July 29, 1930. M. JOHNSEN ET AL 1,771,637

DOOR OPERATING MECHANISM

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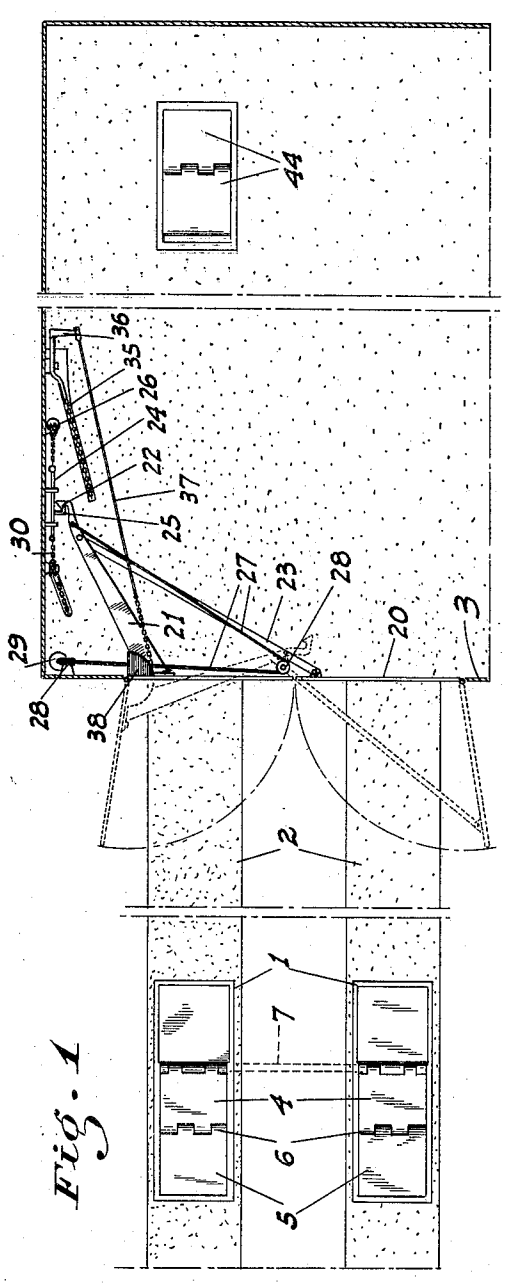


