

June 9, 1936.

R. I. SCHONITZER

2,043,976

COMBINED DOOR HOLDING AND DOOR CHECKING DEVICE

Filed Feb. 28, 1935

2 Sheets-Sheet 1

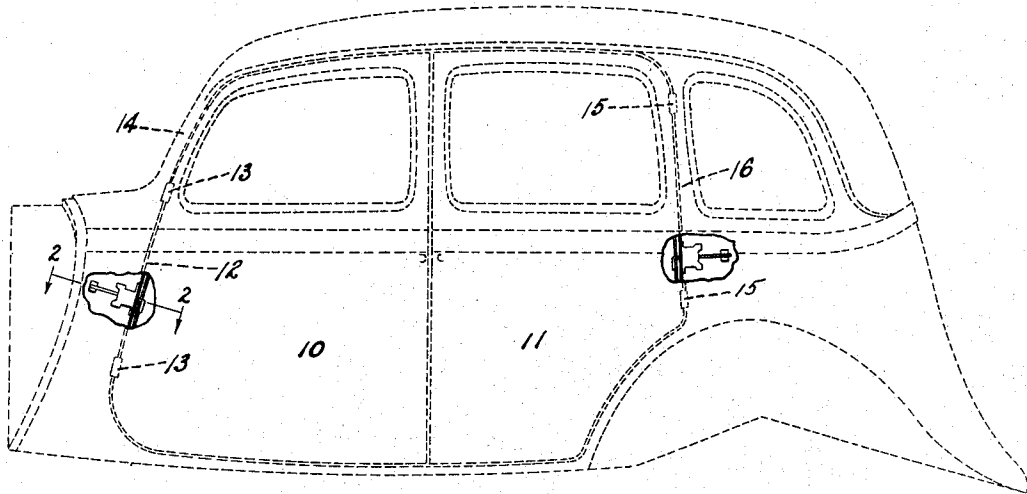


FIG. -1

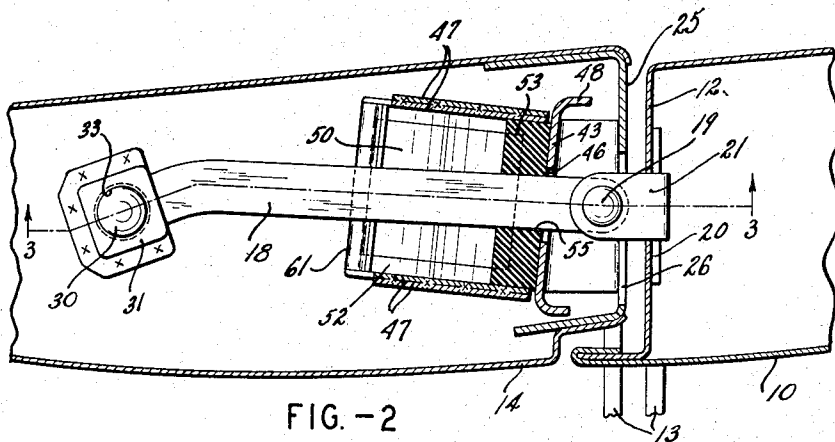


FIG. -2

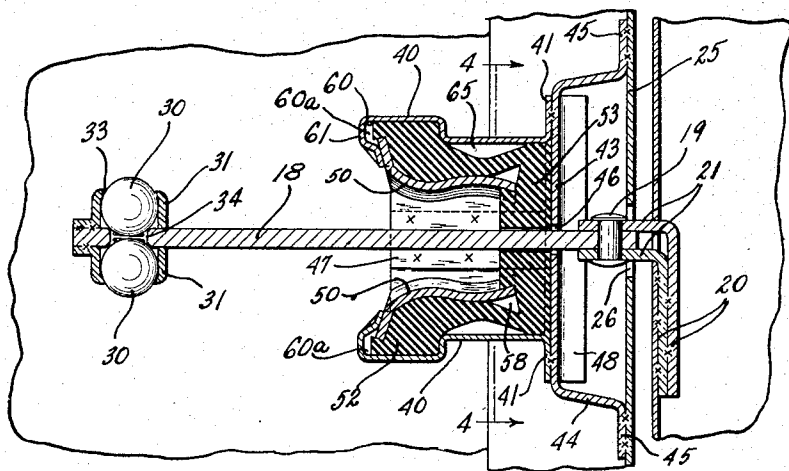


FIG. -3

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2 Sheets-Sheet 2

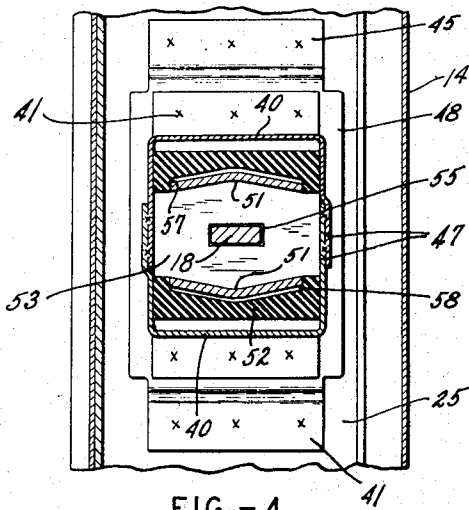


FIG. -4

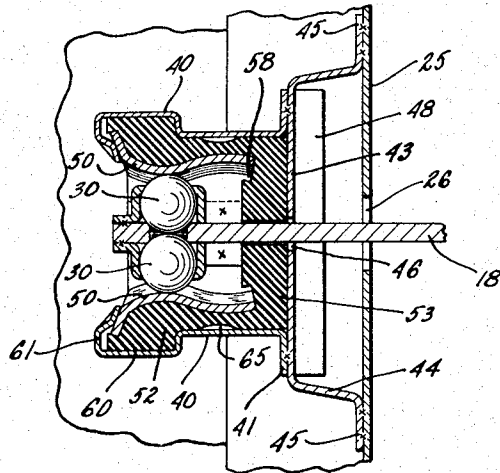


FIG. -5

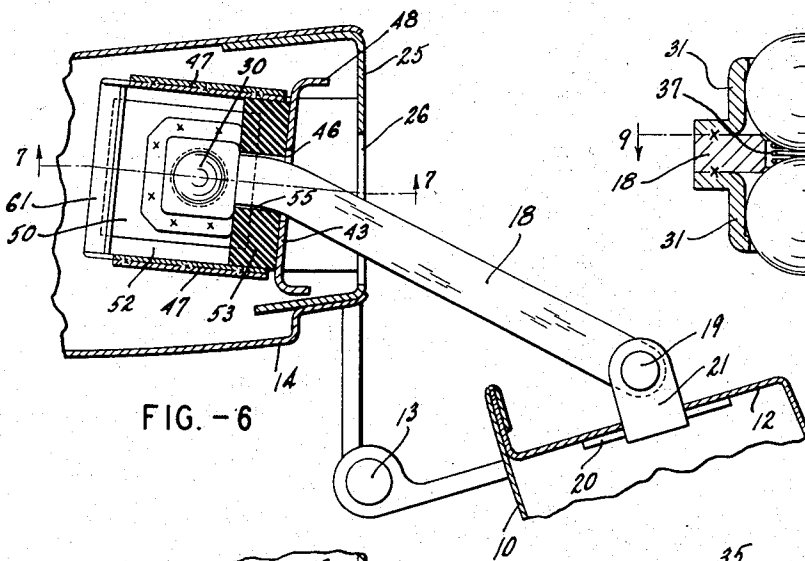


FIG. -6

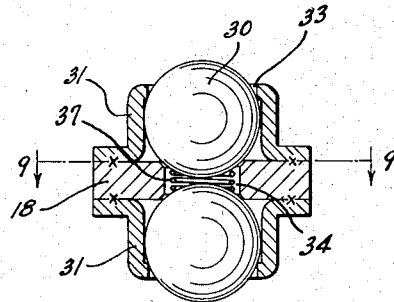


FIG. -8

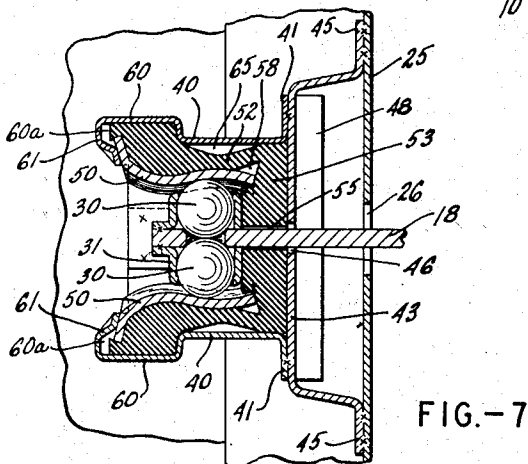


FIG. -7

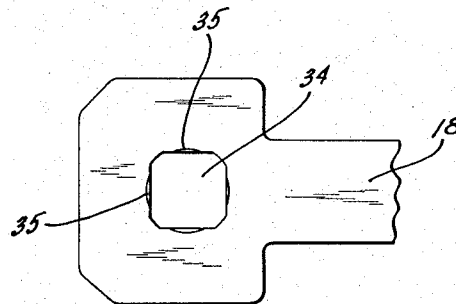


FIG. -9

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# UNITED STATES PATENT OFFICE

2,043,976

## COMBINED DOOR-HOLDING AND DOOR-CHECKING DEVICE

Rudolph I. Schonitzer, Cleveland, Ohio

Application February 28, 1935, Serial No. 8,621

19 Claims. (Cl. 16—86)

This invention relates to a device for releasably holding or retaining a hinged door, such as an automobile door, in open position and for yieldingly checking the opening thereof, the present device being of the same general character as those disclosed in my prior applications for Combined door-holding and door-checking devices, application Serial No. 727,991, filed May 28, 1934 and application Serial No. 739,426, filed August 11, 1934.

The general object of the present invention is the provision of a door-holding and door-checking device which is of simple and inexpensive construction, which is of strong and sturdy character and which performs in a particularly efficient manner the two-fold function of releasably retaining a hinged door in open position and of yieldingly checking the opening thereof.

