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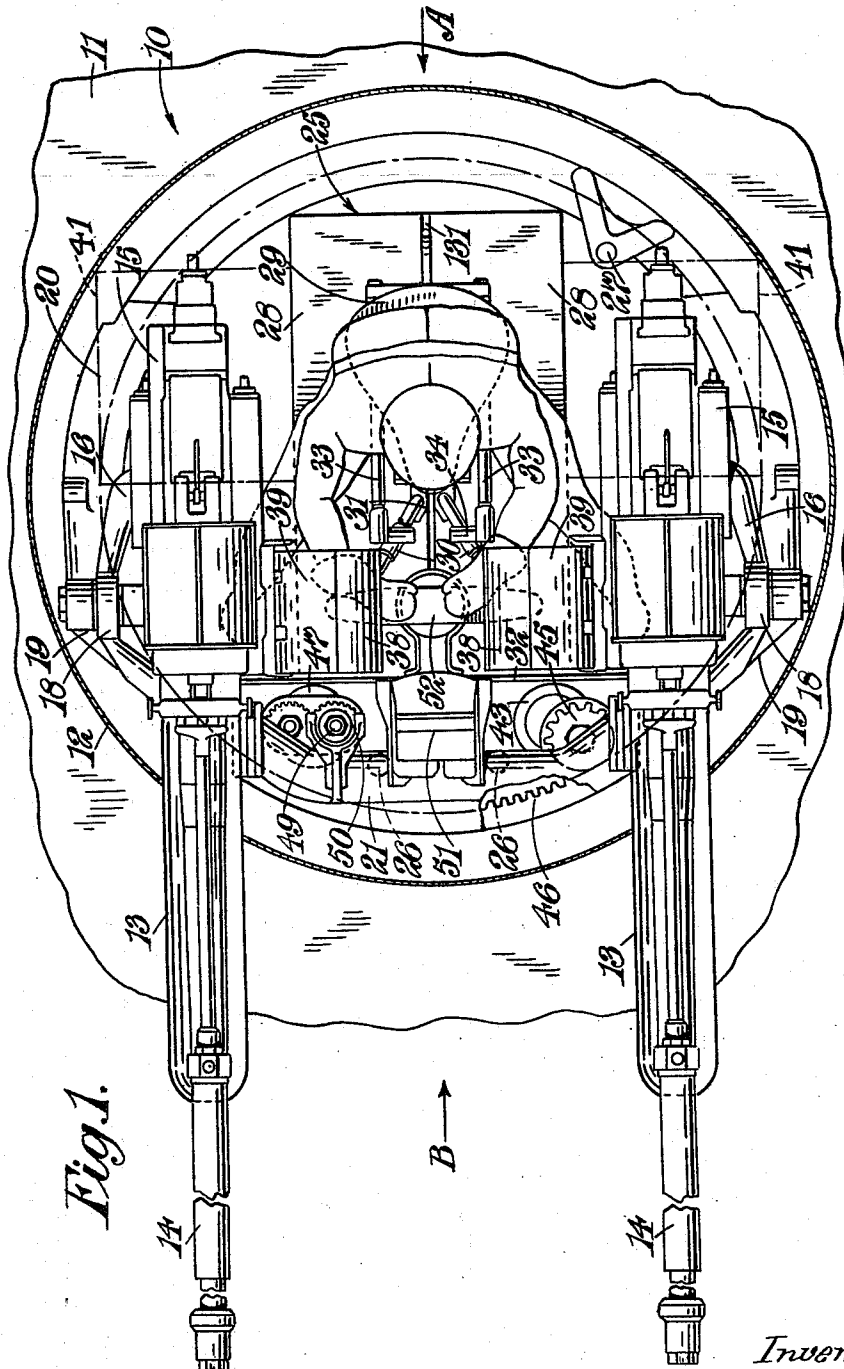
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2,519,129

