E. C. HAVILAND.

MOTOR GEARING FOR REVOLVING DOORS.

APPLICATION FILED MAR. 14, 1911.

1,015,491.

Patented Jan. 23, 1912.

3 SHEETS—SHEET 1.

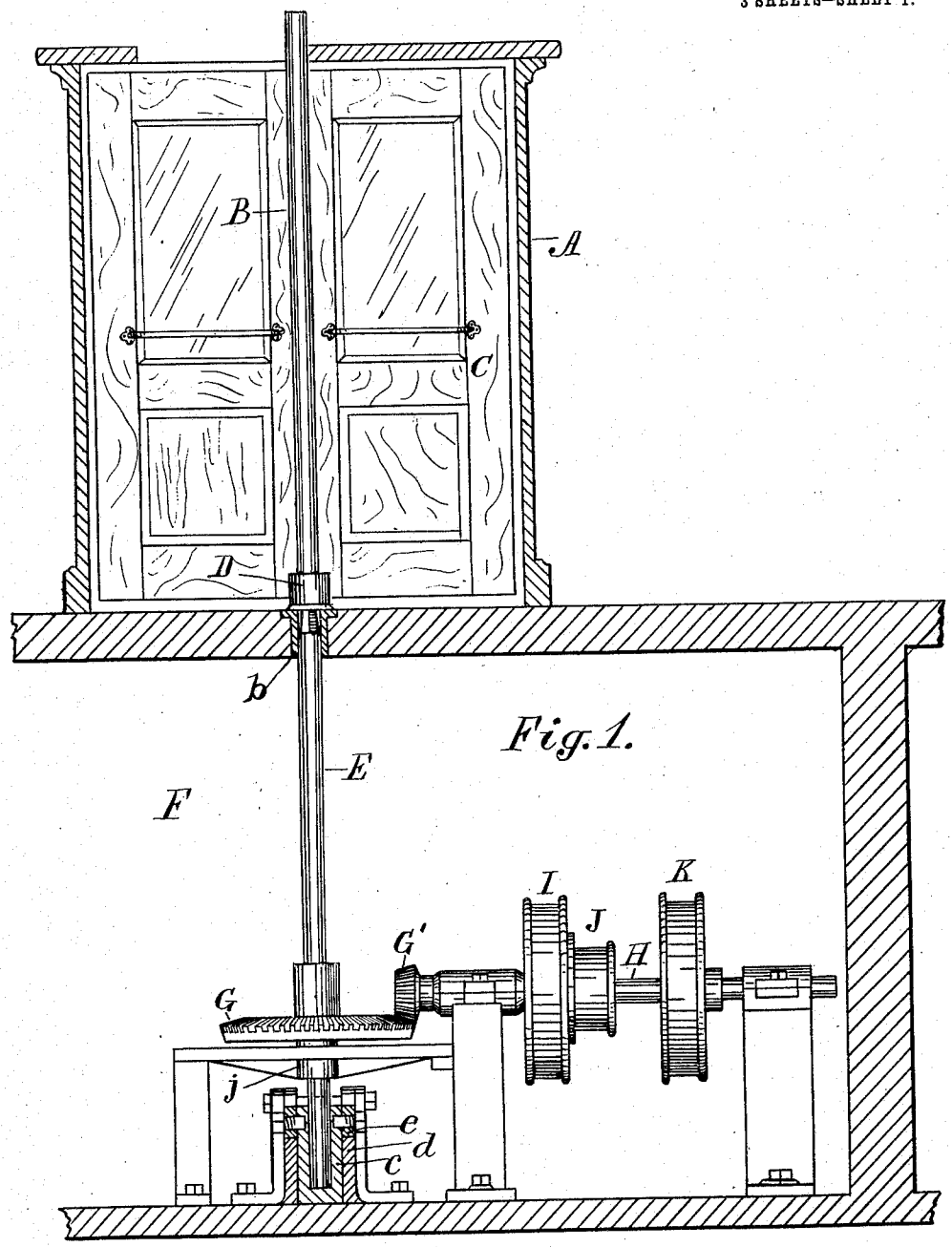

Fig. 1.

Witnesses:
L. Lee.
J. W. Greenbaum

Inventor
Edward C. Haviland,
per Thomas S. Crane, Atty

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

E. C. HAVILAND.

MOTOR GEARING FOR REVOLVING DOORS.

