

Oct. 29, 1940.

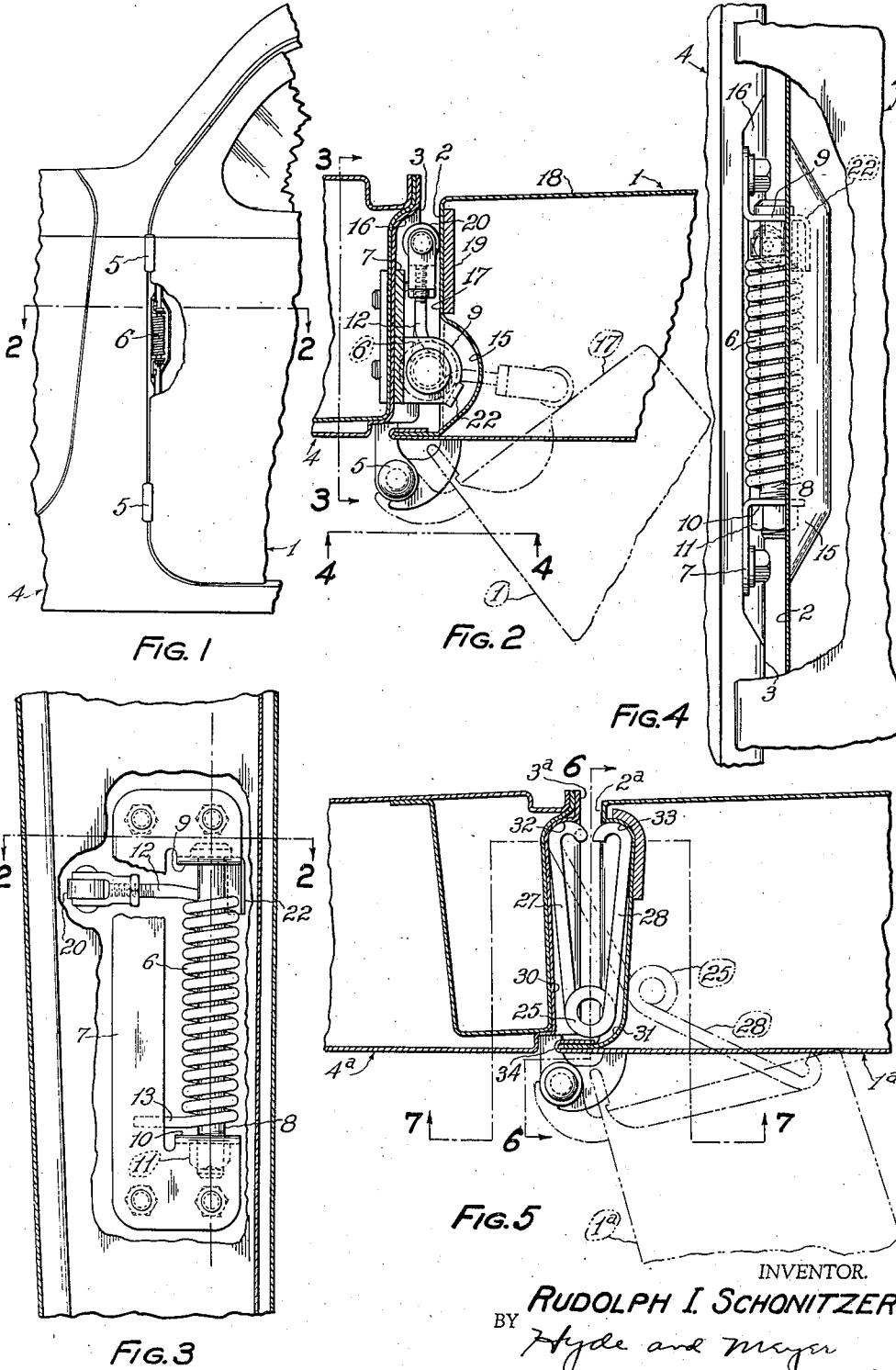
R. I. SCHONITZER

2,219,819

DOOR OPENING DEVICE

Filed Feb. 5, 1940

2 Sheets-Sheet 1



Oct. 29, 1940.

