Oct. 1, 1935. I. J. MIRANDA 2,016,211

AIRCRAFT ARMAMENT

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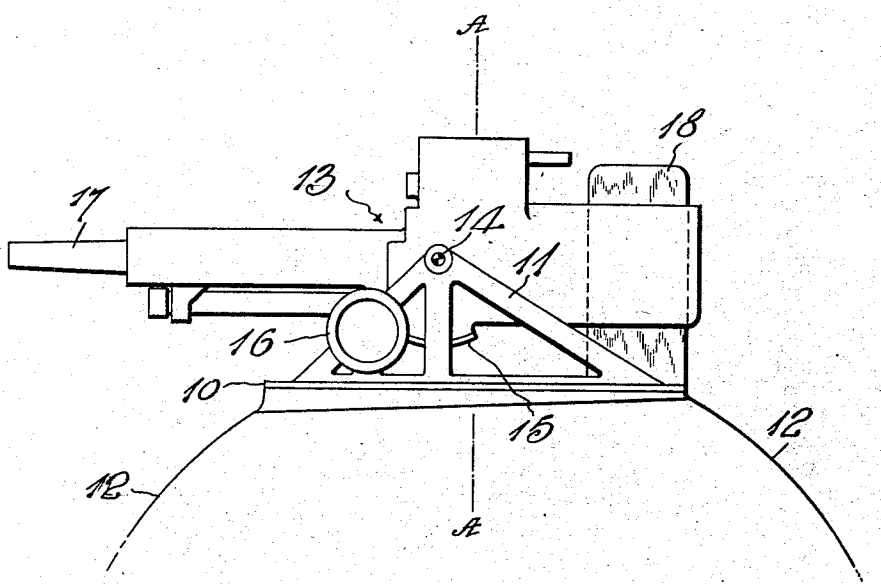


FIG. 1.

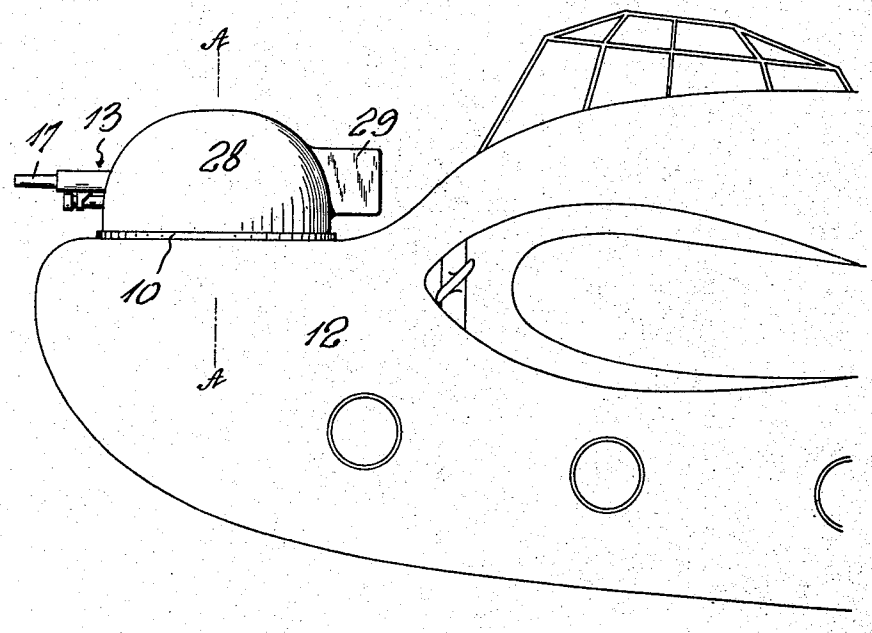


FIG. 2.

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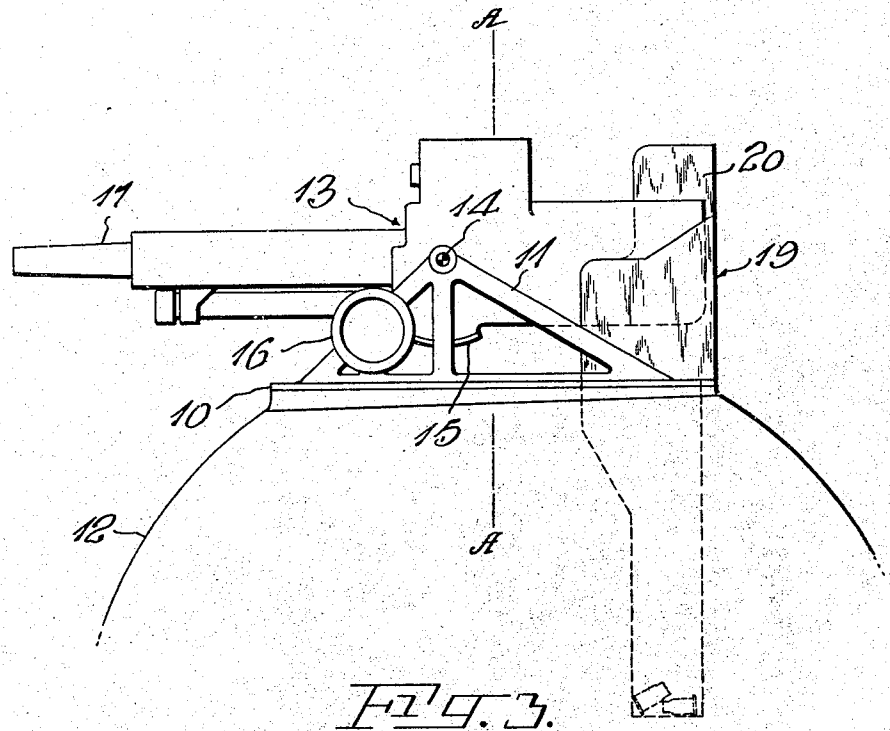


