Dec. 7, 1954 E. HANGARTNER 2,696,608

THREAD GUARD DEVICE

Filed May 4, 1951

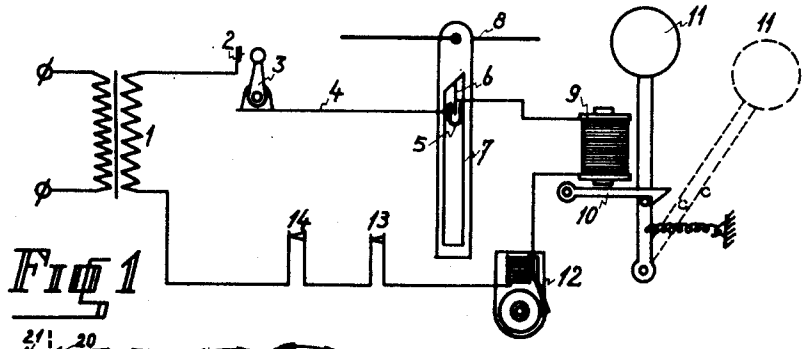


Fig 1

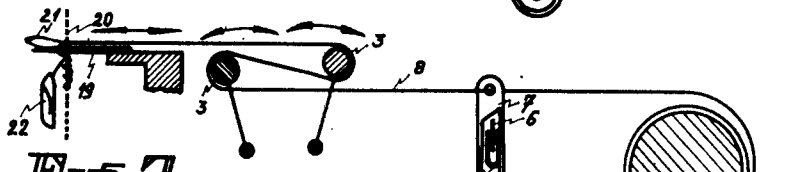


Fig 2

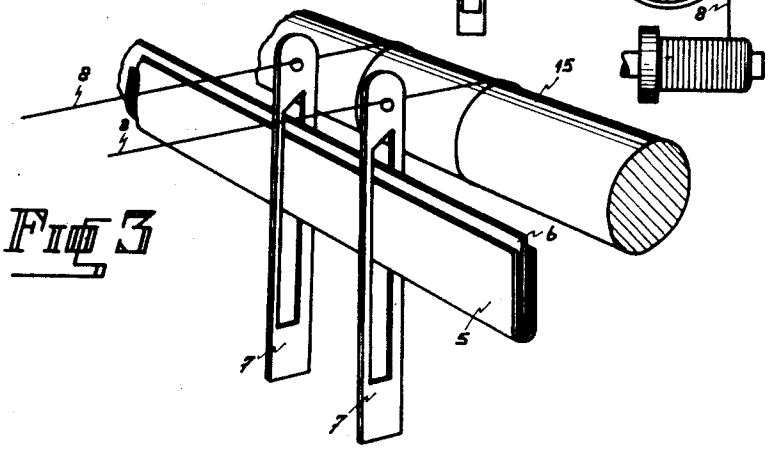


Fig 3

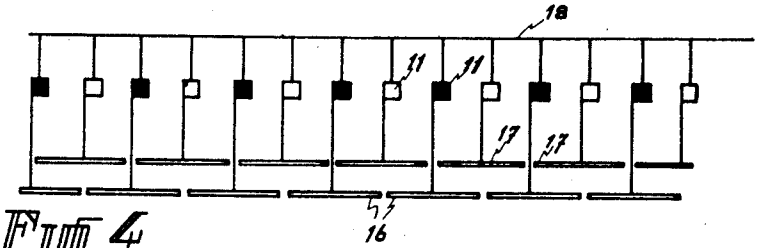


Fig 4

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2,696,608

Patented Dec. 7, 1954

2,696,608

THREAD GUARD DEVICE

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Application May 4, 1951, Serial No. 224,613

Claims priority, application Netherlands August 8, 1950

2 Claims. (Cl. 340—259)

This invention relates to a thread guard device for embroidery machines in which a bar is placed on each embroidery thread, which on thread rupture closes an electric circuit to actuate a signal device. The application of thread guards to textile machines generally is well known, but heretofore it has been regarded as impossible to apply such a thread guard to embroidery machines. The reason for this is that in embroidery machines the threads are alternately slack and taut.

For each fabric web there is a series of needles adapted to be moved into the fabric and removed therefrom. This reciprocating movement of the needles causes the formation of loops in the needle thread at the rear side of the fabric. Bobbins then pass through the loops to retain the needle threads in the fabric in a manner similar to the action of a sewing machine.

A systematic motion of the frame carrying the tensioned fabric web under the guidance of a pantograph or similar device during the time the needles are retracted from the fabric results in the formation of a pattern.

The needle threads are removed from the bobbins on bobbin creels.

Before the thread reaches the needle, it passes over a brake roller which is coated with a friction coating, and passes through two thread tensioning devices which are in the shape of long rods. These thread tensioners cause periodic tensioning and slackening of the embroidery threads. The bobbins pass through the loop at the rear of the fabric when the thread is in the slackened condition, and the thread is then tightened to pull up the stitch.

The needle threads or the bobbin threads often break, with the result that a part of the embroidery stitching is imperfect or the fabric is not embroidered at all. Heretofore it has been necessary to have an operator continuously checking the embroidery machine to watch for broken threads. In a machine which is two stories high in which each story is 9 to 14 meters in length, an operator must control 18 to 28 meters in order to completely check the fabric. Thus if a thread breaks at a point which has just been checked, a substantial period of time will pass before the operator again checks the spot, and the result is that a large portion of the fabric remains unembroidered. This must be repaired by hand when the machine finishes the fabric. The period of time is lengthened if the operator must stop to repair broken threads at other points.

