

Oct. 5, 1943.

L. W. SCHAAFF

2,331,048

CLOSURES FOR SLOT-LIKE APERTURES

Filed Nov. 6, 1941

Fig. 1.

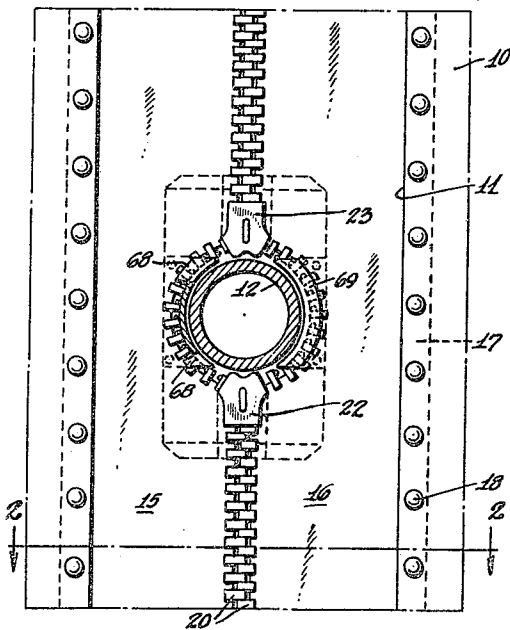


Fig. 3.

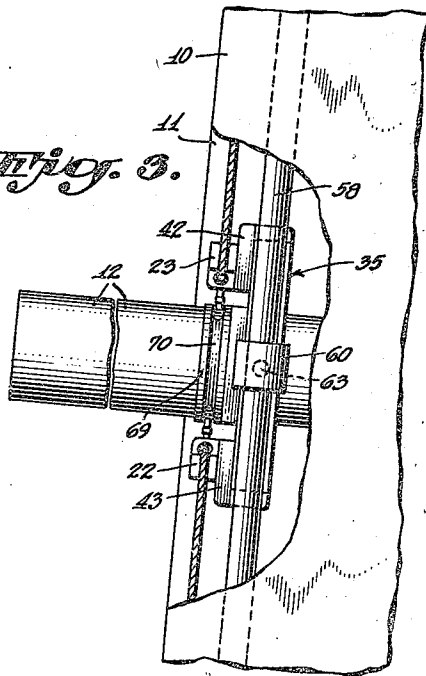


Fig. 2.

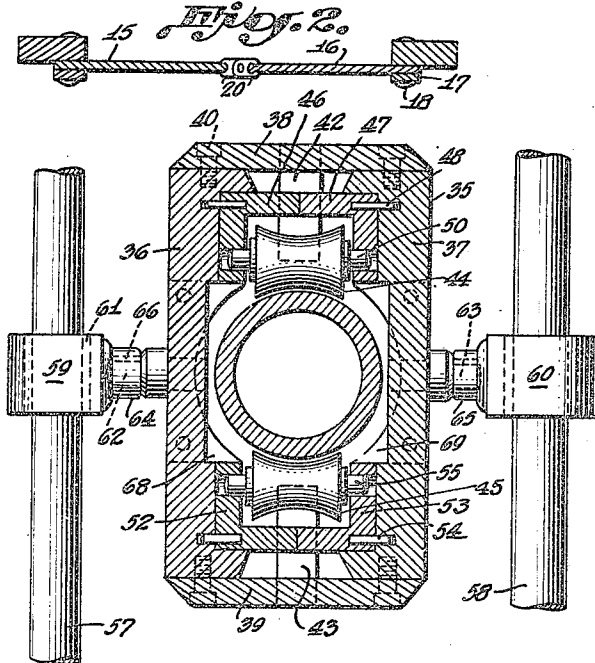


Fig. 5.

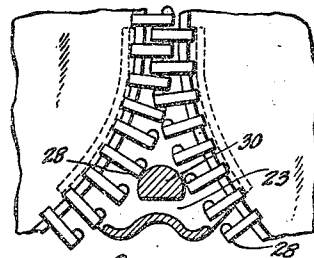


Fig. 6.

