

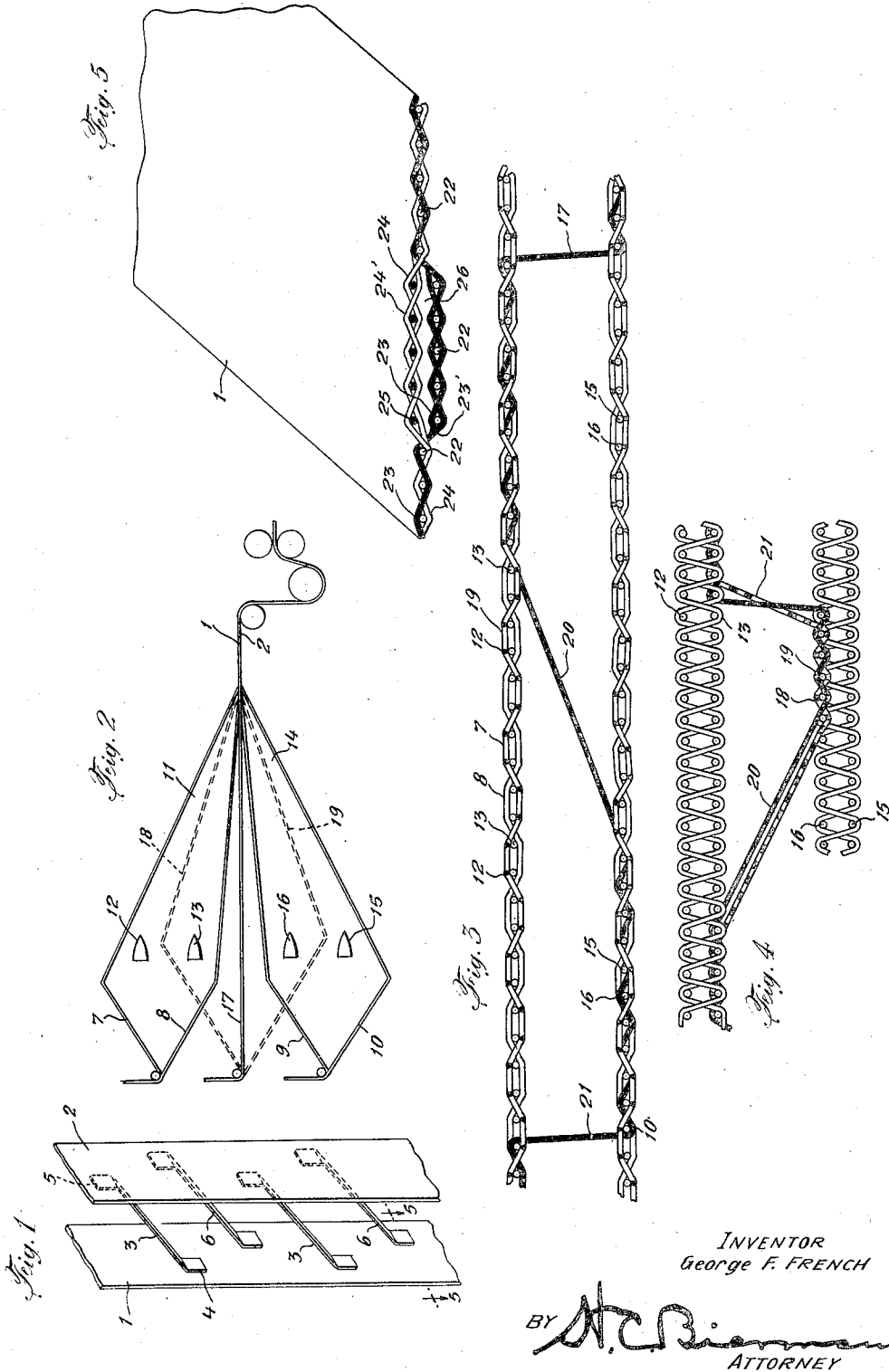
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LADDER WEB WITH DOUBLE WEFT

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LADDER WEB WITH DOUBLE WEFT

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The present invention is directed to Venetian blind ladder web and the like, more particularly to an improved structure thereof.

