Aug. 17, 1937. C. G. TRIMBACH 2,090,079

GUN MOUNT

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FIG. 1.

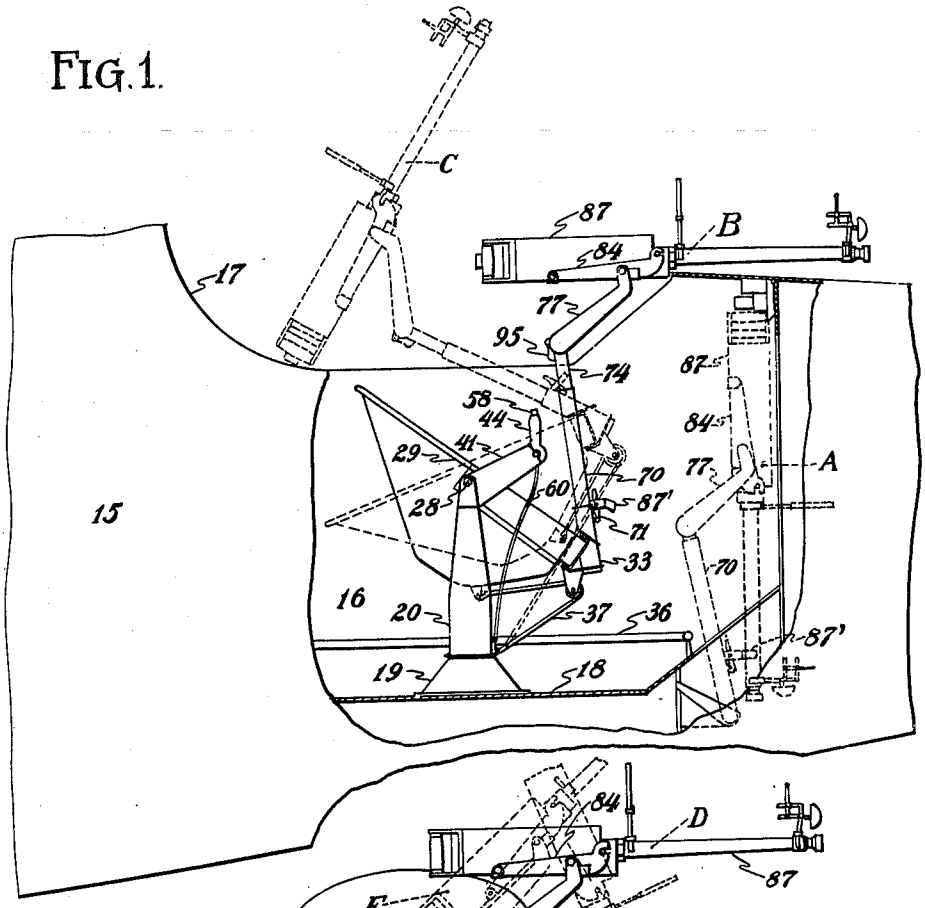
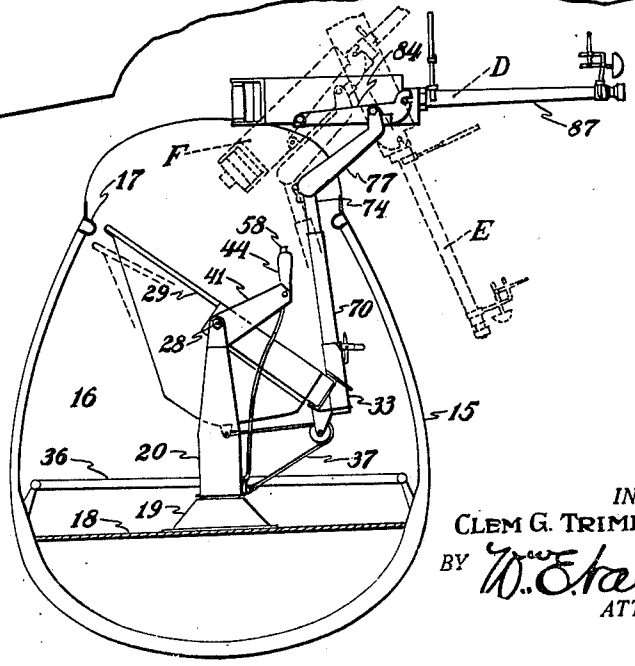


FIG. 2.



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FIG. 4.

