Oct. 29, 1968 P. R. FERGUSON 3,407,433

PIVOTED DOOR MOUNTING

Filed May 17, 1966 3 Sheets-Sheet 1

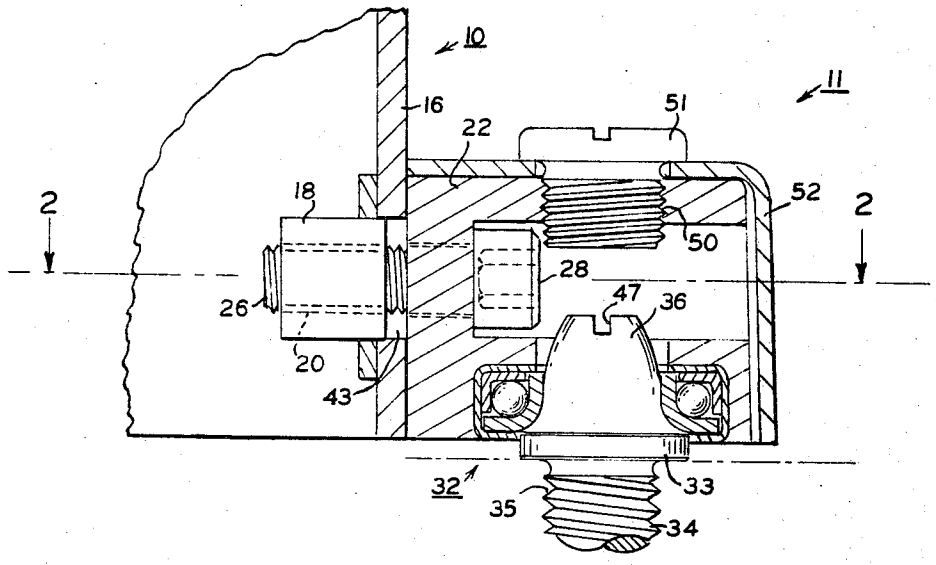


Fig. 1

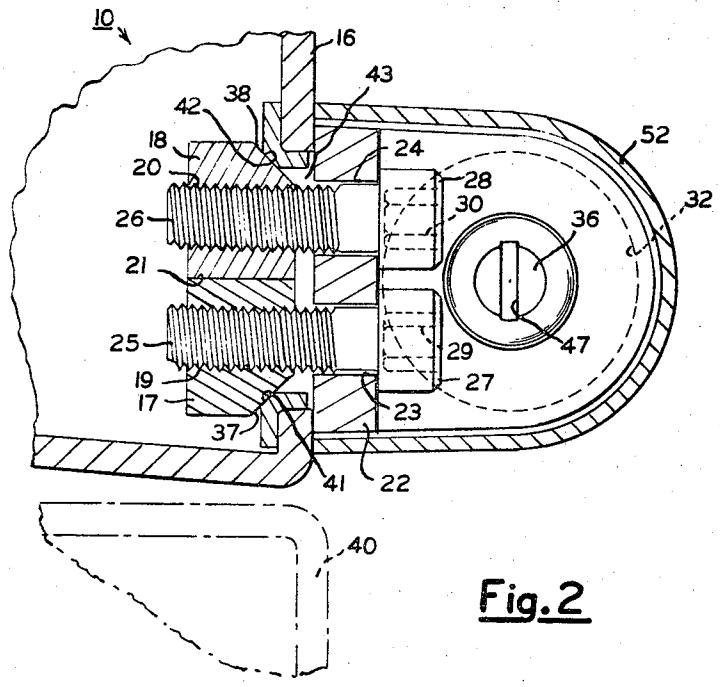


Fig. 2

INVENTOR.

