May 28, 1963 G. M. SIMPKINS 3,091,356

FLUSH CLOSURE

Filed June 16, 1961 2 Sheets-Sheet 1

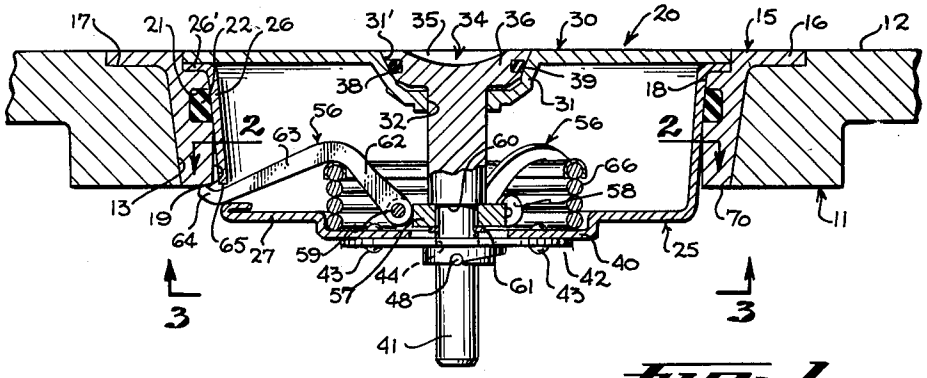


Fig. 1

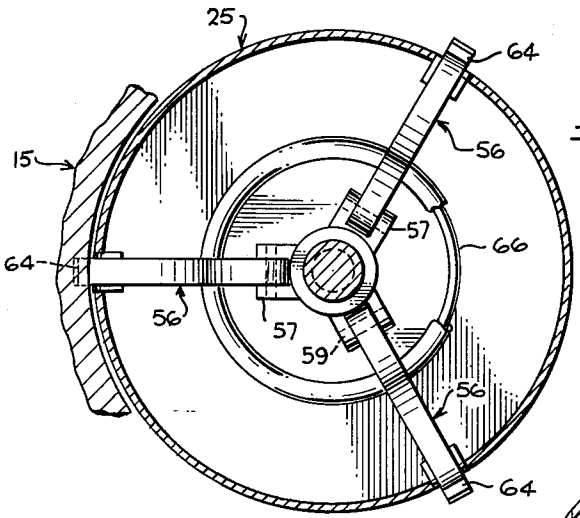


Fig. 2

Fig. 6

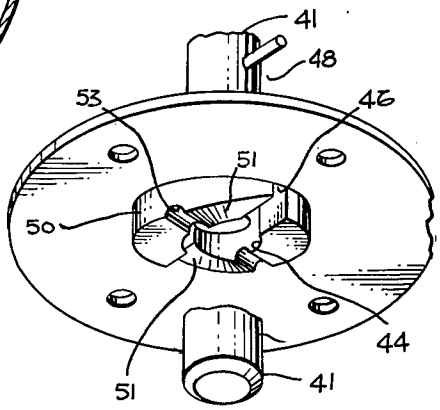
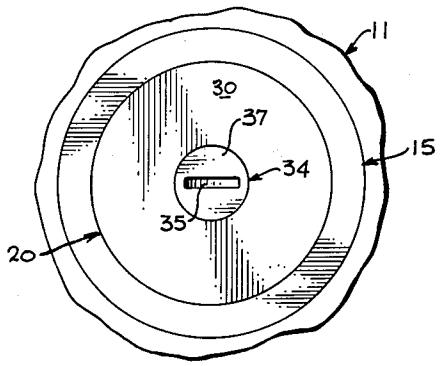


Fig. 5



GIDEON MAC SIMPKINS
INVENTOR.