R. I. SCHONITZER

2,219,819

DOOR OPENING DEVICE

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2 Sheets-Sheet 2

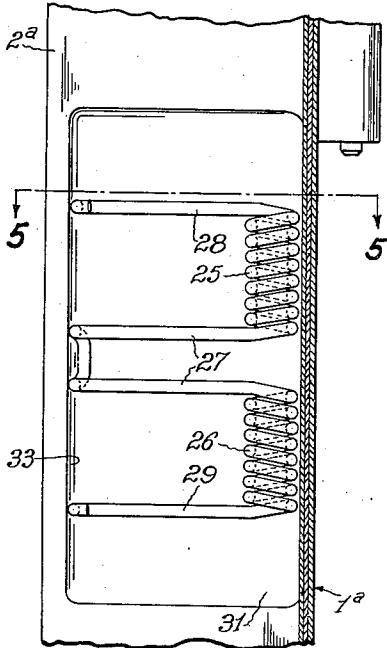


FIG. 6

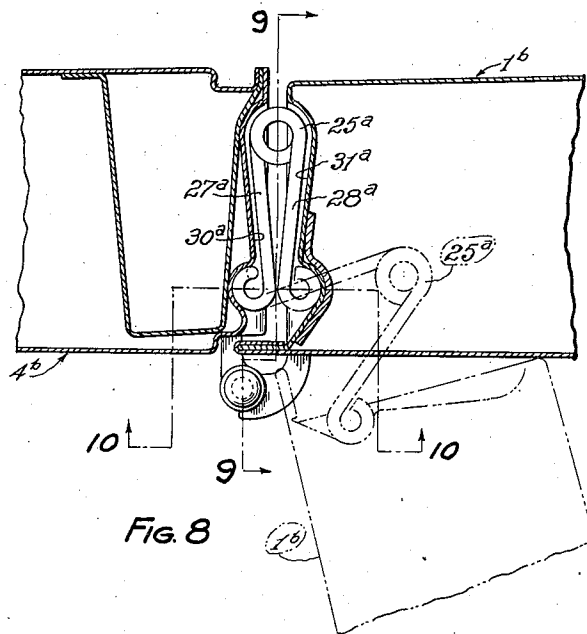


FIG. 8

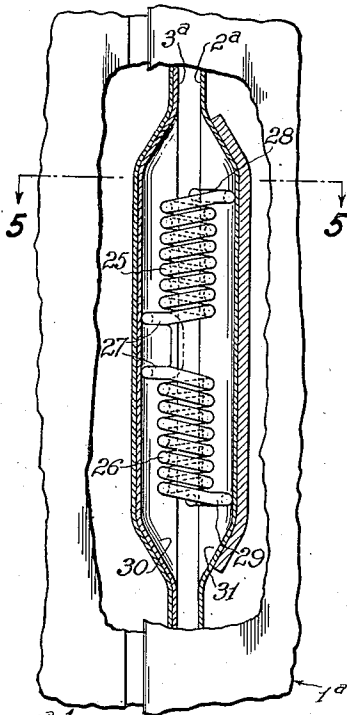


FIG. 7

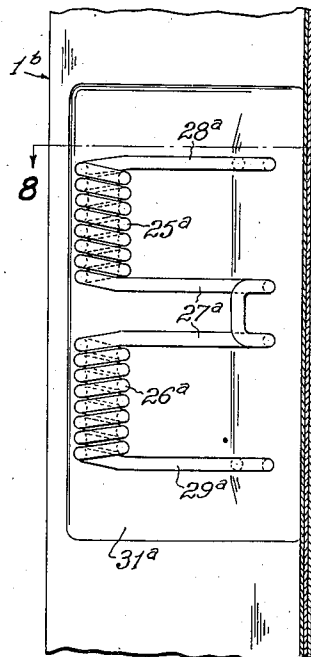


FIG. 9

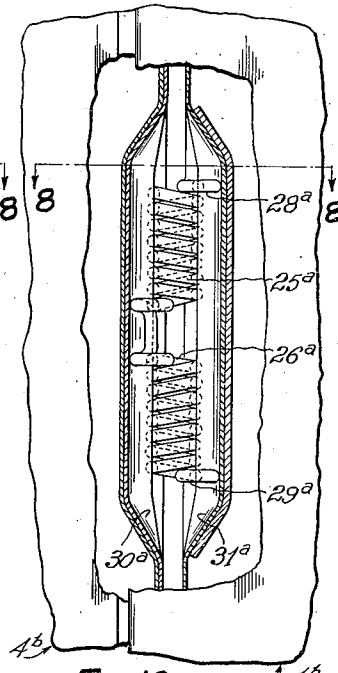


FIG. 10

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UNITED STATES PATENT OFFICE

2,219,819

DOOR OPENING DEVICE

Rudolph I. Schonitzer, Shaker Heights, Ohio

Application February 5, 1940, Serial No. 317,295

7 Claims. (Cl. 16—85)

This invention relates to means for automatically effecting the movement of a hinged door, when closed and unlatched, to an open position, and for yieldingly resisting the closing of said door from the open position (either a partially open position of said door or the fully open position thereof) to which it is automatically movable. More particularly, the present invention relates to means for automatically opening, and yieldingly resisting the closing of, a door which is so hinged on its supporting structure that the hinge edge wall of said door and the hinge edge wall of the supporting structure therefor are in oppositely positioned or generally abutting relationship when said door is in its closed position, such as the door of an automobile or the like, for example.

Briefly stated, the means here involved (which, for convenience, is hereinafter referred to simply as door opening means) includes a torsion spring located between the hinge edge wall of the door to be opened and the hinge edge wall of the supporting structure for said door, said spring having cooperative engagement with said two hinge edge walls (or with said door and its supporting structure in the region of their hinge edge walls) for the performance of its door opening function and its function of yieldingly resisting the closing of the door from the position to which it is automatically opened.

If desired and as here shown, door opening means embodying the present invention may have its torsion spring maintained between and in cooperating engagement with the hinge edge walls of the door to be opened and the structure on which said door is hinged solely by the use of simple and inexpensive sockets or the like with which said hinge edge walls are provided. Although the initial assembly of said spring with such hinge edge walls can be easily and conveniently effected, such assembly thereafter is securely maintained, all as will hereinafter more fully appear.

Other features of the door opening means here illustrated are their structural simplicity; their strong and rugged character, which enables them to have an exceedingly long life without requiring attention from time to time; and the efficiency with which they perform their door opening function and their function of yieldingly resisting door closing movement.