POWER OPERATED GUN TURRET FOR AIRCRAFT

Filed March 23, 1944

4 Sheets-Sheet 1



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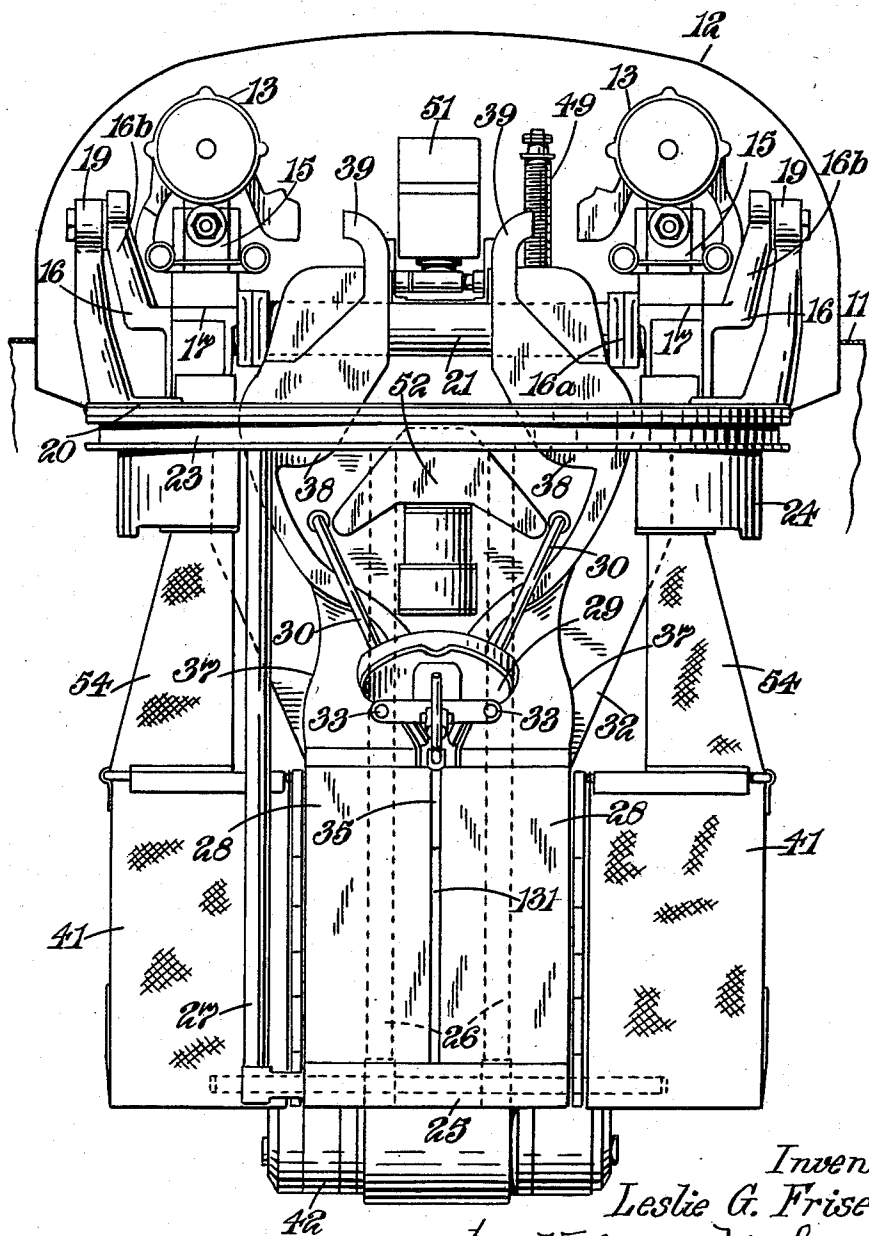
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*Fig. 2.*



