March 27, 1928. 1,663,780

W. I. SPANGLER

TARGET THROWING TRAP

Filed July 8, 1925 3 Sheets-Sheet 1

Fig. 1.

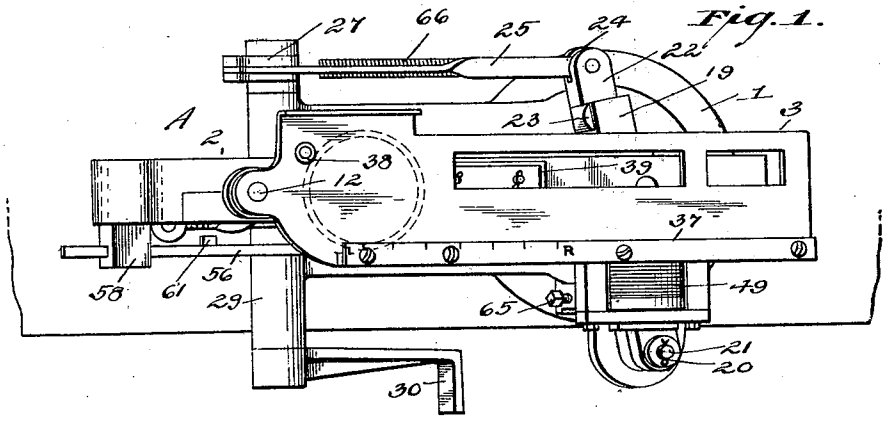
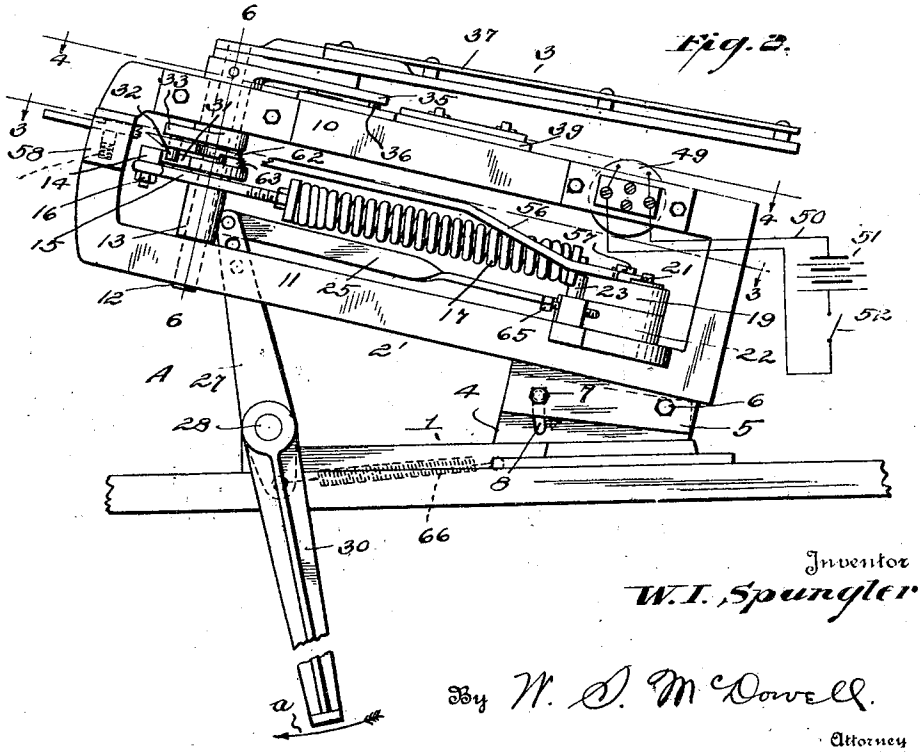


Fig. 2.



