June 5, 1923.

1,457,407

J. G. P. STOKES

RIFLE DEMONSTRATOR

Filed Aug. 1, 1921

3 Sheets-Sheet 1

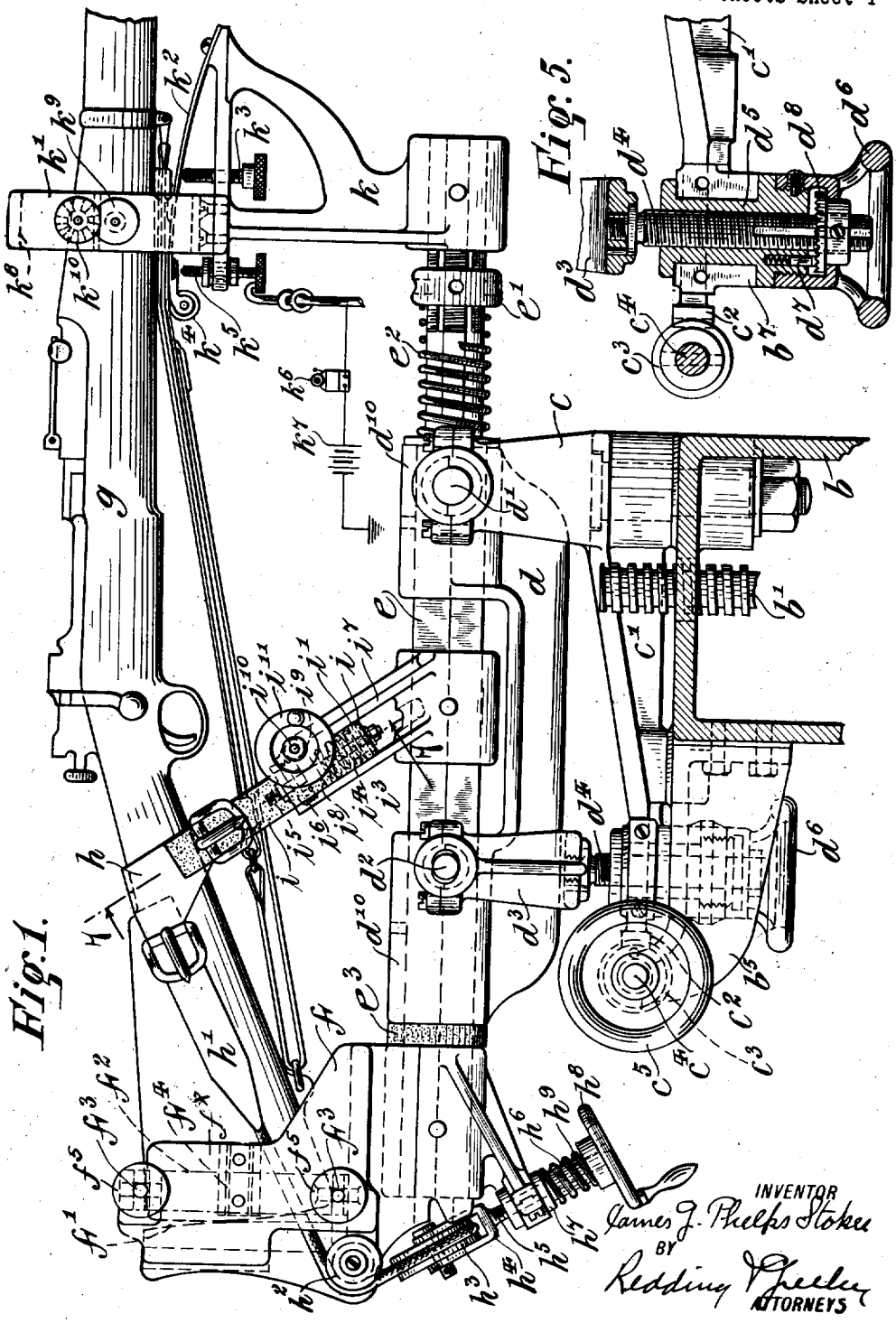


Fig. 1.

Fig. 5.