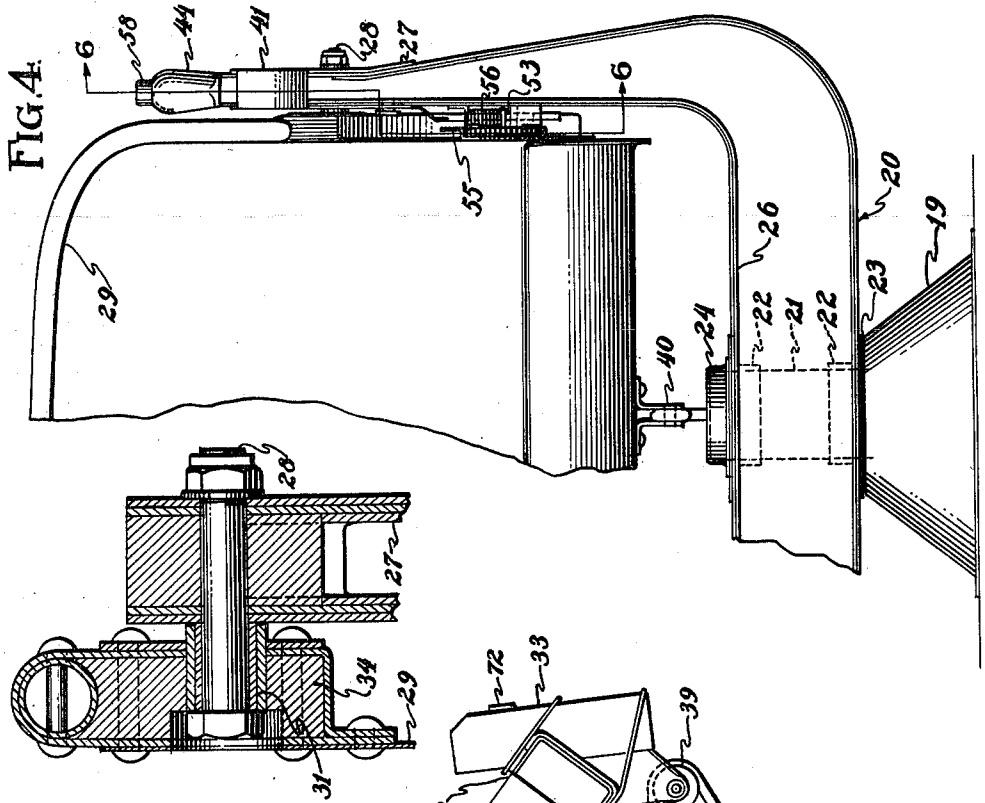


FIG. 5.

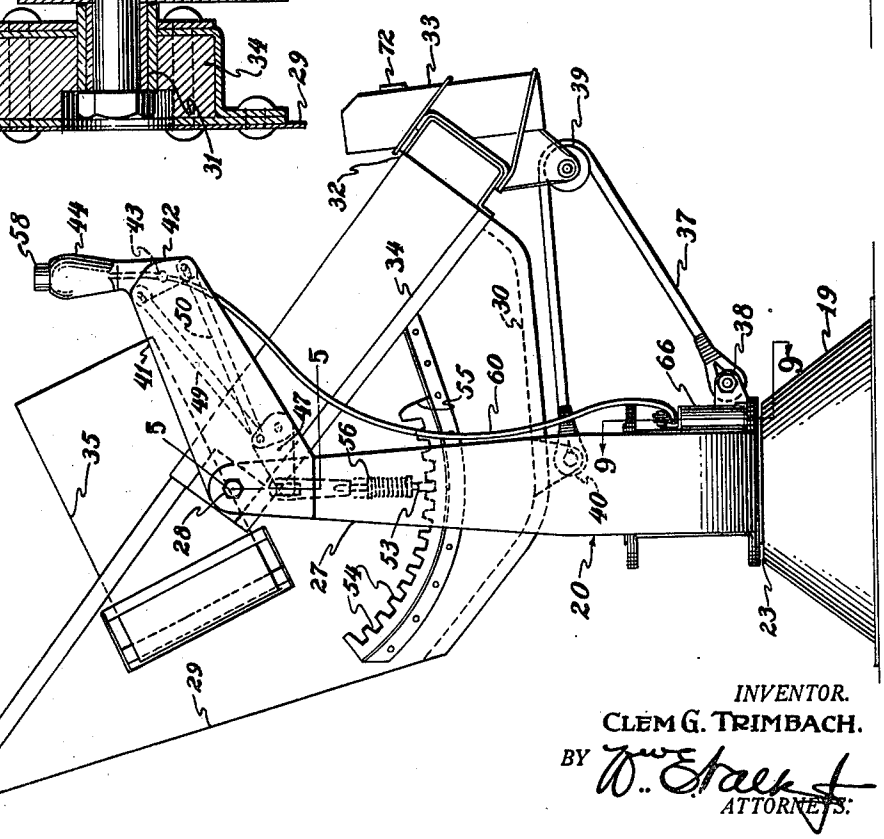


FIG. 3.

