Jan. 23, 1968 J. HESS ET AL 3,364,620

REVOLVING DOORS

Filed July 29, 1965 4 Sheets-Sheet 1

FIG. 1.

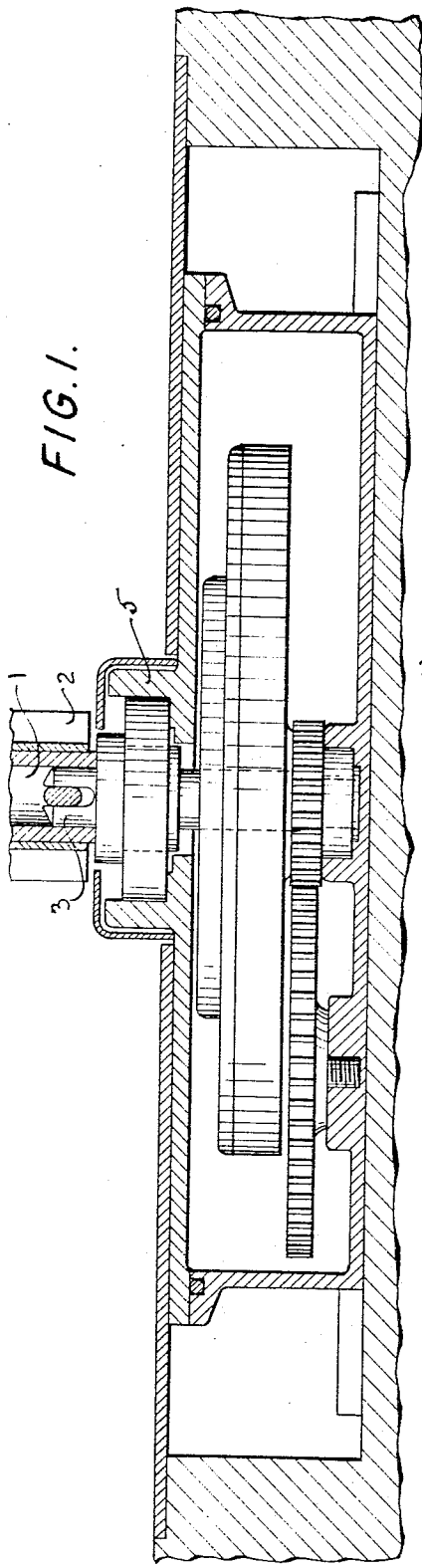
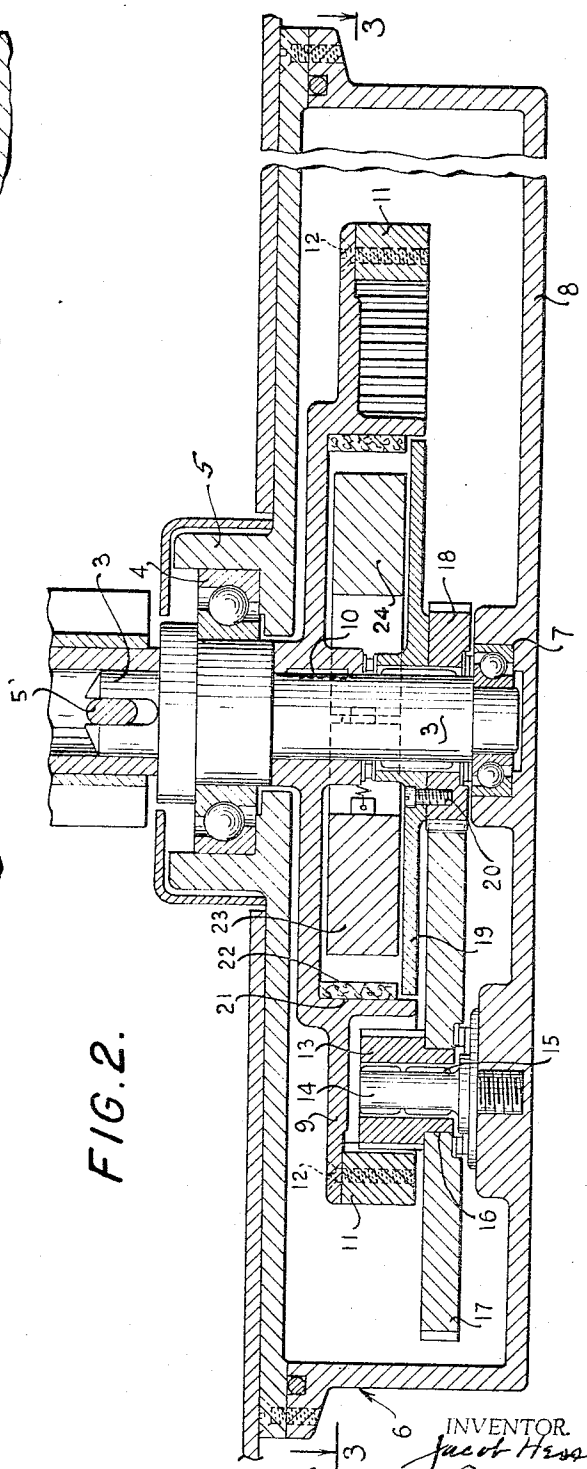


FIG. 2.



