Nov. 13, 1951 R. C. MARCELL 2,574,836

FILLER CAP AND OTHER CLOSURES

Filed Aug. 29, 1949 2 SHEETS—SHEET 1

FIG. 1.

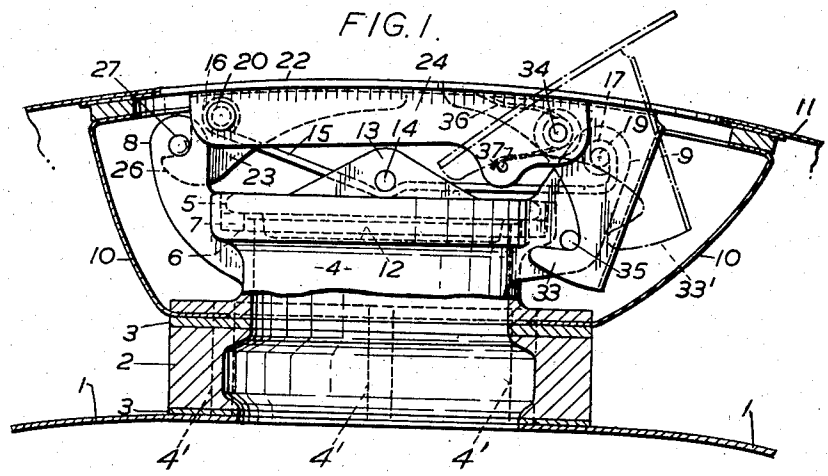
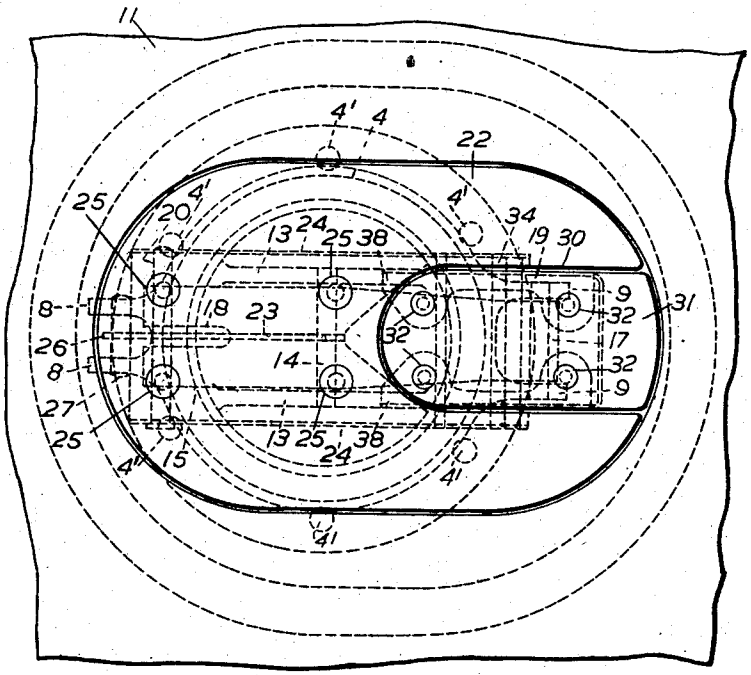


FIG. 2.



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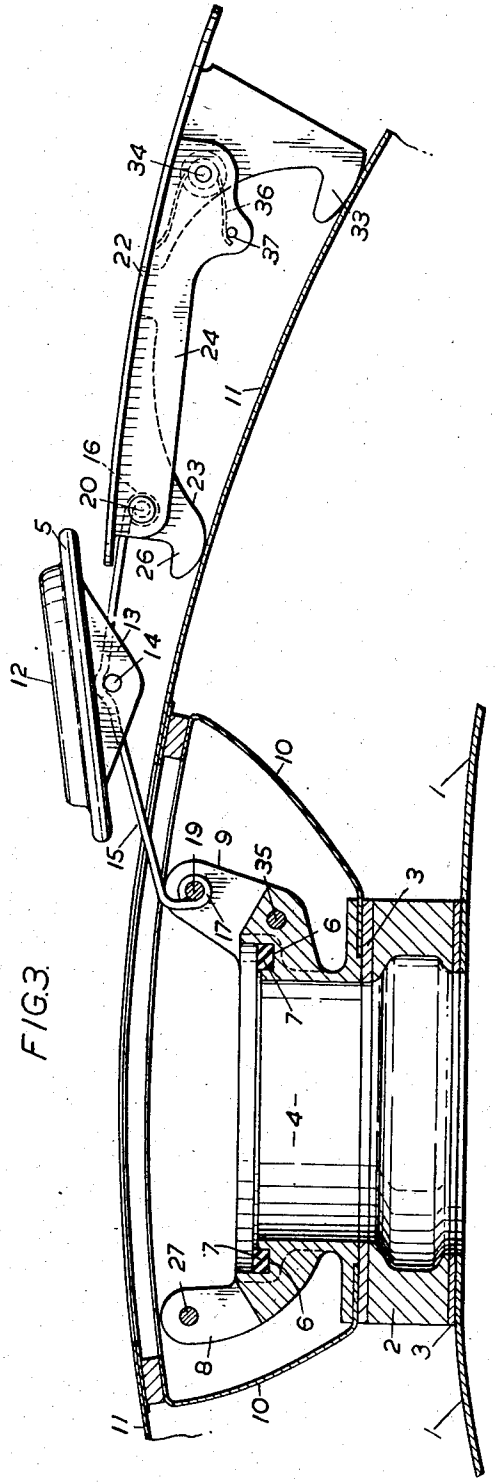


FIG. 3.

