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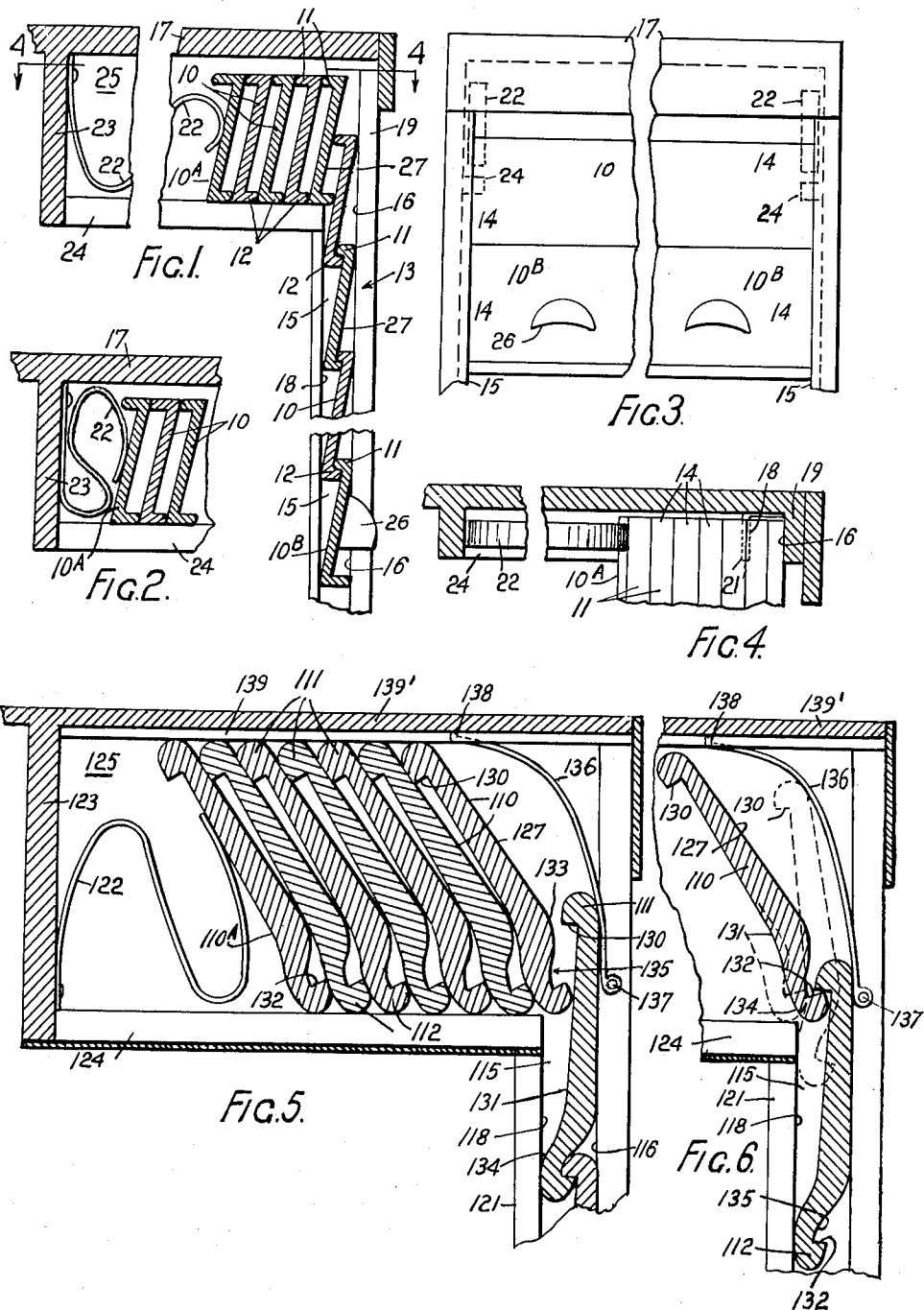
R. GOLDNER

