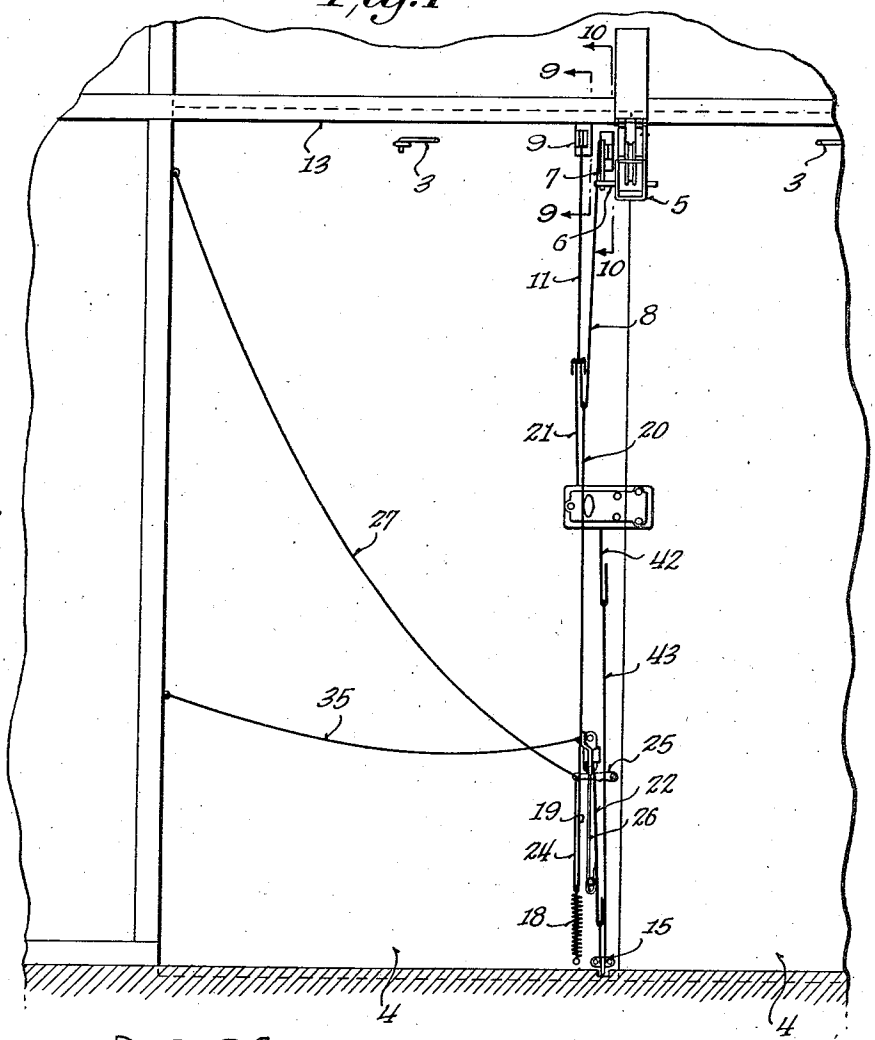
May 18, 1943 F. LICHTFELDT 2,319,612

DOOR OPERATING MECHANISM

Filed April 5, 1939 4 Sheets-Sheet 1

Fig. 1



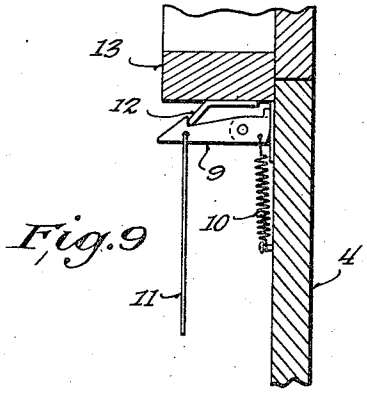


Fig. 9

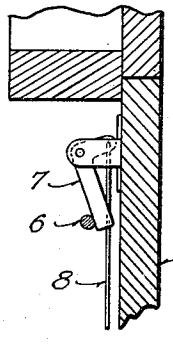


Fig. 10

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May 18, 1943 F. LICHTFELDT 2,319,612