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3 Sheets-Sheet 2

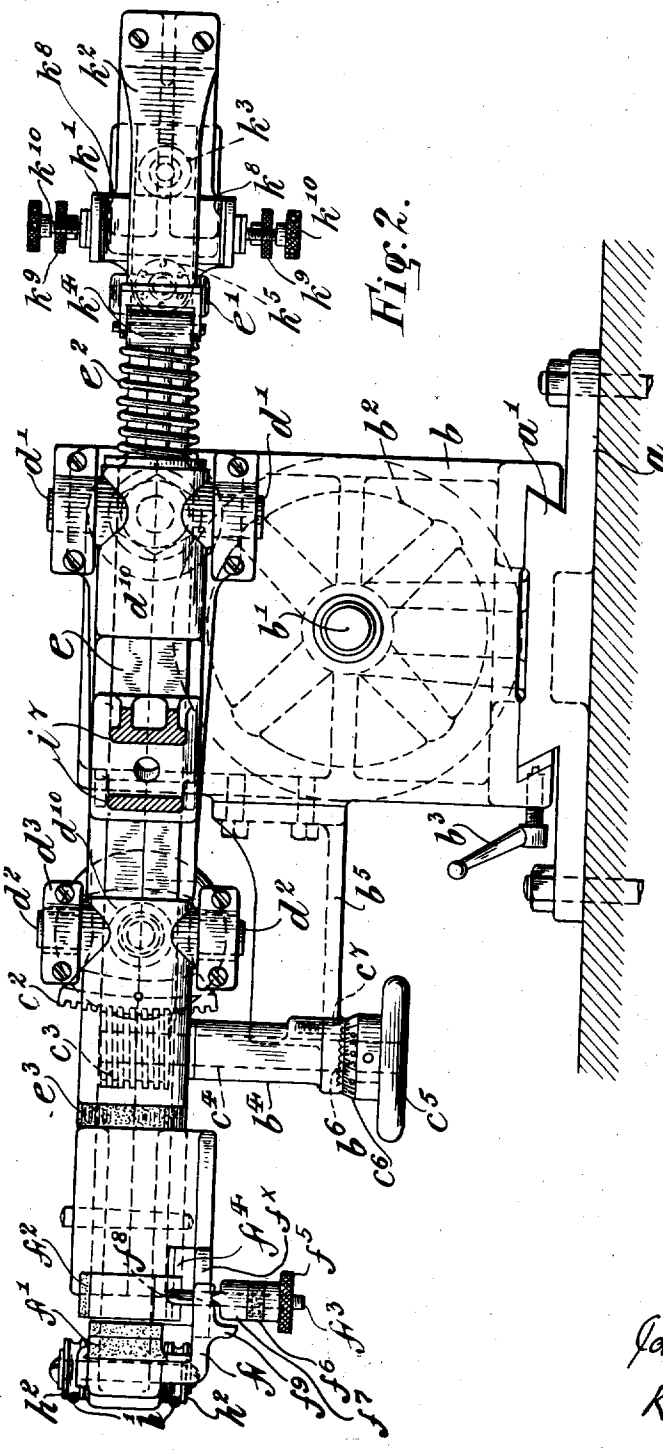


Fig. 2.

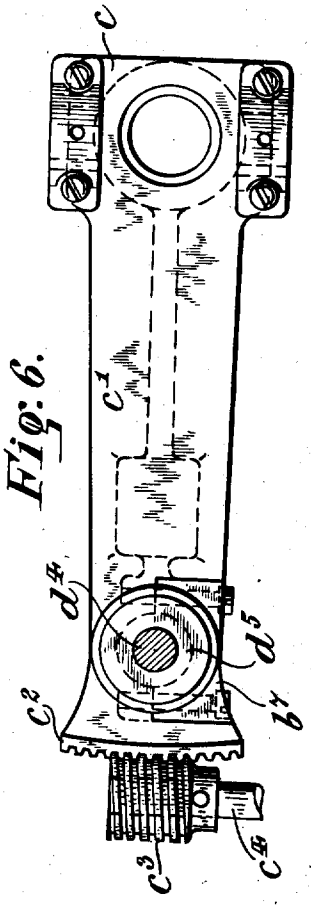


Fig. 6.

