

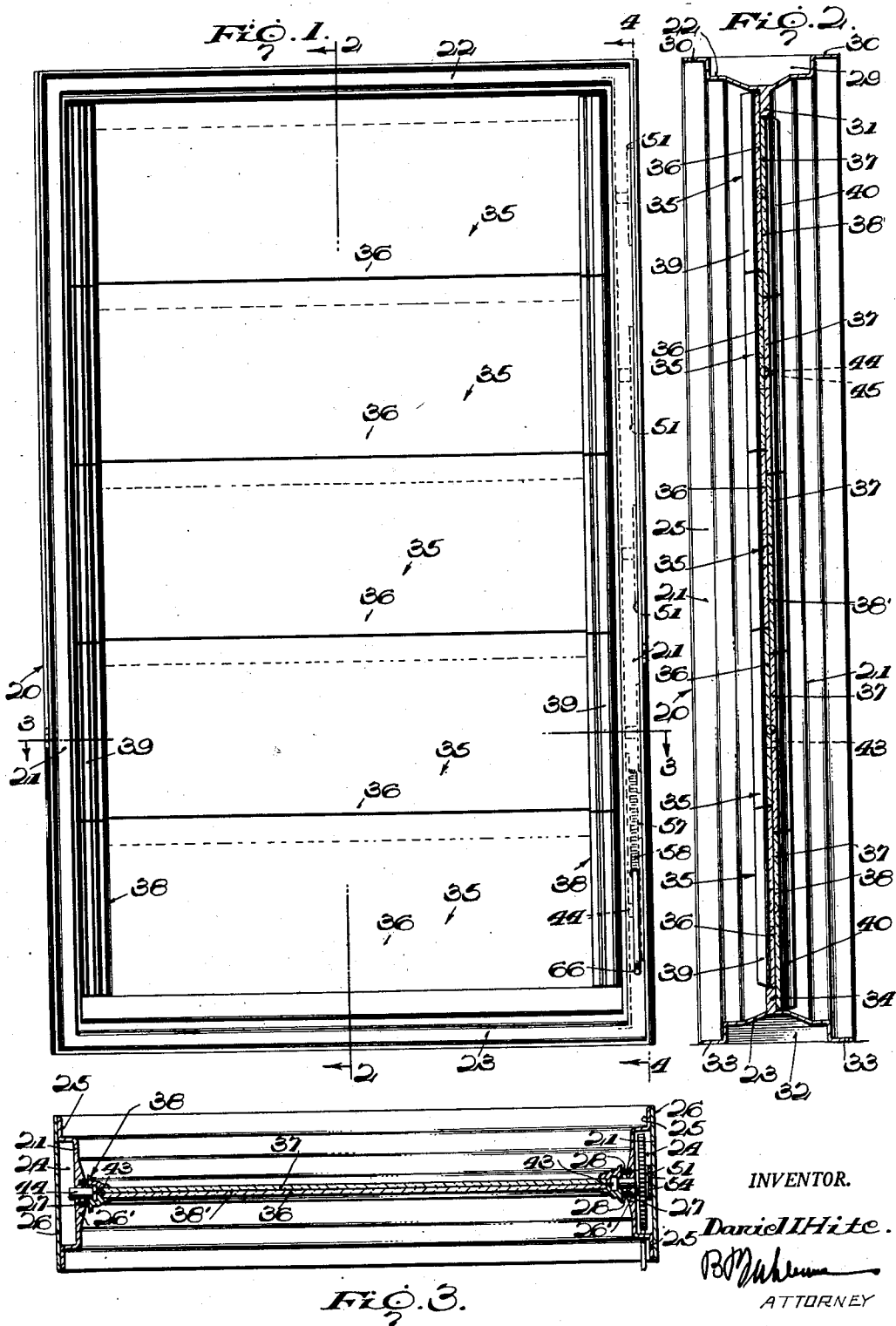
Sept. 16, 1952

D. I. HITE
SHUTTER STRUCTURE

2,610,371

Filed Feb. 27, 1950

6 Sheets-Sheet 1



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Filed Feb. 27, 1950

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FIG. 12.

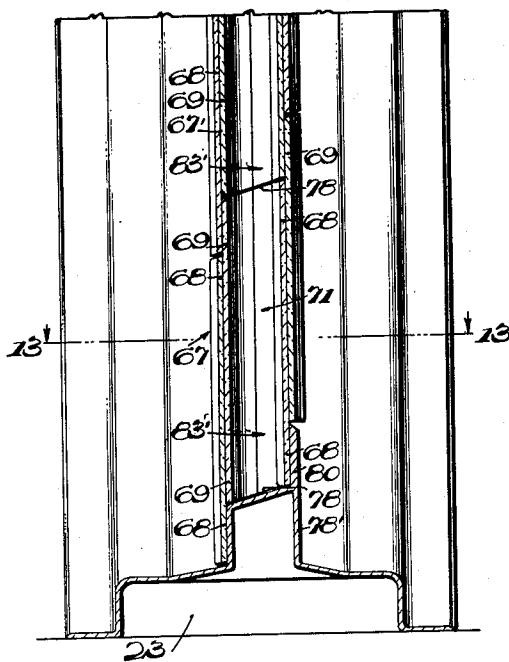


FIG. 13.
127

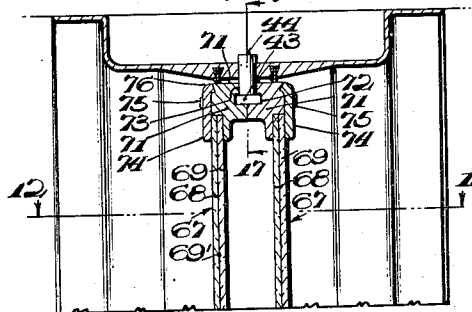


Fig. 16.