DOOR OPERATING MECHANISM

Filed April 5, 1939 4 Sheets-Sheet 2

Fig. 2

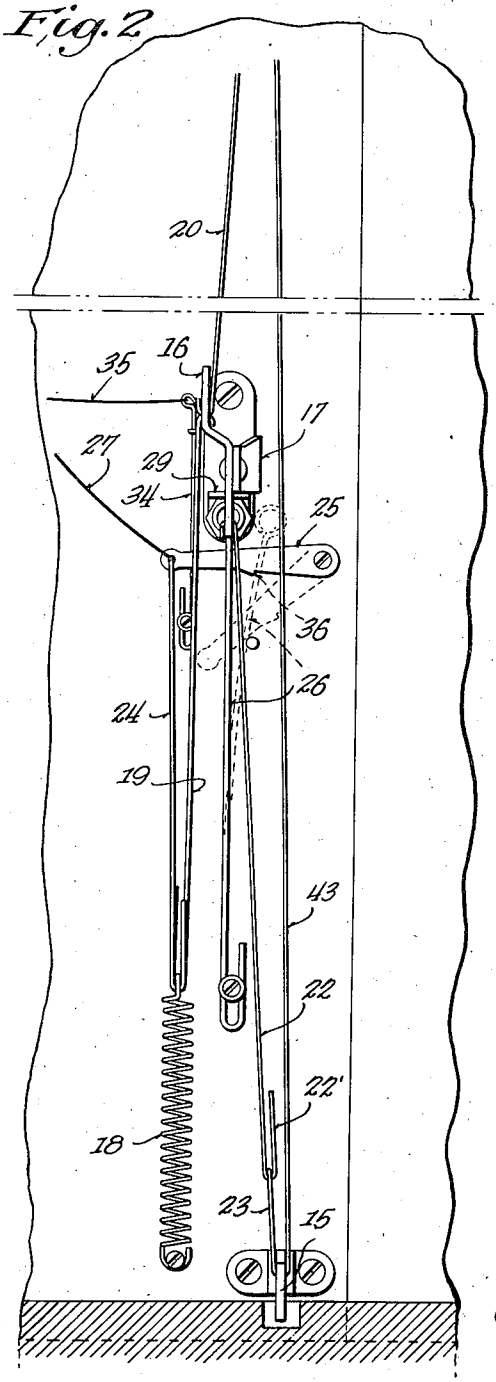
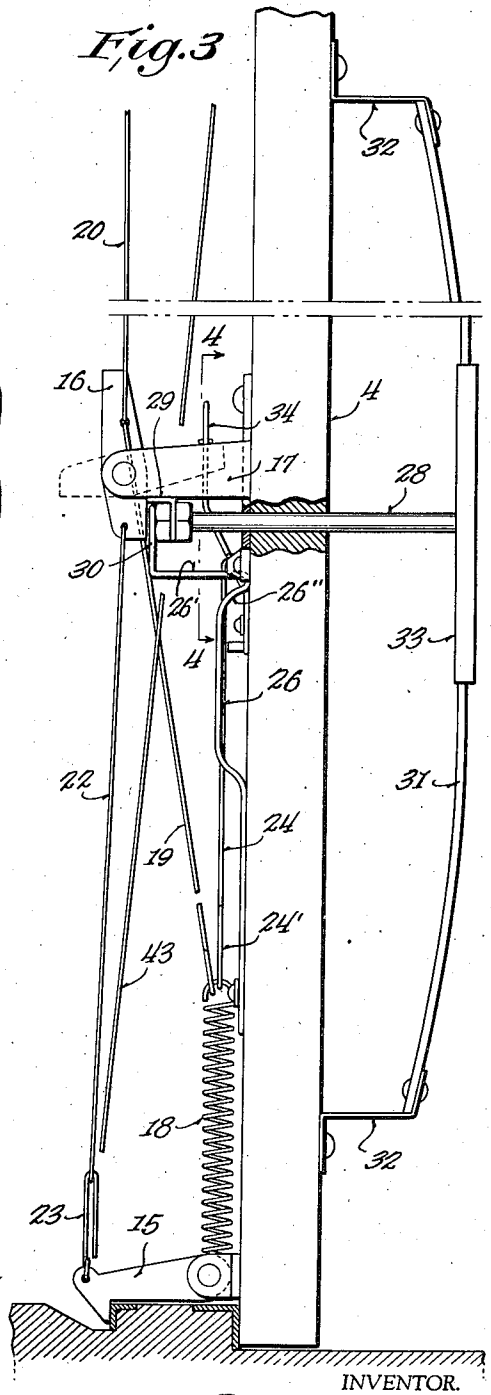


