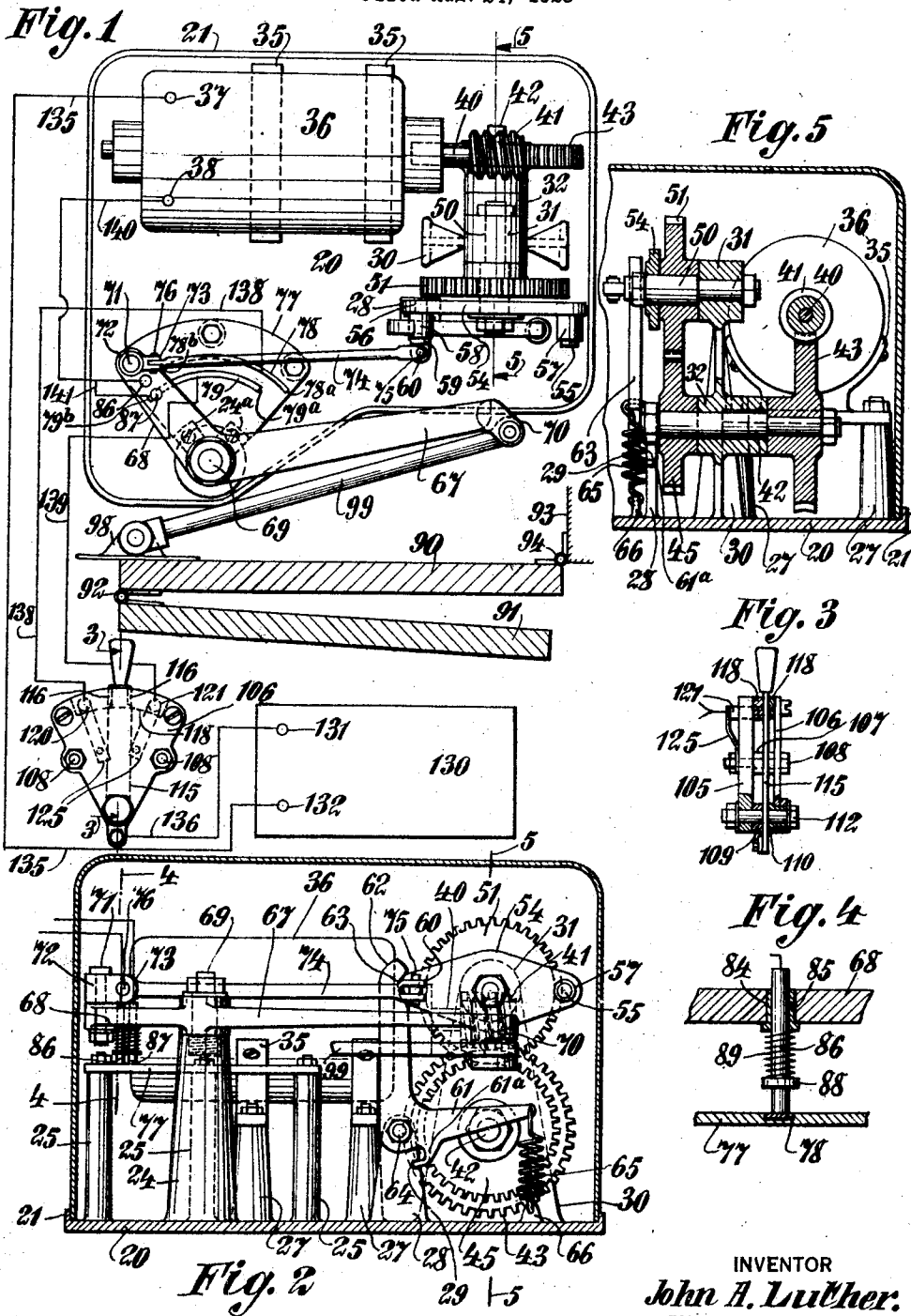


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DOOR OPERATING DEVICE

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UNITED STATES PATENT OFFICE.

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DOOR-OPERATING DEVICE.

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This invention relates to a door operating device. The device is specially applicable to doors, which require to be opened and closed many times in short intervals of time, like the doors of jitney busses various other vehicles and the like.