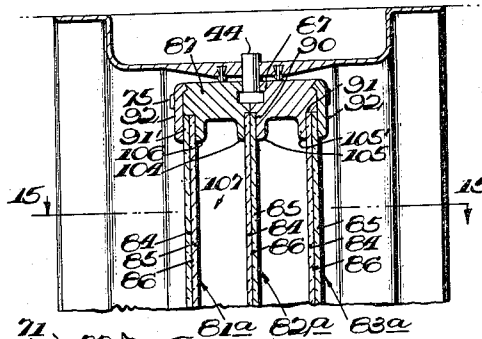


FIG. 14.

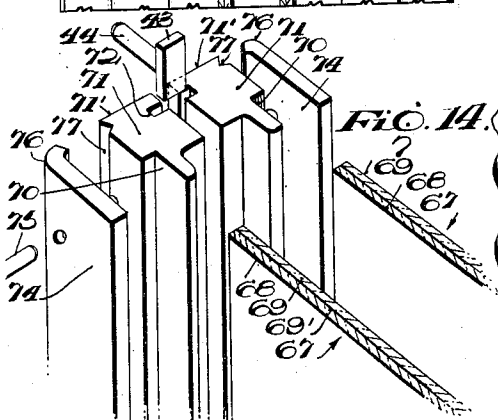


Fig. 17.
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FIG. 12a.

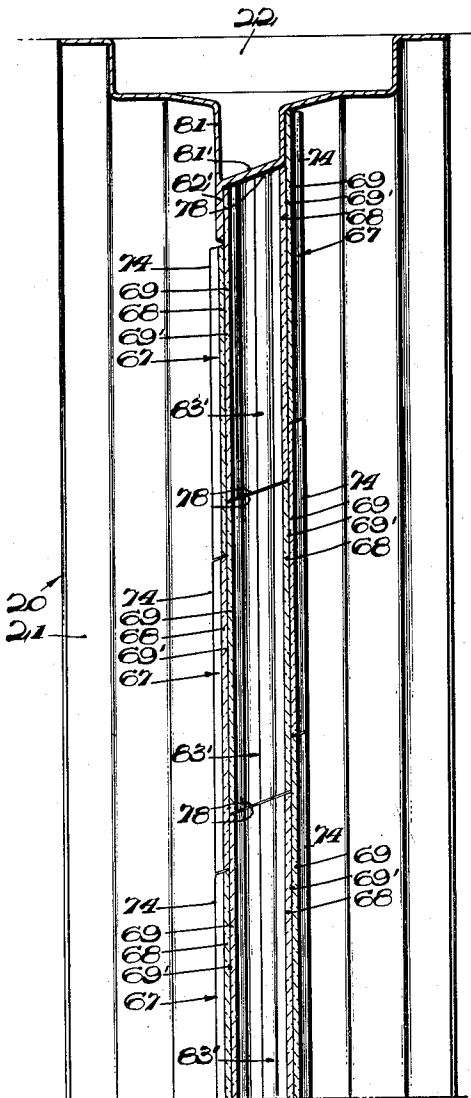
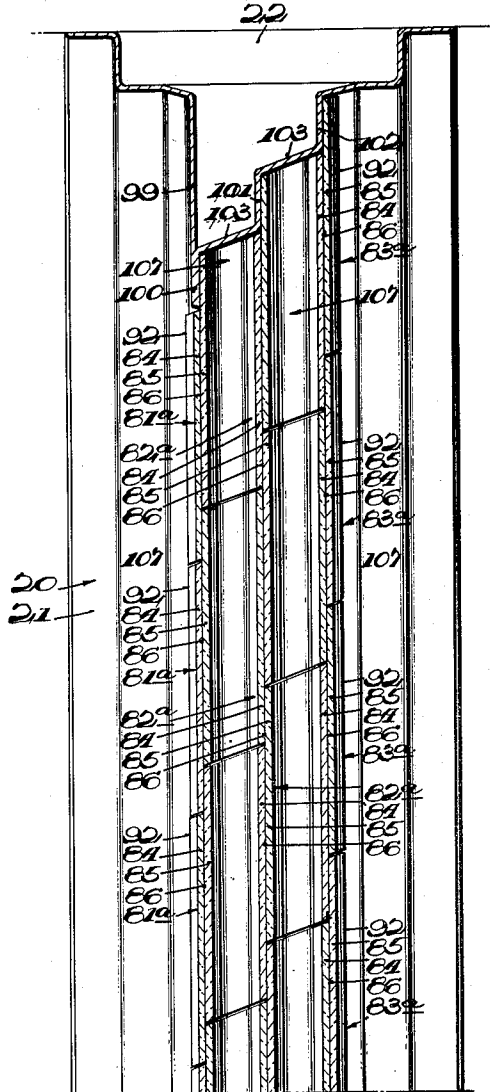


FIG. 15a.



