FLATLOCK SEWING MACHINES

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Abstract: Durable, elastic and flat seams of activewear garments are mostly processed by sewing machines called flatlocks or flateamers. There create coverstitches 607. The machines use to have differently shaped work surfaces. Feed-off-the-arm machines are preferable for closing narrow, log components. Feed-up-the-arm flatlocks are used for small and short tubular item processing. Flat bed sewing machines are designed for joining large size flat components. Flatlocks use to be equipped with different devices: a fabric edge trimmer, a thread chain trimmer, a tape binder, a tape feeder, others. Fabric edge trimmers are available for both or single fabric edge trimming. A suction device is used to suck up the cut off fabric edges. Thread chain trimmers can be operated manually or automatical way. Tape binders are used on the machines to stitch a tape on men briefs. Advanced flatlocks are equipped with servo motors and use automatic lubrication system.

Keywords: activewear garments, flat seams, flatlock sewing machines, fabric edge trimmer, thread chain trimmer, tape binder, servo motor, automatic lubrication system.

1. INTRODUCTION

Currently more and more popular become active wear clothing for different kind of dry and wet sports. Often these garments are developed from high elasticity and advanced materials which gets in direct contact with a human body [1]. They have to create to their users maximal comfort during physical activities and feeling of a “second skin”. The durable, elastic and flat seams of the activewear garments are mostly processed by special kind of 4 needle sewing machines called flatlocks or flateamers [2].

2. STICHES AND SEAMS CREATED BY FLATLOCKS

Flatlock machines create coverstitches 607 (see Fig.1) which cover top and bottom surface and row edges of a material with a lot of thread [3,4]. They are
formed with 4 needle threads, a top cover thread and a bottom looper thread. Seams can also be stitched without top cover thread (for example, attaching a tape). To create the seam maximally flat textured threads are used.

The stitches 607 are used to create different kind of seams: (see Fig.2), [4]:

- *lap seams* - used to join components from light to medium thickness materials.
- *butt seams* - suitable for joining heavy materials and in situation when the fabric joining place is reinforced with a tape.
- *cover seams* - used for decorative purpose.

3. BED TYPES OF FLATLOCKS

Flatlock machines use to have three type of work surfaces [5]:

- *feed-off-the-arm* - preferable for closing (making tubular) narrow, log components and processing 3D items;
- *feed-up-the-arm* - preferable for small and short tubular item processing;
- *flat bed* - preferable for joining large size opened/flat components.

Figure 1: Stitches 607.
Slika 1: Ubodi 607

Figure 2: Lap seam (a), cover seam (b) and butt seam (c) created by a flatlock machine.
Slika 2: Tri vrste ravnih šavova

Figure 3: Feed-off-the-arm flatlock by Juki
Slika 3: Mašina ravnih šavova sa feed-off-the-arm radnom površinom
3.1. Feed-off-the-arm flatlocks

During the work process an operator is sitting behind the machine (see Fig.3). He can handle a processed article on a cylinder arm from both its sides. They are used for different applications:

- to join body parts, shoulders, sleeves, legs of trousers,
- attach tape on shoulders and back neckline,
- join crotches and attach tape on panties, briefs.

3.2. Flat bed flatlocks

Using a machine with a feed-off-the-arm work surface the flat and large size components slip down from the narrow arm. The operator constantly has to pay attention to their correct handling and feeding. To eliminate this problem flat bed flatlocks are developed and used (see Fig.4).

3.3. Feed-up-the-arm interlocks

There are also available feed-up-the-arm interlocks with 4 needles which can create stitches 607 (see Fig.5). Working with this kind of a machine, an operator is sitting in front of it. Feed-up-the-arm interlocks are used to process small and short circular items (cuffs, ankles, necklines), closed sleeves, sharp corners joining neckline with shoulder lines on t-shirts, similar.

4. FLATLOCK DEVICES

Flatlock sewing machines use to be equipped with different devices: a fabric edge trimmer, a thread chain trimmer, a tape binder, a tape feeder, a seam end securing device, a thread wiper, a rear puller.
4.1. Fabric edge trimmer

A fabric edge trimmer is installed on a presser foot of the flatlock machine (see Fig.6). It cuts fabric edges precisely before they are stitched by needles.

Two kind of fabric trimmers can be fixed on flatlock sewing machines:

- both sides fabric edge trimmer - used for light to medium heavy fabric processing (see Fig.7.a),
- single fabric edge trimmer - used for heavy fabric processing, such as, fleece, others (see Fig.7.b).

4.2. Suction device

After fabric edges are cut off, a pneumatic suction device sucks them up. It is done to keep stitching area clean from debris. A plastic or metal pipe is fixed next to the needles (see Fig.8). Through the pipe the cut off fabric parts are taken to a waist bag which is placed under the table of a sewing machine.

4.3. Thread chain trimmer

The thread chain can be cut off by manual or automatic a thread cutting device:

Figure 7: Both sides fabric edge trimming (a) and single fabric edge trimming (b)
Slika 6: Obostrano sečenje materijala (a) i jednostrano sečenje materijala (b)

Figure 8: Cut off fabric suction pipe.
Slika 8: Cev za usisivanje odsečenog dela materijala

Figure 9: Knife fixed at the end of the machine’s arm
Slika 9: Nož fiksiran na kraju radne površine mašine
• manual device - a knife is fixed at the end of the machine’s arm. Finishing a sewing cycle an operator pulls the thread chain over the blade and cuts it off (see Fig.9).

• automatic device - a knife is fixed behind the needles. Light sensors detect beginning and end of a processed fabric part. Two types of knives are used: guillotine or chopper type knife (see Fig.10).

4.4. Tape binder

A tape binder is used to attach folded or flat tape on the front-placket of men briefs (see Fig.11.a) or other kind of underwear and to join wet suits for skiing, diving, canoeing, yachting. The tape can be attached with or without a top cover thread (see Fig.11.b).

The folder is designed for a specified tape width, for example, folded tape width 9.5 mm, 10mm). It is fixed in front of needles.

5. CONCLUSIONS

Flatlocks are not typical type of sewing machines. However they are very important equipment for manufacturers which are producing or going to produce high quality sportswear and underwear. Flatlocks are equipped with energy saving servo motors [6] and use automatic lubrication systems [7]. Material is fed by differential feed system mechanism [5]. By help of previously mentioned and other special devices this kind of sewing machines can ensure high quality and productivity sewing process which is demanded by the industry [8].

Feed-off-the-arm flatlocks are manufactured by many companies, such as, Juki, Yamato, Siruba, Global, Foxsew, Techsew, Kansai Special, Jack, Garudan, Sakura Stitch, Golden Choice, Sahl, Anysew, Isamu, Shing Ling, Allrico, Speedway, others. The flat bed flatlocks are manufactured by companies Yamato, Kansai Special, Garudan, Kingtex, Golden Choice, others.
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