed his finger from the push button of the switch 70.

It will thus be seen that once the operator presses the button of the switch 70, the operation of the device will be automatic both as regards the throwing of the target and the return of the throwing arm to cocked position so that upon actuation of the switch 70 a complete cycle will have been completed and it will only be necessary to again actuate this switch for the completion of a subsequent cycle.

In FIG. 10 of the drawings an illustrative wiring diagram is shown wherein the manually operated switch 70 is connected to one of the solenoids by the conductor 75 while the automatically actuated switch 71 is connected to the solenoid by the conductor 76, the source of current being shown diagrammatically at 77. It will be, of course, understood that any operative wiring circuit may be employed and, if desired, both switches may

5

be manually operated instead of providing for the automatic return of the throwing arm to cocked position.

It will be apparent that the device is simple and may be constructed of relatively light-weight material so no heavy springs are required. Moreover, as the throwing arm is actuated by fluid pressure the return of the arm to cocked position is not opposed and, even if this return be manually effected, it will be found to be of distinct advantage to effect the throwing movement by fluid pressure. It will be understood that the provision of the latch member 29 and detent plunger 42 will be effective to cause a build-up of fluid pressure in the cylinder prior to release of the arm so that the latter will move with a required velocity and the pressure of the actuating fluid may, of course, be regulated by well known means to regulate the speed of delivery of the target.

If desired, the valve 51 may be manually operated by a handle lever secured thereto. Preferably such a handle lever would be spring loaded so that, when moved to position to effect a target-throwing movement of the arm and released, the spring would return it to its original position in which fluid pressure would be introduced into the near end of the cylinder 33 to automatically return the arm to its cocked position.

While I have shown and described a preferred embodiment of my invention, it will be understood that it is not to be limited to all of the details shown, but is capable of modification and variation within the spirit of the invention and within the scope of the claims.

What I claim is:

1. A target trap comprising a supporting base, a target-throwing arm pivotally mounted on the base and adapted for rotation from a cocked position, means for releasably holding said arm in cocked position, a pinion rigidly secured to the arm, a rack member slidably carried by the base, the teeth of which are engaged with those of the pinion, fluid-pressure-actuated means for effecting release of said holding means and moving said rack member to rotate the pinion and target-throwing arm, said means comprising a cylinder, a piston in the cylinder connected to said rack member, means for introducing fluid under pressure to the cylinder, and said holding means restraining movement of the throwing arm until a predetermined force is exerted thereon by said rotating means, and comprising a spring-pressed plunger on said base and a part on said arm engaged by said plunger when the arm is in cocked position.

2. A target trap comprising a supporting base, a target-throwing arm pivotally mounted on the base and adapted for rotation from a cocked position, means for releasably holding said arm in cocked position, a pinion rigidly secured to the arm, a rack member slidably carried by the base, the teeth of which are engaged with those of the pinion, fluid-pressure-actuated means for effecting release of said holding means and moving said rack member to rotate the pinion and target-throwing arm, said means comprising a cylinder, a piston in the cylinder connected to said rack member, means for introducing fluid under pressure to the cylinder, and said holding means restraining movement of the throwing arm until a predetermined force is exerted thereon by said rotating means and comprising a spring-pressed plunger member and a latch member engaged by said plunger member, one of said members being mounted on the supporting base and the other carried by the arm.

3. A target trap comprising a supporting base, a target-throwing arm pivotally mounted on the base and adapted for rotation from a cocked position, fluid-pressure-actuated means connected to said arm for rotating the arm about its pivot from the cocked position, said means comprising a cylinder on the base member, a piston in said cylinder operatively connected to said arm, and means for introducing fluid pressure into said cylinder to move the piston, yieldable latching means to restrain movement of the arm from its cocked position until a

6

predetermined pressure obtains in said cylinder to exert sufficient force on said arm to overcome said yieldable latching means, said latching means comprising a spring-pressed plunger on the base having a nose portion and a part on said arm engaged by said nose portion.

