April 25, 1950 G. K. SMITH 2,505,155

TRANSPARENT SHUTTER CLOSURE

Filed Sept. 3, 1946 3 Sheets-Sheet 1

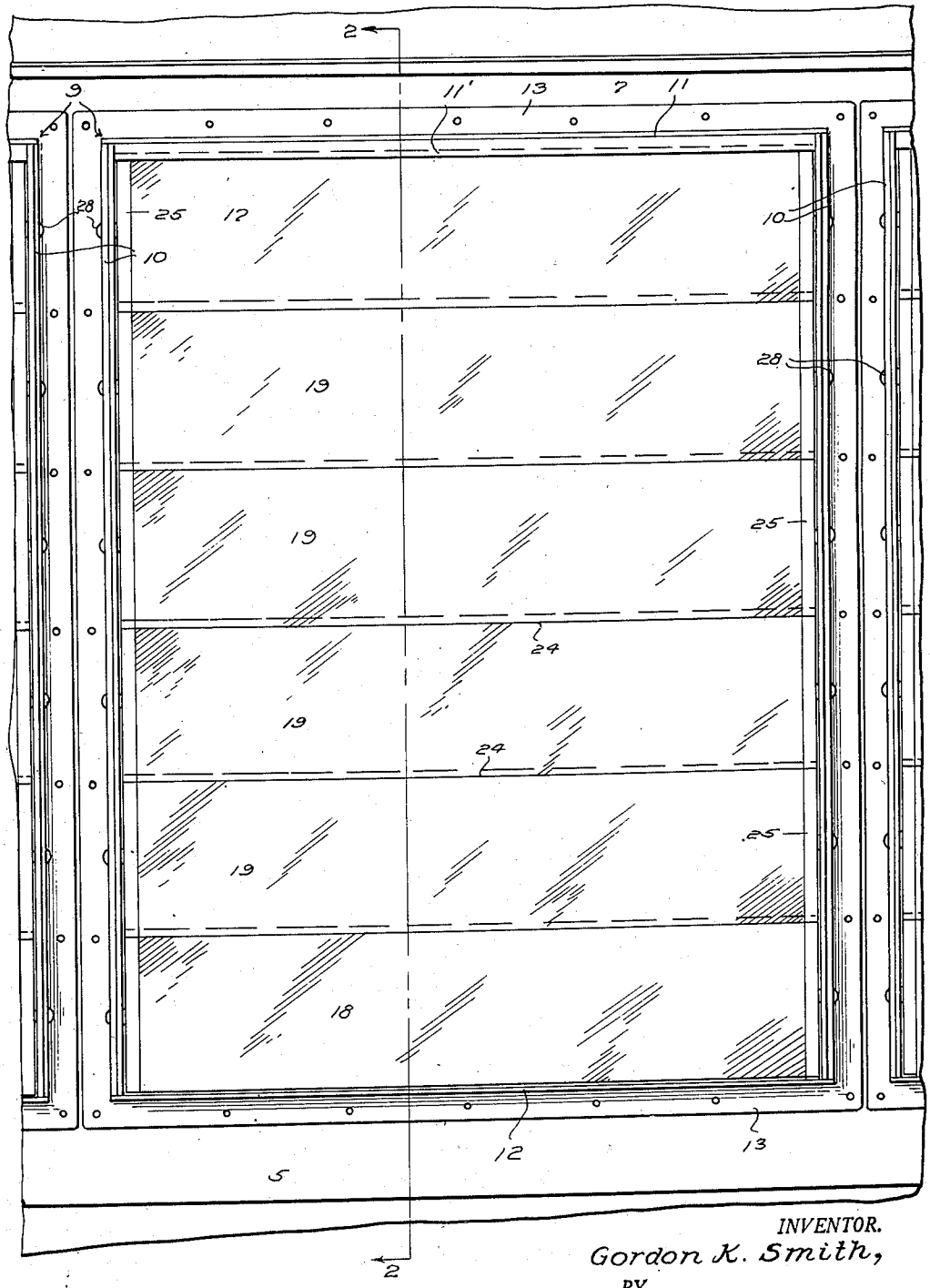


Fig. 1.

