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DETACHABLE FASTENER

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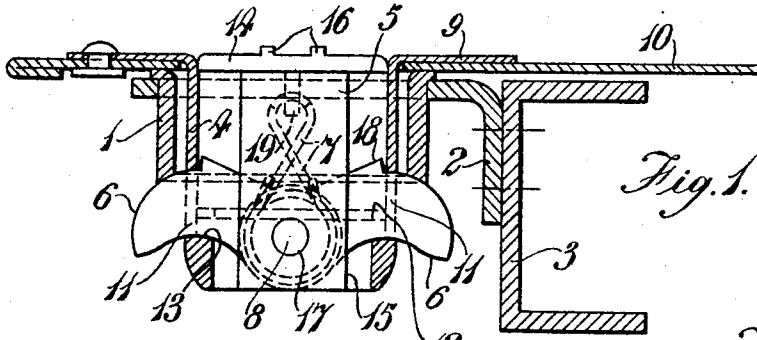


Fig. 1.

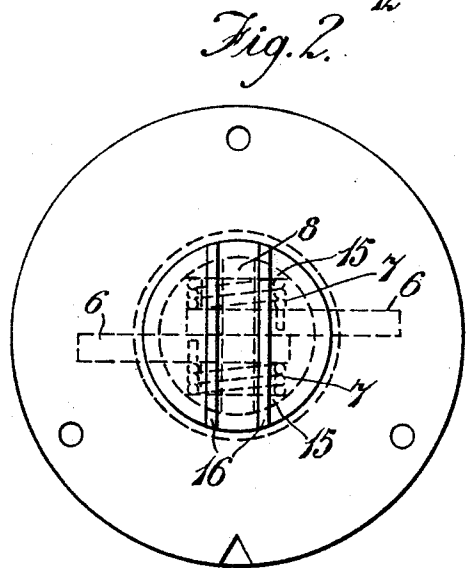


Fig. 2.

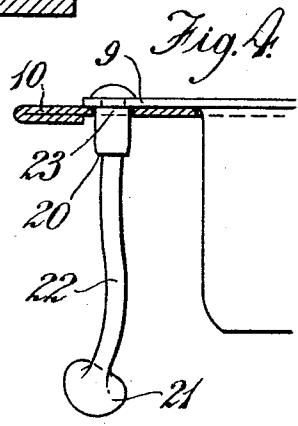


Fig. 4.

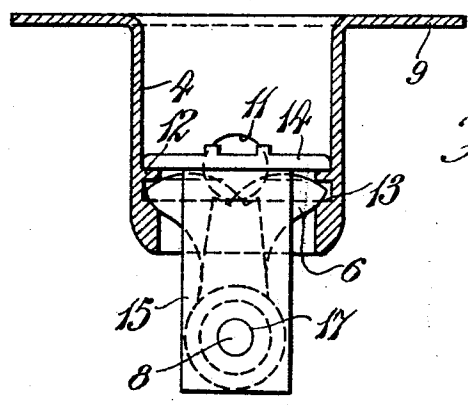


Fig. 3.

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## DETACHABLE FASTENER

Application filed August 24, 1931, Serial No. 559,071, and in Great Britain August 28, 1930.

This invention relates to a device for the improved attachment of doors, panels, or cowlings, and the like coverings (hereinafter referred to shortly as "cowling") to the framework or other parts of structures so that they may be easily and quickly attached and detached therefrom, without the obligation of using tools or implements for the purpose, and that when the cowling is so secured in position on the framing no appreciable number of projecting parts are protruding on the outside thereof.

To this end and in accordance with the invention, a suitably shaped opening (hereinafter called the "socket") is provided on the structure at each point at which the cowling is to be secured, into which an attaching portion (hereinafter called the "fastener"), correspondingly fixed to, or located on the cowling, registers, and is retained therein by the locking parts of the fastener projecting from the fastener body and engaging on or behind the inner side of the said socket.

The invention as hereinafter described with reference to and as illustrated in the accompanying drawing refers to one form of the device as adapted to aircraft cowlings. Figure 1 of the drawing is an assembled arrangement of the fastener and socket with the cowling in position in half sectional side elevation. Figure 2 is a plan view of the fastener only. Figure 3 is a half sectional elevation of the fastener with the plunger depressed and turned at right angles to a line through the ports. Figure 4 is an arrangement of the fastener fixing to the cowling for particular cases, such as for cowlings, in which the fasteners are at angles to one another.

According to the present form of the invention, the socket 1 (Figure 1) is a short length of round tube suitably shaped at the inner end, fitted into a bracket 2 attached to the framing of the structure 3.

The fastener is comprised in the main of an outer casing 4 (hereinafter called the "barrel"), a slidable centre portion 5 (hereinafter called the "plunger"), the locking or intercepting parts 6 (hereinafter called the "cams"), the springs 7 and the pin 8.