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3 Sheets-Sheet 3

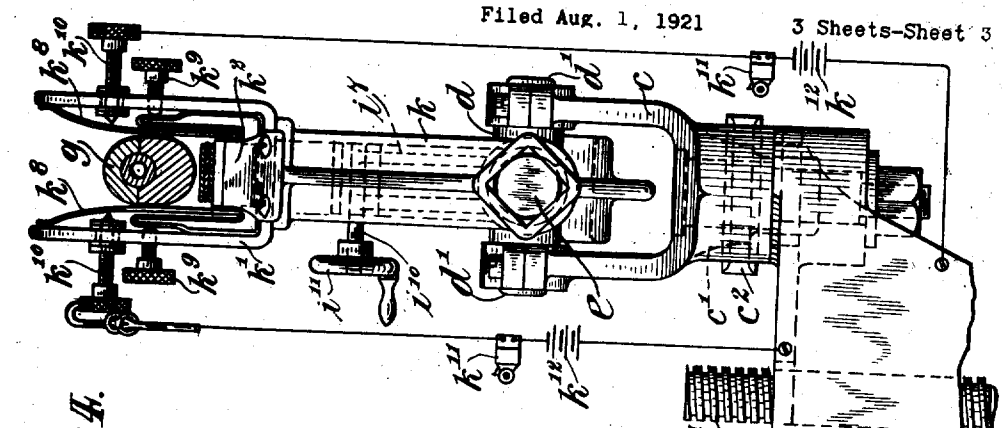


Fig. 4.

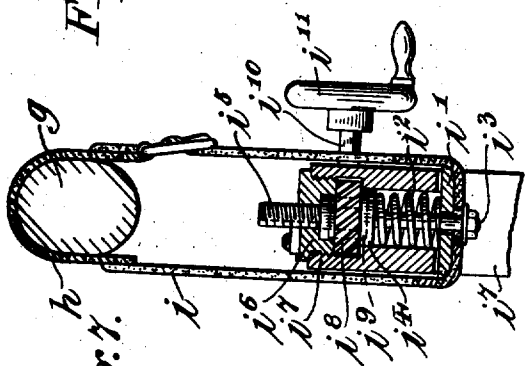


Fig. 7.

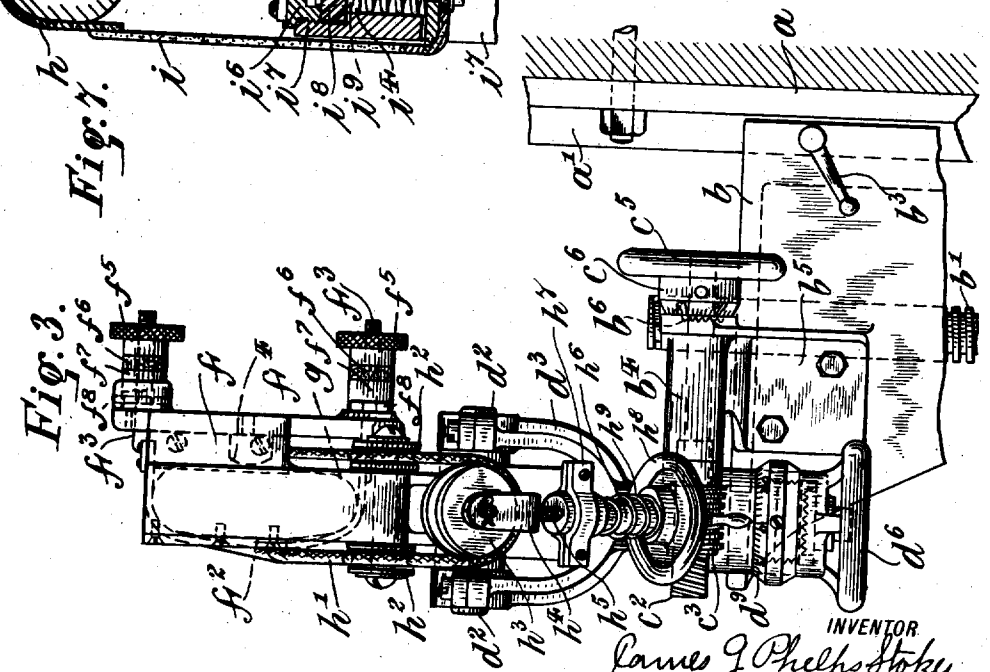


Fig. 3.

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Patented June 5, 1923. 1,457,407

UNITED STATES PATENT OFFICE.

JAMES G. PHELPS STOKES, OF NEW YORK, N. Y.

