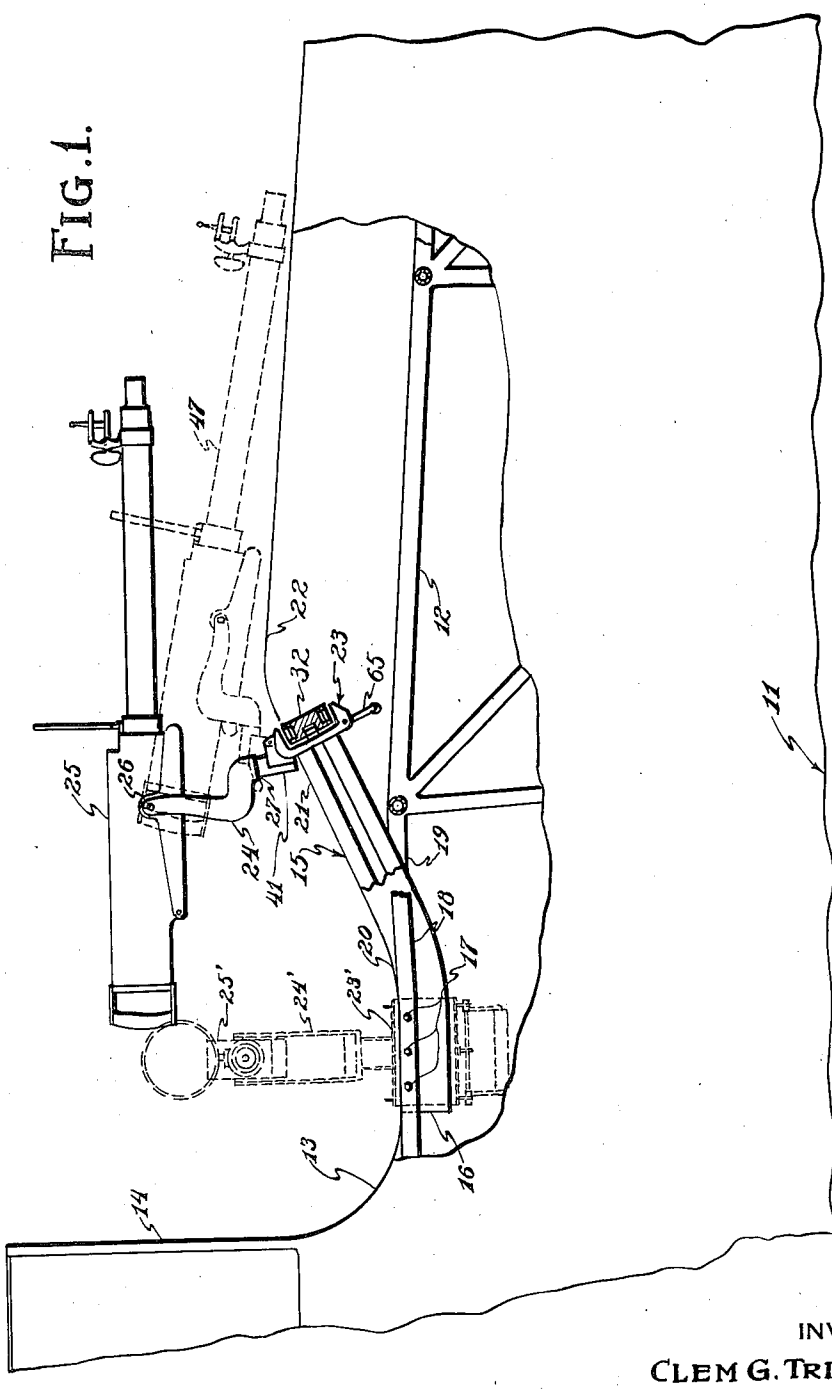
July 31, 1934. C. G. TRIMBACH 1,968,182

GUN MOUNT

Filed Nov. 26, 1932 4 Sheets-Sheet 1

FIG. 1.



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GUN MOUNT

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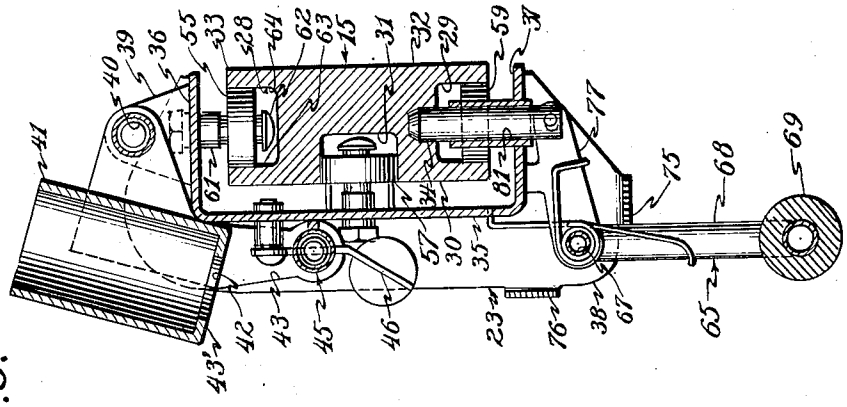


FIG. 3.