More specific objects of the present invention will appear from the following description thereof, said invention residing in the combination and arrangement of parts and in the details of construction defined in the appended claims, it being understood that said invention is not limited to what is herein described and/or illustrated but to what is defined by such claims.

In the accompanying drawings, in which one embodiment of the present invention is illustrated, Fig. 1 is a side elevation of a portion of an automobile body, each of the four doors thereof (two of which are shown) having associated therewith one of the present door-holding and door-checking devices; Fig. 2 is a horizontal, longitudinal sectional view of a portion of the left front door of said body and a portion of the post or pillar structure thereof on which said door is hinged, the door being in closed position and the holding and checking device therefor being in inoperative position, the view being on the line 2—2, Fig. 1; Fig. 3 is a detail vertical sectional view of the parts shown in Fig. 2, the view being on the line 3—3, Fig. 2; Fig. 4 is a detail cross-sectional view of the retaining means and the arm or link of the present device, the view being on the line 4—4, Fig. 3; Fig. 5 is a detail vertical sectional view of the present device with the parts thereof in the positions they occupy upon initiation of their door-holding functions; Fig. 6 is a horizontal, longitudinal sectional view of the parts shown in Fig. 2 but with the door releasably held open by the present device; Fig. 7 is a detail vertical sectional view of parts of said device, the view being on the line 7—7, Fig. 6; Fig. 8 is a detail vertical sectional view of the arm or link pro-

jecting means of the present device; and Fig. 9 is a detail plan view of the free end portion of said arm or link, the view being on the line 9—9, Fig. 8.

In the portion of the automobile body shown in Fig. 1, 10 designates the left front door and 11 the left rear door thereof, the front door 10 having its front edge portion 12 mounted by the usual hinges 13 on the front post or pillar structure 14 of said body and the rear door 11 having its rear edge portion mounted by the usual hinges 15 on the rear post or pillar structure 16 thereof.

To effectively prevent undesired closing movement of such a hinged door, whether said door is mounted on an inclined axis, as here shown, or on a vertical axis, is the chief function of the present device, said device being adapted to releasably and automatically hold such a hinged door in open position whenever it is moved thereto. To avoid the necessity of using a separate device for cushioning or yieldably checking the opening of such a door, the present device is so constructed that it also functions as such a check or cushioning means therefor, all as will hereinafter more fully appear.

For purposes of illustration, the details of construction of the holding and checking device for the left front door 10 of the automobile body of Fig. 1 are shown in Figs. 2 to 9 inclusive, it being understood that the holding and checking devices for the other doors of said body are of like construction.

