

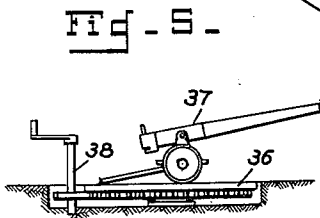
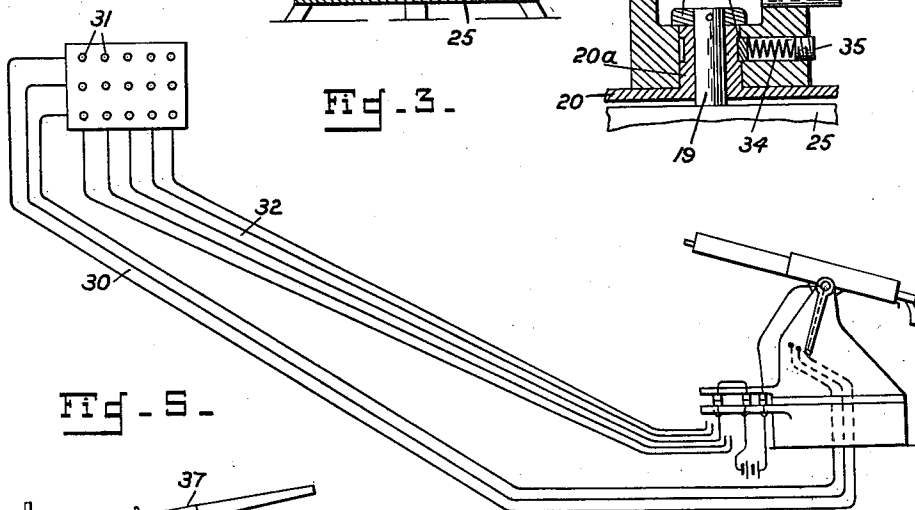
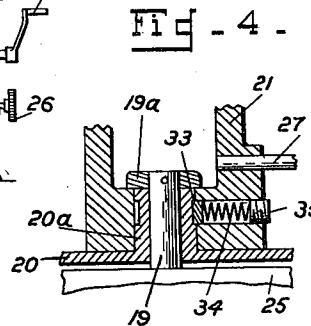
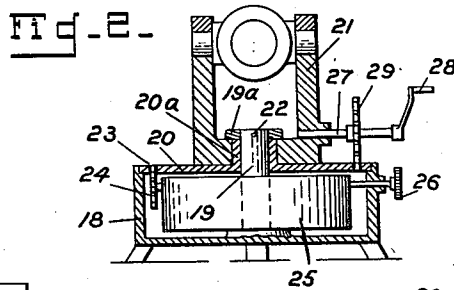
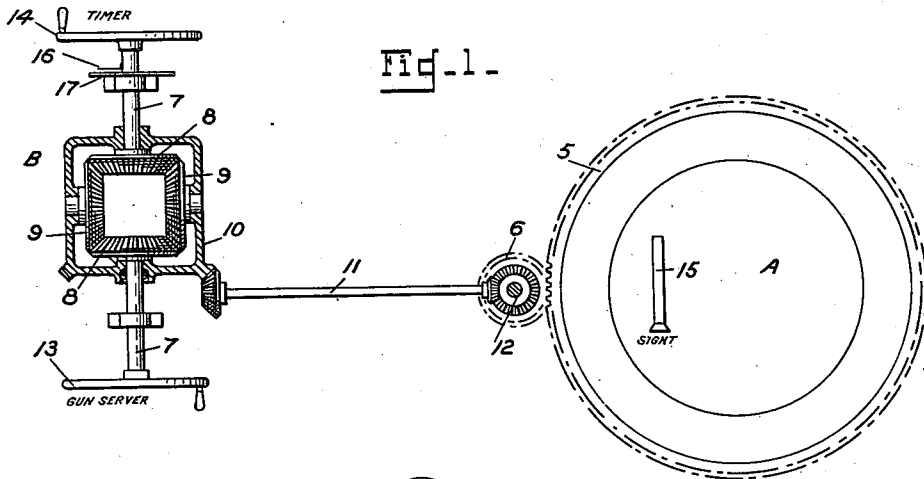
Dec. 19, 1933.

