Jan. 14, 1930. E. C. FEY 1,743,337

RIFLE RANGE

Filed July 26, 1927 2 Sheets-Sheet 1

Fig. 1.

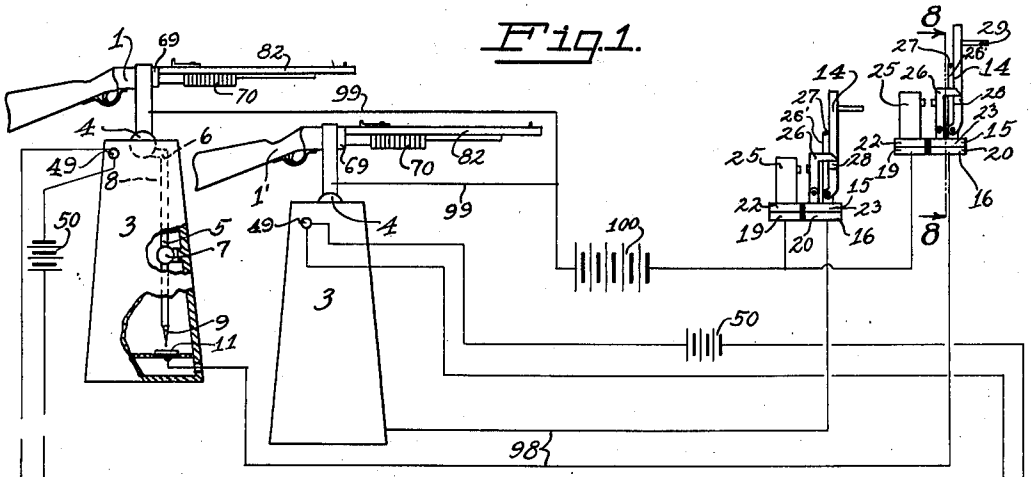


Fig. 2.

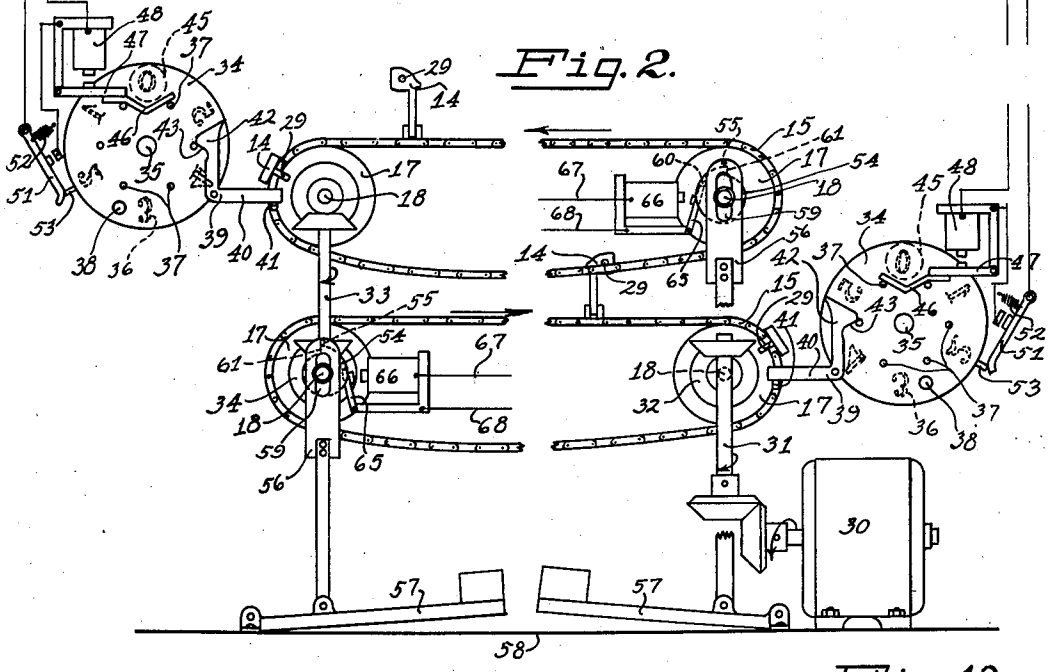


Fig. 10.