Further features of the present invention are in part obvious and in part will appear from the following description of three door opening means

embodying such invention, 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 an adjacent portion of the automobile body on which said door is hinged, a part of the outer side wall of said door being broken away to expose the door opening means located between and in cooperative engagement with the oppositely positioned hinge edge walls of said door and body portions, the door being in its closed position; Fig. 2 is a horizontal sectional view, on an enlarged scale, through said door and body portions, the view being on the line 2—2, Figs. 1 and 3, and the predetermined position (a partially open position, as here shown) to which said door is automatically movable being indicated in dot-dash lines; Fig. 3 is a vertical sectional view through said body portion, on the line 3—3, Fig. 2, a part of the hinge edge wall of said body portion being broken away to expose said door opening means; Fig. 4 is an outside elevation of said door and body portions, as viewed from the line 4—4, Fig. 2, a part of the outer side wall of said door being broken away to expose said door opening means; Fig. 5 is a view corresponding to Fig. 2 but showing another form of door opening means embodying the present invention, the view being on the line 5—5, Figs. 6 and 7, the fully open position to which the door of Fig. 5 is here automatically movable being indicated in dot-dash lines; Fig. 6 is a vertical sectional view substantially between the hinge edge walls of the door and body portions of Fig. 5, the view being on the line 6—6, Fig. 5; Fig. 7 is a view, partly in elevation and partly in vertical section, of the door and body portions of Fig. 5, the view being on the line 7—7, Fig. 5; Fig. 8 is a view corresponding to Figs. 2 and 5 and showing still another form of door opening means embodying the present invention, the view being on the line 8—8, Figs. 9 and 10, the fully open position to which the door of Fig. 8 is here automatically movable being indicated in dot-dash lines; Fig. 9 is a view corresponding to Fig. 6, as taken on the line 9—9, Fig. 8; and Fig. 10 is a view corresponding to Fig. 7, as taken on the line 10—10, 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 door opening means embodying the present invention is applicable for use with any hinged door having its hinge edge wall oppositely positioned or in generally abutting relationship with respect to the hinge edge wall of its supporting structure (the structure on which said door is hinged), said door opening means is particularly useful, as heretofore pointed out, with the door of an automobile or the like, and for purposes of illustration and not of limitation, the use of three such door opening means with present-day automobile doors is here shown and described.

