E. LOVEJOY.

DOOR OPENER.

APPLICATION FILED JULY 30, 1917.

1,260,561.

Patented Mar. 26, 1918.

3 SHEETS—SHEET 1.

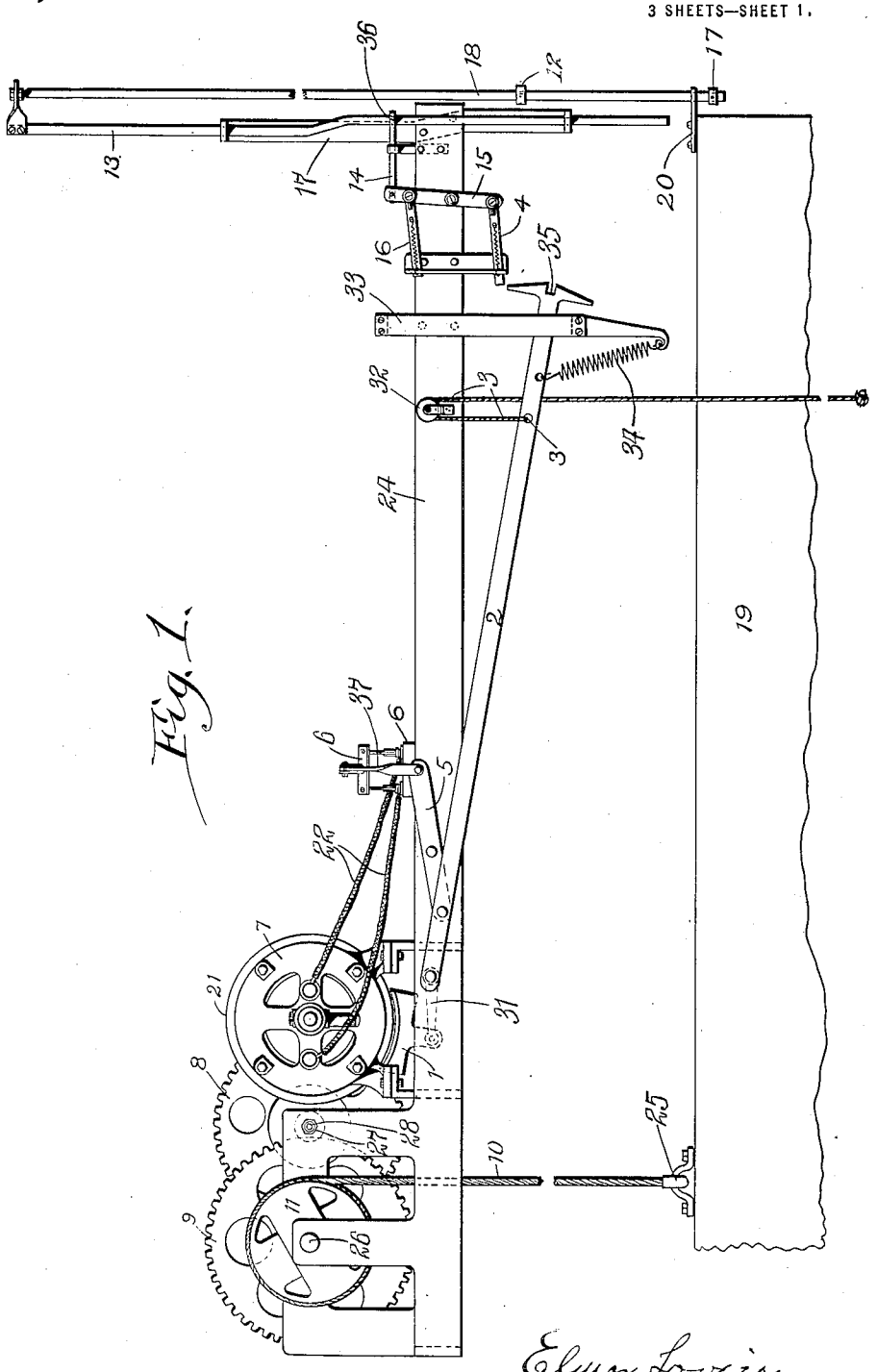


Fig. 1.

Elmer Lovejoy, Inventor
by Jerry A. Mathews
Atty

E. LOVEJOY.

DOOR OPENER.

APPLICATION FILED JULY 30, 1917.

1,260,561.

Patented Mar. 26, 1918.

3 SHEETS—SHEET 2.

Fig. 2.

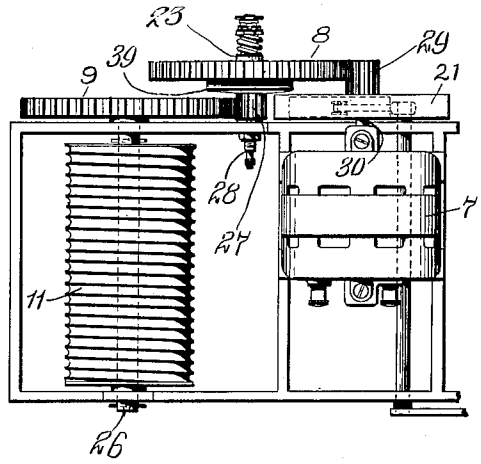


Fig. 3.

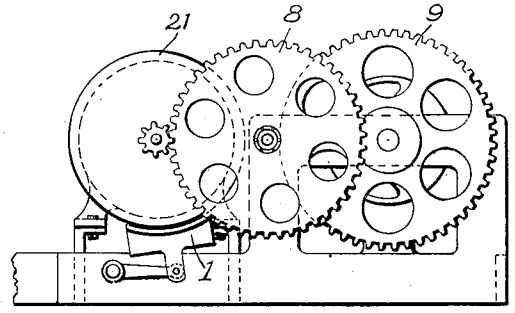
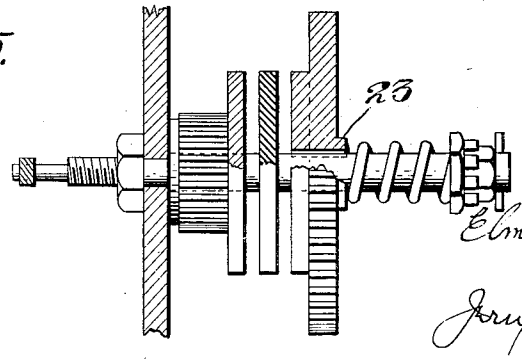


Fig. 5.



Elmer Lovejoy, Inventor
by
Jerry A. Mathews
Atty

E. LOVEJOY.

DOOR OPENER.

APPLICATION FILED JULY 30, 1917.

1,260,561.

Patented Mar. 26, 1918.

3 SHEETS—SHEET 3.

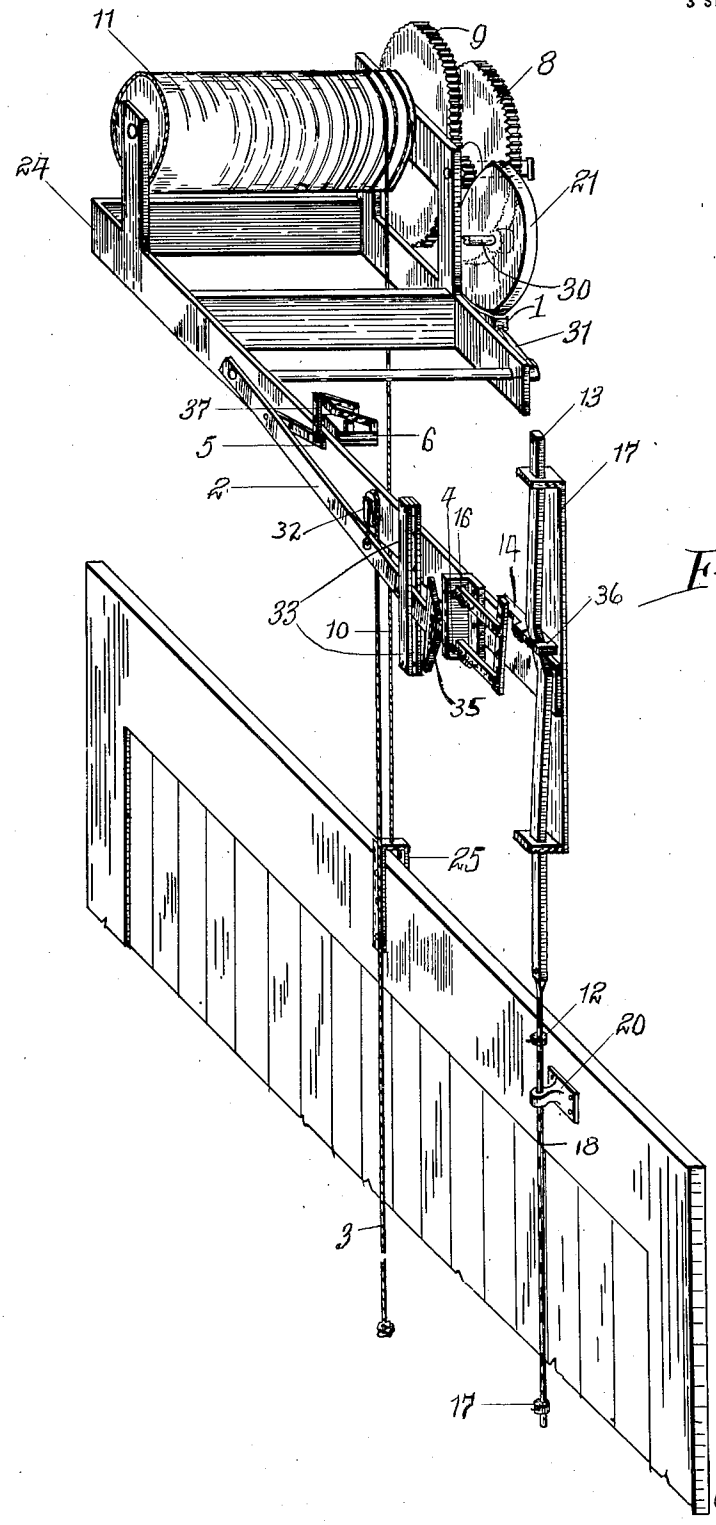


Fig. 4.

Elmer Lovejoy.
INVENTOR.

Jerry A. Mathews
ATTORNEY.

UNITED STATES PATENT OFFICE.

ELMER LOVEJOY, OF LARAMIE, WYOMING.

DOOR-OPENER.

1,260,561. Specification of Letters Patent. Patented Mar. 26, 1918.

Application filed July 30, 1917. Serial No. 183,582.

To all whom it may concern:

Be it known that I, ELMER LOVEJOY, a citizen of the United States, residing at Laramie, county of Albany, and State of Wyoming, have invented a new and useful Door-Opener, of which the following is a specification.

The object of my invention is to provide a power operated device for opening doors and gates, which will operate safely and quickly and which is economical in the cost of operation, and which is operated in part by gravity.

It is a further object of my invention to provide a device that will prevent accidents since the door can only be operated when the device has completed its action in either direction.

I attain these and other objects of my invention by the mechanism illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation of my invention with the door in raised position;

Fig. 2 is a top plan of a portion of the device showing the disposition of the motor;

Fig. 3 is a side elevation of a portion of the mechanism from the reverse side of that shown in Fig. 1;

Fig. 4 is a perspective of the apparatus, different parts being slightly modified.

Fig. 5 is a detail of member 23.

Like characters designate like parts throughout the several views.

Referring to the accompanying drawings, I provide a suitable cable 10 secured to suitable drum 11 which is supported by a suitable axle 26 on frame 24. Cable 10 is secured to the door or gate 19 by any suitable fastening device 25. I provide a relatively large gear 9 mounted on axle 26 and meshing with pinion 27. Pinion 27 is mounted on axle 28 which also carries gear 8. Gear 8 meshes with pinion 29, which in turn is mounted on axle 30 and driven by motor 7. I provide a brake drum 21 mounted on axle 30. I provide a brake shoe 1, which may be moved into and out of contact with brake drum 21. Gear 8 is provided with a suitable friction clutch 23 which has a safety device.

Brake shoe 1 is operatively connected with arm 2 by a suitable connecting member or crank 31. To arm 2, near the end is attached a suitable cord 3 which is led over suitable pulley 32 mounted on either the inside or the outside of the door frame at a convenient height, so that when the lower end of the cord is pulled arm 2 will be raised. I provide suitable guide strips 33 attached to frame 24.

Arm 2 is normally held in lowered position by spring 34. Arm 2 is provided with a slotted end portion 35 shaped to receive and engage latch 4 when arm 2 is raised.

Latch 4 is attached to lever 15 which also operates second latch 16. The upper end of lever 15 is attached to rod 14 which is provided with orificed ends 36, through which bent rod 13 travels. Door 19 is provided with a suitable guide 20 through which a suitable extension 18 of bent rod 13 travels, its path being limited by suitable adjustable collars 12. Bent rod 13 is mounted in a suitable guide member 17 which is attached to frame 24, as shown in Fig. 1.

I provide a lever 5 pivotally mounted to frame 24 and attached at one end to arm 2 and at the other end by means of link 37 to a suitable electrical switch 6. The switch 6 is electrically connected by suitable conductors 22 with motor 7.

In Fig. 1 the door or gate 19 is shown in open or raised position, ready to lower or close. By pulling cord 3 the arm 2, to which it is attached, is raised and its slotted end 35 is engaged by latch 4, releasing brake shoe 1 and allowing the door to close against the weight of a properly proportioned counterweight.

When guide 20 comes in contact with the lower collar 12 the rod extension 18 is pulled down and pulls with it bent rod 13. The bent rod 13 is lowered and its offset portion passes through the orificed end 35 of rod 14, moves that member forward which causes latch 4 to be withdrawn from its engagement with slotted end 35 of arm 2, thus allowing arm 2 to drop. When arm 2 drops brake 1 is applied to brake drum 21 and the door is stopped through gear 8 and drum 11. At the same time that latch 4 is withdrawn latch 16 is pushed forward and is in position for the opening of the door.

When it is desired to open or raise door 19 cord 3 is pulled, raising slotted end 35 of arm 2 into engagement with latch 16. This operation releases brake shoe 1, closes the electric switch through lever 5 thereby starting the motor 7 and through the operation of the train of gears causing cable 10 to be wound on drum 11, thus raising the door. When the door has been elevated suf-

ficiently so that guide 20 strikes the upper collar 12, it thereby raises the rod extension 18 and bent rod 13, until rod 14 is operated, causing lever 15 to swing back latch 16 from its engagement with slotted end 35 of arm 2.

Arm 2 being thus released drops to its lowermost position which is shown in Fig. 1, and applies brake shoe 1 to brake drum 21, at the same time tilting lever 5 and thus opening the electrical switch 6 which, cuts off the current from motor 7 and stops the door.

To guard against any damage if the door becomes jammed or blocked, gear 8 contains a suitable friction clutch 23, as illustrated in Figs. 2 and 3, allowing the motor to run without damage.

While the operation of the device is described as applied to a door or gate which is elevated and lowered, the invention is adapted to operate equally as well with a door that slides sidewise.

In applying the apparatus to a laterally sliding door, it would simply be necessary to have the door hung on the usual form of rail by rollers or wheels, with the rail slanted so that the door would slide shut of its own weight or against a properly proportioned counter-weight, the device being attached to it by a cable so as to pull it open against the slant of the rail.

As shown by the drawing, latches 16 and 4 are attached to the upper and lower extremities respectively, of lever 15. When the door is in the raised position as shown, the bent rod 13 by sliding through the orifice in the end of rod 14 pulls the upper end of lever 15 back which pulls back latch 16 and throws forward latch 4. When cord 3 is pulled arm 2 is raised until slotted end 35 engages with latch 4 where it is held. Arm 2, through its extension 31, removes the pressure of the brake block 1 from drum 21 and allows the door to close by gravity against its counterweight. In this position arm 2, through its connection with lever 5, does not close the electric switch 6, because its travel is not great enough, and hence the motor does not run. The lower collar 17 is so adjusted on rod 18 that when the door reaches its closed position, rod 18 and rod 13 are pulled down so rod 13 slides through the orifice in rod 14 far enough to push rod 14 and the upper end of lever 15 forward which extends latch 16 and withdraws latch 4 at the same time allowing arm 2 to drop again to the position shown in the drawing and applying brake 1 to drum 21 and stopping the door easily and without jar.

As mentioned above, latch 4 is now withdrawn and latch 16 pushed forward. When it is now desired to open the door cord 3 is pulled, raising arm 2, which now clears latch 4 altogether and engages with latch 16. In this position it removes the pressure of brake 1 as before, but in this position the travel of arm 2 and lever 5 is sufficient to close switch 6 which thus starts motor 7 and through connecting gears, drum, and cable, the door is raised until stop 20 reaches upper collar 12 and pushes rod 18 and bent rod 13 up, rod 13 again sliding through the orifice in rod 14 until it pulls rod 14 and the upper end of lever 15 back, thus allowing arm 2 to drop to position shown in drawing, withdrawing latch 16 and pushing forward latch 4 to position shown, at the same time through lever 5 opening switch 6 stopping motor and applying brake to drum 21 and holding door.

In Fig. 4 is shown a modified form of the invention which is substantially identical in operation with the form shown in Fig. 1 the motor 7 having been broken away in order that the device may be shown more clearly in perspective. Spring 34 is omitted in Fig. 4, gravity alone being depended upon in this form of the invention. The only other difference in the modified form is in the arrangement of members 12 and 13 which are in the form of a single longitudinal strip instead of those members being arranged substantially parallel with each other, as in Fig. 1, the function is, however, identical.

Power from the motor is required only when opening the door; the closing of the door is effected by the counterweights. A great saving in operating expense is thus effected as electrical power is required for only one operation of the door; the other operation of its closing being effected by gravity.

The device is accident proof as the door can only be operated when it has completed its action in one direction or the other.

The device may be applied to any door or gate which one wishes to operate by power.

What I claim is:

1. In a power operated door opener, the combination of a motor, a brake drum operatively connected to the motor, a cable drum, a train of gears operatively connecting the cable drum and the motor, a cable attached to the cable drum and to the door to be operated, a brake shoe arranged to be drawn into and out of engagement with the brake drum, a pivoted arm to which the brake shoe is operatively connected, an electrical motor control electrically connected with the motor and mechanically connected with the pivoted arm to control the operation of the motor and application of the brake, spaced latch members arranged to be thrown into and out of engagement with the end of the pivoted arm to release the pivoted arm at predetermined times, a longitudinally movable bent rod with which the latch members are pivotally connected, a rod extension that is attached to one end of the bent

rod, a guide member adapted to be attached to the door and having an operative connection with the rod extension, and adjustable collars mounted on the rod extension to limit the travel of that member and thereby control the operation of the bent rod and in turn of the latch members.

2. In a device of the class described, the combination of a motor, a brake drum operatively connected to the motor, a cable drum, a train of gears operatively connecting the cable drum and the motor, a cable attached to the cable drum and having one end secured to the door to be operated, a brake shoe for the brake drum, means for applying the brake shoe to the brake drum, an electric switch controlling the operation of said means, independent adjustable means operatively connected with the door for operating the electric switch, whereby to control the operation of the door.

3. In a device of the class described, the combination of a motor, a train of gears operatively connected to the motor, a cable drum operated by the gears, a cable attached at one end to the cable drum and at the other to the door to be opened, an electric switch to control the operation of the motor, a pivoted arm operatively connected with the electric switch, latch members releasably engageable with the pivoted arm, braking means operatively connected with the pivoted arm and arranged to mediately regulate the operation of the train of gears and cable drum, means arranged to operatively connect the latch members with the door, said means including adjustable members for causing the latch members to operate when the door reaches predetermined positions.

4. In a device of the class described, electrically controlled means for opening the door, a pivoted arm controlling the operation of the aforesaid electrical means, latch members arranged to engage with the pivoted arm to hold it in predetermined positions, means operatively connecting the latch members with the door, said means including adjustable devices carried by the aforesaid means and positioned to operate the latch members at the desired time, whereby the movement of the door will cause the latch members to operate and release and engage the pivoted arm, at predetermined positions of the door, for the purposes described.

5. In a device of the class described, electrically controlled means for opening a door having braking means for controlling the door operating means, means operatively connected to both the braking means and the electrically controlled means for opening the door, the aforesaid means being operated by the door at predetermined positions, and operatively connected means for setting the device into operation, said means including an arm operatively connected to the door and carrying adjustable stops.

6. In a device of the class described, power operated means for opening a door, braking mechanism for controlling the power operated means, a pivoted arm operatively connected with the braking means and with the power operated means, a cable arranged to operate the pivoted arm at will, latch members adapted to engage the pivoted arm to retain it in the desired operating position, rod members operatively connected with the latch members and with the door, whereby the latch members will be operated when the door reaches a particular position, and adjustable members on the aforesaid rod members, substantially as and for the purposes described.

ELMER LOVEJOY.