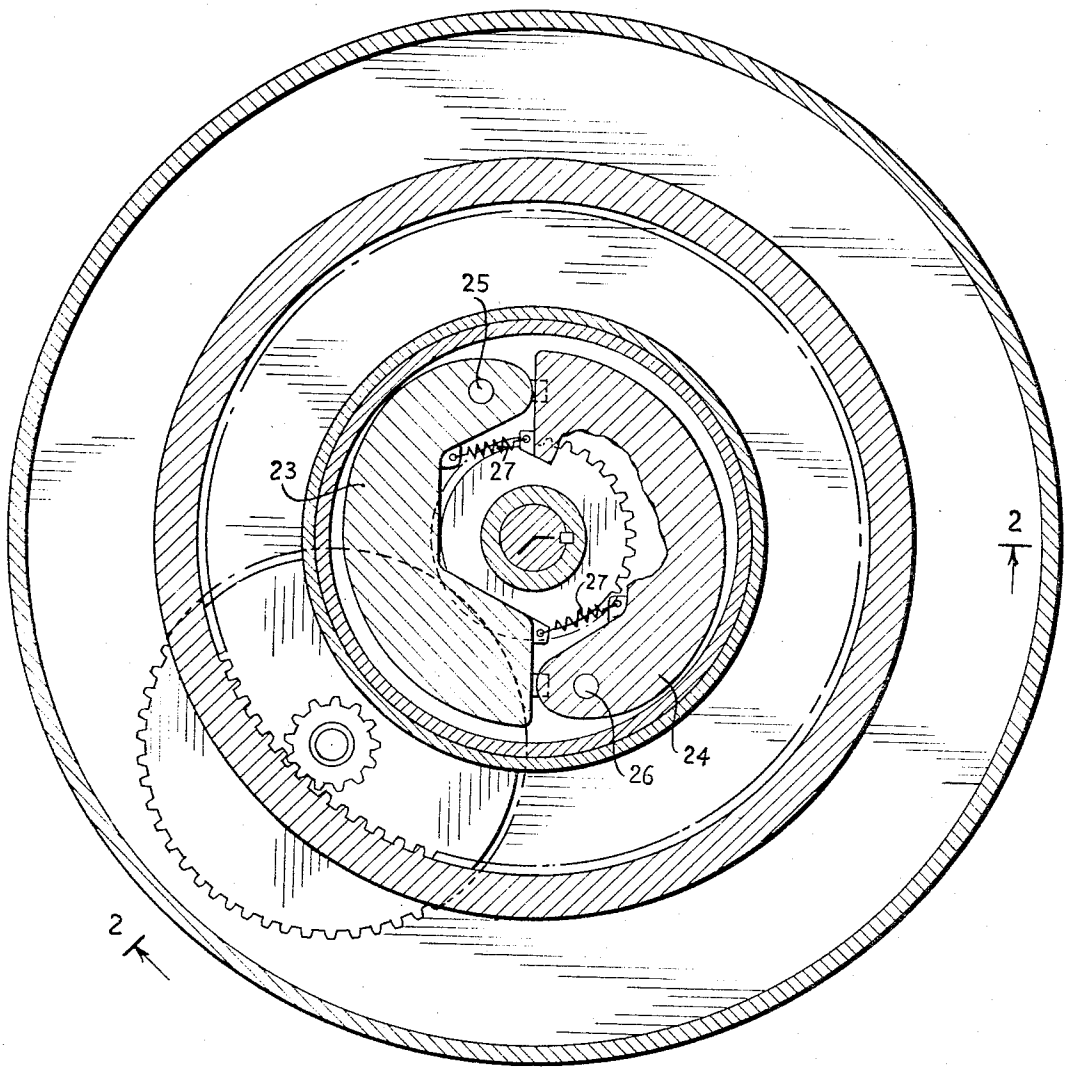
INVENTOR.
Jacob Hess
Edward J. Zachmann
Raymond M. Spinelli
Curtis, Morris & Safford
ATTORNEYS

Jan. 23, 1968 J. HESS ET AL 3,364,620

REVOLVING DOORS

Filed July 29, 1965 4 Sheets-Sheet 2

FIG. 3.