2,729,287

SHUTTER, WINDOW OR THE LIKE

Filed May 12, 1951

2 Sheets-Sheet 1



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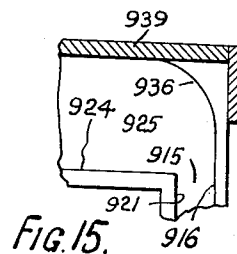
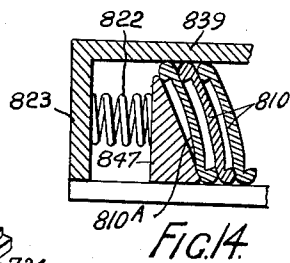
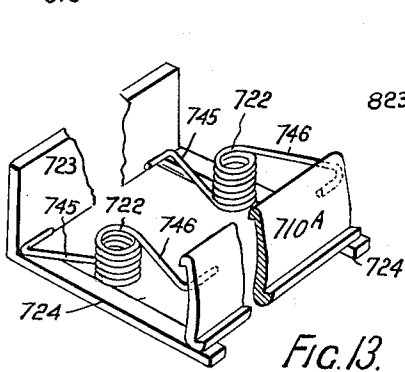
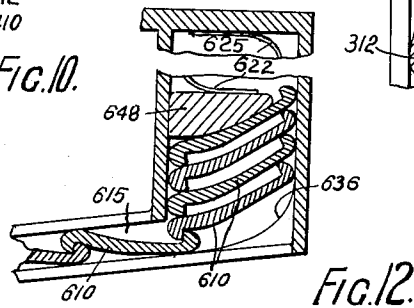
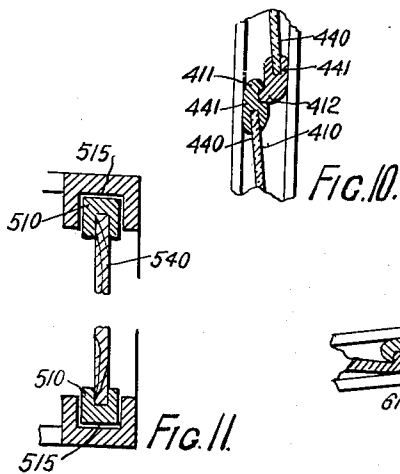
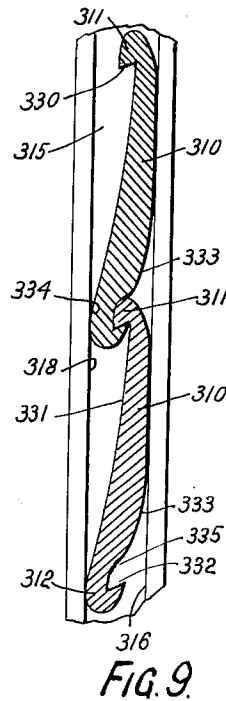
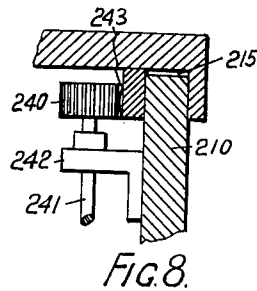
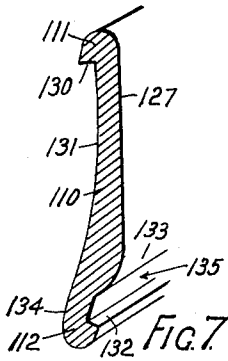
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2,729,287

SHUTTER, WINDOW OR THE LIKE

Filed May 12, 1951

2 Sheets-Sheet 2



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SHUTTER, WINDOW, OR THE LIKE

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Application May 12, 1951, Serial No. 225,960

Claims priority, application Australia May 15, 1950

14 Claims. (Cl. 160—33)

This invention has reference to shutters for the covering and uncovering of apertured structures, for instance wall apertures such as windows and doors, or of the open front, side and/or top of a piece of furniture to replace doors, conventional roller shutters and the like.

The term "shutter" is used herein in a more comprehensive sense than usually, as it is also meant to embrace appliances different from those enumerated above, such as for instance removable awnings or sun-roofs which although not strictly "apertured structures," may yet be designed to be operated similarly to shutters.

Thus it is one object of this invention to devise a novel kind of shutter and elements therefor, in forms permitting application to a wide range of different uses.

Another object of the invention is to provide a simple and inexpensive shutter wherein a series of separate shutter elements—hereafter generally termed "slats"—are edgewise connected with each other while within shutter guides, in order to be operative, i. e. capable of covering or uncovering an apertured or other open structure, but can be separated from each other, one by one, and stacked or piled in a limited magazine space disposed laterally of these guides, in positions in which they are in their turn ready for instantaneous re-connection, i. e. for closing the shutter.

To permit connection and disconnection of the separable slats during shutter operation, each slat—with the possible exception of the first and the last of the series—is provided at its opposite edges with engagement elements or lips and, in order to assure satisfactory operation, i. e. safe and smooth opening and closing of a shutter of this kind, it is necessary that certain conditions are fulfilled with respect to the design of the slats and of these engagement lips, and with respect to the transfer of the slats between the shutter guides and the magazine space.

Referring first to disconnection of the slats during opening of the shutter, it is necessary for each slat leaving the shutter guides and entering the magazine space, to encounter as little resistance as possible to the disconnection of its "rear" edge from the "forward" edge of the following slat which is still in the guides, and to have imparted to it by said following slat at the earliest possible instant a positive thrust towards the magazine space.

