

March 8, 1932.

E. R. NIER

1,848,795

TARGET PRACTICE APPARATUS

Filed Oct. 8, 1930

3 Sheets-Sheet 1

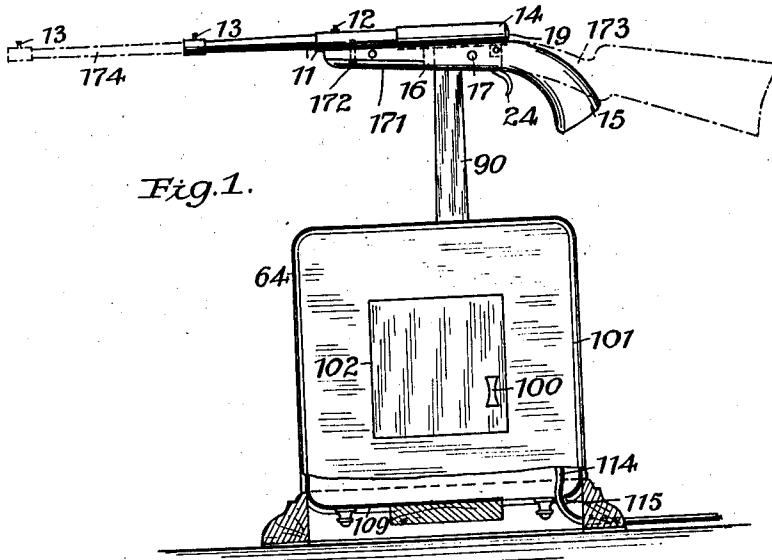


Fig. 1.

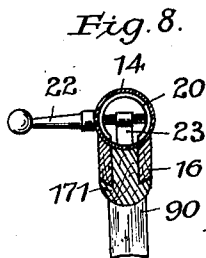


Fig. 8.

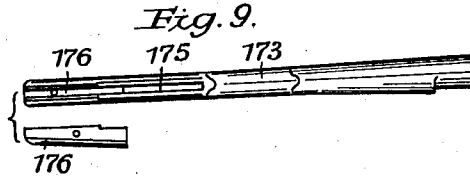


Fig. 9.

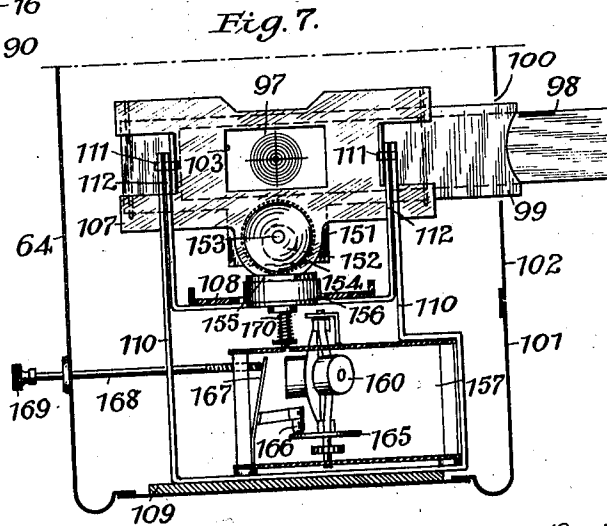


Fig. 7.