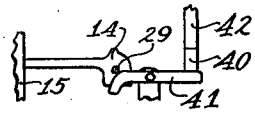


Fig. 8.

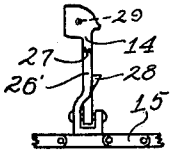
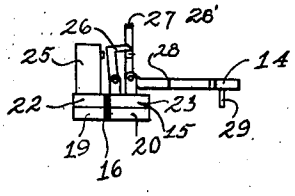


Fig. 9.



INVENTOR.

Edmund C. Fey

BY

Harry A. Tolles

ATTORNEY.

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RIFLE RANGE

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Fig. 3.

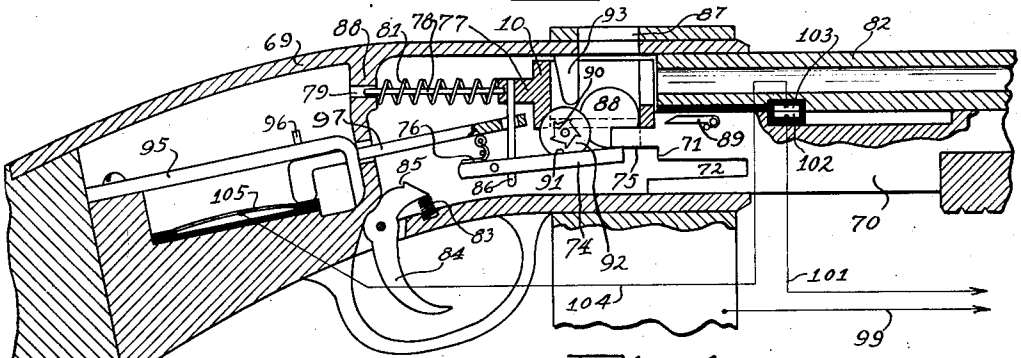


Fig. 4.

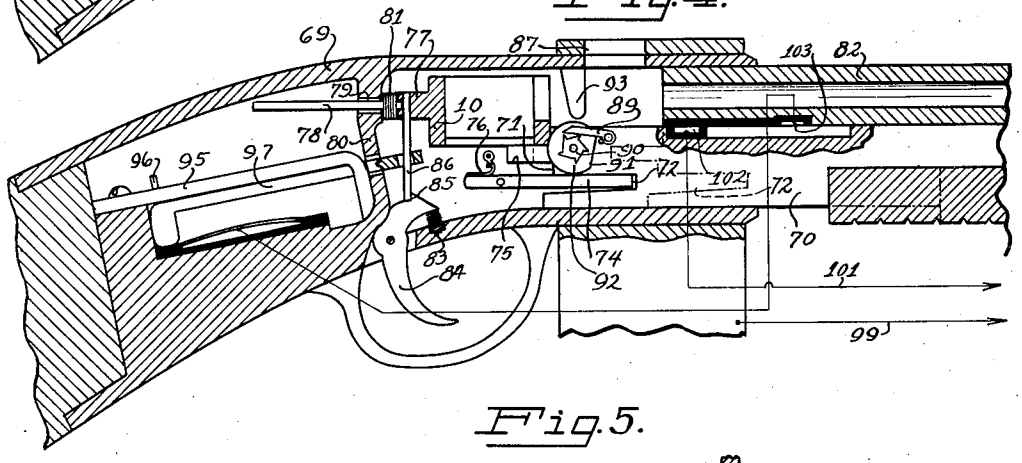


Fig. 5.

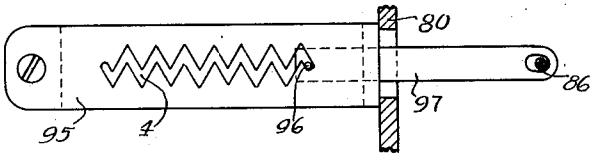


Fig. 7.

