H. PITTS.

DOOR OPERATING AND LOCKING DEVICE.

APPLICATION FILED JAN. 11, 1913.

1,139,905.

Patented May 18, 1915.

2 SHEETS—SHEET 1.

Fig. 6.

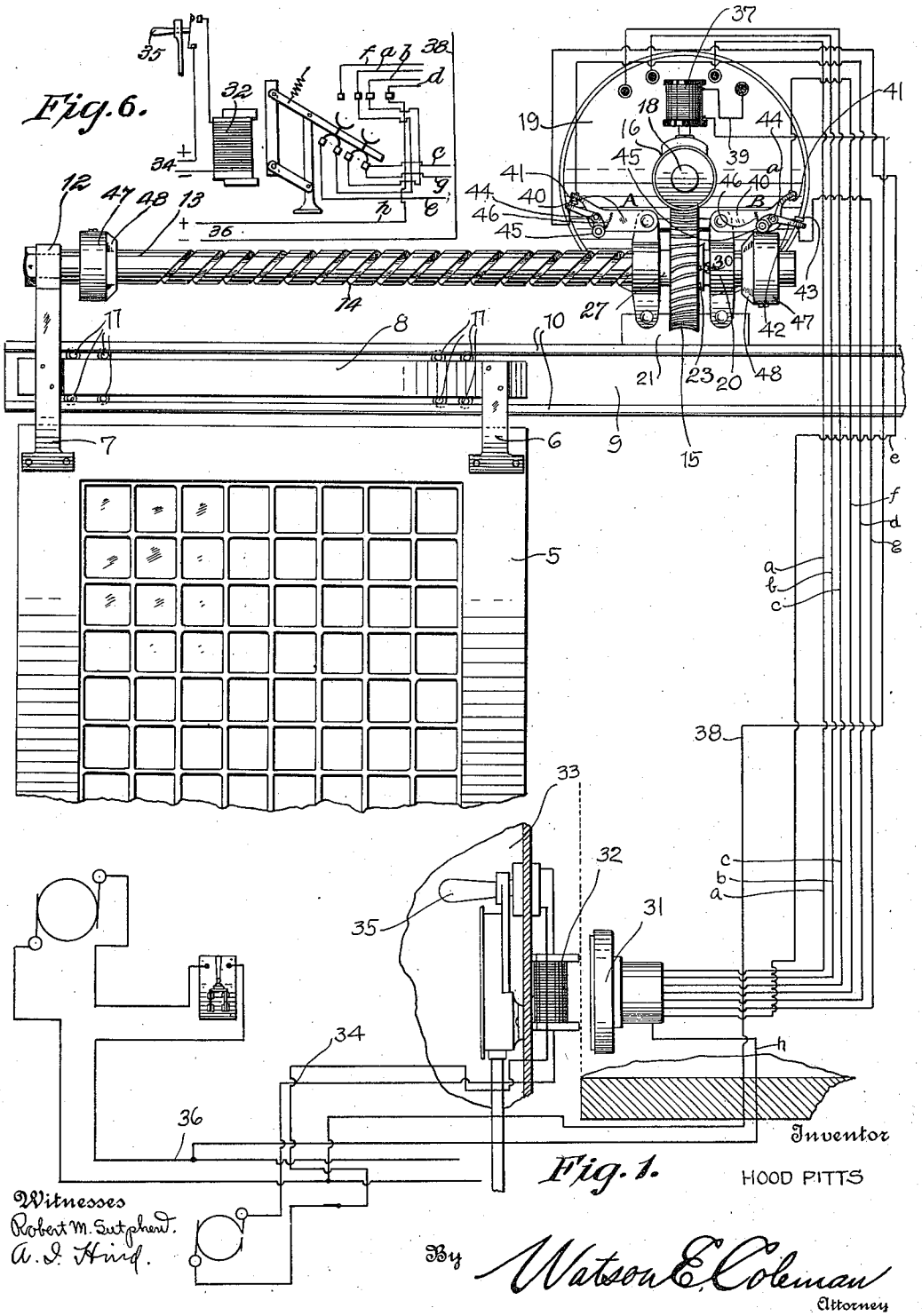


Fig. 1.

Witnesses
Robert M. Sutphen.
A. L. Hind.

Inventor
HOOD PITTS

By Watson E. Coleman
Attorney

H. PITTS.

DOOR OPERATING AND LOCKING DEVICE.