FIG. 3.

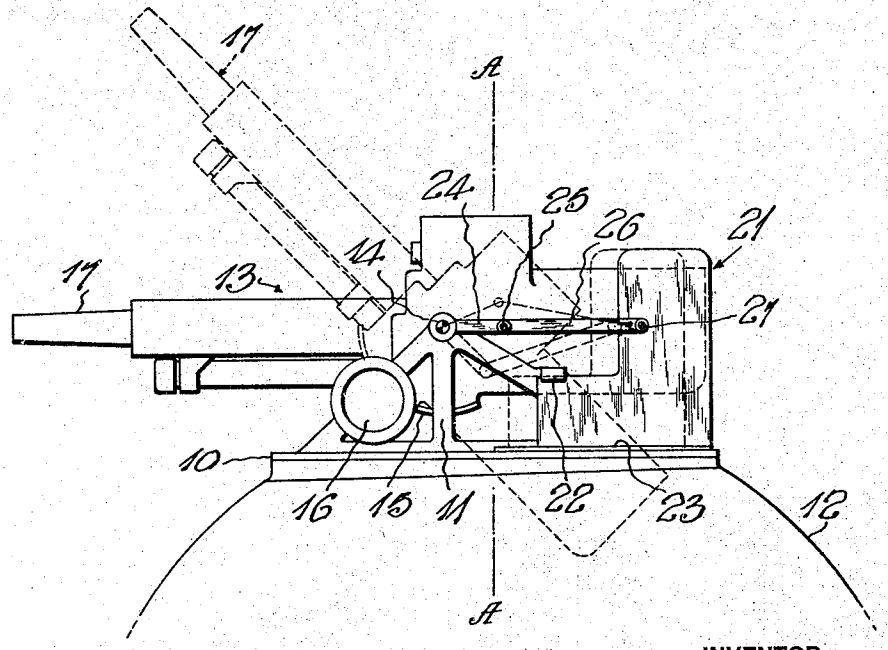


FIG. 4

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# UNITED STATES PATENT OFFICE

2,016,211

## AIRCRAFT ARMAMENT

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Application November 2, 1934, Serial No. 751,218

5 Claims. (Cl. 89—37)

The invention relates to guns for rotatable mounting on aircraft in such positions that they are totally or partially located in the wind stream. Heretofore, the wind pressure has acted unequally at opposite sides of the vertical pivotal axes of such guns and has therefore resisted and materially interfered with traversing of them about their pivots. It is the principal object of my invention however, to overcome this difficulty by the provision of properly located, proportioned and shaped balancing means which insures equalizing of the effect of wind pressure at opposite sides of the vertical pivot.

The above-mentioned resistance decreases as the gun nears the pivotal axis upon being elevated, and increases as the gun is again depressed, and a further object is to provide for automatically adjusting the aforesaid balancing means during such elevation and depression to vary its effect as required.

With the foregoing in view, the invention resides in the novel subject matter hereinafter described and claimed, description being accomplished by reference to the accompanying drawings.

Figs. 1, 2, 3 and 4 are side elevations showing different forms of the invention and it may be considered that the guns shown in Figs. 1, 3 and 4 are mounted in the rear cockpit of an aircraft whereas in Fig. 2 the gun is primarily within a turret carried by the nose of the fuselage, hull or the like.

In Figs. 1, 3 and 4, 10 denotes a turntable by means of which the gun mount 11 is connected with the aircraft 12. 13 has reference to the gun proper which is mounted by means of horizontal trunnions 14 upon the mount 11. Any preferred means may be provided for turning the turntable 10 about its vertical axis to traverse the gun 13, and any desired provision may be made for elevating and depressing the gun. Parts of elevating and depressing means are shown at 15 and 16, the former being a segment meshing with a pinion which may be turned by the member 16, said member 16 being a hand-wheel.

