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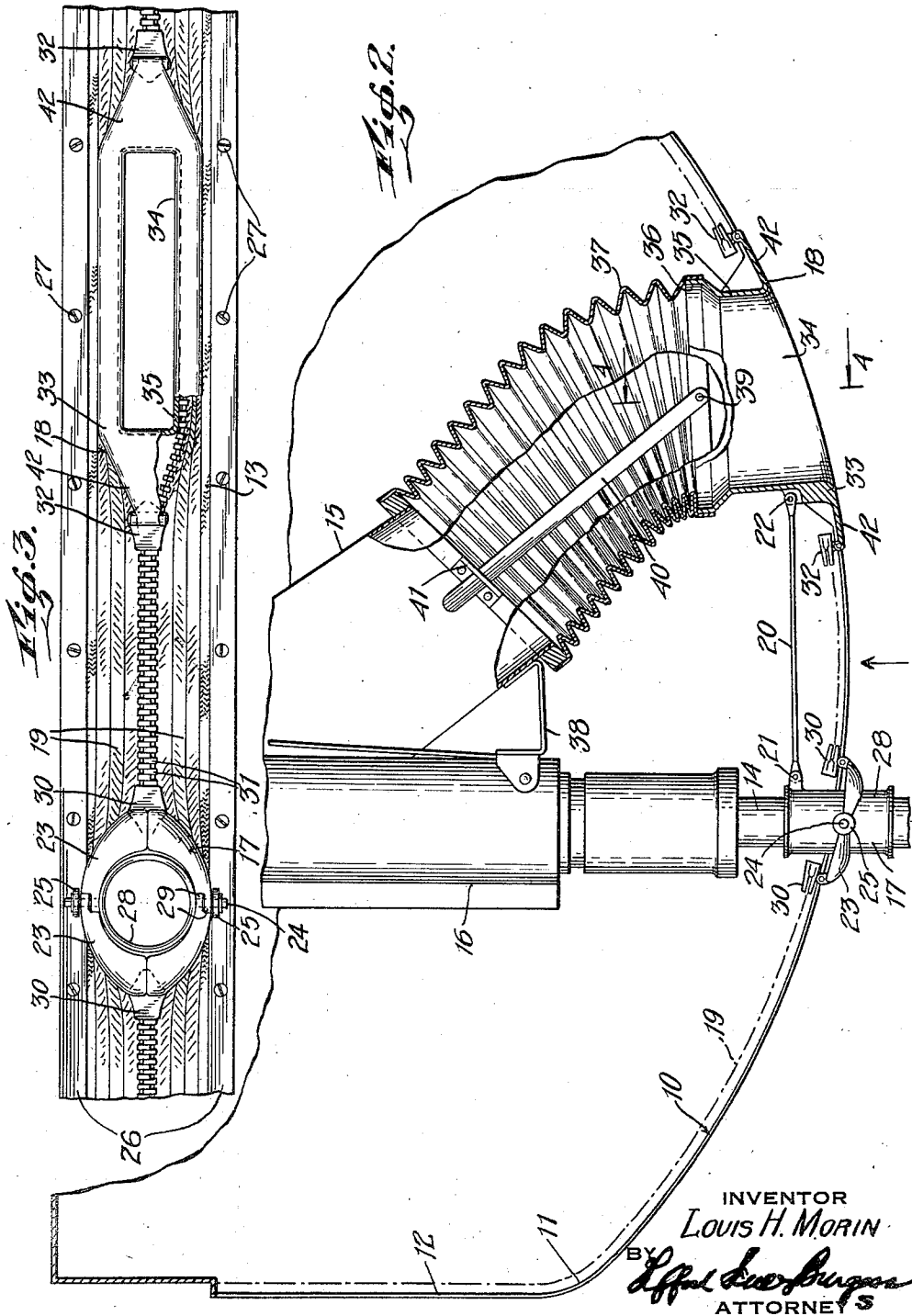
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TANDEM SLIDER UNIT

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TANDEM SLIDER UNITS

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19 Claims. (Cl. 89—36)

This invention relates to separable fasteners of the type employing stringers adapted to be arranged along an elongated opening in controlling two or more passages through said opening. More particularly, the invention relates to slider units for fasteners of the kind under consideration having a link coupling for uniting the units in tandem form, to collectively move longitudinally of the stringers, in maintaining predetermined spaced relation between two openings formed in the stringers by said units.