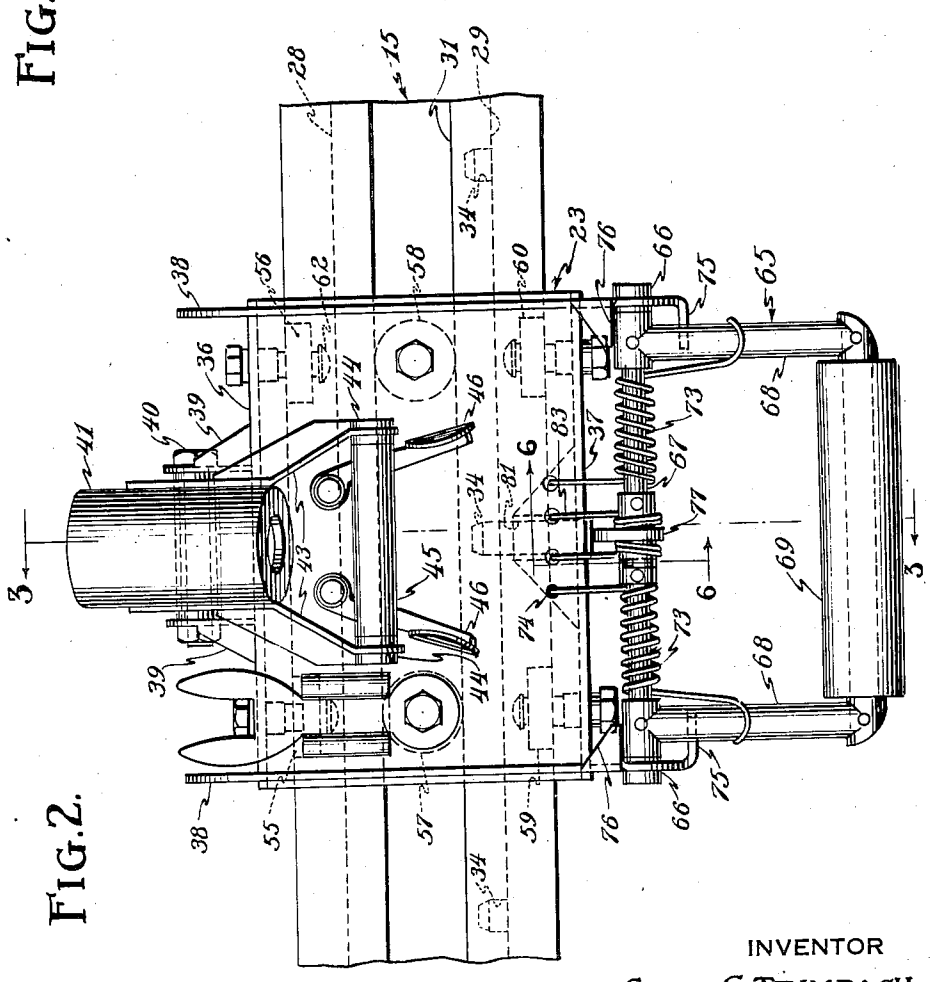


FIG. 2.

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GUN MOUNT

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FIG. 4.

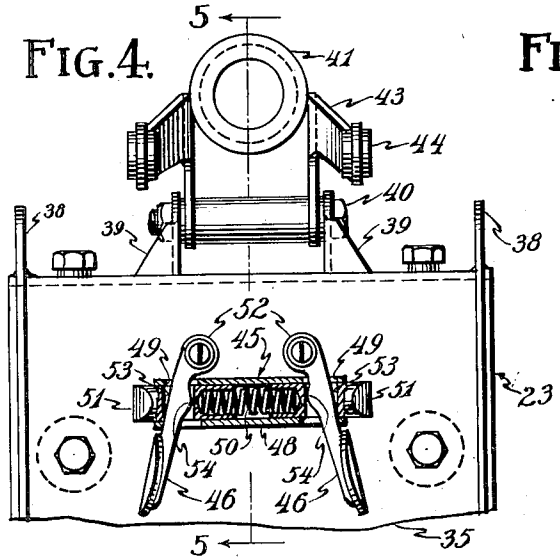


FIG. 5.

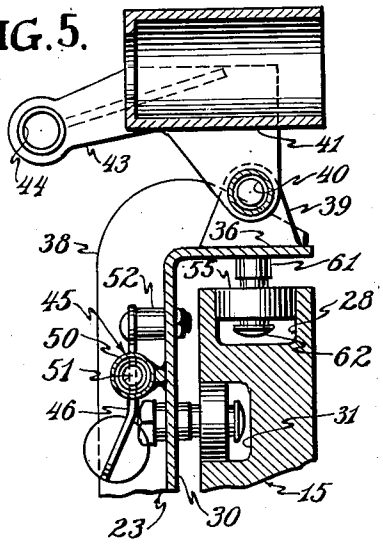


FIG. 6.