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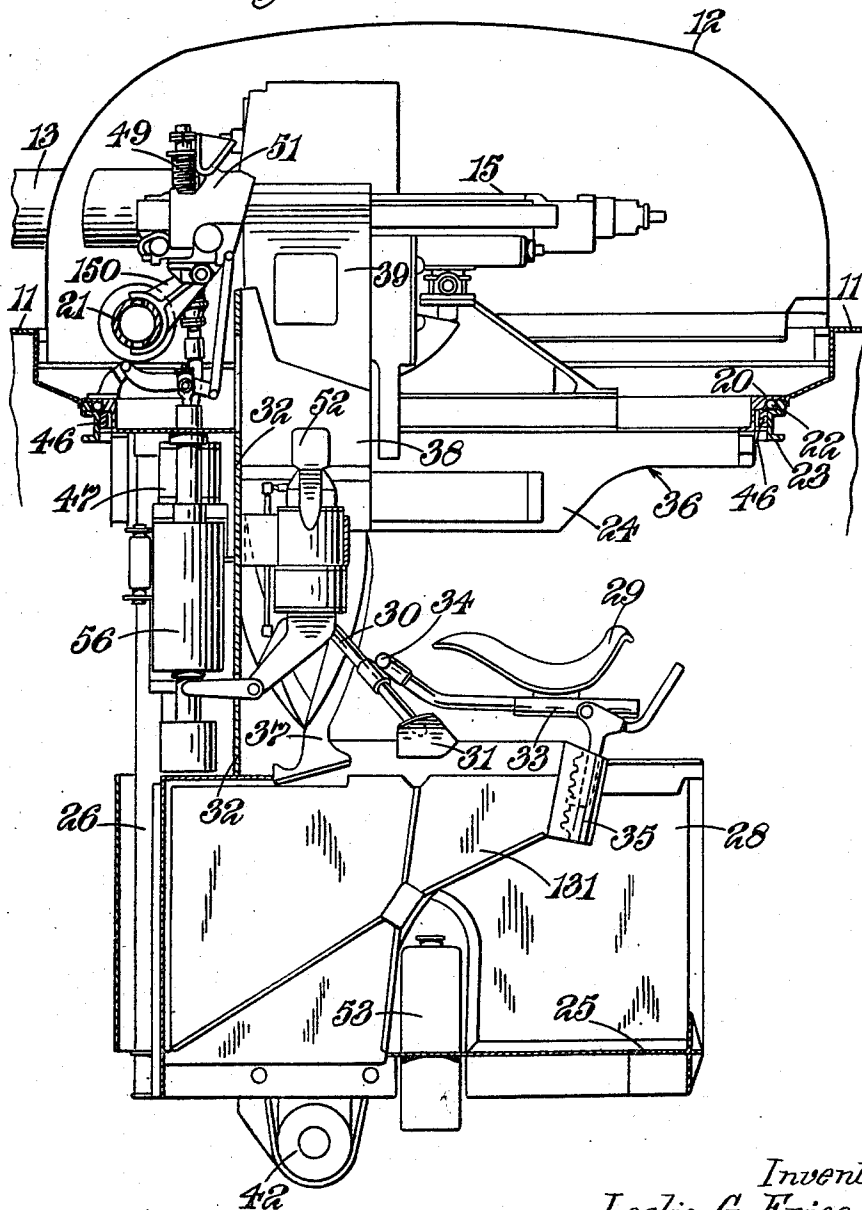
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# POWER OPERATED GUN TURRET FOR AIRCRAFT

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*Fig.4.*



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## UNITED STATES PATENT OFFICE

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POWER-OPERATED GUN TURRET FOR  
AIRCRAFT

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4 Claims. (Cl. 89—33)

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This invention relates to power-operated gun turrets of the kind mounted on top of the fuselage of an aircraft.

According to the present invention a power-operated gun turret comprises an upper portion which is circular in plan and within which two guns or groups of guns are mounted in substantially parallel relationship one on either side thereof with sufficient space between them to accommodate the head and shoulders of a gunner; and a lower portion of which the width, transverse to the axes of the guns is reduced to the minimum necessary to accommodate the lower part of the gunner's body. In this construction the upper part of the turret is outside the fuselage and can be large enough to accommodate two cannon or say four machine guns while the lower part extends into the fuselage but causes the least obstruction therein. It is an important advantage of the construction that, when the guns are pointing fore-and-aft of the aircraft, members of the crew can move along the fuselage past the turret with ease owing to the narrowness of its lower portion.

Preferably a seat for the gunner is provided in the lower part of the turret together with means for storing live ammunition belts below the seat. Means may be provided for feeding the belts upwards in front of the gunner's seat, and thus between his legs, and then outwardly to the guns which are arranged each to be fed from its inner side.

A collapsible and/or removable container may be provided on either side of the turret to receive the spent ammunition and belts.

Power operated traversing and elevating mechanism is preferably arranged at the front of the lower part of the turret and within the overall width of either part.

According to a feature of the invention the lower part of the turret comprises a rectangular platform to receive ammunition boxes and connected to the upper part of the turret by a pair of pillars at the front of the platform and a single pillar at one rear corner of the platform so as to leave one side and the rear open for access to the turret.

According to a further feature of the invention there is provided, on either side of the turret a bracket to support a gun or guns which

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brackets are pivoted at their outer sides on the upper part of the turret and there is also provided a torque rod or tube interconnecting the two brackets so that they move together and are shaped to conform closely to the circular contour or wall of the upper part of the turret. The sight is mounted on the centre of this torque tube, thus dispensing with any driving linkage and avoiding relative backlash between guns and sight.

A specific embodiment of the present invention will now be described by way of example with reference to the accompanying drawings of which—

Figure 1 is a plan view of the power operated gun turret, the gunner being shown in position in said turret.

