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2,689,503

GUN MOUNTING REMOTELY CONTROLLED IN TRAIN AND ELEVATION

Original Filed Jan. 1, 1944

2 Sheets-Sheet 1

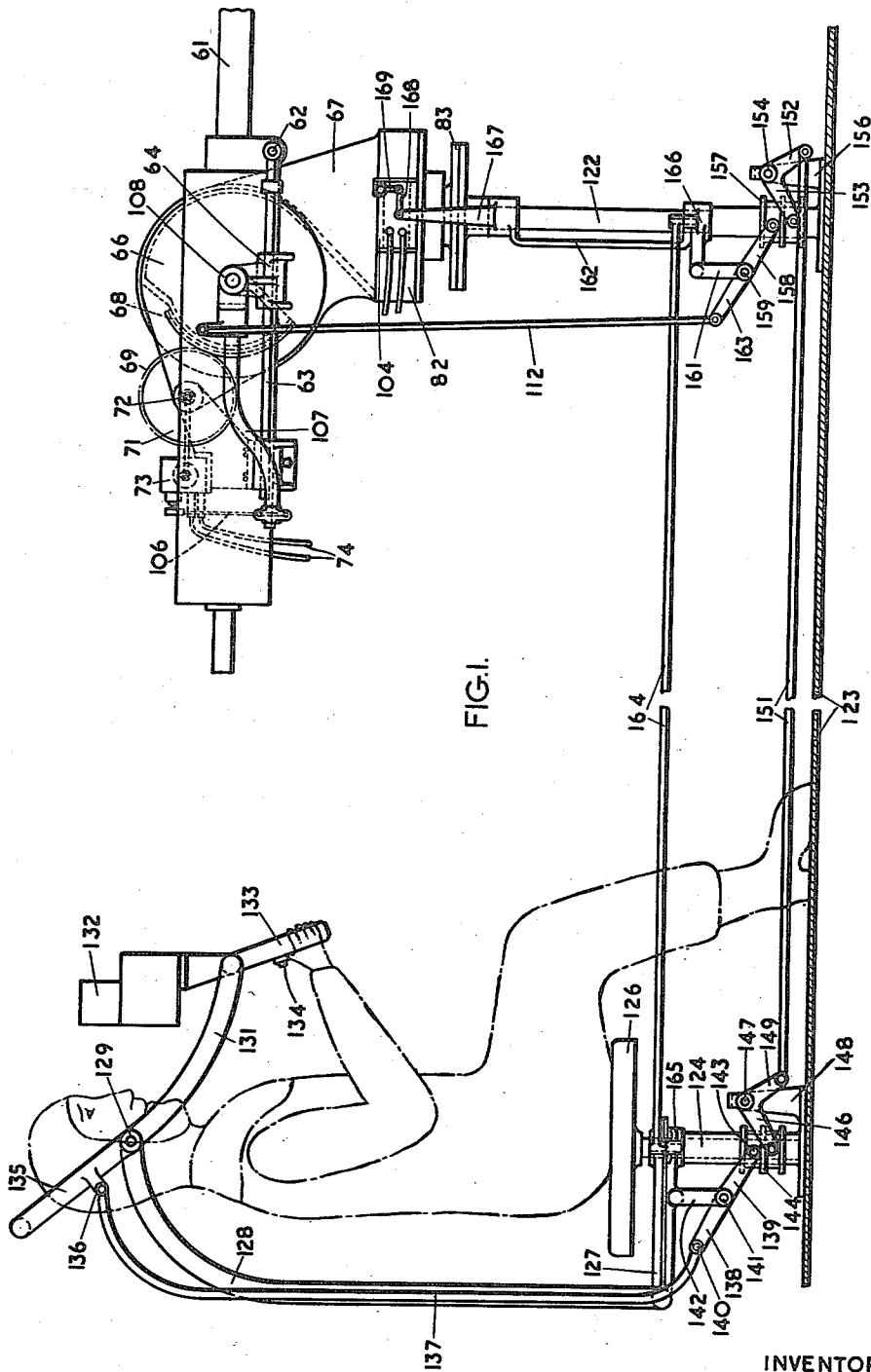


FIG. 1.

