Jan. 30, 1940. W. L. KAVANAGH ET AL 2,188,509

ESCALATOR COVER

Filed May 14, 1938 5 Sheets-Sheet 1

Fig. 1

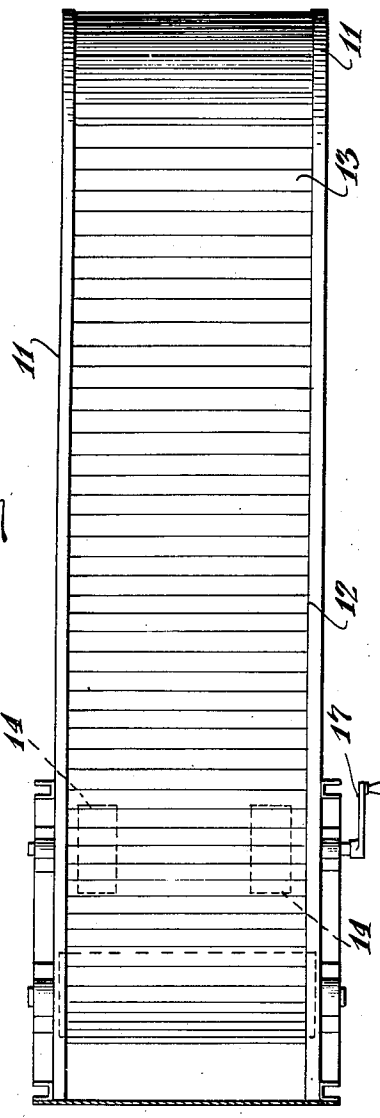
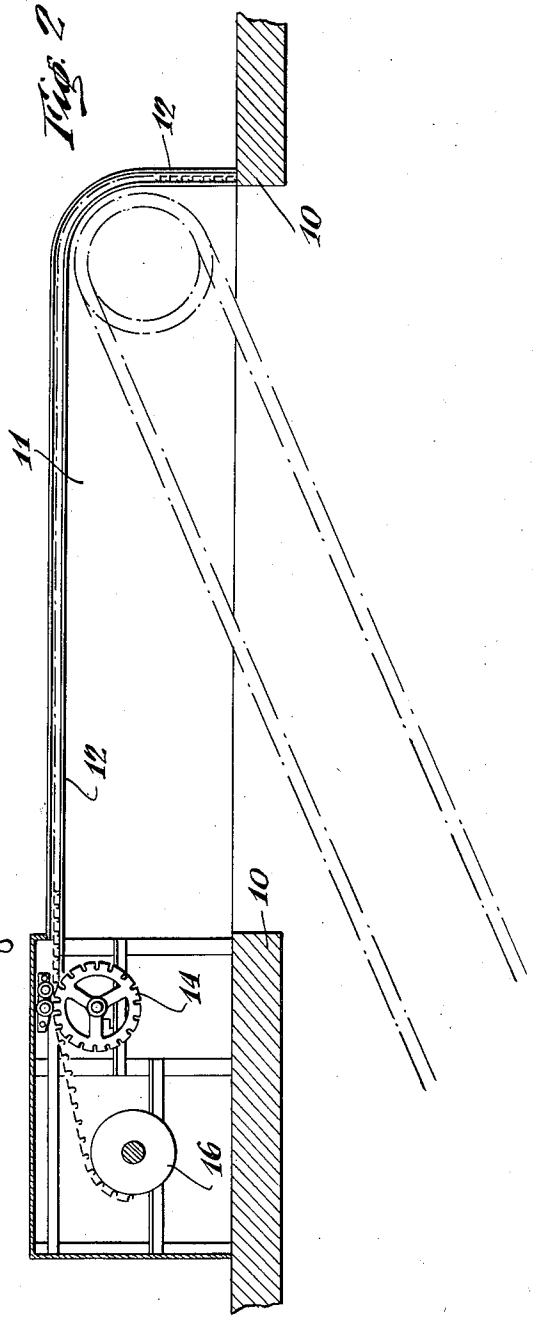