RIFLE DEMONSTRATOR.

Application filed August 1, 1921. Serial No. 488,757.

To all whom it may concern:

Be it known that I, JAMES G. PHELPS STOKES, a citizen of the United States, residing in the city of New York, in the State of New York, have invented certain new and useful Improvements in Rifle Demonstrators, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention has been developed mainly to provide an apparatus by means of which it shall be possible not only to demonstrate the accuracy or the inaccuracy of shoulder rifles, but also to demonstrate to the shooter or his instructor the faults of the shooter and thereby enable the shooter to observe his faults and, by practice, to correct them. Some features of the invention, however, are capable of use with rifles other than shoulder rifles as in the training of coast defense guns and other rifles of large caliber. In accordance with the invention the apparatus is primarily so designed as to provide for the rifle in use a mechanical support which in its capacity for correction of range and elevation and in the character of its resistance to recoil, as well as in its capacity for deflection by improper handling of the rifle, particularly by improper trigger pull, simulates the human frame, while at the same time the rifle is held firmly and with accuracy but in a manner to permit it to jump as it would have a tendency to do in the grasp of a rifleman and is returned, after each discharge, to the position in which it is set. The rifle may be loaded with the usual service charge and fired at any desired range. The rifleman assumes the same position in relation to the rifle that he would assume if he held the rifle himself and he aims the rifle and squeezes the trigger in the same manner as if he held the rifle. The application of certain parts of the apparatus to the mounting, traversing and elevating of heavier rifles will be apparent as the apparatus is described. The invention will be more fully explained hereinafter with reference to the accompanying drawings, in which it is illustrated and in which—

Figure 1 is a view in side elevation, showing the improved apparatus with a rifle in position therein, the barrel of the rifle and the base of the apparatus being broken off to save space and a portion of the base being shown in section.

Figure 2 is a top view of the apparatus, with the rifle removed and a portion of the rifle securing devices in horizontal section.

Figure 3 is a view in end elevation as seen from the left hand in Figures 1 and 2.

Figure 4 is a view in end elevation as seen from the right hand in Figures 1 and 2, the rifle being indicated in section.

Figure 5 is a detail view, in horizontal section, of a portion of the devices for effecting adjustment for variations of range and elevation.

Figure 6 is a top view of the same, with the shaft of the elevating screw in section.

Figure 7 shows a detail to be referred to.

In the embodiment of the invention illustrated in the drawing as adapted for the support of a shoulder rifle, the base on which the apparatus is mounted is represented by a wall plate a, provided with a vertical dove-tailed guide a' on which is mounted a bracket b which can be secured in vertically adjusted position to accommodate the rifleman. A screw for effecting vertical adjustment of the bracket b is indicated at b', with a hand wheel b^5 (shown in dotted lines in Figure 2) and a securing device b^3.

On the bracket b is mounted, on a vertical axis, so that it may swing in a horizontal direction, a yoke c, a horizontal arm c' being provided with a gear sector c^2 for engagement with a worm c^3 on a shaft c^4 which is mounted in a bearing b^4, carried by an arm b^5 which is secured to the bracket b. A hand wheel c^5 is secured to the shaft c^4 and its hub c^6 has a graduated collar c^8, for registration with a mark on bearing b^4. A pin pawl c^7 in bearing b^4 engages with a ratchet b^6 formed on the collar c^8. By means of the hand wheel, worm and gear sector the yoke c can be swung about its vertical axis and the rifle, which is supported by the yoke as hereinafter described, can be traversed as desired. The mathematical length of the arm c' is such that it bears a definite relation to a given unit of distance from the muzzle of the rifle, such as one hundred feet or one hundred yards, in the case of a shoulder rifle, or one thousand yards in the case of a heavy rifle, and the worm c^3 is so related to the gear sector c^2 that rotation of the worm through a determined unit angle produces an angular movement of the arm and therefore of the rifle muzzle through a unit angle. The units of movement of the worm are indicated by the units of the graduated scale

and the ratchet b^6 is so designed that the space betweeen successive teeth corresponds to a unit angle of movement of the arm. The pin pawl and ratchet are so designed that movement of the pawl over each tooth of the ratchet gives forth a sharp click and thus constitute an annunciator by which the rifleman or the gun pointer can readily determine the required traverse in one direction or the other to correct a known or estimated error on the target.

