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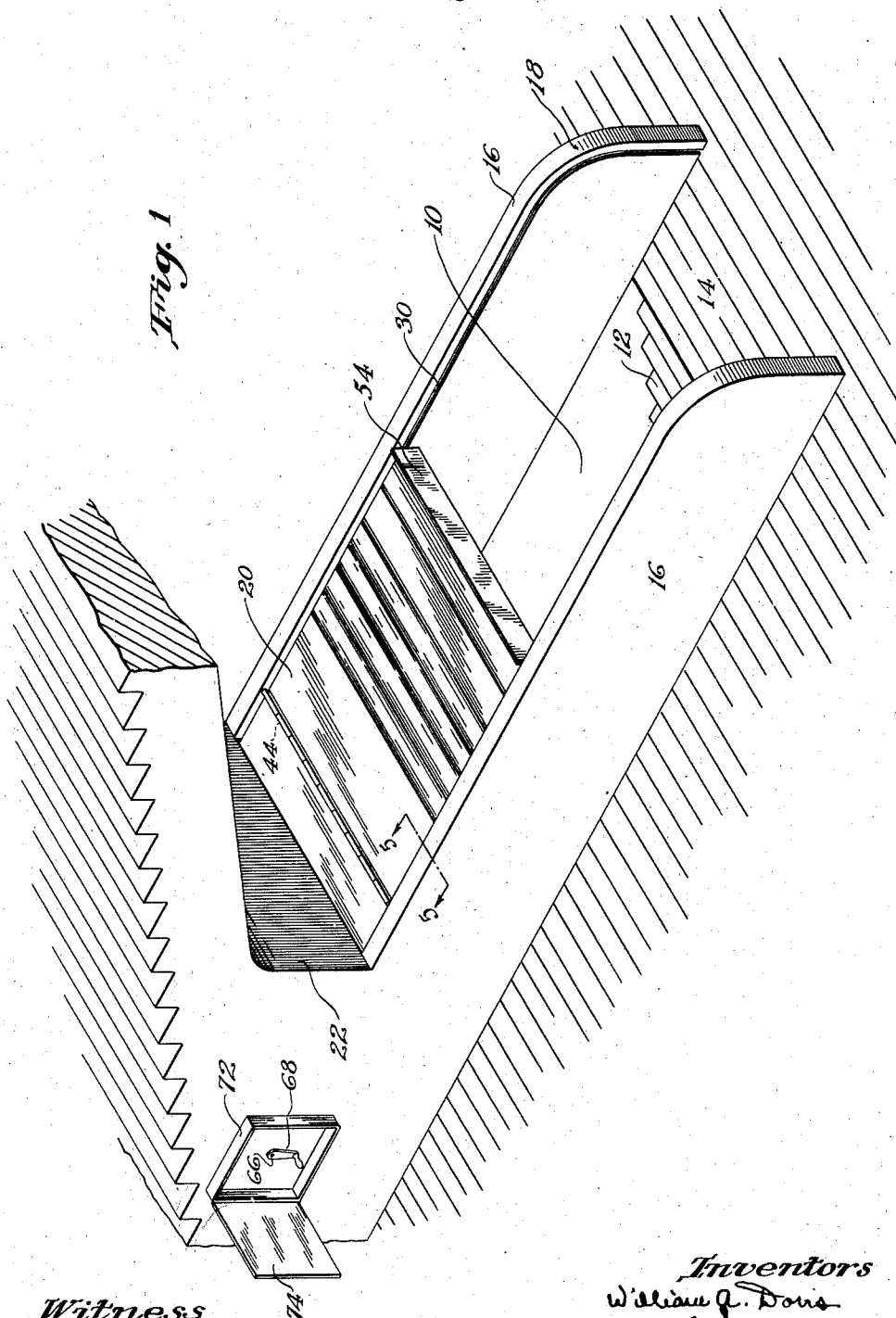
W. A. DAVIS ET AL.