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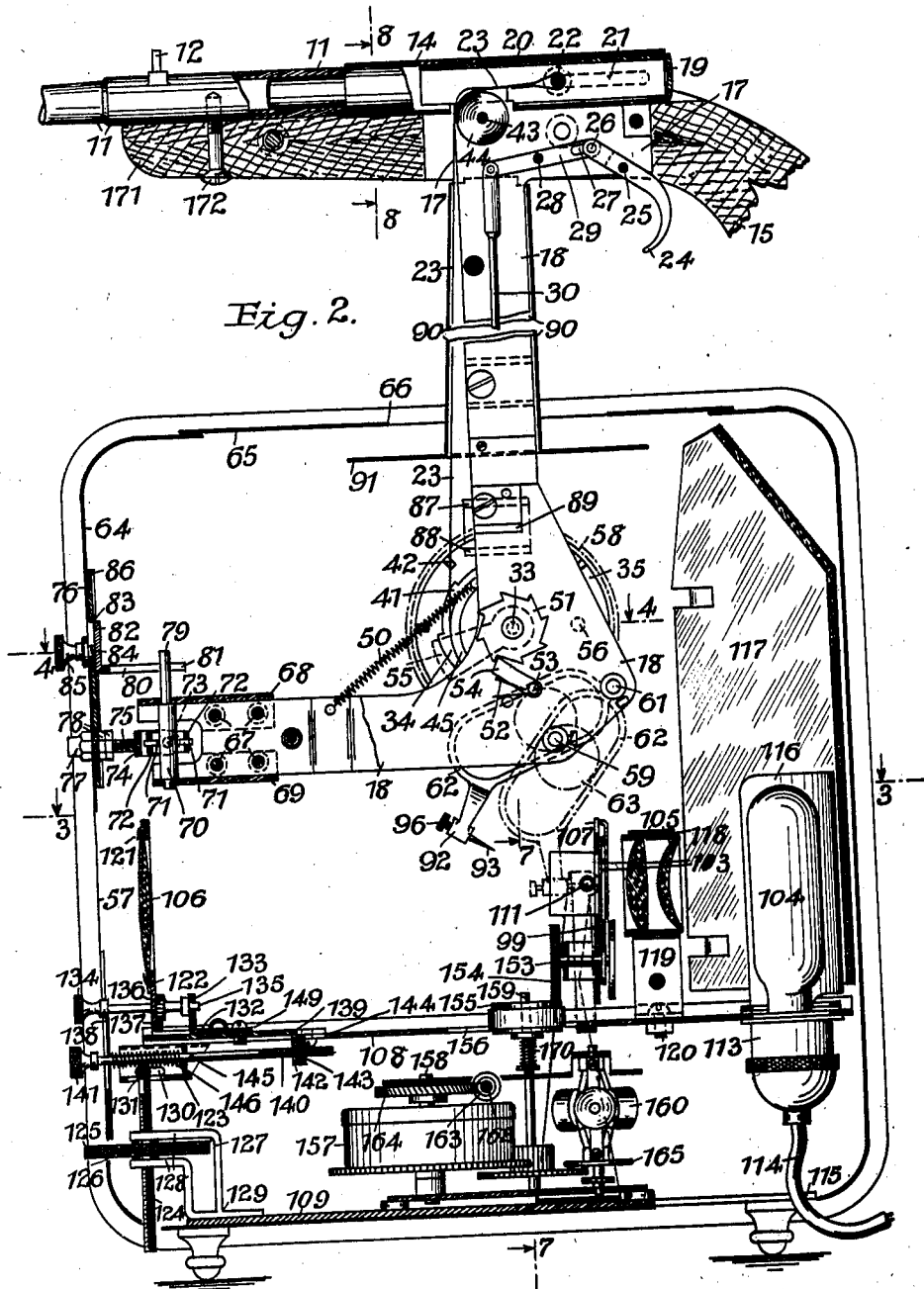
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TARGET PRACTICE APPARATUS