APPLICATION FILED MAR. 14, 1911.

1,015,491.

Patented Jan. 23, 1912.

3 SHEETS—SHEET 2.

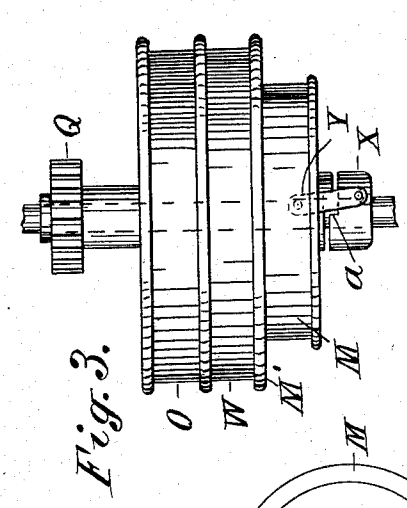

Fig. 3.

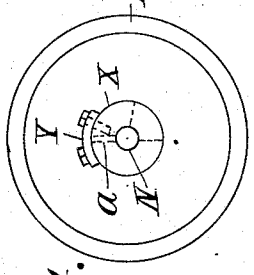

Fig. 4.

Fig. 2.

Witnesses:
L. Lee.
J. W. Greenbaum

Inventor
Edward C. Haviland per
Thomas S. Crane, Atty.

E. C. HAVILAND.

MOTOR GEARING FOR REVOLVING DOORS.

APPLICATION FILED MAR. 14, 1911.

1,015,491.

Patented Jan. 23, 1912.

