Feb. 6, 1968 J. D. LESLIE 3,367,699

CLOSURE LATCH

Filed Sept. 14, 1966 2 Sheets-Sheet 1

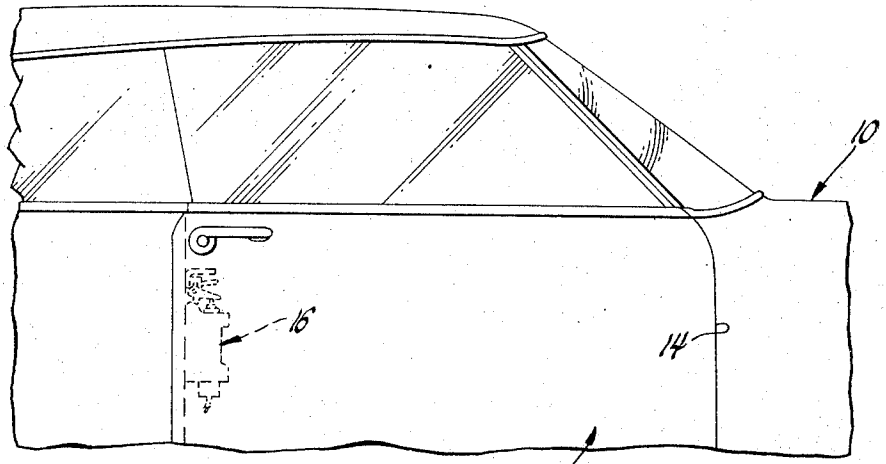


Fig. 1

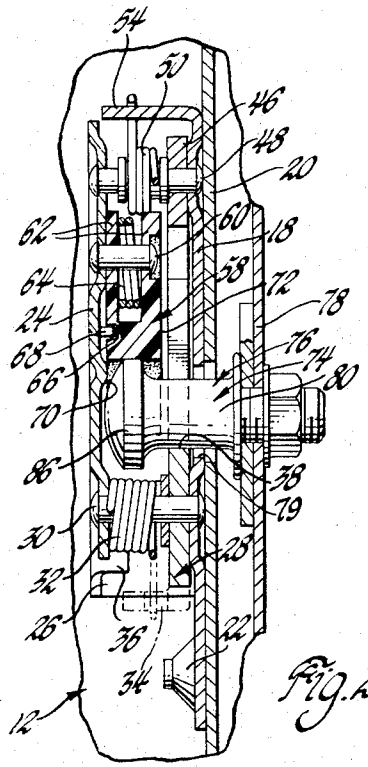
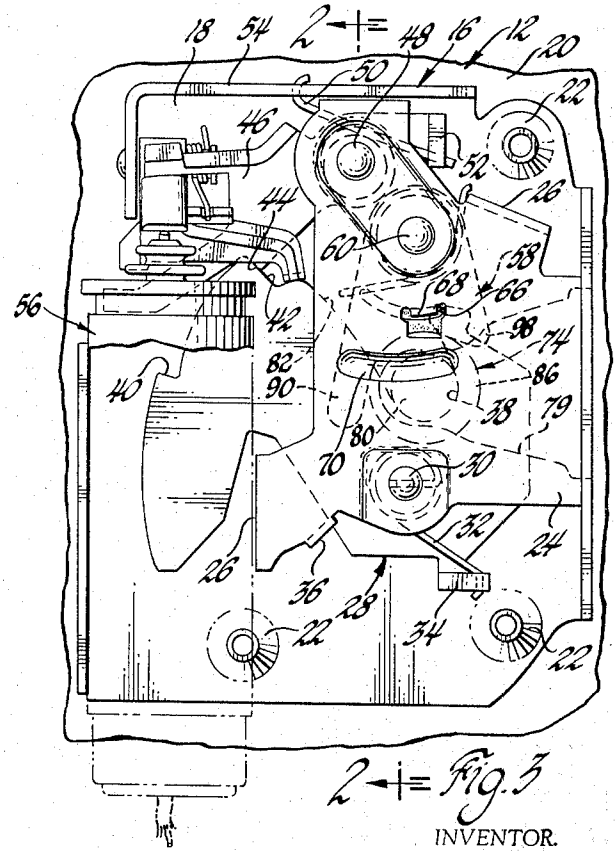