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3 Sheets-Sheet 2



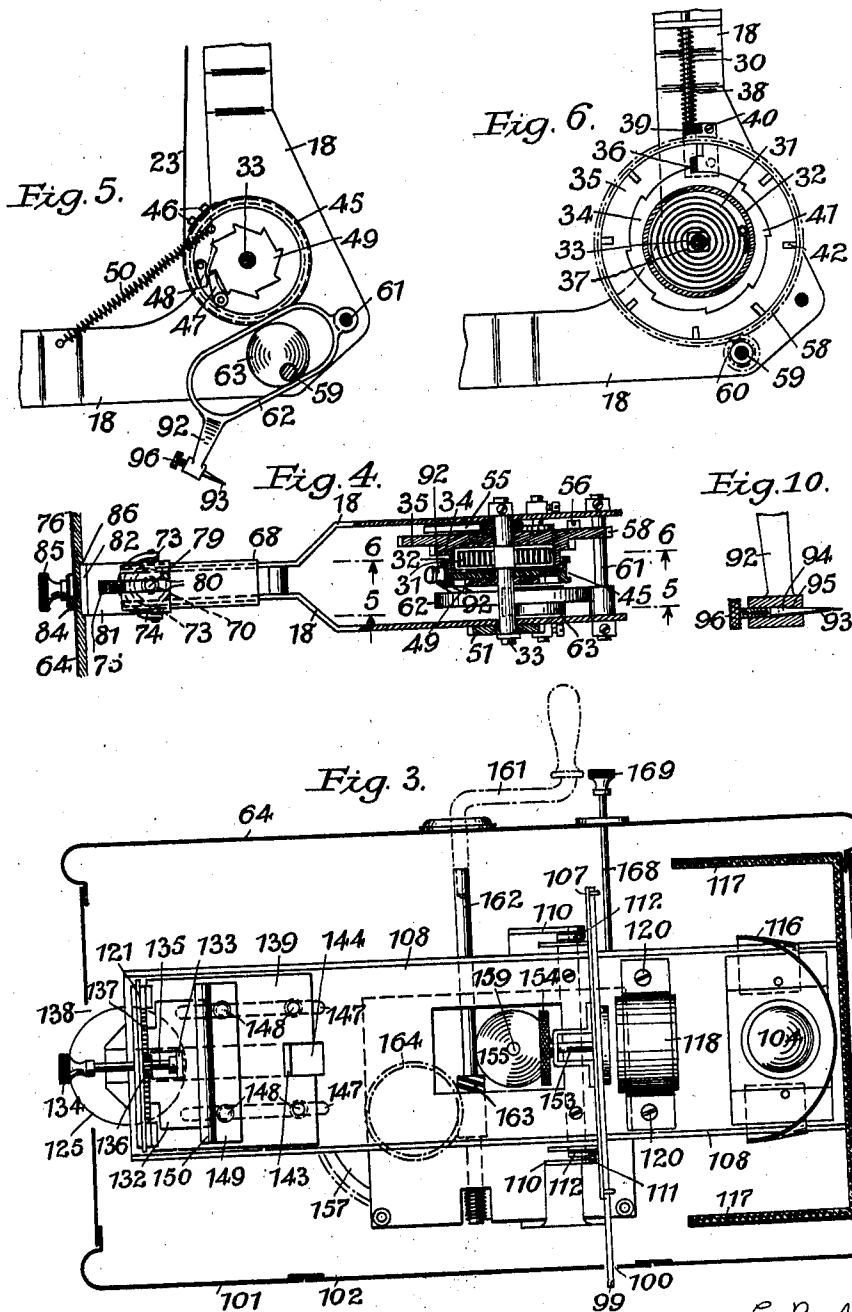
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TARGET PRACTICE APPARATUS
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1,848,795

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

ERNST RICHARD NIER, OF BEIERFELD IN SACHSEN, GERMANY

TARGET-PRACTICE APPARATUS

Application filed October 8, 1930, Serial No. 487,338, and in Germany August 20, 1930.

This invention relates to a target-practice apparatus of the kind wherein a dummy rifle is used for aiming at a projected light image of a perforable diapositive representing a target, the rifle being mounted on a carrier frame which is capable of adjustment about a universal joint and which carries a perforating device adapted, on the trigger being pulled, to pierce the target and produce a corresponding effect on the image at the exact spot towards which the rifle is aimed, thereby giving the impression of an actual hit.

The object of the invention is to produce a simple and reliably operating apparatus of this kind, and the invention consists essentially in the provision of a perforating device adapted to be operated by means of a spring motor. Preferably the movement of the motor is controlled by an escapement mechanism which is released by means of the trigger and which allows a complete operation of the perforating device at each release, means being provided for winding the motor, if desired, sufficiently for the firing of several shots in succession. The winding may be effected either direct or through the medium of a slide fitted in the rifle. In the latter instance one operation of the slide is required for each shot.

In the accompanying drawings an embodiment of the invention is illustrated by way of example,

Fig. 1 representing a side view of the complete device,

Fig. 2, a sectional side view of the device on an enlarged scale,

Fig. 3, a horizontal section on the line 3—3 of Fig. 2,

Fig. 4, a horizontal section on the line 4—4 of Fig. 2,

Fig. 5, a vertical section on the line 5—5 of Fig. 4,

Fig. 6, a vertical section on the line 6—6 of Fig. 4,

Fig. 7, a vertical section on the line 7—7 of Fig. 2,

Fig. 8, a vertical section on the line 8—8 of Fig. 2,

Fig. 9, a view of a modified form of gunstock, and

Fig. 10, a sectional view of part of the perforating device.

