Oct. 29, 1940. R. I. SCHONITZER 2,219,822

DOOR OPENING, DOOR CHECKING, AND DOOR HOLDING DEVICE

Filed Feb. 5, 1940 2 Sheets-Sheet 1

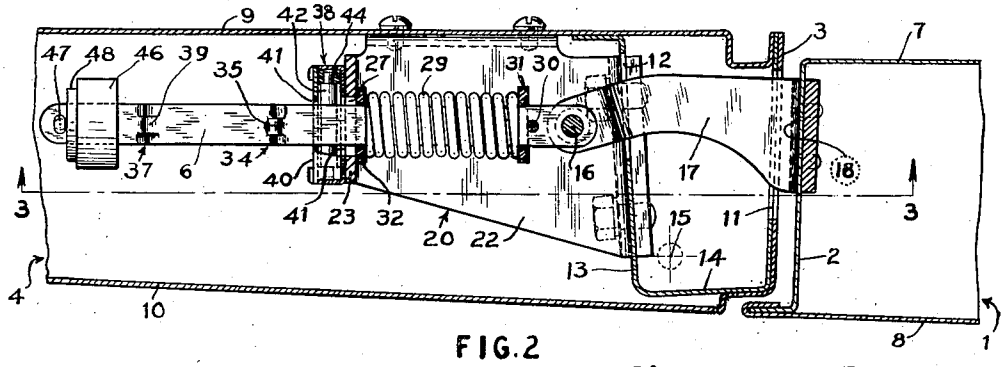


FIG. 2

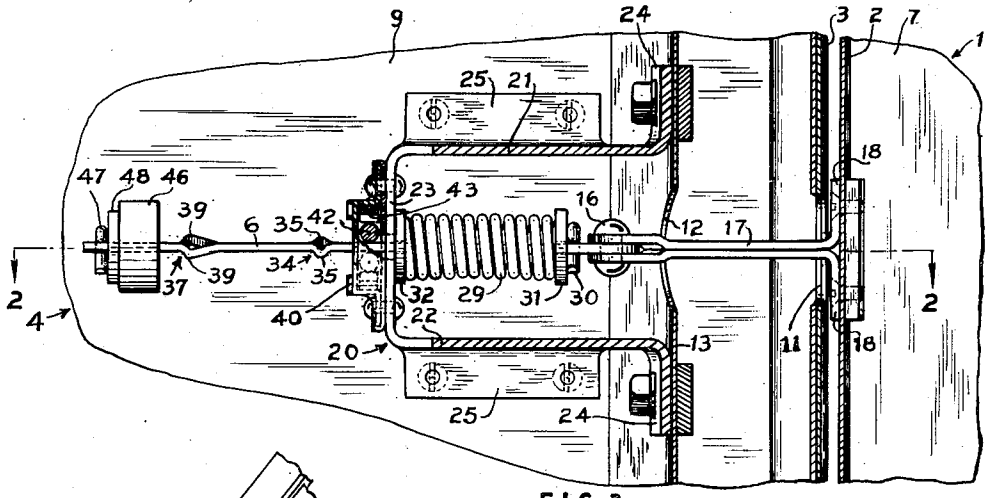


FIG. 3

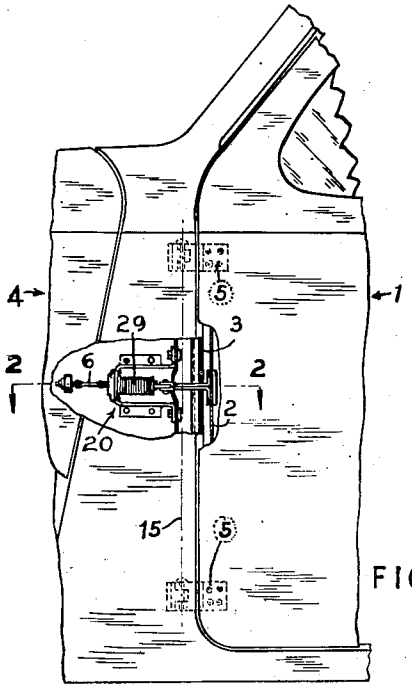


FIG. 1

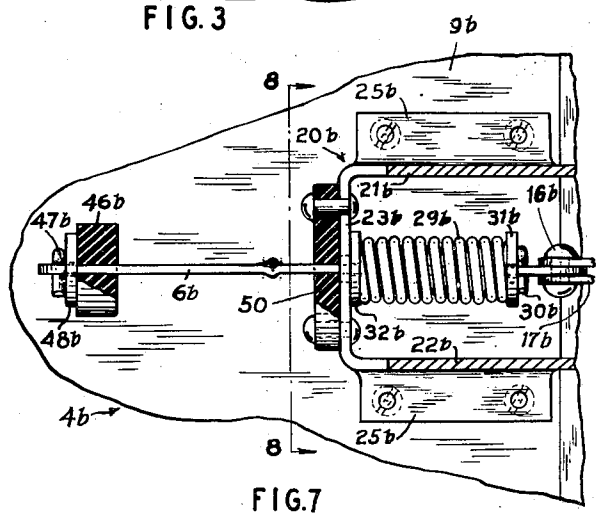


FIG. 7

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DOOR OPENING, DOOR CHECKING, AND DOOR HOLDING DEVICE

Filed Feb. 5, 1940 2 Sheets-Sheet 2

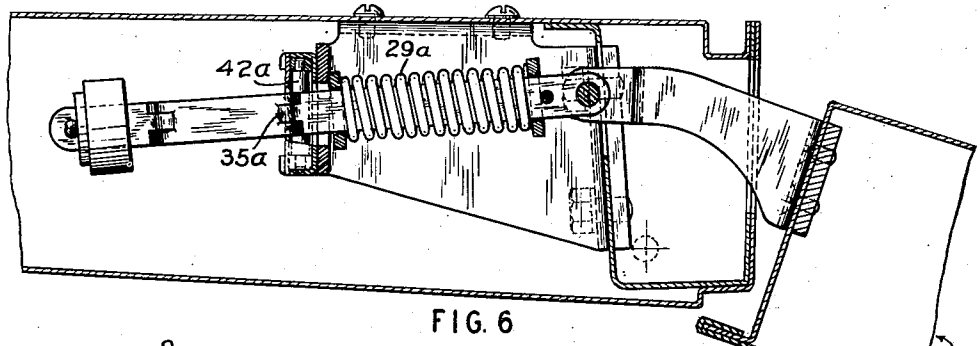


FIG. 6

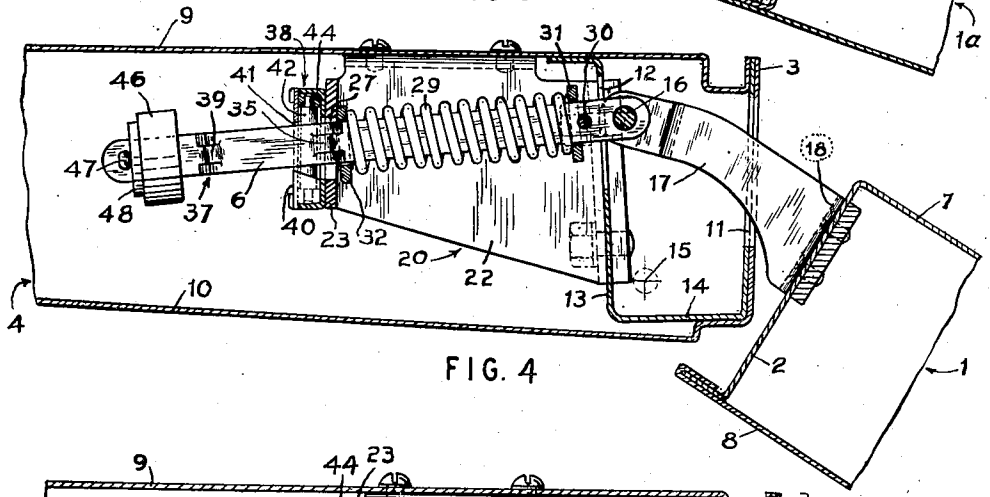


FIG. 4

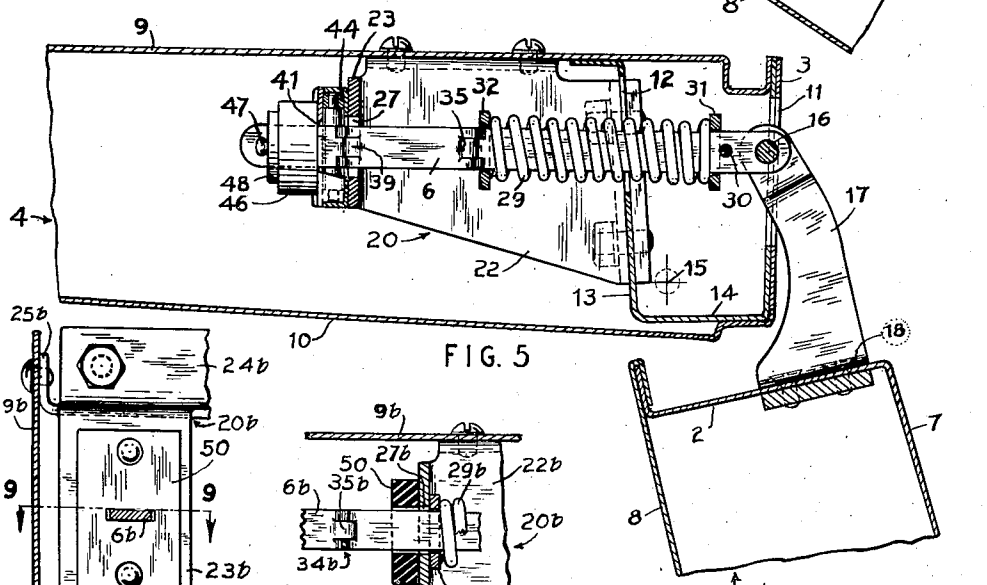


FIG. 5

FIG. 8

FIG. 9

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UNITED STATES PATENT OFFICE

2,219,822

DOOR OPENING, DOOR CHECKING, AND DOOR HOLDING DEVICE

Rudolph I. Schonitzer, Shaker Heights, Ohio

Application February 5, 1940, Serial No. 317,298

20 Claims. (Cl. 16—86)

This invention relates to combined door opening, door checking and door holding devices, although the present invention embraces and includes devices which have no door checking function and which, therefore, are merely combined door opening and door holding devices. As will hereinafter more fully appear, although devices embodying the present invention are applicable for use with doors in general, they are especially applicable for use with doors which are so hinged on their supporting structures that the hinge edge walls of said doors and the hinge edge walls of their supporting structures are in oppositely positioned or generally abutting relationship when said doors are in their closed positions, such as the doors of automobiles and the like for example.

One of the objects of the present invention is the provision of a device which is effective, upon the unlatching of the door with which it is used, to automatically move said door to any desired open position, either a predetermined partially open position of said door (with further opening movement thereof being manually effected) or the fully open position of said door.

Another object of the present invention is the provision of a device which not only is effective, upon the unlatching of the door with which it is used, to automatically move said door to any desired predetermined open position, but which also is effective, upon the movement of said door (either automatically or manually) to its fully open position, to yieldingly or otherwise check or arrest further opening movement of said door.

Another object of the present invention is the provision of a device which not only automatically moves to a predetermined open position the door with which it is used, upon the unlatching of said door, but which also yieldingly resists, to any desired degree, the closing of said door from the predetermined open position to which it is automatically movable.

Another object of the present invention is the provision of a device which automatically moves to a predetermined partially open position the door with which it is used, upon the unlatching of said door, and which also releasably holds or retains said door in its fully open position whenever it is manually moved thereto.

Another object of the present invention is the provision of a device which automatically moves to a predetermined partially open position the door with which it is used, upon the unlatching of said door; which yieldingly resists the closing of said door from such partially open position; and which releasably holds or retains said door in its fully open position whenever it is manually moved thereto.

Another object of the present invention is the provision of a device which automatically moves to a predetermined partially open position the door with which it is used, upon the unlatching of said door; which releasably holds or retains said door in such partially open position; and which releasably holds or retains said door in its fully open position whenever it is manually moved thereto.

Another object of the present invention is the provision of a device which automatically moves to a predetermined partially open position the door with which it is used, upon the unlatching of said door, said door being manually movable to its fully open position; which yieldingly resists the closing of said door from the partially open position to which it is automatically movable; which checks or arrests the movement of said door when it reaches its fully open position; and which releasably holds or retains said door in its fully open position whenever it is moved thereto.

Other features of the here illustrated devices embodying the present invention are their structural simplicity, which enables them to be made and sold at low cost; their strong and rugged character, which enables them to have an exceedingly long life in service, without requiring attention from time to time; and the efficiency with which they perform their door opening function, their door checking function and their door holding function.

Further features of devices embodying the present invention are in part obvious and in part will appear from the following description of three of such devices, reference being had to the accompanying drawings, in which

Fig. 1 is an outside elevation of a portion of a left front automobile door and that portion of the automobile body on which said door is hinged, parts of the outer side walls of said door and body portions being broken away to expose the combined door opening, door checking and door holding device associated therewith, the door being in its closed position; Fig. 2 is a horizontal sectional view, on an enlarged scale, through such door and body portions, the view being substantially on the line 2—2, Figs. 1 and 3; Fig. 3 is a vertical sectional view through such door and body portions, on the line 3—3, Fig. 2; Fig. 4 is a view corresponding to Fig. 2 but showing said door in the predetermined

partially open position to which it is here automatically movable, Fig. 5 is a view corresponding to Figs. 2 and 4 but showing said door in its fully open position, to which it is here manually movable; Fig. 6 is a view similar to Fig. 4 but showing a slightly modified device embodying the present invention, the portion of the left front automobile door there shown being in the predetermined partially open position to which it is here automatically movable; Fig. 7 is a vertical sectional view through an automobile body portion on which is hinged a left front automobile door, and with which door and its supporting body portion is associated another form of device embodying the present invention, the door (not shown) being in its closed position; Fig. 8 is a detail vertical sectional view through the body portion of Fig. 7, the view being on the line 8—8, Fig. 7; and Fig. 9 is a detail horizontal sectional view on the line 9—9, Fig. 8.

Before the present invention is described in detail, it is to be understood that such invention is not limited to the details of construction or the specific arrangement of parts herein illustrated 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.

Although devices embodying the present invention are applicable for use with doors in general, such devices are especially applicable for use with doors having their hinge edge walls oppositely positioned or in generally abutting relationship with respect to the hinge edge walls of their supporting structures, (the structures on which said doors are hinged), such as automobile doors or the like, and for purposes of illustration and not of limitation, the use of three of such devices with present-day automobile doors is here shown and described.

Referring first to Figs. 1 to 5 inclusive, the reference numeral 1 designates a portion of a left front automobile door, said door having its transverse front edge wall 2 suitably hinged, as is usual, on the transverse rear edge 3 of that portion of the automobile body shown in Figs. 1 to 5 inclusive and designated generally by the reference numeral 4, the use of concealed hinges 5 being used for that purpose and the hinge axis 15 of said door being indicated in Figs. 1, 2, 4 and 5. As best shown in Fig. 2, when the door 1 is in its closed position, the door and body edge walls 2 and 3 (which edge walls are hereinafter termed "hinge edge walls") are in oppositely positioned or generally abutting relationship, by which is meant that such hinge edge walls are oppositely positioned or disposed and either in actual contact or, as here shown, relatively close to each other.

Although any suitable means may be utilized for releasably retaining the door 1 in its closed position (the position of said door in Figs. 1 to 3 inclusive) and for actuating said retaining means to release said door for opening movement, (said retaining means being hereinafter referred to broadly as "latch means"), devices embodying the present invention are particularly useful in conjunction with doors whose latch means have push-buttons or the like for effecting release actuation of said latch means, as the movement of said doors, either to predetermined partially open positions thereof or to their fully open positions, is automatically effected by the present devices. Projecting door handles, by the use of which present-day automobile doors are unlatched and manually opened, not only are dangerous (in that many severe injuries have been caused by them) but also, said projecting handles seriously interfere with the streamlining effects now desired for automobile bodies. Inasmuch as devices embodying the present invention automatically effect, upon the unlatching of the doors with which they are used, the opening of said doors to any desired extent, the use for such door of the present-day handles for door opening purposes is wholly unnecessary. As a result, simple push-buttons or the like, desirable from many standpoints, may be used with the latch means of doors with which are used the devices here involved.

