Aug. 19, 1969 W. V. BACHMANN 3,461,481

HINGE

Filed June 24, 1966 2 Sheets-Sheet 1

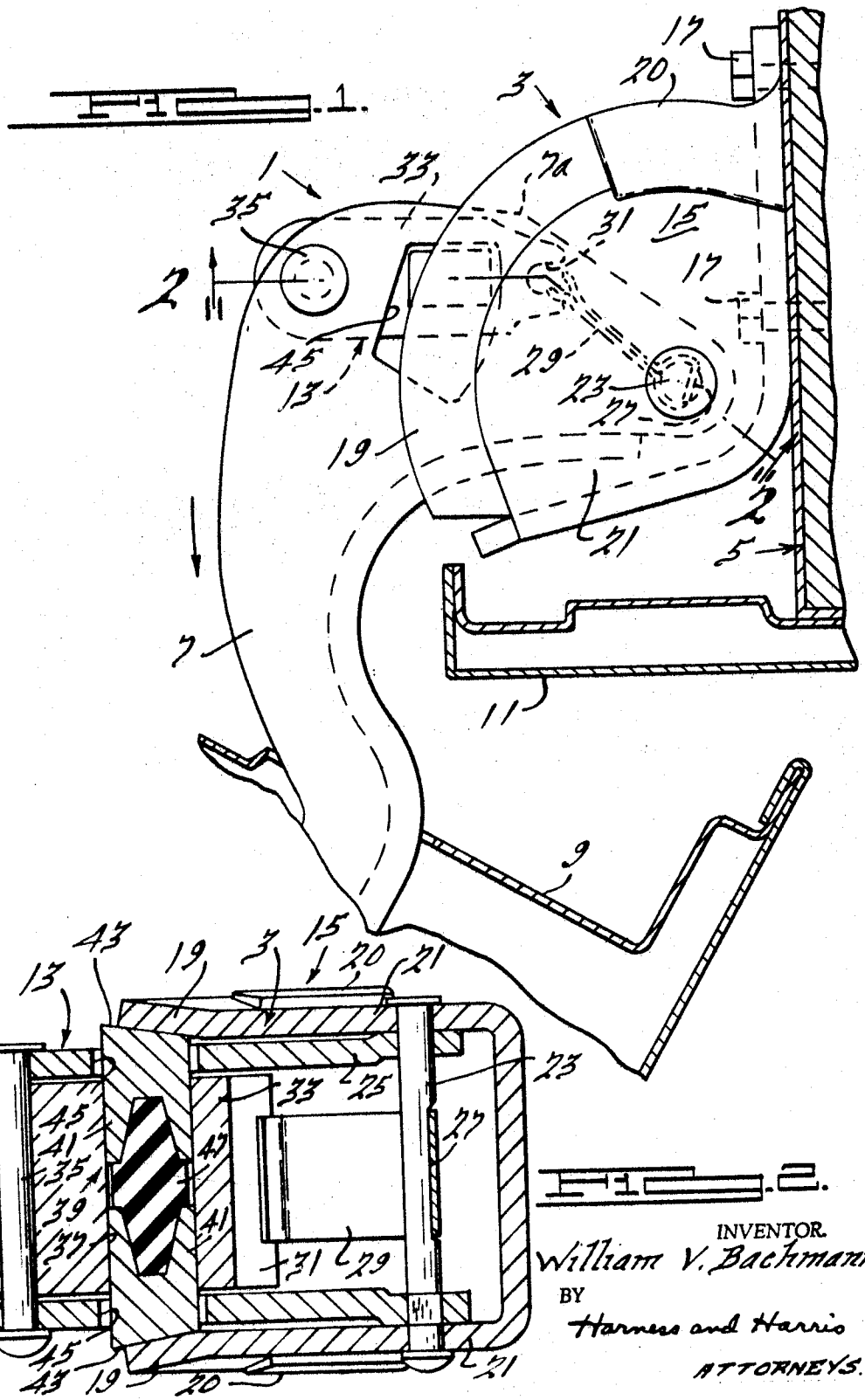



FIG. 1.

FIG. 2.

INVENTOR.
William V. Bachmann
BY
Harness and Harris
ATTORNEYS.