Fig. 3



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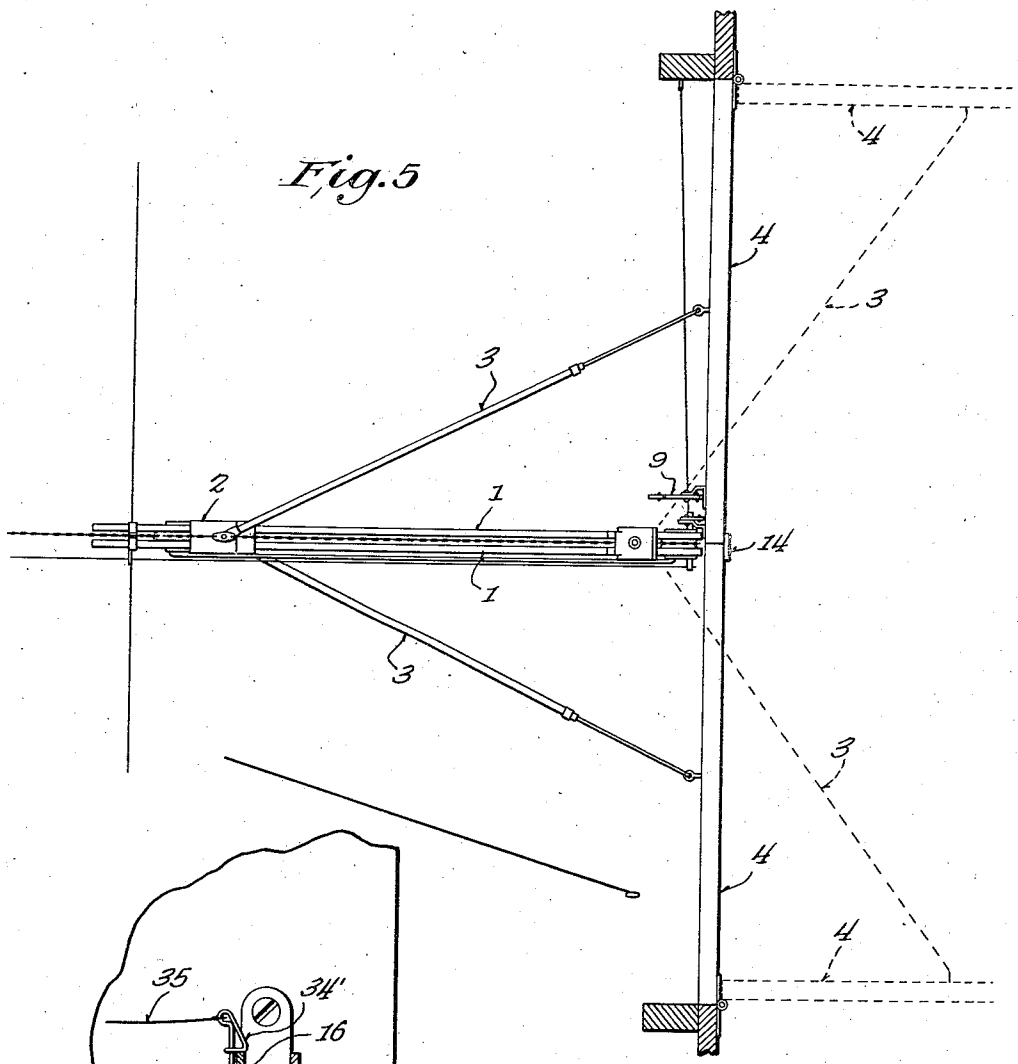
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DOOR OPERATING MECHANISM

