April 22, 1930. R. V. MORSE 1,755,788

GARAGE DOOR OPENER

Filed Sept. 17, 1924

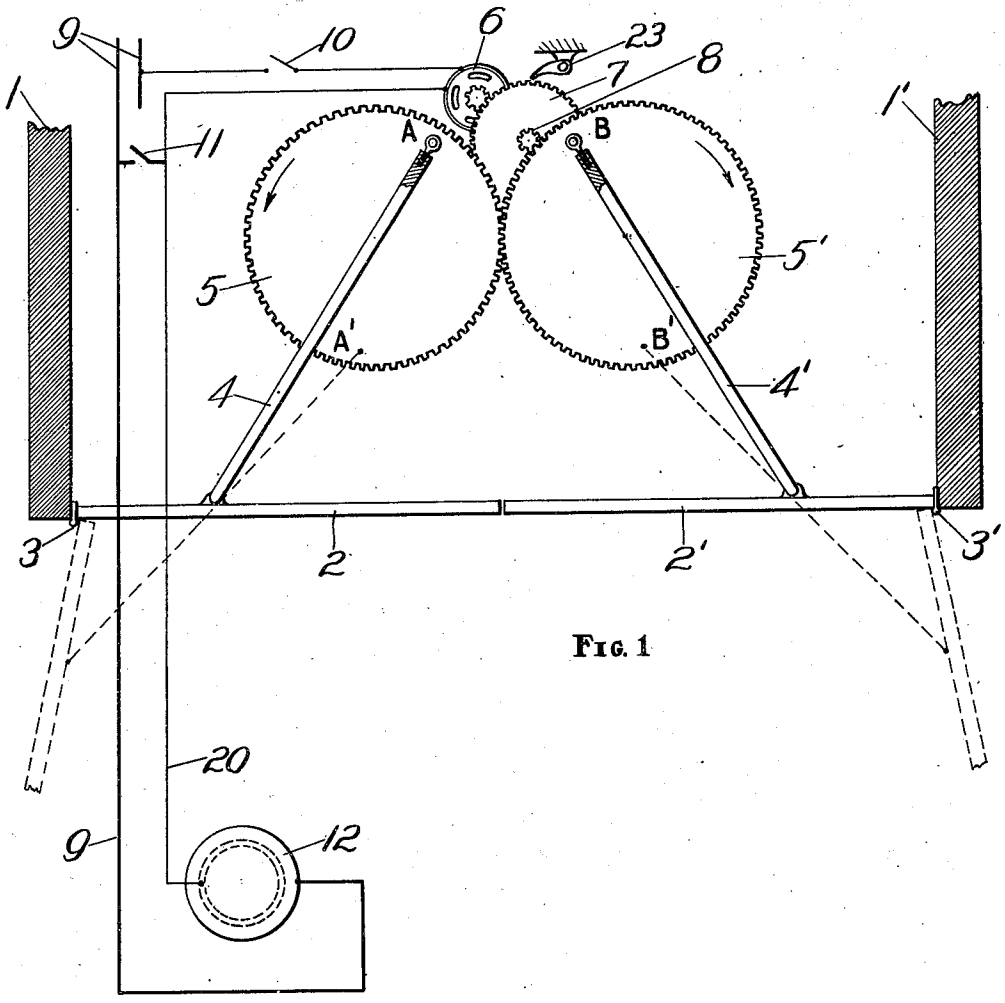
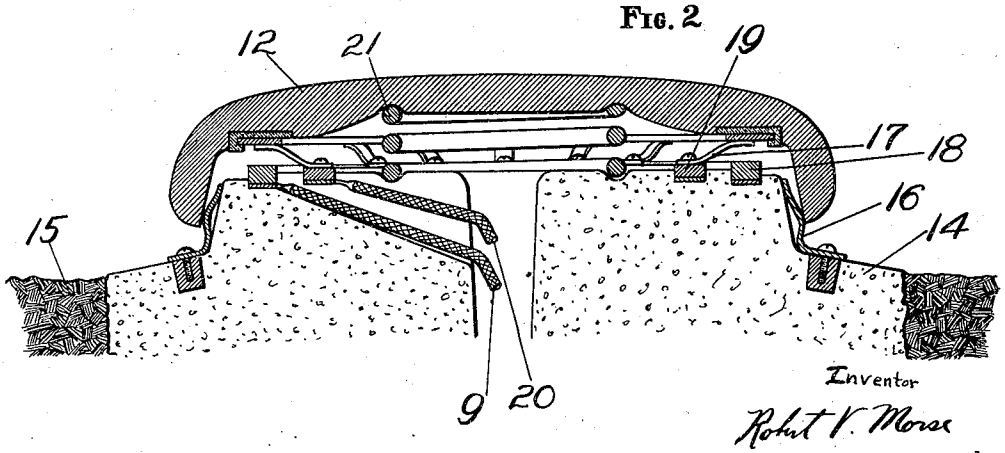


