

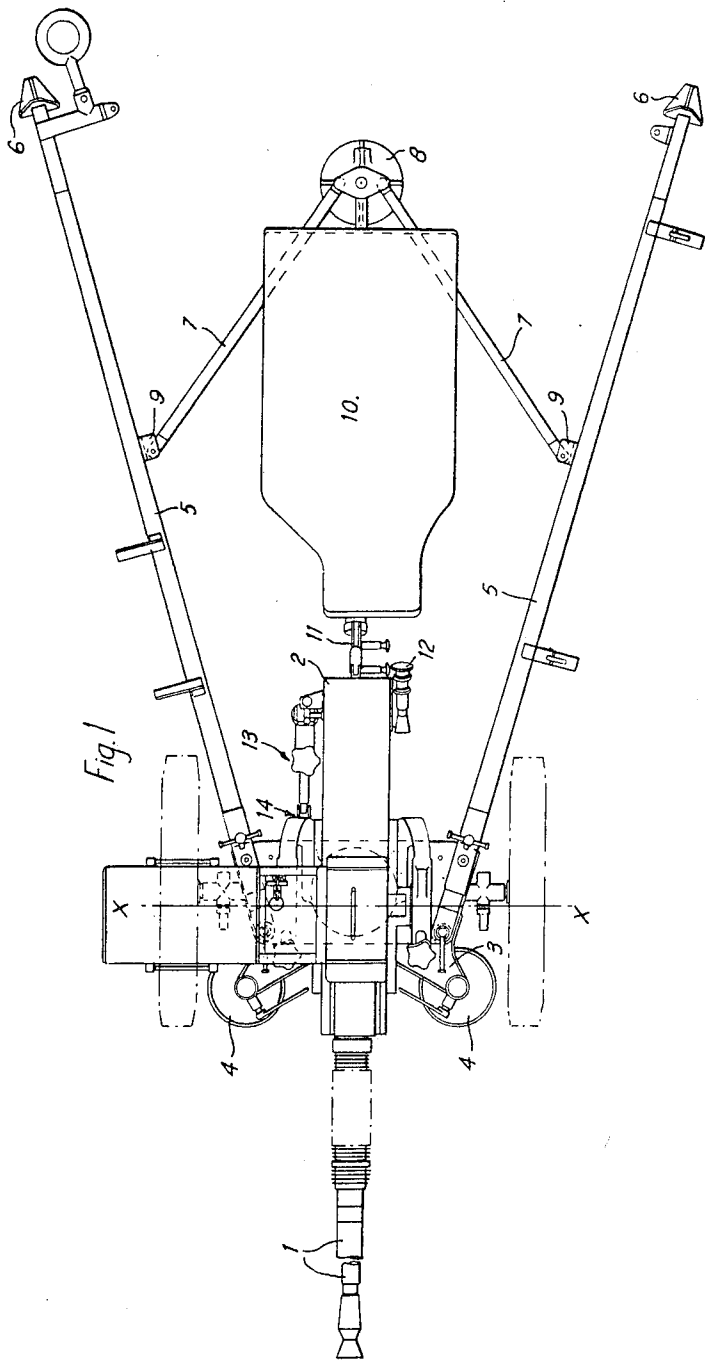
Nov. 1, 1966

R. G. VICKERS
FIELD GUN MOUNTINGS

3,282,164

Filed Jan. 8, 1965

2 Sheets-Sheet 1



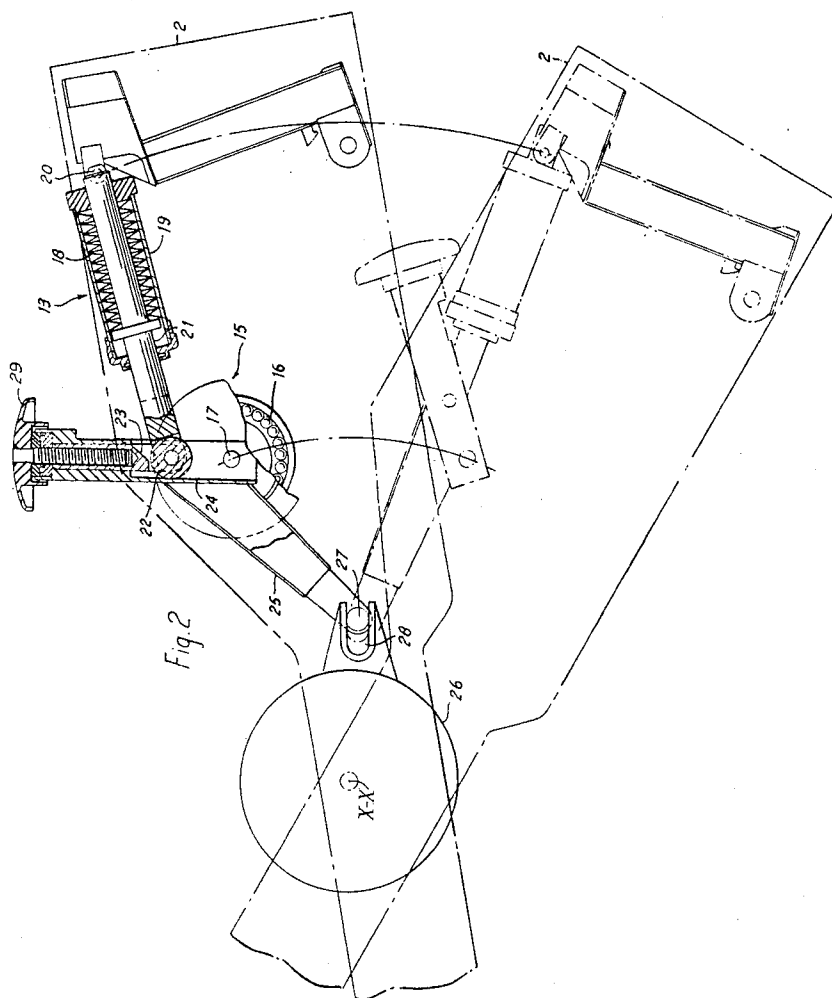
Nov. 1, 1966

R. G. VICKERS
FIELD GUN MOUNTINGS

3,282,164

Filed Jan. 8, 1965

2 Sheets-Sheet 2



1

3,282,164

FIELD GUN MOUNTINGS

Roy Gilbert Vickers, Grantham, England, assignor to Brevets Aero-Mecaniques S.A., Geneva, Switzerland, a society of Switzerland

Filed Jan. 8, 1965, Ser. No. 424,370

Claims priority, application Great Britain, Jan. 9, 1964, 1,060/64

5 Claims. (Cl. 89—40)

This invention relates to field mountings for guns of small calibre, e.g. 20 mm., which are designed to be aimed and fired by one man and are therefore relatively light and manoeuvrable but heavy enough to require a mounting which will itself withstand the reaction of firing.

For such guns, a low silhouette is desirable and, to meet this requirement, the elevation axis is located as low and as far back as possible. This results in the centre of gravity of the elevating mass, this is to say those parts of the gun mounted for movement about the elevation axis, lying forward of the elevation axis. Consequently, the rapidity and ease of laying of the gun in elevation is adversely affected unless some counteracting mass is added to the elevating mass behind the elevation axis. Such an added mass however increases the total weight of the gun and reduces its transport and handling qualities.

The present invention provides a field gun mounting in which the weight of the gunner can be utilised for balancing the gun about the elevation axis and also takes account of the fact that the weight of a gunner is more than is required for this purpose.

The invention therefore comprises a field mounting for a gun of which the centre of gravity of the elevating mass lies forward of the elevation axis and having a gunner support pivotally coupled to the elevating mass to apply thereto, rearward of the elevation axis, at least part of the weight of a gunner, and, according to the invention, spring means are provided to apply to the elevating mass a moment acting about the elevation axis in the same direction as the weight of the elevating mass to counterbalance the applied weight of a gunner.

