June 14, 1932. F. L. MORSE 1,862,860

DOOR OPERATING MECHANISM

Original Filed Oct. 2, 1925

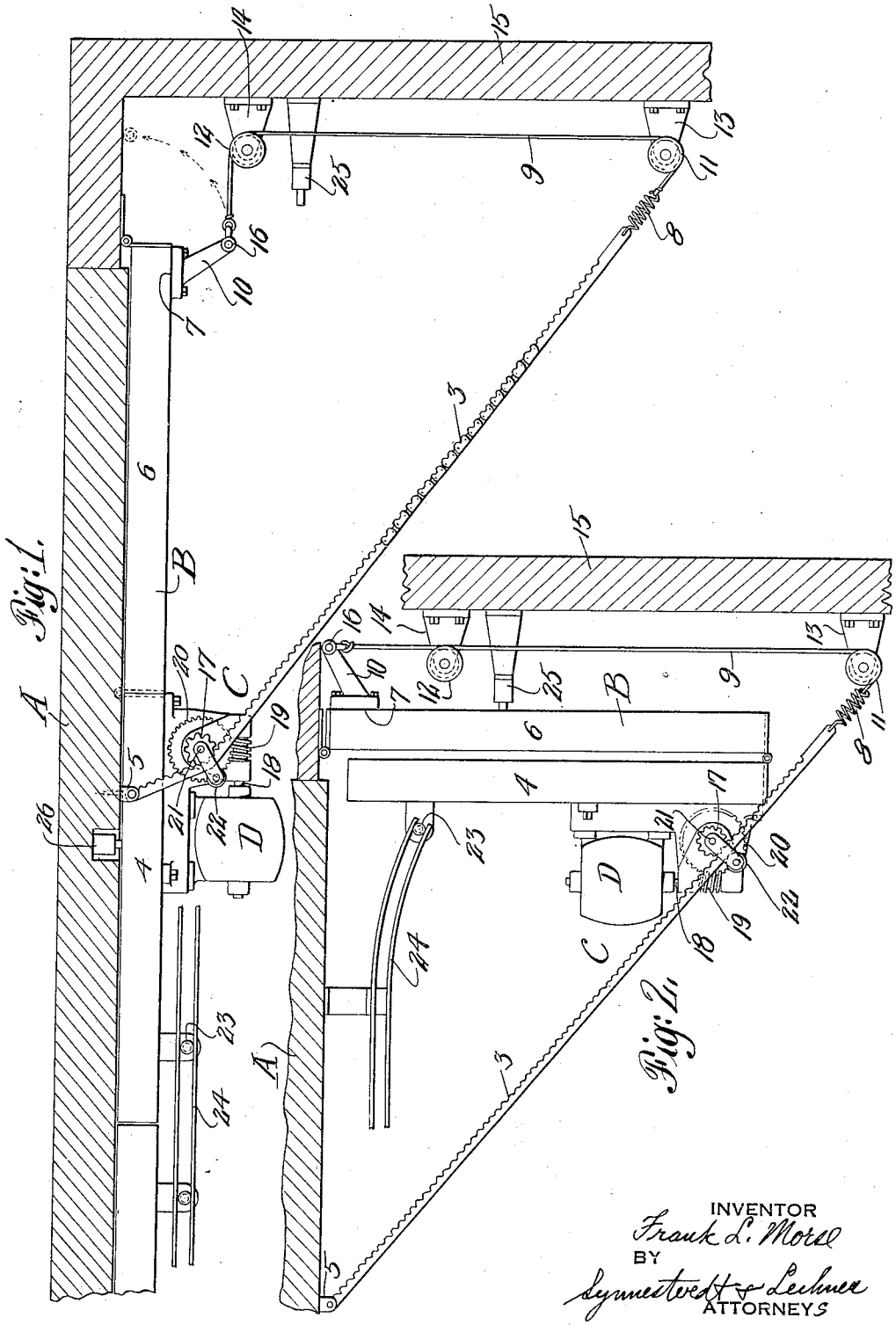


Fig. 1.

Fig. 2.

INVENTOR
Frank L. Morse
BY
Symmetwell & Leehmer
ATTORNEYS

Patented June 14, 1932 1,862,860

UNITED STATES PATENT OFFICE

FRANK L. MORSE, OF ITHACA, NEW YORK

DOOR OPERATING MECHANISM

Original application filed October 2, 1925, Serial No. 60,003. Patent No. 1,777,526, dated October 7, 1930. Divided and this application filed November 26, 1929. Serial No. 409,785.

This invention relates to door operating mechanisms and is a division of my application Serial No. 60,003, filed October 2, 1925, which has eventuated into Patent No. 1,777,526, dated Oct. 7, 1930, on door operating mechanisms.

One of the primary objects of my invention is the provision of a simple and compact mechanism for opening and closing doors, conveniently operated and automatic in its action.

A more specific object of my invention is the provision of a novel door operating mechanism employing a flexible rack or chain.

How the foregoing, together with such other objects as may hereinafter appear, or are incident to my invention, are realized, is illustrated in preferred form in the accompanying drawing, wherein—

Fig. 1 is a fragmentary plan section taken through the upper door frame and showing my door operating mechanism in elevation; and

Fig. 2 is a fragmentary view similar to Fig. 1 but showing the door in open position.

In the drawing I have shown a complete operating mechanism as applied to one door of a pair of two leaf doors, the mechanism for the other door of the pair being the same as that shown. It is obvious that where only one two leaf door is used, only one operating mechanism would be necessary.

The reference letter A denotes the upper door frame, B a two leaf door and C the operating mechanism in general.

The operating mechanism C comprises a flexible rack 3 preferably a "silent type or block chain", and a motor device D mounted directly on the second door leaf 4 of the two leaf door B.

The flexible rack 3 is secured at one end portion to a fixed support, in this instance the upper door frame A, as by means of an anchor member 5, and the other end portion of the rack is connected to the first leaf 6 of the door at 7 through the medium of a spring 8, cable 9 and member 10, the cable 9 passing over rollers or pulleys 11 and 12 mounted on bearing supports 13 and 14 respectively which are secured to the frame 15.

The point 16 at which the cable 9 is secured to the bracket or member 10 is so located relative to the pulley that the cable is played out somewhat as the door opens, thus increasing the length of rack and cable between the anchor member 5 and the pulley 11 during opening movement of the door. This lengthening compensates to a large degree for the arcuate travel of the gear or sprocket wheel 17 of the motor device C, it being pointed out that the spring 8 also serves as a compensating means. As the door approaches its open position, the increase in length of the rack and cable is taken out because the relation of the point 16 to the pulley 12 is such that the point 16 toward the end of its movement moves away from the pulley, as clearly indicated by the dotted arrows in Fig. 1 and in the full open position of the door illustrated in Fig. 2. Thus it will be seen that the rack in effect is automatically lengthened and shortened to compensate for the arcuate travel of the gear or sprocket 17.

The gear 17 is driven from the motor D through the medium of the shaft 18, worm 19 and worm wheel 20, which worm wheel is secured to the shaft 21 of the gear 17. A swivel backing roller 22 is provided to keep the chains 3 in contact with the sprocket or gear 17.

In order to open the door the motor D is started by a suitable switch to cause rotation of the gear 17 in a direction that it will creep along the rack or chain which causes the door to swing on its hinge to open position. In the case of a two leaf door as illustrated, the second leaf folds onto the first leaf during opening movement, as clearly shown in Fig. 2. A roller 23 carried by the second leaf of the door operates in a guide rail 24 to ensure proper folding of the door without jamming.

The door may be automatically stopped as it reaches its full open and closed positions as by means of automatic control switches diagrammatically indicated at 25 and 26. To close the door the motor is reversed.

By virtue of the worm drive above described, the door is automatically locked against movement when the motor is stopped.

While I have shown and described my device as applied to a two leaf door swinging inwardly, it is to be understood that the device is also applicable to other types of doors.

I claim:—

1. A door operating mechanism comprising in combination a flexible rack, a motor device including a driven gear mounted on the door and movable along said rack to open and close the door and means operable by the door for operating on said rack to hold the flexible rack in driving engagement with the gear.

2. A door operating mechanism comprising in combination a flexible rack, a motor device including a driven gear mounted on the door and movable along said rack to open and close the door and means operable by the door for operating on said rack to compensate for the arcuate travel of the gear.

3. A door operating mechanism comprising in combination a flexible rack, a motor device including a driven gear mounted on the door and movable along said rack to open and close the door, means for attaching one end of said rack to a fixed part, and means for attaching the other end of said rack to the door.

4. A door operating mechanism comprising in combination a flexible rack, a motor device including a driven gear mounted on the door and movable along said rack to open and close the door, means for attaching one end of said rack to a fixed part, and means for resiliently attaching the other end of said rack to the door.

In testimony whereof I have hereunto signed my name.

FRANK L. MORSE.