

Jan. 16, 1945.

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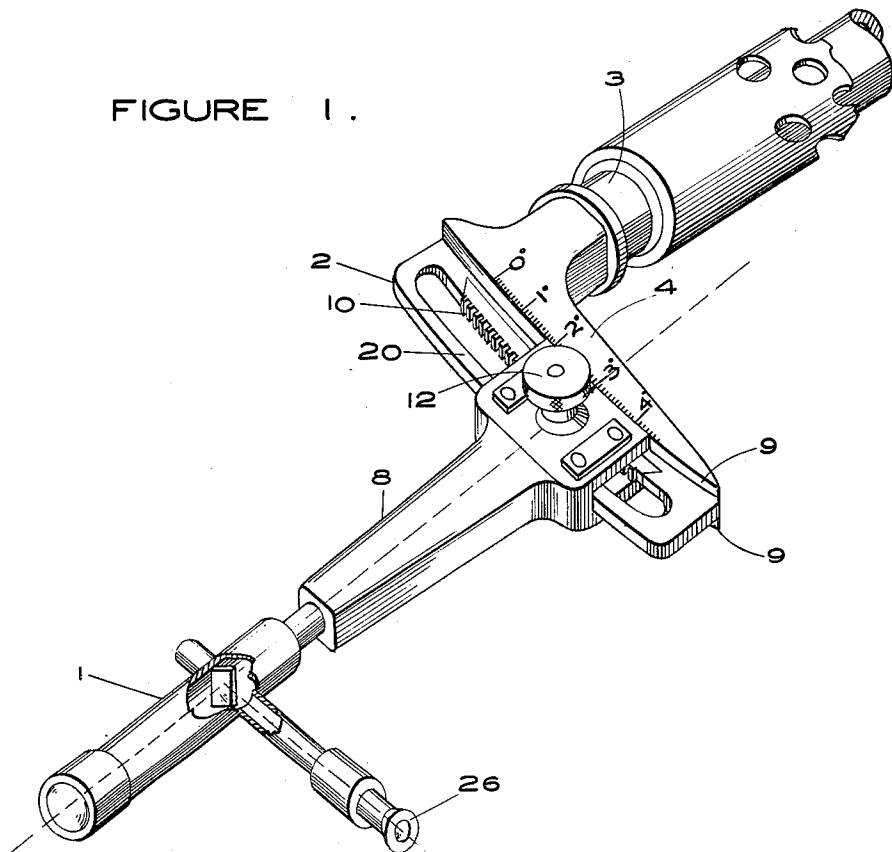
2,367,288

BORESIGHTING ADAPTER

Filed Dec. 3, 1943

2 Sheets-Sheet 1

FIGURE 1.



1502

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2 Sheets-Sheet 2

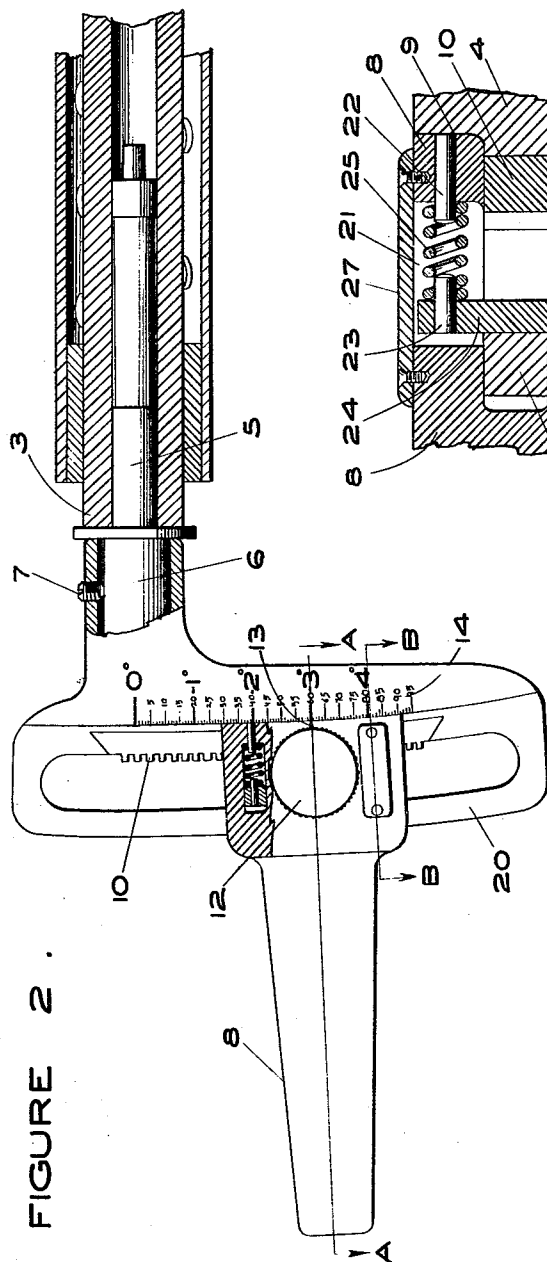


FIGURE 2.