The novel features of the invention will be best understood from the following description when taken together with the accompanying drawings, in which certain embodiments of the invention are disclosed, and in which the separate parts are designated by suitable reference characters in each of the views, and in which:

Fig. 1 is a diagrammatic sectional view through part of what is termed the lower turret of an airplane showing the tandem slider units in one position in the turret.

Fig. 2 is a view similar to Fig. 1 showing the parts in a position substantially at right angles to that shown in Fig. 1 and showing other parts in elevation.

Fig. 3 is a view looking in the direction of the arrow 3 of Fig. 2 on an enlarged scale; and

Fig. 4 is a partial section on the line 4—4 of Fig. 2.

The invention deals with the mounting of two slider units on a pair of stringers and in coupling these units together to maintain predetermined spaced relationship of the units in jointly operating along the stringers in order to provide between the stringers two definitely spaced openings. Each unit comprises a body having a pair of sliders movably coupled with end portions thereof so as to separate the stringers in forming said openings, the units having means retaining the stringers in spaced relationship to each other.

In the adaptation of the invention, which is herein illustrated, the fastener is shown applied to what is commonly referred to as a lower turret of an airplane. The one slider unit has a pivoted sleeve or tube for receiving the barrel of a gun arranged in the turret and projecting there-through, whereas the other unit forms a large discharge opening united with the shell discharge of the gun through a bellows or other flexible wall structure to automatically dispense shells ejected from the gun. It will be understood at this time, however, that the illustration in the accompanying drawings is simply one adaptation of the invention.

In Figs. 1 and 2, 10 represents the wall structure of the lower turret of an airplane which is generally of a large radius curvature but terminates in one end in a rather sharp bend 11 extending to a straight wall portion 12. In the walls 10, 11 and 12 is formed a long slot or opening 13, note Figs. 3 and 4, through which the barrel 14 of a gun is movable longitudinally and two extreme positions of the gun barrel are shown in Figs. 1 and 2 of the drawings. At 15 is shown an ejector chute on the gun 16 or the stock thereof, as diagrammatically illustrated in the drawings. The empty shells are ejected from the gun through the chute or tube 15 in the automatic operation thereof.

Two slider units 17 and 18 are provided to form within the boundaries of two separable stringers 19 apertures or openings in the slot 13 for the barrel 14 and for the discharge of the cartridge shells. The two units 17 and 18 are coupled or linked together by a link or rod 20 pivoted to the unit 17, as seen at 21, and to the unit 18, as seen at 22. The pivots at 21 and 22 are so arranged as to maintain the freest possible movement of the tandem units longitudinally of the stringers 19, and particularly in such cases where one of the units, for example the unit 17, passes around a rather sharp bend or corner 11 in the turret wall structure.

The unit 17 comprises similar side portions 23 pivoted together, as seen at 24, and on the pivots are arranged rollers 25 which operate along track or runway plates 26 secured to the turret body at bordering edges of the opening 13 by fasteners 27. Secured to the pivot pins 24 is an elongated sleeve or tube 28 which has a pivotal mounting in the overlapped pivoted ends 29 of the parts 23, thus the barrel of the gun is free to rock on the pivots 24, as will be apparent. At the ends of the parts 23 are pivoted sliders 30 which are reversely arranged so as to maintain the links 31 of the stringers 19 in coupled relationship beyond the limits of the unit 17. This is also true of the sliders 32 pivoted to the ends of the unit 18, as will clearly appear from a consideration of Fig. 3 of the drawings.

