March 7, 1967 A. E. SHECKELLS 3,307,660

REVOLVING DOOR SPEED CONTROL DEVICE

Filed July 15, 1964 3 Sheets-Sheet 1

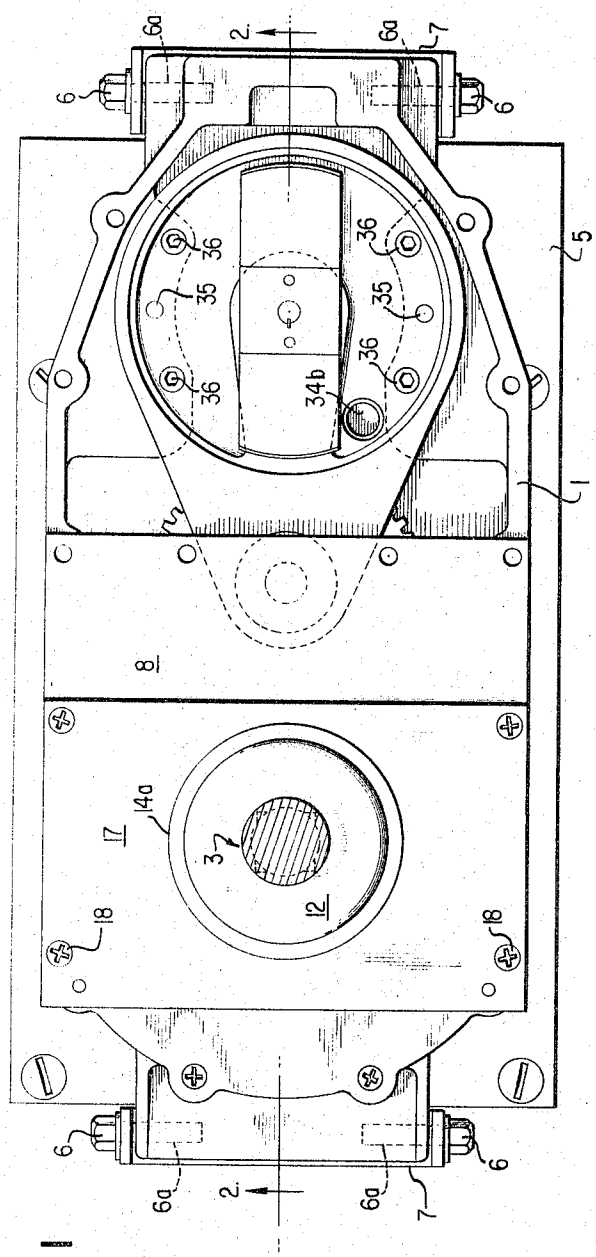


FIG. 1

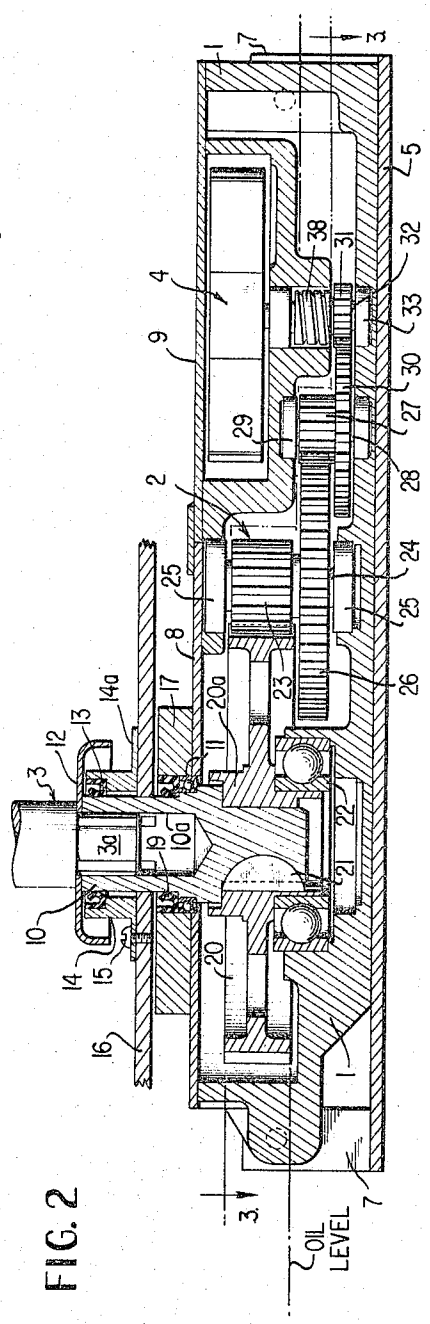


FIG. 2

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REVOLVING DOOR SPEED CONTROL DEVICE