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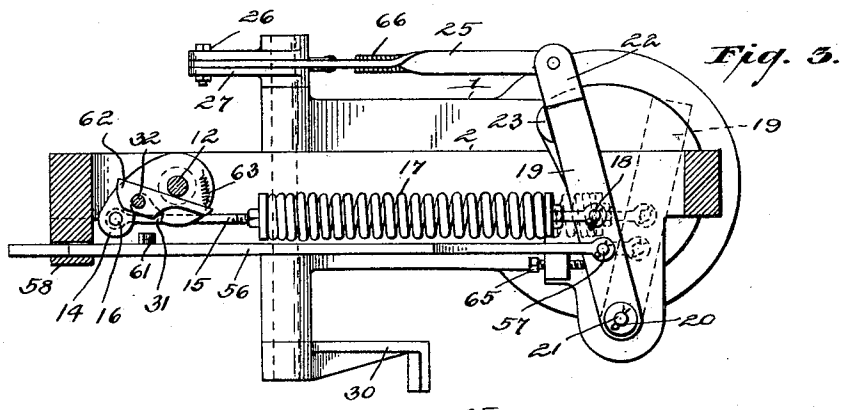


Fig. 3.

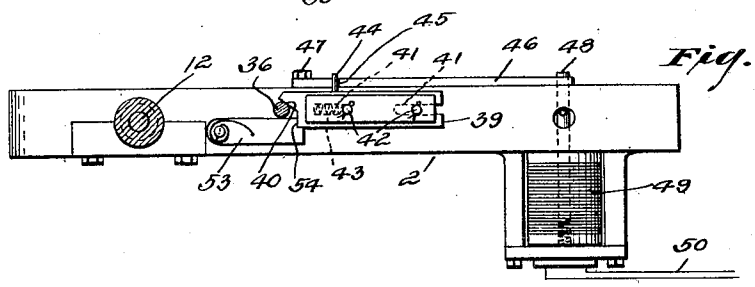


Fig. 4.

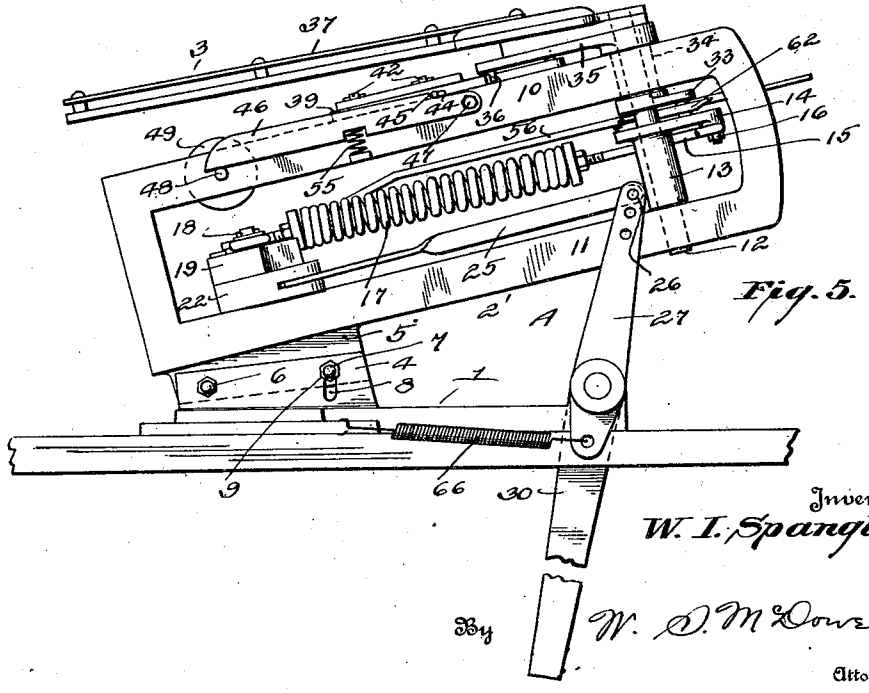


Fig. 5.

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TARGET THROWING TRAP

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Fig. 6.

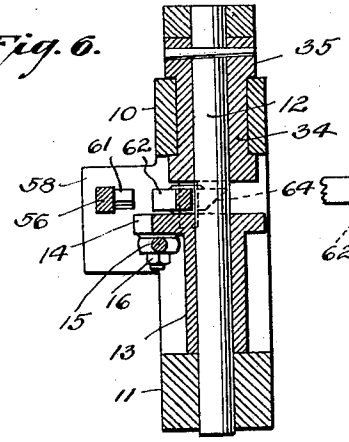


Fig. 7.