Filed April 5, 1939 4 Sheets-Sheet 3

Fig. 5



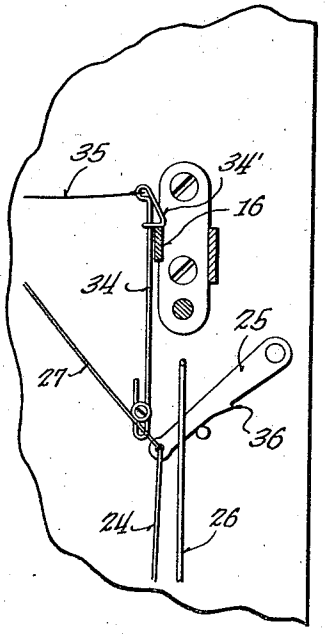


Fig. 4

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DOOR OPERATING MECHANISM

Filed April 5, 1939 4 Sheets-Sheet 4

Fig. 6

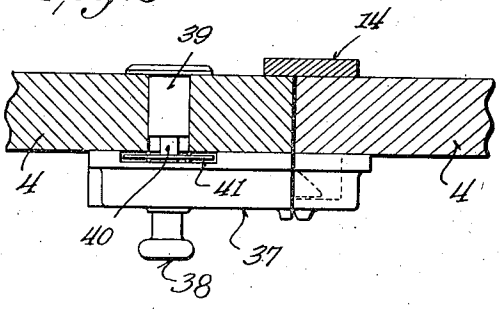


Fig. 8

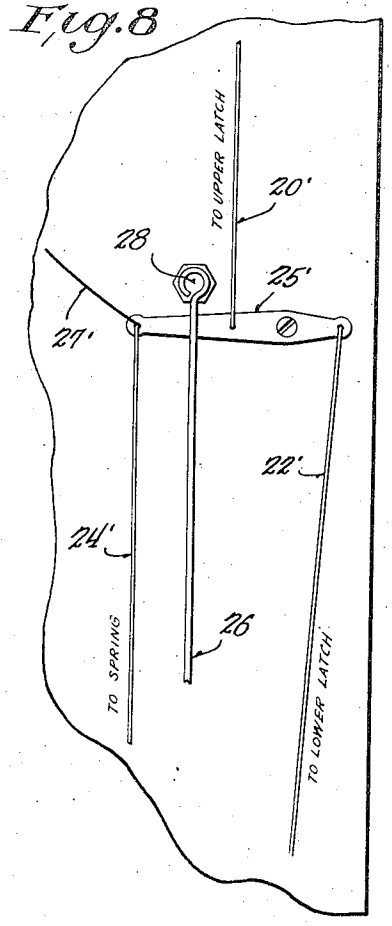
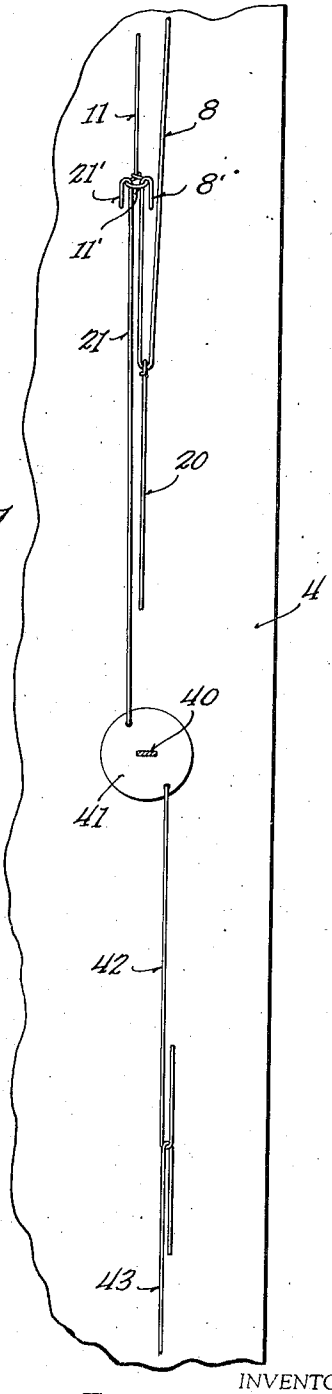


Fig. 7



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UNITED STATES PATENT OFFICE

2,319,612

DOOR OPERATING MECHANISM

Fred Lichtfeldt, Wauwatosa, Wis.

Application April 5, 1939, Serial No. 266,042

9 Claims. (Cl. 292—93)

This invention relates to improvements in door operating mechanism and is particularly directed to mechanism for operating garage doors.

This invention is an improvement over and a continuation in part of my Patent No. 2,156,950 of May 2, 1939, for Door operating mechanism.

In my above noted patent the invention was designed to provide a garage door operating mechanism which was so made that the driver could open the door by hand when he was leaving and by this operation store a sufficient amount of energy in the mechanism and could thereafter drive his car from the garage and trip the mechanism by means of a pull cord or similar device allowing the mechanism to close the doors, and could subsequently drive his car into contact with a portion of the mechanism and thereby cause the doors to open automatically and allow him to drive his car into the garage without descending from the car.

This invention has for its objects to provide improved operating mechanism for controlling the automatic actuation of the power or driving mechanism for operating the doors, and objects of this invention are to provide a construction whereby a spring or other member, preferably in the shape of a bumper, may be positioned and carried on the outer side of a garage door and may be engaged by the bumper or front wheel or other portion of the automobile, and when so engaged will operate trip mechanism to release the automatic mechanism for opening the doors.

A further object of this invention is to provide releasing means for releasing the automatic mechanism, which releasing means may be adjusted so as to require only a slight force to cause it to operate, or which may be adjusted to require a considerable force to cause it to operate, the device being so arranged that when only a slight force is required, the extra energy required for causing tripping may be supplied by a spring, the energy being stored in the spring previously by the opening of the garage door.

Further objects are to provide a construction in which the device may be quickly changed over from one that requires only a light pressure on the releasing bumper on the outer side of the door or one which requires a heavy pressure on the releasing bumper.

Further objects are to provide door operating mechanism in which the releasing means for the door operating mechanism may consist of a bumper-like member or relatively heavy spring mounted on the outer side of the door, in which this spring is so made that it has a relatively heavy arched body portion and is carried by lighter spring-like end members so that as the body portion is bent into a more nearly straight shape, the light spring end portions will yield outwardly and thereby prevent excessive strains being imposed on any of the spring structure, the center portion of the relatively heavy arched spring carrying a plunger and causing the plunger to execute a straight line stroke without binding where it passes through the door.