Aug. 19, 1969 W. V. BACHMANN 3,461,481

HINGE

Filed June 24, 1966 2 Sheets-Sheet 2

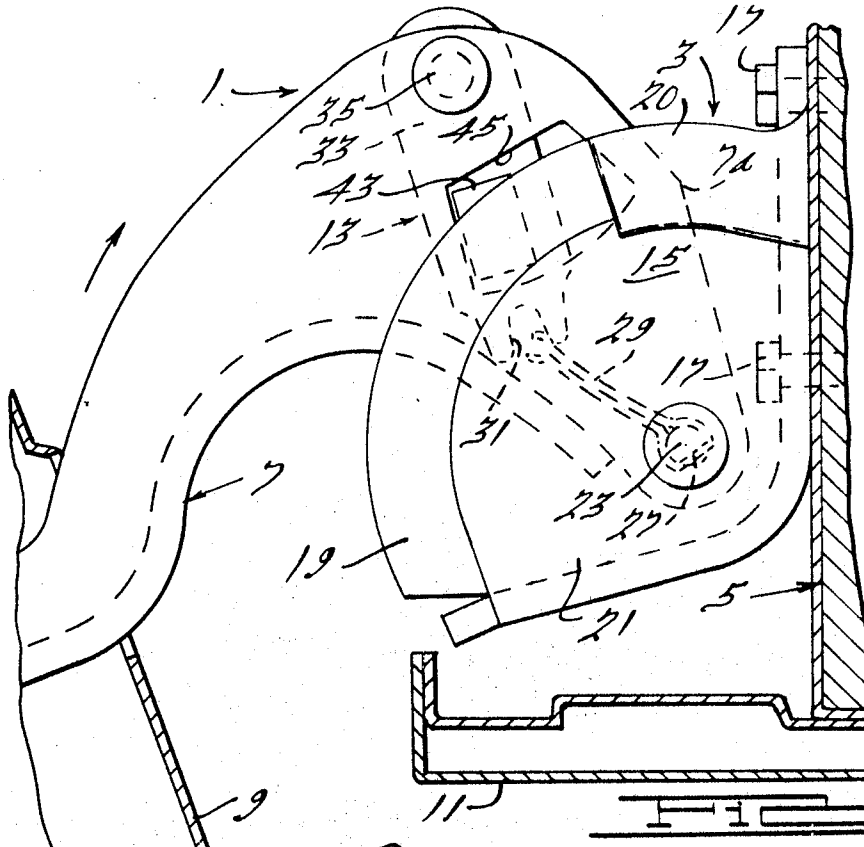



FIG. 3.

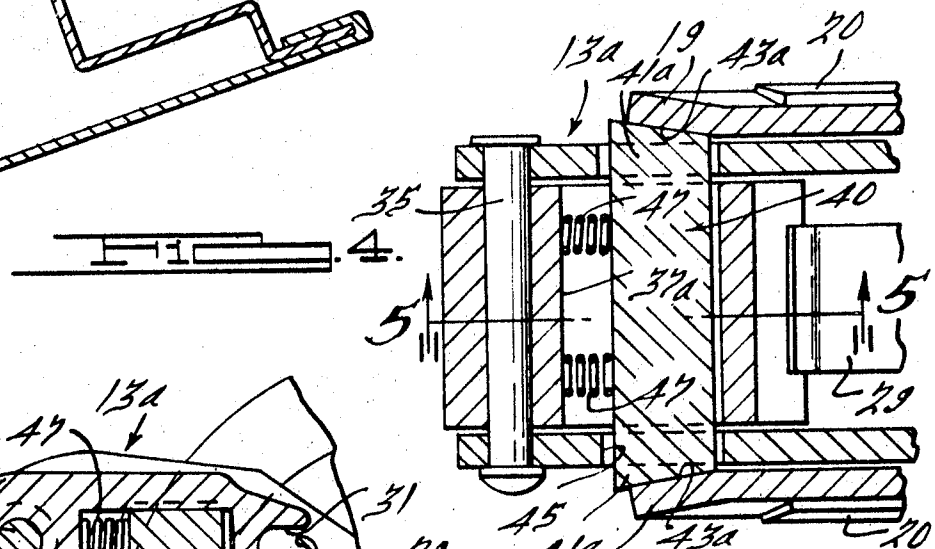



FIG. 4.

