

Dec. 19, 1939.

R. I. SCHONITZER

2,184,201

DOOR CHECK

Filed July 5, 1938

2 Sheets-Sheet 1

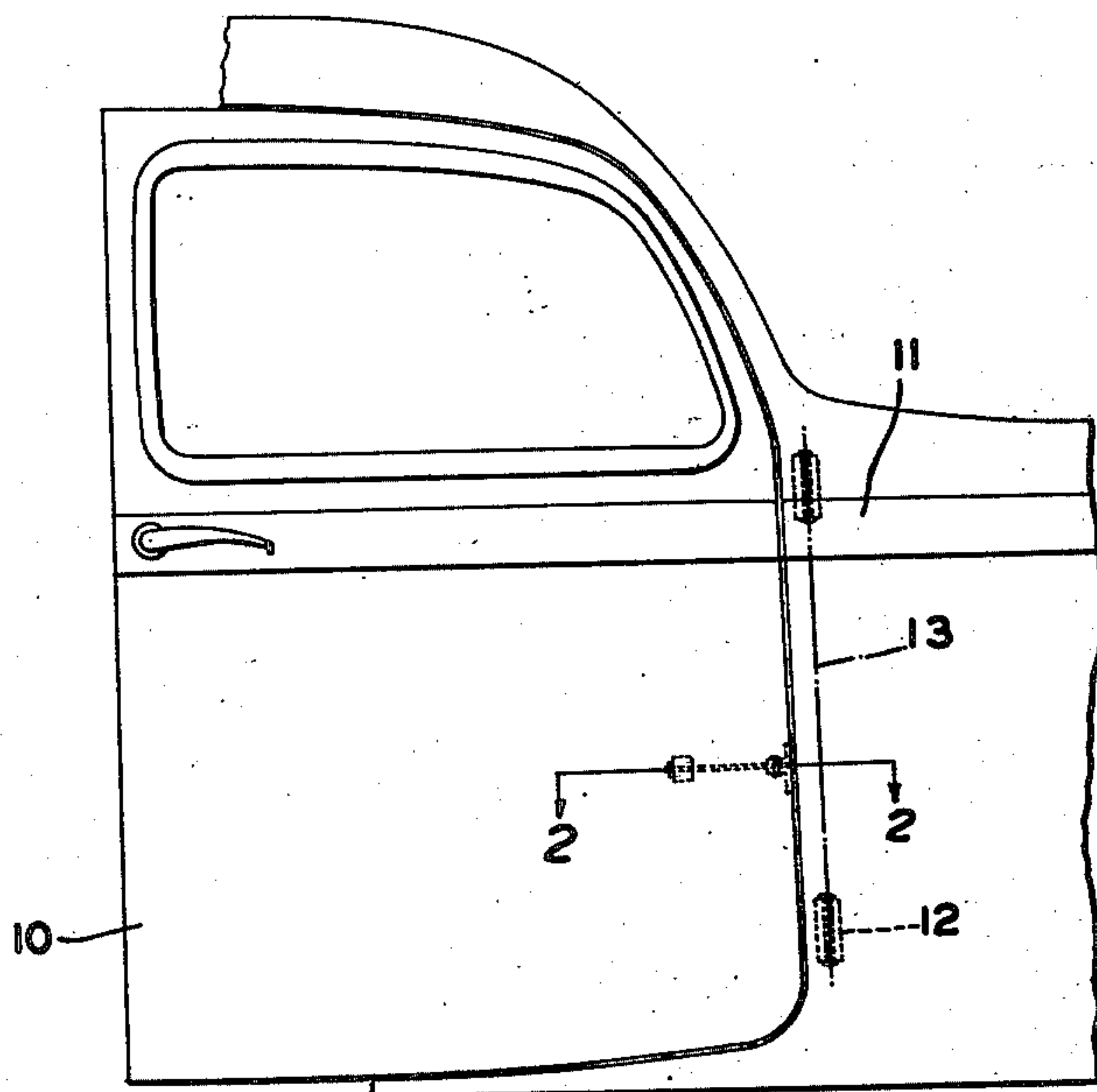


FIG. 1.