Preferably, the moment applied by the spring means is adjustable so that the total moment acting in opposition to the gunner's applied weight can be varied to suit the weight of a particular gunner and so bring any out-of-balance moment to within a range of values permitting the gun to be easily laid in elevation.

Adjustable spring means and other features of the invention are illustrated on the accompanying drawings in which, by way of example:

FIG. 1 shows a field gun and its mounting, in plan, and

FIG. 2 shows, in schematic form, spring means for applying a moment to the elevating mass of the gun of FIG. 1.

The gun illustrated is an automatic gun having a barrel 1 carried in a mounting comprising a cradle 2 pivoted about an elevation axis X—X on a training sub-frame on a carrier base 3.

In known manner, the cradle 2 is provided with hand grips respectively having a trigger, for firing the gun and a control lever for friction brakes, for the training sub-frame and the elevating mass, which hold the gun on aim during firing.

For stable ground support, the carrier base 3 is provided at the front with a pair of feet 4, which are vertically adjustable to enable the carrier base to be supported in a horizontal position on uneven ground, and at the back with a pair of long outwardly-diverging and rearwardly-extending spades 5 having blades 6 at their outer ends which engage the ground during firing to prevent rearward movement of the carrier base.

2

Two struts 7 are pivoted by their ends to a central ground plate 8 and lugs 9 on the spades 5 respectively.

The spades 5 and struts 7 can be folded together to form a two-bar and the carrier base 3 may be provided with wheels (indicated in broken lines) for transport purposes.

A couch 10, upon which a gunner lies during firing of the gun, is supported upon a pivotally connected linkage 11 extending between the rear of the cradle 2 and the ground plate 8 so that part of the gunner's weight is transmitted to the cradle 2 and applies to the elevating mass a moment about the elevation axis which counteracts a moment in the opposite direction about the elevating axis due to the centre of gravity of the elevating mass lying forward of the elevation axis.

The linkage 11 upon which the couch 10 is suspended is constructed so that, during firing, it, and the couch, follow aiming movement of the gun. Thus at least the upper parts of the body of the gunner, who aims through the sight 12, automatically follow movement of the gun and the gunner does not have to adjust his position on the couch when he alters his aim.

It will be appreciated that the weights of the different gunners required to use the gun will vary over a considerable range and that therefore, in the absence of some form of adjustment taking account of this, true balance could not be attained for all gunners. Moreover, it is found that the weight of even the smallest gunner is in excess of that required to balance the moment due to the weight of the elevating mass and therefore some counterbalancing is required to offset the out-of-balance moment due to the excess weight of the gunner.

In order to bring the out-of-balance moment to within a range of values permitting easy laying of the gun, adjustable spring means, indicated generally at 13 in FIG. 1 and illustrated more fully in FIG. 2, are provided between the cradle 2 and the training sub-frame carrying the cradle trunnions. The spring means are arranged to apply a moment to the elevating mass in the same direction as the moment therein due to the weight of the elevating mass so as to oppose the excess weight of the gunner. During firing, any small remaining unbalanced moment can be held by a friction brake 14 for the elevating mass.

As seen in FIG. 2, the adjustable spring means include a crank 15 mounted on ball bearings 16 for pivotal movement about a pivot 17 on the cradle 2 and a compression spring 18, located in a spring housing 19 mounted on the cradle 2. The force of the spring is applied to the crank through a plunger 21 slidably mounted in the spring housing, one end of the housing being pivoted upon the cradle at 20.

The forward end of the plunger is forked and carries a roller 22 engaged within an adjuster fork 23 slidably lengthwise along a channel in a radial arm 24 of the crank 15.

On rotation of a screw turned by a knob 29, the adjuster fork 23 can be moved along the channel of the arm 24 to vary the effective distance between the pivot 17 and the axis of the roller 22 so as to vary the throw of the crank.