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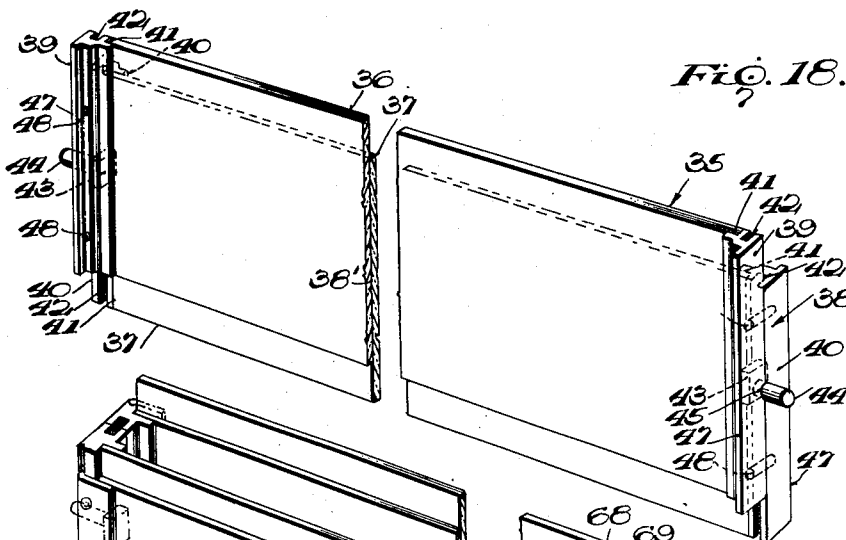


FIG. 18.

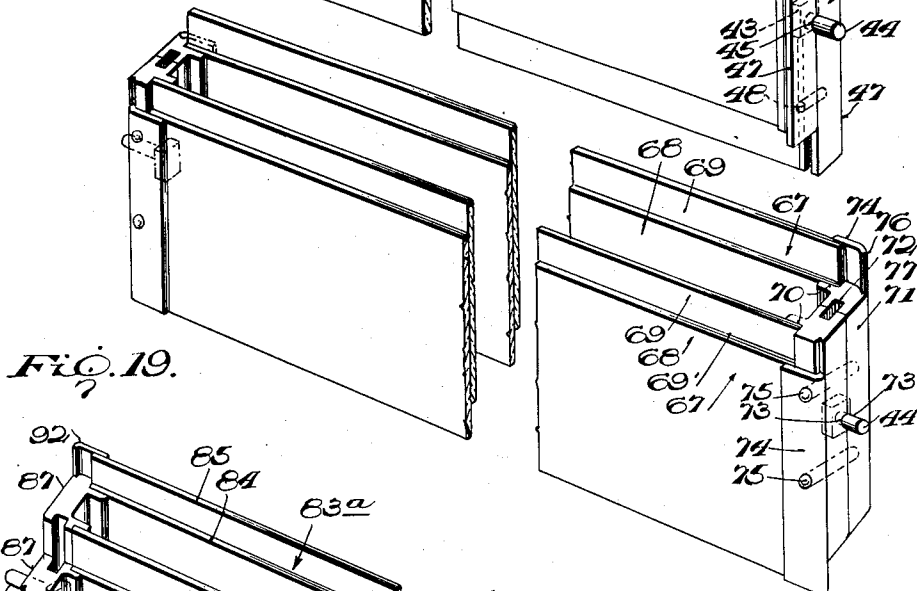


FIG. 19.

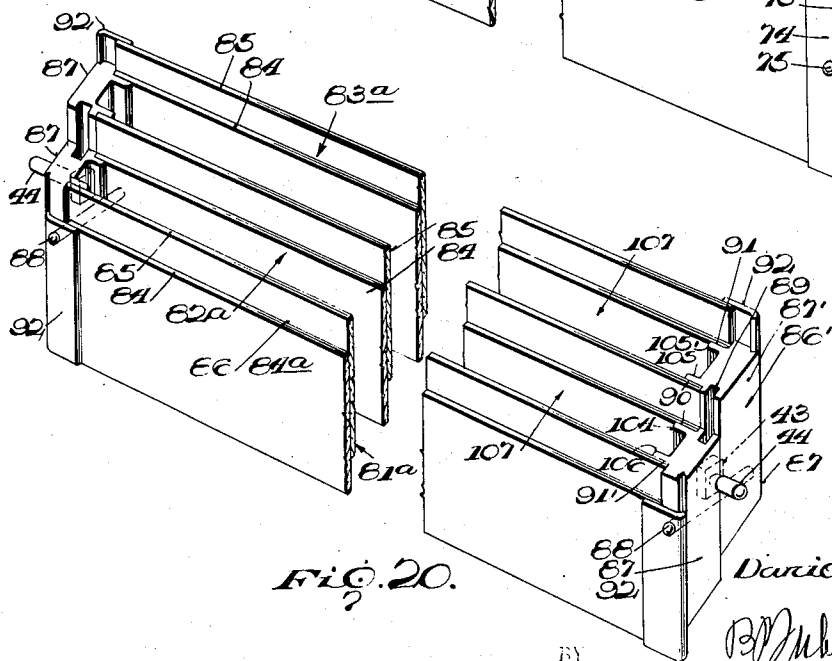


FIG. 20.