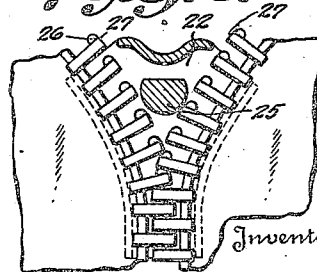


Fig. 4.

334

LOUIS W. SCHAAFF
Rein & Schaeff
Attorney

UNITED STATES PATENT OFFICE

2,331,048

CLOSURE FOR SLOTLIKE APERTURES

Louis W. Schaaff, Jackson Heights, N. Y., assign-
or to Waldes Koh-I-Noor, Inc., Long Island
City, N. Y., a corporation of New York

Application November 6, 1941, Serial No. 418,083

6 Claims. (Cl. 160—368)

This invention relates to closures for slot-like apertures and more particularly to a closure for the slot-like aperture of a machine gun turret.

As usually constructed, machine gun turrets are provided with a vertically disposed aperture through which the barrel of the gun projects and along which it moves vertically when elevated or lowered. Various expedients designed to close the turret aperture, thus to close off the interior of the turret from the weather and from air pressures due to high plane speed, while at the same time permitting free movement of the gun along the aperture, have hitherto been suggested, one such closure means comprising soft rubber flaps disposed in overlapping relation along the aperture and arranged to open about the gun barrel as the latter is moved therealong. This type of closure, while satisfactory at low plane speeds, has developed the serious disadvantage that at the higher plane speeds when the air flow pressures are great, the rubber flaps tend to collapse and to push into the aperture in such manner that they not only fail to serve their intended purpose as a closure but also interfere with the free elevational movement of the gun barrel.

The present invention contemplates and provides an improved closure for the gun barrel aperture of turrets, such as machine gun turrets, which permits of free movement of the projecting gun barrel along the aperture, which maintains the aperture closed above and below and also around the gun barrel, and which is unaffected by air flow pressures which tend to collapse and/or impair the functioning of the prior turret closures. More specifically, the invention seeks to provide an effective closure of the slide fastener type for the gun barrel aperture of a machine gun turret, which is operable by the gun barrel itself and which is so arranged as to provide a closure opening for the projecting gun barrel while maintaining the aperture portions above and below the gun barrel closed, regardless of the elevation of the barrel, i. e., its angle of inclination from the horizontal.

The invention also makes provision for the free elevational movement of a gun barrel along an aperture therefor as formed in a turret wall which curves along an arc which is different from the arc of movement of the barrel or which extends straightway in a vertical plane or straightway in an inclined plane.

Among the further objects of the invention may be noted the provision of a slide fastener closure for an aperture of the stated character which is simple in design and sturdy in construction, which is easy to assemble and disassemble, and which is sure and certain in its operation.

Other objects will be in part obvious and in part hereinafter pointed out in connection with

the following analysis of this invention wherein is illustrated an embodiment of the invention in detail.

In the drawing—

5 Fig. 1 is a partial front elevation of the closure means of the present invention as applied to the gun barrel aperture of a machine gun turret;

Fig. 2 is a section taken along line 2—2 of Fig. 1;

10 Fig. 3 is a broken-away side elevation of the turret and closure means therefor as illustrated in Fig. 1;

Fig. 4 is a sectional elevation taken through the slider carriage and which illustrates the carriage guide means.

15 Fig. 5 is a section taken through the relatively upper slider illustrated in Fig. 1;

Fig. 6 is a section taken through the relatively lower slider illustrated in Fig. 1.

