

[54] REPAIR OF WIRE FABRIC

[72] Inventors: **Leo J. LeBlanc**, Dressel Avenue,
Granby, Mass. 01033; **Wallace C.
Foerster**, 45 Lamb Street, South
Hadely Falls, Mass. 01075

[22] Filed: **Sept. 24, 1969**

[21] Appl. No.: **860,669**

[52] U.S. Cl.**29/401**, 162/348, 245/10,
140/DIG. 1, 162/DIG. 1

[51] Int. Cl.**B22d 19/10**, B23p 7/00

[58] Field of Search 245/10; 140/DIG. 1; 139/425.5;
29/401; 162/348, DIG. 1

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Primary Examiner—John F. Campbell

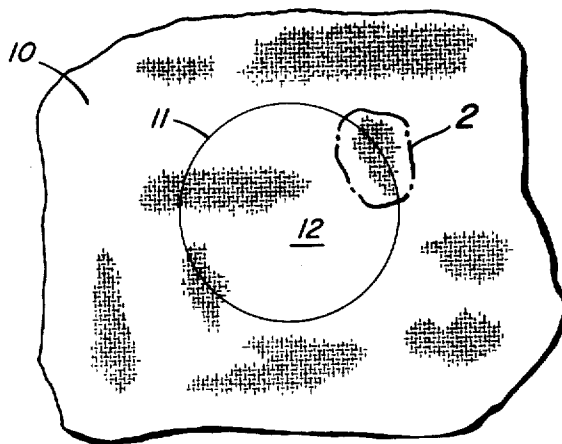
Assistant Examiner—D. P. Roovey

Attorney—Stepno & Neilan

[57] **ABSTRACT**

Wire fabric containing a break is repaired by removing therefrom a section encompassing the break, locking in its stead in non-overlapping relationship a patch coated with bonding material, and then bonding the patch to the fabric by effecting a bonding temperature about the periphery of the patch. A device is also described comprised of heating elements for the bonding operation and preferably magnetic locking means for maintaining the patch in non-overlapping place during the repair operation.