Referring first to Figs. 1 to 4 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 wall 3 of that portion of the automobile body here shown and designated generally by the reference numeral 4, a pair of exposed hinges 5 being used for that purpose. 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 and for actuating said retaining means to release said door for opening movement, (said retaining means being hereinafter referred to broadly as "latch means"), door opening means embodying the present invention is particularly useful in conjunction with a door whose latch means has push-buttons or the like for effecting release actuation thereof, as said door opening means automatically effects the opening of such door upon the unlatching thereof. 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 each of the door opening means here illustrated automatically effects, upon the unlatching of the door with which it is used, the opening of said door to any desired position, either a partially open position of said door or the fully open position thereof, 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 a door with which is used a door opening means embodying the present invention.

The latch means, therefore, of the automobile door 1 may be, and preferably is, of the type in which push-buttons or the like are utilized for effecting the release actuation of said latch means. For example, said latch means may be of the form disclosed in my copending application for Door opening device, 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 such door is here shown or described.

As will hereinafter more fully appear, each of the door opening means here illustrated is of simple and inexpensive character and capable of being located 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 Figs. 2, 5 and 8) 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, each of the door opening means here illustrated not only is eminently satisfactory from structural and functional standpoints but also, is commercially practical for a present-day automobile door, as such means is concealed from view when said door is in its closed position and its location, and the extent of its exposure, even when said door is in its fully open position, are such as to cause said means to be entirely unobjectionable.

Although door opening means embodying the present invention may take various forms, each of the three door opening means here illustrated includes a helical torsion spring located between and in cooperative engagement with the hinge edge wall of the door to be automatically opened and the hinge edge wall of the structure on which said door is hinged, said hinge edge walls being oppositely positioned or in generally abutting relationship when said door is closed, as heretofore pointed out.

In the door opening means of Figs. 1 to 4 inclusive, the helical torsion spring 6 is a part of a self-contained spring unit which is screwed or otherwise suitably secured either to the hinge edge wall 2 of the automobile door 1 or, as here shown, to the hinge edge wall 3 of the automobile body portion 4. In addition to the torsion spring 6, said spring unit here comprises a suitable bracket, such as the generally C-shaped sheet metal bracket 7, and a pintle bolt 8 which is carried by and suitably secured to said bracket.

As here shown, the upper and lower free end portions of the bracket 7 are provided with rearwardly projecting perforated flanges 9 and 10 through which the pintle bolt 8 extends, the head of said bolt resting upon the upper bracket flange 9 and a clamping nut 11, threaded on the lower end portion of said bolt, engaging from below the lower bracket flange 10. As a result, said bolt is firmly secured to the bracket 7, in a manner which makes easy and convenient the assembly of such parts. The coils of the helical torsion spring 6 surround the pintle bolt 8 between the bracket flanges 9 and 10 by which said bolt is carried, and said spring may be so wound, as will be readily understood, that either its upper end portion or its lower end portion (or an intermediate portion thereof, if desired) may constitute the door opening arm of said spring. As here shown, the winding of the spring 6 is such that its upper end portion 12 constitutes the door opening arm of said spring, said arm having a normal tendency to swing in a clockwise direction, Fig. 2, and thus in the direction of opening movement of the door 1. For the "anchoring" of the lower end portion or arm 13 of the spring 6, any suitable means may be utilized, and inasmuch as the lower end portion or arm of said spring has a normal tendency to swing in

a counter-clockwise direction, Fig. 2, its engagement with the upright intermediate portion of the bracket 7, as shown in Fig. 3, results in an effective anchoring thereof, as will be readily understood.