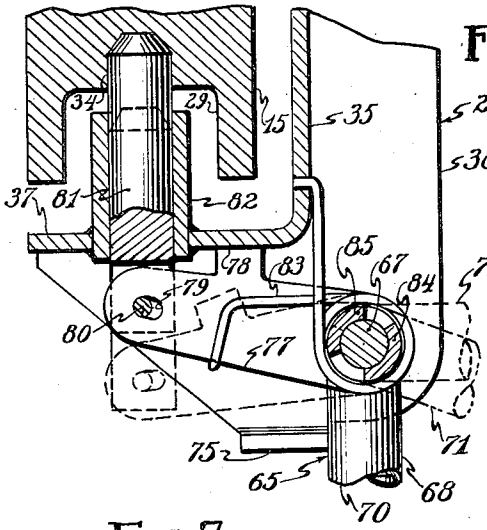


FIG. 8.

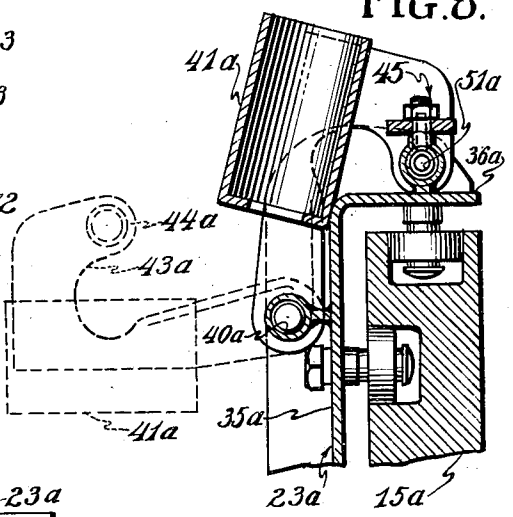
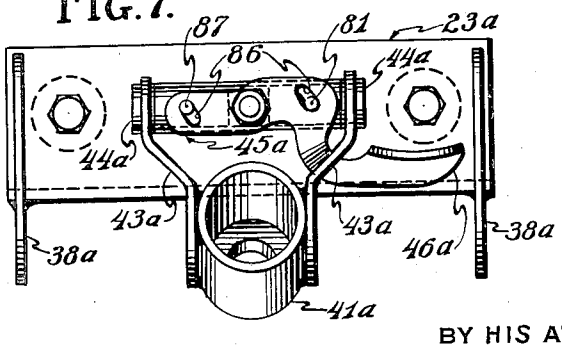


FIG. 7.



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GUN MOUNT

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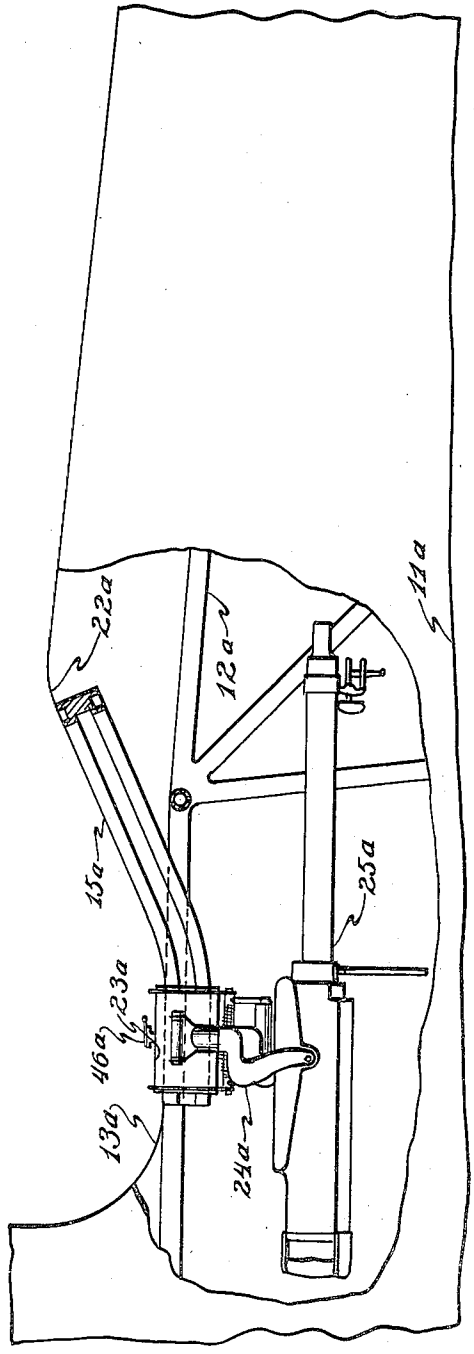


FIG. 9.

