Jan. 7, 1941. W. L. ROBERTS 2,227,556

APPARATUS FOR OPENING AND CLOSING GARAGE DOORS

Filed May 13, 1939 4 Sheets-Sheet 1

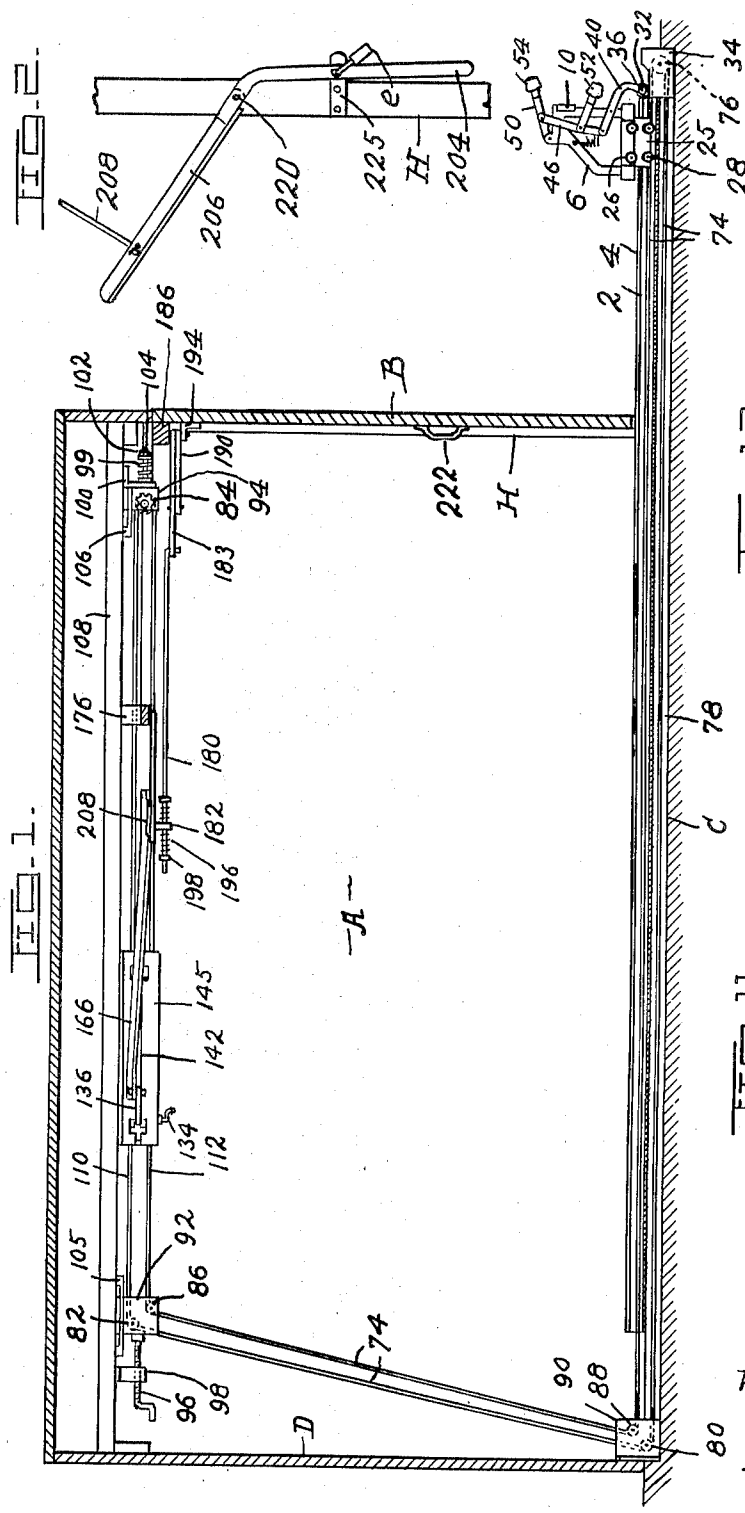


FIG. 2.

FIG. 1.

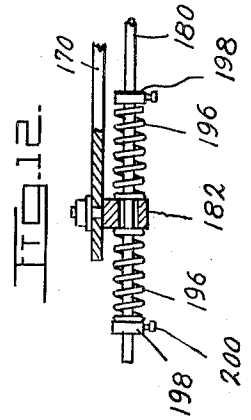


FIG. 12.

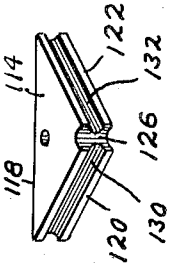


FIG. 11.

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APPARATUS FOR OPENING AND CLOSING GARAGE DOORS

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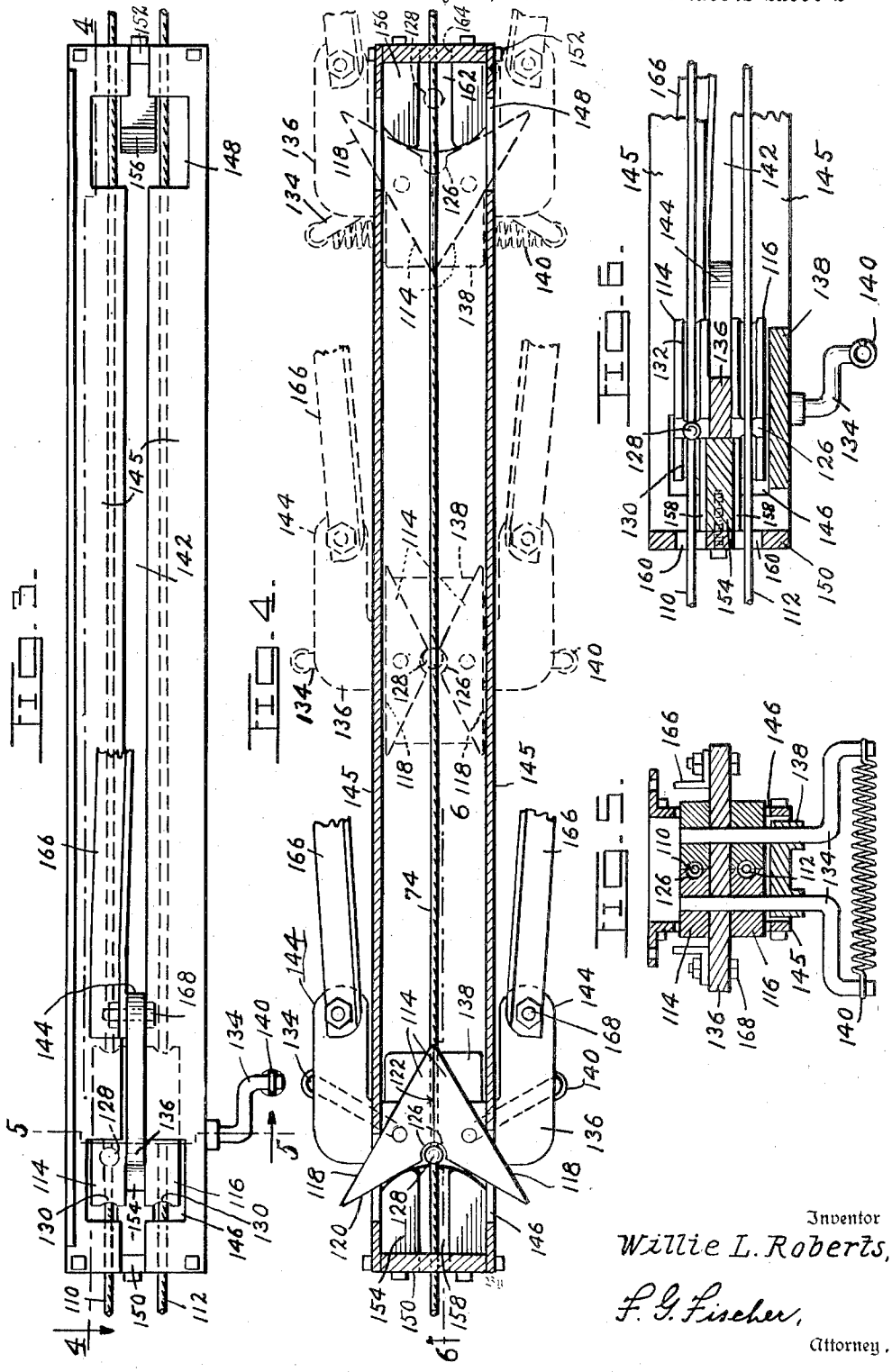


FIG. 3.

FIG. 4.

FIG. 6.

FIG. 5.

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APPARATUS FOR OPENING AND CLOSING GARAGE DOORS

Filed May 13, 1939 4 Sheets-Sheet 3

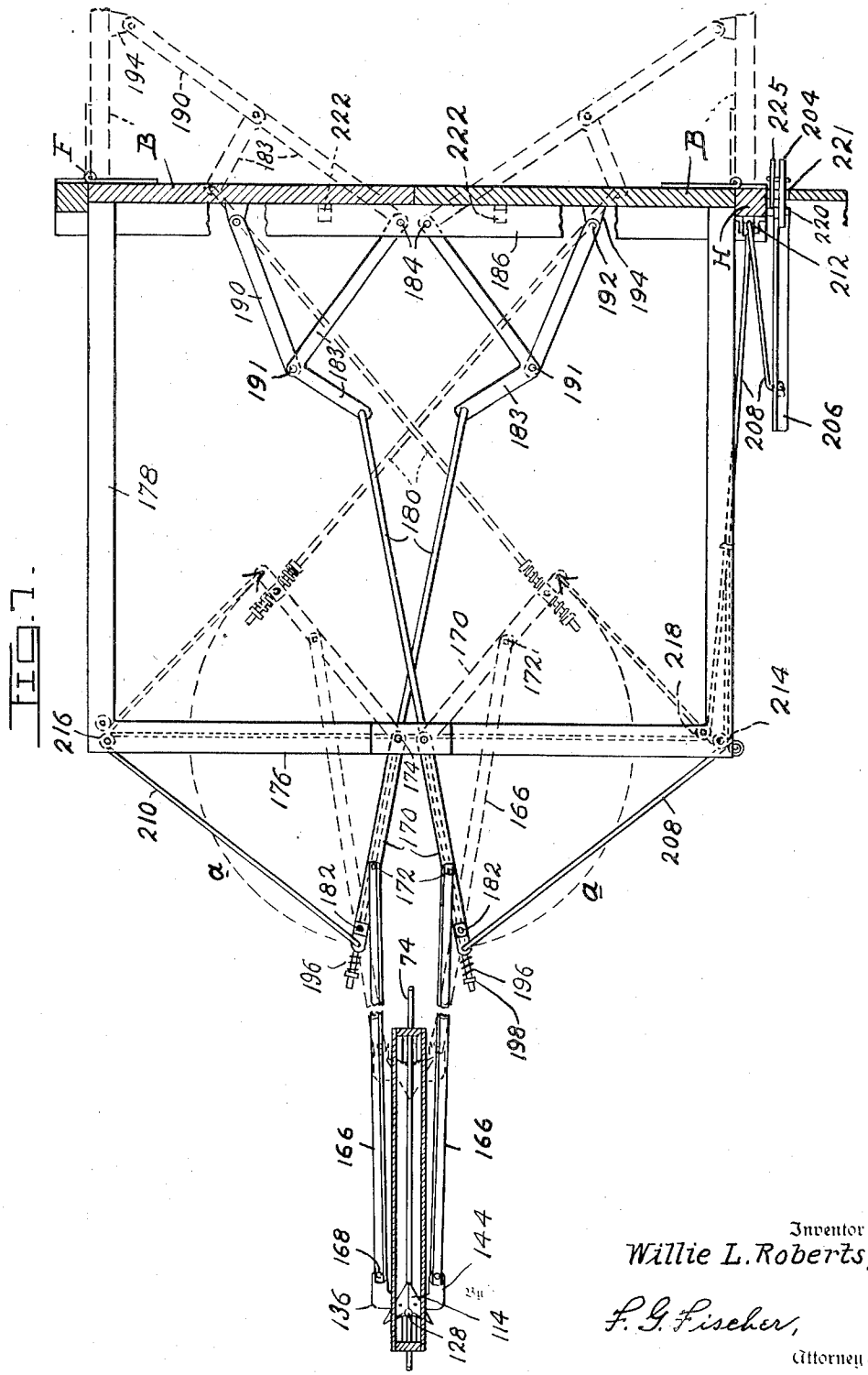


FIG. 1.

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APPARATUS FOR OPENING AND CLOSING GARAGE DOORS

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FIG. 8.

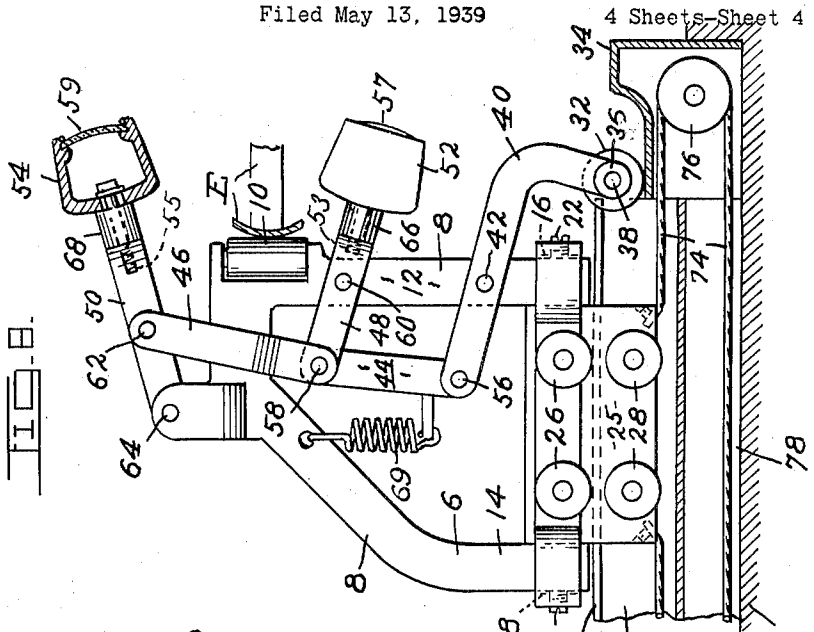


FIG. 9.

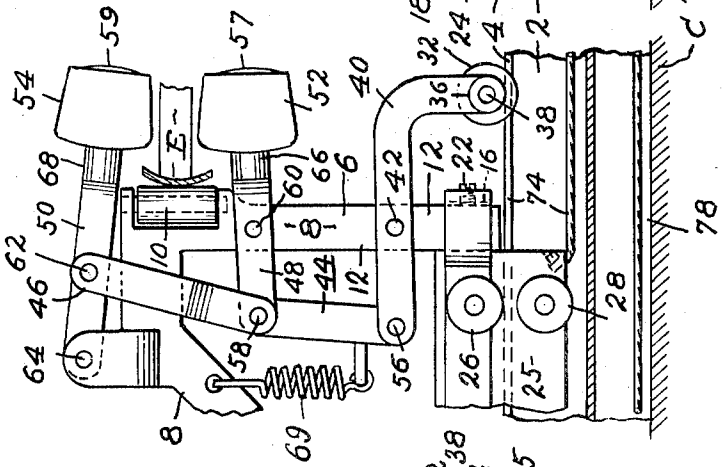
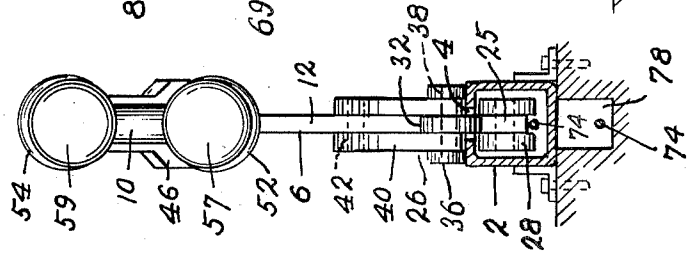


FIG. 10.



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Patented Jan. 7, 1941

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UNITED STATES PATENT OFFICE

2,227,556

APPARATUS FOR OPENING AND CLOSING GARAGE DOORS

Willie L. Roberts, Lees Summit, Mo.

Application May 13, 1939, Serial No. 273,512

22 Claims. (Cl. 268—35)

My invention relates to automatic door opening and closing apparatus and more particularly to apparatus for opening and closing garage doors.

One object of the invention is to provide apparatus which may be automatically actuated by an automobile to open the doors as the automobile is about to enter the garage and to close the doors after the automobile has been driven into the garage, also to open the doors when the automobile is being backed out of the garage and to close the doors after the automobile has left the garage.

Another object is to provide door opening and closing apparatus which may be actuated without requiring the driver to dismount from or stop the automobile.

A further object is to provide manual means whereby the doors may be opened from the inside and also from the outside of the garage.

Another object of the invention is to provide door opening and closing apparatus which may be manufactured and installed at a reasonable cost and will be reliable in operation.

Other objects will hereinafter appear, and in order that the invention may be fully understood, reference will now be had to the accompanying drawings, in which:

Fig. 1 is a vertical longitudinal section of a garage equipped with my door operating apparatus.

Fig. 2 is a broken side elevation of means whereby the doors may be manually opened from the inside and also from the outside of the garage.

Fig. 3 is a side elevation of shuttle means and associated parts.

Fig. 4 is a longitudinal section on line 4—4 of Fig. 3.

Fig. 5 is a vertical cross section on line 5—5 of Fig. 3.

Fig. 6 is a broken longitudinal section on line 6—6 of Fig. 4.

Fig. 7 is a plan view of a part of the door operating mechanism with the garage doors in horizontal section.

Fig. 8 is an enlarged side elevation of a carriage with the bumper of a motor vehicle about to be coupled to said carriage.

Fig. 9 is a fragmentary side elevation of the carriage coupled to the bumper.

Fig. 10 is a front elevation of the carriage with the parts in the position shown by Fig. 9.

Fig. 11 is a detail of one of the shuttles.

Fig. 12 is an enlarged fragmentary detail partly in section of part of the linkage employed in operating the doors.

Referring in detail to the different parts, A designates a garage which in the present instance is equipped with a pair of doors B hinged to swing outwardly in a horizontal plane as indicated by dotted lines, Fig. 7.

A track 2, fixed firmly upon the garage floor C, extends from a point near the rear wall D of the garage outwardly a suitable distance beyond the doors B as disclosed by Fig. 1. The track 2 is of tubular form, Fig. 10, and its upper wall has a longitudinal slot 4 to admit the lower portion of a carriage 6, Figs. 8 to 10, inclusive. The carriage 6 has a frame 8 provided at its upper forward portion with a vertical roller 10 adapted to be contacted by the bumper E of a motor vehicle. In order that the roller 10 may be raised or lowered to accommodate bumpers of different heights, the frame 8 is equipped with front and rear legs 12 and 14 adjustably mounted in openings 16 and 18, respectively, in the lower portion of the frame. The legs 12 and 14 are thin enough to pass through the slot 4 of track 2 should it be necessary to lower roller 10 from the position shown on the drawings. Set screws 22 and 24 serve to secure the respective legs 12 and 14 at any point of their adjustment. The carriage 6 is guided by the slotted portion of track 2 through which the lower portion 25 of the carriage projects, and in order that the operation of the carriage may be attended with a minimum of friction each side of the lower portion 25 is provided with four rollers comprising an upper pair 26 arranged to travel on top of the track and a lower pair 28 adapted to travel against the under side of the slotted wall of the track, a slight amount of space being left between the lower rollers 28 and the wall of the track to allow free forward and backward movement of the carriage.

Normally the carriage 6 is positioned at the outer end of track 2, Fig. 1, so that when a car is about to enter the garage the bumper E will contact roller 10 and push the carriage towards the inner end of the track. As the carriage starts on its inward movement a roller 32 associated therewith and which normally rests upon a sheave housing 34 is lifted with a pair of small rollers 36 which travel up the front end of the track to the upper surface thereof preparatory to traveling inward upon the track. The rollers 36 are mounted upon a shaft 38 which also extends through the roller 32 and the adjacent ends of a pair of levers 40 fulcrumed intermediate their ends upon a pivot 42 extending through the front leg 12 of the carriage. As the roller 32 moves upward the levers 40 pull downward upon

links 44 and 46 and actuate two levers 48 and 50, the forward ends of which swing toward each other and carry forwardly tapered rollers 52 and 54 behind the bumper E, Fig. 9, and thus couple the carriage 6 to the bumper. Link 44 is connected at its lower and upper ends to the rear ends of levers 40 and 48 with pivots 56 and 58, respectively, and links 46 are connected at their lower ends to pivot 58 and at their upper ends to the rear portion of lever 50 with a pivot 62. The levers 48 and 50 are fulcrumed upon pivots 60 and 64, and the rollers 52 and 54 are mounted upon stub shafts 53 and 55 threaded in the forward ends of levers 48 and 50 and carrying antifriction rollers 66 and 68, respectively. By thus providing carriage 6 with the rollers 10, 52, 54, 66 and 68 the bumper E may move laterally and vertically to a limited extent without creating undue friction in the event the motor vehicle deviates from a straight line or passes over small obstructions in its path when operating the carriage 6. A coiled spring 69 is connected to the carriage frame 8 and link 44 to exert an upward pull on the latter and hold the rollers 36 down upon track 2. The forward ends of rollers 52 and 54 are equipped with reflectors 57 and 59, respectively, which constitute guides for the operator of a motor vehicle when approaching the garage doors B at night, by reflecting the light from the lamps of the motor vehicle.

As the carriage 6 is pushed inward by a motor vehicle, it actuates a cable 74 secured at its ends to the lower portion 25 of the carriage. The cable 74 extends forwardly from the carriage around a sheave 76, rearwardly through a longitudinal groove 78 in the garage floor C, around a lower sheave 80, upwardly over an overhead sheave 82, forwardly to a sheave 84, rearwardly to a sheave 86, downwardly to a sheave 88 and forwardly through the tubular track 2 to the lower portion 25 of the carriage. As shown by Fig. 1, sheave 76 is mounted in the sheave housing 34 at the front end of track 2, sheaves 80 and 88 are mounted in a housing 90 at the lower rear portion of the garage, sheaves 82 and 86 are mounted in a housing 92 at the upper rear portion of the garage, and sheave 84 is mounted in a housing 94 at the upper forward portion of the garage.

Means for holding the cable taut is provided in the form of a manually operated screw 96 threaded in a nut 98 and operably connected at its forward end to the sheave housing 92. Tensioning means is also provided in the form of a coil spring 99 interposed between a bracket 100 and a nut 102, which latter is threaded upon a stem 104, extending freely through the bracket 100 and secured to the housing 94. Housings 92 and 94 are slidable in guides 105 and 106, respectively, secured to an overhead beam 108 extending from the front wall to the rear wall of the garage. As shown by Fig. 1 the sheaves 82, 84 and 86 are so positioned as to maintain those portions of the cable traveling between them in parallel relation to each other as indicated at 110 and 112 for the operation of a pair of upper and lower shuttles 114 and 116, respectively, Figs. 3 to 6, inclusive.

Each shuttle is of triangular form and comprises a straight base 118 and sides 120 and 122 extending at acute angles from the ends of the base to the apex of the triangle which has a recess 126 for the reception of an element 128 as shown by Fig. 4. Element 128 is preferably in the form of a ball fixed to cable 74 to travel therewith. The sides 120 and 122 of each triangle have respective grooves 130 and 132 through which the cable is free to pass as will hereinafter appear. Each upper shuttle 114 and the one immediately below it are fixedly mounted midway between their respective ends upon a vertically-disposed crank shaft 134 which extends freely through a cross-head 136 and a slide 138. The lower crank ends of the shafts 134 are connected by a coil spring 140 which assists in operating the shuttles and in yieldably holding them in the different positions which they assume, as shown by full and dotted lines on Fig. 4. The cross-head 136 extends transversely through slots 142 and its ends 144 extend forward in parallel relation to each other for connection to the garage doors B through linkage, as will hereinafter appear.

The slots 142 extend longitudinally through the parallel sides of a pair of slideways 145 and have enlarged end portions 146 and 148, respectively, to admit the ends of the shuttles as shown by full and dotted lines, Fig. 4. The slideways 145 are secured to beam 108 and connected at their ends to transverse members 150 and 152 provided with inwardly extending wedge members 154 and 156, respectively. The wedge member 154 has upper and lower grooves 158 in line with upper and lower apertures 160 in end member 150 for the free passage of the element 128, and wedge member 156 has upper and lower grooves 162 in line with apertures 164 in the end member 152 for the free passage of the element 128.

The cross-head 136 is operably connected to the garage doors B through the medium of linkage, Fig. 7, comprising a pair of bars 166 connected at their rear ends by pivots 168 to the respective ends 144 of the cross-head 136, a pair of arms 170 connected intermediate their ends by pivots 172 to the forward ends of the respective bars 166 and at their forward ends with pivots 174 to the transverse beam 176 of an overhead frame 178, a pair of crossed rods 180 connected at their rear portions to eye-bolts 182 swiveled in the rear ends of the respective arms 170, a pair of bell-cranks 183 connected at their rear ends to the respective downturned forward ends of the rods 180 and connected at their forward ends by pivots 184 to a transverse beam 186, and a pair of links 190 connected at their rear ends with pivots 191 to the intermediate portions of the bell-cranks 183 and at their forward ends by pivots 192 to members 194 fixed to the garage doors B at a predetermined distance from the respective door hinges F.

The rear portion of the crossed rods 180 extend freely through the respective eye-bolts 182 and each is provided with coil springs 196, Fig. 7, interposed between opposite sides of the associated eye-bolt and a pair of collars 198, adjustably secured to the associated rod 180 with set screws 200. The springs 196 afford cushioning means which prevent sudden movement and shock to the doors B when they are being opened or closed. Shock to the doors B is further avoided by arranging the foregoing linkage in such manner that the opening and closing movements of the doors will start and end slowly while the motor vehicle which effects the opening and closing movements may travel at a constant speed. This may be understood on referring to the arrows *a*, *a*, Fig. 7, which show that the rear ends of the arms 170 move nearly in lateral directions as they approach the ends of their

forward and backward movements and move forward and backward during the intermediate portions of their movements. This results in the doors moving slowly near the ends of their respective movements and in their acceleration and deceleration as they pass through the intermediate portions of their movements.

The linkage is also arranged to secure the doors B either in open or closed position. This is accomplished by arranging each pivot 172 so that it will intersect a straight line extending through the associated eyebolt 182 and the forward pivotal end of the rod 180 when the doors are in closed position, and arranging each pivot 191 so that it will intersect a straight line extending through the associated pivots 184 and 192, when the doors are in open position.

Briefly the operation is as follows: When a motor vehicle is about to enter the garage the bumper E contacts roller 10 and moves the carriage 6 inward. As the carriage starts on its inward movement rollers 36 move upward to the top of track 2 and the lower part of roller 32 enters slot 4 and assists in guiding the carriage. When the rollers 36 move upward as stated they, through the medium of the intervening mechanism, move the coupling rollers 52 and 54 toward each other so that they will pass behind the bumper E, and thus couple the carriage 6 to the motor vehicle. As the carriage 6 travels inward it operates the cable 74 which carries ball 128 into recesses 126 of the upper pair of shuttles 114 and moves the upper and lower pairs of shuttles 114 and 116, respectively, forward to the right, Figs. 3 and 4. As the shuttles start on their forward movement the front ends of the enlarged portions 146 of slots 142 force the rear ends of the shuttles inward so that ball 128 will be held in the recesses 126 of the upper pair of shuttles as shown in dotted lines in the intermediate portions of Fig. 4. The shuttles are maintained in parallel relation until they reach the enlarged ends 148 of the slots 142, whereupon the forward ends of the shuttles contact and are spread apart by the wedge member 156 to release the ball 128 so that it may continue its forward movement. As the shuttles move forward as stated they effect the opening of doors B for entrance of the automobile into the garage, through the medium of cross-head 136 and linkage hereinbefore described. Ball 128 travels forward, then around sheave 84, and then backward to enter recesses 126 of the lower shuttles 116 to return the shuttles to their starting point where their rear ends are forced apart by the wedge member 154 to release the ball 128 so that it may continue its backward movement until the carriage 6 reaches the end of its inward movement. As the shuttles move backward to their starting point they close the doors behind the motor vehicle through the medium of the intervening mechanism. The carriage 6 remains coupled to the automobile so that when the latter is backed out of the garage it will pull the carriage therewith.

When the motor vehicle leaves the garage the operation is a reversal of what takes place when the motor vehicle enters the garage, so further description is deemed unnecessary other than to state that as the rollers 36 move downward from the outer end of the track 2 they, through the medium of the intervening mechanism, move the rollers 52 and 54 away from each other so that the bumper E may pass out from between said rollers and thus uncouple carriage 6 from the motor vehicle.

If desired the garage may be equipped with a small door through which the operator may enter and leave the garage, but in the present instance I have shown manual means whereby the main doors B may be partly opened for that purpose. This is effected through the medium of an outer hand lever 204, an inner hand lever 206, a cord 208 attached at one end to lever 206 and at its other end to the rear end of the adjacent arm 170, and a cord 210 attached at one end to the rear end of the other arm 170 and at its forward end to the cord 208. Cord 208 is guided in its movements by sheaves 212 and 214, while cord 210 is guided by sheaves 216 and 218.

The hand levers 204 and 206 are fulcrumed at their adjacent ends upon a pivot 220. The upper end of hand lever 204 is bent at an angle to pass through a slot 221 in the front wall of the garage and overlap the adjacent end of lever 206. When the operator desires to enter the garage the lower end of lever 204 is grasped and pulled upwardly so it will push downwardly upon lever 206 and open doors B through the medium of the intervening mechanism. After the operator enters the garage he may close the doors by pulling inward upon handles 222 fixed to the inner side of the respective doors. If the operator desires to leave the garage without backing the motor vehicle, lever 206 is pulled downwardly to effect partial opening of the doors in the same manner as when the hand lever 204 was operated. After passing outwardly between the doors B they may be pushed to closed position and locked by passing the hasp of a padlock e through registering holes in the lever 204 and a keeper 225 secured to the adjacent door post H.

From the foregoing description it is apparent that I have provided efficient apparatus well adapted for the purpose intended, and while I have shown the apparatus in connection with a pair of doors swingable in a horizontal plane, it is obvious that it may be arranged to operate a gate, or an overhead garage door. I also reserve all rights to such other changes as properly fall within the spirit and scope of the invention as claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:

1. A door operating apparatus comprising reciprocatory shuttle means, means connecting the door to the shuttle means for opening the door on movement of the shuttle means in one direction and for closing the door on the reverse movement of said shuttle means, a guide sheave located between the door and the shuttle means, a reciprocatory cable extending forward through the shuttle means then around the guide sheave and back through the shuttle means, an element fixed to said cable to operate the shuttle means, means for engaging the shuttle means with said element as the latter travels towards the guide sheave and again engage the shuttle means with the element as the latter travels backward after passing around the guide sheave, means for disengaging the shuttle means from said element as the shuttle means reaches the end of each movement, and a carriage adapted to be propelled forward and backward by a motor vehicle to reciprocate the cable and effect the opening and closing of the doors on each forward movement and again on each backward movement of said carriage.

2. A door operating apparatus comprising reciprocatory shuttle means, means connecting the

door to the shuttle means for opening the door on movement of the shuttle means in one direction and for closing the door on the reverse movement of said shuttle means, a guide sheave located between the door and the shuttle means, a reciprocatory cable extending forward through the shuttle means then around the guide sheave and back through the shuttle means, an element fixed to said cable to operate the shuttle means, means for engaging the shuttle means with said element as the latter travels towards the guide sheave and again engage the shuttle means with the element as the latter travels backward after passing around the guide sheave, means for disengaging the shuttle means from said element as the shuttle means reaches the end of each movement, a carriage adapted to be propelled forward and backward by a motor vehicle to reciprocate the cable and effect the opening and closing of the door on each forward movement and again on each backward movement of said carriage, coupling means on the carriage adapted to engage the motor vehicle, a track on which the carriage travels, and means on the carriage adapted to coact with said track in engaging the coupling means with the motor vehicle as the carriage starts forward and disengage the coupling means from the motor vehicle as the carriage reaches the end of its backward movement.

3. A door operating apparatus comprising reciprocatory shuttle means, linkage means connecting the door to the shuttle means for opening the door on movement of the shuttle means in one direction and for closing the door on the reverse movement of said shuttle means, a guide located between the door and the shuttle means, a reciprocatory cable extending forward through the shuttle means then around the guide and back through the shuttle means, an element fixed to said cable to operate the shuttle means, means for engaging the shuttle means with said element as the latter travels towards the guide and again engage the shuttle means with the element as the latter travels backward after passing around the guide, means for disengaging the shuttle means from said element as the shuttle means reaches the end of each movement, and a carriage adapted to be propelled forward and backward by a motor vehicle to reciprocate the cable and effect the opening and closing of the door on each forward movement and again on each backward movement of said carriage.

4. A door operating apparatus comprising reciprocatory shuttle means, means connecting the door to the shuttle means for opening the door on movement of the shuttle means in one direction and for closing the door on the reverse movement of said shuttle means, a guide sheave located between the door and the shuttle means, a reciprocatory cable extending forward through the shuttle means then around the guide sheave and back through the shuttle means, an element fixed to said cable to operate the shuttle means, parallel guide means for engaging the shuttle means with said element as the latter travels towards the guide sheave and again engage the shuttle means with the element as the latter travels backward after passing around the guide sheave, means for disengaging the shuttle means from said element as the shuttle means reaches the end of each movement, and a carriage adapted to be propelled forward and backward by a motor vehicle to reciprocate the cable and effect the opening and closing of the door on each forward movement and again on each backward movement of said carriage.

5. A door operating apparatus comprising upper and lower pairs of reciprocatory shuttles operably connected for simultaneous movement, mechanism connecting the door to said shuttles for opening the door on movement of the shuttles in one direction and for closing the door on the reverse movement of the shuttles, a guide sheave located between the door and the shuttles, a reciprocatory cable extending forward between the upper pair of shuttles then around the guide sheave and back between the lower pair of shuttles, an element fixed to said cable to operate the shuttles, means for engaging the upper pair of shuttles with said element as it travels towards the guide sheave and for engaging the lower pair of shuttles with the element as it travels backward after passing around the guide sheave, said means also engaging the lower pair of shuttles with said element when the cable travels in a reverse direction and engaging the upper pair of shuttles with the element after it has passed around the guide sheave, means for disengaging the shuttles from the element as they reach the end of their movements, and a carriage adapted to be propelled forward and backward by a motor vehicle to reciprocate the cable and effect the opening and closing of the doors on each forward movement and again on each backward movement of said carriage.

6. A door operating apparatus comprising upper and lower pairs of reciprocatory shuttles operably connected for simultaneous movement, mechanism connecting the door to said shuttles for opening the door on movement of the shuttles in one direction and for closing the door on the reverse movement of the shuttles, a guide sheave located between the door and the shuttles, a reciprocatory cable extending forward between the upper pair of shuttles then around the guide sheave and back between the lower pair of shuttles, an element fixed to said cable to operate the shuttles, parallel slideways for engaging the upper pair of shuttles with said element as it travels towards the guide sheave and for engaging the lower pair of shuttles with the element as it travels backward after passing around the guide sheave, said parallel slideways also engaging the lower pair of shuttles with said element when the cable travels in a reverse direction and engaging the upper pair of shuttles with the element after it has passed around the guide sheave, means associated with said slideways for disengaging the shuttles from the element as they reach the end of their movements, and a carriage adapted to be propelled forward and backward by a motor vehicle to reciprocate the cable and effect the opening and closing of the doors on each forward movement and again on each backward movement of said carriage.

7. A door operating apparatus comprising upper and lower pairs of reciprocatory shuttles operably connected for simultaneous movement, mechanism connecting the door to said shuttles for opening the door on movement of the shuttles in one direction and for closing the door on the reverse movement of the shuttles, a guide sheave located between the door and the shuttles, a reciprocatory cable extending forward between the upper pair of shuttles then around the guide sheave and back between the lower pair of shuttles, an element fixed to said cable to operate the shuttles, parallel slideways for engaging the upper pair of shuttles with said element as it

travels towards the guide sheave and for engaging the lower pair of shuttles with the element as it travels backward after passing around the guide sheave, said parallel slideways also engaging the lower pair of shuttles with said element when the cable travels in a reverse direction and engaging the upper pair of shuttles with the element after it has passed around the guide sheave, wedge means associated with the ends of said slideways for disengaging the shuttles from the element, and a carriage adapted to be propelled forward and backward by a motor vehicle to reciprocate the cable and effect the opening and closing of the doors on each forward movement and again on each backward movement of said carriage.

8. A door operating apparatus comprising upper and lower pairs of reciprocatory shuttles, a cross-head to which said shuttles are operably connected, mechanism connecting the door to said cross-head for opening the door on movement of the cross-head in one direction and for closing the door on the reverse movement of the cross-head, a guide sheave located between the door and the shuttles, a reciprocatory cable extending forward between the upper pair of shuttles then around the guide sheave and back between the lower pair of shuttles, an element fixed to said cable to operate the shuttles, parallel slideways for engaging the upper pair of shuttles with said element as it travels towards the guide sheave and for engaging the lower pair of shuttles with the element as it travels backward after passing around the guide sheave, said parallel slideways also engaging the lower pair of shuttles with said element when the cable travels in a reverse direction and engaging the upper pair of shuttles with the element after it has passed around the guide sheave, means associated with said slideways for disengaging the shuttles from the element as they reach the end of their movements, and a carriage adapted to be propelled forward and backward by a motor vehicle to reciprocate the cable and effect the opening and closing of the doors on each forward movement and again on each backward movement of said carriage.

9. A door operating apparatus comprising upper and lower pairs of reciprocatory shuttles, a cross-head, crank shafts operably mounted in said cross-head and to which the shuttles are fixed, a coil spring yieldably connected to said crank shafts, mechanism connecting the door to said cross-head for opening the door on movement of the cross-head in one direction and for closing the door on the reverse movement of the cross-head, a guide sheave located between the door and the shuttles, a reciprocatory cable extending forward between the upper pair of shuttles then around the guide sheave and back between the upper pair of shuttles, an element fixed to said cable to operate the shuttles, parallel slideways for engaging the upper pair of shuttles with said element as it travels towards the guide sheave and for engaging the lower pair of shuttles with the element as it travels backward after passing around the guide sheave, said parallel slideways also engaging the lower pair of shuttles with said element when the cable travels in a reverse direction and engaging the upper pair of shuttles with the element after it has passed around the guide sheave, means associated with said slideways for disengaging the shuttles from the element as they reach the end of their movements, and a carriage adapted to be propelled forward and backward by a motor vehicle to reciprocate the cable and effect the opening and closing of the doors on each forward movement and again on each backward movement of said carriage.

10. In apparatus for operating garage doors, a track extending from the outside to the inside of the garage, a carriage arranged to be propelled inward and outward on said track by a motor vehicle, mechanism controlled by the carriage adapted to open and close the doors as the carriage moves in either direction, coupling means on the carriage for engaging the motor vehicle, and means on the carriage cooperating with the track for controlling said coupling means.

11. In apparatus for operating garage doors, a track extending from the outside to the inside of the garage, a carriage adapted to be propelled inward and outward on said track by a motor vehicle, mechanism controlled by the carriage and adapted to open and close the doors as the carriage moves in either direction, coupling means on the carriage for engaging the motor vehicle, a roller controlled by the carriage and the track, and means mounted on the carriage and controlled by said roller for operating the coupling means.

12. In apparatus for operating garage doors, a track extending from the outside to the inside of the garage, a carriage adapted to be propelled inward and outward on said track by a motor vehicle, mechanism controlled by the carriage and adapted to open and close the doors as the carriage moves in either direction, coupling means on the carriage for engaging the motor vehicle, rollers adapted to move to the upper surface of the track as the carriage moves inward and to move downward at the outer end of the track as the carriage reaches the end of its outward movement, a lever mounted on the carriage and controlled by said rollers, means on the carriage controlled by said lever for moving the coupling means to active position as the rollers move upward and for moving the coupling means to idle position as the rollers move downward.

13. In apparatus for operating garage doors, a track extending from the outside to the inside of the garage, a carriage adapted to be propelled inward and outward on said track by a motor vehicle, mechanism controlled by the carriage and adapted to open and close the doors as the carriage moves in either direction, a pair of coupling rollers for engaging the motor vehicle, levers fulcrumed on the carriage and upon the forward ends of which said rollers are mounted, links for operating said levers, and means associated with the carriage and cooperating with the track for operating said links to effect coupling of the carriage to the motor vehicle as the latter starts the carriage inwardly and for uncoupling the carriage from the motor vehicle as the carriage reaches the end of its outward movement.

14. In apparatus for operating garage doors, a tubular track having a longitudinal slot in its upper portion, a carriage adapted to be propelled inward and outward by a motor vehicle and comprising a frame extending downward through said slot, said frame including a lower portion and an upper portion which latter is vertically adjustable in the former, means for securing said upper portion at any point of its adjustment, rollers adapted to travel upon the track and upon which the carriage frame is mounted, rollers

mounted upon the frame and adapted to travel against the underside of the slotted portion of the track, an antifriction roller mounted upon the frame and adapted to be contacted by part of the motor vehicle, coupling means adapted to move to active position behind the contacting part of the motor vehicle to couple the carriage to the motor vehicle, and to idle position to uncouple the carriage from the motor vehicle, means mounted on the carriage and adapted to coact with the track in actuating said coupling means, and mechanism connecting the carriage to the doors for opening and closing the doors on movement of the carriage in either direction.

15. In apparatus of the character described, a track, a carriage arranged to traverse the track and be actuated by a motor vehicle, a pair of rollers adapted to pass behind part of the motor vehicle and couple the latter to the carriage, levers mounted on the carriage and upon which the coupling rollers are mounted, means mounted upon the carriage and coacting with the track to control said levers, and means connecting the carriage to the doors for opening and closing the latter on movement of the carriage.

16. A door operating apparatus comprising upper and lower pairs of reciprocating shuttles operably connected for simultaneous movement, mechanism connecting the door to said shuttles for opening the door on movement of the shuttles in one direction and for closing the door on the reverse movement of the shuttles, a carriage adapted to be propelled forward and backward by a motor vehicle, and means controlled by said carriage for moving the shuttles forward and backward to effect the opening and closing of the door on movement of the carriage in either direction.

17. In apparatus for operating a pair of doors, a reciprocatory cable, means for operating said cable, a pair of shuttles having adjacent grooved sides to provide a free passageway for said cable, means through which said shuttles control the doors, an element fixed to the cable and adapted to engage and reciprocate the shuttles, a pair of parallel slideways for guiding and holding the shuttles in engagement with said element, and means associated with said slideways for disengaging the shuttles from the element as the shuttles approach the end of their reciprocatory movements.

18. In apparatus for operating a pair of doors, a reciprocatory cable, means for operating said cable, a pair of shuttles having adjacent grooved sides to provide a free passageway for said cable, an element fixed to the cable and adapted to engage and reciprocate the shuttles, a pair of parallel longitudinally slotted slideways for guiding and holding the shuttles in engagement with said element, means associated with said slideways for disengaging the shuttles from the element as the shuttles approach the end of their reciprocatory movements, a cross-head reciprocably mounted in the slotted portions of the slideways and on which the shuttles are operably mounted, and means through which said cross-head operates the doors.

19. In apparatus for operating a pair of doors, a reciprocatory cable, means for operating said cable, a pair of shuttles having adjacent grooved sides to provide a free passageway for said cable, an element fixed to the cable and adapted to engage and reciprocate the shuttles, a pair of parallel slideways for guiding and holding the shuttles in engagement with said element, means associated with said slideways for disengaging the shuttles from the element as the doors reach their open and closed positions, a reciprocatory cross-head associated with the slideways, means through which said cross-head operates the doors, crank shafts operably mounted in the cross-head and upon which the respective shuttles are fixed, and spring means yieldably connecting said crank-shafts.

20. In apparatus for operating a pair of doors, a reciprocatory cable, means for operating said cable, guide means for the cable, a pair of shuttles having adjacent grooved sides to provide a free passageway for said cable, means through which said shuttles control the doors, an element fixed to the cable and adapted to engage and reciprocate the shuttles, a pair of parallel slideways for guiding and holding the shuttles in engagement with said element during a portion of its movement, and wedge members associated with said slideways for disengaging the shuttles from the element as the shuttles approach the end of their reciprocatory movements.

21. In apparatus for operating a pair of garage doors, a reciprocatory cable, means for operating said cable, two pairs of reciprocatory shuttles each pair having grooved sides for free passage of said cable, means for guiding the cable to the grooves, two shafts arranged side by side, each having one of each pair of shuttles fixed thereon for simultaneous movement, a cross-head in which said shafts are operably mounted, means through which said cross-head operates the doors, oppositely disposed recesses in each pair of shuttles communicating with the respective grooves, an element fixed to the cable and adapted to successively enter each pair of recesses during the travel of the cable to move the shuttles therewith, means for guiding the shuttles and holding their recessed portions in engagement with said element, and means for disengaging the shuttles from the element as the doors reach their open and closed positions.

22. In apparatus for operating a pair of garage doors, a reciprocatory cable, a carriage adapted to be actuated by a motor vehicle and to which the cable is attached, two pairs of reciprocatory shuttles each pair having grooved sides for free passage of said cable, sheaves for guiding the cable from the carriage to the grooves, two shafts arranged side by side, each having one of each pair of shuttles fixed thereon for simultaneous movement, a cross-head in which said shafts are operably mounted, means through which said cross-head operates the doors, oppositely disposed recesses in each pair of shuttles communicating with the respective grooves, an element fixed to the cable and adapted to successively enter each pair of recesses during the travel of the cable to move the shuttles therewith, means for guiding the shuttles and holding their recessed portions in engagement with said element, and wedge members for disengaging the shuttles from the element as the doors reach their open and closed positions.

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