Dec. 7, 1954 N. MICHELMAN 2,696,250

ROLLING DOOR

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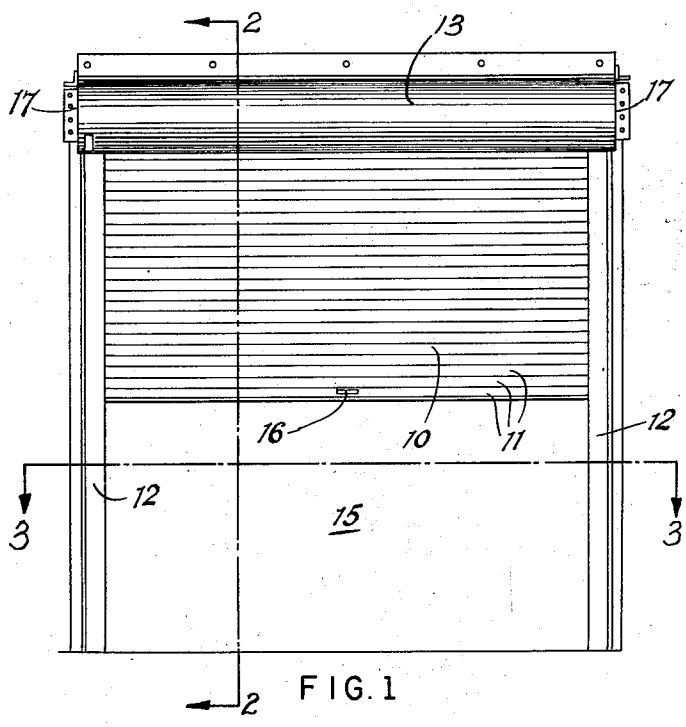


FIG. 1

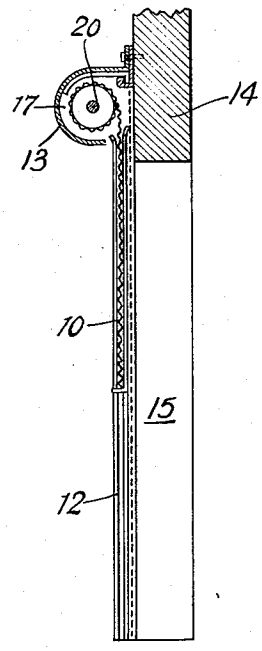


FIG. 2

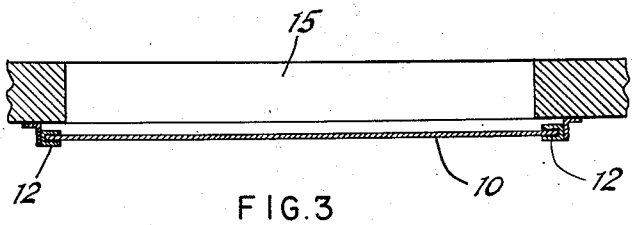


FIG. 3

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ROLLING DOOR

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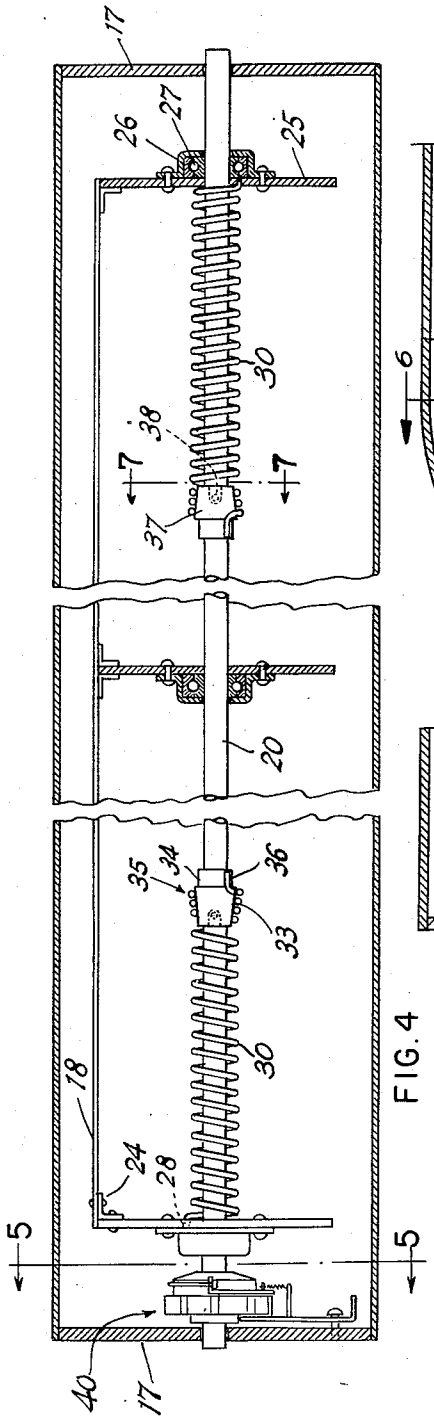