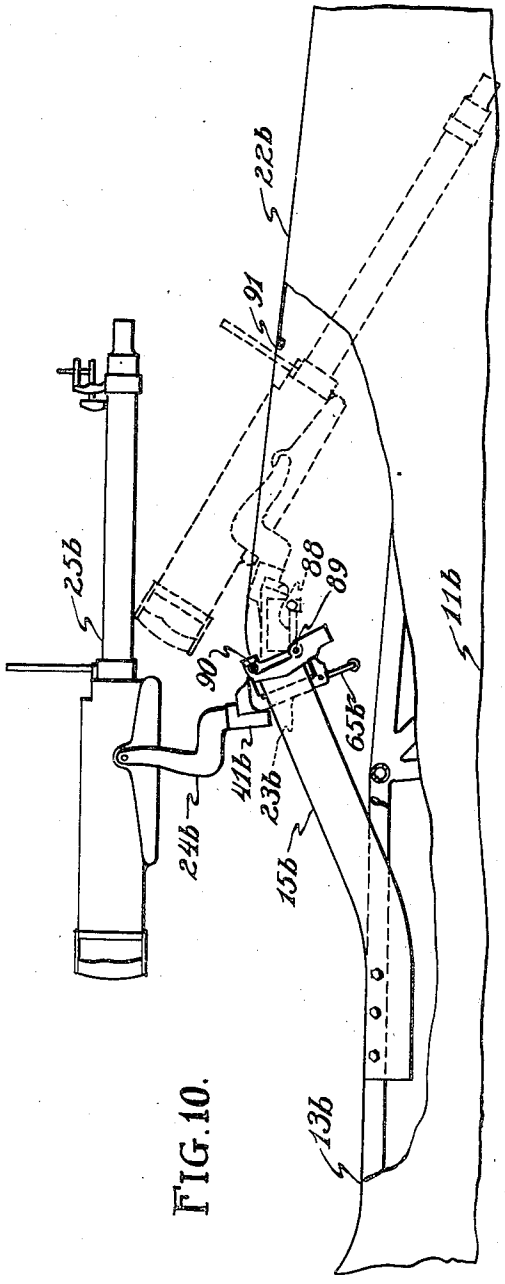


FIG. 10.

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Patented July 31, 1934 1,968,182

UNITED STATES PATENT OFFICE

1,968,182

GUN MOUNT

Clem G. Trimbach, Kenmore, N. Y., assignor to Curtiss Aeroplane & Motor Company, Inc., a corporation of New York

Application November 26, 1932, Serial No. 644,450

18 Claims. (Cl. 89—37)

This invention relates to aircraft, and more particularly to improvements in flexible gun mounts for use in military aircraft. The gun mount of my invention is particularly useful on airplanes in which one or more cockpits are provided for gunners, and wherein a wide field of fire coverage is required from each or any of said gunner's cockpits.

An object of the invention is to provide a flexible gun mount having a track installed in a cockpit, and a gun carriage movable along the track.

Another object is to provide a reinforced cockpit edge which constitutes the gun carriage track.

Other objects are:

(a) To provide a gun carriage track having curved and straight sections, conforming to the shape of the cockpit edge, and furnishing a guide for a gun carriage, thereby allowing the gun to be fired in a great number of different directions.

(b) To provide a flexible gun mount which is convenient for operation by the gunner and in which the gunner may operate the mounted gun easily, quickly and accurately.

(c) To provide a gun carriage track that is simple in conformation and resistant to damage and failure in service.

(d) To provide a gun carriage and track that will be free from likelihood of jamming.

(e) To provide a gun mount which, with its gun, may be readily stowed in the aircraft, or any recess or pockets provided for the gun, but which at the same time allows the gun to be placed in battery, or in an operative position, with a maximum of convenience and celerity.

(f) To provide a gun holding device on a carriage which may be folded.

(g) To provide carriage folding means including a hinged portion of the aforesaid track, allowing the gun and its carriage to be moved out of battery to a stowing position.

(h) To provide a novel and convenient locking device and operating handle, with which a gunner may quickly traverse the gun carriage along a track, and lock it in any desired position.

(i) To provide a gun carriage track which may form a part of the structural bracing of the aircraft.

Further objects will be apparent from a reading of the subjoined specification and claims and from a consideration of the accompanying drawings.

Generally, the invention comprises a grooved track of metal which is adapted to form the edge of a gunner's cockpit in an aircraft. Heretofore, gun mounts have formed no part of the cockpit edge unless, for convenience, the edge of a cockpit has been extended to a circular gun mount ring. In such construction, however, the formation of the cockpit edge is so altered that desirable streamlining of the aircraft fuselage is lost, since the gun mount ring has been a separate structure not designed with the idea of improving streamline cockpit conformation. The gun mount track of this invention may be curved or straight, or both, and may be adapted to make the best streamline shape for the fuselage. At the same time, it forms a sturdy reinforcement at the cockpit edge, to which the fuselage covering may be attached. Likewise, the track may form part of the structure of the fuselage.

On this track is mounted a gun carriage provided with anti-friction rollers so that the carriage may be moved easily and quickly along the entire length of the track, and hence around the periphery of the cockpit. Usually, a normal cockpit is provided with a high rear portion and lower middle portions, and by adapting the track shape to such a cockpit, a further advantage is gained, since, when the aircraft is moved, the forwardly and downwardly slanting track allows the force of gravity to assist the gunner in moving the gun from a rearward position to a forward position, which movement is usually impeded by the blast of air from the slipstream impinging upon the gun. Conversely, when the gun on its carriage is moved from a forward position to a rearward position, the slipstream blast assists in moving the carriage up the rearward slant of the cockpit edge to a rearward position.

The gun carriage is provided with a novel operating handle and locking device, with which, by depressing the handle, the gunner may lock the carriage in any desired position along the track. By raising the handle, the carriage is unlocked from the track, and the handle may be utilized in moving the carriage to any new position.

