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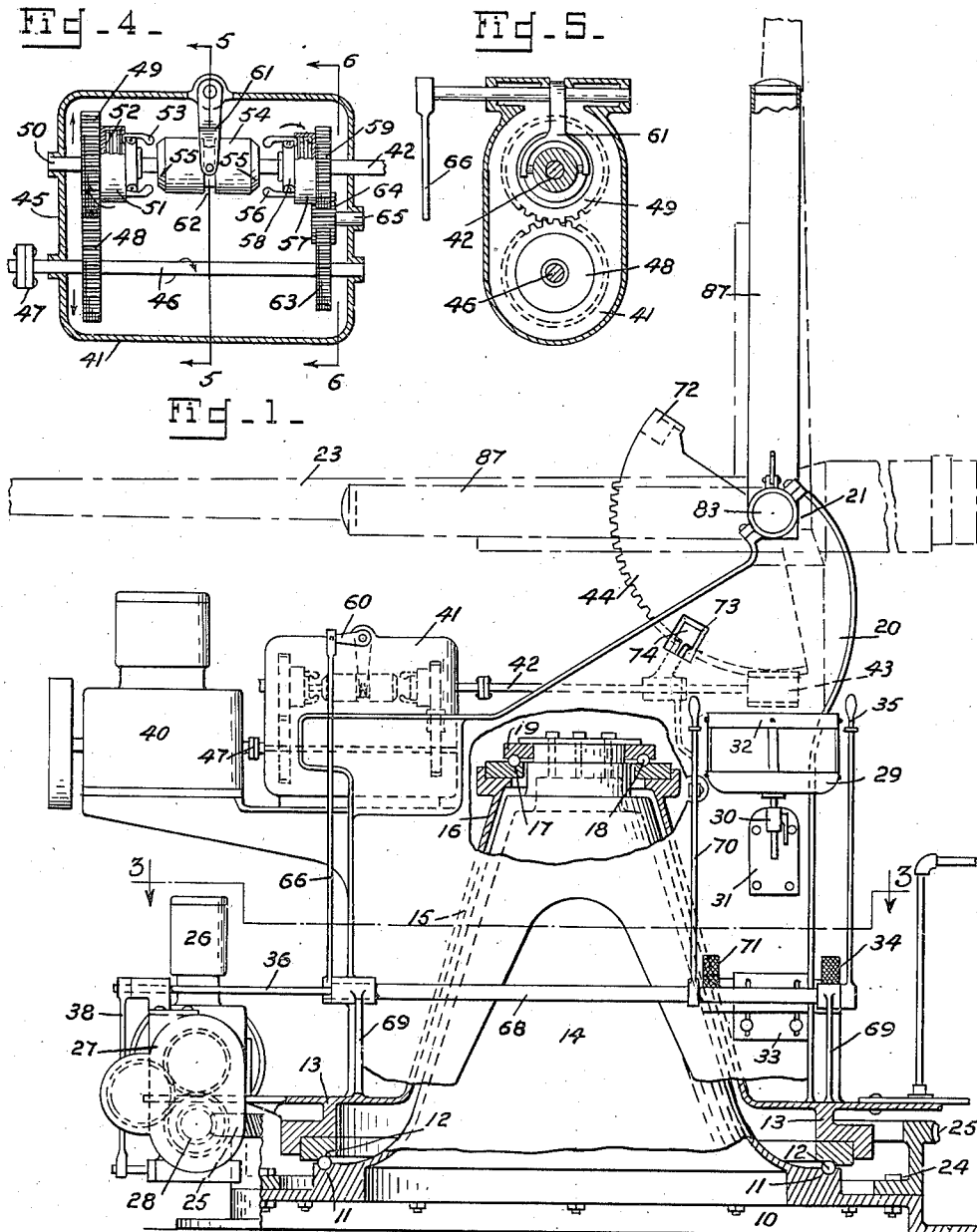
C. H. KASCH

