Dec. 6, 1938. R. I. LAMOTHE ET AL 2,139,193

CAP LOCK

Filed May 12, 1937

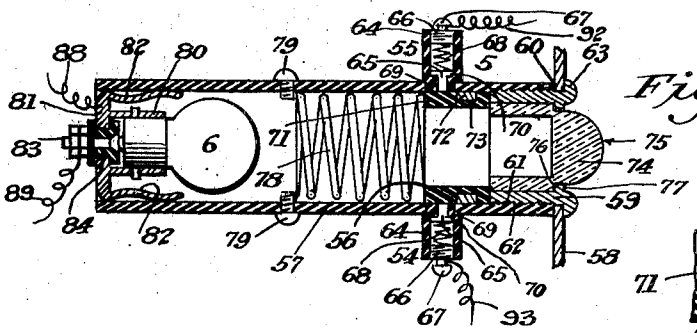

Fig. 1

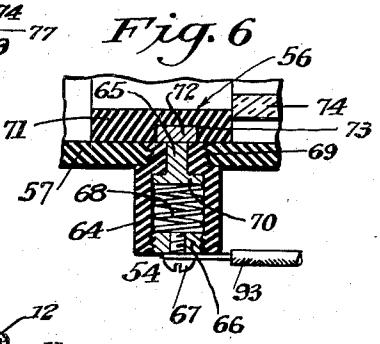

Fig. 6

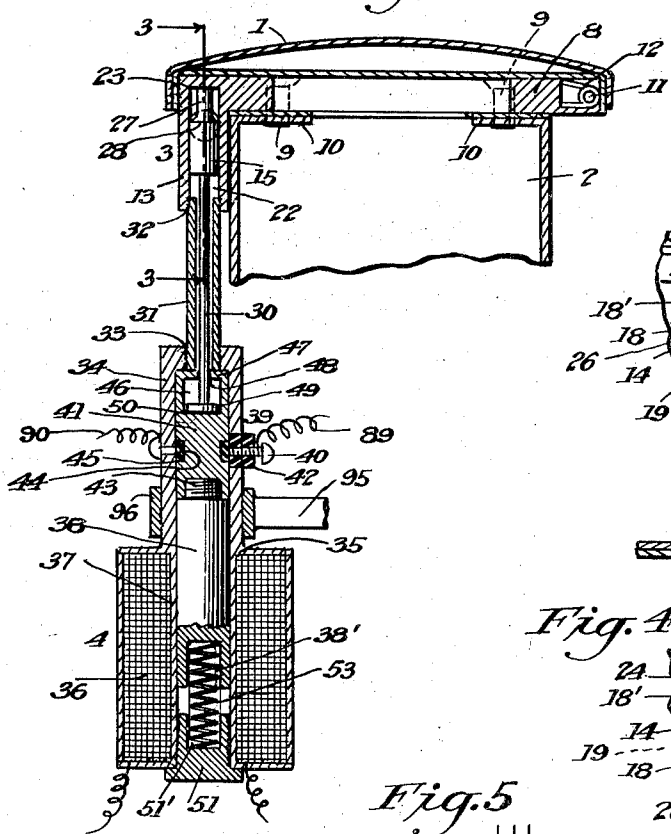

Fig. 2

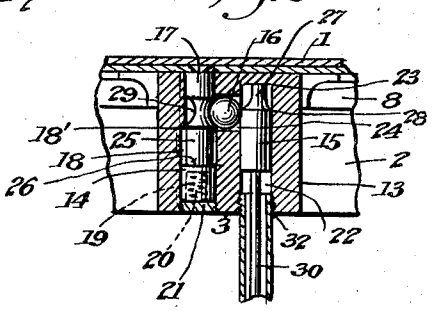

Fig. 3

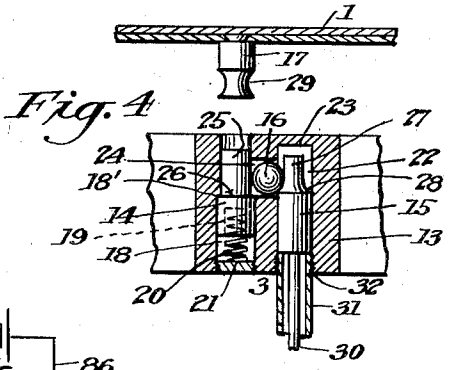

Fig. 4

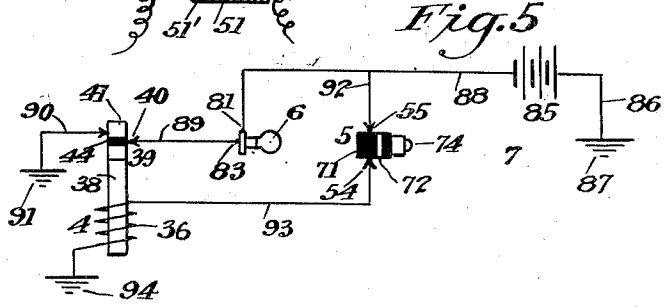

Fig. 5

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CAP LOCK

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Application May 12, 1937, Serial No. 142,202

1 Claim. (Cl. 292—252)

This invention relates to remote control signal locks, and is particularly applicable to the inlet cap of the fuel tank of an automobile.

The general object of the invention is to provide a lock for the inlet cap of the fuel tank of an automobile, to be operated from a suitable place within the automobile, such as the dashboard, for unlocking the fuel inlet cap, when it is desired to fill the fuel tank with fuel.

A further object is to provide a lock of the character stated which will automatically lock the fuel inlet cap, when it is swung closed, and shut off the lock signal.

Other objects and advantages will appear hereinafter.

The invention is illustrated in the annexed drawing, which forms a part of this specification and in which,

Fig. 1 is a longitudinal section of the controlling switch of our invention.

Fig. 2 is a longitudinal section of the fuel inlet cap, the cap lock and the solenoid for unlocking said lock.