Fig. 2



2 Fig. 3

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CLOSURE LATCH

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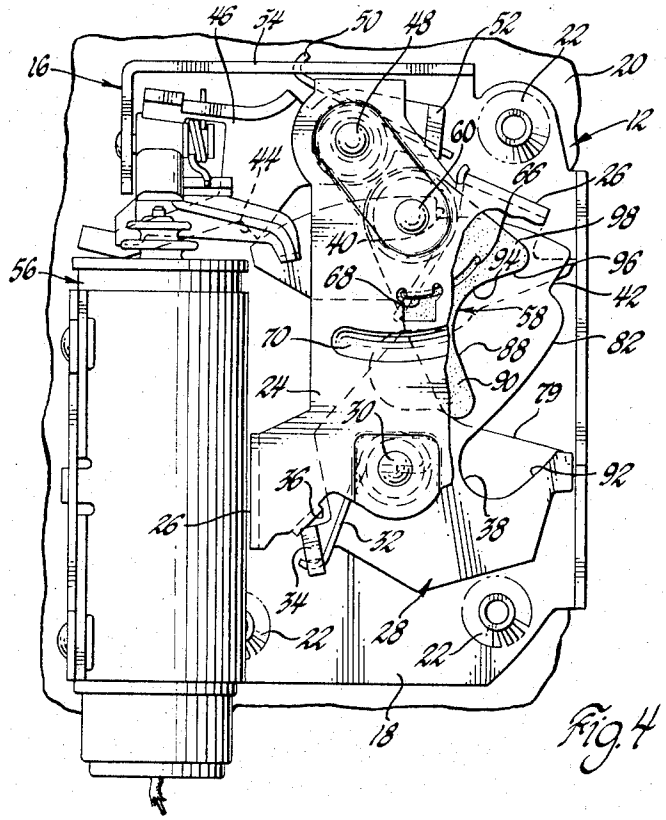


