Oct. 1, 1946. J. A. HARRIS 2,408,422

METHOD OF PREPARING AND APPLYING A PATCH FOR A FOURDRINIER WIRE

Filed Oct. 29, 1943 2 Sheets-Sheet 1

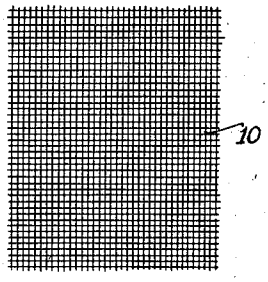


Fig. 1

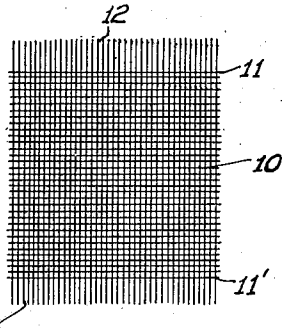


Fig. 2

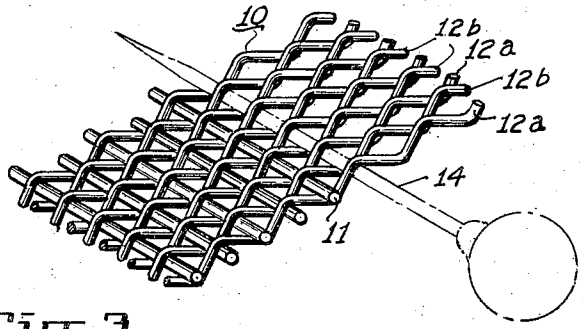


Fig. 3

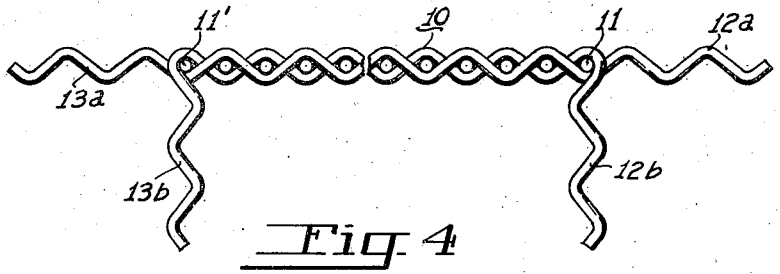


Fig. 4

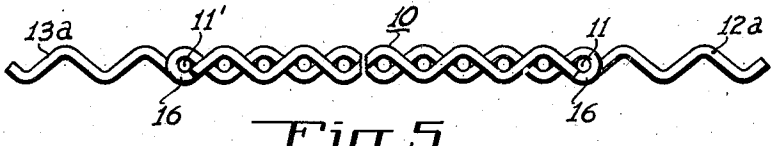


Fig. 5

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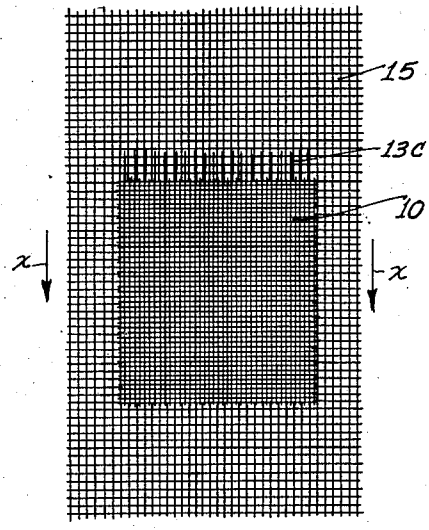


