

Nov. 26, 1935.

E. H. ELLISON

2,022,081

FASTENING DEVICE

Filed Aug. 22, 1932

2 Sheets-Sheet 1

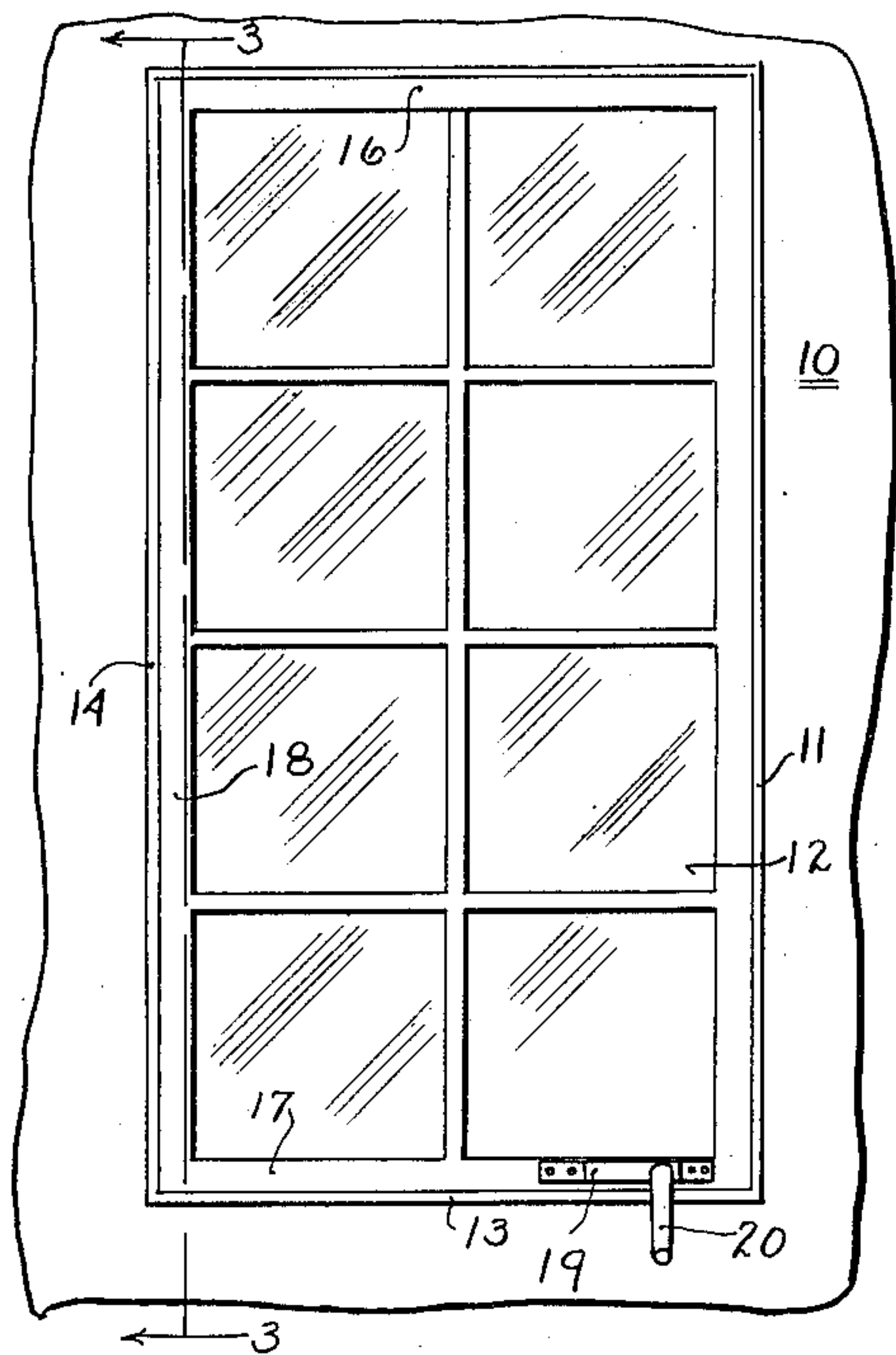