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TRANSPARENT SHUTTER CLOSURE

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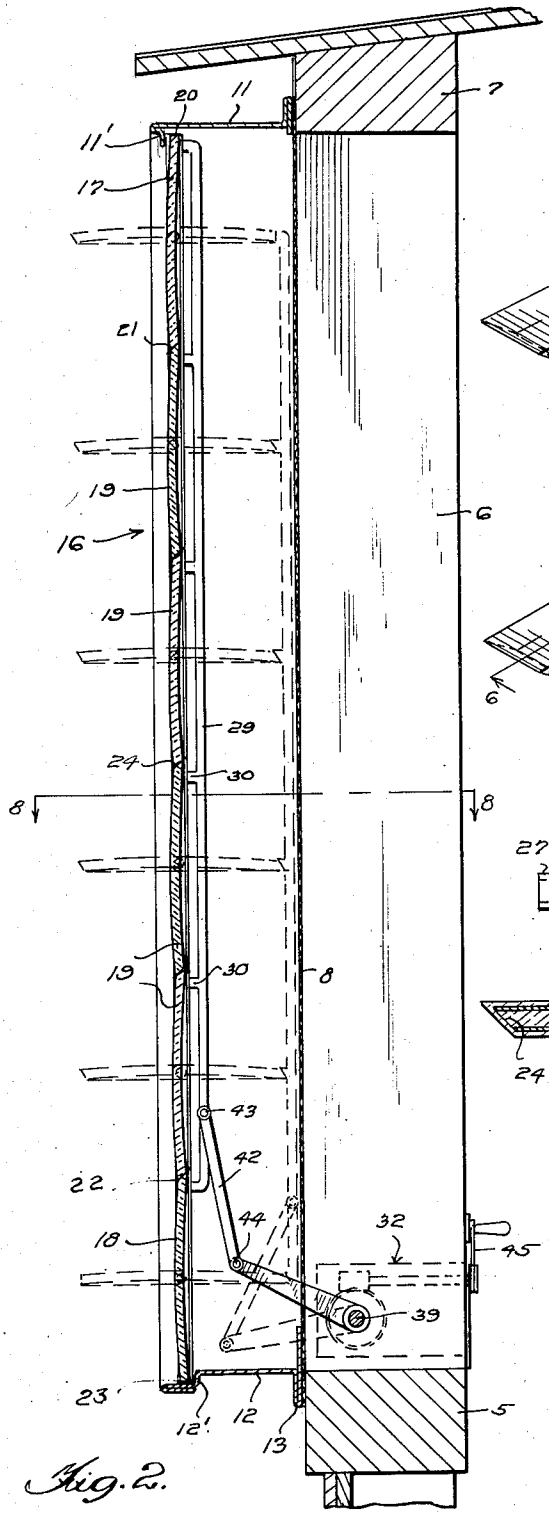


Fig. 2.

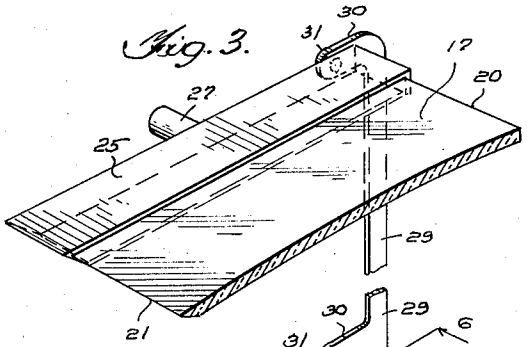


Fig. 3.

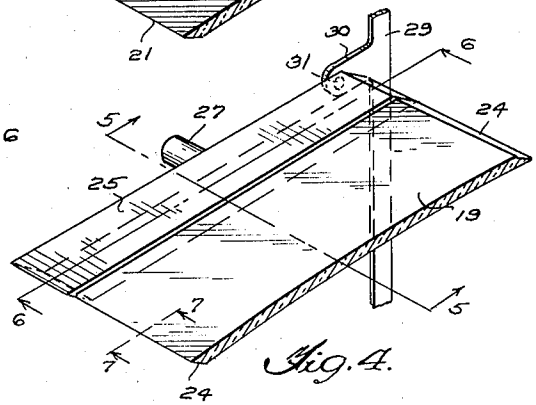


Fig. 4.