20 Referring to the drawing, wherein like reference characters designate like parts throughout the several views, reference character 10 generally designates a machine gun turret of approved construction, the details of which will not be described here as the turret per se forms no part

25 of the present invention except insofar as it enters into the combinations hereinafter claimed. As shown, the turret has a side wall which extends straightway and is inclined from the ver-

30 tical, being provided with a vertically disposed slot or aperture 11 through which the barrel 12 of a machine gun mounted within the turret is adapted to project and along which the barrel is moved in its elevational or lowering movement.

35 Depending on particular design requirements, the turret side wall may be vertically disposed, or it may extend along a curvature which corresponds with or is different from the arc of movement of the gun barrel, it being here noted that

40 in the case of the vertical or straightway inclined turret side wall and also where the side wall extends along a curvature which is different from the arc of movement of the gun barrel, the latter moves relatively inwardly and outwardly through

45 the aperture 11 as it is elevated and lowered.

According to the present invention, closure means of the slide fastener type, and which embodies principles disclosed and claimed/ in my application entitled "Slide fasteners," Serial No. 420,284, filed November 24, 1941, are employed to close the aperture 11 while permitting the gun barrel to extend therethrough and providing for free movement of the gun barrel along the aperture. As shown, the improved closure means is

55 formed by two flap-like stringers 15, 16, each secured along a side edge of the aperture and to the under face of the turret casing by a securing strip 17 held in place by rivets 18 or equivalent securing devices. The stringers are fabricated from heavy waterproof canvas, and each extends

approximately halfway across the aperture. The stringers carry along their inner adjacent edges a chain of fastener elements 20 of conventional construction, which are adapted to be embraced by a lower slider 22 and an upper slider 23, the upper slider being reversed with reference to the lower slider.

The sliders 22, 23 are spaced from each other vertically a fixed distance which is slightly greater than the diameter of the gun barrel 12. The function of the lower slider, which operates "with" the chain, is to effect the engagement of disengaged fastener elements disposed below the barrel as the latter is moved upwardly and the disengagement of engaged fastener elements below the barrel as the latter is moved downwardly. Due to the reversed relation of slider 23, the latter operates "against" the chain to effect the disengagement of engaged fastener elements above the barrel as the latter is moved upwardly and the engagement of disengaged fastener elements above the barrel when the latter is moved downwardly. The spacing between the sliders 22, 23 provides an opening through the fastener for the gun barrel 12, which is maintained in all positions of the barrel, as well as during movement of the barrel along the aperture.

The operation of the sliders 22 and 23 is illustrated in Figs. 5 and 6 for fastener elements whose locking teats or projections are upwardly disposed, it being understood that the illustrated slider arrangement which is capable of effecting two-way operation of the fastener will permit the reversal of fastener elements, in which case the locking projections thereof are pointed downwardly.

Referring to Fig. 6, the wedge or divider 25 of the lower slider 22 which operates with the chain may be of the type having a bluntly rounded operating end providing an obtuse spreading angle for the elements, against which the locking projections 26 and the end faces 27 of the fastener elements are adapted to bear as the elements are spread fanwise in moving into the race branches of the slider.

The relatively reversed slider 23 has its divider 30 also formed with a bluntly rounded working end which is purposely so shaped as to provide the required obtuse spreading angle for the elements necessary to the free operation of the slider when the latter is operated against the chain, said working end presenting a definitely curved or rounded surface against which the more or less straight end faces as well as the squared under corners 28 of the elements are adapted to bear as the divider spreads the elements fanwise into the race branches of the slider. The arrangement is thus such that as sliders 22 and 23 are moved upwardly, the lower slider 22 operates to progressively engage and the upper slider 23 to progressively disengage the fastener elements above the same. As the sliders 22 and 23 are moved downwardly, they effect reverse operation of the fastener. Thus, the two-way operation is independent of the direction in which the locking projections face.