Such webbing usually comprises two outer webs or bands (hereinafter called bandings) and a series of cross-straps between the said bandings, the cross-straps being in two rows, and those in one row lying in staggered relationship, to those in the other row. The cross-straps consist of warp and weft (or warp only), and are united with the outer bandings by being bound into the same by means of the banding weft. Each outer banding consists of warp and weft, with a single weft thread in each warp shed, and in binding-in the cross-strap warps, all such warps interweave with the banding weft and come through on the outer faces of the bandings, which is considered objectionable, especially if of different colour, as is sometimes the case.

Usually a single set of warp threads were used to form the cross-straps in one row. In the improved webbing forming the subject of my Patent No. 2,141,038 and co-pending applications Serial Nos. 203,584 and 272,763, a series of separate sets of cross-strap warp threads, or lengths of cord, braid or the like, are employed to form each row, single or composite.

In order to overcome such disadvantages, it is among the objects of this invention to effect the bindings-in of the cross-strap warps, or lengths of cord or braid or the like (whether in single or multiple sets) in a manner such that the bindings in will not show through the bandings or, if they show through, will harmonize in colour with the bandings.

It is a further object of the invention to produce the webbing at less cost and (or) at a quicker rate than the known webbing, also to simplify the weaving operations, with the advantages of smoother working of the cross-strap-warp dobby mechanism, with fewer changes (if desired) of the weft pins of shuttles, and also avoidance of waster of time on the part of the weaver in detecting and dealing with any faults in the webbing during the weaving operations.

In the practice of the invention, the outer bandings are each woven with two wefts in each warp shed, by means of two shuttles for each banding, four in all for one loom slot and arranged one over another in a single tier, each shuttle preferably moving in one direction, whilst its companion shuttle moves in the opposite direction, thereby giving a single weft pull on each selvage, with a resultant more uniform edge, and

ensuring that the two weft threads lie side-by-side without twisting.

To suit the laying of such additional weft, the "take-up" motion of the loom is accelerated, thus expediting production, increasing the loom output, and reducing cost. In effecting the bindings-in of the cross-strap warps, the dobby-lifting gear for the cross-strap warps, or other strap-forming elements, is regulated to cause them to have a shedding movement only slightly higher than the path of the upper inner shuttle when binding in the straps or elements to the other banding. In this way, the strap warps engage only one weft of each pair of wefts in each banding shed and with the other weft lying over or below its companion weft, the bindings-in of the strap warps or elements are concealed from view on the outer faces of the bandings. In the case of cross-straps composed of warp and weft, a further pair of shuttles will be provided for weaving the straps, one shuttle for each row of straps, 6 in all. Whilst the cross-strap warps are being bound in, the corresponding weft will be left free to float, or will also be woven with the said inner weft threads on the inside of the banding.

With the dobby-lifting gear having a smaller movement for the binding-in of the weftless cross-strap warps, or elements, such gear has a smoother and quieter action than when it has to move the strap warps or elements through the same distance as the banding warps, which contributes to an increase in loom speed.

In the case of bandings of two different colours, one half-portion of the cross-strap warps or elements will correspond in colour with that of one banding, and the other half-portion will correspond in colour with that of the other banding. Usually the strap warps or elements will be divided equally into the two separate colours, each alternate strap-warp thread or element being one colour, and each intermediate strap-warp thread or element being the other colour. In binding them in, the strap warp threads of one colour will engage with the weft of the same colour of banding, whilst the other strap warps will only be superimposed upon and bound to the inner face of the same banding, and thus not show through, the binding-in being effected by the weft of the banding, or by the weft of the cross-strap when warp and weft straps are formed, as for instance by the strengthening ribs of my Patent No. 2,156,151.

In a further example of the invention using four shuttles, two for each banding, each binding-in may take the form of a tubular weave, and in

such case four lifting shafts will be used for each strap binding-in. Two shafts will control the top portion of the tubular weave, and two the bottom portion of the tubular weave, and the colours of the outer portions of the tubular weave will match those of the bandings, thus giving a speckless outer surface to the bandings. With one weft thread laid in one portion of each tubular part, and one weft thread laid in the other portion in succession, like advantages in regard to speed of "take-up" or production, to those of the first example are obtainable.

