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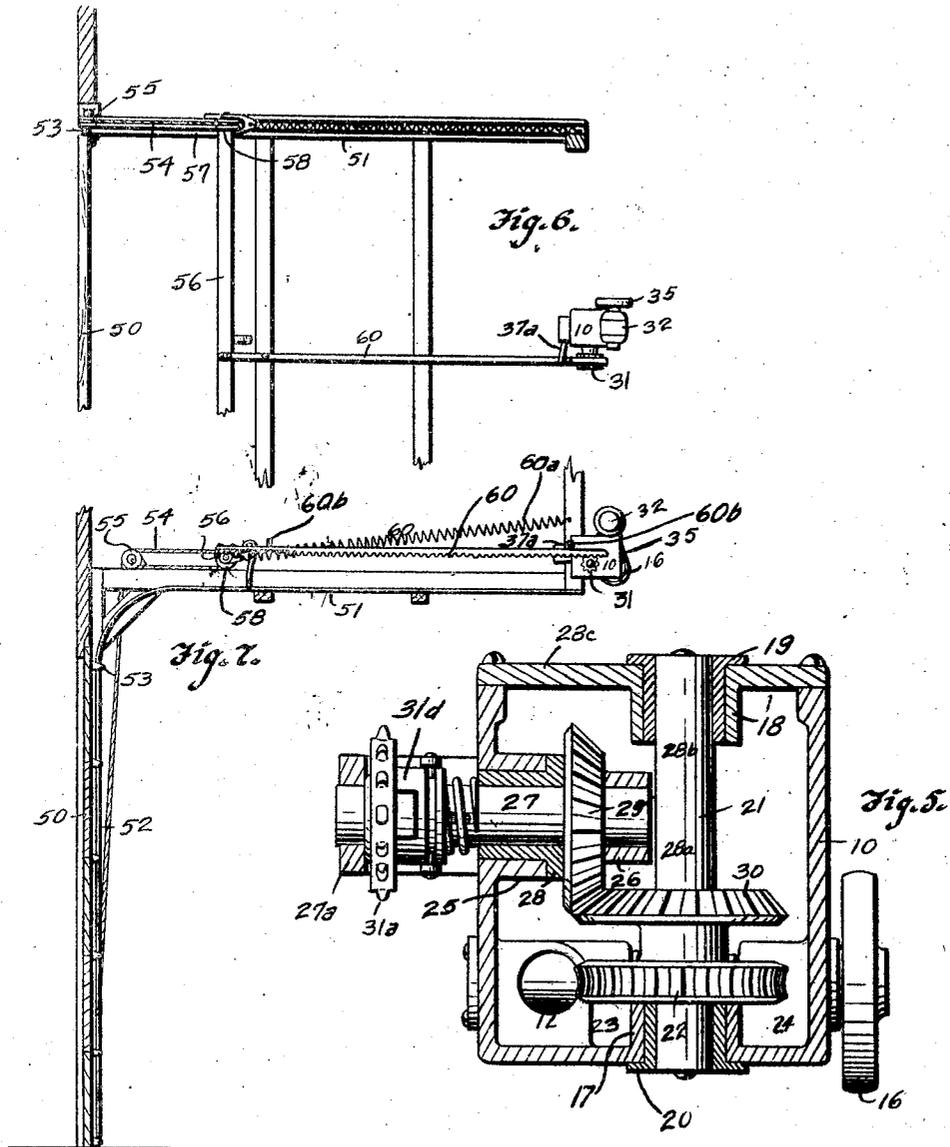
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AUTOMATIC ELECTRIC DOOR CLOSER STRUCTURE

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# UNITED STATES PATENT OFFICE.

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AUTOMATIC ELECTRIC DOOR-CLOSER STRUCTURE.

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My invention relates to a device for use in connection with doors, which must be frequently opened and closed, and includes a gearing mechanism unit having certain parts which are adjustable to different positions, so that the device can be used with a variety of door actuating mechanisms.

One of my objects is to provide a unit of the kind under consideration, having a suitable casing and a gearing structure therein, having parts adjustable to different positions, so that the same unit can be used for operating swinging doors, overhead doors, and so on, with only slight changes in the positions of the parts of my device.

A further object is to provide an automatic door closure structure, of simple, durable and inexpensive construction, which can readily be adjusted and modified for conveniently operating doors by power, the mechanism having means capable of manipulation for disconnecting the power and permitting manual operation of the doors.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:—

Figure 1 shows a side elevation of an operating unit for door closing mechanisms, embodying my invention.

Figure 2 shows a vertical, sectional view through the mechanism shown in Figure 1 with the motor omitted.