PAUL R. FERGUSON

BY Robert Irving Williams

ATTORNEY

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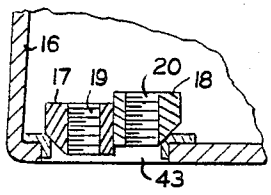


Fig. 3

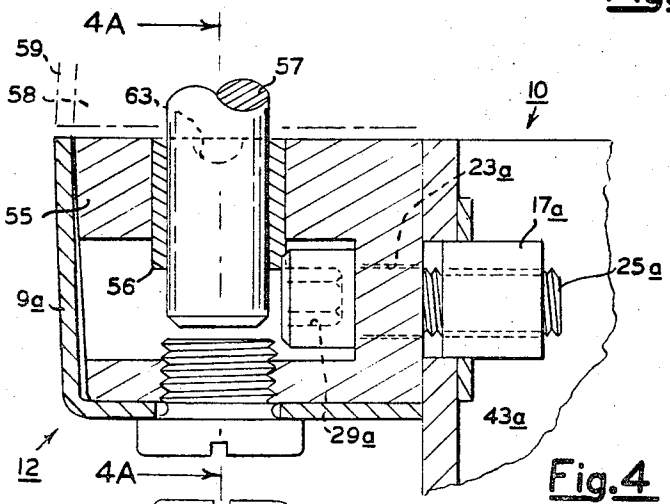


Fig. 4

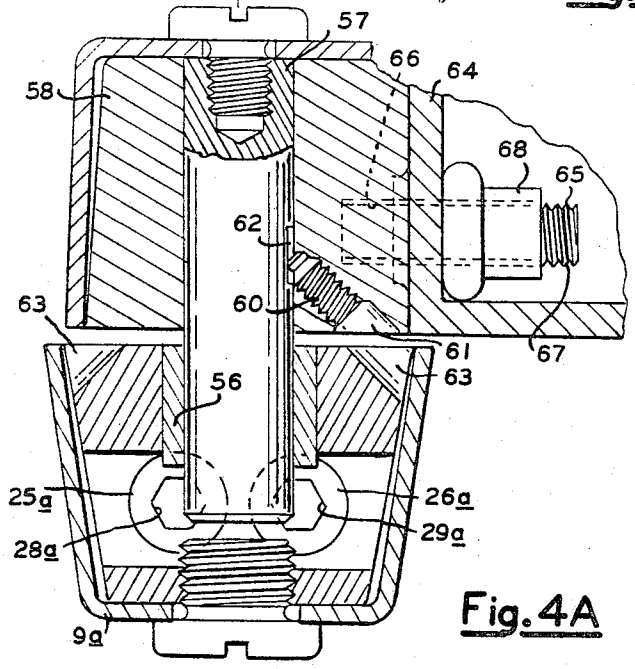


Fig. 4A

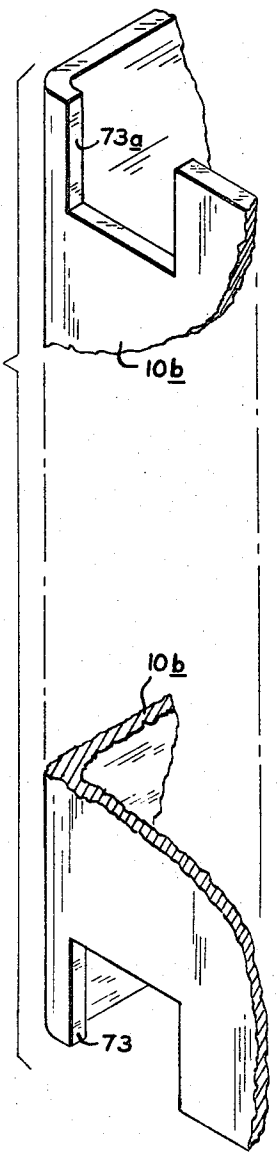


Fig. 5

INVENTOR.
PAUL R. FERGUSON
BY Robert Irving Williams
ATTORNEY

Oct. 29, 1968 P. R. FERGUSON 3,407,433

PIVOTED DOOR MOUNTING

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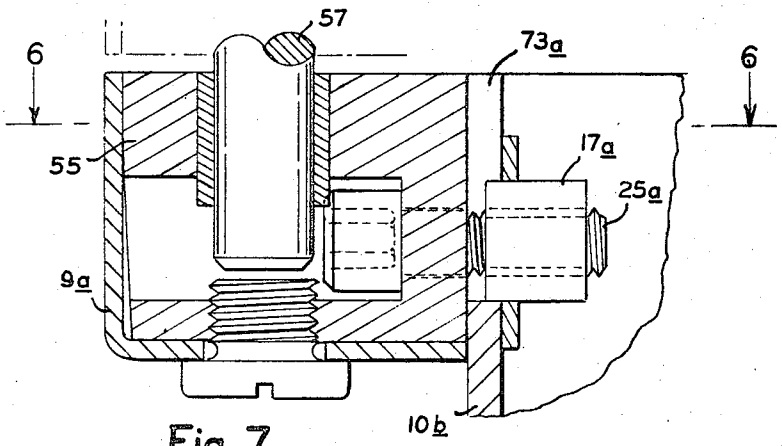


Fig. 7

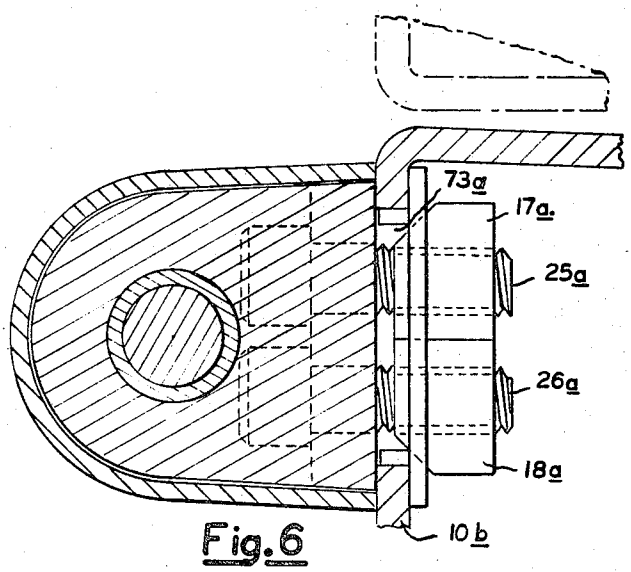


Fig. 6

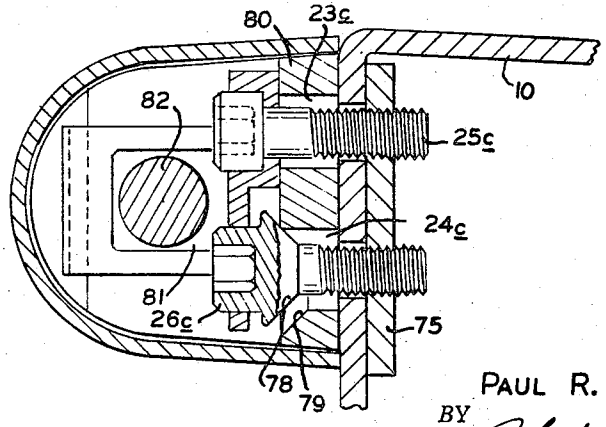


Fig. 8

INVENTOR.
PAUL R. FERGUSON
BY Robert Irving Williams
ATTORNEY

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Patented Oct. 29, 1968

3,407,433

PIVOTED DOOR MOUNTING

Paul R. Ferguson, P.O. Box 203,
Milldale, Conn. 06467

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10 Claims. (Cl. 16—130)

This invention relates to pivotally mounted doors, pivoted-door mounting constructions, and to correlated inventions and discoveries appertaining thereto.

Various factors in the construction of metallic doors and door jambs—which are often formed of aluminum and/or with somewhat less precision than might be desirable—has emphasized the long-standing need for a pivoted door construction which is simple, economical, and free from any interference with easy and accurate vertical adjustment of a door, and which at the same time permits easy and effective adjustment of the top or the bottom of the door or both in a direction generally widthwise of the door.

By means of the present invention this may be accomplished by the provision of one or more sets of cooperating axially movable threaded means (e.g. a screw and nut, or a screw and threaded bore) which extends in a direction generally perpendicular to the face of a door and which includes an element movable in said direction (e.g. a screw and/or a nut), either a screw or a nut (or both) on each of whatever number of sets of cooperating movable threaded members are present being provided with an inclined thrust surface adapted, upon the turning of itself or another element of the set (screw or nut as the case may be), to exert a thrust tending to move the door in a direction widthwise thereof. By the employment of such an arrangmeent, a door can be easily and effectively adjusted when hanging so as to fit its particular frame as precisely as possible.

