Dec. 12, 1950 F. C. ELDER 2,533,439

METHOD OF MAKING COATED WIRE SCREEN CLOTH

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FIG. 1.

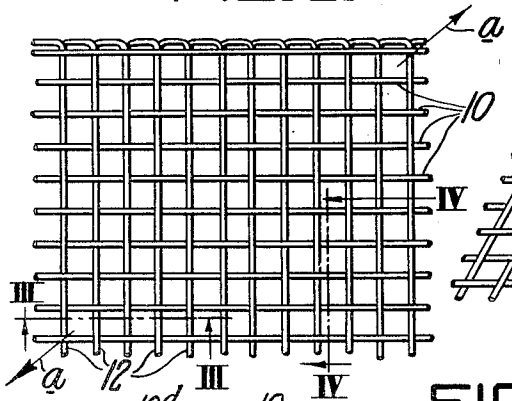


FIG. 2.

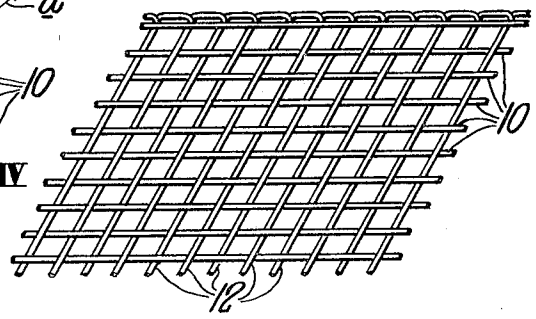


FIG. 3.

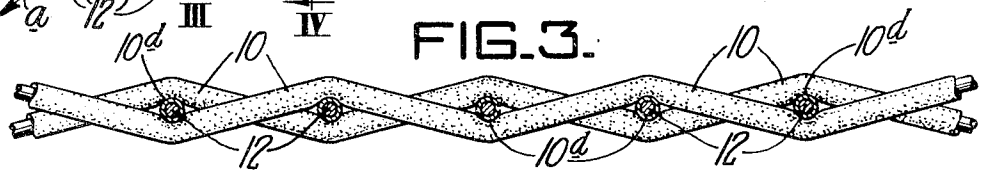
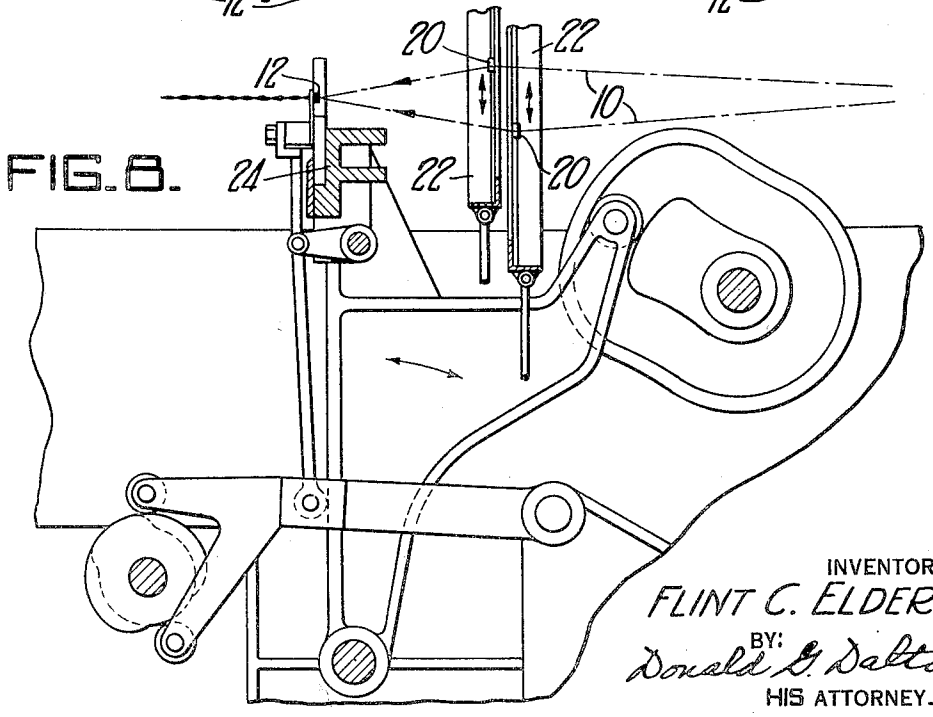


FIG. 4.



