Aug. 29, 1950 F. W. BOPP ET AL 2,520,273

WINDOW SHUTTER

Filed April 14, 1947 2 Sheets-Sheet 1

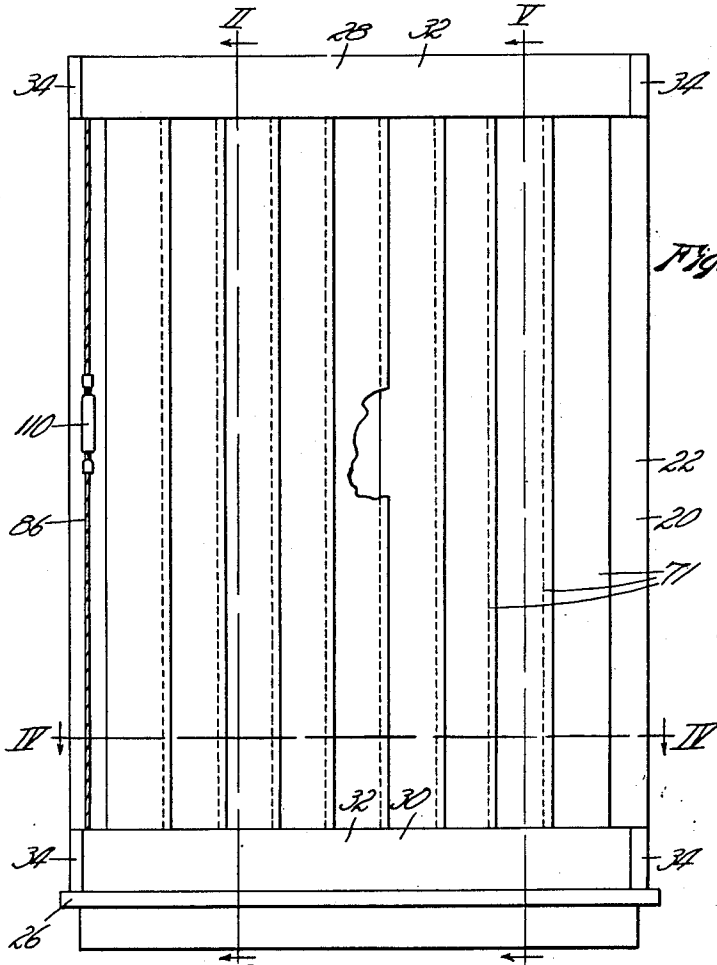


Fig. 1

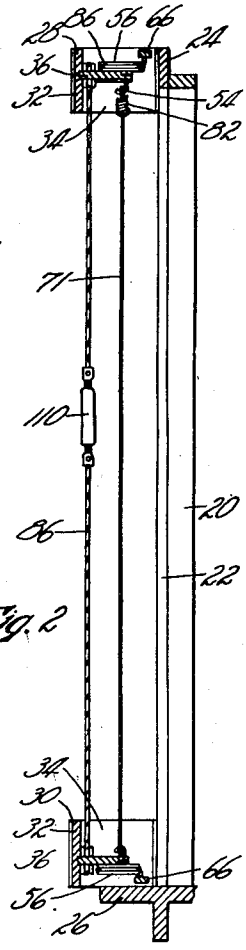


Fig. 2

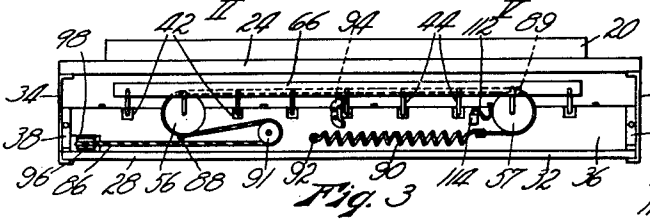


Fig. 3

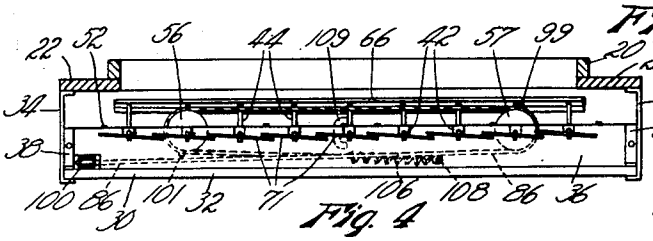


Fig. 4

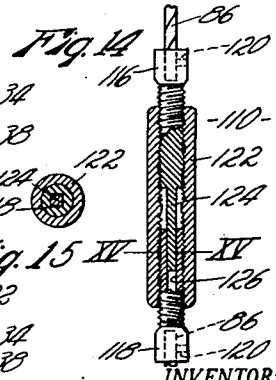


Fig. 14

Fig. 15

INVENTORS,
Frederick William Bopp,
BY Edward Otto Bopp.
Roy I. Hamilton,
Attorney.