The sliders are carried in vertically aligned relationship by a slider carriage generally designated 35 as illustrated in side elevation in Fig. 3, and in sectional elevation in Fig. 4. As shown, the carriage takes the form of a substantially rectangular frame having vertical side pieces 36, 37 secured in spaced relation by a top cross piece 38 and a bottom cross piece 39 through securing screws 40. The top cross piece 38 carries an

angled downward extension 42, to which the upper slider 23 is secured as by welding or riveting. Similarly, the bottom cross piece 39 of the frame carries an angled upward extension 43, to which the lower slider 22 is secured as by welding or riveting. As seen in Fig. 4, the barrel projects through the carriage and, as will appear from Fig. 3, the latter secures the sliders in spaced vertical alignment on the muzzle side of the barrel.

To insure free relative movement between the carriage and barrel, as required when the turret side wall extends straightway or along an arc whose curvature is different from the arc of movement of the barrel, the carriage is provided with bearing means whereby it may freely move axially of and along the barrel as the latter is elevated or lowered. Such bearing means preferably takes the form of upper and lower concaved bearing rollers 44, 45 of non-metallic anti-friction material such as vulcanized fiber, the rollers being arranged to bear against and roll on the gun barrel. The upper roller 44 is mounted in the carriage frame through the medium of angled mounting brackets 46, 47 held in place within the frame by dowel pins 48. The horizontal flanges of the angled brackets are disposed in horizontal alignment, the vertical legs or flanges being spaced to provide a journal mounting for the spindle 50 carrying the bearing roller. The lower bearing roller 45 is mounted in the carriage frame through the medium of angularly disposed bearing brackets 52, 53 secured to the frame in similar manner by dowels 54, in the vertical flanges of which the roller spindle 55 is journaled.

The carriage 35 is guided for vertical movement along the aperture by spaced guide rods 57, 58 which extend adjacent the aperture edges and are preferably disposed within the turret enclosure. The rods may be secured in fixed relation by top and bottom brackets (not shown) carried by the turret. Guide collars 59, 60, each provided with a wear sleeve 61 preferably of non-metallic bearing material such as vulcanized fiber, are arranged to slide on the guide rods and are connected with the slider carriage by swivel pins 62, 63 which extend sidewardly from the carriage into guide collar sockets 64, 65. Preferably, the pins seat in wear bushings 66 of non-metallic bearing material carried by the collar sockets.

Due to the swivel mounting of the slider carriage in the guide collars 59, 60, the carriage may tilt on the axis of the pins 62, 63 as required to accommodate itself to the curvature along which the barrel aperture extends, if any.

By reference to Figs. 1, 5 and 6, it will be appreciated that the disengaged fastener elements of the fastener portion extending between the sliders 22, 23 tend to curve around and crowd against the gun barrel. While such an arrangement is advantageous in that a closure is effected directly around the barrel, a feature never before completely achieved, it is desirable that the fastener elements do not bear directly on the barrel. Accordingly, the carriage 35 carries arcuately extending guide tracks 68, 69 which are disposed sidewardly of the frame opening for the gun barrel and in which the disengaged fastener elements track as they curve around the barrel. Each track is provided with an element receiving groove 70 which is disposed in alignment with the sliders 22, 23. Hence, the disengaged fastener elements instead of bearing directly against the gun barrel as they curve or move around the

barrel travel in the curved guide tracks in the manner illustrated in Fig. 1. In addition to providing definite guidance for the disengaged fastener elements as aforesaid, the tracks, when fashioned from non-metallic anti-friction material as contemplated, prevent undue wear of the elements which is likely if the latter bear directly on the gun barrel and further insulate the fastener from the heat of the gun barrel generated as a consequence of the rapid firing of the gun.

While in the foregoing description, the closure flaps are constituted by the fastener stringers, it will be understood that closure flaps of more or less conventional construction may be used, to the adjacent edges of which separate stringers carrying the fastener elements may be secured. It will further be understood that while fastener elements having their locking projections upwardly disposed have been illustrated, the arrangement may be reversed so that the fastener projections point downwardly, in which case the arrangement of sliders would also be reversed.