Figure 2 is a view in the direction of the arrow A shown in Figure 1.

Figure 3 is a view in the direction of the arrow B shown in Figure 1 and

Figure 4 is a section on the line IV—IV of Figure 3.

Referring to the drawings, a gun turret which is generally indicated at 10 is mounted on the top of the fuselage 11 of an aircraft so that the transparent cupola 12 of the turret lies outside the fuselage and the lower portion of the turret depends within the fuselage. The cupola (as is clearly shown in Figures 1 and 2) is circular in plan view and dome shaped in elevation. Mounted in the turret 10 are a pair of cannon 13. The gun-cradle and breech mechanism of each cannon which is generally indicated at 15 lies within the cupola 12, whilst the barrel 14 thereof extends through a gun slot in said cupola. The diameter of the upper portion of the turret (that is of the cupola and its supporting structure) is such that sufficient space is provided between the guns to accommodate the head and shoulders of the gunner as is clearly shown in Figure 1. In this way when the guns are elevated their cradles and breech mechanisms will pass on each side of the gunner into the lower portion of the turret. Each of the cannon 13 is mounted on a bracket 16 which is L-shaped in elevation as shown in the front of the turret (Figure 3). The horizontal part 16a of each bracket supports a cradle 17 which carries the cannon whilst the vertical portion 16b of said

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bracket extends upwardly in the outer side of its cannon and carries a bearing 18 by which the bracket is pivoted to the turret structure. The bearing 18 is carried by an upright 19 which is secured to a rotating ring 20. The brackets 16 are connected by a shallow U-outline torque tube 21 which extends between said brackets closely adjacent the inner wall of the cupola 12 as shown in Figure 1.

It will be appreciated that since the majority of the parts of the turret described above lie within the cupola they will be disposed above the fuselage of the aircraft. The cupola 12 and the cannons 13 are mounted for rotation upon the ring 20, a suitable bearing 22 (Figure 4) being provided to support said ring from a structure 23 secured to the fuselage. Attached to the ring 20 and depending from it is a skirt 24 which passes into the fuselage. The bearing 22 is such that the turret is capable of complete rotation. The diameter of the skirt 24 is determined by the requirements that the spent ammunition from the cannon 13 be passed downwardly through the skirt and is thus dependent on the distance to which the ejection openings of the two cannon are spaced apart.

The lower part of the turret comprises a substantially rectangular platform 25 (Figure 1) which is connected to the skirt 24 by two pillars 26 (Figures 1 and 3) at the front edge of said platform and a pillar 27 (Figures 1 and 2) closely adjacent the rear edge of said platform. The length dimension of the platform 25 is parallel to the axes of the cannon and is nearly equal to the diameter of the skirt 24. The width of the platform is sufficient to accommodate two ammunition boxes 28 (Figure 2) which are arranged side by side upon the platform. The gunner's seat 29 is arranged upon the platform 25 with sufficient clearance for the ammunition boxes to pass beneath it and is supported by means of a pair of tie-rods 30 which extend from bracket 31 upwardly and outwardly to a sheet of armour plating 32 to which they are attached. The bracket 31 is carried by a frame 131 which lies between the ammunition boxes 28 and is supported by the platform 25. The seat is carried by tubes 33 which are pivoted at 34 to said rods 30, the position of the seat being adjusted by means of a ratchet 35 supported by the frame 131. The skirt 24 is cut away as at 36 immediately over the rear corner of the platform 25 which is unsupported by a pillar from the skirt.

The disposition of the pillars 26, 27 in conjunction with the cut away portion of the skirt 24 enables the gunner to enter the turret. To do this he inserts his head and shoulders through the rear end of the turret beneath the cut away portion of the skirt and then brings one leg over the ammunition boxes and the seat so that it lies on the side of the ammunition boxes which is adjacent the pillar 27. He then draws his other leg into the turret so that it lies on the opposite side of the ammunition boxes. He is then seated upon the ammunition boxes with his legs on either side of them and his head and shoulders between the cannon. The entry of the gunner is only made possible by the particular arrangement of support for the lower platform described above in which one side and the rear of the platform are unobstructed by a rear pillar.

