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METHOD OF MAKING A FOURDRINIER WIRE

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Fig. 1.

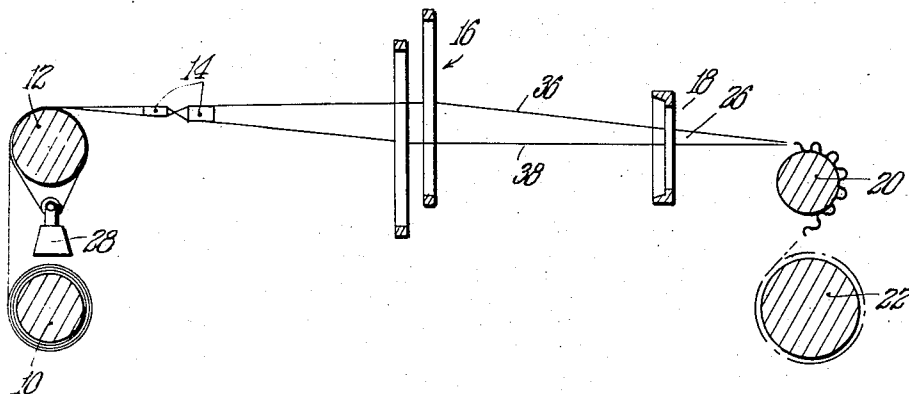
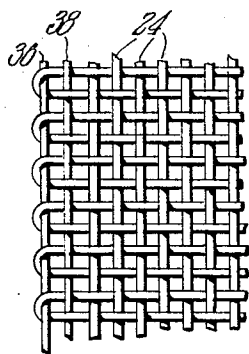


Fig. 2.



Fig. 3.

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METHOD OF MAKING A FOURDRINIER WIRE

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2 Claims. (Cl. 28—1)

This invention pertains to a method of producing a Fourdrinier wire fabric.

The principal objects of this invention include the provision of and method for the production of a novel wire fabric for paper-making purposes which has an even, flat, straight selvage edge that is relatively thin as compared with the main body of the fabric.

Another object of my invention is to provide a fabric which is free from distorted, rough, and scalloped thick edges and this is accomplished according to the invention in the novel method to be described.

A still further object of the invention is to provide a wire fabric which does not have an edge which is heavier than any other portion of the fabric and which may be made more economically and with fewer operations than prior fabrics known in the art.

A Fourdrinier wire, as is well known, is employed in a paper-making machine wherein it is in the form of a continuous band of fine wire mesh which moves over spaced supporting rolls and in contact with the suction boxes and rolls of a paper machine.

It is to be appreciated that a Fourdrinier wire fabric must have a flat and uniform surface from selvage to selvage for proper operation over and in contact with the different rolls of a paper machine. Great difficulty has thus far been experienced in making Fourdrinier wire fabrics which are thin and free from distortions, especially at the selvage edges.

As is well-known, in the production of a wire fabric, the weft wires, or wires which extend across the fabric, may become bruised or distorted and distort the warp wires during the manufacture, so that the edge or selvage of the same at either side becomes useless or produces objectionable results in paper-making.

As is also known, both the warp wires and the weft wires are usually woven from brass or bronze wire of very small diameter. The wire when considered as an individual piece of wire is obviously not of very great tensile strength and a high degree of tension thereupon has heretofore been a thing to be avoided on both the warp and weft wires, with the result the best weaving results have not been obtained.

As is common with most weaving operations, the weft wire is thrown around the outermost warp wire by a shuttle and in so doing a relatively great strain is exerted upon the selvage wires with the objectionable result that the fabric

has distorted edges in that they are wavy, thick and uneven.

Furthermore, in all prior methods of making a Fourdrinier wire, scalloped edges were oftentimes produced due to the force of the short or weft wire on the side warp wires. Such edges would cause considerable difficulty inasmuch as the pulp seeps in under the fabric so as to produce imperfections in the paper. Furthermore, scalloped edges could never be changed once they are produced in the fabric.

Attempts have heretofore been made to obviate the objection mentioned.

One prior method has been to cut off a narrow strip of fabric along the entire selvage edge of the woven fabric. This has one obvious objection in that it made a fabric with raw and loose weft ends and with outermost warp wires which were apt to become unraveled. Furthermore, by this method the edges were roughened and sharpened and were adapted to pick up loose objects due to their unfinished ends.

Another method, as shown in U. S. Letters Patent #1,475,352, granted to me on November 27, 1923, consists of the use of springs to pull selvage wires out during the manufacture of the fabric. That is to say, the selvage wire is arranged to extend part of the way along the woven fabric, and due to its fixed fastening at the spring, to be continuously withdrawn from the same during the weaving of the fabric. The result of this method was that a large outermost selvage wire was necessary and as the selvage wire was withdrawn, it produced large loops which were pulled out so as to result in wavy, uneven and thick edges. Furthermore, the spring pulled the fabric out of alignment inasmuch as the woven wires had a tendency to "gather up."

A defective product does result if the wires are removed from the selvages while the fabric is in the loom. This is due to the fact that there is a certain amount of stretching along the outermost or newest weft wires so as to lead the distortion.

In order to overcome the prior art objections and to provide a fabric having the desired smooth, flat, even and relatively thin edges, my invention employs at the edge of the wire fabric during the weaving thereof, a selvage wire or wires which extend throughout the entire length of the fabric being woven. The selvage wires are of steel and of stiffer character than the main warp wires so as to withstand the strain of the weft wire or wires imparted thereto and I have found that

wire of less diameter than the main warp wires is an especially suitable wire for this purpose.

Previously it has been necessary to use a very heavy wire for the selvage wire and a wire of about twelve one-thousandths was more or less of an average diameter. I have found that wire of between eight one-thousandths and six and one-quarter one-thousandths is sufficient to maintain rigid resistance and to withstand the shock of the short or weft wire equally as well as heavier wire with far better results because the selvage wires are held or tensioned for the weaving operation. The selvage wire is smaller and being made of steel, it is comparatively hard and it will not bend so that more strain can be placed upon this wire and thus the strain on the main warp wires is relieved.

Broadly, my invention involves the method of weaving tensioned selvage wire or wires of relatively small diameter into the fabric whilst held or tensioned and of removing the wire or wires after the fabric has been completed.

The function of the selvage wire or wires is to withstand the shock of the shuttle. After the shuttle has passed and the wire has been woven, the selvage wire or wires are obviously no longer needed, and being of small diameter, small even loops are provided when subsequently removed so as to form relatively small loops and a relatively thin edge.

It is not intended that the selvage wires remain in the fabric during its use as a Fourdrinier screen. Since these wires are usually made of steel, they are likely to corrode and rust and this is an undesirable feature in the operation of paper-making machinery.

This invention has application to regular-weave wires in which the warp wires are carried under one weft wire and over one weft wire in alternating fashion, and in cleft weave wires in which the warp wires are carried under two weft wires and over one weft wire so as to provide longer knuckles and greater wearing surface. Likewise, it may be applied upon a wire fabric of any of the other well-known forms of weave.

Various other novel features and advantages and other objects of my invention will hereinafter be more readily apparent from the following detailed description made in connection with the accompanying drawing, in which:

Fig. 1 is a diagrammatic view showing some of the essential elements of a loom with the novel features for carrying out the invention associated therewith;

Fig. 2 is an enlarged fragmentary detail plan view of a portion of a wire fabric; and

Fig. 3 is an enlarged detail view in cross-section of a portion of a wire fabric.

Referring now to the drawing more in detail, the invention will be fully described. It will be understood that the apparatus to be described may be varied within wide limits for carrying out the novel method of the invention without departing from the spirit and scope thereof.

The process of weaving the wire may be carried out on the type of loom as shown diagrammatically in Fig. 1 wherein 10 represents a warp beam, 12 a whip roll, 14 the lease strips, 16 the heddle frames, 18 the beat up reed, 20 the breast roll, and 22 the take-up or cloth roll.

The selvage wires are indicated at 36 and 38 and the main warp wires 24 which are not shown in Fig. 1 are understood to be positioned parallel to the selvage wires. The weft is indicated at 26.

The warp wires 24 are supplied on the warp

beam from which they reel off as needed and they are supported in the heddle frames 16 for the formation of successive sheds therein in the well-known manner.

At either end of the warp beam, the selvage wires 36 and 38 are disposed and they likewise reel off therefrom during the formation of the fabric although such selvage wires may be let off from independent spools or reels if it is so desired.

A tensioning device for the selvage wires at each side of the fabric is represented by a weight 28. By this device the selvage wires may be and preferably are tensioned independently of the tension on the main warp wires. A definite tautness and a greater rigidity is produced upon these selvage wires. Since a definite tension is obtained by this method, it is possible to use a smaller selvage wire. In addition, the selvage wires are wound around the whip roll once or twice so as to prevent slipping and in this way additional tension is maintained upon the wires. The tension device consists of the weight 28 having a pulley on the selvage wires in a loop or loops provided in the wires as they are wound around the whip roll.

The selvage wires and the main warp wires are preferably carried through separate heddle frames so as to have successive sheds formed therebetween for the passage of the weft wire therethrough in its transverse movements across the wire fabric whereby the warp wires and the selvage wires are interwoven with the weft wires as shown in Fig. 2.

Many difficulties have been experienced in treating woven wire fabrics so as to make them suitable for use on paper-making machines. For example, as the woven fabric comes from the loom, it has curled and wavy edges, which must be straightened or cut off and the curled edges are generally thicker than the main body of the fabric.

As is shown in Fig. 3, by the use of these smaller selvage wires, the thickness of the main body of the fabric as represented between the lines 40 is greater than the thickness of the selvage edge as represented between the lines 42. A flatter form of weave results in a decided decrease in thickness at the edges without sacrifice of strength. The thin edge is composed of small loops and is adapted to lie more flatly than edges heretofore known in the art which are thicker, looser and more wavy.

When the fabric is carried over the rolls of a paper making machine, the loops are flattened so as to produce flattened edges in the fabric and to consequently produce larger surfaces.

Two relatively thin small selvage wires 36 and 38 are shown in Fig. 2. The outside wire 36 is adapted to receive the strain of the weft wire. The inside wire 38 is adapted to even the tension by stabilizing or equalizing the opening of the sheds. It has been found that by carrying the two selvage wires in oppositely moving heddle frames, the effect of raising and lowering one selvage wire will be balanced by the opposed movement of the other selvage wire during the shed-forming action.

It is to be understood that if it is so desired, only one selvage wire, or more than two selvage wires may be used in the fabric and upon the completion of the fabric may be pulled out.

The weft wire 26 is looped at each edge of the fabric outside the selvage edge wire 36 and since this wire 36 travels with the fabric during the

entire period of its manufacture, there is no action tending to pull back and distort the weft wire loops during the weaving operation. The pulling action not only tends to produce large wavy loops and provides an uneven edge but results in an edge which is thicker than the main body of the fabric.

While I have described the invention in great detail and with respect to the present preferred form thereof, it is not desired to be limited thereto since many changes and modifications may be made therein without departing from the spirit and scope of the invention. What it is desired to claim and secure by Letters Patent of the United States is:

1. The method of producing a Fourdrinier fabric consisting in, interweaving a weft wire with a plurality of non-ferrous warp wires from a beam, the end-most warp wire being of a relatively stiffer steel and of a relatively less diameter than the intermediate warp wires, and after the interweaving removing the fabric from the loom and removing the end-most warp wire from the completely woven fabric by pulling the same longitudinally through the selvage loops formed

by the weft wire around the end-most warp wire forming selvage loops which are less in height than the thickness of the main body of the fabric so as to provide a relatively thin selvage edge as compared with the thickness of the main body of the fabric.

2. The method of producing a Fourdrinier fabric consisting in, the interweaving of a weft wire with a plurality of non-ferrous warp wires from a beam with the outermost warp wire being of a relatively stiffer steel and of a relatively smaller diameter than the intermediate warp wires, and after said interweaving the removing of the completely woven fabric from the loom and the removing of the outermost warp wire from the fabric by pulling the same longitudinally through the selvage loops formed by the passage of the weft wire around the outermost warp wire forming a selvage edge which is less in thickness than the thickness of the main body of the woven fabric so as to provide a relatively thin selvage edge as compared with the thickness of the main body of the woven fabric.

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