In addition, the carriage is provided with a socket in which the gun and its adapter or holding device may be set, and the socket is hinged to the carriage so that, when the gun is not being operated, it may be stowed in some convenient recess in the fuselage, or may be folded to a stowing position within the cockpit itself. I provide an alternative stowing means comprising a hinged section in the track. The gun carriage may be moved to this hinged section, and by releasing a locking device which normally holds the hinged track section in alignment with the balance of the track, the hinged section may be folded along

with the carriage and gun to a stowing position in the aircraft.

For a clearer understanding of my invention, reference may be made to the drawings, in which similar numbers indicate similar parts, and in which:

Fig. 1 is a side elevation, partly broken away, of an airplane fuselage having a cockpit and provided with the gun mount;

Fig. 2 is an elevation of the gun carriage and a portion of the track, as viewed from within the cockpit;

Fig. 3 is a section on the line 3—3 of Fig. 2;

Fig. 4 is an elevation of a portion of Fig. 2, showing the gun carriage with its gun holding device in a different position of adjustment;

Fig. 5 is a section on the line 5—5 of Fig. 4;

Fig. 6 is an enlarged section on the line 6—6 of Fig. 2;

Fig. 7 is a plan of a gun carriage showing an alternative embodiment of a folded gun holding device;

Fig. 8 is a section of a portion of the carriage, track and gun holding device shown in the embodiment of Fig. 7;

Fig. 9 is an elevation partly broken away, of an airplane fuselage having a cockpit and showing a gun and the gun holding device of Figs. 7 and 8 in the folded position; and

Fig. 10 is an elevation, partly broken away, of an airplane fuselage having a cockpit and an alternative embodiment of the gun mount.

Referring to Fig. 1 of the drawings, 11 is a portion of an aircraft fuselage having a structural framework 12 and having formed therein in conjunction with the structural framework 12 a cockpit 13. The forward end of the cockpit 13 is provided wih a windshield 14 for the protection of the occupant of said cockpit. The cockpit is furnished for a gunner and is provided with a track 15. Ends 16 of the track 15 are attached as by bolts 17 to a fuselage longéron 18 on the near side of the fuselage, and to a longéron 19 on the far side of the fuselage. The track 15 curves rearwardly and upwardly as at 20 and thence curves inwardly at 21 around the rearward edge of the cockpit 13. A fuselage covering 22 lies adjacent the rearward edge of the track 15 throughout its length, and by curving the track according to the most desirable contour of the edge of the cockpit 13, none of the gain effected by proper aerodynamic cockpit design is lost. Yet, by the natural contour of the cockpit edge and the conformation of the track 15 thereto, certain gains for the operation of the machine gun mount, to be described hereafter, are effected.

A gun carriage designated in its entirety as 23, is adapted to move on rollers along the full length of the track 15. The gun carriage holds an adapter or gun holding device 24 at the upper end of which is pivoted a machine gun designated in its entirety as 25. The gun 25 is adapted to turn about the horizontal pivot 26 at the upper end of the gun holding device 24, while the gun holding device 24 is adapted to pivot about a substantially vertical axis 27 formed as part of the gun carriage 23. Thus, the gun may be traversed in azimuth and in elevation with relation to the gun carriage 23, and hence with relation to the fuselage 11. Fig. 1 indicates the gun 25' with its gun holding device 24' and the carriage 23' in a different position of adjustment along the track 15.

Referring now to Figs. 2, 3, 4, 5 and 6, the detailed construction of the track 15 and of the gun carriage 23 will be described. The track 15 is of substantially rectangular cross section and has formed in its upper and lower faces, grooves 28 and 29, respectively. Also, the inner face 30 of the track 15, has formed therein a groove 31, the inner face 30 being that face which lies within the cockpit. The outer face 32 of the track 15 faces away from the cockpit 13 and is adapted at its upper edge 33 to abut the fuselage covering 22. In the bottom of the lower groove 29, a series of cylindrical openings 34 are formed in spaced relation, the purpose of which will hereafter be described. The gun carriage 23 is of channel section, with its web portion 35 substantially parallel to the track face 30. One flange portion 36 is substantially parallel to the upper track face, and the other flange portion 37 is substantially parallel to the lower track face. Reinforcing yokes 38 serve to retain the channel-like carriage 23 in its proper conformation. Upon the upper flange 36 of the gun carriage 23 is mounted a pair of aligned pivots 39 which support a substantially horizontal pin 40. Upon said pin 40 is mounted for pivoting, a socket 41 into which the gun holding device 24 (Fig. 1) may be inserted. The lower end of the gun holding device (not shown) is simply a cylinder formed to slip within the cylindrical socket 41, and having spring clips adapted to pass through an opening 42 and to clamp upon an edge 43' of the opening 42. The socket 41 is also provided with brackets 43 having pierced ends 44 which extend downwardly around the carriage 23. The ends 44 are adapted to engage a locking device 45 mounted on the web 35 of the carriage 23. When the brackets 43 are held by the locking device 45, the socket 41 is held in a rigid upright position, which position is used when the gun 25 is in operation. By releasing the locking device 45 by means of releasing levers 46, the socket 41 may be tipped forwardly around the pin 40, carrying the gun holding device 24 and the gun 25 along with it, the whole to assume a position indicated in Fig. 1 by dotted lines as 47. Such position may be utilized by the gunner when the gun is not in service, and allows it to be folded in an out of the way stowing position so as not to interfere with other duties or operations which the gunner may be called upon to perform.

The details of the locking device 45 will now be described, and reference may be made to Figs. 4 and 5. A substantially horizontal sleeve 48 is attached to the inner face of the web 35 of the carriage 23, and has formed therein, near the ends thereof, a pair of vertically extending slots 49. Within the confines of the sleeve 48 is contained a spring 50, tending to eject a pair of latches 51 inserted in the ends of the sleeve 48. The latches 51 are each formed with beveled ends, so that, when the socket 41 is swung around the pivot pin 40, the latches may engage the bracket ends 44. Upon registry of the latches 51 with the ends 44, the spring 50 impels the latches outwardly, and firmly locks the socket 41 in battery position. Means are provided for compressing the spring 50 and for retracting the latches 51 to permit release of the socket 41 so that it may be folded, as previously described. Such means comprise the previously mentioned releasing levers 46 which are pivoted as at 52 to the carriage 23. The levers 46 pass through the sleeve slots 49 and through slots 53 formed in the latches 51. Cam surfaces 54 on the levers 46 engage the latches 51 at the inner boundary of the slots 53. By this structure, squeezing together of the levers 46 allows engagement of the cams 54 with the

latches 51, drawing the latches together, out of engagement with the bracket ends 44.

The carriage 23, as shown in Figs. 2, 3 and 5, is furnished with rollers engaging in the grooves 28, 29 and 31 of the track 15. A pair of spaced rollers 55 and 56 are mounted for rotation inwardly of the upper flange 36 of the carriage 23 to engage in the groove 28. A pair of rollers 57 and 58, spaced on the inner web face 35 of the carriage 23, engages in the groove 31, and a pair of rollers 59 and 60, mounted for rotation inwardly of the lower flange 37 of the carriage 23, engages in the groove 29. By these six rollers 55 to 60, inclusive, the carriage 23 is rigidly held with relation to the track 15, except that the rollers permit of easy movement of the carriage 23 along the track. By the mounting of the rollers, binding of the rollers within the grooves is prevented. A description of the mounting of one roller, as 55, will suffice for all, as they are all similarly attached to the carriage 23. The roller 55 comprises a ball bearing, the inner race of which is slidably held on a shaft 61 firmly attached to the carriage 23. A head 62 on the shaft 61 prevents the roller 55 from dropping off. The outer race of the roller 55 forms a bearing surface against one or the other surfaces 63 and 64 defining the groove 28.

An operating and locking device generally designated as 65 is attached to the carriage 23 so that said carriage may be moved along the track 15 and may be locked thereto at a plurality of different positions. The details of construction of the locking and operating mechanism are shown in Figs. 2, 3 and 6.

At the lower portion of the yokes 38 on the carriage 23, bearings 66 are provided for holding a substantially horizontal shaft 67. Upon the shaft 67, near its ends, is a pair of outwardly extending arms 68, bridged at their outer ends by a handle 69. By such mounting, the handle 69 may be moved upwardly or downwardly about the bearings 66 to assume the several positions 70, 71 and 72 shown in Fig. 6. Helical springs 73 wrapped around the shaft 67, each have one end bearing upon the arms 68 and the other end hooked in openings 74 on the carriage 23, and are organized to constantly resiliently urge the handle 69 to its lowermost position, so that it may abut the stops 75 formed as extensions at the lowermost portions of the yokes 38. Stops 76 are also provided as extensions of the yokes 38 to limit the extent to which the handle 69 may be moved in an upward direction. Subtantially at the center of the shaft 67 and pivoted for rotation with respect thereto, is a link 77 extending under the carriage 23. Said link is furnished with a stop 78 adapted to abut the bottom of the carriage 23 to limit its motion in an upward direction. At the other end of the link 77 is formed a slot 79 adapted to engage a pin 80 attached crosswise on a plunger 81. This plunger is adapted to slide vertically to a limited extent within a bushing 82 let through the bottom flange 37 of the carriage, the bushing 82 forming a bore in which the plunger 81 may slide. In its upward position, shown in Figs. 3 and 6, the plunger 81 is adapted to engage one of the cylindrical openings 34 formed in the bottom of the track groove 29. When the plunger 81 is withdrawn from the opening 34, as shown by dotted lines in Fig. 6, the carriage may be traversed along the track 15. A pair of springs 83 is adapted to bear at one end on the link 77, and at its other end on the carriage 23, to resiliently urge the link 77 toward an upward position, and hence to urge the plunger 81 toward engagement with the track 15, or with one of the openings 34 formed therein. The link 77 is furnished with a dog 84, which extends approximately one-third the distance around the circumference of the shaft 67. The shaft 67 is provided with a dog 85, also extending around approximately one-third of the circumference of the shaft. By raising the handle 69 to the position 71 shown in Fig. 6, the shaft 67 is turned so that one face of the dog 85 abuts one face of the dog 84. Upon further raising of the handle 69, engagement of the dogs 84 and 85 causes turning of the dog 84 with the dog 85 and withdrawal, through the link 77, of the plunger 81 from engagement with the track 15. The position of the handle 69 when the plunger 81 is fully withdrawn, is indicated as 72 in Fig. 6.