Fig. 1

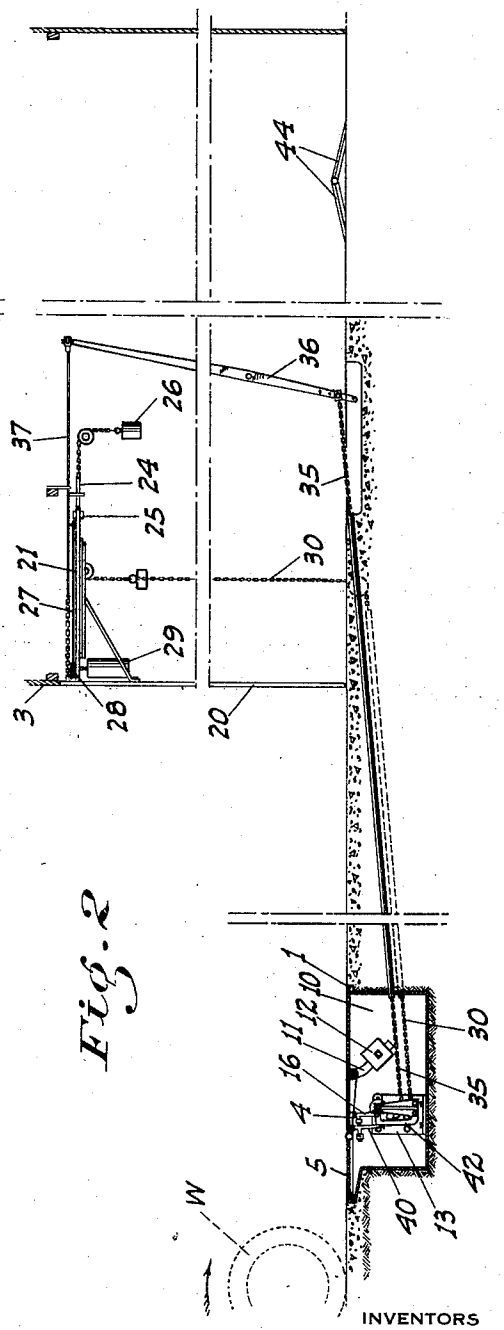


Fig. 2

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Fig. 3

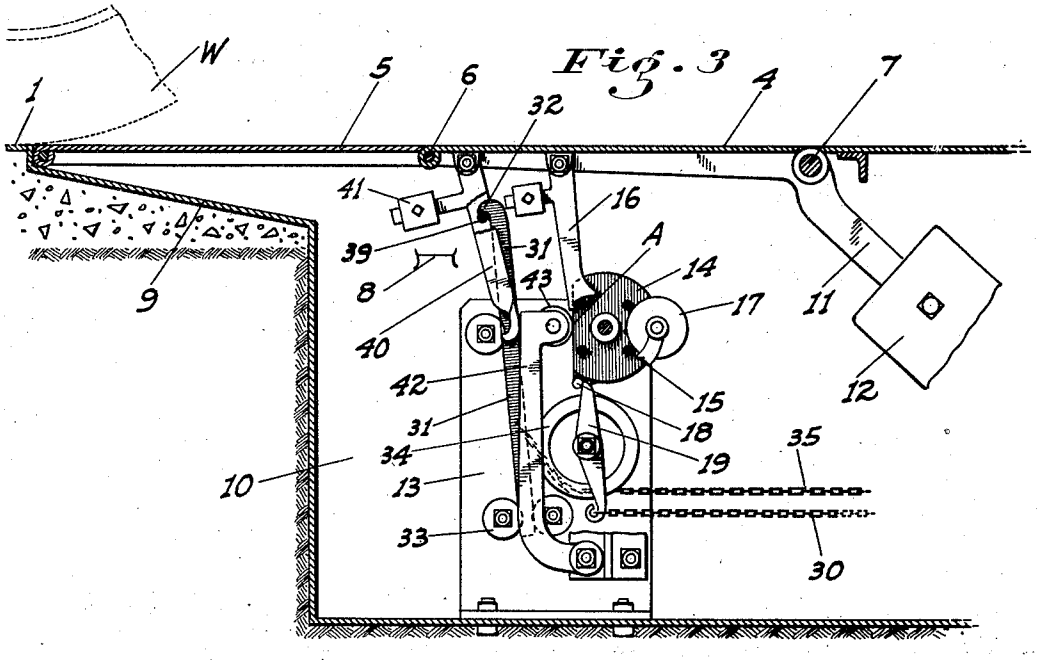
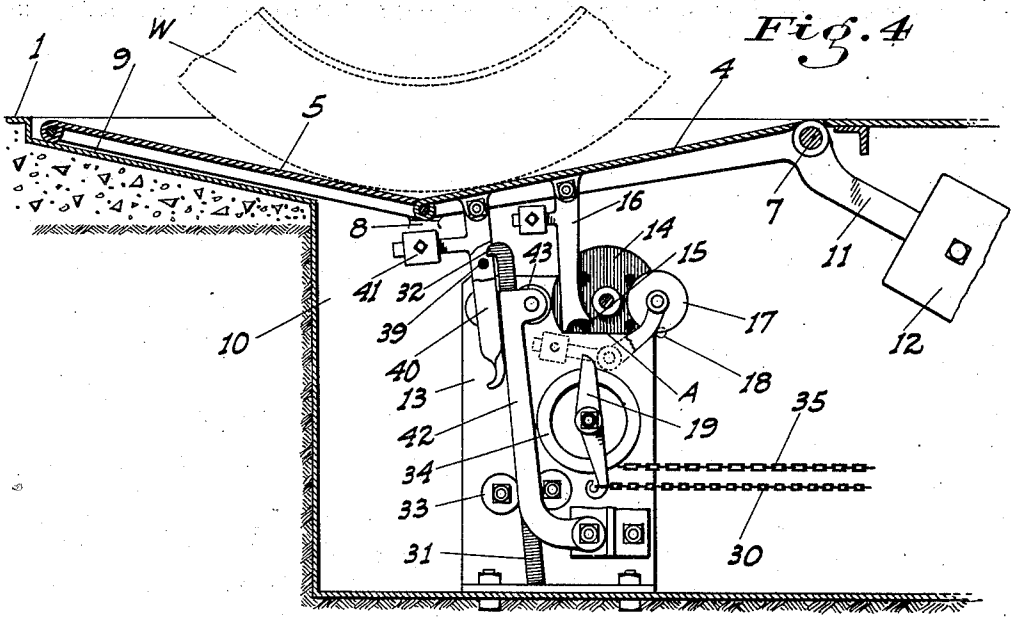


