

Dec. 30, 1941.

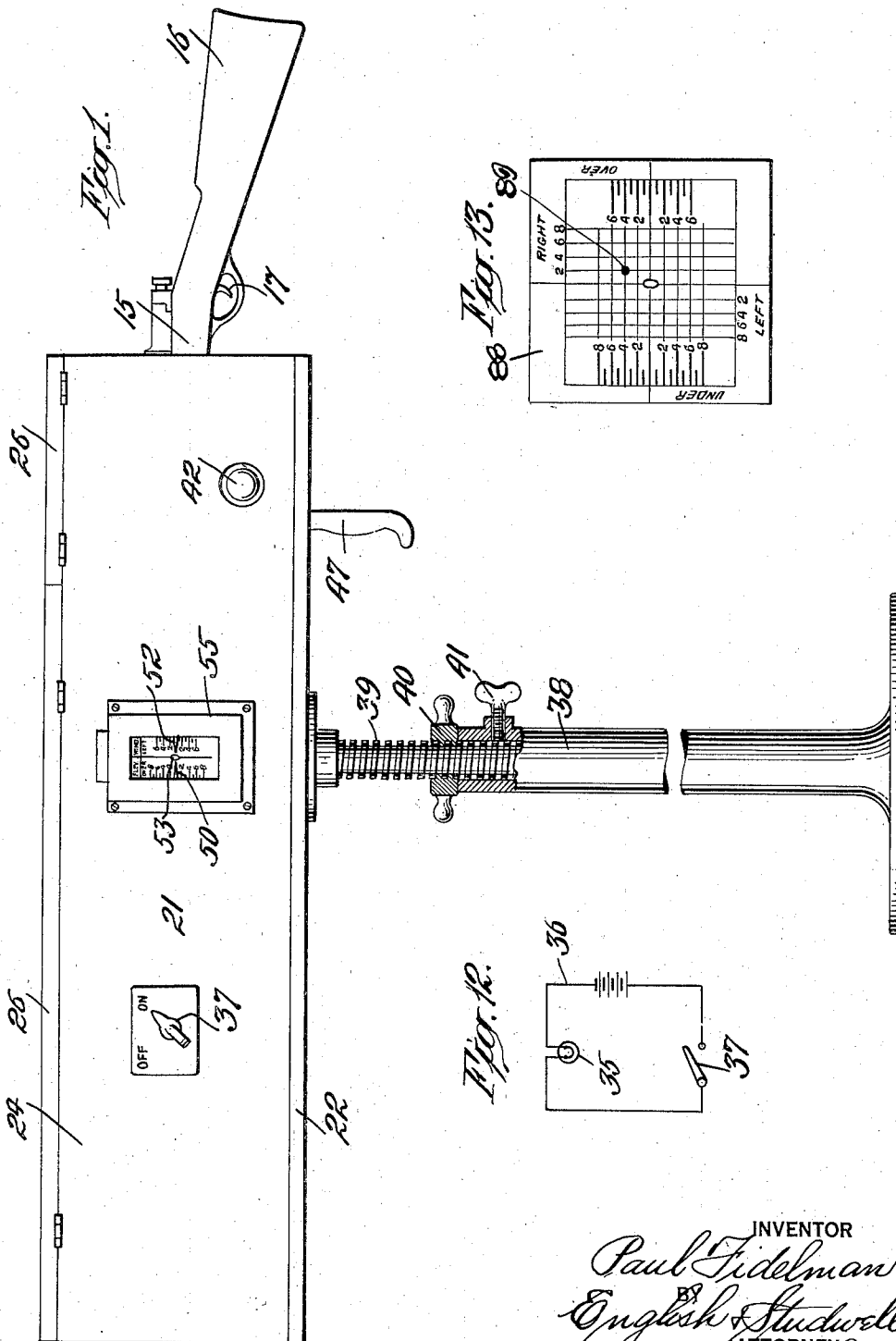
P. FIDELMAN

2,268,113

APPARATUS FOR INDICATING ALIGNMENT

Filed Aug. 3, 1940

3 Sheets-Sheet 1



INVENTOR
Paul Fidelman
English & Studwell
ATTORNEYS

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P. FIDELMAN

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Paul Fidelman
BY
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Fig. 6.