Supported at one end in the yoke c by trunnions d' is a cradle d. At the other end the cradle d is provided with trunnions d^2 which are received in a yoke d^3. In order that the rifle, which is supported by the cradle d as hereinafter described, may be elevated or depressed as desired, regardless of the traverse, the yoke d^3 is mounted on the upper end of a screw d^4, which is mounted in a nut d^5 supported by the arm c'. The nut d^5 is provided with a hand wheel d^6 and with a pin pawl d^7, the latter engaging a ratchet d^8 which is fixed on the screw d^4, the latter being held to the yoke d^3 so that it cannot rotate. The collar d^9 attached to nut d^5 is graduated for registration with a mark on the bearing b^7 of the nut in the arm c', so that the elevation of the rifle can be registered, as well as the traverse. In the same manner as in the case of the traversing devices above described, the distance betweeen the trunnions d' and d^2 bears a definite relation to a determined unit of distance from the muzzle and the pitch of the screw d^4 is such that the movement of the hand wheel d^6 through a given unit angle produces an elevation or depression of the muzzle through a corresponding unit angle. The angle of movement of the hand wheel and nut is indicated by the graduated scale and the teeth of the ratchet d^8 are spaced in correspondence with the graduated scale, so that the pawl and ratchet constitute an annunciator to guide the rifleman or gun-pointer in elevating or depressing the rifle.

The cradle d supports in the bearings d^{10}, so that it shall be free for longitudinal movement therein but held from rotation, the recoil bar e, which receives, between the forward bearing d and an adjustable nut e', threaded on a cylindrical portion of the bar, a recoil spring e^2, the adjustment of the nut providing for regulation of the tension of the spring. The recoil bar also receives a cushion e^3 between the rear bearing d^{10} and the butt support or socket f which is secured to the bar.

The butt support f takes the place of the shoulder of the human frame. It is provided with a pad f' against which the butt of the rifle g is pressed at the time of firing and through which the recoil is transmitted to the recoil bar and is taken up by the recoil spring. The butt support or socket is provided with a strap f^2 adapted to encircle partially the stock of the rifle and having its ends secured to upper and lower adjusting bolts f^3 by means of which the stock of the rifle can be held firmly against the cushion f^4, the stock being capable of being rocked upon the cushion, by taking up more or less on one or the other of the bolts f^3 so that the rifle can be held firmly with the stock in a truly vertical position or, if it be desired to demonstrate the effect of holding the rifle with the stock canted in one direction or the other. The bolts f^3 are passed loosely through the side plate f^* of the butt support or socket f and are engaged by nuts f^5, resilient pads or members f^6 being interposed betweeen the nuts and sleeves f^7 which bear with a knife edge against the side plate so that, at the moment of recoil, the strap can yield rearwardly with the rifle butt. The side plate is slotted as at f^8 for the reception of the upper bolt f^3 so that the bolt can be pushed into place when the strap has been thrown across the butt, the side plate being also provided with a shoulder f^9 to limit the movement of the sleeve f^7. It will be observed that the left hand side of the stock is unobstructed, except for the relatively thin strap just mentioned and for another strap to be mentioned, so that the shooter can lay his cheek against the stock of the rifle as he would if he were holding the rifle in his own grasp.

For the purpose of holding the rifle firmly in position against the butt support there is provided a saddle h, preferably adapted to fit upon the small of the stock, to which is secured, at each side, one of the ends of a strap and cord h', the members of which are led over guide pulleys h^2, mounted on the butt support f, while the bight is engaged by a pulley h^3. The latter is mounted in a yoke h^4 which is carried by a threaded spindle h^5 engaged by a nut h^6 mounted in a bearing h^7, also carried by the butt support f. The nut is provided with a hand wheel h^8 and a spring h^9 is interposed between the hub of the hand wheel and the bearing so that the strap and cord h' is held always under tension and the rifle butt is held yieldingly against the support. The tension of the spring can be regulated by rotation of the nut.