INVENTOR.
Jacob Hess
Edward J. Zachmann
Raymond M. Spinelli
Curtis, Morris & Safford
ATTORNEYS

Jan. 23, 1968 J. HESS ET AL 3,364,620

REVOLVING DOORS

Filed July 29, 1965 4 Sheets-Sheet 3

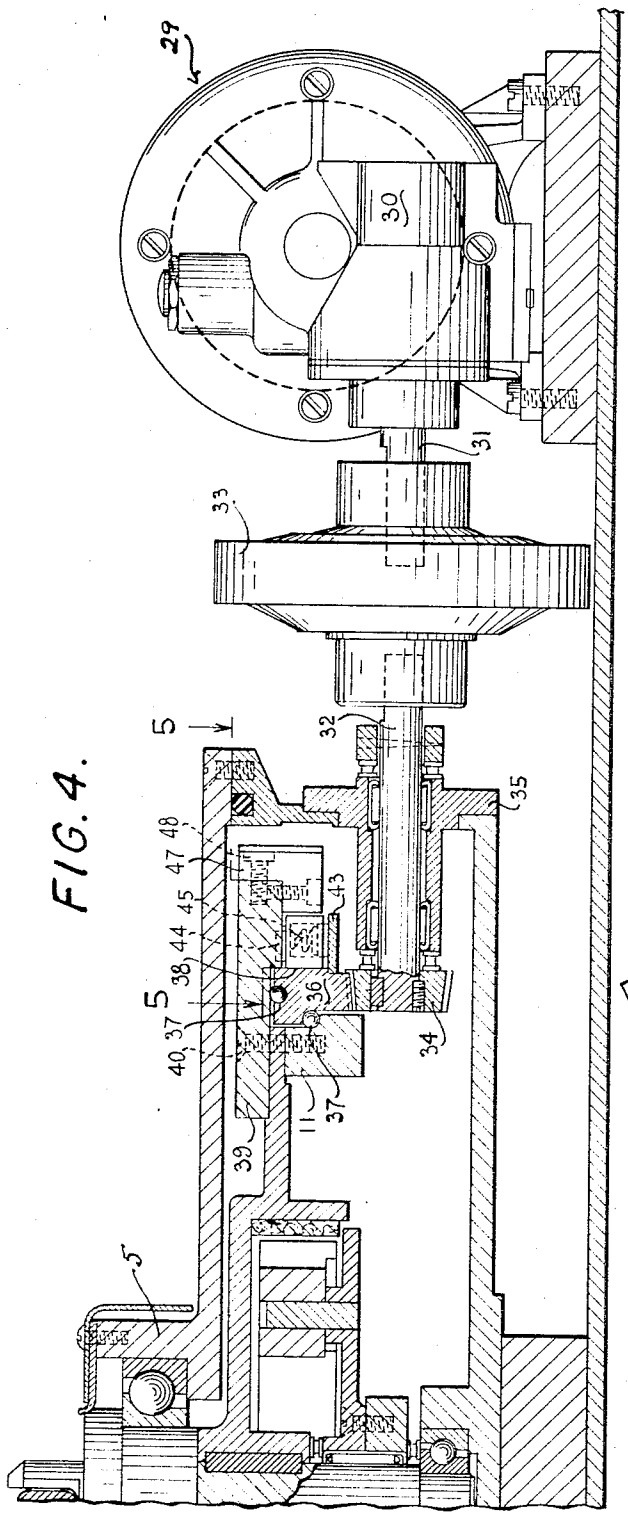


FIG. 4.

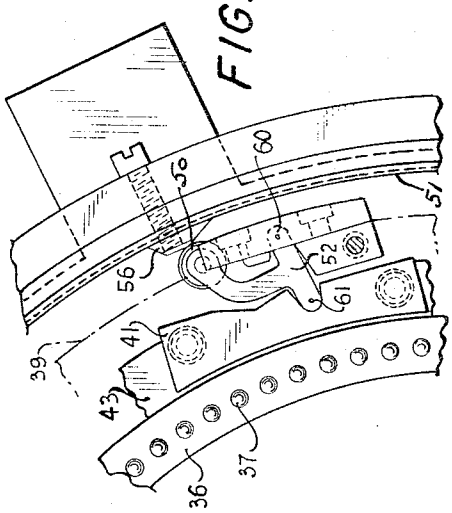


FIG. 6.