These primary conditions are fulfilled, for instance, if each slat is about Z-shaped (or inverted Z-shaped) in cross-section, the head and foot of each Z forming respectively the "forward" and "rear" edges of each slat and at the same time their "forward" and "rear" engaging elements or lips. In this instance the head of the Z (i. e. the "forward" end) of the following slat which points to the magazine space, offers practically no resistance at the station of transfer into the magazine space, to the transverse displacement of the preceding slat from the guides into that space. At the same time the slanting web of the following slat—and under certain conditions also its "forward" head—impart to the preceding slat a positive thrust in the direction of the magazine.

Compliance with the afore-mentioned conditions also assures satisfactory and rapid re-connection of the stacked inoperative slats, one by one, in the shutter guides if provisions are made, or means provided, for urging these slats from the magazine space towards these guides.

For the sake of uniformity and in order to avoid ambiguity, the terms "forward" and "rear," "preceding" and "following" are used hereafter in this specification and in the appended claims (unless stated otherwise) in the same sense in which they have been used above, viz. in relation to the opening movement of a shutter according to this invention.

For smooth and rapid opening of the shutter with a minimum of noise it is further advantageous if, in the guides, the forward edge or head of each slat closely engages a surface element of the preceding slat, said element being adapted to take directly the forward pressure of the following slat during closing. In the case of shutter slats which are substantially Z-shaped (or inverted Z-shaped) in cross-section, such surface element may be constituted by a shoulder or bulge of the web of that slat, which faces the foot of the Z, i. e. the rear anchoring element of said slat.

Hence, a shutter according to this invention comprises spaced parallel shutter guides, several separable slats slidably displaceable within these guides, a magazine for separated slats adjoining one end of the shutter guides at an angle thereto, and a driving arrangement for urging slats inside the magazine towards the guides, each slat having engaging lips which project to different sides of the slat transversely to its general plane and which edgewise connect adjoining slats when disposed within said guides, each lip defining with the slat face whence it projects a space which generally widens with increasing distance from the base of said lip for receiving the engaging lip of an adjoining slat, and projecting into the path of the latter lip when at the station of transfer from the magazine to said guides, the extent of projection of at least one lip of each slat being such that at said station of transfer it contacts a side of the adjoining slat before it engages a lip of the latter during closing of the shutter.

Besides this each slat is preferably formed with a shoulder or bulge facing its rear engaging element or lip at a distance which permits the forward engaging element or lip of an adjoining slat to enter with a minimum of play the space between said shoulder or bulge and said rear engaging lip.

In the best forms of the shutter according to the invention operation is considerably facilitated and improved in other respects also, by the provision of means which during transfer of each slat between the guides and the magazine, gradually tilt its forward edge towards the magazine space, such angular tilt being preferably retained by the slats while inside the magazine. During opening of the shutter such means, which may include stationary or movable deflectors or the like disposed opposite the magazine, not only promote disengagement or disconnection of the slat to be transferred from the following slat, but also considerably reduce the unavoidable sliding friction between the slats during transfer. Besides this, in many uses these deflecting means confine sliding friction and the resulting surface wear to surface parts of the slats which are not normally visible. During closing of the shutter, on the other hand, these means greatly assist in assuring safe connection of the slats when re-entering the guides, prevent edging of the slats, and possible disturbances resulting therefrom during closing.

In order to more particularly describe the invention reference is made to the accompanying drawings which, by way of example, illustrate various forms of shutters and related structures according to this invention as well as component parts thereof, and wherein:

Fig. 1 shows partly in cross-section one form of the improved shutter in half-closed condition;

Fig. 2 is a fragmentary sectional view showing part of the magazine of the shutter according to Fig. 1 when the shutter is fully open;

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Fig. 3 shows on smaller scale than Fig. 1 an elevational view of a shutter according to that figure in partly closed condition;

Fig. 4 is a fragmentary plan view showing one end section of a shutter according to Figs. 1 to 3;

Fig. 5 is a cross-sectional view similar to Fig. 1 showing a modified form of shutter according to this invention in semi-closed condition;

Fig. 6 is a fragmentary view similar to Fig. 5 showing in full lines and dotted lines, respectively, a pair of slats of the shutter according to Fig. 5 in different phases of the shutter operation;

Fig. 7 depicts in cross-section one slat of the shutter according to Figs. 5 and 6;

Fig. 8 is a fragmentary plan view showing one slat of a modified form of shutter, equipped with means for positively preventing edging of that slat;

Fig. 9 depicts in sectional elevation two slats of a modified form of shutter within a guide;

Fig. 10 illustrates a still further modification of slats particularly suitable for windows, according to this invention;

Fig. 11 shows in sectional plan view a single composite shutter slat with engaging elements confined to its ends only;

Fig. 12 shows in cross-section the use of shutter elements according to this invention for a sun-roof or like structure;

Figs. 13 and 14 show diagrammatically in perspective view and cross-sectional view, respectively, modified spring arrangements suitable for shutters according to this invention; and

Fig. 15 shows diagrammatically a different kind of deflector for the improved shutter.