Fig. 3 is a vertical longitudinal section taken on line 3—3 of Fig. 2, showing the fuel inlet cap locked by our lock in closed position.

Fig. 4 is a view like Fig. 3, except that the fuel inlet cap is shown unlocked and in open position.

Fig. 5 is a diagram of the lock operating circuit.

Fig. 6 is an enlarged sectional view of a portion of the switch of Fig. 1.

Referring more particularly to the drawing in which corresponding parts are designated by the same reference characters in all of the figures, our invention includes a spring cap 1 for the inlet 2 of the fuel tank of an automobile; a lock 3 for said cap; a solenoid 4 for unlocking said lock; a switch 5 for controlling said lock, an electric light 6 controlled by said switch for indicating when said lock is unlocked and said cap is open: and an electric circuit 7 controlled by said switch for energizing said solenoid and said electric light for the purpose above described.

On the upper end of the fuel tank outlet 2 is secured an annulus 8 by screws 9 extending downwardly through said annulus and engaging at their lower ends brackets 10 extending inwardly from the upper end of the outlet 2. The cap 1 is hinged at one side to the annulus 8 by a hinge 11 around the pivot of which is coiled a spring 12, one end of which engages said annulus, while its other end engages said cap for swinging said cap upwardly on said hinge to open the inlet 2 of the fuel tank.