Fig. 4

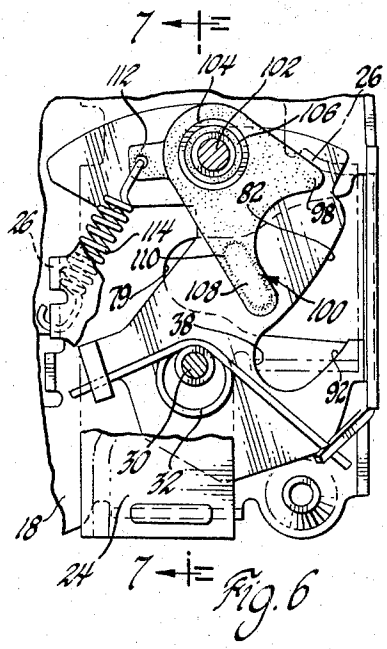


Fig. 6

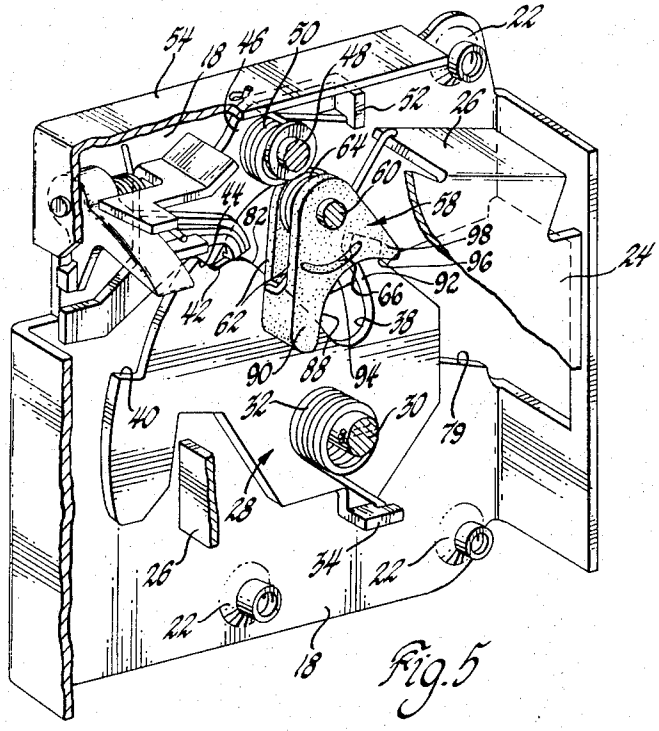


Fig. 5

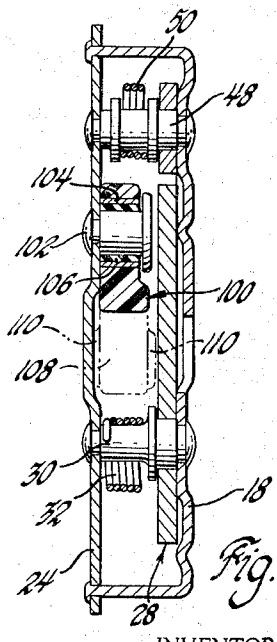


Fig. 7

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CLOSURE LATCH

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9 Claims. (Cl. 292—216)

This invention relates to closure latches and more particularly to an improved wedge or shoe for vehicle body door locks.

Conventionally, vehicle body door locks have included a slidable wedge for engaging a striker member on the body when the door is closed to wedge the striker into engagement with the latch bolt and thereby locate the door vertically within the body opening and also restrain relative movement between the door and body.

The wedge has a guiding surface slidably moving relative to a guiding surface of the lock frame and a wedging surface located for engagement by the striker member. The guiding surface is located either parallel or slightly angularly to the mean or desired swing line of the door. If the latch bolt and striker member should move relatively to each other along a swing line outside the permitted tolerance range of swing lines, it is possible for the guiding surface of the wedge to bind against the guiding surface of the lock frame and increase door opening and closing effort or damage the wedge. Further, manufacturing tolerances sometimes require a swing line tolerance range greater than that which can be obtained through the use of slidable wedges.

The wedge of this invention differs from such wedges in that it is rotatably mounted on the lock frame for movement independently and oppositely of movement of a rotatable latch bolt. The wedge is constrained between the bolt and the lock frame so that only shear forces act on the pivotal mounting of the wedge rather than any bending forces. The wedge is spring biased in the direction of approach of the striker and is arranged with respect to a striker receiving throat of the bolt whereby the striker enters the bolt throat and starts to rotate the bolt toward latched position before the striker engages the wedge. The wedge forces the striker member within the bolt throat as the wedge rotates oppositely of the bolt and the bolt moves to latched position. The wedge of this invention permits a wide swing line tolerance range to be set and yet have the wedge engage and follow the striker member.

One feature of this invention is that it provides an improved rotatable wedge for vehicle body door locks. Another feature is that the wedge rotates oppositely of a rotatable latch bolt when both are engaged by a striker. A further feature is that the latch bolt and wedge are respectively provided with a striker-receiving throat and a wedging surface conforming to at least a portion of the surface of the striker, the throat and wedge surface providing cooperating means for encircling the striker in the latched position of the bolt. Yet another feature of this invention is that the latch bolt and wedge swing in generally parallel spaced planes. Yet a further feature of this invention is that the latch bolt and wedge engage axially spaced but generally radially oppositely disposed portions of an annular striker. Still another feature of this invention is that the wedge and the latch bolt are spring biased in the direction of approach of the striker. Yet a further feature of this invention is that the latch bolt and wedge are successively engaged by the striker upon relative movement between the latch bolt and striker.

These and other features of the wedge of this invention will be apparent from the following specification and drawings wherein:

FIGURE 1 is a side elevational view of a vehicle body having a closure latch mounted thereon which embodies a wedge of this invention;

FIGURE 2 is a sectional view taken generally along the plane indicated by line 2—2 of FIGURE 3;

FIGURE 3 is an enlarged view of the closure latch showing the bolt in latched position;

FIGURE 4 is a partially broken away view similar to FIGURE 3 showing the bolt in unlatched position;

FIGURE 5 is a perspective view;

FIGURE 6 is a view similar to FIGURE 2 and showing a modification; and

FIGURE 7 is a sectional view taken generally along the plane indicated by line 7—7 of FIGURE 6.

