

Feb. 3, 1931.

H. F. FREEMAN

1,790,701

DOOR CONTROL

Filed April 17, 1922

3 Sheets-Sheet 1

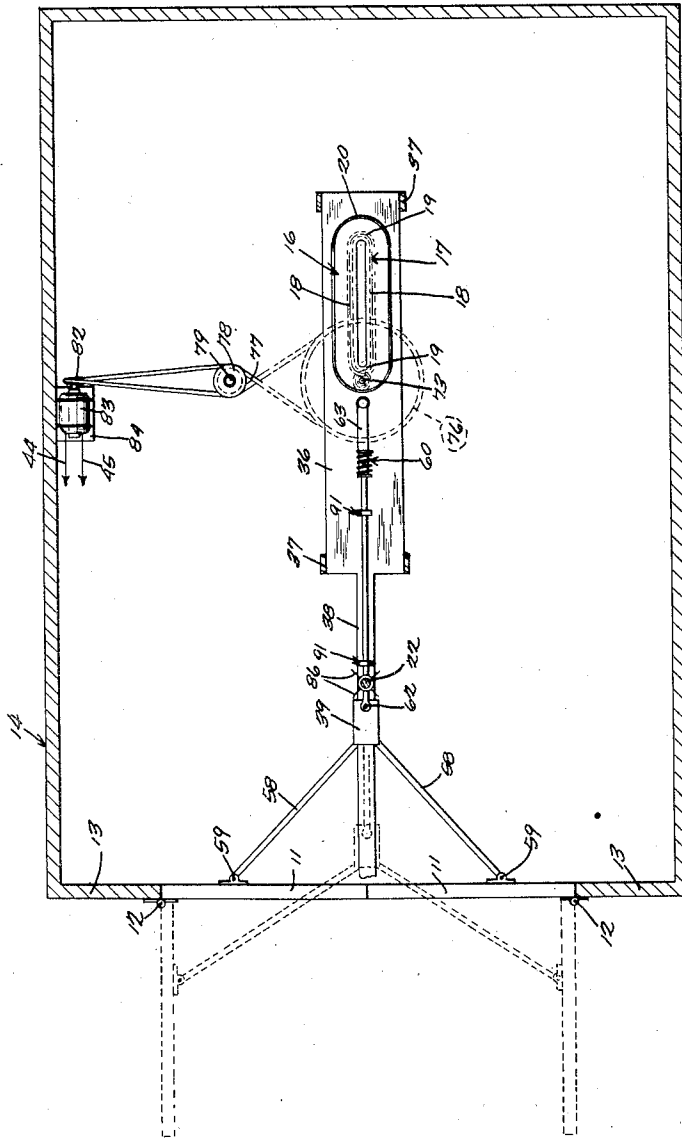


Fig. 1

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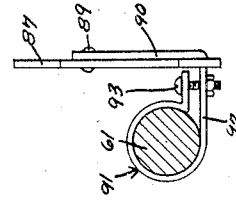
