July 27, 1937. H. G. SPECHT 2,088,448

WOVEN WIRE BELT FOR PAPER MAKING MACHINES

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Fig. 1.

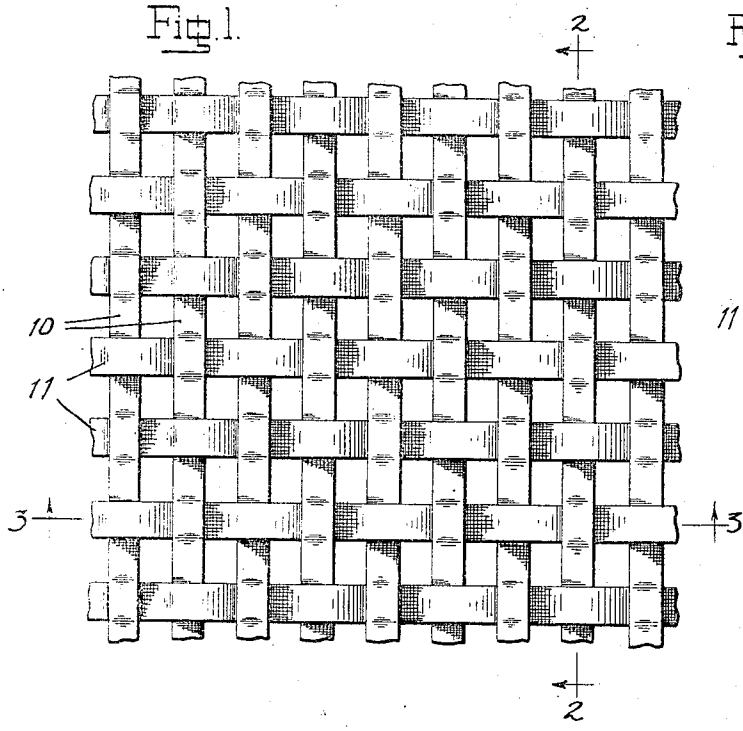


Fig. 2.

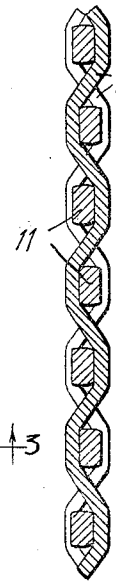
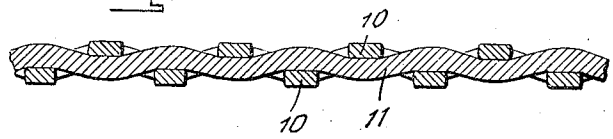


Fig. 4.



Fig. 3.



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Fig. 5.

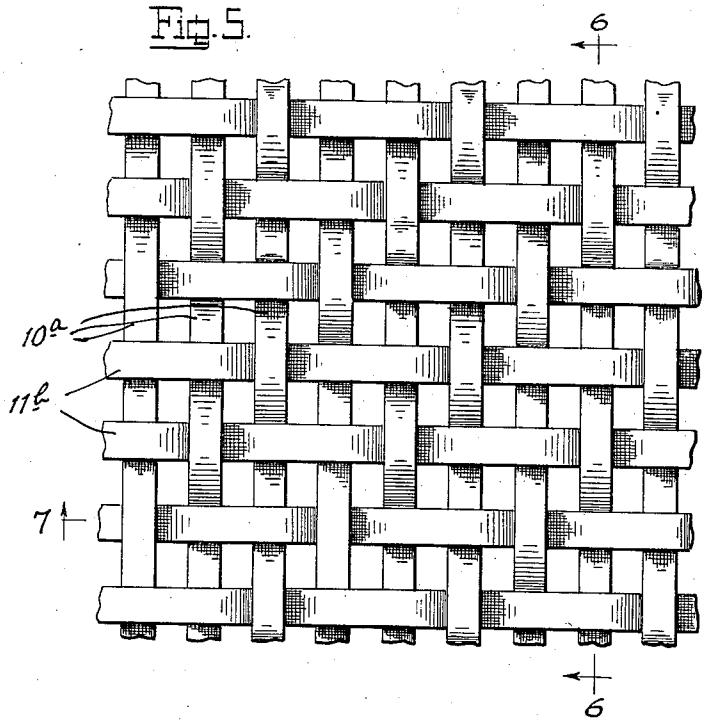


Fig. 6.