Fig. 4



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Fig. 5

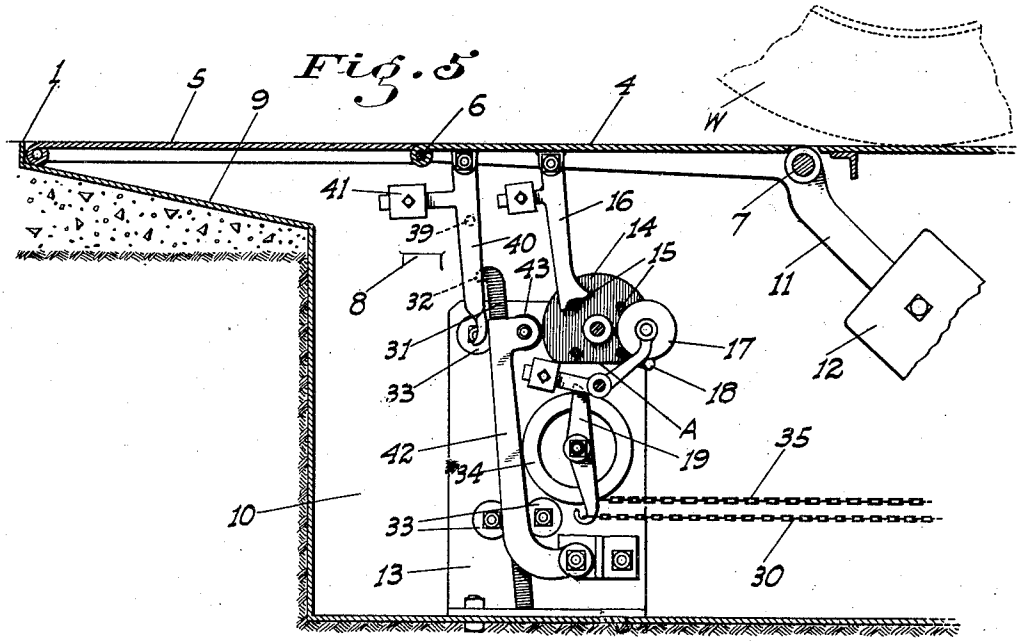
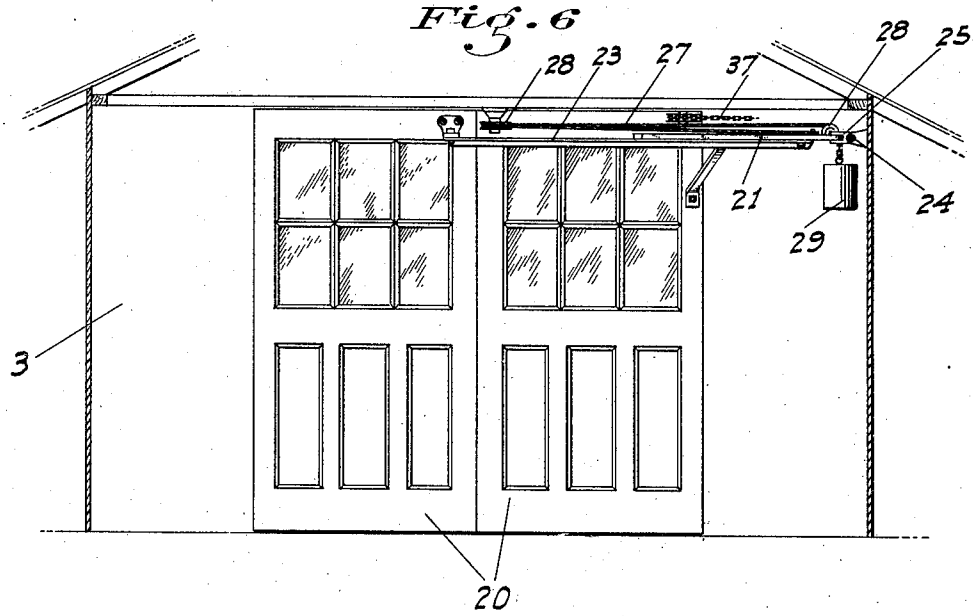


Fig. 6



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UNITED STATES PATENT OFFICE

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DOOR-OPERATING MECHANISM

Application filed October 29, 1928. Serial No. 315,872.