2,392,851

GUN MOUNT

Filed May 27, 1942

3 Sheets-Sheet 1



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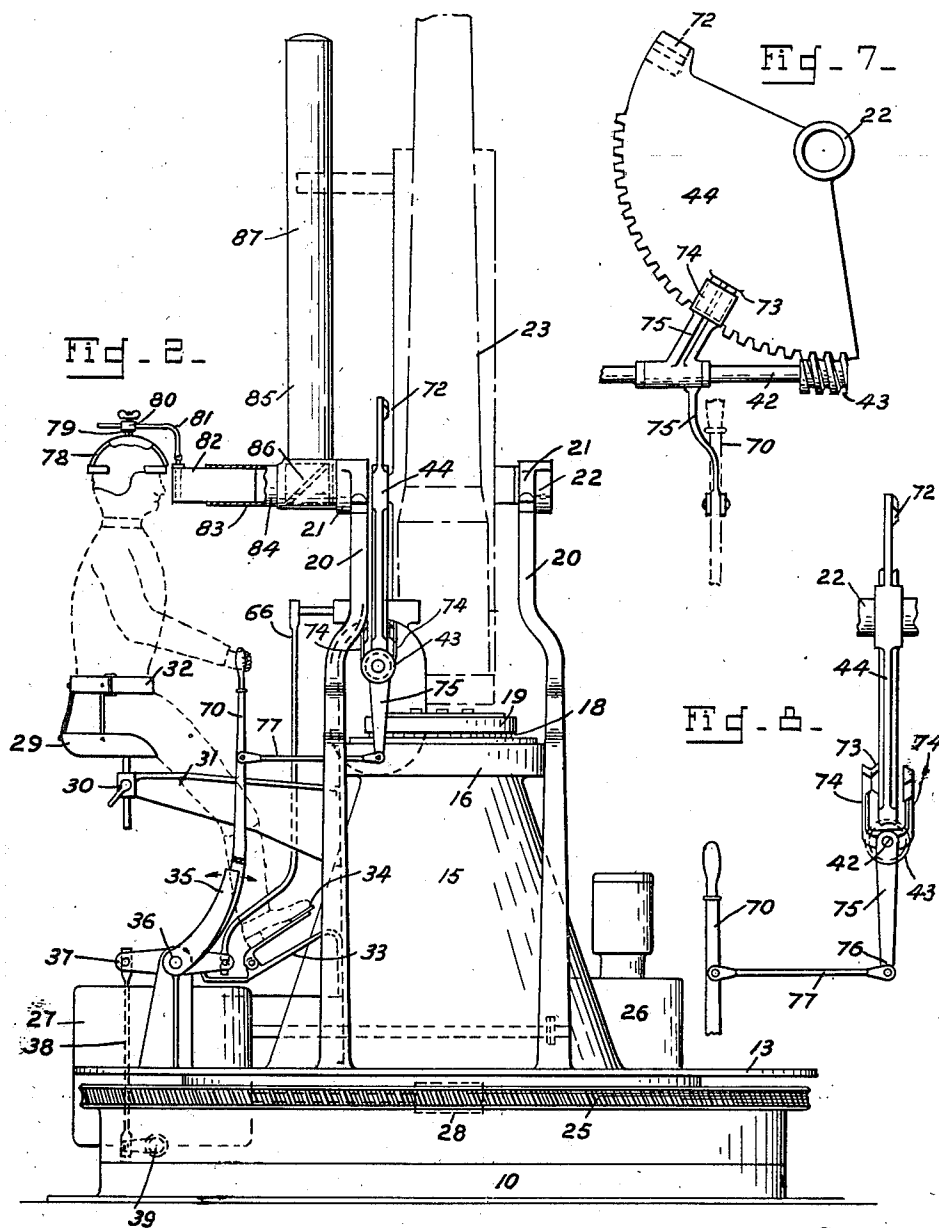
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Fig. 3.