The pivot of the separate parts 23 of the unit 17, as at 24, provides free flexing of the parts within the limits of the tube or sleeve 28 in the passage of the unit 17 around sharp corners, as at 11, in the movement of the unit 17 from the position shown in Fig. 1 to the position shown in Fig. 2 and vice versa. The unit 18, in maintaining a position on the slightly curved wall 10 of the turret, comprises an elongated rigid body

33 preferably having a slight curvature and this body has an elongated opening 34 therein which extends inwardly in the form of a tube 35 having an enlarged or flared end 36. To the end 36 is coupled one end of a bellows 37, the other end of which is coupled with the tubular discharge 15. The discharge 15 is in the form of an attachment to the gun stock and a suitable bracket 38 is employed for mounting the tube 15 on the body portion or stock 16 of the gun. Pivoted to opposite sides of the enlarged portion 36 of the tube 35, as indicated at 39, are reinforcing rods 40 which have a sliding mounting in L-shaped guide plates 41 at opposite sides of the tube 15. The rods 40 serve to maintain definite alinement of the tubes 15 and 35 one with respect to the other while permitting of the expansion and contraction of the bellows 37, as will appear from a comparison of Figs. 1 and 2 of the drawings.

The ends of the body 33 of the unit 18 are contracted, as seen at 42. At two of these contracted ends are pivoted the sliders 32. The side walls of the body 33 are of channeled cross sectional form, as seen at 43 in Fig. 4 of the drawings, the channels serving to form housings for the links or scoops 31 when separated in spanning the tube 35. The stringers 19 comprise the usual tapes to which the links 31 are directly attached which simplifies the production of the stringers and supplemental tapes 44 attached thereto, the latter having eyelets 45, through which the fastening devices 27 pass. Thus the attachment of the track or runway plates 26 also serve as means for mounting the stringers in connection with the wall of the turret adjacent the slot or opening formed therein.

It will appear from a consideration of Fig. 3 of the drawings that the channel portions 43 terminate short of the ends 42 of the body 33, leaving the stringer links free for passage into and out of the sliders 32. With the unit 17, the stringers between the two sliders 30 are entirely free. This construction facilitates free movement of the tandem units 17 and 18 regardless of the weather conditions to which the device may be subjected.

Considering Fig. 2 of the drawings, it will appear that the pivots of the coupling link 20 to the unit 17 at 21 and the unit 18 at 22 are at substantially equal distances from the line of travel of the stringers which maintains a relationship substantially paralleling the curvature of the turret wall, particularly when the parts are in the position shown in Fig. 1. This arrangement and relationship of pivots maintain a free and easy movement of the units on the stringers, particularly in passing the unit 17 over the sharp curve 11 and onto the straight wall portion 12. The rollers 25 of the unit 17 provide a more or less frictionless guide and support for the unit 17 in the movement over the rails or runways 26, and also provide the desired bearing when the separate parts 23 swing one relatively to the other on the pivots 24, when the unit 17 passes around the curve or sharp bend 11.

It will also be noted that sufficient flexibility is provided in the tapes of the stringers 19, as well as in the tapes 44, to allow for lateral expansion of the stringers in passing the tubular portions 28 and 35, as well as to compensate for relative movement of the sliders 30 when the separate parts 23 move on the pivots 24.

From the foregoing, it will be apparent that in operating the gun in any position along the opening 13, as each bullet is fired, the shell of said

bullet is automatically ejected and discharged through the tube 15, the bellows 37 and finally, through the opening 34. It will also be understood that in some instances, particularly when the units 17 and 18 travel from the position of Fig. 2 into the position of Fig. 1, a slight differential movement may prevail between the units 17 and 18 but as each unit is capable of operating separately on the stringers 19, this differential movement is of no consequence, and in fact, where it might be desirable, a definite different speed of travel of two units on the stringers is possible and in some adaptations of the invention, it might even be desirable to move one unit at a speed different from the speed of the other unit.

The links or scoops 31 of the stringers 19 are only diagrammatically shown in the present illustration, but they will be of the type shown, for example, in my application Ser. No. 444,189, filed May 23, 1942, now Patent No. 2,322,537 issued June 22, 1943, or, in other words, links or scoops of what I term the double action type having common opposed side portions and coupling elements, so that sliders mounted in reverse position with respect to each other, such for example as the sliders 30 and the sliders 32, will operate freely along the stringers. This is not commercially practical with links or scoops of the old conventional type having male couplings on one side and female couplings on the other side, nor in fact, with any scoops which do not have a free double action coupling engagement.