FIG 1

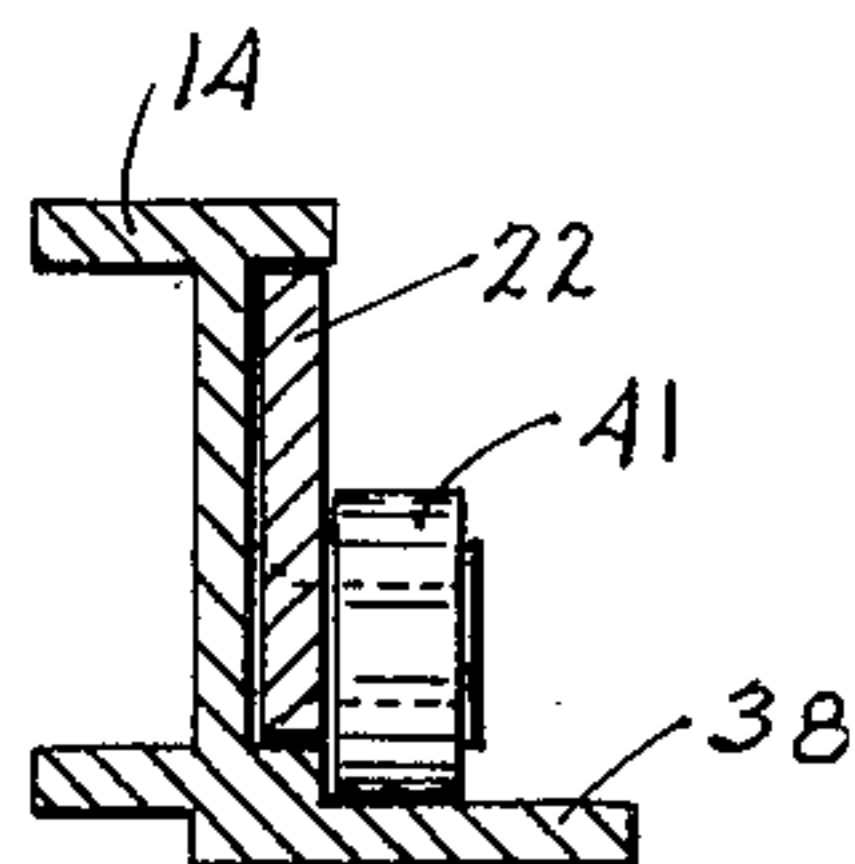


FIG 2

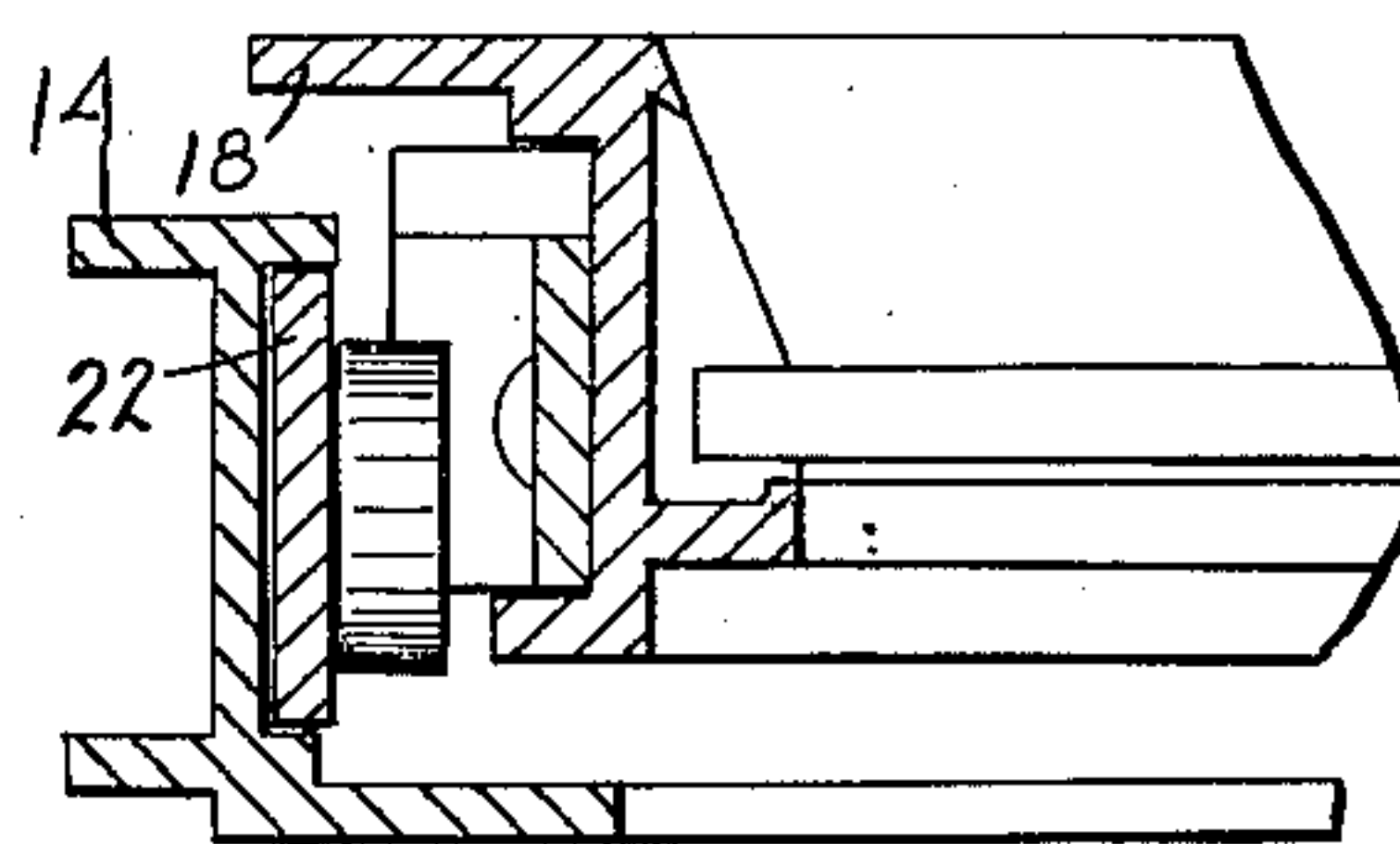


FIG 3

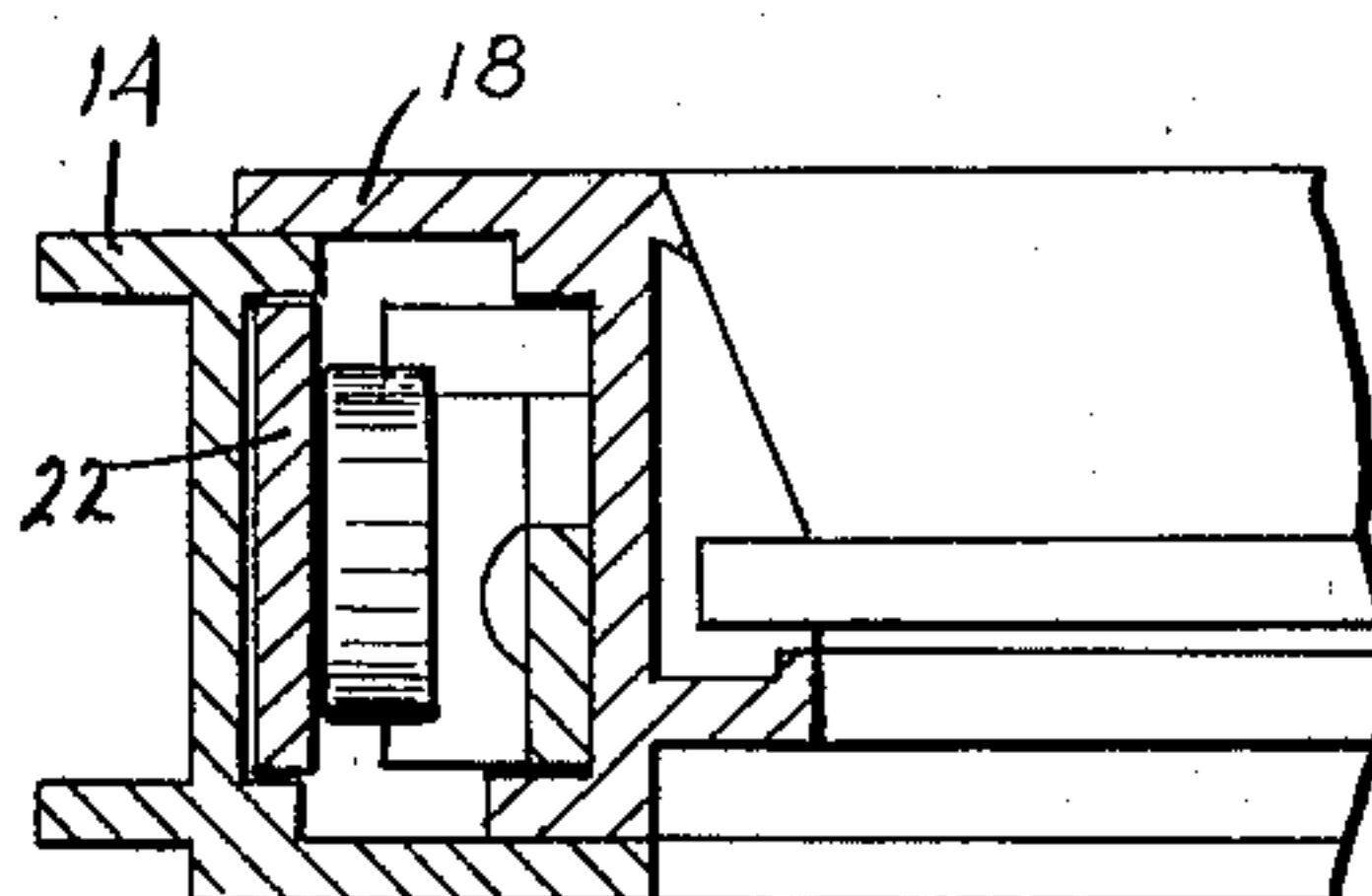


