Nov. 8, 1949 A. T. MANES 2,487,062

GUN AND MOUNT THEREFOR

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Fig. 1.

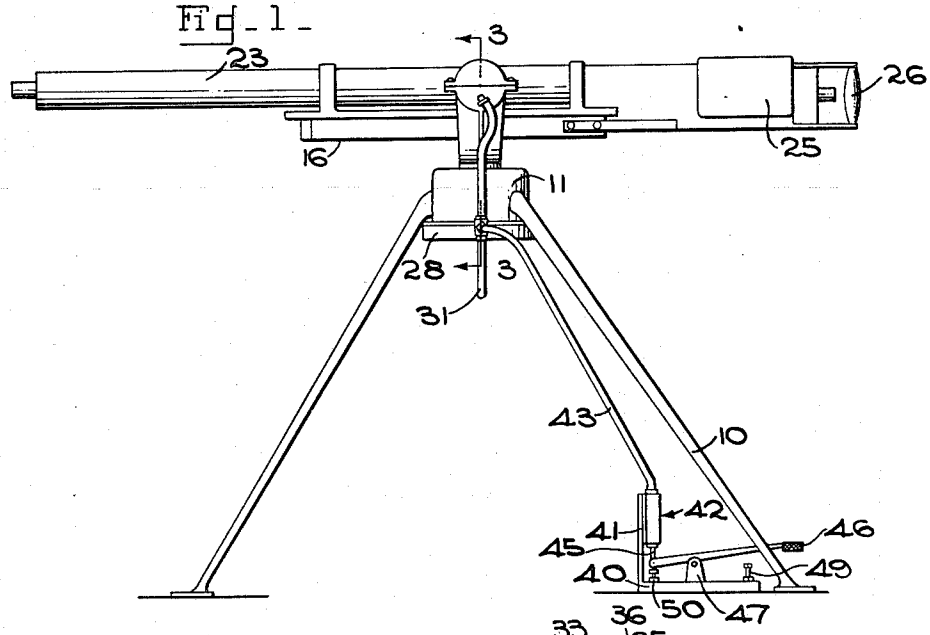
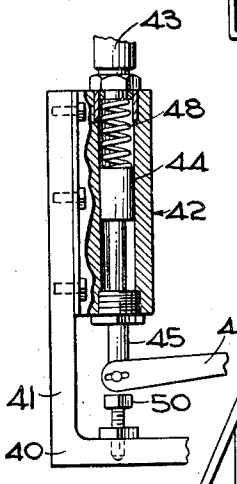


Fig. 4.



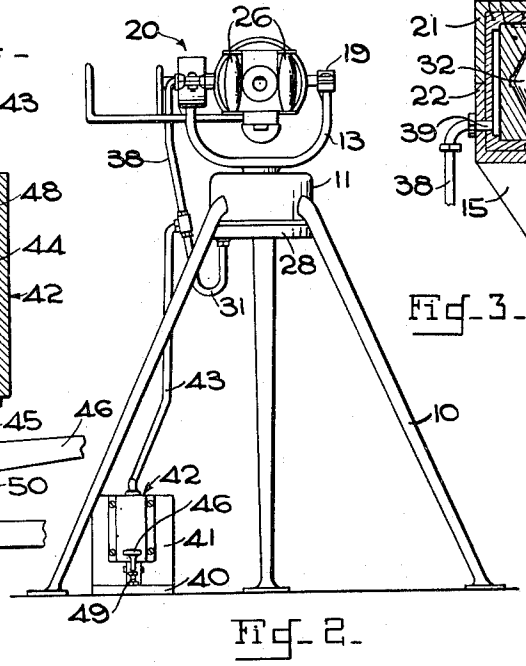


Fig. 2.

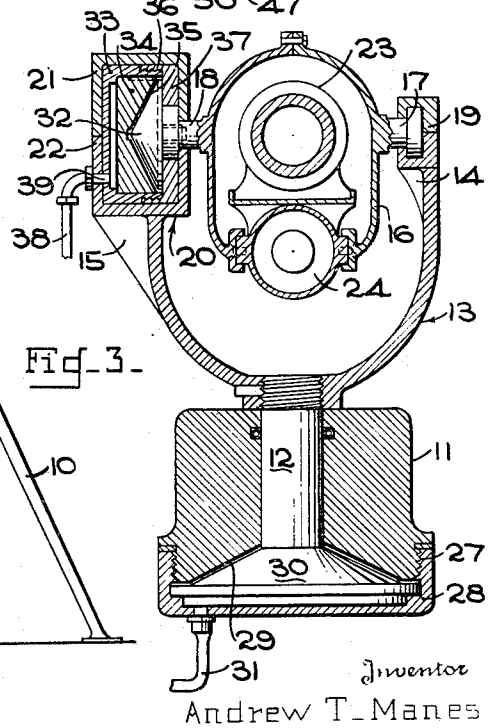


Fig. 3.