As heretofore mentioned, the bracket of the spring unit of the door opening means of Figs. 1 to 4 inclusive is here suitably secured to the hinge edge wall 3 of the automobile body portion 4, said unit being outside said body portion and hence between the hinge edge wall thereof and the hinge edge wall 2 of the automobile door 1 when said door is in its closed position. In order to provide sufficient space for said spring unit between said door and body hinge edge walls 2 and 3 (which edge walls are relatively close to each other when the door 1 is in its closed position, as heretofore pointed out and as clearly indicated in Figs. 2 and 4), suitable depressions are here formed in such hinge edge walls, the resulting recess 15 in the door hinge edge wall 2 and the resulting recess 16 in the body hinge edge wall 3 together providing, as clearly shown in Figs. 2 and 4, ample space for said spring unit when the door 1 is in its closed position.

Although door opening means embodying the present invention may effect the automatic movement of the doors with which they are used to their fully open positions, as will hereinafter appear, the position to which the automobile door 1 is here automatically movable by the door opening means of Figs. 1 to 4 inclusive is a predetermined partially open position of said door, namely, the position indicated in dot-dash lines, Fig. 2.

For effecting the automatic movement of the door 1 to such predetermined partially open position, the upper spring arm 12 of the door opening means of Figs. 1 to 4 inclusive has cooperative engagement with the hinge edge wall 2 of said door, and specifically, with that portion 17 of such hinge edge wall which lies between its recess or cavity 15 and the inner side wall 18 of said door. Inasmuch as the hinge edge wall of an automobile door is usually of relatively light gauge metal, the aforesaid portion 17 of the door hinge edge wall 2 which is engaged by the spring arm 12 may be suitably reinforced, if desired, such as by the rigid backing plate 19 here shown for that purpose. Although the spring arm 12 may slidably engage the portion 17 of the door hinge edge wall 2 for door opening purposes, said spring arm is here provided with a roller 20 or the like for desirable rolling engagement with such portion of said hinge edge wall, as clearly shown in Figs. 2 and 3.

During the manual closing of the door 1 from the predetermined partially open position to which it is automatically movable, the spring arm 12 is swung in a counter-clockwise direction by the hinge edge wall of said door to what is here termed the operative position of said arm, which is the position of said arm when said door is closed. Such counter-clockwise movement of said arm to its operative position effects, of course, the "loading" of the torsion spring 6 to the desired extent for door opening purposes, and as a result, when the door 1 is in its closed position, said spring is in condition to automatically effect, through the engagement of its arm 12 with the portion 17 of the hinge edge wall 2 of said door, the movement of said door to its predetermined partially open position, all as will be readily understood.

The predetermined partially open position to

which the door 1 is automatically movable is determined, of course, by the extent to which the spring arm 12 is permitted to swing in a door opening or clockwise direction, Fig. 2. Although any suitable means may be utilized for limiting or arresting such door opening or clockwise movement of said spring arm, when the door 1 has been automatically opened the desired extent, the means here shown for that purpose is a depending abutment 22 which is carried by the upper bracket flange 8 and which is engaged by the spring arm 12 during clockwise movement thereof when said door reaches the desired predetermined partially open position. Therefore, by merely varying the location of such abutment, the open position to which the door 1 is automatically movable may be easily predetermined, as desired.

If said door is not manually closed or manually moved to a further open position, such as to its fully open position, and if said door has a normal tendency to close, like most present-day automobile doors, the door 1 will remain in the predetermined partially open position to which it is automatically movable, as the torsion spring 6, through its arm 12, yieldingly resists the closing of said door from such partially open position. Inasmuch as the door closing resistance of said spring depends upon its winding resistance when said door is in the open position to which it is automatically movable, and inasmuch as the resistance of said spring to winding or loading thereof may be readily predetermined, any desired resistance to door closing movement may be obtained by a door opening means embodying the present invention, as will be readily understood.