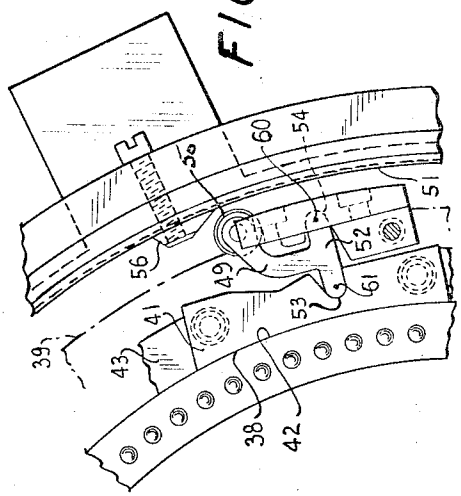


FIG. 5.

INVENTOR.
Jacob Hess
Edward J. Bachmann
Raymond W. Spinelli
Curtis, Morris & Safford
ATTORNEYS

Jan. 23, 1968 J. HESS ET AL 3,364,620

REVOLVING DOORS

Filed July 29, 1965 4 Sheets-Sheet 4

FIG. 8.

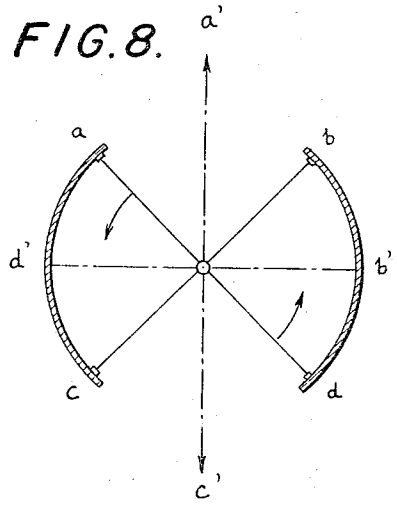
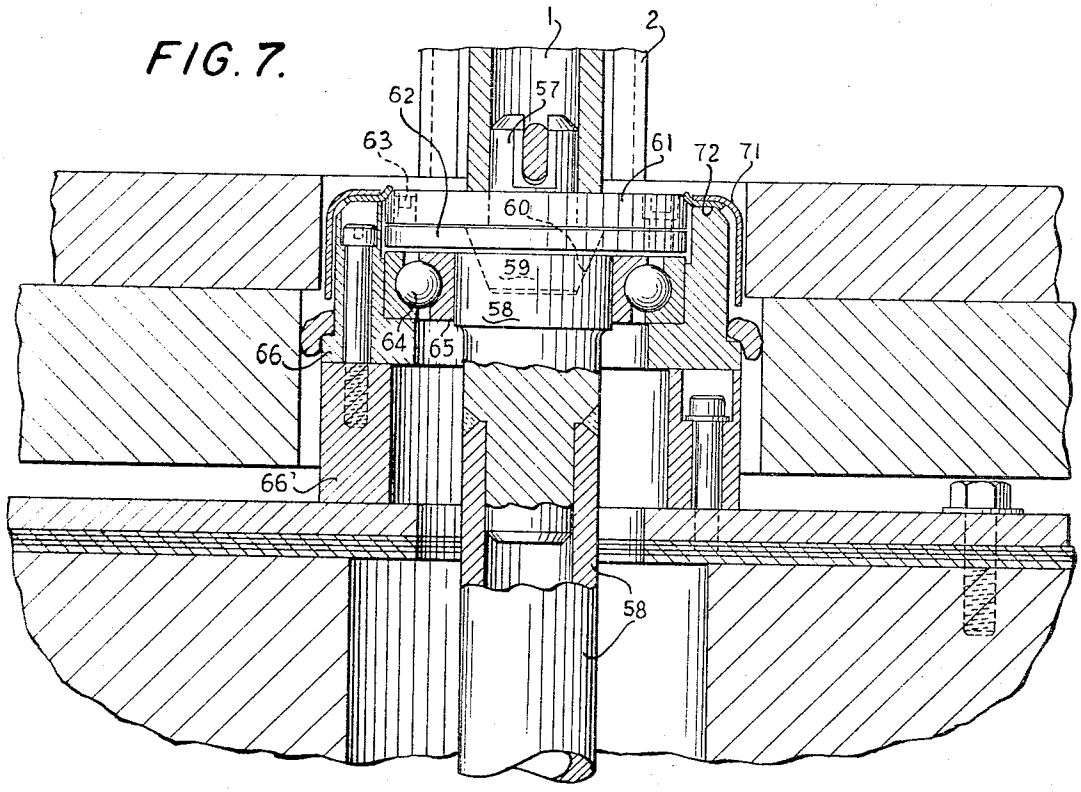


FIG. 7.



