Nov. 23, 1954 P. J. BACQUE 2,695,170

GARAGE DOOR OPERATOR

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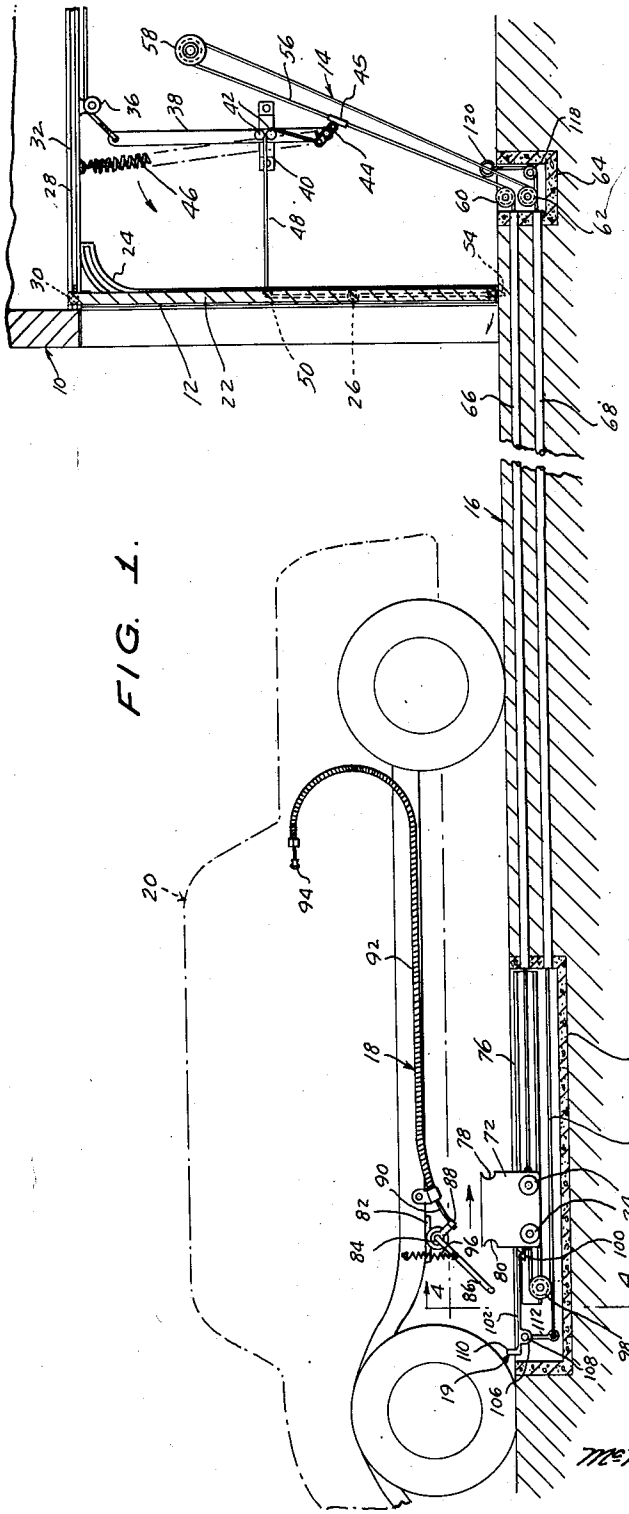


FIG. 1.