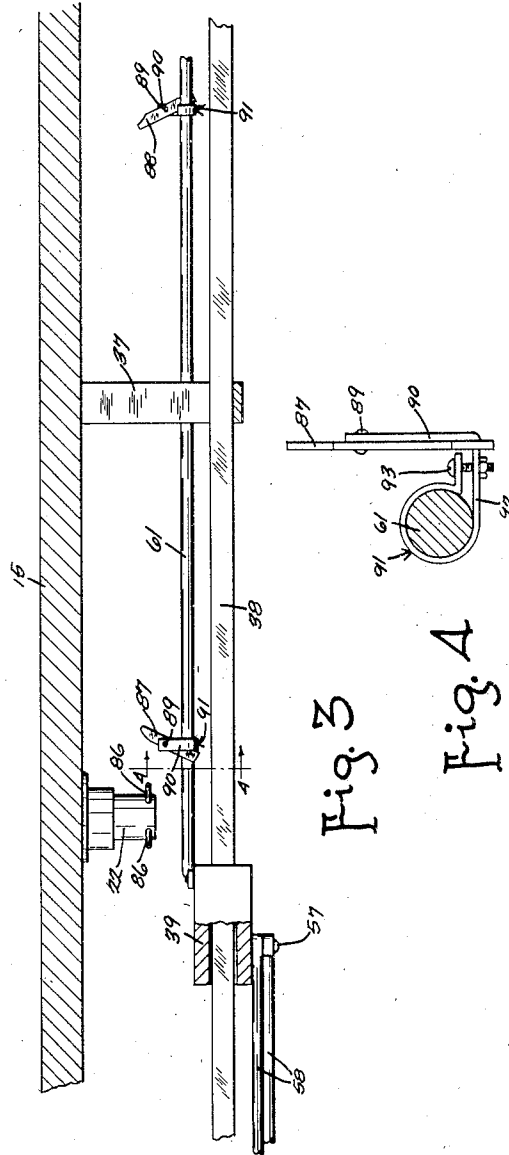
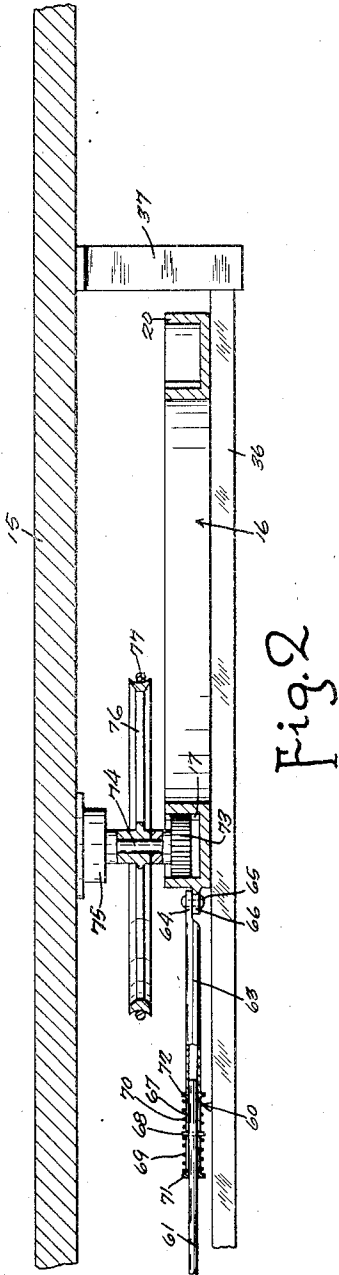
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3 Sheets-Sheet 3

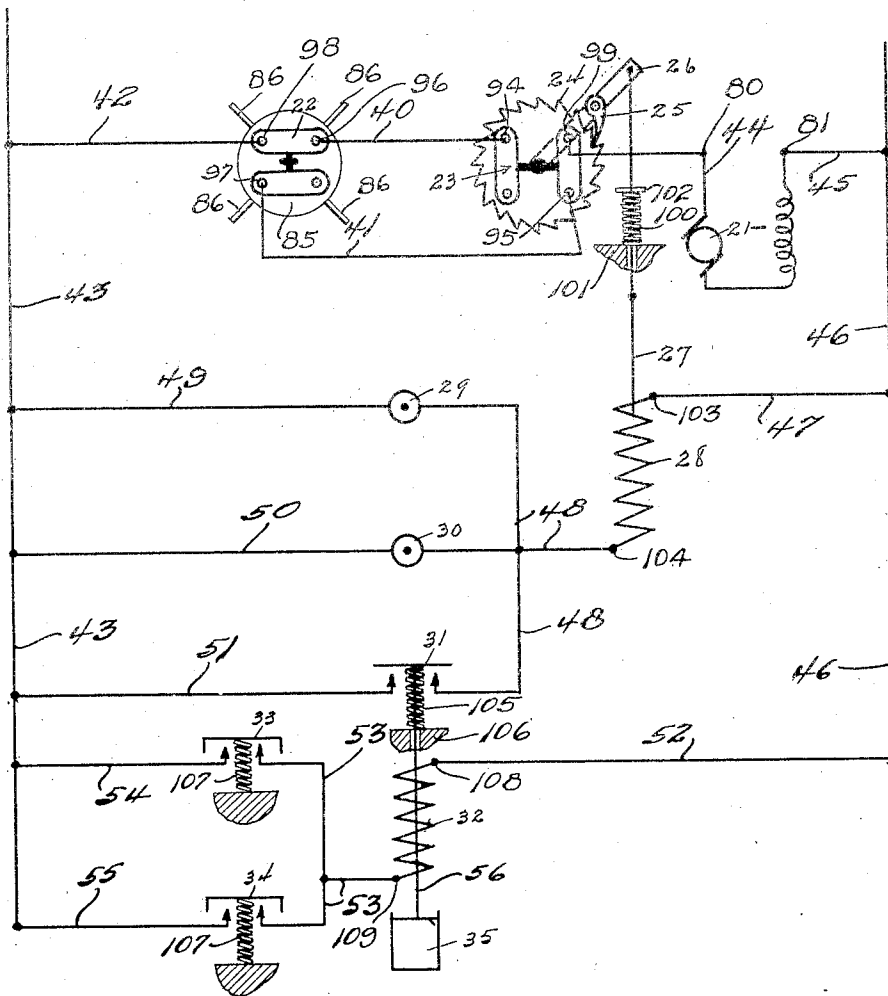


Fig. 5.