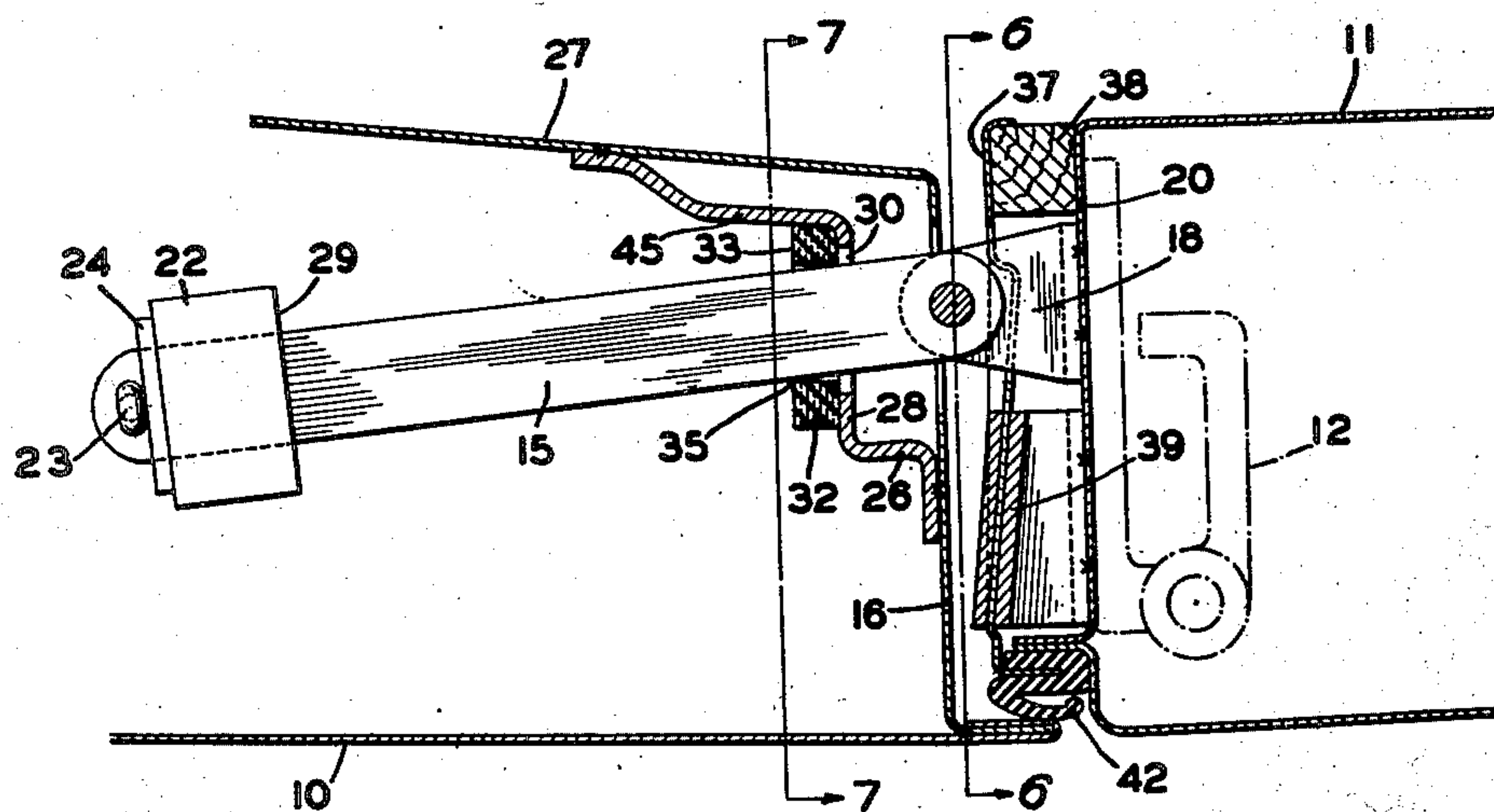


FIG. 2.

INVENTOR:

RUDOLPH I. SCHONITZER

BY

Hyde, Higley & Meyer
ATTORNEYS.