Fig. 2



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ESCALATOR COVER

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Fig. 7

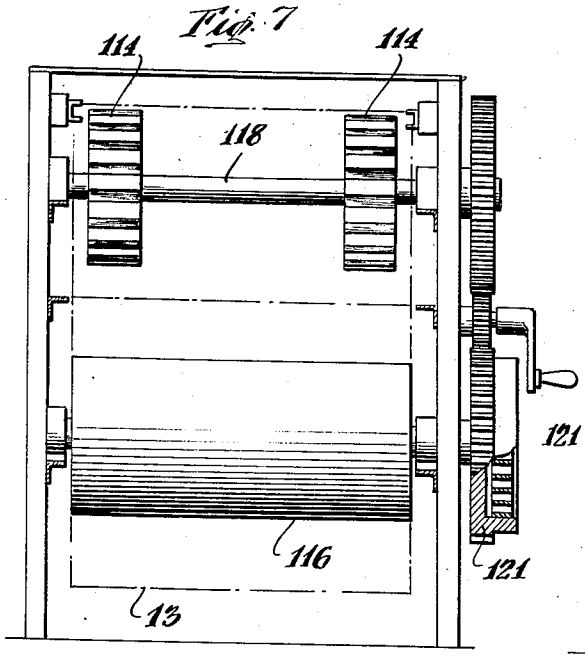


Fig. 8

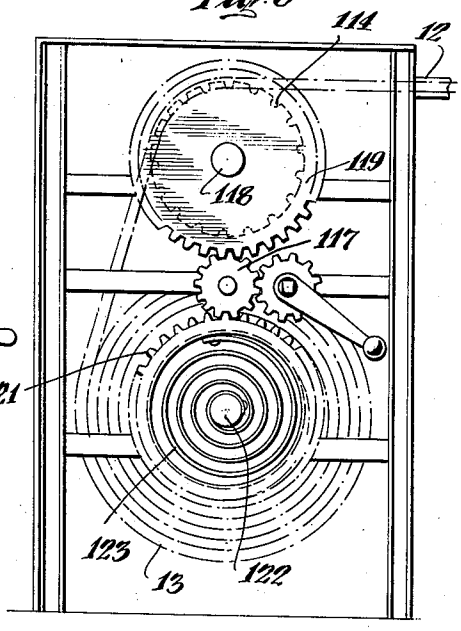


Fig. 3

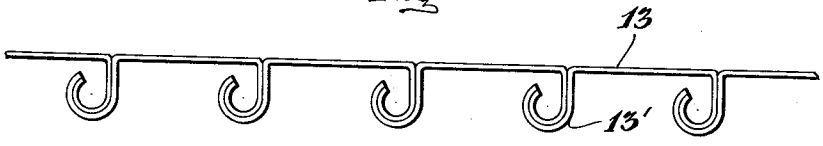
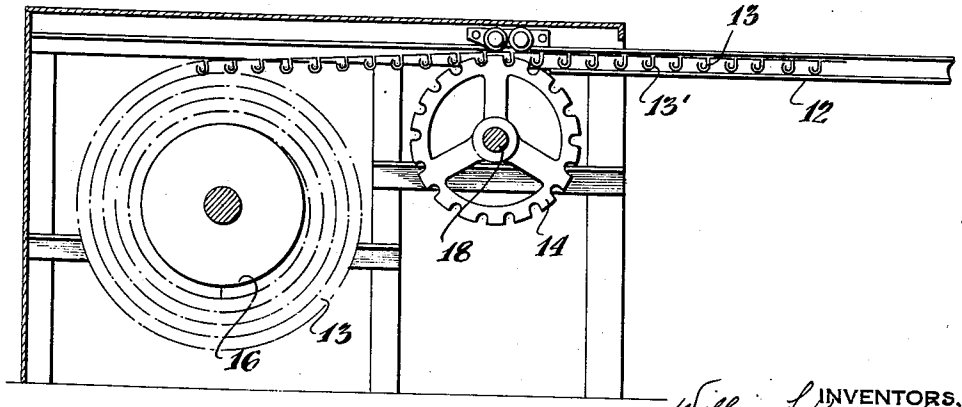


Fig. 4



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ESCALATOR COVER

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Fig. 5

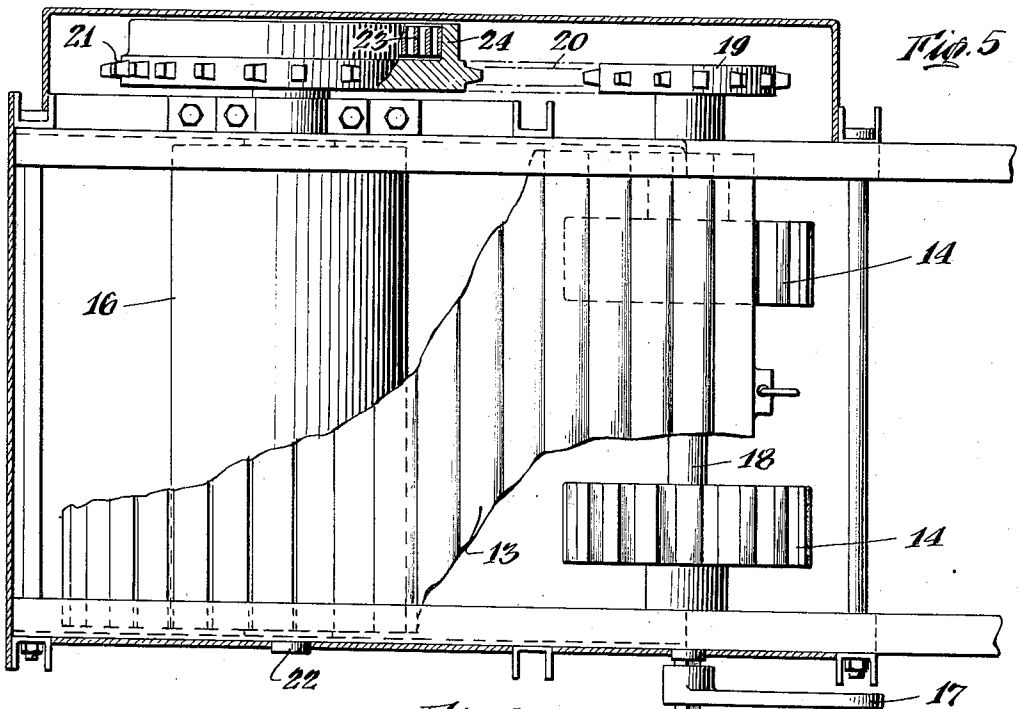
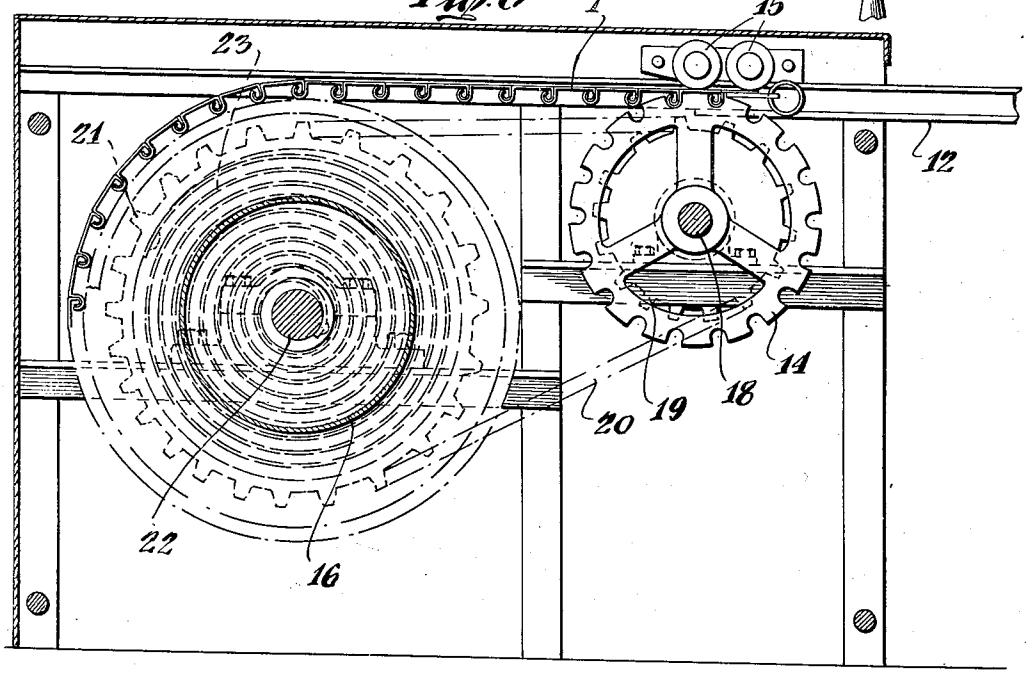