Figure 3 shows a top or plan view partly in section of the door operating mechanism adapted to be controlled and operated with my unit.

Figure 4 shows an end elevation of part of the mechanism shown in Figure 3.

Figure 5 shows a vertical, sectional view taken on the line 5—5 of Figure 2 with the worm shaft in another position, the figure being turned ninety degrees to the left.

Figure 6 shows a top or plan view of a door operating mechanism including my unit, parts being broken away.

Figure 7 shows a side elevation of the same.

It is well known that especially in public garages, it is desirable to have means whereby the large entrance doors may be quickly

and easily opened and closed by mechanical means.

I have provided in my present invention, a power unit which can be quickly and readily adjusted for use with almost any of such forms of doors and operating mechanisms for operating such devices by electricity.

I shall first explain the structure of my improved power unit and will then show how it can be readily adapted for use with different kinds of door operating mechanisms.

I provide a casing indicated in the accompanying drawings by reference character 10. The casing may be made in any suitable way to support the mechanism herein described.

The casing 10 is formed with journals or bearings 11 and 12 to receive a shaft 13 on which is mounted a worm 15. On the shaft 13 are bushings 13<sup>a</sup>.

The shaft 13 is arranged to project from the casing, as shown for instance in Figure 2, and to carry a gearing device detachably mounted on its outer end. The gearing device is illustrated in Figure 2, as a pulley 16.

Mounted in suitable bearings 17 and 18, as shown in Figure 5 for example, by means of bushings 19 and 20 is a shaft 21 on which is a worm wheel 22.

The casing 10 is provided with journals 23 and 24 arranged at right angles to the journals 11 and 12, as shown in Figure 2 to selectively receive the shaft 13 in such position that such shaft will be at right angles to its position shown in Figure 2, and that the worm 15 thereon will mesh with the worm wheel 22.

The casing 10 has journals 25 and 26 arranged at right angles to the shaft 21 to support a shaft 27. On the shaft 27 in the bearing 25 is a bushing 28. On the shaft 27 is a beveled gear 29, which meshes with a beveled gear 30 on the shaft 21, as shown in Figure 5.

On the outer end of the shaft 27 is rotatably and detachably mounted a gearing device, such for instance as the spur gear 31 or a sprocket wheel 31<sup>a</sup>, or pulley as may be desired. The outer end of the shaft 27 is journaled in a yoke 27<sup>a</sup> outside the casing 10.

The gearing device just mentioned has a

hub provided with a clutch member 31<sup>a</sup>. Keyed on the shaft 27 outside the casing for sliding movement thereon is a clutch member 31<sup>a</sup> operable by a handle 31<sup>b</sup> for throwing the gearing device 31 or 31<sup>a</sup> into or out of gear with the shaft 27.

Where the gear 31 is employed, it is provided with a projecting flange 31<sup>a</sup>. Where the gear 31 operates rack bars, such as the rack bars 40 hereinafter described, the racks are held in mesh with the gear, partly by the flange 31<sup>a</sup>. Where a large gear 31 is used, the arms of the yoke 27<sup>a</sup> also serve the function of holding the racks and the gear 31 in mesh. The outer portion of the yoke 27<sup>a</sup> is provided with regularly spaced holes 27<sup>b</sup> to selectively receive pins 27<sup>c</sup>, which may be used to hold the racks in mesh when a smaller gear 31 is used to vary the speed of the operation of the doors, or for any other purpose.

The arrangement whereby the shaft 13 may be adjusted to different positions is of some importance, because it permits the unit to be turned to different positions for connecting the gearing member on the shaft 27 to other gearing devices. The motor 32 can be mounted on the unit in its different positions and the same unit can thus be used for operating different kinds of door opening and closing mechanisms by turning the unit a quarter revolution in two directions, rearranging the shaft 13, and changing the position of the motor.

Thus for example, when it is desired to have the gearing device 31 in horizontal position, the shaft 13 is arranged horizontally as shown in Figures 1 and 2, and the motor is set on top of the casing 10.

If on the other hand, it is desirable to arrange the gearing device on the shaft 27 in vertical position as shown in Figure 5, the shaft 13 is moved from its position shown in Figure 2 to its position in the journals 23 and 24, the motor is removed, the casing is turned a quarter revolution to the left and then a quarter of a revolution forwardly toward the workman, whereupon the parts will be in the position shown in Figure 5, and the motor can be placed on what is then the top of the gear casing.

The motor 32 has on its shaft 33 a pulley 34 which in either of the positions of the unit heretofore suggested can be arranged in line with the pulley 16 for operating said pulley by means of a belt 35.

For illustrating the manner in which the unit may be employed, I have shown in Figure 3 a door operating mechanism, which I will now describe.