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2 Sheets-Sheet 2

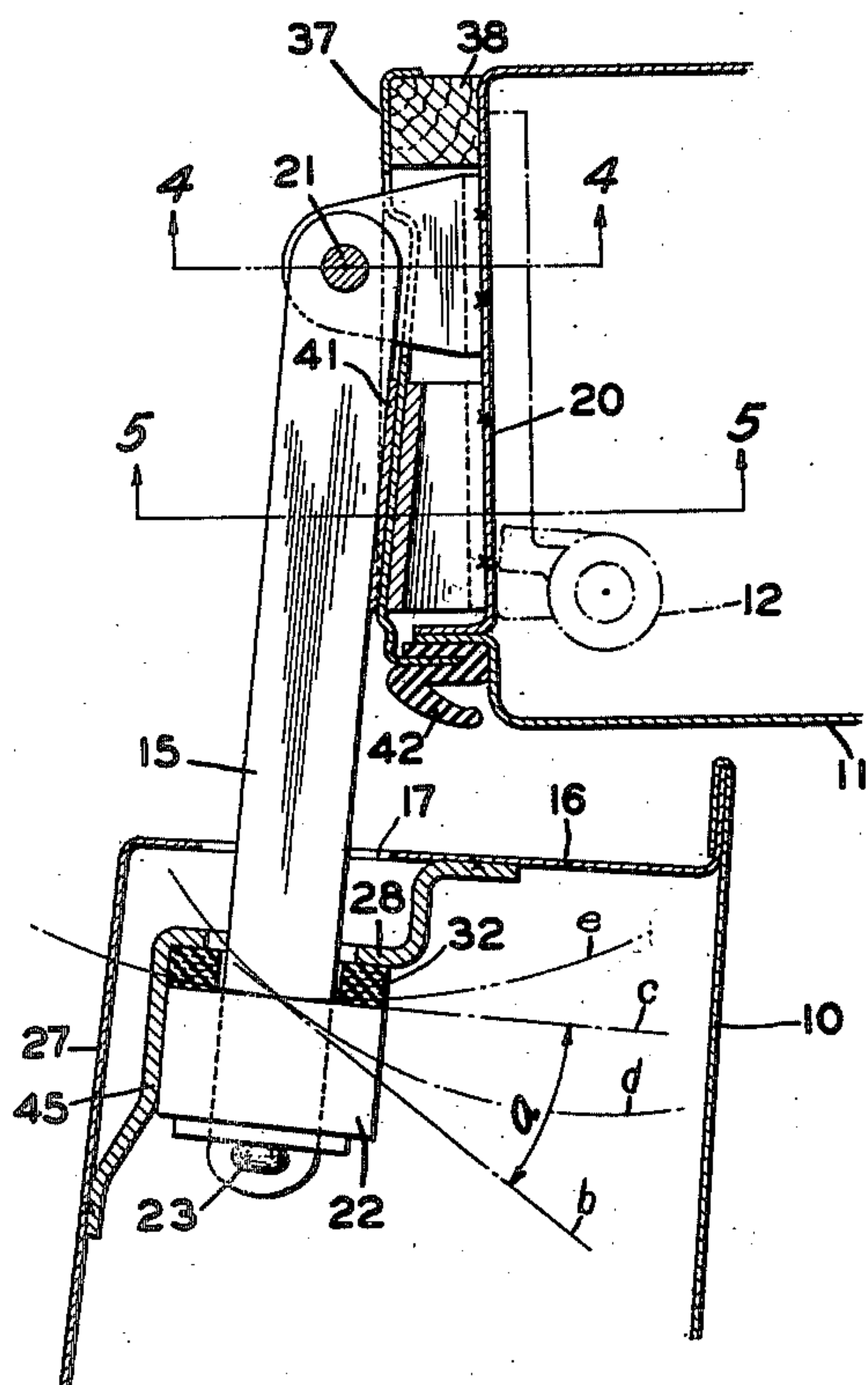


FIG. 3.

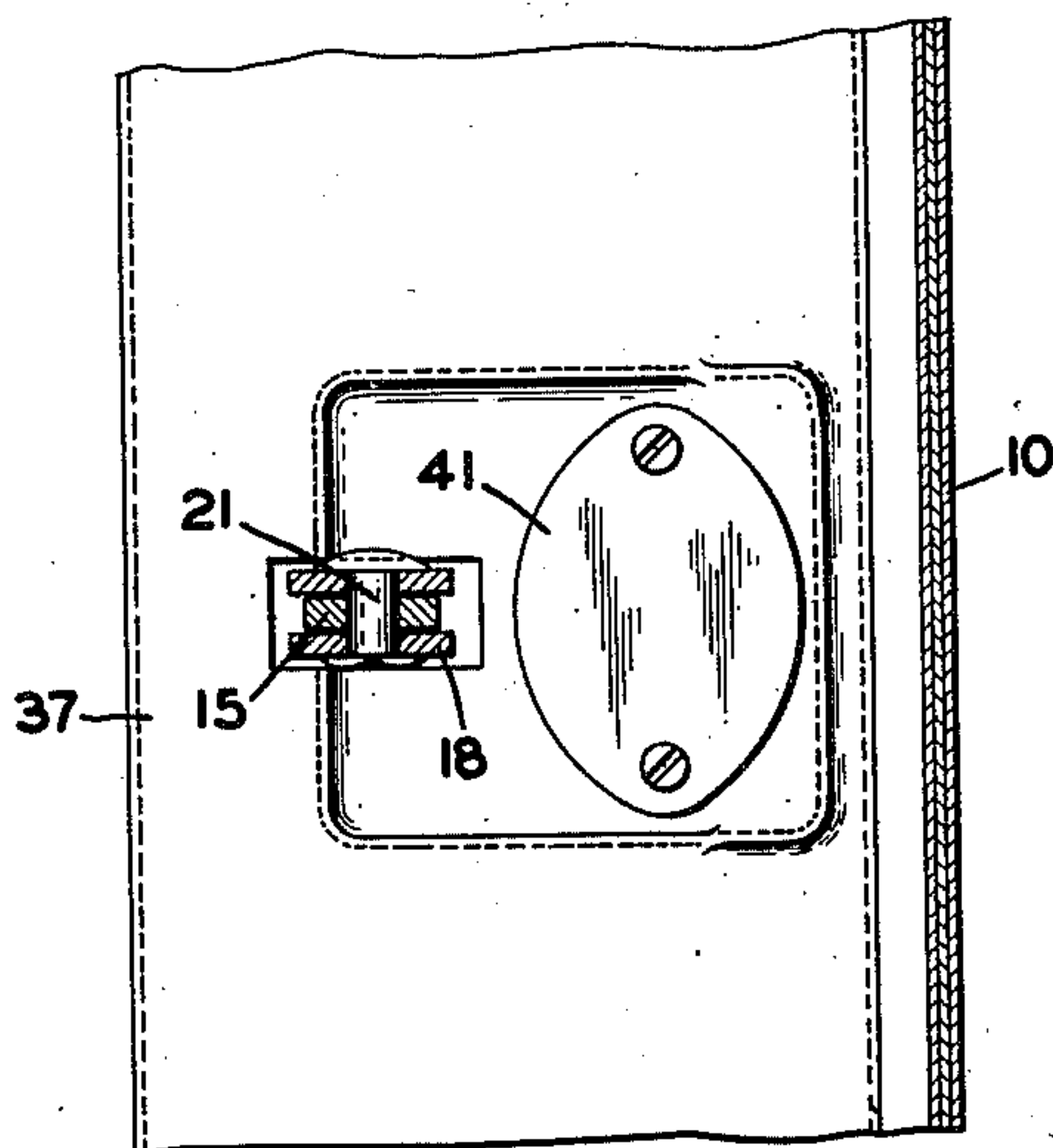


FIG. 6.