The latch means, therefore, of the automobile door 1 of Figs. 1 to 5 inclusive may be, and preferably is, of the type in which push-buttons or the like are utilized for effecting release actuation thereof. For example, said latch means may be of the form disclosed in my copending application for Door opening devices, filed August 21, 1939, Serial No. 291,240, or in other words, latch means embodying the invention of my prior Patent No. 2,094,413, for Door control mechanism, to which patent reference may be had, if desired. However, inasmuch as the latch means of the door 1 forms no part of the present invention, no latch means for said door is here shown or described.

As will hereinafter more fully appear, each of the devices here illustrated is of simple and inexpensive character and of such compact form that it may be easily and conveniently mounted between the general planes of the inner and outer side walls of an automobile door and the general planes of the inner and outer side walls of that portion of the automobile body on which said door is hinged, there being (see Fig. 2) more or less alignment of the outer side wall of such a door and the outer side wall of such a body portion and more or less alignment of the inner side wall of such a door and the inner side wall of such a body portion, when said door is in its closed position.

As a result, the devices here illustrated not only are eminently satisfactory from structural and functional standpoints but also, are commercially practical for present-day automobile doors, as such devices are concealed from view when the doors with which they are used are in their closed positions, and are exposed to such a limited extent when said doors are in their fully open positions as to be wholly unobjectionable.

Although devices embodying the present invention may take various forms, the combined door opening, door checking and door holding device of Figs. 1 to 5 inclusive comprises an arm 6, the rear end of which is pivotally connected, in any suitable manner and by any suitable means, to the automobile door 1 between the general planes of its inner and outer side walls 7 and 8, the general plane of each such side wall, as that term is here used, being the plane which not only includes such side wall but which also extends therebeyond. The free or forward end portion of said arm lies within the automobile body portion 4 and hence is located between the general planes of its inner and outer side walls 9 and 10, there being, for the extension of said arm into said body portion, a suitable opening 11 in the hinge edge wall 3 of said body portion and a suitable opening 12 in the transverse wall

13 of a sheet metal reenforcement pillar 14 with which such body portion is here provided. As here shown, the arm 6 (which is here of generally flat form and which may be of any suitable material, such as metal) has its rear end pivotally connected, by the use of a rivet 16 or the like, to the forward end of a longitudinally bent or arcuately shaped sheet metal bracket 17, the diverging base flanges 18 of which bracket are screwed, welded or otherwise suitably secured to the door hinge edge wall 2.

Arranged within the automobile body portion 4 is a generally U-shaped sheet metal bracket 20 having upper and lower side walls 21 and 22 and a front wall 23 by which said side walls are connected at their forward ends, the side walls of said bracket being generally horizontal and the front end wall of said bracket being generally vertical, as here shown. For the securement of said bracket to the automobile body portion 4, the bracket side walls 21 and 22 are here provided at their rear ends with diverging flanges 24, which are bolted or otherwise suitably secured to the transverse pillar wall 13, and said bracket side walls are also here provided at their inner sides with diverging flanges 25, which are screwed or otherwise suitably secured to the inner side wall 9 of said automobile body portion. As best shown in Figs. 1 and 3, the arm 6, the disposition of which is generally horizontal, lies between the upper and lower bracket side walls 21 and 22 and extends through a suitable aperture 27 in the generally vertical bracket front wall 23.

For automatically moving the door 1 to any desired predetermined open position, upon the unlatching of said door, the device of Figs. 1 to 5 inclusive is provided with expansible means in the form of a coiled compression spring 29 which surrounds, as here shown, the arm 6. Although the rear end of said spring may abut, if desired, any suitable part of the door 1, including its hinge edge wall bracket 17 or the rivet 16 by which the arm 6 is pivotally connected to said bracket, the rear end of said spring here bears against suitable abutment means with which said arm is provided adjacent its pivotal axis. As here shown, said arm abutment means comprises a cotter pin 30 or the like, and although said cotter pin may be directly engaged by the rear end of said spring, a sheet metal washer 31 or the like, suitably mounted on said arm, is here interposed between said cotter pin and the rear end of said spring. Loosely mounted on said arm between the front end of said spring and the body bracket wall 23 is a sheet metal washer 32 or the like which, by its engagement with said body bracket wall, enables said spring to perform, as will hereinafter appear, its door opening function.

When the door 1 is in its closed position (the position of said door in Figs. 1 to 3 inclusive), said spring and the end washers 31 and 32 therefor are confined between two fixed abutments, one (the cotter pin 30) carried by the arm 6 and hence movable with said door, and the other (the bracket front end wall 23) carried by the automobile body portion 4. When said door is in such closed position, said spring is in its fully compressed or "loaded" condition, and upon the unlatching of said door, said spring is effective to automatically open said door, as will be readily understood.

Although the device of Figs. 1 to 5 inclusive may effect, if desired and as will hereinafter appear, the automatic movement of the door 1 to its fully open position, said device here effects the movement of said door to a predetermined partially open position.