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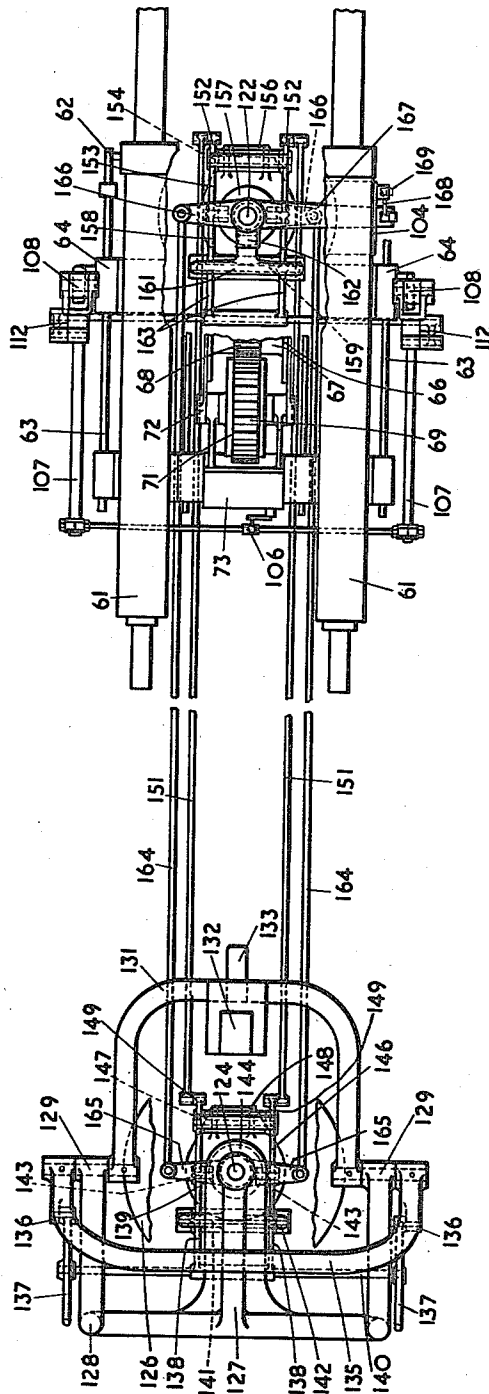


FIG. 2.

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UNITED STATES PATENT OFFICE

2,689,503

GUN MOUNTING REMOTELY CONTROLLED IN TRAIN AND ELEVATION

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3 Claims. (Cl. 89—41)

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This invention relates to gun mountings, and has for its object the provision of a gun mounting in which the operation of the gun or gun assembly is remotely controlled.

More particularly, this invention is a division of the subject matter relating to a gun mounting disclosed in my United States Patent No. 2,566,855, granted to me September 4, 1951.

According to the invention, there is provided a gun mounting wherein pivotal movement of the gun or gun assembly is effected by power-actuated means under the influence of a pivoted member adapted upon pivotal movement to operate means arranged for movement with the gun or gun assembly about the pivotal axis thereof and controlling the action of said power-actuated means and by such operation cause the gun or gun assembly to follow the movement of the pivoted member, and wherein there is provided a sighting arm mounted for pivotal movement about an axis parallel to the pivotal axis of the pivoted member, and mechanical means connecting the pivoted member to the sighting arm in such a manner that the pivoted member is caused to follow the pivotal movement of the sighting arm.