This invention relates to improvements in mechanisms for opening and closing garage doors by means of the vehicle moving to and from the garage, and particularly represents improvements over our previous patent, No. 1,646,025, dated October 18th, 1927.

The principal objects of the present invention are to simplify the construction of the apparatus over what was shown in the patented device, without interfering with the efficiency and positiveness of operation; and to arrange the operating mechanism so that the use of springs, with their tendency to stick or weaken through long use, is avoided.

These objects we accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a top plan view foreshortened of the operating structure.

Fig. 2 is a sectional elevation of similar character showing the parts in the positions occupied after the doors are closed and ready to be acted on by the front wheel of a car to cause the doors to open.

Fig. 3 is an enlarged side elevation of the main control structure in the position indicated in Fig. 2.

Fig. 4 is a similar view but showing the parts as positioned after the doors have been caused to open by the engagement of a front wheel of the car with the control member.

Fig. 5 is a similar view, showing the position of the parts after the front wheel has passed over the structure.

Fig. 6 is an interior end elevation of the garage.

Referring now more particularly to the characters of reference on the drawings, the numeral 1 denotes a pair of transversely alined rectangular frames of suitable dimensions and sunk in the runways 2 leading to the garage 3 a certain distance from the latter. The casings are disposed in the path of the wheels of the car moving to or from the garage. Each frame, which is flush with the runway is covered by two longitudinally alined plates 4 and 5 hinged at their adjacent ends as at 6, the forward plate being secured to the casing by a shaft 7 which connects the corresponding plates of both casings.

The plates can buckle down between the sides of the casing but are limited in such movement by a stop 8 thereunder. The front end of the forward plate 4 only is fixed, the rear end of the rear plate being horizontally slidable on a supporting ledge 9 therebelow. One only of the frames has a pit 10 of considerable depth under the cover plates, and in this pit the operating mechanism is mounted.

Projecting forwardly (or toward the garage) from and rigidly secured to the shaft 7 and disposed in the pit is an arm 11 on which is fixed a weight 12. The arm and weight are so arranged that the weight exerts an upward pressure on the plate and the mechanism connected therewith sufficient to necessitate the weight of the forward portion of an automobile to overcome.

Mounted in the pit under the forward plate 4 is a vertical supporting plate or frame 13 for the operating mechanism. Adjacent the top of said plate a cam disc 14 is mounted on a horizontal transverse axis, the disc being circular, except for a flat surface or side A disposed inwardly of the circular periphery. Pins 15 spaced 90° apart project from one face of the disc parallel to the axis thereof, said pins being concentric with the axis of the cam. These pins are adapted to be successively engaged by a weight pressed pawl 16 pivoted on and depending from the plate 4, said pins and pawl being so arranged as to cause the disc to be rotated one quarter turn in a rearward direction with each full depression of the plate 4; the flat surface A of the cam being disposed relative to the pins so as to be always positioned either in a horizontal or a vertical plane.

A weight actuated roller 17 is mounted in connection with the plate 13 to yieldably project between adjacent pins to positively hold the disc at any quarter turn position. Projecting from the disc adjacent the rear end of the flat surface A relative to the direction of rotation of the disc is another transversely

extending pin 18. This pin is adapted to engage the upper end of a trip arm 19 pivoted intermediate its ends on the plate 13 below the disc, and shift such upper end forward and consequently move the lower end of the arm rearwardly a certain distance relative to the garage.

This movement of the arm effects the opening of the garage doors 20 by the following arrangement: Projecting inwardly from one of the doors toward the adjacent side of the garage when said doors are closed is a rigid arm 21 having a horizontal hook 22 on its inner end. A rigid link or connecting rod 23 is pivoted onto the other door and onto the arm 21 in such a manner that the opening and closing of both doors will take place simultaneously, as in said previous patent. The arm and rod are of course adjacent the top of the doors so as not to interfere with the passage of the car thereunder. Mounted in the garage in horizontal alinement with the hook 22 and disposed in a plane lengthwise of the garage is a rod 24 having a forwardly facing catch 25 on one end normally engaging the hook 22. A weight 26 acts on said rod to normally hold the catch and hook in engagement. A cable 27 or the like is connected to the arm 21 adjacent the hook end thereof and extends thence over a pulley 28 to a weight 29 in such a manner that when the catch 25 is released from the hook, said weight acts on the arm to swing the same to a door opening position.

The catch is thus released by a flexible element 30 connected to the rear end of the rod 24 and extending thence downwardly and rearwardly to a connection with the lower end of the arm 19. When the lower end of said arm is pulled rearwardly, as previously described, the catch 25 is disengaged from the arm hook, allowing the weight 29 to function to open the doors.

The doors when once opened are closed by the fourth subsequent quarter rotation of the cam disc and the subsequent depression and release of the plate 4 by the following means. Projecting upwardly alongside the plate 13 is a substantially vertical bar 31 provided with a rearwardly facing hook 32 on its upper end, and guided for vertical movement between rollers 33 mounted on the plate 13. Connected to the bar intermediate its ends and passing thence about and under a pulley 34 mounted on the plate 13 is a forwardly extending flexible element 35, so that when the bar is raised from a predetermined position, said element will be pulled rearwardly. This element extends to an adjustable connection with a vertical lever 36 which is pivoted intermediate its ends in the garage adjacent one side thereof. (See Figs. 1 and 2). The upper end of this lever is connected by a flexible element 37 to one of the doors 20 adjacent its hinge, passing over a segmental guide member 38 fixed on the door. The hook 32 of the bar 31 is adapted to be engaged by a transversely extending pin 39 mounted on an arm 40 pivoted on and depending from the plate 4 rearwardly of the pawl 16. The pin is positioned intermediate the ends of the arm and the latter normally tends to swing forwardly so that the pin will engage the hook by a suitably arranged weight 41.

Interposed between the arm and disc is a vertical release arm 42, engaged on its rear side by the lower end of the arm 40 and pivoted at its lower end in connection with the plate 13. This arm 42 carries a roller 43 on its upper forward end which constantly engages the periphery of the cam disc. The above parts are so arranged that when the roller is riding on the circular portion of the cam, the arm 40 will be swung rearwardly so that the pin 39 is positioned rearwardly of the hook 32 so as not to engage the same, regardless of the movement of the plate 4. When the flat portion A of the cam is engaged by said roller the arm 40 is free to swing forward by reason of the weight 41 sufficiently to cause the pin 39 to be engaged with the hook 32.

When the doors are opened the lower end of the lever 36 is swung forwardly, which pulls forwardly on the element 37 and causes the bar 31 to drop to its lowermost position. The raising of said bar due to the raising of the plate 4 from a fully depressed position is sufficient to cause the doors to be fully closed, the connected parts being so proportioned as to cause this to be accomplished.

In operation with the doors closed and the car outside the garage the parts occupy the positions shown in Fig. 3, in which the pin 18 is about to engage the lever 19, the flat surface A of the disc is engaged with the arm 32, and the pin 39 on the arm 40 is still engaged with the bar-hook, the bar being in its raised position. As soon as the front wheel W of a car approaching the garage engages and depresses the surface plates, the disc 14 will turn through a quarter revolution, the arm 19 will be shifted by the pin 18, and the doors opened as previously described. Almost as soon as the disc starts to turn, the arm 40 is swung rearwardly from the bar 31 by the rotative movement of the circular portion of the disc to engage the roller 43 of the interposed arm 42, and the arm pin 39 will then be disengaged from the bar-hook.

This allows the arm 40 to move upwardly, with the subsequent upward movement of the plate 4 when the weight of the wheel W leaves the same, without raising the bar 31.

When the rear wheel of the car passes over the plates, the disc will be again rotated through a quarter turn by the depression of the pawl 16 against one of the pins 15, but without any other action being had, since the

pin 18 is then beyond the arm 19 and the roller 43 is still riding on the circular surface of the disc. When the car is in the garage the doors are closed by hand or by means of a wheel actuated plate arrangement 44 such as was fully shown and described in the patent previously mentioned. When it is desired to leave the garage the doors are opened by hand and with both the last named door movements no movement of the disc and the connected mechanisms is had owing to the use of flexible elements which connect such mechanism with the garage parts. The rear wheel of the car upon backing out of the garage again depresses the plates and rotates the disc another quarter turn, still not causing any action. When, however, the forward wheel passes over the plates and the disc is again rotated a quarter turn, the flat surface A again engages the roller 43 so that the arm 40 is free to swing forwardly to cause the pin to engage the hook 32. Upon the wheel being removed from the plates, the upward movement of the plates raises the arm 40 and bar 31 together, and causes the doors to be closed as was previously described. The parts are then in their original positions as shown in Fig. 3, ready for the next door opening operation upon the return of a car toward the garage.