J. C. KARNES

1,939,706

APPARATUS FOR CONDUCTING TRAINING IN GUNNERY

Filed May 20, 1931



INVENTOR.  
James C. Karnes  
BY *W. N. Roach*  
ATTORNEY

## UNITED STATES PATENT OFFICE

1,939,706

APPARATUS FOR CONDUCTING TRAINING  
IN GUNNERY

James C. Karnes, Buffalo, N. Y.

Application May 20, 1931. Serial No. 538,790

11 Claims. (Cl. 35—12)

(Granted under the act of March 3, 1883, as  
amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

5 This invention relates to apparatus for conducting training in gunnery.

In conducting gunnery practice against moving targets it has been customary to move the target across the front of the gun. The purpose 10 of the present invention is to reverse this procedure and means are accordingly provided for displacing the gun angular amounts corresponding to the angular travel of a target at a known range and a given speed.

15 To these and other ends, the invention consists in the construction, arrangement and combination of elements described hereinafter and pointed out in the claims forming a part of this specification.

20 Several practical embodiments of the invention are illustrated in the accompanying drawing as particularly applicable to different types of weapons.

Fig. 1 is a plan view, partly in section, of a 25 differential gearing diagrammatically associated with a training mechanism and adapted for all types of guns.

Fig. 2 is a transverse sectional view through a small gun particularly arranged for gallery 30 practice.

Fig. 3 is a view in side elevation of the gun of Fig. 2 and diagrammatically showing an associated target.

Fig. 4 is a fragmentary sectional view showing 35 a modification of the gun of Fig. 2.

Fig. 5 is a view in side elevation of dissociated operating mechanisms for displacing a gun.

Referring to Fig. 1, A represents a rotatably supported gun mount having a ring gear 5 40 meshing with the pinion 6 of the traversing mechanism B. Depending on the type of gun the traversing mechanism is either carried by the rotatable gun mount or supported on a stationary member.

45 The traversing mechanism comprises a differential gear train consisting of shafts 7—7 on which are fixed gear wheels 8—8 meshing with planet wheels 9—9 carried by an annulus 10. The annulus drives a shaft 11 which in turn 50 drives a shaft 12 on which is the pinion 6 meshing with the ring gear 5 of the gun mount.

On the shafts 7—7 are the handwheels 13 and 14, the wheel 13 being operated by a gun server and the wheel 14 being operated by a timer. In 55 operation the timer by acting on the handwheel

14 traverses the gun mount and accordingly the gun on the mount will be angularly displaced relative to a stationary target. The gun server at the handwheel 13 also has control of the 60 traversing mechanism. If he imparts a displacement to his handwheel that is complementary to the displacement of the timer's handwheel 14, the movements intended to be transmitted to the gun mount will be neutralized and the gun mount will remain stationary.

The gun server regulates the traversing displacement by endeavoring to maintain the sighting telescope 15 trained on the target. In the present instance the telescope is assumed to be 65 fixed to and movable with the gun mount and is moved off of the target by the timer. This motion is apparent to the gun server looking through the telescope as simulated motion of the target and his operation of the handwheel 13, in order to relay on the target, is exactly the same as if 70 the target were actually in motion.

The simulated speed of the target is controlled by the timer whose actions may be arbitrary or regulated. Where the timer is a mechanical 75 motor unit the regulation may be accurately obtained. For general purposes manual control of the handwheel 14 will suffice especially when guided by noting the displacement in a unit of time of a pointer 16 comparable with a reference member 17. 80

The device shown in Figs. 2 and 3, while embodying the principle previously disclosed, is designed particularly as an improvement for the apparatus shown in Patent No. 1,803,064 of 85 April 28, 1931. In the patent the target moves across a series of lights which are illuminated in accordance with the pointing of a gun or director. The purpose of the present improvement is to greatly reduce the requisite number of lights by 90 angularly displacing the gun or director.