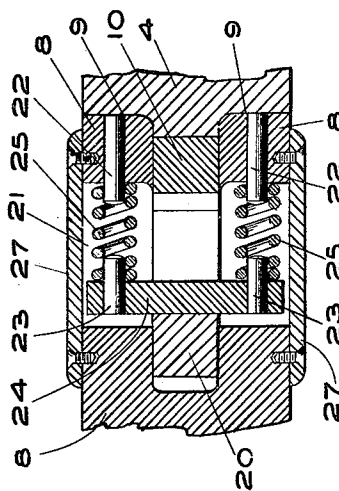


FIGURE 4
(B-B)

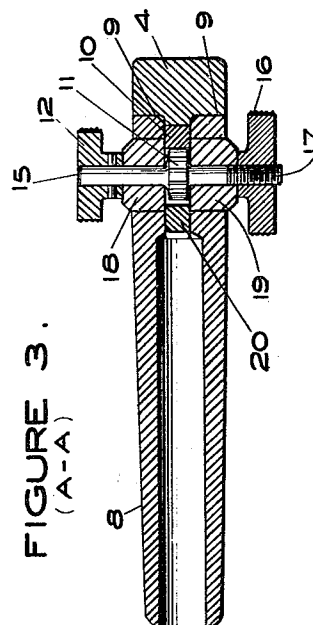


FIGURE 3.
(A-A)

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BORE-SIGHTING ADAPTER

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6 Claims. (Cl. 33—46)

This invention relates to a device to determine the clearance between the path of the bullet and structure which is to be protected from injury by gun fire.

The guns in a gun turret mounted on a vehicle or craft are equipped with interrupters in the fire control circuits which are designed to prevent the gunner from inadvertently shooting off the projecting parts of the vehicle or craft. After the turret and gun fire interrupters are installed on the vehicle or craft, it is necessary to check the alignment of the guns with respect to the interrupter mechanism to determine the clearance of the guns around the silhouette of the projecting portions of the craft. For reasons of design, particularly in aircraft, it is necessary in some instances to have the path of the bullet clear the tail surfaces by at least 2° to 4°. Due to the compact design of all aircraft power turrets, it is practically impossible to boresight the guns while the gunfire interrupter cams are being checked by any sighting device through the barrels of the guns.

An object of this invention is to provide a sighting device to check the clearance of guns around the structure of the aircraft.

Another object of the invention is to provide a sighting device wherein the actual degrees of clearance may be measured.

A further object of this invention is to provide a sighting device for use with a standard borescope to determine the clearance of the path of the bullet and the structure of the aircraft.

Further and other objects will become apparent from the description of the accompanying drawings which form a part of this disclosure and in which like numerals refer to like parts.

In the drawings:

Figure 1 is a perspective view showing the tool in use.

Figure 2 shows a plan view, partially in section, of the invention mounted on the muzzle of a gun.

Figure 3 shows a section on the line A—A of Figure 2.

Figure 4 shows a section on the line B—B of Figure 2.

Figure 1 of the drawings shows a standard angle-borescope 1 attached to the clearance fixture, generally indicated as 2, mounted in the barrel of a machine gun 3. The fixture consists of bracket 4, having a stem 5 mounted therein, by portion 6 and secured by set screw 7. Portion 5 fits into the barrel of the gun 3 with a snug fit. Bracket 4 has a borescope mounting 8 movably mounted thereon, to move along bracket 4 in an

arcuate path determined by surfaces 9 whose center of curvature is the pivot point of the gun. A rack 10 is mounted on bracket 4 to cooperate with gear 11 which is turned by knurled wheel 12 to move portion 8 with respect to bracket 4. An index 13 cooperates with the scale 14 calibrated in degrees, to indicate the angular position of the centerline of the borescope mounting portion with respect to the centerline of the barrel of the gun.

Figure 3 illustrates how the motion and locking of borescope mounting 8 is effected. As pointed out above, gear 11 mounted on shaft 15 is moved by knurled wheel 12 secured thereto on rack 10, thereby moving the borescope mount along the scale on bracket 4. Knurled wheel 16 acts as a nut on threaded portion 17 of shaft 15 to clamp blocks 18 and 19 which are mounted in borescope mount 8, to portion 20 and the edge of the rack 10.