The ammunition belts pass out of the boxes 28 and into a flexible guideway 37. The latter is built up from a plurality of separate elements of rectangular outline which are joined together

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so that they are inseparable but so that they can move relatively to each other. The construction is such as to permit the guideway to be twisted about its long axis and also to be independently curved over its length. Each guideway 37 at its point of attachment to its ammunition box is such that the ammunition belt leaves the box in a plane transverse to the axis of the cannon and between the pilot's legs. Both guideways 37 are twisted through 90° so that the ammunition belts before reaching the cannon will lie parallel to the axis of the cannon. Each belt passes from its associated guideway 37 into a feed-assistor device 38. This device is immediately brought into operation when the guns are fired to draw the belt of ammunition from the ammunition box and through guideway 37 and to deliver it towards the cannon. In this way the excessive loads which would otherwise be imposed upon the feed mechanism of the cannon are taken by the device 38 and the feed mechanism of the cannon operates under lightly loaded conditions. The ammunition belts from the feed-assistor 38 pass through a guide 39 which directs the ammunition belt towards the cannon (see Figure 2).

Each cannon 13 ejects the spent ammunition and the broken ammunition belt downwardly through chutes 40 and 54 (Figures 3) and into a collapsible container 41 which is supported on the side of the ammunition box 28. The mouth of each chute 54 is detachable from the chute 40 whereupon the container 41 collapses at the side of the ammunition box. In Figure 3 one of the containers is shown in the position which it occupies when the chutes 40, 54 are connected together and the other is shown in the collapsed position. In order that the gunner may have access to the turret it is necessary that the container 41 which lies on the rear side of the platform as shown in chain dotted lines in Fig. 1 at which he enters the turret is collapsed as described above.

It will be appreciated from the foregoing description that the lower part of the turret is only of sufficient width to accommodate the gunner and that the ammunition boxes 28 are accommodated within this width. Accordingly when the turret is rotated so that the cannon lie parallel to the longitudinal axis of the fuselage, the platform does not interfere with the movement of the crew along the fuselage on either side of the turret. In certain cases it may be found desirable to collapse the spent ammunition containers 41 in order more easily to permit movement of the crew past the turret.

The containers 41 are detachable from the lower portion of the turret and in this way they permit the ammunition boxes to be slid sideways on to a platform in the aircraft and then drawn along the fuselage away from the turret and subsequently replaced by full ones. Alternatively it is possible by hinging the seat upwardly about point 34 to refill the boxes in situ and in flight with new belts carried conveniently elsewhere in the aircraft to suit the centre of gravity requirements thereof.

The mechanism for traversing the turret and elevating the cannon is arranged over the front end of the platform (that is beneath the arc-shaped torque tube 21) and within the width of the platform 25. The traversing and elevating mechanism is of the kind described in United States patent application Serial No. 479,947 filed March 20, 1943, now Patent No. 2,464,654 dated March 15, 1949, and comprises a separate elec-

tric motor for each movement and a motor-generator set. The motor-generator set 42 is arranged horizontally below platform 25 (Figures 2 and 4) whilst the two motors 47 and 57 are arranged with their axes vertical one on either side of the pillars 26 (Figure 3). The traversing motor 43 drives through a reduction gearing contained within a housing 44, a gear wheel 45 which meshes with a fixed gear ring 46 (Figure 4) formed integral with the structure 23. The elevating motor 47 drives through a reduction gearing disposed within a housing 48 an elevating screw 49 co-operating with a nut 50 pivoted on a bracket 150 carried by the torque tube 21.

The cut-out gear 56 for interrupting the fire of the cannon when the latter are brought to bear upon a part of the aircraft structure, is disposed between the pillars 26 over the front end of the platform.

The sighting apparatus 51 is carried centrally between the cannon by the torque tube 21 within the cupola 12. The control handle 52 by which the traverse of the turret and the elevation and firing of the guns is controlled is located above the ammunition boxes and between the guide channels 37 so as to be in a position convenient to the gunner.

The electric supply to the turret is effected through slip rings mounted centrally of the turret on the platform within a housing 53.

It will be seen that the present invention provides a gun turret which can be rotated, the only external connections being the leads for supplying electric power to the motor-generator set 42, and which, while being of sufficient size to accommodate two cannon, causes the minimum of obstruction within the fuselage and in particular allows the crew to move along the fuselage when the gun turret is rotated so that the cannon point fore-and-aft of the aircraft.