If it is desired that the door 1 be automatically movable to its fully open position, it is merely necessary to widen (or increase the transverse extent of) the door hinge edge wall portion 17 on which the spring arm 12 is effective for door opening purposes, and to change the location of the depending abutment 22 for said spring arm. By merely making deeper the recess 16 in the body hinge edge wall 3, sufficient space for the self-contained spring unit of the door opening means of Figs. 1 to 4 inclusive can be provided without the use of the recess 15 in the door hinge edge wall 2, and as a result, the portion 17 of said door hinge edge wall (along which moves the roller 20 of the spring arm 12 during the movement of the door 1 between its closed position and the predetermined open position to which it is automatically movable) can be easily given sufficient width (or transverse extent) to enable the complete opening of said door to be automatically effected. As to the depending abutment 22, its location will be such that it is not engaged by the spring arm 12, during door opening or clockwise movement thereof, until such arm has automatically effected the movement of said door to its fully open position, as will be readily understood.

If the door opening means of Figs. 1 to 4 inclusive automatically effects the movement of the door 1 to its fully open position, said door will be releasably held or retained by such means in said fully open position whenever it is moved thereto (due to the door closing resistance of the spring arm 12), and as a result, the use of separate holding means for such purpose is wholly unnecessary, all as will be readily understood.

Referring now to the door opening means illustrated in Figs. 5 to 7 inclusive, it will be noted

that such means includes a helical torsion spring having two reversely wound sets of coils 25 and 26, the middle portion of said spring (by which the inner ends of said two sets of coils are connected in spaced relation) being an arm 27 in the form of an extended loop. Although said spring may be so wound that its middle arm 27 engages the hinge edge wall 2a of the left front automobile door 1a for door opening purposes, the winding of said spring, as here shown, is such that its free end portions 28 and 29 (at the upper and lower ends of its two sets of coils) are here utilized as the door opening arms of said spring. The end spring arms 28 and 29, which have a normal tendency to swing in a door opening or clockwise direction, Fig. 5, therefore engage the door hinge edge wall 2a, and the middle spring arm 27, which has a normal tendency to swing in the opposite direction, engages the hinge edge wall 3a of the automobile body portion 4a.

As clearly shown in Figs. 5 and 7, said spring is located between the door and body hinge edge walls 2a and 3a, and to provide therebetween sufficient space for said spring, when the door 1a is in its closed position, a pair of recesses 30 and 31 are here formed in such hinge edge walls by suitably depressing portions thereof, the recesses here formed by such depressions being almost the full width of such hinge edge walls, as best shown in Figs. 5 and 6.

In this particular embodiment of the invention, the transversely disposed end spring arms 28 and 29 and the correspondingly disposed middle spring arm 27 extend inwardly from the spring coils 25 and 26, and in order to provide end thrust bearing support for the inner ends of said arms, the inner longitudinal edge portions of the hinge edge wall recesses 30 and 31 are here provided with suitable shoulders 32 and 33. To enable said spring, through its end arms 28 and 29 and its middle arm 27, to more effectively perform its door opening function, the free inner ends of said arms are here shown as being of generally convex form, and the shoulders 32 and 33 of the hinge edge wall recesses 30 and 31 are here shown as being of generally concave form to provide what may be termed hinge or pivotal sockets for such inner ends of said arms.

When the door 1a is in its closed position, the end spring arms 28 and 29 are in what may be considered their operative positions, said arms then being in generally parallel relation with the middle spring arm 27, as clearly shown in Fig. 5, and the torsion spring of which said arms are parts then being in the desired loaded condition for door opening purposes. Upon the unlatching of said door, relative diverging movement of said end spring arms and said middle spring arm immediately occurs, and as a consequence, said door is automatically swung to an open position. Although such open position of said door may be a partial open position thereof, as will hereinafter appear, the open position to which said door is here automatically movable is its fully open position, (the dot-dash line position of said door in Fig. 5) such position of said door being determined, of course, by the door check (not shown) with which said door, like most present-day automobile doors, is provided. As clearly shown in Fig. 5, the fully open position of the door 1a is such that when said door is in that position, the spring arms 28 and 29 are not in straight line relationship with respect to the middle spring arm 27, the spring coils 25 and 26, by which the outer ends of the three

spring arms are connected, remaining on the outer side of the inner ends of said arms, as shown.