INVENTOR.
Jacob Hess
Edward J. Zachmann
Raymond M. Spinelli
Curtis, Morris & Safford
ATTORNEYS

United States Patent Office 3,364,620 Patented Jan. 23, 1968

3,364,620

REVOLVING DOORS

Jacob Hess, Forest Hills, Edward J. Zachmann, Farmingdale, and Raymond M. Spinelli, Glen Oaks, N.Y., assignors to General Bronze Corporation, Garden City, N.Y.

Filed July 29, 1965, Ser. No. 475,749
10 Claims. (Cl. 49—43)

This invention relates to a revolving door.

An object of the invention resides in the provision of a door of this type wherein the speed of revolution is automatically controlled.

Another object is to provide an actuating mechanism that will insure the arresting of the movement of the door so that the leaves of the door will stop in certain relationship to the edges of the casing in which the door revolves so as to provide a four point weather seal and insure easy passage through the doorway.

In the drawings which illustrate one embodiment of the invention,

FIGURE 1 is a vertical sectional view, partly in elevation, of the mechanism for controlling the speed of revolution of the door;

FIGURE 2 is a vertical sectional view on line 2—2 of FIGURE 3;

FIGURE 3 is a horizontal sectional view on line 3—3 of FIGURE 2;

FIGURE 4 is a view, partly in section and partly in elevation, of the mechanism for revolving the door less than ninety degrees after manual revolving force has been released and for arresting the movement of the door automatically with the edges of the leaves adjacent the edges of the door casing and illustrating the manner in which this mechanism is integrated with the mechanism for controlling the speed of revolution of the door;

FIGURE 5 is a horizontal sectional view on line 5—5 of FIGURE 4 showing one position of the quarter stop;

FIGURE 6 is a view similar to FIGURE 5 showing the quarter stop in another position;

FIGURE 7 is a vertical sectional view disclosing the mechanism that makes it possible to adjust the door leaves in relation to the supporting post and means for integrating the speed control and quarter stop mechanisms therewith;

FIGURE 8 is a diagrammatic view showing possible positions of the leaves of the door.

Referring to FIGURES 1, 2 and 3, it will be seen that the door post 1 that carries the door 2 is supported on a stub shaft 3 which is, at its upper end, mounted for rotation in a bearing assembly 4 that is carried by the cover 5 of the casing 6 and, at its lower end, in a bottom bearing assembly 7 carried by the chamber portion 8 of the casing 6. This stub shaft is keyed to the door post 1 by a key 5'.

A brake plate 9 is attached to the stub shaft 3 by a key 10 to enable the plate to rotate with the shaft 3. The plate 9 is provided with an internally toothed ring gear 11 that is secured to the plate in any suitable manner as, for example, by screws 12.

A spur gear 13 is rotatably mounted on a gear shaft 14 and is provided with roller bearings 15. It intermeshes with the ring gear 11.

The spur gear 13 is secured at 16 to an externally toothed gear 17 which, in turn, intermeshes with a relatively smaller gear 18 rotatably mounted on said stub shaft 3. A brake shoe supporting plate 19 is secured at 20 to the gear 18 and rotates with it.

The brake plate 9 is provided with a brake drum 21 which carries a brake lining 22.

A pair of brake shoes 23 and 24 are pivoted at 25 and 26 respectively, to the brake shoe supporting plate 19. A

restraining spring 27 is attached to each shoe and extends to and is attached to the other, as illustrated in FIGURE 3.

When a person, passing through the doorway, pushes on a leaf of the revolving door, the door post 1 will be rotated, which, in turn, will rotate the brake plate 9 and the ring gear 11. The rotation of gear 11 will result in the rotation of the gear 13 and, consequently, with the external gear 17. This gear 17 will, in turn, rotate the shaft gear 18 and the brake shoe supporting plate 19. This will result in the brake shoes 23 and 24 moving about their pivotal points 25 and 26 to engage the brake lining 22 of the brake drum 21 under the restraint of the springs 27.

Thus the centrifugal force developed by the rotary door will cause the brake shoes to move, outwardly, about their pivots, to various degrees and to exert various degrees of restraining force on the rotating door.

It often happens that the door comes to rest after a person passes through the same with the leaves in the dot and dash lines position shown in FIGURE 8. It obviously is desirable to have the door come to rest with the leaves in the positions shown in full lines in this figure and indicated by the reference letters *a–b–c–d*, rather than in some other positions such as *a'–b'–c'–d'*, for example. Not only is entry facilitated when the leaves are in the former positions, but the doorway is sealed against the weather at four points instead of at two points and creates two insulating chambers between *a* and *c* and *b* and *d*.