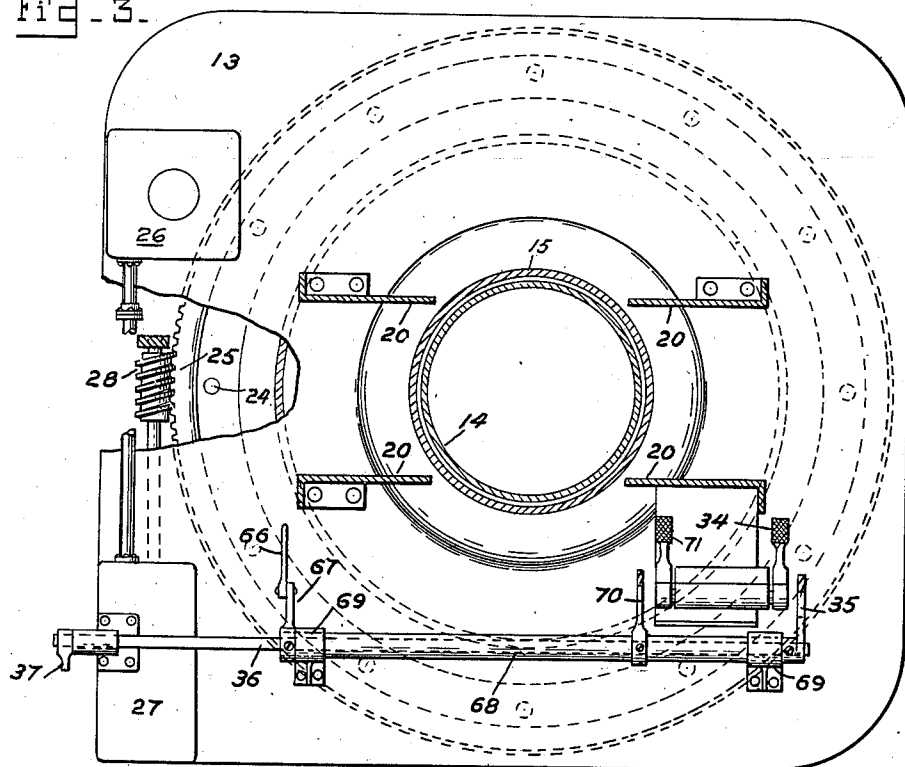


Fig. 4.

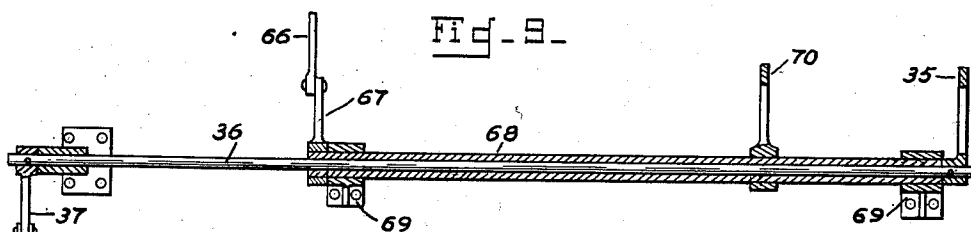
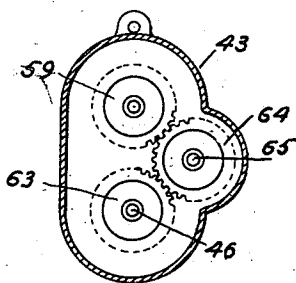


Fig. 5.



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UNITED STATES PATENT OFFICE

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GUN MOUNT

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3 Claims. (Cl. 89—41)(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.

This invention pertains to gun mounts and more particularly to an anti-aircraft gun mount.

To facilitate tracking a fast moving target, it is highly desirable to provide an anti-aircraft gun with a mount which enables the gun to be elevated and traversed quickly and accurately. Furthermore it is sometimes necessary to maneuver the gun slowly and with precision. Where power driven means are employed to move the gun and mount, this movement is best controlled and the weapon utilized to best advantage when it is aimed and fired by a single operator. A simple control arrangement is most desirable where one operator is manning the gun since it promotes his mental and physical coordination thereby increasing the speed of operation of the weapon and improving the accuracy of its fire. From an economic and practical standpoint it is expedient to employ conventional power units and control devices in conjunction with the gun mount.

It is therefore an object of this invention to provide a power-driven anti-aircraft gun mount which is capable of fast or slow operation under the accurate control of a single operator.

Another object of the invention is to provide a simple power-control arrangement which can be quickly mastered by a gun operator.

A further object of the invention is to provide a manually controlled power-driven gun mount with automatic power-stop control features.

An additional object of the invention is to provide a gun mount organization which includes conventional power and control units.