Carried by the crank arm 24, for rotation therewith, is a reaction arm 25 which transmits the force of the spring 18 to an elevation brake drum casing 26 which is coaxial with the elevation axis X—X and is secured fast to the training sub-frame. A roller 27 at the outer end of the reaction arm 25 is engaged in a slotted lug 28 on the casing 26 to anchor the reaction arm 25 with respect to the elevation axis.

The relative positions of the pivots 17 and 20 and the lug 28 are such that the force of the spring 18 applies

3

a moment to the elevating mass acting, about the elevation axis, in the same direction as the moment due to the weight of the elevating mass itself.

The value of the moment applied by the spring means 13 is dependent upon the throw of the crank, that is to say on the length of the lever arm between the pivot 17 and the axis of the roller 22. The throw, and therefore the moment due to the spring means, is at a maximum with the roller 22 positioned as shown in FIG. 2, and at a minimum when the roller 22 is adjusted to lie as close as possible to the pivot 17.

In order to bring the out-of-balance moment of the elevating mass to within an acceptable range for easy laying of the gun, a gunner positions himself upon the couch 10 so as to be able to aim through the sight 12 and then adjusts the throw of the crank 15, for balance, by rotation of the knob 29.

It can be seen from the broken-line position of the mechanism shown in FIG. 2 that as the elevation increases, and the moment of the elevating mass forward of the elevation axis consequently decreases, the moment applied by the spring means 13 also decreases.

The characteristics of the spring 18 and the dimensions of the spring means 13 are so designed that, after setting of the throw of the crank, any change in the counter-acting moment due to the gunner's weight as a result of a change in the elevation of the gun is closely followed by a corresponding change in the moment applied by the spring means so as to maintain the sum of the moments acting on the elevating mass within an acceptable out-of-balance range.

Alternatively, or in addition to effecting adjustment by the fork 23, the angle between the crank arm 24 and the reaction arm 25 could be made adjustable.

What I claim is:

1. In a field gun mounting comprising a gun and a cradle forming an elevating mass of which the center of gravity lies forward of the elevation axis and gunner support means pivotally coupled to the elevating mass to apply thereto, rearward of the elevation axis, at least part of the weight of a gunner on said support means; the improvement which comprises spring means to apply to

4

the elevating mass a moment acting about the elevation axis in the same direction as the weight of the elevating mass to counterbalance the applied weight of said gunner, said spring means comprising a crank pivoted on said elevating mass, said crank having a first arm and a second arm, and a spring mounted on said elevating mass and operatively connected to said first arm, said second arm being pivotally connected as a reaction arm to a relatively fixed part of the mounting.

2. A field gun mounting according to claim 1, said spring being a compression spring, a housing of said spring pivoted on said elevating mass rearward of the elevation axis, a plunger in said housing and bearing axially on said spring, an adjuster member on and slidable along said first arm of said crank and means pivotally interconnecting said plunger and said adjuster member.

3. A field gun mounting according to claim 2, said first arm having a channel therein, a fork constituting said adjuster member and slidable in said channel, screw means for adjustment of said fork along said channel and a roller journaled in said fork bearing in said channel and forming part of said means pivotally interconnecting said plunger and said fork.

4. A field gun mounting according to claim 3, an elevation brake drum casing on said mounting and a slotted lug fast on said casing and constituting said relatively fixed part to which said second arm is pivotally connected.

5. A field gun mounting according to claim 1, in which said spring means comprises an adjustable-throw crank pivoted on said elevating mass, a spring bearing on said crank and a reaction arm forming part of said crank and bearing on a relatively fixed part of the mounting.

References Cited by the Examiner

UNITED STATES PATENTS

1,722,862 7/1929 Ricordel 89—40

BENJAMIN A. BORCHELT, *Primary Examiner*.

FRED C. MATTERN, JR., *Examiner*.

S. C. BENTLEY, *Assistant Examiner*.