

Aug. 23, 1960

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2,950,141

PANEL LATCH

Filed May 28, 1957

FIG. 2

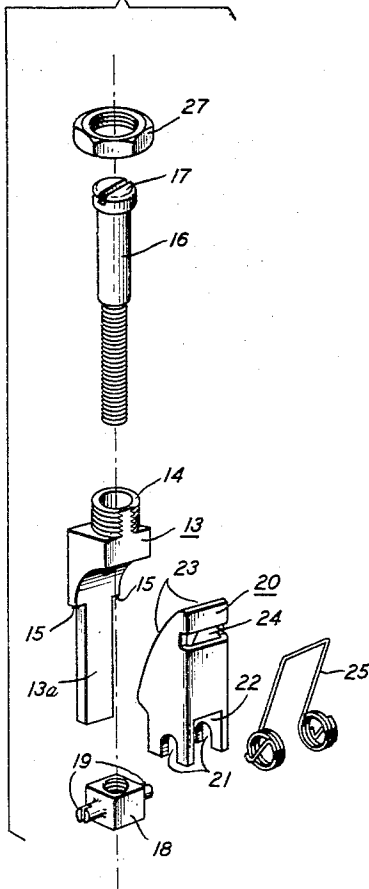


FIG. 1

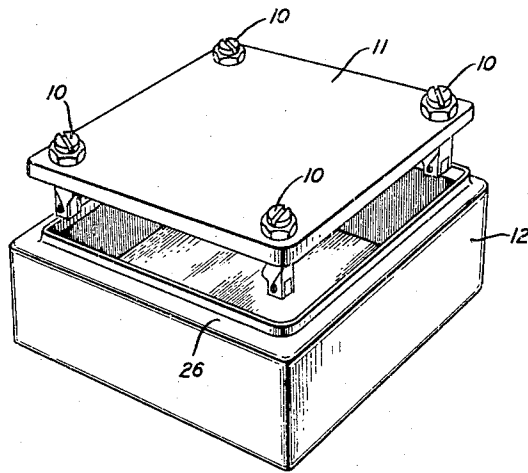
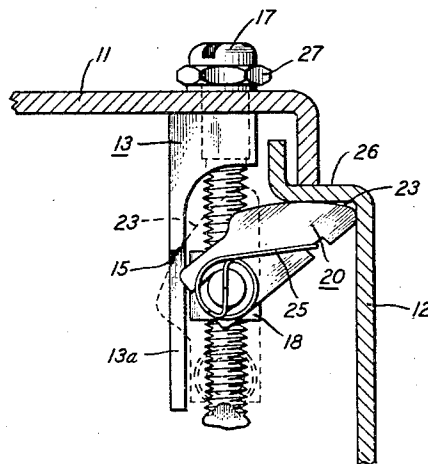


FIG. 3



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1

2,950,141

## PANEL LATCH

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Filed May 28, 1957, Ser. No. 662,120

8 Claims. (Cl. 292—256.73)

This invention relates to securing means for receptacle covers and more particularly to a panel latch for a portable test set.

In communication work, as an example, it is desirable that portable testing sets include latching devices to enable the set to be opened for inspection, standardization and repair purposes. Due to the nature of such test sets, the latching devices should be of compact design, provide reliable fastening action under substantially all conditions of handling, and be adaptable for use in a wide variety of receptacles.

It is an object of the present invention to provide a sturdy latching device of high holding power which can be employed with a variety of receptacles of similar configuration without loss in effectiveness.

It is a more particular object of the invention to provide an efficient, compact, unitary latching device which does not materially reduce the effective storing space in a receptacle and produces fastening action in a plurality of directions.

In an illustrative embodiment of the invention the latch comprises a body member including a mounting bushing and cam guiding edges or shoulders, a bolt journaled in the mounting bushing, a traveling nut engaging the bolt, a latching element pivoted on the nut and having cam surfaces, and a biasing spring bearing on the latching element and secured to the nut. Rotation of the bolt causes translation of the nut and results in the latching element under spring pressure being directed angularly with respect to the bolt as a result of contact between the cam guiding shoulders or the receptacle and the cam surfaces.

According to one feature of the invention, the latching element is freely pivoted on the nut so as to be self-locating and adjusting when it engages a latching surface, thereby enabling the latching device to be employed with a variety of receptacles without loss in effectiveness.

According to another feature, the device is made in a single assembly with a retractable latching element, thereby eliminating protruding members during the open condition of the device which require space allowance in the receptacle for unrestricted entry and removal of these members.

According to still another feature, the latching element is spring loaded and mechanically directed to apply fastening action simultaneously in a plurality of directions, e.g., horizontally and vertically.

These and other features of the invention will be more clearly apprehended from the following detailed description when taken in conjunction with the accompanying drawings in which:

Fig. 1 indicates the application of the invention in a portable test set;

Fig. 2 is an exploded view of an illustrative embodiment of the invention; and

Fig. 3 discloses the latch in assembled condition and serves to illustrate the operation of the invention.