In accordance with a preferred embodiment of the invention, the mount comprises a base to which a carriage is rotatably secured. A conventional internal combustion engine is secured to the carriage and rotates it about the base. The gun is mounted on suitable trunnions on the carriage and its movement in elevation and depression is accomplished by a second internal combustion engine which is secured to the carriage. A standard transmission unit interconnects this engine with suitable gears for tilting the gun. A similar unit is employed with the carriage rotating engine and the gearing which moves the carriage about its vertical axis. The gun operator is provided with a driver's seat similar to that in an automobile. A separate foot accelerator controls the speed of each driving

motor and a separate hand lever can be rocked about either side of a neutral point to control each of the transmissions and hence the direction of rotation of the carriage and also the elevation or depression of the gun. These treadle accelerators and hand levers are positioned with relation to the seat to give the operator full and complete control of the gun mount, and their operation is so simple that they can be mastered in a short space of time and with little difficulty. A periscopic sight is coupled to the gun for aiming it and is equipped with an adjustable telescope which has a special harness or head gear conditioned to encircle the operator's head whereby he can bring the telescope into focus by a simple movement of his head. Thus the control of the gun is within the entire province of one operator, particularly where the functioning of the gun is automatic. Since a 90° elevation of the gun in conjunction with a mount having a 360° horizontal traverse virtually includes a complete field of anti-aircraft fire, it has been found advantageous to stop the gun when the barrel reached the extreme vertical and the extreme horizontal positions. Automatic means are provided for accomplishing this, thus preventing the gun barrel from being rotated below the horizontal and striking portions of the mount whereby the barrel and mount would be damaged. This enables the operator to concentrate fully on hitting his target and inasmuch as the manipulation of the controls is simple and non-confusing it leads to dextrous operation.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from a description of a preferred embodiment as shown in the accompanying drawings in which:

Fig. 1 is a view in side elevation of the gun mount with parts thereof in section,

Fig. 2 is an elevational view at right angles to the representation of Fig. 1,

Fig. 3 is a sectional view on the line 3—3 of Fig. 1, a motor drive being omitted,

Fig. 4 is an enlarged side elevational view of a conventional transmission unit, the housing thereof and portions of the unit being shown in section,

Figs. 5 and 6 are vertical sectional views on the lines 5—5 and 6—6, respectively, of Fig. 4,

Fig. 7 is an enlarged side elevational view of the automatic gun elevating and depressing stop control mechanism,

Fig. 8 is an end view thereof, and

Fig. 9 is an enlarged view, partly in section, of a control shaft detail.

Referring to Fig. 1, a base 10 is provided with an annular bearing race 11 which carries suitable anti-friction bearings 12 and rotatably supports a gun carriage or turntable 13. The base has a central frusto-conical arrangement 14 which mates with a complementary housing 15 on the carriage. The upper portion 16 of this housing has an annular bearing race 17 which retains suitable anti-friction rollers 18 which support a grooved plate 19 that is bolted to the top of the central frusto-conical arrangement 14 of the base 10. The aforementioned bearing organizations not only rotatably mount the carriage on the base but also serve to hold those members together in positive engagement. Positioned at one side of the carriage 13 and integral therewith are a pair of spaced uprights 20 (Fig. 2) which at their upper ends 21 journal the trunnions 22 of a suitable anti-aircraft gun 23 (shown in phantom).

The base 10 has secured thereto by fasteners 24 a ring gear 25. Mounted on the carriage 13 is a suitable motor such as an internal combustion engine 26 which is coupled in a conventional manner to a transmission 27. The output end of the transmission carries a worm gear 28 (Figs. 1 and 3) which engages the fixed ring gear 25 of the base thereby serving as the means for rotating the carriage about the base. The transmission is of conventional construction and includes a clutch and reversing gear which will be described in more detail subsequently. An operator's seat 29 with an adjustable height control 30 is connected to one of the uprights 20 by a suitable horizontal bracket 31. A strap 32 may be provided for embracing the operator's waist to hold him in one position on the seat. Pivoted to a sloping member 33 on the carriage is an accelerator treadle 34 which is connected by conventional means (not shown) to the carburetor of the engine 26. Treadle 34 controls the speed of the engine and hence the speed of rotation of the carriage in the well known manner. A hand lever 35 on the right side of the seat (Fig. 1) is coupled to a central shaft 36 (see also Figs. 1 and 9) which is connected to the usual reversing element (not shown) of the transmission 27 through suitable linkage 37, 38, and 39. As shown in Fig. 2 the lever 35 is in the neutral position and when rocked away from the vertical as indicated by the arrows it will cause the carriage to be selectively rotated either clockwise or counterclockwise.