The barrel 4 is provided with a flange 9 at its outer end for its attachment to the cowling 10; suitably dimensioned openings 11 (hereinafter called the "ports") are provided on opposite sides of its axis through which the cams 6 operate; at the opposite end to the flange 9, or the inner end, the inside diameter is somewhat reduced thereby thickening the barrel wall and forming the outer ledge 12; a groove below the outer ledge forms an inner ledge 13, this inner ledge being level with the inner edge of the ports 11.

The plunger 5 comprises a circular head 14 slidably fitting the outer internal diameter of the barrel 4; the two projections or arms 15 attached thereto extend through and slidably fit the inner internal diameter of the barrel 4; the cams 6 are carried between the arms 15 by the pin 8 upon which they may rotate or pivot. The head 14 acts as a guide and stop to the plunger 5 and has formed on its outer side two parallel ridges or fins 16 by which it may be turned about its axis by the thumb or finger of the hand.

The cams 6 are substantially the locking parts of the device, preventing the fastener from being withdrawn from the socket 1 by projecting for a suitable distance in opposite directions from the barrel 4; they consist mainly of curved bars tapering towards one end, the opposite end being provided with a hole 17. The hole 17 locates the cams 6 in the plunger 5, and acts as a bearing on the pin 8; a step 18 is provided on the outer radius of the cams 6 and acts as a stop to their outward movement.

Between the cams 6 and the plunger arms 15, the springs 7 are fitted, one end being located in the lug 19 on the plunger head 14, the other end being on the cams 6. The springs 7 provide a return action to the cams 6 after they have been withdrawn by the depressing of the plunger 5.

The action of the fastener is as follows: When the plunger 5 is pressed into the barrel 4, the pin 8 carries the pivoted end of the cams 6 along the barrel 4 until further movement is prevented by the head 14 coming against the outer ledge 12; the inner curves

of the cams 6 ride on and slide inward over the ledge 13, causing the cams 6, by rotating inward about the pin 8, to be withdrawn into the fastener against the action of the springs 7. The fastener, together with the attached cowling 10, may then be withdrawn from the socket 1.

To fix the cams 6 in the withdrawn position, the plunger 5, when at the end of its travel into the barrel 4, is partly turned about its axis, thereby moving the outer ends of the cams 6 from opposite the ports 11, along the inner ledge 13, to be retained within the barrel 4 by coming against the unpierced part of its side, the outer ledge 12 preventing any return movement of the parts along the barrel 4. The relative positions of the parts are then as shown in Figure 3.

To fasten the cowling 10 in position: In the case when the fastener has not been set in the unfastened position it will automatically lock when pressed into its socket 1: In the case where the fastener has been set unfastened as illustrated in Figure 3, after insertion of the fastener into its socket 1 the plunger 5 is further turned in the barrel 4 until the cams are again opposite the ports 11; the cams 6, then under the influence of the springs 7, ride on the inner ledge 13 and slide outward through the ports 11 at the same time returning the plunger 5 along the barrel 4 until further movement is prevented by the cams 6 due to their tapering ends, wedging between the ledge 13 and the socket 1, drawing the fastener, together with the cowling 10, to the framing 3.

The fastener is so devised that when in the fastened position (indication of which is given by the plunger head 14 being approximately flush with the outer end of the barrel 4), the pin 8 is level with, or nearer the outer end of, the barrel 4 than the ledge 13. The resultant forces, then on the cams 6, caused by any force tending to pull the fastener outward from the socket 1, are approximately perpendicularly inward towards the axis of the barrel 4, at the level of the ledge 13, in such direction that either there is no tendency for the pin 8 to be moved axially of the barrel 4, or else a tendency for said pin 8 to be moved in the direction of locking the fastener.

To provide for particular cases of curved cowling and for any case in which a fastener may be required to be removed from its socket 1 independently of the cowling 10, an attachment as illustrated in Figure 4 may be used, comprising a suitable length of rod or of flexible cable or the like 22, one end 20 of which is located in the fastener flange 9, the other end being provided with a head 21, inside the cowling 10, of sufficient size to prevent its passing through the hole 23. The fastener then when unfastened may be moved away from its seating on the cowling 10 until

restrained by the inner head 21 coming against the cowling 10 at the hole 23.

What I claim then is:—

1. A fastening device for the removable connection of two elements including a socket carried by one element, a hollow plug carried by the other element, a plunger movable longitudinally in the hollow plug, cams pivotally carried by the plunger and operable through openings in the plug to engage beneath the lower edge of the socket to lock the plug and socket and thereby the elements relative to each other, the cams and the edge of the socket being so formed and arranged with respect to each other as to permit the displacement of the cams from the socket by relative inward movement of the plunger.

2. A fastening device for the removable connection of two elements including a socket carried by one element, a hollow plug carried by the other element, a plunger movable longitudinally in the hollow plug, diametrically opposed cams pivotally carried by the plunger and operable through openings in the plug to engage beneath the lower edge of the socket to lock the plug and socket and thereby the elements relative to each other, the cams and the edge of the socket being so formed and arranged with respect to each other as to permit the displacement of the cams from the socket by relative inward movement of the plunger.