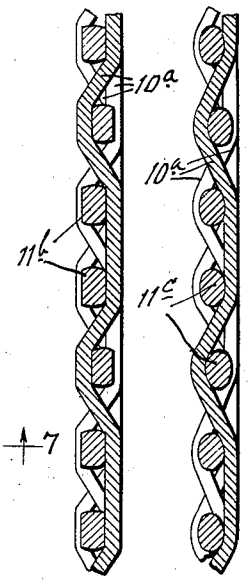
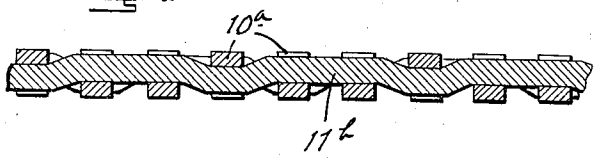


Fig. 8.

Fig. 7.



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WOVEN WIRE BELT FOR PAPER MAKING MACHINES

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Application March 23, 1936, Serial No. 70,528

9 Claims. (Cl. 245—8)

The present invention relates to woven wire belts particularly for paper making machines of the Fourdrinier type, and is an improvement over the woven wire belts disclosed in my U. S. Letters Patent Nos. 2,003,123 and 2,003,124 granted May 28, 1935. These belts, as is well known, are in the form of a continuous band of fine wire mesh which moves over spaced supporting rolls and in contact with suction boxes and rolls. According to the inventions disclosed in said patents greater strength and flexibility, as well as improved drainage characteristics and better paper formation surface, were obtained by providing the warp wires in the form of flat ribbon like wires which were interwoven with shoot or weft wires of circular cross-section, the knuckles of the weft wires being formed about the flattened surfaces of the warp wires. Also according to these inventions, a much finer beat up of the woven wire was permitted, with an increase in the flat knuckle surfaces of the warp wires whereby a greatly increased wearing surface was produced.

It is proposed in the present invention to provide shoot or weft wires which will permit of a flatter type of weave, that is, a decreased thickness dimension without sacrifice of strength, and in which the weft knuckles will provide larger surfaces contiguous to the paper formation side and wear side, so that the wire will have a better paper formation surface and a greatly increased wear surface. To this end it is proposed to provide shoot or weft wires of flat cross-section being either rectangular or oval.

The invention has application in both regular weave wires, and in twill weave wires in which the warp wires are carried under two and over one weft wire to provide longer knuckles and greater wearing surface at the under side. In the case of twill weave the relatively large paper formation and wear surfaces of the warp and weft wires will make for a much finer paper formation surface, as distinguished from the usual type of twill weave in which the paper formation surface had long deep depressions due to the spacing of the warp knuckles to every third weft wire instead of to every second weft wire as in the regular weave. By increasing the length of the weft knuckles, and at the same time obtaining a finer beat up due to the ribbon like warp wires, the depressions are not only decreased in size, but the walls of the mesh openings have less convergence and therefore will provide better support for the paper fibres with less tendency for the fibres to turn down into the mesh openings.

According to my invention there will be an increase in the weft knuckle surfaces both in the direction of the weft and in the direction of the warp wires, the increase in the direction of the weft wires being due to the formation of the weft knuckles over the flat warp wires, and the increase in the direction of warp being due to the increased dimension of the flat weft wires in the direction of the warp, as distinguished from the circular cross-section weft wires heretofore employed.

With the above and other objects in view embodiments of the invention are shown in the accompanying drawings, and these embodiments will be hereinafter more fully described with reference thereto, and the invention will be finally pointed out in the claims.

In the drawings:

Fig. 1 is an enlarged plan view of a portion of a regular weave wire belt, according to one illustrated exemplary embodiment of my invention, in which the weft wires are of flat rectangular cross-section.

Fig. 2 is a longitudinal sectional view, taken along the line 2—2 of Fig. 1.

Fig. 3 is a transverse sectional view, taken along the line 3—3 of Fig. 1.

Fig. 4 is a longitudinal sectional view of the modified form in which the weft wires are of flat oval cross-section.

Fig. 5 is an enlarged plan view of a portion of a twill weave wire belt, according to another illustrated exemplary embodiment of my invention, in which the weft wires are of flat rectangular cross-section.

Fig. 6 is a longitudinal sectional view taken along the line 6—6 of Fig. 4.

Fig. 7 is a transverse sectional view, taken along the line 7—7 of Fig. 4.

Fig. 8 is a longitudinal sectional view of a modified form of twill weave wire, in which the weft wires are of flat oval cross-section.