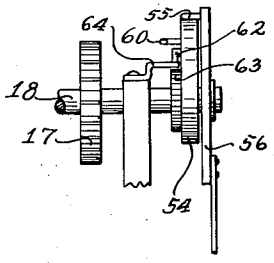
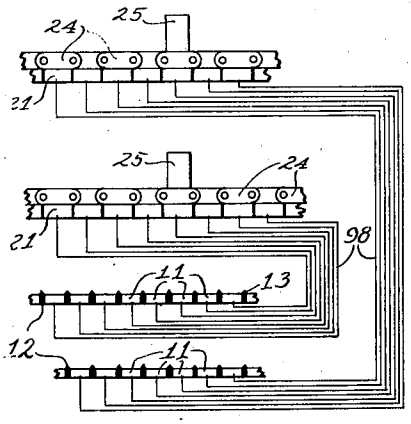


Fig. 6.



INVENTOR.

Edmund C. Fey

BY Harry A. Totten

ATTORNEY.

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UNITED STATES PATENT OFFICE

EDMUND C. FEY, OF SAN FRANCISCO, CALIFORNIA

RIFLE RANGE

Application filed July 26, 1927. Serial No. 208,437.

This invention relates to an apparatus for determining the skill, either singly or in competition with one or more players in testing their accuracy of aim in the operation of devices indicative of, or representing the missile projecting or shooting type.

In its present embodiment, the invention is illustrated in the form of a rifle range employing aiming elements simulating repeating rifles associated with moving tagets in such manner that the accurate aim of the aiming element on the selected target coincident with the actuation of the trigger, operates the target to indicate a hit, operates means simulating the report of the discharge of a rifle, and actuates an indicator registering a hit.

It is the principal object of the invention to provide an apparatus for accomplishing the above results by harmless means operating without explosives; also to provide an aiming element or piece simulating a repeating rifle, and which may be operated a predetermined number of times after the depositing of a coin or token therein. Another object is to provide a target which, when operated to indicate a hit, resembles a target which has been actually hit and fractured by the action of a bullet or missile.

With the above mentioned and other objects in view, the invention consists in the novel construction and combination of parts hereinafter described, illustrated in the accompanying drawings, and set forth in the claims hereto appended, it being understood that various changes in the form, proportion, size and minor details of construction within the scope of the claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Referring to the drawings forming a part of the present application:—

Fig. 1 is a view in side elevation of the preferred embodiment of my invention illustrating the aiming devices and the moving targets.

Fig. 2 is a view in detail rear elevation of the target moving and supporting means, the rifle reporting means, and the hit indicating devices.

Fig. 3 is a view in longitudinal section of the preferred aiming device in the form of a rifle, the parts being in normal position.

Fig. 4 is a view similar to Fig. 3 with the parts in position ready to fire.

Fig. 5 is a view in detail plan of the means for retarding the operation of the firing mechanism.

Fig. 6 is a diagrammatic view of the circuit between the aiming device and moving targets.

Fig. 7 is a view in detail side elevation of one of the shafts and its associated parts for supporting one end of one of the target chains.

Fig. 8 is a view in section taken on line 8—8 of Fig. 1 illustrating one of the targets in normal position.

Fig. 9 is a view in side elevation of the movable portion of the target in a position indicating a hit.

Fig. 10 is a view in side elevation of the operating connection between one of the endless chains and the indicating means.

Referring to the drawings wherein like characters of reference indicate corresponding parts, 1 and 1′ designate suitable aiming elements illustrated in the form of conventional repeating rifles, those employed in the present invention however are of the projectless type. Each rifle is mounted on a base 3 through a universal pivot 4, enabling the same to be moved to any desired point in aiming the same. A tubular rod 5 depends from the under side of each universal joint. A tubular rod 6 is universally fulcrumed at 7 within the base 3, and the upper end of said rod is connected by a universal joint 8 with the free end of rod 5, thereby maintaining said rod 6 substantially perpendicular at all times regardless of a variation of aim of the aiming element. In each rod 6 is freely held a contact pin 9, the same being suspended by a flexible wire, not shown, which extends upwardly through rods 5 and 6 and connects with the hammer mechanism 10 of its associated rifle, hereinafter described in detail, said pin being free to reciprocate when the hammer mechanism is reciprocated back and forth. Within each base 3 directly beneath

each contact pin 9 are a plurality of contact plates 11, Fig. 6, separated by spacers of insulation material 12. The edges of the spacers 12 are inclined as at 13 to deflect the pins 9 in their downward movement toward the contact plates 11 to prevent the same from resting on the insulating spacers 12.