As here shown, the present improved door-holding and door-checking device includes a relatively flat metal arm or link 18 having its rear end pivotally connected to the door 10, preferably to an intermediate part of the hinged front edge portion 12 thereof, such as between the hinges 13. Such connection of said arm or link to said door is here effected by the use of a rivet 19 and a pair of angular brackets, the interconnected abutting portions 20 of which are welded or otherwise suitably secured to the hinged front edge portion 12 of said door and the spaced, forwardly projecting portions 21 of which have pivoted therebetween on the rivet 19 the rear end of said arm or link.

When the door 10 is in closed position, as shown in Figs. 1 to 3 inclusive, substantially all of the arm or link 18 lies within the left front body post or pillar structure 14, the rear edge portion 25 of which is provided with a suitable opening 26 to receive the forwardly projecting bracket portions 21 and/or the arm or link 18

secured thereto. Suitably mounted on the enlarged front or free end of said arm or link, within the left front body post or pillar structure 14, is a suitable projecting means adapted upon sufficient opening movement of the door 10 to automatically engage and be releasably held or retained by the hereinafter described retaining means of the present device.

In the embodiment of the invention here illustrated, the projecting means of the arm or link 18 comprises a pair of opposed ball members 30 and suitable cage means 31 therefor, one of said ball members and a half section of said cage means being arranged on each side of the enlarged front or free end of said arm or link. Within said cage sections, which are welded or otherwise rigidly secured to said arm or link, the ball members 30 are freely rotatable, the outer portions of said ball members projecting or protruding laterally from said cage sections through suitable side openings 33 with which said cage sections are provided. In order to insure rolling, rather than sliding, engagement of said ball members with the hereinafter described retaining means, the arm or link 18, within the cage sections 31, is provided with a suitable opening 34 to permit rolling contact or interengagement of said ball members during their engagement with said retaining means.

As clearly shown in Figs. 8 and 9, said arm opening 34 is of such shape that properly spaced bearing surfaces 35 of concave form are provided for said ball members, the effect of said bearing surfaces, in conjunction with said cage sections, being to effectively prevent longitudinal and transverse play of said ball members and thus not only to insure proper alignment thereof, but also, to insure rolling, rather than sliding, action thereof. To prevent rattling of said ball members when the present device is in its inoperative position, as in Figs. 1 to 3 inclusive, a suitable coil spring 37 is interposed between said ball members in engagement therewith, said spring being arranged within the arm or link opening 34 and being adapted to normally separate said ball members and to yieldingly press them outwardly against their confining cage sections 31.

Arranged within the left front body post or pillar structure 14, and welded or otherwise suitably secured to the rear edge portion 25 thereof, in alignment with the opening 26 therein, is the retaining means of the present device. As here shown, said retaining means includes a pair of opposed retaining members 40, of suitable rigid material, such as metal, and arranged in spaced relation to receive therebetween either an intermediate portion of the arm or link 18 or the front or free end thereof with its laterally projecting means. At their rear ends, said retaining members are provided with laterally disposed flanges 41 which are welded or otherwise suitably secured to the forwardly offset middle portion 43 of a rigid metal base plate 44, the end portions 45 of which are welded or otherwise suitably secured to the rear edge portion 25 of the body post or pillar structure 14. To permit the arm or link 18 to extend therethrough, said offset middle portion 43 of said base plate 44 is provided with a suitable opening 46, said opening being in alignment with the corresponding opening 26 of said body post or pillar structure.

To maintain the two retaining members 40 in proper spaced relation and to insure the desired rigidity thereof without the necessity of making

them of thick or heavy material, said members are provided with integral, inter-connected side flanges 47, the effect of which is the provision of a simple and inexpensive box-like retaining structure of strong and sturdy character. To insure the desired rigidity of the base plate 44 for said box-like structure, the offset middle portion 43 of said base plate is provided with integral, rearwardly extending flanges 48, as shown.

Upon opening of the door 10, with consequent clockwise movement of the arm or link 18 connected thereto, the two retaining members 40 receive therebetween and releasably retain the laterally projecting means, the ball members 30 and the cage sections 31 therefor, of said arm or link. Cooperating with said retaining members and engageable by the ball members 30 of said arm or link projecting means in the releasable retention thereof is a pair of rigid cam plates 50, of hardened metal or other suitable wear-resisting material, said cam plates being of such shape longitudinally that their maximum retaining effect is exerted at a predetermined point adjacent their front ends and being of such shape transversely that longitudinally disposed grooves 51 are provided therein, one such groove in each cam plate, for the ball members 30 of the arm or link projecting means, the effect of said grooves being to properly guide said ball members and their confining cage sections centrally into the retaining means.