The target-practice apparatus comprises essentially a dummy pistol or rifle, a projection apparatus whereby the image of a miniature target, in the form of a perforable diapositive, is projected on to a screen or a wall, and a perforating device which is controlled by the dummy rifle and operated on the pulling of the trigger so as to pierce the target and produce a corresponding effect on the image at the exact spot towards which the rifle is aimed.

The firearm is represented in Fig. 1 by full lines as a pistol and by dotted lines as a rifle and will be referred to hereinafter as a rifle. The barrel 11, which is fitted in the usual manner with sights 12 and 13, is slipped or screwed into the end of a cylinder 14, said cylinder and the barrel being detachably connected to the gunstock 16 forming the butt 15.

The rifle is mounted on the upright member of a carrier frame composed of two spaced elbow plates 18. Enlargements 17 at the upper ends of the plates form a casing which is accommodated in a slit in the gunstock and which is closed at the top by the cylinder 14.

In the illustrated device, the cylinder 14 contains a cylindrical slide 20 having a closed end 19. An operating handle 22 is connected at right angles to the slide and projects through a slot 21 in the cylinder 14, the extent of movement of the slide being limited to that of the handle in the slot.

The casing 17 contains a double-armed lever 29 which rocks about a pivot 28 and which is connected at one end by means of a pin 26 and a slot 27 to a trigger 24 so that it can be rocked by means of the latter, the trigger being mounted on a pivot 25. The opposite end of the lever 29 is connected to a rod 30 which is brought up between the upright members of the frame 18 and which cooperates with the trigger for releasing an escapement mechanism whereby the operation of a spring motor is controlled.

The spring motor is mounted in the elbow of the frame 18 and comprises a coil spring 31 arranged in a barrel 32 which is rotatable

about a shaft 33. One end of the spring is connected to the barrel and the other to a spring core 37 secured to the shaft 33. The spring barrel is moved by the spring action and its movements are controlled by the escapement mechanism which comprises two wheels 34 and 35 of different diameters secured to each other and to the spring barrel or formed integrally with the latter. The smaller wheel 34 is formed with ratchet teeth 41, and the larger wheel 35 is provided with pins 42 which overhang the ratchet wheel 34, the pins being in a staggered position relative to the ratchet teeth. A radially movable stop 36 is adapted to co-operate alternately with the pins and with the ratchet teeth. This stop is connected to a plate 39 carried at the lower end of the rod 30 so as to be operated by means of the latter. A spring 38 on the rod tends to hold the stop in engagement with the ratchet wheel. On the trigger being pulled, the stop is raised so as to release the ratchet wheel and allow the spring barrel to move. In the raised position of the stop it serves as an abutment for the next pin 42 which thus limits the movement of the barrel. On the trigger being released, the stop descends under the influence of the spring and engages the next ratchet tooth. A bracket 40 secured to the carrier frame, forms a guide and lateral support for the stop.

The motor is wound up by means of the shaft 33 for which purpose the shaft can naturally be turned direct in known manner. In the illustrated device, however, the winding is effected by means of the slide 20 and the handle 22. Connected to the handle inside the cylindrical slide 20 is a flexible draught element 23, preferably in the form of a steel band. This band passes through slots in the slide and in the cylinder 14 and is guided on a deflecting pulley 44 mounted on a pivot 43 in the casing 17. The lower end of the band is connected by screws 46 to the circumference of a drum 45 which is rotatably mounted on the shaft 33 and controlled by a spring 50. A pawl 47 on the drum is pressed by a spring 48 against the face of a ratchet wheel 49 which is secured to the shaft 33. The latter has the same number of teeth as the ratchet wheel 34 of the spring barrel. On the slide 20 being operated, the drum 45 is rotated and advances the ratchet wheel 49 through one tooth space, and the shaft 33 which participates in the movement, and winds the spring 31, is retained in advance position by a detent pawl 54 which co-operates for this purpose with a ratchet wheel 51 secured to the shaft. The pawl 54 is controlled by a spring 52 and rocks about a pivot 53 connected to the frame 18.

The winding up of the spring motor and its running down is limited by a stop 56 se-

cured to the wheel 35 and by an arm or sector 55 secured to the shaft 33. In winding up the spring motor by operating the slide 20 the drum 45 is oscillated and imparts by means of the pawl and ratchet mechanism 47, 49 an intermittent rotation to the shaft 33 until the arm or sector 55 secured thereto abuts against the stop 56 on the wheel 35 of the spring barrel 32. The range of rotation of the shaft 33 may be restricted by an additional stop 56 or by the employment of sectors 55 of various sizes to allow any desired number of operations of the trigger 24 without the necessity of winding up the spring motor after each shot. In the arrangement illustrated, complete winding up of the spring motor permits seven successive shots to be fired. After firing the seventh and last shot the stop 56 abuts against the arm or sector 55 on the shaft 33 and thus prevents further rotation of the spring barrel 32.