Fig. 5.

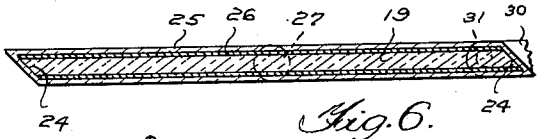


Fig. 6.

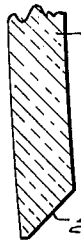


Fig. 7.

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TRANSPARENT SHUTTER CLOSURE

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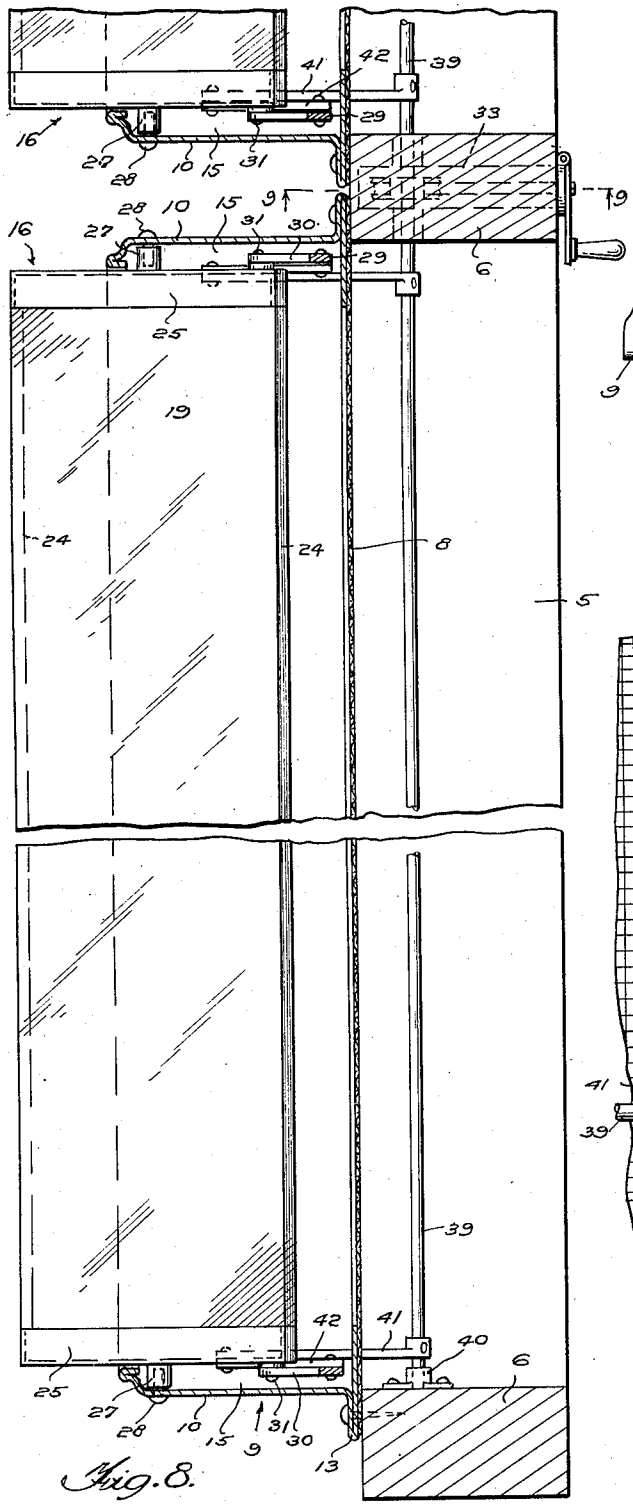


Fig. 8.