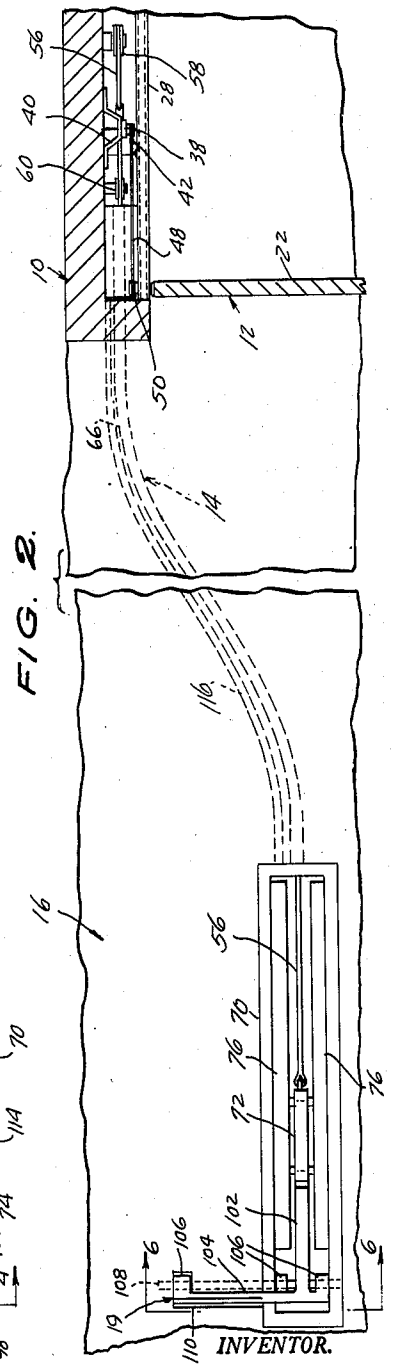


FIG. 2.

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FIG. 3.

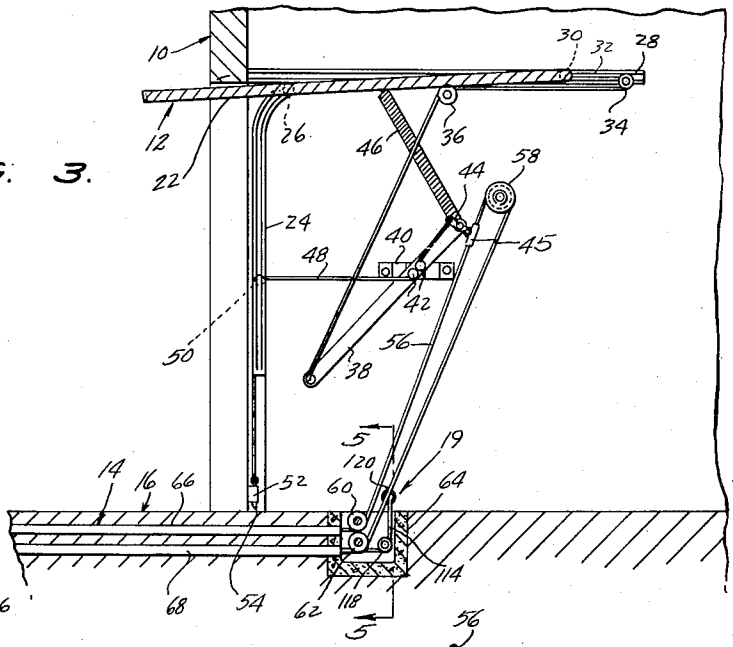



FIG. 4.

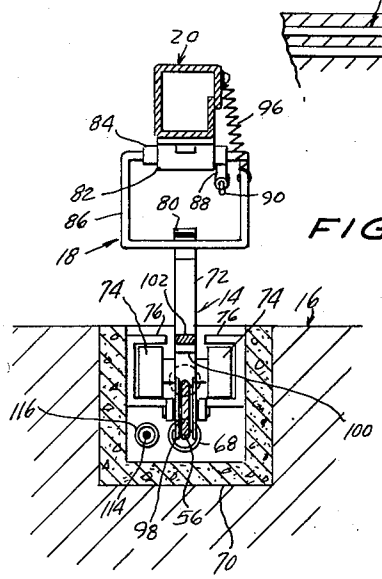



FIG. 5.

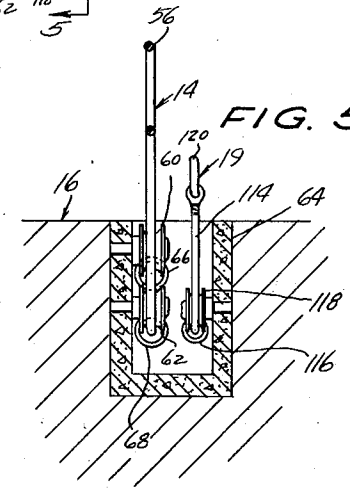
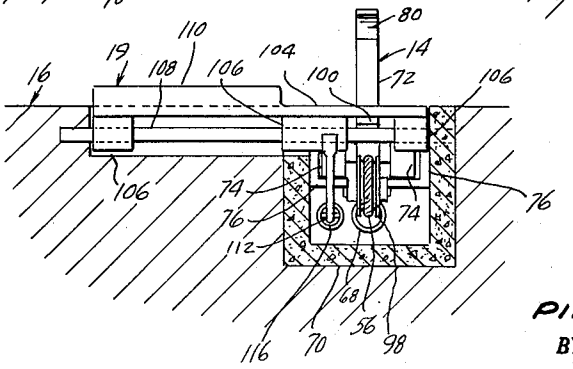



FIG. 6.




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2,695,170

# GARAGE DOOR OPERATOR

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4 Claims. (Cl. 268—42)

This invention relates to apparatus for operating a door, especially a garage door, between open and closed positions, from a location remote from said door.

It is well appreciated that heretofore, there have been devised mechanisms operable by a vehicle, or from a location within the vehicle, to open or close a garage door. The main object of the present invention, in this regard, is to provide a generally improved mechanism of this type.

Summarized briefly, the apparatus constituting the present invention includes an assembly adapted to shift a door between open and closed positions; cable means extending from said assembly to a location remote from the door, as for example, to a driveway in front of the door, with the cable means being adapted, when shifted in opposite directions, to operate the door opening and closing means; a carriage shiftable in opposite directions for the purpose of moving the cable means backwardly or forwardly in the direction of its length, with the carriage being disposed in the path of a vehicle approaching or leaving the garage or other structure in which the door is mounted; an adjustable arm carried by the vehicle and locatable, under the control of the vehicle operator, in position to shift the carriage in a selected direction; and latching means for the carriage normally shifting to a position in which it restrains the carriage against movement, but actuatable by the moving vehicle to release the carriage for movement immediately prior to engagement of the carriage by the vehicle-supported arm.

One feature of the invention believed to be of particular importance resides in a construction wherein the carriage latch means, and the carriage itself, can be mounted selected distances apart, in such a way as to permit the apparatus to be operated only by a single vehicle having its carriage-engaging arm mounted at a predetermined location upon the vehicle.

Yet another object of importance is to provide apparatus as stated which will be so designed as to insure against opening of the door by unauthorized persons, whether said persons be within a vehicle, or on foot.

Yet another object of the invention is to provide apparatus as stated which will be particularly designed to effect opening of the door by a vehicle approaching the garage, and closing of the door by a vehicle moving in a direction away from the garage.

Another object of importance is to provide door opening and closing means as stated which will be relatively inexpensive, and will be capable of being recessed within a vehicle-supporting surface, such as a driveway, at low cost and with relatively little difficulty.

Other objects will appear from the following description, the claims appended thereto, and from the annexed drawings, in which like reference characters designate like parts throughout the several views, and wherein:

Figure 1 is a longitudinal sectional view through a driveway and through a fragmentary portion of an associated garage structure, the device constituting the present invention being illustrated in longitudinal section, a vehicle being shown in dotted outline in position to actuate the mechanism in a manner effective for shifting the door to an open position;

Figure 2 is a fragmentary view of the driveway and the garage structure, said driveway and structure being illustrated partly in top plan and partly in horizontal section, the apparatus constituting the present invention being illustrated in top plan;



Figure 3 is a fragmentary sectional view similar to that shown in Figure 1, in which the door has been operated to an open position;

Figure 4 is an enlarged, transverse sectional view on line 4—4 of Figure 1, showing the carriage and carriage-moving means of the invention;

Figure 5 is a transverse sectional view, on an enlarged scale, taken substantially on line 5—5 of Figure 3; and

Figure 6 is an enlarged, transverse sectional view on line 6—6 of Figure 2, illustrating the carriage-latching means.

A garage has been designated generally by the reference numeral 10 in the several figures of the drawing, a garage door of the overhead type being designated at 12 and being shiftable between the closed and open positions shown in Figures 1 and 3 respectively. Operating means for shifting the door between said positions has been designated by the reference numeral 14, and extends from the garage within a driveway 16 or other vehicle-supporting surface. At a location remote from the garage, the door-operating apparatus is actuated by a vehicle-supported actuating or triggering means designated generally at 18, the means 18 being mounted upon a conventional vehicle 20. A latch assembly designated generally by the reference numeral 19 is located remotely from the garage, adjacent the carriage that is engaged by the means 18, the latch assembly 19 normally holding the carriage against movement in a manner to be presently made apparent.

Considering first the particular construction of the door assembly 12, said assembly includes a door member 22. The door member 22 extends between vertically disposed tracks 24 located at opposite sides of the doorway, and fixedly mounted upon the side walls of the garage structure 10. Rollers 26, projecting outwardly from opposite side edges of the door member intermediate the top and bottom of the door member, extend into the vertical tracks 24, to guide the door in its upward movement. In this connection, the vertical tracks, at their upper ends, are curved rearwardly as shown in Figures 1 and 3, terminating close to horizontally disposed tracks 28 in which are engaged outwardly projecting top rollers 30 mounted upon the sides of the door at the top end thereof.

By reason of the construction illustrated and described above, it will be seen that under normal conditions, the door member 22 will be vertically disposed as in Figure 1, so as to close the garage. When, however, pull is exerted upon the upper end of the door member, to the right in Figures 1 and 3, the door member will initially be pivoted about the rollers 26, while at the same time being drawn upwardly within the vertical tracks. In its final, open position, the door member will be substantially horizontally disposed as in Figure 3.

Considering now the construction of the door-operating assembly designated generally by the reference numeral 14, said assembly 14 includes a cable or other flexible element 32, connected at one end to the top edge of the door member 22. The cable 32 is trained, intermediate its ends, about a roller 34 mounted upon one of the horizontal tracks 28, at that end of the track 28 remote from the doorway. The cable 32 is then extended in a direction toward the doorway, and is trained about an idler pulley 36. The other end of the cable is then extended downwardly, and is connected to one end of an elongated, straight lever 38 pivoted intermediate its ends upon a bracket 40 secured to the wall of the structure 10, with the lever 38 swinging in a vertical plane about its pivot axis between positions shown in Figures 1 and 3.

Mounted in side by side relation upon the lever 38, at the pivot point of the lever, and having their centers spaced longitudinally of the lever, are guide pulleys or rollers 42. In this connection, it will be seen that the guide pulleys 42 are disposed closer to one end of the lever than they are to the other end, the pivot axis of the lever 38 thus being spaced away from the mid-length point of the lever.

Pivoted intermediate its ends upon that end of lever 38 nearer the guide rollers 42 is a relatively short link 44, said link being pivotally connected at one end to a cable clamp 45.

Also connected to that end of the lever 38 on which

link 44 is mounted is a coil spring 46, the spring 46 having one end attached to lever 38 and its other end anchored to the structure 10, adjacent one of the tracks 28. Spring 46 serves to assist in shifting the door member to its open position, in a manner to be made presently apparent.

A door latch means is incorporated in the apparatus, and is adapted to be moved to a door-unlatching position when the door is to be given its initial impetus during adjustment of the door from the closed position shown in Figure 1 to the open position shown in Figure 3. Said door latch means includes a latch cable 48, one end of which is connected to that end of link 44 remote from cable clamp 45. Intermediate its ends, the latch cable 48 is passed between the guide rollers 42, the latch cable then being trained about an idler pulley 50. The end of cable 48 remote from link 44 is attached to a spring loaded latch member slidably mounted in a latch housing 52, the latch member being designated by the reference numeral 54 and being normally spring biased to a latching position in which it is recessed in the supporting surface 16. When in its latching position, latch member 54 also engages the door member 22 against movement to an open position, it being understood that the latch member 54 would be equipped, for this purpose, with a lateral projection or equivalent means, adapted to extend in the path of the door member so as to hold the lower end of the door member against swinging movement to the left in Figure 1, the projection of the latch member being withdrawn from the path of the door member when the latch member is raised to the position shown in Figure 3.

A main cable has been designated by the reference numeral 56, the cable clamp 45 being fixedly engaged with the main cable, thus to cause the cable clamp to move between the positions shown in Figures 1 and 3 respectively, responsive to movement of the main cable in the direction of its length. The main cable, intermediate its ends, is trained about a pulley 58 rotatably mounted upon one wall of the structure 10. The opposite end portions of the cable 56, extending from said pulley 58, are arranged in closely spaced, approximately parallel relation, and are trained about pulleys 60, 62 rotatably mounted within a pulley housing 64 recessed in the supporting surface 16 within the garage structure 10. Thereafter, the end portions of the cable 56 are extended through tubular members 66, 68 embedded in the vehicle-supporting surface 16 as shown to particular advantage in Figures 1 and 2 respectively. The tubular members 66, 68 can be formed of galvanized or copper tubing, bent to a suitable shape, as for example, the gradually curved shape shown in Figure 2.

An elongated carriage housing has been designated by the reference numeral 70, and is recessed in the surface 16 at a location remote from the structure 10. For example, the carriage housing 70 would be embedded within a concrete driveway or the like, in the path of the vehicle 20 when the vehicle is moving toward or away from the garage structure 10.

Rollably mounted within the carriage housing 70 is a carriage 72. This can be formed as a plate-like member, disposed vertically as best shown in Figures 4 and 6, said plate-like member having wheels 74 rotatably mounted upon the lower end portion thereof, with the wheels rolling in channeled trackways 76 fixedly mounted upon the opposite side walls of the carriage housing 70.

In the opposite end edges of the carriage 72, I form notches 78, 80, it being noted from Figure 1 that the notched portion of the carriage projects above the level of the surface 16.

Considering now the construction of the vehicle-mounted actuating means 18, this includes a pivot bracket 82 fixedly secured by bolts or equivalent fastening elements to the underside of one of the side frame members of the vehicle 20. The bracket 82 supports a bushing 84, and pivotally mounted in said bushing is a loop-like arm 86, the arm 86 having a rigid connection to the bushing 84, so as to rotate with the bushing in the bracket 82.

Fixedly connected to the bushing 84, so as to swing with the loop-like arm 86, is a control arm 88, and connected to the outer end of the control arm is one end of a flexible control cable 90 reciprocable within a flexible cable housing 92 mounted upon the vehicle and extending to the instrument panel thereof. A knob 94 is secured to the end of the cable 90 remote from the control arm, the knob being conveniently disposed to be grasped by the vehicle operator. It will be readily seen that on the exertion of pull upon the knob 94, the cable 90 will be shifted in one direction within its associated cable housing 92. This will be effective to swing the loop-like, carriage-engaging arm 86 in a counterclockwise direction when viewed as in Figure 1, to the position shown in Figure 1. In this position, the arm 86 will engage in the notch 80 or notch 78, as the case may be, so as to move the carriage 72 in the same direction as that in which the vehicle 20 is moving.

For the purpose of normally holding the arm 86 in an inoperative, raised position, a spring 96 is employed, one end of the spring being hooked about the arm 86 and the other end of the spring being anchored to the vehicle frame.

As shown in Figure 1, cable 56 is secured at one end to the leading end of the carriage 72. The cable 56 is secured at its other end to the trailing end of the carriage 72, being trained about a direction changing pulley 98 mounted rotatably within the carriage housing 70 adjacent the rear end of the carriage housing.

Considering now the construction of the carriage-latching means 19, this includes a latch member 100 fixedly secured to and extending rearwardly from the trailing end of the carriage 72. The latch member 100, at its free end, has an upwardly extended latching tooth, engageable by the depending latching tooth provided upon the free end of a latch arm 102. Latch arm 102 is integral or otherwise made rigid with a lateral extension 104 (see Figure 2), the lateral extension being provided, at longitudinally spaced locations, with bearing sleeves 106 receiving a pivot shaft 108 mounted in and extending transversely of the carriage housing 70. The shaft 108, as shown in Figure 2, projects a substantial distance beyond one side of the carriage housing 70, and is recessed in the surface 16. This construction is also shown to particular advantage in Figure 6.

Integrally provided upon the lateral extension 104 is an upwardly extending, longitudinal flange 110, said flange 110 projecting above the level of the surface 16 into the path of one of the vehicle wheels.

As shown in Figure 1, the flange 110 is disposed at one side of the pivot axis of the latch arm 102, with the depending tooth of the latch arm being disposed at the other side of said pivot axis. As a result, depression of the flange 110 by the vehicle wheel will be effective to swing upwardly the toothed end of the latch arm 102, so as to disengage the latch arm 102 from the latch member 100, thus to free the carriage 72 for movement from the position thereof shown in Figure 1.

It will be understood that the flange 110 and lateral extension 104 cooperate to define a pressure plate, and I believe that it is well within the spirit of the invention, and is sufficiently obvious as not to require special illustration, that the pressure plate be so mounted within the surface 16 as to be depressible only by a substantial pressure, such as that exerted by the full weight of an automobile vehicle. This would prevent one on foot from tampering with the device, as will be readily appreciated.

Means is provided for releasing the latch means 102, 100, from a location disposed interiorly of the structure 10. To this end, a radial arm 112 is fixedly secured to one of the bearing sleeves 106, the arm 112 depending within the carriage housing 70 and being connected, at its lower end, to one end of a latch release cable 114. Cable 114 extends through a cable housing 116, that is secured at its opposite ends to, and is in communication with, the carriage and pulley housings 70, 64 respectively, the housing 116 extending in parallel relation to the tubular members 66, 68.

Within the pulley housing 64, the cable 114 is trained about a pulley 118, and is then extended out of the pulley housing 64. The end of the cable 114 disposed within the structure 10 is then provided with a ring 120, that facilitates the grasping of cable for the purpose of releasing the latch means associated with the carriage 72.

In use of the invention, the parts would normally appear as shown in Figure 1. Subsequently, when a vehicle approaches the carriage 72, the vehicle will initially depress the pressure plate defined by lateral extension 104 and flange 110. With the flange 110 held in a depressed position, the arm 86 engages the carriage

72, said arm seating in the notch 80 of the carriage. The carriage is then moved in the direction in which the vehicle is traveling, that is, toward the garage door. The vehicle wheel will, of course, then move off the pressure plate, but by this time, the carriage 72 will have moved away from its normal position, thus preventing the carriage from being accidentally latched against movement after the vehicle wheel has passed off the flange 110.

As the carriage 72 moves to the right in Figure 1, it shifts the cable 56 in the direction of its length, causing the cable clamp 45 to move upwardly from the position shown in Figure 1. This causes the lever 38 to be rocked about its pivot axis, in a counterclockwise direction when viewed as in Figure 1.

It is to be noted, in this regard, that before any movement is given to the lever 38 about its pivot axis, the link 44 will have been rocked about the axis of its pivotal connection to the lever 38. Rocking of the link 44, in a counterclockwise direction as viewed in Figure 1, is effective to exert a slight pull upon the latch cable 48, tending to shift the latch member 54 to a door-releasing position.

With the latch member 54 held in a door-releasing position, rocking movement of the lever 38 begins, and almost immediately, the lever 38 moves through a dead center relative to the spring 46, thus causing the spring to be permitted contraction. The contractile force of the spring aids in moving the lever 38 in a counterclockwise direction, and thus serves to assist in shifting the door member to the open position shown in Fig. 3. Movement of the lever 38 to the position shown in Figure 3, of course, is effective to shift the door member to an open position by reason of the pull exerted upon the door member through the medium of the cable 32.

When the spring 46 begins to assert its contractile force, it tends to exert a pull upon the cable 56 through the medium of the lever 38, which pull on the cable will shift the carriage 72 slightly ahead of the arm 86. As a result, the arm 86 is unseated from its notch 80, and the spring 96 is now free to contract, returning the arm to its normal position. Of course, the door member 22 will shift fully to its open position without further impetus from the vehicle 20, due to the contractile force of spring 46.

Assuming that it is desired to close the garage door when leaving the garage in a vehicle, one would back the vehicle out of the garage, while adjusting the arm 86 to the operative, lowered position thereof. As a result, arm 86 will engage in notch 78, causing the carriage 72 to move to the left in Figure 1. This causes the door member 22 to be shifted to a closed position, it being apparent that upon movement of the lever 38 through a dead center once again, the spring 46 will give the final pressure necessary to shift the door fully to a closed position. To disengage the arm 86 from the carriage 72, it may be necessary, under these circumstances, to halt the vehicle and move it slightly toward the right in Figure 1, until the arm 86 disengages from notch 78. However, this may not be required in all instances, since the last movement of the lever 38 after the lever passes through its dead center will be imparted to the lever by the spring 46, thus moving the carriage 72 away from the arm 86 to an extent sufficient to permit the arm 86 to be returned to its normal position.

It is important to note that in the invention, there is shown a construction which particularly serves to reduce tampering or unauthorized entry. In other words, the pressure plate that controls unlatching of the carriage 72, and the carriage itself, can be disposed at a predetermined distance from one another, the arm 86 then being mounted upon the vehicle at a selected point along the length of the vehicle that will be effective to move the carriage 72 forwardly while the pressure plate is depressed by one wheel of the vehicle. In every installation, the spacing can be different, and as a result, one vehicle alone will be enabled to operate a particular garage door opening apparatus.

It is believed apparent that the invention is not necessarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles of operation and the means presently devised to carry out said principles, it being considered that the invention comprehends any minor change in construction that may be permitted within the scope of the appended claims.

What is claimed is:

1. A garage door operator comprising: a carriage housing adapted to be recessed in a vehicle supporting surface at a location remote from a garage door to be operated; a carriage movably mounted in said housing and projecting above the level of said surface into the path of a vehicle moving thereover; means carried by said vehicle for moving the carriage; a latch member fixedly secured to the carriage; a latch arm rockably mounted in the carriage housing and engaging the latch member in one position to which the carriage is moved, for restraining the carriage against movement from said one position; flange means rigid with and projecting upwardly from said latch arm into the path of a vehicle wheel, said flange means being depressible by a vehicle wheel passing thereover to rock the latch arm out of engagement with the latch member, thereby to release the carriage for movement by the vehicle-carried means; a cable connected at its ends to said carriage and extending between the door and carriage; pulley means about which the cable is trained, said cable being shiftable in the direction of its length about the pulley means responsive to movement of said carriage; and means connected between the cable and said door for operating the door between open and closed positions respectively, responsive to shifting of the cable in the direction of its length.

2. A garage door operator comprising: a carriage housing adapted to be recessed in a vehicle supporting surface at a location remote from a garage door to be operated; a carriage movably mounted in said housing and projecting above the level of said surface into the path of a vehicle moving thereover; means carried by said vehicle for moving the carriage; a latch member fixedly secured to the carriage and formed with an upwardly extending tooth; a latch arm fulcrumed intermediate its ends in the housing to swing about a horizontal axis, said latch arm having at one end a downwardly extending tooth overlying and inter-engageable with the latch member tooth in one position to which the carriage is moved, for restraining the carriage against movement from said one position; flange means rigid with and projecting upwardly from the other end of the latch arm into the path of a vehicle wheel, said flange means being depressible by a vehicle wheel passing thereover to rock the latch arm out of engagement with the latch member, thereby to release the carriage for movement by the vehicle-carried means; a cable connected at its ends to said carriage and extending between the door and carriage; pulley means about which the cable is trained, said cable being shiftable in the direction of its length about the pulley means responsive to movement of said carriage; and means connected between the cable and said door for operating the door between open and closed positions respectively, responsive to shifting of the cable in the direction of its length.

3. A garage door operator comprising: a carriage housing adapted to be recessed in a vehicle supporting surface at a location remote from a garage door to be operated; a carriage movably mounted in said housing and projecting above the level of said surface into the path of a vehicle moving thereover; means carried by said vehicle for moving the carriage; a latch member fixedly secured to the carriage; a latch arm rockably mounted in the carriage housing and engaging the latch member in one position to which the carriage is moved, for restraining the carriage against movement from said one position; flange means rigid with and projecting upwardly from said latch arm into the path of a vehicle wheel, said flange means being depressible by a vehicle wheel passing thereover to rock the latch arm out of engagement with the latch member, thereby to release the carriage for movement by the vehicle-carried means; and means connected between the carriage and door for operating the door to open and closed positions responsive to movement of the carriage.

4. A garage door operator comprising: a carriage housing adapted to be recessed in a vehicle supporting surface at a location remote from a garage door to be operated; a carriage movably mounted in said housing and projecting above the level of said surface into the path of a vehicle moving thereover; means carried by said

vehicle for moving the carriage; a latch member fixedly secured to the carriage: a latch arm rockably mounted in the carriage housing and engaging the latch member in one position to which the carriage is moved, for restraining the carriage against movement from said one position; a lateral extension on the latch arm; flange means extending the length of and rigid with said extension, said flange means projecting upwardly from the extension into the path of a vehicle wheel, said flange means being depressible by a vehicle wheel passing thereover to rock the latch arm out of engagement with the latch member, thereby to release the carriage for movement by the vehicle-carried means; a cable connected at its ends to said carriage and extending between the door and carriage; pulley means about which the cable is trained, said cable being shiftable in the direction of its length about the pulley means responsive to movement of said carriage; and means connected between the cable and said door for operating the door between open and closed positions respectively, responsive to shifting of the cable in the direction of its length.



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