FIG. 1

FIG. 2



Inventor

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Patented Apr. 22, 1930 1,755,788

UNITED STATES PATENT OFFICE

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GARAGE-DOOR OPENER

Application filed September 17, 1924. Serial No. 738,217.

This invention relates to automatic door openers, and has for its object the provision of a simple and effective mechanism which can close or open garage doors without requiring the driver of the automobile to alight from his car. Other objects of the invention are to eliminate the reversing or limit switches usually employed, to reduce the starting load on the motor while at the same time giving a powerful starting force at the door, and to provide a compact and reliable system.

Referring now to the drawings, Fig. 1 is a plan view showing the application of the mechanism to a pair of garage doors opening outward. Fig. 2 is a vertical cross-section showing one form of the wheel switch or operating plate which is placed in the line of travel of the automobile wheel outside the garage, so as to be run over when the automobile is leaving or entering, for the purpose of closing or opening the doors.

In the plan view shown in Fig. 1, the side walls of a garage are indicated by the reference numerals 1 and 1′, and the doors 2 and 2′, mounted on the hinges 3 and 3′, are arranged to swing outward to open as indicated by the double broken lines. The doors 2 and 2′ are connected to the operating gearing by pivoted links 4 and 4′, which are preferably attached near the upper part of the door so as to clear the automobile,—the operating gearing being normally hung from the ceiling of the garage. The links 4 and 4′ are pivotally attached to the gears 5 and 5′ respectively, at the points A and B. The linkage and gearing are so proportioned that the links 4 and 4′ will be on dead center when the doors are completely closed and also when they are completely open. The gears 5 and 5′ rotate in opposite directions, preferably as indicated by the arrows, so that when the doors are being opened the links 4 and 4′ will first swing more squarely behind the doors to a position of greater mechanical advantage; and also, when the doors have been opened and the gearing is operating to close them, the links 4 and 4′ will first swing to positions more nearly at right angles to the doors, so as to in that case also increase the mechanical advantage.

The gears 5 and 5′ are driven by the electric motor 6, thru suitable reduction gearing 7 and 8. Any type of reduction gearing of course may be used. The motor 6 is connected to the power lines 9, and may be cut off by opening the switch 10. When the switch 10 is closed, the doors may be operated by closing the switch 11 by hand, as when the doors are first opened before the automobile is driven out of the garage. The doors may also be operated by the wheel of the automobile stopping on the control plate 12, which acts as an operating switch. This control plate 12 is placed on the ground in front of the garage in the track of the wheels, at a sufficient distance from the doors so that when a wheel is resting on the plate 12 there will be plenty of clearance between the automobile and the doors 2 and 2′ as they swing.

