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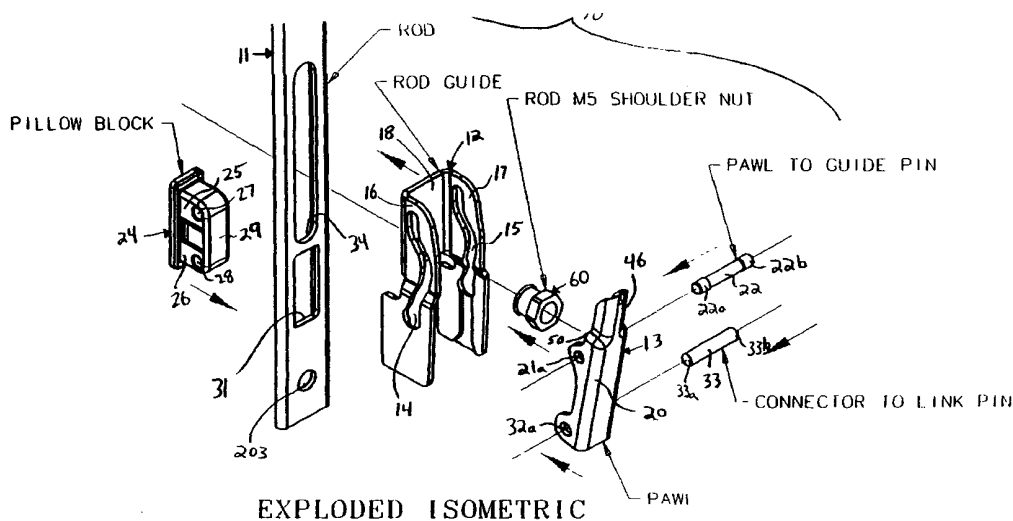
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(54) Title: MULTI-POINT LATCH SYSTEM



(57) Abstract: A multipoint latch system for releasably securing a first panel member against an enclosure cabinet or frame, the latch system having a translatable rod member adapted to be carried on a door panel, a rod guide which is fixably mounted on the door panel, a panel block which is connected to the translatable rod member and a pawl member rotatably mounted to the panel block so that the arm translates with the rod member, there further being a camming mechanism which causes the pawl to move relative to the rod member as the pawl is translated with the rod. A keeper is provided for installation on a corresponding enclosure frame, and an actuator is provided to facilitate translation of the rod member to release the pawl from engagement with a keeper after.

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## MULTI-POINT LATCH SYSTEM

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### CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application 60/152,913 filed  
10 September 8, 1999 and U.S. Provisional Application 60/207,378 filed May 25, 2000.

### BACKGROUND OF THE INVENTION

#### **1. Field of Invention**

The present invention relates to a latch for securing a first panel member to a  
15 second panel member, and more particularly to a multi-point latch system for use on in-door  
telecommunication, computer, and industrial cabinets.

#### **2. Brief Description of the Prior Art**

The prior art in the general field of latches for storage cabinets of the type used for  
electronic equipment, storing supplies and industrial uses, is rather highly developed. For  
20 example, some types of prior art latching devices incorporate a slide fastener for fastening a  
hinged door panel and the like. In some latches a spring is incorporated to bias a latch bolt  
into a latched position about a keeper. Rotary handles may be provided so the latch bolt may  
be rotated away from the keeper in opposition of the spring, and into an unlatched position.  
However, the handle of such a latch, which extends beyond the body, may cause inadvertent  
25 latching and unlatching in response to impact forces.

U.S. Patent 4,693,503, "Lever Latch" issued September 15, 1987 to Robert H.  
Bisbing and assigned to Southco, Inc., comprises a flanged housing, a handle and a latch,  
which are inserted within an opening in a door. The handle and latch are positioned  
substantially flush with the outer door surface when the handle and latch are in the latched  
30 position. The handle is provided with an arm and a stop for engagement with an inner

surface of a cabinet frame when the door is closed and latched. However, the arm and stop portions of the Lever Latch which extend inward from the handle may prevent use of the device in certain confined areas. In addition, the mounting of the Lever Latch on the inside of the outer seal of the cabinet may require that additional sealing may be applied to the latch.

5 A "Slide Fastener" is shown in U.S. Patent 5,201,557 issued on April 3, 1993 to Richard E. Schlack and assigned to Southco, Inc. The Slide Fastener secures a door of an electrical cabinet to the cabinet frame and releasably retains the door against the frame when the door and frame are latched together. The Slide Fastener includes a door assembly secured to the door and slide keepers attached to the frame. The door assembly further includes a  
10 lever assembly and a slide assembly. The lever assembly is rotatable between an open position and a closed position and engages and slides the slide assembly in response to rotation of the lever assembly. The slide assembly engages the slide keepers as the lever assembly is rotated.

A need exists for a latch assembly, which can be used to secure a panel to a  
15 corresponding enclosure frame and has improved latching and retaining properties.

### **SUMMARY OF THE INVENTION**

A novel multipoint latch system for securing a door panel to a cabinet frame and releasably retaining the door panel against the frame is provided by the applicant. The  
20 multipoint latch system has a rod guide which is fixably mounted to a door panel surface to secure a rod member which translates relative to said fixed rod guide. A connecting element is secured on the rod member and translates therewith. The connecting element carries a pawl, which is rotatably mounted to the connecting element and connected to the fixed rod guide to be cammed between open and closed positions when the rod is translated. An

actuator for actuating the translation of the rod is provided, and a keeper member adapted to be mounted on an enclosure cabinet engages and secures the pawl.

Preferably, the keeper can be configured for facilitating the sliding of the pawl, such as, for example, by having a roller element mounted thereon against which a pawl arm will engage as the latch is being secured. Furthermore, the rod guide, which is fixed to the door panel may include cam slots configured to facilitate maximizing the compression when the latch is fully latched to draw the pawl to a compressed position.

It is the object of the present invention to provide a novel multipoint latch system, which can secure a panel member against corresponding enclosure frame.

