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METHOD OF WEAVING

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The present invention relates to a method for use in weaving.

Weaving in general is often made difficult by the fact that the fabric will have a tendency to shrink in the direction of the weft, particularly along the edges of the woven fabric, so that the width of the finished goods will be less than the width of the warp in the reed. The reason is that the weft thread is introduced in the shed in stretched or almost stretched condition and therefore can bend around the warp threads only by a reduction in the width of the fabric. This difficulty has to some extent been overcome by attempts made to keep the weft threads stretched also in the fabric and to force the warp threads to bend around the weft. This has been done, for instance, by employing at both sides of the fabric one or more stretchers according to the quality of the goods, but these stretchers are cumbersome in use and may spoil the fabric by spreading the warp threads excessively in places so that the woven fabric will show holes or irregularities. Besides, such stretchers are not sufficiently effective in the case of goods in which considerable warp tension is required. Also in these cases difficulties have in respect of certain fabrics been overcome by the use of inelastic weft threads of, for instance, jute, flax or heavily sized threads resisting bending. Such weft threads will, however, in many cases depreciate the quality of the goods.

Shrinking in the direction of the weft may also be avoided if the weft thread is entered in the shed with so much excess length distributed over its entire width that the length of thread will be just sufficient to allow the weft to bend around the taut warp threads.

This method has been used, for instance, in the case of certain handwoven fabrics, when the weft thread is laid in large or small loops in the shed before being woven in. In the case of power looms this will, however, be a very difficult process requiring much time and reducing the output considerably. It will likewise be difficult to obtain a regular distribution of the lengths of thread, so that in many cases loose and firm parts will alternate in the fabric.

These difficulties are obviated by the present invention which relates to the use of a weft thread the excess length of which has been produced beforehand.

The characteristic feature of the invention consists in the use as a weft thread of stretchable yarns introduced in the shed unstretched and then stretched during or after, and preferably immediately after the weaving in of the weft into the fabric.

According to the invention the stretchable weft thread used may be threads bent together or coiled in stretchable bundles, spirals, loops or the like shapes, and which in such shape are so fixed that they may be introduced in the shed without being stretched materially and then be stretched after introduction in the shed. One-ply or multi-ply, spun or unspun yarns may be used as weft threads.

According to the invention weft threads may be fixed in unstretched condition by being twisted together with one

or more, preferably thin, binder threads. If, for instance, two binder threads are used, one may be twisted clockwise and the other anti-clockwise on the weft so that one binder thread will hold the other. The binder threads should preferably be placed tightly around the weft so as to keep it in the shapes mentioned. According to the invention fragile, to some extent inelastic binder threads may be used. Such threads which possess considerably less breaking strength than the actual weft thread will relatively easily be broken during the weaving, as described in more detail in the following. By the breaking of the binder thread the fixing of the weft thread will be released so that the weft thread may be extended to its full length. According to the invention it may as an alternative be expedient to use binder threads having only slight or practically no elastic elongation and thereafter a greater inelastic elongation. Also such binder threads will release the fixing of the weft by their great inelastic elongation. By way of an example may be mentioned cellulose acetate threads which like certain other threads possess the property that when exposed to tension they first give slight elastic elongation but thereafter a greater inelastic elongation. Threads of this kind are especially suitable for the present purpose.

According to the invention the weft threads may also be fixed by being twined with binder threads of more or less plastic substances, preferably such as do not become plastic until the temperature is somewhat increased. Thus, artificial thread may be used which in itself becomes lastingly elongated or which becomes so at light heating, for instance certain kinds of nylon thread. During or after weaving such artificial threads may be made to stretch, whereby the fixing of the weft thread will be released.

Further, the weft threads may according to the invention be fixed in unstretched condition by impregnation or surface treatment with more or less brittle or fragile agents. The weft threads may, for instance, be fixed by means of lacquers, water glues or starches, or they may be glued to a suitable strip of, for instance, paper. During or after the weaving such agents may be broken so that the weft thread may be stretched.

According to the invention weft threads may be used fixed both by binder threads and by means of impregnation or surface treatment.

In order to facilitate the stretching of the fixed weft threads it will according to the invention in many cases be expedient to use fixing agents that may be weakened by special means. Such means may be applied before, during or after the weaving either to the full extent of the weft thread or at intervals.