Interposed between each retaining member 40 and its cooperating cam plate 50 is a strip 52 of suitable yieldable material, such as rubber, and interposed between the rear ends of said cam plates and the offset middle portion 43 of the base plate 44 is a strip 53 of such yieldable material, such side strips 52 and such end strip 53 being here shown as of integral construction. In substantially the center of said yieldable end strip 53, in alignment with the base plate opening 46, is a suitable opening 55 for the arm or link 18, the size of said opening 55 being such that undue lateral movement of said arm or link is effectively prevented thereby. As best shown in Fig. 4, the yieldable side strips 52 are provided with suitable recesses 57 to receive the cam plates 50, the rear ends 58 of said recesses being of increased width (Figs. 3, 5 and 7) to permit the corresponding end portions of said cam plates to have limited converging and diverging movement therein.

The cam plates 50 and the yieldable inter-connected strips 52, 53 are adapted to be positioned in and removed from the present retaining means through the open front end thereof, said cam plates and said yieldable strips being releasably maintained in assembly with their associated rigid parts by suitable recesses 60 and by suitable flanges 61 with which the retaining members 40 of said retaining means are provided at their front ends, said recesses being adapted to receive the front ends of the yieldable strips 52 and said flanges being adapted to confiningly engage the front ends of said cam plates 50. Such a construction enables said yieldable strips 52, 53 and said cam plates 50 to be positioned within the present retaining means after securement of the metal members 40 thereof to the metal base plate 44 thereof and after securement of said base plate to the metal post or pillar structure 14, with consequent freedom of any liability of damaging such strips if the securement of such metal parts is effected by welding operations, as will frequently be the case.

Due to the provision of such yieldable strips 52 and 53, the laterally projecting means of the arm or link 18 is yieldingly engaged and yieldingly retained or held by the present retaining means upon opening of the door 10, subject to easy and convenient release thereof, whenever desired, by simple closing movement of said door. When said arm or link projecting means first engages the cam plates 50 of said retaining means upon opening movement of the door 10, said cam plates are not only momentarily moved slightly rearwardly but their rear end portions are swung momentarily outwardly in diverging relation, as shown in Fig. 5, to the outer edges of the widened rear ends 58 of the yieldable side strip recesses 57, with consequent momentary displacement of some of the material of the front end portions of said strips 52 rearwardly and outwardly into the spaces 65 provided therefor between the thinned rear end portions of the yieldable side strips 52 and the corresponding portions of the rigid retaining members 40. Such movement of said cam plates and such displacement of portions of said yieldable strips 52 enable the present retaining means to offer the proper resistance to the arm or link projecting means in effecting both retention and release thereof, all as will be readily understood.

As shown in Figs. 3, 5 and 7, the front ends of the yieldable side strips 52 do not completely fill the recesses 60 of the retaining members 40, and in order to lubricate the ball-engaging surfaces of the cam plates 50, such unfilled portions 60a of said recesses may be supplied with a suitable lubricant, of such character of course that it will not damage such yieldable strips. In the releasable retention of the arm or link projecting means, upon opening of the door 10, the cam plates 50 momentarily become slightly disengaged from the end flanges 61 of the retaining members 40 and this permits a minute quantity of the lubricant to escape to said cam plate surfaces for periodic lubrication thereof in a simple and wholly automatic manner.

In addition to releasably maintaining the door 10 in open position, the present device also yieldingly checks the opening thereof, such checking action being effected by the engagement of the arm or link projecting means with the yieldable end strip 53 which is rigidly backed by the middle portion 43 of the metal base plate 44. The use of a separate door check is therefore unnecessary.

Although the arm or link 18 is here shown as connected to the door 10 and the cooperating retaining means connected to the body post or pillar structure 14, it is to be understood that said arm or link may, and frequently will be, connected to the body post or pillar structure and said retaining means connected to said door, the device being just as satisfactory if such a change is made.