FIG 4

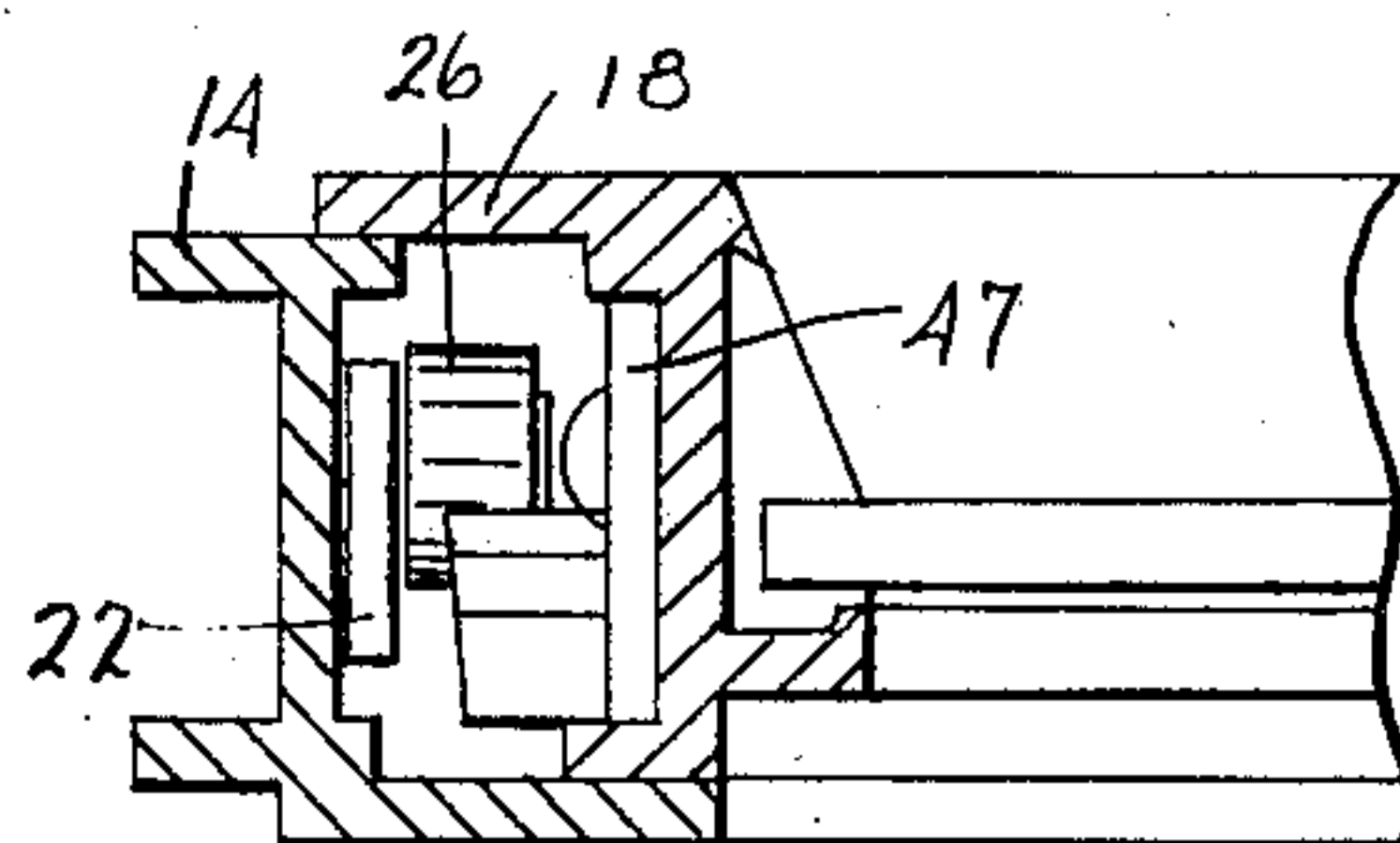


FIG 5

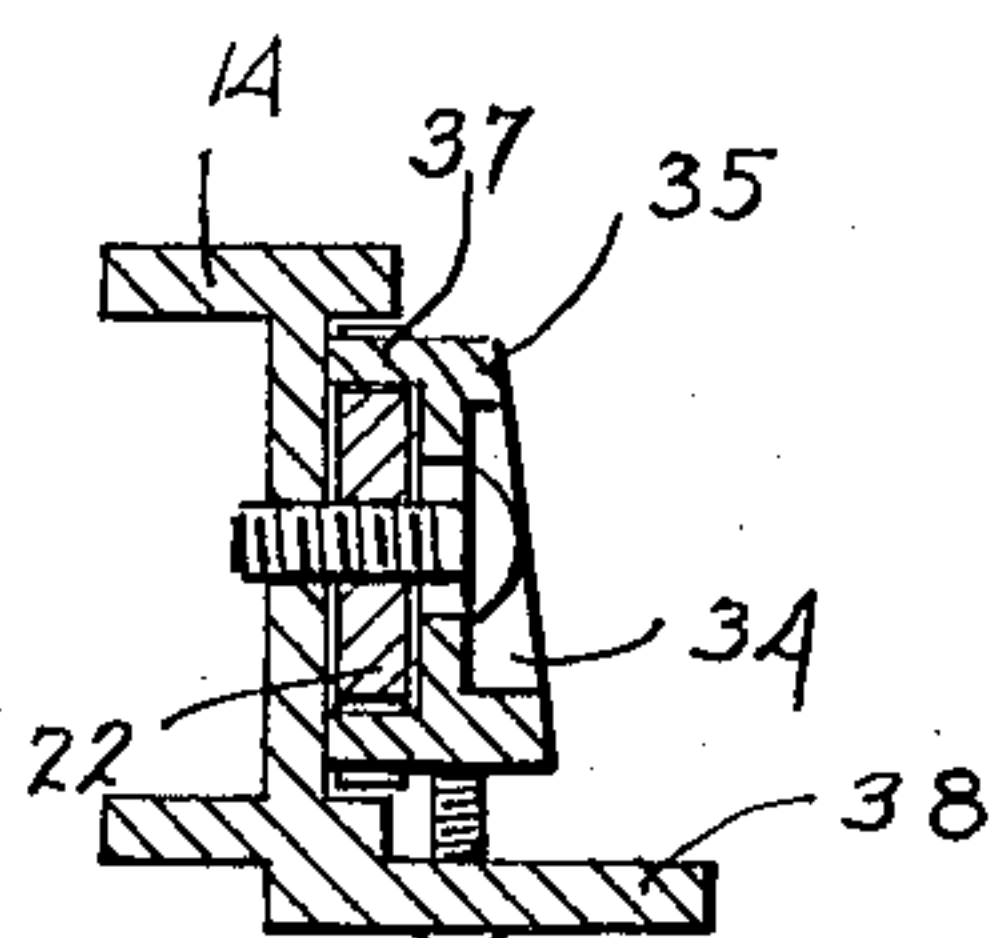


FIG 6