3. A fastening device for removably connecting independent elements including a socket connected to one element, a hollow plug connected to the other element and adapted to fit within the socket, a plunger movable vertically in the plug, cam elements pivotally carried by the plunger and having their free ends operable through openings in the plug to engage beneath the lower edge of the socket when the parts are in locking relation, the plunger being movable inwardly with respect to the plug, the cams and the edge of the socket being so formed and arranged with respect to each other that inward movement of the plunger will withdraw the cams to a position to dispose their free ends inwardly of the plug to free the locking connection of the plug and socket on said inward movement of the plunger, and means whereby the cams may be held against projection through the openings in the plug.

4. A fastening device for removably connecting independent elements including a socket connected to one element, a hollow plug connected to the other element and adapted to fit within the socket, a plunger movable vertically in the plug, cam elements pivotally carried by the plunger and having their free ends operable through openings in the plug to engage beneath the lower edge of the socket when the parts are in locking relation, the plunger being movable inwardly with respect to the plug, the cams and the edge of

the socket being so formed and arranged with respect to each other that inward movement of the plunger will withdraw the cams to a position to dispose their free ends inwardly of the plug to free the locking connection of the plug and socket on said inward movement of the plunger, the plunger and cams being rotatable within the plug to arrange the free ends of the cams inwardly of the plug out of line with the openings therein to maintain the cams in withdrawn position.

5. A fastening device for removably connecting independent elements including a socket secured to one element, a hollow plug secured to the other element, the plug being mounted for sliding movement within the socket and being formed with openings on a plane beyond the free end of the socket, a plunger freely rotatable and slidable in the plug, cams pivotally connected to the plunger, with their free ends adapted to project through the openings in the plug and engage beneath the free end of the socket when the parts are in locking position, said cams and the edge of the socket being so formed and arranged with respect to each other as to permit the cams on movement of the plunger inwardly of the plug to be withdrawn to a position within the plug to thereby free the connection between the plug and socket, the rotation of the plunger following the withdrawal of the cams serving to position the free ends of the cams within the plug out of line with the openings therein whereby the plug is wholly free of connection with the socket and may be withdrawn therefrom to separate the elements.

6. A fastening device including a latch body in the form of a casing adapted to extend plug-like into a socket, a plunger operative in the casing, and locking arms carried by the plunger and spring-influenced to tend to extend through lateral openings in the latch body into engagement with the socket to secure the latch body thereto, the plunger being slidable axially in the casing in the direction in which it extends into the socket, the locking arms and edge of the socket being so formed and arranged with respect to each other as to cause said axial movement of the plunger to retract said locking arms against their spring influence and in the opposite direction, and tension said arms when free to move under their spring influence to extend through the lateral openings in the casing.

7. A fastening device as claimed in claim 4, wherein the locking arms are attached pivotally to the plunger to rock about axes transversely of the latter from positions in which they extend away from the free end and longitudinally of the plunger to positions in which they extend outwardly through the lateral openings in the casing; the edges of said locking arms being so shaped as to

cooperate cam-fashion with the margins of the corresponding lateral openings in the casing to effect their retraction and extension through said openings.

8. A fastening device as claimed in claim 6, wherein the two locking arms are mounted pivotally on a pin carried by and extending diametrically of the plunger.

9. A fastening device as claimed in claim 6, wherein the locking arms are swingingly mounted and are so shaped at those edges which cooperate with the margins of the lateral openings in the casing and with the socket that when the latch body is fastened to the socket, the resultant forces on the axis of the locking arms caused by a force tending to separate said latch body and socket are either equal and opposite, or, alternatively, tend to force said locking arms more firmly into engagement with the socket.

10. A fastening device as claimed in claim 6, wherein the movement of the locking arms under their spring influence into engagement with the socket results in a wedging or equivalent action drawing the latch body and socket firmly together.

11. A fastening device as claimed in claim 6, wherein the slidable plunger when at the end of its axial movement to retract the locking arms may be retained in that position by being turned about its axis, thus moving the ends of the locking arms away from the corresponding lateral openings in the casing.

12. A fastening device as claimed in claim 6, wherein the axially slidable plunger is provided with two or more parallel fins, whereby it may be turned about its axis.

13. A fastening device as claimed in claim 6, wherein the casing has formed within it a ledge which serves to limit the axial movement of the plunger in retracting the locking arms and also to prevent the locking arms and plunger moving along the casing in the reverse direction once the plunger has been rotated to bring the ends of the locking arms clear of the corresponding lateral openings in the casing.

14. A fastening device as claimed in claim 6, wherein the casing is provided with a ledge acting as an abutment to the ends of the locking arms, when withdrawn within, and upon which the arms ride when projecting or being withdrawn through the lateral openings in the casing.

15. A fastening device as claimed in claim 6, wherein the plunger is returned along the casing by the action of the locking arms sliding outward under their spring influence over the margins of the lateral openings in the casing.

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