Mechanism is provided to cause the door to assume the position *a–b–c–d*, automatically, after the force applied by the person passing through has been released.

This comprises the following:

The door is mounted to revolve in the usual casing which comprises two oppositely facing arcuate walls *a–c* and *b–d* with which the usual weather seals on the edges of the leaves engage. An electric motor 29 of low horsepower, as for example, one-fiftieth of one horse power, and provided with a conventional speed reduction gear 30 (not specifically illustrated) continuously drives the shaft section 31. This shaft section 31 in turn drives the shaft section 32 through an over-riding clutch 33 (not specifically illustrated) of conventional type. A beveled gear 34 is secured to the shaft section 32. It is continuously rotated, when the clutch secures the two shaft sections together.

The shaft section 32 is mounted on suitable anti-friction bearings in a housing 35 that is mounted in a wall of the housing 6.

A floating ring gear 36 is freely mounted on the ring gear 11 through the medium of anti-friction bearings 37 and is provided with gear teeth that intermesh with the gear teeth of gear 34. Thus, the gear 36 will be driven, continuously, quite independently of the gear 11, preferably at a speed of approximately 1/10 of that of gear 11, when door is manually operated under normal conditions at about 8 to 10 r.p.m. This ratio is not critical, others may be employed.

This gear 36 is provided with a peripheral clutch surface 38 whose function later will be described.

An annular plate 39 is secured at 40, to the ring gear 11. A clutch 41 having a clutch (friction) face 42 which cooperates with the clutch face 38 is mounted between the plate 39 and the retaining ring 43 which is rigid with gear 36.

Anti-friction rollers 44 are interposed between the plate 39 and clutch 41. Friction shoes 45 are loosely held in sockets 45' of clutch 41 and are resiliently pressed against retaining ring 43 by springs 45 which are interposed between bottom of socket 46' in clutch 41 and friction shoes 46. Clutch 41 is relatively movable with respect to the ring gear 36 and retaining ring 43. Only a slight frictional force is introduced by the friction of shoes 46 and ring 43

when there is a difference in the rotary speed of the two objects.

A housing 47, holding clutch trigger 49 is attached to plate 39 by suitable means, such as screws 48. Clutch trigger 49 carries a roller 50 that may at times run free and close to the adjacent face 51 and at times may engage a cam 56 suitably mounted on said face. This clutch trigger is provided with a cross arm 52 that, at one end, engages into a socket 53 in the freely movable clutch 41 and at the other end engages in the socket 54 in the housing 47 that is rigid with the plate 39.

Substantially ninety degrees apart, cams 56 are secured to the inner wall of the main housing 6, each being in substantial alignment with one of the positions *a–b–c–d* and engageable by the roller 50.

In operation when door is manually revolved, at a normal speed, gear 11, plate 39, housing 47, clutch trigger 49, clutch 41 and friction shoe 46 will rotate in the same direction as floating gear 36 and retaining ring 43, except at a faster speed. The frictional force introduced by rubbing of friction shoe 46 to the face of retaining ring 43 will cause end of cross arm 52 at point 61 to move in an arc around the point 60 as a pivot in socket 54, thus lengthening the effective distance between points 60 and 61 and freeing clutch surface 42 from being pressed against floating gear surface 38 as shown on FIGURE 6. When the manual operation is discontinued the speed of the revolving door will automatically slow down, and with it gear 11, with all parts carried by said gear. When the speed of gear 11 falls below that of continually and uniformly rotating floating gear 36, the friction caused by friction shoe 46 and the face of retaining ring 43 will cause the end of cross arm 52 at point 61 to move in an arc around the point 60 as a pivot in socket 54, thus shortening the effective distance between points 60 and 61 and pressing clutch surface 42 to face 38 of floating gear, causing both clutch 41 and floating gear 36 to travel in unison, driven by motor 29. At this time roller 50 which is carried by clutch trigger 49 moves closer to face 51 of casing 6. Clutch 41 in its engaged position is shown in FIGURE 5.