If a bobbin thread breaks, the corresponding needle does not operate correctly and the needle thread slackens and is carried along by the brake roller. The thread then becomes taut, the needle is bent thereby, abuts against the guide plate and often breaks off. If the operator does not act quickly to correct the condition, the stump of the broken needle punches the fabric to pieces causing irreparable damage.

The thread guard according to this invention allows the installation of thread guards on embroidery machines despite the fact that the embroidery threads may often be slack. Conventional thread guards are utilized, in which the threads are guided through bars. An interrupter is provided in the electric circuit actuating the alarm which interrupts the circuit at the moment when the threads are slack so that the signal device does not operate on each slackening period.

In one embodiment of this invention the thread tensioning device, or a part operating at the same frequency as the thread tensioning device, acts as an interrupter to

prevent the bars from closing the circuit when the threads are slack.

The invention is further described in the following specification and the appended claims taken together with the accompanying drawings, in which:

Fig. 1 is a circuit diagram of the thread guard device according to the invention;

Figure 2 is a diagrammatic view showing the manner in which the threads pass through the embroidery machine;

Figure 3 is a perspective view of the bars arranged on the embroidery thread, and

Figure 4 is a diagrammatic view of the manner in which the signal devices are connected.

From a transformer **1** (Fig. 1) the circuit leads to an interrupter **2** in which the moving part 3 is a thread tensioning device or a part which drives the thread tensioning device or moves with the same frequency as the thread tensioning or thread strainer device.

The circuit leads from the moving part **3** through the frame **4**, shown only as a conductor rather than a structural member, to a U-shaped rail **5**. Substantially enclosed within U-shaped rail **5** is a straight rail **6**, separated from rail **5** by insulation material. Around rail **5** and **6** is placed a bar **7** having an aperture therein through which the rails **5** and **6** pass. The bar **7** is suspended from the embroidery thread **8** when the latter is taut. When the interrupter **2** is open, the thread **8** is slack. The bar **7** is thus allowed to drop onto rail **6**. The upper edge of the aperture in bar **7** being slanted, the bar is caused to move sideways so that it contacts rail **5**. In this manner the circuit between the rail **5** and rail **6** may be completed through the bar **7** when the thread **8** is slack. The circuit leads from rail **6** to a signal device, which may consist for example of an electromagnet **9** adapted to move catch **10** when it is energized. Catch **10** releases a signal disk **11** which moves to the position indicated by the dotted line.

There is also arranged in the circuit in addition to the visual alarm signal **11**, a sound signal, such as a bell or horn **12**. Also, a switch **13** may be provided in order to break the circuit when the machine is running idle, that is when the machine is running but the needles do not operate. There is also provided a main switch **14** for disconnecting the entire circuit, this switch being connected to the starting mechanism for the machine.

As shown in Figure 2, the thread **8** is passed around a thread guiding roller **15**, which may act as a brake roller. Thereafter the thread passes through bar **7** and around a thread tensioning device which consists of two rods **3** adapted to oscillate towards and away from each other. The thread then passes to the needle **19**.

Since the thread tensioning device alternately causes the thread **8** to become taut and then slack, the bars **7** will dance up and down, each time making contact with rails **5** and **6** completing the circuit therebetween. At such time as the threads are slack however, the circuit has been interrupted by the interrupter, and the alarm will not sound.

However, if a needle breaks, or a bobbin thread **21** at the rear of the fabric **20** is broken, or bobbin **22** has become empty, the thread **8** will no longer be able to be made taut by the tensioning device, and the bar **7** will thus not move upward. However, the interrupter will close the circuit, completing the signal devices to be actuated.

Because of the large operational width of an embroidery machine, the thread guard device according to the invention is made so that the circuit may be divided into sections along the width of the machine, and each section is guarded by a separate signal system which is actuated by a number of bars within the section.

A diagrammatic view of this is shown in Figure 4. The sections of the rails **5** and **6** are shown at **16** for the lower half of the machine and at **17** for the upper half. Each section has a separate signal **11**, which may have different means of indicating the section to which it corresponds, e. g. different colors for the upper and lower half of the machine.

By means of this arrangement, the operator can determine immediately which section needs to be attended

to. The sound signal may be connected to all of the sections by wire 18, so that when a thread in any one section ruptures, the sound signal warns the operator, while the signal devices for the individual sections indicate in which section the thread is broken.

I claim:

1. A thread guard device for embroidery machines comprising an electric circuit, a device connected into said circuit, a bar adapted to be placed on each embroidery thread and supported thereby out of normal contact with said circuit, said bar upon a thread rupture contacting and closing said circuit to operate said signal device, an interrupter in said circuit to interrupt the circuit when the threads are normally slack, said interrupter consisting of a thread tensioning device, said interrupter being closed when the device tensions the threads and preventing said bars from closing the electric circuit and thereby preventing operation of the signal device.

2. A thread guard device for embroidery machines comprising an electric circuit, a signal device connected into said circuit, a U-shaped rail having one end thereof connected to said circuit, a second rail placed in said U-shaped rail and insulated therefrom and being connected into said circuit, a bar adapted to be supported on each embroidery thread and having an opening therein surrounding said rails, said bar having a slanting top edge in said opening, said bar being normally maintained out of contact with said rails by a taut thread, said bar upon a thread rupture dropping into contact with said second rail and tilting into contact with said U-shaped rail due to the slanting edge thereby closing the circuit between said rails and operating said signal device, and a circuit interrupter in said circuit actuatable by a thread strainer in said device for opening and closing said interrupter and said circuit depending respectively upon whether the thread is slack or taut thereby preventing operation of said signal device when the threads are normally slackened.

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