The object of the invention is the production of a device, by means of which the energy required to open and close a door is reduced to a minimum. The second object is the production of a device which will maintain a door in its open or closed position. A third object of the invention is the production of a door operating mechanism which operates preferably with its own propelling device, although the propelling mechanism of the vehicle, to which it is attached may be used. Other objects will be apparent from the following description, drawings and claims.

In the accompanying drawings, Fig. 1 represents a top plan view of the door operating device with a sectional view of its associated door; Fig. 2 shows a front elevation of the device; Fig. 3 indicates a section of Fig. 1 on the line 3, 3; Fig. 4 shows an enlarged section of Fig. 2 on the line 4, 4 and Fig. 5 represents a section of Fig. 2 on the line 5, 5.

A base plate 20 is indicated with the vertical flange 21 on all of the edges thereof. A main post 24 with the lugs 24^a and the posts 25 and 27 extend up from the base plate 20. A bracket 28 with the locking notch 29, and a bracket 30 with the hub 31 and journal bearing 32 extend up from the base plate 20.

A pair of yokes 35 are supported upon and fastened to the posts 27. An electric motor 36 with the binding posts 37 and 38 and the armature shaft 40 is supported upon and fastened to the yokes 35. A worm 41 is fastened to said armature shaft. A shaft 42 is journaled in the journal bearing 32 and has fastened to one end thereof the worm wheel 43, which meshes with the worm 41. To the other end of the shaft 42 is fastened the spur gear 45. A shaft 50 extends through and is fastened to the hub 31 and has journaled thereon the spur gear 51, which meshes with the spur gear 45. On the shaft 50 is fastened a beam 54 which has extending therefrom the journal pins 55 and 56, on which are respectively journaled the rollers 57 and 58. The pin 56 has journaled

thereon the collar 59 having the bifurcated journal end 60. A bell crank with the arm 61 and the arm 62 having the seat 63 is pivoted on a pin 64 extending from the bracket 28. The arm 61 has extending therefrom the locking heel 61^a which is adapted to lock with the locking notch 29. A spring 65 has one end fastened to the arm 61, and its other end is fastened to the lug 66 extending from the base plate 20. An operating bell crank with the arms 67 and 68 is pivoted on a pivot 69, extending from the post 24. A bifurcated end 70 is formed with the arm 67. A pin 71 extends from the end of the arm 68 and has pivoted thereto the collar 72, having the bifurcated journal end 73. A connecting rod 74 has its ends connected to the bifurcated journal end 60, by means of the pin 75, and to the bifurcated journal end 73, by means of the pin 76.

A platform 77 of electric insulating material is supported on the lugs 24 and on the posts 25. The said platform 77 carries a pair of curved metallic electric contact strips 78 and 79 in the form of quadrants. In the arm 68 of the said operating bell crank are secured in a pair of openings 84 thereof, the sleeves 85 of electric insulating material. Contact plugs 86 and 87 are guided in the sleeves 85. Each of said plugs has formed therewith an annular flange 88. A spring 89 encircles each of the plugs 86 and 87 and bears between the sleeve 85 and the flange 87. The lower end of the plug 86 bears on the contact strip 78, and the lower end of the contact plug 87 bears on the contact strip 79.

A door is indicated with the members 90 and 91 connected by the hinge 92. The member 90 is hinged to the frame 93 for the door, by means of the hinge 94. A hinge 98 is fastened to the member 90. A link 99 connects the hinge 98 and the bifurcated end 70. A switch is indicated with the front plate 106 of metal, and the rear plate 105 of electric insulating material is spaced from the plate 106 by the spacers 107 of electric insulating material, and the bolts 108. A sleeve 109 of insulating material bears against the inner face of the plate 105 and a second sleeve 110 of electric insulating material extends through the plate 106. A hinge pin 112 extends through the sleeves 109 and 110. A switch arm 115 has one end

hinged on the pin 112 between the sleeves 109 and 110, and at its upper end are formed the tapered sides 116. A pair of strips 118 of electric insulating material are fastened to the inner faces of the plates 105 and 106. A pair of contact plugs 120 and 121 tapered at their inner ends extend through the plate 105, and their inner ends are adapted to engage the switch arm 115. A pair of springs 125 have each one end fastened to the plate 105 and their other ends bearing on the contact plugs 120 and 121.