Fig. 9

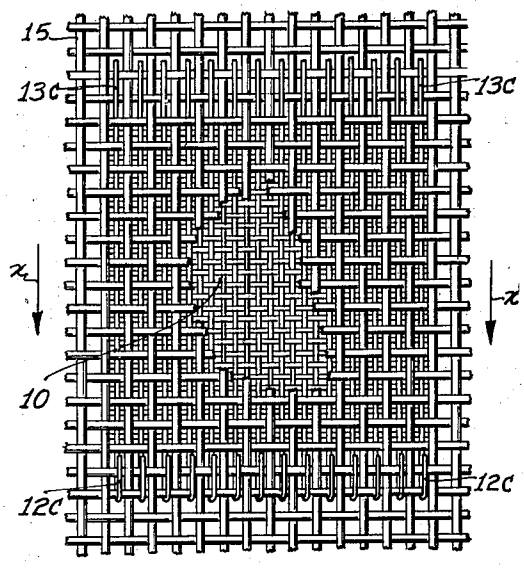


Fig. 10

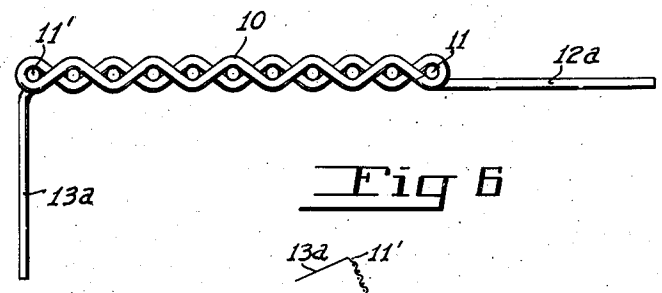


Fig 6

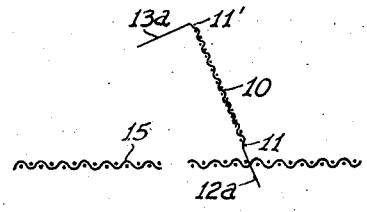


Fig. 7

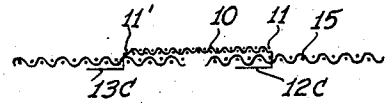


Fig. 8

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METHOD OF PREPARING AND APPLYING A PATCH FOR A FOURDRINIER WIRE

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Application October 29, 1943, Serial No. 508,222

1 Claim. (Cl. 140—3)

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This invention relates to the Fourdrinier wire of a papermaking machine and, specifically, to the patching of small holes developing in the Fourdrinier wire as a result of use or due to other causes.

As is well known, when a hole develops in the Fourdrinier wire it becomes necessary to repair or replace the wire immediately otherwise there will be corresponding failure or imperfection in the mat of paper stock formed on the wire.

At the present time it is customary to repair holes in the Fourdrinier wire by a "sewing" operation. Such repairing enables maximum productive life to be obtained from the Fourdrinier wire and this is an important consideration since it means the conservation of the essential materials used in its manufacture. However, while the customary and regular method of repairing or patching the Fourdrinier wire by "sewing" is quite satisfactory, the chief objection to this procedure is that the operation requires an average minimum of 90 minutes for "sewing" even a small space, and during this period of 90 minutes or more the machine must be completely shut down, which results in a loss in production and a loss in man hours.

The object of the present invention is to prevent or greatly reduce such loss by providing a method for patching the Fourdrinier wire which will require only a very few minutes and which will enable the Fourdrinier wire then to continue in service for considerable time just as if the repairing had been done by the longer and more laborious "sewing" method.

A further object of this invention is to provide a prepared patch, which can be made up in quantity in advance and kept ready for such emergency, and which can be quickly and easily applied to the Fourdrinier wire whenever the necessity arises enabling the Fourdrinier wire then to continue in use.

The manner in which such improved patching of the Fourdrinier wire is carried out by this invention and the manner in which the patch is prepared in advance and then applied to the wire is hereinafter fully described with reference to the accompanying drawings.

In the drawings, which are more or less diagrammatic and in which the various wires are shown considerably enlarged for the sake of clarity:

Fig. 1 shows a piece of woven wire fabric of fine wire mesh cut to the approximate size desired for the patch and suitable for being formed into my prepared patch;

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Fig. 2 shows the same piece of wire fabric after four "shute" wires have been removed from each end, the removal of these "shute" wires constituting the first step in the preparation of the patch;

Fig. 3 is a fragmentary enlarged isometric view of a portion of one end of the same piece of wire fabric illustrating the alternate projecting warp strands at each end and a convenient way of separating alternate warp strands at each end of the piece;

Fig. 4 illustrates the next step in the preparation of the patch in which the alternate warp strand ends are bent down to enable them to be cut off easily;

Fig. 5 shows the bent-down warp strand ends cut off and their stubs hooked around the end "shute" wires;

Fig. 6 is a side elevation of the completed patch with the warp ends straightened and those at the rear end bent down at right angles, the patch now being ready for attaching to the Fourdrinier wire;

Fig. 7 is a diagrammatic side elevation illustrating the first step in attaching the patch to the Fourdrinier wire;

Fig. 8 is a similar diagrammatic side elevation showing the patch fully secured in place;

Fig. 9 is a top plan view of a portion of the Fourdrinier wire showing the patch secured in place; and

Fig. 10 is a bottom plan view drawn to larger scale showing the under side of the patched Fourdrinier wire.

As a rule the holes which occur in the Fourdrinier wire necessitating immediate repair are small, usually only a fraction of an inch in diameter. The piece of woven wire fabric or wire mesh to be used for making the patch in accordance with my method will therefore also be small, for example, from ¾ to 1 inch square on an average. The piece of wire fabric 10 in Fig. 1 is assumed to be such a piece cut to sufficient size to make the desired patch. It is necessary with my method that the warp strands in the woven wire fabric to be used to be of sufficient fineness to pass readily through the meshes or interstices of the Fourdrinier wire. I have found that the material from which the patch is made is satisfactorily described to the trade by stating that it is "about 5 points finer mesh than the Fourdrinier wire." The piece of patching fabric shown in the figures is assumed to be of this approximate fineness as compared with the fineness of the Fourdrinier wire 15 (shown in Figs. 9 and 10).

The first step in forming the cut-out piece of material into my improved patch is the removal of several "shute" (or woof) wires at each end of the piece. I have found it preferable to remove four "shute" wires from each end, this number being sufficient for my purpose. Fig. 2 shows ethe piece of patching material with these "shute" wires removed leaving the fifth "shute" wires 11 and 11' as the last "shute" wires at each end. This removal of the "shute" wires is done to cause the ends of the warp strands to project from each end of the piece as shown at 12 and 13 in Fig. 2.

Not all the warp strand ends can be used in attaching the patch to the Fourdrinier wire since these are too numerous. Therefore I use only the alternate warp strand ends for this purpose, and consequently the other warp strand projecting ends should be cut off. I have found that the most convenient way of doing this is to insert some thin instrument, such, for example, as a dentist's nerve probe, indicated at 14 in Fig. 3, across between adjacent warp strands into the position formerly occupied by the fourth or last removed "shute" wire at each end. This causes the projecting warp strand ends to be separated into two alternate groups, 12*a* and 12*b*, thus with half of the warp wires 12*a* on one side of the instrument 14 and the other warp wires 12*b* on the other side of the instrument (Fig. 3). One of these groups 12*b* may then easily be bent down at right angles if the packing piece is held against a block of wood or other convenient corner surface. Fig. 4 shows the warp wire ends 12*b* and 13*b* bent down in this manner. These bent down ends can now be easily sheared off by a pair of scissors without cutting the other warp strand ends 12*a* or 13*a*. The stubs of the cut-off warp strands are next bent around the fifth "shute" wire at each end, as shown at 16 in Fig. 5. This makes the patching piece stronger by holding the end "shute" wires more firmly and also prevents any warp strand ends extending from the top surface of the patch when in place on the Fourdrinier wire. When the patching piece has reached this stage it is desirable to place the piece against a flat surface and hammer the hooked stubs 16 with a wooden mallet which will insure their lying flat against the underside of the patch, both ends of the piece being treated identically.

The remaining warp strand ends 12*a* and 13*a* projecting from the ends of the patching piece will still be kinked and present a zig zag appearance, as shown in Fig. 5, and it is necessary to straighten out each one of these extending ends before proceeding further. This is a rather tedious step and I have found that the easiest way to do this is with a pair of flat-faced tweezers. The tweezers should be placed on the warp strand ends close to the fifth "shute" wire and pulled out and off the ends of the strands, pulling them and straightening the kinks in each strand. It is desirable to use a hand lens or magnifying glass during this operation so that each strand end can be clearly observed. Some of the warp strand ends may have a tendency to turn 90° so that their kinks lie in the other plane and in such case an extra pair of sharp pointed tweezers should be used to grasp each of such strand ends separately and straighten them individually.

The final step in preparing the patch is to bend the projecting straightened warp strand ends 13*a* at the rear end of the patching piece down at right angles. This is very easily done

by bending them over the corner edge of a block or any other suitable object. Fig. 6 shows the piece after this has been done. The patch is now ready to be attached to the Fourdrinier wire.

The attaching of the patch to the Fourdrinier wire is a simple operation requiring only a few minutes and thus requiring only a momentary shut down of the machine. The pre-formed and prepared patch is held against the top side of the Fourdrinier wire, positioned perpendicularly and transversely with respect thereto, with the projecting warp strand ends 12*a* at the front end of the patch passing through meshes in the Fourdrinier wire a short distance ahead of the hole to be covered. The patch will then be in the relative position indicated in Fig. 7. These forward warp strand ends protruding from the underside of the Fourdrinier wire should be bent over in the opposite direction from the travel of the Fourdrinier wire to secure the forward end of the patch in place. The direction of travel is indicated by the arrows *x* in Figs. 9 and 10. This bending of the protruding ends ordinarily can easily be done by hand, or, if preferred, the Fourdrinier wire can be run slowly over the suction box which will produce the desired bending over of the protruding ends.