It will, of course, be apparent that the stringers 19 control the full length of the opening 13 formed in the turret body in closing this opening, except where the units 17 and 18 are positioned thereon by virtue of the movement of the gun in the turret, so that the units may be said to constitute a pair of members defining and maintaining spaced openings along the stringers of separable fasteners and in shifting the openings to different positions along the stringers.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination with a gun turret having an elongated gun slot therein, of separable fastener stringers mounted on the turret and closing the major portion of said slot, two slider units movable longitudinally of the stringers, one unit forming an opening for the passage of the gun barrel therethrough, the other unit having a shell dispensing opening therein, and means coupling said units to operate in tandem in maintaining predetermined positions of said openings along the stringers in the movement of the gun barrel longitudinally of the slot in said turret.

2. The combination with a gun turret having an elongated gun slot therein, of separable fastener stringers mounted on the turret and closing the major portion of said slot, two slider units movable longitudinally of the stringers, one unit forming an opening for the passage of the gun barrel therethrough, the other unit having a shell dispensing opening therein, means coupling said units to operate in tandem in maintaining predetermined positions of said openings along the stringers in the movement of the gun barrel longitudinally of the slot in said turret, each of said units having a pair of sliders movably supported thereon maintaining the stringers closed beyond the limits of said units, and one of said units comprising relatively movable parts for shifting positions of the sliders of said unit.

3. The combination with a gun turret having

an elongated gun slot therein, of separable fastener stringers mounted on the turret and closing the major portion of said slot, two slider units movable longitudinally of the stringers, one unit forming an opening for the passage of the gun barrel therethrough, the other unit having a shell dispensing opening therein, means coupling said units to operate in tandem in maintaining predetermined positions of said openings along the stringers in the movement of the gun barrel longitudinally of the slot in said turret, each of said units having a pair of sliders movably supported thereon maintaining the stringer closed beyond the limits of said units, one of said units comprising relatively movable parts for shifting positions of the sliders of said unit, and said last mentioned unit including a tubular portion pivoted within the unit.

4. The combination with a gun turret having an elongated gun slot therein, of separable fastener stringers mounted on the turret and closing the major portion of said slot, two slider units movable longitudinally of the stringers, one unit forming an opening for the passage of the gun barrel therethrough, the other unit having an opening therein, means coupling said units to operate in tandem in maintaining predetermined positions of said openings along the stringers in the movement of the gun barrel longitudinally of the slot in said turret, each of said units having a pair of sliders movably supported thereon maintaining the stringer closed beyond the limits of said units, one of said units comprising relatively movable parts for shifting positions of the sliders of said unit, said last mentioned unit including a tubular portion pivoted within the unit, and the other unit having a flexible tubular body forming a shell dispensing discharge communicating with the opening of said last mentioned unit.

5. The combination with separable fasteners employing stringers, of a slider unit movable along the stringers, said unit comprising a hollow body, sliders at opposite end portions of said body coupling the stringers beyond the limits of said body and separating the stringers within the limits of said body in maintaining the opening thereof, another slider arranged on the stringers in spaced relation to said first named slider unit, and means coupling the last mentioned slider with said unit.

6. The combination with a separable fastener employing stringers, of two slider devices arranged in wide spaced relationship to each other on the stringers, means coupling said devices to provide collective and independent movement of the devices on the stringers, and one of said devices comprising a hollow body having spaced sliders thereon for separating the stringers within the boundaries of said body.

7. The combination with a separable fastener employing stringers, of two slider devices arranged in wide spaced relationship to each other on the stringers, means coupling said devices to provide collective and independent movement of the devices on the stringers, and each of said devices comprising a hollow body having spaced sliders thereon for separating the stringers within the boundaries of said body.

8. The combination with a separable fastener employing stringers, of two slider devices arranged in wide spaced relationship to each other on the stringers, means coupling said devices to provide collective and independent movement of the devices on the stringers, each of said devices

comprising a hollow body having spaced sliders thereon for separating the stringers within the boundaries of said body, and one of said hollow bodies being composed of hingedly coupled parts.

9. The combination with a separable fastener employing stringers, of two slider devices arranged in wide spaced relationship to each other on the stringers, means coupling said devices to provide collective and independent movement of the devices on the stringers, each of said devices comprising a hollow body having spaced sliders thereon for separating the stringers within the boundaries of said body, and one of said bodies having a flexible tube coupled therewith.

10. The combination with a separable fastener employing stringers, of two slider devices arranged in wide spaced relationship to each other on the stringers, means coupling said devices to provide collective and independent movement of the devices on the stringers, each of said devices comprising a hollow body having spaced sliders thereon for separating the stringers within the boundaries of said body, one of said bodies having a flexible tube coupled therewith, and means for reinforcing the mounting of said flexible tube in connection with a support.

11. A slider unit for separable fastener stringers, said unit comprising a hollow body, sliders movably coupled with end portions of said body for coupling the stringers beyond the limits of said body while separating the stringers within the limits of said body, means on said body supporting the separated stringers beyond and adjacent the limits of the opening of said hollow body, and a flexible tubular member projecting from one side surface of said hollow body and forming a passage communicating with the opening of said hollow body.

12. A slider unit for separable fastener stringers, said unit comprising a hollow body, sliders movably coupled with end portions of said body for coupling the stringers beyond the limits of said body while separating the stringers within the limits of said body, means on said body supporting the separated stringers beyond and adjacent the limits of the opening of said hollow body, a flexible tubular member projecting from one side surface of said hollow body and forming a passage communicating with the opening of said hollow body, and means for coupling said tubular member to a support movable with respect to said stringers and said body.

13. The combination with a support having an elongated slot therein and tracks on bordering edges of said slot, of a separable fastener comprising stringers for closing the major portion of said slot, two slider units movable longitudinally of the stringers and arranged in spaced relationship to each other on the stringers, each of said units having an opening therein, means on each unit for separating the stringers at the opening of the associated unit, and means for coupling said units for collective and independent movement along the stringers.

14. The combination with a support having an elongated slot therein and tracks on bordering edges of said slot, of a separable fastener comprising stringers for closing the major portion of said slot, two slider units movable longitudinally of the stringers and arranged in spaced relationship to each other on the stringers, each of said units having an opening therein, means on each unit for separating the stringers at the opening of the associated unit, means for coupling said units for collective and independent

movement along the stringers, and one of said units having means engaging the tracks of said support to guide said unit in its movement longitudinally of said slot.

15. The combination with a support having an elongated slot therein and tracks on bordering edges of said slot, of a separable fastener comprising stringers for closing the major portion of said slot, two slider units movable longitudinally of the stringers and arranged in spaced relationship to each other on the stringers, each of said units having an opening therein, means on each unit for separating the stringers at the opening of the associated unit, means for coupling said units for collective and independent movement along the stringers, one of said units having means engaging the tracks of said support to guide said unit in its movement longitudinally of said slot, and said last named unit being composed of hingedly coupled parts.

16. The combination with a support having an elongated slot therein and tracks on bordering edges of said slot, of a separable fastener comprising stringers for closing the major portion of said slot, two slider units movable longitudinally of the stringers and arranged in spaced relationship to each other on the stringers, each of said units having an opening therein, means on each unit for separating the stringers at the opening of the associated unit, means for coupling said units for collective and independent movement along the stringers, and said last named means being pivotally coupled with both

units at substantially equally spaced distances from the track of said support.

17. A dual slider mechanism for separable fasteners including stringers, said mechanism comprising two slider units, each unit comprising a hollow body, means on each unit for separating the stringers within the limits of said body to clear the opening therein, and means movably coupling said units for collective and independent movement along the stringers of separable fasteners.

18. A dual slider mechanism for separable fasteners including stringers, said mechanism comprising two slider units, each unit comprising a hollow body, means on each unit for separating the stringers within the limits of said body to clear the opening therein, means movably coupling said units for collective and independent movement along the stringers of separable fasteners, and one of said units having a flexible tube extending therefrom and registering with the opening therein.

19. A dual slider mechanism for separable fasteners including stringers, said mechanism comprising two slider units, each unit comprising a hollow body, means on each unit for separating the stringers within the limits of said body to clear the opening therein, means movably coupling said units for collective and independent movement along the stringers of separable fasteners, one of said units comprising pivotally coupled parts, and a tubular member movably supported in said last named unit.

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