The use of the two hinged plates 4 and 5 eliminates any sudden drop or abrupt bumps being received when the wheel depresses the plates and moves along the same. This, as will be evident is an improvement over the construction of the previous device in this respect.

From the foregoing description it will be readily seen that we have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described our invention what we claim as new and useful and desire to secure by Letters Patent is:

1. Door operating mechanism including a plate to be depressed by the weight of a vehicle wheel passing thereover, a rotatable member under the plate, means between the plate and said member for causing the latter to be rotated a predetermined extent with every depression of the plate, means between said member and the door and actuated by such rotation for causing the door to be opened, means between the plate and door for causing the latter to be closed, and means controlled by a subsequent rotation of the member for enabling said door closing means to function; said member rotating means comprising transverse pins projecting from said member and spaced 90° apart concentric with the axis of the member, the latter being disposed in a vertical plane with its axis extending transversely of the plate, and a pawl depending from said plate in offset relation to the axis of said member to engage and depress each pin successively with each depression of the plate.

2. Door operating mechanism including a plate to be depressed by the weight of a vehicle wheel passing thereover, a rotatable member under the plate, means between the plate and said member for causing the latter to be rotated a predetermined extent with every depression of the plate, means between said member and the door and actuated by such rotation for causing the door to be opened, means between the plate and door for causing the latter to be closed with the upward movement of the plate, said means including normally disengaged elements, and means controlled by a subsequent rotative movement of the member for causing said elements to become engaged.

3. Door operating mechanism including a plate to be depressed by the weight of a vehicle wheel passing thereover, a vertically disposed disc under the plate having a flat side on its periphery, means between the plate and disc for rotating the latter a quarter-turn with each depression of the plate whereby said flat side will occupy the same position only with every fourth depression of the plate, a vertical bar movably mounted under the plate arranged for vertical movement, connecting means between said bar and the door to cause the latter to be closed with a movement of the bar in an upward direction, means on said plate for engaging and moving the bar in a door closing direction with the upward movement of the plate, and means permitting such engagement only when the flat side of the disc occupies a predetermined position relative to the bar.

4. Door operating mechanism including a plate to be depressed by the weight of a vehicle wheel passing thereover, a vertically disposed disc under the plate having a flat side on its periphery, means between the plate and disc for rotating the latter a quarter-turn with each depression of the palte whereby said flat side will occupy the same position only with every fourth depression of the plate, a vertical bar movably mounted under the plate arranged for vertical movement, connecting means between said bar and the door to cause the latter to be closed with a movement of the bar in an upward direction, means on said plate for engaging and moving the bar in a door closing direction with the upward movement of the plate, said last named means comprising an arm depending from and pivoted on the plate for movement longitudinally of the plate, a transverse pin projecting from the arm, a hook on the bar for releasable engagement with the

pin, yieldable means acting on the arm tend to maintain the pin engaged with the hook, and means permitting such engagement only when the flat side of the disc occupies a predetermined position relative to the arm.

5. A structure as in claim 4, in which said last named means comprises a movable member interposed between and engaged both by said arm below the pin and by the periphery of the disc; the flat side of the later being disposed inwardly of the circular periphery of the disc.

6. Door operating mechanism including a plate to be depressed by the weight of a vehicle wheel passing thereover, a vertical bar movably mounted under the plate and arranged for vertical movement, connecting means between said bar and the door to cause the latter to be closed with the upward movement of the bar, an arm member depending from the plate to releasably engage the bar and pull the same upwardly when the plate moves upwardly from a depressed position, and means controlled by the depression of the plate for permitting the arm to thus engage the bar only with each fourth depression of the plate.

7. A structure as in claim 6, with means likewise controlled by the depression of the plate for causing the door to be opened with a depression of the plate immediately subsequent to the one causing the door to be closed.

In testimony whereof we affix our signatures.

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FREDERICK C. HOLLING.