In all figures of the drawings, like parts are indicated by related numerals which in order to differentiate between various forms of the invention have one or several hundreds added to them.

In the form shown in Figs. 1 to 4 the shutter comprises several slats 10 which in contour are substantially rectangular and in cross-section closely resemble elongated Z-shape, or inverted Z-shape. The heads 11 and bottom beads or lips 12 of the slats 10 are formed to act as engaging elements which permit the slats 10 to be suspended from one another in the manner shown in Fig. 1.

In use, i. e. in a position (Fig. 1) in which the slats 10 wholly or partly close an aperture, say for instance the front opening of a cabinet 13, they are arranged in superposed relationship with their opposite ends 14 placed within vertical guides 15 which are disposed at either side of the cabinet opening, the top lips or heads 11 of all slats pointing inwardly i. e. toward the interior of the cabinet 13, while the bottom lips 12 point in an outward direction.

The "outer" side 16 of each guide 15 may extend to the cabinet roof 17 while, as shown in Fig. 1, the inner side 18 of each guide 15, i. e. the side more remote from the cabinet opening, ends at a distance beneath the roof which corresponds to, and in this example exceeds, the width of a single slat 10. The clearance between the ends of the sides 18 and the roof 17 will permit any one slat 10 to recede into the interior of the cabinet 13, below the roof 17 if and when so required, and will thereby enable the remaining slats within the guides 15 one by one to reach the top position of the guides for opening the shutter.

Conversely this clearance will permit the slats 10 assembled beneath the roof 17 to enter the guides one by one, as is required for closing the shutter.

As may be seen from Fig. 4, the guides 15 are here constituted by a projecting lath 19 at the front end of the cabinet side wall 20, said lath forming the "outer" side 16 of each guide, while the "inner" side 18 of the guides is in this case formed by a rail 21 of L-profile

secured to the interior of the wall 20. Alternatively the guides may be made of channel-profiled rails, or of spaced rails secured to the cabinet side walls or, in other embodiments of the invention, by profiled sections of the furniture wall itself.

At a suitable distance beneath the cabinet roof 17 are provided cartridge springs 22 supported at 23, said springs being disposed above ledges 24 which extend rearwardly from the top end of each "inner" side 18 of the guides 15 and constituting with the supports 23 a magazine 25 for temporarily inoperative slats 10. The springs 22 engage the slat 10^A which, seen from outside the cabinet, is at all times the rearmost slat in the magazine and which, when the shutter is closed, is near or at the entrance to the magazine 25 and may even take up the top position within the guides 15. Thus the springs 22 resiliently urge in an outward direction the slat 10^A as well as any other slat or slats 10 which at any time may have reached the magazine space 25 beneath the roof 17.

The rearmost slat 10^B of the series, i. e. the lowermost slat of the shutter, is provided with handles 26 or the like to facilitate operation of the shutter and, if so desired, it may further be provided with a lock or equivalent (not shown).

In order to understand the operation of the device, let it first be assumed that the shutter is completely open (Fig. 2), in which case the slats 10 are assembled within the magazine 25 and are urged in an outward direction by the springs 22, while slat 10^B will adopt a position at or approximately at the upper ends of the guides 15 (not shown).

If now a downward pull is manually exerted on the slat 10^B, it will move downwardly within the guides 15 and, since at the same time the remaining slats 10 are urged outwardly by the springs 22, the top lip or upper offset element 11 of slat 10^B will operatively engage the bottom lip or lower offset element 12 of the next following slat 10 (in the manner shown in Fig. 1 for other slats 10) and it will thereby cause the latter also to enter the guides 15. The same operation will be repeated with respect to the remaining slats, one by one, as long as the downward pull is maintained on the slats in the guides 15.

If, on the other hand, for opening the shutter the lowermost slat 10^B or any other slat within the guides 15 is moved in an upward direction, either the top lip 11 of that slat will engage the "outer" surface 27 of the preceding slat in the guides 15, or the "inner" face 31 of the following slat will engage the bottom lip 12 of the preceding slat. Jamming of the slats in the guides 15 during opening is prevented if the guides and the slides are accurately machined. Besides this a horizontal groove or lip (not shown) formed at a proper station either in the face 27 or in the face 31 of each slat for engagement with the edge of the lip 11 or with the lip 12 respectively, will assure such adjustment as may be required in the mutual positions of the slats 10 that opening of the shutter without jamming can be effected by pushing up on any one slat within the guides 15. Another method of assuring safe opening of the shutter would be, for instance, by rotary frictional cams disposed opposite the (temporarily) uppermost slat in the guides. By the provision of such cams opening of the shutter would be effected by upward pull exerted by the temporarily uppermost slat upon all other slats in the guides.

When during upward movement of the shutter any one slat 10 approaches its top position opposite the magazine 25, the adjoining (preceding) slat 10 in the magazine space is forced by the following slat against the action of the springs 22 to recede into the magazine space, together with all other slats 10 and 10^A so far assembled within that space. Thus the slats 10 will gradually be collected within the magazine 25 in which they take up a limited space only and do not interfere with the contents of the cabinet.

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While the simple embodiment of the invention described with reference to Figs. 1 to 4 is safely operable, engagement and disengagement respectively of the slats during operation being assured, its operation will be improved with the forms of the invention described hereafter.

This is due to the fact that where for instance during closing of the shutter the top lip 11 of each slat entering the guides from the magazine frictionally engages the outer or front surface 27 of the preceding slat 10, it may in the course of time cause wear of that surface. Another undesirable effect is the comparatively sudden impact of each top lip 11 upon the side of the preceding slat during opening, and upon the bottom lip 12 thereof during closing, which may cause rattling during operation unless the top and bottom lips are rounded-off or padded.

A preferred form of shutter according to this invention shown in Figs. 5 and 6 differs from that shown in Figs. 1 to 4 in the first place by the cross-sectional configuration of the slats. According to Fig. 7 each slat 110 is formed with an offset top lip 111 which is generally rounded as shown, while the lower face 130 of each top lip 111 is substantially plane and juts straight out from the inner face 131 of the web of the slat. The offset bottom lip 112 is shaped similarly to the head 111, its upper face 132 being substantially plane and jutting straight out from the opposite end of the outer face 127 of the web, in a direction opposite to that of the top lip 111. At a distance from the face 132 which substantially corresponds to the height of the top lip 111, the web portion of the slat 110 is formed in its outer face 127 with a rounded bulge or protuberance 133. The inner face 131 of the web of the slat 110 on the other hand, from the top lip 111 downwards, first follows the outer surface 127 in approximate parallelism, but it soon diverges therefrom and joins the bottom lip 112 in an inwardly bulged section 134 opposite the bight 135 which is bounded by the bottom lip 112 and bulge or protuberance 133.

The shutter according to Figs. 5 and 6 also differs from that previously described by the arrangement within the guides 115 and opposite to the magazine space 125, of deflectors 136 which in the embodiment shown are each constituted by a curved leaf spring secured at 137 to the side 120 and at 138 to the top ledge 139 of the magazine 125, the roof portion 139' between the ledges 139 being recessed. The distance of the top ledges 139 from the ledges 124 constituting the magazine bottom, is less than the width of each slat 110 and therefore the slats in the magazine must lean forward as shown in Figs. 5 and 6 with their respective top lips 111 pointing towards the end 123 of the magazine.

The operation of the shutter in this preferred form, although the same in principle, yet differs from the afore-described operation as follows:

When the shutter is opened, a slat 110 approaching the magazine 125 is at first moved in the direction of the guides 115 and its top lip 111 permitted to pass freely the bulge or protuberance 133 of the preceding slat 110 which, as may be seen from Fig. 5, is in a forward inclined position at the entrance of the magazine space 125. During the progress of the ascending slat the inner or rear surface 131 of the slat 110 engages the bottom lip 112 of the preceding slat and gradually urges the preceding slat and with it all other slats in the magazine space, towards the end 123 against the pressure exerted by the springs 122.

After some progress the top lip 111 of the ascending slat is tilted towards the magazine space 125 by the deflectors 136 (dotted lines in Fig. 6) until this slat also assumes the same inclined position within the magazine space 125 as the preceding slats. During the tilting movement the inwardly bulged section 134 of the inner or rear slat surface 131 still further thrusts the preceding slats into the magazine, while the upper face 132 of its bot-

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tom lip 112 gradually disengages itself from the face 130 of the top lip 111 of the next following or ascending slat 110 with which it has then substantially linear contact only. At the same time the bulge or protuberance 133 of its outer or forward face 127 is moved to a position in which it clears the path for the advance of the top lip 111 of the next following slat 110.

Jamming of the slats in the guides 115 during opening of the shutter by upward push upon any one slat in these guides is prevented by the self-adjustment of the top lip 111 of said slat—and of each slat above it—as said lip is being urged towards the bulge 133 of the preceding slat in the guides.