As the gunner operates the carriage, he raises the handle 69 to unlock the carriage 23 from the track 15 and then, by pushing the handle 69 laterally one way or the other, he slides the carriage 23 along the track 15. When he desires to lock the carriage in a new position, he drops the handle to a position such as 70 or 71 in Fig. 6, and continues to slide the carriage. In this attitude, the plunger 81 will bear against a portion of the track intermediate the locking openings 34. On continued sliding of the carriage 23, the plunger 81 will engage in an opening 34, and by virtue of the spring 83, the plunger 81 will be snapped into the opening 34 and will lock the carriage on the track. By the dog mechanism above described, the gunner need give little attention to locking of the carriage on the track, as the springs take care of proper engagement and eliminate the necessity for his careful registering of the plunger 81 with an opening 34 before he thrusts the handle 69 down to lock the carriage.

In Figs. 7, 8 and 9, an alternative construction for the folding of the gun holding device 24*a* and the gun 25*a* with respect to the carriage 23*a*, is disclosed. By this alternative construction, the carriage 23*a* may be slid to an extreme position adjacent one end of the track 15*a* (Fig. 9), the releasing lever 46*a* may be operated, and the gun 25*a* with the gun holding device 24*a* may be folded within the cockpit of the aircraft. The carriage 23*a* and the track 15*a* are identical in construction with that previously described with the exception that on the carriage 23*a*, the pivot for the socket 41*a* is on the web 35*a* of the carriage, and the mechanism for holding the gun holding device in battery is on the upper flange 36*a* of the carriage. The mechanism of latches 51*a* and brackets 43*a* is substantially the same as that previously described, but for convenience, only one lever 46*a* is used for release of the latches 51*a* in place of the two used in the previously described embodiment. The lever 46*a* is provided with a pair of cam slots 86 which engage a pair of pins 87 attached to the latches 51*a*. The lever 46*a* is centrally pivoted between the cam slots 86, so that a slight rotative movement of said lever about its pivot, by means of the cam slots 86 and the pins 87, withdraws the latches 51*a* out of engagement with the bracket ends 44*a* and the brackets 43*a*, whereupon the socket 41*a* may be dropped inwardly about the pivot 40*a*.

Another alternative embodiment of the folding mechanism for the gun holding device is shown in Fig. 10, wherein a track 15*b*, similar to the track 15 previously described, is provided with a short hinged section 88 intermediate its length and pivoted thereto as at 89. A carriage 23*b*, having a carriage operating and locking de-

vice 65b, similar to that already described, has the socket 41b rigidly mounted thereon without the pivots and latching devices provided in the previous embodiments. A simple release mechanism may be provided at 90, similar in construction to the latching devices previously described, for holding the hinged section 88 in continuous relationship with the balance of the track 15b. By releasing the mechanism at 90, and by folding the hinged section 88 along with the carriage 23b, the gun holding device 24b and the gun 25b may be dropped to a stowing position in a suitable recess 91 formed in the covering 22b of the fuselage 11b.

The gun mount above described has a high degree of utility for the major functions in the use and operation of an aircraft machine gun. By the construction of the track and carriage, when the gun is in battery, the gun may be pointed in a multitude of different directions. By sliding the carriage forwardly toward the lower portions of the track, the gun may be pointed laterally, forwardly, upwardly, or downwardly over the side of the fuselage. By traversing the carriage toward the rearward raised portion of the track, the gun may be pointed upwardly at high angles with an adequate degree of lateral traverse. Structure for the other functions provided by the various embodiments of folding arrangement for the gun and its gun holding device, allows for quick and convenient stowage of the gun when it is not being actively used. Such stowage is desirable and well-nigh essential to prevent damage to the gun and to allow for easy adjustment and inspection thereof without actually detaching it from its gun mount. In the operation of military aircraft, in cross country flights, when the aircraft is flying from its home base to the scene of maneuvers, the gunner is occupied with duties such as observation, radio operation, etc., and would be hampered by the constant presence of the gun. In such flying, the gun should be stowed to prevent damage to it and to give greater freedom of movement to the gunner. Upon reaching the scene of military operation, the gun may be quickly placed in battery, and by the maneuverability of the carriage, the gunner has the benefit of a wide aiming sphere for the gun. The gunner is able to operate the mount with a single control handle so that he may accomplish his aiming and firing with a minimum of mechanical complication. In the past, the gun has frequently been carried in the cockpit, detached from the mount, so that the gunner must install it on the mount when he wants to use it. This is awkward and troublesome, and involves the hazard of dropping and damaging the gun. In my invention, the gun is at all times attached to the mount, thus eliminating such a hazard.

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 streamlined fuselage having formed therein a cockpit, the edge of which is curved in side elevation and is reinforced to provide a track, and a gun carriage adapted to move along said track.

2. In aircraft, a fuselage having formed therein a cockpit, the edge of which has straight portions and portions curved in both plan and side elevation, and which said edge is reinforced to form a track, and a gun carriage freely movable along the whole of said track and embracing the exposed portions thereof.