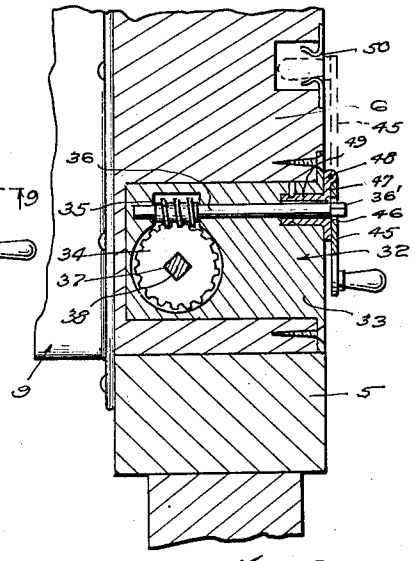


Fig. 9.

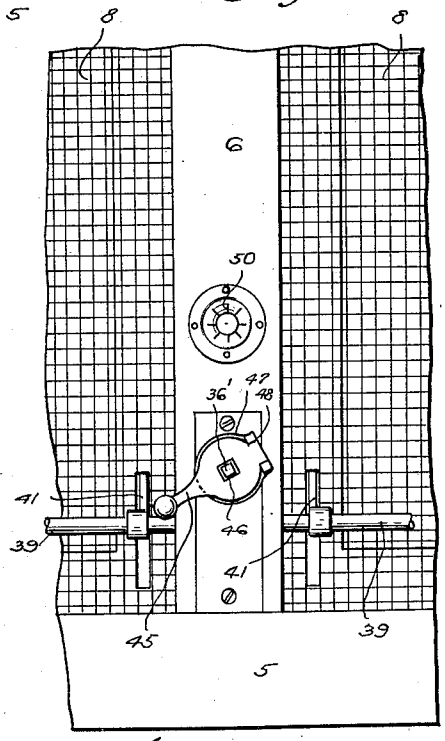


Fig. 10.

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UNITED STATES PATENT OFFICE

2,505,155

TRANSPARENT SHUTTER CLOSURE

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Application September 3, 1946, Serial No. 694,503

1 Claim. (Cl. 20—62)

1

This invention relates to transparent shutter closures and has for its primary object the provision of a closure formed of a plurality of transparent adjustable louvers.

An important object of the invention resides in the employment of transparent louvers, constructed to swing upon a horizontal axis in unison by a common operator, such louvers formed of a methyl methacrylate, either commercial Plexiglas or Lucite and so constructed and arranged as to obtain a maximum opening area or when closed, affording a tight even joint between the several louvers to exclude rain, wind, dust or the like, while at the same time permitting the passage of a maximum of light.

A further important object of the invention resides in the formation of the plastic louvers in a manner to add greatly to its strength, avoiding tendency to warp, increasing its resistance to outside pressures such as might be encountered from wind, rain, hail and most windblown objects.

Other objects reside in mechanical details of construction, the method of supporting the ends of the louvers, the provision of operating mechanism that exerts an even opening and closing force upon both ends of the units of any group and the common operating device for controlling two or more groups of louvers.

Many additional mechanical advantages and objects of the invention will readily present themselves during the course of the following description, reference being had to the accompanying drawings, wherein:

Figure 1 is an outer face view of a complete shutter, with a fragmentary showing of the next adjacent shutters,

Figure 2 is a vertical section through a complete shutter structure, taken on line 2—2 of Figure 1,

Figure 3 is a fragmentary end perspective of the uppermost louver slat of any group,

Figure 4 is a similar view of the intermediate slats,

Figure 5 is a longitudinal section of the slats, taken on line 5—5 of Figure 4,

Figure 6 is a transverse section taken on line 6—6 of Figure 4, illustrating the method of mounting the ends of the slats,

Figure 7 is a fragmentary, enlarged section through the edge of the slat, taken on line 7—7 of Figure 4 and illustrating the co-operating bevel edges of the several slats and the absence of feather edges,

Figure 8 is a horizontal section taken on line

2

8—8 of Figure 2 with a fragmentary showing of the next adjacent louver group,

Figure 9 is a fragmentary section through the operating mechanism, taken on line 9—9 of Figure 8 and,

Figure 10 is a fragmentary inside elevation of the operating mechanism.

Referring specifically to the drawings, wherein like numerals are employed to designate like parts throughout, 5 denotes a sill, 6 the conventional uprights and 7, the head plate, all being of well recognized building construction, forming porch or window openings. Each opening formed by the uprights 6 are covered by the usual insect screen 8.