BY Mason & Graham

ATTORNEYS

May 28, 1963 G. M. SIMPKINS 3,091,356

FLUSH CLOSURE

Filed June 16, 1961 2 Sheets-Sheet 2

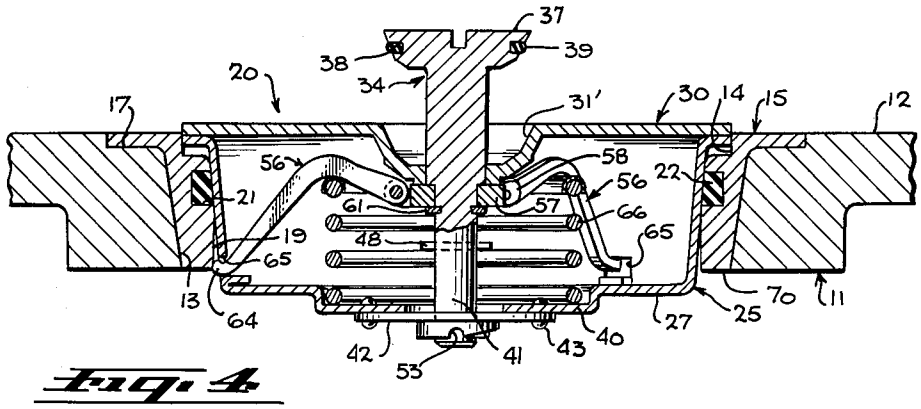


Fig. 4

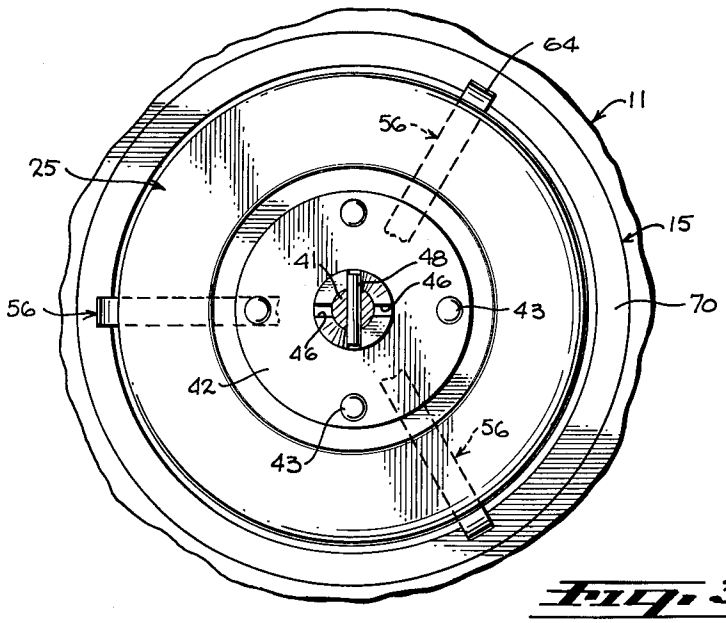
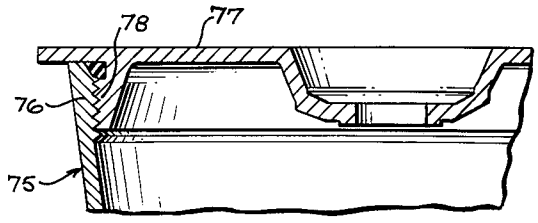


Fig. 3

Fig. 7



GIDEON MAC SIMPKINS
INVENTOR.

BY Mason & Graham

ATTORNEYS

United States Patent Office 3,091,356 Patented May 28, 1963

3,091,356

FLUSH CLOSURE

Gideon Mac Simpkins, Chatsworth, Calif., assignor to Airaterra, Glendale, Calif., a corporation of California

Filed June 16, 1961, Ser. No. 117,644
7 Claims. (Cl. 220—25)

This invention relates generally to closures and particularly to closures adapted to fit within the opening to be closed and to present an outer surface flush with the surrounding structure.

An object of the invention is to provide a new, and improved flush-type closure of simple construction which can be easily operated.

Another object is to provide such a closure having novel mechanical means for releasably securing the device in place and effecting a fluid tight seal between it and the member in which it is mounted and between parts of the device itself.

Another object is to provide a device which can be readily operated under wide ranges of temperature and can be manipulated to release or unlock it at low temperatures where the same has been covered with ice.

Still another object is to provide a relatively lightweight device which can be manufactured economically.

These and other objects will be apparent from the drawings and the following description. Referring to the drawings:

FIG. 1 is a central sectional view through a closure device embodying the invention and showing the device releasably secured in an adapter mounted in the wall of a surrounding structure;

FIG. 2 is a fragmentary sectional view on line 2—2 of FIG. 1;

FIG. 3 is an inverted sectional plan view on line 3—3 of FIG. 1;

FIG. 4 is a view similar to FIG. 1, but showing the device with the parts in released or unlocked position;

FIG. 5 is a fragmentary plan view of the device of FIG. 1;

FIG. 6 is an exploded fragmentary perspective view of the cam and pin lock mechanism at the inner end of the device; and

FIG. 7 is a fragmentary sectional view of a modified type of housing construction.