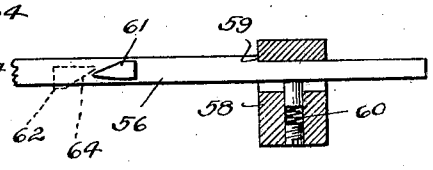
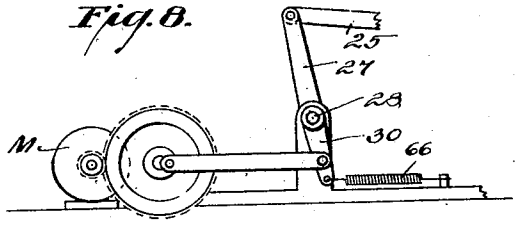


Fig. 8.



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Patented Mar. 27, 1928. 1,663,780

UNITED STATES PATENT OFFICE.

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TARGET-THROWING TRAP.

Application filed July 8, 1925. Serial No. 42,136.

This invention relates to improvements in target throwing traps and has for its primary object the provision of a trap wherein an improved arrangement of parts is provided enabling the target throwing arm thereof to swing automatically from and to a set or normal position of operation.

Another object of the invention resides in the provision of a target trap wherein is employed a single main spring which is utilized for the functions; first, of swinging the target throwing arm or carrier of the trap away from its set or initial position to discharge a target; second, of serving as a shock absorbing member for resiliently limiting the extent of swinging movement of the carrier; third, of causing a rebound action by means of which the carrier is returned to its normal or set position of operation; and fourth, of checking the movement of the carrier as it nears its initial or set position of operation upon its rebound or return stroke so that an automatically operating latch mechanism will be enabled to function positively in holding the carrier in its normal or set position.

A further object of the invention resides in providing an electric control for governing the operation of the latch mechanism by means of which the carrier arm is released, so that the latch mechanism will be enabled to operate quickly, positively and the targets projected from the trap at a rapid rate of speed.

With these and other objects in view, as will appear as the description proceeds, the invention consists in the novel features of construction, combinations of elements and arrangements of parts hereinafter to be fully described and pointed out in the appended claims.

In the accompanying drawing:

Figure 1 is a plan view of a target trap constructed in accordance with the features of the present invention,

Figure 2 is a side elevation thereof,

Figure 3 is a horizontal sectional view on the plane indicated by the line 3—3 of Figure 2,

Figure 4 is a similar view on the line 4—4 of Figure 2,

Figure 5 is a side elevation of the trap disclosing the opposite side of the latter from the showing set forth in Figure 2,

Figure 6 is a vertical transverse sectional view taken on the plane indicated by the line 6—6 of Figure 2,

Fig. 7 is a detail in vertical section of the latch device shown in Fig. 6, and Fig. 8 is a detail in elevation of a modification for motor operation.

Referring to the drawings and more especially to the specific embodiment of the invention illustrated therein, my improved target trap, which is designated in its entirety by the letter A consists essentially of a base 1, a frame 2, a throwing arm or carrier 3 and improved means, hereinafter described in detail, for effecting the automatic operation of the projector.

The base 1 is preferably in the form of a circular casting and in operation is mounted in a stationary position fixed against movement. The upper surface of the base is formed with an upstanding web 4 with which cooperates a complemental depending web 5 formed with and projecting from the lower part of the frame 2. The frame 2 is pivotally united with the base 1 for adjustment in a vertical plane by means of a horizontally extending bolt 6, which furnishes a horizontal pivotal axis about which the frame may be adjusted, the said bolt being positioned within registering openings provided in the webs 4 and 5. Also, one of the webs, in this instance the web 5, is provided with a bolt 7, which extends through an arcuate slot 8 formed in the web 4. The bolt 7 carries a threaded binding device 9 by means of which a frictional relation may be established between the webs 4 and 5 to maintain the frame 2 in any of its vertical positions of adjustment with respect to the base 1. In this particular construction it has not been found necessary to provide a means for rotating the frame in a horizontal plane, since this adjustment can be obtained satisfactorily by shifting the base 1 to control the angles of discharge of the targets released from the throwing arm 3. In this connection it will be understood that by adjusting the frame 2 vertically the height of the target released from the trap may be governed with relation to the ground over which the target is projected. Also, further lateral angles of discharge of the target can be readily effected by placing the targets at different posi-

tions upon the length of the throwing arm 3 and by this arrangement a target may be projected into any desired quarter. If a vertical pivotal connection between the frame 2 and base 1 is deemed desirable the same may be of the type disclosed in my prior Patent No. 1,499,845, issued July 1, 1924, and upon the construction of which the present invention constitutes an improvement in many respects hereinafter pointed out in detail.

