W. F. GRUPE.

METHOD OF HEDDLING AND WARPING.

APPLICATION FILED FEB. 15, 1918.

1,395,818. Patented Nov. 1, 1921.

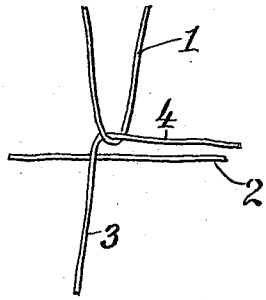


Fig. 1

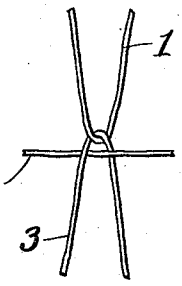


Fig. 2

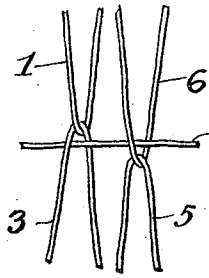


Fig. 3

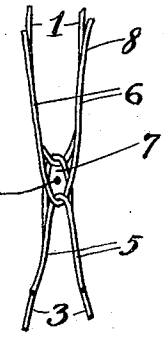


Fig. 4

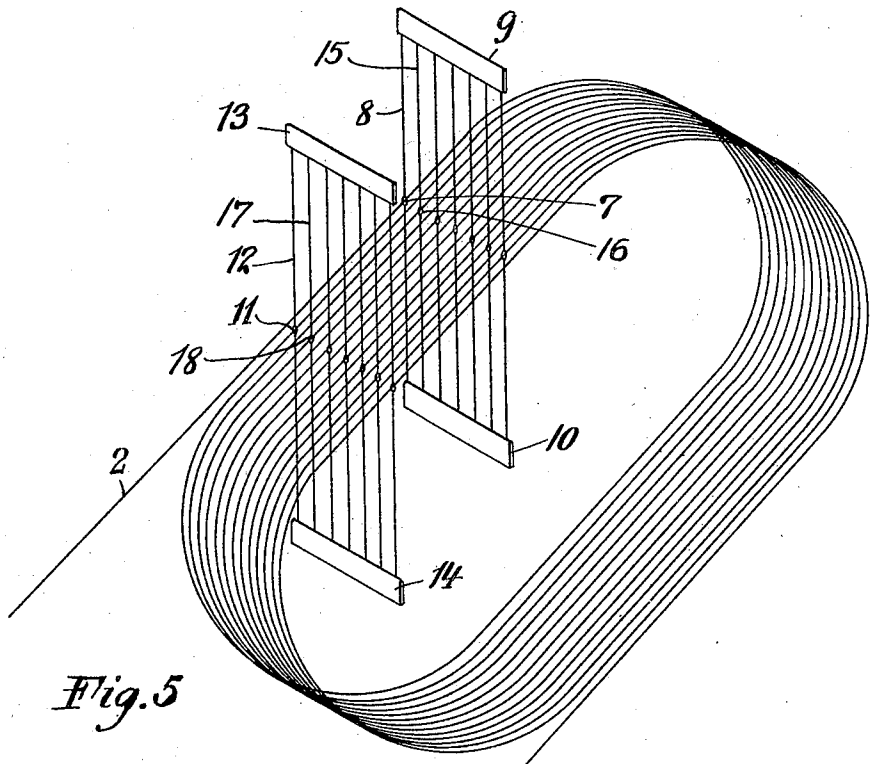


Fig. 5

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METHOD OF HEDDLING AND WARPING.

1,395,818. Specification of Letters Patent. Patented Nov. 1, 1921.

Application filed February 15, 1918. Serial No. 217,331.

To all whom it may concern:

Be it known that I, WILLIAM F. GRUPE, a citizen of the United States of America, residing at Hudson Boulevard, North Bergen, county of Hudson, State of New Jersey, have invented certain new and useful Improvements in Methods of Heddling and Warping, of which the following is a specification.

This invention relates to the method of heddling and warping.