In the case where power-actuated means are provided for effecting both elevational and training movement of the gun or gun assembly, two pivoted members may be provided for effecting operation of such means, respectively, the two members being pivoted about the axes of elevation and training, respectively, or a single pivoted member, arranged for pivotal movement about the axes of elevation and training, may be used for effecting both movements of the gun or gun assembly. In either case, the sighting arm may be arranged for pivotal movement about axes lying parallel to the axes of elevation and training, respectively, and suitably connected to said pivoted member or members in such a manner that pivotal movement of the sighting arm about either axis produces like movement of said pivoted member or members about their corresponding axes.

By way of example, the invention will now be described in greater detail with reference to the accompanying drawings, as applied to a gun mounting in which pivotal movement of the guns is effected by oil motors in a similar manner to that described in the mentioned Patent No. 2,566,855, to which reference may be made for details of the mounting not apparent from this description.

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In the drawings:

Figure 1 is an elevation of a twin gun mounting constructed in accordance with this invention and intended for use in aircraft, and

Figure 2 is a plan view of the apparatus shown in Figure 1.

Referring to the drawings, a pair of guns 61 are attached respectively at points 62 to a pair of recoil frames 63 in known manner. The recoil frames 63 are secured to brackets 64 extending from a common elevation member 66 rotatably mounted in a support 67. The support 67 is provided with an arcuate rack 68 arranged for engagement with a gear 69 formed on the peripheral surface of an elevation oil motor 71 (constituting the power actuated elevation means) supported in bearings 72 extending from the elevation member 66. The inner portion of the elevation motor 71 is secured in the bearings 72 while the outer portion is free to rotate, so that, upon operation, the gear 69 is driven round the arcuate rack 68 and thus causes the elevation member 66 to rotate. The elevation oil motor 71 is controlled by an elevation valve 73 arranged for movement with the elevation member 66, and oil under pressure is supplied to the motor through the valve 73 from a source of supply by suitable connections 74.

As in the case of the apparatus described in the Patent No. 2,566,855, mentioned above, the lower portion 82 of the support 67 constitutes the outer portion of a training oil motor (constituting the power actuated training means) the inner portion of which is secured to a base 83.

In this case, the valve 73 is operated through a rod 106 by a pivoted member 107 freely mounted in bearings 108 for movement about an axis coincident with the axis of elevation of the guns, the bearings 108 being formed in brackets 64 extending from the elevation member 66. The pivoted member 107 is operated through a pair of pivoted links 112 in the manner described below.

The base 83 of the mounting is attached to a gun-supporting pillar 122 secured to a floor member 123 forming part of the fuselage of an aircraft. Secured at a position in the aircraft remote from that of the pillar 122 is a shorter pillar 124 lying with its axis parallel to that of the pillar 122 and provided at its upper end with a seat 126 for the gunner. Pivotaly mounted about the axis of the pillar 124 is an operating frame 127 having a forked portion 128 extending behind the seat 126 and terminating in a pair of bearings 129 having a common axis disposed parallel to the axis of elevation of the guns, the bearings being arranged