Aug. 29, 1950 F. W. BOPP ET AL 2,520,273

WINDOW SHUTTER

Filed April 14, 1947 2 Sheets-Sheet 2

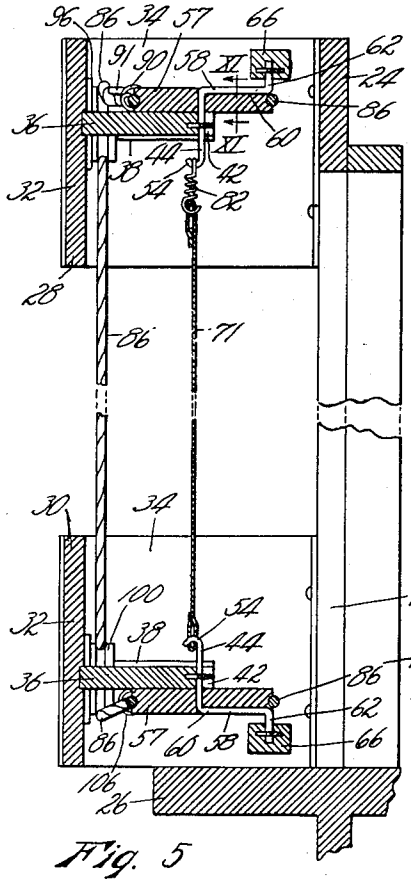


Fig. 5

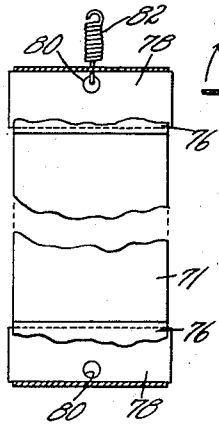


Fig. 7

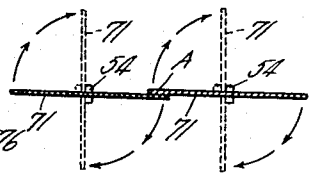


Fig. 13

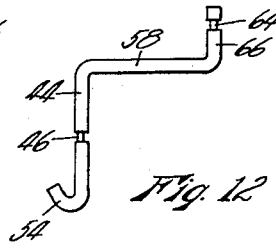


Fig. 12

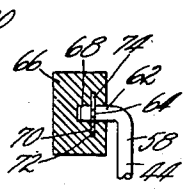


Fig. 9

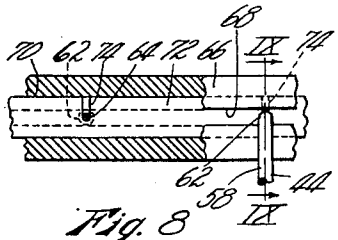


Fig. 8

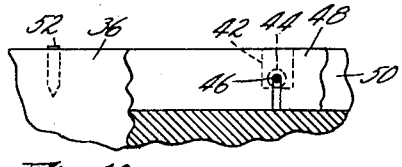


Fig. 10

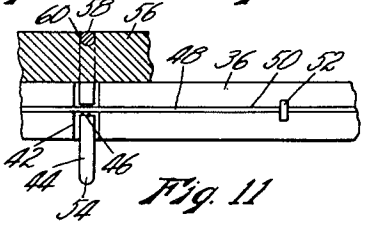


Fig. 11

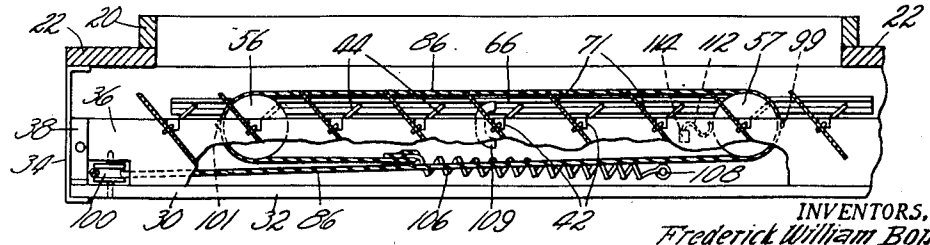


Fig. 6

INVENTORS,
Frederick William Bopp,
Edward Otto Bopp.
BY
Roy I. Hamilton,
Attorney.

Patented Aug. 29, 1950

2,520,273

UNITED STATES PATENT OFFICE

2,520,273

WINDOW SHUTTER

Frederick William Bopp and Edward Otto Bopp,
Kansas City, Mo.

Application April 14, 1947, Serial No. 741,150

3 Claims. (Cl. 160—166)

1

This invention relates to improvements in window blinds or shutters and has particular reference to window shutters having horizontally disposed operating bars with a plurality of vertically disposed strips or bars carried therebetween. This invention is an improvement over the shutter shown in our copending application Ser. No. 577,359½, filed February 12, 1945.

The principal object of the present invention is the provision of a window shutter having a series of overlapping vertically disposed strips provided with operating means whereby said strips may be caused to oscillate on their respective longitudinal axes through an arc of substantially 180°.

Another object is the provision of a window shutter having a series of overlapping vertically disposed flexible strips provided with operating means whereby said strips may be caused to oscillate on their respective longitudinal axes, and means for relatively adjusting the angle of oscillation at the upper and lower ends of said strips.

Another object of this invention is the provision of a vertically disposed window shutter having a top operating bar and a bottom operating bar horizontally disposed and operable by means of a single cord to adjust the shutter throughout its length to control the air and light to the room.

Other objects are simplicity and economy of construction, ease and efficiency of operation, and adaptability for use wherever a shutter for controlling light and air is needed.

With these objects in view, as well as other objects which will appear during the course of the specification, reference will now be had to the drawings, wherein:

Figure 1 is an elevational view of a window shutter embodying the present invention, mounted on the inside of a window frame and partially broken away.

Fig. 2 is a vertical section taken on line II—II of Figure 1.

Fig. 3 is a plan view of the shutter.

Fig. 4 is a horizontal sectional view taken on line IV—IV of Figure 1.

Fig. 5 is an enlarged fragmentary vertical section taken on line V—V of Figure 1.

Fig. 6 is an enlarged view of a portion of the parts shown in Figure 4, with the shutter strips shown partially open to admit light and air through the shutter.

Fig. 7 is an enlarged fore-shortened elevational

2

view of one of the shutter strips, partially broken away.

Fig. 8 is an enlarged fragmentary view of a portion of one of the operating bars with parts broken away.

Fig. 9 is a sectional view taken on line IX—IX of Figure 8.

Fig. 10 is a fragmentary planar view of the ledge and its associated parts partially broken away.

Fig. 11 is an enlarged sectional view taken on line XI—XI of Figure 5.

Fig. 12 is a detached elevational view of one of the operating shafts.

Fig. 13 is a diagrammatic cross sectional view of the shutter strips or slats showing their relative position and movement.

Fig. 14 is a longitudinal section through the turn-buckle adapted to be inserted in the operating cable for purposes of adjustment.

Fig. 15 is a sectional view taken on line XV—XV of Figure 14.

Throughout the several views like reference characters refer to similar parts and the numeral **20** designates a window frame having inside vertical facing members **22**, header **24**, and window ledge **26**. The shutter is secured to the window frame within the room by means including a top bracket **28** and a bottom bracket **30** which extend horizontally across the window frame as clearly shown. Each of these brackets are substantially channel-shaped having a longitudinal cross plate **32** and plates **34**. These end plates are perpendicular to the cross plates **32** and extend inwardly to engage the edges of face members **22**. Bracket **28** is provided adjacent its vertical central portion with a ledge or shelf **36** disposed in a horizontal plane to receive the shutter operating means. The end portions of said ledge are firmly attached to end plates **34** by means of brackets **38**.

Ledge **36** is vertically slotted at **42** at spaced apart points to receive the operating shafts **44**. Referring to Figures 10 and 12, it will be noted that each of said shafts is provided with an annular groove **46**, thus presenting a reduced section of the shaft suitable for being inserted into the slot **47** of the shaft securing bar **48**. Said securing bar is relatively thin so as to fit snugly into the groove **50** formed in the edge face of the ledge **36** to extend beyond the slots **42** so that when the slotted securing bar **48** is positioned to engage the annular grooved portion of the various operating shafts **44** they will be secured in position in the ledge. In order to prevent ac-

cidental displacement of the securing bar 48, staples 52 are driven into the edge of ledge 36 so as to straddle said bar. The lower end of each operating shaft 44 extends below the lower surface of ledge 36 and is rebent to form a hook 54. The upper portions of certain of shafts 44 each extend through the axes of pulleys 56 and 57 which are positioned to rest on the face of ledge 36. Shaft 44 is offset to form a radial crank arm 58 which rests in a radial groove 60 formed in the upper surfaces of said pulleys thereby securing the crank arm and pulley together for oscillatory movement. At the periphery of each of said pulleys the operating shaft 44 is bent upwardly at right angles to the radial crank arm 58 to form a vertical stem 62 which is provided with an annular groove 64. The stems 62 of all of operating shafts 44 are secured in fixed spaced apart relation in the operating bar 66. Said operating bar is substantially rectangular in cross section and is slotted longitudinally at 68, as shown in Figure 9, to a width suitable for receiving stems 62 and is provided with a blind slot 70 which intersects slot 68 and is adapted to contain securing bar 72 having transverse slots 74 suitable for engaging in annular grooves 64 of stems 62. In mounting this operating bar 66, the notched bar 72 is first fitted on to the various stems of the operating shafts as described, and then bar 66 is slid thereon from one end of securing bar 72.

Since the lower bracket 30 contains like parts slightly altered in position, with the operating bar 66 positioned below the ledge 36, the corresponding parts thereof are given like designating numerals as applied to the parts just described. The shutter strips or slats 71 may be made of fabric, plastic, wood, or any other suitable material; however, they are here shown as strips of fabric looped and hemmed at their opposite ends to form boots 76, each adapted to receive therein a stiffening bar 78 having a hole 80 therethrough adjacent the edge of the hem, as shown in Figure 7. A helical spring 82 is attached in said hole at the upper end of each slat 71, the opposite end of said spring being attached to hook 54 of an operating shaft 44 carried by frame 28. The hole 80 at the lower end of said slat is engaged on hook 54 of the corresponding shaft 44 carried by lower frame 30. It is the purpose of this structure to mount these strips or slats under tension with springs 82 partially extended. This tensioning means will always maintain the strips in a taut position regardless of the expansion or contraction of the strip.

The operating cable 86 is secured by screw 88 to the periphery of upper pulley 56 at such a position as to permit a full half revolution of the pulley whereby the strips 71 may be moved through substantially 180°. Referring to Figure 3, one end of cable 86 extending from screw 88 passes around pulley 56, then around pulley 57, to which it is secured by screw 89, and then is attached to one end of a tension spring 90 which in turn is secured at its other end by screw 92 to ledge 36. A stop 94 fixed to ledge 36 adjacent one arm 58 serves to limit the oscillation of arms 58 to 180°. The other end of cable 86 extending from screw 88 passes around a pulley 91 rotatably mounted on the upper surface of ledge 36 and then downwardly through ledge 36 through slot 98 formed through said ledge over a sheave wheel 96 carried in said slot. The cable then extends downwardly around sheave wheel 100 carried by lower bracket 30 to a point below ledge 36, thence around pulley 57 to which it is secured by screw 99, thence around pulley 56 to which it is secured by screw 101, and is fastened at its end to one end of a tension spring 106 which is in turn fastened at its other end to ledge 36 by means of screw 108. A stop 109 fixed to the lower surface of ledge 36 adjacent one of arms 58 serves to limit the oscillation of said arms to 180°.

Referring to the diagrammatic view in Figure 13 wherein two of the strips are shown in their relative relation as disclosed in the different views of the drawing, it will be noted that they overlap slightly at A and that they rotate in the same direction as indicated by the arrows so that the overlapped portions move away from each other. When the strips are rotated through 90°, they will be in substantially right angled relation to their closed position so as to admit a maximum amount of light and air therebetween. By continuing the rotation of the strips through another 90° angle, the strips will contact each other from the opposite directions and the inside surface of the strips will then be exposed to the outside view. It is contemplated to make the inside and outside surfaces of each of the strips of different general appearance so as to produce desirable contrasting effects.

For the purpose of securing the shutter in any desired adjusted position against displacement, a brake spring 112, secured in block 114 attached to ledge 36, is positioned to rest against the peripheries of each of pulleys 57, with sufficient force to overcome the pull of springs 90 and 106 as long as said springs are partially balanced against each other by their opposing pulls on opposite ends of cable 86. Said pulleys, and strips 71 operated thereby, are thus maintained in a set position until the operator grasps cable 86 between upper bracket 28 and lower bracket 30 and pulls up or down to rotate pulleys 56 and 57 against brakes 112.

A turnbuckle 110 may be inserted in cable 86 between the upper and lower brackets as shown in Figures 1 and 2. As shown in Figures 14 and 15, said turnbuckle includes end members 116 and 118 into which the ends of cable 86 may be fixed by set screws 120. One of said end members is provided with left hand threads and the other with right hand threads, and both end members are adapted to be engaged in a correspondingly thread central sleeve 122. Rotation of the end members 116 and 118 relative to each other is prevented by an axially projecting square extension 124 of end member 116, which fits slidably in a squared recess 126 in end member 118. Thus it will be seen that whenever sleeve 122 is turned, said end members will be caused to move toward or apart from each other to vary the effective length of cable 86.

By thus adjusting the turnbuckle, the operating shafts 44 at the upper and lower ends of strips 71 may be brought to substantially the same angle of rotation, thus insuring that the strips will open or close evenly throughout their length. In this manner, compensation may be made for installation inaccuracies, stretching, and expansion of the cable. Furthermore, by varying the relative angle of oscillation of the upper and lower ends of strips 71, novel lighting effects may be produced. For example, referring to Figure 4, it will be seen that if cable 86 is effectively lengthened by means of turnbuckle 110, no change in the relative angle of the lower end of strips 71 will occur, since operative shafts 44

are prevented from moving counter-clockwise by stop 109. Referring to Figure 3, it will be seen that lengthening cable 86 as described, will cause pulleys 56 and 57 to be turned clockwise by spring 90, since brake spring 112 is not strong enough to prevent the rotation of the pulleys when spring 90 is not opposed by the counter-pull of spring 106. Thus, strips 71 are caused to be partially twisted, being turned to admit light at their upper ends, while being closed at their lower ends. Turnbuckle 110 also serves as a handgrip when operating cable 86 in the usual manner to open and close the shutter.

While the drawings embody one form of the invention, it is apparent that many minor changes might be made in the shape and arrangement of the parts without departing from the spirit of the invention.

Having thus described our invention, what we claim as new and desire to be secured by Letters Patent is:

1. A shutter comprising a pair of vertically spaced apart, horizontally disposed brackets adapted to be mounted directly on a window frame; a pair of like series of vertically disposed shafts mounted respectively for oscillation in said brackets; means including pulleys associated with each series of shafts operatively to engage each shaft of the series and manually operable simultaneously to oscillate all of said shafts in like manner; a cable passing about the pulleys associated with both series and manually operable to turn said pulleys; a spring fixed to each of said brackets whereby said cable is tensioned; a turnbuckle interconnected in said cable whereby the effective length thereof may be varied to cause relative oscillation of said series of shafts; and a series of strips of material, each strip being connected under tension at its opposite ends to corresponding shafts of the two series of shafts whereby as said shafts are oscillated, said strips will be oscillated on their longitudinal axes to vary the light spaces therebetween.

2. A shutter comprising a pair of vertically spaced apart, horizontally disposed brackets adapted to be secured respectively to the top and bottom portions of a window frame; two like series of vertically disposed, rotatably mounted shafts carried respectively by said brackets, each shaft having a bell crank lever at its one end; an operating bar associated with each of said series of shafts to engage each bell crank lever thereof; a pulley rigidly fixed to one of said shafts adjacent each end of both of said series of shafts; a tensioned cable passing about said pulleys and manually operable to oscillate the shafts of both series simultaneously; a series of strips of material, each strip being connected, under tension, at its opposite ends to corresponding shafts of the two series; stops whereby the oscillation of said strips on their longitudinal axes is limited

to substantially 180°; and a turnbuckle interconnected in said cable intermediate its ends whereby the effective length of said cable may be varied to turn said upper series and said lower series of shafts independently, said turnbuckle having opposingly threaded end members threaded into a rotatable central sleeve; and means preventing the relative rotation of said end members.

3. A shutter comprising a pair of vertically spaced apart, horizontally disposed brackets adapted to be secured respectively to the top and bottom portions of a window frame; two like series of vertically disposed, rotatably mounted shafts carried respectively by said brackets, each shaft having a bell crank lever at its one end; an operating bar associated with each of said series of shafts to engage each bell crank lever thereof; manually operable means including a cable to simultaneously oscillate all of said shafts in like direction and through the same arc; a turnbuckle interconnected in said cable whereby the length of said cable may be effectively varied to cause the upper and lower series of shafts to oscillate independently, said turnbuckle comprising opposingly threaded end pieces to which the ends of said cable are fixed and which are engaged by a correspondingly threaded central sleeve, one of said members having a non-circular axial projection adapted to be engaged in a similarly shaped recess in the other of said end members thereby preventing the relative rotation of said end members; a series of strips of material, each strip being connected, under tension, at its opposite ends to corresponding shafts of the two series whereby said strips may be adjusted through substantially a half revolution on their longitudinal axes to vary the space between adjacent strips and to reverse the sides of the shutter.

FREDERICK WILLIAM BOPP.
EDWARD OTTO BOPP.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
Re. 20,965	Norton	Jan. 3, 1939
541,346	Eckert	June 18, 1895
550,559	Joseph	Nov. 26, 1895
2,030,234	Villalobos	Feb. 11, 1936
2,158,454	Zubiria	May 16, 1939
2,165,669	Wade	July 11, 1939
2,173,275	Houmere	Sept. 19, 1939

FOREIGN PATENTS

Number	Country	Date
96,594	Germany	Mar. 30, 1898