In order to enable the spring 29 of said device to automatically move the door 1 to a predetermined partially open position, and no further, the arm 6 is here provided with suitable means, such as the projecting means 34 on an intermediate portion of said arm, for replacing, when said door reaches such partially open position, the body bracket wall 23 as the front abutment for said spring. Although said arm projecting means 34 may be of any suitable form, it here comprises three generally V-shaped projections 35 which, if desired, may be economically formed by a simple stamping operation, there being two such projections 35 on the lower face of the arm 6 (one along each longitudinal edge thereof) and one such projection 35 on the upper face of said arm, said upper projection being located opposite the space between the two lower projections and hence being in balanced relation therewith.

The location of the arm projections 35 is such that said projections engage the washer 32 at the front end of the compression spring 29 when the door 1 has been automatically moved by said spring to the desired partially open position, and the replacement of the body bracket wall 23 by said arm projections as the front abutment for said spring renders said spring ineffective to produce further opening movement of said door, as both abutments for said spring are then carried by said arm. Therefore, although said door may be manually opened further, such as to its fully open position, if desired, the compression spring 29, as here shown, is permitted to move said door only to a predetermined partially open position, such as to the position which said door occupies in Fig. 4, for example. The extent to which said door is automatically opened by said spring depends, of course, upon the distance between the arm projections 35 and the washer 32 when said door is in its closed position, and as such distance may be controlled, as desired, by the location of such projections, the partially open position to which said door is automatically movable by said spring may be easily and conveniently predetermined, as will be readily understood.

During the closing of the door 1 from the predetermined partially open position to which it is automatically movable by the compression spring 29, the washer 32 at the front end of said spring engages the body bracket wall 23, and such bracket wall again becomes the front abutment for said spring. As a result, during such closing movement of said door, the spring 29 is compressed or "loaded" to the desired extent, and thereby put in condition to effect, upon the unlatching of said door, the automatic movement of said door to the predetermined partially open position heretofore referred to.

In addition to automatically moving the door 1 to a predetermined open position, a partially open position, as here shown, the compression spring 29 yieldingly resists the closing of said door from the open position, (a partially open position, as here shown) to which said door is automatically movable. Inasmuch as the resistance of said spring to closing movement of said door depends upon its compression resistance, and inasmuch as the compression resistance thereof may be controlled, as desired, the door closing resistance of said spring may be easily and conveniently predetermined, as will be readily understood.

For yieldingly resisting to any desired degree the closing of the door 1 from a predetermined further open position to which said door is here manually movable, such as its fully open position, as here shown, the device of Figs. 1 to 5 inclusive is provided with cooperable retainable means 37 and retaining means 38, one of which is carried by the arm 6 and the other of which is carried by the automobile body portion 4 into which said arm extends. Although said retainable means and said retaining means may be of any suitable form, they are here of the form disclosed in my copending application for Combined door checking and door holding devices, filed July 27, 1938, Serial No. 221,570.

The retainable means 37, which is carried by the forward or free end portion of the arm 6, comprises three projections 39, the form and arrangement of which generally correspond with those of the arm projections 35, as clearly shown in Figs. 2 and 3. The retaining means 38 comprises a generally flat sheet metal casing 40 which is here riveted or otherwise suitably secured to the body bracket wall 23, said casing lying alongside the front face of said bracket wall and being provided with suitable apertures 41, in alignment with the bracket wall aperture 27, for the extension therethrough of the arm 6. Located within said casing is a pair of generally parallel elongated rollers 42 between which said arm extends, and also, suitable resilient means, such as the leaf springs 43, for yieldingly maintaining said rollers in engagement with the upper and lower faces of said arm, said leaf springs being effective on said rollers by their engagement with suitable journal bearings 44 with which said rollers are here provided.

During the manual movement of the door 1 to its fully open position, from the predetermined partially open position to which said door is automatically movable by the compression spring 29, the arm projections 35 and 39 pass in turn between the retaining rollers 42, the leaf springs 43 for said rollers yielding sufficiently for such purpose. As here shown, the location of the retainable arm projections 39 is such that the door 1 reaches its fully open position just after said retainable projections pass between the retaining rollers 42, with the result that said rollers are located, when said door is in its fully open position, just in front of said retainable projections, as clearly shown in Fig. 5. As a consequence, said retaining rollers yieldingly resist forward movement of the arm 6 and hence, closing movement of the door 1 to which said arm is connected, the degree of such resistance being predetermined, as desired, and as will be readily understood.

For yieldingly or otherwise checking or arresting the manual opening movement of the door 1, when said door reaches its fully open position, the device of Figs. 1 to 5 inclusive is provided with suitable bumper means, on the forward or free end portion of its arm 6, for checking contact with suitable abutment means with which the automobile body portion 4 is provided. Although said arm bumper means and the body abutment means engaged thereby may both be of rigid character, the effect of which would be the checking or arresting, in a non-yieldable manner, of the manual opening movement of the door 1, it is desirable to have either said arm bumper means or said body abutment means, or both, of resilient character, in order that the manual opening movement of said door may be yieldingly checked or arrested.

As here shown, the bumper means of the arm 6 comprises a bumper member in the form of a rubber block 46, the retention of which block on the forward or free end portion of said arm is here effected by a cotter pin 47 or the like with which said arm is provided, a metal washer 48 being interposed, if desired and as here shown, between said cotter pin and said bumper block. The body abutment means which is engaged by said arm bumper block for door checking purposes here comprises the sheet metal casing 40 of the retaining means 38, said casing, as heretofore pointed out, being mounted on the front face of the body bracket wall 23.