APPLICATION FILED JAN. 11, 1913.

1,139,905.

Patented May 18, 1915.

2 SHEETS—SHEET 2.

Fig. 3

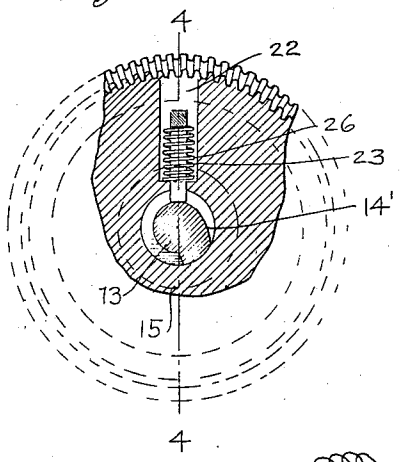


Fig. 4

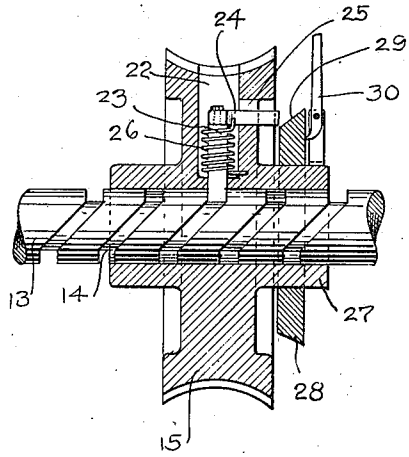


Fig. 5

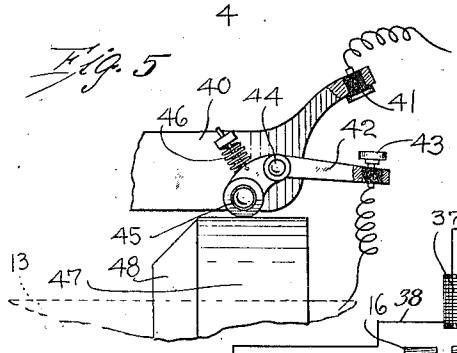
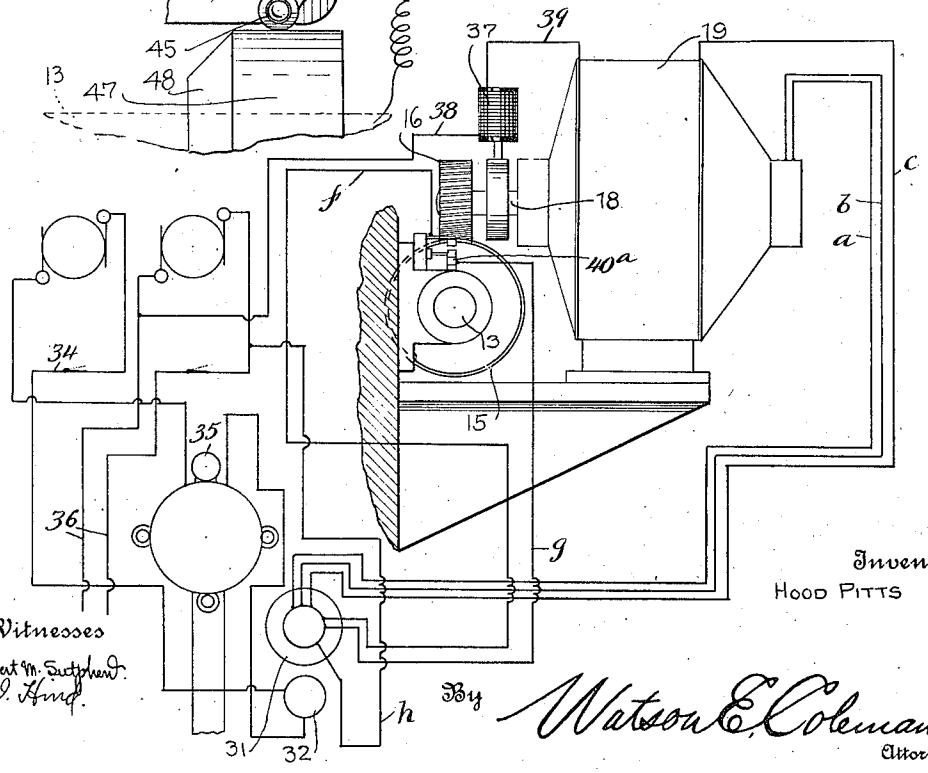


Fig. 2



Witnesses

Robert M. Sutphen

A. D. King

Inventor

Hood Pitts

By Watson E. Coleman

Attorney

UNITED STATES PATENT OFFICE.

HOOD PITTS, OF AUSTIN, TEXAS, ASSIGNOR OF ONE-HALF TO FRANK M. COVERT, OF AUSTIN, TEXAS.

DOOR OPERATING AND LOCKING DEVICE.

1,139,905. Specification of Letters Patent. Patented May 18, 1915.

Application filed January 11, 1913. Serial No. 741,604.

To all whom it may concern:

Be it known that I, HOOD PITTS, a citizen of the United States, residing at Austin, in the county of Travis and State of Texas, have invented certain new and useful Improvements in Door Operating and Locking Devices, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to an improved electric door or gate operating and locking device and has for its primary object to provide means for automatically opening and closing a door or gate and locking the same in either its open or closed position.

Another object of the invention is to provide electrically controlled operating means for the door or gate and an improved automatically actuated cut out device for cutting the operating means out of the electric circuit when the door reaches its open or closed position.

Still another object of the invention resides in the provision of means for rendering the door actuating means noneffective so as to permit of the movement of the door or gate by hand.

A further object of the invention is to generally improve and simplify apparatus of the above character which is strong, durable and efficient in operation, and may be installed in structures already in use at comparatively small cost without necessitating any material alterations in their construction.

I have shown my improved apparatus as applied to an elevator, but it is apparent that it may be used in other situations, such as railway cars or the like.

With the above and other objects in view as will become apparent as the description proceeds, the invention consists in certain constructions, combinations and arrangements of the parts that I shall hereinafter fully describe and claim.

I have not, in this application, claimed my invention in its broadest aspect as such claims are incorporated in my co-pending application filed May 13, 1912, Serial No. 697,011, renewed Sept. 23, 1914, Serial No. 863,218.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawings, in which—

Figure 1 is a front elevation of an elevator door or gate operating apparatus showing diagrammatically the operating circuit; Fig. 2 is a diagram of the circuits, the operating parts being shown in a plane at right angles to those shown in Fig. 1. Fig. 3 is an enlarged detail section of the worm gear; Fig. 4 is a section taken on the line 4—4 of Fig. 3; Fig. 5 is an enlarged detail elevation, partly in section of the cut out device; and Fig. 6 is a diagrammatic view of a floor section switch.

Referring in detail to the drawings, 5 designates a door or gate of any approved form and construction which is provided upon its upper end with the hanger brackets 6 and 7 respectively which extend above the upper edge of the door. These brackets are connected by means of a horizontal bar 8 which operates in a guide track 9, the longitudinal edges of said track being flanged as indicated at 10 to receive suitable antifriction rollers 11 arranged between said flanges and the upper and lower edges of the bar 8. The hanger bracket 7 extends above the guide track 9 and is provided upon its upper end with a suitable bearing 12 in which one end of a shaft 13 is journaled. This shaft is provided with a spiral peripheral groove 14.

Upon the shaft 13, a worm gear 15 is loosely mounted. This worm gear is engaged by a worm 16 fixed upon the shaft 18 of a motor 19 which is mounted upon the device, of which the door or gate is a closure in any preferred manner. Upon the shaft 13 and upon opposite sides of the worm gear 15, bearing members 20 are loosely arranged, said members being secured to and carried by a suitable plate 21.

The worm gear 15 is provided with a radially extending chamber or socket 22 through the inner end wall of which a pin 23 is movably disposed, said pin extending into the central bore of the gear and adapted for engagement in the spiral groove 14 of the shaft 13. An arm 24 is fixed to the outer end of the pin 23 and extends laterally therefrom through an opening 25 provided in the gear. Between this arm and the inner end wall of the chamber 22, a

coil tension spring 26 is arranged upon the pin, the inner end of said spring being fixed to the gear and its outer end secured to the pin in any preferred manner. It will thus be apparent that the spring 26 normally acts to hold the inner end of the pin 23 in engagement with the groove 14 of the shaft 13. As shown in Fig. 3 of the drawings, the base wall of the spiral groove 14 in the shaft at the ends thereof gradually merges into the periphery of said shaft as indicated at 14'. Shock or jar to the parts of the device at the end of the sliding movement of the door or gate will thus be avoided, the pin 23 being forced outwardly by the base wall of the groove to disengage it from the groove and stop the relative longitudinal movement of the gear and shaft. The worm gear 15 is provided with a suitable hub 27 upon which a ring or annulus 28 is mounted, the outer periphery of said ring being beveled as indicated at 29. Upon the gear hub 27, a cam lever 30 is fulcrumed. The cam end of this lever is adapted to bear against the outer face of the ring or annulus 28 to force the same inwardly and engage the beveled surface 29 thereof with the outer end of the arm 24, thereby forcing the pin 23 outwardly in the chamber 22 of the gear to disengage said pin from the spiral groove 14 in the shaft 13.