As a result, although the door 1a is releasably held or retained in its fully open position by said end spring arms 28 and 29 and said middle spring arm 27, whenever said door is moved to such position, the manual closing of said door, whenever desired, may be readily effected. During such manual closing of said door, the end spring arms and the middle spring arm are returned to their generally parallel relationship, as shown in full lines, Fig. 5, and the torsion spring of this door opening means is again put in properly loaded condition for door opening movement, as will be readily understood.

Although such torsion spring may be readily assembled with the hinge edge walls of the door 1a and the automobile body portion 4a (by merely slipping such spring between said hinge edge walls from the inner ends thereof when said door is in at least a partially open condition), there is no likelihood of accidental disassembly thereof, as the free inner ends of the three arms of said spring are securely held in engagement with their sockets by the normal tendency of the end arms and the middle arm to spring apart or diverge. It also is to be noted that the forwardly projecting flange 34 at the front end of the automobile door 1a effectively provides a closure for the space between the door and body hinge edge walls 2a and 3a when said door is in its closed position, as clearly shown in Fig. 5.

Referring now to that embodiment of the present invention illustrated in Figs. 8 to 10 inclusive, it will be noted that the door opening means constituting such embodiment is quite similar to the door opening means illustrated in Figs. 5 to 7 inclusive and just described. In order to avoid needless repetition, therefore, only the manner in which the door opening means of Figs. 8 to 10 inclusive differs from the door opening means of Figs. 5 to 7 inclusive will be referred to.

In the door opening means of Figs. 8 to 10 inclusive, the end spring arms 28a and 29a and the middle spring arm 27a extend outwardly from the spring coils 25a and 26a, and as a result, the hinge or pivotal sockets for the free outer ends of said arms are at the outer longitudinal edge portions of the hinge edge wall recesses 30a and 31a of the automobile body portion 4b and the left front automobile door 1b. Upon the unlatching of said door, diverging movement of the end spring arms and the middle spring arm immediately occurs, and as a result, said door is automatically moved to an open position, its fully open position, as here shown. When said door is in its fully open position (its dot-dash line position Fig. 8), the three spring arms, and the two sets of spring coils by which the inner ends of said arms are connected, occupy the dotted-line position, Fig. 8, said coils remaining, as shown, on the inner side of the outer ends of said spring arms. Therefore, although the spring of this door opening means may be readily assembled with the hinge edge walls of the door 1b and the body portion 4b (by merely slipping said spring between said hinge edge walls from the inner ends thereof when said door is in at least a partially open position), there is no liability of accidental disassembly thereof, as will be readily understood.

As the door opening means of Figs. 8 to 10 inclusive operates in substantially the same man-

ner as the door opening means of Figs. 5 to 7 inclusive, no further specific reference to the door opening means of Figs. 8 to 10 inclusive is believed to be necessary.

Although the door opening means of Figs. 5 to 7 inclusive and the door opening means of Figs. 8 to 10 inclusive here respectively effect the automatic movement of the doors 1a and 1b to their fully open positions, either or both of said door opening means may effect, if desired, the movement of the door with which it is used to a partially open position only, further opening movement of said door being manually effected. For the accomplishment of that result, it is merely necessary to have the tension of the torsion spring of either of said door opening means such that said spring is capable of effecting only limited door opening movement, although said spring will possess, of course, sufficient resiliency in a door opening direction to enable its parts to follow the door with which it is used to its fully open position. When said door is in its fully open position, said spring will merely have sufficient tension to enable it to remain in assembly with the hinge edge walls of said door and the body portion on which said door is hinged, 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. In combination with a door structure and a supporting structure therefor wherein said door structure is so hinged on said supporting structure that the hinge edge walls of said structures are in oppositely positioned relationship when the door structure is in its closed position, a torsion spring located between the hinge edge walls of said structures, said spring having an arm for cooperative engagement with one of said structures in the region of its hinge edge wall, said spring arm being movable in a plane substantially normal to the hinge axis of the door structure to an operative position during the closing of the door structure, with the consequent loading of said spring to the desired degree, and said spring arm being effective when in such operative position to automatically swing said closed door structure, if unlatched, to an open position.

