Dec. 15, 1942. W. B. EWING 2,304,990

SELF-ROLLING SCREEN

Filed Aug. 18, 1941

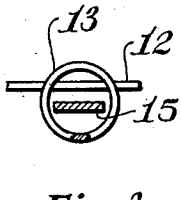


Fig. 3

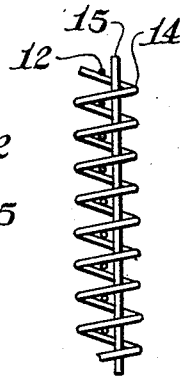


Fig. 2

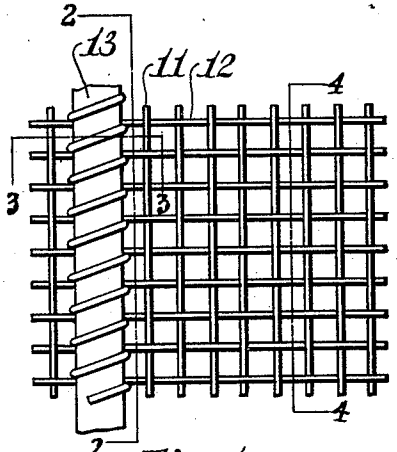


Fig. 1

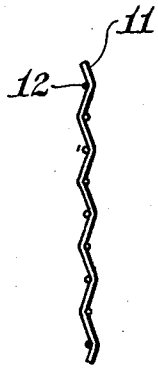


Fig. 4

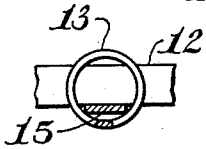


Fig. 7

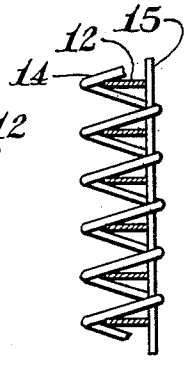


Fig. 6

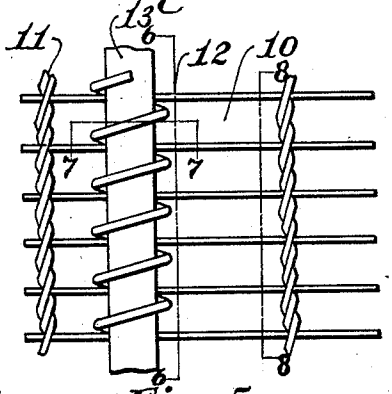


Fig. 5

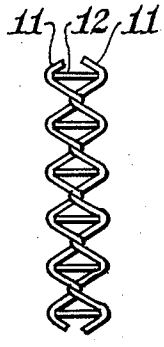


Fig. 8

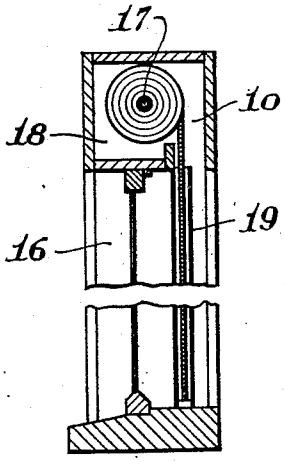


Fig. 9

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SELF-ROLLING SCREEN

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Application August 18, 1941, Serial No. 407,299

4 Claims. (Cl. 245—2)

This invention relates to a self-rolling fabric, especially a screen fabric, and to the means whereby such fabric may be made self-rolling. The invention more particularly concerns a self-rolling awning screen fabric, adapted to serve the normal functions of such screening when drawn over an opening and held in that position, and capable of rolling up away from the opening when released.

The present invention is an improvement in all rollable fabrics which, from time to time, it is desired to displace temporarily from their accustomed hanging place, and more especially it is an improvement in wire screen fabric of various types, including specifically those types which are the subject of Grebe Patent 2,078,940 and my prior Patent 2,194,222. The screens described in the stated patents normally have warps consisting of pairs of wires, preferably with interlocking twists between successive wefts, and wefts consisting of strips (usually metal) having an elongated cross-section throughout their length and disposed with their elongated faces at an angle to the plane of the screen.

Window screens, roller shades, tent flaps, awnings and like objects, at one time or another, have all been provided with some sort of roller mechanism, whereby they might be withdrawn from their extended position if this were desirable. The commonest mechanism for the purpose consists of a roller rod, mounted on fixed end supports or trunnions, and containing a built-in spring and ratchet device. This well-known type of roller is subjected to strenuous conditions in service and often fails before the fabric which it controls has given maximum possible service.

It is accordingly among the objects of the invention to provide a self-rolling fabric, especially screen fabric, which will remain relatively rigidly in extended position when required and which is capable of, and is provided with simple and foolproof means for rolling upon itself when released from the said extended position. Another object is to provide a screen fabric as aforesaid wherein the rolling element forms an integral part of the fabric. Other and related objects will appear hereinafter.

To the accomplishment of the foregoing and related ends, the invention, then, consists of the article and means hereinafter more fully disclosed and particularly pointed out in the claims, the annexed drawing and the following description setting forth in detail but a few of the forms and applications of the invention.

In the said drawing, forming part of this specification, wherein like parts are designated by like numerals throughout.

Fig. 1 is a front elevation of a woven fabric or wire cloth embodying the rolling mechanism of the invention;

Fig. 2 is a side sectional elevation of the same fabric taken along the line 2—2 of Fig. 1;

Fig. 3 is a plan view in section taken on line 3—3 of Fig. 1;

Fig. 4 is a side sectional elevation of the same fabric taken on line 4—4 of Fig. 1;

Fig. 5 is a front elevation of the awning screen described in my prior Patent No. 2,194,222, embodying the rolling mechanism of the present invention;

Fig. 6 is a side sectional elevation similar to Fig. 2, taken on line 6—6 of Fig. 5;

Fig. 7 is a plan view in section, similar to Fig. 3, taken on line 7—7 of Fig. 5;

Fig. 8 is a side sectional elevation, similar to Fig. 4, taken on line 8—8 of Fig. 5; and,

Fig. 9 is a side sectional elevation through a window opening, showing a window screen embodying the invention, partly rolled up away from the opening.

In its broader concept, my invention comprises a fabric having substantially parallel weft members and substantially parallel warp members substantially at right angles to said weft members, and at least one special warp member consisting essentially of a preformed helical filament, successive turns of which are normally spaced apart a distance at least equal to the normal distance between the weft members, engaged at each turn with a weft member and lying in or effective on one face plane of the fabric, and a spirally resilient filament or tape effective on and lying against the other face plane of the fabric, within and along the helix. The flat, spirally resilient element of the special warp member may be turned so that its normal tendency is to spiral away from the fabric, pulling the fabric with it, or it may be turned so that its normal tendency is to spiral or coil toward the fabric, rolling the fabric within its spiral. The flat, spirally resilient element may be fixed to the screen at one end, on, under certain conditions, it may advantageously be attached at both ends. A determining factor whether the resilient element may be attached at both ends is the ratio of the roll diameter to the width of the weft strips. Thus, in a screen with the flat,

spiral weft element on the face of a fabric in which the weft members are 0.050 inch wide and spaced 0.058 inch apart, the resilient element must be free at one end if the roll diameter is to be less than about five inches. In the same fabric, when the roll diameter is above about five inches, or when the spring element is between the faces of the fabric, the said element may be secured to the fabric at both ends. This is particularly advantageous because the fabric of the size just mentioned must be stretched about one-eighth of an inch per foot to present a plane, taut appearance when covering an opening, and the necessary extension of the fabric to the length of the spiral element when unrolled imparts the stretch to tighten the fabric. In general, the greater the width of the elongated face of the weft members, the larger the roll diameter must be if the coiling element on the face of the fabric end is to be fastened at both ends of the fabric. It is pointed out that the coiling element may be of any desired cross-section. Also, the coiling member may be held enmeshed in the fabric by suitably alining in a substantially vertical plane the weft members between any pair of warp members.

The special warp members, consisting of helical and spirally resilient elements, as described, may occur any number of times across the face of a fabric. The number of such special warp members will depend to a large extent on the intended use. Thus, a wide opening, covered by a heavy awning screen such as that described in my Patent No. 2,194,222, might require one special warp member possibly every 6th to 12th warp, while a flap or fly for an umbrella tent, made of light canvas duck, might be handled adequately by one such warp member for each foot or two of width.

Fabrics embodying the special warp member which is the rolling mechanism of the present invention may be secured at one or both ends to rods or other stiffening members running in the weft direction, and, being suspended by one such rod or other stiffener, stretched over a window or other opening. It may be secured at its other end over such an opening by any suitable fastener strong enough to resist the coiling tendency of the spirally resilient elements in the special warps, which warps help to hold the fabric rigidly over the opening when secured. When it is desired to retract the fabric from the distended position, the fastener is released and the fabric is caused to roll upon itself, energized by the spirally resilient elements aforesaid. If the supporting rod is free to rotate as it might, if supported in loose fitting trunnions, and especially if the fabric is required to move longitudinally in a plane bounded by laterally disposed guide channels, release of the fastener at the opposite end allows the fabric to rotate its supporting rod and to roll itself thereon. If, however, the supporting member is fixed and cannot rotate, and the fabric is not confined in lateral guide channels, release of the fastener results in the fabric rolling upon itself, with its distal end innermost, until it meets the supporting element at its proximal end.

Referring now to the drawing, a fabric 10 composed of longitudinal warps 11 and transverse wefts 12 is provided, either during the original weaving or subsequent thereto, with special warps 13 at suitably spaced intervals across the fabric. The special warps 13 consist of a helix 14, having a regular pitch at least equal to the normal spacing between successive wefts 12, though in the case of fine or tightly woven fabric, the pitch of helix 14 may be equal to from two to six or more weft thicknesses. Successive turns of helix 14 project through fabric 10, being most conveniently simply thrust through the fabric, there being no necessity to "corkscrew" the helix into position. In the case of a regularly woven fabric, it may be desirable to draw one or more adjacent warp filaments 11 to provide lateral space equivalent to the diameter of helix 14. The special warp 13 also includes, as its other element, a spirally resilient filament 15, which may be of any self-spiralling spring material, such as spring steel, or the like, inserted between the back of fabric 10 from the face to the back thereof. It is clear that it could easily be lifted away from the face unless the unengaged loops penetrating the fabric were secured, as is done by insertion of the spirally resilient member 15. The helix 14 and spiral spring member 15 serve the complementary functions of holding one another in proper position relative to fabric 10. Fabric 10 may be any rollable fabric, but at present the invention has found widest application to wire screen, particularly of the awning screen type shown in Figs. 5 to 8, inclusive.

The commonest use of the self-rolling screen of the invention at present is illustrated in Fig. 9 in which a window opening 16 is normally covered with a screen fabric 10 embodying the special warp 13 composed of helix 14 and spiralling spring 15. The screen 10 is normally mounted on a rigid rod 17, disposed horizontally within a box 18 above the window 16, rod 17 being rotatable within its end bearings. When screen 10 is released from its extended position over window 16, spring 15 tends to cause it to roll upon rod 17, the lower end of screen 10 being raised vertically in channels or guides 19 disposed on each side of the window opening.

In the foregoing, the terms "face" and "back" have been used with respect to a fabric containing the self-rolling warps 13. It is to be understood that such terms are here used purely in a relative manner, and without regard either to patterns which the respective sides of the fabric may bear or to the direction in which it will roll when actuated by spiral spring member 15.

Many ways of finishing the ends of fabrics embodying the special warps 13 will be apparent, whereby the helix 14 and spring 15 may be "finished off" and properly secured at one or both ends of the fabric, as may be appropriate for the intended use.

Several fields of utility for the invention have been suggested herein, but it is not intended that its utility be so-limited, the invention being so-extensive in scope with the following claims.

I claim:

1. A self-rolling fabric, comprising longitudinal warps and transverse wefts, and having at least one special warp consisting essentially of a helical filament engaged at each turn with a weft member and effective on one face plane of the fabric, and a spirally resilient filament, effective on and lying against the other face plane of the fabric within and along the helix.

2. A self-rolling fabric, comprising longitudinal warps and transverse wefts, and having at intervals across its face special warps, each consisting essentially of a helical filament engaged at each turn with a weft member and effective on one face plane of the fabric, and a spirally resilient filament, effective on and lying against

the other face plane of the fabric within and along the helix.

3. A self-rolling metal screen fabric comprising longitudinal warps and transverse wefts, and having at least one special warp consisting essentially of a wire helix, having a pitch equal to the normal distance between the weft members, engaged at each turn with one of said weft members and effective on one face plane of the screen, and a spirally resilient flat filament of width less than the diameter of the helix, effective on and lying against the other face plane of the screen, within and along the helix.

4. A self-rolling screen, comprising longitudinal warps consisting of pairs of wires having interlocking twists between successive wefts, and wefts consisting of metal strips of elongated cross-section disposed with their elongated faces at an angle to the plane of the screen, and having at least one special warp consisting essentially of a wire helix, having a pitch equal to the normal distance between the weft members, engaged at each turn with one of said weft members and effective on one face plane of the screen, and a spirally resilient flat filament of width less than the diameter of the helix, effective on and lying against the other face plane of the screen within and along the helix.

WALKLEY B. EWING.