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2 Sheets-Sheet 2

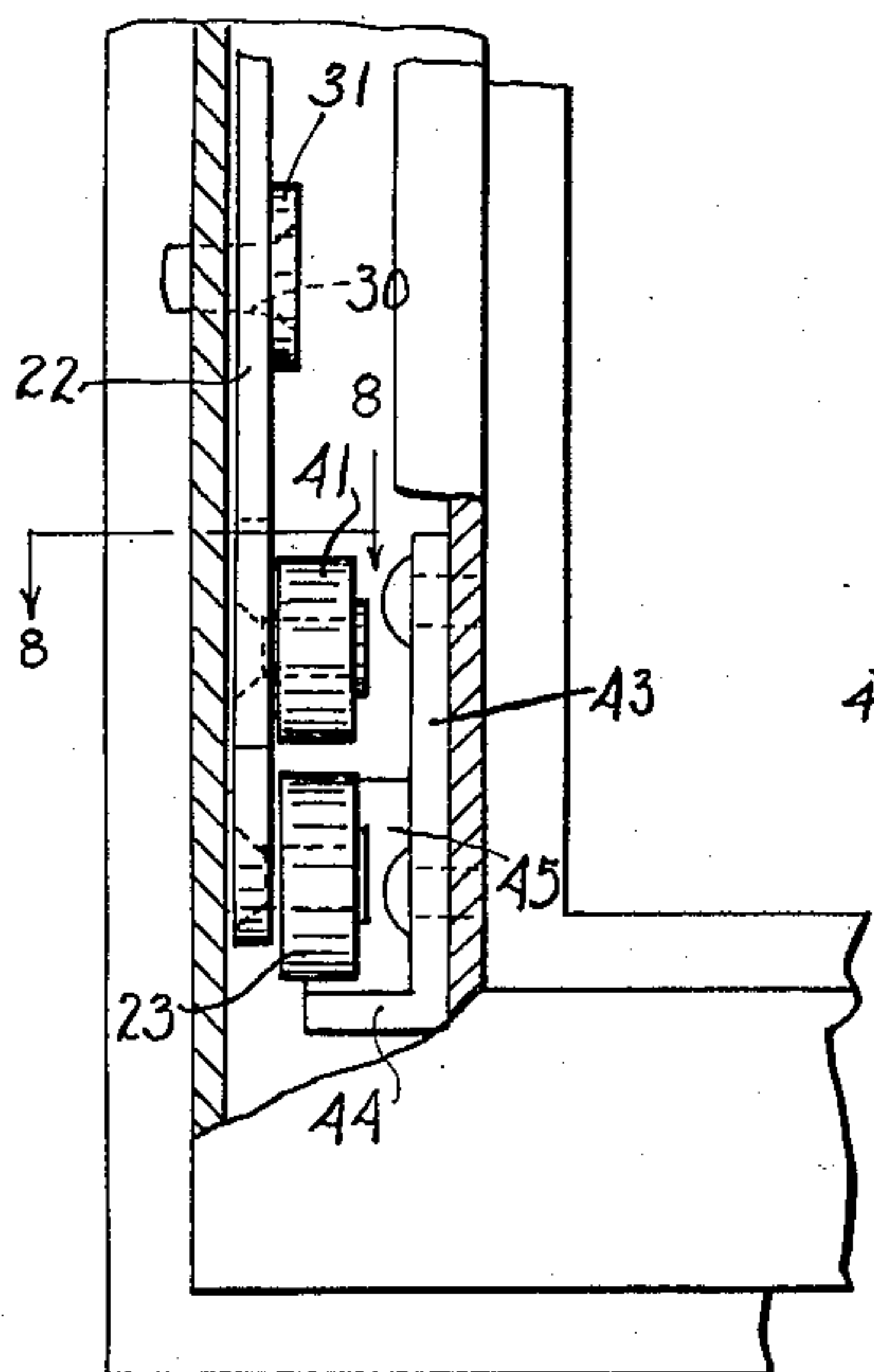
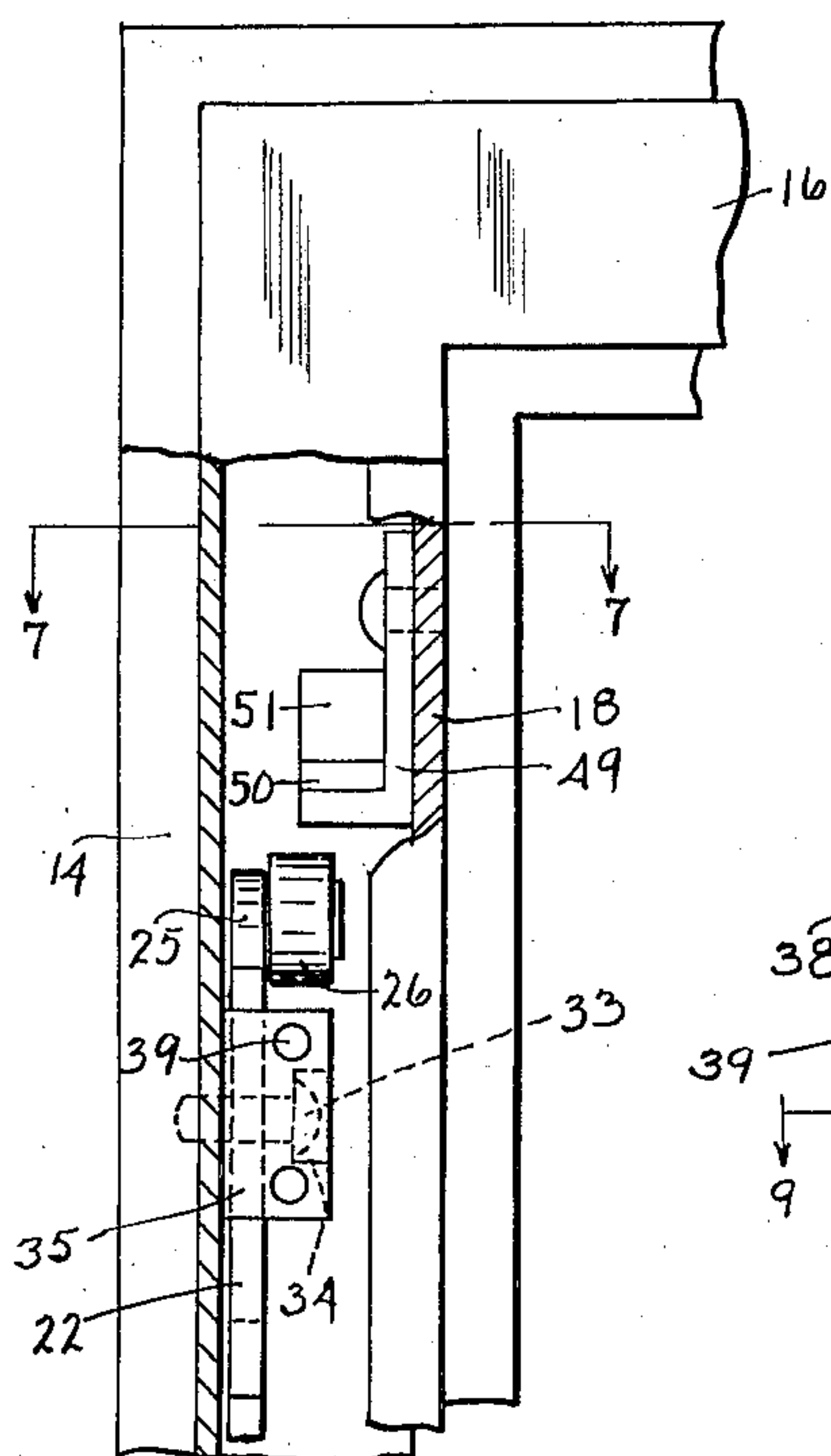