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GUN MOUNT

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FIG. 6.

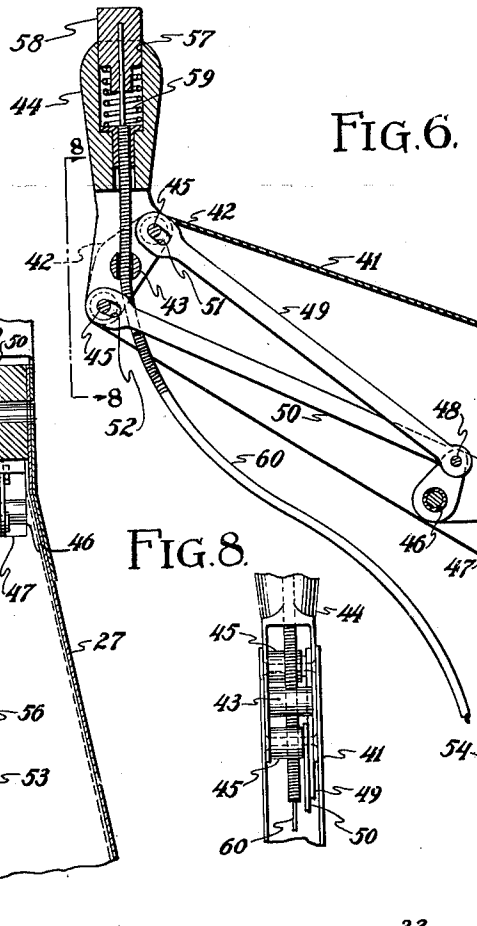


FIG. 7.

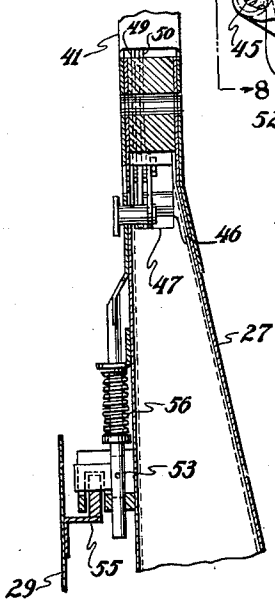


FIG. 8.

FIG. 9.

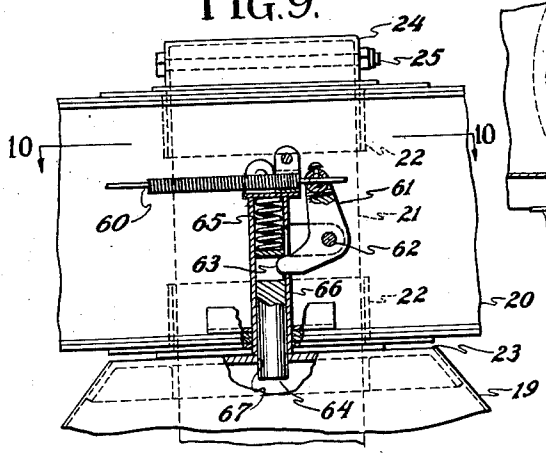
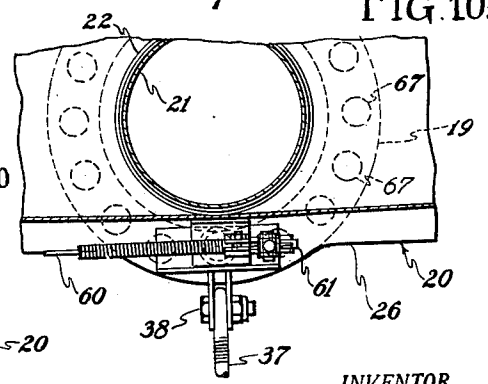


FIG. 10.



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FIG. 11.