Upon the manual movement of the door 1 to its fully open position, therefore, the resilient arm bumper block 46 yieldingly engages the casing 40 of the retaining means 38, and as a result, such manual opening movement of said door is yieldingly checked or arrested. Therefore, the device of Figs. 1 to 5 inclusive makes wholly unnecessary use of separate checking means for the door 1, as will be readily understood.

As best shown in Fig. 5, the distance between the arm bumper block 46 and the retainable arm projections 39 is such that when the door 1 is in its fully open position, said arm bumper block is in engagement with the casing 40 of the retaining means 38, and the retaining rollers 42 within said casing are in engagement with said retainable arm projections. As a consequence, said door is releasably held or retained in such fully open position, although manual closing movement of said door can be easily effected, as desired.

In addition to cooperating with the retainable arm projections 39 in yieldingly resisting manual closing movement of the door 1 from its fully open position, the retaining rollers 42 also cooperate with the intermediate arm projections 35 in yieldingly resisting manual closing movement of said door from the predetermined partially open position to which it is automatically movable by the compression spring 29. As clearly shown in Fig. 4, when the door 1 is in such partially open position, the retaining rollers 42 are located just in front of the arm projections 35 and hence aid or supplement the compression spring 29 in yieldingly resisting the forward movement of the arm 6 and the closing movement of said door from such predetermined partially open position.

From the foregoing description of the device of Figs. 1 to 5 inclusive, it will be apparent that said device automatically effects, upon the unlatching of the door 1, the movement of said door to a predetermined partially open position; that said device yieldingly resists (to the degree desired) the closing of said door from such partially open position, so that if said door has a normal tendency to close, like most present-day automobile doors, it will remain in such partially open position unless it is manually closed or manually moved to a further open position; that said device yieldingly checks or arrests the opening movement of said door when it reaches its fully open position (a position to which said door is manually movable); and that said device releasably holds or retains said door in its fully open position whenever it is moved thereto.

If it is desired that the device of Figs. 1 to 5 inclusive automatically effect the movement of the door 1 to its fully open position, it is merely necessary to eliminate from such device the washer 32 at the front end of its compression spring 29, and to insure that the strength or expansion force of said spring is sufficient to pull between the re-

taining rollers **42** not only the arm projections **35** (which may be eliminated, if desired) but also, the arm projections **39**, as will be readily understood.

Furthermore, if it is desired to eliminate from the device of Figs. 1 to 5 inclusive its door checking function, it is merely necessary to eliminate therefrom its arm bumper block **46**, it being understood that the opening movement of the door with which such device is used (such as the door **1**, as here shown) will be checked or arrested in some suitable manner and by some suitable means when said door reaches the position which is to constitute its fully open position.

Referring now to the device illustrated in Fig. 6, it will be noted that such device is seemingly identical with the device of Figs. 1 to 5 inclusive. There is, however, one difference, and that difference is that the force of expansion of the coiled compression spring **29***a* of the device of Fig. 6 is less than that of the coiled compression spring **29** of the device of Figs. 1 to 5 inclusive. As indicated in Fig. 6, the coiled compression spring **29***a* of the device there shown is incapable of pulling the arm projections **35***a* through the retaining rollers **42***a* and as a result, the partially open position to which the left front automobile door **1***a* is automatically movable by said spring is determined by the engagement of said arm projections with said retaining rollers. Inasmuch as said retaining rollers yieldingly resist the further opening movement of the door **1***a*, when said door is in such predetermined partially open position, and inasmuch as the compression spring **29***a* yieldingly resists the closing movement of said door from such partially open position, said door will be releasably held or retained in such partially open position whenever it is moved thereto, irrespective as to whether or not said door has a normal tendency to close. Otherwise, the device of Fig. 6 is identical with the device of Figs. 1 to 5 inclusive, and no further reference to the device of Fig. 6 is therefore believed to be necessary.

It is not essential, of course, that all devices embodying the present invention be capable of releasably holding or retaining in their fully open positions the doors with which such devices are used. In Figs. 7 to 9 inclusive, therefore, a device is illustrated which differs from the device of Figs. 1 to 5 inclusive chiefly in that it has no means for releasably holding or retaining in its fully open position the door (not shown) with which such device is used. In other words, the arm retainable means **37** and the body retaining means **38** of the device of Figs. 1 to 5 are omitted in the device of Figs. 7 to 9. In other respects, however, the device of Figs. 7 to 9 corresponds to the device of Figs. 1 to 5, and for convenient reference, the parts which the device of Figs. 7 to 9 does include are indicated by reference designations which differ from the reference numerals for the corresponding parts of the device of Figs. 1 to 5 only by the addition of the suffix letter *b*. Inasmuch as the device of Figs. 7 to 9 will be readily understood from the foregoing detailed description of the device of Figs. 1 to 5, no further reference to the device of Figs. 7 to 9 is believed to be necessary, although it should be pointed out that the arm bumper block **46***b* of the device of Figs. 7 to 9 engages, for door checking purposes, a resilient pad **50** with which the body bracket wall **23***b* is here provided, said pad being riveted or otherwise suitably secured to said bracket wall and lying alongside the front face thereof, as shown.

Although the arms of the devices here illustrated are pivotally connected to the doors with which such devices are used, and extend into the automobile body portions on which said doors are hinged, said arms may, if desired, be pivotally connected to such body portions and extend into such doors, all as will be readily understood.

