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GOVERNOR FOR REVOLVING DOORS

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This invention relates to governors for revolving doors and the like, and its objects are to provide a governor construction which is particularly adapted to the conditions of revolving door use, which is simple and comprises a minimum number of parts, and which is smooth and effective in operation, durable and adapted to function over long periods of time, with little or no servicing.

Another object of the invention is to provide a governor for revolving doors and the like in which the rotating parts are comparatively light, so as to have small inertia, while at the same time the construction is such that adequate braking power is provided.

In the accompanying drawings, in which one preferred embodiment of the invention is shown for purposes of illustration:

Figure 1 is a diagrammatic view in side elevation showing a part of a revolving door, the door supporting trolley and the governor mechanism mounted thereon;

Figure 2 is a horizontal sectional view of the governor mechanism and driving gearing therefor taken on line 2—2 of Fig. 1;

Figure 3 is a vertical sectional view of the governor mechanism taken on line 3—3 of Fig. 2, the door trolley being shown in elevation; and

Figure 4 is a fragmentary view in vertical section showing parts of the governor mechanism in braking position.

Referring to the drawings in detail, and particularly to Fig. 1, a part of a revolving door is shown comprising wings 10 carried on a central vertical shaft 11 which rotates with the wings. At its upper end the shaft is suspended in a trolley 12 having wheels 13 carried by a track 14 mounted above the ceiling 15 of the door enclosure. Fixed at the upper end of the rotatable shaft 11 is a gear 20 mounted in a housing 21 carried on the trolley. Also mounted in the housing is a governor shaft 23 which is arranged to be driven from the gear 20, it being shown as having fixed to it a pinion 24 which meshes with the gear 20. The shaft 23 is shown as fitting at its lower end in a ball race 26 resting on a row of balls 27 which are carried in a second ball race 28 resting on a plate 30 which is mounted in a recess 31 in the housing 21. The two ball races and the balls constitute a thrust bearing which supports the weight of the shaft 23 and of the mechanism to be described carried thereby. The plate 30, thrust bearing, shaft and parts carried thereby may be adjusted vertically in the recess 31 by means of a supporting screw 35 and lock nut 36.

The housing 21 has a governor compartment 37 closed by top plate 38, and the top of shaft 23 is preferably supported in a ball bearing 39 carried by this top plate.

5 Fixed to the shaft 23 above the pinion 24 is a governor base plate 45. Mounted on the base plate are one or more lifting screws 47, two being shown. The screws 47 may be mounted on the plate in any suitable manner and are preferably arranged for limited vertical adjustment with reference to the base plate. As illustrated the screws 47 have threaded stems 50 screwing into threaded holes in the base plate and have kerfs 51 in their lower ends so that they may be turned
10 so as to adjust the elevation of the screw portions 47 with reference to the base plate. They may be locked in adjustment by means of set screws 52. Slidably mounted upon the shaft 23 above the base plate 45 is the brake plate 60 carrying a friction facing 62. When the plate 60 is raised, as shown in Fig. 4, the facing 62 is forced into frictional contact with the flat bottom surface 64 of the housing top plate 38. For
15 raising the plate 60 so as to force the facing against the fixed braking surface 64 centrifugal arms 70 are provided, these having sleeve portions 72 encircling the screws 47. The sleeves 72 are preferably fitted with screw threaded bushings 74 of bronze or other suitable material which screw on the screws 47. Coarse threads of substantial pitch are preferably provided, the screws
20 47 being shown in the example as having a double thread. The free ends of the centrifugal arms are preferably provided with weighted heads 76. The arms and weighted heads are shaped to partly surround the shaft 23 and the central bosses of the base plate 45 and brake plate 60 and move freely in a space between such plates. The plate 60 is provided near its periphery with a pair of
25 bosses 80 having bores 81 which freely receive the upper ends of screws 47, which thus serve to guide the plate in its up and down movement, and also cause it to rotate with the shaft 23. The bottom faces of the bosses 80 rest on the tops of sleeves 72 and bushings 74. When the governor rotates and the centrifugal arms swing out, the bushings and the sleeves of the centrifugal arms will turn relatively to the screws 47 so that they
30 will rise on the screws, as shown in Fig. 4. This will cause the brake plate and facing 62 to be lifted so that the facing will be brought into braking engagement with the surface 64, thereby acting as a friction brake and retarding the rotary movement of the governor and consequently
35 of the shaft 11 and the door itself.

For retracting the centrifugal arms to their inner positions, shown in full lines in Figs. 2, spring means are provided. Such retraction of the arms will screw the bushings down on the screws 47 thereby lowering the brake plate and drawing the friction facing out of contact with the surface 64. In the construction shown the spring means for retracting the centrifugal arms comprise helical springs 85 mounted on rods 86 pivotally attached to the hub of the base plate 45. As shown the hub is provided with pins 87 which are engaged by hook shaped ends 88 of the rods. The arms 70 are provided with lugs 89 against which bear washers 90 which are engaged by the inner ends of springs 85. The outer ends of these springs engage abutments formed by adjustable nuts 92 screwing on the ends of the rods. By adjusting the nuts 92 the spring tension may be varied. In operation the springs 86 are adjusted to such tension that during the operation of the revolving door at normal speeds the centrifugal arms are held in retracted position, and the friction face 62 is out of engagement with the friction surface 64. The governor then revolves freely and exerts no drag on the normal revolution of the door. If the door is pushed too violently, however, so that the speed of rotation is increased to an undesirable rate, the centrifugal arms swing out, overcoming the force of springs 85, and, as these arms swing out they rise on the screws 47 and thereby bring the friction braking faces into engagement so as to retard the movement of the door, and prevent it from spinning at excessive speed. The desired maximum speed may be adjusted by adjusting the nuts 92. Owing to the fact that the screws 47 provide for a very substantial multiplication of power caused by the centrifugal action of the arms 70, the latter, including the weighted heads 76 may be made comparatively light and all of the parts of the governor made light, so that the inertia of the governor itself is small, and, although it operates at a relatively high speed, it does not substantially increase the momentum of the door itself.

The entire governor mechanism may be adjusted vertically so as to adjust the relative position of the brake face 62 with relation to the top of the housing by means of the screw 35 which may be advanced so as to lift the plate 30 and consequently the thrust bearing and the shaft 23 and parts carried thereby. The screws 47 may also be adjusted to take up for wear or for any other purpose by loosening the set screws 52 and rotating the screw stems 59. The governor mechanism is very compact and low so as to fit within a very limited space above the door, and it is of such shape as not to interfere with the movements of the door and trolley when the door is collapsed and moved to one side of its enclosure in a well understood manner. The governor may be readily removed for inspection or repair by taking off the top plate 38 and lifting out the entire governor assembly, including the shaft 23 which slides out of the thrust bearing.

While we have illustrated and described in detail certain preferred forms of our invention, it is to be understood that changes may be made therein and the invention embodied in other structures. We do not therefore desire to limit ourselves to the specific construction illustrated, but intend to cover the invention broadly in whatever form its principles may be utilized.

We claim:

1. In a governor of the character described a 75

housing, a vertical shaft mounted for rotation in the housing, a base plate mounted on said shaft, threaded members carried by said base plate, centrifugal arms having threaded portions engaging with said threaded members, whereby outward lateral movement of said arms due to centrifugal force will cause movement of said arms in a vertical direction, a rotatable friction member carried by said arms and movable in a vertical direction with the arms, and a fixed braking member carried by said housing adapted to cooperate with said movable friction member.

2. In a governor of the character described, a rotatable governor shaft, a base mounted thereon, a fixed brake member mounted transversely to the axis of said shaft, a movable friction member movable in a direction longitudinally of said shaft into and out of frictional engagement with said fixed brake member, a centrifugal weight and a screw connection between said centrifugal weight and said base member, the axis of the screw connection being parallel to the axis of said shaft, said screw connection being such that outward movement of the centrifugal weight with respect to the shaft will produce movement of said axially movable friction member into engagement with said fixed brake member.

3. In a governor of the character described, a rotatable shaft, a base carried by said shaft, screw threaded studs carried by said base, centrifugal arms each screwing on one of said screw threaded studs, a brake member mounted on said shaft and movable axially thereof and bearing against the portions of said centrifugal arms adjacent to said studs, and a fixed brake member adapted to cooperate with said movable brake member.

4. In a governor of the character described, a rotatable shaft, a base mounted on said shaft, screw threaded studs mounted on said base, centrifugal arms having threaded sleeves screwing on said studs and having centrifugal weights at their free ends, a brake member mounted on said shaft and having socketed portions thereon registering with said studs, the ends of said studs projecting into the sockets in said socket portions and the end walls of said socket portions bearing against the threaded sleeve portions of said centrifugal arms, and a fixed brake member adapted to be engaged by said movable brake member.

5. In a governor of the character described, a rotatable shaft, a base mounted on said shaft, screw threaded studs mounted on said base, centrifugal arms having threaded sleeves screwing on said studs and having centrifugal weights at their free ends, a brake member mounted on said shaft and having socketed portions thereon registering with said studs, the ends of said studs projecting into the sockets in said socket portions and the end wall of said socket portions bearing against the threaded sleeve portions of said centrifugal arms, a fixed brake member adapted to be engaged by said movable brake member, and means for adjusting said screw studs longitudinally with respect to said base member.

6. In a governor of the character described, a rotatable shaft, a base mounted on said shaft, screw threaded studs mounted on said base, centrifugal arms having threaded sleeves screwing on said studs, a brake member mounted on said shaft and having socketed portions thereon registering with said studs, the ends of said studs projecting into the sockets in said socket por-

tions and the end wall of said socket portions bearing against the threaded sleeve portions of said centrifugal arms, a fixed brake member adapted to be engaged by said movable brake member, and means for adjusting said shaft and the parts carried thereby longitudinally with respect to said fixed brake member.

7. In a governor of the character described, a rotary shaft, a base mounted thereon, said base having threaded holes therein, studs having threaded stems screwing in said holes and having screw threaded projecting portions carried by said stems, centrifugal arms mounted on each of said studs, said arms having sleeve portions through which said screw threaded projecting portions pass, said sleeve portions carry threaded bushings engaging said threaded projecting portions, rods having hooked portions pivotally attached to said base, springs mounted on said rods and bearing against said centrifugal arms, a brake member mounted on said shaft for axial movement with respect thereto and having por-

tions engaging the sleeve portions of said centrifugal arms, and a fixed brake member adapted to be engaged by said movable brake member when the latter is moved in a direction parallel to the axis of said shaft.

8. In a governor of the character described, a governor housing having a recess in the bottom thereof, a plate mounted in said recess, an adjusting screw adapted to elevate said plate, a thrust bearing supported on said plate, a rotatable vertical shaft carried by said thrust bearing, a base plate mounted on said shaft, a friction plate mounted on said shaft movable axially with respect thereto, centrifugal means mounted between said base plate and said friction plate for moving said friction plate away from said base plate under the influence of centrifugal force, and a fixed brake member carried by said housing and adapted to be engaged by said movable friction plate.

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