Embodiments of the invention are shown in the accompanying drawings, in which:

Figure 1 is a fragmentary inside face view looking at the doors of a garage with the device in place and with the doors closed.

Figure 2 is a fragmentary detail of the lower portion of the structure shown in Figure 1.

Figure 3 is a side view, partly in section, of the structure shown in Figure 2.

Figure 4 is a sectional view on the line 4—4 of Figure 3.

Figure 5 is a plan view, partly in section, showing a part of the door operating mechanism, showing in full lines the position occupied when the doors are closed and in dotted lines the position when the doors are open.

Figure 6 is a sectional detail showing the lock.

Figure 7 is a fragmentary view with a portion of the lock removed and with parts in section.

Figure 8 is a detail view showing a modified form of construction.

Figure 9 is a detail view, partly in section, showing the upper latch, such view corresponding to a section on the line 9—9 of Figure 1.

Figure 10 is a detail, partly in section, showing the trip means for releasing the door operating mechanism for door opening movement, such view corresponding to a section on the line 10—10 of Figure 1.

Referring to the drawings, it will be seen that the door operating mechanism comprises a pair of tracks 1 located in the upper portion of the garage, as shown most clearly in Figure 5, upon which a main carriage 2 travels forwardly and backwardly and is operated by power means which may take the form of weights, all as described in greater detail in my above noted patent.

This main carriage is connected to the door, if a single door is used, by means of a link, or if two doors are employed, by means of a pair of links 3 as shown in Figure 5, so that when the carriage travels forwardly, the doors 4 are moved to the dotted line position shown in Figure 5 and when the carriage travels rearwardly, the doors occupy the full line position. The main carriage 2 is normally locked in its rear position, as shown in Figure 5, and is released by means of suitable mechanism which is not shown in detail, but which is shown and described in my copending application. This releasing mechanism includes a front trip member 5, see Figure 1, provided with a laterally projecting pin 6 which latter is adapted to be struck by one arm of a bell crank lever, see Figure 10, such lever being pivoted to the upper

portion of one of the doors 4. The mechanism is so arranged that when the bell crank lever 7 is rocked in a clockwise direction as viewed in Figure 10, it moves the trip member 6, which forms a portion of the member 5, outwardly and thus releases the main carriage, allowing it to move forwardly, as viewed in Figure 5, and open the doors.

This bell crank lever or tripping means 7 is operated by means of a downwardly extending rod or wire 8. The tripping member 5—6, see Figure 1, is supported from the tracks. The upper portion of one of the doors 4 also carries the upper latch 9, see Figures 1 and 9. The latch 9 consists of a lever which is urged into latching position by means of the spring 10 and which is operated by the downwardly extending rod or wire 11. The latch 9 normally engages a slanting cam like catch 12 carried by the upper stationary door casing 13. The construction is such that when the door is closed, the latch snaps into place and locks the door in closed position. The door which carries the latch if the double door is employed, is provided with an outer strip 14, see Figure 5, in accordance with the usual practice.

The lower portion of the door may be provided with a lower latch as indicated at 15 in Figures 1, 2 and 3. In the form of the invention shown particularly in Figures 1, 2 and 3 a main operating lever 16 is provided and is pivotally mounted on a bracket 17 secured to one of the doors 4. This lever is spring urged towards clockwise rotation by means of a spring 18 secured adjacent the lower portion of the door and the spring is connected to the lever by means of a rod or wire 19 pivoted adjacent the upper portion of the lever 16 and having a hook like lower end that is adapted to slidably enter the upper end of the spring under certain conditions, as will hereinafter appear. The lever 16 is connected by means of a rod or wire 20 with the wire 8 leading to the trip mechanism, see Figure 1, and also is connected to the upper rod or wire 11, as shown most clearly in Figure 7. It is to be noted that the wire 20 is connected to a lower loop formed in the wire 8 and that the end of the wire 8 is provided with a hook like portion 8' which hooks into a ring or eyelet 11' formed at the lower end of the rod 11.

Further it is to be noted from Figure 7 that a rod or wire 21 is also provided with a hook like upper portion 21' which hooks into the eyelet 11' of the rod 11. The rod 21 extends to the lock mechanism as will hereinafter appear.

Returning to Figure 3, it will also be seen that the main operating lever 16 is connected by means of a rod or wire 22 with the lower latch 15. The wire 22 is provided with a looped lower end 22' which engages the looped portion of a wire or rod 23 secured to the lower latch 15, as shown most clearly in Figures 2 and 3.

It will be seen from the description thus far given that the spring 18, see Figures 2 and 3, tends to rock the operating lever 16 in a clockwise direction and tends to release the upper and lower latch. However, the spring 18 is normally prevented from exerting its force on the rod 19 and consequently on the lever 16 because the spring is held in an extended position by means of the rod or wire 24 whose lower end is provided with a hook like portion 24' that is adapted to slide into the spring under certain conditions. The upper end of the wire 24 is secured to the outer end of the lever 25 which is pivoted to the door, see particularly Figures 1 and 2. It is obvious, therefore, that as long as the wire 24 is held in its upper position by means of the lever 25, that the operating lever 16 cannot be operated by means of the spring 18.

The lever 25 is latched in its upper position, as shown in full lines in Figure 2, by means of the latching spring arm 26, see Figures 2 and 3. This latching spring arm 26 has a shouldered portion 26' which is adapted to fit beneath the lever 25 as shown in Figure 3 and to thus hold the lever in elevated position. It has a slanting portion 26'' which acts like a cam when the lever 25 is pulled upwardly and thus allows the lever to ride beneath the latching spring arm 26 and to be locked in its elevated position, as shown in full lines in Figure 2. The lever 25 is pulled upwardly by means of a flexible member, such as a cord or chain 27 see Figures 1 and 2, whose upper end is attached to a portion of the casing of the door so that as the door is rocked outwardly to open position, the lever 25 is pulled up into its upper position as shown in full lines in Figure 2.

The operating lever 16 is free from any pull due to the spring 18, see Figure 3, and is yieldingly held under these conditions in its full line position shown in Figure 3 by means of the pull on the wire or rod 20, which pull is obtained from the spring 10, see Figure 9, acting on the upper latch 9 and transmitting its pull through such latch and through the wire 11 to the wire 20.

It is obvious that under the conditions of the parts hereinabove described that if the lever 25 is now released by moving the latching spring arm 26 out of latching engagement with the lever 25, that the lever will be drawn downwardly by the spring 18 and the spring 18 will exert its force on the operating member 16 to rock it into the dotted line position in Figure 3. This release or unlatching action is obtained by means of a plunger 28, see Figure 3, which slidably passes through the door 4 and which is provided with an inner end which may be headed or may be provided with nuts, as shown in Figure 3. The plunger or rod 28 also includes, in addition to the enlarged end or nuts, an operating member 29 which, in the form shown in Figure 3, is clamped between the nuts on the end of the rod or plunger 28. This member 29 is in the form of an angle bracket or operating member which is adapted, in one mode of operation hereinafter described, to engage a portion of the lever 16 to rotate the lever when the plunger 28 is pressed inwardly of the door.

The plunger is positioned beneath an overhanging portion 30 of the latching spring arm 26 so that when the plunger 28 is pressed inwardly, this latch is moved to releasing position and releases the lever 25, allowing the lever to move downwardly and thus allowing the spring 18 to rock the operating lever 16 and withdraw the upper and lower latches 15.

At the same time that the above described operation takes place, it will be seen that the downward motion of the wire 20, see Figures 1, 7 and 10, pulls the wire 8 downwardly and thus rocks the tripper 7, see Figures 1 and 10, to tripping position. This tripper 7, as previously described, releases the tripping mechanism 5—6, see Figure 1, and allows the main carriage 2 to move forwardly as viewed in Figure 5 to thus automatically open the door, as described in detail in my above noted patent.

The means for operating the plunger 28 may comprise the bowed, relatively heavy spring 31 which is carried at opposite ends by lighter

springs 32 secured to the front of the door. When the bumper of the automobile strikes the spring 30 or a pad 33 carried thereon, the bowed spring 31 is straightened and consequently the lighter springs 32 at the ends are flexed so that no unusual or undesirable strain is imposed on any of these parts. Further, the construction insures a straight line motion for the plunger 28.

In order to store energy in the spring 18, it is necessary to pull the lever 25, see Figure 2, from its dotted line lower position to its full line upper position. This is accomplished by means of the cord or flexible member 27 secured to a stationary portion of the door assembly. It is obvious that when the door is opened, the lever 25 is pulled up to its full line position and the latch arm 26 latches beneath the lever 25 and holds it in this elevated position.

It is to be noted that when the operating lever 16 has rocked to the dotted line position, Figure 3, that it is temporarily latched in this position by means of the spring latch 34, see Figures 2, 3 and 4. This spring latch has a bevelled upper face 34' over which the end of the lever 16 rides, see Figure 4, and has an abrupt shoulder which locks the lever in place. This spring latch is tripped by means of a cord, chain or other flexible member 35 which is attached to the latch and to a stationary portion of the frame of the door, as shown in Figure 1, so that when the door is opened outwardly, the latch is tripped and the lever 16 is allowed to rock back to its full line position shown in Figure 3 by the upward pull on the rod or wire 20 which is transmitted to such wire from the spring 19, see Figure 9, through the wire 11, see Figure 7.