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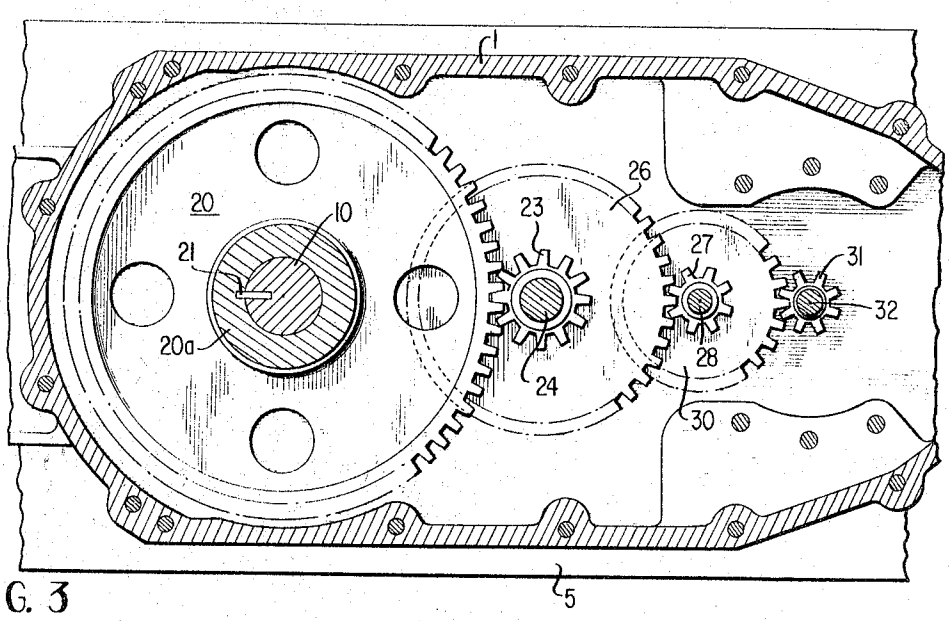