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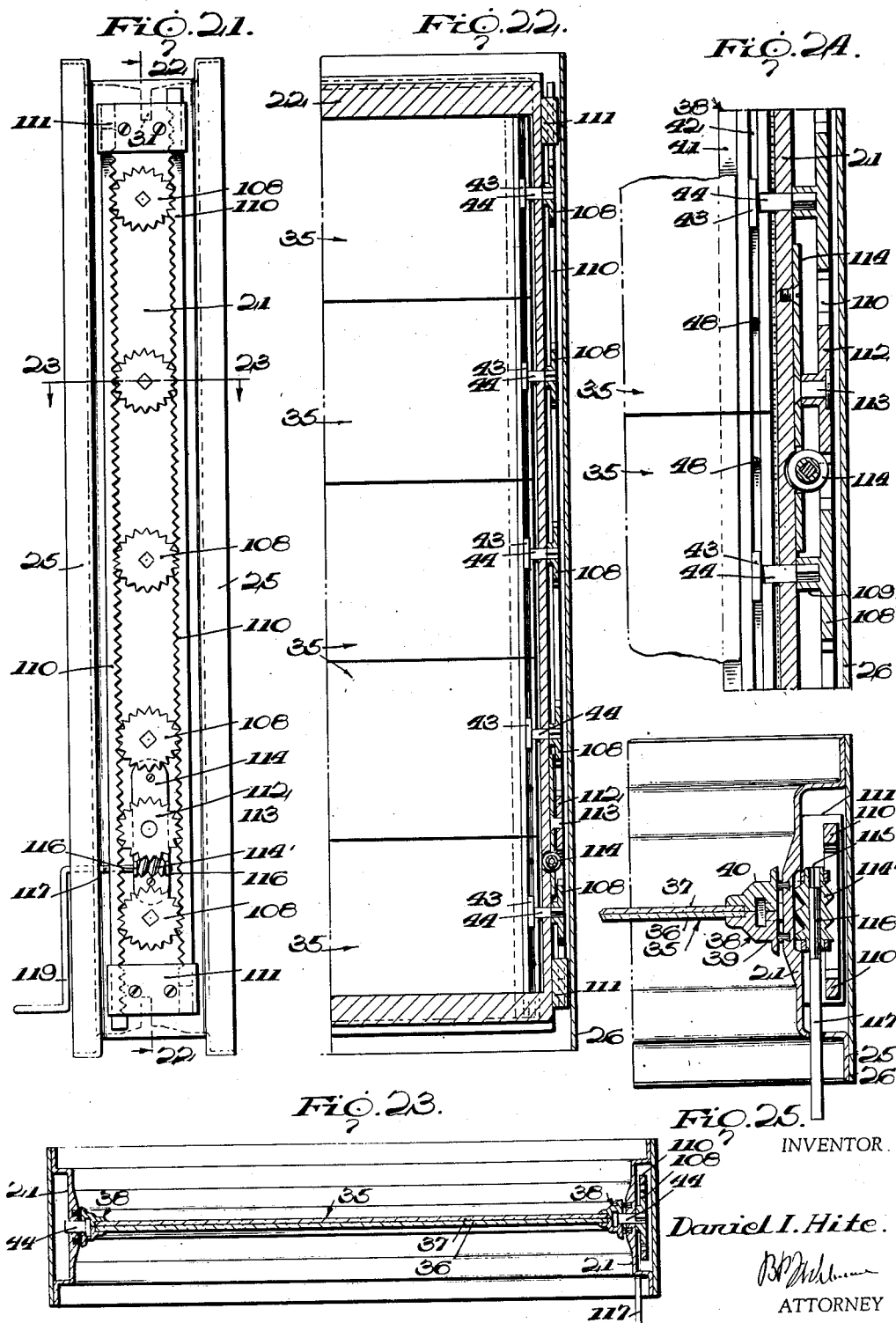
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SHUTTER STRUCTURE

2,610,371

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SHUTTER STRUCTURE

Daniel I. Hite, West Columbia, S. C.

Application February 27, 1950, Serial No. 146,474

7 Claims. (Cl. 20-62)

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My invention relates to a shutter structure.

An important object of the invention is to provide a shutter structure having louvers which may be closed to exclude rain, air or the like, or shifted to positions for providing various degrees of ventilation.

A further object of the invention is to provide a shutter structure of the above mentioned character which will be substantially air tight when closed.

A further object of the invention is to provide a shutter structure of the above mentioned character which will have a high degree of heat insulation when closed.

A further object of the invention is to provide louvers formed of transparent or translucent glass, which is shatter proof, and which will embody glass sections provided with reduced overlapping portions.

A further object of the invention is to provide holders for the glass louvers which may be formed from extruded metal bars having the desired construction.

A further object of the invention is to provide mechanical means for swinging the louvers about their pivots, which means applies a balanced force to the louvers.

Other objects and advantages of the invention will be apparent in the course of the following description.

In the accompanying drawings, forming a part of this application, and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is an inner side elevation of a shutter structure embodying my invention,

Figure 2 is a vertical section taken on line 2-2 of Figure 1,

Figure 3 is a horizontal section taken on line 3-3 of Figure 1,

Figure 4 is a side elevation of the operating means for the louvers, showing the louvers closed, taken on line 4-4 of Figure 1,

Figure 5 is a similar view, with the louvers in the opened position,

Figure 6 is an enlarged side elevation of the lower end of the louver operating means,

Figure 7 is a vertical section taken on line 7-7 of Figure 5,

Figure 8 is a fragmentary side elevation of one of the louver holding heads,

Figure 9 is a horizontal section taken on line 9-9 of Figure 6,

Figure 10 is a horizontal section taken on line 10-10 of Figure 6,

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Figure 11 is a fragmentary perspective view of the bars included in the louver holding head or end,

Figure 12 is a vertical section taken on line 12-12 of Figure 13, through a modified form of the invention, showing the louvers in the closed position,

Figure 12^a is a similar view through the upper portion of the same device,

Figure 13 is a horizontal section taken on line 13-13 of Figure 12,

Figure 14 is a fragmentary perspective view of the elements included in the head or end for the two-louver construction shown in Figure 12,

Figure 15 is a vertical section through a second modification of the invention, taken on line 15-15 of Figure 16,

Figure 15^a is a similar view through the upper portion of the same device,

Figure 16 is a horizontal section taken on line 16-16 of Figure 15,

Figure 17 is a fragmentary vertical section taken on line 17-17 of Figure 18,

Figure 18 is a perspective view of a single louver and ends or heads embodied in the first form of the invention removed, part broken away,

Figure 19 is a similar perspective view of a double louver and associated elements removed,

Figure 20 is a similar perspective view of a triple louver and associated elements removed,

Figure 21 is a side elevation of a modified form of operating means for louvers, similar to Figure 4,

Figure 22 is a central vertical section taken on line 22-22 of Figure 21,

Figure 23 is a horizontal section taken on line 23-23 of Figure 21,

Figure 24 is an enlarged fragmentary vertical section showing the lower portion of the mechanism illustrated in Figure 22, and,

Figure 25 is a horizontal section taken on line 25-25 of Figure 24.

In the drawings, where for the purpose of illustration, are shown preferred embodiments of my invention, attention is directed first to Figures 1 to 11 and 18, wherein the numeral 20 designates a casing or frame including sides 21, top 22 and bottom 23. This casing or frame may be formed of sheet metal. The sides 21 have outer recesses 24, formed therein, Figure 3, providing flanges 25, which are secured to side plates 26 by any suitable means. The sides 21 have inner longitudinally thickened portions 26' having longitudinal grooves 27 for receiving packing or

weather strips 28 extending through substantially the entire length of the sides and projecting inwardly beyond the thickened portions 26', for a short distance. The top 22 has a recess 29 and flanges 30, and this top is provided at its transverse center with a depending strip or shoulder 31, integral therewith. The bottom 23 has an exterior recess 32, flanges 33, and an upstanding stop or strip 34 integral therewith and disposed near its transverse center. The sides, top and bottom may be formed integral, if desired.

The first form of the invention comprises a plurality of transparent or translucent louvers 35. Each louver includes a pair of glass sheets 36 and 37, which are bonded together by a layer of transparent adhesive material 38', of a type employed in making shatter-proof glass. The inner glass layer 36 of each louver extends for a substantial distance beyond the top of the outer glass layer 37 and the outer glass layer 37 extends downwardly below the lower edge of the inner glass layer for a substantial distance, providing a stepped arrangement of the glass layers at the longitudinal top and bottom of each louver. As more clearly shown in Figure 2, when the louvers are closed, the lower portion of the outer glass layer 37 of the lowermost louver overlaps the stop or strip 34 and the top portion of the inner glass layer 36 of the uppermost louver overlaps the stop or extension 31, and the tops of the layers 36 of the remaining louvers overlap the lower portions of the outer layers 37 of the adjacent louvers. Due to the stepped arrangement of the glass layers, all louvers are arranged in the same plane when closed.

Each louver 35 is held at its ends by heads 38. Each head 38 comprises inner and outer bars 39 and 40. These bars are provided upon their inner faces with grooves 41, which when assembled form a longitudinal recess for receiving the glass layers 36 and 37 of the louver. The bars 39 and 40 also have longitudinal grooves 42 upon their inner faces to receive elongated rectangular heads 43, Figure 7, rigidly secured to pins or pivots 44. These pins or pivots pass through notches 45, formed in the bars 39 and 40. The elongated heads 43 may be slid in the grooves 42, to position, but when the pins 44 are received in the notches 45, the pins are securely held against subsequent displacement with respect to the bars 39 and 40. The bars 39 and 40 have outer flat faces 46, which are widened by flanges 47. These flat faces are arranged to engage the packing of weatherstrips 28, as shown. The bars 39 and 40 of each head are secured together by pins 48 or the like, passing through openings 49. The pivot elements or pins 44 are journaled within openings 50 formed in the thickened portions 26' of the sides 21. These pivot elements 44 are arranged at the transverse centers of the louvers and their heads and pivotally mount the louvers within the frame or casing, as shown. The inner bars 39 extend at their tops beyond the outer bars 40 and the outer bars 40 extend at their bottoms beyond the inner bars, providing a stepped arrangement. The inner glass layers 36 extend to the top and bottom of the inner bars 39 and the outer glass layers 37 extend to the top and bottom of the outer bars 40 and terminate at these extremities.

The operating means for the louvers is mounted within the recess 24 of the right side 21. This operating means comprises transverse levers 51 provided at their longitudinal centers with lat-

erally extending sockets 52, Figure 7, for receiving the ends of the pins 44. The bore of the sockets may be polygonal for receiving the polygonal ends 53 of the pins. If desired, the bore of the sockets may be cylindrical and the pins equipped with keys or splines engaged within grooves formed in the sockets. Any suitable means may be employed to mount the sockets upon the pins 44 so that the sockets may turn the pins in their bearings. The sockets 52 are rigidly secured to the levers 51, as stated, and these levers are pivotally connected at their opposite ends, as shown at 53', with vertical links 54.

Arranged between the two lower levers 51 is a transverse operating lever 55, pivoted to the main links 54 at 56. The operating lever 55 is mounted at its longitudinal center upon a hub 57, formed integral with a worm gear 58. This worm gear is rotatable upon a stationary trunnion or stub shaft 59, rigidly secured to a metal strap 60, secured to the inner thickened portion 26' of the side 21 by screws 61 or the like. The worm gear 58 is engaged and driven by worm 62 having a tubular head 63, the ends of which are rotatably mounted in brackets 64 rigidly secured to the strap 60. The tubular hub has a bore which is polygonal in cross-section, receiving a removable drive shaft 65, also polygonal in cross-section, extending to the inner side of the shutter structure and having a crank 66 by means of which it can be turned.