When two sets of such threaded means are used, the two can be mutually adjusted and then tightened to lock the door in adjusted position with particular effectiveness.

An additional advantage is that the same cooperative axially-movable threaded means which effect the widthwise adjustment can serve to hold together the door and the mounting for the vertical pivot means, thus avoiding duplication of parts—a consideration of great importance in constructions like those under consideration where available space is limited.

In certain of its aspects, the invention further contemplates the provision of means which can be assembled and disassembled with particular ease.

Arrangements embodying the invention may be employed in connection with a lower door pivot, an upper door pivot, or—preferably—both.

While, as illustrated in my Patent 3,152,355, means have been provided for adjusting pivoted doors both in a direction parallel to the vertical edges of the doors and in a direction parallel to the top and bottom of the doors; there has remained an urgent need for the provision of simple and effective means for adjusting a door in a widthwise direction—i.e. a direction perpendicular to both of the foregoing directions. Considerations of strength, safety, and appearance dictate the operability of such means from a position outside the door.

Again, various types of pivotal mounting means for doors have been devised without taking into consideration their applicability to doors whereof the mounting means should be arranged so as to not to be easily tampered with by burglars or the like, and so as to be disassemblable only with great difficulty as long as the door remains on its pivotal support and/or in closed and locked position. It is important, however, that considerations of simplicity,

effectiveness, and ease of assembly be not sacrificed in the provision of "burglar-proof" qualities.

The present invention accordingly contemplates the provision of a door-pivoting construction which, while simple, effective, and satisfactory in other respects, will satisfy all or some of the needs above indicated.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the constructions hereinafter set forth and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

FIG. 1 is a vertical sectional view of one form of construction embodying the invention;

FIG. 2 is a horizontal section on the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary sectional view on a reduced scale on the plane of FIG. 2, but showing the parts in an adjusted position;

FIG. 4 is a view on the plane and scale of FIG. 1 from the opposite direction showing the top pivot of the door;

FIG. 4A is a view on the line 4A—4A of FIG. 4 showing the upper mounting for the pivot pin in detail;

FIG. 5 is a fragmentary vertical isometric view on the scale of FIG. 2 of the face of a door formed with modified portions for receiving door-mounting constructions;

FIG. 6 is a view similar to FIG. 2 showing the upper pivotal mounting of FIG. 4 in the door of FIG. 5 taken on the line 6—6 of FIG. 7;

FIG. 7 is a vertical sectional view showing the mounting of FIGS. 4 and 6 in a door of FIG. 5; and

FIG. 8 is a view similar to FIG. 1 showing a modified form of construction.

In the form of construction shown in FIGS. 1–4 there is provided a door **10** of conventional hollow metal (e.g. aluminum or stainless steel) construction, in association with which there are shown a lower pivot construction **11** (FIGS. 1, 2 and 3) and an upper pivot construction **12** (FIG. 4).

On the rear of the forward side **16** of the door there are provided a pair of nuts **17** and **18** forming part of the mounting means for the lower pivot construction and providing, respectively, threaded bores **19** and **20** and slidably engaging with each other at **21**. The threaded bores extend, in parallel with each other, in a direction generally perpendicular to both the vertical extent and the widthwise extent of the door. A forward member **22** is provided with openings **23** and **24** alined respectively with the bores **19** and **20**; and fastening screws **25** and **26**, respectively, extend thru openings **23** and **24**, and are threaded into the bores **19** and **20**. The fastening screws are formed with heads **27** and **28** which are disposed against the forward face of the member **22** just forwardly of said openings, and the heads **27** and **28** are formed, respectively, with means for rotating their respective screws—in the present instance sockets **29** and **30** each adapted to be engaged by a socket wrench to turn the fastening screws.