In the accompanying drawing, constituting a part hereof, and in which like reference characters indicate like parts:

Fig. 1 is a view of a piece of ladder webbing included in the present invention;

Fig. 2 is a diagrammatic view showing the manner in which the various sets of threads are interwoven to give the present product;

Fig. 3 is a longitudinal cross-sectional view of a piece of ladder web illustrating the nature of the present invention; some threads being differently shown for clearness;

Fig. 4 is an enlarged view similar to Fig. 3, showing diagrammatically the relative arrangement of the threads; and

Fig. 5 is a transverse cross-sectional view taken along the line 5—5 of Fig. 1 showing a tubular binding-in of cross-straps and outer bands, some threads being differently shown for clearness.

The ladder webbing consists of an outer band 1 and an oppositely placed outer band 2 with a series of cross-straps 3 between the same, bound in on band 1 in the area 4 and bound in on band 2 in the area 5. A similar set of cross-straps 6 along the opposite sides of the outer bands and staggered with respect to cross-straps 3 are provided.

The warp threads constituting the outer band 1 are in two lots 7 and 8 and the warp threads constituting outer band 2 are also in two lots 9 and 10. Warp threads 7 and 8 are manipulated in the loom so as to form a shed 11 within which are shuttles 12 and 13 adapted to introduce two weft threads into each shed, preferably by moving in opposite directions. The warp threads 9 and 10 of outer band 2 form a shed 14 within which shuttles 15 and 16 operate similarly. Cross-strap warp threads 17 are adapted to form a series of cross-straps 3. In operation, in order to form a binding on band 1, said threads 17 are brought up by a loom mechanism, as shown at 18, to a point intermediate the shuttles 12 and 13 whereby only the weft thread corresponding to shuttle 13 will cause a binding-in of the threads 17. Similarly, when it is desired to bind in the warp threads 17 into the band 2, they are moved into position as shown at 19 between shuttles 15 and 16, and thereby are bound into the band 2 only by the thread corresponding to shuttle 16.

Beginning at the right of Fig. 3, the threads 17 are held by weft thread 13, but weft thread 12 in the same shed overlays threads 17, thus concealing the same from the outside of the outer band. This is repeated for the proper number of picks with the wefts 13 accomplishing the binding-in. Threads 17 then form cross-strap 20 and pass into the opposite outer band where they are now bound in by weft threads 16, while weft threads 15 overlay threads 17. The cross-strap threads then pass over to form the cross-over 21 and are again bound into the first outer band, and so on.

Fig. 4 shows the same construction but the

two weft threads 12—13 and 15—16 in each shed on bands 1 and 2, respectively, are shown in superposed position to more clearly indicate the structure. In actual practice, these weft threads are in alinement as shown in Fig. 3. The warp threads of the cross-straps are in two lots 18 and 19. They are bound into band 1 by weft threads 13 and into band 2 by weft threads 16.

In the modification shown in Fig. 5, each shed of the outer bands has a pair of weft threads 23—24 interwoven with band warp threads 22. At the binding-in area the cross-strap warp threads 25 are interlaced with a thread 24 from one shed and a corresponding thread 24' from the adjacent shed. The other thread 23 with a corresponding thread 23' from the adjacent shed interlace with band warp threads 22'. After the binding-in is accomplished the weft threads 23—24, 23'—24', etc., are woven with the remaining band warp threads 22. This provides a tubular portion 26 at the binding-in area.

To further expedite and cheapen production, there will preferably be one length only of webbing produced in each loom slot, thus giving the weaver a better chance of quickly detecting and repairing any fault, and further, allowing of less skilled labour (for example women instead of men) being employed for controlling the weaving operations. Further, with the strap-warps having only a relatively small lift, and there being a greater clearance between the shuttles, the weft cops of the shuttles may be of larger diameter, and thus allow of fewer shuttle-replenishing stoppages.