3 SHEETS—SHEET 3.

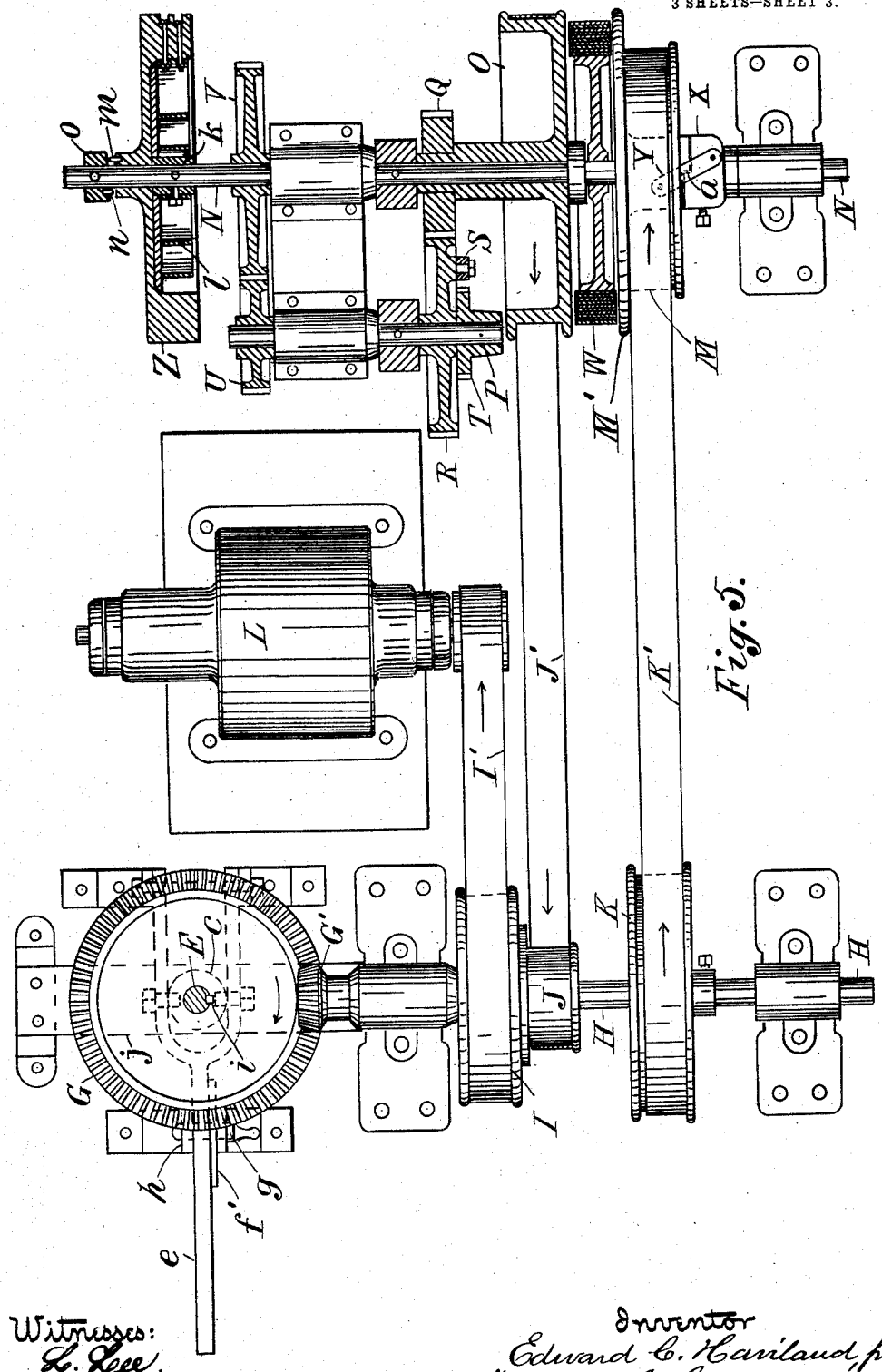

Fig. 5.

Witnesses:
L. Lee.
J. W. Greenbaum

Inventor
Edward C. Haviland, by
Thomas S. Crane, Atty.

UNITED STATES PATENT OFFICE.

EDWARD C. HAVILAND, OF NEW YORK, N. Y., ASSIGNOR TO VAN KANNEL REVOLVING DOOR COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

MOTOR-GEARING FOR REVOLVING DOORS.

1,015,491. Specification of Letters Patent. Patented Jan. 23, 1912.

Application filed March 14, 1911. Serial No. 614,351.

To all whom it may concern:

Be it known that I, EDWARD C. HAVILAND, a citizen of the United States, residing at 290 East One Hundred and Thirty-fourth street, New York, county of New York, and State of New York, have invented certain new and useful Improvements in Motor-Gearing for Revolving Doors, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The invention relates to revolving doors having wings rotated within a segmental casing, and the object of the invention is to facilitate the turning of the door by the passenger in his transit through the same. To conform to architectural surroundings, it has become common to make the wings of such revolving doors of bronze and other ornamental material of considerable weight, so that the inertia of the door opposes a great resistance to the passenger when pressing upon one of the wings to make his transit through the door-casing. If such a heavy door were revolved continuously by a motor at a suitable speed for the transit of passengers, it would embarrass and sometimes injure those unaccustomed to the use of such doors; and to avoid such accidents it is preferable that the door should rotate at only a very slow speed until the wings are pressed upon by the passenger, and mechanism then operate automatically to rotate the door at a suitable higher speed for the passenger to move quickly through the same. The high speed of the door wings should then be automatically arrested, so that the space between the wings may be safely entered by other passengers, who in turn would engage the mechanism for producing the higher speed during their own transit through the door-casing.

To meet these conditions, the invention furnishes mechanism for rotating the doors and means actuated by the passenger when moving through the doorway for engaging such mechanism and increasing the speed of the door wings; the mechanism preferably operating to rotate the door slowly when passengers are not moving through it, so that the inertia of the door may not oppose the desired higher speed.

The invention will be understood by reference to the annexed drawing, in which—

Figure 1 is an elevation of a revolving door with a part of the motor-gearing in section, on the center line of the upright spindle; Fig. 2 is an elevation of the motor-gearing and the connections from the same to the spindle of the revolving door; Fig. 3 is a plan showing the friction-gearing in operation; Fig. 4 is an end view of the door-moving or clutch-pulley and thrust-thumb; and Fig. 5 is a plan of the motor-gearing and the connections to the revolving door, the parts being shown in section at the center of the driving-shaft and back gear-shaft.

A designates the door-casing, B the spindle carrying the wings C and shown connected by a coupling-socket D to an upright shaft E in an apartment F below the door. Bevel-gears G, G′, connect the upright shaft F with a so-called intermediate shaft H having connected pulleys I and J fitted to turn loosely thereon, and a pulley K fixed thereto to rotate said shaft and the door. The pulley I is driven by belt I′ from a motor L, and the pulley K and intermediate shaft are driven by belt K′ from a door-moving pulley M upon a driving-shaft N. Such door-moving pulley operates, also, as a clutch-pulley, and is rotated continuously with the driving-shaft; which turns at different rates of speed according to the gearing engaged therewith.