Due to the extent to which the gun barrel 17 projects from the vertical axis of the turntable 10, when the gun is disposed in any position except one extending truly longitudinally of the aircraft, the wind pressure against said barrel, unless counteracted, would seriously resist turning of the gun and turntable about the vertical axis of the latter. Therefore, I make novel provision at the opposite side of the turntable axis for counteracting the effect of the aforesaid wind pressure so that the turntable and gun may be turned with ease about said turntable axis.

In Fig. 1, the counteracting means is in the form of a vane 18 fixedly secured to a suitable part of the gun mount 11. This vane is so located, proportioned and shaped relative to the barrel 13 and any other parts similarly receiving the wind pressure, that wind pressure at one side of the turntable axis tending to resist traversing of the gun in one direction, is balanced and counteracted by the wind pressure tending to retard rotation in the other direction, the result being that the gun may be traversed without being retarded by wind resistance.

In Fig. 3, a receiver 19 is provided for the empty shell cases ejected from the gun 13, and a portion of this receiver is exposed to wind pressure to counteract the effect of such pressure on the forward portion of the gun, one side wall of said receiver being extended upwardly in the form of a vane 20.

In Fig. 4, the balancing vane 21 is slidable toward and from the turntable axis, being mounted in appropriate guiding means 22 and 23. One of the trunnions 14 is provided with a crank arm 24 which is pivoted at 25 to a link 26, this link being pivoted at 27 to the vane 21. As the gun barrel is elevated, the crank arm 24 and link 26 move the vane 21 toward the turntable axis and as the barrel is again lowered, said crank arm and link move said vane away from said axis. Thus, as the barrel is elevated and the effect of the wind pressure against it is correspondingly lessened, the effectiveness of the vane 21 is correspondingly decreased, and vice versa, so that the wind pressure will have no retarding effect upon rotation of the gun about its vertical axis.

In Fig. 2, the gun barrel 13 projects beyond a turret 28 carried by the turntable 10, and to counteract the effect of wind pressure against the projecting portion of the gun, a balancing vane 29 is secured to said turret at the side of the turntable axis opposite the projecting gun portion.

In the several views, the dot and dash line A—A represents the vertical axis about which the gun is rotatable.

It will be seen from the foregoing that provision has been made for expeditiously attaining the objects of the invention, but attention is invited to the fact that within the scope of said invention as claimed, numerous variations may be made.

I claim:

1. In an aircraft armament, a gun rotatable about a vertical axis and having means whereby it may be elevated and depressed, said gun having a portion subjected to wind pressure at one side of said axis, a balancing vane subjected to wind pressure at the opposite side of said axis, means mounting said vane for rotation with said gun about said axis and for movement toward and from said axis, and means operatively connecting said gun and vane for automatically moving said vane toward said axis as the gun is elevated, and away from said axis as the gun is again depressed.

2. In an aircraft armament, a gun mounted upon a vertical axis and upon a horizontal axis, said gun having a portion subjected to wind pressure at one side of said vertical axis, a balancing vane subjected to wind pressure at the opposite side of said vertical axis, means mounting said vane for rotation with said gun about said vertical axis and for movement toward and from said vertical axis, a crank arm rigidly connected with the gun and swingable about said horizontal axis as the gun is elevated and depressed, said crank arm projecting rearwardly from said horizontal axis, and a link connecting said crank arm with said vane for moving said vane toward said vertical axis as the gun is elevated, and away from said vertical axis as the gun is again depressed.

3. In an aircraft armament, a gun mounted upon a vertical axis and upon a horizontal axis, said gun having a portion subjected to wind pressure at one side of said vertical axis, a balancing vane subjected to wind pressure at the opposite side of said vertical axis, means mounting said vane for rotation with said gun about said vertical axis and for movement toward and from said vertical axis, a crank arm rigidly connected with the gun and swingable about said horizontal axis as the gun is elevated and depressed, and a link connecting said crank arm with said vane for moving said vane toward said vertical axis as the gun is elevated, and away from said vertical axis as the gun is again depressed.

4. In an aircraft armament, a gun rotatable about a vertical axis and having a trunnion about which it may be elevated and depressed, said gun having a portion subjected to wind pressure at one side of said vertical axis, a balancing vane subjected to wind pressure at the opposite side of said vertical axis, means mounting said vane for rotation with said gun about said vertical axis and for movement toward and from said vertical axis, and means operatively connecting said trunnion and said vane for automatically moving said vane toward said vertical axis as the gun is elevated, and away from said vertical axis as the gun is again depressed.

5. In an aircraft armament, a gun rotatable about a vertical axis and having a trunnion about which it may be elevated and depressed, said gun having a portion subjected to wind pressure at one side of said vertical axis, a balancing vane subjected to wind pressure at the opposite side of said vertical axis, means mounting said vane for rotation with said gun about said vertical axis and for movement toward and from said vertical axis, a crank arm secured to said trunnion, and a link operatively connecting said crank arm with said vane for automatically moving said vane toward said vertical axis as the gun is elevated, and away from said vertical axis as the gun is again depressed.

IGNACIO J. MIRANDA.