Thus when the door is rocked outwardly, the latch 34 is tripped and also the lever 25 is pulled to its upper full line position shown in Figure 4 and energy stored in the spring 18 for a subsequent operation of the apparatus.

It is apparent that a very light pressure is required on the bumper or bowed spring 31, see Figure 3, in order to trip the mechanism as heretofore described. However, if it is desired to adjust the mechanism so that a very heavy pressure is required so that a person cannot operate the mechanism by merely manually pressing against the spring 31, all that is necessary is to pull the spring latching arm 26 to the right, as viewed in Figure 2, so that it occupies the dotted line position shown in Figure 2 and hooks behind the shoulder 36 formed on the underside of the lever 25.

When in this position the reciprocation of the plunger 28 cannot release the latch 26 as it is out of line with such bolt or with the headed end thereof. On the other hand, assume the parts are in the position shown in Figure 3 with, however, the latch 26 moved to the dotted line position shown in Figure 2, it is obvious that a considerable pressure has to be exerted on the spring 31 so as to force the plunger 28 inwardly a considerable distance and cause the member 29, which acts like a cam member, to ride along the under face of the lever 16 and rock it into its dotted line position as shown in Figure 3, thereby releasing the upper and lower door latches and also operating the tripper for the automatic door opening mechanism. In order to hold the upper and lower latches 9 and 15 out of engagement with the catches until the door has swung to full open position, the spring latch 34 now comes into play, see Figures 2, 3 and 4, and temporarily locks the lever 16 in its dotted line position as shown in Figure 3. However, after the door has swung fully open, the cord 35 trips the latch 34 and allows the lever 16 to move to its full line position shown in Figure 3.

A lock may be provided and is indicated generally by the reference character 37 in Figure 6 which may be opened from the inside by means of the knob 38 in the usual manner or which may be opened from the outside by means of a key inserted into the portion 39. The lock is so made that the key will turn a flat shaft 40 to withdraw the bolt of the lock.

This flat shaft 40 is also shown in section in Figure 7 and it will be seen that this flat shaft passes through a disk 41 which at diametrically opposite points is provided with apertures through one of which the wire 21 passes and through the other of which a wire 42 passes. The wire 42 is connected to a wire 43 by means of the slip joint or interlocking loops, as shown in Figure 7, and the wire 43 extends downwardly to the bottom latch 15 so that when the key is turned in the lock, the wires 42 and 21 are pulled inwardly towards the lock and thus release the upper and lower catches.

In the form of the invention described, either the lever 16 may be operated directly from the plunger 28, see Figure 3, or else the spring actuated trip mechanism may be operated, depending on whether or not the arm 26, see Figure 2, is in the position shown in such figure in full lines or in the dotted line position locked back of the notch 36 of the lever 25. When it is locked back of the notch 36 of the lever 25, it is necessary for a considerable pressure to be exerted on the spring 31 so as to force the plunger 28 inwardly a considerable distance and directly actuate the operating lever 16. On the other hand, if the spring release construction is employed, the spring arm 26 is released from the notch 36 and allowed to occupy its full line position as shown in Figure 2. Under these conditions a very light force is all that is needed to be applied to the spring 31, see Figure 3, in order to trip the mechanism.

The invention may take a still further form as shown in Figure 8. In this form of the invention the lever 16 is omitted and the wire 20, instead of extending directly to the lever 16, now extends to the lever 25' corresponding to the lever 25, the wire 20' corresponding to the wire 20. Also the wire 22, see Figure 3, does not extend to the lever 16 as in Figure 3, but instead extends to the lever 25' and is indicated by the reference character 22' in Figure 8. The locking spring arm 26 is employed as heretofore described to temporarily lock the lever 25 in its upper position, which is the position shown in Figure 8. The wire 24' of Figure 8 corresponds to the wire 24 of Figure 3 and extends to the spring not shown in Figure 8 but identical with the spring 18 of Figure 3.

In this form of the invention the spring actuated mechanism alone is used and the operating lever 16 is not employed. Therefore, this latter form of mechanism has only one mode of functioning and may be tripped by a light pressure exerted on the spring 31, not shown in Figure 8, at all times. A cord 27' is employed in this form of the invention in identically the same manner as the cord 27 in the previously described form.

It will be seen that a novel mechanism has been provided for unlatching the door and also for tripping the automatic door opening mechanism by means of a movable member mounted

and carried on the outer side of the door so that this movable member will actuate the mechanism to unlatch the door and also to trip the power operated door opening mechanism.

