Design and innovation New Weaving Double Reeds and Its Effect on air permeability Fabric Properties

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Introduction

Weaving machines have plenty of mechanical operations in order to complete the weaving operation in addition to connecting the timing of these operations with each other, also the mechanical operations efficiency is affected with a lot of elements, most importantly are yarns and its characteristics and the weaving reeds in the weaving machines with its different kinds play plenty of functions important for the fabric appearance and characteristics, the most important of which are:

- Fixing the density of the warp yarns in cm through fixing the number of the warp yarns in each dent of the reed dents.
- Preserving the warp within the weaving reed.
- Beating up the last weft to the ones weaved later.
- Giving a guide to the weft carrier in the traditional weaving machines.

First part: designing the weaving reeds to be researched:

Three weaving reeds designs have been produced upon double based reeds and this is by fixing the spaces in one of the reed faces with dents density 6 \cm while the other face we used a different arrangement.

Table no (1) show the produced reed properties, pictures (1), (2) and (3) shows the designed reed which have been named by the researcher, the double reed with the irregular spaces.

Table 1

Main elements	properties
Reed kind	Double French reed with two faces.
Reed count	6 dents\cm in one the two faces while the other differs according to the design.
Reed length	160 cm
Reed height	10cm
Dents height	6cm
Dents width	5.5mm

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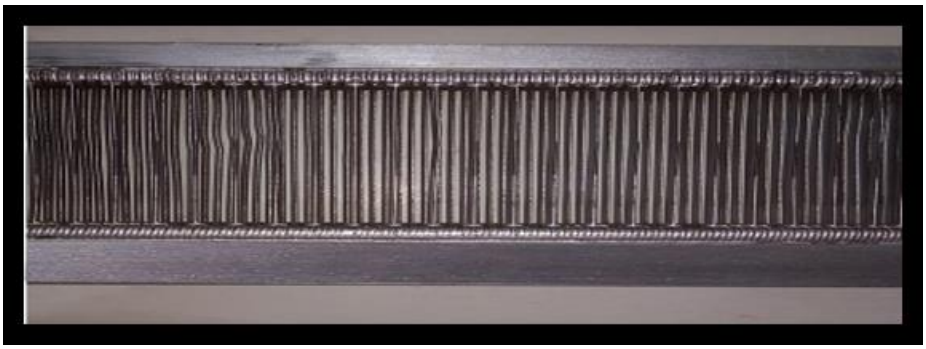
First design:

Regular arranging of the reed dents as narrow spaces between the dents picture (1).



Picture (1)

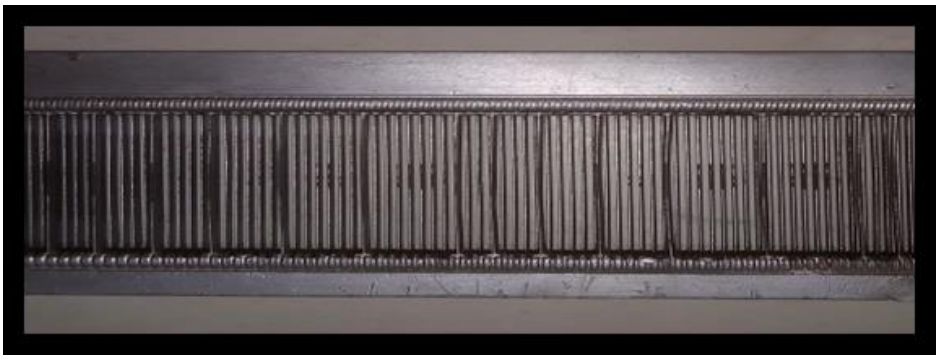
Second design:

Regular arranging of the reed dents as wide spaces between the dents picture (2).

Picture (2)

Third design

Irregular arranging for the reed dents as the spaces between the dents are different picture no (3).



Picture (3)

Second part: weaving experiments:

The experimental program consists of three main parts:

The first part is designing the reeds under research, while the second part is the weaving experiment by producing the research samples, there were 12 different sample by changing the reed kind, the materials and the weft yarn count, and the third part is testing the air permeability for the produced fabrics.

The loom properties:

The search samples have been produced on an automatic rapier loom and table (2) shows its properties.

Table (2) The used loom specifications

Main elements	specifications
Fabric width	**163.1 cm**
Reed width	**170 cm**
Warp yarn number	**5872**
Selvage yarns number	**72**
Warp density	**36\cm**
Warp count	**40\2**
Shafts number	**16**

The constant and variable elements in the weaving experiments:

The constant elements in the weaving experiments:

The fixed elements were warp yarn count has been fixed 30\2, warp density was 36\cm, the weft density 20weft\cm also the weaving structure satin 4.

The variable elements in the weaving experiments:

Two cotton weft of count 30\2-16\2 and two acrylic weft of count 40\2-28\2 have been used with using three different designs of reeds.

The produced samples:

The samples which have been produced using the first design of the reed with narrow equal spaces:

Four samples have been produced by using different weft materials and count while fixing the weaving structure, warp and weft density per cm.

Samples produced using the second design with equal wide spaces between and along the reeds:

Four samples have been produced by using different weft materials and count while fixing the weaving structure, warp and weft density per cm.

Samples produced using the third design with unequal spaces between the dents along the reed:

Four samples have been produced by using different weft materials and count while fixing the weaving structure, warp and weft density per cm.

Third part: the air permeability test for the produced fabrics

Permeability test have been done to the fabrics produced in the research at national institute of standards to know how much did the difference of the reeds designs affect the air permeability of the fabrics produced by it.

Summary

The new weaving machines parts is considered to have an active effect on the produced fabric properties either physical, mechanical or aesthetic, so this research presents the weaving reed in a developed lace. This is considered one of the most important parts of the weaving machine as it plays an important role in the fabric properties and this research contains three basic parts:

First part: designing the weaving reed to be researched:

Three weaving reeds have been designed on the double reed base.

Second part: **the weaving experiments**:
12 different samples have been produced by changing the reed design and weft yarn count and material.

Third part: testing the air permeability of the produced fabrics:
And this is to know how much difference of the designed weaving reeds on the fabrics air permeability.

The most important research results were:

- The first design of the narrow spaces has more air permeability than the fabrics produced with the reed of the wide spaces and the third design with the irregular spaces.
- The research result has shown that the produced fabrics using weft of count 30\2 cotton and 40\2 acrylic is more air permeable tan that produced with weft of count 16\2 cotton and 28\2 acrylic.
- Through the research it appeared that the produced fabrics with a cotton material is more air permeable than that produced with the acrylic material.

The research issue:

Some studies proved the possibility of producing the decorated fabrics by the mechanical parts of the weaving machines especially the weaving reed.
It was a must to benefit from these mechanical parts to find a new ways to produce the decorated fabrics on the weaving machines with limited possibilities and properties which produce the simple and this by designing and producing weaving reeds with different dent's organizing and its angle which gives an additional value to the produced fabrics.

The research goals:

- Producing a kind of decorative fabrics which is weaved locally using a different kind of reeds under the supervision of an applied designer to give a chance of spreading and opening a new field of exporting.
- Developing designing and producing weaving reeds which to bring benefit on the produced fabrics.

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