Referring now particularly to FIGURE 1 of the drawings, a vehicle body designated generally **10** includes a front door **12** which is swingably mounted adjacent its forward edge **14** on body **10** for movement between a closed position, as shown, and an open position, not shown. A closure latch **16** is mounted within the door **12** adjacent the rearward edge portion thereof for cooperating engagement with a striker mounted on the juxtaposed body pillar to thereby hold the door **12** in closed position. Latch **16** embodies a wedge according to this invention.

The closure latch **16** is the same as that shown and described in the copending application of Lloyd W. Rogers, Jr., Serial No. 546,415, filed April 29, 1966, and assigned to the assignee of this invention. Accordingly, only those details of the latch **16** which are necessary to an understanding of this invention will be particularly described, and reference may be had to the aforenoted application for the other details of the latch.

As shown in FIGURES 3 and 4, the latch **16** includes a main plate or frame **18** which abuts the rear wall **20** of door **12** and is secured thereto by a number of bolts which extend through the wall **20** into tapped embossments **22** of the frame **18**. An auxiliary plate or frame **24** is located in spaced relationship to the main frame **18** and is secured thereto by a number of lateral tabs **26** which extend laterally of the frame **24** and are staked to the frame **18**.

A fork type bolt designated **28** is pivotally mounted on a pin or shaft **30** which extends between the frames **18** and **24** and has its ends secured thereto. A coil torsion spring **32** has one end thereof hooked within a notched lateral tab **34** of bolt **28** and the other end thereof hooked within an opening in the pin **30** to continuously bias the bolt **28** toward its unlatched position as shown in FIGURE 4. The bolt is located in the unlatched position by engagement of the tab **34** with a lateral tab **36** of the plate **24**. The bolt **28** includes a striker receiving throat **38**, FIGURE 4, and a pair of shoulders **40** and **42** which respectively define the secondary latched and fully latched positions of the bolt. The bolt is held in either the secondary latched position or the fully latched position by engagement of a foot or shoulder **44** of a detent member **46** with the respective shoulder. The detent member **46** is pivotally mounted on a pin **48** which extends between the plates **18** and **24**. The detent is continuously biased counterclockwise or toward engagement with the bolt **28** by a coil torsion spring **50** which surrounds the pin **48** and has one end hooked within a notched lateral tab **52** of the detent and the other end hooked within an opening in the upper lateral flange **54** of plate **18**.

A solenoid operated release means **56** is provided to release the detent member **46**. The details of the release means are not necessary to an understanding of this invention and are, therefore, not described. Reference may be had to the aforenoted Rogers application for such details. Further, other means of releasing the detent **46** from

engagement with the bolt may be provided in locks incorporating the wedge of this invention.

The wedge or shoe according to this invention includes a wedge member **58** pivotally mounted on a pin **60** which extends from the plate **24** and is located above the pin **30** and slightly outwardly therefrom with respect to the direction of approach of the striker. The member **58** is preferably formed of nylon to reduce noise and be self-lubricating, although it may be formed of other materials. As best shown in FIGURES 2 and 5, the member 58 includes a pair of integral spaced walls or flanges **62** which extend upwardly from the body thereof and define a spring receiving housing. A coil torsion spring **64** surrounds the pin **60** within this housing, with one leg of the spring being hooked over one of the lateral flanges **26** of the plate **24** and the other end of the spring engaging the base wall of the spring receiving housing to continually bias the member **58** counterclockwise or toward the direction of approach of the striker. Member **58** is provided with a shallow arcuate closed end groove **66** having its center at the axis of the pin **60**. A lateral tab **68** of plate **24** extends into this groove and the engagement of the tab with the inner end of the groove limits counterclockwise swinging movement of member **58**, as shown in FIGURE 4. Ordinarily the tab **68** will not engage the outer end of the groove.

The plate **24** further includes an arcuate embossment or rib **70** which extends inwardly of the plate and has its center at the axis of the pin **60**. As shown in FIGURE 2, the inner surface **72** of member **58** is located in close spaced relationship to the outer surface of the bolt **28** while the outer surface of member **58** is in sliding engagement with the embossment **70**. The purpose of this is described hereinafter.

The striker **74** includes a conventional headed annular pin or member **76**. Member **76** is bolted or otherwise secured to the body pillar **78** located in juxtaposed relationship to the rear wall **20** of door **12** when the door is in closed position. As shown in FIGURE 2, the rear wall **20** of the door and plate **18** are cut away at **79** to provide for entry of the striker within the door and between the plates **18** and **24**.