FIG 2

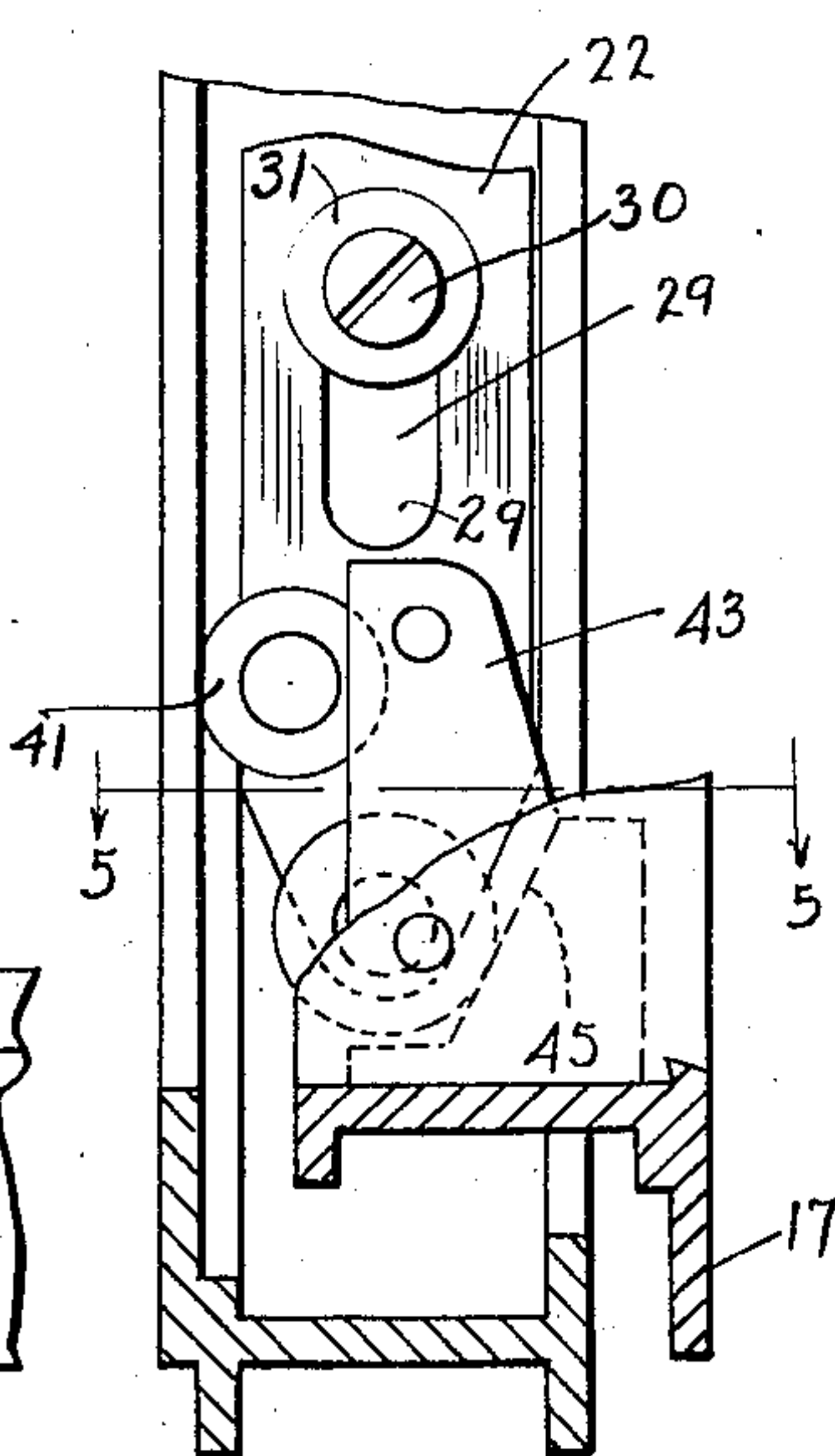
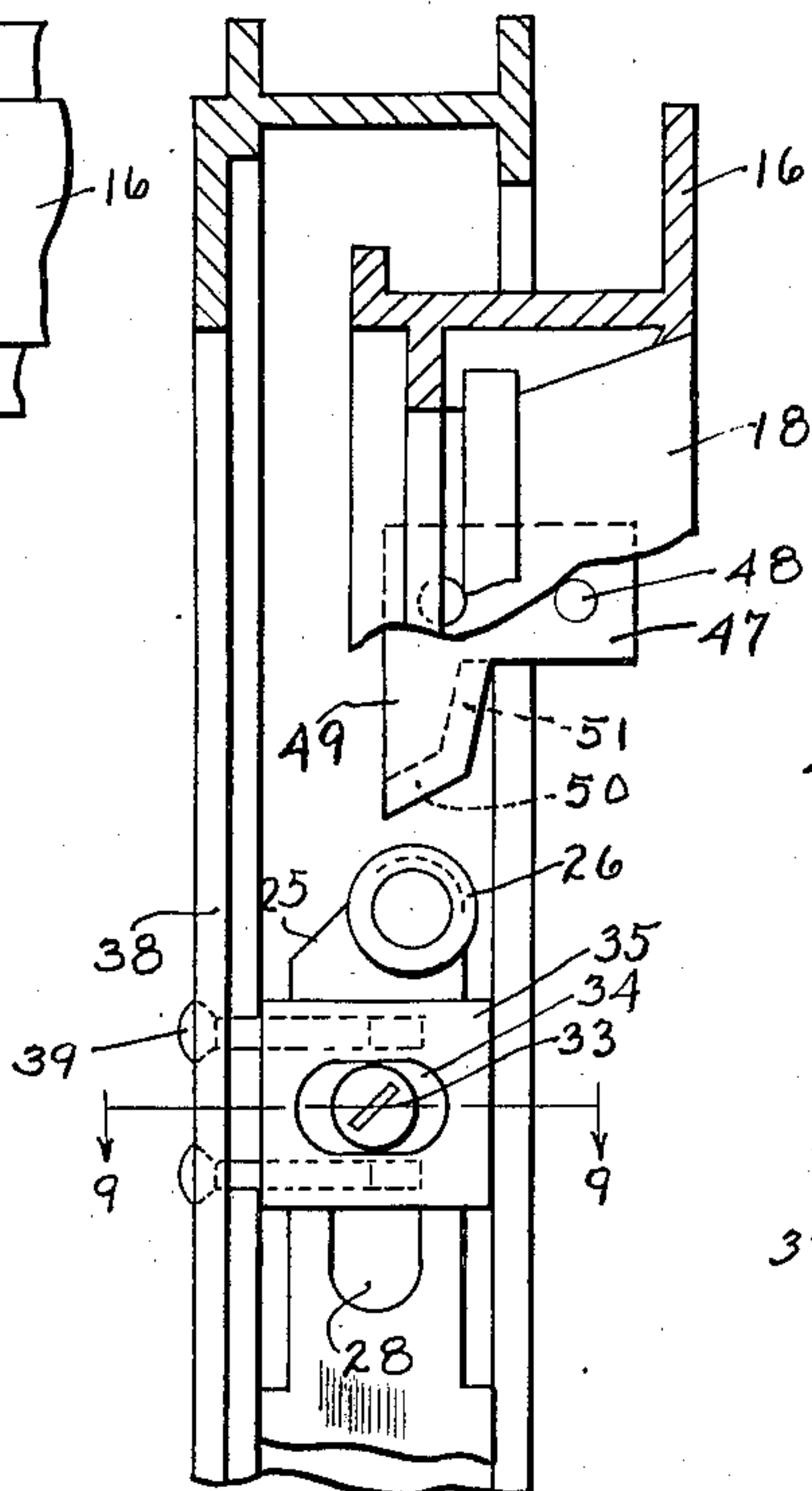