If fixing media are used which may be weakened by moistening with water, as will, for example, be the case of binder threads of certain fibres, such as various kinds of synthetic wool or some impregnation or surface treatment media, it may be expedient to use moistening with water, if necessary in conjunction with the use of agents reducing its surface tension. The fixing medium will thereby be weakened to such an extent as to facilitate the stretching of the weft thread by breaking, elongation or bursting of the fixing medium.

If fixing media are used which may be weakened or dissolved by treatment with certain substances, they may be treated with such substances, for instance organic solvents or chemicals. Thus, alginate threads may be treated with alkalines, such as soap, and cellulose acetate threads with organic solvents, for instance, acetone. The same rule applies to weft threads impregnated or surface treated with such substances.

For the weakening it will further be possible to use heating as stated by way of an example in the foregoing in the case of binder threads of plastic materials. Heat-

ing may, however, be used also under other circumstances, for instance in the case of impregnated or surface treated weft threads. Such heating may, for example, take place by contact with a warm surface, by radiation, by means of high-frequency apparatus or by steaming.

According to the invention the release of the fixing and thereby the stretching of the weft thread may be promoted, or performed solely, by mechanical means, preferably by means of the reed or special mechanical devices connected with the reed. Thus, it is possible to use a batten which is introduced in the shed between the weft thread and the edge of the fabric and which enters between the lamellae of the reed during the upward motion of the latter, whereby the fixing agent will be broken or elongated. The batten is then removed before the reed has moved the weft all the way up.

According to the invention the stretching of the weft thread may take place by separate mechanical means.

In the weaving of certain handwoven goods it is a known practice to use alternately a slack and a taut weft thread, whereby greater density of the fabric is attained. A similar effect may be attained by the present method by using alternately taut weft threads and weft threads according to the invention. If it is desired, weft threads according to the invention may be used, some with great and others with small elongation.

Having thus described our invention what we claim is:

1. Method for weaving on a loom of a fabric so as to avoid substantial shrinking thereof in the direction of the weft during weaving, comprising the injection in the shed of a stretchable weft thread maintained in unstretched condition by binder means and allowing said thread to be stretched during the weaving operation on the loom, thereby rendering the binder means ineffective and the elongation of the weft thread permanent.

2. Method according to claim 1, in which said stretchable weft thread is, prior to introduction into the loom, fixed in curled shape so that it may be introduced in the shed without material stretching and then is allowed to stretch after introduction in the shed.

3. Method according to claim 1, in which said stretchable thread is fixed in unstretched condition by twining it together with at least one fragile binder thread having a considerably lesser breaking strength than said stretchable thread, before it is put on the loom.

4. Method according to claim 1, as applied to weaving with a stretchable yarn twined together with at least one fragile binder thread, in which said stretchable thread is fixed both by the binder thread and by embrittling of at least the surface of the stretchable thread.

5. Method according to claim 1, as applied to weaving with a stretchable yarn twined together with at least one fragile binder thread, in which said binder thread is made of a material displaying substantially no elastic elongation and thereupon a greater inelastic elongation.

6. Method according to claim 1, as applied to weaving with a stretchable yarn twined together with at least one fragile binder thread, in which the stretchable weft thread is fixed in curled shape so that it may be introduced in the shed without material stretching and then be made to stretch after introduction in the shed and the binder thread is of plastic material becoming plastic at an increased temperature.

7. Method of weaving with a weft thread containing binder threads, on a loom a fabric so that during weaving a substantial shrinking in the direction of the weft is avoided, comprising the use of a stretchable weft thread introduced between the sheds in unstretched condition and thereafter stretched, the stretchable weft thread being fixed in curled shape so that it may be introduced in the shed without material stretching and then be made to stretch after introduction in the shed, and in which the binder thread is made of a suitable substance and is weakened by treatment with an agent chosen from the group consisting of water, non-aqueous solvents, heat and chemical materials acting upon said binder thread, said group being characterized by a weakening action upon said binder thread, said process being used upon at least a part of the weft thread.

8. Method according to claim 1, as applied to weaving with a stretchable thread, in which said thread is fixed in unstretched condition, and said binder means comprises at least one binder thread which is fragile and substantially inelastic, and is twined together with said stretchable thread.

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