In view of the foregoing description, it is obvious that the louvers may be completely closed, Figure 2, whereby they form with each other and with the frame or casing a substantially tight shutter structure. The upper ends of the louvers overlap the lower ends of the next upper louvers, while the upper end of the uppermost louver overlaps the stop 31 and the lower end of the lowermost louver overlaps the stop 34. The flat faces 46 of the heads slidably engage the packing of weatherstrips 21, as shown. The louvers all are arranged in the same plane when closed. By turning the operating shaft 65, the worm gear 58 may be turned clockwise, Figure 4, and the levers 51 will swing the main links 54 to the position shown in Figure 5, whereby the louvers will be completely opened. The louvers may be shifted to various positions between the completely closed position to the completely opened position.

In Figures 12, 13, 14, 17, 19 and 12* I have shown a shutter structure wherein each louver comprises a pair of spaced louver sections 67. Each louver section 67 is identical with the louver 35. Each louver section 67 is formed of two glass layers 68 and 69, secured together by a transparent adhesive material 69'. The upper end of each layer 69 projects above the upper end of the companion layer 68, and the lower end of each layer 68 projects below the lower end of the companion layer 69. The inner louver section 67 projects below the lower end of the outer louver section 67 and the upper end of the outer louver section projects above the upper end of the inner louver section, in each pair of louver sections.

In each louver, the inner and outer sections 67 are retained within recesses 70, formed within bars 71, corresponding to the bars 39 and 40. The bars 71 have grooves 72 to receive the heads 43 of the pins 44, and these pins are held within notches 73 in the bars 71. The louver sections 67 are held within the grooves 70 by strips 74,

held in place by pins 75. The strips 74 have longitudinal tongues 76 to enter grooves 77. The pins 44 of each louver unit, Figures 12-17, are mounted within the sides 21 of the frame, in the identical manner as described in connection with the first form of the invention. The bars 71 have flat faces 71' which slideably engage the packing strips 23. The pins 44 in the second form of the invention are turned by the identical means as described in connection with the first form of the invention.

The upper and lower ends of the pairs of bars 71 included in the several heads or holders are vertically inclined as shown at 78. The outer layer 69 of the inner louver section and the inner layer 68 of the outer louver section terminate at the tops and bottoms of the bars 71. When the louvers are closed, the lower ends 78 of the bars 71 engage against the upper inclined end of a stop 78' formed upon the frame bottom 23, while the inner layer 68 of the inner louver section overlaps the inner face of the stop 78'. The outer layer 69 of the inner louver section terminates at its bottom with the bottoms of the bars 71 and terminates at its top with the tops of the bars 71, while the companion inner layer 68 terminates short of the top of the bars and at its bottom extends below the bottoms of the bars 71. The plates 74 of the inner louver section terminate at their tops with the top of the inner layer 68, and short of the tops of the inner bars 71, and terminate at their bottoms with the bottom of the inner layer 68 and extend below the inner bars 71. The inner layer 68 of the outer louver section terminates at its bottom with the bottoms of the outer bars 71 and terminates at its top with the tops of the outer bars 71. The top of the outer layer 69 of the outer louver section projects above the tops of the outer bars 71 and the bottom of such outer layer 69 terminates short of the bottoms of the outer bars 71. The inner layer 68 of the outer louver section of the lowermost unit contacts with a shoulder 80 formed upon the stop 78'. The plates 74 of the outer louver section terminate at their bottoms with the bottom of the outer layer 69 and at their tops with the top of the outer layer 69. Plates 74 of the outer louver section project above the tops of the outer bars 71 and terminate short of the bottoms of the outer bars 71. The inner and outer plates 74 of each unit are vertically staggered. The top 22 of the frame is provided with a stop 81, having an inclined end 81', and a depending shoulder 82'. The outer layer 69 of the inner louver section contacts with the shoulder 82', and the outer layer 69 of the outer louver section contacts with the outer face of the stop 81.

When the louver units are in the closed position, they all lie in the same plane and afford a closed dead air space 83'. When the louver units are turned from the vertical position, openings are provided between them for the passage of the air.

In Figures 15, 16, 20, and 15^a I have shown a third modification of the invention, wherein each louver unit includes three louver sections 81^a, 82^a, and 83^a. Each louver section comprises inner and outer glass layers 84 and 85 secured together by a transparent adhesive. In each louver section, the inner layer 84 extends at its bottom beyond the bottom of the outer layer 85, and the outer layer 85 extends at its top beyond the top of the inner layer 84. In each louver unit, the louver sections 81^a, 82^a, and 83^a are carried by heads 86', including bars 87, secured together by