Further, it will be seen that in one form of the invention a light pressure alone is needed and in the other form of the invention either a light or a heavy pressure is needed on the externally mounted operating member so that the device may be set for either mode of operation, depending upon the choice of the user.

This invention provides means for automatically locking and unlocking the door at either the top or bottom or at both the top and the bottom, and for simultaneously tripping the power mechanism for opening the doors. Further, it provides means for storing power in the actuating spring 18 for the latch releasing and trip operating mechanism when the door is opened so that the spring may be later released and this energy utilized to withdraw the upper and lower latches and operate the trip mechanism.

Although this invention has been described in considerable detail, it is to be understood that such description is intended as illustrative rather than limiting, as the invention may be variously embodied and is to be interpreted as claimed.

1. In a door operating mechanism, a door, latching means for locking said door in closed position, an external operating member mounted on the outer side of said door and comprising a relatively heavy leaf spring held in spaced relation to said door by a pair of lighter straight, outwardly extending springs secured to the ends of said leaf spring and to said door, said relatively heavy leaf spring and said lighter outwardly extending springs being located on the outside of said door, whereby said leaf spring is movable towards said door, and trip means controlling said latching means and released when said external operating means is moved towards said door.

2. In a door operating mechanism, a door, locking means for locking said door in closed position, releasing means for unlocking said locking means, biasing means for said releasing means, cable means operated by the opening movement of said door for setting said biasing means for biasing said releasing means towards door unlocking movement, and external operating means carried by said door for controlling said releasing means, said external operating means including a spring bumper and a plunger operated thereby.

3. In a door operating mechanism, a door, locking means for locking said door in closed position, releasing means for unlocking said locking means, biasing means for said releasing means, a casing for said door, means connected to said casing and operatively connected to said biasing means for setting said biasing means to bias said releasing means towards door unlocking motion when said door is opened, and an externally mounted means carried by said door and controlling the operation of said releasing means, said externally mounted means including a spring bumper and a plunger operated thereby.

4. In a door operating mechanism, a door, locking means for locking said door in closed position, releasing means for unlocking said locking means, biasing means for said releasing means, a casing for said door, means connected to said casing and operatively connected to said biasing means for setting said biasing means to bias said releasing means towards door unlocking motion when said door is opened, a plunger slidable through said door for releasing said biasing means, and an elongated externally mounted bumper connected to said plunger and movable towards said door to actuate said plunger.

5. In a door operating mechanism, a door, locking means for locking said door in closed position, releasing means for unlocking said locking means, biasing means for said releasing means, a casing for said door, means connected to said casing and operatively connected to said biasing means for setting said biasing means to bias said releasing means towards door unlocking motion when said door is opened, a plunger slidable through said door, a leaf spring having an intermediate portion connected to said plunger and positioned externally of said door, and a pair of lighter springs connected to the ends of said leaf spring and connected to said door on the outside of said door and extending outwardly to avoid friction when said leaf spring is pressed and to lessen the stresses imposed on said leaf spring when said leaf spring is deflected, whereby said leaf spring may be moved towards said door to impart substantially straight line motion to said plunger.

6. In a door operating mechanism, a door, locking means for locking said door in closed position, a pivoted lever carried on the inner side of said door for releasing said locking means, latching means controlling the operation of said lever, a plunger slidable through said door for releasing said latching means, and bumper means mounted externally of said door for actuating said plunger, said bumper means including a relatively heavy leaf spring and a pair of lighter springs secured to the ends of the leaf spring and extending backwardly therefrom and secured to the outside of said door.

7. In a door operating mechanism, a door, locking means for locking said door in closed position, a pivoted lever carried on the inner side of said door for releasing said locking means, latching means controlling the operation of said lever, a plunger slidable through said door for releasing said latching means, and bumper means mounted externally of said door for actuating said plunger, said lever being mounted in the line of travel of said plunger and said latching means being manually movable to inoperative position, whereby said mechanism may be set for either the actuation of said latching means by said plunger or for the direct actuation of said lever by said plunger.

8. In a door operating mechanism, a door, locking means for locking said door in closed position, a pivotally mounted lever carried on the inner side of said door for unlocking said locking means, a latch for locking said lever in lock-released position, means for tripping said latch when said door is opened, and operating means located externally of said door for rocking said lever.

9. In a door operating mechanism, a door, latch means for said door, a lever normally latching said latch means against releasing motion, a bumper fastened on the outside of said door having a heavy leaf spring with lighter springs on each end connected to said leaf spring and to the door, and a plunger connected to said bumper and having a straight line motion and operatively associated with said lever and latch means for releasing said latch means.

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