Similar reference characters indicate corresponding parts throughout the several figures of the drawings.

Referring to Figs. 1 to 3 of the drawings, the Fourdrinier wire, according to the exemplary embodiment shown therein, comprises warp wires 10 of flat ribbon-like form, and weft wires 11 of flat rectangular cross-section, and replacing the usual circular cross-section weft wires. The upwardly crimped knuckles of both the warp and weft wires provide the upper paper formation

surface, and the downwardly bent knuckles provide the lower wearing surface. The warp wire is preferably a rolled or drawn bronze wire which is annealed before weaving, and the weft wires are preferably bronze.

In the proper weaving of the wire the warp should control or predominate the weft. The stronger warp wires permit of beating the weft wires up to a finer mesh, the flattened warp wires being highly flexible and directly taking the punishment and strain necessary in this operation. The weft wires, which are shaped by and follow the action of the warp wires, only indirectly take the strain imposed by the beating up operation, and should not be such as to overcome the predominance or control of the warp wires. Where both the warp and weft are of the same material, this control is lost to a certain extent as neither the warp nor the weft will predominate over the other. Other material than bronze and brass may be used for the warp and weft, as for instance stainless steel for the warp and bronze or brass for the weft.

The dimensions of the warp wires are proportioned with respect to the weft wire dimensions, the width being such as to provide a relatively wide paper formation and wear surface and the thickness being such as to permit a fine beat up of the weft, and at the same time allow the knuckles of the weft, with a lesser deformation in the crimping of the weft than in the warp, to come into or very close to the plane of the warp knuckles. For instance with .009 of an inch thickness weft wires the width of the warp wires may be .012 of an inch and the thickness .004 of an inch. The relative thinness of the flat warp wires, it will be seen, allows beating up a large number of weft wires per inch, while their relative wideness gives an area equivalent to or greater than that of the largest round warp wire permissible. The edges of the warp wires are preferably slightly rounded to allow free drainage through the mesh openings.

The cross-sectional width dimension of the weft wires 11 is substantially greater than the thickness dimension, so that the warp knuckles will have relatively long flat surfaces in the upper and lower surface planes of the woven wire, thus producing a relatively flatter type of weave in which the paper formation and wear surfaces of the warp wires are increased from line contact surfaces, as is the case when the knuckles are formed over single circular cross-section weft wires, to surface contact areas substantially corresponding in length to the width dimension of the weft wires. This is of particular advantage at the beginning of the use of the wire as wide contact areas are present both before the knuckles are worn down and after wearing down, so that an approximately uniform wear surface is maintained throughout the life of the wire.

The knuckles of the weft wires are increased in the weft direction by being formed over the flat warp wires and are increased in the warp direction by their relatively greater width dimension. The two directional flat knuckles of the warp as well as the two directional flat knuckles of the weft produce a paper formation surface in which the fibres will be supported by flat contact, as distinguished from the point contact with wires having circular cross-section warp and weft wires. At the same time the fine beat up of the weft provides a smooth surface which will support the paper stock without the usual tendency to turn down into the mesh and clog it. Without sacrificing this support the mesh openings may be of adequate size to provide full drainage.

The flat warp wires while providing a much greater tensile strength are at the same time more flexible than circular cross-section warp wires, and this in addition to the long knuckles formed over the flat weft wires enables the woven wire to be operated at high speed over rolls for a considerably greater time than heretofore before fatigue sets in.

In Fig. 4 I have shown the weft wires 11a of flat oval cross-section, the thickness and width dimensions being approximately the same as the flat rectangular weft wires 11.

In the modification shown in Figs. 5 to 7 the Fourdrinier wire is a twill weave, the warp wires 10a being woven under two pairs and over one pair of the flat rectangular weft wires 11b, thus providing very long knuckles on the wear side. In Fig. 8 I have illustrated the twill weave having flat oval cross-section weft wires 11c.

I have illustrated and described a preferred and satisfactory embodiment of my invention, but it will be obvious that changes may be made therein, within the spirit and scope thereof, as defined in the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. Woven wire fabric for paper making machines comprising interwoven fine gauge warp and weft wires with knuckles produced in both the warp and weft wires, the warp wires throughout their length being of uniform non-circular cross-section elongated in one dimension, said elongated dimension being parallel to the plane of the woven wire fabric whereby the weft knuckles cross the elongated faces of the warp wires and have their outer projected surfaces substantially co-extensive transversely with said elongated faces to produce substantially flat paper stock supporting surface areas having flatness in both the length and breadth dimensions of the wire, the weft wires throughout their length being of uniform non-circular cross-section elongated in one dimension, said elongated dimension being parallel to the plane of the woven wire fabric whereby the warp knuckles cross the elongated faces of the weft wires and have their outer projecting surfaces substantially co-extensive transversely with said elongated faces of the weft wires to produce substantially flat paper stock supporting surface areas having flatness in both the length and breadth dimensions of the wire.