3. In aircraft, a fuselage, a cockpit in said fuselage, a gun mount including a track adjacent the edge of said cockpit, a gun receiving recess formed in said fuselage, a pivoted section of said track opposite said recess, a carriage movable along said track and adapted to normally hold the gun in operating position, and a locking device associated with said pivoted track section, which, upon release thereof, when said carriage is on said track section, permits said track section, said carriage and the gun to be moved to a stowing position within said recess.

4. In combination, an airplane including a fuselage, a gun, a track secured to said airplane for movably supporting said gun, means for mounting said gun on said track, and a hinged section in said track to which said mounting means may be moved, said hinged section being adapted to swing said gun to a stowing position.

5. In an aircraft gun mount, a track of substantially rectangular cross section, a substantially rectangular groove in each of three faces of said track, a gun carriage embracing said three track faces, and rollers carried by said carriage and engageable within said grooves, the plane of rotation of each roller being substantially parallel to the corresponding track face with which it is associated, and each said roller lying within its corresponding groove, whereby said carriage may closely embrace said track.

6. In an aircraft gun mount, an irregularly shaped one-piece track having a plurality of longitudinal grooves formed in certain of the side faces thereof; a carriage adapted to be traversed along said track comprising a channel member embracing part of said track and subtending a relatively short section of said track, rollers carried on the inner faces of said channel member for engagement with the side faces of said grooves; a handle carried by and pivoted to said channel member; and mechanism selectively operable under the influence of said handle for locking said channel member against movement along said track.

7. In an aircraft gun mount, a track having curves in horizontal and vertical planes, and a gun holding carriage freely movable along said track, said carriage including a plurality of rollers engaging with said track, each said roller being axially movable with respect to said track in certain positions of said carriage thereon.

8. In aircraft, in combination, a streamlined fuselage having a cockpit, the edge of the latter, having an irregular contour including curves in horizontal and vertical planes, said edge thereby lying in the streamline of said fuselage, a track forming a reinforcement for said cockpit edge and having curves complementary thereto, and a gun carriage freely movable along the entire length of said track.

9. In aircraft, a streamlined aircraft fuselage having an upper surface curved in cross section and having formed therein a cockpit, the edge of said cockpit lying in the curved plane of the upper fuselage surface, a track curved in complement to the curved cockpit edge whereby said track is curved both in plan and in side eleva-

tion, and a gun carriage adapted to move along said track.

10. In an aircraft body having a cockpit therein, the edge of said cockpit being curved in shape and being appreciably lower toward the sides of said cockpit than at the end thereof, a curved track complementary in shape to the cockpit edge so that track portions adjacent the cockpit side are lower than track portions adjacent the cockpit end, and a gun carriage movable throughout the length of said track.

11. In a flexible gun mount for aircraft, a one-piece track substantially rectangular in cross section and having longitudinal grooves formed in the top, bottom and the inner side face thereof, and a carriage comprising a channel member having flanges substantially parallel to and embracing respectively the upper and lower track faces and having a web lying substantially parallel to the inner track face and rollers carried on the inner sides of each said flange and web for engaging the grooves formed in the corresponding track face.

12. In aircraft, a track for a flexible gun mount comprising a one-piece substantially rectangular member curved in its length both in plan and in elevation, said member having grooves formed in certain of the side faces thereof, and a carriage movable along said track and having members engaging said grooves.

13. In aircraft, a gun mount having a grooved track of substantially rectangular section and a carriage comprising a channel member within the embrace of which the track is adapted to fit, the upper and lower flanges of said channel, and the web thereof, having inwardly projecting means for engaging the grooves in adjacent track faces.

14. An aircraft gun mount including a track and a carriage movable therealong, means for locking said carriage against movement along said track, a handle lying below said carriage and substantially parallel to the track for traversing said carriage along the track, and means responsive to upward movement of said handle for unlocking said locking means, whereby said carriage may be unlocked, traversed and locked by the operation of said handle.

15. An aircraft gun mount including a track and a gun carriage movable therealong, a handle movable with said carriage for traversing the carriage along the track, and movable with respect to said carriage, and means for locking and unlocking said carriage with respect to said track, responsive in its operation to movements of said handle with respect to said carriage.

16. An aircraft gun mount including a substantially rectangular one-piece track having grooves formed therein and a channel-shaped gun carriage embracing three sides of said track, means carried on the inner faces of said channel engaging said track grooves, a pair of spaced arms pivoted to said carriage, a handle joining said arms, said handle, upon lateral movement thereof, being arranged to traverse said carriage on said track, and means responsive to lowering of said handle and arms about the pivots of the latter for locking said carriage against traversing movement.

17. In an aircraft gun mount having a carriage slidable along a track, and a unit handle on said carriage organized for traversing said carriage along the track, said handle being movable with respect to said carriage for locking and unlocking said carriage with respect to said track.

18. In an aircraft gun mount having a substantially rectangular track and a channel-shaped carriage embracing three sides of said track and movable therealong, a gun carrying member fixed to adjacent outer faces of said channel, the attachment on one face comprising a hinge about which said member is adapted to swing, and the attachment on the other face comprising a releasable lock.

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