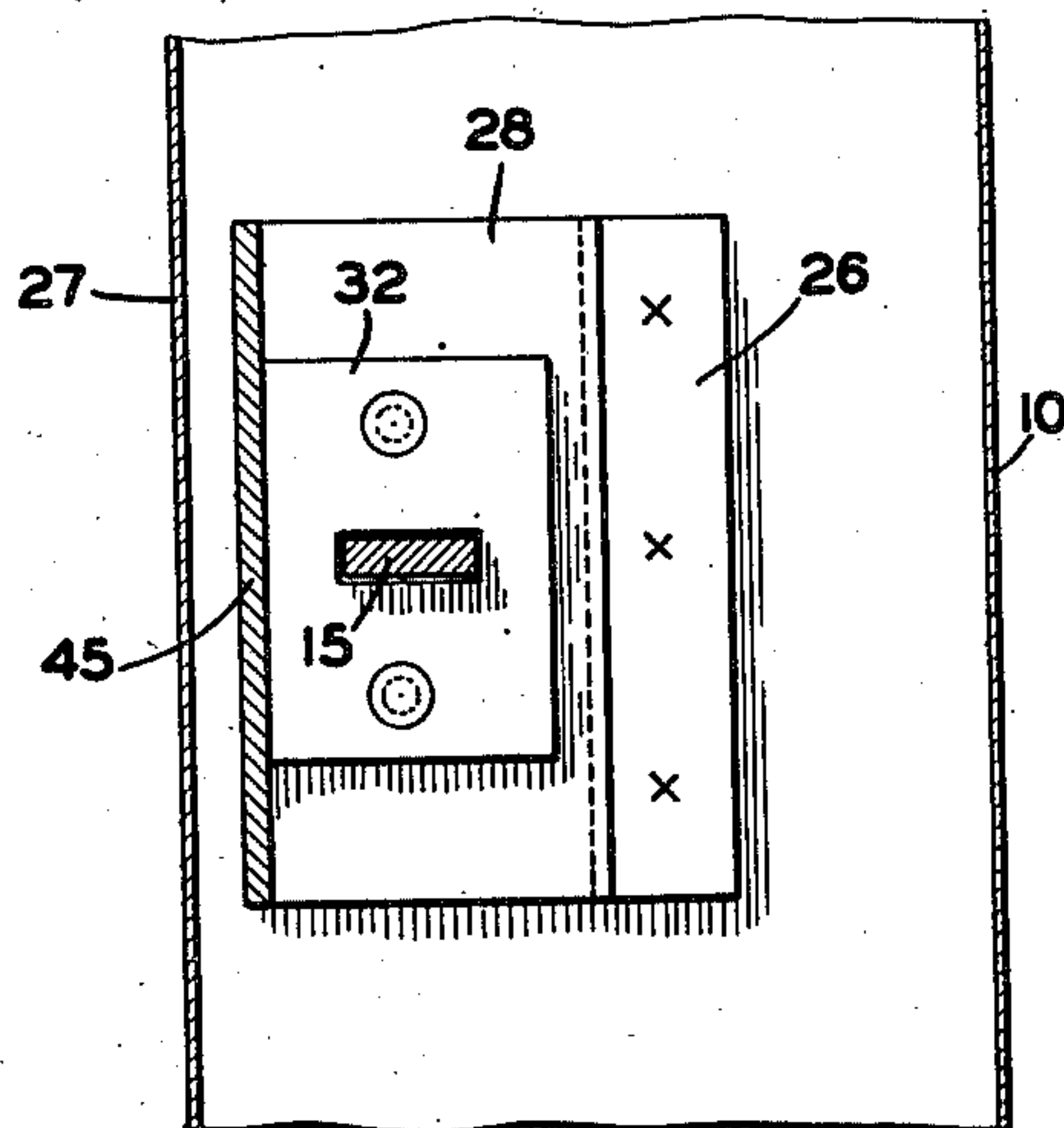


FIG. 7.