FIG 3

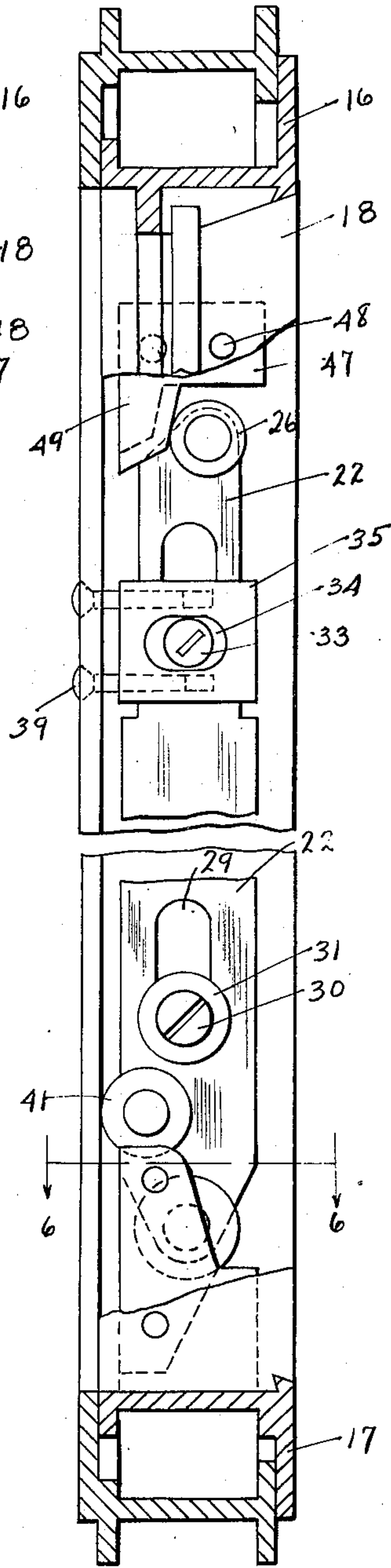


FIG 4

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## UNITED STATES PATENT OFFICE

2,022,081

## FASTENING DEVICE

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Application August 22, 1932, Serial No. 629,841

17 Claims. (Cl. 292—138)

This invention relates to an improvement in a fastening device for doors or windows of the casement type.

The preferred embodiment of the invention discloses a fastener which is automatically operated when a door or window is closed or opened. Whether or not the door or window is operated manually or by means of a suitable operating mechanism is immaterial provided some means, for holding said door or window in fully closed position, is utilized. The preferred type of operator is shown and described in my Patent No. 1,539,549 and consists of a worm gear mechanism by which the door or window is held in closed position.

Since much difficulty has been encountered in providing suitable operators and fasteners for casement doors or windows, the present invention is shown applied to such structure. The present type casement window, for example, is arranged with an operator usually mounted on the sill and a fastener located mid-way of one of the frame stiles. The fastener and operator are independent of each other in operation and location and, therefore, require two sets of finished hardware. Furthermore, since it is a universal requirement that a casement window be equipped with a screen, a considerable problem is involved in so locating the screen that it will not interfere with the manipulation of the operator or fastener. Many of the present casement window fastening devices are of such proportion, arrangement and location as to hinder installation or removal of a screen. Furthermore, since these fasteners are generally located mid-way of the vertical stile of the frame and engage only the adjacent open edge of the window, they generally do not draw the window into weather tight engagement with the frame at the top and bottom. It frequently occurs that dirt on the outside sill prevents complete engagement of the lower rail of the window with the corresponding rail of the frame and, therefore, a fastener adapted to draw in the central portion of a window into contact with the frame, tends to bend the stile of the window somewhat out of shape. Since most operators are attached to the bottom rail of a window, there is a tendency, resulting from whipping by wind, for the upper free corner of the window to be sprung outwardly a distance of one-half inch or more. The fastening devices now on the market, although presenting great improvement over the old type used on casement windows, still fall short of perfection since they are unable to draw the window into such contact with the

frame as to fully prevent entry of the elements when the window is in closed position.

The present invention marks a considerable advance in a casement window and door fastening device as it provides a fastener that is fully automatic in its operation and will not only hold the door or window in closed position, but will pull in the upper free corner of the window or door though it be warped and sprung outwardly and would not otherwise be brought into contact with the frame and this, therefore, constitutes the principal object of the invention.

Another object of the invention lies in the provision of a fastening device which, while automatically locking the window in closed position, will not interfere with the installation or removal of a fly screen or storm sash that may be applied to the inside face of the frame.

A further object of the invention lies in the provision of an automatically operated fastener which will function even though the window is inadvertently slammed or otherwise mistreated.

Another and further object of the invention lies in the provision of a fastener which, when the window is in closed position, is entirely concealed from view.

Other and further objects of the invention will be more fully understood from a consideration of the following specification which is taken in conjunction with the accompanying drawings which form a part thereof, and in which

Fig. 1 is a front elevation of a casement window to which one form of the invention is applied and in which is shown an operator of the type referred to in the above listed patent;

Fig. 2 is an enlarged fragmentary view of one of the window and frame stiles, parts being broken away to disclose the location of the fastening mechanism;

Fig. 3 is a vertical sectional view, taken substantially on the line 3—3 of Figure 1, showing the fastening mechanism in elevation;

Fig. 4 is a view similar to Figure 3, showing the other extreme position of the fastening mechanism with the window drawn into close abutment with the frame;

Figs. 5, 6 and 7 are horizontal sectional views of the fastener, being taken substantially on the lines 5—5, 6—6 and 7—7 of Figure 2;

Fig. 8 is a horizontal sectional view, taken substantially on the line 8—8 of Figure 2; and

Fig. 9 is a horizontal sectional view, taken substantially on the line 9—9 of Figure 3, of an adjuster for the fastener.