The invention is applicable to the ordinary make of webbing, i. e. with two rows of cross-straps and those in one row lying in staggered relationship to those in the other row, and also to webbing with the cross-straps composed of a series of sets of warp threads, or elements, either in two separate rows, or in a single composite row, the short cross-over portion of one set of warps or elements, in the latter case, passing through or across the cross-strap formed by another set. In such connection the improved weave allows of considerable advantages in regard to strength of binding-in, rate of production, and economy of materials, besides also the elimination of the said blemishes in the outer faces of the bindings. Whilst chiefly applicable to Venetian blind ladder webbing, the invention may also be applied in the production of webbing as used for holding pieces of cork or the like in sun helmets.

What I claim is:

1. Ladder web comprising two woven outer bands formed of warp and weft threads, said bands having warp sheds each of which contains a pair of band weft threads, a series of cross-straps having at least warp threads located between said outer bands, said cross-straps being bound alternately into said outer bands at spaced intervals over substantial areas by band weft threads, there being at least two weft threads in each shed of each outer band in all of the area wherein the cross-strap warp threads are interwoven with outer band weft threads, each of said cross-strap warp threads being bound into said areas by only one of each pair of said band weft threads, the other of each said pair overlying said cross-strap warp threads and tending to conceal said warp threads when viewed from the outside of said bands.

2. Ladder web comprising two woven outer bands formed of warp and weft threads, said bands having warp sheds each of which contains

a pair of band weft threads, a series of cross-
straps having at least warp threads located be-
tween said outer bands, said cross-straps being
bound alternately into said outer bands at spaced
intervals, over substantial areas by band weft
threads, there being at least two weft threads in
each shed of each outer band in all of the area
wherein the cross-strap warp threads are inter-
woven with outer band weft threads, at least a
portion of said cross-strap warp threads being
bound into said areas by only one of each pair
of said band weft threads, the other of each said
pair overlying said cross-strap warp threads and
tending to conceal said warp threads when
viewed from the outside of said bands.

3. Ladder web comprising two woven outer
bands formed of warp and weft threads, said
bands having warp sheds each of which contains
a pair of band weft threads, a series of cross-
straps having at least warp threads located be-
tween said outer bands, said cross-straps being
bound alternately into said outer bands at spaced
intervals over substantial areas by band weft
threads, there being at least two weft threads
in each shed of each outer band in all of the area
wherein the cross-strap warp threads are inter-
woven with outer band weft threads, at least a
portion of said cross-strap warp threads being
bound into the inner face only of each of said
areas by only one of each pair of said band weft
threads, the other of each said pair overlying said
cross-strap warp threads and tending to conceal
said warp threads when viewed from the outside
of said bands.

4. Ladder web comprising two woven outer
bands formed of warp and weft threads, said
bands having warp sheds each of which con-
tains a pair of band weft threads, a series of
cross-straps having at least warp threads located

between said outer bands, said cross-straps being
bound alternately into said outer bands at spaced
intervals over substantial areas by band weft
threads, there being at least two weft threads in
each shed of each outer band in all of the area
wherein the cross-strap warp threads are inter-
woven with outer band weft threads, at least a
portion of said cross-strap warp threads being
bound into said areas by only one of each pair of
said band weft threads, the other of each said
pair overlying said cross-strap warp threads and
tending to conceal said warp threads when
viewed from the outside of said bands, the bind-
ing-in area being of tubular weave.

5. Ladder web comprising two woven outer
bands formed of warp and weft threads, said
bands having warp sheds each of which contains
a pair of band weft threads, a series of cross-
straps having at least warp threads located be-
tween said outer bands, said cross-straps being
bound alternately into said outer bands at spaced
intervals over substantial areas by band weft
threads, there being at least two weft threads in
each shed of each outer band in all of the area
wherein the cross-strap warp threads are inter-
woven with outer band weft threads, at least a
portion of said cross-strap warp threads being
bound into said areas by only one of each pair
of said band weft threads, the other of each said
pair overlying said cross-strap warp threads and
tending to conceal said warp threads when
viewed from the outside of said bands, the bind-
ing-in area being of tubular weave wherein the
cross-strap warp threads are interwoven with two
band warp threads, the latter consisting of one
thread from each of two adjacent band warp
sheds.

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