The lock 3 is located at the edge of the cap 1 opposite the hinge 11 and includes a lock casing 13, depending from said edge of the cap over the outside of the inlet 2; a pair of plungers 14 and 15 mounted in said casing; a lock ball 16 mounted in said casing; and a latch 17 depending from the adjoining edge of the cap 1 for engaging said lock ball for locking said cap in closed position over the inlet 2. The plunger 14 is slidably mounted in a bore 18 in the lock casing 13 extending through the upper side of the annulus 8, and said plunger is formed with a socket 19 in its lower end in which is fitted a spring 20, bearing at lower end upon the lower end 21 of the bore 18, and at its upper end against the upper end of said socket 19 for urging the plunger 14 upwardly in said bore 18. The upper portion of the plunger bore 18 is slightly smaller in diameter than the lower portion thereof, forming an annular shoulder 18' between said smaller and larger portion of said bore. The plunger 15 is slidably mounted in a bore 22 in the lock casing 13 extending downwardly through the lower end of said casing, and the upper end 23 of said bore is adapted to be engaged by the upper end of said plunger for limiting the upward movement of said plunger in said bore. In the casing 13 is provided a transverse opening 24 extending from the plunger bore 18 to the plunger bore 22 in which opening is retained the lock ball 16 so that it may roll into either of said plunger bores for the purpose to be described. The plunger 14 is reduced from its upper end for a portion of its length, as at 25 to slide within the upper reduced portion of the bore 18' and to receive one side of the lock ball 16, which reduced portion of said plunger forms at its lower end a shoulder 26 for engaging the shoulder 18' for limiting the upward movement of said plunger in the bore 18, under the influence of the spring 20, as illustrated in Fig. 4 of the drawing. The plunger 15 is reduced from its upper end for a portion of its length, as shown at 27, to receive the other side of the lock ball 16, which reduced portion forms a shoulder 28 at its lower end for engaging the lower side of said lock ball when rolled to the right into the opening 24, whereby said ball holds the plunger 15 in its lowermost position preventing upward movement of said plunger in the bore 24 as illustrated in Fig. 4 of the drawing. The latch 17 is provided with a notch 29 to receive the lock ball 16, whereby the cap 1 is locked in closed position over the inlet 2. A solenoid

connecting rod 30 is connected at its upper end to the lower end of the lock plunger 15 and extends downwardly through a tube 31 screw-seated at its upper end at 32 in the lower end of the plunger bore 22 and screw-seated at its lower end at 33 in the upper end of a sleeve 34, which extends upwardly from the upper end of the spool 35, on which the coil 36 of the solenoid 4 is wound, said sleeve 34 forming an extension of the sleeve 37 of said spool to receive the upper portion of the core 38 of said solenoid. A solenoid switch 39 is mounted in the sleeve 34, said switch comprising a fixed contact member 40 and a slidable contact member 41. The contact member 40 is in the form of a screw which extends through and is screw-seated in a threaded bushing 42 of insulation which is seated in the wall of the sleeve 34. The slidable contact member 41 is in the form of an extension of the solenoid core 38, being coupled at its lower end to the upper end of the solenoid core by a screw coupling 43, and includes a ring 44 of insulation which is countersunk in said contact member within an annular groove 45 in the periphery thereof. In the upper end of the contact member 41 is provided a pocket 46 closed at its upper end by an end wall 47, which wall is provided with an aperture 48 through which extends the lower end of the connecting rod 30 into said pocket, there being a head 49 on the lower end of said connecting rod, in said pocket for engaging said upper end wall 47 when the solenoid core 38 is drawn downwardly and for engaging the lower wall 50 of said pocket when said solenoid core is moved upwardly, in the manner and for the purpose hereinafter more fully described. In the lower end of the solenoid core 38 is secured a plug 51 provided with a socket 51' in its upper end. A coil spring 53 rests in the plug socket 51' and extends upwardly into a socket 38' in the lower end of the solenoid core 38 for normally holding said core and the lock plunger 15 in their elevated position as shown in Figs. 2 and 3, in which position said plunger holds the lock ball 16 in the notch 29 of the latch 17, whereby the lock 3 locks the cap 1 in closed position over the fuel inlet 2.