The member **22** carries the upper element **32** of the vertical pivotal mounting for the door, and this is rotatably supported on a supporting member **33** in the form of a screw having a threaded portion **34** (fastenable into a threaded opening **35** in a floor) and a head **36**. Adjustment of the screw **33** serves to raise and lower the door **10**.

The nuts **17** and **18** are formed, respectively, with inclined thrust surfaces **37** and **38** adapted to urge the door toward and away from, respectively, the jamb **40**, bearing surfaces **41** and **42** therefor, respectively, being provided

at opposite edges of a rectangular opening **43** in the door. By drawing one nut (e.g. the nut **17**—see FIG. 3) forwardly a desired amount after the other nut (e.g. the nut **18**) has been pushed rearwardly the same amount (the inclination of the surfaces **37** and **38** being 45° in the present instance) the bottom of the door will be thrust toward the jamb, whereas the reverse of this operation will move the bottom of the door away from the jamb.

Pursuant to the invention, in certain of its aspects, the head **36** is located forwardly of the heads **27** and **28** of the fastening screws in the path of forward unfastening movement of the fastening screws, thus interfering with the unauthorized removal of the fastening screws when the door is in place.

Since the relationship of the head **36** of the support screw to the path of forward (unfastening) movement of the fastening screws remain unchanged regardless of the adjustment of the support screw, the head of the latter will at all times render exceedingly difficult the unfastening of one or both screws; and will thus make separation of the door and the pivotal mounting unit, and the removal of the door from a closed position, a matter of exceptional difficulty.

A slot **47** is provided in the head **36** for operating the screw **33**, and access thereto is readily had thru an opening **50** normally closed by a readily accessible screw **51** which serves in the present instance to removably retain a closure **52**.

In the upper mounting means **12** there are provided, as shown in FIGS. 4 and 4A, elements similar to those of the lower mounting means **11** and similarly numbered except for the addition of the subscript *a*, e.g., nuts **17***a* and **18***a* and screws **25***a* and **26***a* rotatable in openings **23***a* and **24***a*, respectively in the door **10**. The mounting member **55** corresponds to member **22**, but is formed with an upper sleeve bearing **56** for rotary and vertical sliding movement therein of a bearing pin **57** which is mounted for vertical sliding movement in a member **58** carried by the header or lintel **59** of the door frame.

As will be seen, the bearing **56** projects downwardly into the path of removal of the screws **25***a* and **26***a*, and the bearing pin **57** blocks entry of a wrench to the sockets **28***a* and **29***a*. Further, in the present instance, there is provided a screw **60** extending from a bore **61** in the member **58** into a vertical groove **62** of limited extent in the pin **57**, so that the pin cannot be removed when the screw **60** is in place. The screw **60** is accessible only when the door is open (about 90° in the present instance) and inaccessible when the door is locked closed, so as to positively prevent movement of the door by removal of the pin **57** which might enable the unhinging of the door when closed, or the movement of either of the members **33** and **57** out of the path of the screws **25** and **26** or **25***a* and **26***a* as the case may be. Even when the door is open, the cover **9***a* must be removed before the screw **60** is removed. In order to assure access to the bore **61** in either of the open positions of the door, access notches **63** are provided in the member **55**.

The lintel is provided with an upright member **64** and this is secured to the member **58** by means of transversely extending screws one of which is shown in front of the other at **65**, and each of which is threaded into the member **58** as at **66** and provided at its outer end with threads **67** on which a now-deformed deformable nut **68** is mounted.

I have found that, by replacing the openings **43** and **43***a* in the door by recesses which extend to the lower and upper ends of the door, respectively, the assembly of the mounting means on the door as a unit can be carried out with far more ease than by putting the nuts in place after the screws have been thrust thru the openings. Recesses **73** and **73***a* of this nature are shown in a door **10***b* in FIG. 5, and also in FIGS. 6 and 7 which show a construction which is otherwise similar to that of FIGS. 1–4.