Fig. 6



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ESCALATOR COVER

Filed May 14, 1938 5 Sheets-Sheet 4

Fig. 9

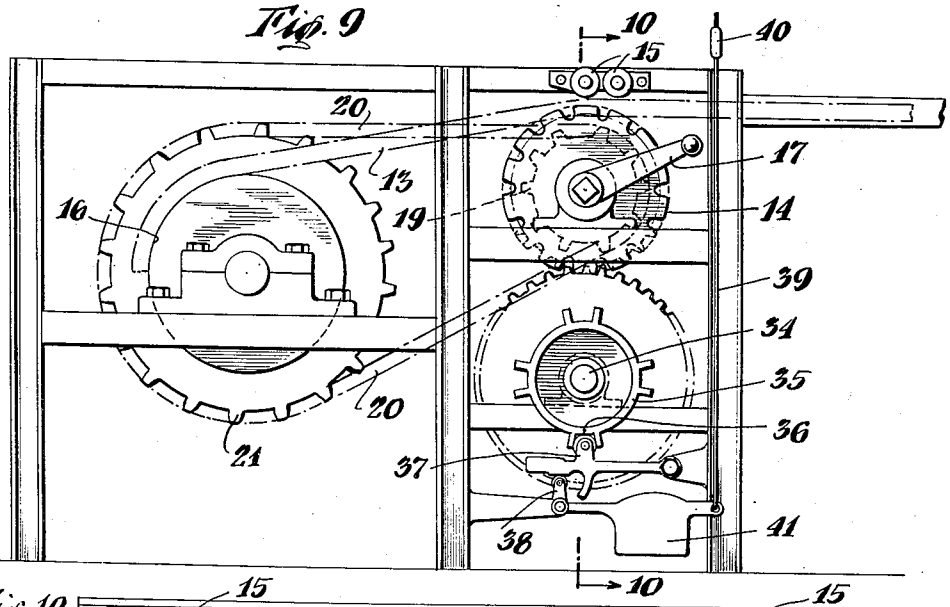


Fig. 10

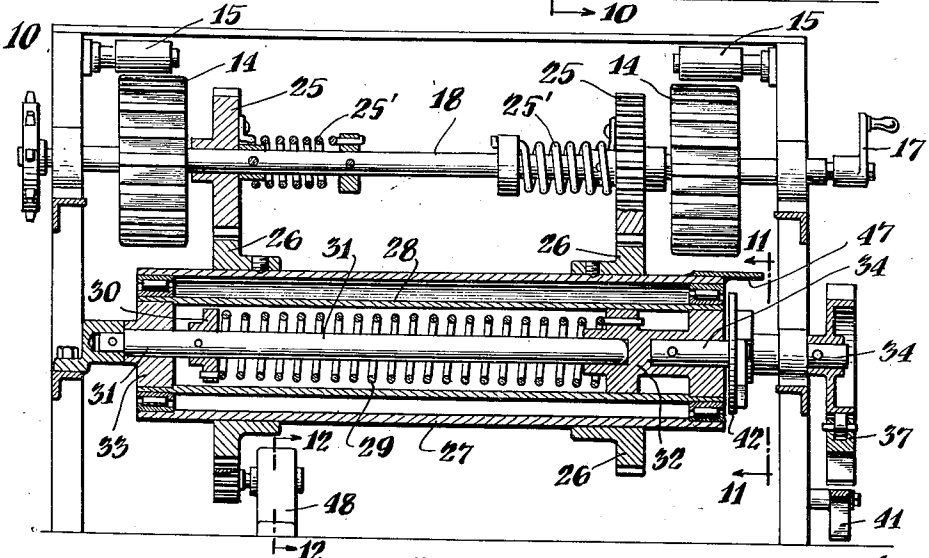


Fig. 11

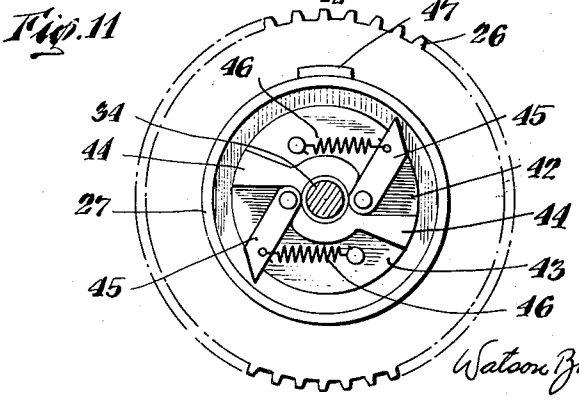
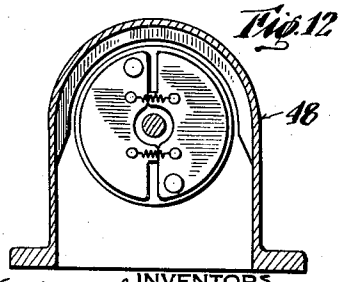


Fig. 12



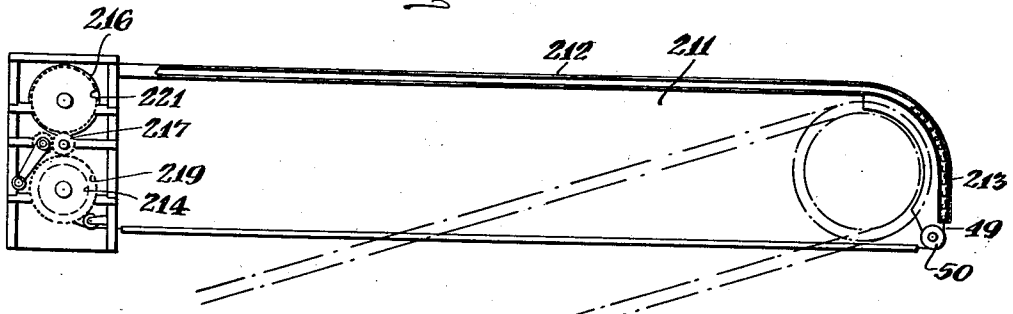
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ESCALATOR COVER