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. A device for automatically moving to a partially open position a closed but unlatched door structure hinged on a supporting structure and for releasably holding said door structure against closing movement when said door structure is in a further open position, said device comprising an arm pivotally secured to one of said structures and extending into the other structure, expansible means carried by said arm and cooperable with the structure into which said arm extends for automatically effecting the movement of the door structure, when closed and unlatched, to a partially open position, said door structure being manually movable to a further open position and said expansible means being in at least a partially loaded condition during such manual movement of said door structure, and means cooperable with said arm for releasably holding said door structure against closing movement when it has been manually moved to such further open position.

2. A device for automatically moving to a partially open position a closed but unlatched door structure hinged on a supporting structure and for checking the opening movement of said door structure when it has been manually moved to a further open position, said device comprising an arm pivotally secured to one of said structures and extending into the other structure, expansible means carried by said arm and cooperable with the structure into which said arm extends for automatically effecting the movement of the door structure, when closed and unlatched, to a partially open position, said door structure being manually movable to a further open position and said expansible means being in at least a partially loaded condition during such manual movement of said door structure, and means carried by said arm and cooperable with the structure into which said arm extends for checking the opening movement of the door structure when it has been manually moved to such further open position.

3. A device for automatically moving to a partially open position a closed but unlatched door structure hinged on a supporting structure and for checking the opening movement of said door structure when it has been manually moved to a further open position and for releasably holding such door structure against closing movement when it is in such further open position, said device comprising an arm pivotally secured to one of said structures and extending into the other structure, expansible means carried by said arm and cooperable with the structure into which said arm extends for automatically effecting the movement of the door structure, when closed and unlatched, to a partially open position only, said door structure being manually movable to a further open position and said expansible means being in at least a partially loaded condition during such manual movement of said door structure, means carried by said arm and cooperable

with the structure into which said arm extends for checking the opening movement of the door structure when it has been manually moved to such further open position, and means for cooperation with said arm in releasably holding said door structure against closing movement when said door structure is in such further open position.

4. A device for automatically moving to a partially open position a closed but unlatched door structure hinged on a supporting structure, said device comprising an arm pivotally secured to one of said structures and extending into the other structure, expansible means cooperable with said arm for automatically effecting the movement of the door structure, when closed and unlatched, to a partially open position only, said door structure being manually movable to a further open position, and other means cooperable with said arm for releasably holding said door structure against closing movement when it is in the partially open position to which it is automatically movable and for releasably holding said door structure against closing movement when it is in the further open position to which it is manually movable.

5. A device for automatically moving to a partially open position a closed but unlatched door structure hinged on a supporting structure and capable of being moved to a further open position, said device comprising an arm pivotally secured to one of said structures and extending into the other structure, compression spring means carried by said arm for automatically effecting, when loaded to the desired degree, opening movement of said door structure, when closed and unlatched, and means for limiting the automatic opening movement of said door structure to such an extent that said door structure is automatically movable to a partially open position only, said last named means also serving to maintain said spring means in at least a partially loaded condition at all times.

6. A device for automatically moving to a predetermined open position a closed but unlatched door structure hinged on a supporting structure, said device comprising expansible means, means carried by said supporting structure and constituting one abutment for said expansible means, means movable with said door structure and constituting an opposing abutment for said expansible means, said expansible means when effective on said abutments being capable of automatically moving the door structure, if closed and unlatched, in an opening direction, and other means movable with said door structure for replacing, when said door structure reaches a predetermined open position, the aforesaid means of said supporting structure as an abutment for said expansible means, whereby said expansible means is rendered ineffective to produce further opening movement of said door structure.

7. A device for automatically moving to a predetermined open position a closed but unlatched door structure hinged on a supporting structure, said device comprising an arm pivotally secured to one of said structures and extending into the other structure, expansible means, means associated with the structure into which said arm extends and constituting one abutment for said expansible means, means constituting an opposing abutment for said expansible means, said expansible means when effective on said abutments being capable of automatically moving the door structure, if closed and unlatched, in an opening direction, and means carried by said arm for replacing, when said door structure reaches a predetermined open position, the aforesaid means of the structure into which said arm extends as an abutment for said expansible means, whereby said expansible means is rendered ineffective to produce further opening movement of said door structure.

8. A device for automatically moving to a predetermined open position a closed but unlatched door structure hinged on a supporting structure and for yieldingly resisting closing movement of said door structure when it has been automatically moved to such position, said device comprising an arm pivotally secured to one of said structures and extending into the other structure, expansible means, means associated with the structure into which said arm extends and constituting one abutment for said expansible means, means constituting an opposing abutment for said expansible means, said expansible means when effective on said abutments being capable of automatically moving the door structure, if closed and unlatched, in an opening direction, means carried by said arm for replacing, when said door structure reaches a predetermined open position, the aforesaid means of the structure into which said arm extends as an abutment for said expansible means, whereby said expansible means is rendered ineffective to produce further opening movement of said door structure, and means carried by the structure into which said arm extends and cooperable with the means carried by said arm for yieldingly resisting in one direction the movement of said door structure when said door structure is in such predetermined open position.

9. A device for automatically moving to a predetermined partially open position a closed but unlatched door structure hinged on a supporting structure and capable of being manually moved to a further open position, said device comprising an arm pivotally secured to one of said structures and extending into the other structure, expansible means, means associated with the structure into which said arm extends and constituting one abutment for said expansible means, means constituting an opposing abutment for said expansible means, said expansible means when effective on said abutments being capable of automatically moving the door structure, if closed and unlatched, in an opening direction, means carried by said arm for replacing, when said door structure reaches a predetermined partially open position, the aforesaid means of the structure into which said arm extends as an abutment for said expansible means, whereby said expansible means is rendered ineffective to produce further opening movement of said door structure, retaining means carried by the structure into which said arm extends and cooperable with the means carried by said arm for yieldingly resisting the movement of said door structure in one direction when said door structure is in the predetermined partially open position to which it is automatically movable, and other means carried by said arm and cooperable with said retaining means for yieldingly resisting the closing of said door structure when said door structure is in a predetermined further open position to which it is manually movable.