#### What I claim is:

1. A device for releasably retaining in open position a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, projecting means carried by said arm within the other of said members, and retaining means adapted to be secured to said last mentioned member for engaging and releasably retaining said arm projecting means upon opening of said door member, one of said means being provided with a rollable member to make the inter-engagement of said two means of rolling character.

2. A device for releasably retaining in open position a door member hinged on a supporting

member, said device comprising retaining means adapted to be secured to one of said members, an arm adapted to be secured to the other of said members and to extend through said retaining means, and rollable means carried by said arm for rolling engagement with and releasable retention by said retaining means upon opening of said door member.

3. A device for releasably retaining in open position a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, retaining means adapted to be secured to the other of said members, cage means secured to said arm, a pair of opposed rollable members, one on each side of said arm, carried by said cage means and projecting laterally therefrom for rollable engagement with and releasable retention by said retaining means upon opening of said door member, said arm having an opening within said cage means to permit inter-engagement of said rollable members upon engagement thereof with said retaining means, and spring means located within said cage means for normally maintaining said rollable members out of inter-engagement and in yielding contact with said cage means.

4. A device for releasably retaining in open position a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, retaining means adapted to be secured to the other of said members, cage means secured to said arm, a pair of opposed rollable members, one on each side of said arm, carried by said cage means and projecting laterally therefrom for rollable engagement with and releasable retention by said retaining means upon opening of said door member, said arm having an opening within said cage means to permit inter-engagement of said rollable members upon engagement thereof with said retaining means, and spring means arranged in said arm opening for normally maintaining said rollable members out of inter-engagement and in yielding contact with said cage means.

5. A device for releasably retaining in open position a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, retaining means adapted to be secured to the other of said members, and projecting means carried by said arm for engagement with and releasable retention by said retaining means upon opening of said door member, said retaining means including a pair of opposed retaining members of rigid character and in spaced relation for receiving therebetween the projecting means of said arm, rigid cam plates for said retaining members engageable by said arm projecting means, and yieldable means interposed between said retaining members and said cam plates.

6. A device for releasably retaining in open position a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, retaining means adapted to be secured to the other of said members, and projecting means carried by said arm for engagement with and releasable retention by said retaining means upon opening of said door member, said retaining means including a pair of opposed retaining members of rigid character and in spaced relation for receiving therebetween the projecting means of said arm, rigid cam plates for said retaining members engageable by said arm projecting means, and yieldable means interposed between said retain-

ing members and said cam plates, said retaining members being provided with means for releasably maintaining said cam plates in assembly therewith.

7. A device for releasably retaining in open position a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, retaining means adapted to be secured to the other of said members, and projecting means carried by said arm for engagement with and releasable retention by said retaining means upon opening of said door member, said retaining means including a pair of opposed retaining members of rigid character and in spaced relation for receiving therebetween the projecting means of said arm, rigid cam plates for said retaining members engageable by said arm projecting means, and yieldable means interposed between said retaining members and said cam plates, said retaining members being provided with means for releasably maintaining said cam plates and said yieldable means in assembly therewith.

8. A device for releasably retaining in open position a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, retaining means adapted to be secured to the other of said members, and projecting means carried by said arm for engagement with and releasable retention by said retaining means upon opening of said door member, said retaining means including a pair of opposed retaining members of rigid character and in spaced relation for receiving therebetween the projecting means of said arm, rigid base means for said retaining members, rigid cam plates for said retaining members engageable by said arm projecting means, and yieldable means interposed between said cam plates and said retaining members and between said cam plates and said base means.

9. A device for releasably retaining in open position a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, retaining means adapted to be secured to the other of said members, and projecting means carried by said arm for engagement with and releasable retention by said retaining means upon opening of said door member, said retaining means including a pair of opposed retaining members of rigid character and in spaced relation for receiving therebetween the projecting means of said arm, rigid base means for said retaining members, rigid cam plates for said retaining members engageable by said arm projecting means, and one-piece yieldable means interposed between said cam plates and said retaining members and between said cam plates and said base means.

10. A device for releasably retaining in open position and for yieldingly checking the opening of a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, projecting means carried by said arm, and retaining and checking means adapted to be secured to the other of said members and comprising spaced retaining parts of rigid character between which said arm projecting means is releasably retained upon opening of said door member, a checking part of rigid character for checking the movement of said arm projecting means upon opening of said door member, and yieldable means associated with such retaining and checking parts for cooperation with said arm projecting means

in such retention and checking thereof, that part of said yieldable means which is associated with said checking part serving also as a guide for said arm.