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GUN AND MOUNT THEREFOR

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7 Claims. (Cl. 89—37)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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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 relates to a gun and mount therefor and more particularly to means operable to permit pointing and training of the gun and to brake the movement of the gun in traverse and elevation or depression.

The invention is most particularly concerned with improvements in weapons of an intermediate caliber; e. g. 20–57 mm., although it may, of course, be employed equally well in conjunction with weapons of smaller or even much larger caliber under certain circumstances. It is often desirable in this type of weapon to mount the weapon for normally free traverse and normally free elevation or depression so that the operator may swing the gun horizontally or vertically in order to facilitate tracking of targets. The situation is the same whether the gun is mounted in a vehicle, aircraft, stationary mount, or other arrangement. It has been found however that in weapons of intermediate caliber of the type referred to, the weight of the gun is such that sheer inertia ordinarily prevents the operator from stopping his tracking in time to effectively secure a proper line on the target.

It is accordingly a principal object of the present invention to provide an improved mount in which the gun is normally freely swingable horizontally and vertically and in which means are provided under control of the operator for instantly stopping or braking travel of the weapon once it is properly sighted with respect to the target.

An important object of the invention is to provide the braking means in the form of fluid-pressure means.

It is another important object of the invention to associate with each of the pivots that mount the gun for horizontal and vertical swinging, simple and efficient braking means that will instantly secure the weapon in position after it has been properly aimed.

Still another object of the invention is to provide means whereby both horizontal and vertical swinging movement of the weapon may be braked simultaneously.

The invention has for another object the provision of means whereby the braking means may be operated by foot pressure applied by the operator.

It is still another object of the invention to provide means for regulating the amount of pressure that may be applied by the operator so that the force applied to the braking means may be controlled.

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Other objects and important features of the invention will become apparent from the following detailed description of a preferred embodiment thereof as shown in the accompanying sheet of drawings in which:

Fig. 1 is a side elevation of a gun and mount constructed according to the present invention;

Fig. 2 is a view of the same structure as appearing from the breech end of the weapon;

Fig. 3 is an enlarged sectional view through the braking means, the view being taken substantially on the line 3—3 of Fig. 1; and

Fig. 4 is an enlarged view, partly in section, of the cylinder and piston assembly for actuating the fluid-pressure means.

Figs. 1 and 2 illustrate the application of the invention to a gun mounted on a stationary mount such as a tripod 10. The upper end of the tripod is formed as a housing 11 having a central vertical bore in which is journaled a vertically disposed pivot member 12. The upper end of the member 12 is threaded and receives the lower end or bight portion of a support 13 preferably in the form of a bifurcated member having opposite side portions 14 and 15. A suitable locking pin secures the members 12 and 13 together for rotation about the axis of the member 12.

The weapon mounted on the tripod 10 includes a cradle 16 having a pair of oppositely extending transverse trunnions 17 and 18. The trunnion 17 is suitably journaled in the side member 14 of the support 13, and a bearing cap 19 is secured in place on the member 14 to retain the trunnion 17. The opposite side member 15 is provided with a housing 20, preferably formed integrally therewith. The inner wall of the housing 20 serves to journal the trunnion 18. As will be hereinafter more fully set forth, the housing 20 includes upper and lower halves 21 and 22 so that the housing may be easily assembled and disassembled. The gun may be of any conventional construction and includes a tube or barrel 23, recoil mechanism 24, breech 25, and operating handles 26. The mounting of the support 13 on the housing 11 is such that the weapon may be normally freely traversed and the association between the trunnions 17 and 18 and the support 13 is such that the weapon may also be normally freely elevated or depressed.

The lower portion of the housing 11 is reduced and threaded as at 27 and receives an internally

threaded cap 28. The inner portion of the bottom of the housing 11 includes a braking element, preferably formed by means of a conical recess 29 provided in the housing. The lower portion of the member 12 is provided with a complementary braking element 30 formed with a conical surface engageable with the conical recess 29. The relationship between the recess 29 and surface 30 is such that normally free traverse of the weapon is permitted. A fluid-pressure inlet conduit 31 is connected through the cap 28 so that fluid under pressure may be applied to the base or under radial face of the element 30.