The clutch-pulley is capable of turning slightly upon the shaft, and advancing endwise during its rotations with the shaft, so as to clamp the side of an annular friction-gear W, by means of a friction-plate M′. A pulley J from the belt J′ rotates a driving-pulley O upon the driving-shaft N at a uniform so-called high speed; but such pulley is not attached to the shaft and operates, unless the clutch-pulley be actuated, to turn the shaft slowly by means of gearing upon a back gear-shaft P. A pinion Q upon the driving-pulley O meshes with a gear R fitted to turn loosely upon the back gear-shaft and operating normally to turn the same by a pawl S engaging a ratchet T which is attached to such shaft. A pinion U fixed to the back gear-shaft engages a wheel V fixed to the driving-shaft N, and the back gear thus operates normally to transmit a so-called "slow-speed" to the driving-shaft and through the pulley M to the intermediate shaft and the door. An annular friction-gear W, consisting of a composite ring of leather mounted upon a

spider, is fitted to turn loosely upon the driving-shaft between the flange M′ of the clutch-pulley M and the driving-pulley O, and clears both so slightly that any motion of the clutch-pulley M toward the driving-pulley operates to clamp the friction-gear and cause the clutch-pulley to rotate at the same speed as the driving-pulley, and thus results in driving the pulley K and the door at the so-called "high-speed." A thrust-hub X is secured to the driving-shaft N adjacent to the clutch-pulley M, and an inclined link Y is pivoted at opposite ends to such thrust-hub and to the hub of the clutch-pulley.

Arrows indicate the direction of rotation, which is the same whether the door be running at "slow-speed" or "high-speed"; and is adapted to straighten the link Y if the clutch-pulley be turned upon the shaft while in motion. As any pressure upon the door wings to turn the same is in the direction of their rotation, it operates when the door is turning at a slow speed to turn the pulley M a little faster than the driving-shaft N is turned by the back gearing, and such rotation of the clutch-pulley turns its hub in relation to the thrust-hub X and operates to turn the link Y more nearly into the line of the driving-shaft. The link thus acts as a toggle with considerable force, and operates to press the clutch-pulley forcibly toward the annular friction-gear W, crowding the same against the driving-pulley O which is rotated by its motor connection at a uniform so-called "high-speed," (as shown in Fig. 3) and causes the clutch-pulley and also the driving-shaft to rotate at the same speed. The door is thus, while the pressure upon the door wing continues, rotated at the so-called high-speed by the belt K′ and intermediate shaft. When the pressure upon the door-wing ceases the driving force of the shaft N exerted through the hub X tends to turn the link back to its initial position shown in Fig. 5, and the clutch-pulley is then detached from the friction-gear W by a fly-wheel Z fitted to turn upon the shaft N and connected with a fixed hub *k* by a spirally coiled spring *l* which drives the wheel when the shaft is uniformly rotated; but permits it to turn thereon when the speed of the shaft is varied or reduced. When the fly-wheel thus turns, a pin *m* upon its hub contacts with a pin *n* upon a collar *o*, fixed on the shaft N, giving the shaft a jerk in the direction of its rotation, which turns the hub X and straightens or loosens the link *y*. Such effect is produced, because the rotation of the shaft N is tending constantly to turn the hub X in relation to the pulley M so as to move the link X back to its initial position, shown in Fig. 5, and such tendency is only overcome by the pressure of the hand upon the door-wing which changes the operation of the intermediate shaft H, from a shaft driven by the pulley O through the back-gear into a shaft which under the hand impulse turns the pulley Y in relation to the hub X to straighten the link. Such turning of the pulley M by hand operates to straighten the link, and while this causes the shaft N to revolve faster it cannot immediately affect the speed of the fly-wheel, as the fly-wheel is loose on the shaft N, and the effect of the shaft's increased speed is first to coil the spring within the hub of the fly-wheel. As the movement of any passenger through the revolving door is very brief, the pressure of the hand upon the door-wing is equally brief, and ceases before the fly-wheel attains the velocity of the shaft N. When the pressure upon the door-wing ceases, the spring is imparting its energy to the fly-wheel, which causes the fly-wheel soon to revolve as fast as, or faster, than the shaft, thus jerking the link into an inclined position, which loosens the grip of the pulley M upon the pulley O. The shaft then immediately assumes its slow speed, which it retains until the door-wing is again pushed by hand.