11. A device for releasably retaining in open position and for yieldingly checking the opening of a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, projecting means carried by said arm, and retaining and checking means adapted to be secured as a unit to the other of said members and comprising spaced retaining parts of rigid character between which said arm projecting means is releasably retained upon opening of said door member, a checking part of rigid character for checking the movement of said arm projecting means upon opening of said door member, and yieldable means removably associated with such retaining and checking parts for cooperation with said arm projecting means in such retention and checking thereof, that part of said yieldable means which is associated with said checking part being provided with an aperture through which said arm extends and in which said arm is guided.

12. A device for releasably retaining in open position and for yieldingly checking the opening of a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, projecting means carried by said arm, and retaining and checking means adapted to be secured to the other of said members and comprising spaced retaining parts of rigid character between which said arm projecting means is releasably retained upon opening of said door member, rigid cam plates for said retaining parts engageable by said arm projecting means in the retention thereof, a checking part of rigid character for checking the movement of said arm projecting means upon opening of said door member, and yieldable means associated with such retaining and checking parts for cooperation with said arm projecting means in such retention and checking thereof, the association of said yieldable means with said checking part being maintained by said cam plates.

13. A device for releasably retaining in open position a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, projecting means carried by said arm, retaining means adapted to be secured to the other of said members for engaging and releasably retaining said arm projecting means upon opening of said door member, and means for automatically lubricating those parts of said retaining means which engage said arm projecting means.

14. A device for releasably retaining in open position a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, projecting means carried by said arm, retaining means adapted to be secured to the other of said members for engaging and releasably retaining said arm projecting means upon opening of said door member, and a lubricant reservoir in said retaining means from which lubricant is automatically and periodically supplied to those parts of said retaining means which engage said arm projecting means.

15. A device for releasably retaining in open position a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, projecting means carried by said arm, and retaining means

adapted to be secured to the other of said members for engaging and releasably retaining said arm projecting means upon opening of said door member, said retaining means comprising a pair of rigid retaining members in spaced relation for receiving therebetween said arm projecting means, a pair of rigid cam plates movably associated with said retaining members and engageable by said arm projecting means in the releasable retention thereof, and yieldable means interposed between said retaining members and said cam plates and having portions thereof normally separated from said retaining members to provide spaces into which some of the material of said yieldable means may be momentarily pressed by said cam plates during engagement thereof with said arm projecting means.

16. A device for releasably retaining in open position a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, projecting means carried by said arm, and retaining means adapted to be secured to the other of said members for engaging and releasably retaining said arm projecting means upon opening of said door member, said retaining means comprising a pair of rigid retaining members in spaced relation for receiving therebetween said arm projecting means, a pair of rigid cam plates movably associated with said retaining members and engageable by said arm projecting means in the releasable retention thereof, and yieldable means interposed between said retaining members and said cam plates and having portions thereof cut away to provide spaces into which some of the material of said yieldable means may be momentarily pressed by said cam plates during engagement thereof with said arm projecting means.

17. A device for releasably retaining in open position a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, retaining

means adapted to be secured to the other of said members, cage means carried by said arm, a rollable member carried by said cage means and projecting laterally therefrom for rolling engagement with and releasable retention by said retaining means upon opening of said door member, and means providing a rigid backing for said rollable member upon its engagement with said retaining means.

18. A device for releasably retaining in open position a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, retaining means adapted to be secured to the other of said members, cage means carried by said arm, a rollable member carried by said cage means and projecting laterally therefrom for rolling engagement with and releasable retention by said retaining means upon opening of said door member, yieldable means normally providing a yieldable backing for said rollable member, and means providing a rigid backing for said rollable member upon its engagement with said retaining means.

19. A device for releasably retaining in open position a door member hinged on a supporting member, said device comprising an arm adapted to be secured to one of said members, retaining means adapted to be secured to the other of said members, cage means carried by said arm, a pair of opposed rollable members carried by said cage means and projecting laterally therefrom for rolling engagement with and releasable retention by said retaining means upon opening of said door member, and yieldable means normally maintaining said rollable members in spaced relationship, the space normally between said rollable members being such that they interengage upon their engagement with said retaining means, thereby enabling each rollable member to serve as a rigid backing for the other.

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