2,268,192

CLOSURE FOR STAIR OPENINGS

Filed Aug. 9, 1939

4 Sheets-Sheet 1



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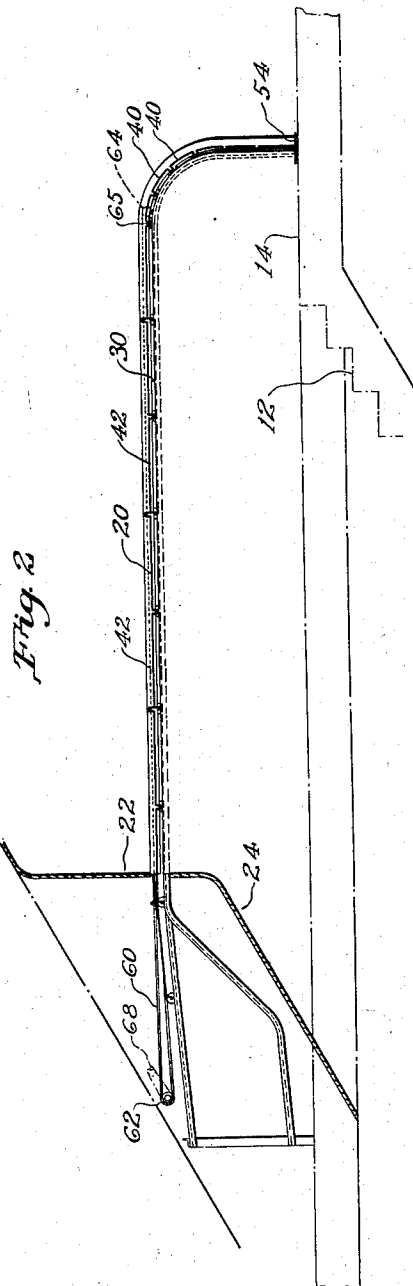
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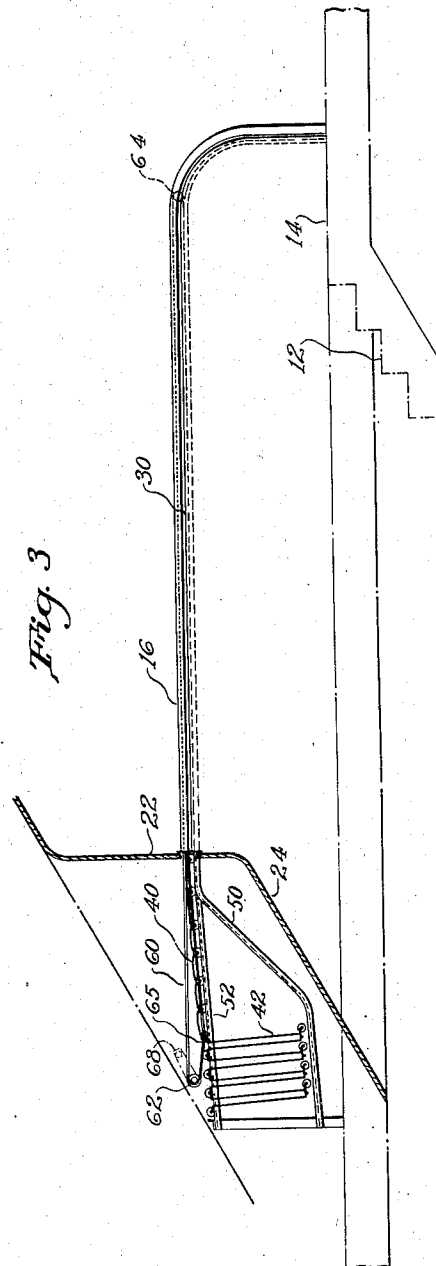
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4 Sheets-Sheet 2



