April 21, 1970 R. C. DELLERT 3,508,043

LOCKING MECHANISM

Filed Aug. 1, 1967

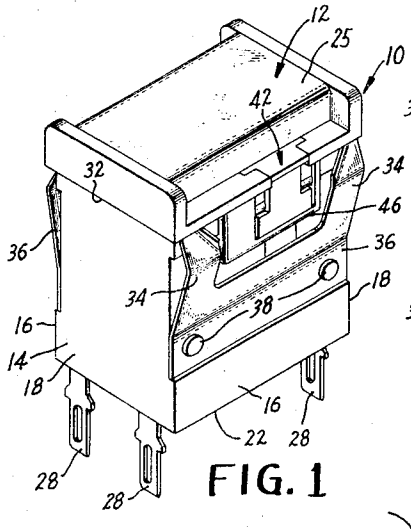


FIG. 1

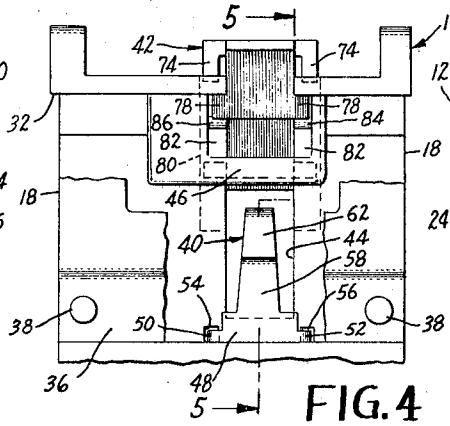


FIG. 4

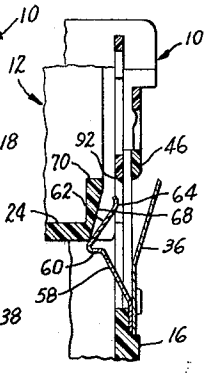


FIG. 5

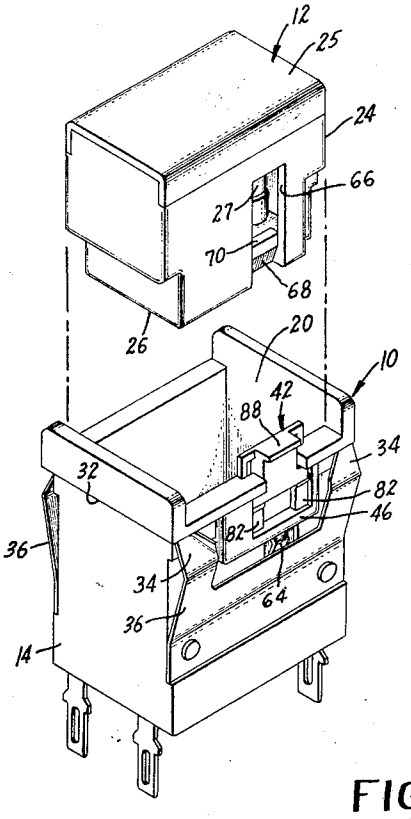


FIG. 2

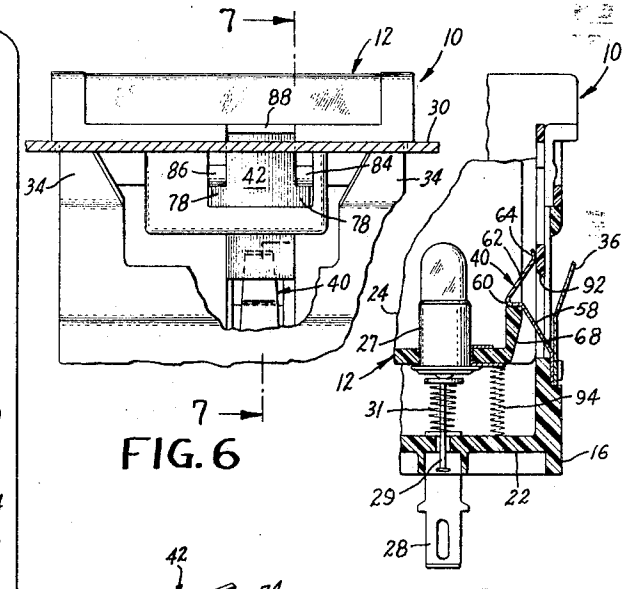


FIG. 6

FIG. 7

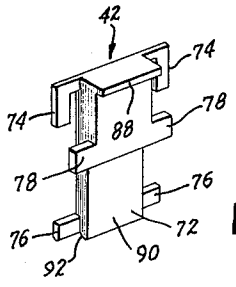


FIG. 3

INVENTOR
ROBERT C. DELLERT

BY Jon Carl Gealow

ATTORNEY

United States Patent Office 3,508,043
Patented Apr. 21, 1970

3,508,043

LOCKING MECHANISM

Robert C. Dellert, Bloomington, Ill., assignor to General Electric Company, a corporation of New York

Filed Aug. 1, 1967, Ser. No. 657,690
Int. Cl. F21v 21/08
U.S. Cl. 240—52.1 11 Claims

ABSTRACT OF THE DISCLOSURE

A mechanism for locking a stationary indicator unit or a reciprocative illuminated push button unit within a cavity in a panel mounted housing. A cantilevered leaf spring which includes a portion extending into the housing cavity having a shoulder formed therein, is secured at one end to the housing wall, with the free end also being adjacent the housing wall. The shoulder formed in the spring engages a shoulder formed on the unit to retain the unit in the housing cavity. A stop slidably mounted on the housing wall is movable to a position wherein it engages the free end of the spring to restrict its deflection, thereby locking the unit in the housing cavity.

BACKGROUND OF THE INVENTION

Stationary indicator units or reciprocative push button units are received in the cavity of a housing which is secured in an aperture in a panel. Electrical translating devices such as lamps may be mounted in the units. It is desirable that a unit be removably retained in the housing cavity, such that it will not be displaced from the cavity by jarring or by vibration of the panel, but such that it may be easily removed from the housing cavity so as to provide access to the translating devices mounted therein. In the past the units have been retained in the housing cavity by a pair of springs, mounted on opposite sides of the housing, which engaged opposite sides of the unit. However, difficulty was experienced in forming and mounting the pair of springs so as to provide enough force to retain the unit in the housing cavity and yet not so great a force as to make it extremely difficult to remove the units from the housing cavity.

OBJECTS OF THE INVENTION

It is therefore an object of this invention to provide a novel and improved mechanism for retaining a unit in a housing cavity whereby the unit is positively retained until the mechanism is actuated to permit easy withdrawal of the unit.

It is another object of the invention to provide a novel and improved mechanism of low cost and compact construction comprised of a simple slidable part for selectively locking and releasing a unit relative to a housing cavity.

SUMMARY OF THE INVENTION

The foregoing objects are accomplished in accordance with this invention when a preferred embodiment is utilized with a housing or receptacle part having a cavity therein for receiving an insertable part such as a stationary or reciprocative unit or member. In the preferred embodiment the mechanism includes a spring means, a first portion of which is secured to a side wall of the housing so as to support in a cantilever manner a second portion which extends into the cavity, and a third portion which includes a cam portion extending from the free end of the second portion toward the side wall upon which the first portion is secured. A shoulder is provided on the second portion of the spring means to

engage an engaging means which is a shoulder formed on the member received in the cavity, the engagement of the shoulders retaining the member in the housing. The mechanism further includes a stop means movably mounted on the same side wall of the housing as is the spring means to permit relative movement of the stop means and the spring means. In a first position the stop means engages the free end of the third portion of the spring means to support the third portion of the spring means as a simple beam such that it is incapable of being deflected to the extent necessary to permt removal of the member received in the cavity. In a second position the stop means does not engage the spring means, such that the third portion of the spring means is supported in a cantilevered manner and may be easily deflected to the extent necessary to disengage the shoulders such that the member received in the cavity may be removed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a perspective view of a housing having a light box secured therein by the improved locking means contemplated by this invention.

FIGURE 2 is a perspective view of the housing and light box with the light box shown external to the housing in position to be inserted in the housing.

FIGURE 3 is an enlarged perspective view of the stop.

FIGURE 4 is a side view of the housing shown in FIGURE 2, with portions broken away.

FIGURE 5 is a sectional view taken substantially along line 5—5 in FIGURE 4.

FIGURE 6 is a side view of the housing and light box shown in FIGURE 1, with portions broken away.

FIGURE 7 is a sectional view taken substantially on line 7—7 in FIGURE 6.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the perspective views shown in FIGURES 1 and 2, one embodiment of the locking mechanism as utilized in an indicating light assembly will be described. The indicating light assembly includes a housing assembly **10** and a light box or lens assembly **12** which is received within a cavity in the housing assembly. The housing assembly **10** includes a generally rectangular housing or receptacle **14** formed of an insulating material with side walls **16**, end walls **18**, a first open end **20** and a second closed end or base **22**. The lens assembly **12** which is received in the housing **14** through the open end **20** includes a hollow generally rectangular insulating member **24** over the open outer end of which is secured a light transmitting lens cap **25**. The insulating member **24** is formed with an inner end or base **26** upon which are supported one or more electrical translating devices such as electrical lamps **27** which are energized from an electrical source through electrical connecting means including terminals **28** which extend through the base **22** of the housing **14**. Electrical connections are made between the lamp contacts and the terminals **28** by resilient connectors such as rivets **29** biased by coil springs **31**.

The housing assembly **10** is secured in a rectangular aperture in a panel **30** as shown in FIGURE 6 by the engagement of a flange **32** provided around the open end **20** of the housing **14** and arms **34** of a pair of spring members or retaining clips **36** with opposite sides of the panel. The retaining clips **36** are secured to the side walls **16** of the housing by mushrooming projections **38** formed integrally with the side walls **16** of the housing over holes provided in the retaining clips **36**.

In accord with the invention an improved means is provided for positively locking the lens assembly **12** in the housing assembly **10**. The locking mechanism com-

prises cooperating relatively movable stop and spring means arranged such that when in first relative positions of engagement, they effect locking of the assembly **12**, and when in second relative positions of disengagement, they release the assembly **12** for removal. In the preferred form the stop is movable relative to the spring to effect the locking and releasing functions. According to the specific embodiment illustrated, the locking mechanism includes two principal elements in the form of a spring member **40** which is best seen in FIGURES 4–7 and a stop **42** which is shown in all of the figures, and in an enlarged view in FIGURE 3. The spring member **40** and the stop **42** are preferably secured to a side wall **16** of the housing **14** over a slot **44** formed in the side wall. The slot **44** which is generally rectangular in shape is separated into two parts by a cross member **46**.

The first principal element of the locking mechanism, spring member **40**, which preferably is a leaf spring, includes a first or base portion **48** which is provided with a pair of tabs **50** and **52** which extend at right angles into apertures **54** and **56**, respectively, in side wall **16** of the housing **14**. As is best seen in FIGURES 5 and 7, the base portion **48** of spring member **40** is secured between side wall **16** and retaining clip **36** to be retained in position. Extending from the base portion **48** of spring member **40** is a second portion or a first arm **58** which extends through a first part of the slot **44** into the cavity in the housing **14**. The free end of first arm **58** is bent at approximately right angles to base portion **48** to form a shoulder **60** facing the base **22** of the housing **14**. Extending from the shoulder **60** is a third portion or second arm **62** which extends outwardly from the cavity toward the side wall **16** of the housing and terminates in a curved tip **64**.

The engaging means provided on the insulating member **24** of the lens assembly **12** for receiving shoulder **60** of spring member **40** includes an aperture **66**. The lower edge of aperture **66** is provided with a recessed cam surface **68** which extends from the base **26** and terminates in a shoulder **70** which faces the open end **20** of the housing **14** and which is engaged by the shoulder **60** of spring member **40**.

The second principal element of the locking mechanism, stop **42**, includes a generally rectangular body portion **72** and first extending portions such as pairs of arms **74**, **76**, and second extending portions such as pairs of arms **78** which serve to secure the stop in the slot **44** in the housing. As shown by the dashed lines **80** in FIGURE 4, channels are provided on the inner surface on the side wall **16** on each side of slot **44** for receiving the pairs of arms **74** and **76**. Similarly, as also shown in FIGURE 4, channels **82** are provided on the outer surface of side wall **16** on each side of slot **44** to receive the pair of arms **78**. The bases of channels **82** are provided with a pair of aligned rounded projections **84** and **86** which coacts with pairs of arms **78** to define two positions of stop **42** and to serve as detents to maintain the stop **42** in either of the two positions. A tab **88** is provided on stop **42** to facilitate movement of the stop **42** between its two positions, one of which is shown in FIGURES 1, 6, and 7, and the other of which is shown in FIGURES 2, 4, and 5.

Referring first to FIGURES 2, 4, and 5, the operation of the locking mechanism will now be described. The lens assembly **12** may be inserted in the housing **14** with the stop **42** in either of its two positions. With the stop in the raised position shown in FIGURES 2, 4, and 5, lower portion **90** of the stop does not engage the curved tip **64** of spring member **40**. Thus, upon inserting lens assembly **12** into housing **14**, cam portion **68** of insulating member **24** will engage the inner surface of second arm **62** of spring member **40** which serves as a cam portion and deflect it outwardly into the first portion of slot **44**. As shoulder **70** of the insulating member **24** passes by shoulder **60** of the spring member **40**, the spring member will move inwardly under its own force, to cause engagement of shoulders **60** and **70**.

If the stop means was as presupposed in the position shown in FIGUIES 2, 4, and 5, it may now be depressed to the position shown in FIGURES 1, 6, and 7 whereupon cam **92** at the lower edge of lower portion **90** of stop **42** will engage curved tip **64** of the spring member **40** to inwardly deflect second arm **62** such that the curved tip **64** engages the flat inside surface of the stop **42**. With the stop in the position shown in FIGURES 1, 6, and 7, the spring member **40** is supported at each end as a simple beam, such that it will not deflect outwardly to permit withdrawal of the lens assembly **12**, and will retain the lens assembly **12** in the housing **14** against the force of spring **94** shown in FIGURE 7.

Should it be desirable to withdraw the lens assembly from the housing **14**, for instance, to replace the lamps mounted on the base **26** thereof, a force is applied to tab **88** to raise the stop **42** to the position shown in FIGURES 2, 4, and 5. With the stop **42** in this position the spring member **40** is supported only by its base portion **48**, such that its second arm **62** is easily deflected outwardly as shoulder **70** of insulating member **24** is pulled outwardly with relatively little force against shoulder **60** of spring member **40**. The outward deflection of the spring member **40** disengages the shoulders **60** and **70** such that the lens assembly **12** may be easily removed from the housing **14**.

The lens assembly **12** may also be inserted into the housing **14** when the stop **42** is in the position shown in FIGURES 1, 6, and 7. While a greater force must be applied to the lens assembly **12** to insert it in this manner, the engagement of the cam portion **68** of the insulating member **24** with second arm **62** of the spring member **40** will cause the shoulder **60** of the spring member to be deflected outwardly such that shoulder **70** of the insulating member **24** may be moved below it, whereupon shoulder **60** will snap over shoulder **70** to retain the lens assembly **12** in the housing **14**.

The member **24** may be a stationary indicator unit or a reciprocative illuminated push button unit depending upon the spacing between base **22** of the housing **14** and base **26** of the member **24** when the member is locked in the housing **14** as shown in FIGURES 1, 6, and 7. If no spacing is provided, a stationary indicator unit is provided. However, if spacing is provided it should be noted that the locking mechanism prevents only outward movement of the member **24**, and that member **24** may be depressed inwardly until the top edge of aperture **66** engages the second arm **62** of the spring member **40**. Thus with the spacing provided, an actuating member can be provided on the base **26** of the member **14** which will pass through an aperture in base **22** of the housing **14** to actuate the mechanism such as a switch attached to the outer surface of the base **22**.

While a particular embodiment of this invention has been shown and described, it will be obvious to those skilled in the art that various changes and modifications may be made without departing from this invention in its broader aspects and, therefore, it is intended that the appended claims cover all such changes and modifications as fall within the true spirit and scope of this invention.

I claim:

1. A locking mechanism comprising in combination:
   (a) a receptacle part having side walls and an open end;
   (b) an insertable part removably mounted in said receptacle part and being installed and removed relative to said open end;
   (c) a leaf spring on said receptacle part having a portion positioned for detaining engagement with said insertable part when said insertable part is installed, said spring having a free end and being deflectable to move said portion of said spring into and out of detaining engagement with said insertable part;
   (d) a stop on said receptacle part; and
   (e) means for effecting relative movement between said spring and said stop when said insertable part is in-

stalled between a first relative locking position wherein said stop engages said free end of said spring, and a second relative releasing position wherein said stop is disengaged from said spring, said spring when in engagement with said stop being supported as a simple beam to prevent deflection of said spring whereby said portion of said spring engages said insertable part to prevent removal of said insertable part, and said spring when disengaged from said stop being supported as a cantilever beam to premit deflection of said spring and disengagement of said portion of said spring from said insertable part whereby said insertable part can be removed from said receptacle part.

2. A mechanism as defined in claim 1 wherein said relative movement between said spring and said stop is along an axis generally parallel to the axis of movement of said insertable part relative to said receptacle part during installation and removal of said insertable part.

3. The locking mechanism defined in claim 1 wherein said second end of said receptacle part is closed and said receptacle part and said second end are formed of an insulating material, said insertable part is formed of an insulating material, and comprising in addition

(a) at least one electrical translating device supported by said insertable part,

(b) at least one electrical connecting means supported by said receptacle part, said electrical connecting means being electrically connected to said electrical translating device when said insertable part is locked in said receptacle part.

4. The locking mechanism defined in claim 1 wherein said insertable part is formed with side walls, and a light transmitting outer end, and an inner end which supports said electrical translating device which are electrical lamps.

5. A locking mechanism comprising in combination:

(a) a receptacle having side walls, a first open end, and a second end,

(b) a member removably received within said receptacle through said first open end,

(c) a spring means supported on the side wall of said receptacle having at least three portions,

(i) a first portion supported on the side wall of said receptacle,

(ii) a second portion supported by said first portion extending within said receptacle away from the side wall,

(iii) a third portion supported by said second portion extending from within said receptacle toward the side wall,

(d) engaging means provided on said member to be engaged by said second portion of said spring means when said member is received within said receptacle and

(e) a stop means mounted on the side wall of said receptacle movable to at least two positions,

(i) a first position wherein said stop means engages said third portion of said spring means to limit deflection of said spring means so as to lock said member in said receptacle,

(ii) a second position wherein said stop means does not engage said third potrion of said spring means, such that said spring means may deflect to permit withdrawal of said member from said receptacle.

6. The locking mechanism defined in claim 5 wherein said second portion of said spring means is provided with a shoulder facing said second end of said receptacle, and said engaging means provided on said member is a shoulder which faces said first open end of said receptacle when said member is received within said receptacle, and said shoulder on said spring means engages said shoulder on said member, such that when said stop means is in the first position said member is locked in said receptacle by the engagement of said shoulders.

7. The locking mechanism defined in claim 5 wherein said third portion of said spring means includes a cam portion which engages said engaging means on said member to permit insertion of said member in said receptacle with said stop means in any position.

8. The locking mechanism defined in claim 5 wherein a slot is provided in a side wall of said receptacle, and said first portion of said spring means is supported on the outer surface of said side wall of said receptacle, and said second portion extends through said slot to within said receptacle.

9. The locking mechanism defined in claim 5 wherein a slot is provided in a side wall of said receptacle, and said stop means is slidable supported in said slot.

10. The locking mechanism defined in claim 9 wherein said stop means is provided with a first extending portion for engaging the inside surface of said walls of said receptacle and a second extending portion for engaging the outside surface of said side walls of said receptacle so as to maintain said stop means in said slot.

11. The locking mechanism defined in claim 9 wherein said first portion of said spring is supported on the outer surface of said side wall of said receptacle, and said second portion extends through said slot to within said receptacle.

References Cited

UNITED STATES PATENTS

2,784,987	3/1957	Corcoran	295—87
2,904,662	9/1959	Spring	200—167
3,157,771	11/1964	Roeser	200—167
3,246,320	4/1966	Houbolt	340—381

NORTON ANSHER, Primary Examiner

F. L. BRAUN, Assistant Examiner

U.S. Cl. X.R.

200—167; 240—151; 340—381

PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,508,043 Dated April 21, 1970

Inventor(s) Robert C. Dellert

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 5, line 32, the claim reference numeral "1" should read -- 3 --.

Column 6, line 5, the word "potrion" should read -- portion --.

SIGNED AND
SEALED
AUG 4 - 1970

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents