

July 12, 1960

E. DAVID ET AL.

2,944,643

RETAINING DEVICE FOR REMOVABLE PANEL

Filed July 29, 1957

FIG. 1.

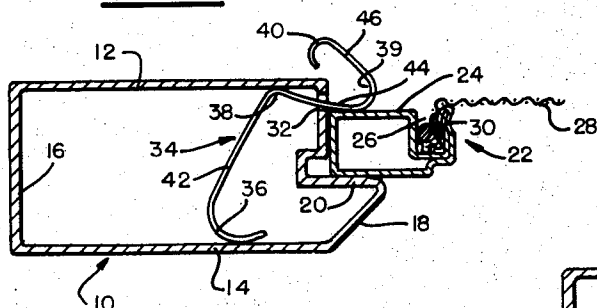


FIG. 2.

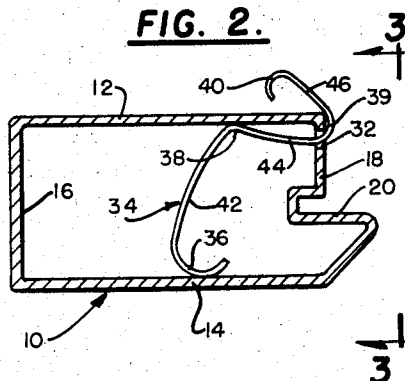


FIG. 3.

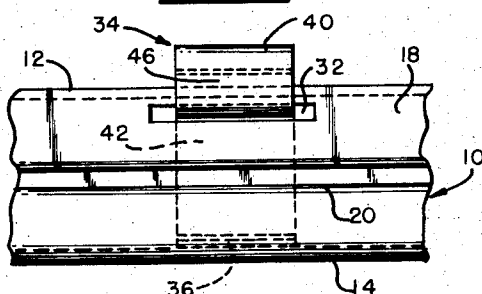


FIG. 4.

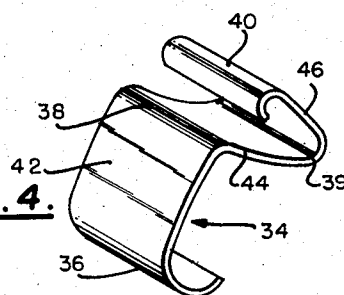
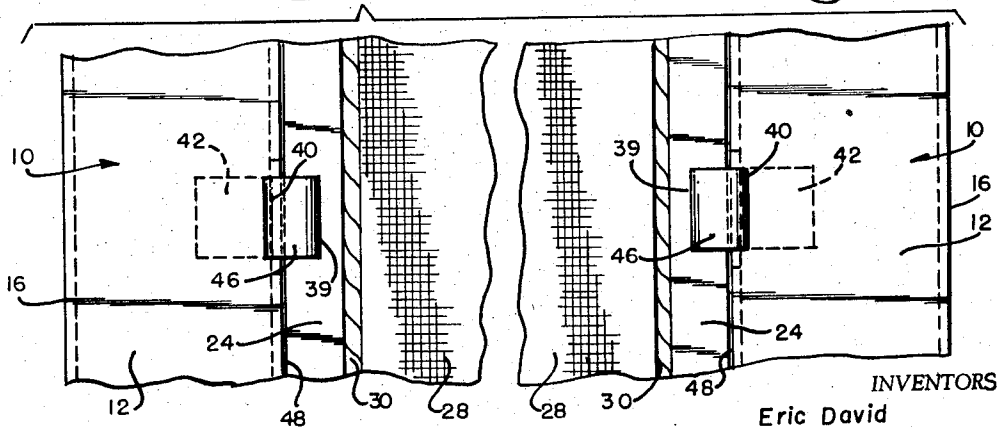


FIG. 5.



INVENTORS

Eric David
Peter M. Aiello

BY Nelson H. Shapiro

ATTORNEY

1

2,944,643

RETAINING DEVICE FOR REMOVABLE PANEL

Eric David, Baltimore, and Peter M. Aiello, Dundalk, Md., assignors to L.A.D. Industries, Inc., a corporation of Maryland

Filed July 29, 1957, Ser. No. 674,925

3 Claims. (Cl. 189—88)

This invention relates to a device for retaining a removable panel in a frame and more particularly to a unique clip for holding a panel in a frame. The invention, while having broader applicability, is particularly suitable for retaining screen or glass panels in combination storm doors.

