

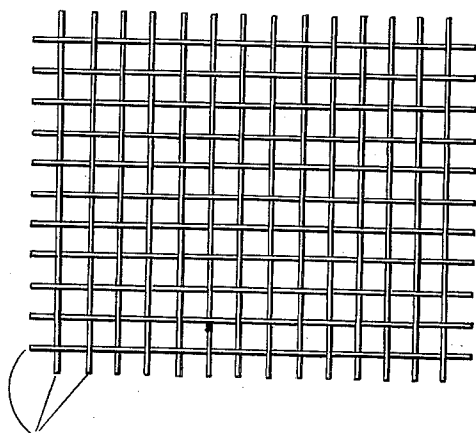
July 11, 1944.

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2,353,225

WINDOW SCREEN

Filed April 30, 1943



THREADS OF STRETCHED ORGANIC
ESTER OF CELLULOSE FILAMENTS
BOUND TOGETHER WITH A
COMPATIBLE COMPOUND.

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2,353,225

WINDOW SCREEN

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Application April 30, 1943, Serial No. 485,165

7 Claims. (Cl. 28—80)

This invention relates to window screens and relates more particularly to window screens woven of composite threads of high tenacity and high flexibility prepared from a plurality of filaments of stretched organic ester of cellulose materials. This invention is a continuation in part of the invention described in my co-pending application S. No. 453,570, filed August 4, 1942.

An object of my invention is to provide a window screen which is strong, weather-resistant, inexpensive, and efficient in use.

Another object of my invention is the provision of a window screen which is designed to prevent the entrance of insects while permitting an ample degree of air circulation.

A further object of my invention is to provide a window screen of relatively translucent material which permits a substantial portion of natural light of extreme wave lengths to pass through.

A still further object of my invention is to provide a window screen of relatively high flexibility, comprising an open mesh fabric made of specially treated high tenacity threads, whereby said screen may be frequently rolled and unrolled or folded and unfolded without breaking, fraying or otherwise becoming damaged.

Other objects of my invention will appear from the following detailed description.

The figure of the accompanying drawing shows diagrammatically a screen of the present invention.

Window screen designed to prevent the entrance of insects heretofore have been made of woven wire cloth or woven enamelled fibers fixed to a frame which is inserted in windows of homes, bunkhouses, automobiles and the like. Wire cloth, however, suffers from disadvantages not only in that it is subject to rusting and like weathering, but it is easily bent or deformed and, as a consequence, the appearance of the screen may be easily marred. Painted cotton netting does not rust, but is not wholly satisfactory since flexing causes the paint to flake off permitting moisture to get to the cotton fibers causing rot, swelling and a separation of the fibers that tend to close the pores of the screen, and give a worn and unsightly appearance. Materials from which window screens may be made and which do not suffer from the foregoing disadvantages have been long sought.

In accordance with my invention, I make window screens from open mesh fabrics formed by weaving or netting high tenacity composite yarns or threads of stretched filaments of an organic

ester of cellulose, said filaments being bound together by a suitable substance to form the composite yarn or thread.

The fabrics may be woven or netted in any desired pattern but the openings must, of course, be small enough to prevent the passage of insects therethrough. The open texture fabric may be fixed in any convenient manner to a frame of suitable size to fit the opening which is to be screened. It may be held in place on the frame, after being stretched taut, by suitable wooden or metallic strips affixed thereto by nails, tacks or staples, or the fabric may be held in place on the frame by a suitable adhesive. The fabric may, if desired, be reinforced along the edges by cloth strips or tapes of any suitable material sewn or otherwise fixed thereto and the reinforced edge attached to the frame. The fabric may also be woven in standard widths with a closely woven selvedge which will serve to reinforce the fabric edge, thus obviating the necessity of employing a separate tape or cloth binding.

The screens produced in accordance with this invention are not effected by continuous flexing and, therefore, they may be mounted on spring rollers with the edges attached to guides that operated in trackways. This permits the construction of a window screen that is permanently installed and may be pulled across the window opening to close the same against insects. This same property adapts the screen for use in pre-fabricated buildings that are put up, torn down and put up at a different location, such as labor camp bunkhouses, army barracks, produce depots, etc.

The fabric may be woven or netted on suitable textile devices. The multi-filaments composite threads may be of any suitable denier. Threads having deniers from 500 to 1500 have been found very practical for window screens for dwelling houses. Such threads may have from 50 to 500 or more filaments. Any suitable number of filaments may be grouped into a yarn, say 5, 10, 20, 40 or more, and this yarn stretched and then combined in a twisting operation with yarns having a similar number of filaments or a different number of filaments to form the thread of the desired denier. All the yarns going to form the composite thread may be stretched to the same degree or to different degrees, and they may all have the same or differing acidyl value. I have found, however, that yarns of about 20 filaments and about 75 denier plied together with from 3 to 10 turns per inch to give a total denier

of from 750 to 1200 are most suitable for general purposes.

The filaments may be prepared by extruding a solution of cellulose acetate or other ester of cellulose, dissolved in a suitable solvent, through an orifice into an evaporative medium as in the dry method of spinning, or into a coagulating or precipitating medium as in the wet method of spinning. A number of filaments may be extruded through a plurality of orifices in a single cabinet and these filaments associated to form a multi-filament yarn. These filaments, either as they are formed or in a subsequent operation, are subjected to a softening medium and then stretched such that their length is increased from 100% to 200% of their original length. This stretching operation modifies the characteristics of the filaments adapting them for use in screens. The softening medium, referred to, may be a vapor of a solvent such as acetone, a liquid such as a mixture of acetone and water or alcohol with or without heat, or it may be water vapor at above 100° C. or even dry heat at a temperature sufficient to soften the filaments.

The filaments may be formed of cellulose acetate of say 53 to 55% acetyl value calculated as acetic acid or any other suitable cellulose acetate or organic acid ester of cellulose. Examples of other organic acid ester of cellulose are cellulose butyrate, cellulose formate, cellulose propionate, cellulose acetate-butyrate, cellulose acetate-propionate, etc. After stretching, the yarns may be partially saponified.

Several of the multi-filament yarns are associated together to form the thread of the desired denier. The multi-filament yarn is then treated by impregnating the same with a derivative of cellulose compatible with the organic ester of cellulose that forms the bases of the filaments, under such conditions that a composite thread is formed having the properties of a monofil, such as freedom from fraying, freedom from ballooning, freedom from dirt catching interstices, etc. and of a multifil, such as flexibility, strength, etc. By the expression "compatible compound" as herein used, is meant a compound that is capable of wetting and/or adhering to the particular organic ester of cellulose forming the base of the filaments. Examples of such compatible impregnating compounds are the organic esters of cellulose such as are used as the base of the filaments and cellulose ethers such as ethyl cellulose, methyl cellulose and benzyl cellulose. These impregnating compounds may be applied to the threads in one, two or more applications from solutions of same and in amounts of 5 to 25% based on the original weight of the yarn may be applied.

The application of the impregnating compound to the yarn is preferably made by passing a traveling yarn through a bath of the impregnating compound dissolved in a volatile solvent and then removing the solvent. These baths preferably contain from 5 to 15% solids and are of a viscosity suitable for application to the thread without containing an excess of solvent. The impregnating compound may be applied in other ways such as dipping spools or bobbins of the thread in a bath containing the compound or by spraying the thread with a solution of the compound. It is preferable to apply from 15 to 20% based on 70

the weight of the thread of the impregnating compound. The solvent employed will depend upon the nature of the impregnating compound employed. Examples of suitable solvents for the organic derivative of cellulose impregnating compound are benzol, acetone, acetone-alcohol mixtures and acetone-water mixtures with or without heat.

The following example is given merely by way of illustration of this invention and it is not to be considered as being in any way limitative.

Example

Ten bobbins of 75 denier stretched cellulose acetate yarn were plied together with 5 t. p. i. The plied yarn was run through a pan containing 10% ethyl cellulose in acetone over a roller and into another pan containing a 9% solution of ethyl cellulose in benzol, a smooth lustrous filament resulted after the removal of the solvent. This operation applied approximately 17% on the original weight of the thread of ethyl cellulose. Although the thread was smooth it retained considerable of the strength and flexibility of a multifil.

It is to be understood that the foregoing detailed description is merely given by way of illustration and that many variations may be made therein without departing from the spirit of my invention.

Having described my invention, what I desire to secure by Letters Patent is:

1. A window screen of an open mesh fabric containing smooth composite threads of heavy denier formed of a plurality of stretched filaments having a basis of an organic ester of cellulose bound together substantially along the length thereof with a compatible compound.

2. A window screen of an open mesh fabric containing smooth composite threads of heavy denier formed of a plurality of stretched filaments having a basis of cellulose acetate bound together substantially along the length thereof with a compatible compound.

3. A window screen of an open mesh fabric containing smooth composite thread of heavy denier formed of a plurality of stretched filaments having a basis of an organic ester of cellulose bound together with a derivative of cellulose.

4. A window screen of an open mesh fabric containing smooth composite threads of heavy denier formed of a plurality of stretched filaments having a basis of cellulose acetate bound together with a derivative of cellulose.

5. A window screen of an open mesh fabric containing smooth composite threads of heavy denier formed of a plurality of stretched filaments having a basis of an organic ester of cellulose bound together with ethyl cellulose.

6. A window screen of an open mesh fabric containing smooth composite threads of heavy denier formed of a plurality of stretched filaments having a basis of cellulose acetate bound together with ethyl cellulose.

7. A window screen of an open mesh fabric containing smooth composite threads of heavy denier formed of a plurality of stretched filaments having a basis of cellulose acetate bound together with from 15% to 20% of a derivative of cellulose.

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