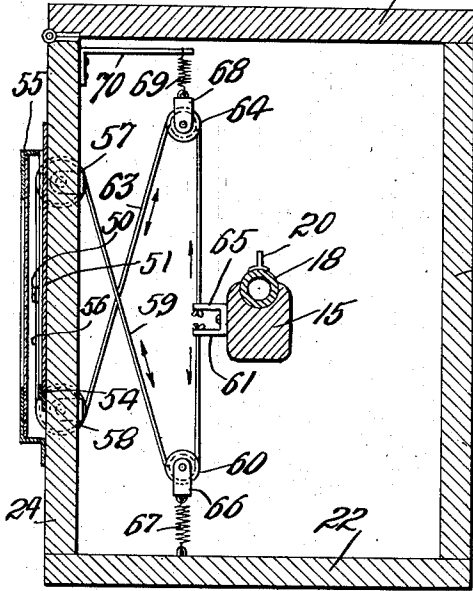


Fig. 7.

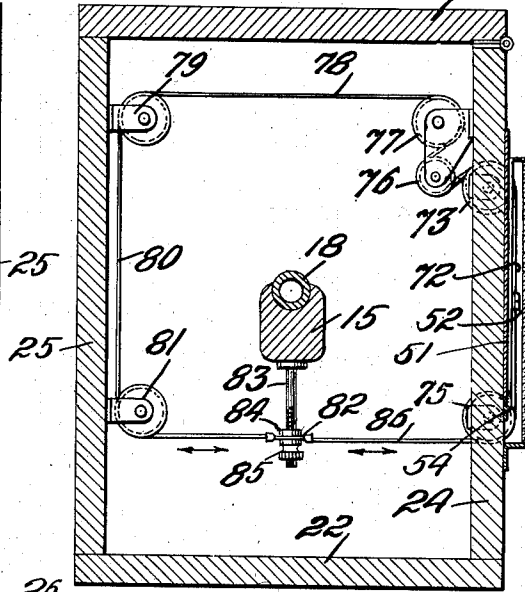


Fig. 9.

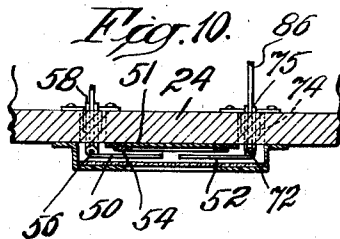
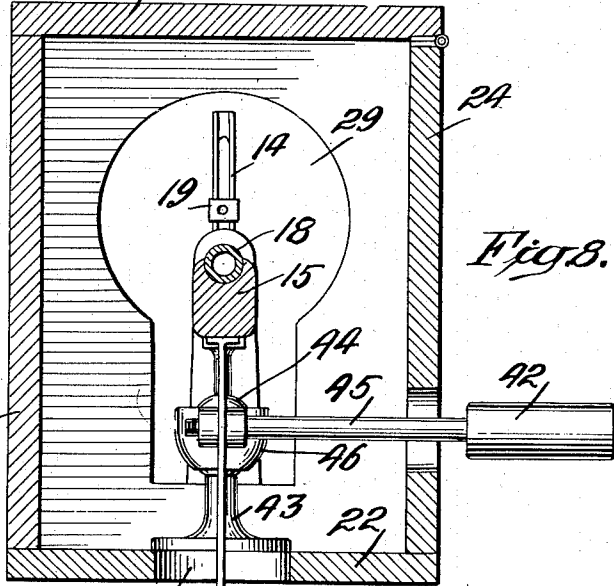
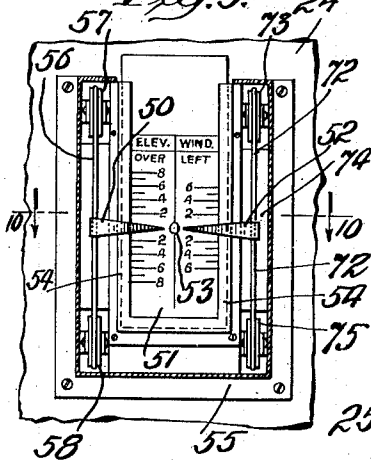
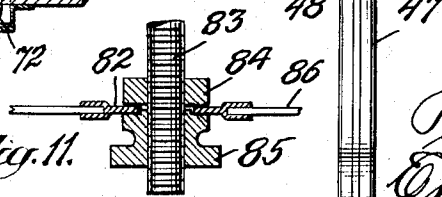


Fig. 11.