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Fig. 13



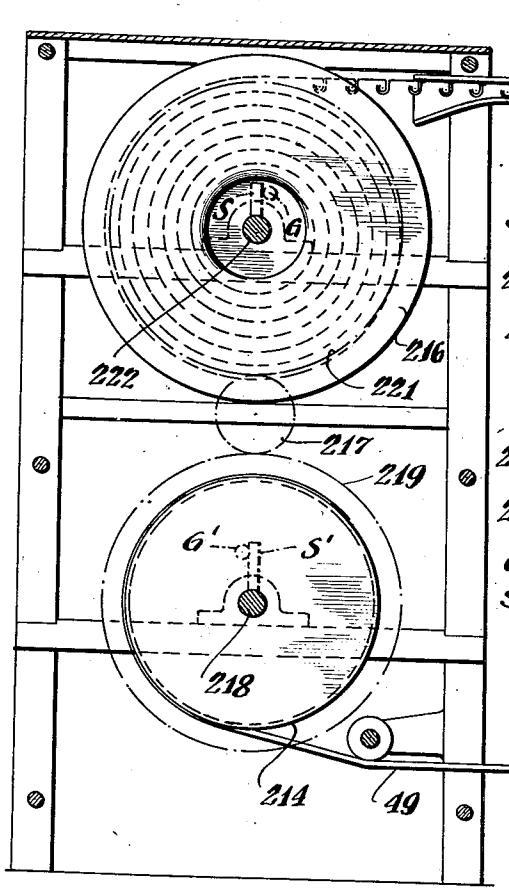


Fig. 14

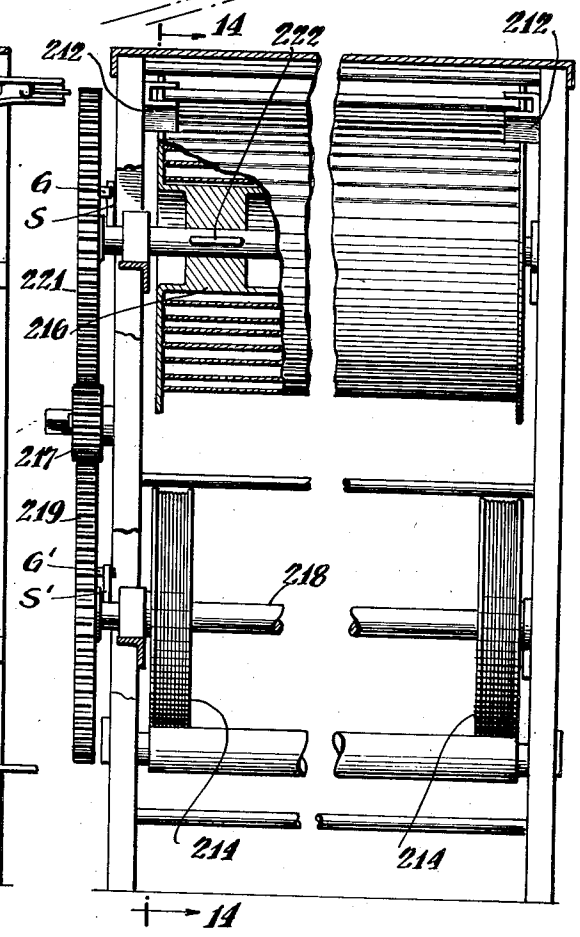


Fig. 15

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Patented Jan. 30, 1940 2,188,509

UNITED STATES PATENT OFFICE

2,188,509

ESCALATOR COVER

William L. Kavanagh, New York, and Milton L. Cornell, Jackson Heights, N. Y., assignors to Cornell Iron Works, Inc., Long Island City, N. Y., a corporation of New York

Application May 14, 1938, Serial No. 207,992

12 Claims. (Cl. 189—57)

This invention relates to slidable curtains or covers for Escalator or stair wells, and to means for operating them.

General objects of the invention are to provide Escalator curtains and associated operating mechanism having novel features of construction affording new and superior performance characteristics.

Sliding Escalator covers comprise flexible fireproof curtains generally formed of jointed sheet metal sections. These covers are guided along the opposed rails at the head of the stair well, the major portion of their travel being along a substantially horizontal traverse. For this reason, the weight of the curtain cannot be utilized to move it in one direction, as is the case with vertically hung rolling doors, but instead means must be provided to drive the curtain positively both to closed and open positions. This means may comprise separately driven winding and unwinding reels with suitable cables, as shown and claimed in a copending application of Milton L. Cornell and John B. Cornell, Serial No. 144,844, filed May 26, 1937. This entails use of separate winding and unwinding cranks. It is more advantageous to couple the winding and unwinding means for operation from a single crank, since then they cannot get out of phase so as to jam, and the arrangement is easier to understand and to operate. But if the separate reels are directly driven from the same crank, that is at correlated uniform speeds, difficulty is encountered because, as will later be pointed out more clearly, the periphery or circumference of the coiled portion of the curtain increases or diminishes as the curtain is wound or unwound, so that the curtain reel must be rotated at different angular speeds with reference to the speed of the unwinding reel.

One object of the present invention is to provide improved means for driving curtain winding and unwinding devices from a common operating crank, while providing for varying angular speeds of rotation of one commonly driven device as compared with the other.

Governing boards charged with maintaining fire regulations prefer to have Escalator covers equipped with a simple pull rope or chain so that anyone seeking to close them in an emergency may do so by this obvious means without searching for or selecting the proper operating crank. But in the case of a cover having reeled cables for moving it to closed position, the cables are liable to be snarled if the cover is pulled closed by a separate emergency pull-rope. For this reason, among others, it is desirable to avoid use of operating cables.

Further objects of this invention are to provide improved cover operating means avoiding the use of cables with their attendant problems, and having a much simpler and more direct action.

More particularly, objects of the invention comprise provision of a flexible curtain coiled on a winding reel and means for engaging the curtain to push it along its guides to closed position, in which both the winding reel and pushing means are operable from a common drive and have means compensating for the tendency of the coiled curtain to move at changing peripheral speeds as the thickness of the coil varies. The invention further contemplates driving the curtain winding reel through a yieldable tensed spring which permits the peripheral curtain speed to vary with respect to the driving speed and has the added advantage of winding the curtain coils under tension so that snug coiling of its several convolutions is assured.

Another object of the invention is to provide a heat responsive automatic drive for operating such a curtain pushing device to close the curtain automatically in case of fire.

Yet another object is to combine with a flexible curtain having tooth-like ribs or projections on its body portion, a pushing device comprising a toothed driving wheel meshing with the ribs on the curtain.