The transmission of motion from the spring motor to the perforating device is effected by means of the toothed wheel 58 engaging a pinion 60 mounted on a shaft 59, pinion and shaft being adapted to make a complete revolution at each operating step of the spring motor. The perforating device comprises an elongated frame 62 which is arranged to rock about a shaft 61 secured to the frame 18. The frame 62 embraces an eccentric sheave 63 secured to the shaft 59 and receives from said shaft a rapid rocking motion on the shaft being rotated by the motor. An arm 92 on the frame 62 is headed to form a hammer and the head has a conical bore 95 for the reception of a perforating needle 93, preferably in the form of an ordinary talking machine needle. A screw 96, which enters the bore behind the needle, as best shown in Fig. 10, forces the conical portion 94 of the needle into the bore and forms a rigid abutment for the needle during its operation. The needle can easily be exchanged after the removal of the screw 96.

The upright, rifle supporting member of the carrier frame 18 is brought up from a casing 64 the cover 65 of which has an opening 66 for the member large enough to allow the necessary aiming movements of the rifle. The frame is supported inside the casing by means of a universal joint engaging the end of the lower horizontal frame member. The two plates of the member are connected by means of screws 67 to bridge pieces 68 and 69 wherein a vertical shaft 70 is rotatably mounted. Co-axial trunnions 71 secured at right angles to said shaft engage in a horizontal ring 72, and this ring is held by trunnions 73, arranged at right angles to the trunnions 71, in a fork 74 secured to a screw spindle 75. The latter passes through an aperture in the wall of the casing 64 and is secured to the latter by means of clamping and locking nuts 77 and 78, the casing wall

being reinforced by a plate 76 which ensures a rigid support for the carrier frame.

A vertical elongated aperture 83 in the plate 76 and in the casing wall admits a clamp screw 84 which is fitted with a milled head 85 and which secures to the wall a bracket 82. A horizontal member 81 on said bracket has a slit 80 which is situated vertically above the centre of the universal joint. A reduced extension 79 of the shaft 70 is adapted to engage in this slit and fits it snugly so that, while the shaft can turn in the slit and oscillate therein in a vertical plane, it prevents lateral tilting of the carrier frame and of the rifle. When this restriction of the rifle movement is not required, the bracket 82 is raised and secured in a position where it is out of reach of the shaft extension 79. The plate 76 is provided with a vertical guide rib 86 whereby the bracket 82 is maintained with the slit 80 in a proper vertical position relative to the centre of the universal joint. When the guide bracket 82 is not in use, the aiming operation, as regards freedom of movement of the rifle, is substantially identical with that of an ordinary rifle and provides efficient target practice.

The casing 64 is provided, at both sides of the carrier frame, with spaced guide brackets 87 and 88 which, in co-operation with a bracket 89 secured to the frame and also with the frame itself, restrict the movement of the frame to the limits required for aiming. When the rifle is not in use, the carrier frame rests by means of the brackets 89 on the brackets 88. The brackets may, if required, be provided with a covering of soft material adapted to absorb shocks.

The upper part of the carrier frame, from the gunstock to within the casing 64, is enclosed in a casing 90 whereby the mechanism is concealed. The casing 90 is connected to the casing 17 and may be made in two sections. The lower end of the casing 90 carries, inside the casing 64, a wide flange 91 whereby access to the interior of the casing 64 through the opening 66 is prevented. This flange, which may be perforated for ventilation purposes, is situated at a sufficient distance from the casing cover 65 to allow the necessary movements of the rifle.