In FIG. 8 there is shown another form of construction embodying the invention in certain of its broader aspects. In this construction (which is shown in association with the upper portion of the door **10**), the nuts are replaced by a plate **75** which is fixed to the door, and one of the horizontal screws **26***c* is formed with an annular inclined surface **78** adapted to bear against a semi-circular bearing surface **79** on a mounting member **80** carrying a bearing **81** fitting on the vertical bearing pin **82** which descends from the lintel. The screws **25***c* merely serves as a holding screw, but its opening **23***c* is widened to permit the adjusting action, as is also the opening **24***c* of the screw **26***c*.

Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In or for a pivoted door construction, vertical pivot means for mounting said vertical pivot means outwardly of one face of a door, and co-operating threadedly-connected members extending axially in a direction generally at right angles to the plane of such a face, and movable in said direction upon the relative rotation of said members, and at least the axially movable one of said threaded members having a diagonally-extending thrust surface adapted to be located in diagonal sliding contact with a portion of a door to exert door-moving pressure for moving the door generally perpendicularly to said axial movement and widthwise of such a door when the axially movable threaded member is moved axially.

2. A combination as in claim **1** wherein there are provided a pair of parallel screws for securing said mounting means to said door and each of which forms one member of a set of cooperating threaded members as aforesaid, the other one of each set of cooperating threaded members being an element having a threaded bore.

3. In or for a pivoted door construction, vertical pivot means, means for mounting said vertical pivot means outwardly of one face of a door, two sets of parallel screws and of cooperating internally-threaded elements arranged side-by-side and extending axially in a direction generally at right angles to the plane of such a face, said cooperating internally threaded elements being axially movable relative to each other and having thereon diagonal thrust surfaces sloping outwardly away from each other and adapted to be located in diagonal sliding contact with opposite portions of said door to exert by the rotation of said screws a door-moving action generally perpendicular to the axes of said screws and a wedge-locking action for the construtcion.

4. A combination as in claim **1** wherein there are provided a pair of parallel screws for securing said mounting means to said door, wherein at least one of said screws forms one member of said cooperating threaded members, and wherein at least one of said screws provides said diagonal thrust surface.

5. A combination as in claim **1** wherein there are provided a pair of parallel screws for securing said mounting means to said door and at least one of which forms one member of said cooperating threaded members, and wherein said pivot means is a lower pivot means and is formed to obstruct the outward movement of said screws to prevent separation of said mounting means and its door while said mounting means and such a door are in normal position on said pivot means.

6. In or for a pivoted door construction, vertical pivot means, means for mounting said vertical pivot means outwardly of one face of a door, and a pair of cooperating axially-movable threaded means extending in a direction generally at right angles to the plane of such a face and each including an element movable in said di-

rection and having an inclined thrust surface adapted to bear against a portion of a door for effecting a relative movement of said pivot means and a door in a direction generally widthwise of the latter upon the operation of one of said axially-movable threaded means and for wedging and releasing actions for controlling the locking of them in such relatively-moved position upon the operation of the other of said axially-movable threaded means.

7. A combination as in claim 6 wherein said pivot means is an upper pivot means and comprises separable elements, and there is provided removable means preventing separation of said separable elements, said removable means being positioned to be inaccessible when such a door is closed.

8. A combination as in claim 6 wherein there is provided a door associated with the combination in the defined relationship and formed with a recess extending in the direction of the length of the door into one face thereof from one of its horizontal edges to permit the combination to be brought into association with the door by

a movement of at least one thereof in the direction of the length of the door.

9. A combination as in claim 1 wherein said pivot means is an upper pivot means and connects a lintel-supported member to a door-supported member, and wherein said lintel-supported member is attached to the lintel by means of transverse elements securing said lintel-supported member to an upright fixed to the lintel.

10. A combination as in claim 1 wherein there is provided a door associated with the combination in the defined relationship.

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BOBBY R. GAY, *Primary Examiner.*

D. L. TROUTMAN, *Assistant Examiner.*

U.S. DEPARTMENT OF COMMERCE

PATENT OFFICE

Washington, D.C. 20231

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,407,433 October 29, 1968

Paul R. Ferguson

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

Column 4, line 21, after "pivot" insert -- means, --.
Column 5, line 19, "the", first occurrence, should read -- a --.

Signed and sealed this 3rd day of March 1970.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents