



ISSN: 2350-0328

**International Journal of Advanced Research in Science,
Engineering and Technology**

Vol. 8, Issue 8 , August 2021

New Method of Plush Knitting on a Flat Machine

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ABSTRACT: Plated plush jersey has recently found wide application for the production knitwear with high heat-shielding properties. Unlike all types of jersey, plated plush jersey has a structure that creates increased bulk. The article presents the developed structures and methods for producing plush knitwear with reduced material consumption and increased reliability of the looping process during its production. In order to expand the range of knitted fabrics, improve the quality and reduce the consumption of raw materials, new structures of the plush stitch were developed, using technological possibilities of flat knitting machine Long Xing LXA 252 SC. As the result of investigation, a new structures and method for producing plush knitwear with reduced material consumption and increasing the reliability of the looping process during its production.

KEYWORDS: plush jersey, flat knitting machine, technological capabilities, production method.

I. INTRODUCTION

The issues of expanding the assortment and improving the quality of plush knitwear, creating new structures and developing effective methods of knitting knitwear with optimal parameters are currently being dealt with by many researchers both in our country and abroad [1-5].

Classification and analysis of knitted stitches [6] developed by prof. A.S. Dalidovich and prof. M.M. Mukimov [7-9] allow not only to study the variety of stitches, but also to create new ones, to expand the range of knitted fabrics and products.

II. LITERATURE REVIEW

An analysis of the results of studies carried out by many scientists [10-12] showed that a decrease in the surface density of knitwear is the least dangerous for reducing its strength properties, since the absolute value of the strength of knitted fabrics is high, and during operation, the products are subjected to loads not exceeding 20% from discontinuous [13,14].

According to the classification recommended by prof. M.M. Mukimov, according to the method of fixing the plush thread in the ground, plush jersey can be divided into the following groups: plated, fleecy, inlay, tied, plated-fleecy and plated-inlay.

Plated plush jersey has recently found wide application for the production of knitwear with high heat-shielding properties. Unlike all types of jersey, plated plush jersey has a structure that creates increased bulk. The plush surface is formed thanks to the elongated plush broaches, knitted together with the ground threads, as a result of which the plush broaches have a sufficiently strong anchorage in the ground. When processing yarns of high linear density, the plush layer of knitted fabric can be quite stable, capable of maintaining a high bulk for a long time during operation, providing increased heat-shielding properties of the product.

Other positive properties of plush knitwear are its fluffiness and softness, which is very important in the production of outerwear, warm underwear and socks.

Plush fabrics are produced both woven and knitted, depending on their purpose. It should be noted that woven plush (looped and split) is used to make dresses, warm outerwear, decorative items, etc. Compared to knitted plush, woven plush has a more form-stable soil structure, but the methods of its production are complex and therefore ineffective.

III. EXPERIMENT RESULTS AND DISCUSSION

The structure and methods of producing knitted plush have great advantages. The advantages of the production of plush knitwear are the simplicity of obtaining both looped and cut plush and high productivity of the equipment. In the manufacture of plush knitwear, it is easy to regulate the consumption of raw materials, the thickness of the knitwear by changing the length of the plush broaches, as well as to reproduce various patterns on the fabric, using raw materials with different properties and different colors [15,16].

When making one-sided knitwear of plush single stitches, the main thing is the formation of pile from elongated pile broaches.

The principle of obtaining a plated plush knitwear on a double-loop knitting machine is that in the first system of the machine, a plush thread is laid on the needles of both needle beds, the plush broaches are pulled with the needles of one needle bed, and the knitted fabric is formed by knitting in the same machine system of the ground thread, which is laid only on needles of one bed, and dropping of plush broaches from the needles of the machine is carried out in the second system. The disadvantage of this method of production is that the jersey consists of plated loops formed from two threads, ground and plush, as a result, the surface density increases and the knitting process of the proposed jersey becomes more complicated.

The specificity of the laying operation for the production of plated plush knitwear on a double-loop knitting machine relates primarily to the thread of the ground, since the laying of the plush thread occurs in the same way as in the production of conventional knitwear. Therefore, an important part in designing a workflow for knitting plush knitwear is finding the optimal feed parameters for the thread of soil.

An incorrect selection of the parameters of the ground thread supply will lead to a violation of the operation of laying the ground filament, as a result of which a defect appears on the web. On the machine, the plush thread is laid using the main thread guide, and for the ground thread, an additional thread guide is installed. High requirements are imposed on its placement in relation to the needles, since the range of variation of the parameters of the ground thread supply is limited.

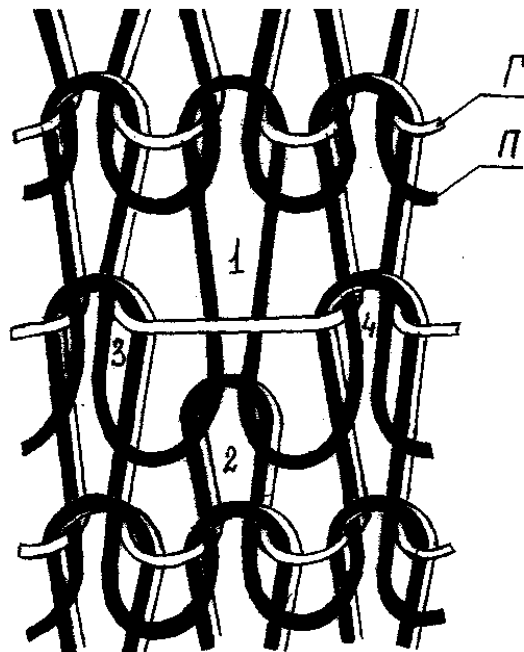


Fig. 1 Defect of dumping loops when knitting plated plush jersey

Obtaining plush knitwear of proper quality on a flat-fanged machine is even more complicated, since the installation of an additional yarn guide does not always ensure a normal looping process, as a result of which the ground thread is not caught by the hooks of the rip-washer needles and they form enlarged loops 1 only from the plush thread (Fig. 1). Since loop 1 has elongated broaches, the discarded old loop 2, dropping below the level of the location of loops 3, 4, decreases in size, due to which the adjacent loops 3, 4 increase, i.e. the thread is drawn.

IV. CONCLUSION AND RECOMMENDATION

The purpose of this scientific work is to develop a structure and method for producing plush knitwear with reduced material consumption and increasing the reliability of the looping process during its production.

The problem is solved by the fact that when making plush jersey, the operation of laying a ground thread is excluded from the looping process, i.e. the loops are formed from plush thread only.

Figure 2 shows the structure and graphical record of production I-variant of plush jersey.

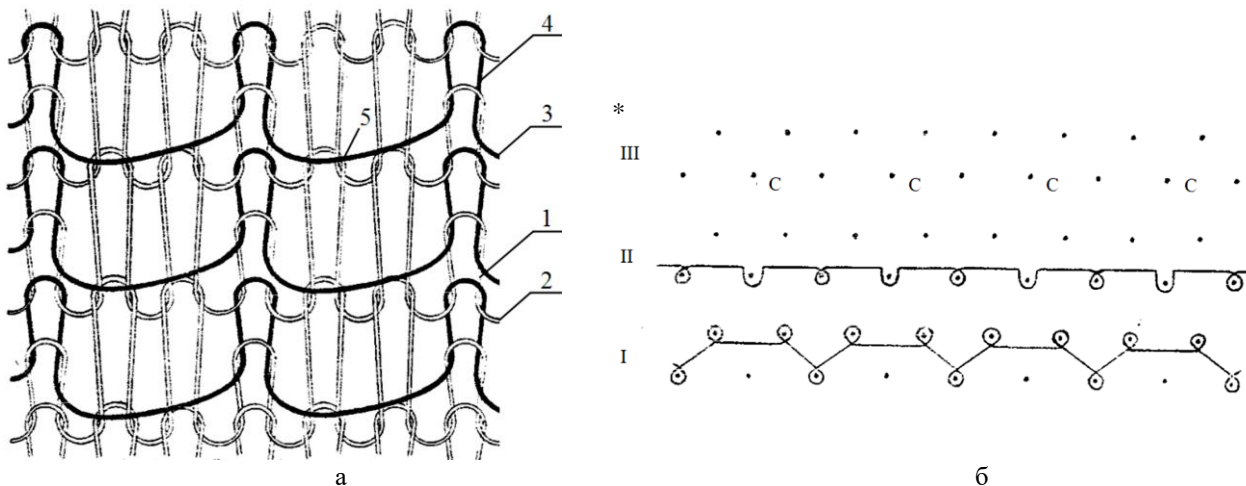


Fig. 2. Structure (a) and graphical record (b) of the development of the I-variant of plush jersey

Knitwear (Fig. 2, a) consists of loops 1 of the ground formed from threads 2, plush loops 3 formed from plush thread 4. Elongated plush broaches 5 from thread 4 are formed between the loop wales. The needles that have not received the ground thread pull the plush broaches (Fig. 2, a, b).