The hub 27 of the worm gear 15 is somewhat longer than the face of the gear and constitutes a sleeve through which the shaft 13 plays.

As thus far described, it will be readily understood that when motion is transmitted to the gear 15, the same is revolved around the shaft 13 and said shaft through the medium of the pin 23 operating in the spiral groove 14 is moved longitudinally through the worm gear, thereby sliding the door or gate to its open or closed position. If, however, for any reason the operating mechanism should get out of order, it is simply necessary to shift the ring or annulus 28 in the manner above described to disengage the pin 23 from the groove of the shaft so that the door may be manually operated.

In Fig. 1 of the drawings, I have illustrated an operating circuit for the motor 19, and in this circuit is included a floor selector switch indicated generally by the numeral 31. This switch is not illustrated in detail nor will it be specifically described in this specification, as the same forms the subject matter of a separate application for patent filed Dec. 24, 1912, Ser. No. 738494. It is sufficient to state that for the purpose of rendering the operation of the present invention readily understood, that said switch is actuated to close the circuit for the opening movement of the elevator door or gate through the medium of an electromagnet 32 carried by the moving device indicated at 33. This magnet is supplied with current from a circuit 34 in which is located the operator's switch 35 mounted upon the device. The specific construction of this switch is also described and claimed in a separate application for patent filed Dec. 24, 1912, Ser. No. 738495. The floor selector switch 31 is supplied from the car lighting circuit 36 or any other suitable source of current supply and the feed wires *h*—38—39 and *c* lead from the switch 31 to the motor field. The circuit 36 also supplies current to the brake magnet 37 one terminal of which is connected by a wire 38 directly to said circuit. The other terminal is connected by means of a wire 39 to the motor field.

The wires *a* and *b* lead from the switch 31 to the armature of the motor. These connections are shown in detail in my co-pending application Serial No. 738,494.

The bearings 20 which support one end of the shaft 13 carry cut-out switches A and B respectively. Each cut-out has a horizontally disposed arm 40, said arms extending in relatively opposite directions. These arms are each provided with a contact member 41 with which similar contact members 43 upon levers 42 are adapted to engage. These levers are fulcrumed as at 44 upon one side of the arms 40 and are provided with rollers 45 for a purpose which will be presently disclosed. Compression springs 46 are connected to the inner ends of the levers 42 and to the arms 40 and normally act to hold the contacts 41 and 43 in engagement.

The wires *d*, *e* and *f*, *g* are connected respectively to the pairs of contacts 41 and 43 included in the main operating circuit, said wires being connected to opposed pairs of stationary contacts embodied in the switch 31, as disclosed in my companion application hereinbefore referred to, wherein the connections with the floor switch are fully illustrated and to which reference may be had. Upon the shaft 13, adjacent the ends thereof, the adjustable collars 47 are mounted, said collars being provided with beveled peripheral faces 48.

By means of the structure above described, it will be understood that when the operator closes the circuit 34 by means of the switch 35, the magnet 32 on the car is energized to attract the armature of the switch 31. The current will now flow as follows: wire *h*, wire *b*, armature of motor 19, wire *a*, switch 31, wire *f*, cut-out B, wire *g*, wire *c*, field of motor, wire 39, brake solenoid, wire 38, to source, and open the door. When it is desired to start the car, before the lever of the controller can be thrown, the handle 35 must be manipulated to break the circuit of the magnet 32. The spring will now withdraw the armature of the magnet and throw the

switch 31 to the position shown in Fig. 6. The current will then flow through wire *h*, wire *d*, cut-out A, wire *e*, wire *a*, armature of motor (in reverse direction), wire *b*, wire *c*, field coils of motor, wire 39, brake solenoid, wire 38 to source, and close the door, Should the car, in any unforeseen manner, be started without the controller having been operated, the magnet 32 will be moved away from the armature of the switch 31, the spring will throw the switch and the door will be closed as above described.