The rifle is also held down by another strap i which is connected to a suitable spring tightening device mounted in a guideway formed on a block which is secured to the recoil bar. By such means the rifle is held down firmly but yieldingly. In the arrangement shown the strap i, the ends of which are secured to the saddle h, is looped about a plate i' which bears against a spiral spring i^2 and is guided freely on a stem i^3 which has fixed thereon a collar i^4 forming

the abutment for the spring i^2. The strap is slotted to straddle the stem i^3. Above the collar i^4 the stem is screw-threaded as at i^5 for engagement with the threaded opening of a spiral gear i^8 which is held from movement in an axial direction by a cap i^6 which is threaded into the end of a guide piece i^7 fixed on the recoil bar e. The screw threaded portion i^5 of the stem is also formed with a keyway for engagement by the cap i^6 or a key carried thereby so that the stem is held from rotation. The spiral gear i^8 is engaged by a corresponding spiral gear i^9 on a shaft i^{10} which is mounted in bearings on the guide piece i^7 and is provided with a hand wheel i^{11}. In this manner the strap i is held yieldingly and its tension can be regulated at will.

Also fixed on the recoil bar e, at its forward end, is a forward support k which takes the place of the left hand of the rifleman. It is formed with a fork k', having parallel sides which are spaced apart sufficiently to receive freely between them, so that it is movable in a vertical direction, the fore-end of the rifle. The rifle is resiliently supported rests upon a spring k^2 which is secured to the support k and is provided with an adjusting screw k^3. At its free end the spring k^2 receives a roller k^4 on which the rifle and below the free end of the spring is mounted an adjustable contact screw k^5 which is normally out of contact with the spring. The contact screw is included in circuit with an annunciator k^6 and battery k^7, which is grounded on some convenient part of the apparatus. If, by an improper trigger pull, the muzzle of the rifle is depressed, circuit will be closed through the annunciator by contact between the spring k^2 and the screw k^5 and the fact of the improper trigger pull will be thereby indicated.

It will be understood that the term "annunciator" is used herein in its broad sense, as a thing which announces or indicates the movement of the rifle under the influence of unsteadiness of the shooter or an improper trigger pull.

The rifle is supported in the fork k', at each side, by a suitably bent spring k^8, which may be adjusted by a corresponding screw k^9, to regulate the pressure against the rifle. In proximity to the spring k^8, at each side, is mounted a contact screw k^{10} which is connected in circuit with an annunciator k^{11} and battery k^{12}, which may be grounded upon some convenient part of the apparatus. Thus any deflection of the rifle to one side or the other, by reason of an improper trigger pull, will be indicated and brought to the attention of the shooter and the instructor. It will be observed that each spring k^8 is a long, flattened S-shape and by the use of two such springs, one at each side, the rifle is held as firmly as it could be held by the hand and with pressure which can be adjusted readily by the screws k^9, while yet the rifle can yield to one side or the other under the influence of an improper trigger pull.

In the use of the apparatus the rifle is placed in position, with its butt in the socket or support f and its fore-end between the springs k^8 and resting on the roller k^4 of the spring k^2. The straps of the saddle h are then adjusted so that the rifle is held firmly but resiliently in position. The breech being unobstructed, the rifle is loaded in the usual manner and is then aimed by manipulation of the hand wheels c^5 and d^6, the shooter laying his cheek against the left hand side of the rifle stock in the same manner as if he were holding the piece in his own grasp. The trigger is then squeezed by the shooter and the rifle is fired. When the hit is marked up the necessary corrections of range and elevations are made, either to correct error in sighting or to accommodate conditions, each unit of error in either lateral or vertical displacement of point of impact from center of target being corrected by a corresponding unit of change in the lateral or vertical pointing of the rifle as measured by graduated scales c^8 d^9. After each discharge, the recoil being taken up by the spring e^2, the rifle is returned to the precise position occupied previous to firing. The measured corrections being then made, the next shot should hit the mark desired. Any defects in trigger squeeze being indicated by the annunciators, whether the piece be fired or not, the shooter should, by practice, quickly overcome his errors in this regard. Errors in sighting by the rifleman become apparent at once to the instructor, who examines the sighting after it has been completed by the rifleman, and either before or after the piece has been discharged.

It will be understood that the apparatus is capable of use at different ranges and under service conditions. It will also be understood that various changes in details of construction and arrangement can be made to suit different requirements and that the invention, except as pointed out in the claims, is not restricted to the precise construction and arrangement shown and described herein.

I claim as my invention:

1. In an apparatus of the character described, the combination of a butt support, a fore-end support, the fore-end support, in which the rifle is movable in a vertical direction, including a spring upon which the rifle is yieldingly supported for movement downward in a vertical direction, and means in operative relation with the fore-end spring support to indicate a vertical movement of the fore-end of the rifle.