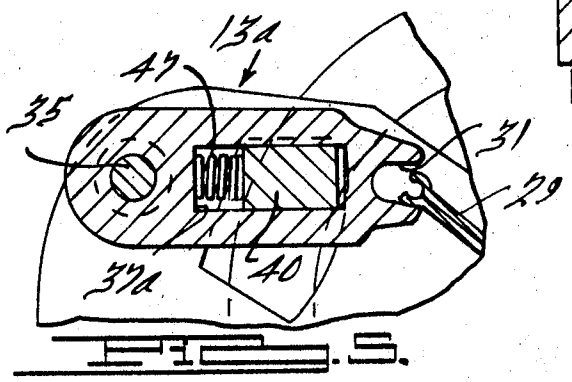



FIG. 5.

INVENTOR.
William V. Bachmann
BY
Harness and Harris
ATTORNEYS.

United States Patent Office 3,461,481 Patented Aug. 19, 1969



3,461,481

# HINGE

William V. Bachmann, St. Clair Shores, Mich., assignor to Chrysler Corporation, Highland Park, Mich., a corporation of Delaware

Filed June 24, 1966, Ser. No. 567,797
Int. Cl. E05d 7/00, 11/00
U.S. Cl. 16—140 20 Claims

## ABSTRACT OF THE DISCLOSURE

Hinge and checking device for an automotive vehicle door, including a toggle linkage having on one of the links thereof friction members engageable with a friction surface for locking the door in a selected position. The linkage is connected to the door and the friction surface is on a mounting bracket attached to the vehicle body.

This invention relates to door hinges and checking devices, and more particularly to a hinge and check device for a vehicle body door.

The hinges for many vehicle body doors include means for checking or holding open the door in a fully open position and for checking or holding open the door in one or two additional partially opened positions. These doors can be manually moved to one of these positions and under normal conditions will remain in the position selected. If the door is released while it is between two of the predetermined positions, it will usually pass right through the partially open position to a fully closed position. Thus, the vehicle door must be placed in one or two predetermined positions if it is desired to have the door partially opened. There is no in-between position in which the door may be placed.

Accordingly, one of the primary objects of this invention is to provide a checking device or hinge for a vehicle body door which is adapted to permit the door to be checked or held open in an infinite number of intermediate or partially open positions through a predetermined range of movement of the door.

A further object of this invention is to provide a hinge such as described which permits the door to be releaseably locked in an infinite number of positions throughout a substantial range of the total swinging movement of the door and which, when a manually exerted force is placed upon the door, releases the door for swinging movement.

Another object of this invention is to provide a hinge of the class described in which the mechanism for checking or holding open the door is adapted to automatically frictionally lock the door in the position selected.

A further object of this invention is to provide a hinge such as described which may be operated to lock the door in a desired position during either opening or closing movements of the door.

Still another object of this invention is to provide a hinge of the class described which is simple and economical in construction, and effective in operation.

Other objects and features of this invention will become apparent as the description progresses.

In the accompanying drawings, in which two of various possible embodiments are illustrated:

FIG. 1 is a fragmentary plan view of a hinge or checking device constructed in accordance with this invention, the hinge being shown during the opening movements of the door, and certain parts being shown in section for clarity;

FIG. 2 is an enlarged section taken along line 2—2 of FIG. 1;

FIG. 3 is a view similar to FIG. 1, showing the hinge during door closing movements;



FIG. 4 is an enlarged section similar to FIG. 2 illustrating a modification of the hinge;

FIG. 5 is a section taken along line 5—5 of FIG. 4.

In the drawings like parts are indicated by corresponding reference characters throughout the several views.

Referring now to the drawings, a hinge or checking device of this invention is generally indicated at 1 in FIG. 1. The hinge 1 includes a mounting member 3 secured to a door post or pillar 5 of a vehicle and an arm 7 connected by means (not shown) to a vehicle door 9. A portion of the vehicle body with which the door is adapted to be substantially aligned when in a closed position is indicated at 11. The hinge is adapted to be frictionally locked in a selected position by a locking mechanism generally designated 13.

Mounting member 3 comprises a generally channel-shaped cup member 15 the bottom of which is secured by any conventional fastening means, such as bolts 17, to post 5. It will be understood that member 15 could be connected to post 5 by other means, such as by welding for example, or could be formed integrally with the post 5, if desired.

The outside edge margins or portions 19 of sides 21 of member 15 are flared outwardly throughout substantially the entire length of the sides. The degree to which the edge portions 19 are flared is substantially uniform throughout the length thereof except at the inner end portions 20, where the degree of flare is increased so that the distance between these portions at the ends 20 thereof is greater than in the remaining portions. As will be made apparent hereinafter, the inside surfaces of portions 19 provide one portion of the frictional locking surfaces of the hinge.

