Dec. 23, 1941. J. W. WUNSCH 2,267,632

REVOLVING DOOR MECHANISM

Filed June 4, 1940 2 Sheets-Sheet 1

Fig. 1.

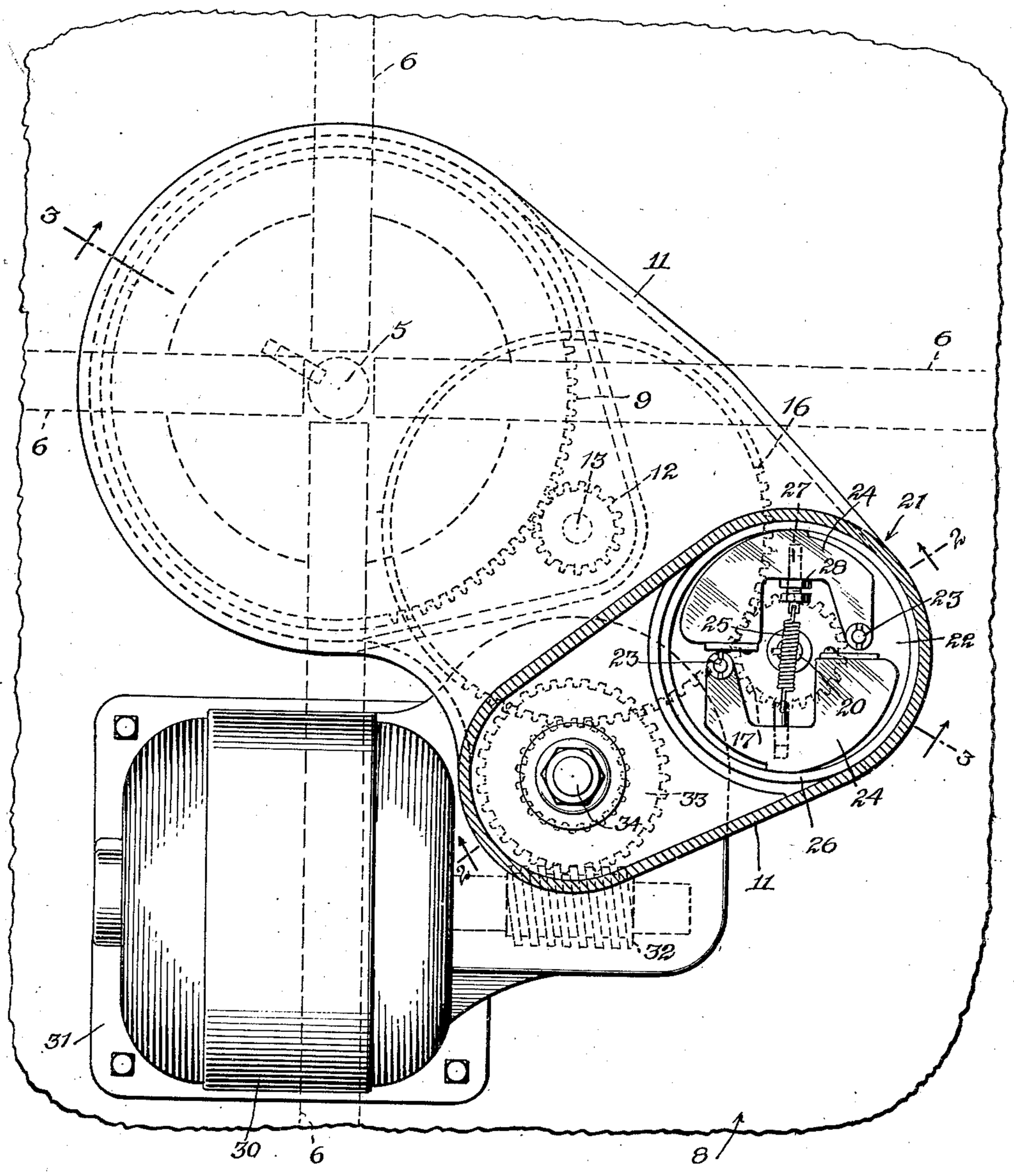

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Fig. 2.