a pin 88. A groove arrangement 89, similar to the groove arrangement 72, is provided for receiving the heads 43 of the pins 44. These pins are pivotally mounted in the frame 20 in the identical manner as described in connection with the first two forms of the invention and are turned by the identical means described in connection with the first form of the invention. The intermediate louver section 82^a is held within grooves 90 formed in the bars 87, while the inner louver section 81^a is held within grooves 91' and the outer louver section 83^a in grooves 91, covered by plates 92, held in place by the pins 88. As shown in Figure 15, the inner layer 84 of the inner louver section 81 contacts with a vertical shoulder 93, the inner layer 84 of the intermediate louver section 82^a contacts with a shoulder 94, and the inner layer 84 of the outer louver section 83^a contacts with a shoulder 95, carried by a stop 96 formed upon the frame bottom 23. The stop 96 has inclined shoulders 97 and 98. This construction is at the bottom of the frame 20. As shown in Figure 15^a, the top 22 of the frame has a depending stop 99, provided with an inner vertical shoulder 100, and intermediate vertical shoulder 101, and an outer vertical shoulder 102, and inclined bottoms 103. The outer layer 85 of the inner louver section 81 contacts with the shoulder 100, the outer layer 85 of the intermediate louver section 82^a contacts with the shoulder 101, and the outer layer 85 of the louver section 83^a contacts with the shoulder 102. The bars 87 in each pair are vertically stepped. The outer layer 85 of the inner louver section 81^a terminates at its top with the tops of the inner bars 87 and terminates at their bottoms with the bottoms of the inner bars 87. The inner layer 84 of the inner louver section 81^a, extends below the bottoms of the inner bars 87 and terminate short of the tops of the inner bars 87. The inner plates 92 terminate short of the tops of the inner bars 87 and project below the bottoms of the inner bars 87. The inner plates 92 terminate at their tops and bottoms with the tops and bottoms of the inner layer 84 of the inner louver section. In the intermediate louver section 82^a, the inner layer 84 terminates short at its top with the tops of the outer bars but projects below the bottoms of the outer bars, while the outer layer 85 extends to the top of the outer bars 87 and terminates short of the bottoms of the outer bars 87. The inner rib 104 extends from the top of the inner layer of the intermediate louver section 82^a to the bottom of this layer, while the rib 105 extends from the top of the outer layer 85 of the intermediate louver section to the bottom of such outer layer, and terminates short of the bottom of the inner layer 84. In the outer louver section 83^a, the outer plates 92 extend from the top of the outer layer 85 to the bottom of the outer layer and terminate short of the bottom of the inner layer 84, while the rib 105 extends for the entire width of the inner layer 84. The rib 106 extends for the entire width of the layer 85 of the louver section 81^a.

When the louver units are in the closed position, their edges produce a stepped interfitting arrangement, and the louver sections are arranged in the same plane, and afford closed dead air spaces 107. When the louver units are turned from the vertical position, they provide openings for the passage of air.

In Figures 21-25 inclusive, I have shown a modified form of driving means to turn the louvers shown in Figures 1-3 inclusive. The lou-

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vers 35 are carried by the heads 38 and these heads are pivotally connected with the sides 21 of the frame by the pins 44. This is identical construction as shown in connection with the first form of the invention.

In the present form of the invention, the levers 51 are dispensed with and gears or pinions 108 provided. The pinions 108 have tubular hubs 109, for receiving the square ends 53 of the pins 44, at the right, so that the pinions and pins turn as a unit. Arranged upon opposite sides of the pinions 108 are reciprocatory racks 110, slideably mounted in fixed guides 111, attached to the side 21.

Arranged between the racks 110 is an operating gear or pinion 112, arranged between the two lower pinions 108, and rotatably mounted upon a stud or shaft 113, carried by a plate 114, rigidly secured to the side 21. The pinion 112 is engaged and driven by a worm 114', having a tubular hub 115, the ends of which are rotatably mounted with their brackets 116, rigidly secured to the plate 114. The worm 114' is laterally offset with respect to the pinion 112, but engages with the teeth of this pinion to drive it. This arrangement permits the operating shaft 117 to clear the racks 110. This operating shaft has a square end 118 for insertion within the square bore of the tubular hub 115. Shaft 117 is horizontal and extends to the inner side of the device and is provided with a crank 119 to turn it.

In view of the foregoing description it is obvious that by turning the shaft 117, the pinion 112 will be turned, and the racks 110 moved in opposite directions. These racks turn the pinions 108 which are connected with the louvers to open or close them.

It is to be understood that the forms of my invention herewith shown and described are to be taken as preferred examples of the same and the various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A shutter structure comprising a frame including opposed sides having spaced transverse openings, louvers mounted within the frame between the sides for tilting movement and having their ends spaced from the sides, heads arranged between the ends of the louvers and frame sides and carrying the louvers, the heads including pairs of opposed separate bars having inner and outer sides, the bars of each head having groove means in their inner sides receiving the adjacent ends of the louvers, the bars of the heads being provided in their opposed faces with opposed longitudinal grooves forming longitudinal passages in the heads, the bars of the heads having pairs of opposed transverse notches formed in their opposed faces and forming transverse openings extending through the outer sides of the heads and leading into the longitudinal passages, pins positioned within the transverse openings formed by the notches and extending beyond the outer sides of the heads and journaled within the transverse openings of the frame sides, enlargements secured to the pins and engaging in the longitudinal passages of the heads, means securing the opposed bars of the heads together, and mechanical operating means connected with the pins for rotating them in unison to tilt the louvers.

2. A shutter structure comprising a frame including opposed sides having spaced transverse openings, louvers mounted within the frame be-

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tween the sides for tilting movement and having their ends spaced from the sides, heads arranged between the ends of the louvers and frame sides and carrying the louvers, the heads including pairs of opposed separate bars having inner and outer sides and extending for substantially the entire width of the louvers, the bars of each head having longitudinal groove means in their inner sides and receiving the adjacent ends of the louvers, the bars of the heads being provided in their opposed faces with opposed longitudinal grooves forming longitudinal passages through the heads and spaced outwardly of the groove means, the bars of the heads having pairs of opposed transverse notches in their opposed faces forming transverse openings near the longitudinal centers of the heads and extending through the outer sides of the heads and leading into the longitudinal passages, pins positioned within the transverse openings formed by the notches and extending beyond the outer sides of the heads and journaled within the transverse openings of the frame sides, enlargements secured to the pins and mounted within the longitudinal passages of the heads and holding the pins against rotation relative to the heads, means securing the opposed bars of the heads together, and mechanical operating means connected with the pins for rotating them in unison to tilt the louvers.