The inner end of arm 7 is pivotally connected to mounting member 5 by a pin 23 extending through sides 21 of member 5 and sides 25 of arm 7. Pin 23 is secured to sides 25 of arm 7 so that the pin and arm move together, but the pin is free to rotate in sides 21 of member 5. Pin 23 is formed with a flat side 27. A spring 29 surrounds pin 23 and is held against rotation relative to the latter by the engagement of the spring with flat side 27.

The outer end of spring 29 extends into a vertically extending recess or groove 31 in one end of a body 33 forming part of locking mechanism 13. Body 33 is pivotally connected at the other end thereof to arm 7 by a pin 35. Spring 29 is so constructed and extends from pin 23 in such direction that it exerts a biasing force on body 33 which tends to move the body to a position (not shown) in which a straight line will pass through the axes of rotation of pins 23 and 35 and through the middle of body 33 and spring 29, i.e., the spring 29 tends to move the toggle linkage formed by body 33 and spring 29 to a fully extended position. In this fully extended position, the spring 29*a* and body 33 would extend in a direction substantially perpendicular to flat side 27 of pin 23. However, as will be made apparent hereinafter, this is normally accomplished only when the door is shifted from an opening movement to a closing movement, vise versa, or when the door is closed.

Body 33 is provided with a generally rectangular opening 37 in which a composite locking member 39 is located. Member 39 is shown in FIG. 2 to comprise a pair of wedging members 41 having tapered ends 43 formed for mating with the inner surfaces of edge portions 19. The wedging members 41 are held apart through openings 45 in arm sides 25 by a resilient core or insert 47, having low compressability characteristics, such as a hard rubber plug for example. When the body 33 and spring 29 are in the central portion of the arc formed by edge portions 19 and are almost to the position in which the spring tends to hold them, i.e., when the toggle links 33 and 29 are almost fully extended, the tapered ends 43 of wedging

members 41 are forced into frictional locking engagement with the inner surfaces of edge portions 19. If the body 33 and spring 29 are located at the end portions 20 of the arc formed by portions 19, at which point the portions are flared outwardly to a greater extent, the body 33 and spring 29 assume an extended position without having the tapered ends 43 of members 41 contact the portions 20.

Operation of the door hinge or check device 1 is as follows:

When the door 9 is closed, the corner 7*a* of arm 7 contacts the bottom of mounting member 15 adjacent post 5, and body 33 and spring 29 assume a straight line or extended position. The tapered ends 43 of wedges 41 are in vertical alignment with the inner ends 20 of flared edge portions 19, which are flared to a greater extent than the central portion of the edge portions 19. Thus, the tapered ends 43 do not contact the edge portions 19 in this position.

As the door is swung open the body 33 and spring 29 tend to remain in an extended position. However, as shown in FIG. 1, as soon as the wedges 41 are moved from the ends 20 of edge portions 19, they engage the inner surfaces of the edge portions, due to the decreased flare of the latter, and thus create a drag on the outer end of the body 33. This frictional dragging relationshp between body 33 and edge portions 19 causes the body and spring toggle linkage to assume the non-locking position shown in FIG. 1 relative to the arm 7. In this position the spring 29 biases the body 33 in a clockwise direction as viewed in FIG. 1 against the counterclockwise force on the body created by the drag of wedges 41 against the inner surfaces of flared edge portions 19.

When the door 7 is opened to the position desired, it is manually released. The door is hung so that in a normal level position of the vehicle, the door has a tendency to swing to a closed position. Thus, when the door is released at the desired opened position, it starts to move to a closed position. As soon as the door begins to move, the body 33, due to the contact of wedges 41 with edge portions 19, and due to the spring 29, the outer end of which is biasing the body 33 clockwise about the axis of rotation of pin 35, is swung clockwise about the axis of pin 35 from the position shown in FIG. 1 to a locking position in which the body 33 and spring 29 are either almost in an extended position or are actually in the extended position, i.e., a position in which a straight line would pass through the axis of rotation of pins 23 and 35 and through middle of body 33 and spring 29, depending upon the physical characteristics of the various parts and the closing force exerted by the door. As the body 33 is swung to this position the wedges are forced from a frictional dragging relationship into frictional locking engagement with edge portions 19. Thus, the door 7 is prevented from further movement in a closing direction and it stays in the position selected.