FIG. 3

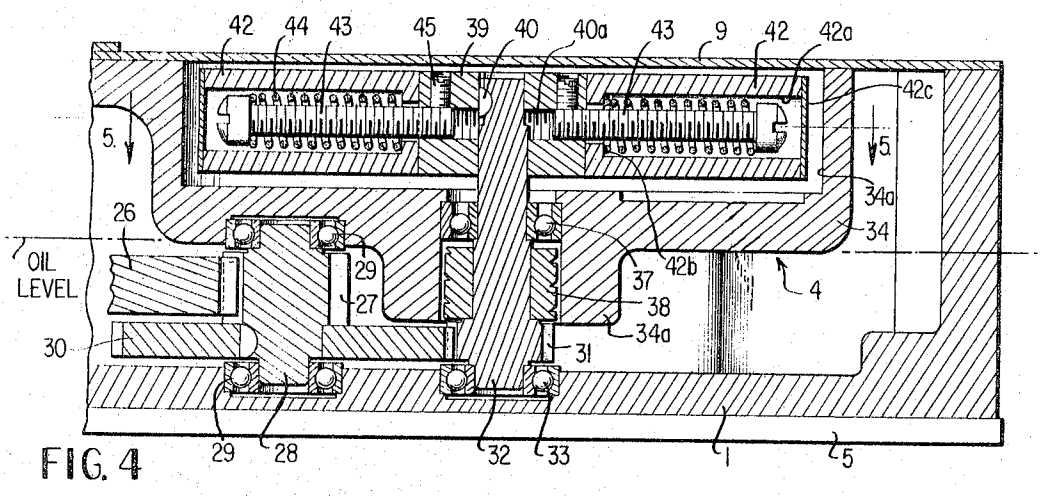


FIG. 4

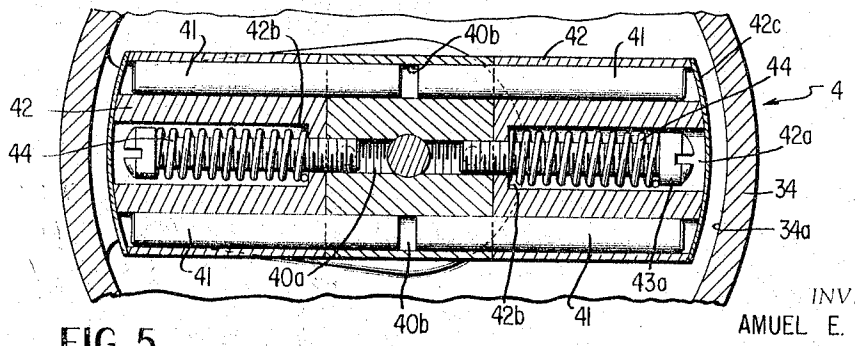


FIG. 5

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FIG. 6

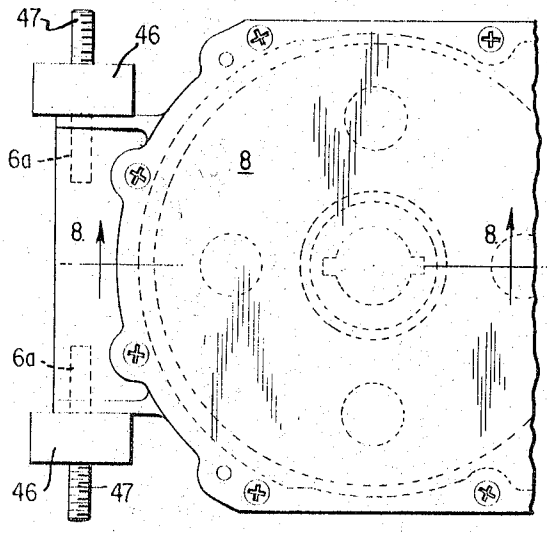
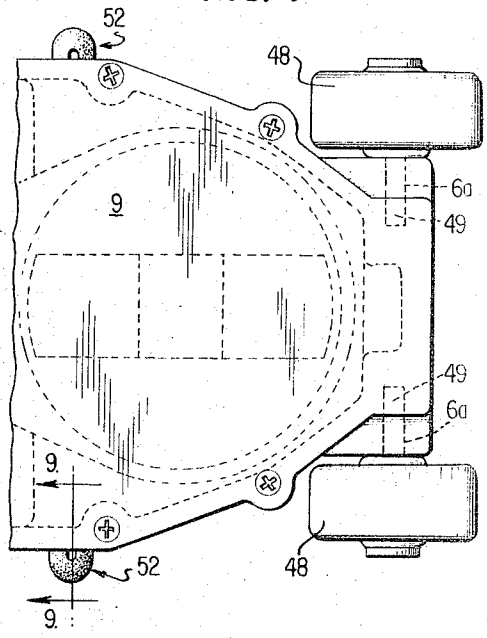