Additional objects are to provide an Escalator closure and operating means therefor having the above or other advantageous features which is simple and rugged in construction and operation, is capable of being mounted compactly in available building spaces, and which works smoothly and surely without getting out of order.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a top plan view of an Escalator cover installation, embodying features of the invention and showing the sliding curtain in closed position;

Fig. 2 is a longitudinal vertical sectional view through the structure shown in Fig. 1;

Fig. 3 is a fragmentary side elevation, on an enlarged scale, showing a preferred form of flexible curtain employed in the present invention;

Fig. 4 is a vertical longitudinal sectional view, on an enlarged scale as compared with Figs. 1 and 2, showing a detail of the structure at the left side of Fig. 2 with the curtain indicated as being partially coiled about its winding reel;

Fig. 5 is a fragmentary plan view, on an enlarged scale, of curtain winding and unwinding mechanism embodying features of the invention, parts being broken away better to reveal the construction;

Fig. 6 is a vertical longitudinal sectional view of the structure shown in Fig. 5;

Figs. 7 and 8 are respectively fragmentary end and side elevations showing another form of operating mechanism similar to that shown in Figs. 5 and 6;

Fig. 9 is a side elevation of a device such as that of Fig. 5 equipped with an automatic fire control embodying features of the invention;

Fig. 10 is a vertical transverse sectional view along line 10—10 of Fig. 9;

Fig. 11 is a detail, on an enlarged scale, along line 11—11 of Fig. 10;

Fig. 12 is a sectional view taken on line 12—12 of Fig. 10 of a speed governing mechanism used on the structure of Figs. 9 and 10;

Fig. 13 is a somewhat diagrammatic representation of another form of Escalator cover installation embodying features of the invention;

Fig. 14 is a vertical longitudinal sectional view, on an enlarged scale, showing the curtain winding and unwinding mechanism of Fig. 13, taken along line 14—14 of Fig. 15; and

Fig. 15 is a contracted end elevation of the mechanism shown in Fig. 14, parts being broken away better to reveal the construction.

Referring more particularly to the drawings and first to Figs. 1 to 4, there is shown an Escalator installation involving a stair well 10, over the upper end of which a closure is provided. This closure includes opposed rails 11 along the upper and end edges of which opposed channel-shaped guideways 12 are mounted to receive a sliding curtain 13. The major portion of these guideways occupies a horizontal plane, there being a short vertical traverse adjoining such horizontal traverse at one end of the stair rail and meeting the floor. In order to move a flexible curtain along these guides between closed position in which it abuts the floor and open position in which it is retracted to clear the stair well, some positive driving means must be provided to effect both movements.

In the presently described form, the means for moving the curtain to closed position comprises a pushing wheel 14 which engages it. A preferred type of curtain for use with such a pusher is shown in Fig. 3 and comprises a plurality of sheet metal sections each having downwardly extending ribs 13' flexibly articulated with corresponding ribs on adjacent sections so that the curtain is sufficiently flexible to coil on a winding reel and also to traverse its path along the curved parts of guides 12. It will be seen that the interfitted ribs 13' provide a series of tooth-like projections so that one surface of the curtain is of crenellated form, and advantage is taken of this by making the pusher 14 in the form of a toothed driving wheel adapted to mesh with the teeth or ribs 13'. For the sake of quiet operation, the pusher is preferably made of tough wood, fibre or other suitable composition, although it also may be of metal, if desired. Any number of pushers may be employed, two being shown in the present illustrative embodiments. Preferably, rollers 15 ride above the curtain adjacent the pushers to keep these parts constantly in engagement.

Other suitable forms of flexible fire-proof curtains may be employed, and other types of pushing devices. For example, the curtain may be equipped with sprocket chains along its sides and the pusher may be a sprocket engaging these, or special toothed projections may be mounted on the curtain sections for cooperation with the pusher, if the curtain does not already have suitable ribs or crenellations.

The curtain has one end attached to a winding reel or drum 16 about which it coils. In a preferred form of curtain, each of the sections shown in Fig. 3 measures in cross-section about 1¼ x ½ inches, and many other forms capable of being used have an appreciable thickness on this order or even larger. Since a typical installation requires about seven or eight convolutions of a conveniently sized winding drum to bring the entire curtain into coiled position, the extent of the periphery of the outermost convolution will change constantly as the reel rotates, as will be apparent, for example, from Fig. 4. In closing the curtain the pusher 14 is rotated in a clockwise direction as viewed in Fig. 4 so as to pull it from the reel 16. In retracting the curtain, the drive must be effected through the reel 16 which is rotated in a counter-clockwise direction. Rotor members such as 14 and 16 could be independently operated by separate driving cranks, but this is inconvenient or confusing and might lead to other difficulties occasioned by improper correlation of the two rotors. In the present case, means is preferably provided for driving both the pusher 14 and retracting reel 16 from a common hand crank 17, or other suitable driving means, such as a motor (not shown) which may conveniently be attached to the shaft 18 to which the pushers 14 are keyed. When the driving system for the rotors is turned, as by applying power to pusher 14, the curtain must always move at the peripheral speed of such pusher 14 with which it is in mesh, so that means must be provided for changing the relative angular speed of rotation of the winding rest 16 as compared with that of the pusher 14 because of the constantly changing peripheral extent of the outermost convolution of the curtain coiled on the reel.

Referring now to Figs. 5 and 6, two closing pushers 14 are keyed on their shaft 18 so as to mesh with the curtain near its opposite edges. Shaft 18 is journaled on suitable rails or framing and has a sprocket 19 keyed to it. This sprocket is connected by means of a drive chain 20 with a second sprocket 21 from which the winding reel 16 is driven. The sprockets respectively act as drivers for their associated winding reels or rotors, and when coupled form a common or unitary driving system from which the curtain rotors obtain power. The sprocket 21, as shown illustratively, is somewhat larger than sprocket 19 so that it rotates more slowly, while the winding reel 16 may be about the same diameter as the pushing wheel 14. The winding reel 16, to which the end of the curtain is attached, is fixed to a shaft 22 journaled in the frame and having the sprocket 21 freely rotatable thereon. A

spiral spring 23, coiled outwardly to the left as viewed in Fig. 6, connects the reel shaft 22 and the sprocket 21, being enclosed in a suitable housing 24 which may be cast integrally with the sprocket. Of course, the spring connection between the reel and its driver may be effected in any other suitable or desired manner, so long as these parts are coupled in the described functional relation.