2. Woven wire fabric for paper making machines comprising interwoven fine gauge warp and weft wires with knuckles produced in both the warp and weft wires, the warp wires throughout their length being of uniform non-circular cross-section elongated in one dimension, said elongated dimension being parallel to the plane of the woven wire fabric whereby the weft knuckles cross the elongated faces of the warp wires and have their outer projected surfaces substantially co-extensive transversely with said elongated faces to produce substantially flat paper stock supporting surface areas having flatness in both the length and breadth dimensions of the wire, the weft wires throughout their length being of uniform rectangular cross-section elongated in one dimension, said elongated dimension being parallel to the plane of the woven wire fabric whereby the warp knuckles

cross the elongated faces of the weft wires and have their outer projecting surfaces substantially co-extensive transversely with said elongated faces of the weft wires to produce substantially flat paper stock supporting surface areas having flatness in both the length and breadth dimensions of the wire.

3. Woven wire fabric for paper making machines comprising interwoven fine gauge warp and weft wires with knuckles produced in both the warp and weft wires, the warp wires throughout their length being of uniform non-circular cross-section elongated in one dimension, said elongated dimension being parallel to the plane of the woven wire fabric whereby the weft knuckles cross the elongated faces of the warp wires and have their outer projected surfaces substantially co-extensive transversely with said elongated faces to produce substantially flat paper stock supporting surface areas having flatness in both the length and breadth dimensions of the wire, the weft wires throughout their length being of uniform oval cross-section elongated in one dimension, said elongated dimension being parallel to the plane of the woven wire fabric whereby the warp knuckles cross the elongated faces of the weft wires and have their outer projecting surfaces substantially co-extensive transversely with said elongated faces of the weft wires to produce substantially flat paper stock supporting surface areas having flatness in both the length and breadth dimensions of the wire.

4. Woven wire fabric for paper making machines comprising interwoven warp and weft wires with knuckles produced in both the warp and weft wires, the warp wires being carried over one and under a plurality of weft wires, the warp wires throughout their length being of non-circular cross-section elongated in one dimension, said elongated dimension being parallel to the plane of the woven wire fabric whereby the weft knuckles cross the elongated faces of the warp wires and have their outer projected surfaces substantially co-extensive transversely with said elongated faces, the weft wires throughout their length being of non-circular cross-section elongated in one dimension, said elongated dimension being parallel to the plane of the woven wire fabric whereby the warp knuckles cross the elongated faces of the weft wires and have their outer projecting surfaces substantially co-extensive transversely with said elongated faces of the weft wires.

5. Woven wire fabric for paper making machines comprising interwoven warp and weft wires with knuckles produced in both the warp and weft wires, the warp wires being carried over one and under a plurality of weft wires, the warp wires throughout their length being of non-circular cross-section elongated in one dimension, said elongated dimension being parallel to the plane of the woven wire fabric whereby the weft knuckles cross the elongated faces of the warp wires and have their outer projected surfaces substantially co-extensive transversely with said elongated faces, the weft wires throughout their length being of rectangular cross-section elongated in one dimension, said elongated dimension being parallel to the plane of the woven wire fabric whereby the warp knuckles cross the elongated faces of the weft wires and have their outer projecting surfaces substantially co-extensive transversely with said elongated faces of the weft wires.

6. Woven wire fabric for paper making machines comprising interwoven warp and weft wires with knuckles produced in both the warp and weft wires, the warp wires being carried over one and under a plurality of weft wires, the warp wires throughout their length being of non-circular cross-section elongated in one dimension, said elongated dimension being parallel to the plane of the woven wire fabric whereby the weft knuckles cross the elongated faces of the warp wires and have their outer projected surfaces substantially co-extensive transversely with said elongated faces, the weft wires throughout their length being of oval cross-section elongated in one dimension, said elongated dimension being parallel to the plane of the woven wire fabric whereby the warp knuckles cross the elongated faces of the weft wires and have their outer projecting surfaces substantially co-extensive transversely with said elongated faces of the weft wires.

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