I claim:

1. A gun turret for an aircraft comprising an upper circular portion, two belt-fed guns mounted in the circular portion in substantially parallel relationship one on either side thereof with sufficient space between them to accommodate the head and shoulders of a gunner and arranged each to be fed from the inner side, a rectangular platform to receive two ammunition boxes side by side, a pair of pillars depending from the circular portion of the turret and supporting one end of the platform therefrom, a single pillar depending from the circular portion of the turret and supporting one corner of the other end of the platform therefrom, a seat for the gunner supported on the platform at a height permitting of ammunition boxes being placed on the platform below it, and means for leading an ammunition belt from each ammunition box on the platform upwardly in front of said seat and then outwardly to a separate one of the guns.

2. A gun turret for an aircraft comprising an upper circular portion, two belt-fed guns mounted in the circular portion in substantially parallel relationship one on either side thereof with sufficient space between them to accommodate the head and shoulders of a gunner and arranged to be fed each from its inner side, a platform arranged to support two ammunition containers side by side, means supporting the platform from the circular portion, a seat for the gunner supported by the platform at a height permitting of ammunition containers being arranged side by side on the platform below the seat, means for leading an ammunition belt upwardly in front

of the seat and then outwardly to the guns, two collapsible containers detachably mounted one on each side of the lower portion of the turret, and guide means leading the ammunition belt and spent ammunition from the outer side of each gun into the collapsible container on the same side of the turret, said means supporting the platform from the circular portion comprising a pair of pillars depending from the circular portion of the turret and supporting one end of the platform therefrom, and a single pillar depending from the circular portion of the turret and supporting one corner of the other end of the platform therefrom.

3. A gun turret for an aircraft comprising an upper circular portion, two belt-fed guns mounted in a circular portion in substantially parallel relationship one on either side thereof with sufficient space between them to accommodate the head and shoulders of a gunner and arranged to be fed each from its inner side, a rectangular platform the length of which is parallel to the plane of the guns when they are in a horizontal position and the width of which is not more than the distance between the guns, means supporting the platform from the circular portion so that it is below and between the guns, two rectangular ammunition boxes resting on the platform closely side by side and within the width of the platform, a seat for the gunner supported by the platform at a height permitting the ammunition boxes to be below the seat, means for leading an ammunition belt upwardly in front of the seat and then outwardly to the guns, two collapsible containers of a length less than the length of the ammunition boxes detachably mounted one on each side of said boxes so as to be beneath a gun and towards the rear of the boxes and means for leading the ammunition belt and spent ammunition from the outer side of each gun into the collapsible container on the same side of the turret.

4. A gun turret for an aircraft comprising an upper circular portion, two belt-fed guns mounted in the circular portion in substantially parallel relationship one on either side thereof with sufficient space between them to accommodate the head and shoulders of a gunner and arranged to be fed each from its inner side, a rectangular platform the length of which is parallel to the plane of the guns when they are in a horizontal position and the width of which is not more than the distance between the guns, means supporting the platform from the circular portion so that it is below and between the guns, two rectangular ammunition boxes resting on the platform closely side by side and within the width of the platform, a seat for the gunner supported by the platform at a height permitting the ammunition boxes to be below the seat, means for leading an ammunition belt upwardly in front of the seat and then outwardly to the guns, two collapsible containers of a length less than the length of the ammunition boxes detachably mounted one on each side of said boxes so as to be beneath a gun and towards the rear of the boxes, means for leading the ammunition belt and spent ammunition from the outer side of each gun into the collapsible container on the same side of the turret, two brackets pivoted within the circular upper portion of the turret one on either side thereof and a torque rod interconnecting the two brackets so that they move together, said rod being of shallow U outline to conform closely to the circular contour of the

upper portion of the turret, said guns being mounted one on each bracket.

LESLIE GEORGE FRISE.

#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

Number	Name	Date
1,385,755	Roche -----	July 26, 1921
2,186,026	Joyce -----	Jan. 9, 1940
2,206,065	Trimbach et al. ----	July 2, 1940
2,320,238	Horncastle -----	May 25, 1943
2,329,308	Trotter et al. -----	Sept. 14, 1943

Number
673,342
784,128
785,893
436,071
477,972
800,249
341,506
483,847
559,478

5

10

15

#### FOREIGN PATENTS

Country	Date
France -----	Oct. 7, 1929
France -----	Apr. 23, 1935
France -----	May 27, 1935
Great Britain -----	June 4, 1935
Great Britain -----	Apr. 4, 1936
France -----	Apr. 27, 1936
Italy -----	June 27, 1936
Great Britain -----	Feb. 15, 1937
Great Britain -----	Dec. 7, 1938

#### OTHER REFERENCES

"Aviation" Magazine, June 1943, pages 227, 229, 343, by Boulton Paul Aircraft Company.