FIG. 7



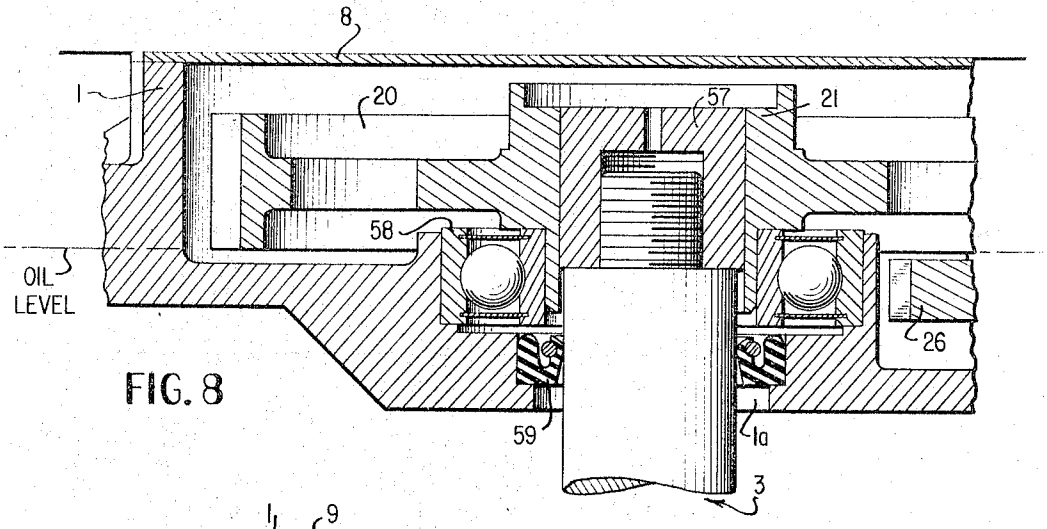


FIG. 8

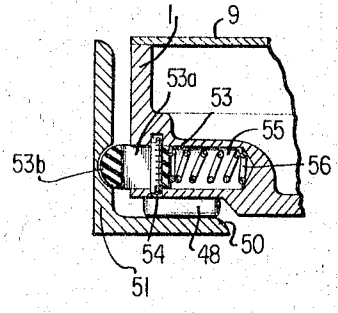


FIG. 9

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United States Patent Office 3,307,660 Patented Mar. 7, 1967

3,307,660

REVOLVING DOOR SPEED CONTROL DEVICE

Amuel E. Sheckells, Evansville, Ind., assignor to International Steel Company, Evansville, Ind., a corporation of Indiana

Filed July 15, 1964, Ser. No. 382,791
6 Claims. (Cl. 188—185)

This invention relates to a speed control mechanism and more particularly to a speed control mechanism for revolving doors.

Heretofore many types of speed control devices have been devised for limiting the speed of rotation of revolving doors. These devices usually include a gear train operatively connected between the shaft of the revolving door and a centrifugal brake mechanism whereby, upon rotation of the revolving door beyond a certain speed, the centrifugal brake mechanism is actuated.

While these speed control devices have been satisfactory for their intended purposes, they have been open to certain objections. One such objection is the bulkiness of the mechanism caused by the design of the gear train for operating the centrifugal brake assembly. Because of the bulkiness the speed control mechanism had to be designed specifically for installation in either the overhead or floor type revolving door installation.

Another disadvatage in hitherto employed revolving door speed control devices was the constant maintenance required in adjusting cleaning and lubricating the mechanism to prevent the accumulation of moisture, rust, etc., which causes the braking assembly to grab with the resultant chattering of the door when operated.

After considerable research and experimentation, the revolving door speed control mechanism of the present invention has been devised to overcome the aforementioned disadvantages in hitherto employed speed control devices. The speed control mechanism of the present invention comprises, essentially, a gear train positioned within a housing and operatively connected between a shaft of a revolving door and a centrifugal brake assembly; the housing, gear train and brake mechanism being constructed and arranged to form a low-profile assembly, whereby the control mechanism can be selectively mounted in either an overhead or floor type revolving door installation. The housing of the speed control mechanism is also adapted to receive a volume of oil which not only provides continuous lubrication of the mechanism but also coacts with the braking assembly to provide a smooth and dependable braking action.

When using the speed control mechanism of the present invention in an overhead installation, the housing is adapted to be provided with either shock absorbers, or wheels in the case of revolving doors requiring a roll-aside feature wherein the door wings and control mechanism are moved to one side to provide a larger access opening in the doorway, the roll-aside assembly being further provided with novel detent means to release the control mechanism when being moved to one side.

An object of the invention is to provide an improved low-profile speed control mechanism adapted to be selectively mounted in either an overhead or floor type revolving door installation.

Another object of the invention is to provide an improved speed control mechanism, including a centrifugal brake assembly where in a film of oil coacts with the brake assembly to provide a smooth braking action.

Still another object of the invention is to provide an improved speed control mechanism having a gear train operatively connected between the shaft of a revolving door and a centrifugal brake assembly, the gear train being constructed and arranged to have a gear ratio of 100 to 1.

Yet still another object of the invention is to provide an improved speed control mechanism including a housing containing a gear train and a centrifugal brake assembly, the housing being adapted to be selectively provided with shock absorbers or wheels when mounted in an overhead revolving door installation.

A further object of the invention is to provide an improved speed control mechanism, characterized by its compactness and ruggedness in construction and which is not likely to get out of order even after long and continued use.