10. A device for automatically moving to a predetermined partially open position a closed but unlatched door structure hinged on a supporting structure and capable of being manually moved

to a further open position, said device comprising an arm pivotally secured to one of said structures and extending into the other structure, expansible means, means associated with the structure into which said arm extends and constituting one abutment for said expansible means, means constituting an opposing abutment for said expansible means, said expansible mean when effective on said abutments being capable of automatically moving the door structure, if closed and unlatched, in an opening direction, means carried by said arm for replacing, when said door structure reaches a predetermined partially open position, the aforesaid means of the structure into which said arm extends as an abutment for said expansible means, whereby said expansible means is rendered ineffective to produce further opening movement of said door structure, retaining means carried by the structure into which said arm extends and cooperable with the means carried by said arm for yieldingly resisting the movement of said door structure in one direction when said door structure is in the predetermined partially open position to which it is automatically movable, other means carried by said arm and cooperable with said retaining means for yieldingly resisting the closing of said door structure when said door structure is in a predetermined further open position to which it is manually movable, and other means carried by said arm and cooperable with the structure into which said arm extends for checking or arresting the opening movement of said door structure when it reaches its fully open position.

11. A device for automatically moving to its fully open position a closed but unlatched door structure hinged on a supporting structure and for releasably holding said door structure against closing movement when said door structure is in such position, said device comprising expansible means confined between opposed abutments with which said structures are provided, the confinement of said expansible means between said opposed abutments effecting the desired loading of said expansible means during the closing of the door structure and said expansible means when so loaded being effective to automatically move said door structure, when closed and unlatched, to its fully open position, and means independent of said expansible means for releasably holding said door structure against closing when said door structure is in its fully open position.

12. A device for automatically moving to a partially open position a closed but unlatched door structure hinged on a supporting structure and capable of being moved to a further open position, said device comprising compression spring means for automatically effecting, when loaded to the desired degree, opening movement of said door structure, when closed and unlatched, and means cooperable with said compression spring means for limiting the automatic opening movement of said door structure to such an extent that said door structure is automatically movable to a partially open position only, said last named means also serving to maintain said compression spring means in at least a partially loaded condition at all times.

13. A device for automatically moving to a partially open position a closed but unlatched door structure hinged on a supporting structure and capable of being moved to a further open position, said device comprising expansible means cooperable with said structures for automatically effecting, when loaded to the desired degree, opening movement of said door structure, when closed and unlatched, and means for terminating the cooperation of said expansible means with said supporting structure when said expansible means has automatically moved said door structure to such partially open position.

14. A device for automatically moving to a partially open position a closed but unlatched door structure hinged on a supporting structure and capable of being moved to a further open position, said device comprising expansible means cooperable with said structures for automatically effecting, when loaded to the desired degree, opening movement of said door structure, when closed and unlatched, and means for terminating the cooperation of said expansible means with one of said structures when said expansible means has automatically moved the door structure to such partially open position.

15. A device for automatically moving to a partially open position a closed but unlatched door structure hinged on a supporting structure and capable of being moved to a further open position, said device comprising means for automatically effecting the movement of said door structure, when closed and unlatched, to a partially open position, and means for releasably holding said door structure against further opening movement.

16. A device of the character described, comprising means for releasably holding a hinged door structure in a predetermined partially open position and in its fully open position, and means for automatically moving said door structure, when closed and unlatched, to such partially open position.

17. A device of the character described, comprising means including an arm for releasably holding a hinged door structure in a predetermined partially open position and in its fully open position, and means carried by said arm for automatically moving said door structure, when closed and unlatched, to such partially open position.

18. A device of the character described, comprising means including a pivoted arm for releasably holding a hinged door structure in a predetermined partially open position, and compression spring means carried by said arm for automatically moving said door structure, when closed and unlatched, to such partially open position.

19. A device for automatically moving to a predetermined open position a closed but unlatched door structure hinged on a supporting structure and capable of being moved to a further open position, said device comprising an arm pivotally secured to one of said structures and extending into the other structure, abutment means carried by the structure into which said arm extends, expansible means carried by said arm and cooperable wtih said abutment means for automatically effecting the movement of the door structure, when closed and unlatched, to a partially open position, means carried by said arm for terminating the cooperation of said expansible means with said abutment means when said door structure has been moved to said partially open position, and means carried by said abutment means and cooperable with the means carried by said arm for releasably holding said door structure against movement in one direction when said door structure is in such partially open position.

20. A device for automatically moving to a predetermined open position a closed but unlatched

door structure hinged on a supporting structure and capable of being moved to a further open position, said device comprising an arm pivotally secured to one of said structures and extending into the other structure, abutment means carried by the structure into which said arm extends, expansible means carried by said arm and cooperable with said abutment means for automatically effecting the movement of the door structure, when closed and unlatched, to a partially open position, means carried by said arm for terminating the cooperation of said expansible means with said abutment means when said door structure has been moved to said partially open position, and means carried by said abutment means and cooperable with the means carried by said arm for releasably holding said door structure against movement in one direction when said door structure is in such partially open position, and other means carried by said arm and cooperable with the means carried by said abutment means for releasably holding said door structure against closing movement when it is in a further predetermined open position.

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