As shown in Fig. 1, a plurality of latching devices 10

2

are attached to a test panel 11 for connecting together the panel and a receptacle 12 of a test set. It should be understood that the invention is applicable to enclosure covers and sub-assemblies used for other purposes and is not limited to receptacles used for test sets alone.

As shown in Figs. 2 and 3, each of the latching devices has a body member 13 which includes a tail piece 13a, a D-shaped mounting bushing 14 and cam guiding shoulders 15. A bolt 16 having a slotted head 17 is journaled in the bushing 14 and is engaged by a traveling nut 18, as illustrated in Fig. 3. The outer end threads of bolt 16 are deformed after assembly of the latch so as to prevent the nut 18 from moving off the end of the bolt 16. The opposite sides of the nut 18 include notched cylindrical extensions or pivot pins 19. In the assembled device one face of the nut is sufficiently close to a surface of the tail piece 13a to prevent its rotation with the bolt. Thus during translation of the nut, these pins move in a plane parallel to said surface of the tail piece.

A channel shaped latching element 20 includes pivot slots 21 on its opposite sides for cooperation with the pins 19. A clearance slot 22 for the nut 18 is located in an intermediate side or base of the element 20. The slots 21 and 22 being located at one end of the latch element 20, permit its rotation about the nut 18. The edges of the channel are cam shaped, as at 23, from the end of the latch remote from the pivot to an intermediate point. The cam surfaces cooperate with the cam guiding shoulders 15 to aid in rotating the latch around its pivot. The latch element 20 includes a rectangular slot 24 adapted to receive the bight of a U-shaped biasing spring 25, the ends of which are coiled about the pivot pins 19 and secured in the notches of these pins. The spring simultaneously retains the element 20 on the nut 18 and imposes a positive pressure on the camming arrangement of members 15 and 23.

Latching devices 10 are mounted on the panel 11 in D-shaped holes which are near the turned flange 26 of the receptacle when the panel is in place, e.g., at the corners of the panel. The D-shaped holes prevent rotation of the body members 13, as is well understood in the art. A nut 27 is threaded onto each bushing to hold together the panel and the latching device.

The operation of device 10 will be explained with reference to Fig. 3, and for purposes of explanation, it is arbitrarily assumed that clockwise rotation of the bolt 16 causes translation of the nut 18 upward in the direction of the panel 11 and counterclockwise rotation of the bolt 16 causes translation of the nut 18 downward from the panel 11. As the nut 18 moves upward it is apparent that cam surfaces 23 bearing on the shoulders 15 will direct the latching element 20 angularly with respect to the bolt 16 and against the pressure of the spring 25. At some position, depending upon the configuration of the receptacle 12, the cam surfaces will engage the flange 26. The spring action on element 20 causes cam surfaces 23 to be guided by the nearest surface (shoulders 15 or flange 26) since the element 20 is freely pivoted on the pins 19. The shape of the cam surfaces is such that eventually the element 20 is directed by the flange 26, instead of the shoulders 15. It will be seen that slightly higher or lower receptacle flanges than those shown in Fig. 3 will not prevent latching action or reduce the effectiveness of the latching action due to the self-adjusting and locating ability of the latch assembly. Thus, the latching device is capable of use with a wide variety of receptacles having similar configuration.

The bolt may be rotated clockwise until the point of the latch 20 arrives at the side of receptacle 12, as shown by the solid line view in Fig. 3. In this position, an upward force is applied to the flange 26, thereby

3

producing a downward pull on bolt 16. At the same time the horizontal thrusts on the sides of the receptacle produced by corresponding latching devices on opposite sides of the panel result in the panel being restricted in movement in a horizontal plane. Because of its unique configuration and novel operation, the latch of this invention may be made smaller than conventional latches that exert force in one direction only. Moreover, the multidirectional application of the latching forces enables the closed receptacle to withstand great forces due to rough handling.

The latching device is unlatched by rotating bolt 16 counterclockwise which results in element 20 being retracted along the flange 26 and cam shoulder 15 until it folds up against bolt 16 as shown by the dotted line view of Fig. 3. Counterclockwise rotation of bolt 16 may continue until the nut 18 contacts the deformed thread of the bolt, as described hereinbefore. It will be noted that due to the compact, unitary construction of device 10 and the retracting nature of the latching element 20, there are no protruding members of device 10 which require space allowance in receptacle 12 for unrestricted passage of these members into and out of the receptacle. Consequently, the usable space in the receptacle is increased since test components or other units may be mounted under the latching device, whereas in many conventional latching devices such space is reserved to permit entry and removal of these protruding latching members.

It is understood that various modifications may be made in the size, shape, etc. of the latching members by those skilled in the art without departing from the spirit and scope of the present invention; therefore, it is desired that the particular form of the invention described herein be considered as illustrative and not in any sense limiting.