The frame 2 comprises a hollow substantially rectangular member consisting of vertically spaced longitudinally extending, parallel upper and lower bars 10 and 11 respectively which are united by end walls. Journaled in the upper and lower bars of the frame is a shaft 12 and loosely mounted upon this shaft, between the bars 10 and 11, is a sleeve 13 formed with an integral outwardly extending crank arm 14. To the outer end of this arm there is connected as at 16 one end of a rod 15, which has its other end connected with one end of a coil contractile spring 17 of considerable strength, which is arranged between and extends substantially parallel with the bars 10 and 11. The other end of the spring 17 is connected as at 18 with a lever 19, which is pivoted at 20 upon a stud 21 formed with the frame 2. Also pivoted upon the stud 21 below the lever 19 is a second longer lever 22 which has formed therewith an integral upstanding lug 23, arranged to engage with the outer edge portion of the lever 19 thereabove, so that as the lever 22 is oscillated in one direction from the set or normal position the lever 19 will move in unison therewith, however, the return of the lever 22 to such set or normal position may be independent of the return movement to such position of the lever 19, as will be obvious. The outer end of the lever 22 is bifurcated to pivotally receive, as at 24, one end of a connecting link 25, which has its opposite end pivoted as at 26 to a crank arm 27 carried in connection with a shaft 28, which is journaled as at 29 in connection with the base 1. The opposite end of the shaft 28, as regards the arm 27, is provided with a depending pedal 30, adapted to be operated by the foot of the target attendant and it will be seen that when the pedal is oscillated as indicated by the arrow *a*, movement will be imparted to the lever 22 which, by reason of its upstanding lug 23 will cause the joint oscillation therewith of the lever 19, and since this lever is directly connected with the main spring 17, it follows that the latter may be stretched, when the crank arm 14 is held stationary, to place the spring 17 under the required degree of tension necessary to effect complete and rapid operation on the part of the trap.

To hold the crank arm 14 stationary, until its release is desired to effect the swinging of the throwing arm, the said crank arm 14 is provided with a slot 31, in which is positioned a depending stud 32 carried by a crank arm 33 that is rotatable in unison with the projector or carrier 3. The crank arm 33 terminates in an integral sleeve 34, journaled for rotation in the upper frame bar 10 and carries at its upper end a second crank arm 35 which is also provided with a depending pin 36. Mounted upon the crank arm 35 and rigidly secured therewith is the throwing arm or carrier 3, which comprises ordinarily a flat plate of aluminum or the like and is formed along one edge with a longitudinally extending target guide 37 against which is placed, on the upper surface of the carrier one or more of the usual circular type of clay targets or "pigeons" which are projected from the trap. The carrier is provided with an upright stud 38, adjacent to its pivoted end, which as shown in Figure 1, cooperates with the target to provide a seat or abutment against which the target may be placed prior to the projection thereof. As is customary in devices of this character, the throwing arm is oscillated at a high rate of speed, and due to centrifugal action on the target the latter is projected from the carrier through space in front of the trap, providing an excellent aerial target for marksmanship purposes. As previously related it is not necessary to place the target directly in engagement with the stud 38, since by placing the target at various positions along the length of the carrier, the angle of discharge of the target from the trap may be varied, so that the target may be caused to leave the trap at different angles to diversify shooting angles.

To retain the throwing arm 3 in a normal or "set" position, use is made of a latch mechanism which consists of a sliding latch member 39 mounted for movement upon the upper surface of the bar 10. This member is formed to include an inclined edge 40, and slots 41 are provided in the latch member for the reception of pins 42, and springs 43 are positioned in the slots 41 and cooperate with the pins 42 so as to normally maintain the latch member in such a position that the pin 36 on the crank arm 35 will be positioned in engagement with the edge 40.

It will be seen that the tension on the main spring 17 normally serves to place a rotative force on the crank arm 35 so as to move the pin 36 out of engagement with the plane 40. This is prevented by providing one edge of the latch member 39 with a stud projection 44 which engages normally with an inclined shoulder 45 provided on a lever 46 which is pivoted as at 47 to the bar 10. The forward end of the lever 46 engages with the outwardly projecting portion of a movable core 48 of an electrically energized

solenoid 49, which core constitutes a trigger for the lever. The windings of this solenoid are arranged in an electric circuit 50, which includes a source of energy 51 and the circuit is opened and closed by means of a quick acting switch 52. When it is desired to release the carrier and project a target, the switch 52 is closed thereby exciting the windings of the solenoid 49, causing the retraction of the core 48 so that the latter will be moved out of engagement with the outer end of the lever 46 which is normally supported in an elevated position by the core. Therefore, when the core has been removed from engagement with the lever 46 the pressure of the main spring 17 on the crank arm 35 causes the pin 36 to act on the inclined edge 40 and moves the latch member 39 rearwardly or longitudinally, and this can be readily accomplished since there is no sustaining relation exercised between the stud 44 and the inclined shoulder 45 of the lever 46. It will be seen that by this arrangement the latch mechanism is retracted, permitting the carrier to revolve rapidly under the influence of the main spring and to project a target in the manner described.

As stated the latch member moves rearwardly against the pressure of the spring 43 and there is provided a spring-actuated pivoted dog 53 on the frame 2 which is notched as at 54 to normally engage the latch member, as shown in Figure 4, which dog responds to its spring pressure and holds the latch member in its retracted position, and since the stud projection 44 is then engaging the upper surface of the lever 46 the latter will be held downwardly, against the influence of the light spring 55 and the solenoid core retained in its retracted position by engaging with the outer end of the lever 46. The parts of the latch mechanism are thus held while the arm or carrier 3 is in its cycle of movement to and from its discharging positions. Upon the return of the throwing arm 3 to a latched position, effected by the action of the main spring in a manner presently to be described, the pin 36 of the crank arm 35 first engages with the dog 53 and moves the latter to release the latch member 39, permitting this member to move forwardly automatically under the influence of its light springs 43 and engage with the pin 36 to hold the carrier in its latched position. This also then permits the solenoid core to assume a projected position underlying the free end of the lever 46 so that the latch member will be again retained in a stationary position until the solenoid is subsequently energized, whereupon the cycle of operations above described is repeated.

To hold the crank arm 19 in a position stretching the main spring 17 there is provided a link 56 which is pivoted as at 57 to the arm or lever 19. This link extends forwardly and longitudinally of the frame and has its forward end slidably received within a bearing 58 provided in the outer wall of the frame 2. The outer end of the link is shouldered as at 59 and is pressed normally into engagement with the upper wall of the bearing by means of a spring 60 and a plunger 60^a. It will be seen that as the lever 19 is swung under foot pressure applied to the pedal 30, the said lever 19 will be held in a position stretching the main spring by the engagement of the shoulder 59 with the outer surface of the bearing 58, as is effected automatically by the action of the spring 60 and plunger 60^a. This construction permits the main spring to be stretched to the required degree and then held in this stretched condition until the release of the carrier is effected by the latch mechanism. The link 56 is formed along the inner side thereof with a cam stud 61 which is adapted for cooperation with a dog 62 pivotally carried by the stud 32 and arranged for rotation about the shaft 12 between the crank arms 14 and 33. A light spring 63 is secured to one end of the dog 62 and the crank arm 14, which normally serves to position the dog 62 in engagement with the shaft 12. The outer portion of the dog 62 is provided with a cam surface 64, so shaped that as the dog revolves with the carrier the surface 64 thereof will engage with the cam 61 on the link 56, but this engagement will be such as to prevent the release of the shoulder 59 of said link from the side of the bearing 58. However, upon the return or rebound of the carrier the dog 62 will then engage directly with the cam projection 61 so as to trip the link 56, allowing the return of the lever 19 to the normal position disclosed in Figure 3. It is this construction particularly that allows the spring 17 to function in returning the carrier to its normal or set position in connection with its latch mechanism.