Figure 4 illustrates how portion 8 is held firmly against the arcuate surfaces 9 to cause the borescope mount to move radially to surfaces 9. In cavity 21, pins 22 are mounted in member 8. Pins 23 are mounted in member 24 which slides along the inner surface of member 20. Compression springs 25, held in place by pins 22 and 23, urge member 8 against arcuate surfaces 9. Since there are two such resilient assemblies on each side of the centerline of member 8, the borescope is held by this member in a position along a radius of arcuate surfaces 9. Cover plates 27 are provided for cavities 21.

When the borescope is mounted in member 8, knurled wheel 16 may be loosened to permit shaft 15 to be turned by wheel 12 which moves the gear along the rack and thereby the borescope mounted in member 8, to the zero position on the scale. At this point, the borescope is aligned with the axis of the barrel of the gun and by looking in eyepiece 26, the gun may be sighted or aligned. If it is desired to determine the clearance of the gun fire around any objects at relatively close range, it is merely necessary to point the gun and move member 8 along the scale until it is aligned with the object and the clearance can be measured on scale 14.

This is particularly useful in checking gun fire interrupters on the machine guns of gun turrets mounted on aircraft or other vehicles. The gun fire interrupter is a mechanism designed to interrupt the electrical firing circuit of the gun for a predetermined silhouette of the portions of the craft which may come into the line of the fire. The clearance of near by portions is relatively

small, while a greater margin of clearance should be allowed for portions of the craft more remote from the gun due to the various factors which effect the path of travel of the projectiles. With this fixture in place, the gun may be traversed over a path, while observing the operation of the interrupter circuit as the gun nears the surface of the craft, the interrupter circuit will operate and the gun may be stopped and the clearance of the gun around the portion of the craft determined from the scale 14.

Another use of this device will be in determining the silhouette of the interrupter mechanism by tracing the silhouette of the projecting portions of the craft by sighting through the borescope and from the gun fire interrupter mechanism, the silhouette may be determined or checked.

It is to be understood that certain changes, alterations, modifications and substitutions can be made without departing from the spirit and scope of the appended claims.

We claim:

1. A borescope fixture comprising a bracket member, means for removably mounting said bracket member on the barrel of a pivoted gun, said bracket member having an arcuate surface concentric with the pivot axis of said gun, and means to mount said borescope on said arcuate surface to move relative thereto, to maintain the axis of the borescope radial with respect to the pivot axis of said gun.

2. A borescope fixture comprising two portions, one fixed portion adapted to be removably secured on the barrel of a pivoted gun, said portion having a curved outer surface concentric with the pivot axis of said gun, a second portion adapted to be mounted on said fixed portion and slide on said curved surface so that an axis thereof intersects the pivot axis of the gun, means to mount a borescope on said curved surface radially with respect to said curved surface and means to move said second portion relative to said first portion.

3. A borescope fixture comprising two portions, one fixed portion adapted to be removably secured in the barrel of a pivoted gun, said portion having a curved outer surface concentric with the pivot axis of the gun, a scale calibrated in degrees adjacent said curved surface, a second portion adapted to be mounted on said fixed por-

tion and slide on said curved surface, means to mount a borescope on said curved surface radially with respect to said curved surface and means to move said second portion relative to said first portion, an index on said second portion cooperating with said scale whereby the angular displacement of the centerline of the borescope and the centerline of the gun may be determined.

4. A borescope clearance fixture comprising a bracket member removably mounted on a pivoted gun barrel, means to mount a borescope on said bracket member, guide means between said bracket member and borescope mount whereby an axis of said borescope mount is maintained in intersecting relation with the pivot axis of the gun as the two are relatively moved, and scale means to measure the angular displacement of the axis of said borescope from the axis of said gun barrel.

5. A borescope mount comprising a bracket member adapted to be fixed on the barrel of a pivoted gun, a borescope mounting member mounted on said bracket member guide means between said bracket member and borescope mount whereby an axis of said borescope mount is maintained in intersecting relation with the pivot axis of the gun as the two are relatively moved, means whereby said mounting member may be so moved with respect to said bracket member to selectively align the borescope with the barrel of the gun at a selected angular position relative thereto, and means to lock the borescope relative to the gun barrel in any selected position.

6. A borescope fixture comprising a bracket member, means for removably mounting said bracket member on the barrel of a pivoted gun, said bracket member having an arcuate surface concentric with the pivot axis of said gun, means to mount said borescope on said arcuate surface, calibration and pointer means on said bracket and said borescope mount cooperating to indicate the angular displacement of said borescope mount relative to said bracket, and means to move said borescope mount relative to said bracket member.

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