Referring to the drawings, the invention is



shown mounted in a casement window structure, generally indicated by the reference numeral 10. This structure includes a casement frame 11 and window 12. The frame 11 comprises upper and lower horizontal rails 13 and stiles 14. The window 12 comprises upper and lower horizontal rails 16 and 17 and vertical stiles 18. The particular contour of the rails and stiles of the frame and sash herein shown is of no consideration other than that these elements must be of such form as to cooperate to provide sealing contact of one with the other. An automatic window operator 19, of the worm gear type, operated by a crank 20, is found preferable for use in connection with applicant's fastener since an operator of this type is locked against any movement except that produced through rotation of the crank.

The fastener for securing the window 12 in full and complete contact with the frame 11 is mounted in the stile 14 of the frame and comprises a vertically reciprocable plate 22. The lower end of the plate is tapered and fitted with a roller 23 which projects beyond the lower extremities of said plate. The upper end of the plate is formed with a sloped wall 25, in the upper end of which is located a further roller 26. The plate is formed with upper and lower longitudinally extending slots 28 and 29. A pin 30, projecting through the slot 29 has threaded engagement with the stile 14. A suitable washer 31 is mounted beneath the head of the pin to prevent removal of the plate. The upper slot 28 receives a pin 33 which is likewise threaded into the stile 14. The head of this pin projects through a horizontal slot 34 in a guide block 35. The block 35 has flanges 37 which lie adjacent to and act as a guideway for the upper end of the plate 22. The block 35 is mounted on the inwardly directed flange 38 of the stile 14 by means of screws 39. Turning the screws 39 causes the block 35 and the upper portion of the plate 22 to move inwardly or outwardly for the purpose of altering the horizontal position of the roller 26. Further description of this adjustable feature will be considered in connection with the operation of the fastener. A third roller 41 is mounted adjacent the lower end of the plate 22, being so located as to project beyond the inner vertical edge of the plate for the purpose of contacting with the flange 38 of the stile 14 when said plate is vertically reciprocated.

The structure above described constitutes the moving element of the fastening mechanism. The means by which the plate is vertically reciprocated is attached to the free stile 18 of the window and is shown as a bracket 43. The bracket is formed with a lower horizontal flange 44 which is continued upwardly at any desired angle to form a cam face 45. When the window 12 is moved inwardly toward the frame 11, the cam face 45 strikes the roller 23, causing said roller, and the plate 22 on which it is mounted, to move upwardly. The pitch of the cam surface 45 of the bracket determines the ratio of vertical movement of the plate 22 to the horizontal movement of the window 12. This may be more clearly understood by a comparison of Figures 3 and 4 of the drawings. It will be noted, since plate 22 must move in a direction perpendicular to the direction of travel of the window, that no fastening operation takes place along the lower edge of the window other than that which is produced by a worm gear operating mechanism above referred to. This type of operator, having long been in commercial use, is known to be capable of draw-

ing the window into close abutment with the frame.

Adjacent the rail 16, and mounted on the stile 18 of the window, is a strike plate 47. This plate is secured in any suitable manner, as by screws 48, and includes a depending portion 49 having two angularly disposed cam flanges 50 and 51. The roller 26, mounted on and projecting beyond the upper extremity of the plate 22, is adapted to first engage the flange 50, moving upwardly and over onto the more steeply pitched flange 51. The more gradual the slope of the flange 50, the greater the inward travel of the upper corner of the sash toward the frame when the plate 22 is moved upwardly. When the upper corner of the window has moved almost into abutment with the frame, the roller 26 is moved upwardly onto the flange 51, the pitch of which being steep diminishes the inward rate of travel of the window but increases the force with which the window is caused to abut the frame for the purpose of providing a weather tight seal between said window and said frame. The length of the portion 49, as well as that of the flanges 50 and 51, is governed by the size of the window and the distance it is desired to have the roller 26 move the upper portion of the window inwardly to abut the frame.

The operation of the device above described, is as follows: The operating crank by which the window is moved from one position to another is manipulated to draw the window toward the frame. When the lowermost free edge of the window has approached to within approximately one-fourth inch of the frame 14, the cam face 45 contacts with the roller 23 on the plate 22. As the crank is further turned to draw the lower portion of the window into abutment with the lower part of the frame, the cam face bears against roller 23, causing it to move upwardly along the cam face. Since the direction of travel of the cam is perpendicular to that of the direction of travel of the plate 22, the roller 41 is provided to contact with the frame flange 38 for the purpose of decreasing friction. The vertical travel of the plate 22 is limited to the length of the slots 28 and 29 but it will be noted that this is at least twice the distance of inward travel of the lower edge of the window toward the frame. By reason of the fact that the upper free corner of practically every casement window is unsupported, since the operator is usually mounted on the casement sill and engages the lower rail of the window, said upper portion is very frequently sprung somewhat out of alignment with the lower portion of the window. In fact this is found to be a usual rather than an unusual condition. Figure 3 of the drawings, therefore, illustrates this condition by showing the upper free corner of the window to be sprung out of alignment with the lower free corner by approximately one-fourth inch. As the plate 22 is moved upwardly at a rate of speed twice that of the inward travel of the window toward the frame, the roller 26 is caused to abut and travel upwardly along the cam face 50 and since the roller 26 is constrained to vertical movement, the upper free portion of the window must move inwardly approximately a distance twice that of the lower portion of the window. When the upper free portion of the window has very nearly approached the frame, the roller 26 leaves the cam face 50 and moves upwardly onto the face 51. This cam face is of a pitch which, while diminishing the inward



rate of movement of this portion of the window, increases the force of the roller applied to cause the window to closely abut the frame. Since the inward travel of the upper free portion of the window is dependent upon the vertical movement of plate 22, and the vertical movement of plate 22 is dependent on the inward movement of the lower free portion of the window, it is evident that if a window operating mechanism is of sufficient ruggedness to cause the lower free portion of the window to sealingly abut the frame, the fastening mechanism will be operated to cause the upper free portion of the window to abut the frame in a like manner. As brought out above, the operating mechanism must be provided with locking means to retain it in adjusted position with the lower portion of the window abutting the frame.

The guide block 35, which is laterally adjustable by means of screw 39 subsequently to the release of locking pin 33, is adapted to move the upper end of the plate 22 and roller 26 inwardly or outwardly for the purpose of drawing the window into closed abutment with the frame or loosening the window should it improperly abut at this point. This feature may be more clearly understood by an illustration in connection with Figure 3 of the drawings. In this figure it is assumed that the upper portion of the window has been sprung outwardly. It is apparent that when the window operator moves to draw the window into abutment with the frame the upper portion of said window will fail to abut the upper portion of the frame by a space equal to the extent of misalignment. Adjustment is made as follows, the window is opened, pin 33 rotated to release the guide block 35 and the window again closed. The adjusting screws may now be rotated to move the guide block inwardly which movement will draw the plate 22 and roller 26 inwardly causing the adjacent portion of the window to be drawn into abutment with the frame. The window is then opened and the pin 33 rotated to lock the guide block in its new position. Unless some accident occurs to the window such as would make it impossible for any operator or fastening device to function, the present fastener will continually serve to draw the upper portion of the window into abutment with the frame simultaneously with that of the lower portion of the window.