It will be seen that the door may be checked or frictionally locked in an infinite number of partially open positions throughout a substantial range of its movement merely by opening it to a desired position and releasing it. When it is desired to close the door, the door is manually moved inwardly. This causes the toggle linkage formed by body 33 and spring 29 to overcenter to the non-locking position shown in FIG. 3. In this position the wedges 41 are dragged along the edge portions 19 under the biasing force exerted on body 33 by spring 29.

If it is desired to place the door 9 in any particular position while the latter is being closed, the closing movement is first stopped manually. Then a slight opening or reverse force is applied to the door to cause the body 33 to swing counterclockwise as viewed in FIG. 3 under the bias of spring 29 and due to the frictional contact of wedges 41 with edge portions 19. When the body 33 reaches the fully extended position or goes slightly beyond such position the frictional contact between the wedges and edge portions 19 frictionally locks the door against



further inward or closing movement. The door may be released from this position for closing in the manner previously described, i.e., the door is merely moved inwardly manually to cause the toggle linkage formed by body 33 and spring 29 to overcenter to the non-locking position shown in FIG. 3.

When the door is in the fully opened position, the locking mechanism 13 first assumes a position generally similar to the position shown in FIG. 1. A slight closing movement of the door causes the toggle linkage 33 and 29 to assume a locking position to frictionally hold the door against further inward movement unless it is manually forced in such direction.

When the door is moved to a completely closed position, the wedges 41 are moved into vertical alignment with end portions 20 of the flared edges 19. Since portions 20 are not in contact with wedges 41 no frictional drag is exerted on the latter and the toggle linkage 33 to 29 assume an extended position under the influence of spring 29.

A modified form of the locking mechanism as indicated generally by the reference character 13*a* in FIGS. 4 and 5. A body 33*a* is pivotally connected to arm 7 by pin 35 and has an opening 37*a* therein slightly larger than opening 37. A locking member 39*a* extends through opening 37*a* and is formed as a single block 40 having wedging end portions 41*a*. The tapered ends 43*a* of end portions 41*a* are adapted to mate with the inner sides of flared portions 19. Block 40 is biased away from pin 35 to force the sides 43*a* toward portions 19 by a pair of compression springs 47. The modified locking mechanism 13*a* operates in the same manner as locking mechanism 13 for frictionally locking the door 9 in a selected position.

It will be seen that the hinge of this invention permits a door to which the hinge is connected to be frictionally locked in infinite number of partially opened positions through a predetermined range of the total door movement either when the door is being opened or while the door is being closed. There are no predetermined positions in which the door must be placed before it will be prevented from closing.

While the wedging members 41 and block 40 are preferably constructed of metal, such as steel, for example, it will be understood that any material which would provide the necessary frictional contact, have the strength characteristics to withstand repeated locking operations, and have sufficient anti-corrosion properties could be used.

While the hinge or door checking device is shown and heretofore described as being used for supporting a vehicle door, as well as providing one of the pivotal connections between the door and a support, it will be understood that, if desired, additional hinges might be provided for supporting the weight of the door so that the device of this invention primarily functions as a checking device.

In view of the foregoing it will be seen that the several objects of the inventions are achieved.

It will be understood that the invention is not to be limited to the exact constructions shown and described, but that various changes and modifications may be made without departing from the spirit and scope of the invention.

I claim:

1. A checking device connected between a door member and a support member comprising mounting means joined to one of said members, arm means connected to the other member, said arm and mounting means being connected together for pivotal movement relative to one another, and locking means pivotally connected to one of said means to frictionally engage the other of said means and including means for biasing said locking means toward a position for releasably locking the door member in an infinite number of positions throughout a predetermined range of the permissible movement of the door member, said locking means being adapted to release said

door member when a manually exerted force is placed on the latter in a closing direction.

2. A checking device as set forth in claim 1 wherein said locking means comprises a toggle linkage, said toggle linkage having two links one of which has wedging means adapted to frictionally lock said door member against substantially movement relative to said support member.

3. A checking device as set forth in claim 2 wherein said one link comprises a body pivotally connected to said arm means, the other link of said toggle linkage comprising a spring connected to said arm means and extending into a recess in said body.

4. A checking device as set forth in claim 3 wherein said body has an opening therein, said wedging means comprising a locking member extending through said opening and having tapered ends, said mounting means having flared edge portions with which said tapered ends are adapted to mate for frictionally locking said door member against movement relative to said support member.