Combination storm doors of the type having extruded aluminum frames have been manufactured and sold in increasing numbers in recent years. Such doors incorporate glass and screen panels which may be attached to the door frame interchangeably according to the season of the year. Some means must be provided for removably holding the panels in the door frame, and the device most commonly utilized for this purpose is a small link mounted on the door frame in overlapping relationship with the edge of the panel. A number of such links are located around the periphery of the panel to hold the panel securely in place. These links or panel retaining clips, as they are called, are secured to the frame by virtue of a device known as a "rivnut," which is a form of internally threaded rivet secured to a wall of the appropriate frame members. A "knurl" or machine screw passes through a hole in the frame end of the retaining clip and is threaded into the rivnut. Thus, when the knurl is tightened, the retaining clip is fixed in place. To remove the panel from the door frame, the knurls are loosened to allow the clips to pivot away from the edge of the panel.

While panel retaining devices of the type just described appear to be relatively simple, they are by no means free of disadvantages. The devices themselves are relatively expensive, when the cost is computed on a quantity basis, and even a small saving per door can make a significant difference in the profit shown by an establishment which manufactures and/or sells doors in large numbers.

A second disadvantage of such retaining devices concerns the manner of installation. First a hole must be drilled or punched in the frame member; then the rivnut must be attached to a special gun; then the rivnut must be inserted in the hole; and finally the gun must be actuated to expand the nut to secure it to the frame member. When the nut has been installed, the knurl must be inserted through the retaining clip and then threaded into the nut. Considering the fact that four to six retaining clips are used per panel, it can be readily seen that a substantial amount of time is expended in installing the retaining devices. With the high cost of even relatively unskilled labor, the high cost of such installation becomes self-evident.

A third disadvantage of the retaining clips used heretofore is that they are subject to frequent failure. It is not uncommon to have the rivnut become loosened, so that it turns when an attempt is made to thread the knurl into or out of the nut. Frequently, after the doors are in use, the threads of a rivnut will become mutilated. In either case it is usually necessary to replace the nut with another. In order to do this, it is necessary to drill

2

out the old nut and then insert a larger nut in the hole. Such repairs require the services of a skilled serviceman and are unduly costly, particularly when the travel time of the serviceman to and from the site of the job is considered.

A fourth disadvantage of the retaining devices used heretofore is that they are rigid and hold the panels rigidly in the door frame. When the panels are glass, a sudden shock to the door frame, as when the door is slammed, frequently causes breakage of the glass, necessitating an expensive repair.

A fifth disadvantage of the prior retaining devices is that they project from a central portion of the frame member. In this position they tend to catch on clothing, and they detract from the esthetic qualities of the door. A more serious disadvantage of such location of the retaining devices is that a wider frame member is required to accommodate the desired range of lateral adjustment of the conventional U-shaped expanders that are utilized to adjust the width of the door to the size of different door openings.

With the foregoing facts in view it is accordingly a principal object of the invention to provide a unique and improved panel retaining device.

It is a further object of the invention to provide a panel retaining device which overcomes the failings and deficiencies of the devices known heretofore.

More specifically, it is an object of the invention to provide a panel retaining device that is inexpensive to produce and install, that operates properly indefinitely without service, that does not project from the rear or front surface of the door frame members, that retains the panels positively, yet resiliently, and that operates easily.

The foregoing and other objects of the invention will become more readily apparent upon consideration of the following detailed description of the invention when taken in conjunction with the accompanying drawings, which illustrate a preferred embodiment of the invention and wherein—

Figure 1 is a transverse sectional view of the invention with the operative parts shown in a first position;

Figure 2 is a similar view with the operative parts shown in another position;

Figure 3 is an end view as seen in the direction of the arrows 3—3 of Figure 2;

Figure 4 is a perspective view of a unique retaining clip which constitutes a basic element of the invention; and

Figure 5 is a contracted plan view of the invention illustrating the manner in which a screen panel is held in a door frame.

Briefly stated, the objects of the invention are accomplished by providing a hollow, box-like frame with a resilient clip, a part of which is held within the frame, and another part of which extends from the frame in overlapping relationship with the edge of a panel which rests against an abutment of the frame. The construction of the invention is such that the amount of exposure of the clip outside of the frame may be adjusted manually so that the clip either overlaps and engages the edge of the panel or is drawn back into the frame away from the panel. As will be appreciated more fully from the detailed description hereinafter, when the clip is drawn outwardly into engagement with the panel, tensing of a portion of the clip within the frame member is decreased, while the tensing of another portion of the clip, which engages the panel, is increased. Conversely, when the clip is drawn away from the panel, the tensing of the panel engaging portion is decreased, while the tensing of the portion within the frame member is increased. This

mode of operation results in a highly effective panel retaining device.