The rotation of the door by the power of the electrical motor 29 may be discontinued by two different actions—First: when the revolving door reaches the desired position designated for a stop, cam 56 mounted on surface 51 of casing 6 will press roller 50 away from surface 51, as shown in FIGURE 6, causing clutch 41 to disengage and the rotation of the door will be arrested, notwithstanding the fact that floating gear 36 continues to rotate by the power of motor 29. Second: If a manual force is applied to operate the door which under normal conditions will speed up gear 11, with all the before mentioned parts attached to it, to a speed exceeding that of floating gear 36, thus causing clutch surface 42 to be released from being pressed against surface 38 of floating gear as described before. Clutch 41 will remain in a disengaged position as long as the door with gear 11 rotates at a higher speed compared to that of floating gear 36.

In operation, when the door is rotated by the power of the electric motor 29, and an obstruction is placed in such a way, as to prevent a door leaf from entering the door casing, override clutch 33, which may be of many commercial forms, such, for example, as the "Tork-O-Stat Type DD" of Machine Accessories, Inc., of Minneapolis, Minn., will act as a safety device and disengage shaft 31 from shaft 32, causing bevel gear 34 to come to a stop.

It sometimes happens that the door leaves are not correctly associated with the stub shaft 3 to insure their stopping properly adjacent the edges of the arcuate members of the doorway. To make it possible to correct this situation, which occurs usually when the door is being installed, the following mechanism is provided:

A position adjustment comprises a stub shaft stub 57 and a stub shaft extension 58. The shaft 57 is rigidly connected to the door post and is, at its lower end, provided with a frusto-conical head portion 59 which is located in

a complementally formed socket member 60 in the extension 58. These two members are frictionally secured together by a ring 61 which engages the upper face of the head portion 59 and is secured to a plate 62, which is an integral part of 58.

The ring 61 and plate 62 are secured together by screws 63. When the screws 63 are loosened, the head 59 may be rotated in the socket 60 to sufficient degree to permit the door post to be manually rotated to align the edges of the leaves of the door with the edges of the doorway. The screws may again be tightened. The screws, when tightened, will again frictionally secure the stub shaft 57 to the extension shaft 58. The extension shaft 58, the stub shaft 57, the ring 67, and the plate 62 are rotatable on bearings 64 which are supported on a shoulder 65 in the bearing housing 66.

This housing 66 is supported by an annular spacer 66'.

The portion of this mechanism that extends above the finish floor line 70 is covered by a cover 71 having a sealing member 72.

All mechanisms as hitherto described are not restricted to a position below the floor line as shown in the illustrations. They may be suitably mounted into the ceiling above the revolving door.

Thus this invention provides for a braking of the door as it is revolved under influence of manually applied force. It also insures the arresting of the rotation of the door in such position that the door will be weather-sealed at four locations and so that access to the doorway is unobstructed. It also provides for the adjustment of the door leaves to insure the four point seal.

What we claim is:

1. In a revolving door assembly including a door casing comprising opposite walls having their edges spaced from each other to provide entry and exit openings including a door post and radial door leaves mounted thereon for rotation in said casing under the influence of manual and automatic forces, the improvement which comprises means to control the speed of rotation of said door when manual rotative force is applied thereto, and means to automatically rotate said door when said manual force is released to substantially align the edges of the door leaves with the edges of said casing at the entry and exit openings, said speed controlling means comprising centrifugal brake shoes rotatable with said post and a relatively stationary brake drum engageable by said shoes.

2. In a revolving door assembly including a door casing comprising opposite walls having their edges spaced from each other to provide entry and exit openings including a door post and radial door leaves mounted thereon for rotation in said casing under the influence of manual and automatic forces, the improvement which comprises means to control the speed of rotation of said door when manual rotative force is applied thereto, means to automatically rotate said door when said manual force is released to substantially align the edges of the door leaves with the edges of said casing at the entry and exit openings, and means to automatically arrest the movement of said door when the edges of the leaves are substantially aligned with the edges of said casing, said speed controlling means comprising centrifugal brake shoes rotatable with said post and a relatively stationary brake drum engageable by said shoes.

3. In a revolving door assembly including a door casing comprising opposite walls having their edges spaced from each other to provide entry and exit openings including a door post and radial door leaves mounted thereon for rotation in said casing under the influence of manual and automatic forces, the improvement which comprises means to control the speed of rotation of said door when manual rotative force is applied thereto, and means for varying the angular relation of the door leaves to the axis of rotation of the door post, said speed controlling means comprising centrifugal brake shoes rotatable with said

post and a relatively stationary brake drum engageable by said shoes.

4. In a revolving door assembly including a door casing comprising opposite walls having their edges spaced from each other to provide entry and exit openings including a door post and radial door leaves mounted thereon for rotation in said casing under the influence of manual and automatic forces, the improvement which comprises means to control the speed of rotation of said door when manual rotative force is applied thereto and means to automatically rotate said door when said manual force is released to substantially align the edges of the door leaves with the edges of said casing at the entry and exit openings, the said automatic means comprising a continuously operating slow speed motor, means for transmitting rotative movement to said post from said moor, and means automatically rendering said last mentioned means inoperative after a given angular rotation to said door.