When the driving-shaft is rotated through the back-gearing at "slow speed", the thrust-hub X operates positively to turn the clutch-pulley and the door, by means of shoulders *a* formed upon the thrust-hub and the hub of the clutch-pulley, which operate as clutch-teeth to turn the clutch-pulley positively at the "slow-speed"; but which become separated automatically when the clutch-pulley is turned by sufficient pressure upon the door wings to move the link Y, as shown in Fig. 3. When the driving-shaft is driven by the friction-gear at an increased rate of speed, the gear V operates instead of the gear Q to drive the back gear-shaft, the teeth of the ratchet-wheel T slipping beneath the pawl S; as the loose wheel R is turning at a slower rate of speed than the ratchet-wheel T.

It is often desirable to collapse the wings of a revolving-door and shift them sidewise in the casing to make a clear passage in the casing in warm weather, and I provide means for disconnecting the upright shaft F from the door to permit such a shifting of the wings. This is effected by forming a coupling-socket D upon the bottom of the door-spindle at the level of the floor D′ and making the upright shaft E to slide vertically to connect and disconnect with such socket. The socket, as shown in Fig. 2, is formed with a tapering square recess and the top of the shaft E is correspondingly tapered to fit such recess, and its upper end is guided in the floor by a bearing *b*. The bottom of the upright shaft is supported in a step *c* movable vertically in a socket *d*

fixed to the floor f of the apartment F, and such step can be raised and lowered by a lever e having an adjustable wedge f' resting upon a pin g in a supporting guide h. The shaft is fitted movably to the bevel-gear G by a spline i and the bevel-gear is supported upon a fixed bearing j, so that the step c can be raised and lowered without disturbing the relation of the gears G, G'. The removal of the pin g below the lever e permits the shaft to be lowered sufficiently to disconnect its upper end from the coupling-socket D, and when engaged with such socket the shaft is held at the right elevation by the supporting-pin g and by adjusting the wedge f' upon the lever e by means of bolts j' inserted through slots in the wedge.

It is common to suspend the wings of a revolving door, by its spindle, from an overhead carriage by which the wings may be shifted laterally when the wings are collapsed, and it will be readily understood that such or any other suitable means may be used to shift the wings when disconnected from the vertical shaft E.

It will be seen from the above description that the operation of the speed-gearing is entirely automatic, as the door can be revolved mechanically at a so-called "slow-speed" and the speed then increased by the mere instinctive action of the passenger in pressing upon the wings to turn the door, the increased speed automatically stopping when the passenger's pressure upon the wings ceases.

It is obvious that the friction-gear W would operate to turn the pulley M when pressure is exerted upon the wings, whether or not the wings be already rotated at a slow speed, and I do not therefore limit myself to means for rotating the door at two different speeds. It is also obvious that other means than pressure upon the wings can be actuated by the passenger when moving through the door-casing, to engage the mechanism for revolving the door, and I have not, therefore, limited myself in my claims to the particular mechanism herein described.

Having thus set forth the nature of the invention what is claimed herein is:

1. In a revolving door having a central spindle with wings attached to be pushed by the passenger, the combination, with such door, of a motor with mechanism having a clutch to rotate the door, and means connected with the door-spindle for throwing the clutch into operation when the door-wings are pressed and the spindle turned at the will of the passenger.

2. In a revolving door having wings, the combination, with such door, of mechanism operated automatically to rotate the door slowly, and mechanism engaged by pressure upon the wings for rotating the door at an increased rate of speed.

3. In a revolving door having wings to be pushed by the passenger, the combination, with such door, of a motor with mechanism connected to the door for automatically rotating the door slowly, and additional mechanism connecting the motor and the door and engaged by pressure upon the wings, for rotating the door at an increased rate of speed.