What is claimed is:

1. A latch comprising a body member including a mounting bushing, cam guiding shoulders and a tail piece, a bolt journaled in the bushing in parallel relation to the tail piece, a traveling nut on the bolt, said tail piece inhibiting rotation of the nut, a channel shaped latching element embracing the nut and pivot thereto, and a U-shaped latch biasing spring having its ends secured to said nut and an intermediate portion bearing on the latching element for biasing said element to a position substantially parallel to said bolt and said tail piece, said latching element having cam surfaces for bearing on said cam guiding shoulders and for engaging a receptacle rim, whereby translation of the nut by rotation of the bolt in one direction deflects the latching element against the bias of the spring to a latching position angular to the bolt and tail piece, and reverse rotation of the bolt retracts the latching element.

2. A latch comprising a body member including a mounting bushing, cam guiding shoulders, and a tail piece, a bolt journaled in the bushing, a traveling nut on the bolt, said tail piece inhibiting rotation of the nut, a latching element pivoted on said nut, and biasing means bearing on the latching element and secured to the nut for biasing said element to a position substantially parallel to said bolt, said latching element having cam surfaces for bearing on said cam guiding shoulders and for engaging a receptacle rim, whereby translation of the nut by rotation of the bolt in one direction deflects the latching element against the bias of the spring to a latching position angular to the bolt, and reverse rotation of the bolt retracts the latching element.

3. A latching means for fastening a panel to a receptacle, said latching means comprising a body member including mounting means for attaching the latch to the panel and cam guiding shoulders, a bolt journaled in said mounting means, a traveling nut rotationally restrained and engaging said bolt whereby rotation of the bolt produces translation of the nut, a latching

4

element pivoted on said nut and including cam means which cooperate with said cam guiding shoulders and receptacle for deflecting the element to or from a latching position according to the direction of translation, said cam surfaces engaging the receptacle in the latching position, and biasing means bearing on the latching element and secured to the nut to resist deflection of the element in the latching direction and to aid movement of the element in the unlatching direction, said latching element in the latching position applying fastening action to the panel and receptacle in a plurality of directions and in the unlatching position being folded parallel to and against the bolt.

4. A latching means for fastening a panel to a receptacle, said latching means comprising a body member including mounting means for attaching the latch to the panel and cam guiding shoulders, a bolt journaled in said mounting means, a traveling nut rotationally restrained and engaging said bolt whereby rotation of the bolt produces translation of the nut, a latching element freely pivoted on said nut and including cam means, said cam means in cooperation with the cam guiding shoulders and the receptacle deflecting said latching element to or from a latching position according to the direction of translation, said latching element being self-locating on the receptacle, and biasing means bearing on the latching element and secured to the nut to resist deflection of the element in the latching direction and to aid movement of the element in the unlatching direction.

5. A latching means for fastening a panel to a receptacle, said latching means comprising a body member including a mounting means for attaching the latch to the panel, a tail piece, and cam guiding shoulders, a bolt journaled in said mounting means, a traveling nut including pivot pins being rotationally restrained on said bolt whereby rotation of the bolt produces translation of the nut along the bolt, a latching element including cam surfaces for cooperating with the shoulders and the receptacle, and means for securing said element on said pins and normally biasing said cam surfaces against the shoulders, said element on translation of the nut being alternately guided by said shoulders and said receptacle to or from a latching position according to the direction of translation.

6. A latching means for fastening a panel to a receptacle, said latching means comprising a body member including a mounting means for attaching the latch to the panel, a tail piece, and cam guiding shoulders, a bolt journaled in said mounting means, a traveling nut including pivot pins being rotationally restrained on said bolt whereby rotation of the bolt produces translation of the nut along the bolt, a latching element, and U-shaped means for biasing and securing said element on said pins, said element including cam surfaces cooperating with the shoulders to guide the element to or from engagement with the receptacle according to the direction of translation of the nut, said element being self-locating and adjusting on the receptacle when in contact therewith.

7. The combination defined in claim 6 wherein the latching element also includes side and base portions, said element being slotted in the sides and base at one end thereof to accommodate the pivot pins and traveling nut, respectively, said slots freely supporting said element on the pins, the end of the element remote from said slots having an aperture in the base to accommodate the center portion of the U-shaped biasing means.

8. A latching means for fastening a panel to a receptacle, said latching means comprising a body member including a mounting means for attaching the latch to the panel, a tail piece, and cam guiding shoulders, a bolt journaled in said mounting means, a traveling nut including pivot pins being rotationally restrained on said

5

bolt whereby rotation of the bolt produces translation of the nut along the bolt, a latching element including cam surfaces normally engaging said shoulders, said cam surfaces cooperating with the shoulders to impart a pre-selected motion to said element to engage or disengage the element and the receptacle according to the direction of translation of the nut, and biasing means securing the element to the pins, said biasing means urging the element against the shoulders until the element engages the receptacle whereupon said biasing means urges the element against the receptacle.

5

10

6

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