5. In a revolving door assembly including a door casing comprising opposite walls having their edges spaced from each other to provide entry and exit openings including a door post and radial door leaves mounted thereon for rotation in said casing under the influence of manual and automatic forces, the improvement which comprises means to control the speed of rotation of said door when manual rotative force is applied thereto, means to automatically rotate said door when said manual force is released to substantially align the edges of the door leaves with the edges of said casing at the entry and exit openings, and means to automatically arrest the movement of said door when the edges of the leaves are substantially aligned with the edges of said casing, said arresting means comprising brake means and a trigger for automatically applying and releasing said last mentioned brake means.

6. In a revolving door assembly including a door casing comprising opposite walls having their edges spaced from each other to provide entry and exit casing, a door including a door post and radial door leaves mounted thereon for rotation in said casing under the influence of manual and automatic forces, the improvement which comprises means to automatically rotate said door when said manual force is released to substantially align the edges of the door leaves with the edges of said casing at the entry and exit openings, and means to automatically arrest the movement of said door when the edges of the leaves are substantially aligned with the edges of said casing, said arresting means comprising brake means and a trigger for automatically applying and releasing said last mentioned brake means.

7. In a revolving door assembly including a door casing comprising opposite walls having their edges spaced from each other to provide entry and exit openings including a door post and radial door leaves mounted for rotation in said carriage under the influence of manual and automatic forces, the improvement which comprises means to control the speed of rotation of said door when manual rotative force is applied thereto, said control means comprising an internally toothed gear rotatable independently of said post, a spur gear fixed in relation to said internally toothed gear and having teeth interengaged with the teeth of the internal gear, an externally toothed gear fixed with relation to said spur gear and rotatable therewith, a relatively smaller gear rigid with said post and having teeth intermeshing with the teeth of the last mentioned gear, a brake drum rigid with said internal gear and centrifugal brake shoes movable with relation to said internal gear to cooperate with said brake drum to retard the movement of the internal gear and the post.

8. In a revolving door assembly including a door casing comprising opposite walls having their edges spaced from each other to provide entry and exit openings, a door including a door post and radial door leaves mounted thereon for rotation in said casing under the influence of manual and automatic forces, the improvement which comprises means to automatically rotate said door when said manual force is released to substantially align the edges of the door leaves with the edges of said casing at the entry and exit openings, said automatic means including a motor, a shaft rotatable by said motion, a gear on said shaft, an over-riding clutch interpolated in said shaft, a floating gear intermeshing with said first mentioned gear and driven thereby on a vertical axis, said last mentioned gear having a clutch face thereon, a clutch member having a face engageable with said first mentioned clutch face, said clutch faces being separable on movement of said clutch member in one direction, said clutch faces being normally in contact with each other, a trigger connected with said clutch member to move the same to disengage the above-referred to clutch faces, and stationary cams for actuating said trigger.

9. In a revolving door assembly including a door casing comprising opposite walls having their edges spaced from each other to provide entry and exit openings, a door including radially arranged leaves for rotation in said casing under the influence of manual and automatic forces, the improvement which comprises means to rotate said door when the speed of rotation under manual influence falls below a selected number of r.p.m., said means including a plate rigid with and rotatable with said door, a ring gear mounted on said plate to travel in unison therewith and also independently thereof, a driving gear meshing with said ring gear to continuously rotate the latter independently of the rotation of the plate, means for actuating said driving gear including an overriding clutch, a clutch member supported by said floating gear and having a face adapted to engage a complemental face on said floating gear, a trigger pivotally carried by said plate and pivotally engaging said last mentioned clutch, a cam for moving said trigger pivotally to disengage the before mentioned clutch faces on said floating gear and said clutch member, and a friction member associated with said floating gear and said cooperating clutch member to restrain the movement of the latter to move said trigger pivotally to engage the clutch faces on said floating gear and said cooperating clutch member.

10. The combination recited in claim 9 wherein the clutch member and said friction means travel rotatably with said plate.

References Cited

UNITED STATES PATENTS

1,822,404	9/1931	Hull	49—396
2,316,184	4/1943	Peremi et al.	49—43

FOREIGN PATENTS

267,855	3/1927	Great Britain.
512,074	8/1939	Great Britain.

DAVID J. WILLIAMOWSKY, *Primary Examiner.*

J. KARL BELL, *Assistant Examiner.*