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D. D. SWENEY

2,158,682

SHUTTER

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2 Sheets-Sheet 1

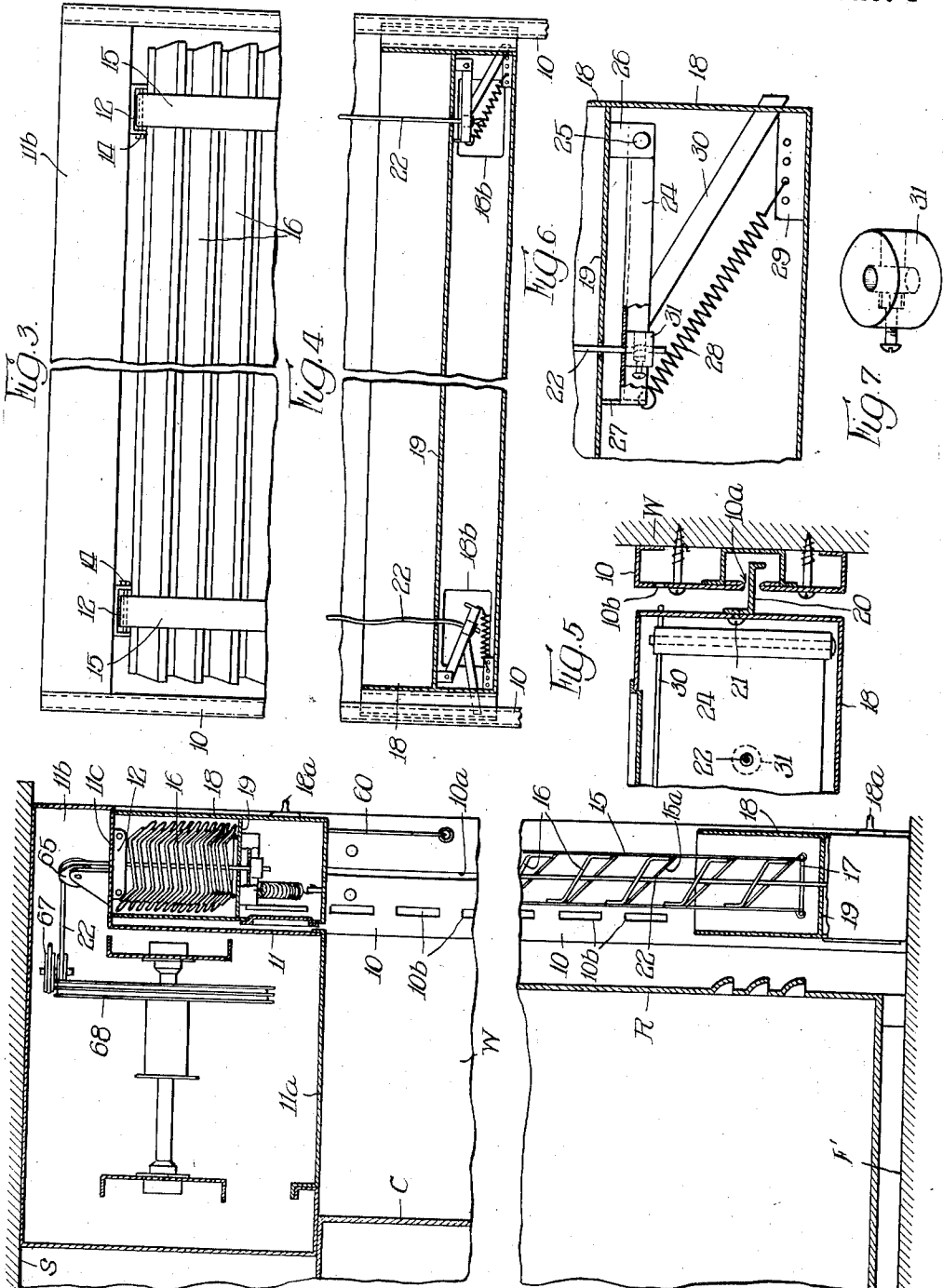


Fig. 1

Fig. 2

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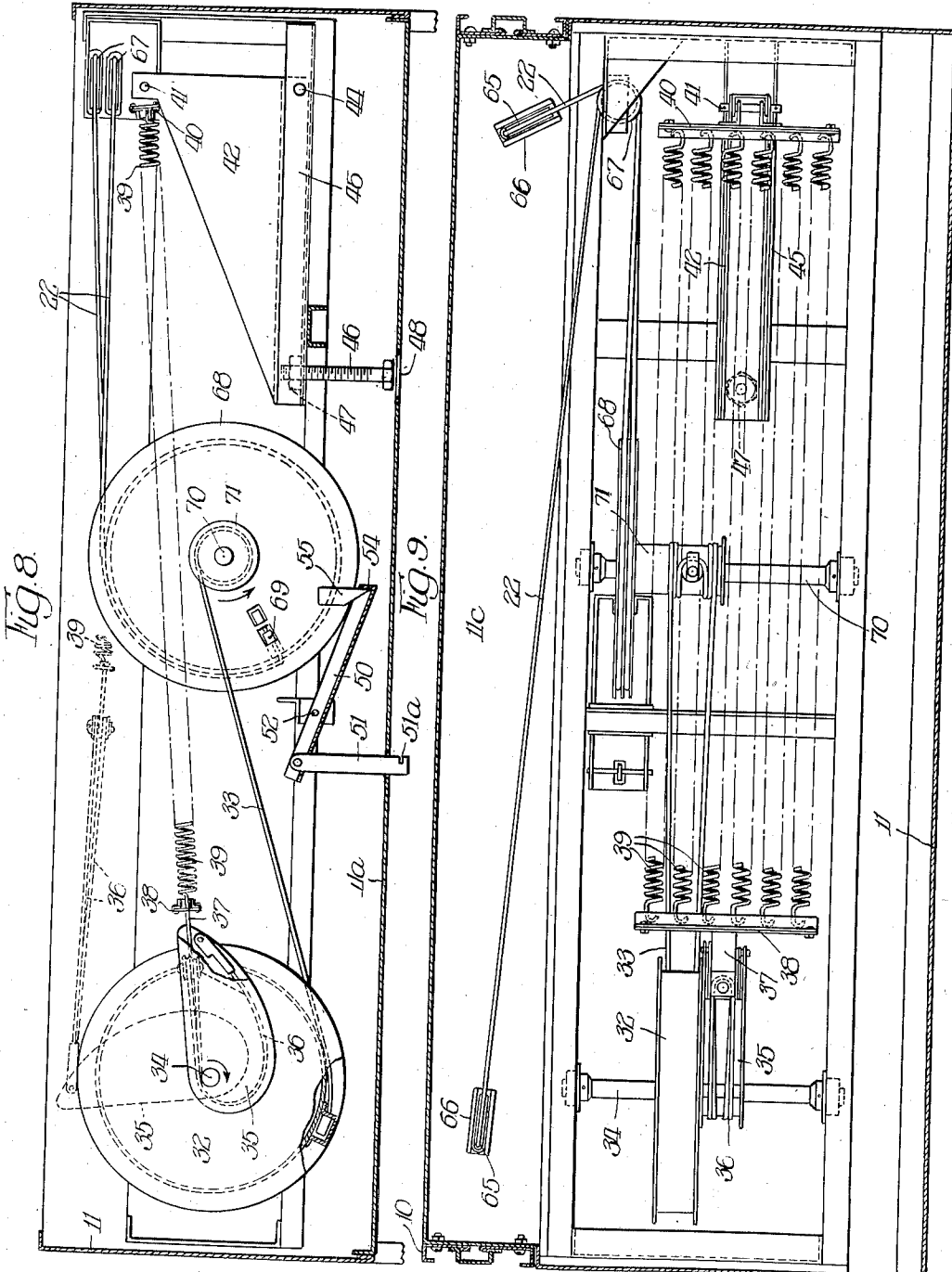
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UNITED STATES PATENT OFFICE

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SHUTTER

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12 Claims. (Cl. 189—60)

This invention relates to improvements in closures, in the nature of screens or shutters, for use in buildings. The shutter construction which constitutes the subject matter of the present invention is designed particularly for use as an interior closure or screen for closing off or concealing an alcove, closet, or the like, from the room into which it opens, but, of course, may be employed in other locations.