When the door is in an open position, as shown in FIGURE 4, the bolt **28** is located in its unlatched position, foot **44** of detent **46** engages the outer edge of the bolt, and the member **58** is located by the tab **68** and groove **66**. When the door is closed, the striker and bolt approach each other along the mean swing line **84**, FIGURE 4. The shank **80** of the striker will engage the edge or abutment surface **82** of the bolt and start to swing the bolt counterclockwise toward its secondary latched position against the action of spring **32** as the foot **44** of detent **46** slides relative to the outer edge of bolt **28**. As the striker swings the bolt **28** counterclockwise, the shank **80** of the striker will move relative to the edge **82** toward the throat **38**. After the bolt has rotated a limited number of degrees, the enlarged head **86** of the striker will engage the edge or abutment surface **88** of the leg **90** of member **58** to start to swing member **58** clockwise about pin **60** as the head **86** moves relative to edge **88**. Upon continued closing movement of the door, the shank **80** of the striker will move within the throat **38**, between the edge **82**, which defines the inboard edge of the throat, and the edge **92**, which defines the outboard edge of the throat, while the head of the striker will engage the edge or wedging surface **94** of member **58**, which joins surface **88** and another surface **96** provided on an outboard leg **98** of member **58**. Surface **94** conforms to at least a portion of the outer annular surface of head **86**. When the head **86** engages the surface **94**, the shank **80** is located within the throat **38** and the foot **44** of detent **46** engages shoulder **40** of the bolt to retain the bolt in the secondary latched position.

The head **86** engages the surface **94** prior to the engagement of the detent shoulder **44** with the bolt shoulder **40**. When the bolt is in the secondary latched position, the shank **80** of the striker does not engage the base of the throat **38** but is located between the edges **82** and **92** so that it is impossible for the striker to escape from the bolt throat.

Upon continued movement of the door **12** from its partially closed position to its fully closed position, the bolt **28** will rotate counterclockwise from its secondary latched position to its fully latched position and the shank **80** of the striker pin will move within the bolt throat **38** relative to the edges **82** and **92** which define the throat. The head **86** of the striker will move slightly along the surface **94** of the wedge **58** during this movement of the bolt to wedge the shank **80** tightly against the base of the throat when the bolt reaches its fully latched position. The bolt is retained in this position by the engagement of the foot **44** of detent **46** with shoulder **42**.

The shank **80** of the striker can, of course, engage the surface **82** of the bolt at various places when the door is initially closed, depending on the swing line of the door. Although a mean swing line **84** has been indicated in FIGURE 4, it will be understood that the swing line can vary a number of degrees to each side of this swing line, depending, of course, on the buildup of various manufacturing tolerances. Inasmuch as the wedge **58** is rotatably mounted rather than being slidably mounted, the head **86** of the striker can engage the surface **88** of the wedge at various places without binding between the wedge and the pin **60**. Thus, the range of possible swing lines which can be used and still have an adequately functioning wedge and bolt is greatly increased. This is one distinct advantage of the wedge of this invention over the conventional sliding wedge.

It will also be noted that in the fully latched position of the bolt **28**, as shown in FIGURE 3, the axis of the striker **74** is located substantially in vertical alignment with the axis of the pin **60** and outboard of the axis of the pin **30**. In certain respects, the wedge **58** and the bolt **28** act as toggle members when the door is closed, with the joint of the toggle being the axis of the striker, and the pivotal connection between the members of the toggle being provided by the shank **80** of the striker and the edge **82** of the bolt and by the surfaces **88** and **94** of member **58** and the head **86** of the striker. By locating the axes as shown in FIGURE 3 in the latched position of the bolt, any overcenter action is effectively prevented.

Conventionally, vehicle doors are mounted on a hinge axis so as to swing outwardly and upwardly as the door is opened. It will be noted from the foregoing description that the bolt **28** has its throat **38** opening upwardly and that the wedge or shoe **58** forces the striker pin downwardly within this throat. Should any forces be applied to the door **12** tending to open the door, such as by a passenger engaging the door **12** from the inside thereof, the tendency of the door to move outwardly and upwardly will result in the shank **80** of the striker being more tightly forced against the base of the throat **38** to thus resist with even more force any movement whatsoever of the door toward open position.