More particularly, the invention relates to the method of forming heddles and warping the warp threads therein by warping in the warp threads of the eyes of the proper heddles while forming the respective heddles. In such method of concurrently or substantially simultaneously forming the heddles and warping in the warp threads, the formed heddles having the warp threads positioned in the eyes thereof are properly distributed, for the purpose of properly suspending the resulting sets of heddles from the desired number of shafts, in accordance with the design of the weave.

In carrying out the most preferred form of my invention, an initial portion of the firstly formed heddle is positioned, thereafter the warp thread positioned in operative relation thereto and the remaining portion or portions of such firstly formed heddle are positioned to complete the heddle while inclosing the warp in the eye portion of the heddle.

The invention is applicable to various forms of woven fabric. In the particular use of the invention for weaving endlessly woven belts for conveying the cigarette making materials in a cigarette making machine, the respective steps referred to more particularly hereinafter correspond generally to the broad invention applicable to woven fabrics.

In my pending applications, Serial No. 137,949, filed December 20, 1916, and Serial No. 213,627, filed January 25, 1918, I have set forth several forms of woven fabric such as endlessly woven cigarette conveyer bands, in the making of which the present invention is applicable.

Further features and objects of the invention will be more fully understood from the following description and the accompanying drawings, in which Figure 1 indicates diagrammatically a preliminary stage of my method; Fig. 2 indicates diagrammatically a succeeding stage; Fig. 3 indicates diagrammatically a further succeeding stage; Fig. 4 indicates diagrammatically an intermediate final stage of one step; and Fig. 5 indicates diagrammatically a subsequent final stage of the invention.

In the drawings, I have indicated diagrammatically the application of my invention to the weaving of an endlessly woven conveyer belt by means of a heddle comprising a plurality of loop elements. It will be understood, however, that the invention is applicable broadly to the making or forming of other types of heddles and to woven fabrics other than cigarette conveyer belts.

Referring to the specific figures of the drawings, the loop element 1 is formed of a cord of suitable material, as understood by the art. The warp thread or "end" 2 is positioned relatively to the loop element 1 and the complementary loop element 3, whereby the end 2 is inclosed within the loop 3, as by drawing the end 4 of loop 3 through the loop of loop element 1 and over the warp thread or end 2. The resulting position of the aforesaid parts are indicated in Fig. 2.

The heddle is completed by forming the loop element 5, similar to loop element 1 and loop element 6 similar to the loop element 3. The aforesaid four loop elements are arranged and suspended to effect the formation of the "eye" 7 determined in contour by the aforesaid four loop elements.

The terminals of the respective loop elements 1, 6, 3 and 5 are attached to its upper shaft 9 and lower shaft 10 of the weaving apparatus in accordance with approved practice.

The warp thread or end 2 is positioned within the eye 11 of the heddle 12 similar to the aforesaid steps of forming the aforesaid heddle 8. The resulting heddle 12 having the warp end 2 positioned in its eye 11 thereof, is similarly suspended on another harness, such as the harness having the indicated upper shaft 13 and lower shaft 14.

In the various forms and types of weaving, at least two harnesses are required, and the invention is exemplified in the other stages thereof by reference to two harnesses, as indicated in Fig. 5.

The heddle 15 having the warp end 2 positioned through its eye 16 is formed simi-

larly to the aforesaid steps forming the aforesaid heddles 8, 12, the said heddle 15 being properly distributed by suspension from the shafts 9, 10.

Thus, in a similar manner, the heddle 17 is formed while the end or thread 2 is concomitantly positioned within the eye 18, and the heddle 17 properly distributed among the required harnesses as by suspension from the shafts 13, 14.

The aforesaid steps of concomitantly forming heddles and positioning the warp end or thread in the respective eyes thereof and properly distributing the resultant warped-in heddles are repeated until the required number of harnesses having the required number of heddles are formed and distributed. It will be noted that in the forming of the later heddles and wraping therein, the warp threads have been previously positioned during the stage of forming the prior heddle or heddles, and accordingly such warp thread or threads will have been positioned prior to positioning the initial portions of the respective later heddles.