INVENTOR
Paul Fidelman
BY English & Studwell
ATTORNEYS

UNITED STATES PATENT OFFICE

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APPARATUS FOR INDICATING ALIGNMENT

Paul Fidelman, New York, N. Y.

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9 Claims. (Cl. 35—25)

The invention relates to an improvement in apparatus for indicating the alignment of a plurality of objects, such as the alignment of a straight, elongated element with a spot or small disk. More particularly, the invention is an improvement in apparatus for indicating whether a pointed rifle or other firearm is accurately in alignment with a bull's eye, and for indicating how much out of alignment the rifle is with the bull's eye when the person aiming the rifle or other firearm decides he has accurately aligned the firearm with the bull's eye. In its general application the apparatus of the invention is employed and is particularly adapted for use in instructing beginners in shooting with a rifle or other firearm to align the rifle accurately with the object to be hit, typically, the bull's eye of a target. It is assumed that the rifle or other firearm is of regulation size and is equipped with the usual sights or other aligning devices which the shooter or aimer of the rifle aligns with the bull's eye. One object of the invention is to provide means connected with the rifle or other firearm for indicating to an instructor how nearly the rifle of the subject is in alignment with the bull's eye, so that the instructor may tell the subject in what direction to point or move the firing end of the rifle to align it accurately with the bull's eye. Another object of the invention is to enable the aimer of the rifle to lock it in aimed position and then ascertain for himself from the alignment indicating means whether the aim was accurate, and if not, how far out of alignment the aim was, and in what direction the rifle should be moved to make the aim accurate, that is, align the rifle barrel with the objective. A further object of the invention is to provide means whereby the shooting at targets at various distances may be simulated within a short space. Other objects of the invention will appear as the description of the improved alignment apparatus proceeds.

To the accomplishment of these objects, the improved alignment apparatus of the present invention provides direction indicating means for attachment to a straight, elongated implement, such as the barrel of a rifle or other firearm, which will move correspondingly to the movement of the rifle barrel to indicate how nearly the rifle barrel is in alignment with the object to be shot at, as the bull's eye of the target. The direction indicating means, which may conveniently be indicators or pointers are moved over graduations on a chart or scale. Since it is only necessary to move the firing end of a rifle barrel vertically and horizontally, or a combination of the two movements, in order to align the rifle barrel with the objective, only two pointers are required. One pointer indicates by its position on the scale the elevation of the rifle barrel,

that is, whether it is pointed below or above the objective, and the other needle indicates the windage of the rifle barrel, that is, whether it is pointed to the left or to the right of the objective. The elevation and windage scales may be on separate charts arranged suitably according to the manner of attaching the elevation and windage indicating pointers to the rifle barrel. But it is preferred for convenience to show both scales on one chart or sheet vertically arranged, over which the two pointers travel vertically.

When the subject under instruction in the art of rifle shooting determines to his own satisfaction that the sights of the rifle are properly aligned with the bull's eye or other objective and he communicates that conclusion to the instructor, the latter, by looking at the chart can tell from the position of the pointers on the graduations of the scales whether the firing end of the rifle is too high or too low and whether it is too much to the left or too much to the right and how much the rifle is out of alignment. The instructor can then inform the subject how much to move the rifle barrel to bring it into accurate alignment with the bull's eye, and means are provided for making a record of the aim. The same sequence can be followed by the operator himself by first locking the rifle in aimed position, noting the positions of the pointers, and recording the aim.

The improved alignment indicating apparatus together with the firearm or other straight elongated aimable implement and the objective, the target, may conveniently be mounted in and on a portable elongated box-like receptacle mountable on any portable or fixed adjustable (vertical) standard or support.