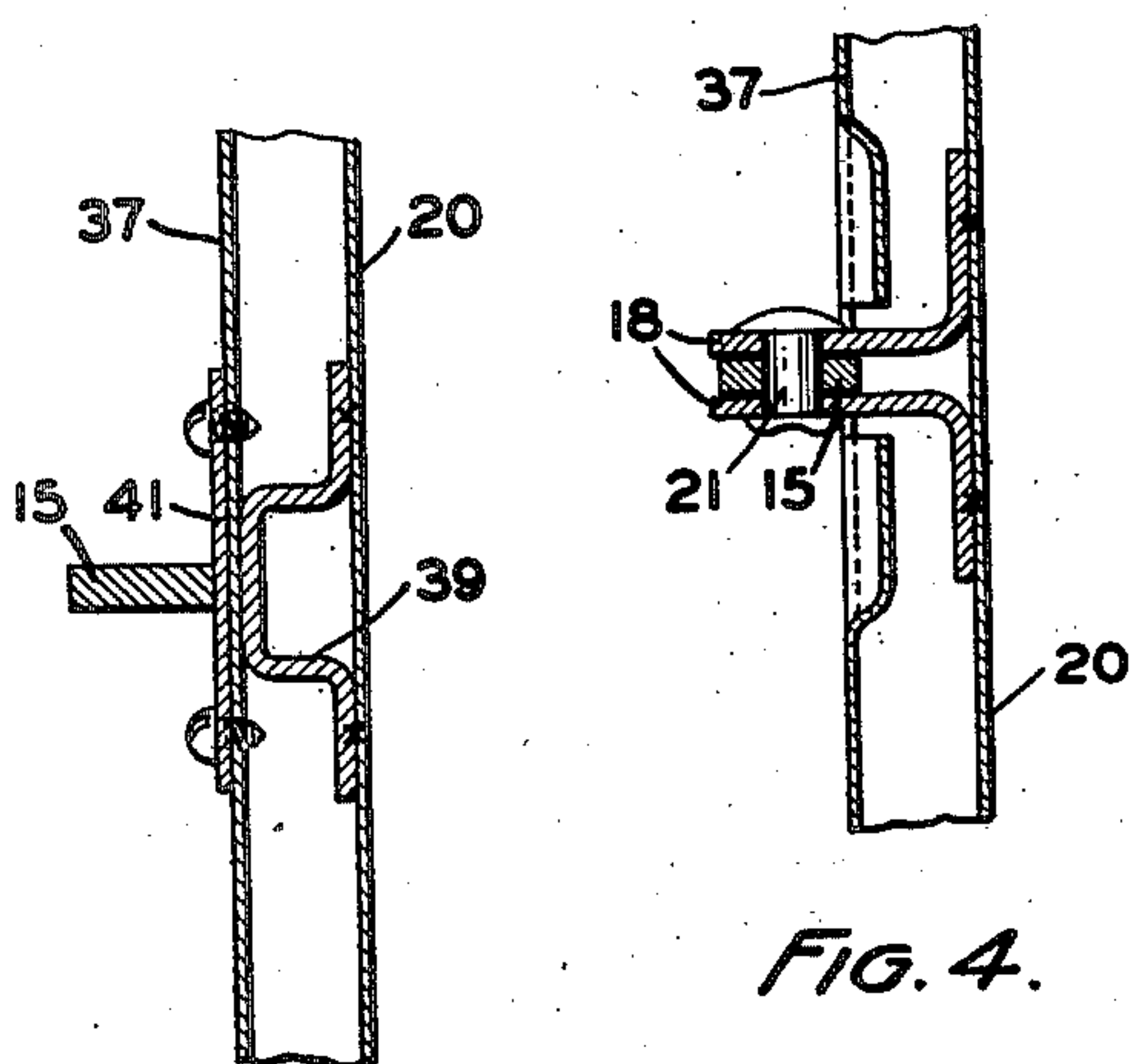


FIG. 4.

FIG. 5.

INVENTOR:
RUDOLPH I. SCHONITZER
BY

Hyde, Higley & Meyer
ATTORNEYS.

UNITED STATES PATENT OFFICE

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DOOR CHECK

Rudolph I. Schonitzer, Shaker Heights, Ohio

Application July 5, 1938, Serial No. 217,333

12 Claims. (Cl. 16—86)

This invention relates to improvements in door checks, such as are used for checking the opening movements of hinged automobile doors and the like. More particularly, the present invention relates to a door check of the concealed type, that is, a door check which is concealed from view when the door with which it is associated is in closed position.

The general object of the present invention is the provision of a door check which is of simple and inexpensive construction, of strong and durable character, and which performs in a particularly effective manner its door-checking function.

A more specific object of the present invention is the provision of a door check which is especially applicable for use with a door mounted on concealed hinges, the strains on such hinges and on the door and its supporting structure which normally result when such a door is checked, being effectively eliminated by the use of the present door check.

Another specific object of the present invention is the provision of a door check in which the check arm thereof is so associated with the door to be checked and with the supporting structure for such door that the drag or "side slip" of the check arm during door-opening movement is effectively arrested before it prevents proper door-checking action.

Further objects of the present invention are in part obvious and in part will appear more in detail hereinafter.

The present invention will be readily understood from the following description of one embodiment thereof, reference being had to the accompanying drawings, in which

Fig. 1 is an outside elevation of an automobile door and a portion of the automobile body structure to which such door is hinged, said door and said body structure having associated therewith, for checking the opening movement of said door, a door check embodying the present invention; Fig. 2 is a horizontal sectional view thereof, on the line 2—2, Fig. 1; Fig. 3 is a view similar to Fig. 2 but with the door in an open position, the opening movement of said door having been checked by the present door check; Figs. 4 and 5 are detail vertical sectional views on the lines 4—4 and 5—5, Fig. 3, respectively; and Figs. 6 and 7 are detail vertical sectional views on the lines 6—6 and 7—7, Fig. 2, respectively.

Before the present invention is described in detail, it is to be understood that such invention is not limited to the details of construction and/or

the specific arrangement of parts herein illustrated and/or described, as the invention obviously may take other forms. It also is to be understood that the phraseology or terminology herein employed is for the purpose of description and not of limitation, as there is no intention and no desire to limit the present invention, as herein disclosed and as defined in the appended claims, beyond the requirements of the prior art.