7 Claims, 5 Drawing Figures



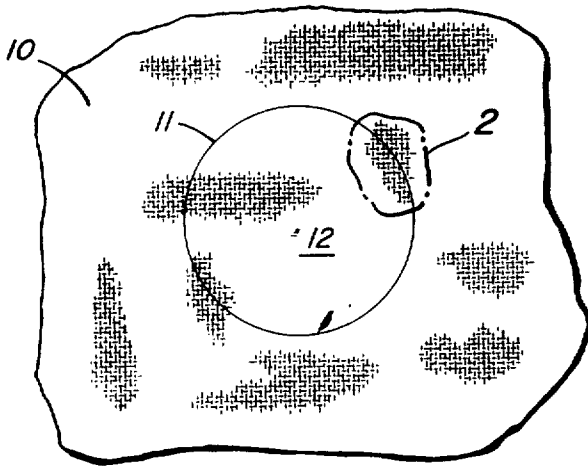


FIG. 1

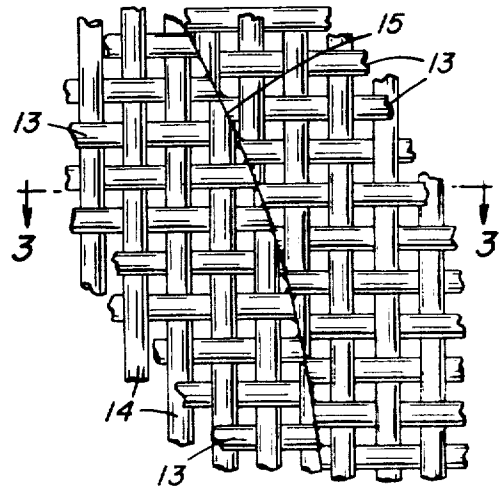


FIG. 2

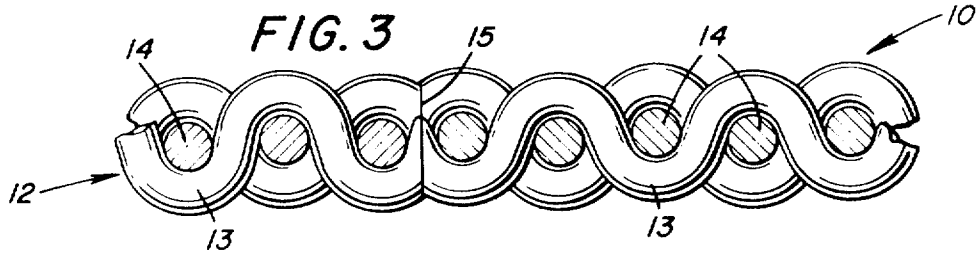


FIG. 4

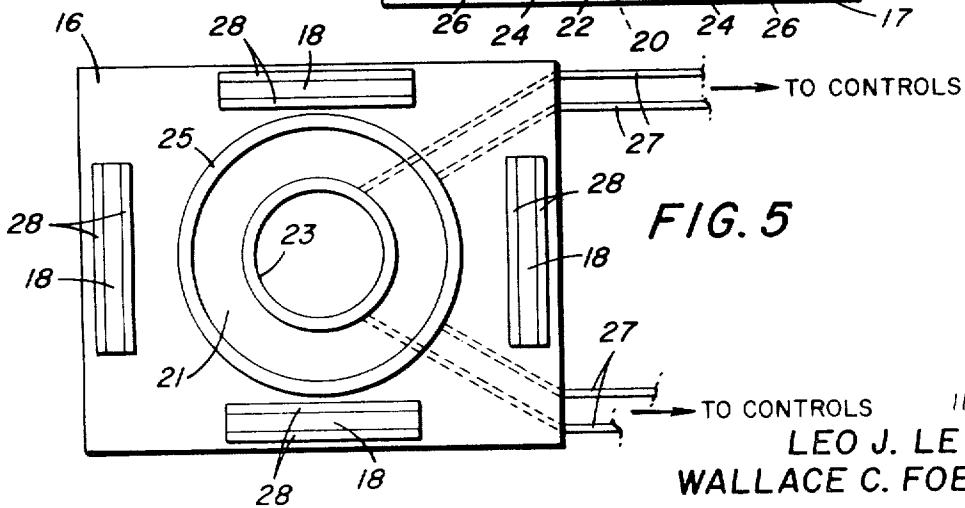
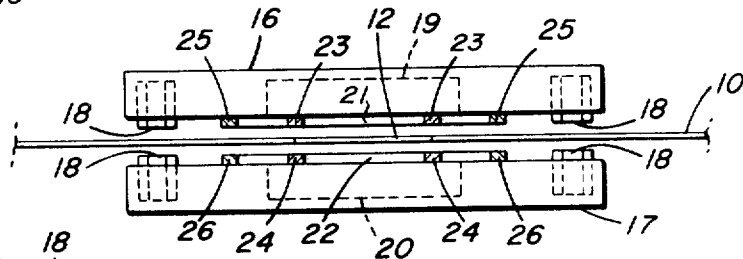


FIG. 5

INVENTORS
LEO J. LE BLANC
WALLACE C. FOERSTER

BY

Stepno and Neilan
ATTORNEYS

REPAIR OF WIRE FABRIC

BACKGROUND OF THE INVENTION

This invention relates to the patching of wire fabrics, especially Fourdrinier belts.

Continuous woven wire cloths fabricated by joining opposite ends of a cloth in a seam are used extensively in the paper industry in connection with the so-called Fourdrinier paper machine. Such woven wire cloths, called "Fourdrinier wires," must have fine mesh, smooth wire strands and must be uniform throughout so that water in a paper or pulp web carried on the wire will drain properly, and fibers will not adhere thereto, so as to leave the web without undesired marks and thin spots. A particular problem arises in the industry when one or more of the several warp or weft wires constituting the Fourdrinier wire breaks thus rendering the Fourdrinier paper machine unacceptable for the further manufacture of paper products thereon.

It is known in the art to repair such defective Fourdrinier wires by removing a portion of the mesh containing the break as with a punch and then inserting in its place a complementary patch. While such prior art patches, representative of which being the so-called "cup" and "Tyler" patches, effectively repair the protruding break in either the weft or warp wires, they are nonetheless unacceptable because all of the same overlap the parent screen, namely, they project above or below the surface of the screen, and, accordingly, leave the pulp or paper being processed with undesired marks, water marks, thin spots and the like.

SUMMARY OF THE INVENTION

Accordingly, a primary object of the instant invention is the provision of a method for patching wire fabrics, especially Fourdrinier wires, whereby a patch is provided which does not overlap the parent screen or wire.

Another object is to provide a patching device for repairing wire fabrics useful in performing the aforesaid method.

Yet another object is the provision of a repaired wire fabric, especially a Fourdrinier wire, thus patched.

Other objects, features and advantages of this invention will become more apparent from the description which follows.

Briefly summarized, the invention provides for the repair of wire fabrics of plain, twill or any other weave by means of a patching technique, the patches themselves being comprised of wire fabrics or wire cloths which are advantageously identical to those undergoing repair. More particularly, when a break is observed in one or more of the weft or warp wires comprising the mesh of the Fourdrinier paper machine, the machine is shut down and a preferably circular hole is then punched out of the Fourdrinier wire to remove that portion of the wire containing the break. Next a precut patch complementary in geometry or marginal outline to the section which was removed is inserted into the open space and the patch magnetically locked in non-overlapping place by means of the device to be hereinafter more fully described. The patch is coated either at its edges or in its entirety with a thin film of brazing material. To bond or braze the patch to the parent screen, there is employed an electric heating device which effects the brazing temperature, same ad-

ditionally effecting an optional preheating to better prevent rapid dissipation of the heat necessary for brazing.

To illustrate further the invention, an embodiment thereof is described hereunder with reference to the accompanying figures of the drawing, which figures depict the best mode presently contemplated for carrying out the objects of the invention and its principles and are not to be construed as restrictions or limitations on its scope or as in any way precluding the substitution of one non-critical equivalent member for another, and in which:

FIG. 1 is a plan view of a Fourdrinier wire including a patch embodying the present invention;

FIG. 2 is an enlarged view of the portion 2 of FIG. 1;

FIG. 3 is a view in section of the patched wire taken along the line 3—3' of FIG. 2;

FIG. 4 is a side view of the patching device of the invention disposed both above and below a length of Fourdrinier wire; and

FIG. 5 is a bottom plan view of the patching device of the invention.

DETAILED DESCRIPTION OF THE INVENTION

In FIG. 1, 10 generally indicates a section of Fourdrinier wire comprised of a plurality of warp and weft strands, and from which has been cleanly cut or punched a portion indicated along its perimeter 11. A patch 12 according to the invention is depicted as having been bonded in place of the section removed. Said patch 12, preferably a two inch circular patch, is advantageously comprised of fabric or wire cloth which is identical to that undergoing repair, and which was coated, either at its edges or in its entirety, with a thin film of brazing material, advantageously silver solder, prior to its having been placed in the space vacated by the portion removed. After being rigidly locked in place the patch is brought to a temperature which effects the brazing thereof to the parent screen. As the patch is geometrically identical to both the section removed and the resulting hole in the wire, it can be made to snugly fit in such hole (see FIG. 3). Thus, the planarity of the wire is maintained, the patch neither projecting above nor below the surface thereof.

FIGS. 2 and 3 illustrate better the flush, wire planar patch according to the invention, whereby the warp and weft strands 13 and 14, respectively, of both patch 12 and parent screen 10 are shown as being joined along narrow and uniform joint 15, for example, a silver solder joint. The joint 15 is formed by raising the temperature of the area at and about the peripheries of the patch and hole to a brazing temperature, and thence permitting the, for example, fused silver solder to harden.

The device of FIGS. 4 and 5, which holds the patch in place during the repair operation and which is provided with means for effecting the brazing temperature, is comprised of top and bottom base members 16 and 17 which are fabricated from a non-magnetic type of metal such as one inch aluminum plate. The base members 16 and 17 are provided with a plurality of powerful permanent magnets or electromagnets 18 imbedded therein, advantageously sandwiched between pairs of thin steel plates 28 which enhance magnetic activity. The poles of the magnets 18 at the top and bottom

halves of the device attract to securely lock the patch in place in flush relationship with the screen undergoing repair. In other words, when the device of the invention is mated, each half to the other and with the screen interposed therebetween, the magnets imbedded in the respective halves thereof are aligned in north pole – south pole relationship, albeit for purposes of clarity and convenience the base members 16 and 17 are illustrated in FIG. 4 as not being mated and are vertically spaced from the screen 10 containing the patch 12. Most advantageously, each half of the device of this invention is provided with four powerful permanent bar magnets (or electromagnets) as illustrated, namely, two pair of magnets, those in each pair being parallel and with each pair perpendicular to the other, and the four magnets being arranged on their respective base member as in the 12, 3, 6 and 9 o'clock positions. It will be appreciated, though, that any number of magnets can be deployed in any number of arrangements, so long as the mating operation is not impaired. Also imbedded in base members 16 and 17 are elements 19 and 20, respectively, comprised of preferably circular face plates 21 and 22, also respectively, which plates are advantageously fabricated of stainless steel. Integral with the face plates 21 and 22 are brazing temperature, low voltage – high amperage electric heating elements 23 and 24, advantageously stainless steel elements, and, optionally, electric preheating elements 25 and 26, again respectively. The preheating elements too are advantageously fabricated of stainless steel. The several heating elements are connected to a suitable power source or controls (not shown) by means of conductive wires 27. Thus, it will be appreciated that in mated relationship or vertical alignment the face plates 21 and 22 will serve to bias and maintain the patch 12 exactly within the hole vacated by the section containing the break. Moreover, the heaters 23 and 24 are preferably constructed in such configuration that their exposed surfaces, when the device is mated, are flush with the circumference of the patch to insure the most efficient use of the device. Accordingly, a patch can be seamed in a wire fabric surely and easily according to the invention merely by raising by means of the heating elements the temperature of the area at and about the peripheries of the patch and hole to a brazing temperature. The resultant joint is thin, narrow and uniform, and possesses strength and durability, and which will not interfere with proper operation of the Fourdrinier paper machine.

In accordance with this invention, when a break is observed in the wire of a Fourdrinier paper machine in operation thus rendering the machine unacceptable for further manufacture of paper products thereon, the machine is immediately shut down. A section, preferably circular and about two inches in diameter, and encompassing the break, is next removed from the mesh as by die punching. This is quite a simple operation because a die can be placed under the mesh very conveniently no matter where the break has occurred. The reason for this is that, if necessary, the suction boxes can be conveniently lowered to afford an ample interspace beneath the mesh for purposes of inserting the die. Moreover, even when the break occurs at the middle of a wide papermaking screen a plank can be placed thereover and across a pair of supports such

that, after the die is maneuvered into place beneath the screen, the mechanic can safely walk over the plank to the vicinity of the break whereat the punching operation can be effected. In the punching operation care need only be taken that the screen is not wrinkled or otherwise damaged in the vicinity of the prospective joint, as such damage would obviously impair being able to align the edges of the patch with the edges of the hole prior to the brazing operation. Once the section containing the break has been cleanly removed the bottom base member is pushed into place under the area containing the break as by means of an attached aluminum rod, tube or the like and the patch is manually inserted, which patch geometrically corresponds to the removed section containing the break, and which is coated, either at its edges or in its entirety, with a thin film of brazing material. If desired, a magnifying glass may be used and the patch aligned so that the warp and weft strands thereof are in alignment with the warp and weft strands of the screen undergoing repair. This provides for a more uniform patch, with the continuity of the Fourdrinier wire being maintained. In any event, whatever the alignment, there is sufficient physical contact between the patch and the parent screen for purposes of the brazing or seaming operation because the diameter of the individual strands, both warp and weft, comprising the Fourdrinier wire is greater than the interspaces therebetween, both longitudinal and transverse. The patch now being in place, the upper base member is disposed thereover and vertically aligned with the bottom base member which is disposed therebelow. The plurality of permanent magnets or electromagnets imbedded in both the upper and lower base members are arranged in north pole – south pole relationship so that the patch is rigidly locked in place in the parent screen, interposed between the face plates of the said base members. The face plates of the base members also serve to insure that the patch at no time projects either above or below the surface of the screen. The said plates are also comprised of electric heating means for purposes of providing the soldered or brazed seam upon their being activated to a temperature which is sufficient for this end; and are optionally comprised of electric preheaters for purposes of better preventing the rapid dissipation of the heat necessary for the brazing operation imparted by the heaters, per se. To bond the patch to the screen any heat setting may be used which is sufficient for the soldering or brazing operation, dependent upon the thermal characteristics of the brazing material. By “brazing material” there is intended any of the typical known brazing compositions and alloys suitable for forming a seam. There is accordingly provided a patched Fourdrinier wire which possesses strength and durability in the region of the patch and which will not interfere with proper drainage. The patch, moreover, neither projects above nor below the surface of the screen, and, accordingly, does not leave the pulp or paper being processed with undesired marks, water marks, thin spots or the like. Likewise, there is no danger of tearing of the paper web or damage thereto when used in paper making machinery, and the patch shall not cause undue wear to the suction boxes. While there have been shown and described and pointed out the fundamental novel features of the invention as ap-

plied to the preferred embodiment, those skilled in the art will appreciate that various modifications, changes and omissions in the repair of wire fabric illustrated and described can be made without departing from the spirit of the invention. It is the intention, therefore, to be limited only by the scope of the following claims.

What is claimed is:

1. The method of repairing Fourdrinier wire fabric containing a break in one or more of the weft or warp strands thereof to reestablish the uniform continuity of said fabric, consisting essentially of removing therefrom a section of fabric comprised of a plurality of the said warp and weft strands and wholly encompassing the break, locking in its stead in non-overlapping relationship a complementary patch of Fourdrinier tape wire such that no portion of the patch extends beyond the periphery of the void created by removing said section, said patch coated at least at its edges with a thin film of bonding material, and thence bonding the patch to the fabric while in such non-over-

lapping relationship.

2. The method as defined by claim 1, wherein the patch is comprised of fabric identical to that undergoing repair.

3. The method as defined by claim 2, wherein the patch is magnetically locked in non-overlapping place.

4. The method as defined by claim 3, wherein the patch is coated in its entirety with the bonding material.

5. The method as defined by claim 3, wherein the warp and weft strands of the patch are aligned with those of the fabric prior to locking the patch in non-overlapping place.

6. The method as defined by claim 3, wherein the bonding operation is effected by raising the temperature about the periphery of the patch to a bonding temperature.

7. The method as defined by claim 3, wherein the section removed and the patch are circular.

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