FIG. 4

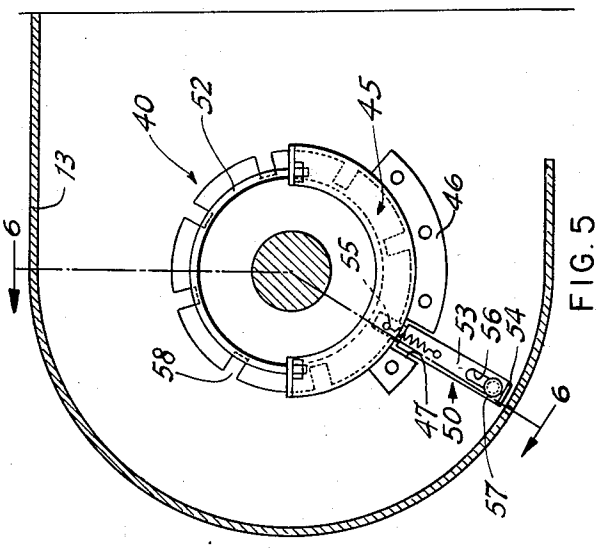


FIG. 5

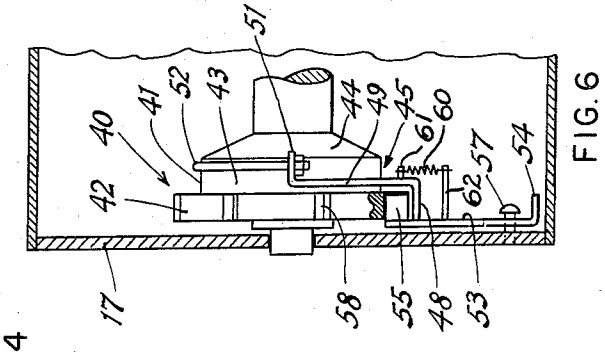


FIG. 6

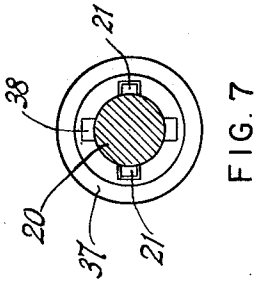


FIG. 7

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ROLLING DOOR

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7 Claims. (Cl. 160—192)

This invention relates to rolling doors and, more particularly, to a novel, simplified counter-balancing arrangement for manually operated rolling doors.

Rolling doors usually comprise a series of hingedly interconnected elongated slats, panels or the like, and are arranged to be wound on a drum or shaft extending across the lintel of a doorway. The slats are guided and restrained, in their vertical movement in opening and closing the doorway, by channels or tracks extending along the sides of the opening.

Such doors, which are often referred to as curtain doors, find numerous uses, such as fire doors, pier doors, and the like. They are also useful as garage doors and in any location where it is desirable that the full width of the opening be always available, or where it is desirable to be able to selectively adjust the vertical clearance of the opening. Thus, these doors may be raised only partially to limit access through the opening.

Whether such doors are manually operated or power operated, counterbalancing arrangements are desirable due to the weight of the door, particularly when the latter is made of steel or other relatively heavy metal. Such counterbalancing arrangements are a practical necessity with manually operated rolling or curtain doors. The counterbalancing arrangements hitherto provided, while reliable in operation, have been complicated and expensive to an extent substantially limiting their field of application due to the cost of installing doors incorporating such arrangements.

It is, accordingly, an object of the present invention to provide a novel, simplified and reliable rolling door construction and counterbalancing arrangement therefor which is much less costly to construct and install than presently known constructions and arrangements.

To this end, the invention rolling door construction includes a shaft arranged horizontally across a lintel of a doorway and normally non-rotatable. Rotatably mounted on this shaft are disk means having the upper end of the flexible door secured thereto for winding onto such disk means and unwinding therefrom.

Coil spring means are mounted on the shaft in embracing relation thereto and having an end engaged with the disk means. The other end of the coil spring means is engaged by spring adjustment means fixed to the shaft and constraining the associated end of the coil spring means against rotation relative to the shaft.

The coil spring means is so disposed that it is wound up, during lowering of the door, so that the stored energy counterbalances the door weight during raising or opening of the door. Means are provided, whereby the shaft may be selectively released for rotation to provide for adjustment of the initial spring tension.

Preferably, the coil spring means comprises a pair of coil springs each having an end secured to a disk and an end secured to one of the spring adjustment means. The latter are each selectively angularly adjustable about the shaft axis to correlate the initial tension of both springs. Selective rotation of the shaft adjusts both springs conjointly.