FIG. 8.



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FIG. 6.

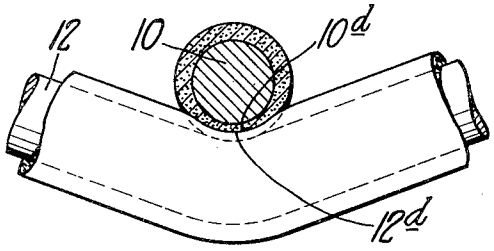


FIG. 7.

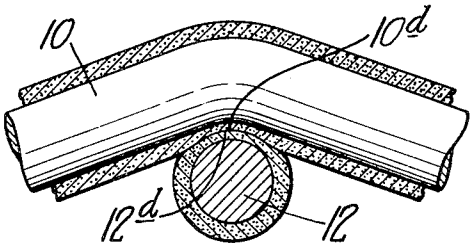
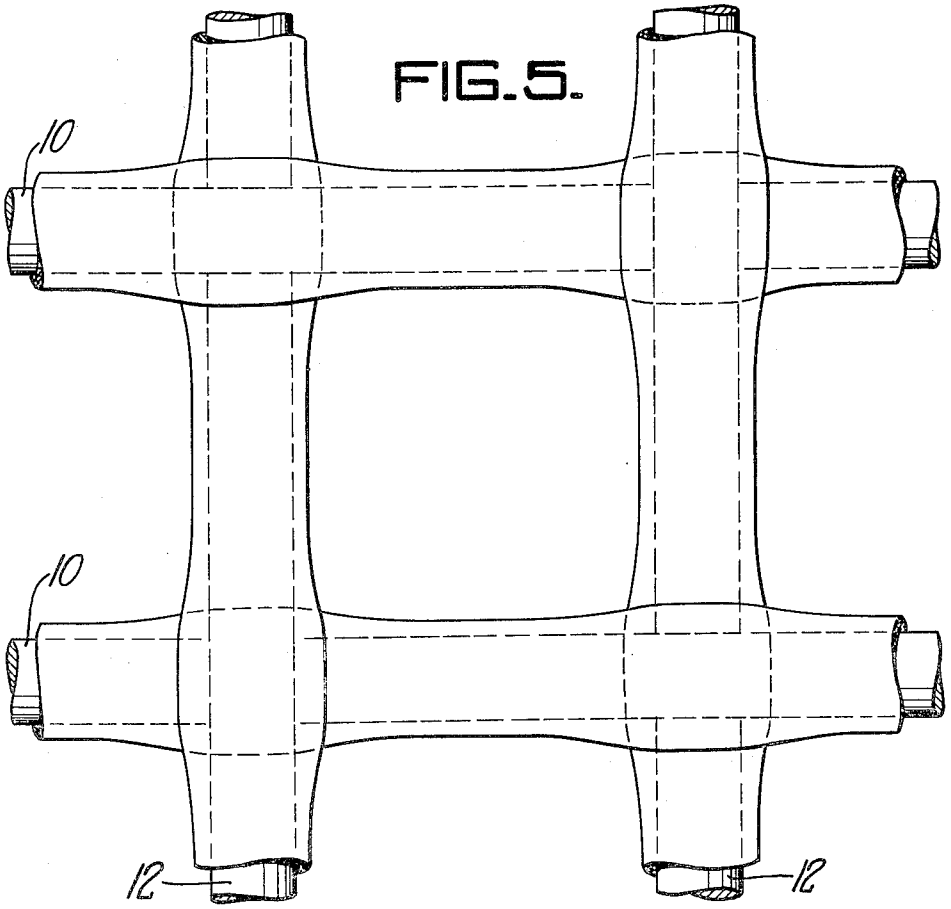


FIG. 5.



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METHOD OF MAKING COATED WIRE SCREEN CLOTH

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Application December 12, 1945, Serial No. 634,497

1 Claim. (Cl. 28—73)

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This is a continuation-in-part of my prior applications Serial No. 485,787, filed May 5, 1943, now abandoned, and Serial No. 554,241, filed September 15, 1944, now abandoned, entitled "Wire Screen Cloth."

The present invention relates to an improved wire screen cloth the strands of which are coated with a film-like layer or skin of thermoplastic material preferably applied to the metal wire filaments prior to weaving while the thermoplastic is in a molten or liquid state.

It has been proposed to provide a woven mesh of reticular material composed primarily of warp and weft wires having thereon a thermoplastic coating of such thickness that the characteristics of the coating material predominate, the warp and weft wires being crimped prior to being interwoven, and the thermoplastic coating material on the wires being heated to set it permanently in the crimped form. Such heat-set coated screen made of precrimped strands is disclosed in Thomas Patent No. 2,364,404, dated December 5, 1944.

My invention, as more fully pointed out hereinafter, is an improvement over and differs from the teachings of the Thomas patent in that neither the warp nor weft strands of my screen are precrimped, nor are the coatings of my wires heat-set while in a crimped condition.

One object of the invention is to provide a method of coating metal warp and weft wires with a thermoplastic material and interweaving the coated wires in such manner that slight depressions are formed in the film-like coatings which are effective to interlock the wires of the resulting fabric and thus endow the same with greater stability or stiffness.

Another object of the invention is to provide a non-racking open mesh screen cloth coated with a thermoplastic, having complementary depressions formed in the thermoplastic coatings of the warp and weft wires at the regions where they intersect, for the express purpose of forming an interlocking engagement between the coatings per se, in addition to the interlocking relationship resulting from the crossing crimps of the warp and weft wires caused by the interweaving thereof.

A further object of the invention is to provide a screen fabric in which film-like coatings of the warp and weft wires thereof are formed with depressions constituting interlocking portions effective to rigidify or stabilize the fabric and cause it to lie flat and true when laid out on a plane surface.

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A further object is to provide a screen fabric composed of coated warp and weft wires so integrated with one another that the completed fabric can be attached in a single plane to a screen frame or the like without the necessity of applying tension either longitudinally or transversely at the time of installation.

For a complete understanding of the invention, reference is made to the following detailed disclosure, the accompanying drawings, and the appended claim.

In the drawings:

Figure 1 is a plan view illustrative of a piece of fly screen cloth which may be regarded, for example, as having from about 8 to 20 square meshes per inch, the warp and weft wires of this cloth being assumed to be coated with a suitable thermoplastic material as hereinafter set forth, with shallow depressions in the film-like coating at the regions where the warp and weft wires intersect.

Figure 2 is a diagrammatic showing of a prior art screen cloth to illustrate an inherent disadvantage thereof when a force is exerted in a direction diagonal to the substantially square meshes of the intersecting warp and weft wires.

Figure 3 is a cross-sectional view approximately on line III—III of Figure 1, showing the weft wires in cross section and the intersecting warp wires in elevation.

Figure 4 is a cross section on line IV—IV of Figure 1, showing the warp wires in cross section and the weft wires in elevation.

Figure 5 is a greatly exaggerated view illustrative of the interlocking relationship of the warp and weft wires brought about by virtue of the interengagement of the shallow depressions formed in the film-like coating of strands at the points of intersection.

Figure 6 is an exaggerated fragmentary sectional view showing a warp wire in cross section and a weft wire in elevation, to illustrate the interlocking of the depressions in the coatings thereof at the point of intersection.

Figure 7 is a similar exaggerated view, showing a weft wire in cross section and a warp wire in elevation, illustrating the interlocking of the depressions in the coatings at the point of intersection.

Figure 8 is a diagrammatic view, illustrative of a method of making the improved screen herein claimed, and showing a weft wire at the apex of the warp shed, in the act of being forcibly beaten into the fell of the screen cloth by the action of the reed dents on the beater of a loom.

Referring particularly to the drawings, reference numeral 10 represents a multiplicity of parallel warp wires of metal such, for example, as copper, bronze, iron or steel. Each warp wire carries a thin film or coating of synthetic thermoplastic resin. The synthetic thermoplastic coating or film may be applied by various methods well known in the art such as by feeding the stock through a suitable extruding apparatus containing a thermoplastic material of the character herein referred to, which, when heated to the requisite temperature, can be extruded so as to form an envelope or skin-like film surrounding the warp wire.

Weft wires 12 are also coated with a thermoplastic material in the same manner as the warp wires. Both warp and weft wires are coated with the thermoplastic material prior to the time they are woven into screen fabric. While not limited thereto, by way of example, in the formation of screen fabric ranging in size from 8 to 20 mesh I may use steel or iron wire measuring .011 inch in diameter with an extremely thin coating of thermoplastic thereon, on the order of about .002 inch, thus making an over-all diameter of the coated warp and weft strands of approximately .015 inch.

The protective film or skin is preferably a linear polyamide, but it is to be understood that it is within the scope of my invention to use other thermoplastic materials in place thereof, such as polyvinyl chloride, co-polymers such as vinyl chloride and vinyl acetate, polyvinylidine chloride, ethyl cellulose, or cellulose nitrate. The material may be translucent or may have a pigment incorporated to give any desired color or appearance to the screen cloth, such, for example, as silver, to simulate galvanized cloth; or copper, to simulate copper or bronze screen cloth; or black, to simulate black painted screen cloth.

In the production of the improved screen fabric, weft wires may be thrown through the warp sheds by the usual shuttle, in a manner well known to those skilled in the art, or I may feed a gang of warp wires in substantially parallel relation, forming sheds thereof, and feed lengths of weft wire successively, from a stationary supply, through the warp sheds, as shown in Harter Patent No. 2,363,415, dated November 21, 1944. Regardless of whether a shuttle type loom or a loom as shown in the Harter patent is used, the beater will apply weft wires into the fell of the cloth or apex of the shed with sufficient force to complementarily crimp both the warp and weft wires and at the same time to cause the formation of slight indentations or depressions in the thermoplastic coatings of the warp and weft wires, so as to bring about an interlocking relationship of the coatings. By this novel method, a new and unexpected result is accomplished, i. e., forcing the weft wires into woven relation with the warp wires in such a manner as to make the complementary indentations in the coating films effective to so interlock the warp and weft wires that the fabric cannot be racked or distorted by forces acting in the direction of the diagonals of the square meshes.

One method of producing the fabric is diagrammatically illustrated in Figure 8, which shows certain elements of the wire working loom covered in Harter Patent No. 2,363,415, dated November 21, 1944.

The steel wires or filaments, after having been coated with a thermoplastic film or skin of suitable character, as above set forth, are wound on suitable reels or spools. A number of spools are placed in the supply racks of a conventional wire working loom and the warp is fed over the warp beam of the loom and threaded through the eyes of usual heddles 20. These heddles are carried by conventional harness frames 22 which are alternately lifted and lowered so as to periodically reverse the warp sheds. After each weft wire is fed between the sheds, it is acted upon by the reed dents of the beater 24 of the loom so as to properly place each weft at the fell of the fabric during the weaving operation. The warp wires are maintained under a substantial tension during the weaving, and this tension combined with the action of the loom in beating the weft into woven relationship in the fabric, forms slight crimps in both the warp and the weft wires at the points where they cross or intersect. In addition to the crimping of the metal components of the screen, the act of beating the weft strands into the warp sheds results in the formation of respective shallow depressions 10^d in the warp strands and similar depressions 12^d in the weft strands.

The action of the reed dents in beating the weft wires into position at the fell results in slightly displacing restricted portions of the skin coating forming slight bulges in the region of the intersections of the warp and weft wires, as suggested in Figure 5, and these bulged areas also have the depressions 10^d and 12^d formed therein at the same time. The net result of the weaving operation is thus to bring about a slight increase in the areas of contact between the crossing warp and weft wires at the increased regions thereof. This increased interengagement of the recessed intersecting regions of the warp and weft wires appears to contribute materially to the non-racking characteristics of the fabric as a whole, and to enable it to resist distorting forces acting along the diagonal lines as suggested by the oblique arrows in Figure 1. This is a surprising and totally unexpected result not obtained heretofore.

My improved fabric thus comprises warp and weft wires complementarily crimped at their points of intersection as a result of their interweaving, and each warp and weft wire is coated with a thin film of a hardened thermoplastic material in such manner that the film on each warp and each weft wire will have a shallow depression in the region where the wires cross each other, to form an interlocking relationship between the film coatings in addition to the interlock resulting from the cross crimped formation of the wires caused by the interweaving. The relationship of the wires is such that the screen fabric as a whole is endowed with considerable stiffness which enables it to resist racking or distortion. This is in sharp contrast with conventional woven products. In an ordinary woven wire fabric, if forces are exerted in the direction of the diagonals of the square meshes, as suggested by the oblique arrows *a* in Figure 1, the fabric as a whole can be racked or distorted to the condition illustrated in Figure 2, so as to cause the square meshes to assume a diamond shape. The present invention overcomes this inherent deficiency in known fabrics, with the result that my improved fabric is characterized by a greater resistance to racking or distortion, and it also has the added advantage that when rolled out to considerable length it will lie flat and true on a plane surface and can be installed in window screen frames, doors, or the like, with-

out applying tension thereto. Thus screened articles made with the improved fabric are devoid of buckled or warped portions. This greatly enhances the appearance of articles made of my improved fabric.

My improved screen cloth is also suitable for use in filtering various chemicals and food products and may take the place of an all-plastic filter screen cloth with the added advantage of greater rigidity due to the presence of the metal wire center.

In addition to the advantages above mentioned, the woven screen embodying the invention will have a much longer life than ordinary painted or galvanized wire or screen, since the resistance to atmospheric corrosion is superior to that of all comparable prior galvanized or painted products with which I am familiar. When the improved plastic coating is applied to cuprous products such as bronze or copper screen wire, the thermoplastic film effectively serves to prevent staining the woodwork of the house in which the screening is used.

While I have described a method of production and specific characteristics of the fabric which have been demonstrated by experiment, it is to be understood that I am not precisely limited thereto since various modifications may be resorted to without departure from the invention as defined in the appended claim.

I claim:

In a method of making open-mesh wire-screen cloth, the steps including coating metal screen wire about .011 inch in diameter with a film of organic thermoplastic resin about .002 inch thick, forming warp sheds thereof, interweaving therewith a weft of said wire and, after the weft wire has been fed between the sheds, beating it into the fell of the resulting cloth under pressure sufficient partially to displace the films on the warp and weft wires adjacent their intersections and form mutually interlocking depressions in the contacting surfaces thereof.

FLINT C. ELDER.

REFERENCES CITED

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

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Number	Name	Date
2,357,492	Abendroth	Sept. 5, 1942
2,368,689	Thomas	Feb. 6, 1945
2,375,597	Thomas	May 8, 1945