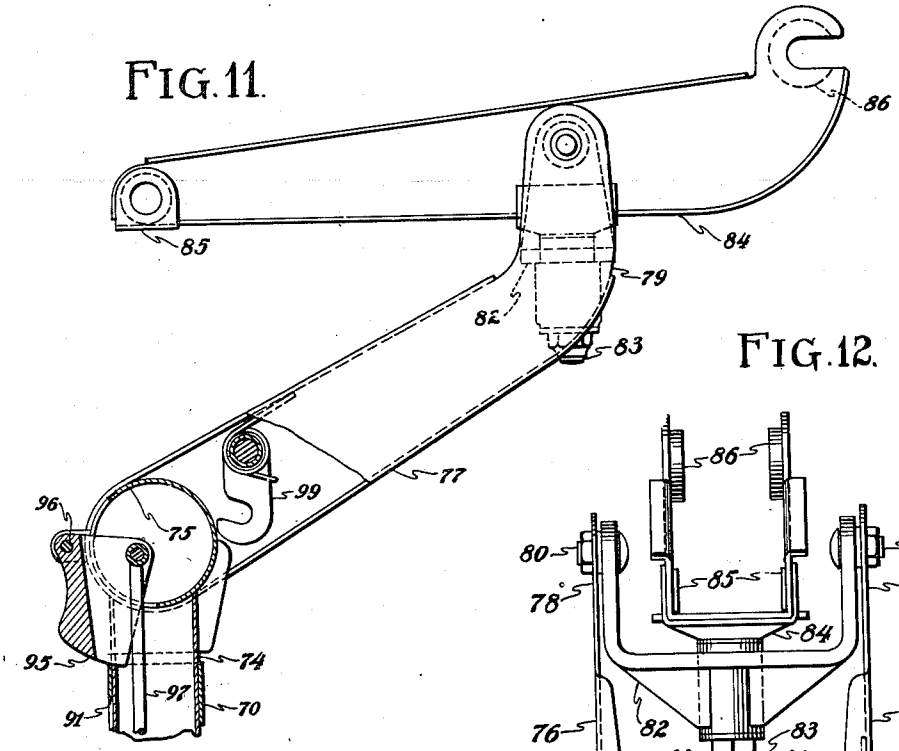


FIG. 12.

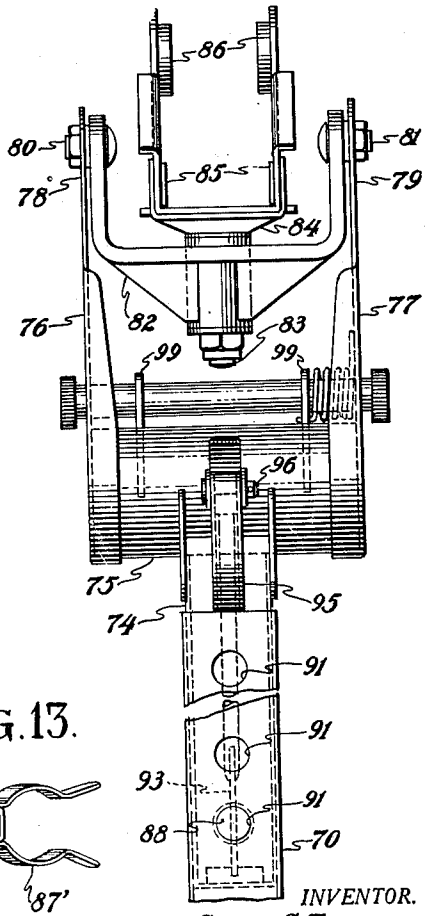
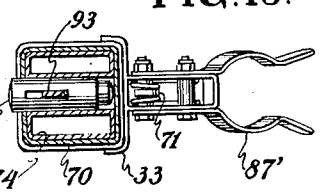


FIG. 13.



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Patented Aug. 17, 1937 2,090,079

UNITED STATES PATENT OFFICE

2,090,079

GUN MOUNT

Clem G. Trimbach, Kenmore, N. Y., assignor, by mesne assignments, to Curtiss-Wright Corporation, a corporation of New York

Application April 11, 1933, Serial No. 665,517

8 Claims. (Cl. 89—37.5)

This invention relates to movable machine gun mounts for aircraft.

The gun mount is particularly adapted for use in military aircraft wherein a cockpit is provided for a gunner. The gun is adapted for universal aiming and firing, so that a maximum sphere of fire is afforded. In the past, it has been customary to provide a track, ring or swivel upon which the gun may be mounted for universal movement, the gunner being required to move around within the cockpit in order to aim the gun. This method of aiming was satisfactory when aircraft moved at relatively slow speeds, but with the modern military aircraft, capable of high speed, it becomes increasingly difficult for the gunner to manipulate the gun by hand, and to withstand the pressure of wind on himself and on the gun, making it difficult for him to move the gun and to aim properly. This invention provides a seat for the gunner and a support for the gun mounted on the seat. The seat is carried for swinging movement in a yoke, so that a wide range of elevation is provided for firing of the gun, the gunner and gun moving together. This yoke, in turn, is swivelled on a suitable pintle fixed to the aircraft, so that the seat and gun may be moved through a full 360° in azimuth. Suitable means readily available to the gunner, is provided for locking the seat with the gun in any position of elevation or azimuth. As in the normal gun installation, the gun is carried for limited universal movement with respect to its support, so that by moving himself in the seat, the gunner may cover a relatively small sphere of fire without moving the seat and gun support. Where the aiming point changes materially, the gunner may move the whole seat and mount readily, to train the gun on the new aiming point. In addition to the broad arrangement of the gun mount, improved features are embodied in the invention for stowing the gun and for adjusting the height of the gun to accommodate gunners of varying stature. Improved means is likewise embodied in the gun support and adapter so that the gun may be moved in elevation and azimuth regardless of the attitude of the gun mount and seat as a whole.

Objects of the invention are:

(*a*) To provide a composite gun mount including a gunner's seat and gun support;

(*b*) To provide a gun mount that is universally movable over a wide sphere of fire, both in elevation and azimuth;

(*c*) To provide a gun mount in which the air forces upon the gunner and mount are substantially balanced regardless of the position of adjustment of the gun mount;

(*d*) To provide convenient means for detaching the gun and its adapter for stowing within the aircraft;

(*e*) To provide convenient means for adjusting the height of the gun and its adapter to accommodate the gun for gunners of varying stature;

(*f*) To provide a unitary and readily available means for locking the gun mount in any position of adjustment in elevation or azimuth;

(*g*) To provide resilient means adapted to be overcome by physical exertion on the part of the gunner for holding the gun mount in a normally level position of adjustment;

(*h*) To provide convenient means whereby the gunner may manually traverse the gun in elevation or azimuth; and

(*i*) To provide a gun adapter having an auxiliary sphere of fire in elevation and in azimuth regardless of the position of the gun mount as a whole.

Further objects will be apparent from a reading of the subjoined specification and claims, and from a consideration of the accompanying drawings, in which:

Fig. 1 is an elevation, partly broken away, of an aircraft including the gun mount of this invention, showing the gun mount in a normally level position, and also in alternative elevated positions, and the gun in a stowing position;

Fig. 2 is a section through the gunner's cockpit of the aircraft showing the gun mount in alternative positions for lateral gun fire in different phases of elevation;

Fig. 3 is a side elevation, on an enlarged scale, of the gunner's seat forming part of the gun mount;

Fig. 4 is a rear elevation of a portion of the gunner's seat shown in Fig. 3;

Fig. 5 is an enlarged section on the line **5—5** of Fig. 3;

Fig. 6 is an enlarged section on the line **6—6** of Fig. 4;

Fig. 7 is a section on the line **7—7** of Fig. 6;

Fig. 8 is a section on the line **8—8** of Fig. 6;

Fig. 9 is an enlarged section on the line **9—9** of Fig. 3;

Fig. 10 is a section on the line **10—10** of Fig. 9;

Fig. 11 is a side elevation, partly in section, of the gun support and adapter forming part of the gun mount;

Fig. 12 is a rear elevation of the gun support and adapter; and

Fig. 13 is a section on the line 13—13 of Fig. 11.

Referring principally to Figs. 1 and 2, a portion of an aircraft fuselage 15 has formed therein a gunner's cockpit 16, having an upper cockpit opening 17. Centrally disposed on the floor 18 of the cockpit is a rigid pintle 19 upon the vertical axis of which is a yoke 20 mounted for swivelling. The pintle, referring briefly to Figs. 3, 4 and 9, is provided with a vertical shaft 21, while the yoke 20 is provided with bearing sleeves 22 engaging the shaft. The pintle 19 is provided with an abutment 23 against which the lower surface of the yoke 20 is adapted to rest, and the upper end of the shaft 21 is provided with a sleeve 24 fastened thereto by a bolt 25 to hold the yoke 20 against upward translation on said shaft.

Referring now to Figs. 1, 2, 3 and 4, the yoke 20 comprises a substantially horizontal portion 26 having upwardly turned arms 27 at the upper ends of which are arranged aligned pivots 28. A seat 29, preferably of the bucket type and having a seat recess 30 to accommodate the service type of seat parachute, is provided at central points on the sides of the seat with aligned bearings 31, adapted to engage the pivots 28, thus allowing the seat 29 to be swung in a vertical plane about said pivots. It will be noted that the axis of the bearings 31 is so located that it passes through substantially the center of gravity of the swinging portion of the gun mount with the gunner seated and with the gun mounted, as will hereafter be described.

Centrally, along the lower forward edge of the seat, as at 32, is firmly mounted a socket 33. A reinforcing member 34, carried by the seat 29, is provided to brace the socket 33 with the bearings 31, this reinforcement 34 being a substantially U-shaped member slanted from the bearings 31 around the forward lower edge of the seat 29. The seat is also provided with a suitable safety belt 35 which may be adjusted in the conventional manner by the gunner to hold him firmly in a seated position (shown in Fig. 3).