For an understanding of the invention principles, reference is made to the following description of a typical embodiment thereof as illustrated in the accompanying drawings.

In the drawings:

Fig. 1 is a front elevation view of a rolling door embodying the invention;

Fig. 2 is a vertical sectional view of the doors on the line 2—2 of Fig. 1;

Fig. 3 is a horizontal sectional view of the door on the line 3—3 of Fig. 1;

Fig. 4 is a front elevation view of the door winding means;

Fig. 5 is a vertical sectional view of the releasable shaft locking means, taken on the line 5—5 of Fig. 4;

Fig. 6 is a front elevation view, partly in section, of the releasable shaft locking means, corresponding generally to the line 6—6 of Fig. 5; and

Fig. 7 is a diametric sectional view on the line 7—7 of Fig. 4.

Referring to Figs. 1, 2 and 3, door 10 may comprise a plurality of hingedly interconnected elongated strips or slats 11, of any suitable material such as wood or metal, slidable in vertical tracks 12 extending along each side of a doorway or other opening 15. Door 10 is arranged to be wound on suitable rotatable means located in a transversely curved longitudinal guard or housing 13 extending along the lintel 14 of doorway 15. The illustrated door is manually raised or lowered, as by grasping the handle 16. At the left side of guard 13, a slide 40 projects for releasing the normally non-rotatable door mounting shaft to allow it to rotate to preset the spring tenison, as described more fully hereinafter.

Figs. 4, 5 and 6 illustrate the door mounting and counterbalancing means. The door mounting shaft 20 extends horizontally of lintel 14 and substantially axially of and concentric with guard 13, being mounted at each end though the end walls 17 of the guard. Shaft 20 is normally held against rotation by means described more fully hereinafter.

Rotatably mounted on shaft 20 are a plurality of door winding disk means, such as disks 25. Three are shown, although a greater number may be used for wider doors 10. Each disk 25 has secured concentrically therewith an annular bracket 26 which is U-shape in cross section and encloses an anti-friction bearing 27 supporting the associated disk 25 for rotation on shaft 20. The uppermost slat or strip 18 of door 10 is secured to the peripheries of disks 25, as by angle brackets 24, so that door 10 may be wound on disks 25 during opening of the door and unwound therefrom during closing of the door. The securement of the door 10 to the several disks 25 fixes the relative positions of the disks axially of shaft 20.

A pair of coil springs 30 are mounted in embracing relation on shaft 20, and each disposed adjacent an end disk 25. From Fig. 4 it will be observed that the two springs 30 are oppositely wound. One end of each spring 30 is anchored to the adjacent end disk 25, as by having an end hooked through an aperture 28 in the disk. The opposite end of each spring is anchored to a spring adjustment member 35.

These members 35, which may be castings, each comprise a conical spring seat portion 33 and a collar portion 34 integral with portion 33. The related end of a spring 30 is anchored in the associated adjustment member as by having an end inserted into a radial aperture 36 in portion 34.

The forward face 37 of conical portion 33 of each member 35 is formed with a series of radial notches 38, shown as four in number in the specific example illustrated. These notches are arranged to engage pin or pins 21, projecting radially from shaft 20, to lock members 35 against rotation relative to shaft 20. By pulling members 35 away from end disks 25, the notches 38 are released from pins 21 so that members 35 may be angularly adjusted on shaft 20 to correspondingly adjust the individual tensions of springs 30 to equalize the initial tension of the two springs.

The desired tension exerted conjointly by both springs 30 may be selectively adjusted by the shaft locking means 40 at the left of shaft 20, as viewed in Fig. 4, and shown more particularly in Figs. 5 and 6. The locking means includes an enlarged hub element 41 non-rotatably secured, for example, to the left end of shaft 20 and including a relatively thick disk 42 and a cylindrical intermediate section 43 terminating in a conical portion 44.

A generally semi-circular bracket 45 has a radial

flange **46** secured to end wall **17** of guard **13** and having a slot **47** therethrough. An axially extending wall **48** joins flange **46** to a second radial wall **49** parallel to the face of disk **42**. The ends of wall **49** are bent to form apertured ears **51** receiving a U-bolt **52** embracing hub section **43**.

The slot **47** in flange **46** is a guide for slide **50**, which includes a flat strip **53** having a bent outer end **54** adjacent an access opening in guard **13**. Slide **50** is guided by a slot **56** in strip **53** receiving a headed pin or rivet **57** secured to guide end wall **17**.

The inner end of strip **53** carries a block **55** selectively engageable in radial notches **58** in the periphery of disk **42**. A coil spring **60** secured between an ear **61** on wall **49** and a pin **62** on slide **50** normally biases slide **50** radially toward shaft **20** to engage block **55** in a notch **58** to lock shaft **20** against rotation.

To conjointly adjust the tension of both springs **30**, slide **50** is pulled outwardly and shaft **20** rotated relative to disks **25** until the desired spring tension is attained.

The described arrangement thus provides a simplified, inexpensive counterbalance for a rolling door, individual and conjoint spring tension adjustments.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the invention principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

I claim:

1. A rolling door comprising, in combination, a normally non-rotatable, horizontally arranged mounting shaft; disk means rotatably mounted on said shaft; a flexible door having one end secured to said disk means for winding thereon by rotation of said disk means; coil spring means embracing said shaft and having an end engaging said disk means; and spring seat means normally fixed to said shaft in axially spaced relation to said disk means and engaging the other end of said coil spring means to such other end of said coil spring means against rotation relative to said shaft; said coil spring means being disposed to be wound by relative rotation of said disk means and said shaft during unwinding of the door to counterbalance the door weight during winding of the door on said disk means; said spring seat means being angularly adjustable on said shaft to preset the tension of said coil spring means; said shaft being selectively rotatable for adjustment of the initial tension of said coil spring means.

2. A rolling door comprising, in combination, a horizontally arranged mounting shaft; releasable means normally locking said shaft against rotation; disk means rotatably mounted on said shaft; a flexible door having one end secured to said disk means for winding thereon by rotation of said disk means; coil spring means embracing said shaft and having an end engaging said disk means; and spring seat means normally fixed to said shaft in axially spaced relation to said disk means and engaging the other end of said coil spring means to such other end of said coil spring means against rotation relative to said shaft; said coil spring means being disposed to be wound by relative rotation of said disk means and said shaft during unwinding of the door to counterbalance the door weight during winding of the door on said disk means; said spring seat means being angularly adjustable on said shaft to preset the tension of said coil spring means; said releasable means being selectively operable to release said shaft for rotation for adjustment of the initial tension of said coil spring means.

3. A rolling door comprising, in combination, a normally non-rotatable, horizontally arranged mounting shaft; a pair of circular disks rotatively mounted in axially spaced relation on said shaft; a flexible door having one end secured to said disks for winding thereon by rotation of said disks; a pair of oppositely wound coil springs each embracing said shaft and each having one end engaged with one of said disks; and a pair of spring seats each normally fixed to said shaft in axially spaced relation to a disk and each engaging the other end of a coil spring to such other end against rotation relative to said shaft; said coil springs being disposed to be wound by relative rotation of said disks and said shaft during unwinding of the door to counterbalance the door weight during winding of the door on said disks; each spring seat being angularly adjustable on said shaft to preset the relative tensions of the two coil springs.

4. A rolling door comprising, in combination a normally non-rotatable, horizontally arranged mounting shaft; a pair of circular disks rotatably mounted in axially spaced relation on said shaft; a flexible door having one end secured to said disks for winding thereon by rotation of said disks; a pair of oppositely wound coil springs each embracing said shaft and each having one end engaged with one of said disks; and a pair of spring seats each normally fixed to said shaft in axially spaced relation to a disk and each engaging the other end of a coil spring to constrain such other end against rotation relative to said shaft; said coil springs being disposed to be wound by relative rotation of said disks and said shaft during unwinding of the door to counterbalance the door weight during winding of the door on said disks; each spring seat being angularly adjustable on said shaft to preset the relative tensions of the two coil springs; said shaft being selectively rotatable for conjoint adjustment of the initial tension of both of said coil springs.

5. A rolling door comprising, in combination, a horizontally arranged mounting shaft; releasable means normally locking said shaft against rotation; a pair of circular disks rotatably mounted in axially spaced relation on said shaft; a flexible door having one end secured to said disks for winding thereon by rotation of said disks; a pair of oppositely wound coil springs each embracing said shaft and each having one end engaged with one of said disks; and a pair of spring seats each normally fixed to said shaft in axially spaced relation to a disk and each engaging the other end of a coil spring to constrain such other end against rotation relative to said shaft; said coil springs being disposed to be wound by relative rotation of said disks and said shaft during unwinding of the door to counterbalance the door weight during winding of the door on said disks; each spring seat being angularly adjustable on said shaft to preset the relative tensions of the two coil springs; said releasable means being selectively operable to release said shaft for rotation for conjoint adjustment of the initial tension of both of said coil springs.

6. A rolling door as claimed in claim 5 in which said releasable means comprises a circumferentially notched circular element rotatable with said shaft, a reciprocable slide movable radially toward the shaft axis to engage in one of such notches, and means biasing said slide to the shaft locking position.

7. A rolling door as claimed in claim 5 in which said releasable means comprises a circumferentially notched circular element rotatable with said shaft and fixed to one end of the latter, a non-rotatably mounted bracket embracing said element; a slide reciprocably mounted in said bracket for radial movement toward the shaft axis to engage in one of such notches; and means biasing said slide to the shaft locking position.

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