The controlling switch 5 includes a pair of terminal contact members 54 and 55 and a slidable contact member 56 mounted in a tube of insulation 57 which is detachably secured at its forward end to the dashboard 58 of the automobile by means of a clamp screw sleeve 59, which sleeve extends through an opening 60 in said dashboard and is formed with an external thread 61 which engages an internal thread 62 in the forward end of the tube 57, the outer end of said sleeve being formed with an external flange 63 for engaging the face of the dashboard 58 for drawing said forward end of said tube 57 against the inner side of said dashboard, as shown in Fig. 1 of the drawing. Each of the terminal contact members 54 and 55 comprises a tubular body 64, a contact point 65, a screw plug 66, a screw terminal 67 and a spring 68. The body 64 is formed with a reduced inner end 69 which is seated in the tube 57 of insulation, and through which extends the contact point 65 into contact with the slidable contact member 56. The plug 66 is screw-seated in the outer end of the tubular body 64, and the terminal screw 67 is screw-seated in the outer end of said plug. The contact point 65 is formed with a head 70 on its end within the tubular body 64 and the spring 68 is located within said body with its ends engaging said contact pin head 70 and the plug 66 whereby the contact point 65 is urged into contact with the sliding contact member 56. The sliding contact member 56 comprises a sleeve 71 of insulation and a metallic ring 72 fitted within an annular groove 73 in the periphery of said sleeve, which sleeve and ring are slidably fitted within the insulation tube 57. A glass switch push button 74 is slidably fitted in the clamp sleeve 59 with its inner end engaging the forward end of the sleeve 71 of the sliding contact member 56; the outer end of said push button being rounded as at 75 and formed with an annular shoulder 76 around said rounded portion, which shoulder is adapted to engage an annular internal flange 77 formed on the clamp sleeve 59 for limiting the outward movement of said push button and sliding contact member 56 under the influence of a coil spring 78 in the insulation tube 57, the forward end of which spring engages the rear end of said sliding contact member 56 and the rear end of which spring engages a pair of set screws 79 seated in the insulation tube 57.

The signal light 6 is an electric bulb light, which is fitted in a socket 80 mounted on a base 81 formed with a plurality of spring fingers 82 for yieldingly engaging the inner surface of the insulation tube 57, said light, base and fingers being inserted in the rear end of said insulation tube, so that the light of said light may be seen through the switch push button 74 and sliding contact member 56. The base 81 forms the socket terminal for the light 6, while the central terminal 83 for the light extends through said base into the bottom of said socket and is insulated from said base by an insulation sleeve 84.

Electric current for the operating circuit 7 may be generated by a battery 85. From one pole of said battery extends a lead 86 to ground 87. From the other pole of said battery extends a lead 88 to the terminal 81 of the light 6 and from the other terminal 83 of said light extends a lead 89 to the terminal 40 of the solenoid switch 39. From the slidable contact member 41 of said solenoid switch extends a lead 90 to ground 91. From the lead 88 extends a lead 92 to the terminal contact member 55 of the controlling switch 5. From the terminal contact member 54 of said controlling switch extends a lead 93 to one end of the coil 36 of the solenoid 4, the other end of said coil leading to ground 94.

The solenoid 4 is mounted on a suitable part of the automobile by means of a bracket 95 formed with a sleeve 96 which securely embraces the solenoid sleeve 34.

The operation, uses and advantages of our invention are as follows:

When the cap 1 of the fuel tank inlet 2 is closed and the controlling switch 5 is open, said cap is locked closed by the lock 3, as illustrated in Figs. 1 and 2 of the drawing, the lock being locked by the engagement of the lock ball 16 with the latch notch 29, which ball is held in its locking position by the plunger 15 in its uppermost position, in which position said plunger is held by the solenoid spring 53 engaging the lower end of the solenoid core 38.

To unlock the fuel inlet cap 1 it is necessary to close the controlling switch 5, which is located within the automobile. The switch 5 is closed by the driver of the automobile upon pressing the switch button 74 inwardly against the tension of spring 78, until the slidable contact member 56 is moved to such position that its contact ring 72 engages the contact points 65 of the con-

tact members 54 and 55, whereupon electric current flows from one pole of battery 85 through lead 86 to ground 87, and from the other pole of said battery through leads 88 and 92, and through contact member 55, contact ring 72, and contact member 54 of the controlling switch 5, thence through lead 93 and coil 36 of solenoid 4 to ground 94 and back through ground 87 and lead 86 to battery 85, and the current flowing through the solenoid coil 36 pulls down the solenoid core 38, sliding contact member 41 of solenoid 4, connecting rod 30 and lock plunger 15 and unlocks the lock 3, there being a short downward movement of the solenoid core 38 and contact member 41, before the head 49 of the connecting rod 30 passes from the lower to the upper end of the pocket 46, and engages the upper wall 47 of said pocket with a jar to pull down said connecting rod and said plunger. The plunger 15 being pulled down, the cap 1 may be swung up on its hinge 11, the latch notch 29 camming the lock ball 16 therefrom through the opening 24 into the plunger bore 22 at one side of the reduced upper end 27 of the plunger 15 upon the shoulder 28 of said plunger, and the plunger 14 being elevated by its spring 20, until arrested by the engagement of the plunger shoulder 26 with the bore shoulder 18' and the reduced upper end 25 of said plunger locking said ball in engagement with the shoulder 28 of the plunger 15. The engagement of said plunger shoulder 28 by the ball 16 holds the plunger 15 down in its lowermost position against the tension of the solenoid spring 53, with the connecting rod head 49 engaging the lower wall 50 of the pocket 46 and preventing upward movement of the solenoid core 38 under the influence of said spring, when the push button 74 is released, and the solenoid coil 36 is deenergized by the opening of the controlling switch 5 under the influence of spring 78, which forces the sliding contact member 56 forward until the contact ring 72 disengages the contact points 65 of the contact members 54 and 55, and said contact points engage the insulation sleeve 69. While the cap 1 is unlocked and swung open for filling the fuel tank through the inlet 2, and the plunger 15 is held down in its lower position by the engagement of ball 16 with the plunger shoulder 28, the sliding contact member 41 of the solenoid switch 39 is held down in its lower position, by the engagement of the connecting rod head 49 with the lower wall 50 of the pocket 46, in which position of said contact member 41 the contact 40 of the switch 39 engages said metallic contact member above the insulation ring 44 and closes said switch 39, whereupon electric current passes from the battery 85 through lead 88, light terminal 81, signal light 6, terminal 83 and lead 89 terminal 40 of switch 39, slidable contact member 41 of said switch and lead 90 into ground 91 and thence through ground 87 and lead 86, back to battery 85, the current passing through signal light 6 lighting said light which can be seen through the glass button 74 and the sliding switch contact member 56. While the light 6 is lighted the driver in the automobile observing said light through the glass button 74, will know that the fuel inlet cap 1 is open and unlocked.

When the fuel tank is filled with fuel and the cap 1 is swung down over the inlet 2 into closed position, said cap is automatically locked in such position by the lock 3, because the latch 17 depresses the plunger 14 against its spring 20 and withdraws the plunger shoulder 26 below the bore shoulder 14', whereupon the plunger 15 is forced upwardly by the solenoid core 38, switch contact member 41 and connecting rod 31, under the influence of the solenoid spring 53, and the shoulder 28 of said plunger cams the ball 16 through the opening 24 into the latch notch 29, as illustrated in Fig. 2 of the drawing.

While our invention is particularly applicable to automobile fuel tank inlet caps, it may be used as a remote control lock for other purposes.

Our invention, being controlled by the driver or other occupant of an automobile, prevents unauthorized persons from opening the fuel tank inlet and stealing gasoline from said tank.

We do not limit our invention to the exact construction herein disclosed, in as much as variations and modifications thereof may be made without departing from the spirit of the invention.

We claim:

A lock for fuel tank inlet cap and the like comprising a notched latched member on said cap, a casing provided with a pair of plunger bores and a ball opening extending between said bores, a spring plunger in one of said bores to be depressed by said latch member upon entering said bore when said cap is swung into closed position, a lock ball in said ball opening for engaging the notch in said latch member and locking said cap in closed position, a plunger in said other bore for engaging said ball and holding said ball in engagement with said notched latch, and means for withdrawing said latter plunger from said ball to allow said ball to roll in said opening out of engagement with said notched latch member for unlocking said cap, said spring plunger being constructed and arranged to move upwardly against said ball, when said cap is swung open, to hold the ball out of the spring plunger bore until said cap is swung closed and said spring plunger is depressed by said latch member.

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