When the door or gate reaches its full open position, as shown in Fig. 1, the beveled face 48 of one of the collars 47 engages the roller 45 on the end of the lever 42 and moves said lever against the action of the spring 46 to disengage the contacts 41 and 43 of the cut-out B and thus open the operating circuit at this point. When the magnet 32 is deënergized, or the car moves away from the switch 31, the movable switch element assumes its normal position and engages the other set of contacts to close the operating circuit through the contacts 40 and 41 of the cut-out A and reverse the operation of the motor, to move the door or gate to its closed position. When the gate has moved to its closed position, the lever 42 of the cut-out A is actuated by its spring 46 to open the main operating circuit and thereby stop the motor. It will thus be seen that even if the car operator neglects to operate the switch 35 and deënergize the magnet 32, the door or gate will, nevertheless, be moved to its closed position and securely locked in such position by the automatic opening of the main operating circuit, which can only be closed through the medium of the magnet 32 carried by the car. When the operating circuit is opened in the manner above described, the brake magnet 37 is deënergized so that the brake is applied to positively check the continued rotation of the motor shaft and thus prevent slamming of the gate or door. Any form of magnetic brake may be employed, such as that shown in my co-pending application filed Jan. 11, 1913, Serial No. 741,603.

From the foregoing it is believed that the construction and manner of operation of my improved gate operating apparatus will be clearly understood. By means of the same, heavy doors or gates such as those of elevators or railway cars may be quickly closed and opened and the operator thus relieved of the considerable labor incident to their manual operation.

With my improvement the door or gate will be automatically closed when the car is moved from opposite it, should the operator fail to close it.

As the invention embodies but few parts in its construction, it will be obvious that the same may be inexpensively manufactured and installed at small cost without necessitating material alterations in the existing structures.

While I have shown and described what I believe to be the preferred embodiment of the invention, the same may be, however, variously modified as may be occasioned by special circumstances without departing from the principle involved or sacrificing any of the advantages hereinbefore specified.

Having thus described the invention, what is claimed is:

1. The combination with a slidably mounted door, of a shaft connected at one of its ends to said door and provided with a spiral groove, a gear loosely mounted upon said shaft, means mounted in said gear to rotate therewith and engaging in the groove of said shaft, and a reversible motor to drive said gear and move the shaft axially to move the door to its open or closed position and means for automatically disengaging the groove engaging means.

2. The combination with a slidably mounted door, of a shaft connected at one of its ends to said door and provided with a spiral groove, a gear loosely mounted upon said shaft, a spring pressed pin mounted within the gear and normally engaging in the groove of said shaft, means mounted upon the gear to move the pin out of engagement with said groove, and a reversible motor to drive said gear and move the shaft axially to move said door to its open or closed position.

3. The combination with a slidably mounted door, of a shaft connected to said door at one of its ends and provided with a spiral groove, a gear loosely mounted upon said shaft, radially movable spring held means arranged within the gear and normally engaged in the groove of said shaft, a reversible motor to drive said gear and move the shaft axially to open or close the door, and means for holding said means within the gear out of engagement with the groove in the shaft to permit of the manual operation of the door.

4. The combination with a slidably mounted door, of a spirally grooved shaft connected at one of its ends to said door, a worm gear loosely mounted upon said shaft and provided with a radially extending chamber, a spring pressed pin mounted in said chamber to engage in the groove of the shaft, a laterally projecting arm fixed to the outer end of said pin and extending exteriorly of said chamber, means mounted upon the gear to engage said arm and move the pin out of engagement with the groove in said shaft, and a reversible motor to drive the gear and move the shaft axially to open or close the door.

5. The combination with a slidably mounted door, of a spirally grooved shaft connected at one of its ends to said door, a

worm gear loosely mounted upon said shaft, a reversible motor to drive said gear, means carried by the gear normally engaged in the groove of said shaft to move the same axially in either direction and open or close the door, means for automatically disengaging the groove engaging means, and additional means mounted upon the gear for movement with respect thereto and coacting with said first named means to disengage the same from the groove in the shaft to permit of the manual operation of the door.

6. The combination with a slidably mounted door, of a spirally grooved shaft connected at one of its ends to said door, a worm gear loosely mounted upon said shaft, a reversible motor to drive said gear, a radially movable element mounted within the gear, means normally acting to yieldingly hold said element in engagement with the groove of the shaft, said gear being provided with an opening communicating with said chamber, an arm connected to said element projecting through said opening, and a cam actuated member mounted upon the gear to engage said arm and move the element out of engagement with the groove in the shaft to permit of the manual operation of the door.

7. The combination with a slidably mounted door, of a spirally grooved shaft connected at one of its ends to said door, a worm gear loosely mounted upon said shaft, a spring pressed pin arranged within said gear and normally engaging in the groove of the shaft, a reversible motor to drive said gear and move the shaft axially in either direction to open or close the door, and means mounted upon the gear and movable longitudinally of the shaft to disengage said pin from the groove in the shaft and permit of the manual operation of the door.

8. The combination with a slidably mounted door, of a shaft connected at one of its ends to said door, said shaft being provided with a spiral groove merging into the periphery of the shaft at its ends, a worm gear loosely mounted on said shaft, a spring pressed pin radially movable in said gear and normally engaged in the groove of said shaft, a reversible motor to drive said gear and move the shaft axially in either direction to open or close the door, and a manually operable element mounted upon the gear and movable longitudinally of said shaft to disengage said pin from the groove in the shaft and permit of the manual operation of the door.

9. The combination with a slidably mounted door, of a spirally grooved shaft connected at one of its ends, to said door, a worm gear loosely mounted upon said shaft, a spring pressed pin carried by said gear normally engaged in the groove of the shaft, a reversible motor to drive said gear and move the shaft axially to open or close the door, an arm fixed to one end of said pin, an annulus movable longitudinally of said shaft, and manually operable means to engage the annulus and engage the same with said arm to move the pin out of the groove in the shaft and permit of the manual operation of the door.

10. The combination with a slidably mounted door, of a spirally grooved shaft connected at one of its ends to said door, a worm gear loosely mounted upon said shaft, a spring pressed pin carried by said gear normally engaged in the groove of the shaft, a reversible motor to drive said gear and move the shaft axially to open or close the door, an arm fixed to one end of said pin, a member movable longitudinally of the shaft having a beveled face, and manually operable means to move said member and engage the beveled face thereof with said arm to move said pin out of the groove in the shaft and permit of the manual operation of the door.

11. The combination with a slidably mounted door, of a spirally grooved shaft connected at one of its ends to said door, a worm gear loosely mounted upon said shaft, a spring pressed pin carried by said gear normally engaged in the groove of the shaft, a reversible motor to drive said gear and move the shaft axially to open or close the door, an arm fixed to one end of said pin, an annulus mounted upon said gear and movable longitudinally with respect to said shaft, said annulus having a beveled peripheral face, and a manually operable cam mounted upon the gear to move said annulus and engage the beveled face thereof with said arm, to move the pin out of the groove in the shaft and permit of the manual operation of the door.

12. In a door operating apparatus, an operating shaft having a spiral groove, a sleeve surrounding the shaft, means carried by the sleeve to engage the groove to impart relative longitudinal movement of the sleeve and shaft, means for automatically raising the groove engaging means from the groove, and means for imparting rotative movement to the sleeve.

13. In a door operating apparatus, an operating shaft having a spiral groove, a sleeve surrounding the shaft, means carried by the sleeve to engage the groove to impart relative longitudinal movement of the sleeve and shaft, means carried by the shaft for automatically raising the groove engaging means from the groove, and means for imparting rotative movement to the sleeve.

14. In a door operating apparatus, an operating shaft having a spiral groove, a sleeve surrounding the shaft, means carried by the sleeve to engage the groove to impart

relative longitudinal movement of the sleeve and shaft, means for automatically raising the groove engaging means, means for imparting rotative movement to the sleeve, and means carried by the sleeve for manually disengaging the groove engaging means.

15. The combination with a slidably mounted door and motor actuated operating means therefor including an axially movable shaft, an electric circuit for the motor, of bearing members on the shaft, cut out devices mounted upon said bearing members and included in said circuit, each of said cut out devices including a stationary contact member, a spring pressed lever, a movable contact member mounted on said lever to engage the stationary contact and normally close the circuit, and adjustable collars mounted upon said shaft to move said levers and disengage the contacts to cut the motor out of the circuit at the end of the sliding movement of the door in either direction.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

HOOD PITTS.

Witnesses:
W. B. ANTHONY,
GEO. T. HUME.