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FILLER CAP AND OTHER CLOSURES

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8 Claims. (Cl. 220—29)

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This invention relates to closures, and is primarily but not exclusively applicable to filler caps for the fuel tanks of aircraft and the like.

An object of the invention is to provide an improved form of filler cap or other closure which can be securely fastened and yet rapidly opened, which has no detachable parts, and which when closed gives a smooth and uninterrupted surface which may be flush with a surrounding surface such as the skin of an aircraft.

According to the present invention a filler cap or other closure device comprises a seating surrounding the opening to be closed, a closure fitting in or over the opening, a primary lever extending across and carrying the closure and carried by a fixed pivot at one end, a secondary floating lever pivoted to the free end of the primary lever and having an extension at one end projecting beyond such pivot to engage under a fixed abutment, and locking means for retaining the other end of the floating lever in a position close to the primary lever. The locking means may comprise a hook engaging a fixed pin.

In one arrangement the floating lever is in the form of a flat cover having in it an aperture or recess occupied by a subsidiary flat cover, the subsidiary flat cover being capable of movement to operate the locking means for the secondary lever. The subsidiary cover conveniently is secured to or formed as part of a locking hook and pivoted about an axis intermediate in its length so that one end of it can be pressed inwardly to release the hook after which the other end can be pulled to swing the secondary lever clear of its abutment and then swing the primary lever about its pivot to open the closure.

The primary lever may be in the form of a leaf spring serving to hold the closure resiliently on its seating when in the closed position.

The invention may be carried into practice in various ways, but one specific embodiment will now be described by way of example with reference to the accompanying drawings, in which—

Figure 1 is a side elevation, partly sectioned, of a filler cap in the closed position,

Figure 2 is a plan of the filler cap of Figure 1, and

Figure 3 is a side elevation, partly sectioned, of the filler cap of Figure 1 in the open position.

In this particular embodiment the invention is applied to a filler cap for the fuel tank of an aircraft. Secured around the filling opening of the tank 1 with the aid of a packing block 2 and washers 3 by rivets or screws passing through holes 4' is a casting in the form of a seating 4 for a closure 5. The seating 4 is formed with an annular groove 6 to receive a sealing washer 7 surrounding the filling opening and pairs of lugs

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8 and 9 on each side of the filling opening projecting upwards at diametrically opposite points. The seating 4 is surrounded by an outer skin or funnel 10 connecting its lower portion to the skin 11 of the aircraft in which it is fitted so that if any fuel is upset it will not flow into the space between the tank and the skin.

The closure proper consists of a cast disc 5 having an annular rib 12 on its under side to fit within the sealing washer 7 and a pair of shallow lugs 13 on its upper side to accommodate a pivot pin 14. This pivot pin 14, situated diametrically across the top of the closure 5, fits over a primary lever 15 in the form of a leaf spring formed of spring steel strip having both ends sloping slightly upwards and curled round at their extremities to form eyes 16 and 17. The end having the eye 16 is slotted down the middle at 18. The other end is pivoted by means of the eye 17 to the pair of fixed lugs 9 of the seating 4 by means of a pivot pin 19 passing through them. Accordingly the primary lever 15 and the closure 5 can be swung clear of the filling opening about this pivot to the positions shown in Figure 3.

A secondary lever is pivoted to the free end of the primary lever by a pin 20 passing through the eye 16. This secondary lever is in the form of a main cover 22 of sheet metal having a central web 23 and two outer parallel webs 24 projecting from its under side. The latter are formed from two further pieces of sheet metal bent to unequal channel section and riveted to the cover at 25. The central web 23 has a hole near one end by which it is pivoted by the pin 20 to the primary lever, this web extending into the central slot 18. The web 23 is continued beyond the pivot 20 downwardly and outwardly and terminates in a hook 26 arranged to engage beneath a fixed pin 27 extending between the pair of lugs 8 of the seating 4. Accordingly the secondary lever serves to force the free end of the primary lever down towards the seating and due to its leverage enables a substantial force to be readily exerted on it.