The accompanying drawings illustrate the preferred form of the invention. Fig. 1 is a side elevation of the box-like receptacle carrying the improved alignment indicating apparatus, the standard being shown partly in section, and the butt end of the rifle being shown projecting from the box; Fig. 2 is a longitudinal vertical section through the upper part of the apparatus shown in Fig. 1, and disclosing the rifle in side elevation; Fig. 3 is the section taken on the line 3—3 of Fig. 2; Fig. 4 is a longitudinal section, on an enlarged scale, taken on the line 4—4 of Fig. 2, and looking in the direction of the arrows; Fig. 5 is an enlarged vertical section, partly in side elevation, taken on the line 5—5 of Fig. 2; Figs. 6 and 7 are transverse sections taken on the lines 6—6 and 7—7, respectively, of Fig. 2, and looking in the direction of the arrows; Fig. 8 is a sectional elevation taken on the line 8—8 of Fig. 2; Fig. 9 is a front elevation of the elevation and windage chart and showing the connection of the indicators or pointers with the cords connected with the rifle barrel; Fig. 10 is a longi-

tudinal section taken on the line 10—10 of Fig. 9; Fig. 11 is a vertical sectional detail showing the adjustable connection between the rifle barrel and the cords connected with the pointer for indicating windage; Fig. 12 is a diagrammatic view of the electric light circuit; Fig. 13 is a top plan view of a chart for the use of the instructor in recording any deviation of the alignment of the rifle with the bull's eye as indicated by the position of the pointers for registering elevation and windage.

Although the alignment indicating apparatus of the present invention may be employed for many purposes where it is desired to align a straight, elongated element with a point or spot, the invention will be described as applied to the alignment of a rifle of usual construction with the center or bull's eye of a target, since this use of the apparatus is typical of the uses to which the apparatus can be put. The rifle comprises generally the barrel supporting part 15 of the stock and the butt 16, a trigger 17, and the barrel 18 supported in the stock and provided with the usual rear or peep-hole sight 19 and the front or muzzle sight 20. The rear sight 19 is adjustable vertically on the slotted guide 14. The barrel portion 18 of the rifle and its supporting stock 15 are enclosed in an elongated box-like structure, generally indicated at 21 in Fig. 1. The box 21 is rectangular in length and square in cross section and comprises a bottom 22, a front wall 24, a rear wall 25, a two-section, hinged top or cover 26, a solid front end 27, and an apertured rear end 28 through which the butt portion of the rifle projects. The opening 29 in the rear end 28 of the box 21 is of such size that the butt end of the rifle may be moved freely vertically and sidewise so that the operator or learner may point the barrel of the rifle at any point on the target 31 mounted on the inner face of the front end 27 of the elongated box. The target may consist of a card removably held in the vertical guides 32 secured to the inner face of the wall 27. To simulate different distances on the rifle range, cards with different sizes of bull's eye 33 will be used. When the alignment indicating apparatus is in use the target 31 is illuminated by means of a bulb 35 located in a manually-controlled circuit 36 (indicated diagrammatically in Fig. 12), the switch 37 of which is shown in Fig. 1 located on the outer surface of the front wall 24 of the box.

The elongated box-like structure 21 with its contents may be mounted on a standard or support 38. Since the alignment indicating apparatus will be used by persons of different height, the rifle mounted in the box 21 can be adjusted to the height of the shoulder of the user by means of a screw 39 projecting downwardly from the under surface of the bottom 22 of the box 21 and received loosely within the standard 38. The adjustment of the height of the box is effected by means of the hand operated nut 40 threaded on the screw 39 and bearing against the top of the standard. The apparatus as a whole is secured in its adjusted vertical position by means of the wing screw 41 which is threaded into the upper end of the standard 38 and takes against the screw 39.

The rifle or other firearm or elongated instrument is supported swivelly at substantially its center of gravity by means of a ball and socket construction, the socket part 43 of which is mounted on the upper surface of one end of the

bottom 22 of the box 21 and the ball portion 44 of which depends from the under surface of the stock of the rifle at its center of gravity. A lock rod 45 passing through a hole in the front wall 24 of the box 21 and connected at its inner end with the two-armed locking device 46 on the ball and socket joint secures the rifle in any aligned position when that is considered desirable. The outer end of the lock rod is provided with the handle 42. Normally, the lock rod 45 will be turned to such point that the rifle may be moved freely in aiming it at the target 31. To assist the user in handling and aiming the rifle, a handle 47 is provided projecting downwardly from the under surface of the rifle stock at a point just forward of its center of gravity or point of balance. The handle 47 extends through an opening in the bottom wall 22 of the box. When the apparatus is not in use, the muzzle end of the rifle barrel may be depressed and held firmly in a spring lock 48.