The projection apparatus comprises a light source 104, a condenser 105, an objective 106, a slide carrier 99, and a guide frame 107 for the latter, frame and carrier being provided with gates 103 for the projection of the target 97. The latter consists, in known manner, of a perforable diapositive made of celluloid or the like. It is provided either with concentric rings or with other suitable target images. The target is mounted on a supporting slide 98 which may be made of cardboard or the like and formed with an aperture over which the target is stretched and

pasted in position so as to be able to withstand the operation of the perforating needle. The carrier 99 projects through an aperture 100 in the side wall 101 of the casing 64 or in a door 102 and allows the slide 98 to be readily inserted and subsequently withdrawn for checking purposes or for being carried away as a souvenir. In the inner end position of the slide and of the carrier, the target is centered relative to the optic axis of the projecting apparatus and is in position to be perforated by the needle 93 on the frame 62 being rocked.

The projection apparatus is mounted on a platform 108 which is suspended by means of a stirrup 112 and co-axial pivots 111 in a bearing bracket 110 secured to the bottom 109 of the casing 64. The frame 107 is secured to the stirrup 112, and the pivots 111 are substantially in alignment with the centre of the gate 103 or with the target slide.

The light source consists of an electric lamp which is fitted in a holder 113 in the platform 108, the flexible electric wire 114 being led in through an aperture 115 in the bottom 109 of the casing 64.

A reflector 116 is arranged behind the lamp, and a screen 117 of heat insulating material is arranged so as to embrace the lamp and reflector.

The lense mount 118 of the condenser 105 is secured to a supporting bracket 119 which is secured to the platform 108 by means of a screw 120.

The lense mount 121 of the objective 106 is adjustably mounted by means of a bracket 122 at the front end of the platform 108. This bracket has a horizontal member 132 whereby it is mounted, so as to be adjustable in the direction at right angles to the optic axis, on a slide 139 which by means of pins 148 engaging longitudinal slots 147 in the platform 108 is adjustable in a direction parallel to the optic axis. A transverse rail 149 secured in place by means of the pins 148 is provided with an elevated edge 150 beneath which the bracket member 132 is guided in its adjustment. A spindle 135 is supported in the upright bracket member 122 and in a lug 133, which is turned up from the member 132, and is fitted with a pinion 136 which engages a rack 137. The latter is rigidly supported on the slide 139 and will therefore cause the objective to be transversely adjusted on the spindle being rotated. The spindle projects through an aperture 138 in the front wall of the casing 64 and is fitted with a milled operating knob 134.

The slide 139 has a down-turned lug 142 which is reinforced by a plate 143 whereby it is guided in a longitudinal slit 144 in the platform 108. Lug and plate are drilled and screw-threaded for engagement with a screw-spindle 140 which passes through a casing 123 carried at the under side of the platform.

The spindle is controlled by a spring 146 situated inside the casing 123 and by a cross pin 145 passing through the spindle outside the casing and causes, on rotation, an adjustment of the slide 139 and the objective in the direction of the optic axis. The spindle projects through the front wall of the casing 64 and is fitted with a milled operating knob 141.

The platform itself is controlled and adjusted by means of a vertical screw spindle 124 which passes through a pair of brackets 128 and through a large nut 127 situated between the brackets and formed with a milled edge 125. The brackets are secured by means of a base plate 129 to the bottom 109 of the casing 64. The upper end of the screw spindle engages by means of a pivot 131 in a slit 130 in the casing 123 and thus maintains the platform in a given position. The nut 127 projects through an aperture 126 in the front wall of the casing and can therefore readily be turned for moving the front end of the platform up and down, thereby regulating the inclination of the optic axis in its vertical plane.

Owing to this adjustability of the projection apparatus, the focussing of the image, the adjustment thereof as regards size and distance, and the positioning of the image relative to the rifle so that the aim of the latter co-incides with the perforation made by the needle in the target, can be easily effected. The positioning of the image relative to the rifle is particularly facilitated by the pivotal suspension of the platform which allows the inclination of the optic axis to be varied without affecting the relationship of the perforating device to the miniature target.

Normally the perforating needle 93 remains outside the light cone which is projected through an opening 57 in the front wall of the casing 64 on to a wall or screen which thus receives the image of the target. After the winding up of the motor by means of the handle 22 or otherwise, the rifle is ready for use, and as the trigger 24 is pulled the escapement mechanism releases the motor and causes the perforating needle to snap into contact with the target and pierce it and immediately to return to its initial position. This operation is too rapid to be perceived with the eye. The piercing of the target will have a corresponding effect on the image and give the impression as if the projection screen had actually been hit by a bullet.