During closing of the shutter, on the other hand, when a slat 110 enters the guides (Fig. 5) its top lip 111 is clear of the outer face 127 and bulge 133 of the adjoining slat in the magazine which is still in its forwardly inclined position and the bottom lip 112 of which is held in engagement with the inner face 131 only of the first-mentioned slat 110. As the top lip 111 of this slat is about to leave the position opposite the magazine 125 (full lines in Fig. 6), its lower side 130 engages and grips the edge of the bottom lip 112 of the adjoining slat in the magazine which projects into its path, thereby forcing the latter slat also to enter the guides 115. During the following period the newly engaged slat is erected, the rate of erection being controlled by the deflectors 136, while the top lip 111 of the first-mentioned slat gradually and smoothly enters, and eventually takes up, the space of the bight 135 of the slat being erected (dotted lines, Fig. 6).

It ought to be noted that during opening as well as closing of the shutter sliding friction only occurs between the inner face 131 of each slat and the bottom lip 112 of the preceding slat, which is not normally visible from outside the cabinet. Sliding friction of the top lip 111 of each slat takes place along the deflectors 136 and the top ledges 139 and therefore only over a width which corresponds to the depth of the guides 115. Thus the central section of the top lips 111 which are visible when the shutter is closed, are not subjected to sliding friction during operation. Hence no visible parts of the shutter are subject to wear by friction and therefore the described shutter design is very suitable for furniture of any description.

Due to the linear contact between the underside 130 of each top lip and the edge of the bottom lip 112 of each adjoining slat, at the instant of their engagement during closing operation, comparatively little noise only is produced when the interengaging elements of adjoining slats meet and therefore the operation of the shutter is quiet. The manner in which the top lips 111 grip the bottom lips 112 of adjoining slats has the further advantageous effect that the slats are automatically aligned whereby edging of the slats in the guides is practically excluded. This is due to the fact that the design of the interengaging elements (heads and beads of the slats) demands their mutual contact over their entire length.

This notwithstanding it may be preferred for heavy shutter structures, such as for instance heavy shutter doors of wide span, to provide means whereby at least one of the slats of the shutter is guided strictly at both ends during operation and is thus precluded from uneven progress of its ends during both closing and opening. Such means may for instance comprise toothed pinions 240 secured in perfect register with each other on a common spindle 241 which is held in brackets 242 secured to the inner side of, say, the lowermost slat 210^B of a shutter in the manner shown in Fig. 8. A rack 243 provided on each guide 215 and engaged by the teeth of the pinion 240 thus assures progress of the slat 210^B in strictly parallel translation and it thereby also compels the other slats to assume strict parallelism throughout their operation.

In order to make a shutter burglar-proof, the design of its slats may be modified as shown in Fig. 9. The slats 310 depicted therein closely resembled those shown in Fig. 7 but they differ therefrom in that the anchoring elements formed by surfaces 330 of their top lips 311 and the corresponding faces 332 of their bottom lips 312 are undercut so as to hook into each other during engagement. Thus the top and bottom lips are interlocked over their entire length while in the guides, and render it impossible to force them apart in any section of the shutter.

In shutters of the kind so far described which are suitable for furniture, doors, and for various other uses, the slats are made of one material only, for instance wood, or synthetic or plastic material, or metal. Where the material permits, they may be made by an extrusion process and subsequent cutting, in which case uniform cross-section of the slats throughout their length is assured.

Alternatively the lips and the web portion of each slat may consist of different material. One example which is suitable, for instance, for use in windows made on the principle of the shutter according to this invention, is shown in Fig. 10. Here the web portions 440 of the slats 410 consist of plane strips of glass or other transparent material, of appropriate width, while the top lips 411 and bottom lips 412 which are profiled on the principles set out with reference to Fig. 7 or Fig. 9, consist of beads made separately, for instance by an extrusion process, of a synthetic material, or of metal, each bead being formed each with a groove 441 adapted to accommodate one edge of the web 440 which may be secured therein by a suitable cement or otherwise, depending on the material used for the beads and/or webs.

The width of the heads 411 and beads 412 in comparison to that of the slats 410 is preferably narrow in order to reduce obstruction of vision through the window to a minimum and, if desired, the beads and heads may be made of a transparent or translucent material.

One considerable advantage of windows made according to this invention lies in the fact that broken slats can be exchanged easily. If one or more than one spare slat is provided in the magazine, repair of a partly broken window requires only the removal of the broken slat or slats from the guides.

It ought further to be observed that for this particular use it is preferred to arrange the magazine space (not shown) at the outer side of the window structure in order to secure rainproof closure of the window.

Except where interlocking is required over the entire length of the slats as in the case described with reference to Fig. 9, the top heads and bottom lips need not extend over the entire length of the slats, but may be confined to limited lengths. Thus for instance only the opposite ends of each slat may be constituted by profiled elements 510 of a width corresponding to the width of the guides 515 and may have mounted between them plain web portions 540 in the manner shown in Fig. 11. Where desired, engaging elements may also be provided at an intermediate station or stations to preclude or at least obstruct forcing apart of the webs between the guides, such engaging elements (not shown) consisting of short headed sections profiled like the top and bottom lips 311 and 312 of slats according to Fig. 9, and being attached to the webs for instance in the manner shown in Fig. 10.

The slats or webs as described in the foregoing parts of the description have plain surfaces. They may, however, be profiled, or formed with projections and grooves, or corrugated, anywhere along their length. In profiling the webs or web portions of the slats for ornamental or other purposes, ribs, projections and other irregularities of shape must be kept within bounds in order to avoid interference with the head and bead portions or heads and beads of adjoining slats during operation of the shutter in the aforescribed manner.

In the foregoing disclosure the invention has been

described as applied to shutters disposed in vertical guides only.

The invention however is by no means limited to such uses. Thus for instance it can be applied with advantage to doors and other apertured structures for opening and closing in a horizontal direction, in which case the slats are disposed vertically within horizontal guides disposed respectively at the base and top of the aperture.

Furthermore the guides may be inclined and if so desired they may be slightly curved as for instance in the case of desk shutters arranged in the manner of the known roll top shutters.

A similar arrangement may be used for instance in the application of the invention to removable sun-roofs or awnings disposed, say above a verandah. As may be seen from Fig. 12 which depicts the magazine and associated parts only, the slats 610 are in that case slidably disposed between spaced and properly shaped guide rails 615. The magazine 625 is here arranged vertically instead of horizontally and, accordingly, the weight of the slats stored in the magazine, which is increased by that of a metal block 648, is in this arrangement relied on as the driving force acting on the slats and assuring their engagement in the guides during withdrawal from the magazine 625. Where the slats themselves are sufficiently heavy, the metal block can be dispensed with.

It is not desired to limit protection by Letters Patent to the details so far described, as these may be further modified within the scope of this invention.

Thus for instance the spring arrangement as described and shown may be modified by the use of coil springs or, for instance in shutters of smaller dimensions, by leaf springs.

One suitable arrangement of coiled driving springs within a magazine space 724 is diagrammatically shown in Fig. 13 according to which the ends of the coil springs 722 are formed with extensions 745 and 746 respectively, which are secured to the rear spring support 723 and to the last slat 710^A respectively of a series. Springs of this kind are powerful and yet yield easily when the shutter is opened, the spring force remaining about constant.

Where conventional coil springs (without extensions) are used and stacking of the slats in the magazine space takes place in forward inclined position, a wedge-shaped support 847 (Fig. 14) may be interposed between the last slat 810^A and the spring 822. In a further alternative form (not shown) this support may be made in one with said last slat.

The aforescribed deflectors at the entrance to the magazine space also are capable of modification. Thus for instance these deflectors may be formed as shown in Fig. 15 by curved continuations 936 of the sides 916 of the guides 915. At the same time the magazine supports 924 may be formed in one with the inner sides 921 of these guides. In further modifications (not shown) the deflectors may be constituted by cam levers or other elements extending into the magazine space opposite the guides.

It can thus be seen, that there has been provided according to the invention a shutter structure, which includes a pair of spaced parallel and stationary shutter guides, separable slats slidably displaceable within said stationary guides during closing and opening of the shutter, a magazine for separated slats adjoining one end of said shutter guides at an angle thereto and defining at said end a station of transfer from the magazine to said guides, drive means urging slats inside the magazine towards said guides, each slat being provided with engaging lips which project in opposite directions from the side faces of the slat and transversely to the general plane of the latter, said lips edgewise connecting adjacent slats when the latter are received within said guides, each engaging lip defining with the slat face whence it projects a space which generally widens with increasing distance from the base of said lip for receiving the engaging lip of an adja-