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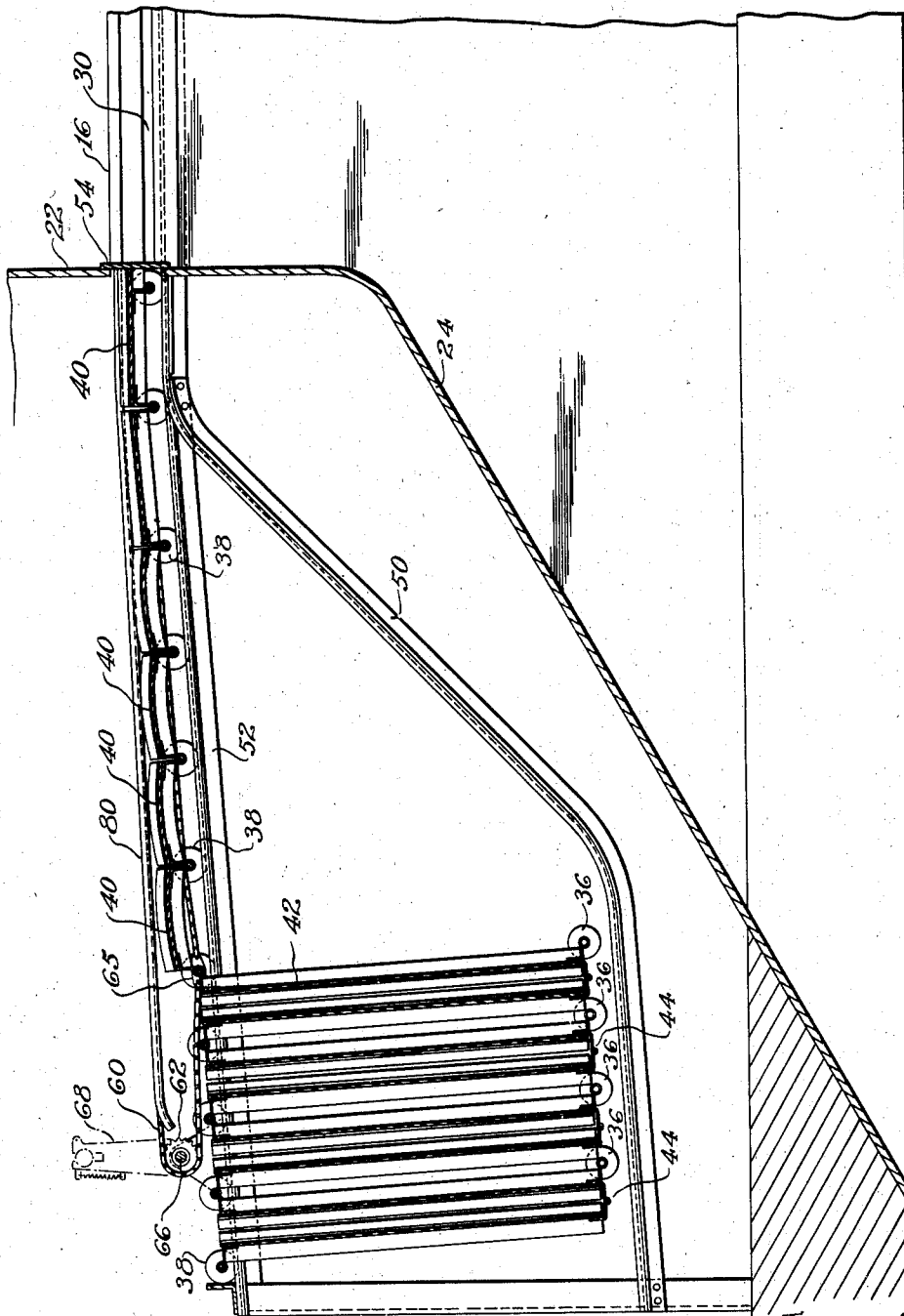
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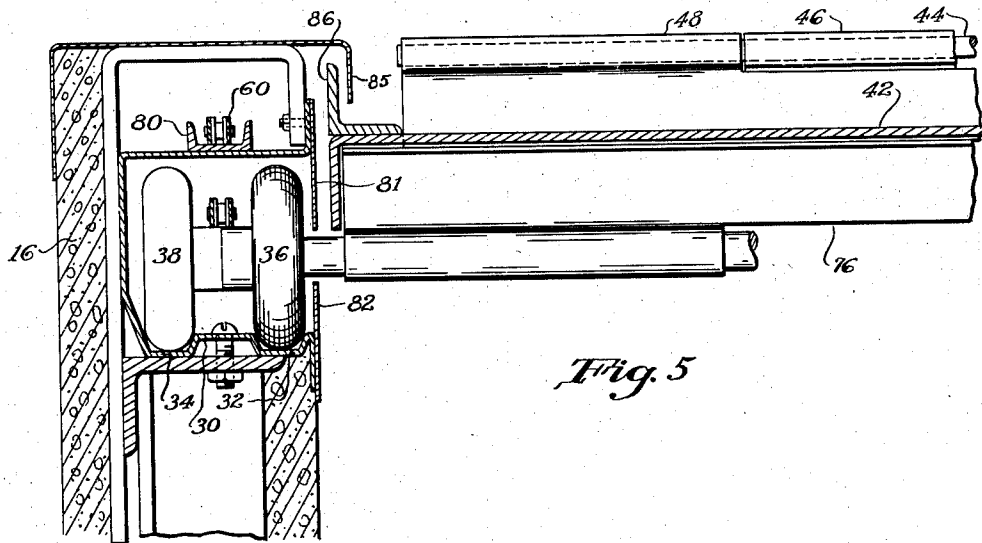