More particularly describing the invention, numeral 11 designates a structure having a flat outer surface 12 and an opening 13 therethrough. An adapter 15 is shown mounted in opening 13 of member 12 and this is provided with a flange 16 which is received in a counterbore 17 so that the outer surface of the flange provides a continuation of the flat outer surface 12 of structure 11.

The adapter 15 provides an interior surface which includes a tapered entry section 18 and a cylindrical section 19. The closure device of the invention, generally designated by numeral 20, is shown in the adapter. The inner wall section 18 is provided with an annular groove 21 to receive a sealing ring 22. The adapter is also provided with a counterbore or annular recess 14 at its outer end to receive the device 20 as will later appear.

The closure 20 includes a cup-shaped housing 25 provided with an inclined or frusto-conical side wall 26 and an inner wall 27. Wall 26 is outwardly flanged at its upper end at 26' and a cover-plate 30 is welded or otherwise secured thereto.

The cover plate is centrally dished at 31 and centrally apertured at 32 to receive a headed locking pin 34 which is both slidable and rotatable in the opening. Pin 34 has a slot 35 in the outer surface of its head 36 for the reception of a suitable tool. The head is contoured to fit the inner surface 31' of the dished portion 31 of the top when positioned as in FIG. 1. The outer surface 37 of the pin is flat so that it will be flush with the outer surface of the cover plate. A peripheral groove 38 containing a seal ring 39 is provided for effecting a seal between the parts.

The inner wall 27 of the housing has an annular depressed portion 40 which is centrally apertured to pass a section 41 of the locking pin of reduced diameter. A cam plate 42 is secured to the under surface of the lower wall by rivets 43, and this is centrally apertured at 44 to receive the reduced section 41 of the pin. Also, it is provided with radial slots 46 to pass a crosspin 48 mounted in the locking pin.

Cam plate 42 is formed to provide two cam sections 50 which extend circumferentially of the slots 46 and which are correspondingly disposed having inclined cam surfaces 51 extending axially away from the inner wall 27 and terminating therebeyond in radially extending recesses 53 for receiving the end portions of the cross pin 48.

The pin 34 carries three latching legs designated 56 which are pivotally mounted at their inner ends upon a spider 57 provided with suitable pairs of apertured ears 58 between which the inner ends of the legs are received, pins 59 passing through the parts. The spider is held between a shoulder 60 on pin 34 and a split ring 61. The legs are angular, or outwardly bowed, each having an inner section 62 and an outer section 63 extending at a substantial angle thereto. The outer end portions 64 of the legs are turned back slightly upon sections 63 and project through openings 65 provided in the cup housing so that they can serve to engage the under or inner surface of the adapter 15 (FIG. 1) or any other suitable undercut ledge. A coil compression spring 66 is mounted between the legs and the inner wall 27 of the housing. This serves to urge the locking pin outwardly of the housing and draw the latching legs into the housing.

In order to install the flush cap, it is inserted in the adapter until the housing is nearly flush with the surrounding structure, as shown in FIG. 4. In this position spring 66 serves to hold the legs retracted and at the same time hold the locking pin in outer or released position. In order to lock the device, the pin is pushed into the housing against the force of the spring with the crosspin in alignment with the slots 46 after which the locking pin is turned clockwise to draw it in by the action of the crosspin traversing the cam faces 51 until it comes to rest in the recesses 53, and thus position the parts as shown in FIG. 1. In such position, the legs 56 are extended to engage the under or inner anchor surface 70 of the adapter. In reaching this position the legs exert leverage upon the housing to draw it into the adapter and thus compress seal 22.

To release the cap, the pin 34 is turned counterclockwise until it springs out as shown in FIG. 4. The extended pin then serves as an indicator or flag that the cap is not secured and also serves as a handle for removing the cap.

In FIG. 7 I show another form of the invention wherein the housing cup, here designated 75, is shown provided with an interiorly threaded upper end section 76 into which a top plate 77 having a depending externally threaded flange 78 is threaded. A seal ring 80 is provided between the parts. This type of construction can be used where it is desirable to have a housing which can be readily disassembled.

Although I have illustrated and described a preferred form of my invention, I contemplate that various changes and modifications can be made therein without departing from the invention, the scope of which is indicated by the following claims.

I claim:

1. A flush-type closure adapted to be releasably mounted in an opening in a structure providing an undercut anchoring surface, comprising a housing receivable in said opening having an inner end wall, a locking pin mounted centrally of said housing for limited axial movement and for rotative movement, a plurality of radially extending latch legs pivotally mounted at their inner ends on said locking pin for pivotal movement in planes containing the pivotal axis of the locking pin, the free ends of said legs projecting through said housing in extended position for engagement with the anchoring surface, when said locking pin is in its inner position, spring means interposed between the inner end wall of the housing and said legs yieldably urging said locking pin outwardly of said housing thereby to retract said legs, and interengaging means on said housing and said locking pin for releasably securing said locking pin in innermost position.

2. A closure as set forth in claim 1 in which said legs are bowed toward the outer end of the housing and said spring means comprises a compression coil spring.

3. In a flush-type closure adapted to be releasably mounted in an opening in a structure providing an undercut anchoring surface adjacent the opening, comprising a housing receivable in the opening having an inner wall and having an outer wall flush with the outer surface of the structure, said outer wall having a central, centrally apertured dished section, a locking pin mounted centrally of said housing for limited axial movement and extending through said dished portion of the outer wall of the housing, said pin having a head receivable in said dished portion of said outer wall in sealing relation therewith when the pin is in inner, locked position, said head having a flat outer surface adapted to be flush with the outer surface of said housing, a plurality of radially extending latch legs pivotally mounted at their inner ends on said locking pin for pivotal movement in planes containing the pivotal axis of the locking pin, said legs each being bowed toward said outer wall and terminating in end portions projecting through said housing, a coil spring between the inner wall of said housing and the intermediate portions of the legs tending to retract said legs into the housing and move said locking pin outwardly of the housing, and interengaging means on said inner wall of said housing and said locking pin for releasably securing said locking pin in inner, locked position.

4. A closure as set forth in claim 3 in which said interengaging means comprises a crosspin in said locking pin and cam surface and recess means on the inner wall of the housing engageable by said crosspin.

5. A closure adapted to be releasably mounted in an opening in a structure providing an undercut anchoring surface, comprising a housing receivable in said opening, said housing having an inner wall, an outer wall, and a frusto-conical side wall, a locking pin mounted centrally of said housing for limited axial movement and for rotative movement, said inner and outer walls being centrally apertured and receiving the locking pin, a plurality of radially extending latch legs pivotally mounted at their inner ends on said locking pin for pivotal movement in planes containing the pivotal axis of the locking pin, said side wall having openings through which the free ends of said legs project in extended position for engagement with the anchoring surface when said locking pin is in its inner position, a compression spring interposed between intermediate portions of said legs and said inner wall of the housing yieldably urging said legs and said locking pin outwardly of said housing thereby to retract said legs, and interengaging means on the inner wall of said housing and said locking pin for releasably securing said locking pin in its inner position.

6. In a closure adapted to be releasably mounted in an opening in a structure providing an undercut anchoring surface, a cup-like housing having an inner wall, an outer wall, and a side wall, a locking pin mounted centrally of said housing for limited axial movement, a plurality of latch legs pivotally mounted at their inner ends on said locking pin for pivotal movement in planes containing the axis of the pin, said legs being bowed intermediate their ends toward the outer wall of the housing, said side wall of the housing having openings through which the free ends of the legs project, compression spring means between the inner wall of the housing and the bowed portions of the legs yieldably urging said legs and said locking pin in a direction toward said outer wall of the housing whereby to retract said legs relative to the side wall, and interengaging means on said housing and said pin for securing said pin in inward position with said spring compressed and said legs extended to engage said anchoring surface.

7. The closure set forth in claim 6 in which said outer wall is detachably secured to said side wall and in which said spring, said legs and said pin are removable from the remainder of the housing when the outer wall is removed.

References Cited in the file of this patent

UNITED STATES PATENTS

2,183,488	Duffield	Dec. 12, 1939
2,844,274	Kelish et al.	July 22, 1958

FOREIGN PATENTS

333,904	France	Oct. 5, 1903