Motor 40 operates through transmission 41, shaft 42, worm gear 43 and sector gear 44 to oscillate the gun 23 about its horizontal trunnions 22. Sector gear 44 may be mounted on one of the trunnions of the gun as represented in Figs. 1 and 2 and permits the gun to be elevated from a horizontal position to a vertical position.

Figs. 4-6 illustrate a conventional transmission unit which is adapted for use with either power plant but will be described in connection with the gun elevating mechanism. A housing 45 encloses the structure and journals a drive shaft 46 which is connected to the motor through a flexible coupling 47. Spur gear 48 secured to shaft 46 engages a gear 49 which is normally freely rotatable on driven shaft 50. Secured to one side of gear 49 is a housing 51 containing a well known friction disk assembly 52, a portion of which is coupled to the shaft 50 and the other portion is secured to housing 51. Fingers 53 are pivoted to the housing so that when moved radially outward

from the position shown in Fig. 4 they bring the clutch disks into engagement and yieldingly couple the gear 49 to the shaft 50. A cam slide 54 which is reciprocable on the driven shaft has a pair of spaced cam faces 55 which are conditioned to actuate the fingers 53 and similar fingers 56 on a second housing 57 and friction disk assembly 58 associated with another gear 59 on the other end of shaft 50. While gears 49 and 59 are free to rotate on the shaft, they have no axial movement thereon. Cam slide 54 is connected to external control elements through a bell-crank lever 60 having a bifurcated portion 61, for engagement with a groove 62 in the slide; see Figs. 1, 4 and 5. Another end of the drive shaft 46 has positively coupled thereto a gear 63 which engages with an idler gear 64 mounted on an idler shaft 65 and meshing with gear 59. It is apparent that when cam slide 54 is moved to the left in Figs. 1 and 4, clockwise rotation will be imparted to the driven shaft 50 and when the slide is pushed to the right counterclockwise torque will be transmitted through driven shaft because of the idler gear 64 which reverses the direction of rotation. The friction disk assemblies also permit the application of a gradual torque, and a quick reversal of the position of the cam slide can be employed to impart a braking effort on a body being moved by the driven shaft.

A linkage 66-67 connects the bell crank 60 to one end of a tubular shaft 68 (Figs. 1 and 9) which slidably encloses the central shaft 36. The tubular shaft is journaled in suitable uprights 69 attached to the bed of the carriage. Hand lever 70 is positively coupled to the tubular shaft 68 and is disposed on the left side of the seat as viewed in Fig. 1. When this lever is pushed either to the right or to the left of the vertical neutral position, it controls its transmission unit so as to elevate or depress the gun. A left accelerator treadle 71 is connected in the usual manner (not shown) to the gun elevating motor 40 for governing the speed thereof.

Since the gun is to oscillate between a vertical and a horizontal position, it is desirable to provide automatic stop control features. Spaced 90° apart on the sector gear 44 and on opposite sides thereof as illustrated in Figs. 1, 7 and 8 are a pair of cams 72 and 73. The gear 44 is arranged to oscillate between the forked portion 74 of a lever 75 which is pivotally mounted on the shaft 42 which carries the worm gear 43. The lower end 76 of the lever 75 is coupled to a link 77 which in turn is connected to the gun elevating and depressing lever 70. When the gun is being elevated and reaches a position of maximum elevation, the lower cam 73 engages one side of the forked portion 74 and through the link 77 pulls the lever 70 into the vertical neutral position as shown in Fig. 8 and throws the transmission 41 into neutral thereby disconnecting the power source and bringing the gun to rest. This operation is automatic and does not require the attention of the operator. When the gun is being depressed and reaches zero elevation, the upper cam 72 engages the opposite side of the forked portion 74 (Fig. 8) and rocks the control lever 70 into neutral thereby disengaging the driving motor 40. Thus the gun is automatically stopped at its extreme positions of elevation and depression.

As illustrated in Fig. 2 a padded springband head gear 78 is arranged to encircle the head of the gunner. The head gear is connected through a hinge 79 to a block 80 which is adjustable along a rod 81 that is pivoted to a sliding element 82 of

a telescope 83. The telescope comprises the usual optical elements and its fixed portion 84 is aligned with a periscope 85 having a reflector 86 and a scanning and sighting tube 87. The sighting tube is mounted on one of the trunnions of the gun and parallel to the axis of the barrel. The telescope is focused by moving the operator's head toward or away from the fixed portion 84 so as to move the sliding element 82. The pivotal and adjustment features on the headgear permit its ready adaptation to the heads of different observers.