The numeral 9 designates a supporting frame, formed of sheet metal of recognized non-corrosive qualities, shaped to provide sides 10, top 11 and bottom 12. The sides, top and bottom are bent outwardly at right angles, then inwardly upon themselves to form attaching flanges 13, whereby the frame completely surrounds the porch or window opening, with the inwardly bent portions projecting slightly inwardly of the opening as a means for shielding the operating mechanism of the louvers to be described. Each of the sides 10 has its free edges turned inwardly, as at 14, to provide a channel 15, for operating bars, to be described.

The numeral 16 designates groups of louver units, it being understood that each frame 9 supports a group of louvers for each porch or window opening. Each louver group includes an upper slat 17, a lower slat 18 and intermediate slats 19. Each of the slats are heat treated to give them a slight convex transverse curve, see particularly Figures 2, 3 and 4. These slats are formed of methyl methacrylate, commercially recognized as Plexiglas and Lucite. The upper slat 17 has a square upper edge 20, adapted to abut a lip 11', formed upon the top 11, when in closed position, while its lower edge is ground to a bevel, as at 21. The lower slat 18 has its upper edge beveled as at 22, while its lower edge 23 is formed square to abut a shoulder 12', formed upon the bottom 12 of the frame. Each of the intermediate slats have both upper and lower edges bevelled, as at 24 and, when in their closed position engage to provide a tight joint against entry of foreign matter. Each of the bevelled edges are further ground to remove feather edges, see Figure 7.

Means are provided to mount the several slats within the frame 9 for horizontal swinging movement in co-operative relation, comprising chan-

nel members 25, formed of non-corrosive metal, closed at their ends and back and open upon their forward edges. The channels 25 for the several slats are shaped on their ends to conform to the edges of their respective slats. A channel 25 engages over the opposite ends of each slat and suitable packing 26 is interposed between the channel and the plastic, to avoid accidental displacement of the slat from the channel and to provide for any slight distortion due to expansion and contraction. The edges of the slats and their respective channels present an uninterrupted engaging joint with each other, thus assuring a weather-tight joint throughout the length of louvers. Each of the channel members 25, intermediate its ends, are provided with trunnions 27, pivotally supported in the side walls 10, by pins, screws or like pivotal members 28, whereby the several slats are supported for horizontal swinging movement in the frame.

It is essential that all the slats in a given group move in unison, so that the degree of opening and closing is identical and, to accomplish this, a common operating bar 29 is provided, having offset arm extensions 30, corresponding to the number of slats in the group. Each arm 30 is pivotally connected, as at 31, to the channel members adjacent their upper ends. As clearly shown, there is provided identical operating bars for each end of the unit. Movement of the bar in a vertical direction, under the influence of operating means, to be described, results in the several slats swinging upon their trunnions 27, as indicated by dotted lines in Figure 2. As shown in Figure 8, the operating bars 29 lie wholly within the channel 15, being hidden from both outside and inside.

Means are provided to actuate the bars 29, comprising a gear mechanism, indicated as a whole by the numeral 32 and, includes a gear housing 33, recessed into one of the uprights 6. The housing 33 encloses a worm wheel 34 and a worm 35, the worm being fast upon an operating shaft 36. The worm wheel, see Figure 9, is provided with a square opening 37, receiving the squared portion 38 of a control shaft 39. The shaft 39 passes through suitable openings formed in the side walls of the upright 6 in opposite directions and has its free ends supported in suitable bearings 40. The shaft 39 lies parallel with the sill 5 and, as shown, extends upon opposite sides of the upright 6 to provide a common operating medium for two sets of louvers from a single operator. Crank arms 41, fast upon the shaft 39, extend outwardly and have their free ends connected with the bars 29, through the medium of links 42, pivotally connected with the bar 29 as at 43 and to the end of the crank as at 44. Obviously, rotation of the worm 35, results in a rotation of the worm wheel 34, shaft 39, with the resulting swinging of the cranks 41 for shifting the bar 29 in a vertical direction. The provision of the bars 29 at both ends of the unit assures an even opening and closing pressure to be exerted upon the slats and avoids a tendency toward tortional strain, as is so noticeable in shutter closures previously used. The evenly distributed closure pressure assures a close joint between the several slats throughout their length.