To indicate whether the rifle barrel is accurately in alignment with the bull's eye 33 as determined by the user sighting at the bull's eye through the peep-hole sight 19 and the front sight 20 and moving the rifle accordingly, the apparatus of the present invention provides two separately operated pointers, located on the outside surface of the front wall 24 of the box 21. The pointer 50 indicates by its position on the left hand scale of the chart 51 whether the rifle barrel is in vertical alignment with the bull's eye or whether it is above or below the bull's eye; and the pointer 52 by its position on the right hand scale of the chart 51 indicates whether the rifle barrel is in horizontal alignment with the bull's eye or is to the right or to the left of it. When both pointers 50 and 52 are opposite the central zero mark 53 of the chart 51, that indicates that the rifle barrel is in accurate alignment with the bull's eye, both as to elevation and as to windage, these parts, it being understood, having been previously calibrated with respect to the sights 19 and 20 and the target. The chart 51 is removably mounted in the vertical guides 54. The graduations on the chart show the amount of elevation or windage the rifle barrel has with respect to the markings of the target 31 and are calibrated to the particular target in use. In this connection it will be understood that to simulate shooting on a range of 200 yards length, or 400 or 600 yards, targets of different sized bull's eyes and circles are used, and that each target has its corresponding elevation and windage chart.

The pointer 50 which serves to indicate the elevation of the muzzle of the rifle with respect to the bull's eye 33 is secured to a vertically-arranged cord 56 which passes over an upper pulley 57 and a lower pulley 58 located in a vertical slot in the wall 24 of the box 21 and journaled in the wall 24. From the upper pulley 57 the cord passes as the section 59 around a lower pulley 60 to a bracket 61 secured to one side of the barrel supporting portion 15 of the rifle. From the pulley 58 the section 63 of the cord passes over the upper pulley 64 down to the upper arm 65 of the bracket 61. The pulley 60 is mounted in a journal block 66 resiliently attached to the bottom 22 of the box 21 by means of the contraction spring 67. The journal 68, in which the pulley 64 is mounted is resiliently pulled upwardly by means of the contraction spring 69 attached to the outer end of the bracket 70 secured to the upper end of the inner surface of the wall 24 of

the box 21. By means of this arrangement the pointer 50 instantly responds to the vertical positions of the barrel 18 of the rifle and yet does not change its indicating position, irrespective of the horizontal positions of the rifle.

The pointer 52 which by its vertical positions on the right hand scale of the chart 51 indicates whether the rifle barrel is in alinement horizontally with the bull's eye of the target, is secured to a vertical cord 72, the upper portion of which passes over a pulley 73 mounted in the sides of a vertical slot 74 cut in the wall 24 of the box 21 and the lower section of which passes over the pulley 75 mounted in the sides of the slot 74. From the pulley 73 the cord 72 passes under the idler pulley 76 supported from the upper end of the inner surface of the wall 24 and thence over the pulley 77. From the pulley 77 the cord continues as the section 78 to the pulley 79 supported from upper end of the inner surface of the wall 25 of the box 21 and thence as the section 80 it passes under the pulley 81 to the perforated plate 82 which loosely embraces the lower end of the threaded rod 83 extending downwardly from the rifle stock 15. The plate 82 is held in adjusted vertical position on the rod 83 between the check nuts 84. From the plate 82 the cord extends as the section 86 to the pulley 75 and thence to the pointer 52.

The alignment indicating apparatus is used in the following manner, assuming it to be used for instruction in rifle shooting: The pupil places the rifle butt extending from the box 21 against the shoulder of one arm, grasps with the hand of the other arm the handle 41, and places the index finger of the first arm against the trigger 17. The pupil then proceeds to sight the rifle in the normal manner by looking through the peep-hole sight 19 and aligning the muzzle sight 20 with the bull's eye 33, which has been illuminated by the bulb 35. The movements of the rifle as the pupil attempts to align it with the bull's eye are followed by the instructor who watches the movements of the elevation and windage pointers 50 and 52. When the pupil thinks he has properly aligned the rifle with the bull's eye, he lets the instructor know. If both pointers are directed to the zero mark 53, that indicates that the pupil has accurately aimed the rifle. Assuming, however, that the elevation pointer 50 is opposite the number 4 above the zero point on the left hand or elevation scale of the chart 51 and that the windage pointer 52 is opposite the number 2 above the zero point on the right hand scale of the chart, the instructor will tell the pupil to lower the muzzle of the rifle somewhat and to move the muzzle slightly to the left. By following the instructor's directions, the pupil finally brings the rifle barrel into alignment with the bull's eye.