By the mechanism thus far described, it is apparent that the seat 29, with the yoke 20, is free to swivel about the vertical axis provided by the pintle 19, and that the seat 29 is free to swing about a substantially horizontal axis provided by the pivots 28. The gunner, when seated, may swivel or swing the seat to any desired attitude by use of a toe rail 36. By pressing on the toe rail with his foot, the seat 29 may be tilted or swung rearwardly. By pressing laterally against the toe rail, the seat and yoke may be swivelled on the pintle 19. To enable the gunner to quickly recover from a tilted attitude to a substantially horizontal attitude, a resilient rubber chord 37, or its equivalent, is provided between the seat 29 and the lower portion of the yoke 20. This chord 37 is anchored to a suitable bracket 38 on the lower portion of the yoke 28 and thence passes around the pulley 39 mounted at the bottom of the socket 33, to a suitable anchor 40 on the bottom of the seat 29. When the seat is tilted, the chord 37 is tensioned, tending to resiliently urge the seat toward a level attitude.

Referring now to Figs. 1, 2, 3, 6, 7, 8, 9 and 10, the mechanism for locking the seat 29 in any of the several possible positions of swinging or swivelling adjustment, will be described. A bracket 41 is firmly attached to the upper end of one of the yoke arms 27, this bracket extending forwardly and upwardly so that its forward end 42 is conveniently within reach of the gunner regardless of the tilt of the seat 29 with respect to the yoke 20. At the end 42 of the bracket 41, is a pivot 43 on which is carried for oscillation, a handle 44. The handle carries a pair of pins 45 spaced substantially equally on opposite sides of the pivot 43. The bracket 41 is also provided with a pivot 46 adapted to carry a dog 47 for oscillation, said dog having a pin 48 for the mounting of a pair of links 49 and 50. The outer ends of the links 49 and 50 each have formed therein elongated slots 51 and 52, each engaging one of the pins 45. When the handle is in a central position, shown in Fig. 6, the links 49 and 50 are untensioned, and allow the dog 47 to drop to its lower extreme position. When the handle 44 is rocked about the pivot 43, in a counterclockwise direction, as shown in Fig. 6, the link 49 is tensioned, rotating the dog in a counter-clockwise direction about its pivot 46; simultaneously, the link 50 is moved with respect to its pin 45, but, by virtue of the slot 52, it rides free of the pin and has no stopping effect upon movement of the dog. Conversely, if the handle 44 is moved in a clockwise direction, the link 50 is tensioned, raising the dog 47, whereupon the link 49 is inactive. Thus, by oscillating the handle 44 in either direction, the dog 47 is actuated. This dog engages a pawl 53, which is in turn adapted to engage in any one of several notches 54 carried by a quadrant 55 affixed to the side of the seat 29. A spring 56 is arranged to hold the pawl 53 in an engaging position with said quadrant, oscillation of the handle 44 serving to disengage the pawl from the quadrant to allow tilting or swinging of the seat. Movement of the handle 44 in either direction for unlocking the seat with respect to the yoke 20, is a distinct convenience and improvement, if it is realized that when the gunner has tilted the seat to a position of high elevation, his normal reaction would be to pull the handle 44 toward him. This enables him to unlock the seat and control the rate of its downward swinging. Conversely, if he wishes to tilt the seat to a high elevation from a level position, his normal reaction would be to push on the handle 44, which would allow him to unlock the seat and tilt it to any desired angle.

Within a guide 57 in the handle 44, a plunger 58 is adapted to slide, said plunger projecting above the handle 44 to enable its depression against a suitable spring 59. The plunger 58 is connected by a flexible control cable 60 to a bell crank 61, shown in Fig. 9, pivoted as at 62 to the yoke 20. The free end 63 of the bell crank 61 engages within an opening in a pin 64, normally urged downwardly by a spring 65. The pin 64 slides in a guide 66 carried by the yoke 20. A plurality of openings 67 are arranged circumferentially in the upper portion 23 of the pintle 19, within any one of which openings the pin 64 is adapted to engage. When so engaged, the pin locks the yoke from rotation about the pintle 19. Withdrawal of the pin 64 from any one said opening 67, is effected by depressing the plunger 58 carried by the handle 44, by virtue of the connection effected by the control cable 60 and the bell crank 61. Thus, the gunner has under his immediate control the locking of the seat 29, as it may be rotated in azimuth about the pintle. It will be noted here that the handle 44 with the plunger 58, forms a unitary control by the use of which the gunner may lock the seat in any position of swinging or elevation, and swivelling or azimuth.