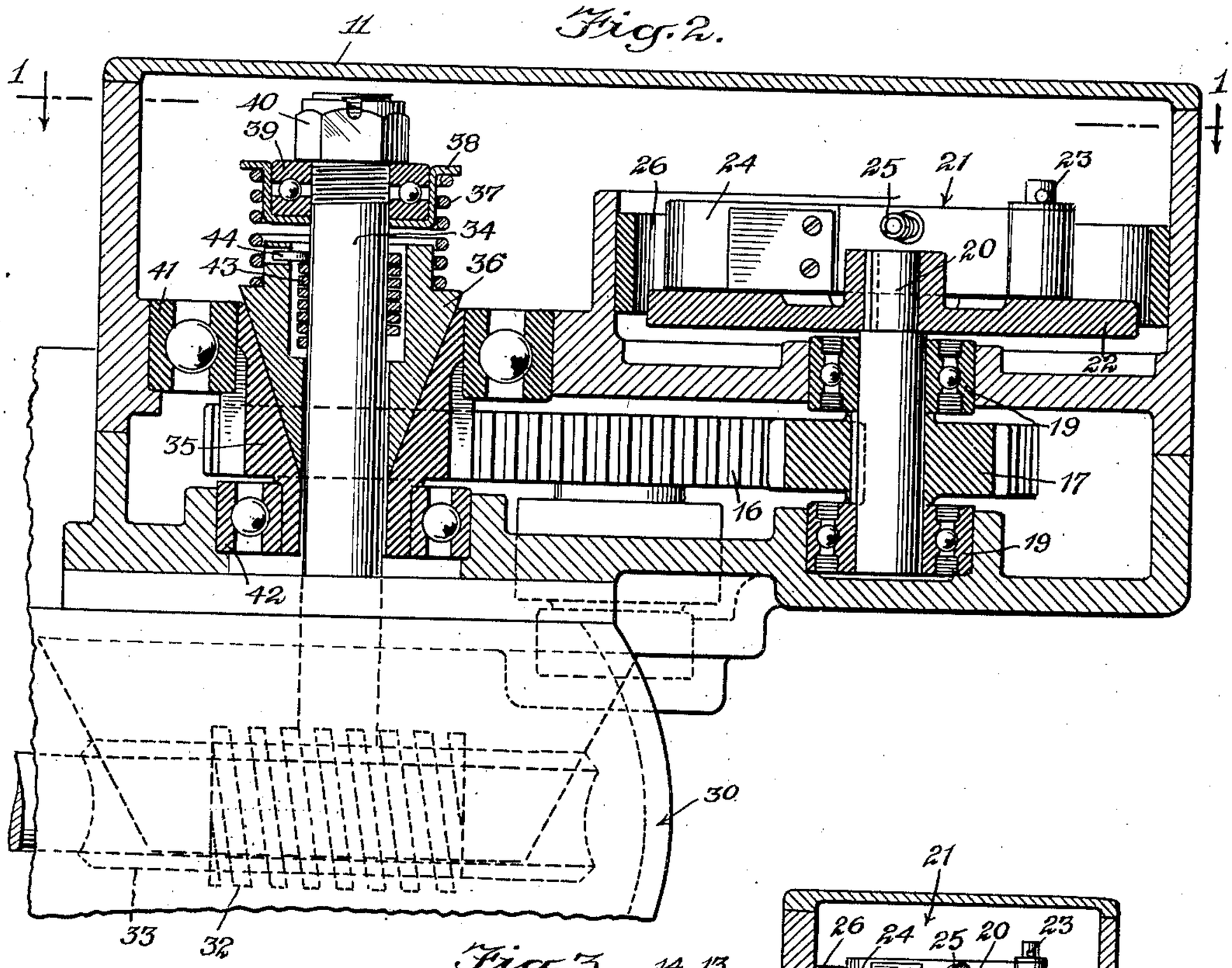