Positioned in front of each aiming element is an endless series of targets 14 carried by the respective links of an endless chain 15, the respective chains sliding on horizontal tracks 16 which prevent the same from sagging, and at their ends chains operate over sprockets 17 on shafts 18. The tracks 16 comprise separate parallel rail sections 19 and 20 insulated from each other, Figs. 1 and 9, the forward rail section 19 being divided transversely into independent contacts 21 and the rear section 20 forming a single contact common to all of said independent contacts. Each chain 15 is divided longitudinally into front and rear sections 22 and 23 insulated from each other, and each adapted to slide along the respective rails 19 and 20. The front chain section 22 cooperates with rail section 19 and is transversely insulated at the respective links into sections 24. Each section 24 carries an electromagnet 25 and corresponding sections carry the targets 14 and cooperating armatures 26, one interposed between each magnet and its associated target, thus corresponding segments or links of corresponding chains carry a target and the holding and releasing means therefor.

Each target in the embodiment illustrated represents a conventional clay pipe, the stem of which is fulcrumed to swing on an axis parallel with its chain section 23. Disposed in front of the stem of each target is a permanent upstanding representation of a false pipe stem 26′ indicated as being broken at its upper end, as at 27. The false stem 27 remains upright after its associated main target portion has been released and has dropped to a horizontal position, as in Fig. 9 to indicate a hit, giving the impression that the target has been actually hit and fractured, and the stem being the only part remaining. The regular stem of each target carries a lug 28 which is engaged by the armature 26, the latter holding the target in upright position. When a target operates to indicate correct aim, or the registering of a hit, the same pivots rearwardly, as in Fig. 9, to a horizontal position, it being overbalanced by a lateral weight 29 on the releasing of the armature 26 from its associated lug 28. The target retains this horizontal position until it passes below the plane of shafts 18, after which time it swings downwardly by gravity and is again engaged by its armature 26 and is locked thereby to be presented in a vertical position when it again moves across the field of the aiming apparatus.

The respective endless chains 15 move in relatively opposite directions, Fig. 2, the power means for operating the same at a relatively slow speed comprises a motor 30 connected through a shaft 31 with a suitable gear 32 on one of the shafts 18. A second shaft 33 driven from a gear 34 on one shaft 18 of the drive chain mechanism engages a gear on the shaft 18 of the other endless chain mechanism, this being clearly illustrated in Fig. 2.

Associated with each series of targets is a means for indicating the number of correct aims or hits registered during the operation of the aiming appartus, and each is constructed and operates in the following manner:—

Facing each aiming apparatus, and one positioned at the end of its endless chain toward which the targets travel when in vertical position is an indicating disk 34 rotatable on a horizontal axis 35, and its face being peripherally numbered consecutively, as at 36. On its rear the disk carries an annular series of spaced pins 37. The disk is also provided adjacent its periphery with a weight 38, the tendency of which is to rotate the disk to present the zero character uppermost when the disk holding and operating means are released and the disk is free to rotate. Positioned at one side of the disk to project rearwardly therefrom into the path of pins 37 is a rectangular disk rotating lever 39, the horizontal leg 40 of which overlies one end of a lever 41 pivotally mounted within its length and with its other end within the path of travel of the lateral weight 29 and to be engaged thereby when a target in its released position passes the same. The vertical leg 42 of lever 39 is provided with a bevelled surface 43, the forward end of which lies slightly without the path of travel of the pins 37. On each horizontally disposed target passing the end of lever 41, the weight 29 thereof trips the lever 41 to actuate the lever 39 forcing the bevelled surface 43 thereof toward one of the pins 37 lying opposite the same, causing the pin to ride downwardly on the inclined surface 43 imparting sufficient rotation to the disk to present a successive numeral on the face thereof to the opening 45 in the face plate, not shown. To releasably hold the disk in its rotated position, there is provided a substantially V-shaped retaining member 46 on the end of an armature 47, the member 46 being of a length and formation to bear uniformly at its ends on two of the pins 37 centering one of the numerals 36 in rear of the face plate aperture 45. Each successive operation of the lever 39 causes one of the pins 37 to pass beneath the member 46 and the weight of the armature 47 causes the member 46 to act on such pin to advance the same in its direction of travel until a succeeding pin contacts with the other end of the member 46. The pin 37 which has travelled from the zone of the free end of member 46 now lies opposite the outer end of the inclined wall 43.

To reset the disk to zero or normal position, the following mechanism is provided:— Cooperating with the armature 47 is an electromagnet 48, the electric circuit controlling the same extending to the base 3 of its associated aiming device where a manually operated switch 49 of the push button or other conventional type is mounted within convenient reach of the operator. The circuit includes a battery 50 and a circuit breaker switch 51, normally closed by a spring 52, the breaker switch being moved to open position when the zero numeral 36 lies in rear of the aperture 45, a trigger pin 53 on the periphery of target 34 accomplishing this breaker movement.

It is desirable that each time the trigger of the aiming apparatus is pulled to operate or release the mechanism of the aiming element that simultaneously therewith a noise be made simulating the report of the firing of a rifle of the type and caliber employed as an aiming element, and the structure for accomplishing this purpise is arranged and operated as follows:— One of the shafts 18 of each endless chain mechanism mounts for free rotation a cam 54, Figs. 2 and 7, and on the periphery of the latter rides a pin 55 extending laterally from a reciprocating member 56 connected at its lower end to a weighted lever 57. The lever is designed when dropped to strike a sounding board or base 58 and render a sharp report. The upper end of member 56 is vertically slotted at 59 to receive the shaft 18 extending therethrough. On its rear face, each cam 54 carries a projecting pin 60 arranged at approximately 90 degrees from the step 61 of cam 54. The cam also carries a spring pressed pawl 62 for contacting with the ratchet 63 normally rotatable with the shaft 18 in front of the cam 54. The pawl 62 on the arrival of the step 61 at the position in Fig. 2, at which lever 57 is elevated, contacts with a fixed releasing arm 64 and is disengaged thereby from the ratchet 63. At this time a pin 60 overlies and contacts with the end of a pivotally mounted armature 65, the latter affording a stop for the cam 54 to preclude its free rotation until the armature is removed from beneath the same. The armature lies opposite an electromagnet 66 from which and the armature 65 extend the respective leads 67 and 68 connecting with the circuit of the aiming apparatus, as hereinafter described.

Referring to Figs. 1, 3, 4 and 5 disclosing the aiming elements one associated with each endless series of targets, it will be observed that each element, either 1 or 1′ is constructed with a hollow frame shell 69, into which reciprocates the inner end of the reciprocating loading mechanism 70. The loading mechanism 70, in the present embodiment, represents the conventional sliding hand grip repeating mechanism of the conventional rifle, and at its end within the hollow frame it is provided with a stop shoulder 71 immediately below which is a stop pawl receiving slot 72. Fulcrumed within the frame is a stop pawl 74, the free end of which faces the shoulder 71 and is normally maintained raised contacting with the guide wall 75 by a spring 76 sufficiently light to be overbalanced by the weight of a coin or token resting on the free end of the pawl 74. The hammer mechanism 10 reciprocates within the frame and comprises a vertically slotted hammer frame 77 engaging at its forward end with setting shoulder 78 on member 70 above guide wall 75. The frame 77 is movable rearwardly with a rearward movement of the number 70, in which position it is held releasably locked in cocked position, as hereinafter described, while the operator returns the member 70 to its forward position, Fig. 4. Rearwardly from frame 77 extends a guide pin 78′ operating in guide opening 79 in the transverse frame wall 80. Surrounding the guide pin is a spring 81, the action of which is to force the hammer mechanism 10 forwardly to strike against the rear of the barrel 82 on the operation of the trigger 84 against its spring 83, the notched portion 85 of trigger 84 engaging the lower end of the cocking-pin 86 on the movement of frame 77 to cocked position.

The frame 69 is provided, in rear of the barrel 82, with a coin or token receiving slot 87 registering with the slot in the frame 77 when the latter is in its forwardmost position, Fig. 3. A coin or token 88 deposited in the slot 87 passes therethrough into the slot in the frame 77 and rests on the free end of stop pawl 74 depressing the same in alignment with the open end of slot 72. On the next rearward reciprocation of frame 77, the pawl 74, which is depressed by the weight of the coin or token, is received in slot 72, and the rearward movement of member 70 into frame 77 causes the pivoted pawl 89 carried thereby to engage the ratchet 90 within its path and impart a partial revolution thereto to remove the flat surface 91 of the pawl controlling disk 92 from contacting with the pawl, as indicated in Fig. 4. The disk 92 thus maintains the pawl 74 depressed until the successive reciprocations of the member 70 cause a complete rotation of the disk again presenting its flat surface 91 to the pawl which admits of the pawl end striking the stop shoulder 71 on its next rearward movement and until another coin or token is deposited. A finger 93 depending from the frame shell in rear of slot 87 projects into the slot in frame 77 and forces the coin or token downwardly therethrough on the rearward movement of the frame 77 after a controlling coin or token has been deposited therein.

A means for retarding the reciprocation of frame 77 during its cocking and firing movements, to ensure adequate electrical con-

tact of moving parts during the latter movement, is provided, the same comprising a zigzag channel 94 in a plate 95 positioned in rear of the wall 80. Slidable longitudinally of the channel is a pin 96 carried by the link 97 operating through an aperture in the wall 80 and loosely connected at its forward end to the cocking pin 86. The electrical connections between the respective aiming elements and the electrical apparatus associated with the respective series of moving targets, and with the rifle report means, is arranged as with the rifle report means, is arranged as follows:—From each contact plate 11 extends a lead 98 connected with one of the independent contacts 21 of its associated series of targets, and from the frame shell 69 of each rifle extends a lead 99 connected through a battery 100 with both of the rails 19, Fig. 1. The pin 9 of each aiming element is connected through a lead 101 with a contact 102 carried by the reciprocating loading element 70, and the latter contact, when the loading element is in its forwardmost position, coacts with a stationary contact 103 associated with the barrel 82. The latter contact 103 connects through a lead 104 with a leaf spring contact 105 over which operates the end of link 97 in its movement to and from cocked position, the link having electrical connection in any suitable manner with the fame shell 69. The lead 67 from one of the electromagnets 66 connects with the lead 104 of its associated rifle, and the lead 68 of the armature 65 connects with the battery 100.

The operation of the aiming apparatus constructed and arranged as previously described is as follows:—

With the motor 30 operating to cause the targets to travel in the direction of the arrows, Fig. 2, one desiring to test his skill, deposits a coin or token 88 in the slot in one of the aiming elements, and with the element to his shoulder in gun aiming fashion, reciprocates the mechanism 70 a complete stroke rearwardly, Fig. 4, and returns it to its normal position, Fig. 3. The element is now cocked, the frame 70 being held rearwardly by a trigger 84, and contacts 102 and 103 contacting as in Fig. 3. If the aim of the element on the target passing across the field of aim thereof is accurate, at the instant the trigger 84 is pulled, the circuit will be completed through contact 105, leads 101, 99 and 98, battery 101 to the electromagnet 25 passing over the contact 21 energized, actuating the armature 26 and permitting the target 14 to drop as if struck by a bullet. Simultaneously with the operation of the trigger, the circuit is completed through electromagnets 66 and armature 65 releasing the weighted lever 57, the latter striking the sounding board 58 rendering a sharp report corresponding to that made by the actual firing of a rifle. This latter operation takes place regardless of the accuracy of the aim of the element at the time of pulling the trigger. The continued travel of the chain mounting the target registering the hit restores the lever 57 to its position, Fig. 2. As the target in its horizontal position passes around one of its chain supporting sprockets 17, it operates the lever 41, which in turn operates lever 39, causing a rotative movement to be imparted to the disk 34, sufficient to present a successively higher numeral on the face of the disk in register with opening 15. The aiming element may be operated as many times, after the initial deposit of a coin or taken, as there are ratchet teeth 90 associated with the disk 92. In the present disclosure five so called shots being available to the player on the deposit of a coin or token.

I claim:—

1. An apparatus for determining the accuracy of aim comprising an aiming element representing a firearm, a plurality of pivotally mounted targets movable in a single direction across the aiming range of the aiming element, means for normally retaining the targets in an upright position during their movement across the aiming range of the aiming element, electrically operated means associated with the aiming element and said targets whereby on the accurate aim of said aiming element on a selected target at the operation of said aiming element, said target will be released to pivot and disappear from view to indicate a hit, and means actuated by the operated target for registering the number of hits scored.

2. An apparatus for determining the accuracy of aim comprising an aiming element representing a firearm, a plurality of targets movable across the aiming range of the aiming element, electrically operated means associated with said aiming element and said targets wherey on the accurate aim of said aiming element on a selected target at the operating of said aiming element, said target will operate to indicate a hit, means operated in accordance with the accuracy of aim of the aiming element for registering the number of hits scored, and means for rendering a report indicative of the discharge of a firearm on each operation of the aiming element.

3. An apparatus for determining the accuracy of aim comprising an aiming element representing a firearm, a plurality of targets movable across the aiming range of the aiming element, electrically operated means associated with said aiming element and said targets whereby on the accurate aim of said aiming element on a selected target at the operating of said aiming element, said target will operate to indicate a hit, and means operated by a target actuated to indicate a

hit for registering the successive number of hits scored.

4. An apparatus for determining the accuracy of aim comprising an aiming element representing a firearm, a plurality of targets successively movable across the aiming range of the aiming element, each of said targets including a pivotally mounted article representation and a fixed representation of a portion of the article, and electrically operated means associated with the aiming element and said targets whereby on the accurate aim of said aiming element on a selected target at the time of operation of said aiming element the pivotally mounted portion of the target will disappear from view leaving the fixed portion indicating the scoring of an accurate hit.

5. An apparatus for determining the accuracy of aim comprising an aiming element representing a firearm, a plurality of targets movable in an endless path across the aiming range of the aiming element, said targets each including a fixed portion and a relatively movable portion, an electrically operated means associated with said aiming element and said targets whereby on the accurate aim of said aiming element on a selected target at the time of operation of said aiming element the relatively movable portion of the target will disappear from view.

6 An apparatus for determining the accuracy of aim comprising an aiming element and presenting a firearm, a target including a fixed portion and a relatively movable portion, an electrically operated means associated with said aiming element and the movable portion of said target, whereby on the accurate aim of said aiming element on said target at the time of operation of said aiming element, the relative movable portion of the target will be operated to disappear from view.

7. An apparatus for determining the accuracy of aim comprising a plurality of aiming elements each representing a firearm, an endless series of targets movable across the aiming range of each element, means for imparting to each series of targets continuous movement in a single direction, an electrically operated means associated with each aiming element and in its associated series of targets whereby on the accurate aim of either of said aiming elements on a selected target of its associated series of targets at the time of operation of said aiming element, the selected target will disappear from view registering a hit, means for rendering a report indicative of the discharge of a firearm, on each operation of either of said aiming elements, and means associated with each respective series of targets for indicating the number of hits scored.

8. An apparatus for determining the accuracy of aim comprising an aiming element representing a firearm, a target, said target including a pivotaly mounted article representation and a fixed representation of a portion of the article, and electrically operated means associated with the aiming element and said target whereby on the accurate aim of said aiming element on the target at the time of operation of said aiming element the pivotally mounted portion of the target will disappear from view leaving the fixed portion indicating the scoring of an accurate hit.

In testimony whereof I have signed my name to this specification.

EDMUND C. FEY.