The spring 23 is pre-loaded so as always to be under tension so that if the sprocket 21 is held relatively fixed the spring tends to rotate the reel shaft 22 in a counter-clockwise direction (Fig. 6) and thus tends normally to wind the curtain on the reel. However, since the spring 23 also tends to move the sprocket 21 in a clockwise direction, if the shaft 22 be regarded as stationary, and since this tendency toward clockwise rotation is transferred to the pusher wheel 14 by the sprocket chain 20, it will be seen that the normal tendency of the spring to cause the curtain reel to wind up is counteracted by the pusher 14 which is urged in the opposite direction from the other end of the spring, so that the system is normally in equilibrium with the portion of the curtain extending between the pusher and the winding reel as indicated at T being under tension.

Assuming that the curtain is in closed position and is to be retracted, the crank is turned so as to rotate drive shaft 18 in a counter-clockwise direction (Fig. 6). The curtain at this time will be substantially all paid out as indicated in Fig. 2 so that there will probably be less than one convolution on the winding reel 16. This reel, being about the same diameter as the wheel 14 would, if driven directly from the sprocket 21, without the interposition of the spring 23 or equivalent means, travel with a somewhat slower peripheral speed than wheel 14 because of the difference in driver sprocket sizes. Since the curtain is being delivered into the reel at the peripheral speed of the wheel 14, the spring 23 will at first speed up the angular rotation of the shaft 22 with respect to that of the driven sprocket 21, assuring that the curtain will be snugly wound around the reel. As more convolutions wind on the reel, a point will be reached at which the peripheral speed of the curtain on the reel will naturally match that of the wheel 14. Beyond this stage as the diameter of the inwinding curtain continues to increase, the periphery of the outermost convolution will be so much greater than that of the wheel 14 that rotation of the sprocket 21 will have a tendency to draw in the curtain faster than it is being delivered by the wheel 14. This tendency is offset by the flexing of the spring 23 which permits the rotation of the reel 16 to slow as compared with the angular speed of the sprocket 21, while the spring is wound up more tightly, thus recovering the stored energy which is yielded during the initial portion of the winding operation.

When the curtain is to be pushed into closed position, the crank shaft 18 is rotated in a clockwise direction and a substantially reverse spring action occurs. In either event, the linear speed of the moving curtain matches the peripheral speed of the pusher wheel 14 and if the latter is regarded as rotating at a uniform angular rate, the spring acts to produce or permit a differential in speed, that is, to vary the angular rate of rotation of the reel 16 so that the peripheral speed of the outermost convolution properly matches that of the pusher wheel.

This spring loaded feed permits or causes a necessary adjustment of one of the commonly driven winding devices to the other much as though the latter were each driven through suitably directed one-way clutches, but the described apparatus is superior to such a free clutch arrangement because it always tends to wind the curtain in snugly against the winding reel as it is paid out from the pusher wheel and thus prevents coasting and sagging of the curtain while it is being coiled. This is of added value if the inwinding curtain has a vertical traverse, as in the modification next described, since the weight of such vertically extending portion of the curtain militates against snug coiling.

In Figs. 7 and 8 a somewhat similar winding and unwinding arrangement is shown in which the pusher wheels 114 are arranged more or less vertically above the winding reel 116. This is because in many cases limited building space calls for such compacting of the operating parts lengthwise of the apparatus. Here the curtain 13 is attached to the winding reel 116 which is fastened to a shaft 122. A gear 121 is freely rotatable on shaft 122 and is connected thereto by a coil spring 123. The gear 121 is rotated by a driving pinion 117 which also rotates a gear 119 fixed to the shaft 118 bearing the pusher wheels 114. Here the relative sizes of the gears are such as to drive them at the same angular speed of rotation and the diameter of the winding reel may be about the same as that of the pusher wheel. With this arrangement, the operation of winding up the curtain will cause the spring to become coiled more tightly thus permitting a lost motion by which the speed of rotation for shaft 122 and reel 116 is reduced as compared with the speed of rotation of the pusher 114. In this winding operation, the driving impetus on the curtain is provided by the winding reel which rotates as fast as it is permitted to by the delivery of curtain from the pusher wheel but not so fast as the driving gear 121. During the reverse curtain closing operation, the spring releases the energy thus stored by gradually slowing the turning of the reel shaft 122 angularly with respect to the uniformly turning gear 121, which is now rotating in a clockwise direction (Fig. 8).

Since the weight of the curtain at T and along the under half of the reel tends to cause coasting and sagging, the presence of the constantly tensioning spring during coiling is advantageous in assuring proper winding and avoiding jams.

Of course, the arrangement and sizes of the gearing or sprockets connecting the pusher and the winding reel and the relative sizes of the latter parts may be varied within reasonable limits, the interposed springs being always arranged to assure the proper corresponding peripheral speeds of the pusher and the outer convolution of the coiling curtain.

In Figs. 9 to 11, there is shown an illustrative device for moving the pusher so as to close the curtain automatically in case of fire. Here the normal operating mechanism is shown as being the same as that in Figs. 5 and 6, comprising pushers 14 and operating crank 17, sprockets 19 and 21 connected by a sprocket chain 20, and a winding reel 16 which is spring loaded on the sprocket 21 in the above described manner. The shaft 18 bearing the pushers has connected to it additional gears 25 which mesh with gears 26 fastened to a normally freely rotating outer drum 27. This drum 27 rotates on roller bearings upon

an inner drum 28 which is spring loaded for rotation when released but which is normally held still. The stored spring energy which is used to close the curtain is provided by a helical spring 29 having one end anchored to a fixed seat 30 on a shaft 31 which is mounted on a suitable bracket on the frame and is always held against rotation. The shaft 31 has a free end over which a sleeve 32 is rotatably telescoped. This sleeve carries the other end of the spring 29, which normally would tend to rotate it except for the heat responsive check about to be described. The inner drum 26 is fixedly attached to sleeve 32 and to a journal 33 which is also rotatable on the shaft 31. The sleeve 32 has fixed to it an extension shaft 34 which passes through and rests in a suitable bearing on the frame.

Keyed to the outer end of the extension shaft 34 is a trigger disc 35 having a series of detent pockets 36 around its rim. In one of these pockets, a pawl detent 37 is held by a bell crank support 38 which is normally held in erect position by a fuse chain 39 having one or more suitably located heat fusible links 40. If such a link fuses, the weight 41 is permitted to drop, thus releasing detent 37 from its pocket 36 and permiting the disc 35 and shaft 34 to rotate under impulsion of spring 29, which also rotates the inner drum 26 on the shaft 31.