Fig. 5

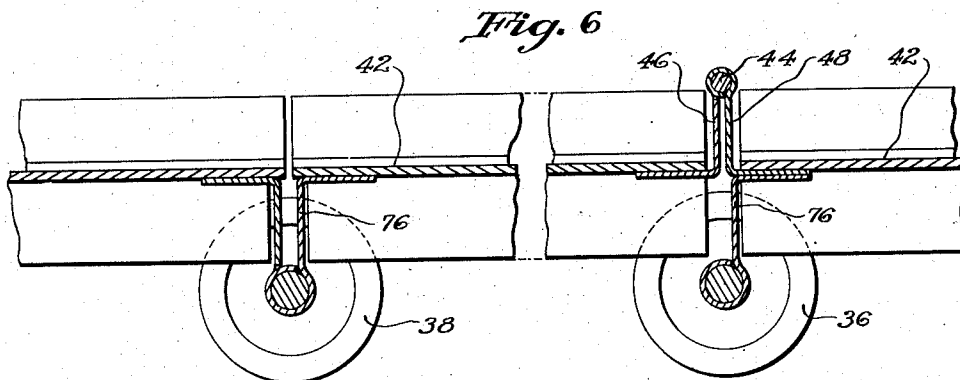


Fig. 6

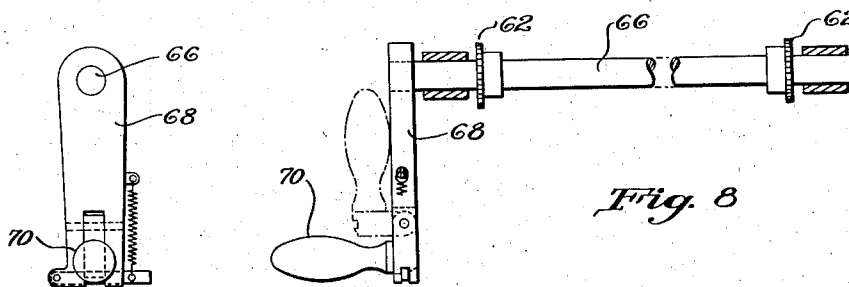


Fig. 7

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Fig. 8

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UNITED STATES PATENT OFFICE

2,268,192

CLOSURE FOR STAIR OPENINGS

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Application August 9, 1939, Serial No. 289,192

5 Claims. (Cl. 20—20)

The present invention relates to improvements in retractible closures for floor or roof openings required for stair wells, hoist ways and the like, and is more particularly concerned with generally fire-proof closures of this type intended to cut off circulation from one floor to the next throughout the region where the stair emerges to the upper floor.

The purpose of the invention is to provide a shutter-like type of fire closure which when not in use leaves the stair opening completely available for use, and which in extended position completely closes and blocks off the stair opening. The shutter is intended primarily for use with a moving stairway or escalator, although serving equally well for closing the opening in a stationary type of stair.

For the accomplishment of the above-described and other purposes, the invention consists in certain novel features of construction, combinations and arrangements of parts hereinafter described and claimed, the advantages of which will be obvious to those skilled in the art from the following description.

In the accompanying drawings illustrating the preferred form of the invention, Fig. 1 represents a perspective view of the closure shutter assembled with a moving stairway of conventional type; Figs. 2 and 3 are diagrammatic elevations partially in section illustrating the closure and operating mechanism; Fig. 4 is an enlarged detail in section illustrating the operating end of the shutter and the manner in which it pulls into closed position; Fig. 5 is a detail illustrating an enlarged section on the line 5—5 of Fig. 1; Fig. 6 is a detail illustrating the method of supporting the shutter sections; and Figs. 7 and 8 are details illustrating the folding crank connection for operating the shutter.

As will be evident from the drawings, particularly Fig. 1, the shutter is intended to close off the opening 10 through which the stairway emerges to the upper floor. The moving treads, indicated generally at 12, approach the upper platform 14, and are provided with moving hand rails (not shown) which are located within stationary side walls 16, provided with curved end portions 18 which join the floor surface. A sectional shutter 20, movable between the side walls and down the front end portion 18 into contact with the floor, completely closes the opening when in extended position.

As will be evident from an inspection of Figs. 1 to 4, inclusive, the sectional shutter when in inoperative position is housed within a partition

wall 22, having a portion 24 beneath the shutter, and normally forming a partial ceiling for the moving stairway.

The shutter 20, which in extended position is shown in Fig. 2, extends throughout the length of the side walls 16 making contact with the floor surface, and in closed or retracted position shown in Fig. 3 is completely housed within the partitions 22 and 24. This is accomplished through the provision of guide tracks 30, extending lengthwise of each side wall and downwardly to the floor at the front ends thereof. These guide tracks are recessed within the side walls 16, as shown in Fig. 5, and comprise parallel inner and outer rails 32 and 34, respectively, each of which carries a series of supporting rolls 36 and 38. The shutters themselves comprise a series of narrow sections 40, extending about the curved front, and a series of wider sections 42 designed to overlie the top of the opening. All of the sections are hingedly interconnected by a piano type of hinge indicated more particularly in Fig. 6, as comprising a hinge pin 44 and lever 46 and 48 each connected to a section.

It will be noted upon observing Figs. 3 and 4 that the inner track 32, together with the series of rolls carried thereby, is depressed at 50 after it has entered into the housing portion, whereas the outer tracks 34 project downwardly upon a slight incline throughout the section 52. These tracks extend on opposite sides of the opening, and are formed in each side wall, thus adequately supporting the shutter section carried thereby.

In operation the hinged sections, shown wholly in retracted or inoperative position in Figs. 3 and 4, ride along the guide rails, the depending sections in folded relationship alternately unfolding with the lower rails engaging and riding upward upon the guide rails 50 into the extended position shown generally in Figs. 1 and 2. When moving in the opposite direction the sections are completely retracted to an area within the housing, the slot or opening in the front of the housing being closed by a plate 54 engaging with the front of the walls when the shutter is retracted, this same plate resting upon the floor when the shutter is completely extended, as shown in Fig. 2.

It will be evident that the wide sections 42 of the shutter when retracted fold into the relationship shown in Fig. 4, and to make this arrangement possible successive supporting rolls are alternately mounted upon the inner and outer rails. By so doing retraction of the shutter causes successive rolls to alternately ride downward upon the rails 50 and swing clear thereof

to assume the position shown in Fig. 4, whereby there is no possibility of binding or cramping in either the extending or retracting movement of the shutter.

Although it is possible to push or pull the sections outwardly or inwardly by hand, a simple operating mechanism is conveniently provided which comprises an operating chain 60, there being one chain for each side of the shutter, these chains passing over sprockets 62 and 64 at their inner and outer ends respectively. The chains may be conveniently attached in a section of the shutter at the junction between the narrow and wider sections, these being indicated at 65. With this construction as the chain is operated to move the shutter from the retracted position shown in Fig. 4 to extended position, the narrow sections of the shutter are propelled from the rear, whereas the wider sections of the shutter are pulled ahead. Upon retraction of the shutter a reverse action takes place, the slight inclination of the guide rails serving to facilitate retraction due to the weight of the shutter parts themselves.

As will be evident from Figs. 7 and 8, the inner sprocket 62 is mounted upon an operating shaft 66 provided with a crank 68 to which is attached a folding handle 70, the operating end of the crank and handle normally being contained within a housing 72 having a closure 74.

The shutter may consist of a series of metal plates or their equivalent, generally flat and of sufficient strength and stability to permit the imposition of a weight thereon. The narrow shutters extending about the curved portion may if the nature of the curvature requires be slightly curved to provide a smooth curved closure when in extended position. The supporting rolls, as indicated, are provided with L-shaped supporting members 76, and may be welded or otherwise secured to the edges of adjacent sections. The operating chains 60 may be provided with a guide track 80 throughout its upper range and pass loosely throughout the space between the guide rails at the lower or return range.

It will be evident from an inspection more particularly of Fig. 5, that escape of smoke and fumes past the side edges of the shutter when in closed position is effectively precluded by the downwardly extending stationary wall 85, which in conjunction with the upstanding portion of the L-shaped member 86 at the side edge of the shutter compelling a tortuous path which forms a labyrinth and produces an effective barrier at this point. In addition, the tracks within the side walls are effectively shielded by upper and lower plates 81 and 82, the combination producing a sufficiently effective seal against the escape of smoke and fumes.

What is claimed is:

1. The combination with walls at opposite sides of a floor opening, of a sectional sliding shutter mounted at opposite sides of the walls and designed when extended to close the opening therebetween, a housing at one end into which the shutter is retracted to be enclosed thereby, inner

and outer guide tracks in each wall, roller supports operating in conjunction with the tracks and connected to the sections, alternate sections being supported respectively by the inner and outer tracks, and a housing into which the tracks enter at one end, the inner tracks dropping downwardly within the housing to cause the sections of the shutter to fold in vertical relationship and to swing clear of the tracks when retracted within the housing.

2. A retractible closure for openings comprising a jointed shutter having hinge-connected sections, and inner and outer tracks at opposite sides of the opening and respectively supporting the ends of alternate hinge connections in an extended and generally horizontal position, the inner tracks declining steeply at their rear ends to permit alternate hinge connections to drop and swing clear of the inner tracks when the shutter is retracted, and thereby to bring adjacent sections into folded and generally vertical relationship.

3. A retractible closure for openings comprising a jointed shutter having hinge-connected sections, and inner and outer tracks at opposite sides of the opening and respectively supporting the ends of alternate hinge connections in an extended and generally horizontal position, the inner tracks declining steeply at their rear ends to permit alternate hinge connections to drop and swing clear of the inner tracks when the shutter is retracted, and thereby to bring adjacent sections into folded and generally vertical relationship, and the outer tracks declining slightly at their rear ends.

4. A retractible closure for openings comprising a jointed shutter having hinge-connected sections, and inner and outer tracks at opposite sides of the opening and respectively supporting the ends of alternate hinge connections in an extended and generally horizontal position, the inner tracks declining steeply at their rear ends to permit alternate hinge connections to drop and swing clear of the inner tracks when the shutter is retracted, and thereby to bring adjacent sections into folded and generally vertical relationship, and a pull device connected with the foremost section for extending and retracting the shutter.

5. A retractible closure for openings comprising a jointed shutter having hinge-connected sections, and inner and outer tracks at opposite sides of the opening and respectively supporting the ends of alternate hinge connections in an extended and generally horizontal position, the inner tracks declining steeply at their rear ends to permit alternate hinge connections to drop and swing clear of the inner tracks when the shutter is retracted, and thereby to bring adjacent sections into folded and generally vertical relationship, and the outer tracks declining slightly at their rear ends, and a pull device connected with the foremost section for extending and retracting the shutter.

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