cent slat and projecting into the path of the lip of said adjacent slat when at said station of transfer, the extent of projection of at least one engaging lip of each slat being such that at least at said station of transfer it contacts a side face of the adjacent slat before it engages the corresponding engaging lip of the latter during closing of the shutter, and deflecting means disposed opposite said magazine and at said station of transfer and imparting angular deflection to said slats successively, when the latter are displaced away from said magazine toward said guides.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. A shutter comprising spaced, parallel shutter guides, several separate shutter slats slidable within the space bounded by these guides, a magazine for disconnected slats adjoining one end of the shutter guides at an angle thereto, a driving arrangement whereby slats inside the magazine are urged towards said guides, the slats being provided at their opposite edges with engaging elements which project to different sides thereof in directions transverse to the general plane of the slats and which edgewise connect adjoining slats whilst in said space, the shutter further comprising deflecting means disposed near the station of slat transition between magazine and guides, said deflecting means causing angular deflection towards the magazine of the disconnected edge of a slat in transition.
2. A shutter as claimed in claim 1, wherein said deflecting means are resilient.
3. A shutter as claimed in claim 1, wherein said deflecting means are constituted by springs.
4. A shutter as claimed in claim 1, wherein said deflecting means are constituted by sections of the shutter guides disposed opposite the magazine.
5. A shutter as claimed in claim 1, wherein the width of the magazine is less than the transverse width of one of said slats.
6. A shutter as claimed in claim 1, wherein the engaging elements are constituted by beads integral with said slats, and a protuberance formed on each slat which faces the "rear" engaging element of the slat at a distance corresponding to the width of the "forward" engaging element of the adjoining slat more remote from said magazine, the width of said magazine being smaller than the transverse width of each slat.
7. A shutter as claimed in claim 1, wherein the engaging elements of the slats are constituted by undercut beads which extend along the opposite edges of each slat and project to different sides thereof, each at an acute angle to the obverse face of said slat, the engaging elements of adjoining slats being thus interlocked throughout their lengths when received within the shutter guides.
8. A shutter as claimed in claim 1, wherein the engaging elements are provided at the ends of each slat and are integral with same.
9. A shutter device as claimed in claim 1, wherein the shutter guides are non-vertical and the magazine extends substantially upwardly from the ends of the shutter guides and the driving force urging disconnected slats towards the shutter guides is at least partly supplied by the weight of the slats in the magazine.
10. In a shutter and like closure structure; a plurality of slat means, deflector means, a magazine for storing said slat means in juxtaposition to each other when in inoperative position, elongated guide means extending at an angle from said magazine and conducting said slat means lengthwise of said guide means to operative and inoperative positions, respectively, said deflector means being positioned intermediate said magazine and said guide means, and drive means in said magazine for displacing said slat means into the path of said deflector means, said slat means being movable from said magazine past said deflector means for tilting said slat means into said guide means to operative position, each of said slat means

being provided with a web and two offset solid coupling elements each including a substantially flat portion and extending in opposite directions from the lateral edges of its web, said slat means being located with the webs in edgewise relation to each other when received in said guide means, adjacent offset elements of two successive slat means being in flush and superposed engagement with their respective flat portions in said operative position, whereby said flat portions extend substantially perpendicularly to said elongated guide means.

11. In a structure according to claim 10, said deflector means being constituted by curved leaf spring means extending from a wall of said guide means to an adjacent wall of said magazine.

12. In a shutter and like closure structure; a plurality of slat means including a rearmost slat means, spring-deflector means, a magazine for storing said slat means in juxtaposition to each other when in inoperative position, elongated guide means conducting said slat means lengthwise of said guide means to operative and inoperative positions, respectively, said magazine and said guide means having each an adjacent wall extending at an angle to each other, and spring means in said magazine engaging the rearmost slat means and displacing said slat means into the path of said spring-deflector means, said slat means being movable from said magazine past said deflector means into said guide means to operative position, each of said slat means including two offset elements extending in opposite directions to each other, adjacent offset elements of two successive slat means being engageable with each other in said operative position, said spring-deflector means being curved and extending spaced from a corner formed at the junction of said adjacent walls of said magazine and said guide means.

13. In a structure according to claim 12, said spring-deflector means being provided with ends, one end being accommodated in said wall of said magazine, the other end being retained in said wall of said guide means.

14. A shutter comprising a pair of spaced parallel and stationary shutter guides, separable slats slidably displaceable within said stationary guides during closing and opening of the shutter, a magazine for separated slats adjoining one end of said shutter guides at an angle thereto and defining at said end a station of transfer from the magazine to said guides, drive means urging slats inside the magazine towards said guides, each slat being provided with engaging lips which project in opposite directions from the side faces of the slat and transversely to the general plane of the latter, said lips edgewise connecting adjacent slats when the latter are received within said guides, each engaging lip defining with the slat face whence it projects a space which generally widens with increasing distance from the base of said lip for receiving the engaging lip of an adjacent slat and projecting into the path of the lip of said adjacent slat when at said station of transfer, the extent of projection of at least one engaging lip of each slat being such that at least at said station of transfer it contacts a side face of the adjacent slat before it engages the corresponding engaging lip of the latter during closing of the shutter, and deflecting means disposed opposite said magazine and at said station of transfer and imparting angular deflection to said slats successively, when the latter are displaced away from said magazine toward said guides.

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