Rotation of the inner drum and of its shaft 34 is imparted to the normally free outer drum 27 by a centrifugal starter 42 fixed to shaft 34 and best shown in Fig. 11. This starter comprises a round plate 43 having integrally cast lugs 44 on it adjacent which are pivoted swinging arms 45 normally held inwardly away from lugs 44 by weak springs 46. When the shaft 34 begins to spin upon release of detent 37, these arms fly outwardly until they rest directly against their adjacent lugs 44 and one or the other of them extends into the path of and picks up a finger 47 fixed to the outer drum 27. Such outer drum is thereafter rotated by the spring 29 so that the meshed gears 26 and 25 act to turn drive shaft 18 and close the curtain by means of the pushers 14. Preferably, a suitable friction type governor 48 is meshed with one of the rotating parts such as drum 27 to prevent the curtain from being closed too suddenly or jammed.

To prevent harmful effects of too sudden an application of the emergency spring driving force to the curtain, cushioning means is preferably interposed between such driving spring and the curtain pushers 14. This means may conveniently comprise a pair of helical springs 25' respectively coupling the gears 25 with shaft 18, the gears being free to rotate on the shaft, except for this spring coupling. The springs 25' also serve to hold the gears 25 against collars on the shaft to control their lateral positions.

The fuse detent structure and the centrifugal starter substantially follow the construction of similar parts shown in U. S. Patent 1,530,652, issued to Milton L. Cornell, March 24, 1925, while the friction governor 48 may desirably be of the kind shown in the mentioned copending application, Serial No. 144,844. These parts may follow other conventional or suitable designs and do not, per se, form a part of the present invention except in so far as they are used in novel combinations herein.

In Figs. 13 to 15, another embodiment of the invention involving a common winding and unwinding driving system and associated means for compensating for variations in the curtain periphery is shown. Here, the unwinding means involves pull cables instead of a pusher.

Referring to Fig. 13, this form of installation involves opposed side rails 211 positioned at the head of the stair well and bearing opposed channel-shaped guides 212 in which the flexible curtain 213 travels. The curtain, when in open position, is coiled on a winding reel 216 fixed to a shaft 222 mounted in bearings on the frame. An unwinding cable 49 is attached to each corner of the forward or free terminal edge of a curtain 213 which may be of any suitable flexible type. Each cable is respectively led around one of a pair of pulleys 50 located below the floor level at the forward end of the rails 211 and runs thence to respective winding drums 214 keyed near the opposite ends of a cable drive shaft 218.

As the cable drums are rotated in a clockwise direction (Fig. 14) the curtain is pulled off the reel to closed position and when the winding reel is rotated in a counter-clockwise direction, the curtain is coiled and each cable is paid off its drum. Since the effective winding periphery of the cable drum remains substantially constant, while that of the outermost convolution of the coiled curtain changes, compensating means is provided in order to drive these parts from a common crank.

The drum and reel are driven from a crank which turns a common drive pinion 217 constantly meshing with equally sized gears 221 and 219 which are respectively freely mounted on the curtain drive shaft 222 and the cable drive shaft 218. An axial gear pin G extends outwardly from gear 221 in the path of a radial pin S fixed to the reel shaft 222. On the cable gear 219, there is a similar axial pin G' extending into the path of a radial pin S' on the cable drum shaft 218.

As shown in Fig. 14, the curtain is coiled in open position ready to be drawn closed by the cables 49. The relative positions of the several pins at this time may preferably be as illustrated in Fig. 14, the cable gear pin G' being in driving position against the drum pin S', while the reel gear pin G is to the right of or in a clockwise direction from its associated pin S. The cable drum 214 is of larger diameter than the bare winding reel 216, but is of less diameter than the outermost convolution of the curtain when the latter is fully coiled. As the crank is rotated so as to turn the cable gear 219 in a clockwise direction, the gear pin G' picks up the cable drum pin S' and rotates the drums so as to wind in the cable. When gear 219 has been rotated one revolution the similarly sized curtain gear 221 also will have rotated one revolution in a clockwise direction, carrying its pin G along with it. The curtain shaft 222 and its pin S, however, will not travel a complete revolution during the first turn of the cable drum since the periphery of the later is less than that of the outermost curtain convolution. For this reason, the curtain gear pin G will leave the shaft pin S somewhat behind and will continue to gain on such pin until a point is reached at which the peripheries of the outermost curtain convolution and of the cable drum match. From this point onwardly each single revolution of the cable drum will pull off more than one turn of curtain from the winding reel so that during this portion of the curtain closing operation the curtain shaft pin S will catch up with the gear pin G. Preferably, the relative sizes of the winding reel and cable drum, of the driving gears, the number of curtain revolutions

needed, and the dimensions of the curtain are so correlated that the several pins will reach their abutting relation as shown in Fig. 13, both at the beginning and ending of an unwinding operation.

During the curtain winding operation, substantially a reversed action of the several pins occurs. The curtain gear 221 now drives and is rotated in a counter-clockwise direction (Fig. 14) driving the shaft pin S and turning the winding reel 216, which at the end of its first revolution will have pulled in less than a full turn of cable on the drum 214, since the latter is larger than the bare winding reel. For this reason, the drum gear pin G' will move in a counter-clockwise direction ahead of the drum shaft pin S' for a while until the curtain roll diameter eventually matches and finally surpasses that of the cable drum, after which pin S' will regain its initial position ready for the next unwinding operation.

While it is desirable to arrange the dimensions of the several parts so that the proper pins will be in driving engagement at the beginning and end of each operation, this is not strictly necessary so long as the discrepancy in position between a given gear and its associated reel or drum is kept within a single revolution during a complete closing operation, and this is quite easy to control through the relative proportioning of the cable drum and curtain reel.

With this common drive of the winding reel and unwinding cable, there can be no snarling of the cable 49 if the curtain 213 is pulled down by hand or by an emergency pull chain attached to its front edge, since such unwinding of the curtain reel acts to wind up cable drum through the intermediate drive pinion 217. The arrangement is also economical, compact and easy to operate.