The steps of attaching or otherwise suspending the respective resulting heddles to their proper shafts may be performed progressively and succeeding the completion of the individual heddles or subsequent to the completion of the total required number of heddles, as may be determined under particular circumstances of use.

As indicated, the invention is preferably carried out by the employment of a continuous warp thread or end extending in series or in sequence through the eyes of the respective heddles of the respective harnesses.

In the event of the employment of four or a greater number of harnesses, the respective heddles are formed simultaneously with warping-in of the warp thread or end and the resultant heddles distributed on the respective harnesses in accordance with the "design" of weave desired to be effected in the resultant woven fabric.

It will be apparent that the various steps ensuing during the successive stages of forming portions of the respective heddles and positioning the warp threads in the eye portions of the respective heddles while completing the heddles, may be carried out manually or mechanically, in whole or in part. It will further be clear that the positions at which the respective heddles are formed may be at a common position for all heddles or at spaced positions corresponding generally to the number of harnesses desired to be employed.

In the employment of the present invention in the making of endlessly woven conveyer belts or other woven fabric such as disclosed in my aforesaid pending applications Serial No. 137,949 and No. 213,627, the terminals of the warp thread or "end" may be secured by weaving the same as a weft at an appropriate weft or "pick" of the woven fabric.

The invention is practised in a similar manner in the making and forming of heddles while simultaneously positioning the warp end or thread through the proper eyes thereof for heddles formed of round or flat wire or other material suitable for the purpose, and the respective heddles are distributed by locating the same in the proper relation on the required harnesses in accordance with the desired design of weave.

Whereas I have described my invention by reference to specific forms thereof, it will be understood that many changes and modifications may be made without departing from the spirit of the invention as defined by the appended claims.

I claim:

1. The method of heddling and warping in, comprising positioning a warp thread and forming an initial portion of a heddle, and thereafter adding the remaining portion or portions of the heddle while inclosing the positioned warp thread in the eye of the resulting heddle.

2. The method of heddling and warping in, comprising positioning the warp threads, forming an initial portion of a heddle, completing such heddle while inclosing a warp thread in the eye thereof and forming an initial portion of another heddle and completing such another heddle while inclosing another warp thread in the eye of such another heddle.

3. The method of heddling and warping in, which comprises placing in position an initial element of the heddle, thereafter placing a warp thread adjacent said heddle element, thereafter placing another element of the heddle adjacent said warp thread and forming the eye of the heddle to inclose said warp thread.

4. The method of heddling and warping in which comprises placing in position an initial element of the heddle, placing thereafter a warp thread adjacent said heddle element, placing another element thereafter of the heddle adjacent said warp thread and forming the eye of the heddle to inclose said warp thread.

5. The method of heddling and warping in which comprises placing in position an initial element of the heddle, placing a warp thread adjacent said heddle element, thereafter placing another element of the heddle adjacent said warp thread and on a side opposite said initial first-named element forming the eye of the heddle while inclosing the warp thread in the heddle eye.

6. The method of heddling and warping in, which comprises placing in position an initial element of the heddle, placing a warp thread adjacent the said heddle element,

thereafter placing another element of the heddle adjacent said warp thread and on a side opposite said initial first-named heddle element, forming the eye of the heddle while concomitantly inclosing the warp thread in the heddle eye.

7. The method of heddling and warping in, which comprises placing in position an initial element of a heddle, placing a warp thread adjacent the eye portion of said heddle element and thereafter completing the eye of the heddle element to inclose the warp thread, duplicating the aforesaid steps to form the heddles while concomitantly positioning a warp thread in the respective heddle eyes thereof and distributing the formed heddles on suitable harnesses in accordance with the design of the fabric to be woven.

In testimony whereof I have signed this specification this 8th day of February, 1918.

WILLIAM F. GRUPE.