2. In an apparatus of the character described, the combination of a butt support, a fore-end support and resilient means to hold the rifle down, the fore-end support in which the rifle is movable in a vertical direction including a spring upon which the rifle is yieldingly supported for movement in a vertical direction.

3. In an apparatus of the character described, the combination of a butt support and a fore-end support, including a spring upon which the rifle is yieldingly supported and an annunciator actuated by movement of the spring.

4. In an apparatus of the character described, the combination of a butt support, a fore-end support, and resilient means to hold the rifle down the fore-end support including a spring upon which the rifle is yieldingly supported in a vertical direction, an electrical contact in operative relation with the spring, and an electrical circuit including the contact and an annunciator.

5. In an apparatus of the character described, the combination of a butt support and a fore-end support, the fore-end support including a spring upon which the rifle is yieldingly supported in a vertical direction, and means to adjust the spring.

6. In an apparatus of the character described, the combination of a butt support and a fore-end support, the fore-end support including a spring against which the rifle may rest laterally, and an annunciator in operative relation with the spring.

7. In an apparatus of the character described, the combination of a butt support and a fore-end support, the fore-end support including a spring against which the rifle may rest laterally, an electrical contact in operative relation with the spring and an electrical circuit including the contact and an annunciator.

8. In an apparatus of the character described, the combination of a movable recoil bar, means to support the same, a cushioned butt support carried by the recoil bar, and means to exert a rearward pull on the rifle to hold the rifle butt against the butt support.

9. In an apparatus of the character described, the combination of a movable recoil bar, means to support the same, a butt support carried by the recoil bar, and yielding means to hold the rifle yieldingly against the butt support.

10. In an apparatus of the character described, the combination of a movable recoil bar, means to support the same, a butt support carried by the recoil bar, a saddle to engage the rifle stock, a strap extended rearwardly from the saddle and means to tighten the strap to hold the rifle butt firmly against the butt support.

11. In an apparatus of the character described, the combination of a movable recoil bar, means to support the same, a butt support carried by the recoil bar, a saddle to engage the rifle stock, a strap extended rearwardly from the saddle, and yielding means to hold the rifle butt yieldingly against the butt support.

12. In an apparatus of the character described, the combination of a movable recoil bar, means to support the same, a butt support carried by the recoil bar, a saddle to engage the rifle stock, a strap extended rearwardly from the saddle, resilient means to hold the rifle butt resiliently against the butt support, and means to adjust the tension of said resilient holding means.

13. In an apparatus of the character described, the combination of a recoil bar, a butt support carried by the recoil bar, a fore-end support carried by the recoil bar, and means connected to the recoil bar and adapted to engage the rifle to hold the same downward resiliently against the fore-end support.

14. In an apparatus of the character described, the combination of a recoil bar, a butt support carried by the recoil bar, a fore-end support carried by the recoil bar, resilient means connected to the recoil bar and adapted to engage the rifle to hold the same downward resiliently toward the recoil bar, and means to adjust the tension of said resilient means.

15. In an apparatus of the character described, the combination of a recoil bar, a butt support carried by the recoil bar, a fore-end support carried by the recoil bar, a saddle to engage the rifle stock and connections between the saddle and the recoil bar to hold the rifle downward toward the recoil bar.

16. In an apparatus of the character described, the combination of a recoil bar, a butt support carried by the recoil bar, a fore-end support carried by the recoil bar, a saddle to engage the rifle stock and yielding connections between the saddle and the recoil bar to hold the rifle yieldingly downward toward the recoil bar.

17. In an apparatus of the character described, the combination of a recoil bar, a butt support carried by the recoil bar, a fore-end support carried by the recoil bar, a saddle to engage the rifle stock, resilient connections between the saddle and the recoil bar to hold the rifle stock yieldingly downward toward the recoil bar, and means to adjust the tension of said resilient means.

18. In an apparatus of the character described, the combination of a bar having a butt support and a fore-end support, a yoke, a cradle in which the bar is mounted for longitudinal movement, said cradle having

trunnions pivotally mounted in said yoke, and means to raise or lower the other end of the cradle.