Now referring to Figs. 1, 2, 11, 12 and 13, the gun support and adapter, and their respective

relationship to the operation of the gun mount, will be described. A support 70, comprising a square tube, as shown in Fig. 13, is adapted to be inserted in the socket 33 carried by the seat 29. The square tube is used so that the support may not turn in the socket; obviously other shapes might be used. A latch 71 hinged on the support 70 is adapted to engage a projection 72 on the outside of the socket, said latch being provided with a handle 73 for its release. Insertion of the support 70 within the socket 33 allows automatic engagement of the latch holding it firmly in place. The latch may be released by the handle 73 for withdrawal of the support. A member 74, comprising a section of square tubing adapted to telescope within the support 70, carries at its upper end a boss 75 from which a pair of spaced arms 76 and 77 slant forwardly and upwardly. The outer ends of the arms 76 and 77 are provided with upturned portions 78 and 79 provided with pivots 80 and 81 adapted to carry a yoke 82 for swinging about the horizontal axis provided by the pivots 80 and 81. Centrally in the yoke 82 a vertical pivot 83 is provided, which carries a gun adapter 84. The adapter 84 has suitable fittings 85 and 86 engageable with the machine gun 87. By the construction thus far described, assuming that the support 70 and the seat 29 are locked from tilting or swivelling, it is apparent that the gun 87 and the adapter 84 may be traversed in azimuth about the pivot 83 to an extent limited only by interference of the adapter 84 with the yoke 82. Likewise, the yoke, with the gun and adapter, may be swung in elevation. These motions of which the gun is capable are useful for aiming in a limited sphere of fire and provide mechanism such that the gun may be traversed when, as shown in position E, Fig. 2, it is pointed downwardly over the side of the aircraft. It is believed that provision for traversing the gun when pointed downwardly over the side of an aircraft is a novel feature which has not been provided for in previous gun mounts. As well as the position mentioned, the gun has universal action for aiming in the limited sphere of firing in any attitude in which the gun mount, including the seat 29 and the support 70, may be placed. For instance, position B, Fig. 1, allows relatively level rearward firing; position C allows elevated rearward firing; position D allows relatively level lateral firing; position E allows depressed lateral firing; and position F allows elevated lateral firing. The gun may be turned to fire from either side of the aircraft and also forwardly, simply by swivelling the mount.

Provision for stowing the gun is afforded by means of a spring clip 87', in which the barrel of the gun may be snapped when not in use, as shown in dotted lines in Fig. 1. The clip 87' is carried by the support 70, so that the gun, the member 74, and the support 70 may all be removed as a unit from the socket 33 and stowed in the aircraft, as in position A, to allow the gunner to engage in other duties which he may be called upon to perform, without having the gun in his way.

The mechanism shown in Fig. 11 is provided for adjusting the height of the member 74 with respect to the support 70, whereby gunners of different height or stature may adjust the member 74, carrying the arm 77, the adapter 84 and the gun 87, so that said assembly is convenient for proper manipulation of the gun. This adjustment may also be used for raising the gun for high angle fire, or for lowering the gun for firing over the side of the cockpit. Said mechanism comprises a keeper 88 slidable laterally in a guide 89 carried by the member 74. The keeper is urged outwardly by a spring 90 to engage in one of several openings 91 provided in the wall of the support 70. The keeper 88 is provided with a slot within which is held a pin 92, while a slide 93, having an angled notch 94 is adapted to engage said slot and said pin 92 in such a manner that when the slide 93 is moved upwardly, the keeper 88 is forced inwardly to disengage the opening 91. A handle 95 conveniently pivoted as at 96 to an upper portion of the member 74, carries a rod 97 for raising or lowering the slide 93. In order to alleviate unnecessary effort in raising and lowering the member 74 with the gun and other auxiliary apparatus mounted thereon, a spring 98 is nested within the support 70 in such manner that it constantly resiliently urges the member 74 from the support 70. The gunner may readily move the member 74 up and down, engaging the keeper 88 within any suitable opening 91.

Between the arms 76 and 77, a pair of hooks 99 is arranged to be turned for engagement with the rearward end of the gun adapter 84 when it may be desired to temporarily hold the gun in a fixed position with respect to the support and seat.