With these and other objects in view, which may be incident to my improvements, the invention consists in the parts and combinations to be hereinafter set forth and claimed, with the understanding that the several necessary elements comprising my invention, may be varied in construction, proportions and arrangements, without departing from the spirit and scope of the appended claims.

In order to make my invention more clearly understood, I have shown in the accompanying drawings means for carrying the same into practical effect, without limiting the improvements in their useful application to the particular constructions which, for the purpose of explanation, have been made the subject of illustration.

In the drawings:

FIGURE 1 is a top plan view of the improved speed control mechanism mounted in a floor type revolving door installation;

FIG. 2 is a sectional view of the mechanism taken along line **2—2** of FIG. 1;

FIG. 3 is a plan view of the gear train employed in the speed control mechanism taken along line **3—3** of FIG. 2;

FIG. 4 is an enlarged sectional view of the centrifugal brake assembly employed in the speed control mechanism of the present invention;

FIG. 5 is a view of the centrifugal brake assembly taken along line **5—5** of FIG. 4;

FIGS. 6 and 7 are fragmentary plan views showing modifications of the mechanisms adapted for mounting in overhead type revolving door installations;

FIG. 8 is an enlarged sectional view taken along line **8—8** of FIG. 6; and

FIG. 9 is a view taken along line **9—9** of FIG. 7.

Referring to the drawings, and more particularly to FIGS. 1 and 2, the speed control mechanism of the present invention comprises an integral, cast housing **1** enclosing a gear train **2** operatively connected between a revolving door shaft **3** and a centrifugal brake assembly **4**. The assembly shown in FIGS. 1 and 2 is adapted for mounting in a floor-type revolving door installation, wherein housing **1** is secured to a base plate **5** by means of suitable bolts **6** threaded into bore **6***a* formed in the housing and extending transversely through brackets **7** mounted on each end of the base plate. The housing is further provided with a pair of cover plates **8** and **9** secured to the upper edge thereof to enclose the gear train and brake assembly, respectively, cover plate **8** being provided with an aperture in which a stub shaft **10** is rotatably mounted by means of an anti-friction bearing **11**. The upper end of the stub shaft is provided with a grooved bore **10***a* adapted to receive the reduced, splined end portion **3***a* of the door shaft **3**. A dust cap **12** is mounted between the upper end of the stub shaft and the reduced end portion of the door shaft for covering a resilient seal **13** carried by a cylindrical seal retainer **14** which is formed with a flange **14***a* at its lower end through which suitable screws **15** extend to secure the retainer to a plate **16** which is coextensive with the floor of the installation. A rectangular plate **17** is positioned below the floor plate and is secured to cover plate **8** by means of suitable screws **18**, the rectangular plate being provided

with an aperture in which the bearing **11** and a resilient seal **19** are mounted for engaging the stub shaft which extends therethrough.

As will be seen in FIGS. 2 and 3, the gear train for the mechanism comprises a main gear **20** having a hub portion **20***a* keyed to stub shaft **10** as at **21**. The main gear is rotatably mounted within the housing by means of an anti-friction bearing **22**, said main gear being adapted to mesh with a pinion **23** carried by shaft **24** which is rotatably mounted within the housing by means of bearings **25**. An intermediate gear **26** is also carried by shaft **24** and meshes with a pinion **27** carried by a second shaft **28** which is rotatably mounted within the housing by means of bearings **29**. A second intermediate gear **30** is carried by shaft **28** and meshes with a third pinion **31** secured to the centrifugal brake assembly shaft **32** which is rotatably mounted within the housing by means of bearing **33**. The gear train is designed to have a gear ratio of 100 to 1 to thereby increase the sensitivity of the centrifugal brake assembly in response to rotation of the revolving door shaft, to be described more fully hereinafter. While gears **30** and **31** have been shown and described as pinion gears, they are preferably helical gears to keep the noise level of the speed control at the higher operating speeds as low as possible.