The housing 20 formed on the support 13 encloses the trunnion 18 on the cradle 16 of the weapon. The portion of the trunnion 18 within the housing 20 is provided with or formed as a braking element 32 having an outer conical surface. A cylindrical cup member 33 is carried within the housing 20 and serves to enclose a second braking element 34 having an internal conical recess 35 engageable with and complementary to the conical surface on the braking element 32. The element 34 is preferably keyed to the cup 33 so that it is held against rotation with respect to the cup but has sliding movement toward and away from the braking element 32 along the axis of the trunnion 18. The cup 33 is secured against rotation in the housing 20 by means of a threaded connection 36 with a second cup member 37 rigidly carried by the housing 20 and additionally forming a bearing for the trunnion 18. As best shown in Fig. 3 the proximate radial faces of the cup 33 and the braking element 34 are spaced apart. A fluid-pressure inlet conduit 38 is in communication with this space through connecting ports 39 formed in the housing 20 and cup 33.

A support 40 is adapted to be positioned adjacent the base of the mount 10 and is provided with an upstanding member 41 on which is mounted a cylinder and piston assembly 42 for the supplying of fluid under pressure through a fluid line 43, which may be flexible, to the fluid-pressure inlet conduits 31 and 38 and thence to the housings 11 and 20, respectively. As best shown in Fig. 4, the cylinder carries a reciprocable piston 44 having a piston rod 45 the lower end of which is pivotally connected to one end of an operating member in the form of a foot lever or pedal 46. The pedal 46 is pivoted intermediate its ends on a pivot means or fulcrum 47 on the support 40. Depression of the pedal 46 forces fluid through the lines 43 and inlets 31 and 38 to the housings 11 and 20. A compression spring 48 is provided within the cylinder 42 to return the piston to its original position.

As stated previously, it is an important object of the invention to provide means whereby the movement of the pedal 46 may be controlled so that the force applied through the fluid-pressure system may be regulated. A simplified and preferred embodiment of this means takes the form of a pair of adjustable stops 49 and 50. The stop 49 is located for vertical adjustment under the foot pedal 46 at one side of the fulcrum 47. The stop 50 is located at the other side of the fulcrum 47 below that portion of the pedal that is connected to the piston rod 45. Adjustment of the stop 49 upwardly limits the downward travel of the foot pedal and thus limits the force that may be applied through the fluid-pressure system to the housings 11 and 20. Adjustment of the stop 50 upwardly limits the amount of return travel of the piston 45 so that the positions of the parts may be adjusted according to the volume of fluid in the system. It will be understood, of course, that any suitable means of well known type may be provided for replenishing the supply of fluid.

It will be noted that, since the braking elements 30 and 32 are circular and are freely mounted with respect to the conical recess portions 29 and 34, there is no interference with the normally free swinging of the weapon through traverse and/or elevation or depression. However the braking means provided is such that the weapon may be instantly braked and securely held, when aimed, and fired. The fluid-pressure means provides a system that is easily controlled by the operator for effecting engagement between the braking surfaces 29 and 30 and 32 and 35. The application of continued pressure to the pedal 46 maintains these braking elements in braking position so that the weapon is securely locked against angular displacement due to the shocks of firing and recoil.

As the pedal 46 is depressed and fluid is forced through the lines 43, 31 and 38 to the housings 11 and 20, the braking means are simultaneously applied. Fluid entering under pressure through the line 31 into the chamber formed between the cap 28 on the housing 11 and the under radial face of the brake element 30 forces the conical surface of the brake element into engagement with the conical recess 29, and securely binds the members 12 and 30 to the housing 11. At the same time fluid under pressure entering through the line 38 into the space between the cup 33 and braking element 34 forces the braking element axially of the trunnion 18 and into engagement with the conical face on the braking element 32. Because of the clearances between the braking elements 29 and 30, there may be slight shifting of the weapon upwardly with respect to the mount as pressure is applied. However, this shifting will be very minute and since it will be a bodily shifting of the entire gun barrel without change in its aiming angle, the effect will be practically negligible.