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UNITED STATES PATENT OFFICE

HADLEY F. FREEMAN, OF MILWAUKEE, WISCONSIN

DOOR CONTROL

Application filed April 17, 1922. Serial No. 853,642.

My invention relates to door controls, and particularly to door controls for garage doors, and the principal object of my invention is to provide a new and improved door control of this type. In the drawings accompanying this specification and forming a part of this application I have shown, for purposes of illustration, one form which my invention may assume, and in these drawings:

10 Figure 1 shows a portion of a garage equipped with a door opening and closing mechanism embodying my invention;

Figure 2 is a side elevation of the door operating mechanism;

15 Figure 3 shows the mechanism for discontinuing the movement of the door operating mechanism;

Figure 4 is a detail of the discontinuing mechanism; while

20 Figure 5 is a diagrammatic view of the wiring system.

The embodiment of my invention herein shown is applied to doors 11 supported by means of hinges 12 from the walls 13 of a garage 14 provided with a roof or ceiling 15, and the operating mechanism used in the embodiment of my invention herein shown includes a mangle rack 16 having rack teeth 17 disposed as two parallel portions 18 connected by two semi-circular toothed end portions 19, as shown in dotted lines in Figure 1. Surrounding these teeth 17 is an upstanding flange 20 supported in spaced relation to the teeth 17. This mangle rack 16 is arranged to slide backward and forward upon a preferably horizontally mounted supporting plate 36 supported from the garage roof 15 by means of brackets 37 disposed at suitable points and provided at one end with a rearwardly extending rail 38 upon which is slidably mounted a sleeve 39 carrying a pin 57 to which are pivoted a pair of links 58 the remote ends of which are secured to the doors 11 by means of pivots 59.

45 In order to open and close the doors 11 the sleeve 39 is reciprocated backward and forward by means of the mangle rack 16, the mangle rack 16 being connected to the sleeve 39 by means of a connecting unit 60 comprising a rod 61 connected to the sleeve 39 by

means of a pivot pin 62 and telescoping at its rear end within a tubular member 63 which is provided with a terminal ear 64 connected by means of a suitable pin 65 to an ear 66 projecting from the forward end of the mangle rack 16, and is provided also with a longitudinally extending slot 67 within which reciprocates a pin 68 projecting from the rod 61 and biased to mid position by means of two sections of coil spring 69 and 70 surrounding the tubular member 63 between the pin 68 and stop collars 71 and 72 secured to the exterior of the tubular member 63 respectively ahead and rearwardly of the pin 68, this connection serving to connect the mangle rack 16 to the sleeve 39 resiliently to permit slight movement of the mangle rack 16 independently of the doors 11 to allow for slight inaccuracies in coordination of the movement of the mangle rack 16 and of the doors 11, and also to cushion the initiation and termination of the operating movement of the mangle rack 16.

The mangle rack 16 is reciprocated backward and forward by means of a drive pinion 73 held in mesh with the teeth 17 of the mangle rack 16 by means of the upstanding flange 20, rotatably mounted upon a stub shaft 74 depending from a suitable support 75 fixed to the garage ceiling 15, and operated by means of a sheave 76 secured to the drive pinion 73 and itself operated by means of a belt 77 passing over an idler pulley 78 mounted upon a suitable support 79 and operated from the driving pulley 82 of an electric motor 83 carried by a suitable supporting shelf 84 and energized through connecting wires 44 and 45 under the control of the control mechanism herein shown.

Among the devices for controlling the operation of the motor 83, and therefore of the doors 11, is a four point switch 22 having its movable element rotatably mounted upon a suitable base 85, and provided with four out-standing switch arms 86 adapted to be operated by means of dogs 87 and 88 pivotally mounted upon pivot pins 89 supported within extending arms 90 of brackets 91 each terminating in an ear 92 carrying a bolt 93 by means of which the dogs 87 and 88 are ad-

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justably connected to the operating rod 61 in position so that the dog 87 will operate the switch 22 at the termination of the backward or door closing movement of the mangle rack 16 and the dog 88 will again operate the switch 22, and in the same direction, upon the termination of the forward or door opening movement of the mangle rack 16, each actuation rotating the switch 22 a quarter revolution.

The control mechanism herein shown also comprises a second four point switch 23 having its terminals 94 and 95 connected to the terminals 96 and 97 of the four point switch 22 by the usual "go-between" wires 40 and 41, a conductor 42 connecting the terminal 98 of the four point switch 22 to the line wire 43, the conductor 44 connecting the terminal 99 of the four point switch 23 to one terminal 80 of the motor 21, and the conductor 45 connecting the other terminal 81 of the motor 21 to the other line wire 46.

From the above description it will now be understood that operation of the switch 23 will close the circuit through the motor 21 to cause the motor 21 to operate until it has moved the doors 11 to an extreme position where the switch 22 will be actuated automatically to open the circuit through the motor 21 to terminate operation of the motor 21, that a subsequent actuation of the switch 23 will again complete the circuit through the motor 21 to cause the motor 21 to again actuate the doors 11 until they reach the other extreme position and the switch 22 is again automatically actuated to again open the circuit through the motor 21 to again terminate operation of the motor 21, and that this cycle may be repeated over and over, the circuit being closed by operation of the switch 23 and opened automatically when the doors 11 have reached extreme position by the automatic operation of the switch 22 at that time.

It will also be obvious that in an emergency the operation of the motor 21 may be terminated at any time by actuation of the switch 23 to open the circuit through the motor 21 in that way, and renewed by a further actuation of the switch 23 to its previous condition to cause further actuation of the motor 21 again terminable by emergency operation of the switch 23, or in the normal way by automatic operation of the switch 22.

In the embodiment of my invention herein shown the switch 23 is provided with a ratchet 24 engaged by a pawl 25 carried by a lever 26 to which is connected the armature 27 of a solenoid 28 connected to the lever 26 in such manner that each operation of the solenoid 28 causes a quarter revolution of the switch 23 to thus shift the switch from its one circuit condition to its other circuit condition.

Upon cessation of the action of the solenoid 28 the lever 26, and armature 27, but not the ratchet 24 or switch 23, are returned to

normal position ready for a subsequent actuation in any desired manner, as by a spring 100 compressed between a fixed abutment 101 and a shoulder 102 secured to the armature 27, or by the action of gravity on a weight suitably positioned.

The solenoid 28 is herein shown as connected between the line wires 43 and 46, through any one of a plurality of switches 29 or 30 or 31, by means of a conductor 47 connecting one terminal 103 of the solenoid 28 to the line wire 46, a conductor 48 connecting the other terminal 104 of the solenoid 28 to one terminal of each of the switches 29 and 30 and 31, and conductors 49 and 50 and 51 connecting to the line wire 43 the other terminal of each of the switches 29 and 30 and 31.

The switches 29 and 30 may be of any number, and may be located at convenient points to permit ready manual control of the door operating means, particularly for emergency.

The switch 31, however, is an electro-magnetically operated switch biased to open position in any suitable manner, as by a spring 105 compressed between fixed abutment 106 and the head of the switch 31, or by the action of gravity on a weight suitably positioned, and operated to closed position by a solenoid 32 energized through either of a pair of floor pan switches 33 or 34 positioned one outside the garage and one inside the garage, each normally held in elevated circuit-open position by a compression spring 107 disposed therebelow, and each mounted in position to be actuated by depression of its operating plate by an automobile passing thereover in entering or leaving the garage, the solenoid 32 being connected to the line wires 43 and 46 through the switches 33 or 34 by means of a conductor 52 connecting one terminal 108 of the solenoid 32 with the line wire 46, a conductor 53 connecting the other terminal 109 of the solenoid 32 with one terminal of each of the switches 33 and 34, and conductors 54 and 55 connecting the other terminal of each of the switches 33 and 34 with the line wire 43.

In order to prevent actuation of the switch 31 by momentary actuation of one of the switches 33 and 34, as by the impact of a person jumping thereon, the armature 56 of the solenoid 32 is connected to a retarding device retarding movement of the armature 56 under the action of the solenoid 32 to thus require energization of the solenoid 32 continued for an appreciable period, the retarding device being herein shown conventionally as a dash pot 35.

In operation, a vehicle approaching the garage to enter, when the doors are closed will be brought to rest on the pan 33, and continued maintenance of the circuit through the solenoid 32 will result in closing the switch 31 to operate the switch 23 to thus

energize the motor 21 and open the doors. On the other hand, if the doors be already open, the vehicle will be moved over the pan 33 without pause and the momentary energization of the solenoid 32 will be ineffective to close the switch 31 and the doors will remain open. After entering the garage continued depression of the pan 34 will re-actuate the switch 23 to cause the motor 21 to close the doors, while momentary depression will permit the doors to remain open. Similarly, in leaving the garage continued depression of the pan 34 will open the doors, and subsequent continued depression of the pan 33 will close the doors, while momentary depression of either pan will cause no change in position of the doors. On the other hand, the doors may at all times be controlled by the manually operable switches 29 and 30, and an operation of any one of the switches 29 or 30 or 31 while the doors are in motion will at once operate the switch 23 to open the circuit of the motor 21 and thus arrest the motion of the doors until a subsequent operation of the switch 23 causes the motor 21 to resume. Inasmuch as the switch 31 is operated only after continued depression of the pan 33 or the pan 34 impact on a pan will have no effect and the pan may be adjusted to respond readily to a light vehicle without risk of operation by a jumping person.

From the above it will be obvious to those skilled in the art that I have provided new and improved means for operating garage doors, and accordingly that the embodiment of my invention herein shown and described accomplishes at least the principal object of my invention. At the same time it also will be obvious to those skilled in the art that the embodiment of my invention herein shown and described is applicable to other uses than those specifically pointed out or suggested herein, and embodies advantages other than those specifically pointed out or suggested herein, and also that this particular embodiment of my invention may be variously changed and modified without departing from the spirit of my invention, or sacrificing the advantages thereof, particularly by the interposition of suitable disabling switches to prevent unauthorized operation of the doors, for example when it is desired to lock the garage, for example by inserting within the circuit of the external operating pan 33 a switch either locked against unauthorized operation or located within the garage itself, or by inserting such a switch directly in the circuit of the motor itself, or wherever else such a switch may be desired, or by inserting one or more such switches, and accordingly it will be understood that the disclosure herein is illustrative only, and that my invention is not limited thereto.

I claim:—

1. In combination, motive means for opening and closing a door of a vehicle-admitting opening and control means, for controlling the operation of said motive means, comprising a plurality of means at least two of which are mechanically actuable by such vehicle and each of which is effective, upon actuation when said door is in closed position, to cause said motive means to open said door, and upon actuation when said door is in open position, to cause said motive means to close said door.

2. In combination, motive means for opening and closing a door of a vehicle-admitting opening, and control means, for controlling the operation of said motive means, comprising a plurality of means at least two of which are mechanically actuable by such vehicle, and at least one of which is actuable manually, and each of which is effective, upon actuation when said door is in closed position, to cause said motive means to open said door, and upon actuation when said door is in open position, to cause said motive means to close said door.

3. In combination, motive means for opening and closing a door of a vehicle-admitting opening, and control means, for controlling the operation of said motive means, comprising a means mechanically actuable by such vehicle, effective only after continued actuation for an appreciable period, and effective, upon such actuation when said door is in closed position, to cause said motive means to open said door, and upon such actuation when said door is in open position, to cause said motive means to close said door.

4. In combination, motive means for opening and closing a door of a vehicle-admitting opening, direct control means for directly controlling the operation of said motive means, and a plurality of secondary control means each controlling the operation of said direct control means, at least one arranged to be mechanically operated by such vehicle and actuated only after continued such operation for an appreciable period, and each effective, upon actuation when said door is in closed position, to cause said direct control means to cause said motive means to open said door, and upon actuation when said door is in open position, to cause said direct control means to cause said motive means to close said door.

5. In combination, motive means for opening and closing a door of a vehicle-admitting opening, direct control means for directly controlling the operation of said motive means, and a plurality of secondary control means each controlling the operation of said direct control means, at least one arranged to be mechanically operated by such vehicle and actuated only

after continued such operation for an appreciable period, at least one arranged to be actuated manually, and each effective, upon actuation when said door is in closed position, to cause said direct control means to cause said motive means to open said door, and upon actuation when said door is in open position, to cause said direct control means to cause said motive means to close said door.

6. In combination, motive means for opening and closing a door of a vehicle-admitting opening, and control means, for controlling the operation of said motive means, comprising means mechanically actuatable by such vehicle to effect operation of said motive means, but effective only after continuous such actuation for an appreciable period.

7. A door operating device for a door of a vehicle-admitting opening and a control therefor comprising means to cause actuation of said operating device operable only after continued imposition of a mechanical actuating force by such vehicle upon said means.

8. In combination, motive means for opening and closing a door of a vehicle-admitting opening, and control means, for controlling the operation of said motive means, comprising a plurality of means at least two of which are mechanically operable by such vehicle and actuated only after continued such operation for an appreciable period, and each of which is effective, upon actuation when said door is in closed position, to cause said motive means to open said door, and upon actuation when said door is in open position, to cause said motive means to close said door.

9. In combination, motive means for opening and closing a door of a vehicle-admitting opening, and control means, for controlling the operation of said motive means, comprising a retarded relay mechanically actuatable by such vehicle to effect operation of said motive means, but effective only after continuous such actuation for an appreciable period.

10. In combination, motive means for opening and closing a door of a vehicle admitting opening, and control means, for controlling the operation of said motive means, comprising means mechanically actuatable by the weight of such vehicle to effect operation of said motive means, but effective only after continuous such actuation for an appreciable period.

11. In combination, motive means for opening and closing a door of a vehicle-admitting opening, and control means, for controlling the operation of said motive means, comprising a retarded relay mechanically actuatable by the weight of such vehicle to effect operation of said motive means, but effective only after

continuous such actuation for an appreciable period.

12. In combination: motive means for opening and closing a door of a vehicle-admitting opening; and control means, for controlling the operation of said motive means, comprising a means mechanically actuatable by such vehicle and effective, upon every actuation when said door is in either open or closed position, to cause said motive means to move said door to the other said position.

13. In combination: motive means for opening and closing a door of a vehicle-admitting opening; and control means, for controlling the operation of said motive means, comprising at least two means each mechanically actuatable by such vehicle and effective, upon every actuation when said door is in either open or closed position, to cause said motive means to move said door to the other said position.

14. In combination: motive means for opening and closing a door of a vehicle-admitting opening; and control means, for controlling the operation of said motive means, comprising a means mechanically actuatable by such vehicle, effective only after continued such actuation for an appreciable period, and effective, upon every such actuation when said door is in either open or closed position, to cause said motive means to move said door to the other said position.

15. In combination: motive means for opening and closing a door of a vehicle-admitting opening; and control means, for controlling the operation of said motive means, comprising a means mechanically actuatable by such vehicle and effective, upon every actuation when said door is in intermediate position, either in the condition of movement or the condition of rest, to cause said motive means to place said door in the other said condition.

16. In combination: motive means for opening and closing a door of a vehicle-admitting opening; and control means, for controlling the operation of said motive means, comprising at least two means each mechanically actuatable by such vehicle and effective, upon every actuation when said door is in intermediate position, either in the condition of movement or the condition of rest, to cause said motive means to place said door in the other said condition.

17. In combination: motive means for opening and closing a door of a vehicle-admitting opening; and control means, for controlling the operation of said motive means, comprising a means mechanically actuatable by such vehicle, effective only after continued such actuation for an appreciable period, and effective, upon every such actuation when said door is in intermediate position, either in the condition of movement or the condition of

rest, to cause said motive means to place said door in the other said condition.

18. In combination: motive means for opening and closing a door of a vehicle-admitting opening; and control means, for controlling the operation of said motive means, comprising a means mechanically actuatable by such vehicle and effective, upon every actuation when said door is in either open or closed position, to cause said motive means to move said door to the other said position, and upon every actuation when said door is in intermediate position, either in the condition of movement or the condition of rest, to cause said motive means to place said door in the other said condition.

19. In combination: motive means for opening and closing a door of a vehicle-admitting opening; and control means, for controlling the operation of said motive means, comprising at least two means each mechanically actuatable by such vehicle and effective, upon every actuation when said door is in either open or closed position, to cause said motive means to move said door to the other said position, and upon every actuation when said door is in intermediate position, either in the condition of movement or the condition of rest, to cause said motive means to place said door in the other said condition.

20. In combination: motive means for opening and closing a door of a vehicle-admitting opening; and control means, for controlling the operation of said motive means, comprising a means mechanically actuatable by such vehicle, effective only after continued such actuation for an appreciable period, and effective, upon every such actuation when said door is in either open or closed position, to cause said motive means to move said door to the other said position, and upon every such actuation when said door is in intermediate position, either in the condition of movement or the condition of rest, to cause said motive means to place said door in the other said condition.

In testimony whereof I have signed my name to the above specification.

HADLEY F. FREEMAN.

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