Without further analysis, it will be seen that the present invention provides an improved closure of the slide fastener type for a slot-like aperture such as the gun barrel aperture of a machine gun turret. Such an improved closure insures that the aperture is at all times maintained closed both above and below the barrel, regardless of its position in the aperture or its angle of inclination. Moreover, a closure as described is substantially unaffected by the high air flow pressures resulting from high plane speeds, and accordingly protects the gunner from air blasts entering the turret through the aperture and from inclement weather. It is a further important feature of the invention that the slider assembly is adapted for operation by the gun barrel itself and that the fastener is accordingly operated in automatic manner in response to movement of the gun barrel.

While in the foregoing description the invention has been described in its application to the closing of the gun barrel aperture of a machine gun turret, along which the gun barrel is freely movable, it will be understood that the invention has wider application to the closing of any slot-like aperture through which a member projects and along which the member is movable.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a closure for a slot-like aperture, a pair of closure flaps carrying fastener elements along their adjacent edges, two spaced and oppositely arranged sliders cooperating with said elements to provide a shiftable opening through the closure while maintaining the fastener elements closed on both sides of the opening, and a frame-like carriage providing a mount for and fixedly securing the sliders in their necessary spaced relationship, the carriage being provided with means to guide the disengaged elements around said opening, and with means adapted to cooperate with guide means arranged along the edge of the aperture for guiding the carriage along the latter.

2. In a closure for a slot-like aperture, a pair of

closure flaps carrying fastener elements along their adjacent edges, two spaced and oppositely arranged sliders cooperating with said elements to provide a shiftable opening through the closure while maintaining the fastener elements closed on both sides of the opening, and a frame-like carriage providing a mount for and fixedly securing the sliders in their necessary spaced relationship, the carriage being provided with oppositely curved track sections defining said opening and which are operative to guide the disengaged fastener elements between the sliders.

3. In a closure for a slot-like aperture, a pair of closure flaps carrying fastener elements along their adjacent edges, two spaced and oppositely arranged sliders cooperating with said elements to provide a shiftable opening through the closure while maintaining the fastener elements closed on both sides of the opening, and a frame-like carriage providing a mount for and fixedly securing the sliders in their necessary spaced relationship, the carriage being provided with oppositely curved track sections defining said opening and which are operative to guide the disengaged fastener elements between said sliders, and with means adapted to cooperate with guide means arranged along an edge of the aperture for guiding the carriage along the latter.

4. In a closure for a slot-like aperture, a pair of closure flaps carrying fastener elements along their adjacent edges, two spaced and oppositely arranged sliders cooperating with said elements to provide a shiftable opening through the closure while maintaining the fastener elements closed on both sides of the opening, and a frame-like carriage providing a mount for and fixedly securing the sliders in their necessary spaced relationship, the carriage being provided with rollers adapted to bear on a member extending through said opening.

5. In a closure for a slot-like aperture, a pair of closure flaps carrying fastener elements along their adjacent edges, two spaced and oppositely arranged sliders cooperating with said elements to provide a shiftable opening through the closure while maintaining the fastener elements closed on both sides of the opening, and a frame-like carriage providing a mount for and fixedly securing the sliders in their necessary spaced relationship, the carriage being provided with guide rollers adapted to bear on a member extending through said opening and said carriage carrying means adapted to cooperate with guide means arranged along an edge of the aperture.

6. In a closure for a slot-like aperture, a pair of closure flaps carrying fastener elements along their adjacent edges, two spaced and oppositely arranged sliders cooperating with said elements to provide a shiftable opening through the closure while maintaining the fastener elements closed on both sides of the opening, and a frame-like carriage providing a mount for and fixedly securing the sliders in their necessary spaced relationship, the carriage being provided with oppositely curved track sections defining said opening and which are operative to guide the disengaged fastener elements between said sliders, said carriage further carrying rollers adapted to bear on a member extending through said opening and guide ears adapted to cooperate with guide means arranged along an edge of the aperture.

LOUIS W. SCHAAFF.