The penetration of the needle through the target can be varied by adjusting the screw spindle 75, which carries the universal joint in the front wall of the casing. The brackets 87, 88 and 89 restrict the movements of the rifle and of the carrier frame. The needle movement will be similarly restricted, and the needle will be prevented from digging into the slide of the carrier.

In order to enable the apparatus to be

used with moving as well as with stationary targets the slide carrier 99 is adapted to perform a rocking to and fro motion in its own plane within the frame 107 and is controlled, as shown in Fig. 7, by an eccentric 152 or other suitable operating element which engages in an aperture in a lug 151 on the carrier. The eccentric is mounted on a shaft 153 carried by the frame 107 and is operated, through the medium of friction gears 154, 155 or by means of conical gears, by a spring motor arranged under the platform 108 on the bottom 109 of the casing 64. The platform has an aperture 156 through which the friction gear 155 is admitted.

The spring motor consists in known manner of a spring accommodated in a barrel 157 and mounted together with the latter on a shaft 158. Suitable gears transmit motion from the spring barrel to a shaft 159 on which the friction gear 155 is mounted, the movement being controlled by a governor 160. The motor is wound up by means of a crank handle 161 which, as shown in Fig. 3, is admitted through an aperture in the casing 64 for application to a shaft 162. A worm gearing 163, 164 connects the shaft 162 with the shaft 158 whereby the spring is wound.

For regulating the speed of the motor and for stopping the same, a brake disc 165 is provided which is connected in known manner to the governor shaft. A brake arm 166, which is pressed against the disc 165, is, as shown in Fig. 7, mounted on a resilient carrier 167 which tends to keep the arm out of contact with the brake disc. A suitably mounted screw spindle 168, which projects through the casing 64 and is fitted outside the casing with an actuating knob 169, acts by axial displacement on the brake arm carrier 167 and presses the brake arm 165 with greater or less force against the brake disc, thereby regulating the speed of the motor.

Proper engagement between the friction gears 154, 155 in the various positions occupied by the platform 108, is ensured by the provision on the shaft 159 of a spring 170 which bears at one end against a collar or cross pin on the shaft and at the other end against a friction gear 155, the latter being slidably feathered on the shaft.

The pistol shown by full lines in Fig. 1 may, as previously explained, be disassembled and replaced by a rifle. For this purpose the gunstock 16 is provided with a longitudinal slit for the reception of the casing 17 and with a groove for the accommodation of the barrel (Figs. 1, 8 and 9). The open front end of the slit is closed by a filling piece 171 which is secured by means of a screw 172. The latter also secures the barrel and fixes the pistol in position on the carrier frame.

On the removal of the fastening between

the gunstock 16 and the casing 17 and that between the filling piece 171 and the gunstock and the barrel, the shaft and filling piece may be detached and replaced by the gunstock 175 of the rifle. This gunstock has also a slit 175 which accommodates the casing 17 and the barrel 174 as well as the filling piece 176.

After the pistol barrel has been replaced by a rifle barrel 174, the gunstock 175 can be slipped on to the casing 17 under the cylinder 14 and secured like the pistol by means of the filling piece 176.

I wish it to be distinctly understood, that I do not limit myself to the precise constructions shown, variations in the arrangement and combination of the several parts being possible according to desire or requirement without departing from the scope and spirit of the invention.

What I do claim as my invention and desire to secure by Letters Patent is:

1. A target-practice apparatus of the character described comprising a projection apparatus, a perforable slide in said apparatus representing a target, a frame supported above said projection apparatus and adjustable about a universal joint, a dummy rifle mounted rigidly on said frame in position to be aimed at a projected light image of said target, a perforating device carried by said frame and operable for perforating said slide at a point corresponding to that of the image towards which the rifle is aimed, a spring motor in the frame for operating said perforating device, a pawl and ratchet device for winding the motor, a slide on the rifle, a connection between said slide and the pawl and ratchet device for operating the latter, a trigger on the dummy rifle, and means co-operating with said trigger for causing said motor to operate.

2. A structure as claimed in claim 1, wherein the pawl and ratchet device is operable to wind the motor for one operation of the perforating device for each reciprocation of the slide.

3. The structure claimed in claim 1 in combination with checking means for the motor allowing of several successive windings before the perforating device is operated.

4. A structure as claimed in claim 1 wherein the spring motor comprises a rotatable spring barrel which acts on the perforating device and which operates the latter completely during less than a complete revolution of the barrel.