Inasmuch as the director is designed for indoor target practice, the mount shown in Fig. 2 is a small, light and inexpensive unit. It consists of a base 18 having a central stud 19 on which is 95 mounted a disc 20 forming a closure for the base. A standard 21 constituting a gun carriage is rotatable about the central annular flange 20a of the disc and both of these members are held in place by a head 19a secured by means of a pin 22 100 on the upper end of the stud. The disc is formed with an annular series of apertures 23 engaged by a sprocket 24 driven from a spring motor 25 housed in the base. The spring motor is wound by means of the usual removable key 26. 105

A shaft 27 rotatably secured in the standard 110

and terminating in a handle 28 carries a sprocket 29 also engaging in the series of apertures 23 in the disc. The sprocket 29 constitutes a driving connection between the rotatable disc and the standard so that both of these members will be rotated in unison through the action of the sprocket 24 unless the sprocket 29 is rotated through the handle 28 to move the standard relative to the disc. The sprocket 24 corresponds to the timer of Fig. 1 and angularly displaces the gun relative to the target while the sprocket 29 permits the gun to be independently relayed on the target. The wiring 30 leading from the horizontal rows of lights 31 and the wiring 32 leading from the vertical rows of lights are associated with the gun in a manner similar to that shown in the patent.

In the modification shown in Fig. 4 the sprocket 29 of Fig. 2 may be omitted or supplemented by a frictional driving connection conveniently established between the disc and standard. This connection consists of a washer 33 engaging the annular flange 20a of the disc and held in contact therewith by a spring 34 whose compression may be varied by the nut 35.

In Fig. 5 there is shown a large turn-table 36 adapted to support a light field weapon 37 having its own traversing mechanism. The turn-table is angularly displaced by means of the gearing 38.

In the drawing a gun mount has been shown as the pointing member but it is to be understood that the pointing member may equally well consist of a sighting instrument or fire control apparatus.

The wiring 30 leading from the horizontal rows of lights 31 and the wiring 32 leading from the vertical rows of lights are associated with the gun in a manner similar to that shown in the patent.

The invention has been illustrated only as applied to angular displacement in a horizontal plane but the principle also applies to angular displacement in a vertical plane.

I claim.

1. Apparatus for conducting training in gunnery including a rotatable gun mount, a differential gear train, a driving connection between the annulus of the gear train and the gun mount, and a dual control for the gear train.

2. Apparatus for conducting training in gunnery including a rotatable pointing member, a differential gear train, a driving connection between the annulus of the gear train and the pointing member, and a dual control for the gear train.

3. Apparatus for conducting training in gunnery, including a pointing member, a differential gear train associated therewith in driv-

ing relation, and a dual control for the gear train.

4. Apparatus for conducting training in gunnery, including a pointing member, means for supplying a movement to angularly displace the pointing member, and additional means for supplying a movement to angularly displace the pointing member and acting through said preceding means whereby the first movement may be counteracted.

5. In apparatus of the class described, a pointing member, mechanism for moving the pointing member, a pair of controls for said mechanism, said controls capable of actuating the mechanism to move the pointing member when they are individually operated and capable of neutralizing the effect of each other when jointly operated.

6. A pointing apparatus including a base having a central pivot, a disc mounted on the pivot and forming a closure for the base, an annular series of apertures in the disc, a pointing member rotatably mounted on the disc, a spring motor in the base including a sprocket engaging the apertures in the disc, and a sprocket carried by the standard and engaging the apertures in the disc.

7. A pointing apparatus including a base, a rotatable closure for the base, means for rotating the closure, a pointing member rotatably mounted on the closure, and means carried by the pointing member and engageable with the closure whereby the pointing member is selectively rotatable with the closure and relative to the closure.

8. A pointing apparatus including a base, a rotatable closure for the base, means for rotating the closure, a pointing member rotatably mounted on the closure, and means whereby the pointing member is selectively rotatable with the closure and relative to the closure.

9. A pointing apparatus including a support, means for rotating the support, a pointing member rotatably mounted on the support, and means whereby the pointing member is selectively rotatable with the support and relative to the support.

10. A pointing apparatus including a rotatable support member, means for rotating said member, a pointing member rotatably mounted on the support member, a driving connection between the support and pointing members and means for rotating the driving connection to move the pointing member relative to the support member.

11. A pointing apparatus including a rotatable support member, a pointing member, means for rotating the pointing member relative to the support member, and means associated with said preceding means for rotating both of said members as a unit.

JAMES C. KARNES.