Referring to FIGS. 4 and 5, the centrifugal brake assembly comprises a housing **34** positioned within the speed control mechanism housing **1** by means of dowel pins **35** (FIG. 1) and secured therein by suitable bolts **36**. The brake housing is provided with a hub portion **34***a* through which the shaft **32** extends and is rotatably mounted therein by means of bearing **37**. A worm-like member **38** which functions as an oil pump of the screw-type, to be described more fully hereinafter, is carried by shaft **32** on the lower end portion thereof and is positioned within the hub portion **34***a*, the upper end portion of shaft **32** being provided with a rotor **39** keyed to the shaft as at **40**. The rotor is provided with a tapped bore **40***a* disposed in the medial portion thereof, the rotor also being provided with a pair of parallel bores **40***b* extending through the rotor and positioned on opposite sides of tapped bore **40***a* (FIG. 5). Each of the bores **40***b* is provided with a pair of oppositely extending guide pins **41** which are adapted to slidably receive a brake shoe **42**, each brake shoe being held on its respective pair of guide pins by means of a bolt **43** positioned within a recess **42***a* formed in the brake shoe and threaded into the tapped bore **40***a*, the brake shoes being urged radially inwardly by means of coil springs **44** positioned between the bolt heads **43***a* and a shoulder **42***b* formed on the inner end of the recess **42***a*. Thus, it will be readily understood that the biasing force of springs **44** urging brake shoes **42** inwardly toward the rotor can be varied by moving bolts **43** inwardly or outwardly relative to the rotor, the bolts being held in adjusted position by means of suitable set screws **45** extending normal to the bolts (FIG. 4). To complete the brake assembly the outer ends of the brake shoes are provided with arcuate shaped brake bands **42***c* which are adapted to engage the inner peripheral wall **34***a* of the brake housing during the braking action.

The operation of the centrifugal brake assembly will be readily apparent to those skilled in the art; thus the centrifugal force produced by rotation of shaft **32** causes the brake shoes **42** to slide radially outwardly whereby the brake bands **42***c* engage the peripheral wall of the brake housing to thereby control the speed of the mechanism. As the brake shoes move radially outwardly springs **44** are compressed so that when shaft **32** stops rotating the springs expand, thereby biasing the brake shoes inwardly to their normal position as shown in FIGS. 4 and 5.

As noted hereinabove, one of the disadvantages experienced in hitherto employed speed control devices was the chattering of the door caused by the grabbing of the brake bands against the wall of the brake housing when the door was operated. This objectionable feature is due partly to the design of the brake assemblies used in the prior art speed control devices which normally consist of a horizontal rotating disc having an upwardly extending pin attached thereto and to which a brake shoe assembly is pivotally connected. As the horizontal disc is rotated the brake shoe assembly is thrown radially outwardly by centrifugal force and pivots about the upstanding pin into engagement with the wall of the brake housing. The brake shoe assembly thus always approaches engagement with the wall at an angle and heretofore a locking or binding effect has been realized when the shoes engage with the brake housing wall. This is caused by the fact that the angle between the brake band, the drive pin and the center of rotation is not constant and thus uneven forces are exerted on the wall of the brake housing by the brake shoes. This objection has been overcome by the speed control device of the present invention by omitting the pivot angle and providing a brake shoe construction wherein braking is due to centrifugal force only and not to locking mechanical lever brake mechanisms.

In a preferred construction of the invention, the smooth operation of the control is enhanced by providing the housing **1** with a volume of oil or lubricating fluid sufficient to maintain the screw pump **38** submerged therein, the oil level being shown in dashed lines and so designated in FIGS. 2 and 4. As shaft **32** rotates, screw pump **38**, which is secured to the shaft, performs as a screw-type pump and supplies a small volume of oil to the brake housing **34**. As the oil is supplied to the brake housing it impinges upon rotor **39** and brake shoes **42** with the result that the centrifugal force of the rotating members causes the oil to be flung outwardly, thereby forming a thin film of oil on the brake housing wall **34***a*, the floor of the brake housing being provided with a port **34***b* to allow the oil to return to housing **1**. By this construction and arrangement, a lubricated surface is provided between the brake bands and brake housing wall which results in a smooth braking action to thereby preclude the grabbing of the brake bands against the wall.

Reference being had to FIG. 2, it will be noted that main gear **20**, pinion **23**, and centrifugal brake assembly **4** are positioned in substantially the same horizontal plane, and intermediate gear **26**, pinion **27** and gears **30** and **31** are positioned in substantially another horizontal plane which is spaced below and closely adjacent to the first mentioned horizontal plane. By positioning these various elements in closely adjacent horizontal planes, a low-profile speed control device is produced which can be easily modified for either floor or overhead-type door installations.