An electric battery 130 is indicated with the binding posts 131 and 132. A wire 135 extends from the binding post 132 of the electric battery to the binding post 37 of the electric motor 36. A wire 136 extends from the binding post 131 of the electric battery to the lower end of the switch arm 115. A wire 138 extends from the contact plug 120 to the contact strip 78. A wire 139 extends from the contact plug 121 to the contact strip 79. A wire 140 extends from the binding post 38 of the electric motor 36 to the contact plug 86, and a branch wire 141 extends from the wire 140 to the contact plug 87.

To operate the device the user moves the switch arm 115 from its neutral position as indicated best in Fig. 1 to the left or the right, and makes contact with one of the contact plugs 120 or 121. By this means the electric circuit is closed and the armature shaft 40 of the electric motor 36 turns. Rotation is transmitted from the worm 41 to the worm wheel 43. The shaft 42 turns with the worm wheel 43, and thereby the spur gear 45 turns the spur gear 51. The beam 54 rotates with the spur gear 51 and is allowed to turn until it has assumed a horizontal position as indicated in Fig. 2. In turning to this position the connecting rod 74 has swung the arm 67 of the operating bell crank to the position best shown in Fig. 1 and thereby through the other arm 66 of said bell crank and the link 99 the door with the members 90 and 91 has been swung to its open position. When the arm 68 of the bell crank has been swung to the position best shown in Fig. 1 the contact plug 86 has moved out of contact with its coacting contact strip 78 and the electric circuit is broken. While the door is in this position the roller 58 is engaged with the seat 63 of the arm 62 and the locking heel 61^a is locked with the locking notch 29, and the door is locked in its open position. When it is desired to close the door, the said switch arm is moved to contact with the other of the contact plugs, and thereby the armature shaft 40 is again turned in the same direction, and the roller 57 is caused to engage with the seat 63 of the arm 62. By this means the arm of the operating bell crank has swung to close the door with the coaction of its operating ele-

ments. When the contact plug 87 leaves the contact strip 79, the electric current is again broken and the door is in its closed position until opened by the operator. In the latter position the locking heel 61^a is also locked with the locking notch 29.

It will be noted that the end 78^a of the strip 78 extends beyond a line drawn through the axial center of the pivot 69 and the end 79^a of the strip 79, and the end 79^b of the strip 79 extends beyond a line drawn through the axial center of the pivot 69 and the end 78^a of the strip 78. By this means when the contact plug 86 separates from the end 78^a of the contact strip 78, and when the contact plug 87 separates from the end 79^a of the strip 79 the electric circuit in each case is broken. The distance between the centers of the pins 55 and 56 is such that during the revolutions of the beam 54, the contact plug 86 separates at one end of its oscillation from the said end 78^b and the contact plug 87 separates from the end 79^a of the strip 79.

Various modifications can be made in the invention and the present exemplification is to be taken as illustrative and not limitative thereof.

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

1. In a door operating device the combination of a hinged door, an electric motor, a source of electric current for the motor, a bell crank pivoted in the device, a pair of electric contact strips adjacent to one arm of the bell crank and disposed so that one end of each extends beyond the adjacent end of the other, contact plugs carried by the said arm of the bell crank, one of said plugs coacting with one contact strip and the other contact plug coacting with the other contact strip, the electric motor, contact strips and contact plugs in electric circuit a three pole switch in the electric circuit, connecting means between said arm and said motor to swing the former with the rotations of the motor and connecting means between the other arm of the bell crank and said door.

2. In a door operating device the combination of a beam, means to rotate the beam, a journal pin extending from each end of the beam, a roller journaled on each pin, a spring actuated bell crank pivotally mounted and having a seat disposed to engage with each of said rollers during the rotations of said beam, a door and connections between said door and one of said pins of the beam.

3. In a door operating device the combination of an electric motor, a source of electric current for the motor, a platform of electric insulating material in the device, a pair of electric contact strips in said platform and disposed so that one end of each extends beyond the adjacent end of the

other, a bell crank pivoted over said platform, a pair of contact plugs carried on one arm of said bell crank, one of said plugs adapted to contact with one of said strips and the other adapted to contact with the other strip, means between said motor and said arm of the bell crank to swing the latter over the platform said motor contact strips and contact plugs in electric circuit a three pole switch in the electric circuit, a door 10 for the device and connecting means between the other arm of the bell crank and said door to actuate the latter.

In testimony whereof I affix my signature.

JOHN A. LUTHER.