4. A target trap comprising a supporting base, a target-throwing arm pivotally mounted on the base and adapted for rotation from a cocked position, a pinion rigidly secured to the arm, a rack member slidably carried by the base, the teeth of which are engaged with those of the pinion, fluid-pressure-actuated means for reciprocating said rack member to effect rotation of said target-throwing arm in opposite directions to and from the cocked position, said means comprising a cylinder mounted upon the supporting base and a piston in the cylinder and operatively connected to said rack member, a source of fluid pressure, movable valve means adapted to direct fluid under pressure from said source into said cylinder upon one or the other side of said piston selectively, electrically actuated means for moving said valve, manual means for energizing said electrical means to move said valve to introduce air into one end of the cylinder to rotate said arm in a target-throwing direction, automatically actuated means to energize said electrical means to move said valve to position to direct air to the other side of said piston to effect a return movement of the target-throwing arm to its cocked position, said automatically actuated means comprising a switch to control the energization of said electrical means, and means moved by the piston to actuate said switch.

5. A target trap comprising a supporting base, a target-throwing arm pivotally mounted on the base and adapted for rotation from a cocked position, a pinion rigidly secured to the arm, a rack member slidably carried by the base, the teeth of which are engaged with those of the pinion, fluid-pressure-actuated means for reciprocating said rack member to effect rotation of said target-throwing arm in opposite directions to and from the cocked position, said means comprising a cylinder mounted upon the supporting base and a piston in the cylinder and operatively connected to said rack member, a source of fluid pressure, movable valve means adapted to direct fluid under pressure from said source into said cylinder upon one or the other side of said piston selectively, electrically actuated means for moving said valve, manual means for energizing said electrical means to move said valve to introduce air into one end of the cylinder to rotate said arm in a target-throwing direction, automatically actuated means to energize said electrical means to move said valve to position to direct air to the other side of said piston to effect a return movement of the target-throwing arm to its cocked position, said automatically actuated means comprising a switch to control the energization of said electrical means, and means moved by the piston to actuate said switch, said last-named means comprising a member carried by the rack member and adapted to engage and actuate the switch when the rack member reaches a point adjacent the end of its movement in one direction.

6. A target trap comprising a supporting base, a target-throwing arm pivotally mounted on the base and adapted for rotation toward and from a cocked position, fluid-pressure-actuated means to effect rotation of said target-throwing arm in opposite directions, said means comprising a cylinder mounted upon the supporting base and a piston in the cylinder and operatively connected to said arm, manually operable means for introducing fluid pressure into the cylinder upon one side of the piston to effect rotation of said arm in one direction, and means controlled by the position of the piston to introduce fluid pressure into the cylinder at the other side of the piston to effect rotation of said arm in the opposite direction.

7. A target trap comprising a supporting base, a target-throwing arm pivotally mounted on the base and adapted for rotation toward and from a cocked position, fluid-

7

pressure-actuated means to effect rotation of said target-throwing arm in opposite directions, said means comprising a cylinder mounted upon the supporting base and a piston in the cylinder and operatively connected to said arm, manually operable means for introducing fluid pressure into the cylinder upon one side of the piston to effect rotation of said arm in a target-throwing direction, and means actuated by movement of said piston to a point adjacent its limit of movement in said direction to introduce fluid pressure into the cylinder on the other side of the piston to effect return movement of the arm to cocked position.

8. A target trap comprising a supporting base, a target-throwing arm pivotally mounted on the base and adapted for rotation toward and from a cocked position, fluid-pressure-actuated means to effect rotation of said target-throwing arm in opposite directions, said means comprising a cylinder mounted upon the supporting base and a piston in the cylinder and operatively connected to said arm, manually operable means for introducing fluid pressure into the cylinder upon one side of the piston to effect rotation of said arm in a target-throwing direction, and means to introduce fluid pressure into the cylinder upon the other side of the piston to effect return movement of the arm to cocked position, said means including a movable controlling member mounted on the supporting base and a part on said piston to engage said controlling member when the piston reaches a point adjacent the limit of its movement in a target-throwing direction.

8

9. A target trap comprising a supporting structure, a throwing arm pivoted to said structure to swing outwardly from a cocked position adjacent the support, a cylinder supported by the structure, a piston reciprocally mounted in the cylinder and extending therefrom, the extended end of the piston being operatively connected to said arm to move it in opposite directions about its pivot when the piston is reciprocated, means for introducing fluid pressure into said cylinder on opposite sides of the piston to move the latter in opposite directions, a spring-biased latch member mounted on the supporting structure to normally lie in the path of and engage a part of said arm and releasably retain the latter in cocked position, and said latch member being cammed to a position out of the path of said arm when the latter is moved to cocked position and thereafter moved under the influence of its spring to engage said part.

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