Means are provided to rotate the worm shaft 36, comprising a hand crank 45, having a centrally disposed square opening 46 for engaging over the squared end 36' of the shaft 36. The crank 45 is pivotally connected to a plate 47, as at 48 and this plate is freely rotatable on the shaft 36, through

the medium of a sleeve 49, held against shifting movement by a suitable set screw. The crank 45 is adapted to swing outward to disengage the shaft 36, at which time the hand portion is adapted to be engaged in and held by a spring detent 50, set into the upright 6. Thus, when the crank is not in use, its hand portion is engaged in the detent with the result that no protruding parts of the mechanism extend into the room.

It is believed, that from the description heretofore given, the operation of the louvers will be entirely obvious. The use of the plastic louvers affords excellent protection against heat and storm, while at the same time in no way interfering with the passage of light. The use of this type of louver permits a wider slat, being light in weight as compared with other materials in use heretofore, requires fewer slats for a given opening and will obviously permit the entry of a greater volume of air. Wood slats and metal slats heretofore employed have the added disadvantage of shutting out light when it becomes necessary to close them and, since the wood slats must of necessity be made comparatively heavy to avoid warping, it follows that this added thickness, multiplied by the number of slats necessary, reduces the air area an appreciable degree.

It is contemplated that various transparent and translucent plastic materials will be used, to fit various requirements. The crystal clarity and transparency of the plastic louver is highly desirable. The plastic used is more transparent than the best glass, transmitting 92% light as compared with 88% for the best plate glass. While the transmission of light is excellent, the material has high internal reflection and thus heat from the light transmission is, to a great extent, absorbed and diffused. This, combined with a highly polished exterior surface, which has a coruscating effect, gives remarkable heat insulating results. Methyl methacrylate plastic has a high index of refraction and this refractive index, indicating excellent light reflection, will insure clear vision without distortion or crazing.

The plastic louver would be unusually tough and strong. The plastic has high flexural strength and yet is only half as heavy as glass. It provides adequate protection against storms and most wind-blown objects and its strength makes it much more desirable than glass.

It is further contemplated that various colored transparent and colored and uncolored translucent louvers may be used. The plastic used has color stability, while glass lacks this stability. The various color combinations can be employed with extremely ornamental effects. It is further contemplated to sandblast ornamental designs upon the complete louver which, when the slats are closed, will carry out a complete design that will be highly pleasing, yet will not interfere with visibility. The use of an ornamental design upon the lower portion of the louver will serve the dual purpose of ornamentation and will obscure from external view the operating shaft 39. The sun's rays or light reflection on the curved surface of the slats will hinder to some extent, a view into the interior, when the louver is closed. This is of course desirable and the view from the interior is somewhat improved. Further, that since a curved surface reflects glare and heat to a greater extent than a flat surface, the reflective arc of the sun's rays will follow the curve of the slat and be deflected therefrom.

Various treatments of the slats from both the standpoint of ornamentation and utility, tend

to create a closure for porch and window openings that is highly desirous and overcomes the many objections to louvers now in use.

The parts are few and simple, are strong, durable, cheap to manufacture and require a minimum of attention.

It is to be understood that the invention is not limited to the precise arrangement shown, but that it includes within its purview, whatever changes fairly come within either the terms or the spirit of the appended claim.

Having described my invention, what I claim is:

A transparent closure device embodying a frame, a plurality of closure louvers mounted in the frame to swing in a horizontal plane, end channels for supporting the opposite ends of each louver, said louvers being formed concavo-convex throughout the major portion of their length transversely, the terminal ends of each louver being formed flat transversely for engagement in the channels, the opposite longitudinal edges of the louvers being bevelled at an identical angle throughout their length, the ends of the channels being closed and bevelled at an angle identical to the angle of the edges of the louvers, with the bevel of the channels engaging the bevel of the louvers forming a continuous bevelled edge throughout the louver and the channels, said louvers and the channels adapted to overlie each other in bevelled engagement when in the closed position to provide an uninterrupted continuous surface to the closure device.

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