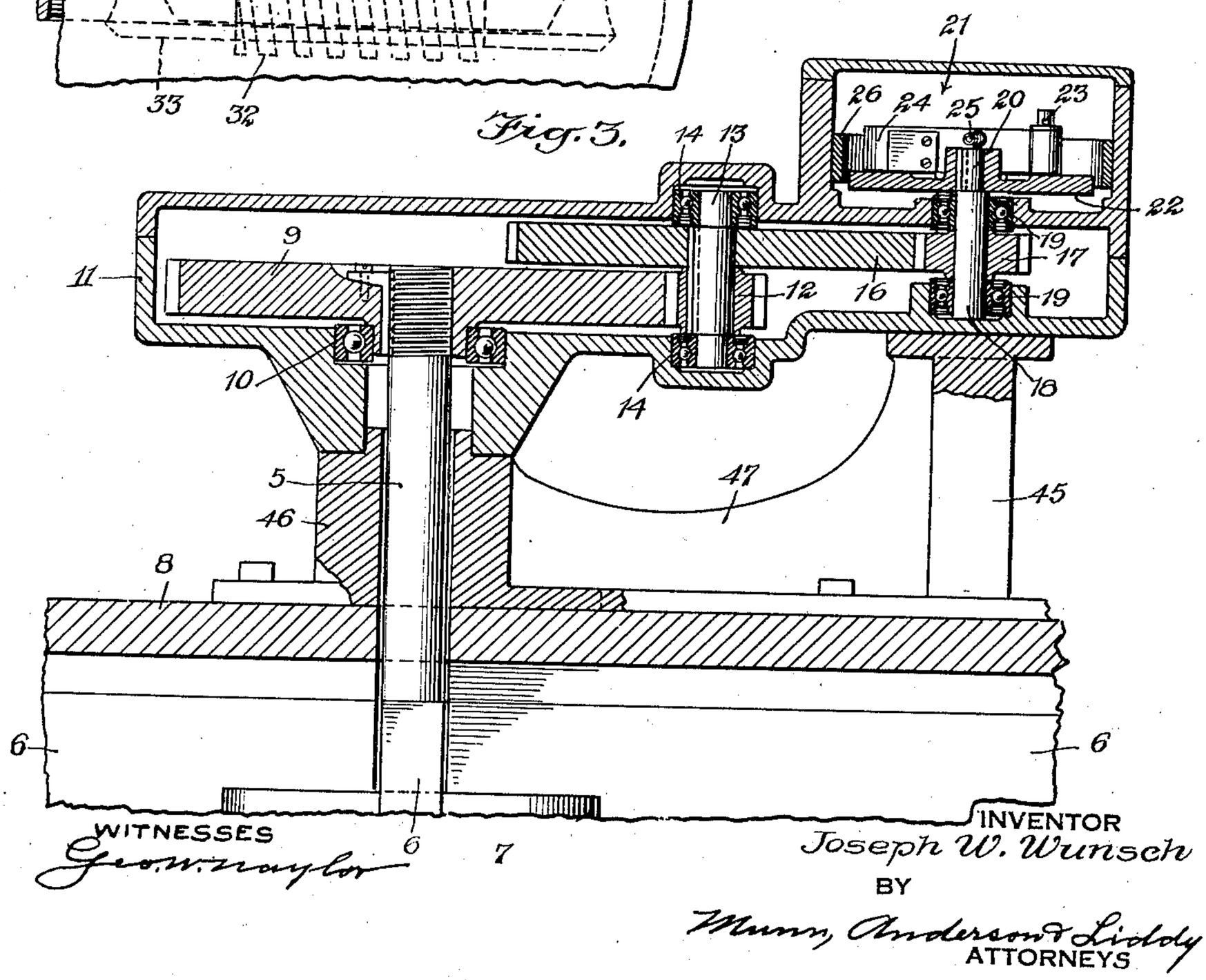


Fig. 3.



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REVOLVING DOOR MECHANISM

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3 Claims. (Cl. 268—73)

This invention relates to improved revolving door mechanism, particularly operating and control mechanism for revolving doors.

It is an object of the invention to provide improved mechanism for operating a revolving door by means of a motor and which eliminates the discomfort and danger heretofore associated with mechanisms of this character.

Heretofore attempts have been made to rotate revolving doors by means of a motor. These prior attempts, however, have had certain disadvantages. Thus the mechanisms of this character heretofore employed frequently resulted in injuries to persons using the door or in damage to property carried by the persons due to the fact that a portion of the body, as for instance, an arm or leg or some article, as for instance, an umbrella, would from time to time become caught between a door wing and the revolving door enclosure. Since the motor would continue to rotate the door it naturally would result in injury to the person or damage to his property. Also, it will be seen that where a revolving door is rotated by a motor it is desirable to adjust the speed of the door so that it will not discomfort or injure invalids or elderly people using the door with the result that the speed of operation must be fairly slow. This naturally causes discomfort and is a nuisance to people who wish to travel through the entranceway at a greater rate of speed.

It is a particular object of the present invention to overcome the disadvantages heretofore encountered and to provide improved revolving door operating and control mechanism whereby the door may be rotated by a motor but nevertheless there will be no danger of injury to persons using the door or damage to their property.

A further object is the provision of improved revolving door control and operating mechanism of the above character in which the door may be operated at a uniform rate of speed by means of a motor but which nevertheless will permit those who wish to travel through the entranceway at a greater rate of speed to rotate the door more rapidly.

Another object is the provision of an improved revolving door of the above character which is of rugged but nevertheless economical construction and which may be used for a relatively long period of time with comparative freedom from wear.

In the accompanying drawings—

Fig. 1 is a plan view partially in section in the direction of the arrows on the line 1—1 of Fig. 2 showing improved revolving door control and operating mechanism embodying my invention;

Fig. 2 is a sectional view in the direction of the arrows on the line 2—2 of Fig. 1 showing a portion of the mechanism; and

Fig. 3 is a sectional view in the direction of the arrows on the line 3—3 of Fig. 1 showing another portion of the mechanism.

My improved mechanism is adapted for use in connection with any type of revolving door and may be installed beneath the door or above the door although in accordance with standard practice at the present time in the hanging of revolving doors I prefer to mount the apparatus above the ceiling in the manner indicated. In the accompanying drawings the numeral 5 indicates the central supporting shaft of a revolving door from which door wings 6 are supported in any desired manner as for instance by means of disks 7. The door may be of the fully collapsible panic proof type, partially collapsible, or non-collapsible, the portion of the door illustrated merely serving as an example of one type of door to which my invention may be applied.

In the usual manner the shaft 5 of the door extends upwardly above the ceiling 8 and keyed to its upper end is a gear 9 which is suitably journaled as by the ball bearings 10 in the housing 11. The gear 9 meshes with a relatively small pinion 12 mounted on stub shaft 13 which in turn is mounted in ball bearings 14 at its upper and lower ends in the housing 11 and also has mounted thereon a larger gear 16. Gear 16 in turn meshes with a relatively small pinion 17 mounted on stub shaft 18 which similarly is supported by means of ball bearings 19 in the housing 11. It will thus be seen that due to the speed increasing ratio of the gearing just described, when revolving door shaft 5 is rotated the stub shaft 18 will rotate at a relatively higher rate of speed.

Stub shaft 18 extends upwardly above its top bearing, as indicated at 20 and speed control mechanism in the form of a centrifugally operated governor or brake 21 is connected thereto. This governor may be of any desired construction such as the illustrated governor comprising disk 22 mounted on the projecting end 20 of stub shaft 18 and having pivotally and eccentrically mounted thereon as indicated at 23 a pair of brake dogs or shoes 24. The brake shoes 24 are normally held within the confines of the periphery of disk 22 by means of a spring 25 connected between the central portions of the shoes. When the disk 22 is rotated at a relatively high rate

of speed centrifugal force causes the shoes to pivot outwardly into engagement with stationary brake band 26 disposed adjacent the periphery of disk 22. At one end the spring 25 is connected to a threaded pin 27 held in position by means of the lock nut 28 and by adjusting the pin 27 the tension of spring 25 may be adjusted. In this manner the governor may be adjusted so as to cause a braking action at any desired predetermined speed.

In addition to the mechanism so far described I also provide a motor for rotating the revolving door and I provide a driving connection between the motor and the revolving door shaft which permits the door to be manually rotated at a greater rate of speed than the normal driving speed of the motor and which permits the door to be held against rotation when sufficient resistance is applied thereto, as for instance, when some article or an arm or a leg becomes caught between a door wing and the revolving door enclosure.

Thus it will be seen that I provide an electric motor 30 which may be supported on a base 31 resting on and suitably connected to the ceiling 8. The motor is connected by means of a suitable speed reduction gearing, as for instance, the worm 32 meshing with worm gear 33 to shaft 34 which extends into housing 11. Surrounding shaft 34 but not connected thereto is a pinion 35 which forms one element of a slip clutch of the cone type, the pinion being provided with a tapered opening extending downwardly from the top into which the other element comprising conical body 36 is inserted. The conical clutch body 36 likewise surrounds shaft 34 but is not connected directly thereto and is urged into frictional engagement with the pinion 35 by means of spiral spring 37 which is engaged at its upper end by collar 38 disposed around the ball bearing member 39 which in turn is adjustably held in position by means of a nut 40 threaded to the upper end of shaft 34. Due to the construction just described it will be appreciated that when there is sufficient resistance there may be relative movement between pinion 35 and clutch body 36. The entire assembly just described is supported in the housing 11 as by means of the ball bearing members 41 and 42 disposed between the pinion and housing in the manner shown.

So as normally to cause the clutch body 36 and pinion 35 to rotate with shaft 34 when it is driven by the motor I provide an overriding or free-wheeling clutch connection between shaft 34 and clutch body 36. This connection should be of such character that when the shaft 34 is rotated in the proper direction clutch body 36 and pinion 35 are caused to rotate with the shaft as a unit. Pinion 35 meshes with gear 16 and in this manner the operation of the motor causes rotation of the revolving door. However, the overriding or free-wheeling clutch should permit the rotation of the revolving door at a higher rate of speed, as for instance, when someone travels through an entranceway at a greater rate of speed than provided for by the normal speed of the motor, without any interference from the motor or driving mechanism. For this purpose I have found that very satisfactory results are provided by a clutch of the type indicated comprising a spiral spring member 43 relatively closely wound about the shaft 34 and anchored at one end as indicated at 44 in the clutch body 36. In the illustrated embodiment when shaft 34 is rotated in counterclockwise direction it causes a tightening of spiral spring 43 with the result that it tightly grips shaft 34 and rotates therewith. Since the spring is anchored at 44 in clutch body 36 it causes the entire assembly to rotate as a unit. However, when the clutch body 36 is caused to rotate in a counterclockwise direction at a greater rate of speed than the shaft 34 the spiral member 43 is unwound loosening its grip on shaft 34 and permitting the free rotation of the pinion 35 and clutch body 36 without affecting the rotation of shaft 34.

In the normal operation of the mechanism illustrated the shaft 5 of the revolving door is caused to rotate in a counterclockwise direction by means of motor 30. This speed should preferably be relatively slow. At times persons will wish to travel through the door at a relatively higher rate of speed. The user will then press against one of the door wings 6 and, due to the overriding or free wheeling clutch member 43, the door can readily be manually operated at a higher rate of speed without interference from shaft 34 or motor 30. If any article or any portion of the body of a user should become caught between a door wing and revolving door enclosure no injury or damage will be caused due to the fact that the slip clutch 36 will release against the tension of spring 37 permitting the door to stand still while the motor and shaft 34 continue to rotate. In this connection it will be appreciated that the tension of spring 37 should be adjusted by means of nut 40 so as to cause the motor to rotate the door under normal operating conditions but so as to permit slippage when sufficient resistance is encountered by the door so as to prevent injury to persons or damage to property.

Housing 11 may be suitably supported above the ceiling 8 as by means of a standard 45 and a tubular standard 46 surrounding the shaft 5 which may be connected together as indicated at 47.

It will be appreciated that the motor may be continuously operated at all times or, if preferred, it may be controlled by a manually operated switch conveniently positioned so that a person desiring to pass through the entranceway can cause the door to rotate by operating the switch. If preferred, a photo-electric control mechanism may be installed in a well known manner with a photo-electric cell positioned on one side of the entranceway and with a light beam focused on the photo-electric cell from the opposite side of the entranceway so that a person seeking to pass through the entranceway will cut off the light beam from the photoelectric cell and cause the operation of the motor.

It should be understood of course that modifications may be made in the illustrated and described embodiment of my invention as for instance by varying the particular type of clutch mechanism employed and by changing the gearing connection between the motor and door shaft. While I have illustrated one embodiment of my invention it nevertheless should be understood that I do not wish to be limited by the illustration and intend to broadly cover the invention as set forth in the accompanying claims.

I claim—

1. Operating and control mechanism for use with a revolving door comprising a motor, connecting means for connecting the motor to a revolving door to cause it to rotate, said connecting means including clutch mechanism providing an overriding clutch whereby the door may be

manually rotated at a greater rate of speed than the normal speed caused by the motor without affecting the operation of the motor, and providing a slip clutch in which the parts are held in operative engagement under normal operating conditions but in which the parts automatically disengage when a predetermined resistance to rotation is encountered by the door so that the door may remain stationary while the motor continues to operate and a centrifugal brake adapted to operate when rotated above a predetermined speed operatively connected to said connecting means between the overriding clutch and the door so that the brake is caused to operate when the door rotates above a predetermined speed.

2. Operating and control mechanism for use with a revolving door comprising a motor, connecting means for connecting the motor to the revolving door to cause it to rotate, said connecting means including a drive member, a driven member and an overriding clutch connection between the drive member and driven member arranged to engage when the drive member rotates in the normal direction of operation but which releases when the driven member rotates at a greater rate of speed than the drive member in the normal direction of operation whereby the revolving door may be manually rotated at a greater rate of speed than the speed caused by the motor without affecting the operation of the motor and a centrifugal brake adapted to operate when rotated above a predetermined speed operatively connected to said connecting means between the overriding clutch and the door so that the brake is caused to operate when the door rotates above a predetermined speed.

3. In a revolving door structure a supporting shaft for the door, a motor adapted to rotate the door at a relatively slow rate of speed, connecting means for connecting the motor to the revolving door to cause it to rotate said connecting means including a drive member, a driven member and an overriding clutch between the drive member and driven member arranged to engage when the drive member rotates in the normal direction of the operation but which releases when the driven member rotates at a greater rate of speed than the drive member in the normal direction of operation whereby the revolving door may be manually rotated at a greater rate of speed than the speed caused by the motor without affecting the operation of the motor and a centrifugal brake adapted to operate when rotated above a predetermined speed which is greater than the rate of speed at which it is caused to rotate by the motor, said brake being connected by a positive drive connection with the supporting shaft so that the brake is caused to operate when the door is rotated above a predetermined speed.

JOSEPH W. WUNSCH.