to lie at convenient positions one on each side of the gunner's head. Pivotaly mounted in the bearings 129 is a sighting arm 131 carrying a gun sight 132 and formed with a handle portion 133 conveniently shaped for manipulation by the gunner and on which is mounted a firing button 134 for operating the firing mechanism of the guns in known manner. The sighting arm 131 is provided with an extension 135 passing from one bearing 129 to the other over the gunner's head, the extension being formed with a pair of bearings 136 which are each connected by a link 137 to an arm 138 through the medium of a rod 140 extending from a forked member 139 pivoted at 141 in a bearing member 142 depending from the operating frame 127. The operating frame 127 thus constitutes a supporting member for the sighting arm 131. The forked member 139 is provided with a pair of shoes or rollers 143 arranged to bear in an annular groove formed in a double-grooved member 144 slidably mounted on the pillar 124. A further forked member 145, similar to the forked member 139, is pivotaly mounted at 147 in a bearing member 148 extending from the base of the pillar 124. The forked member 146 is provided with a pair of shoes or rollers arranged to bear in the other groove of the double-grooved member 144 and is also provided with a pair of arms 149 which are connected by pivoted links 151 to similar arms 152 on a similar forked member 153 pivoted at 154 in a bearing 156 extending from the base of the pillar 122. The forked member 153 co-operates with a further double-grooved member 157 slidably mounted on the pillar 122 in a manner similar to that described above in connection with the double-grooved member 144. A further forked member 159 is pivotaly mounted at 159 in a bearing formed in an arm 161 extending from a further pivoted member 162 freely mounted on the pillar 122. The forked member 159 is similar in all respects to the forked member 139, being provided with shoes or rollers arranged to bear in the second groove of the double-grooved member 157 and with arms 163 which are connected to the pivoted member 162 by the pivoted links 162. The pivoted member 162 is connected to the operating frame 127 by means of a pair of pivoted links 164 each connected to an arm 165 extending from the operating frame 127 and an arm 166 extending from the pivoted member 162. A further arm 167 extends from the pivoted member 162 and is connected by a pivoted link 168 to the operating arm 169 of the training valve 104 attached to the lower portion 82 of the training motor.

The dimensions of the various arms and links in the mechanism connecting the sighting arm 131 and the supporting member 127 to the pivoted members 167 and 162 are such as to constitute parallel motion linkage movements of the sighting arm 131 about the axis of the bearings 129 and about the axis of the pillar 124 thus producing similar movements of the pivoted members 167 and 162 respectively about the axes of elevation and training respectively.

It will thus be seen that as the gunner moves the sighting arm 131 about either axis the pivoted member 167 or 162, as the case may be, or both, bring about operation of the valves 73 or 104 or both, with the result that the guns follow the movements of the sighting arm.

The valves 73 and 104, which are substantially identical in construction, are the subject of United States Patent No. 2,455,315, to which reference

may be made for details of their construction and operation.

When the guns and the sighting arm are disposed at a substantial distance apart, means may also be provided for causing the line of sight to converge at a given range with the line of fire as the guns and sighting arm move from the "in line" position illustrated by Figure 2 to a transverse position when the lines of sight and fire are disposed at a substantial distance apart.

I claim:

1. A gun mounting comprising a common support pivotaly mounted on a base member for movement about a training axis, a gun assembly pivotaly mounted on said support for movement about an axis of elevation, power actuated training means for rotating said support about the training axis, a training control means arranged for movement with the gun assembly about the training axis and controlling the action of said training means, power-actuated elevation means for rotating said gun assembly about the axis of elevation, an elevation control means arranged for movement with the gun assembly about the axis of elevation and controlling the action of said elevation means, a supporting member rotatably mounted for movement about an axis remote from and parallel to the training axis, a sighting arm pivotaly mounted on said supporting member for movement about an axis remote from and parallel to the axis of elevation, a first pivoted member mounted for movement about the training axis for operating said training control means, a second pivoted member mounted for movement about the axis of elevation for operating said elevation control means, said sighting arm having means which upon pivotal movement of said sighting arm about its remote axis actuates said second pivoted member to operate said elevation control means, and means which by rotating said supporting member about its remote axis actuates said first pivoted member to operate said training control means, such movements of the sighting arm causing the gun assembly to commence its elevational and training movements substantially simultaneously with those of said sighting arm and to continue such movements substantially in synchronism with those of said sighting arm.

2. A gun mounting as in claim 1, wherein the power-actuated training and elevation means each comprises a hydraulic motor in driving connection with the gun assembly and wherein the said training and elevation control means each comprises a valve so arranged in the hydraulic system that its operation by movement of said sighting arm in either direction causes the motor to rotate in one direction or the other according to the direction of movement of said sighting arm.

3. A gun mounting as in claim 2, wherein the means for actuating the first and second pivoted members includes parallel motion linkage.

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