This invention relates to means for housing a roll of fabric in a stationary position, where the outside of the fabric roll is attached to a member reciprocable in reference to the stationary position, in such a manner that the fabric may be unrolled and re-rolled to follow the movement of the member.

The invention has particular utility and application in providing a flexible roll-away screen for a double-hung window.

For more than seventy years, efforts have been made to provide roll-away screens for windows of this type, as witness the early Patent No. 415,966 issued to Alphonso Riggs in 1889. Since the latter year, a number of patents have been granted on various arrangements for mounting window screening in this manner, but none of such arrangements has attained what might be fairly considered ready acceptance and widespread use.

One of the principal objections to roll-away screen arrangements, prior to the present invention, has been the large size of the screen roll, and hence of the housing in which it is contained. Large boxlike housings which are set on a window sill and occupy a substantial part of the otherwise open window area, when the lower sash of the window is raised, and which housings do not lend themselves to blending into the sash framing when the window is closed, have been generally aesthetically unacceptable to the public.

Further, such large housings may prevent placing storm windows over the sashes and, hence, must be removed in the wintertime in the latitudes where storm windows are needed during the latter season. However, with prior roll-up screen mounting and housing arrangements, unless the outside diameter of the roll is of the order of two and one quarter inches, the roll does not include sufficient screening to cover the area exposed by raising a conventional 36 by 40 inch sash of a double-hung window.

Another problem posed by prior known devices has been their complexity, with consequent difficulty, and high cost of installing them. For devices of this type to appeal to the home owner, they must be priced reasonably close to conventional screens, and they should be simple enough in structure to enable the "Do-It-Yourself" household to install them without substantial difficulty.

The actual mounting unit, moreover, should contain no parts which will deteriorate through subjecting to the elements to which it will be exposed on the outside of the window where screen housings of this character are normally exposed.

Further, the unit should lend itself to easy and inexpensive repair.

The present invention obviates the foregoing problems by providing an effective roll-away fabric mounting and housing arrangement which is compact, yet includes sufficient screening to cover any conventional 36 by 40 window. The arrangement itself is quite simple, the preferred embodiment consisting of only eight parts, exclusive of the screening and means for actually securing the screen to the outside of the window sash. Further, it is easily mounted and, because of its compactness, holds sufficient screening to cover a conventional 36 by 40 inch window with an overall diameter approximating the thickness of the upper sash. Such dimensioning enables the screen housing to be seated within the window framing in such a manner as not to interfere with the placing of a storm window over both the upper and lower sashes.

The preferred embodiment of the invention is hereinafter detailed with reference to the accompanying drawings in which:

FIG. 1 is a perspective view of a double-hung window which is equipped with a roll-away screen according to the invention; FIG. 2 is a section taken on the line 2—2 of FIG. 1; FIG. 3 is an enlarged section of the rolled up screen shown in FIG. 2; FIG. 4 is a view similar to FIG. 2 showing the screen unrolled to cover the opened window area; FIG. 5 is an exploded perspective view, partly broken away, of the screen mounting arrangement as seen from inside the window; FIG. 6 is an exploded partial detail, in perspective, showing the manner of mounting the inner end of the screen; FIG. 7 is a section showing the inner edge of the screen actually mounted to the tubular core; and FIG. 8 is a perspective view of a horizontally mounted roll-away screen, according to the invention.

In its preferred embodiment, illustrated in FIGS. 1-7 of the drawings, the invention is shown in its application to a roll-away screen installed in a double-hung window.

A screen 10 is rolled upon a tubular element 12 by securing one edge 14 to the element 12 by means of an adhesive 16 which is first painted or otherwise laid along the peripheral area which the screen edge 14 actually abuts. To afford a better area of adhesive contact with the outside wall of the element 12 than would be provided by the cross strands 11 of the screening 10 alone, a thin strip of paper or tape 18 is laid over the edge 14 of the screen parallel to the area of the element 12 which is coated with the adhesive, and before the latter sets. In this way, the adhesive penetrates through the screening and contacts the uninterrupted expanse of the paper or tape. The use of the paper or tape strip 18 also prevents penetration of the adhesive through to successive layers of screen 10, should the latter be rolled up before the adhesive sets completely.

The tubular element 12 is mounted for rotation on, and between a pair of oppositely directed coaxially disposed spindles 20, 20a, each of which is fixedly secured against rotation. One of such spindles 20, 20a is provided in each side of the window framing 22.

Each spindle is held in the desired position by an orifice plate 24 having holes 26 by which the plate may be screwed or nailed to the inside of the sash frame 22, and an additional hole 28 through which a screw 30 may be inserted from the back side of the plate and into the end of the spindle 20 or 20a, which is drilled and internally threaded to receive such screw 30. In this way, the spindle may be held in position perpendicular to the plate 24. Spindle 20a is a short cylindrical stub. Spindle 20a is elongate and slotted at 21 from its axially inwardly projecting end 23. Each plate 24 is provided with a positioning boss 25, the function of which will be fully explained hereafter.

The element 12 is actually mounted for rotation on and about the spindles 20, 20a by means of a pair of sleeve-like bushings 32 and 34 which are inserted, one in each end of the element 12. The bushing 32 is a simple cylindrical sleeve having an outside diameter equal to the inside diameter of the tubular element 12, so as to fit tightly within one end of the element 12; and an inside diameter only slightly greater than the outside diameter of the spindle 20, thereby permitting the bushing 32 to be rotated freely about the spindle 20 when the latter is inserted through the bushing 32.
The bushing 34 is similarly dimensioned but is annularly recessed at 35 to receive one extremity 36 of an elongate helical spring 38. The spring extremity 36 includes a radiating projection or boss 40 which is adapted interlockingly to engage a slot 41 extending from the end of the tubular element 12. The spring 38 extends axially away from such recessed portion 35 in such a manner that the spring 38 and bushing 34 may both be simultaneously inserted in the tubular element 12. When so inserted, the other extremity 42 of the spring 38 is disposed axially well inside the tube 12.

Both bushings 32 and 34 are preferably made of phenolic resin cotton fabric base, mechanical grade, such as is publicly offered for sale by the Taylor Fibre Co. of La Verne, Calif., under the trade designation of "Taylor Grade C (NEMA)."

Bushing 34 is partially orificed at 46 to receive a screw 48 which is loosely inserted through an orifice 49 in the wall of the tubular element 12, to prevent the bushing 34 from rotating relative to the tubular element 12. By such fixed relationships, rotation of the element 12 causes corresponding rotation of both the bushing 34 and the extremity 36 of the spring 38.

The outer extremity 42 of the spring 38 is held against all rotation by the engagement of the terminal diameter 44 with slotting 21 provided at the end 23 of the elongate spindle 20a which extends through and in the axis of both the bushing 34 and the helical spring 38.

The entire portion of the assembly which is disposed between the spaced plates 24 is enclosed in a cylindrical housing 52.

The outer edge of the screening 10 is passed through a longitudinal slot 60 which extends the full length of the cylindrical housing 52, and is permanently secured to a cross member 59 which is dimensioned to seat in a channel 61 in the underside of an element 64. Both the member 59 and element 61 are orificed in registry so that a single screw 65 passes through both of them, and in this way the outer edge 15 of the screening 10 may be secured, when the screening is rolled up, to the outer face 63 of the lower window sash 62 at a level just above the slot 60. One or more drain holes 56 may be provided, although these are not necessary.

The housing 52 is fixedly secured in relation to the plates 24 by inserting the bosses 25 into the extremities of the slotting 60.

The divider molding, which is conventionally provided in a window framing to comprise the common inner wall for the channels within which the upper and lower sashes slide, is removed from each side of the side framing downward to the lower sill from the highest point to which the element 64 can be raised, and is replaced by a channelled molding 67. This molding 67 is formed with a deep narrow channel 66 which serves to guide the lateral edges 68 of the screening 10 as the latter is raised or lowered in the manner hereinafter explained. This channelled molding also prevents insects from entering the window by passing around such lateral edges 68 of the screening 10.

To install the illustrated embodiment of the invention, the divider molding is first replaced with the channelled molding 67 as stated in the preceding paragraph. The screening 10 is then rolled tightly upon the element 12, and inserted in the housing 52. The bushing 34 is passed through hole 49 and the bushing 34 is rotated and moved until its partial hole 46 is in registry with the hole 49. The screw 48 is then tightened to secure element 12 and the bushing 34 against all rotation relative to each other.

Spindles 20, 20a, tightly mounted on the plates 24, are then inserted through the bushings 32, 34 respectively, and the elongated spindle 34 is turned until the spring end diameter 44 seats in the spindle slot 31. The plates 24 are pushed toward each other until they are in intimate contact with the extremities of the tube element 12, the plate bosses 25 being aligned with and inserted in the ends of the slotting 60, thereby to prevent the screening from becoming unwound.

The entire assembly is now placed in between sides of the window framing 22 on the lower sill 70. The outer edge 15 of the screening 10 is next secured by the cross member 59 and element 64 to the face 63 of the lower window sash 62 at a level just above the slotting 60, and the plates 24 are screwed into the sides 22 of the window framing.

It will be found that as so assembled and mounted, the illustrated embodiment of the invention provides screening which rolls out and rolls back up with the raising and lowering, respectively, of the window.

By making the bushings 32, 34 of the fiber plastic recommended above, and the element 12 and spindles 20, 20a preferably of aluminum, it will be found that these exposed parts will require no replacements for very long periods, since rusting and wear do not occur.

The entire unit may be made at a relatively low cost, and installed with a minimum of labor expense. Moreover, the unit may be easily removed whenever this becomes desirable, since the screws become necessary because of its long life and the fact that its compactness in overall dimension avoids interference with the installation of storm windows in those latitudes where the latter are employed.

It should also be pointed out that the screen roll and mounting brackets may conveniently be made up into an assembly and sold as a ready-to-install and properly wound-up unit. Such a unit may be readily installed simply by:

1. Removing the window divider molding;
2. Replacing it with the channel molding 67;
3. Inserting the screen roll unit between the side window framing and seating it on the sill;
4. Securing the element 64 and cross member 59 to the face of the lower window sash;
5. Securing the plates 24 to the side framing by screws or nails.

These steps are quite within the ability of the average "do-it-yourself" householder, so that the latter may avoid all labor costs to install the unit.

While the preferred embodiment of the invention has been shown in its application to a window which is raised vertically, the unit works equally well in windows which slide open horizontally, as shown in FIG. 8.

Various modifications of the illustrated structure will undoubtedly occur to those skilled in the art, but insofar as these modifications employ the principles of the present invention, they are intended to be comprehended within the scope thereof.

I claim:

1. A roll-up screen combination adapted for installation in a window having a sash slidable across the window opening to open and close the same, and to provide a screen covering for the window area exposed upon the sliding of the sash, said screen being rolled up proportionately with the closing of said sashable sash, said combination comprising: a tubular element, said element being provided with bushing means to receive for rotation of the element thereabout and wherein the bushing means is annularly recessed on its extremity which is first inserted into the element, an elongate spindle extending through one end of the element and with the end of the element into which the elongate spindle is inserted being slotted; an elongated helical spring provided with a radiating boss at one end, said spring opposing counterrotation of its extremities, one
end of said spring received within the annularly recessed portion of the bushing means and with the radiating boss received within the slotted end of the element in interlocking engagement to prevent rotation of said spring extremity relative to the element and the other end of said spring extending axially within the said element; a flexible sheet of screening rolled upon said element, the inner edge of said sheet being secured to said element; a rigid housing, said housing surrounding said element and being slotted for the full length of said sheet, the outer edge of said sheet being passed through said slotting and secured to said slidable sash to move therewith; means to dispose said spindle from one of its ends in an axis parallel to said sash edge and in proximity to said edge when the sash is closed, the last said means further holding said spindle against all motion; the free end of said spindle being provided with means to engage the unsecured extremity of said spring when the spindle is inserted through the bushing means and into the tubular element; the said means to dispose the spindle being further provided with means to interlock with the said housing and to prevent rotation relative thereto, whereby the screening may be tightly rolled up and the spring turned until it is tightened and upon such interlocking, the coil tension is held while the means to dispose the spindle is fixedly mounted within the window framing.

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