Where it is desired to make a record of the pupil's performance when he has decided he has aimed the rifle so as to score a bull's eye, the instructor secures the rifle in aimed position by manipulating the handle 42 to tighten the clamp 46 on the ball and socket joint 44 and 43. He then makes a record of the aim on the graphic recording chart 88 shown in Fig. 13. Assuming, as noted above, that the elevation pointer 50 is opposite the upper number 4 on the left hand scale of the chart 51 and that the pointer 52 is opposite the lower number 2 on the right hand scale of the chart, the aim will be recorded at the point 89 on the recording chart 88, indicating that if a bullet had been fired from the rifle

it would hit the target 31 at about the point 90.

Having thus described the invention what I claim as new is:

1. An apparatus for indicating the degree of alignment of a straight, elongated, movable implement with an objective, comprising a movable elevation pointer, connections between the elevation pointer and the implement whereby the elevation pointer is moved correspondingly to the vertical movements of the implement, a movable second pointer, connections between the second pointer and the implement whereby the second pointer is moved correspondingly to the horizontal movements of the implement, a graduated scale over which the pointers are arranged to move, said scale having a zero point, all of said parts being so arranged and calibrated that when the two pointers are at the zero point the elongated implement is in alignment with the objective.

2. An apparatus for indicating the degree of alignment of a straight, elongated, movable implement with an objective, comprising a vertically-arranged chart having a scale thereon with a zero point, an elevation pointer arranged to move vertically in front of the chart, connections between the elevation pointer and the implement whereby the elevation pointer is moved over the chart correspondingly to the vertical movements of the implement, a second pointer arranged to move vertically in front of the chart, connections between the second pointer and the implement whereby the second pointer is moved over the chart correspondingly to the horizontal movements of the implement, all of said parts being so arranged and calibrated that when the two pointers are at the zero point on the chart the implement is in alignment with the objective.

3. An apparatus for indicating the degree of alignment of a straight, elongated, movable implement with an objective, comprising a vertically-arranged chart having a scale thereon with a zero point, an elevation pointer arranged to move vertically in front of the chart, cords connecting the pointer with the implement, a plurality of pulleys over which the cords pass from the pointer to the implement whereby the pointer is moved over the chart correspondingly to the vertical movements of the implement, a second pointer arranged to move vertically in front of the chart, cords connecting the second pointer with the implement, a plurality of pulleys over which the cords from the second pointer to the implement pass whereby the second pointer is moved vertically over the chart correspondingly to the horizontal movements of the implement, all of said parts being so arranged and calibrated that when the two pointers are at the zero point on the chart the implement is in alignment with the objective.

4. An apparatus for indicating the degree of alignment of a straight, elongated, movable implement with an objective, comprising a vertically-arranged chart having a scale thereon with a zero point, an elevation pointer arranged to move vertically in front of the chart, a cord connecting the upper edge of the pointer with the implement, an upper pulley over which the cord passes, a second cord connecting the lower edge of the pointer with the implement, a lower pulley over which the second cord passes, and a second upper pulley and a second lower pulley yieldingly mounted over which the first cord and the second cord pass, respectively, whereby when the implement moves vertically the elevation pointer

moves vertically correspondingly, a second pointer arranged to move vertically in front of the chart, an endless cord connecting the second pointer with the implement, pulleys over which the endless cord passes whereby the implement is moved horizontally the second pointer is moved vertically, all of said parts being so arranged and calibrated that when the two pointers are at the zero point on the chart the implement is in alignment with the objective.

5. An apparatus for indicating the degree of alignment of a rifle barrel with the bull's-eye of a target, means for swivelly supporting the rifle, means for vertically supporting the target at a predetermined distance in front of the muzzle of the rifle, means for vertically supporting a chart at a predetermined distance from the rifle, an elevation pointer arranged to move vertically in front of the chart, connections between the elevation pointer and the rifle whereby the elevation pointer is moved vertically over the chart correspondingly to the vertical movements of the rifle, a windage pointer arranged to move vertically in front of the chart, connections between the windage pointer and the rifle whereby the windage pointer is moved vertically over the chart correspondingly to the horizontal movements of the rifle, all of said parts being so arranged and calibrated that when the two pointers are at the zero point on the chart the implement is in alignment with the objective.