The described embodiments of the invention are severally, and to some extent interchangeably, capable of performing their intended functions. Thus it is obvious that the common driving system for the winding and unwinding devices in any of the several illustrated embodiments may comprise the sprockets and chain of Fig. 5, the intermeshed gearing of Figs. 7 or 14, or any similar inter-coupled driving arrangement. Also, while in Figs. 5 and 14 the compensating loose-motion connection has been shown between the reel and reel driver, as is preferred, certain benefits of the invention are also attainable by locating this loose-motion connection between the pusher wheel and its driver, in which case the winding reel may be directly coupled with the driving system. Both cable driven and pusher wheel unwinding devices have been provided in common driving relation with a winding reel, together with compensating means for "matching" the speeds of the reel periphery and the unwinding means sufficiently closely substantially to eliminate objectionable free play. The spring compensator of Figs. 5 or 7 can be substituted for the one-way pin drives of Fig. 14 if desired, thus giving a compensated cable driven arrangement in which either the winding reel or unwinding cable drums may be spring coupled to their associated drivers. The compensating spring used in any of the described forms may be coupled in proper functional relation between a curtain moving reel, wheel or drum and its associated driving means in any suitable way, and such spring may be of the illustrated spirally coiled form or may be helical in other suitably designed specific arrangements following the presently taught principles. Such various embodiments and utilizations of these principles are all understood to fall within the purview of the invention, and within the scope of the claims whenever their context permits.

It will be seen that in all of the forms described the structural features are well suited to fulfill intended objects of the invention, and, since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described our invention, what we claim as new and desire to secure by Letters Patent is:

1. An Escalator cover comprising a flexible curtain adapted to be moved between open and closed positions over a stair well, curtain moving means including a winding reel for said curtain and a device for both winding and unwinding said curtain on said reel whereby said curtain is moved into closed and open positions, a reel driver, a driver for said device, means directly coupling said drivers at all times for movement in unison, and a yielding motion connection between at least one of said drivers and its associated curtain moving means enabling said reel and device to travel at matched curtain moving speeds at all times.

2. An Escalator cover comprising a flexible curtain adapted to be moved between open and closed positions over a stair well, curtain moving means including a winding reel for said curtain and a device for both winding and unwinding said curtain on said reel whereby said curtain is moved into closed and open positions, a reel driver, a driver for said device, means directly coupling said drivers at all times for movement in unison, and compensating means for adjusting the peripheral speed of the curtain coiled on said reel to the linear speed imparted to the curtain by said device.

3. An Escalator cover comprising a flexible curtain adapted to be moved between open and closed positions over a stair well, curtain moving means including a winding reel for said curtain and a device for both winding and unwinding said curtain on said reel whereby said curtain is moved into closed and open positions, a common driving system acting concurrently on both reel and device to drive them in either direction, and compensating means between said driving system and said curtain moving means for matching the peripheral speed of the curtain coiled on said reel with the linear speed imparted to the curtain by said device.

4. An Escalator cover comprising a flexible curtain adapted to be moved between open and closed positions over a stair well, a winding reel for said curtain, pushing means for both winding and unwinding said curtain from said reel, and spring means normally biasing said reel in a curtain winding direction opposed to said unwinding means.

5. An Escalator cover comprising a flexible curtain adapted to be moved between open and closed positions over a stair well, a winding reel

for said curtain, an actuating wheel coupled for both winding and unwinding said curtain on said reel whereby said curtain is moved into open and closed positions, common drive means coupled with said reel and wheel, the means coupling said reel with the drive means including a spring normally biasing said reel in a curtain winding direction.

6. An Escalator cover comprising a flexible curtain adapted to be moved between open and closed positions over a stair well, a winding reel for said curtain, an unwinding wheel for positively pushing said curtain on said reel into both open and closed positions, a reel driver, a driver for said unwinding wheel, common actuating means moving said drivers in unison, and a tension spring connecting said reel and its driver arranged to cause the peripheral speed of the curtain coiled on said reel to match the linear curtain speed imposed by said unwinding wheel.

7. An Escalator cover comprising a flexible curtain adapted to be moved between open and closed positions over a stair well, a rotatable shaft, a winding reel for said curtain fixed on said shaft, a rotating winding and unwinding device for positively pushing said curtain on and off said reel, a rotating driver freely mounted on said reel shaft adjacent said reel, means for turning said driver uniformly with respect to said unwinding device, and a yielding-motion connection between said driver and reel enabling the peripheral speed of the curtain coiled on said reel to match the linear curtain speed imposed by said unwinding device.

8. An Escalator cover comprising a flexible curtain adapted to be moved between open and closed positions over a stair well, a rotatable reel shaft, a winding reel for said curtain fixed on said shaft, a second shaft having an activating wheel fixed thereon and arranged for positively pushing said curtain relative to said reel into both open and closed positions, a driver fixed to said second shaft, a reel driver free on said reel shaft, means for rotating said drivers in unison, and a coil spring interposed between said reel driver and reel and arranged to permit or cause the peripheral speed of the curtain coiled on said reel to match the linear curtain speed imposed by said unwinding wheel.

9. An Escalator cover comprising a flexible curtain adapted to be moved between open and closed positions over a stair well, a winding reel for said curtain, a driver for said reel, means for unwinding said reel including an unwinding wheel, a driver for said wheel, means directly coupling said drivers for movement in unison at all times, a one-way driving connection between said reel driver and reel operable only when said drivers are turned in a curtain winding direction, and a one-way driving connection between said wheel driver and wheel operable only when said drivers are turned in a curtain unwinding direction.

10. An Escalator cover comprising a flexible curtain adapted to be moved between open and closed positions over a stair well, a winding reel for said curtain, an unwinding cable attached to said curtain for pulling it off said reel, a curtain unwinding cable drum for taking in and paying out said cable, a common drive system for said reel and said drum, and loose motion driving connections between said system and said reel and drum enabling the latter to turn at relatively different angular speeds of rotation corresponding with the linear speed of said curtain at any time.

11. An Escalator cover comprising a flexible curtain adapted to be moved between open and closed positions over a stair well, a winding reel for said curtain, an unwinding cable attached to said curtain for pulling it off said reel, a curtain unwinding cable drum for taking in and paying out said cable, a rotary reel driver and a rotary drum driver, common means coupling said drivers for movement in unison, means causing said reel driver to pick up and drive said reel only when said drivers are turned in a curtain winding direction, and means causing said drum driver to pick up and drive said drum only when said drivers are turned in a curtain unwinding direction.

12. An Escalator cover comprising a flexible curtain adapted to be moved between open and closed positions over a stair well, a winding reel for said curtain, an unwinding cable attached to said curtain for pulling it off said reel, a curtain unwinding cable drum for taking in and paying out said cable, common driving means for acting on both said reel and drum, and compensating means for matching the peripheral speed of the curtain coiled on said reel with the linear cable speed at all times.

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