19. In an apparatus of the character described, the combination of a recoil bar having a butt support and a fore-end support, a cradle in which the recoil bar is mounted for longitudinal movement, an adjustable stop mounted on the recoil bar, and a recoil spring interposed between the cradle and the stop.

20. In an apparatus of the character described, the combination of a bar having a butt support and a fore-end support, a cradle in which the bar is mounted, a fork having a pivotal bearing for one end of the cradle, a fork having a pivotal bearing for the other end of the cradle, and means to raise and lower the last named fork.

21. In an apparatus of the character described, the combination of a bar having a butt support and a fore-end support, a cradle in which the bar is mounted, a fork having a pivotal bearing for one end of the cradle, a fork having a pivotal bearing for the other end of the cradle, means to raise and lower the last named fork and means to indicate the extent of such raising or lowering.

22. In an apparatus of the character described, the combination of a bar having a butt support and a fore-end support, a cradle in which the bar is mounted for longitudinal movement, a fork in which the cradle has a pivotal support on a horizontal axis, and means to rotate the fork on a vertical axis.

23. In an apparatus of the character described, the combination of a bar having a butt support and a fore-end support, a cradle in which the bar is mounted for longitudinal movement, a fork in which the cradle has a pivotal support, the fork being rotatable on a vertical axis and having a horizontal arm and means to swing the arm in a horizontal plane.

24. In an apparatus of the character described, the combination of a bar having a butt support and a fore-end support, a cradle in which the bar is mounted, a fork in which the cradle has a pivotal support, the fork being rotatable on a vertical axis and having a horizontal arm, a second fork having a pivotal support for the other end of the cradle, and means carried by said arm for raising and lowering the second named fork.

25. In an apparatus of the character described, the combination of a longitudinally movable bar having a butt support and a fore-end support, means to support the bar with freedom to swing about a vertical axis, means to effect the horizontal traverse of the support, means to indicate the extent of the traverse, and an annunciator device in operative relation with said means.

26. In an apparatus of the character described, the combination of a butt support and a fore-end support, the fore-end support including a flattened S-shaped spring against which the rifle may rest laterally, and means to exert pressure against one member of the S-shaped spring whereby another member is pressed against the rifle.

27. In an apparatus of the character described, the combination of a support for the rifle capable of swinging about a vertical axis for traversing the rifle and having an extended arm, the length of the arm having a definite relation to a predetermined unit of range distance from the muzzle and an annunciating device in operative relation with said means to announce each unit of movement of said last named means.

28. In an apparatus of the character described, the combination of a rifle support pivoted at one end, and means applied to said support at the other end to raise and lower the same, said support having a length between the pivot axis and the application of the elevating means which bears a definite relation to a predetermined unit of length of the range distance from the muzzle, and an annunciating device in operative relation with said means to announce each unit of movement of said last named means.

29. In an apparatus of the character described, the combination of a butt support having a side plate, a strap, bolts mounted in the side plate and having the ends of the strap engaged therewith, and means to adjust the bolts.

30. In an apparatus of the character described, the combination of a butt support having a side plate, a strap, bolts mounted in the side plate and having the ends of the strap engaged therewith, means to adjust the bolts, and resilient members interposed between the side plate and said means.

31. In an apparatus of the character described, the combination of a butt support having a side plate, a strap, bolts mounted in the side plate and having the ends of the strap engaged therewith, means to adjust the bolts, and knife edged sleeves interposed between the side plate and said means and bearing against the former.

32. In an apparatus of the character described, the combination of a supporting bar for the rifle, a strap for engagement with the rifle, a plate engaged with the strap, a block on the bar, a threaded stem mounted in the block and carrying the plate, and a nut mounted in the block and engaged with the threaded stem.

33. In an apparatus of the character described, the combination of a butt support having a side plate, a strap, bolts mounted

in the side plate and having the ends of the strap engaged therewith, means to adjust the bolts, and a spring interposed between the nut and the plate.

34. In an apparatus of the character described, the combination of a longitudinally movable bar having a butt support and a fore-end support, means to support the bar with freedom to swing about a vertical axis, means to effect the horizontal traverse of the support, means to indicate the extent of the traverse, means to support the bar with freedom to swing about a horizontal axis, means to effect the movement of the bar about the horizontal axis, and means to indicate the extent of such movement.

This specification signed this 22 day of July A. D. 1921.

JAMES G. PHELPS STOKES.