2. In combination with a door structure and a supporting structure therefor wherein said door structure is so hinged on said supporting structure that the hinge edge walls of said structures are in oppositely positioned relationship when the door structure is in its closed position, a torsion spring located between the hinge edge walls of said structures, said spring having arm means for cooperative engagement with each of said structures in the region of its hinge edge wall, said two spring arm means having a normal tendency to diverge, the assembly of said spring with said structures being maintained solely by the engagement of its two arm means therewith, the spring arm means which has cooperative engagement with said door structure being movable to an operative position during the closing of said door structure, with the consequent loading of said spring to the desired degree, and said last mentioned spring arm means being effective when in such operative position to automatically swing said closed door structure, if unlatched, to an open position.

3. In combination with a door structure and a supporting structure therefor wherein said door

structure is so hinged on said supporting structure that the hinge edge walls of said structures are in oppositely positioned relationship when the door structure is in its closed position, a torsion spring located between the hinge edge walls of said structures and provided with a pair of arm means having a normal tendency to diverge, each of said structures being provided in the region of its hinge edge wall with socket-like means for the pivotal reception of an arm means of said spring, the spring arm means which is pivotally associated with said door structure being movable to an operative position during the closing of said door structure, with the consequent loading of said spring to the desired degree, and said last mentioned spring arm means being effective when in such operative position to automatically swing said closed door structure, if unlatched, to an open position.

4. In combination with a door structure and a supporting structure therefor wherein said door structure is so hinged on said supporting structure that the hinge edge walls of said structures are in oppositely positioned relationship when the door structure is in its closed position, a torsion spring located between the hinge edge walls of said structures and provided with a pair of arm means having a normal tendency to diverge, the hinge edge wall of each of said structures being provided with socket-like means for the pivotal reception of an arm means of said spring, the spring arm means which is pivotally associated with the hinge edge wall of said door structure being movable to an operative position during the closing of said door structure, with the consequent loading of said spring to the desired degree, and said last mentioned spring arm means being effective when in such operative position to automatically swing said closed door structure, if unlatched, to an open position.

5. In combination with a door structure and a supporting structure therefor wherein said door structure is so hinged on said supporting structure that the hinge edge walls of said structures are in oppositely positioned relationship when the door structure is in its closed position, a torsion spring located between the hinge edge walls of said structures and provided with a pair of arm means having free end portions of generally convex form, said spring arm means having a normal tendency to diverge, each of said structures being provided in the region of its hinge edge wall with socket-like means for the pivotal reception of the free end portion of an arm means of said spring, the spring arm means which is pivotally associated with said door structure being movable to an operative position during the closing of said door structure, with the consequent loading of said spring to the desired degree, and said last mentioned spring arm means being effective when in such operative position to automatically swing said closed door structure, if unlatched, to an open position.

6. In combination with a door structure and a supporting structure therefor wherein said door structure is so hinged on said supporting structure that the hinge edge walls of said structures are in oppositely positioned relationship when the door structure is in its closed position, torsion spring means located between the hinge edge walls of said structures and having coil means and two arm means extending therefrom with a normal tendency to diverge, the free end portions of said two arm means having cooperative engagement with said structures in the region of

- the hinge edge walls thereof, said spring means being in a loaded condition when said door structure is closed and hence being capable of automatically effecting the movement of said door structure, when closed and unlatched, to an open position, and said spring coil means having swinging movement with said spring arm means during opening and closing movements of said door structure.
7. In combination with a door structure and a supporting structure therefor wherein said door structure is so hinged on said supporting structure that the hinge edge walls of said structures are in oppositely positioned relationship when the door structure is in its closed position, torsion spring means located between the hinge edge walls of said structures and having two sets of coils and two arm means with a normal tendency to diverge, one of said arm means having arms which extend from the outer ends of said coils and the other of said arm means having an arm which extends from the inner ends of said coils, the free end portions of said arms having cooperative engagement with said structures in the region of the hinge edge walls thereof, said spring means being in a loaded condition when said door structure is closed and hence being capable of automatically effecting the movement of said door structure, when closed and unlatched, to an open position, the coils of said spring means having swinging movement with the arm means thereof during opening and closing movements of said door structure.

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