3. A shutter structure comprising a frame including opposed sides having aligned transverse openings, a louver mounted within the frame between the sides for tilting movement and having its ends spaced from the sides, heads arranged between the ends of the louver and frame sides and carrying the louver, the heads including pairs of separate opposed solid bars having inner and outer sides and relatively wide flat meeting faces, the bars of each head having longitudinal groove means in their inner sides receiving the adjacent ends of the louver, the bars of the heads being provided in their meeting faces with opposed longitudinal narrow grooves forming longitudinal passages in the heads, the bars of the heads having pairs of opposed transverse notches in their opposed faces and forming transverse openings extending through the outer sides of the heads and leading into the longitudinal passages, pins positioned within the transverse openings formed by the notches and extending beyond the outer sides of the heads and journaled within the aligned transverse openings of the frame sides, enlargements secured to the pins and engaging in the longitudinal passages of the heads to hold the pins against rotation relative to the heads, means for holding the opposed bars of the heads together, and means connected with one pin for rotating the same to tilt the louver.

4. A shutter structure comprising a frame including opposed sides having spaced transverse openings, heads arranged inwardly of the opposed frame sides and having inner and outer sides, the heads including separate opposed solid bars having relatively wide flat meeting faces and being provided in their meeting faces with longitudinal narrow grooves forming longitudinal passages in the heads, the heads having opposed notches in their meeting faces forming transverse openings in the outer sides of the heads and leading into the longitudinal passages of the heads, trunnion pins mounted within the transverse openings of the heads and including heads arranged within the longitudinal passages and preventing rotation of the pins relative to the

first-named heads, each second-named head having a fiat face engaging a side of the longitudinal passage, the trunnion pins extending beyond the outer sides of the heads and being journaled within the transverse openings of the frame sides, the heads being provided in their inner sides with spaced longitudinal grooves, spaced louver sections extending between the heads and having their ends mounted within the spaced longitudinal grooves, and operating means connected with the pins adjacent to one frame side for rotating them to tilt the louvers in unison.

5. A shutter structure comprising a frame including opposed sides having spaced transverse openings, heads arranged inwardly of the opposed frame sides and having inner and outer sides, the heads including opposed separate bars provided in their meeting faces with longitudinal grooves forming longitudinal passages in the heads, the heads having opposed notches in their meeting faces forming transverse openings in the outer sides of the heads and leading into the longitudinal passages of the heads, trunnion pins mounted within the transverse openings formed by the notches and including heads arranged within the longitudinal passages and preventing rotation of the pins relative to the first-named heads, the trunnion pins extending beyond the outer sides of the heads and being journaled within the transverse openings of the frame sides, the first-named heads being provided in their inner sides with spaced longitudinal recesses, spaced louver sections extending between the heads and having their ends engaging in the spaced longitudinal recesses, detachable strips arranged upon opposite sides of the heads in opposition to the spaced longitudinal recesses and overlapping the ends of the louver sections to hold them within the spaced longitudinal recesses, pin means extending through the opposed bars and detachable strips for securing the same together with the louver sections, and mechanical operating means connected with the trunnion pins adjacent to one frame side for rotating them to tilt the louvers in unison.

6. A shutter structure comprising a frame including opposed sides having spaced transverse openings, louvers mounted within the frame between the sides for tilting movement and having their ends spaced from the sides, heads arranged between the ends of the louvers and frame sides for carrying the louvers, the heads including pairs of opposed separate bars havng inner and outer sides and relatively wide flat meeting faces, the bars of each head having groove means at their inner sides receiving the adjacent ends of the louvers, the bars of the heads being provided in their meeting faces with opposed longitudinal narrow grooves forming longitudinal passages in the heads, the bars of the heads having pairs of opposed transverse notches formed in their meeting faces and forming transverse openings ex-

tending through the outer sides of the heads and leading into the longitudinal passages, pins positioned within the transverse openings formed by the notches and extending beyond the outer sides of the heads and journaled within the transverse openings of the frame sides, enlargements secured to the pins and engaging in the longitudinal passages and serving to hold the pins against rotation relative to the heads, means securing the opposed bars of the heads together, transverse levers connected with the pins adjacent to one of the frame sides, a connecting link for the transverse levers so that they may be turned in unison, and manually operated gear means connected with one transverse lever so that the louvers may be tilted in unison.

7. A shutter structure comprising a frame including opposed sides having spaced transverse openings, heads arranged inwardly of the opposed frame sides and having inner and outer sides, the heads including opposed separate bars provided in their meeting faces with longitudinal grooves forming longitudinal passages in the heads, the heads having opposed notches in their meeting faces forming transverse openings extending through the outer sides of the heads and into the longitudinal passages, trunnion pins mounted within the transverse openings of the heads and including heads arranged within the longitudinal passages and preventing rotation of the pins relative to the first-named heads, the trunnion pins extending beyond the outer sides of the heads and being journaled within the transverse openings of the frame sides, the heads being provided in their inner sides with spaced longitudinal grooves, spaced louver sections extending between the heads and having their ends mounted within the spaced longitudinal grooves, the louver sections of each louver having their longitudinal edges staggered so that the louver sections of adjacent louvers overlap and contact when the louvers are closed, means securing the opposed bars of the heads together, and operating means connected with the pins for rotating them to tilt the louvers in unison.

DANIEL I. HITE.

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