Many apartment buildings are designed to provide small housekeeping apartments in which the kitchen, or kitchenette, is confined to a small space, frequently in the nature of a comparatively shallow alcove or offset from a living room, entrance hall, or the like. It is quite desirable that means be provided for closing off or screening such alcoves from the connecting room in order to conceal its equipment or contents, but due to limitations of space, the use of swinging doors, curtains, or the like is undesirable because of their restriction of the entrance space to the alcove or encroachment on space in the room or the alcove which is required for other purposes. The width of such kitchenette alcoves runs from a minimum of about 39 inches to a maximum of about seven feet, and their depth may be as little as three feet. In such a kitchenette of average width, which is about six and a half feet, it is customary to install a small gas range, mechanical refrigerator and sink, and various cabinets or cupboards above them.

The general object of the present invention is to provide a shutter or closure installation which is adapted to afford an effective and slightly screen for such an alcove and which, when it is in open position, does not encroach upon the floor space or wall space of the alcove or adjoining room.

Another object is the provision of such a closure or shutter which is susceptible of being operated very easily in moving it to open and closed positions, which is substantially "foolproof", and which affords effective safeguards against injury to persons or equipment incident to its operation or in event of its disablement.

Another object is the provision of such a closure which is fireproof and which may be moved to open or closed position with safety while the gas range is operating, and which, in its closed position, permits desirable access of ventilating air to the alcove and to the gas range and mechanical refrigerator housed therein.

Yet further objects are the provision of such a closure which can be matched well with the room trim, which may be easily installed as a piece of

equipment in a completed building without requiring any cutting or modification of the building structure, which is readily removed or dismantled for purpose of cleaning, and which is, for the most part, effectively concealed and housed, when in closed position, so that its surfaces are not exposed to the fouling effect of vapors arising from the cooking.

Other objects and advantages of the invention will be pointed out or indicated hereinafter, or will be apparent from the following description.

For purpose of aiding in an explanation of the invention I show in the drawings forming a part of this specification, and hereinafter describe, one embodiment of it. It is to be understood, however, that this is presented merely for purpose of illustration and is not to be construed in any fashion for the purpose of limiting the appended claims short of the true and most comprehensive scope of the invention in the art.

In said drawings,

Fig. 1 is an elevational section of the upper portion of an alcove equipped with a closure or shutter constituting the subject matter of the present invention, the shutter installation being shown in the open or fully elevated position;

Fig. 2 is a similar elevational section of a lower portion of the alcove, showing portions of the shutter or closure in the closed or fully lowered position;

Fig. 3 is a broken front elevational view showing the upper portion of the shutter in the lowered or closed position;

Fig. 4 is a broken vertical section taken longitudinally of the shutter carrier;

Fig. 5 is a horizontal section through an end portion of the shutter carrier and the associated guide;

Fig. 6 is a front elevational view of one of the safety stops;

Fig. 7 is a perspective view of a form of clamp for securing the suspension cables of the shutter carrier;

Fig. 8 is a rear elevational view of the shutter operating and counterbalancing mechanism, some of the parts being shown in section; and

Fig. 9 is a top or plan view of the shutter operating and counterbalancing mechanism.

As may be ascertained from the following detailed description of the embodiment here illustrated, the closure constituting the subject matter of the present invention is somewhat in the nature of the conventional Venetian blind, in the particulars that the screen is comprised of slats which are carried on ladder tapes or the like that

are suspended at their upper ends. With this blind or screen is associated a vertically slidable carrier which affords a compartment in which the slats are collected, one upon another, as the carrier is raised, and from which they are withdrawn by the tapes as the carrier is lowered. In the upper limit position of the carrier, the compartment in which the slats and tapes are gathered is completely closed, so that they are fully housed and protected from fouling by vapors, smoke, and dust-carrying air currents. The carrier normally is supported by suspension cables which are acted on by a counterbalancing mechanism which automatically varies the counterbalancing power exerted on the carrier as the weight imposed on it is increased or decreased incident to its upward or downward movement. The carrier is guided in its vertical movement by suitable guiding means at its ends, and it is equipped with safety catch devices which operate automatically to prevent its falling in event it is not sustained by the suspension cables, or to support it when desired.

The illustrative embodiment shown in the drawings will now be described in detail.

Referring first to Fig. 1, let it be understood that this represents an upper portion of an alcove equipped as a kitchenette or the like, the entrance to the alcove being at the right of the figure. Fig. 2 represents a lower portion of the alcove directly below the portion illustrated in Fig. 1. The object designated by the reference character C may be regarded as representing an upper portion of a cabinet or cupboard in the alcove, and that designated by R as representing a portion of the casing or cabinet of a mechanical refrigerator housed in the alcove. The ceiling of the alcove is indicated at S and the floor at F and a side wall at W.

To the opposite wall portions at the entrance of the alcove are affixed vertically extending guides 10, which extend from the floor almost to the ceiling. These guides are shown in Fig. 3, and one of them is shown in cross section in Fig. 5. They afford vertically extending slotways 10a and a vertically running series of stop openings 10b.

In the upper front portion of the alcove and extending across its width is installed a metallic housing 11 having a removable bottom closure 11a and a forwardly jutting portion 11b which has a bottom wall 11c. This housing constitutes a unit in which the operating and counterbalancing mechanism is mounted and carried. Ears or brackets 12 are secured to the bottom wall 11c and in these are mounted removable pins 14 on which the ladder tapes 15 of the screen are hung. There are two or more pairs of these ladder tapes, depending on the width of the screen, and they are of conventional form and, if made of fabric, may be impregnated or treated, in a suitable known manner, to render them fireproof. The screen slats 16 are made of light sheet metal, of length to extend almost completely across the entrance opening of the alcove. Preferably they are of somewhat Z-shape in cross section, as illustrated in Fig. 2, so that, when the screen is hanging, their marginal flanges rest against the vertical tapes and they are supported on the cross tapes 15a in such fashion that, while spaced vertically apart from one another, they form a continuous screen which conceals the interior of the alcove. The lower end of the screen is free, the vertical tapes being connected in pairs at their lower ends by suitable rigid spacers 17.

The carrier 18 is in the nature of a narrow sheet metal box closed at the bottom, sides and ends, and subdivided by a partition 19 into an upper or screen housing compartment, which is open at its top, and a lower or stop housing compartment. The carrier extends across the alcove entrance, and at its ends carries demountable guide cleats 20, which are detachably secured to it by screws 21 (see Fig. 5). These cleats ride in the vertical guide slots 10a of the guides 10, so that the carrier is movable upwardly and downwardly in a vertical plane below the screen formed of the ladder tapes 15 and slats 16.

The carrier 18 is suspended on suspension cables 22, which run from the counterbalancing mechanism downwardly through apertures in the housing wall 11c and through apertures in the slats 16 and partition 19, there being a suspension cable adjacent each end of the carrier.

Within the lower compartment of the carrier and adjacent each end thereof, is a plate 24 which is hinged at 25 in a bracket 26, so that it may swing upwardly until stopped by abutment of its flange 27 against the partition 19, or downwardly toward the bottom and adjacent end wall of the carrier. A spring 28, which is anchored in a plate 29, tends to swing the inner end of the plate 24 downwardly. Rigidly secured to the plate is a stop bar 30 which slopes downwardly toward the end of the carrier, its lower end projecting through an aperture in the end wall. The suspension cables 22 pass through apertures in the plates 24, and clamps 31, which are not connected to the plates 24, are secured to the suspension cables below said plates in position such that when the cables are taut, the clamps abut the under sides of the plates 24 and hold them in the upper limit position, against the tension of springs 28, thus causing the carrier to be supported and suspended by the cables. Accordingly, so long as the suspension cables remain taut, the carrier is supported by them, and the catch plates are held in their upper position and the stop bars 30 in their retracted position as shown in Fig. 6 and at the right hand end of Fig. 4. But if either one or both of the cables should be severed, or loosed from its support at its upper end so as to become slack, as illustrated at the left hand side of Fig. 4, the spring 28 will swing the plate 24 downwardly and push the stop bar 30 outwardly so that its projecting end will engage in one of the stop openings 10b of the associated guide 10. The suspension cables 22 slide freely through the apertures in the slats 16 and housing wall 11c, and run over guide sheaves 65 which are journaled in bearing members 66 fixed in the housing portion 11b. Thence they are guided about guide sheaves 67 and onto a winding drum 68, to which their ends are attached by connections 69. Winding drum 68 is fixed to a shaft 70 which is journaled in housing 11, and a motion-reducing drum 71 is also fixed to said shaft.

An actuating drum 32 is fixed to a shaft 34 which is journaled in the housing 11, and an eccentric snail sheave 35 is also fixed to shaft 34 so as to rotate with drum 32. A power-transmitting cable 33 is attached at one end to actuating drum 32 so that it will wind on the periphery thereof, and at its other end it is attached to motion-reducing drum 71 so that it may wind thereon. A tension cable 36 has one end connected to the snail 35, so that said cable will wind on the periphery thereof, and its other end connected to the drag strap 37 of a tension yoke 38. A tensioning means, comprised of a

plurality of parallel helical springs 39, is connected at one end to the tension yoke 38 and at the other end to an anchor yoke 40, which is hinged at 41 to the upper end of an adjusting lever 42. This lever is of bell-crank form and is hinged at 44 in a channel 45 that is fixed in the housing. An adjusting screw 46 is threaded in a nut 47 which is fixed to the channel 45, the upper end of said screw forming an abutment for the lower end of the adjusting lever 42. Said screw is accessible through an aperture 48 in the bottom of housing 11, so that it may be screwed upwardly or downwardly to rock lever 42 on its fulcrum 44 and thereby adjust the tension of springs 39.

A latch device, comprised of a latch lever 59 and detent bar 51, is associated with winding drum 68, the lever 50 being pivoted at 52 so that it may rock in a vertical arc. It has a catch portion 54 adapted to be engaged by a lug 55 which is fixed to the drum 68, to hold the drum against rotation in one direction. The lower end portion of detent bar 51 extends through an aperture in the bottom of housing 11, and it may be operated to swing latch lever 50 for the purpose of positioning the catch 54 in or out of the path of lug 55, and the latch lever may be held in the thrown-off position by engagement of the detent notch 51a of the detent bar with the bottom of the housing. In Fig. 3 the latch is shown in the latching position, but it is normally maintained in the thrown-off position.

In Fig. 8 are shown two positions of snail 35 and tensioning device 39. The solid line position represents that assumed by these parts when the shutter is in the closed or fully lowered position. In this position the tensioning cable 36 is wound around the periphery of the snail 35, and the springs 39 are in their maximum stretched or tensioned condition. The position of the snail 35 and tensioning cable 36 which is shown in dotted lines represents that which they assume when the shutter is in the open or fully elevated position, the cable 36 being unwound from the snail and the springs 39 being in their minimum stretched condition.

The functions of this counterbalancing mechanism are to reel up and unreel the suspension cables 22 incident to the raising and lowering of the shutter, to sustain the shutter at various intermediate elevations, and to facilitate its operation by counterbalancing its weight and varying the counterbalancing power in relation to the increase and decrease of the weighting of the carrier which occur incident to the raising and lowering thereof. As pointed out above, when the shutter is in the closed or fully lowered position, the weight of all of the slats 16 is supported entirely by the ladder tapes. As the carrier is progressively elevated to open position, the slats are picked up in succession from the bottom by the carrier, so that the weighting of the carrier is progressively increased. As the carrier is progressively elevated, the suspension cables 22 are wound on the winding drum 68 which, by the pull of springs 39, is rotated in the direction indicated by the arrow in Fig. 8. The pull of springs 39 is rendered effective on winding drum 68 through the medium of the snail 35, shaft 34, tensioning drum 32, transmission cable 33, motion-reducing drum 71 and shaft 70. Due to the contour and angular position of the snail 35, the torque leverage exerted through it by springs 39 upon shaft 34 is at the minimum when the

carrier is in the fully lowered position, although at that time the tension of springs 39 is at the maximum.

The carrier is elevated manually by drawing it upwardly by means of its handle 18a, such raising of the carrier being accomplished with but slight exertion because of the counterbalancing effect exerted by springs 39 through the mechanism described above. With the progressive upward movement of the carrier, the snail 35 is rotated in the direction indicated by the arrow in Fig. 8, and with such rotation of the snail, the torque leverage exerted by springs 39 on shaft 34 is progressively increased, due to the spiral contour of the snail from which the tensioning cable 36 gradually unwinds. Accordingly, as the carrier is progressively elevated, the effectiveness of springs 39 is commensurately increased, and the additional weight on the carrier, accruing from the picking up of the slats 16, is effectively counterbalanced.

Since the full height to which the carrier is elevated exceeds somewhat the reach of the average person, the contour of the snail is designed so that when the carrier reaches a position of, say, two feet from its upper limit, the torque leverage on shaft 34 is increased at a greater ratio than the additional weighting of the carrier. As a consequence, during the last two feet or so of the upward movement of the carrier, it is automatically lifted by power from the springs until it reaches its upper limit position.

In its upper limit position, which is illustrated in Fig. 1, all of the blind slats are housed within the upper compartment of the carrier and that compartment is tightly closed at the top by the housing wall 11c, so that access of smoke or vapors to the confined blind slats and tapes is prevented. In such position, the entire blind installation is entirely cut of the way and does not encroach upon the entrance space to the alcove or interfere in any manner with use of any of the equipment in the alcove.

If desired, the carrier may be made without any side wall at its side which is toward the alcove. In that case its bottom wall is made of sufficient width to contact the housing 11 when the carrier is in its fully elevated position, so that the contents of the carrier will be completely enclosed, at the top and inner side by the housing and at the front, bottom and ends by the walls of the carrier.

In order to permit the carrier to be drawn down conveniently from its elevated position, it is equipped with a depending pull cord 60 which may be grasped with the hand. After it has been drawn downwardly more than two feet or so, it will remain at any elevation at which it is left, due to the counterbalancing effect of the mechanism above described. As it is drawn down, the blind pays out of the upper compartment of the carrier and the slats assume their normal position as they are withdrawn from it. When drawn fully down, the carrier may rest upon the floor and form, in effect, a continuation of the baseboard trim of the room. In such position it affords an anchorage for the lower end of the screen, due to the fact that the suspension cables 22 act as guides which keep the screen slats in proper alignment vertically. When the carrier is in the lowered position, the suspension cables 22 are held taut by the tension of the counterbalancing springs 39, and the safety catches 30 are accordingly held in their re-

tracted position, as illustrated at the right hand side of Fig. 4.

These safety catches are provided for two purposes, the first being to afford a means for automatically holding the carrier against falling in event either of the suspension cables becomes broken or detached or in event anything goes wrong with the counterbalancing mechanism.

The second purpose is to provide means for holding the carrier in an elevated position, should occasion require. In a closure of this sort, it is quite desirable that the blind be susceptible of removal easily and quickly for purpose of cleaning, refinishing, or the like. With the construction above described, this may be accomplished as follows. The carrier is drawn down about half way, and the latch detent bar 51 is disengaged from the housing bottom 11a and the catch 54 is moved upwardly into the path of the lug 55. Then the carrier is moved upwardly until the lug 55 engages the catch 54. When so engaged, the winding drum 68 is held against rotating further under the pull of the springs 39. Then the carrier is elevated a little more, so that the suspension cables are slacked, whereupon the safety catches automatically engage in the stop slots 10b, thus causing the carrier to be supported on the guides 10 rather than on the suspension cables. The pins 14 on which the tapes 15 are hung are then removed, and the slats and portions of the tapes which are above the carrier are lowered into it. Then access may be had to the safety catch compartment of the carrier through openings 18b which are normally tightly closed by removable doors, and the clamps 31 may be disengaged from the suspension cables. Then the cables may be withdrawn upwardly out of the slats, whereupon the entire screen may be drawn out of the carrier and the slats removed individually from the tapes. The carrier can be removed from the guides 10 by removing the screws 21 which hold the guide cleats 20 and then lifting the plates 24 to disengage the catch bars 30 from the guides.

From the foregoing it will be apparent that the present invention provides a shutter installation which may be installed with facility in a limited space, which is entirely out of the way when in its open position, and which forms an effective screen or closure when in its closed position. It is to be noted furthermore that when in the closed position the shutter affords free access of air to the alcove for ventilation of the equipment housed therein, but that at the same time it is of substantial character and definitely held in place so that it cannot be swung or slammed by drafts of air or disarranged by having furniture or other objects pushed against it.

What I claim is:

1. A shutter comprising, in combination, a plurality of slats, means for suspending them movably in spaced relationship one under another, and a carrier below the slats and movable vertically in the space wherein they are suspended, said carrier having end, side and bottom walls forming a compartment for receiving the slats one upon another as it is elevated through said space.

2. A shutter comprising, in combination, a plurality of slats, means for supporting them independently in spaced relationship one under another in such fashion that they may be moved upwardly, a carrier below the slats and movable vertically in the space occupied by them, said carrier having a compartment for receiving the

slats one upon another as it is elevated through said space, and means cooperating with the carrier when it is in its uppermost position to close said compartment and thereby enclose the slats.

3. A shutter comprising, in combination, a plurality of slats, means for suspending them movably and independently in spaced relationship one under another, a carrier below the slats and movable vertically in the space wherein they are suspended, said carrier affording a compartment for receiving said slats one upon another as it is elevated through said space, and suspension means for said carrier cooperating with said slats to guide them into said compartment as the carrier is moved upwardly.

4. A shutter comprising, in combination, a plurality of slats, means for supporting them in spaced relationship one below another in such fashion that they may be moved upwardly, a carrier below the slats and movable vertically in the space in which the slats are supported, said carrier affording a compartment for picking up and carrying the slats in a stack one upon another as it is moved upwardly, guide means at the ends of the carrier for guiding it in its vertical movement and flexible guide means connected to the carrier and cooperating with the slats to guide them in parallel relationship into said compartment as the carrier is elevated.

5. A shutter as specified in claim 4 and wherein the compartment has wall portions which partially enclose the slats when they are carried on the carrier, and closure walls are provided in position to cooperate with walls of the compartment to enclose the slats completely when the carrier is in its uppermost position.

6. In a shutter installation having a plurality of slats and means for supporting them independently one below another in such manner that they may be moved upwardly and a carrier below the slats and movable upwardly through the space occupied by them so as to pick them up successively and carry them upward, an operating means comprising in combination suspension cables by which the carrier is supported, take-up mechanism for drawing up the suspension cables as the carrier is elevated and counterbalancing means effective on the take-up mechanism to increase its power progressively in proportion to the increase of weight imposed on the carrier by the slats during the major portion of the upward movement of the carrier and to an amount sufficient to lift it and the slats carried thereon during the latter portion of its upward movement.

7. In a shutter, the combination of a plurality of similar slats of longitudinally channeled form so that they may nest or interfit with one another when stacked, means for supporting the slats in spaced relation one below another, and a carrier below the slats and movable upwardly in the space occupied by them to pick them up one upon another, said carrier having a portion for housing the slats stacked thereon at any elevation of the carrier.

8. A shutter comprising, in combination, a blind suspended at its top and made up of horizontally extending strips spaced one below another and flexible means supporting said strips, and a carrier below the blind and movable vertically in the space occupied by it to collapse the blind, said carrier having a compartment for accommodating the strips and portions of the flexible means which are in collapsed condition at any elevation of the carrier.

9. In a shutter installation having an upwardly collapsible blind and a carrier movable upwardly to collapse the blind and support portions thereof, a counterbalancing mechanism comprising suspension cables for supporting the carrier, a winding drum for reeling up and paying out said cables, an actuating drum, driving connections between the winding drum and actuating drum for effecting rotation of the former by the latter at a multiplied rate throughout upward movement of the carrier, a spring for actuating the actuating drum, and a power-transmitting connection between the spring and actuating drum whereby the torque leverage of the spring on the actuating drum is increased progressively incident to rotation of said drum by said spring.

10. In a shutter having a vertically movable carrier which is subjected to increasing weight as it is elevated, a counterbalancing mechanism comprising suspension cables for supporting the carrier, a winding drum for reeling up said cables as the carrier is elevated, an actuating drum, an operative connection between said drums whereby, upon elevation of the carrier the winding drum is rotated by rotation of the actuating drum but to a greater extent, a spring for rotating the actuating drum, and a power-transmitting connection between the spring and actuating drum whereby the torque leverage of the spring on the actuating drum is progressively increased incident to rotation of the actuating drum in the direction to effect reeling-up rotation of the winding drum.

11. In a shutter installation having an upwardly collapsible blind and a carrier movable upwardly to collapse the blind and support portions thereof, a counterbalancing mechanism comprising suspension cables for supporting the carrier, a winding drum for reeling up and paying out said cables, an actuating drum, driving connections between the winding drum and actuating drum whereby the former may be rotated by the latter but always at a multiplied rate, a spring for actuating the actuating drum, a power-transmitting connection between the spring and actuating drum whereby the torque leverage of the spring on the actuating drum is varied incident to rotation of said drum, and means for latching the winding drum against operation by the actuating drum.

12. A shutter installation comprising a housing adapted to be installed in a building adjacent the top of a wall opening and affording means for supporting a collapsible blind in suspension thereon, take-up mechanism in said housing, supporting cables attached to and adapted to be reeled up and paid out by said take-up mechanism incident to the raising and lowering of the blind, said housing having a recess for receiving the blind in its collapsed and raised condition, and a carrier for the blind adapted to be supported on the housing by the supporting cables and adapted for cooperation with the housing to enclose the collapsed blind in the recess thereof.

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