In summarizing the above construction, it will be seen that the present invention provides a target trap wherein the main spring thereof is caused to function first, as the propelling means for whipping the throwing arm through an arc necessary to project the target, second, as a shock absorbing element for arresting gradually the movement of the arm as the letter reaches its extreme of outward swinging movement and third, as a means for returning the arm to its normal latched or set position. By this peculiar assembly of elements an automatic trap mechanism is provided wherein it is necessary for the operator to merely place the targets successively on the arm and to operate the foot pedal, or other equivalent device, for stretching the main spring to the neces-

sary degree for providing final impetus to the arm. A fourth function may be assigned to the main spring in that the latter is stretched appreciably as the carrier or arm returns to the latching mechanism, and this serves to check the rebound movement of the arm as the latter nears such mechanism and enables said mechanism to operate smoothly and positively in holding the carrier latched. A set screw 65 may be used for engaging the lever 22 and thereby limiting the forward swinging movement of the lever 19. The set screw 65, by limiting the forward movement of the lever 19, holds the end of the spring 17 which is opposite the crank arm 14 from moving as the throwing arm returns to its latch-engaging position. It thus provides an adjustable means for regulating the "overthrow" of the throwing arm—that is to say, the amount of movement of the throwing arm behind or back of its latch-engaging position before its movement will be checked and stopped by the throwing spring. This overflow movement will vary under conditions of use; according to wind conditions, the length of desired flight of the targets, and the number of targets thrown—single or double. The adjustable stop screw 65 enables the overthrow to be adjustably controlled and at the same time retains in the spring 17 a material amount of tension, such as will enable the additional throwing tension to be applied thereto by means of the foot lever and rock shaft and without unduly fatiguing the operator. A spring 66 is utilized in returning the pedal 30, and likewise the lever 22 to a normal position following the setting or application of final tension to the main spring.

It will be seen that with the parts of the apparatus positioned as shown in Figures 1 to 5, the trap may be operated by placing a target on the arm as shown in Figure 1. By rocking the foot pedal in the direction indicated by the arrow A, the levers 19 and 22 are swung so as to stretch the main spring, the lever 19 being locked by means of the latching of the link 56 with the bearing 58, while the lever 22 may return to its normal position under the influence of the spring 66. Then, by operating the solenoid 49, the latch member 39 is released and the carrier or arm is permitted to swing sharply through an arc, projecting the target therefrom by the centrifugal force thereby established. The movement of the throwing arm is secured through the joint rotation of the crank arms 27 and 33, effected through the stud 32. As the throwing arm nears the end of its path of outward swinging movement, the crank arm 14 will swing beyond the line joining its pivot with the anchored end of the spring 17. This movement from one side of such line to the other will result, first in taking the tension off the spring when the anchored end of the spring and the said pivot are in line, and second, in putting the spring under tension when the crank shall have crossed said line as the throwing arm reaches the end of its outward movement. The spring thus provides a shock absorbing device for cushioning and limiting the outward swinging movement of the throwing arm. Then, upon the subsequent contraction of the spring 17 the crank arms 14 and 33 revolve in the opposite direction to return the carrier to its latched position. It is during this movement of the crank arms 14 and 33 that the dog 62 engages with the link 56 to release the lever 19 so that the tensional resistance of the spring 17 to the return of the throwing arm to its initial position is broken and the spring may move with the crank arm 14 until the lever 19 contacts with the lug 23 the position of which, in turn, is governed by the set screw 65. Then, as the throwing arm nears its latched position the main spring is again stretched by the inertia of the throwing arm so as to check the rebound action of the throwing arm and retard its velocity for latching engagement with the member 39. It will be seen, therefore, that the trap is in every sense automatic since the carrier moves by itself from and to a set or normal position of operation. The fact that the final tension is placed on the spring by a manual operation does not alter the status of the trap as a fully automatic construction. The trap can be easily operated and may project targets at great rapidity through all of the varied angles common to projectors of this type.

By providing a free and unobstructed space back of or behind the latch, the throwing arm is enabled to swing freely on its return movement until its inertia is cushioned and stopped by the throwing spring alone. The provision of this free and unobstructed space also affords ample time for the latch mechanism to be set in a position to intercept the stud on the throwing arm by the time the arm is moved forwardly by the spring to latch-engaging position. The function of the set screw 65 in permitting a variation in the residual tension in the throwing spring has been pointed out hereinbefore. This adjustment is necessary to insure on the one hand that the throwing arm will swing back to or behind the latch on its return movement and, on the other hand, that it will not be thrown so far back of or behind this position as to cause the rod 15 to be brought forcibly against the shaft 12 by the crank arm 14. While the tension of the throwing spring is momentarily released as the crank arm passes the line joining its pivot with the anchored end of the spring 17, in both the throwing and return movements of the arm 3, the actual throwing tension of the spring is never en-

tirely released, such throwing tension being the tension available to operate the arm 3 when the latter is in its latch-engaging position.

While I have described what I consider to be the preferred embodiment of the present invention, nevertheless, it will be understood that the principles herein disclosed may be embodied in other physical forms and that changes in proportion and materials used may be made without departing from the spirit of the invention and I therefore claim as my invention all of such modifications and variations that may be said to fall fairly within the scope and intent of the following claims.

If desired an electric motor M may be used for operating the crank pedal 30. In the previously described form of the invention the pedal 30 is manually operated to apply final tension to the main spring 17, however, by the provision of the motor M this can be done by power and the operator of the trap is then left free to apply the targets to the projecting arm.

What is claimed is:

1. In a target trap, the combination of a shaft, a throwing arm connected with said shaft, a crank connected with said shaft, a spring connected at one end to said crank, a movable support for the opposite end of said spring, a rock shaft at the target, a one-way connection between said rock shaft and the said support whereby the support may be moved by said rock shaft thereby to place the spring under throwing tension, means, releasable by the return movement of said throwing arm, for holding the said support in its spring-tensioning position, and adjustable means for engaging the said support after the release thereof, thereby to limit the movement of said support toward said crank and to retain a material part of the throwing tension in said spring.

2. In a target trap, the combination of a shaft, a throwing arm secured to said shaft, a crank secured to said shaft, latch mechanism carried by the said frame and adapted to hold the said arm in target-receiving position, a pivotally supported arm, a spring connected at one end to the crank and at its opposite end to the second arm, a rock shaft at said trap, a third arm also pivotally supported and adapted to engage the second arm, a crank on said rock shaft, a link connecting the said crank and the third arm, detent mechanism adapted to releasably hold the second arm in spring-tensioning position, connections between the first-mentioned shaft and the detent mechanism for releasing the latter after the throwing movement of the throwing arm thereby to relive the tension on the throwing spring, and adjustable means for engaging the second arm thereby to retain a material and variable amount of tension in the throwing spring and to enable the latter to check the movement of the throwing arm back to and beyond latch-engaging position.

3. In a target trap, the combination of a shaft, a throwing arm secured to said shaft, a crank secured to said shaft, latch mechanism carried by the said frame and adapted to hold the said arm in target-receiving position, a pivotally supported arm, a spring connected at one end to the crank and at its opposite end to the second arm, a third arm also pivotally supported and adapted to engage the second arm, means for operating the third arm thereby to operate the second arm and tension the said spring, detent mechanism adapted to releasably hold the second arm in spring-tensioning position, connections between the said shaft and the detent mechanism for releasing the latter after the throwing movement of the throwing arm thereby to relieve the tension on the throwing spring, and adjustable means for engaging the second arm thereby to retain a material and variable amount of tension in the throwing spring and to enable the latter to check the movement of the throwing arm back to and beyond latch-engaging position.

4. In a target trap, the combination of a frame, a throwing arm pivotally supported by said frame, means for throwing said arm, and latch mechanism carried by said frame for said arm, said mechanism comprising a lever pivoted to said frame a latch member movably supported on said frame, and arranged to be engaged by said throwing arm, the said lever and the said member having interengaging parts adapted to pervent the movement of the latch member by said arm, and a trigger carried by said frame and adapted to engage said lever thereby to hold the same in a position to prevent the latch member from being moved out of engagement with the cooperating part of said lever.

5. In a target trap, the combination of a frame, a throwing arm pivotally supported by said frame, means for throwing said arm, and latch mechanism for the said arm, said mechanism comprising a latch member movably supported on the top of said frame, the said latch member and the said arm being provided with inter-engaging parts whereby said member may retain the arm against movement by said spring, a lever and a trigger arranged to support the said lever in position to prevent the movement of said latch member by and out of the way of said arm.

6. In a target trap, the combination of a frame, a throwing arm pivotally supported by said frame, means for throwing said arm, and latch mechanism for said arm, the said mechanism comprising a stud carried by and projecting downwardly from the arm, a latch member for said stud movably supported on top of said frame, a lever pivoted to a verti-

cal face of said frame and having a portion adapted to be engaged by a portion of the latch member to prevent movement of said member, a trigger normally supporting said lever in a position to intercept said latch member, and means for operating said trigger to release the said lever.

7. In a target trap, the combination of a pivotally supported throwing arm, a latch for said arm, and a throwing spring connected with said arm and serving, upon the release of said latch: first, to throw the arm in one direction; second, to cushion and stop the throwing movement of said arm; third, to move the arm in the reverse direction of a point behind said latch; and fourth, to constitute the sole means for cushioning and stopping such return movement of said arm and to move the arm to latch-engaging position, there being a free and unobstructed space behind said latch whereby the arm may swing behind and beyond the latch on its return movement until stopped by said spring and the said latch may be held in a position to intercept said arm when the spring shall have brought the said arm to latch-engaging position.

8. In a target trap, the combination of a pivotally supported throwing arm, spring-controlled latch-mechanism for intercepting said arm, a throwing spring connected with said arm and serving, upon the release of said latch against the action of the first spring: first, to throw the arm in one direction; second, to cushion and stop the throwing movement of said arm; third, to move the arm in the reverse direction to a point behind said latch; and fourth, to constitute the sole means for cushioning and stopping such return movement of said arm and to move the said arm to latch-engaging position, the said arm being provided with means for moving the latch mechanism as the arm is moved behind such mechanism, there being a free and unobstructed space behind said mechanism whereby the arm may swing behind and beyond said mechanism on its return movement until stopped by the throwing spring and the said mechanism may be moved by the spring thereof into a position to hold the said arm before the arm shall have reached the said mechanism after its return movement.

9. In a target trap, the combination of a pivotally supported throwing arm, a latch for said arm, a throwing spring connected with said arm and serving, upon the release of said latch: first, to throw the arm in one direction; second, to cushion and stop the throwing movement of said arm; third, to move the arm in the reverse direction to a point behind said latch; and fourth, to constitute the sole means for cushioning and stopping such return movement of said arm and to move the arm to latch engaging position, there being a free and unobstructed space behind said latch whereby the arm may swing behind and beyond the latch on its return movement until stopped by said spring and the said latch may be held in a position to intercept said arm when the spring shall have brought the said arm into latch-engaging position, means operated through the return movement of the throwing arm for releasing a portion only of the throwing tension in said spring, and means for varying the amount of the residual throwing tension in said spring whereby the extent of movement of the arm beyond and behind the latch may be controlled.

10. In a target trap, the combination of a pivotally supported throwing arm, a latch for said arm, a movable tensioning member, a coiled throwing spring operatively connected at one end to said arm and at the other end to said movable tensioning member, releasable means for holding said member in spring-tensioning position, said spring serving, upon the release of said latch: first, to throw the arm in one direction; second, to cushion and stop the throwing movement of said arm; third, to move the arm in the reverse direction to a point behind said latch; and fourth, to constitute the sole means for cushioning and stopping such return movement of said arm and to move the arm to latch-engaging position, there being a free and unobstructed space behind said latch whereby the arm may swing behind and beyond the latch on its return movement until stopped by said spring and the said latch may be held in a position to intercept said arm when the spring shall have brought the said arm into latch-engaging position, means operated by the return movement of said throwing arm for releasing the said tensioning member, and adjustable means for engaging the said tensioning member to limit the movement thereof after such release thereby to vary in the staid spring the residual tension operating to cushion and stop the return movement of the throwing arm.

11. In a target trap, the combination of a shaft, a throwing arm connected with said shaft, a latch for said arm, a crank connected with said shaft, a rock shaft at the target, a movable support, a throwing spring connected with said crank and with the said support, a one-way connection between said rock shaft and the said support whereby the support may be moved by said rock shaft thereby to place said spring under throwing tension, means for holding the said support in its spring-tensioning position, the said spring serving, upon the release of said latch: first, to throw the arm in one direction; second, to cushion and stop the throwing movement of said arm; third, to move the arm in the reverse direction to a point behind said latch; and fourth, to con-

stitute the sole means for cushioning and stopping the return movement of said arm and to move the arm to latch-engaging position, there being a free and unobstructed space behind said latch whereby the arm may swing behind and beyond the latch on its return movement until stopped by said spring and the said latch may be held in a position to intercept said arm when the spring shall have brought said arm to latch-engaging position, means operative by the return movement of said arm for releasing the said support, and adjustable means for engaging said support after the release thereof, thereby variably to limit the movement of said support toward said crank and to retain a desirable and material part of the throwing tension in said spring.

In testimony whereof I affix my signature.

WILLIAM I. SPANGLER.