In present-day automobile door checks, the stresses incident to the checking action tend to drag the pivoted check arm around its pivotal axis, with the result that an effective pull on the check arm, and consequently a proper checking of the opening movement of the door, is not usually produced. This tendency to pivotally drag the check arm during door-opening movement is due primarily to the absence of a favorable checking angle, and if concealed hinges for the door are used, with the consequent location of the axes of such hinges within the automobile body, the checking angle is particularly unfavorable to the production of a direct and effective pull on the check arm. Because of the pivotal drag of the check arm during opening movement of the door, there is a tendency for such door opening movement to continue, with the consequent production of a binding effect upon the door hinges and/or upon the automobile body, and such a binding effect frequently results in more or less serious damage.

Furthermore, an unfavorable checking angle frequently produces "side slip" of the check arm, which not only results in a less effective checking of the door but also, in the binding of the check arm against the side walls of the clearance slot in the automobile door or automobile body through which such check arm extends, and as a consequence, abrasion, noise and damage frequently occur.

As will hereinafter appear, the present door check provides an effective checking action irrespective of the location of the axes of the hinges on which the door is mounted or the character of the checking angle, and for the accomplishment of that purpose, means is provided for arresting, when the door reaches a predetermined open position, any tendency of the check arm to slip sidewise or drag, after which an effective pull upon the check arm is produced, with the consequent effective checking of the door opening movement.

For the illustration of the present invention, there is shown in the accompanying drawings a

standard metal automobile door 10 and a portion of a standard metal automobile body 11 on which such door is supported by the use of concealed hinges 12, said door having swinging movement about the aligned axes of such hinges (indicated by the dot-dash line 13, Fig. 1) between the closed position shown in Figs. 1 and 2 and the open position shown in Fig. 3. The hinges 12 may be of any suitable form, and inasmuch as such hinges form no part of the present invention, only portions of such hinges are here illustrated.

The present improved door check, by which the opening movement of the door 10 is effectively checked, notwithstanding the use of concealed hinges for such door and the consequent location of the axes of such hinges within the automobile body 11, includes a rigid check arm 15, which is here shown as of generally flat form and which may be made of any suitable material, such as metal. As in present-day automobile door checks of the concealed type, one end of the check arm 15 is pivotally connected to either the door 10 or the automobile body 11, and the free end portion of such check arm lies within the other. In the embodiment of the invention here illustrated, the check arm 15 has one of its ends pivotally connected to the automobile body 11 and the free end portion of such check arm lies within the door 10, the side edge wall 16 of said door, at its hinged side, being provided with a suitable slot 17 through which the check arm extends.

Any suitable means may be utilized in effecting the pivotal connection of one end of the check arm 15 to the automobile body 11. As here shown, a two-part bracket 18 is spot welded or otherwise rigidly secured to the jamb wall 20 of such automobile body, and on a pin 21 carried by said bracket, one end of the check arm 15 is pivotally mounted.

Within the door 10, the free end portion of the check arm 15 is here provided with suitable bumper means, said bumper means being of any suitable size and form and of any suitable material. Although said bumper means may be an integral part of the free end portion of such check arm, the bumper means here shown is a separate member 22, and for retaining such bumper member 22 on said check arm, a simple cotter pin 23 is here utilized, said cotter pin being secured within a suitable aperture with which the free end portion of such check arm is provided. It is, of course, preferable that the door 10 be yieldingly checked, and to that end, either the bumper member 22, or the part which it contacts in checking the opening movement of such door, may be of yieldable character, or both may be of such yieldable character. In the embodiment of the invention here illustrated, the bumper member 22 is of resilient character, said member being of rubber or other suitable resilient material, and if desired and as here shown, a metal backing disc 24 may be provided for said bumper member, said backing disc being interposed between the cotter pin 23 and the adjacent end surface of said bumper member.

For contacting cooperation with the bumper member 22 in checking the opening movement of the door 10, any suitable part of said door may be utilized, such as the edge wall 16 of said door, as in many of the present-day automobile door checks, or such as a separate abutment plate with which said door may be suitably

provided, as in the embodiment of the invention here illustrated. The abutment plate 26 here shown is a rigid metal member spot welded or otherwise rigidly secured to the door 10, one end portion of the present abutment plate being spot welded to the door edge wall 16 and the other end portion of said bumper plate being spot welded to a part of the inner side wall 27 of said door. An intermediate portion 28 of said abutment plate, transversely disposed relative to the check arm 15, cooperates with the end checking surface 29 of the bumper member 22 in effecting the desired door-checking action, a suitable slot 30, in alignment with but here shown as somewhat shorter than the door edge wall slot 17, being provided in said abutment plate portion 28 for the extension therethrough of the check arm 15. Although the end checking surface 29 of the bumper member 22 may directly contact or abut, if desired, said abutment plate portion 28, in checking the opening movement of the door 10, a suitable abutment pad 32 is here provided for such abutment plate portion, and the checking surface 33 of such pad is yieldingly engaged by the bumper member checking surface 29 when the door 10 reaches a predetermined open position. The abutment pad 32 is preferably made of a semi-resilient material, such as rubberized canvas or the like, and is provided with a suitable slot 35, in alignment with but here shown as somewhat shorter than the abutment plate slot 30, for the extension therethrough of the check arm 15.