The patch is now tilted back until it lies flat on the top face of the Fourdrinier wire, and during this positioning of the patch the warp strand ends 13*a* at the rear end of the patch, which had been bent at right angles to the patch, are pushed through meshes of the Fourdrinier wire, and these ends are finally hooked over on the underside of the Fourdrinier wire also in the opposite direction from the travel of the Fourdrinier wire. This secures the rear end of the patch in place on the Fourdrinier wire. It will be obvious that if the warp strand ends were bent over in the opposite direction, viz. in the direction in which the Fourdrinier wire travels, the ends would engage the edges of the stuffing box and the patch would be pushed loose. All the warp strand ends bent over on the under side of the Fourdrinier wire should be smoothed down and this can be conveniently done if desired by running the patched Fourdrinier wire onto the suction box edge and pounding the end of the patch with a small wooden mallet.

It will now be apparent that a very few minutes will be required to attach the patch in place on the Fourdrinier wire and consequently, if the patching piece has been prepared in advance in anticipation of such emergency according to the manner which I have described, only a minimum amount of time is lost in making such repairs.

Although I developed my method of patching the Fourdrinier wire at first as only a temporary expediency with the idea of making a more or less temporary patch which would enable the Fourdrinier wire to continue in service for the time being and until more permanent repairing, such as "sewing" the wire, could be conveniently performed, for example, when the plant was shunt down on a Sunday, I found that a patch made and secured in place in accordance with my method lasted as long on the average and proved fully as satisfactory as the "sewed" patches and other more laborious methods of repairing worn holes in the Fourdrinier wire. Occasionally it happens that a hole in the Fourdrinier wire which has been patched once, will, if the patched wire continues in use for several weeks, wear larger until it extends beyond the patch border at one side. However, my method

of patching offers an additional advantage under such circumstances in that the patch can be removed from the Fourdrinier wire just as easily as it is applied and a larger patch then substituted in its place, this again requiring only a few minutes at most. For this reason it is desirable to have a supply of several patching pieces of different sizes made up in order that holes of different size can immediately be taken care of at any time.

It is of course possible to have patching pieces of different sizes specially woven for carrying out my method, thus with some of the "shute" wires omitted and also with the warp strands formed straight instead of kinked at the places where the "shute" wires are omitted. This would save the trouble of removing the "shute" wires from the patching piece and also the trouble of straightening out the warp strand ends projecting from the ends of the patching piece. Also the warp strand ends at both ends of the finished patching piece could be bent down at right angles to the piece and both groups inserted simultaneously through meshes in the Fourdrinier wire as the patch is applied. I prefer, however, to leave the warp ends at the forward end of the piece extending in the same plane and to attach the patching piece in the way previously described.

I claim:

The method of patching the Fourdrinier wire in a paper-making machine comprising cutting a piece of woven wire fabric of finer mesh than the Fourdrinier wire to proper size to extend over the portion of the Fourdrinier wire to be patched, removing several "shute" wires from opposite ends of said piece so as to leave the warp strand ends projecting from the ends of said piece, bending down the alternate projecting warp strand ends, cutting off said bent-down warp ends and turning their stubs back against the under side of the adjacent "shute" wire to prevent said stubs from extending from the top surface of the patch, straightening out the kinks in said remaining projecting warp ends to facilitate their insertion in the meshes of the Fourdrinier wire, bending down the warp strand ends extending from the rear end of said piece until they are approximately at right angles to said piece, inserting the warp strand ends at the forward end of said piece through meshes of the Fourdrinier wire slightly ahead of the place to be patched by holding said patching piece against the Fourdrinier wire while positioned perpendicularly and transversely thereon, securing the forward end of said patching piece in place on the Fourdrinier wire by bending said forward warp strand ends back against the under side of the Fourdrinier wire in the direction opposite to the direction of Fourdrinier wire travel, tilting said patching piece back down on the Fourdrinier wire and inserting the bent-down warp ends at the rear of said piece through the Fourdrinier wire until the patching piece lies flat against the top face of the Fourdrinier wire, and securing the rear end of said patching piece in place by bending said rear warp ends back on the under side of the Fourdrinier wire in the direction opposite to the direction of Fourdrinier wire travel.

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