At its end opposite to the pivot 20 the main cover 22 of the secondary lever has a substantial piece cut out of it so as to leave a recess 30 extending nearly half the length of the cover. This recess is occupied by a subsidiary cover 31 to which is secured a locking hook. The latter is constituted by a further piece of metal of generally channel section riveted at 32 to the subsidiary cover 31 and affording two webs in the shape of hooks 33 projecting downwardly from it. Near the middle of the length of the subsidiary cover these webs are formed with holes to receive a pivot pin 34 passing through the cor-

responding webs 24 of the secondary lever so as to pivot the locking hook to the free end of the secondary lever. The adjacent lugs 9 of the seating 4 are provided with a further pin 35 situated so that it can be engaged by these hooks 33 to lock the secondary lever in position. The parts are so dimensioned that when in their locked position the subsidiary cover 31 of the locking hook and the main cover 22 of the secondary lever are flush with one another and with the surrounding skin 11 of the aircraft. A torsion spring 36 surrounding the pivot pin 34 bears against the subsidiary cover 31 and against a stop pin 37 carried by the webs 24 of the secondary lever, and serves to bias the locking hook, in a clockwise direction as viewed in Figure 1, to the flush position in which the protruding ends 38 of the webs which form the hooks 33 engage the inner surface of the main cover 22 to prevent further relative rotation of the locking hook.

It will be appreciated that to open the filler cap it is only necessary to press on the inner end of the subsidiary cover 31 of the locking hook so as to rock the hooks 33 to the position 33' shown in chain lines in Figure 1. The other end of the subsidiary cover 31 of the locking hook will then project above the level of the surrounding skin 11 and can be pulled so as to raise the secondary lever until its hook 26 clears the corresponding pin 27 whereafter further pulling swings the main cover 22, primary lever 15 and closure 5 clear of the filler opening to the positions shown in Figure 3. Thus the filling opening is exposed in what really amounts to a single movement. The converse movement closes it.

Thus the arrangement according to the invention provides a form of closure that can be securely fastened and yet rapidly opened, that has no loose parts, and that gives a smooth uninterrupted surface when closed.

What I claim as my invention and desire to secure by Letters Patent is:

1. A closure device for closing an opening, comprising in combination a fixed seating surrounding the opening, a closure member which can be removably fitted against the seating to close the opening, a primary lever pivoted at one end to a fixed pivot adjacent the seating at one side of the opening and extending across and carrying the closure member, the primary lever being movable about the fixed pivot to a closed position in which it extends across the opening and holds the closure member against the seating to close the opening, an abutment provided by a fixed part adjacent the seating on the side of the opening opposite the fixed pivot, a floating secondary lever pivoted to the end of the primary lever remote from the fixed pivot and carrying an extension which projects beyond the common pivotal axis of the primary and secondary levers, the extension being so positioned on the secondary lever as to be detachably engaged under the abutment when said primary lever is in closed position and serve as a fulcrum for the secondary lever, and locking means for retaining the free end of the secondary lever in a position across the opening close to the primary lever in which position it will retain the primary lever in its said position holding the closure member on to the seating.

2. A device as claimed in claim 1 in which the locking means comprises a hook engaging a pin.

3. A device as claimed in claim 1 in which the primary lever comprises a leaf spring serving to hold the closure resiliently on the seating when in the closed position.

4. A closure device for closing a filling opening of a tank, comprising in combination a fixed seating surrounding the opening and secured to the tank, a cap which can be detachably fitted against the seating to close the opening, a primary lever pivoted at one end to a fixed pivot adjacent the seating at one side of the opening and extending across and carrying the cap, the primary lever being movable about the fixed pivot to a closed position in which it extends across the opening and holds the cap against the seating to close the opening, a floating secondary lever which incorporates a substantially flat main cover having an aperture therein and is pivoted to the end of the primary lever remote from the fixed pivot, and which carries a rigid extension projecting beyond the common pivotal axis of the primary and secondary levers, an abutment provided by a fixed part adjacent the seating on the side of the opening opposite the fixed pivot, detachably engaging said extension when said primary lever is moved to closed position and constituting a fulcrum for the secondary lever about which it may be moved to a closed position in which the main cover overlies the cap, a fixed locking member secured to the tank, and a subsidiary cover in the aperture in the main cover, pivoted to the secondary lever adjacent its free end and carrying a locking member which cooperates with said fixed locking member to lock the free end of the secondary lever in closed position when said subsidiary cover is rotated to lie flush with said main cover.

5. A device as claimed in claim 4 in which the subsidiary cover is pivoted about an axis intermediate in its length and in which the two cooperating locking members comprise a fixed pin carried by the seating and a hook mounted on the subsidiary cover and moving therewith out of engagement with said pin when one end of said subsidiary cover is pressed inwardly from the locked position, thus permitting its other end to be pulled upwardly to swing the secondary lever clear of the abutment and then to swing the primary lever about the fixed pivot to lift the cap off the opening.

6. A device as claimed in claim 5 in which the primary lever comprises a leaf spring serving to hold the cap resiliently against the seating when in the closed position.

7. A device as claimed in claim 6 in which the seating is provided by a casting secured to the tank having projecting lugs which support the fixed pivot for the primary lever and the fixed abutment and the fixed pin.

8. A device as claimed in claim 7 including a sealing washer carried in a groove in the seating, against which the cap is pressed when in the closed position to seal the opening.

REGINALD CLAUDE MARCELL.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,753,946	Replogle	Apr. 8, 1930

OTHER REFERENCES

Publication: Automotive and Aviation Industries, May 1, 1944, pages 27–29.