5. A checking device as set forth in claim 1 wherein said locking means includes a frictional locking member movably connected to said arm means and adapted to be moved from either of two non-locking positions into a locking position wherein relative movement between said door member and said support member is inhibited, said means for biasing said locking means comprising a spring biasing said locking member from one of said non-locking positions toward locking position during opening movement of said door member and biasing said locking member from the other non-locking position toward locking position during closing movement of said door member.

6. A checking device as set forth in claim 5 wherein said locking member has tapered ends, said mounting means having flared edge portions with which said tapered ends are adapted to mate for frictionally inhibiting relative movement between said arm means and said mounting means.

7. A checking device as set forth in claim 6 wherein said locking member includes wedging members, and a resilient member biasing said wedging members apart.

8. A checking device as set forth in claim 6, further comprising resilient means biasing said tapered ends into engagement with said flared edge portions.

9. A checking device as set forth in claim 8 wherein locking member includes wedging members, said resilient means comprising a resilient member biasing said wedging members apart.

10. A checking device as set forth in claim 8 wherein said locking member comprising a body pivotally connected member toward said mounting means.

11. A checking device as set forth in claim 5 wherein said locking member comprising a body pivotally connected at one end to said arm means, said body having an opening therethrough adjacent its free end, a wedge in said opening having tapered ends, said mounting means having flared edge portions with which said tapered ends are adapted to mate for frictionally inhibiting relative movement between said door member and said support member.

12. A checking device as set forth in claim 11 wherein said free end of said body has a recess therein, said spring having one end extending into said recess for biasing said body from said non-locking positions.

13. A hinge for connecting a vehicle door to a vehicle frame comprising a hinge arm attached to the door, a hinge mount connected to said frame, said arm and mount being connected together for pivotally connecting the door to the frame, frictional locking means pivotally connected to said arm to frictionally engage said hinge mount and including means for biasing said locking means towards a position for releasably locking the door in an infinite number of positions throughout a substantial range of the permissible pivotal movement of the door, said locking means being adapted to release the door for movement when a manually exerted force is placed on the latter in a closing direction.

14. A hinge as set forth in claim 13 wherein said locking means is adapted to be swung from either of two non-locking positions into a locking position wherein said locking means frictionally engages said hinge mount to hold the door against substantial movement relative to said frame, said means for biasing said locking means comprising a spring biasing said locking means from one of said non-locking positions toward locking position during opening of said door and biasing said locking means from the other non-locking position toward locking position during closing of said door, a small reverse movement of said door during opening of the latter causing said locking means to swing to locking position from one non-locking position, and a small reverse movement of said door during closing of the latter causing said locking means to swing toward locking position from the other non-locking position.

15. A hinge as set forth in claim 14 wherein said locking means includes at least one wedging portion, said hinge mount having a flared edge portion with which said wedging portion is adapted to frictionally engage.

16. A hinge as set forth in claim 14 wherein said hinge mount is channel-shaped, the outer edge portions of the sides of said hinge mount being flared outwardly, said locking means including wedging portions adapted to extend into engagement with the flared outwardly edge portions.

17. A hinge as set forth in claim 16 further comprising resilient means biasing said wedging portions toward engagement with said flared edge portions.

18. A hinge as set forth in claim 17 wherein said resilient means comprising springs biasing said wedging portions toward said flared edge portions.

19. A hinge as set forth in claim 14 wherein said hinge mount is channel-shaped the outer edge portions of the sides of said hinge mount being flared outwardly, said locking means including a body having an opening therein in generally vertical alignment with said outer edge portions, and a locking member in said opening having tapered end portions extending from opposite ends of the opening into engagement with said outer edge portions.

20. A hinge as set forth in claim 19 wherein said body is pivotally connected adjacent one end thereof to said arm, the other end of said body having a recess therein into which one end of said spring extends for biasing said locking means from said non-locking position.

**References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 1,902,175 | 3/1933 | Lurie | 16—140 |
| 2,799,889 | 7/1957 | Ragsdale | 16—140 |
| 3,091,796 | 6/1963 | Leslie | 16—142 |
| 3,146,487 | 9/1964 | Johnson et al. | 16—140 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 885,630 | 12/1961 | Great Britain. |

BOBBY R. GAY, Primary Examiner

DORIS L. TROUTMAN, Primary Examiner

U.S. Cl. X.R.

16—146