Although applicant has shown and described only one modification of his invention as applied to the fastening of a casement window, it is contemplated that the invention may be utilized for the fastening of other closures and also any modifications or adaptations of the present structure which may be made in so far as they do not depart from the spirit and scope of the invention as defined in the hereunto annexed claims.

Having thus set forth my invention what I claim as new and for which I desire protection by Letters Patent is:—

1. In a casement window structure, a fastener for drawing in and securing the window in closed position, said fastener comprising relatively movable elements, one of said elements being attached to the window and the other of said elements being mounted on and movable longitudinally of the frame of said structure, said window element, during the operation of closing said window, being engaged with and moved by the element on

said frame to draw said window into closed position.

2. In a casement window structure having frame and window stiles of a form which together produce a rectangular enclosure, a fastener for moving a free corner of the window into closed position, said fastener being located within said rectangular enclosure and comprising relatively movable elements, one of said elements being mounted on the stile of said frame, the other of said elements being mounted on the stile of said window, and means on said window for moving the element on said frame to engage the window element and move said window during the normal operation of closing said window.

3. A fastener for securing a casement window in abutment with the frame therefor comprising a movable element and a fixed element, one of said elements being mounted on the stile of said frame and the other of said elements being mounted on the stile of said window, a bracket for engaging and moving said frame mounted element into engagement with said window mounted element during the operation of closing said window.

4. In a casement window structure, a window fastener comprising relatively movable elements, one of said elements being mounted on the window, and the other element on the frame, said frame mounted element being vertically movable to engage said window mounted element and draw said window into abutment with said frame and means for varying the engaged distance of travel of one element relative to the other.

5. In a casement window structure, a window fastener comprising relatively movable elements, one of said elements being mounted on the window, and the other element on the frame, and means on said window, said means, during closing of said window, causing said frame mounted element to engage and move said window element and the adjacent portion of said window a distance greater than that portion of said window on which said means is located.

6. In a casement window structure, a window fastener comprising relatively movable elements, joined to the frame and window of said structure, and means on said window for moving said elements at greater than closing velocity of said window whereby said elements will cause an outwardly sprung portion of said window to abut the frame simultaneously with the unsprung portion.

7. In a casement window structure, a window fastener comprising relatively movable elements joined to the frame and window of said structure, and means for varying the engaged relative distance of travel of said elements whereby to draw a free portion of said window into abutment with the corresponding portion of said frame substantially simultaneously with the abutment of the portion of said window connected with a suitable closing means.

8. In a casement window structure including means for holding said window in closed position, a window fastener comprising a vertically movable element mounted on the frame of said structure, engageable means attached to the free portion of the window, and means on said window, said means moving said frame mounted element to engage said engageable means and draw the said free portion of said window into abutment with said frame during the operation of closing said window.



9. In a casement window structure, a window fastener comprising a vertically reciprocable plate on the frame stile of said structure, a strike plate on the corresponding stile of the window, anti-friction rollers on said reciprocable plate, and means on said window, said means, during the operation of closing said window, engaging one of said rollers and moving said plate to engage another of said rollers with said strike plate whereby a free portion of said window may be drawn into and held in abutment with said frame.

10. In a casement window structure, a window fastener comprising a plate located within the stile of the frame of said structure, pins in said stile projecting into slots in said plate and limiting the vertical reciprocating of said plate, and anti-friction rollers mounted on and projecting beyond the upper and lower extremity of said plate, means on said frame for adjusting the upper of said rollers inwardly or outwardly, a strike plate joined to the stile of the window of said structure, and means for moving said frame mounted plate upwardly to engage the upper of said rollers with said strike plate, whereby to draw in and fasten said window in abutment with said frame.

11. In a casement window structure, a window fastener comprising a vertically reciprocable plate on the frame stile of said structure, a strike plate on the corresponding stile of the window, anti-friction rollers projecting beyond and mounted on the upper and lower extremities of said stile mounted plate, a bracket on said window, said bracket having a cam-face engageable with the lowermost of said rollers and adapted to move said stile mounted plate upwardly to engage the uppermost of said rollers with said strike plate whereby to draw in and fasten a free portion of said window during the manual or mechanical operation of closing said window.

12. In a casement window structure, a window fastener comprising a vertically reciprocable plate on the frame stile of said structure, a strike plate on the corresponding stile of the window, said strike plate having a double cam-like face, anti-friction rollers projecting beyond and terminating the upper and lower extremities of said frame mounted plate, a bracket having a cam-like face joined to a portion of said window remote from said strike plate, said bracket, during the operation of closing said window, engaging one of said rollers and moving said frame mounted plate upwardly to engage another of said rollers with first one and then the other of the cam-like faces of said strike plate to draw the free portion of said window into abutment with said frame, and means for laterally adjusting the upper portion of said frame mounted plate whereby the upper of said plate rollers will

move the strike plate of a badly sprung window into abutment with said frame.

13. In a casement window having frame and window stiles of a form which together produce a rectangular enclosure, a fastener located in said enclosure, said fastener including relatively movable elements, one of said elements being joined to said frame and the other of said elements to said window, said elements, during the operation of closing said window, automatically cooperating to move the adjacent portion of said window into abutment with said frame at a velocity equal to or greater than the closing velocity of said window.

14. In a casement window having frame and window stiles of a form which together produce a rectangular enclosure, a fastener located in said enclosure, said fastener comprising two relatively movable elements mounted on the stiles of said frame and said window, said elements, during the operation of closing said window, automatically cooperating to move the adjacent portion of said window into abutment with said frame, said elements being concealed from view when said window is closed, and means for varying the extent of cooperative movement of said elements, whereby to adapt said fastener for use with properly aligned or sprung casement windows.

15. In a casement window having frame and window stiles of a form which together produce a rectangular enclosure, a fastener for said window including relatively movable elements located within said enclosure and joined to the stiles of said window and said frame, said elements automatically cooperating to move a portion of said window into abutment with said frame, during the operation of closing said window, and being wholly concealed from view when said window is in closed position.

16. In a casement window structure, a fastener for drawing in and securing the window in closed position, said fastener comprising relatively movable cooperating elements mounted on the frame and window of said structure, and means for automatically actuating one of said elements to engage and move the other of said elements, during the operation of closing said window.

17. In a casement window structure, an automatically actuatable fastener for drawing in and securing the window in closed position, said fastener comprising relatively movable cooperating elements mounted in the frame and window of said structure, and means for laterally adjusting one of said elements, whereby to vary the extent of cooperative engagement of said elements and the extent of movement of said window by said fastener during the normal operation of closing said window.

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