5. A target-practice apparatus of the character described comprising a projection apparatus, a perforable slide in said apparatus representing a target, a frame supported above said projection apparatus and adjustable about a universal joint, a dummy rifle mounted rigidly on said frame in position to be aimed at a projected light image of said

target, a perforating device carried by said frame and operable for perforating said slide at a point corresponding to that of the image towards which the rifle is aimed, a spring motor in the frame for operating said perforating device, means for winding the motor, an escapement mechanism controlling the operation of the motor, a trigger on the rifle, and connection between the trigger and said escapement mechanism for operating the latter.

6. A structure as claimed in claim 5 wherein the escapement mechanism comprises a pair of inter-connected co-axial wheels of different diameters; the smaller wheel being formed with ratchet teeth and the larger wheel with pins which overhang said ratchet teeth, a stop adapted to be radially reciprocated between said ratchet teeth and said pins for alternate engagement therewith, the connection between the escapement mechanism and the trigger comprising a longitudinally reciprocative, spring controlled rod carrying said stop, and a lever transmitting motion from the trigger to the rod.

7. A structure as claimed in claim 5 wherein the motor is adapted to effect a complete operation of the perforating device during each operation of the escapement mechanism.

8. A structure as claimed in claim 5 wherein the perforating device comprises a rocking frame and wherein the operative connection between the motor and the perforating device comprises an eccentric sheave which engages and rocks said rocking frame, and a pinion transmitting motion between the motor and the sheave, said pinion adapted to make a complete revolution during each operation of the escapement mechanism.

9. A structure as claimed in claim 1 wherein the perforating device comprises a rocking frame, an eccentric operated by the motor for rocking said frame, a hammer carried by said frame, and a perforating pin detachably secured to said hammer.

10. The structure claimed in claim 1 in combination with means allowing the frame support to be adjusted for regulating the position of the perforating mechanism relative to the target slide.

11. The structure claimed in claim 1 in combination with a vertical shaft connected to the frame in alignment with the point about which the frame is adjustable, and a rigidly supported, vertically adjustable fork, said fork adapted in one position to engage said shaft and prevent lateral tilting of the frame about said point.

12. The structure claimed in claim 1 in combination with a platform carrying the projection apparatus, a pivotal suspension for said platform allowing adjustment thereof for regulating the angular position of the optic axis in its vertical plane, and means for adjusting the platform and for maintaining it in adjusted position.

13. The structure claimed in claim 1 in combination with a platform carrying the projection apparatus, a pivotal suspension for said platform allowing adjustment thereof for regulating the angular position of the optic axis in its vertical plane about an axis which is substantially in alignment with the centre of the target slide, and means for adjusting the platform and for maintaining it in adjusted position.

14. The structure claimed in claim 1 in combination with a platform carrying the projection apparatus, a pivotal suspension for said platform allowing adjustment thereof for regulating the angular position of the optic axis in its vertical plane, a screw spindle for adjusting the platform, a milled nut on said spindle, and a guide holding said nut stationary in place.

15. The structure claimed in claim 1 in combination with a platform carrying the projection apparatus, a pivotal suspension for said platform allowing adjustment thereof for regulating the angular position of the optic axis in its vertical plane, a lens mount for the objective of said projection apparatus arranged to slide on said platform in the direction of the optic axis, and a screw spindle for adjusting said lens mount.

16. The structure claimed in claim 1 in combination with a platform carrying the projection apparatus, a pivotal suspension for said platform allowing adjustment thereof in a vertical plane, cross slides on said platform carrying the objective of said projection apparatus, and spindles for adjusting said cross slides.

17. The structure claimed in claim 1 in combination with means for imparting a rocking to and fro motion to the target slide in its own plane.

18. The structure claimed in claim 1 in combination with a movable slide carrier for the projection apparatus, an eccentric or cam for imparting a rocking to and fro motion to said carrier in the plane of the target slide, and means for transmitting motion to said eccentric or cam.

19. The structure claimed in claim 1 in combination with a platform carrying the projection apparatus, a carrier for the target slide movable in the plane of said slide, an eccentric or cam for imparting a rocking to and from motion to said carrier, a spring motor mounted under said platform, a friction gear transmitting motion from the motor to the eccentric or cam, and means for regulating the speed of said motor.

In witness whereof I have hereunto signed my name this 17th day of September, 1930.
ERNST RICHARD NIER.