By the above description, it will be seen that a gun mount having an extreme universality of movement is made possible, and that, particularly by the arrangement of the pintle 19, the yoke 20 and the seat 29, the gun mount as a whole may be installed in a cockpit of no greater than usual dimensions. It is known to be old in the art to provide a seat type gun mount capable of swivelling and swinging, but such prior mounts have been bulky and have required extensions in the aircraft fuselage, enlarged cockpits and the like which, in the present type of high speed military aircraft would be most undesirable, as such enlargements and the like would interfere materially with the aerodynamic efficiency of the aircraft. It will also be apparent that by the location of the swinging axis 28 about which the seat 29 may tilt, the air forces against the gunner and gun are substantially balanced. For instance, if the gun mount is in the position shown in Fig. 2, air pressure from the aircraft slipstream will address the gun and the gunner in substantially equal amounts on each side of the pintle axis, enabling the gunner to easily turn the gun mount in any direction. If the seat be tilted upwardly a substantial amount, as shown in dotted lines in Fig. 1, the gun and its support are elevated, and as such elevation takes place, the gun sweeps upwardly to lie substantially over and in line with the pintle axis; at the same time the gunner tilts below the coaming of the cockpit, so that he is out of the slipstream. Thus, the gun mount may be rotated about the pintle axis to any desired degree without air forces interfering with such movement. Traversing and elevation of the gun mount may be effectively accomplished by the gunner regardless of the attitude of the gun mount, and locking of the mount in any position of traverse or elevation may be readily and easily accomplished by the locking mechanism and its controls as described.

While I have described my invention in detail in its present preferred embodiment, it will be obvious to those skilled in the art, after understanding my invention, that various changes and

modifications may be made therein without departing from the spirit or scope thereof. I aim in the appended claims to cover all such modifications and changes.

What is claimed is:

1. In aircraft, a gunner's cockpit, a substantially vertical pintle centrally located on the floor of said cockpit, a substantially U-shaped yoke mounted for swivelling on said pintle, aligned pivots at the ends of the arms of said yoke, a seat swingable about said pivots and suspended therefrom, lying between said arms, a support adapted for carrying a gun, mounted on said seat, means for locking said yoke in any swivelling position on said pintle, means for locking said seat in any swinging position in said yoke, and a unitary device carried on an arm of said yoke for controlling both said locking means to permit of their selective operation.

2. In an aircraft gun mount including a seat adapted for swivelling and tilting, means for controlling the swivelling of said seat, means for controlling the tilting of said seat, and a device for operating both said controlling means including a bracket, a member pivoted to said bracket, mechanism for operating said tilting control means upon movement of said member about its pivot, a plunger carried by said member, and mechanism for operating said swivelling control means upon movement of said plunger with respect to said member.

3. In an aircraft gun mount, in combination, a yoke, a seat pivoted to the upper ends of said yoke for swinging, a pulley mounted for rotation on said seat, and a resilient flexible member attached to said seat, passing over said pulley and attached to said yoke for resiliently urging said seat toward one extreme of its swinging motion.

4. In an aircraft, a gun mount comprising a yoke adapted to swivel on said aircraft, an angularly swingable seat pivoted to said yoke above the seat level and lying between the arms of said yoke, and a bracket on said yoke having a handle by which a gunner may manually swing said seat to any angular position, in any swivel position of said yoke, said handle having mechanism associated therewith to enable said gunner to lock said yoke in any swivelling position and to lock said seat in any swinging position.

5. In aircraft, a support, a pair of spaced horizontal pivots carried thereby, a seat carried by said pivots for swinging in a substantially vertical plane, a member rigidly carried by said support and having a handle pivoted thereto, said handle being within easy reach of an occupant of said seat whereby such occupant may move said seat with respect to said support by exerting pressure on said handle, locking means for locking said seat in any available angular position relative to said support, and means connecting said locking means with said handle, said locking means being operated by moving said handle about its pivot.

6. In aircraft, a support having spaced pivots, a gunner's seat swingable about said pivots, a member carried by said support convenient to said gunner, said seat with the gunner being swingable by pressure imposed by the gunner on said member, locking means for locking said seat in any swinging position, and a handle for operating said locking means pivoted to said member, said handle having a central locking position and unlocking positions on either side of said central position.

7. In an aircraft gun mount including a seat adapted for swiveling and tilting, means for controlling the swiveling of said seat, means for controlling the tilting of said seat, and a unitary device for operating both said controlling means including a member movable in one direction for operating said tilting control means and a second member carried by the first member, movable relative to the first member for operating said swiveling control means.

8. In a seat type gun mount for aircraft, in combination, said aircraft having a cockpit for said mount, a relatively short substantially vertical pintle mounted centrally on the floor of said cockpit, a substantially U-shaped yoke the bottom thereof being centrally journalled on said pintle whereby said yoke may swivel thereon, substantially horizontally aligned pivots carried respectively on the upper ends of the upstanding arms of said yoke, a seat having side plates journaled in said pivots for permitting swinging of said seat in a substantially vertical plane, said seat lying between the yoke arms and over said pintle, a gun carrying support fixed to the edge of said seat and extending substantially vertically therefrom, and a reenforcing member extending from said side plates adjacent said pivots, downwardly and inwardly, for holding said gun carrying support.

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