To modify the floor-type speed control device shown in FIGS. 1 and 2 for use in an overhead-type installation, illustrated in FIGS. 6 and 7, bolts **6** are replaced by rubber shock absorbers **46** carried by threaded stems **47** which extend between and are secured within the housing bores **6***a*, and the beam (not shown) of the door frame construction. These shock absorbers as indicated from FIGS. 6, 1 and 2 are mounted in the same horizontal plane as the housing **1** to enable the control to be installed in a relatively thin header over the door. The shock absorbers besides dampening noise from the control also aid in aligning the revolving door shaft with the opening in main gear **20** during installation. In the case of an overhead installation having a roll-aside feature wherein the door wings and control device are moved to one side to provide a larger access opening in the doorway, wheels **48** (FIG. 7) are provided which are rotatably mounted on stub shafts **49** mounted within the bores **6***a*. In this arrangement the wheels **48** are adapted to roll on tracks **50** (FIG. 9) of angle beams **51** of the door frame construction.

The roll-aside type overhead installation is also provided with detent means **52** (FIG. 6) for holding the speed control mechanism in place while the revolving door is

in its normal operating position. As will be seen in FIG. 9 the detent means comprises a resilient plunger **53** provided with a slot **53***a* through which a threaded pin **54** extends, the ends of said pin being secured within opposite walls of a recess **55** formed in the bottom wall of the housing **1**. A spring **56** is positioned within recess **55** for biasing the convex end **53***b* of the plunger into a concave recess formed in the surface of the beam **51**.

For purposes of clarity, the shock absorbers **46** and wheels **48** are shown in FIGS. 6 and 7, respectively, as being mounted on one end of the speed control housing; however, it will be understood that the opposite end of the housing will be provided with a duplicate pair of shock absorbers or wheels depending upon the type of overhead installation being employed.

Further modification of the speed control device for use in the overhead-type revolving door installation is illustrated in FIG. 8, wherein the upper end of the door shaft **3** extends through an opening **1***a* formed in the bottom wall of housing **1**, the end of the door shaft being threadably secured to a key member **57** which is splined to the hub **21** of main gear **20**. The main gear is rotatably mounted within the housing by means of anti-friction bearing **58** and a suitable sealing member **59**, biased against the shaft, is positioned within the opening **1***a* to prevent leakage of oil from the housing.

In the operation of the speed control device, whether it be the floor-type as shown in FIGS. 1 and 2, or the overhead-type as illustrated in FIGS. 6, 7 and 8, when the revolving door shaft **3** is rotated, the main gear **20** is rotated to thereby cause rotation of the various gears in the gear train **2** which actuates the centrifugal brake mechanism **4**, as described hereinabove, whereby the speed of rotation of the revolving door is governed.

It will also be readily apparent that the volume of oil contained within the housing not only provides a smooth braking action for the assembly but it also provides a constant lubrication for the various moving parts of the device. Furthermore, by providing the gear train with a ratio of 100 to 1, the speed control device is readily adaptable for motor drive revolving door installations wherein the motor and clutch assembly can be connected directly to the high speed pinion gear **31** and shaft **32** without requiring the use of bulky and space-consuming reduction gear assemblies.

While I have shown and described the preferred embodiment of my invention, I wish it to be understood that I do not confine myself to the precise details of construction, herein set forth by way of illustration, as it is apparent that many changes and variations may be made therein, by those skilled in the art, without departing from the spirit of the invention, or exceeding the scope of the appended claims.

What is claimed is:

1. A revolving door speed control device of the character described, comprising a housing, a main gear rotatably mounted within said housing, said main gear adapted for connection to a revolving door shaft, a centrifugal brake assembly including braking surface means positioned within the housing, gear train means rotatably mounted within the housing, said gear train means being operatively connected between the main gear and the centrifugal brake assembly, whereby upon rotation of the revolving door, lubricating fluid bath means within said housing, and lubricating fluid pump means operatively connected to the lubricating fluid bath means and said centrifugal brake assembly and operative upon rotation of said centrifugal brake assembly for directing a volume of lubricating fluid onto said braking surface means in said brake assembly upon actuation thereof.