It is another object of the present invention to secure the multipoint latch system components to a door panel and to secure a keeper to a corresponding enclosure frame so that the pawl of the latch system can engage with the keeper to shut the door panel and maintain the door panel in a closed position.

It is another object of the present invention to provide a multipoint latch system where a pawl is fixed at one point for rotation about an axis, and to translate the pawl, as well as provide a camming mechanism for controlling the position of the pawl with respect to the door panel throughout the rotation range of the pawl.

It is another object of the present invention to provide a multipoint latch system, which can be readily installed with minimal or no tools required.

It is a further object of the present invention to provide a multipoint latch system, which can be installed in relation to a cabinet and corresponding door panel in a minimal amount of space.

It is another object of the present invention to provide a multipoint latch system, which can be switched from the left hand to right hand door operation as desired by the user.

It is a further object of the present invention to provide a multipoint latch system which ensures engagement of all latch points before the door panel to which the latch is attached can be closed against a corresponding enclosure frame.

5 **BRIEF DESCRIPTION OF THE DRAWING FIGURES**

Fig. 1 is a perspective view showing a schematic representation of an enclosure cabinet and door panel with which the multi-point latch system of the present invention can be used.

Fig. 2 is a cross sectional view of the door panel and enclosure frame taken cross  
10 sectionally through the door and enclosure frame of Fig. 1 in the latching area.

Fig. 3a is an exploded view of a multi-point latch system according to the present invention.

Fig. 3b is a perspective view of the pawl of the multi-point latching system of Fig. 3a.

Fig. 3c is a perspective view of the pillow block and rod of the multi-point latching  
15 system of Fig. 3a.

Fig. 3d is a perspective view of the pawl and pillow block assembled onto the rod of the multi-point latching system of Fig. 3a.

Fig. 3e is a perspective view of the rod guide assembled onto the rod of the multi-point latching system of Fig. 3a.

Fig. 3f is a perspective view of the shoulder nut of the multi-point latching system of  
20 Fig. 3a.

Fig. 3g is a perspective view of the assembled multi-point latching system of Fig. 3a.

Fig. 3h is a front view of the assembled multi-point latching system of Fig. 3a.

Fig. 4a is an exploded view of the keeper bracket assembly.

Fig. 4b is a perspective view of the assembled keeper bracket assembly.  
25

Fig. 4c is a bottom view of the assembled keeper bracket assembly.

Fig. 5 is an exploded view of the actuator assembly.

Fig. 6a is a perspective view of the actuator assembly in the open position.

Fig. 6b is a perspective view of the actuator assembly in the closed position.

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### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Referring to Fig. 1, a cabinet enclosure 100 is shown comprising a cabinet enclosure frame 101 an enclosure door panel 102 with a panel cut out 103 disposed therein. The cabinet enclosure 100 is shown with schematic representations to indicate the latch  
10 mechanism, actuator (outer), and actuator (inner translation mechanism).

Fig. 2 shows the enclosure door 102 in a closed position engaging against the enclosure frame 101 with the multi-point latch system according to the present invention being represented schematically by an actuator (outer) and an actuator (inner translation mechanism).

15 Referring to Fig. 3a, a preferred embodiment 10 of a multi-point latch system according to the present invention is shown comprising a rotatable pawl 13 mounted to a translating rod 11 so that the pawl 13 translates with the rod 11 and freely rotates with respect to said rod 11. The rod 11 is mounted on a door panel such as the enclosure door 102 shown in Fig. 1, by a fixed rod guide 12. The fixed rod guide 12 is mounted to the door panel 102.  
20 The fixed rod guide 12 is shown having a first cam slot 14 and a second cam slot 15 disposed respectively in opposing flanges 16, 17 which extend upwardly from the base 18 of the rod guide 12.

The pawl 13 has a body portion 20 with a pair of cam pinholes 21a, 21b (21b not shown) bored on opposite lateral sides of the pawl body 20. The first and second cam  
25 pinholes 21a, 21b of the pawl 13 are provided to accept a guide pin 22, such that the ends of

the guide pin 22 will extend outwardly once inserted in the pinholes 21a, 21b. The resulting first and second ends 22a, 22b of the guide pin 22 of the pawl 13 are provided to ride, respectively, in cam slots 14, 15 of the rod guide 12 to control the motion of the pawl 13 during actuation of the multi-point latch system 10. The multi-point latch system 10 further includes a pillow block 24 which has mounting means for mounting to the rod 11, and includes a pair of flanges 25, 26 with slots 27, 28 disposed in the respective flanges 25, 26, and a connecting arm 29 to connect the flanges 25, 26. The rod 11 is provided with a first notch 31 for facilitating mounting of the pillow block 24 thereto. The pawl 13 further includes a pivot member 33, shown preferably comprising first and second pivot pin ends 33a, 33b which extend outwardly on opposite lateral sides of the pawl body 20, once it is inserted in link holes 32a, 32b (32b not shown) in pawl 13, for pivotal mounting of the pawl 13 with the pillow block 24.

Figures 3b through 3h further show the step-by-step procedure of assembling the pawl 13 with the rod 11. In step 1, shown in Fig. 3b, the guide pin 22 is inserted into the pawl 13. In step 2, shown in Fig. 3c, the pillow block 24 is snapped into the first notch 31 of the rod 11. In step 3, illustrated in Fig. 3d, the pivot member 33 is shown connecting the pawl 13 to the pillow block 24 through link holes 32a, 32b (32b not shown) in pawl 13. In step 4, best seen in Fig. 3e, the rod guide 12 is slidably mounted onto the pawl 13. Fig. 3f, which details step 5, shows a shoulder nut 60 being inserted through the rod guide 12 and then through an eyelet 34 of the rod 11, and then it flares out, which allows for the rod assembly to be delivered to customers with all pieces of the assembly attached together. Fig. 3g shows the assembled latch system 10 with the pieces of the assembly mounted together. Moreover, Fig. 3h shows the assembled latch system 10 from the front view with the pieces of the assembly mounted together.

The latch system 10 is operated from open to closed position, for example, by translating the rod 11 which translates the pawl 13 behind a keeper 30, shown in Fig. 4a, mounted on an enclosure frame such as the cabinet enclosure frame 101. The keeper 30 includes a body portion 41 having a locating boss 42 extending outwardly therefrom, a  
5 bolthole 47 for securing the keeper 41 onto the latch system 10, and a pair of flanges 43, 44, which extend downwardly from said body 41. The pair of flanges 43, 44 each further comprising a pinhole 48a, 48b, which accept a roller pin 49. The roller pin 49 further comprises two pin ends 49a, 49b located opposite each other. A roller 45 is disposed between the keeper flanges 43, 44. The roller pin 49 connects the roller 45 with the keeper  
10 30. The roller 45 is positioned for engagement with the arm 46 (shown in Fig. 3a) of the pawl 13. Fig. 4b further shows the keeper 30 assembled with the roller 45 connected, and the roller pin end 49a protruding outwards from the flange 43 of the keeper 30. Fig. 4c further shows the bottom view of the keeper 30 along with the roller 45, with the locating boss 42 shown protruding outwards, along with pin ends 49a, 49b also extending outwards.

15 The pawl 13 engages the keeper 30 as the pawl arm 46 moves into further engagement with the keeper 30, with the end of the arm 46 moving beyond the roller 45. It will be appreciated that the pillow block 24 and pawl 13 are provided narrower in relation to the rod guide 12 so that the pawl 13 and pillow block 24 can be positioned between the first and second flanges 16, 17, respectively, of the rod guide 12.

20 The multi-point latch system 10 is operated for closing by translating the rod 11 (not shown), which initially begins to translate the pawl 13 into position behind a keeper, such as the keeper 30, which is mounted on a corresponding frame 102. Further translation of the rod 11 causes the pawl 13 to both translate and rotate. This action begins to pull the door panel 102 into the frame 101. The final translation of the rod 11 forces a ramped portion 50 of the  
25 pawl 13 to ride up the keeper roller 45.

Fig. 5 is an exploded representation showing an actuator 51 for actuation of the multi-point latch system 10 shown and described herein. The actuator 51, also shown in the schematic representation of Fig. 1, can comprise an element located on a door panel, which the user can grip and, preferably lift, to cause the translation of the rod for releasing the pawl  
5 from a corresponding keeper. For example, the actuation element can include a linkage to facilitate translation of the rod when the actuator is lifted, slid or otherwise used by the user.

The actuator 51 comprises an escutcheon 52, which includes a pair of screw pegs 69, 70 located at opposite ends of the back wall 71 of the escutcheon 52. The screw pegs 69, 70 mount onto a housing 55, and are secured to said housing 55 by a pair of hex nuts 64a, 64b.  
10 The escutcheon 52 has an eyelet 72, which allows a handle cover 53 to extend therefrom. The handle cover 53 comprises a pair of flanges 75, 76, which include a pair of connector holes 73, 74. The handle cover 53 connects to the housing 55 by rotatably mounting onto a housing pin 59, which extends through a pair of housing pin holes 77, 78 located on a pair of flanges 79, 80 on the housing 55.

15 A handle 54 is shown in Fig. 5, which is fixably mounted to the back wall 81 of the handle cover 53. A U-shaped inner portion 82 of the handle 54 allows for enough space to house the connection with a link assembly 65. The link 65 further comprises a pair of identical separate links 66, 67, each comprising a pair of pinholes 83,84, and a draglink hole 85. A link pin 68 connects link 66 with link 67, and both links 66, 67 with the handle 54.

20 The link pin 68 extends through an eyelet 86, 87 (87 not shown) on the handle 54, and through pinhole 84 of link 67 and pinhole 83 of link 66. Thus, the link assembly 65 is rotatably connected to the handle 54 by a link pin 68 extending through the eyelet 86, 87 (87 not shown) of the handle 54.

The link assembly 65 is connected to connectors 56a, 56b by a connector link pin 62,  
25 which extends through pinhole 83 of link 67, and through connector holes 88, 89 of the

connector 56b and by a connector link pin 61, which extends through pinhole 84 of link 66, and through connector holes 90, 91 of the connector 56a.

Connectors 56a, 56b are slidably attached to housing 55 by means of connector slots 95, 96, 97, and 98 (98 not shown) engaging housing ribs 99 and 200 (200 not shown).

5 Connector lugs 201, 202 of connectors 56a, 56b engage holes 203 in rod 11. Rotation of handle 54 causes rotation of links 66, 67, which in turn causes translation of connectors 56a, 56b.

Link 66 and link 67 each further comprise a drag link hole 85 located in the center of the links 66, 67. A draglink 58, which comprises an extending arm 92, is rotatably mounted  
10 to the housing 55 by a draglink housing pin 63, which extends through link hole 93. The extending arm 92 extends through the drag link hole 85 of link 67, which ensures both links 66, 67 and therefore both connectors 56a, 56b, move equally in substantially the same motion.

Fig. 6a shows the actuator 51 in the open position, while Fig. 6b shows the actuator  
15 52 in the closed position.

These and other advantages of the present invention will be understood from reading the above summary of the invention, brief description of the drawing figures and detailed description of the preferred embodiments. The invention is to be construed in accordance with the description set forth herein.

20

## CLAIMS

What is claimed is:

1. A multipoint latch system for securing a first panel to a second panel, said multipoint latch system comprising:

- 5 a) a translating rod member comprising a plurality of notches;
- b) a rod guide comprising a plurality of cam slots;
- c) a rotatable pawl member comprising a pawl arm and means for attaching said rotatable pawl member onto said rod guide; wherein said pawl member further comprises a pivot member;
- 10 d) a pillow block comprising means for mounting said pillow block to said translating rod member; wherein said pillow block further comprises slots for accepting said pivot member;
- e) connecting means for attaching said rod guide to said rod member;
- f) means for actuating said latch from an open to a closed position; wherein said  
15 means for actuating said latch from an open to a closed position comprises an actuator further comprising an escutcheon, a handle, a handle cover, a lock mechanism, a housing, a plurality of connectors, a draglink, a link assembly comprising a plurality of links, and a plurality of connecting means for attaching said housing to said connector; and
- 20 g) a keeper member.

2. The multipoint latch system according to claim 1, wherein said plurality of notches on said translating rod member comprises at least one notch for acceptance of said pillow block, and at least one notch for acceptance of said rod guide.

3. The multipoint latch system according to claim 1, wherein said rod guide slidably  
25 mounts onto said rod member.

4. The multipoint latch system according to claim 1, wherein said keeper member comprises a bracket, a roller pin, and a roller, wherein said roller pin slidably mounts through a pair of pinholes and through said roller mounted therebetween.

5. The multipoint latch system according to claim 4, wherein said bracket comprises a  
5 locating boss, a bolthole, and a pair of flanges, wherein said flanges each comprise at least one pinhole.

6. The multipoint latch system according to said claim 4, wherein said keeper member is mounted on said second panel.

7. The multipoint latch system according to claim 1, wherein said pawl arm selectively  
10 engages said roller member of said keeper member.

8. The multipoint latch system according to claim 7, wherein said pawl arm further comprises a ramped portion, wherein said ramped portion engages said roller of said keeper member.

9. An actuator for opening and closing a multipoint latch system, wherein said actuator  
15 comprises: an escutcheon, a handle, a handle cover, a lock mechanism, a housing, a plurality of connectors, a drag link, a link assembly comprising a plurality of links, and a plurality of connecting means for attaching said housing to said connector.

10. The actuator of claim 9, wherein said escutcheon mounts onto said housing, and wherein said escutcheon further comprises an elongated eyelet.

20 11. The actuator of claim 9, wherein said handle cover is configured to receive said handle, wherein said handle cover rotatably mounts onto said housing, and wherein said handle cover extends through said eyelet of said escutcheon.

12. The actuator of claim 9, wherein said handle is dimensioned in a U-shape, and comprises a pair of eyelets for engaging said links.

13. The actuator of claim 9, wherein said link assembly comprises said plurality of links rotatably mounted in the eyelets of said handle.

14. The actuator of claim 13, wherein said plurality of links comprises two links, each rotatably mounted to each other.

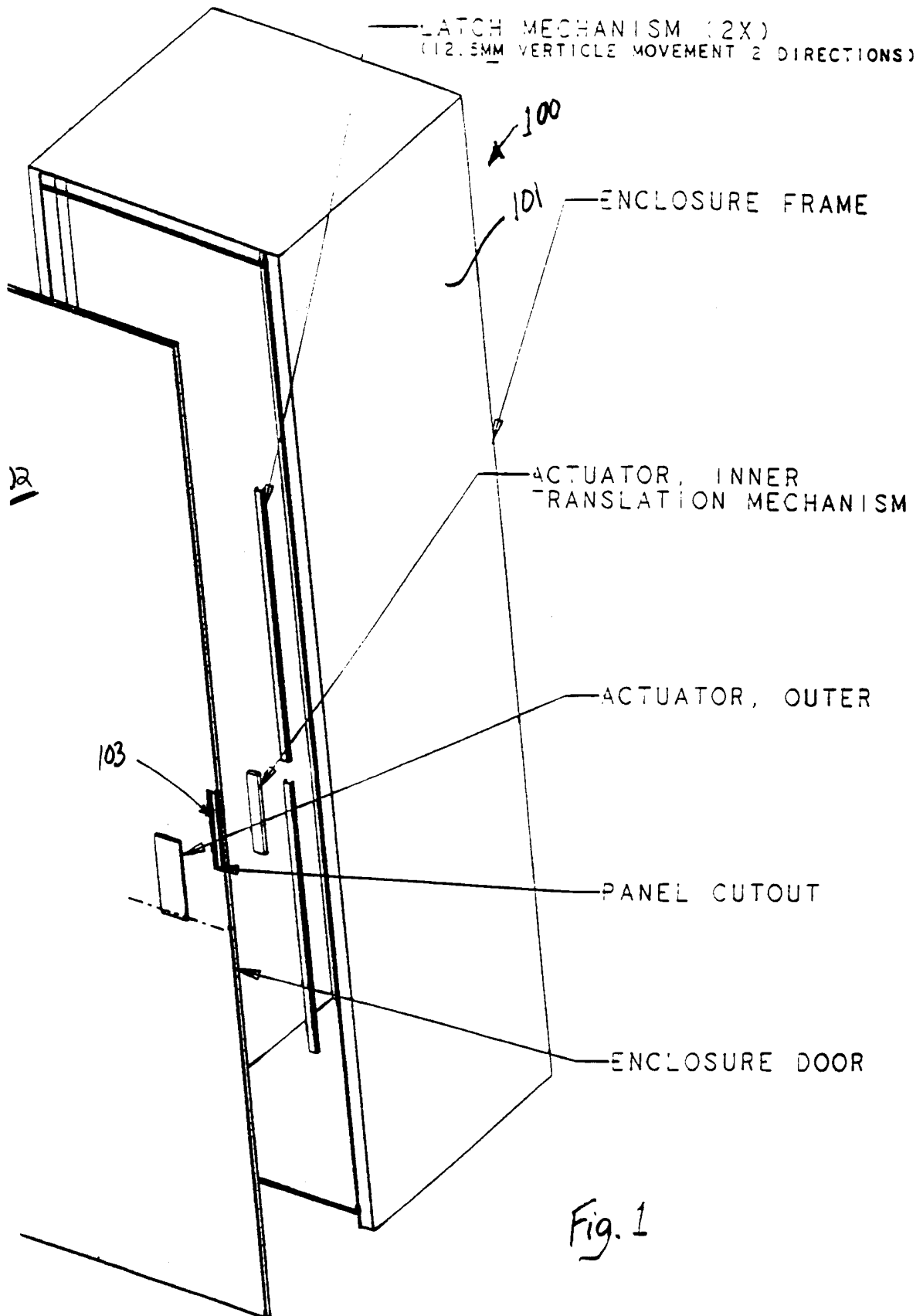
5 15. The actuator of claim 9, wherein said plurality of connectors comprises a plurality of connector slots for slidably mounting on said housing, and connector holes for receiving said plurality of links.

16. The actuator of claim 15, wherein said plurality of links rotatably mounts onto said plurality of connectors.

10 17. The actuator of claim 16, wherein said connectors comprise connector lugs, wherein said connector lugs mount on an external mechanism.

18. The actuator of claim 9, wherein said draglink comprises an extending arm, whereby said draglink is rotatably mounted on said housing, whereby actuation of said handle causes said draglink to engage said link assembly, which causes said connectors to translate in a

15 same direction.



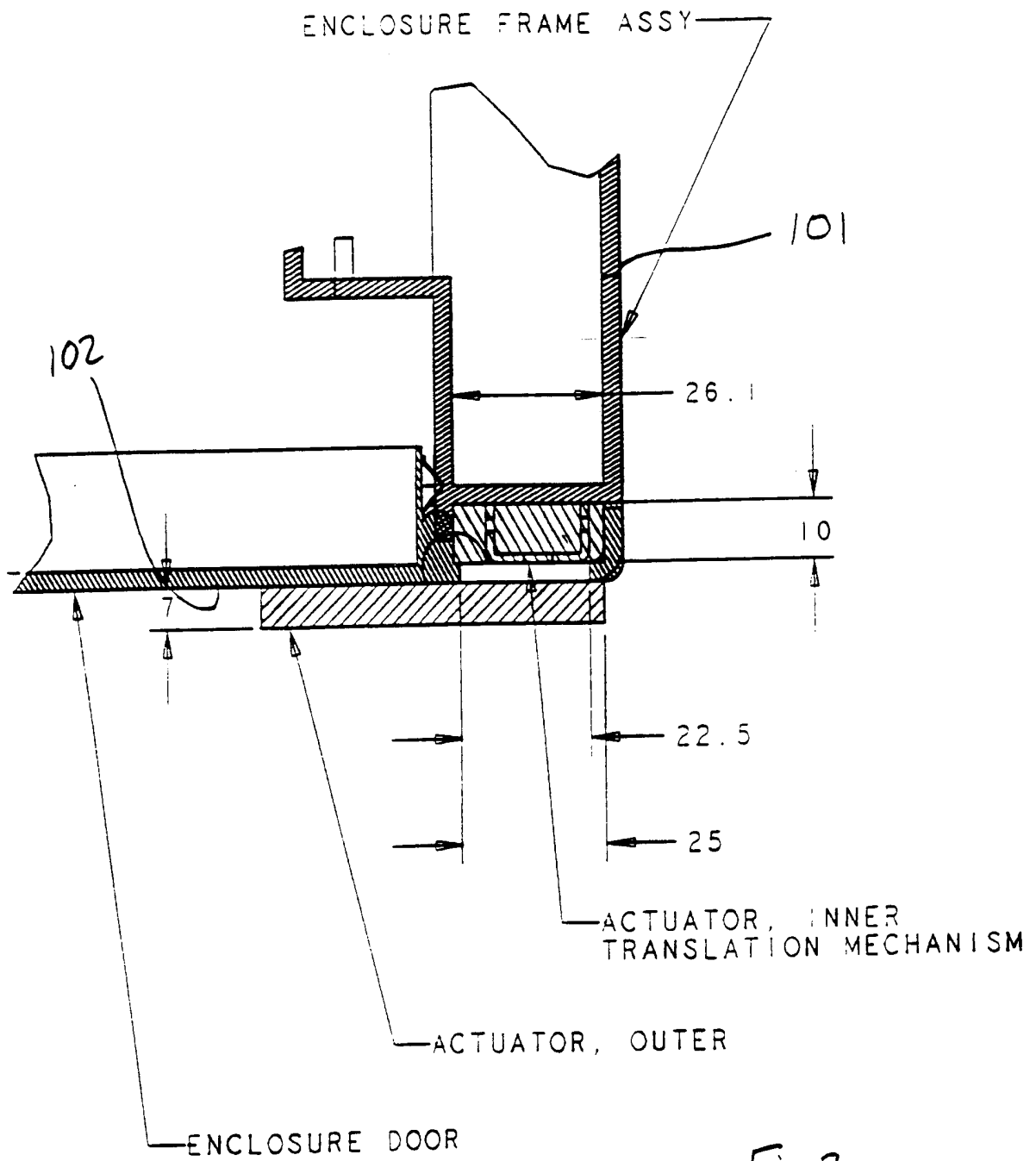
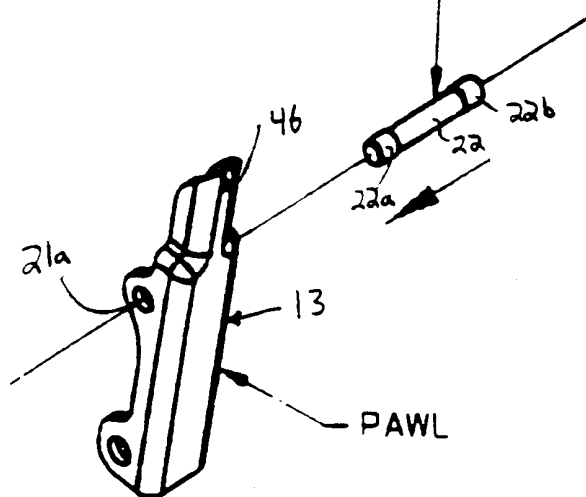


Fig. 2

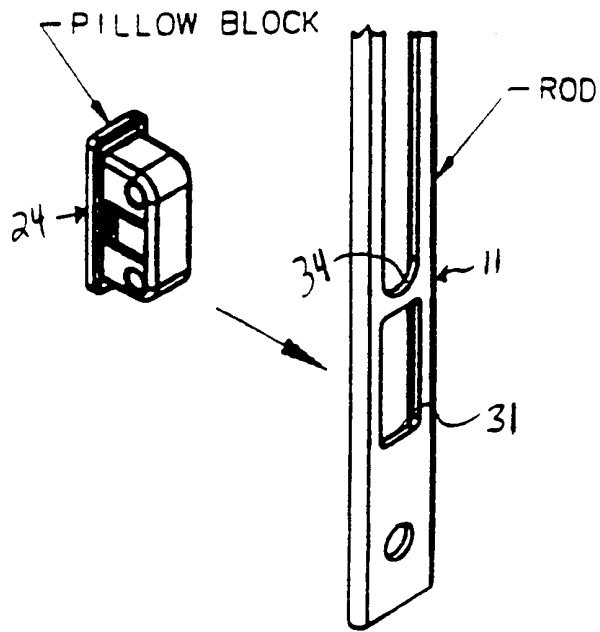


PAWL TO GUIDE PIN



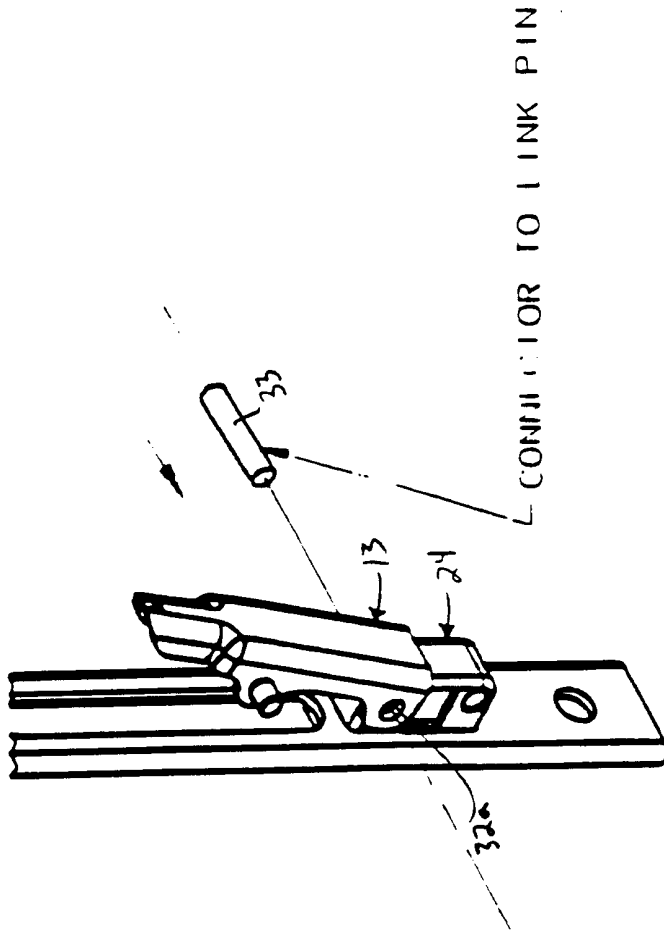
STEP 1: INSERT PAWL TO GUIDE  
PIN INTO PAWL

Fig. 3B



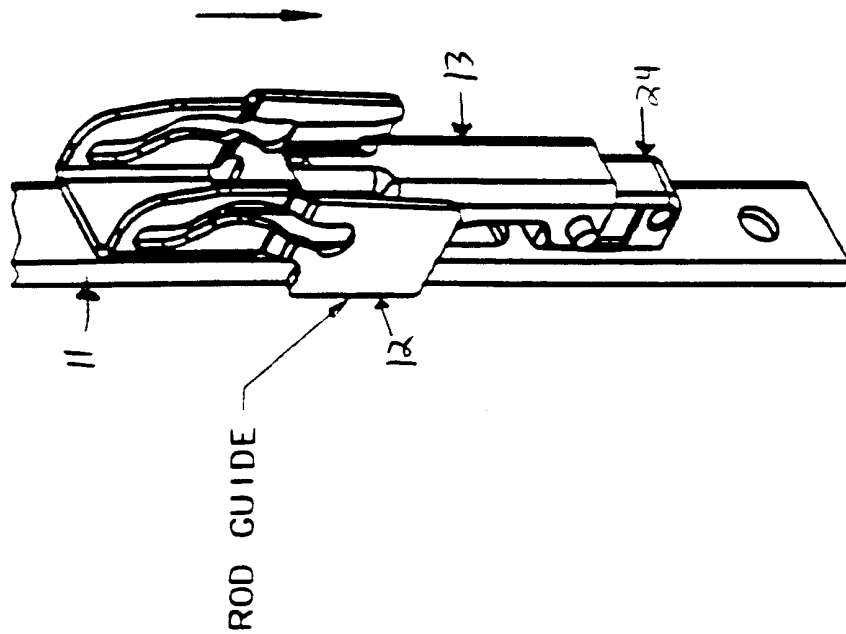
STEP 2: SNAP PILLOW BLOCK INTO ROD

Fig. 3C



STEP 3: PLACE PAWL ONTO PILLOW BLOCK AND  
INSERT CONNECTOR TO LINK PIN.

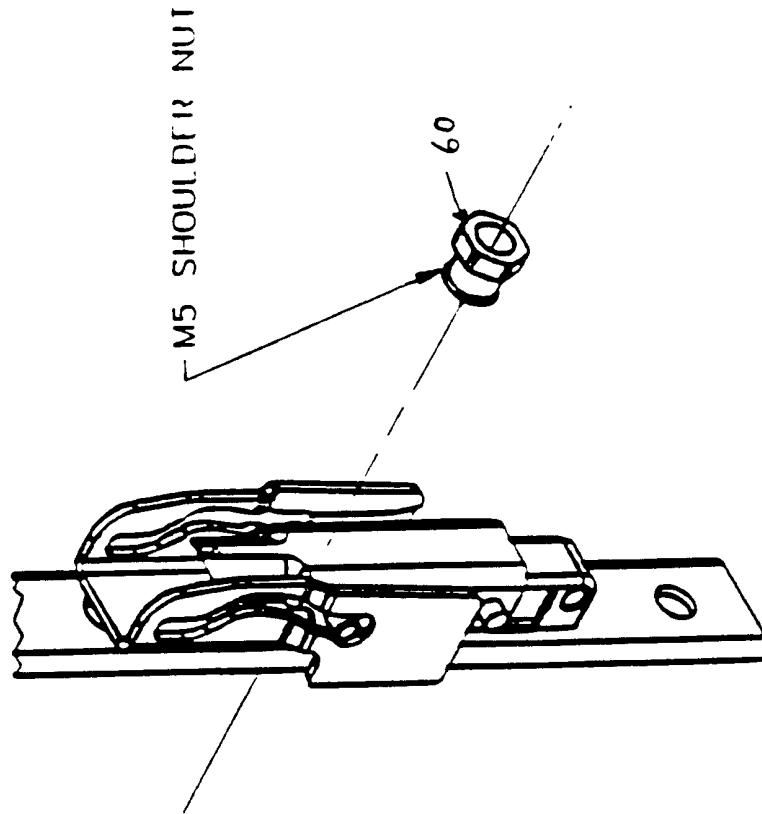
Fig. 3D



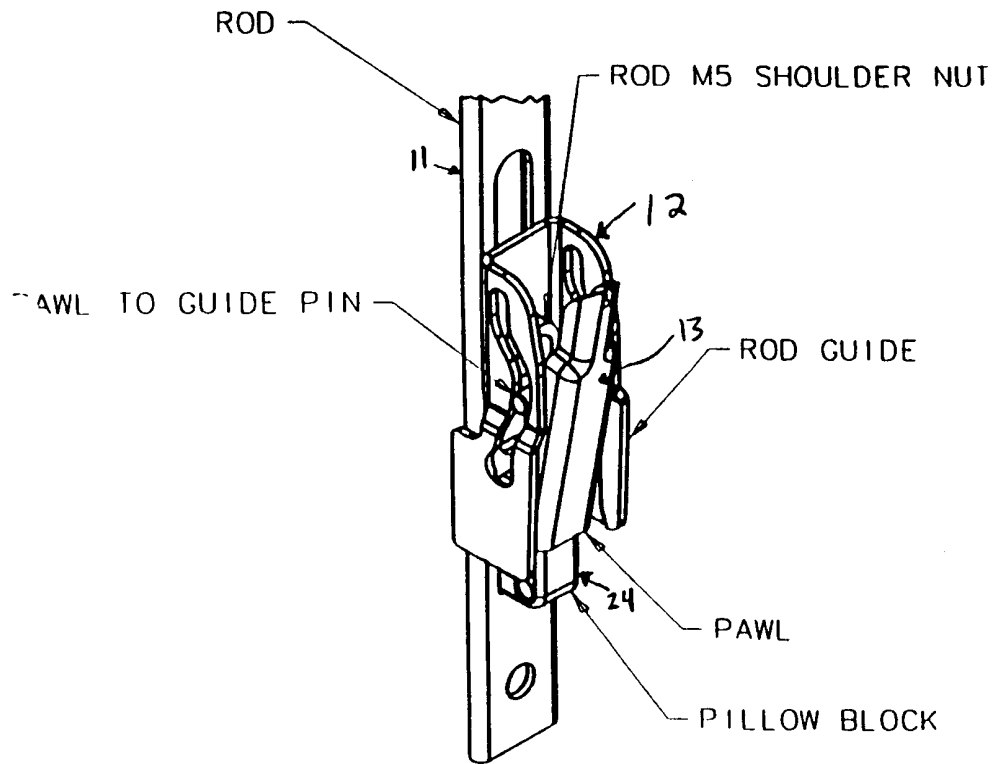
STEP 4: SLIDE ROD GUIDE ONTO PAWL TO GUIDE PIN

Fig. 3E

Fig. 3F



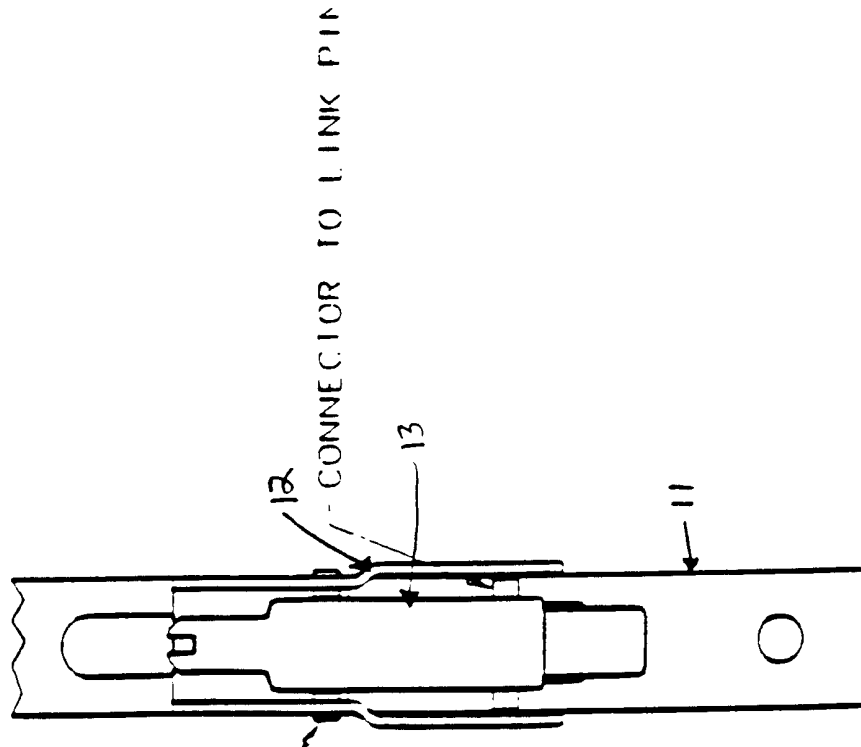
**STEP 5: INSERT M5 SHOULDER NUT THROUGH ROD GUIDE AND ROD THEN FLARE.**



ASSEMBLED

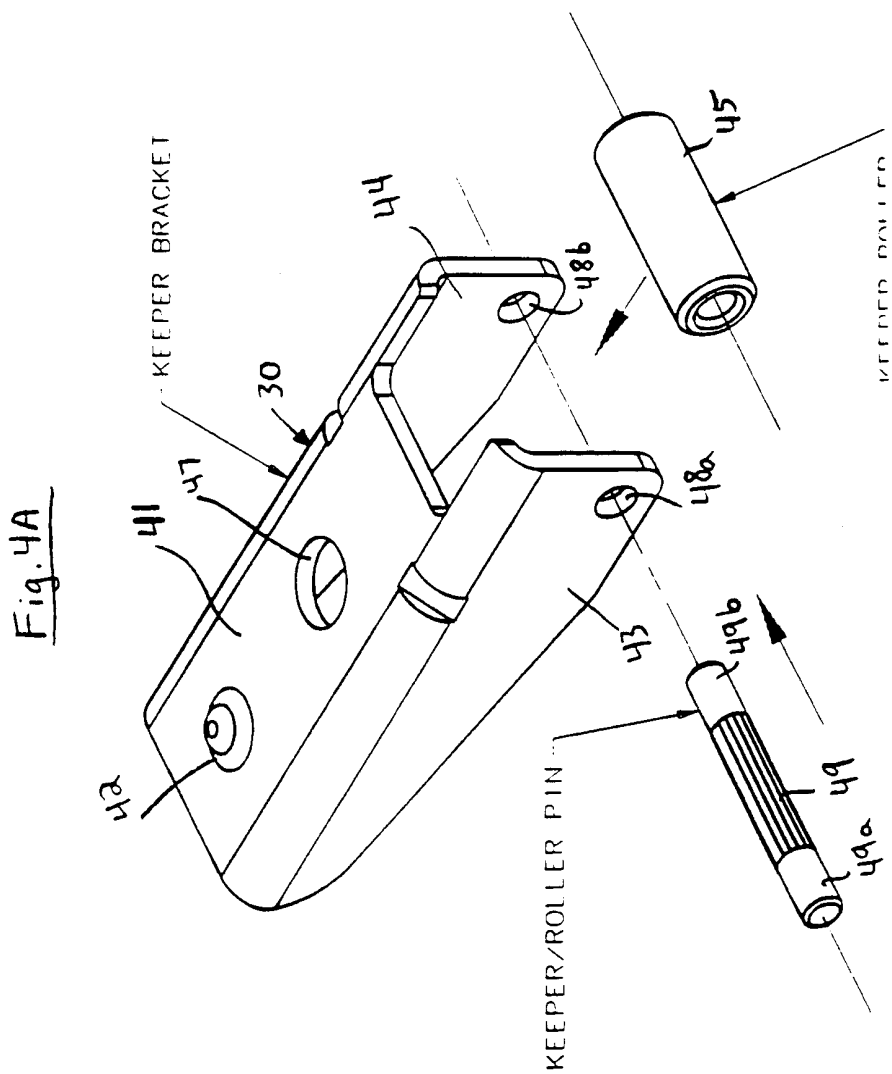
Fig. 3G

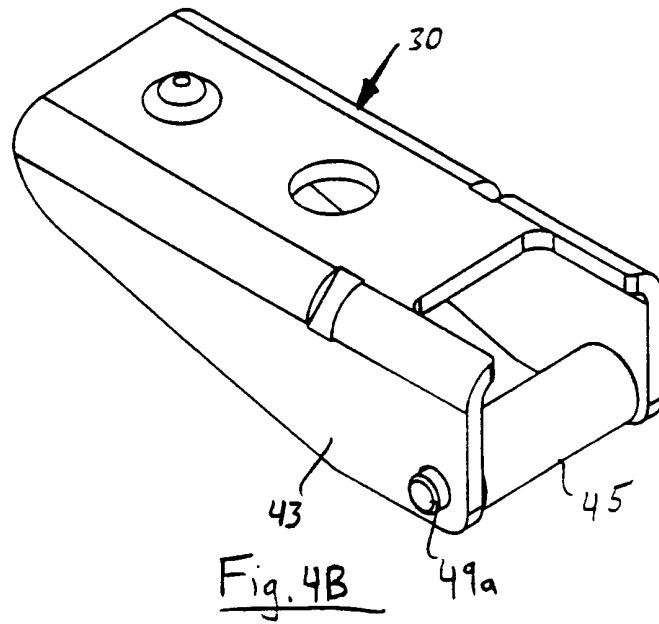
Fig. 3H



PAWL TO GUIDE PIN

CONNECTOR TO LINK PIN





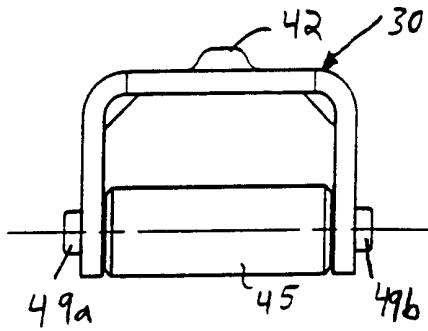
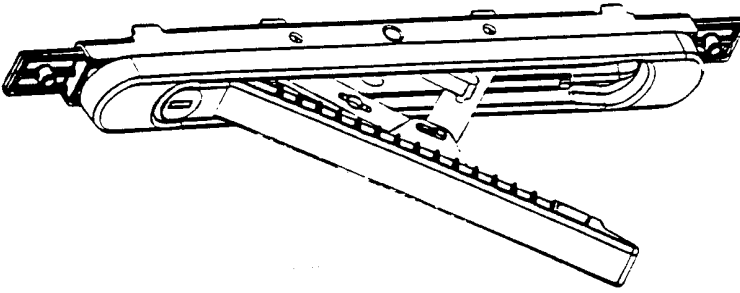


Fig. 4C





ACTUATOR OPEN ISOMETRIC

Fig. 6A



ACTUATOR CLOSED ISOMETRIC

Fig. 6B