The proposed versions of plush knitwear were produced on a Long Xing LXA 252 SCflat knitting machine. As a raw material, polyacrylonitrile yarn with linear density 32 tex x 2 was used.

The first version of plush jersey (Fig. 2.) on a flat knitting machine is obtained in the following way.

One repeat of the I-variant of the plush jersey is formed by three strokes of the knitting system.

When the knitting system of the flat machine moves from left to right, the needles of the front and back needle beds are knitted from the thread 2 a row of an incomplete rib. In this case, are working all needles of the back bed, and the needles of the front bed through one (Fig. 2, b).

With the reverse movement of the knitting system of the flat knitting machine, the needles of the back needle bed do not participate in the work, but all the needles of the front needle bed work and a plush thread is laid on them.

Due to the fact that the even needles of the front bed do not have old loops, they form open plush buckles, and the odd needles form closed loops of plush thread.

When the knitting system of the flat-fanged machine moves from left to right, the plush broaches are dropped from the even needles of the front needle bar, the thread in this row is not laid on the needles. When knitting the next course of the stitch rapport, the latches of the even needles of the front bed are opened with the help of the valve openers.

To increase the density of plush broaches on the fabric surface, a second variant of plush jersey based on double jersey is proposed (Fig. 3). It takes four carriage moves to form one stitch repeat. The first and second row of knitwear is obtained in the same way as in the first variant, and in the third row of knitwear, as in the second, a plush thread is laid on all the needles of the front needle bed, and the needles of the back needle bed are not involved in the work. In this case, the odd needles of the front needle bed form closed loops of plush thread (Fig. 3), because in the even needles of the front needle bed, the sketches of the previous row are dropped onto the new thread, as a result, closed loops are formed on these needles. The plush loops are dropped in the fourth row, after the drop, these loops turn into plush broaches.

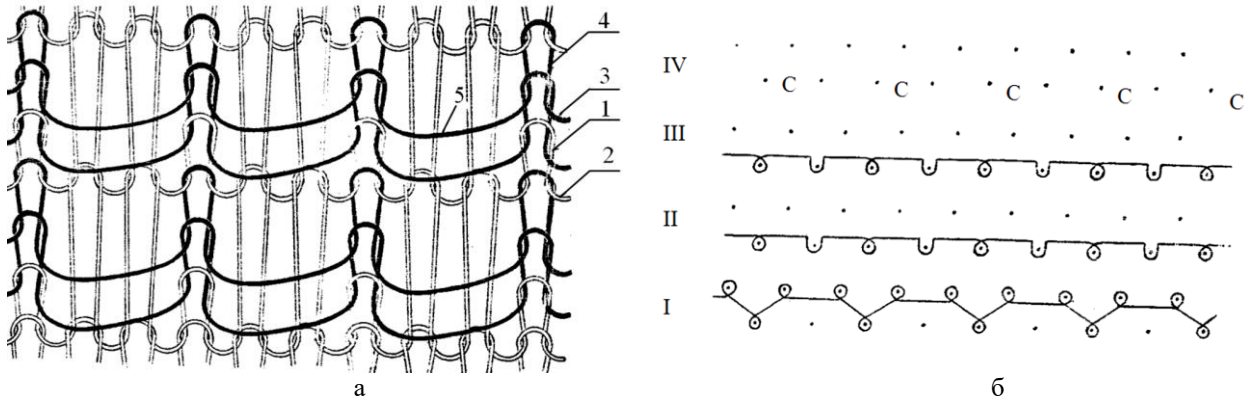


Fig. 3. Structure (a) and graphical record (b) of the development of the II-variant of plush jersey

The resulting jersey has a lower areal density compared to conventional plush jersey. The production of this knitwear on a double flat knitting machine expands the range of knitted fabrics. The method is simple to implement and does not require additional mechanisms and devices. The resulting jersey can be used for knitted outerwear.

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