2. A revolving door speed control device of the character described comprising, a main housing, a main gear rotatably mounted within said main housing, said main gear adapted to be secured to the revolving door shaft, a centrifugal brake assembly including a second housing mounted within the main housing, a rotatable shaft extending through said second housing, gear train means rotatably mounted within the main housing, said gear train means being operatively connected between said main gear and one end of said shaft, a rotor secured to the opposite end of said shaft, a pair of diametrically opposed bolts secured to said rotor and extending radially outwardly therefrom, a brake shoe slidably mounted on each bolt, brake band means connected to the brake shoes, a volume of lubricating fluid contained in said main housing, pump means connected to said shaft, said main gear, gear train means, and centrifugal brake assembly all being positioned within said housing in spaced parallel, closely adjacent horizontal planes to thereby form a low-profile speed control device, whereby upon rotation of the revolving door shaft the resultant centrifugal force causes the brake shoes to move radially outwardly from the rotor causing the brake bands to engage the wall of the second housing, and said pump means being responsive to rotation of the brake assembly shaft for coating the wall of the second housing with a thin film of lubricating fluid to thereby provide a smooth braking action when said brake bands engage the wall.

3. A revolving door speed control device for the shaft of a revolving door comprising, a main housing, a first gear rotatably mounted within said housing, said first gear adapted for connection to the revolving door shaft, a centrifugal brake assembly including braking surface means positioned within and in communication with the main housing, gear train means rotatably mounted within the main housing and operatively connected between the first gear and said centrifugal brake assembly, and lubricating fluid in said main housing being at all times in contact with said braking surface means and said gear train means upon rotation of the revolving door shaft, whereby upon rotation of the shaft the centrifugal brake assembly is actuated to smoothly govern the speed of rotation of the revolving door.

4. A revolving door speed control device according to claim **3**, wherein said first gear, gear train means and centrifugal brake assembly are all positioned within said main housing in spaced, parallel, closely adjacent horizontal planes to thereby form a low-profile speed control device adapted for selective installation in either an overhead or floor-type revolving door installation.

5. A revolving door speed control device of the character described comprising, a housing, a main gear rotatably mounted within said housing, said main gear adapted for connection to a revolving door shaft, a centrifugal brake assembly positioned within the housing, gear train means rotatably mounted within the housing, said gear train means operatively connected between the main gear and the centrifugal brake assembly, whereby upon rotation of the revolving door shaft the centrifugal brake assembly is actuated to thereby govern the speed of rotation of the revolving door, said main gear, gear train means and centrifugal brake assembly all being positioned within said housing in spaced parallel, closely adjacent horizontal planes to thereby form a low-profile speed control device adapted for selective installation in either an overhead or floor-type revolving door installation, and shock absorber means connected at substantially right angles to the housing in a horizontal plane bounded by the vertical dimensions of said housing for resiliently supporting the speed control device between the beams of an overhead type revolving door installation to dampen the noise therefrom and aid in aligning the revolving door shaft with said main gear.

6. A revolving door speed control device of the character described comprising, a housing, a main gear rotatably mounted within said housing, said main gear adapted for connection to a revolving door shaft, a centrifugal brake assembly positioned within the housing, gear train means rotatably mounted within the housing, said gear train means operatively connected between the

main gear and the centrifugal brake assembly, whereby upon rotation of the revolving door shaft the centrifugal brake assembly is actuated to thereby govern the speed of rotation of the revolving door, said main gear, gear train means and centrifugal brake assembly all being positioned within said housing in spaced parallel, closely adjacent horizontal planes to thereby form a low-profile speed control device adapted for selective installation in either an overhead or floor-type revolving door installation, wheels connected to the housing, said wheels being adapted to travel in track means carried by the beams in an overhead-type revolving door installation, and spring detent means connected transversely of said housing and in the same

horizontal plane therewith and extending into releasable connection with said track means, whereby the revolving door and associated control device can be rolled aside to increase the access opening in the doorway.

References Cited by the Examiner

UNITED STATES PATENTS

2,128,531	8/1938	Hagenbook	49—43
2,566,036	8/1951	Shaff	188—185 X
2,976,955	3/1961	Huber	188—184 X
3,262,524	7/1966	Haslehurst	188—82.9

DUANE A. REGER, *Primary Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,307,660 March 7, 1967

Amuel E. Sheckells

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 5, line 64, after "door" insert -- shaft the centrifugal brake assembly is actuated to thereby govern the speed of rotation of the revolving door --.

Signed and sealed this 26th day of August 1969.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents