My invention is related to the production of light-tight closures for window openings, such as for employment for hospital use, X-ray work, classrooms which must be darkened for projection work, theatres, photographic darkrooms, and all situations requiring the occasional exclusion of all light. More particularly my invention is of special value under conditions requiring the absolute exclusion of all direct light from an outside source; and an object of my invention is the provision of means to this end. It will be understood that the particular movable closure member employed by me may be such as will pass light of a certain character, if desired, e.g., red, instead of being absolutely opaque; but in either event the problem is essentially the same. Hereinafter in these specifications I shall speak of the absolute exclusion of light from an outside source which might come directly through chinks or crannies in the mechanism, or indirectly by reflection around obstructions; and by "closure cloth" or similar terms in the specification and claims I intend to be understood as including my type of flexible closure cloth or member serving to exclude at least light of undesired characteristics.

A fundamental object of my invention is the provision of a rolling, and therefore an openable window closure which shall be absolutely light-tight. Another object of my invention is the provision of a rolling light-tight closure which may be installed in windows already built.

Still another object of my invention is the adaptation to a light-tight closure of certain features of the rolling window screen, and the provision of additional features whereby a construction somewhat similar to the rolling window screen may be made light-tight for the purposes described.

These and other objects of my invention which will be set forth hereinafter or will be apparent to one skilled in the art upon reading these specifications, I accomplish by that certain construction and arrangement of parts of which I shall now describe an exemplary embodiment, reference being had to the accompanying drawings, wherein:

Figure 1 is an elevation of a window to which my invention has been applied.
Figure 2 is a sectional view taken along the lines 2—2 of Figure 1.
Figure 3 is a sectional view taken along the lines 3—3 of Figure 1.
Figure 4 is a sectional view along the lines 4—4 of Figure 1.
Figure 5 is a vertical sectional view along the lines 5—5 of Fig. 1.
Figure 6 is an enlarged elevational view of a portion of the side frame of my device.
Figure 7 is an end view of the draw bar.
Figure 8 is an end view of the spring roller housing.
Figure 9 is a partial view of a portion of the bottom channel member.
Figure 10 is a view of the end of a side channel member, showing the parts thereon which co-act with the spring roller housing to give a light-tight union therewith.
Figure 11 is an end view of an exemplary draw bar construction.

In the practice of my invention I provide as a general assembly for use in a window opening, a spring roller, a pair of side guides, a bottom channel member, a flexible light-tight closure member running upon the spring roller and withdrawable from the housing to cover the window opening, a draw bar for the flexible member, and other mechanical features providing such an interengagement between the housing and the side guides and the closure member, between side guides and the draw bar, and between the draw bar and the bottom channel as will completely prevent the passage of direct light through my device.

In the assembly views, such as Figures 1, 5 and 6, I have indicated at 6 the sill of a window opening, at 7 and 8, sides thereof, and at 9, the top. 10 indicates a housing for a rolling closure 90, 11, the edges of which are retained in side guides 12 and 13. The bottom edge of the closure is retained by a draw bar indicated generally at 14. A channel-shaped member 15 is located at the bottom of the window opening and co-acts with the draw bar to make a light-tight closure, in a manner which will hereinafter be explained. I have shown this assembly in Figures 1, 5 and 6 as being less in depth than the height of the window opening, leaving a space for a ventilating device indicated broadly at 16. It will be understood, however, that this ventilating device is optional, though very desirable in some constructions; and that it may be eliminated where it is not needed. In such case the roller 105 housing 10 will lie against the top of the window opening.

The various metallic parts of my construction herebefore mentioned, namely the guides 12 and 13 and bottom channel 15 and the housing 10, 110
or ventilating device 16, will be so mounted in the window opening as to exclude the passage of light between the window members proper and such parts. This may be accomplished by fastening them in place by the usual means, but with a layer of deformable opaque substance, such as the layers of felt or rubber 17, 18 and 19, interposed between said members and the window frame members.

The ventilating device, if employed, will preferably consist of a plurality of vanes 20 of sinuous shape held in place in nested relationship by means of bolts, studs, or rivets 21, and collars 22. The vanes will preferably be colored to render them as absorbent to light as possible, and their sinuous shape will be such as to permit the passage of air between them, but completely to exclude the passage of light. Top, end and bottom frame members for the vanes assembly will be provided, and the bottom frame member 22a will have depending flange portions 22b to form a light-tight closure with the roller housing 10.

The spring roller housing 10 is of the usual box shape, having, preferably adjacent one edge, a longitudinal opening 23 through which the cloth 11 may pass. The end members 24 and 25 of the housing support the usual spring roller 26 upon a shaft 27.

My side guides are members presenting narrow channels in which the edges of the closure cloths may ride. These guides may be of different forms; but the form which I prefer to use is illustrated partly in section in Figure 10, where it is shown as made up of two strips of sheet metal angularly bent and fastened together at one side to form an attachment flange 28. These lie at right angles to the sides 29 and 30 of the guide proper, and members forming the sides are turned inwardly at their other edges, as is shown at 31 and 32. The intumed portions are interseached to leave a relatively narrow channel 33 within which the closure cloth may ride, and within which may also extend those guided parts which are associated with the draw bar herinafter to be described. The flange 28 may be perforated at intervals, and is employed in fastening the guide against the sides 29 and 30 of the window opening, with the interposition of the felt or other opaque layers 17 and 18.

The organization of the side guides thus far described is essentially the same as that of other side guides which have heretofore been employed in rolling window screens, but I have found it advisable to make the side guides of my new organization of unusual depth. Consequently, in the preferred form of my device, the side members 29 and 30 are usually made from two to two and one-half inches in depth, and the width of the screen cloth is such as to cause it to enter the channel 33 and extend into the guide for substantially the full guide depth. In this way I have found that the assembly of my side guides and closure cloth is completely light-tight, and there is no infiltration of light by reflection or otherwise around the closure cloth in the guide.

In order to effect the positive location of my roller housing with respect to the side guides, I provide the latter with two tongues 34, 35, attached to the upper end of the side member 29 and having a slot 36. A tongue 36 struck up from the roller housing may be placed in the slot 36 for the purpose described. In order to prevent the upward movement of the roller housing with respect to the side guide, it is my usual practice to provide the side guide member 33, from the bottom portion of the housing as to leave a passageway 38 (Fig. 8) for an angular tongue 39 (Fig. 6), one portion, 38a of which may be fastened to the flange of the side guide or directly to the window frame by means of a screw 40.

In addition to these means for locating and fixing the side guides and housing in their proper relative positions, I also provide means for effecting a light-tight interconnection between the roller housings 22, and the side guide members 33. In order to do this, I attach a plate 41, headed as at 42 to accommodate the beading on the housing, and having a depending portion 43 extending below the roller housing proper. To the upper end of the side member 30 of my guide I attach a co-operating plate 44, having an offset portion 45, providing a slot or channel 46 within which the portion 43 may be received. The plates mentioned will be of substantially the width of the side guides and serve to connect these guides to the housing in such a way as to prevent the passage of light between the side guide members 33.

The rolling closure member may be thought of as consisting of or comprising an opaque flexible material such as Pantostone or any of the treated fabrics. In ordinary use the rolling closure will be entirely opaque, but in some instances the presence of light between the side guides may be desired; and my invention is not restricted to any particular character of closure. By way of example, if my construction is desired for use in a photographic dark room, a screen or rolling closure of some flexible so-called safety material which will pass enough light to form a working illumination, but only such light as will not affect the particular photographic emulsion being worked with, may be preferable to a closure which is absolutely opaque. The flexible closure member 11, of whatever material is chosen, will be rolled upon the spring roller 26 and will be withdrawable from the housing against the tension of the spring roller to cover the window opening. Its width is such, as hereinafter noted, as to permit the edges of it to lie well within the side guides 7 and 8 the bottom of it will be held by a draw bar 14.

This bar will preferably be such as will present, as shown in Figure 7, an upwardly extending portion 14a to receive the closure cloth and a horizontally projecting ledge 14b, which may act as a rail for engagement by the fingers in drawing the closure down if desired, and which also has a reinforcing function in stiffening the draw bar itself. Finally, it comprises a downwardly projecting portion 14c, the function of which is to hold a lower flange member 14d in Figure 7. The draw bar may be made by spot welding together two separate sections to form the structure shown in Figure 11.

Here both sections are made from a single piece of sheet metal rolled and bent to form the bodies 14e and 14e and the composite flange 14f. The flange portions may be spot welded as at 85. Within the body portions extend channel portions 86 and 87, terminating, as shown, in enlargements into which wires, or the like, may be inserted to form a sheet metal curtain. In order to permit the endwise insertion of members hereinafter to be described, I prefer to notch the assembly as at 88.

Instead of this, I make up a special construc-
tion for my draw bar which is shown in Figure 5, and the construction of which will now be described in detail. The front portion may be made of a single strip of metal, or two strips having portions joined together to make the ledge 14b, and having side portions 47 and 48 with reversely bent edges 49 and 50. A back portion may be said to form a face 51, having turned edges 52 and 53.

The closure cloth 11 passes down between these two elements, and the lower edge of it may be enclosed in a U-shaped metallic piece 54, the lower edge of which projects to form the flange 14d. The members forming the draw bar may be held together and to the closure cloth by bolts 55 and 56.

At the ends of my draw bar I provide devices which enter the channels of the side guides and serve to mount the draw bar slidably with respect thereto. The edges of the cloth may be faced with metal parts 57 and 58, which have offset tongues 59 and 60 entering, respectively, the channels in the ends of the draw bar between the members 51, 47 and 48, and the turned over portions thereof 49, 52, 50 and 53, or the corresponding parts in the structure of Figure 11. The offset shoulders may also be engaged by the bolts 55. Beyond these plates on either side I provide additional plates of thin metal 61 and 62, having offset shoulders 63 and 64 not long enough to engage the members 31 and 32 of the side guide and form a sliding closure therewith very much in the nature of a weather strip.

A bottom channel member illustrated in Figure 6 is provided and comprises a structure very much like the structure of the side guides, but shallower. It may be made of one piece of metal bent as shown to form an attachment flange 65, and side members 66 and 67 having turned edges 68 and 69 between which there is the narrow channel 70. This member will be fastened along the sill 6 by means of screws, or the like, passing through the attachment flange 65, with the interposition of the layer of light excluding substance 19. The flange 14d, when the rolling closure is closed, enters the slot 70 or the like shown in Figure 2, and is longer than the distance between the side channels.

It is, however, necessary to make provision for effecting a light-tight union of the bottom channel member 15 and the side guides 12 and 13. To this end, as shown most clearly in Figure 2, I attach to the lower ends of my side channels plates 71 and 72, having offset shoulders 73 and 74 so disposed that they may enter the bottom channel member 15 and lie between the portions 67 and 68 and 69 thereof, respectively. These plates may be spot welded, or otherwise fastened to the side guides, and will have a sliding fit in the spaces aforesaid.

As shown in Fig. 7 the draw bar will have preferably one or more latching devices conveniently made in the form of a base 75, to which the entire member 76, having a handle portion 77 and a latch 78. The member 76 will be controlled by a spring in the base 75. Upon the bottom channel I fasten a member 79, which is engaged by the latch, and which, when so engaged, holds the closure member in a position to close the entire window opening.

In order that air pressure, or the like may not displace my closure cloth so as to permit light to enter, I prefer to provide upon one or both sides of the cloth 11, retaining bars 79 slidably mounted upon the guides and retained in intermediate position by angles 80 and 81 upon the side guides. When the rolling closure is opened, these bars rise up to the roller housing upon brackets 82 and 83, attached to the draw bar. As many of these retaining bars as desired may be placed upon either side of the closure cloth 11 and may be graduated as to length, the stop members 81 and 80 being positioned for the various bars differently, so that the several bars will selectively engage their appropriate stops and be held at selected intermediate positions along the length of the window opening. Such constructions are described in my Patents No. 1,833,140, dated November 24, 1931 and No. 1,890,588, dated Oct. 4, 1932. In order to provide a substantially noiseless construction, I prefer to provide the angles 80 and 81 with feet of rubber or felt, 89 and 90.

In the manner described I have provided, so far as its light-tight quality is concerned, what amounts to a unitary structure for installation within a window opening. The parts are all so interconnected and interengaged as to prevent absolutely the direct infiltration of light either through chinks or crannies, or by way of reflection around obstacles. Any irregularities in the external contour of my assembled device will, of course, be taken care of by the layers 17 and 18, etc., of flexible light-tight material interposed between these members and the window frame. It will be obvious that my device may be installed in new or old window openings, and that modifications may be made in it without departing from the spirit of my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a rolling closure, the combination of a roller housing, side guides and a bottom rail, and light excluding means connecting all of said members.

2. In a rolling light-tight closure, the combination of a housing containing a spring roller, side guides, a flexible closure member operating with said roller and extending within said housing, a bottom channel member and a flange on said draw bar adapted to enter said bottom channel member.

3. In a rolling closure, a draw bar, a bottom rail, light excluding means on said draw bar cooperating with said bottom rail to form a light-tight closure.

4. In a rolling closure, a draw bar, a bottom rail, light excluding means on said draw bar cooperating with said bottom rail to form a light-tight closure, and means for interconnecting said draw bar and said bottom rail to hold said draw bar in position.

5. In a rolling light-tight closure, a roller housing, side guides, and interlocking light excluding means on said guides and said roller housing.

6. In a rolling light-tight closure, a spring roller housing, side guides, means for locating said roller housing with respect to said side guides, and an interlocking light-tight connection between said side guides and said roller housing.

7. In a rolling light-tight closure, a roller housing, side guide members of relatively great depth as compared with their thickness, a flexible closure member, a draw bar on said closure
member, and means at the lower ends of said side guides to connect with said draw bar to form a light-tight union.

In a light-tight closure, the combination of side guides, a draw bar slidably mounted on said side guides, a bottom rail member having a channel, a flange on said draw bar adapted to enter said channel, and means for making a light-tight connection between the ends of said bottom member and the ends of said side guides.

In a light-tight closure, the combination of side guides, a draw bar slidably mounted on said side guides, a bottom rail member having a channel, a flange on said draw bar adapted to enter said channel, and means for making a light-tight connection between the ends of said bottom member and the ends of said side guides.

In a light-tight closure, the combination of side guides, a draw bar slidably mounted on said side guides, a bottom rail member having a channel, a flange on said draw bar adapted to enter said channel, and means for making a light-tight connection between the ends of said bottom member and the ends of said side guides.

In a light-tight closure, the combination of a housing containing a spring roller, side guides and a bottom rail, light-tight means for connecting said several elements together, a draw bar, light-tight means for slidably mounting said draw bar with respect to said side guides, a flange on said bottom rail member adapted to connect with said bottom rail to form a light-tight closure, said assembly mountable in a window opening with the interposition of a light excluding substance between said elements and said window opening.

In a rolling light-tight closure, a draw bar comprising oppositely opening channels in unitary relation, one channel adapted to grip a closure cloth and the other channel adapted to make light-tight straddling engagement with a bottom rail of the enclosure.

In a rolling light-tight closure, a draw bar comprising oppositely opening channels in unitary relation, each channel comprising outer walls and inner walls bant inward from the free edges of the outer walls and having a junction in the form of a major segment of a tube, one channel adapted thereby to grip a closure cloth and the other channel adapted thereby to straddle and resiliently grip a bottom rail of the closure.

In a rolling light-tight closure, a draw bar comprising oppositely opening channels in unitary relation, each channel comprising outer walls and inner walls bant inward from the free edges of the outer walls and having a junction in the form of a major segment of a tube, one channel adapted thereby to grip a closure cloth and the other channel adapted thereby to straddle and resiliently grip a bottom rail of the closure.

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