Referring to the drawings, reference numeral 10 designates a hollow, box-like frame member, which is conventionally formed of extruded aluminum. A pair of such members form the opposite stiles or vertical rails of a combination storm door as indicated in Figure 5. These members in conjunction with horizontal members constitute the frame of the door, the horizontal and vertical members being joined in any conventional manner. For purposes of description, but without any intent to limit the scope of the invention, the frame member of Figures 1 and 2 may be said to have a front wall 12, a rear wall 14, and side walls 16 and 18. Side wall 18 is formed so as to provide an abutment 20 which engages the edge portion of the rear surface of a removable panel generally designated 22. This panel may be glass or screen, for example, a screen panel being illustrated. As is well known, the panel itself may have a hollow box-like subframe 24 frequently provided with a groove 26 in which the extremity of the screen wire 28 is held fixed by a rubber or plastic cord 30. Opposite extremities of the panel engage the abutments of the opposed vertical frame members 10 as shown in Figure 5. Panel retaining clips 34, to be described, are provided to hold the panel against the abutments of the vertical frame members. The horizontal frame members above and below the panel may have similar abutments and clips, but frequently the member supporting the bottom of the panel will simply have a channel in which the lower edge of the panel is inserted.

In accordance with the teachings of the invention, the side wall 18 of the frame member 10 is provided with an elongated slot 32 for each of the retaining clips 34. The major axis of each slot is substantially parallel to the front wall 12 of the frame member, and the slots are located just below the front wall and above the front surface of the adjacent panel. The slots are preferably preformed by a punch press.

Each slot is provided with a panel retaining clip 34 best seen in Figure 4. The clip is formed from a strip of resilient material, preferably stainless steel, shaped to the configuration illustrated by conventional metal bending techniques. One end of the clip has a smoothly curved bend 36 of substantial length. In a practical form of the invention, this bend has a radius of curvature of approximately one-quarter inch. A second bend 38 is formed intermediate the ends of the clip and is of considerably shorter length so that the bend is essentially sharper than bend 36. Another smoothly curved bend is formed at 39 and still another at 40, the opposite end of the clip. Bends 39 and 40 may have less length than bend 36 but are preferably longer than bend 38. The radius of curvature of bends 39 and 40 may be approximately $\frac{1}{16}$ to $\frac{1}{8}$ inch. Bend 38 may be just long enough to form a smooth junction between intermediate portions 42 and 44 of the clip. With the clip in its relaxed state, portion 42 bows slightly in the same direction as bends 36 and 38, while portion 44 bows slightly in the same direction as bend 39. Another intermediate portion 46 may bow slightly in the same direction as bends 39 and 40.

With the panels out of the way, the clips are installed in the associated frame members by threading the clips through their slots, bends 36 first, in a counterclockwise direction as seen in Figure 1. Viewing the clips as they appear installed, each may be deemed to have a first part which extends from wall 14 to wall 12 (sloping toward the panel), a second part which extends from wall 12 to the panel, and a third part which extends away from the panel and is exposed for manual engagement. When the clips are first inserted in their slots, they are forced rearwardly until the bends 39 envelop the edge of the associated slots nearest the front wall 12, as shown in Figure 2. The panels are then placed against the abutments 20,

and the clips are pulled or pushed outwardly from the frame members into overlapping relationship with the panels, as shown in Figure 1. Since the clips do not entirely clear the space in front of the panels when they are fully withdrawn into the frame members as shown in Figure 2, it is necessary to provide a slight clearance between the edges of the panel and the adjacent side walls of the frame members, as indicated at 48 in Figure 5. However, such clearance is conventionally provided even with the retaining devices utilized heretofore.

The configuration and relative proportions of the parts of the invention are such that when the clips are inserted within their frame members, the intermediate portion 42 of each clip is tensed between the points of contact of the bends 36 and 38 with the opposite walls 12 and 14 of the frame member. When the panel is in place, and the clip is drawn outwardly into engagement with the panel, the intermediate portion 44 of the clip is tensed between the points of engagement of the bends 38 and 39 with wall 12 of the frame member and the edge portion of the panel, respectively. With the configuration shown and described, sufficient friction is created at the region of contact between bend 36 and wall 14 to provide a rolling-sliding contact, rather than a simple sliding contact. The result is that when the clip is forced more deeply into the interior of the frame member, by manual pressure on the intermediate portion 46 and the bend 40, the bend 36 rolls upon the adjacent surface of the wall 14, and the intermediate portion 42, which normally slants toward the panel in extending from bend 36 to bend 38, tends to become more nearly perpendicular to the walls 12 and 14. Since the spacing between the walls 12 and 14 is fixed, the intermediate portion 42 becomes more distinctly bowed, as shown in Figure 2, and the tensing of the clip between walls 12 and 14 is substantially increased. This results in increased resistance to the movement of the clip away from the panel and ensures that the clips will not be moved away from the panels under the jars and shocks which occur through normal use of the door.

While the bend 36 does slide somewhat along the wall 14, the rolling contact is quite pronounced. The movement of bend 38 on wall 12, on the other hand, is essentially sliding, the force on this bend being applied substantially along wall 12 through intermediate portion 44 of the clip. In a similar manner bend 39 slides on the surface of the panel subframe 24. The rolling movement of bend 36 may be understood from the fact that intermediate portion 42 constitutes a lever arm which moves about its fulcrum at the point of contact of bend 36 with wall 14.

When the clip is forced out of the frame member into overlapping relationship with the panel, rolling movement is produced at bend 36, but in the opposite direction. This slants intermediate portion 42 toward the panel, reduces the tensing of the intermediate portion, and allows the clip to move toward the panel more readily. However, bend 39 engages the panel almost immediately after the intermediate portion 44 has begun to move through the slot, and intermediate portion 44 is tensed between the regions of contact of bends 38 and 39 with wall 12, and the subframe 24, respectively. Thus the reduction in the tensing of intermediate portion 42 is accompanied by an increase in the tensing of intermediate portion 44, thereby ensuring that the panel will be securely held within the frame.

The resiliency of the clip, and especially the intermediate portion 44, affords an amount of "give" to the panel retaining device which has been found in practice to reduce significantly the amount of glass breakage caused by slamming or otherwise jarring the door. Nevertheless, the panel is held tightly enough within the door frame to prevent rattling.

It will thus be apparent that the invention provides a significantly improved panel retaining device. The device

of the invention will operate properly indefinitely, but should replacement of a retaining clip ever become necessary, it is a simple matter to remove one clip and insert another. While a preferred embodiment of the invention has been shown and described, it will be apparent to those skilled in the art that modifications can be made in this embodiment without departing from the principles and spirit of the invention, the scope of which is defined in the appended claims. Accordingly, the foregoing embodiment is to be taken as illustrative, rather than restrictive of the invention, and those modifications which come within the meaning or range of equivalency of the claims are included therein.

We claim:

1. An article of the type described, comprising a hollow box-like frame member having front, rear, and side walls and an abutment along one side thereof having substantially the same orientation as said front and rear walls, a panel having its rear surface against said abutment, and a panel retaining clip composed of a one piece detachable strip of resilient material having a first part extending between and tensed between said front and rear walls, a second part passing through the side wall adjacent said panel and tensed between said front wall and the front surface of said panel, and a third part extending from said second part and exposed for manual engagement to move said second part into and out of said frame member, whereby said panel is detachably secured to said frame member, said first clip part having a curved extremity engaging said rear wall, the friction between said extremity and the rear wall being sufficient to cause said extremity to roll on said rear wall as said second clip part is moved into and out of said frame member.

2. An article of the type described comprising a hollow box-like frame member having front, rear, and side

walls, and an abutment formed at one side of and in a plane intermediate the planes of said front and rear walls, a panel having the edge portion of its rear surface against said abutment, the side wall adjacent said abutment having a slot along the edge of said front wall between said front wall and the front surface of said panel, and a panel retaining clip composed of a one piece detachable resilient strip extending from a first gentle bend engaging said rear wall to a second bend engaging said front wall then through said slot to a third bend engaging the front surface of said panel, the portions of said strip intermediate said bends being tensed.

3. The article of claim 2, the portion of said strip between said first and second bends sloping from said first bend toward the edge of said panel, said first bend having a rolling contact with said rear wall, and said second bend having a sliding contact with said front wall, whereby movement of said third bend toward said slot causes said strip to roll about said first bend as said second bend slides away from said slot, increasing the tensing of the portion intermediate said first and second bends while decreasing the tensing of the portion intermediate said second and third bends.

References Cited in the file of this patent

UNITED STATES PATENTS

1,033,161	Dixon	July 23, 1912
1,299,448	Forsyth	Apr. 8, 1919
2,126,148	Souza	Aug. 9, 1938
2,612,244	Kiefer	Sept. 30, 1952
2,638,191	Menosky	May 12, 1953

FOREIGN PATENTS

718,025	Great Britain	Nov. 10, 1954
---------	---------------	---------------