It will be seen from the foregoing description that there has been provided an improved gun and mount therefor, incorporating simple and efficient braking means for instantly clamping or locking the weapon in position after it has been aimed. It will be understood, of course, that the foregoing description is of only a preferred embodiment of the invention and that numerous modifications and alterations may be made therein without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. A gun and mount therefor, comprising a gun barrel, a mount including a support having opposite side members between which said barrel is positioned, means mounting said barrel on said support for elevation and depression and including a transverse trunnion carried in a side member and connected to said barrel for rotation therewith during elevation and depression, means on one said side member forming a fluid-tight housing having a portion provided with a conical recess formed about the axis of said trunnion, a brake element in said housing having a conical surface complementary to said conical recess, means connecting said brake element to said trunnion for rotation therewith as said barrel is elevated and depressed, means mounting said support on said mount for traversing of said support and barrel and including a vertical pivot member connected to said support for rotation

therewith as said barrel is traversed, means on said mount forming a second fluid-tight housing having a portion provided with a conical recess formed about the axis of said pivot member, a brake element in said second housing having a conical surface complementary to said second conical recess, means connecting said brake element to said pivot member for rotation therewith as said support and barrel are traversed, and means on said mount for applying fluid under pressure to the aforesaid housings to cause interengagement between said brake elements and their respective conical recesses for braking both traversing and elevation or depression of said barrel with respect to said mount.

2. In a gun mount, a housing, a pivot member journaled in said housing on a normally vertical train axis, a first conical braking surface connected for rotation with said pivot member and coaxial of said train axis, a second conical braking surface fixed against rotation with respect to said housing and complementary to said first braking surface, said first and second braking surfaces being relatively translatable along said train axis into braking contact, a support fixed to said pivot member, a gun cradle, trunnions journaling said cradle in said support for pivotal movement about a normally horizontal elevation axis, a third conical braking surface coaxial with said elevation axis and connected for rotation with said cradle about said axis, a braking element carried by said support and having a fourth conical braking surface coaxial of said elevation axis and complementary to said third braking surface, said third and fourth braking surfaces being relatively movable along said elevation axis into braking contact, and manually controlled means for effecting simultaneous relative movements of said first and second, and third and fourth braking surfaces into contact.

3. A mount as recited in claim 2, said last named means comprising a fluid pressure cylinder and piston slidably fitting said cylinder, a pivoted lever for operating said piston in one direction, a compression spring within said cylinder to urge said piston in the other direction, a support for said lever and adjustable stop means carried by said support and engageable with said lever to limit the rocking thereof in opposite directions respectively, fluid pressure responsive means including said second and fourth braking surfaces, for effecting braking movements of said surfaces, as aforesaid, and fluid pressure connections between said cylinder and said fluid pressure responsive means.

4. In a gun mount, a cradle for supporting a gun, aligned trunnions extending oppositely from said cradle and defining a normally horizontal elevation axis, a support, means journaling said trunnions in said support, means forming a first brake element fixed to one said trunnion concentric to said axis and having a braking surface extending generally transversely of said axis, a second braking element carried by said support for translation only along said axis into and out of engagement with said first braking surface,

and manually controlled means for forcing said second braking element into engagement with said first braking element to thereby brake said cradle against pivotal movement about said axis.

5. In a gun mount, a support, a cradle journaled in said support for pivotal movement about a normally horizontal axis, and first and second brake elements concentric of said axis and having mating brake surfaces formed as complementary surfaces of revolution about said axis, said first element being fixed to said cradle for rotation therewith and said second element being carried by said support for translation only along said axis into and out of engagement with said first element, and manually controlled means for so translating said second element into braking engagement with said first element, whereby to secure said cradle against pivotal movement about said axis.

6. In a gun mount, a cradle, a support, trunnions journaling said cradle in said support for pivotal movement about a normally horizontal gun elevation axis, a normally vertical pivot member rigidly connected with said support and defining a normally vertical train axis, a first brake element secured to said pivot member concentric of said train axis and having a brake surface extending generally transversely of said axis, a fixed housing journaling said pivot member and having a second brake surface complementary to and engageable with the brake surface of said first brake element in response to relative translation of said surfaces along said train axis to thereby brake pivotal movement of said cradle in train, and manually controlled means for effecting said relative translation.

7. A mount as recited in claim 6, an element secured to one said trunnion concentric thereof and having a third brake surface generally normal to said elevation axis, a housing carried by said support, an element mounted in said housing and having a fourth brake surface translatable only along said elevation axis into braking contact with said third brake surface, said manually controlled means being connected to so translate said fourth brake surface.

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