The operation of the present door check, as thus far described, will be readily understood, as such operation does not materially differ from the operations of present-day automobile door checks. The door 10, upon opening movement thereof, swings about the aligned axes 13 of its concealed hinges 12, and the check arm 15, due to the engagement therewith of the abutment pad 32, swings with said door about the axis of the check arm pivot pin 21. When the door reaches a pre-determined open position, the end checking surface 29 of the bumper member 22 yieldingly contacts or engages the checking surface 33 of the abutment pad 32, and further opening movement of the door 10 is yieldingly checked.

In order to insure a direct pull on the check arm 15 upon opening movement of the door 10, with the consequent production of an effective door-checking action, and to eliminate objectionable binding effects upon the door hinges 12, the automobile body 11 and the abutment pad 32, means is here provided for arresting, in a particularly effective and positive manner, side slip or drag of the check arm 15 when the door 10 reaches a predetermined open position.

Such arresting action is accomplished, in the embodiment of the invention here illustrated, by bringing about inter-engagement of the check arm 15 and the automobile body 11 when the automobile door 10 reaches a predetermined open position, the effect of such inter-engagement being to positively arrest further pivotal movement of the check arm 15 in a door-opening direction. Although the check arm 15 may engage, for such purpose, any suitable part of the automobile body 11, such as its regular jamb wall 20 (which may be suitably re-enforced or initially made of the desired strength and rigidity), the automobile body 11 here shown is provided with an auxiliary jamb wall with which the check arm 15 engages. The auxiliary door jamb wall here

shown is a simple sheet metal plate 37 for which suitable backing means is provided, the backing means being interposed between such auxiliary jamb wall plate 37 and the regular jamb wall 20 of the automobile body. In the embodiment of the invention here illustrated, the backing means for the auxiliary jamb wall plate 37 comprises a wooden member 38 located on the inner side of the check arm bracket 18 and a rigid metal member 39 located on the outer side of such check arm bracket, said metal backing member having its base portions spot welded or otherwise suitably secured to the regular body jamb wall 20, as clearly shown in Fig. 5.

Preferably and as here shown (see Figs. 2 and 3), that portion of the auxiliary jamb wall plate 37, which overlies the metal backing member 39 and which is engaged by the check arm 15 when the door 10 reaches a predetermined open position, is of inclined character, to conform to the disposition of said check arm when such predetermined open position of the door 10 is reached. Upon such inclined portion of the auxiliary jamb wall plate 37 may be mounted, for its protection against marring and the like, a suitable scuff plate, the metal scuff plate 41 here shown being screwed or otherwise suitably secured to such inclined portion of the auxiliary jamb wall plate, as best shown in Figs. 5 and 6.

Suitable sealing means, such as the rubber strip 42 is here associated with the outer side edge portion of the auxiliary jamb wall plate 37, said rubber strip cooperating with the automobile door 10 in sealing this side edge portion of the door opening, as clearly shown in Figs. 2 and 3.

As will be readily understood, the check arm 15, when forcibly brought into engagement with the scuff plate 41 of the automobile body 11 upon opening movement of the door 10 to a predetermined position, normally tends to rebound or move in the opposite direction. Although not an essential feature of the present invention, means is preferably provided, as in the embodiment of the invention here illustrated, for arresting such rebound movement of the check arm 15. For that purpose, a portion 45 of the door abutment plate 26 is disposed for engagement by the side wall of the check arm bumper 22 upon such rebound movement of the check arm 15, the effect of such engagement being to positively arrest all rebound movement of said check arm.

As the result of arresting pivotal movement of the check arm 15 when the door 10 reaches a predetermined open position, there is always insured a direct pull on such check arm and as a consequence, an effective door-checking action, with no liability of strain on or damage to the door hinges 12 or the automobile body 11. Moreover, there is no liability of damage to the abutment pad 32 by engagement of the check arm 15 therewith, as will be readily understood.

It will thus be apparent that opening movement of the door 10 is always effectively checked, notwithstanding the use for said door of concealed hinges, the axes of which lie within the automobile body and normally produce a checking angle unfavorable to a direct pull on the check arm 15. In Fig. 3, the checking angle of the present door check is indicated by the letter *a*, said angle being defined by the straight dot-dash lines *b* and *c*. The curved dot-dash line *d* denotes the arc of a circle, the center of which coincides with the aligned axes 13 of the concealed hinges 12, and the curved dot-dash line *e* denotes the arc of a

circle the center of which coincides with the axis of the check arm pivot pin 21. As indicated in the accompanying drawings, the straight line *b* is tangent to the arc *d* at the point of its intersection with the arc *e*, and the straight line *c* is tangent to the arc *e* at the point of its intersection with the arc *d*.

Further features and advantages of the present invention will be readily apparent to those skilled in the art to which it relates.

What I claim is:

1. In combination, a supporting structure, a door structure hinged thereon, and a rigid check arm pivotally secured to one of said structures and extending into the other structure, the structure to which said check arm is pivotally secured having means for cooperation with said check arm in arresting pivotal movement thereof in one direction when said check arm reaches a predetermined position during opening movement of the door structure.