The doors 36 and 37 are hinged as at 38 to the frame 39. Above the doors are arranged rack bars 40 mounted in suitable bearings not here fully illustrated. These

rack bars are made in parts, the racks proper 40<sup>a</sup> at the ends thereof being connected by suitable bars 40<sup>b</sup>.

The unit is arranged above the doors with the pinion or gearing member 31 between the two rack bars, which overlap as shown in Figure 3, and in mesh with the teeth of both rack bars. At their outer ends, the rack bars are in mesh with segmental gears 41 supported by brackets 42. (See Figure 4.)

Extending from each segmental gear are vertically spaced short arms 43 pivoted at their outer ends to one end of a link 44. The opposite end of the link 44 is pivoted to the door 36 or the door 37, as the case may be, near the hinge side thereof.

It will, of course, be understood that the motor is connected with current conducting wires or the like, and that the circuit includes switches suitably located, and that the motor is of the reversible type. One switch 37<sup>a</sup> is mounted on the casing 10, as shown in Figures 6, 7 and 8.

When the motor arranged as shown in Figures 1 and 2 and the unit as shown in said figures are employed in connection with a door operating mechanism of the kind shown in Figures 3 and 4, it will be seen that the operation of the motor and the pinion 31 will serve to open or close the doors 36 and 37 depending upon the direction of rotation of the pulley 34.

The pins 37<sup>b</sup> on the rack 40 cooperate with the switch 37<sup>a</sup> to open the circuit when the mechanism has operated to close or open the doors.

In Figures 6 and 7, I have illustrated a different form of door and door operating mechanism.

In these figures, there is shown a door comprising the hinged horizontal sections 50 and forming a door of the overhead type. The door is illustrated somewhat diagrammatically because of its structure and forms no part of my invention. It may be said, however, that the door slides from its vertical position, shown in Figure 7, upwardly and then horizontally. The door sections have rollers at their ends, which travel on guides 51 and 52, the rollers being illustrated at 53.

The lower section 50 has secured to it flexible members or ropes 54, which extend upwardly over pulleys 55 at the sides and above the door.

A cross bar 56 slides on guides or supports 57 and has at its ends pulleys 58.

The ropes 54 are extended from the pulleys 55 around the pulleys 58 and thence back to the brackets which support the pulleys 55.

Connected with the cross bar 56 is a rack bar 60 extending away from the door toward the casing 10 of my unit and arranged with

teeth connecting with the pinion or gear 31, as shown in Figure 7. On the rack 60 are pins 60<sup>b</sup>, which operate the switch 37<sup>a</sup> already mentioned. Springs 60<sup>a</sup> counterbalance the weight of the doors.

The unit can be readily adjusted and adapted for use with different door operating mechanisms.

It will be obvious that by throwing the clutch out of gear, the doors can be operated independently of the motor and the mechanism of the unit in the casing 10.

In the form of device shown in Figure 3, both doors may be operated by manipulating one of them, since the clutch is so located that the rack bars operate the gear 31, but do not operate the rest of the mechanism of the unit.

My unit is of simple and inexpensive construction, occupies a minimum amount of space and can be made in one size in the factory for a considerable variety of uses.

I claim as my invention:—

1. In a device of the class described, a casing, a shaft mounted therein for rotation, a worm wheel on said shaft, a beveled gear on said shaft, said casing having pairs of bearings arranged in lines intersecting each other at right angles, a shaft adapted to be selectively mounted in the different pairs of bearings and to project from the casing, a worm on said shaft for meshing with said worm wheel, a third shaft supported on said casing, a gear device thereon meshing with

said beveled gear, a gear element on said third shaft, adjustable means for connecting said third shaft with said gear element or for throwing the third shaft out of gear with the gear element, said second shaft being arranged at the same distance from the two sides of the casing.

2. In a device of the class described, a unit comprising a casing, a shaft mounted therein having a worm wheel and a beveled gear thereon, said casing having pairs of bearings arranged in lines at right angles to each other, said bearings being respectively equidistant from two different sides of the casing, a shaft adapted to be mounted in either of said pairs of bearings, a worm on said shaft for meshing with said worm wheel, a third shaft mounted on said casing, gearing devices on said second and third shafts, a gear element, a clutch interposed between the third shaft and the gear element, and a motor adapted to be supported on said casing and operatively connected with the gearing device on the second shaft.

3. In a device of the class described, a casing, a gearing mechanism supported thereon, including a shaft, a yoke for supporting said shaft, a gear element on the shaft between the yoke and the casing, racks meshing with said gear, and adjustable pins in said yoke adapted to holding the racks in mesh with said gear.

Des Moines, Iowa, March 7, 1924.

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