6. An apparatus for indicating the degree of alignment of a rifle barrel with the bull's-eye of a target, comprising an elongated rectangular box closed on its four sides and on one end, the other end of the box having an opening, means for swivelly supporting the rifle longitudinally in the box with its muzzle pointing at the closed end of the box and its butt end projecting through the open end of the box, the target being removably supported on the inner surface of the closed end of the box, means for illuminating the target, a graduated chart having a zero point mounted on the outer surface of one wall of the box parallelly with the longitudinal axis of the rifle, an elevation pointer arranged to move vertically in front of the chart, connections between the elevation pointer of the rifle whereby the elevation pointer is moved vertically correspondingly to the vertical movements of the rifle, a windage pointer arranged to move vertically in front of the chart, connections between the windage pointer and the rifle whereby the windage pointer is moved vertically correspondingly to the horizontal movements of the rifle, all of said parts being so arranged and calibrated that when the two pointers are at the zero point on the chart the rifle is in alignment with the bull's-eye.

7. An apparatus for indicating the degree of alignment of a rifle barrel with the bull's-eye of a target, comprising an elongated rectangular box closed on its four sides and on one end, the other end of the box having an opening, means for swivelly supporting the rifle longitudinally in the box with its muzzle pointing at the closed end of the box and its butt end projecting through the open end of the box, the target being removably supported on the inner surface of the closed end of the box, means for illuminating the target, a graduated chart having a zero point mounted on the outer surface of one wall of the box parallelly with the longitudinal axis of the rifle, an elevation pointer arranged to move vertically in front of the chart, connections between the elevation pointer of the rifle whereby the

elevation pointer is moved vertically correspondingly to the vertical movements of the rifle, a windage pointer arranged to move vertically in front of the chart, connections between the windage pointer and the rifle whereby the windage pointer is moved vertically correspondingly to the horizontal movements of the rifle, all of said parts being so arranged and calibrated that when the two pointers are at the zero point on the chart the rifle is in alignment with the bull's-eye, and means for locking the rifle in aimed position.

8. An apparatus for indicating the degree of alignment of a rifle barrel with the bull's-eye of a target, comprising an elongated rectangular box closed on its four sides and on one end, the other end of the box having an opening, means for swivelly supporting the rifle longitudinally in the box with its muzzle pointing at the closed end of the box and its butt end projecting through the open end of the box, the target being removably supported on the inner surface of the closed end of the box, means for illuminating the target, a graduated chart having a zero point mounted on the outer surface of one wall of the box parallelly with the longitudinal axis of the rifle, an elevation pointer arranged to move vertically in front of the chart, connections between the elevation pointer of the rifle whereby the elevation pointer is moved vertically correspondingly to the vertical movements of the rifle, a windage pointer arranged to move vertically in front of the chart, connections between the windage pointer and the rifle whereby the windage pointer is moved vertically correspondingly to the horizontal movements of the rifle, all of said parts being so arranged and calibrated that when the two pointers are at the zero point on the chart the rifle is in alignment with the bull's-eye, and means for adjusting the apparatus vertically and locking the apparatus in vertical adjusted position.

9. An apparatus for indicating the degree of alignment of a rifle barrel with the bull's-eye of a target, comprising an elongated rectangular box closed on its four sides and on one end, the other end of the box having an opening there-through, means for swivelly supporting the rifle longitudinally in the box with its muzzle pointing at the closed end of the box and its butt end projecting through the open end of the box, the target being removably mounted on the inner surface of the closed end of the box, means for illuminating the target, a graduated chart having a zero point mounted on the outer surface of one wall of the box parallelly with the longitudinal axis of the rifle, an elevation pointer arranged to move vertically in front of the chart, connections between the elevation pointer and one side of the rifle including cords and pulleys over which the cords pass arranged so that the pointer moves vertically correspondingly to the vertical movements of the rifle, a windage pointer arranged to move vertically in front of the chart, connections between the windage pointer and the lower side of the barrel of the rifle including a cord and pulleys over which the cord passes arranged so that the windage pointer is moved vertically correspondingly to the horizontal movements of the rifle, all of said parts being so arranged and calibrated that when the two pointers are at the zero point on the chart the rifle barrel is in alignment with the bull's-eye of the target.

PAUL FIDELMAN.