While the gun mount has been illustrated in connection with a single gun, it is to be understood that it may be modified by one skilled in the art to accommodate a plurality of weapons mounted for simultaneous use. The guns may be automatic if desired and their trigger or firing mechanisms may be disposed within convenient reach of the operator.

I claim:

1. A power driven gun mount comprising a base, a carriage rotatably mounted on the base and positively coupled thereto, said carriage being rotatable about a vertical axis, a gunner's seat on the carriage, power driven means secured to the carriage for imparting rotation thereto, said means including a transmission unit having a forward and a reverse gear, a hand lever on one side of the seat operatively connected with the transmission unit for keeping the carriage at rest or for controlling its movement in either of two directions, an accelerator treadle adjacent the seat operatively connected to the power driven means for controlling the speed thereof, supports on said carriage for mounting a gun about a horizontal axis, a second power driven means on said carriage for elevating a gun, said means including a second transmission unit having a forward and a reverse gear, a hand lever on the other side of the seat operatively connected with the second transmission unit for controlling the elevating or lowering movement of the gun, and a second accelerator treadle adjacent the seat operatively connected to the second power driven means for controlling the speed thereof.

2. A power driven gun mount comprising a base, a carriage rotatably mounted on the base and positively coupled thereto, said carriage being adapted to be rotated about a vertical axis, a gunner's seat on the carriage, power driven means secured to the carriage for imparting rotation thereto, said means including a transmission having a forward and a reverse gear, a hand lever on one side of said seat operatively connected with said transmission unit for keeping said carriage at rest or for controlling its movement in either of two directions, an accelerator treadle adjacent said seat operatively connected to said power driven means for controlling the speed thereof, supports on said carriage for mounting a gun about a horizontal axis, trunnions secured to said gun and journaled in said

supports and adapted to oscillate said gun about a horizontal axis, a second power driven means on said carriage for elevating the gun, said means including a second transmission unit having a forward and a reverse gear, a hand lever on the other side of said seat operatively connected with said second transmission unit for controlling the elevating or lowering movement of the gun, a second accelerator treadle adjacent said seat operatively connected to said second power driven means for controlling the speed thereof, a sector gear mounted on one of said trunnions and adapted to oscillate said gun, a worm gear rotatably mounted in mesh with said sector gear, said sector gear being adapted to oscillate the trunnion on which it is mounted for elevating and depressing said gun about a horizontal axis, a shaft operatively connected to said second power driven means and to said worm gear and adapted to rotate the latter in either of two directions, automatic stop means on said sector gear spaced apart on opposite sides thereof and adapted to limit the degree of oscillation of said gun, a bifurcated member pivotally mounted on said shaft and having one prong adapted to engage one of said stop means when the gun is in a position of maximum elevation and having its other prong positioned to engage the other of said stop means when the gun reaches zero elevation.

3. In combination, a power driven gun mount comprising a carriage, supports secured to said carriage for mounting said gun about a horizontal axis, trunnions secured to said gun and journaled in said supports and adapted to oscillate said gun about a horizontal axis, means for oscillating said gun about said horizontal axis comprising a sector gear mounted on one of said trunnions and adapted to oscillate said gun, a worm gear rotatably mounted to mesh with said sector gear, said sector gear being adapted to oscillate the trunnion on which it is mounted for elevating and depressing said gun about a horizontal axis, a shaft operatively connected to power driven means and to said worm gear and adapted to rotate the latter, power driven means mounted on said carriage and operatively connected with said shaft, said power driven means including a transmission unit having a forward and a reverse gear and being adapted to rotate said shaft in either of two directions, a hand lever mounted on said carriage and operatively connected to said transmission unit for controlling the elevating or lowering movement of the gun, automatic stop means on said sector gear spaced apart on opposite sides thereof and adapted to limit the degree of oscillation of said gun, a bifurcated member pivotally mounted on said shaft and having one prong adapted to engage one of said stop means when the gun is in a position of maximum elevation and having its other prong positioned to engage the other of said stop means when the gun reaches zero elevation.

CHARLES H. KASCH.