4. In a revolving door having wings to be pushed by the passenger, the combination, with such door, of a motor, a gear-shaft connected thereto and to the door for rotating the door slowly, gearing upon the gear-shaft for rotating the door more rapidly, and a clutch actuated by pressure upon the door wings for engaging such gearing with the gear-shaft.

5. In a revolving door having wings to be pushed by the passenger, the combination, with such door, of a motor, a gear-shaft connected thereto by back-gearing to drive the shaft slowly, such back-gearing having a detachable connection therein, high speed gearing upon the gear-shaft for rotating the door more rapidly, and a clutch actuated by pressure upon the door wings for engaging such high speed gearing with the gear-shaft.

6. In a revolving door having wings to be pushed by the passenger, the combination, with such door, of a motor, a gear-shaft connected thereto by a driving-pulley adapted to turn loosely upon the gear-shaft, back-gearing connecting the pulley with the gear-shaft to turn it slowly, a friction-wheel adjacent to the driving-pulley, a clutch-plate rotated with the gear-shaft and connected to the door, and a clutch actuated by pressure upon the door wings for shifting the clutch-plate to engage the friction-wheel with the pulley and transmitting the rapid motion of the pulley to the clutch-plate, gear-shaft and door.

7. In a revolving door having a central spindle with wings to be pushed by the passenger, the combination, with such spindle, of an intermediate shaft geared thereto, a driving gear-shaft connected with the intermediate shaft to drive the same, a driving-pulley upon said driving-shaft with gearing for rotating the shaft and door continuously at a so-called "slow-speed," gearing normally disconnected with the driving shaft to turn the same and the door at a so-called "high-speed," and a clutch actuated by pressure upon the wings and the consequent torsion of the door-spindle, to connect such high-speed gearing with the driving-shaft and turn the door at such high-speed during the continuance of the pressure upon the wings.

8. The mechanism for revolving a door having a spindle and wings, consisting of

a driving-shaft N, a. cog-wheel V attached thereto, a back gear-shaft P connected with the gear V, a driving-pulley O fitted to turn loosely on the driving-shaft and connected by cog-wheels Q and R to the back gear-shaft to rotate the driving-shaft at a so-called "slow-speed," a combined clutch-pulley having a clutch-plate arranged to turn slightly upon the driving-shaft and to slip endwise thereon and connected with the door-spindle, the clutch-plate being adjacent to the driving-pulley, an annular friction-gear W loose on the driving-shaft between the clutch-plate and the driving-pulley O, a hub X fixed rigidly upon the shaft adjacent to the hub of the clutch-plate and connected thereto by an inclined link Y, the pressure upon the door wings operating to turn such clutch-plate upon the driving-shaft and thereby crowd the annular friction-wheel against the driving-pulley O, and transmitting the so-called "high-speed" of the driving-pulley to the clutch-pulley and the door, the back-gearing having a slip connection with the driving-shaft, to permit the rotation of the driving-shaft independently of the back-gear shaft.

9. The mechanism for revolving a door having spindle and wings, consisting of an intermediate shaft H geared to the door-spindle, large and small loose pulleys rotatable on the intermediate shaft and driven by motor connection, a driving-shaft N having clutch-pulley and belt connection with the intermediate shaft, a driving-pulley rotated continuously by a belt from the small pulley upon the intermediate shaft, an annular friction-gear loose upon the driving-shaft between the clutch-pulley and the driving-pulley, and means actuated by pressure upon the door wings for crowding the clutch-pulley toward such friction-gear and driving-pulley, and transmitting the rapid motion of the driving-pulley to the driving-shaft and thereby to the door.

10. The combination, with a revolving door having casing with wings rotated therein, of a door-spindle having a coupling-socket upon the lower end, an upright shaft movable through the floor into and out of such coupling-socket, and motor-gearing connected with such shaft for rotating the door, whereby the upright shaft may be disconnected from the door and the door wings shifted sidewise in the casing when desired.

11. The combination, with a revolving door having a casing with wings rotated therein, of a door-spindle having a coupling-socket upon the lower end, an upright shaft movable through the floor into and out of such coupling-socket, a bevel-wheel splined upon such shaft, a motor with gearing for rotating the bevel-wheel for turning the door, and means for raising and lowering the upright shaft through such bevel-wheel for coupling with the door-spindle.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EDWARD C. HAVILAND.

Witnesses:
LENORA LEMON,
BARRY E. MCGUSTY.