It will be recalled that the inner surface **72** of the wedge **58** is located in close spaced adjacency to the surface of the bolt **28** while the outer surface of the wedge slides on the embossed rib **70**. Thus the wedge **58** is effectively trapped between two relatively rigid members so that any forces which are applied to the pin **48** will place this pin in shear rather than in bending. In other words, only vertical forces will be applied, rather than tending to bend the pin relative to its mounting on the plate **24**. This increases the strength of the wedge when forces are applied to the door or to the body tending to separate the striker and the bolt in vertical directions.

FIGURES 6 and 7 show a modification and only those details which are different from the embodiment shown in FIGURES 1 through 5 will be particularly described. In this embodiment of the invention, the shoe or wedge

100 is the same in size and shape to the wedge 58 and is mounted on a headed pin 102 by means of a metal sleeve 104 and a rubber sleeve 106 which are located between the opening in the shoe and the pin. The wedge 100 rotates relative to the sleeve 104 and the rubber sleeve 106 provides a tolerance take-up which provides limited shifting movement of the wedge radially of the pin 102 if required by manufacturing tolerances or by swing line variations between the pin 102 and the bolt 28 when the door is closed.

The inboard leg 108 of the wedge, which corresponds to the leg 90, is provided with embossments 110 on the inner and outer sides thereof which respectively engage the outer surface of the bolts 28 and the inner surface of the plate 24 to effectively trap the wedge between the bolt and plate. The reasons for this were described in conjunction with the wedge 58.

The wedge 100 includes a laterally extending apertured ear 112. A tension spring 114 is hooked between ear 112 and one of the tabs 26 of plate 24 to bias the wedge 100 counterclockwise of the pin 102. The wedge is located by the engagement of the outboard leg 98 thereof with another of the tabs 26 of the plate 24. The wedge 100 functions in the same manner as the wedge 58 previously described.

Thus, this invention provides an improved wedge arrangement for vehicle body door locks.

I claim:

1. In a vehicle body having a closure member mounted thereon for movement between open and closed positions with respect to a body member, a closure latch, comprising, in combination, a support mounted on one of the members, a latch bolt rotatably mounted on the support for movement between latched and unlatched positions, a striker mounted on the other of the members, the bolt including an abutment surface located in the path of travel of the striker upon relative movement of the members and merging into a striker receiving bolt throat, wedge means independently rotatably mounted on the support, the wedge means including an abutment surface merging into a wedging surface, relative movement of the members moving the striker into engagement with the bolt abutment surface and the wedge means abutment surface, the striker moving relative to the bolt abutment surface and into the bolt throat as the bolt moves to latched position and moving relative to the wedge means abutment surface and into engagement with the wedge means wedging surface to retain the striker within the bolt throat in the latched position of the bolt.

2. The combination recited in claim 1 wherein the wedge means and the latch bolt move in generally parallel planar relationship.

3. The combination recited in claim 1 wherein the wedging surface of the wedge means conforms to at least a portion of the surface of the striker.

4. The combination recited in claim 1 wherein the abutment surfaces of the wedge means is located in spaced relationship to the abutment surfaces of the bolt with respect to the direction of relative movement of the members when the bolt is in unlatched position.

5. The combination recited in claim 1 wherein the bolt is movable to a plurality of latched positions and the wedge means retains the striker within the bolt throat in each of the latched positions.

6. The combination recited in claim 1 wherein the striker includes an annular member, one annular portion of the bolt being received within the bolt throat and an axially spaced annular portion of the striker being engageable with the wedging surface of the wedge means.

7. The combination recited in claim 6 wherein the axially spaced annular portion includes an annular flange on the striker located laterally of the bolt and engageable therewith under lateral forces to provide an interlock.

8. The combination recited in claim 1 wherein the wedge means is entrapped between the support and the latch bolt to limit the forces applied to the pivotal mounting of the wedge means to shear forces.

9. The combination recited in claim 1 including means biasing the wedge means in the direction of relative movement of the members and means locating the wedge means in this direction when the bolt is in unlatched position.

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RICHARD E. MOORE, *Primary Examiner.*