One form of the control plate 12 is shown in greater detail in Fig. 2, which is a vertical cross-section. A cement base 14 is shown embedded in the ground 15. The sides of the projecting portion of this cement base are protected from abrasion by an annular sheet metal facing 16. The control plate 12 is preferably somewhat dome shaped, and extends part way down the sides of the cement projection so as not to be displaced by lateral impacts. The control plate 12 is supported by a number of spring fingers 17 which also act as switch contacts when the plate 12 is depressed, connecting the metal ring 18 with the metal ring 19. These fingers 17 are insulated from the control plate 12. The rings 18 and 19 are connected to the wires 9 and 20, so that when the electrical connection is made across them the motor 6 may be operated. A supplementary spring 21 may be added if desired to help the spring fingers 17 carry the weight of the plate 12, though usually the spring fingers 17 alone can be designed to give all the resistance desired. This spring resistance should be proportioned so that the plate 12 cannot be lightly depressed, so that it will require a heavy weight such as the wheel of a car, to close

the circuit. This will prevent accidental operation by children.

The doors can be opened or closed at any time by means of the switch 11, and various switches corresponding to 11 may be located at covenient positions wherever desired. That is the normal mode of operation when used in connection with public garages. In the ordinary private garage the normal operation is as follows: The owner comes to the garage and closes the switch 10, if not already closed, and then opens the doors by closing the switch 11. This switch 11 is normally of the push button variety which springs open when the pressure of the finger is released, thus stopping the motor 6 and leaving the doors held open. There is no danger of a wind blowing the doors shut, as the linkage is substantially on dead center when the doors are fully open, and furthermore a cross wind that tends to blow one door shut tends to blow the other door open, and these conflicting forces are neutralized within the gearing.

The owner then drives his car out of the garage, and stops the car for a moment when he feels the wheel ride up on the control plate 12. This starts the motor 6 again and closes the doors without the owner leaving his car. In the case of a closed car it is not necessary to open a window and reach out to operate a switch. As the doors of the garage approach the closed position they move more and more slowly, so that the owner can easily see when to drive off and leave the linkage on the dead center position. The doors are thus held closed while the car is out of the garage. When the owner returns he runs the wheel of the car on the control plate 12, operating the motor 6 and causing the doors to swing open. As the doors approach their full open position the owner drives on into the garage. He then closes the doors by touching the switch 11.

If an absolutely positive lock is desired, a ratchet 23 may be attached to the gearing so that it cannot reverse its direction. Then if the mechanism is stopped on dead center or a little short of dead center, no amount of pulling on the doors can open them. However, a ratchet is not generally required, as the friction of the gearing and the dead center position of the links is usually sufficient.

In installing the apparatus in a garage, even when its location has been carefully measured, it may still be desirable to adjust the length of the links 4 and 4′ in order to give the precise action desired. This may be done for example by screwing the eyes of the pivots A and B in the links 4 and 4′ to the degree desired. In the drawing the letters A′ and B′ indicate the approximate position of the pivots A and B when the doors are open.

In the foregoing specification I have described my invention in one embodiment by way of illustration. It will be understood however that the invention is not limited to the particular structure therein shown, but may have various modifications to adapt it to different installations, as will be apparent to those skilled in the art. The particular arrangement shown is merely one illustration; and the essential features and combinations which constitute the invention are embodied in the following claims.

I claim:

1. In a door opener, the combination of a gear, a door, a link directly connecting said door and said gear, said link being arranged so as to be on dead center when the door is fully open or fully closed, an electric motor arranged to run in one direction and connected to the gear, the direction of rotation of the gear being such that when the door is being opened the link will first swing so as to be more nearly at right angles to the door, so as to increase the mechanical advantage.

2. In a door opener, the combination of a pair of gears arranged to rotate in opposite directions for complete revolutions, a pair of doors, a pair of links extending from the doors to the gears respectively, said links extending obliquely outward from the gears to the doors, an electric motor arranged to run in one direction, reduction gearing between the electric motor and the first mentioned gears, and a switch controlling the electric motor, whereby a half revolution of said first mentioned pair of gears will open the doors, and a further half revolution in the same direction of rotation will close the doors.

In witness whereof I have hereunto set my hand this 15th day of September, 1924.

ROBERT V. MORSE.