2. In combination, a supporting structure, a door structure hinged thereon, a rigid check arm pivotally secured to one of said structures and extending into the other structure, and bumper means carried by said check arm within said last mentioned structure for checking contact with a part thereof in checking the opening movement of the door structure, the structure to which said check arm is pivotally secured having means for cooperation with said check arm in arresting pivotal movement thereof in one direction when said check arm reaches a predetermined position during opening movement of the door structure.

3. In combination, a supporting structure having edge wall means, a door structure hinged on said supporting structure adjacent the edge wall means thereof, said door structure having edge wall means oppositely positioned relative to the edge wall means of said supporting structure when the door structure is closed, and a rigid check arm pivotally secured to one of said structures and extending into the other, the pivotal movement of said check arm in one direction being arrested, when said check arm reaches a predetermined position during opening movement of the door structure, by the engagement of said check arm with the edge wall means of that structure to which said check arm is pivotally secured.

4. In combination, a supporting structure, a door structure hinged thereon, a rigid check arm pivotally secured to one of said structures and extending into the other structure, bumper means carried by said check arm within said last mentioned structure for checking contact with a part thereof in checking the opening movement of the door structure, and abutment means co-operable with a portion of said check arm remote from said bumper means for arresting the pivotal movement of said check arm in one direction when said check arm reaches a predetermined position during opening movement of the door structure.

5. In combination, a supporting structure, a door structure, hinge means of concealed character for mounting said door structure on said supporting structure, and a rigid check arm pivotally secured to one of said structures and extending into the other, the pivotal movement of said check arm in one direction being arrested, when said check arm reaches a predetermined position during opening movement of the door structure, by the lateral engagement of said check arm with

abutment means carried by that structure to which said check arm is pivotally secured.

6. In combination, a supporting structure, a door structure hinged thereon, and a rigid check arm pivotally secured to one of said structures and extending into the other, the pivotal movement of said check arm in one direction being arrested, when said check arm reaches a predetermined position during opening movement of the door structure, by the lateral engagement of said check arm with inclined abutment means carried by that structure to which said check arm is pivotally secured.

7. In combination, a supporting structure having jamb wall means, a door structure hinged on said supporting structure, a rigid check arm pivotally secured to said supporting structure adjacent the jamb wall means thereof and extending into said door structure, and bumper means carried by said check arm within said door structure for checking contact with a part thereof in checking the opening movement of said door structure, the pivotal movement of said check arm in one direction being arrested, when said check arm reaches a predetermined position during opening movement of the door structure, by the engagement of said check arm with an inclined abutment with which the jamb wall means of said supporting structure is provided.

8. In combination, a supporting structure, a door structure hinged thereon, said supporting structure having regular jamb wall means and auxiliary jamb wall means, and a rigid check arm pivotally secured to one of said structures and extending into the other, the pivotal movement of said check arm in one direction being arrested, when said check arm reaches a predetermined position during opening movement of the door structure, by the lateral engagement of said check arm with said auxiliary jamb wall means.

9. In combination, a supporting structure, a door structure hinged thereon, and rigid check arm means pivotally secured to one of said structures and having an end portion thereof extending into the other structure, the pivotal movement of said check arm means in one direction being arrested, when said check arm means reaches a predetermined position during opening movement of the door structure, by the engagement of an intermediate portion of said check arm means with abutment means carried by that structure to which said check arm means is pivotally secured, and the movement of said door structure in a door opening direction being arrested, when said door

structure reaches a predetermined open position, by the lateral engagement of the structure into which said check arm means extends with the aforesaid end portion of said check arm means.

10. In combination, a supporting structure, a door structure hinged thereon, a rigid check arm pivotally secured to one of said structures and extending into the other structure, bumper means carried by said check arm within said last mentioned structure for checking contact with a part thereof in checking the opening movement of the door structure, the pivotal movement of said check arm in one direction being arrested, when said check arm reaches a predetermined position during opening movement of the door structure, by the engagement of said check arm with abutment means carried by that structure to which the check arm is pivotally secured, and a side portion of said bumper means being engageable, when the door structure reaches a predetermined open position, with a part of the structure within which said bumper means is carried.

11. In combination, a supporting structure, a door structure hinged thereon, a rigid check arm pivotally secured to one of said structures and extending into the other structure, bumper means carried by said check arm within said last mentioned structure, abutment means engageable with said check arm when said check arm reaches a predetermined position during opening movement of the door structure, with the consequent arresting of pivotal movement of said check arm in one direction, and abutment means engageable with said bumper means when said door structure reaches a predetermined position during the opening movement thereof, with the consequent arresting of such movement of said door structure.

12. In combination, a supporting structure, a door structure hinged thereon, a rigid check arm pivotally secured to one of said structures and extending into the other structure, bumper means carried by said check arm within said last mentioned structure, abutment means engageable with said check arm when said check arm reaches a predetermined position during opening movement of the door structure, with the consequent arresting of pivotal movement of said check arm in one direction, abutment means engageable with a side portion of said bumper means when said door structure reaches a predetermined open position, and other abutment means engageable with an end portion of said bumper means when said door structure reaches a predetermined open position.

RUDOLPH I. SCHONITZER.