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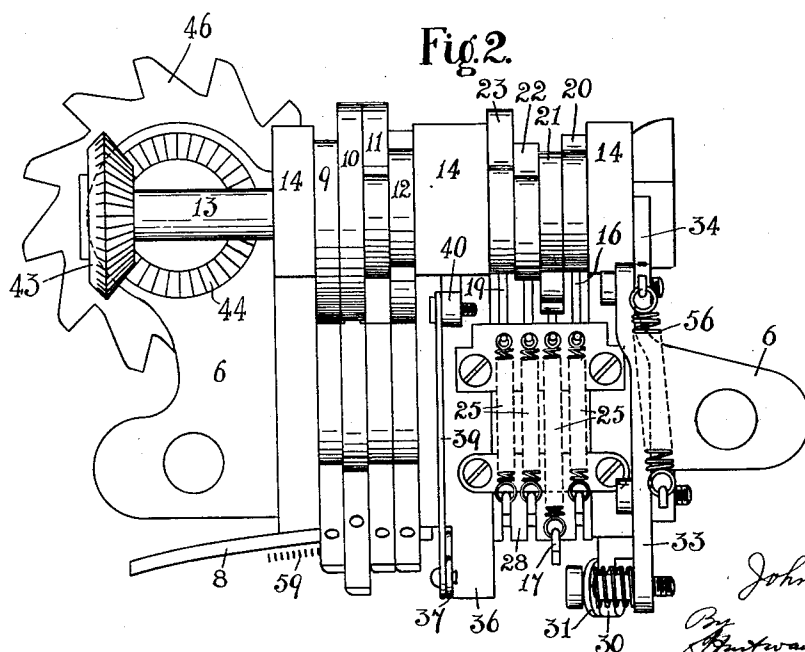
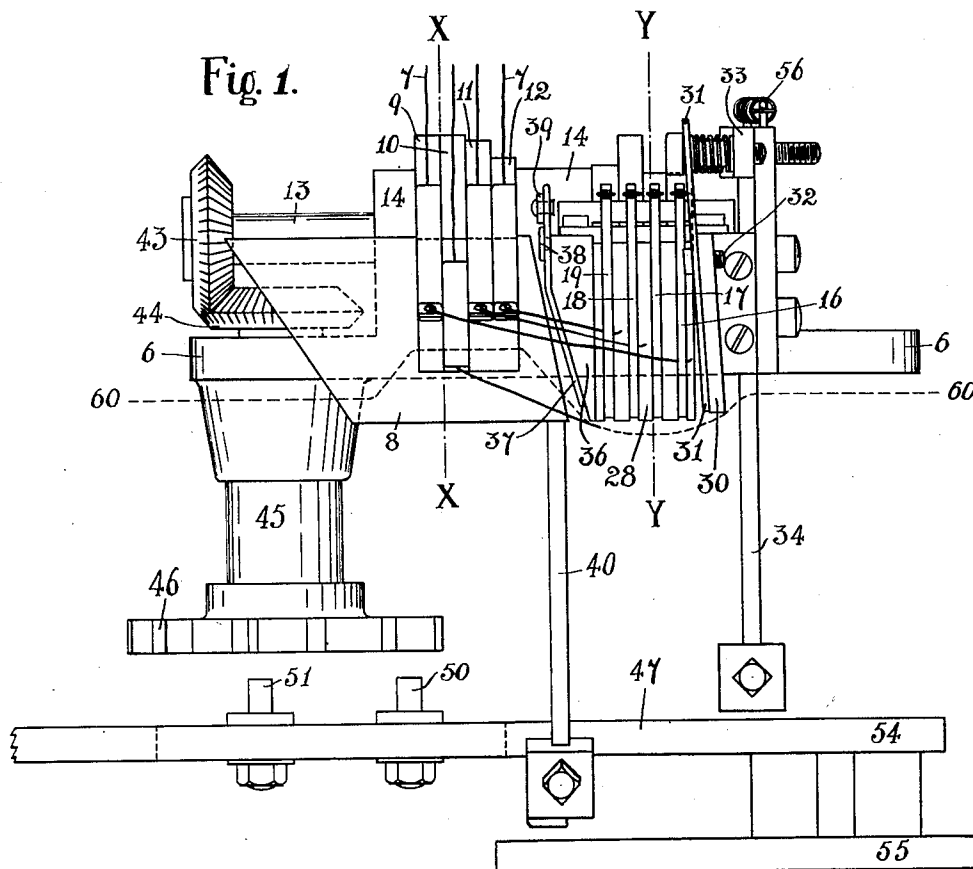
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1,921,902

THREAD CHANGING FEEDER MECHANISM OF CIRCULAR KNITTING MACHINES

Filed Aug. 25, 1931

2 Sheets-Sheet 1



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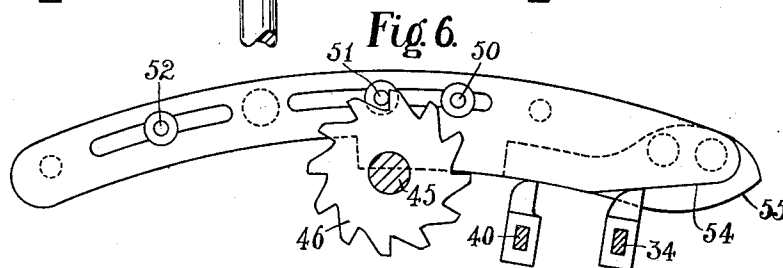
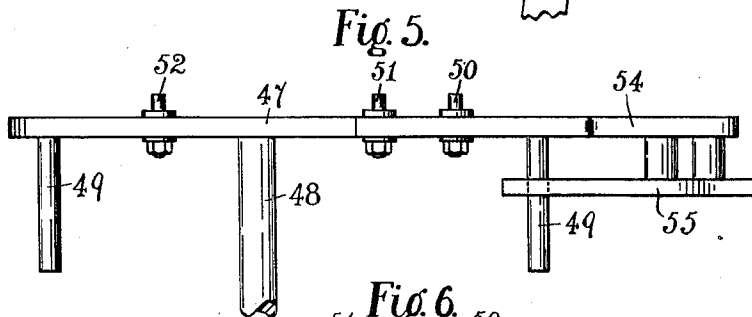
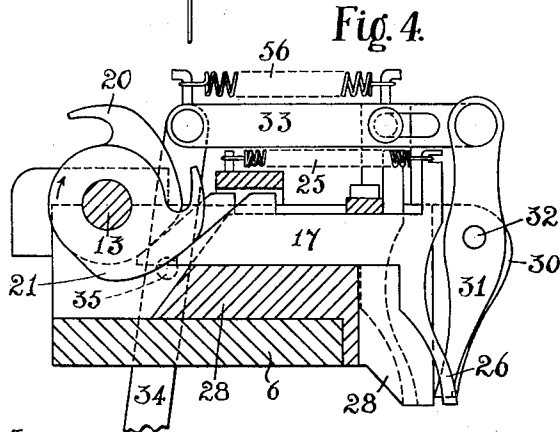
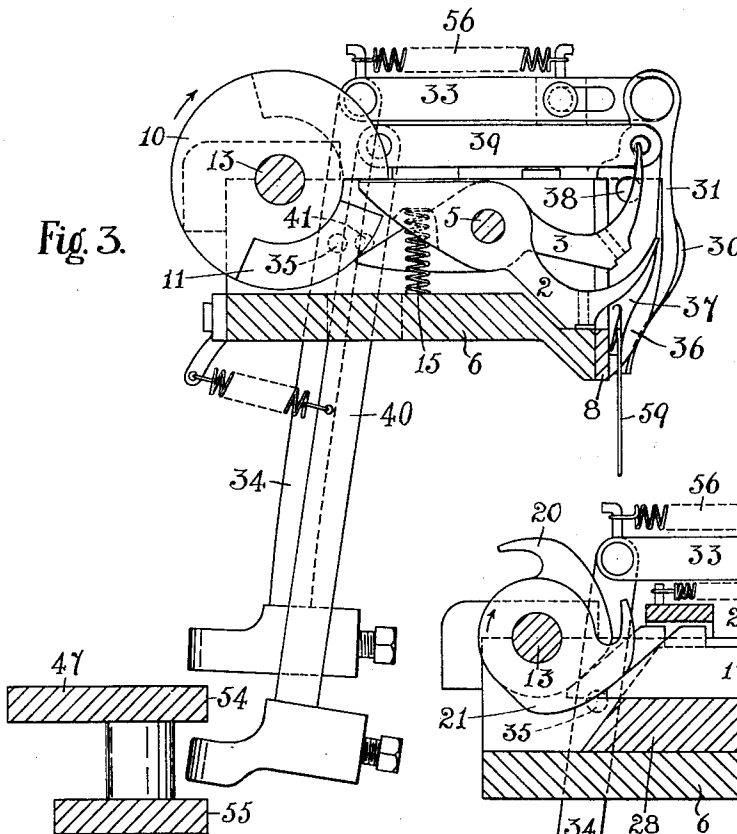
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THREAD CHANGING FEEDER MECHANISM OF CIRCULAR KNITTING MACHINES

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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THREAD CHANGING FEEDER MECHANISM
OF CIRCULAR KNITTING MACHINES

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5 Claims. (Cl. 66—140)

This invention relates to improvements in the thread changing feeder mechanism which is employed in circular knitting machines for producing horizontal striped fabrics for example, and its object is to provide mechanism for this purpose which is more certain in its action, and will produce work with less faults and make less waste than the mechanism hitherto employed.

The present invention relates to thread changing feeder mechanism of the kind, in which a series of approximately radially disposed pivoted thread levers or fingers are adapted to present their threads to and withdraw them from the needles in succession, and in which means are also provided for severing the withdrawn threads, and holding their loose ends until such time as they are reintroduced into the work.

According to the present invention, the thread fingers are controlled by means of a series of cams which are disposed on a shaft at the rear of the said fingers, and the trapper devices comprise a series of slides which are mounted side by side in recesses in a block disposed at the side of the thread fingers. These slides are formed with dependent thread trapping parts on their inner ends, and a series of cams on the same shaft as the thread finger cams, are adapted to project the said slides and control their return movements. Provision is made for insuring the delivery of the threads to the needles, and one thread cutting arrangement is provided, which is so disposed that it is adapted to sever each of the threads in turn as they are withdrawn from the work.

The invention is hereinafter described as applied to a machine with a rotating cam-ring, it also refers to mechanism with four thread fingers each controlling an independent thread, but it must be understood that the number of fingers may be varied according to the number of different threads which have to be introduced into the fabric produced.

Referring to the accompanying drawings.

Fig. 1 is an elevation, and

Fig. 2 a plan of thread changing feeder mechanism for circular knitting machines constructed according to my invention.

Fig. 3 is a vertical cross section taken on the line X X of Fig. 1.

Fig. 4 is a vertical cross section taken on the line Y Y of Fig. 1.

Fig. 5 is an elevation, and

Fig. 6 a plan of the rising and falling cam-plate associated with the mechanism.

Figs. 5 and 6 are drawn to a smaller scale than Figs. 1 to 4.

Like letters indicate like parts throughout the drawings.

In the preferred construction, the thread fingers 1 to 4, (see Figs. 1 and 2) are pivoted side by

side at 5, (see Fig. 3) in a base 6 secured to the cam-ring of the machine, which latter is not shown. The inner ends of the said thread fingers which are provided with thread-eyes for the passage of the threads 7, are disposed in a gap in the latch guard 8, whilst their outer ends bear on cams 9 to 12 (shown more clearly in Figs. 2 and 3) which are mounted on a cam-shaft 13 carried in bearings 14 on the outer side of the base 6. It will be understood that the cams 9 to 12 are so shaped and adjusted that one of the thread fingers 1 to 4 is always in a position to supply its thread to the needles 59, and that when there are four fingers as shown, a thread change is effected every quarter of a revolution of the cam-shaft 13, that is, the thread finger in action is raised immediately after another has been released and lowered. The inner ends of the thread fingers 1 to 4 are in the construction shown, positively raised so as to withdraw their threads, by the action of the cams 9 to 13, and the reverse movement of the said fingers is effected quickly by springs 15, which are shown more clearly in Fig. 3.

At the side of the thread fingers 1 to 4 and disposed parallel thereto, are a corresponding number of slides 16 to 19. These slides (hereinafter termed trapper slides) are mounted side by side a short distance apart in recesses in a guide-block 28 secured to the base 6, and their outer ends bear on cams 20 to 23 disposed on the cam-shaft 13 previously described. These cams 20 to 23 are adapted to positively move the slides 16 to 19 inward, while their return movements are quickly effected by springs 25 (see Figs. 2 and 4).

The inner ends of the trapper slides 16 to 19 described, are provided with dependent parts 26 which are normally located in recesses in the face of the guide block 28 in which they are supported, but they are when required projected therefrom by their cams 20 to 23, and when so projected they are adapted to admit a thread between their dependent parts 26 and the face of the guide block. This thread is then trapped when the slide is released by its cam, and the slide is returned to its normal position by the action of its spring 25. The thread is then securely held by the trapper slide in its recess in the guide block 28 until such time as it is again presented to the needles.

The movements of the respective trapper slides 16 to 19 are synchronized with the movements of the corresponding thread finger levers 1 to 4, so that just before each of the latter withdraws its thread from the needles 59, the corresponding trapper slide is moved in towards the latter so that the withdrawn thread is moved under the dependent end 26 of the slide so that it can be trapped between the same and the guide

block 28 in which the slide works, as previously described. The loose end of each thread when it is withdrawn from the needles 59 is thus held by an independent trapper slide, and it is only released when it is again introduced to the needles.

At the right of the trapper slides 16 to 19 as seen in Fig. 1, is a thread severing arrangement which comprises a fixed scissor blade 30 which is secured to the guide block 28, and a movable scissor blade 31 which is pivoted to the former at 32 (see Figs. 1 and 4). The pivoted scissor blade 31 has an upwardly extending arm which is connected by means of a link 33 to the upper end of a lever 34, which latter is pivoted at 35 to the base 6, and the lower end of this lever 34, which is hereinafter referred to as the scissor lever, is carried down to a point below the base 6, and is actuated by means of a stationary cam-plate that will be hereinafter described.

When a thread is withdrawn from the needles as previously described, it is not only moved into position where it can be trapped and retained by one of the trapper slides 16 to 19, but it is also moved between the fixed and movable scissor blades 30 and 31 which are opened to receive it, and immediately the thread is trapped, it is severed by the said scissor blades. The latter are adapted to sever each of the several threads 7 employed in turn, at a point between the trapper slides and the needles 59, when they are withdrawn from the latter.

Between the thread fingers 1 to 4 and the trapper slides 16 to 19 described, is a fixed thread guiding nose or member 36 disposed on the guide block 38, and associated with this nose 36 is a thread directing lever 37, which is pivoted at 38 to the said nose (see Figs. 1 and 3). The upper end of this lever 37 is connected by a link 39 to the upper end of a lever 40, which is pivoted at 41 to the base 6 and extends down to a point below the latter, so that it can be actuated by the cam-plate hereinafter described and transmit the required motion to the thread directing lever 37.

When a thread is first presented to the needles, the lower end of the thread directing lever 37 over which the thread is then carried, is moved inwards by the said lever over the needles, so as to carry the thread to the latter and insure that it is delivered to them with certainty, and so soon as the said thread has been engaged in the work, its end is released by its trapping slide. The loose end of each thread when it is first introduced to the needles, is thus held until it has been embodied in the work, and the prompt starting of each thread to knit when first introduced, is ensured.

The cam-shaft 13 previously referred to, on which the cams for actuating both the thread fingers and the trapper slides are disposed, is connected by means of toothed bevel gear wheels 43 and 44 (see Figs. 1 and 2) to the upper end of a vertical spindle 45 carried in a bearing provided for it in the base 6, and the lower end of this vertical spindle 45 is fitted with a ratchet wheel 46. The movements required to effect the necessary thread changes are obtained by advancing this wheel 46 one quarter of a revolution at intervals, and at the same time actuating the scissor lever 34 and the lever 40 associated with the thread directing lever 37, a result which is effected by the following arrangement.

At a lower level than the base 6 which carries the mechanism described, is a stationary plate 47 (see Figs. 1, 5 and 6) hereinafter termed the

cam-plate, and this plate is carried by a vertical plunger 48 and guide pins 49 working in guides in the fixed bed which is not shown, an arrangement that permits of the said cam-plate 47 being raised and lowered as required. These rising and lowering movements are imparted to this cam-plate 47, by means of lifts distributed on a pattern chain of the usual kind, and which pattern chain is carried and intermittently advanced by means of ratchet and pawl mechanism in a well known manner.

The cam-plate 47 described, is provided with three studs 50 to 52 (see Figs. 5 and 6) for the teeth of the ratchet wheel 46 on the vertical shaft 45 to engage with as it moves round with the cam-ring of the machine, and it will be understood that owing to the ratchet wheel 46 being provided with twelve teeth, the said wheel 46 will be advanced one quarter of a revolution each time it passes the cam-plate 47 when the latter is raised, and that no movement will be imparted to it when the cam-plate is lowered.

The advancement of the ratchet wheel 46 one quarter of a revolution in order to effect each thread change, takes place in two stages, that is, there is a first initial movement followed later by a final movement. The initial movement is effected by the two studs 50 and 51, and the final movement by the stud 52, which latter is a little distance from the other two so as to provide a short interval between the two movements. The initial movement lowers one of the out-of-action thread fingers 1 to 4 into action, while the final movement raises the one that was previously in action. The said movements further actuate the co-operating trapper slides so that one thread is released and the other trapped.

The cam-plate described is further fitted with two cam faces 54 and 55, the latter of which is disposed below the former, and when the cam-plate 47 is raised, the said cam faces are disposed in the path of and adapted to act upon projections at the lower ends of the scissor lever 34, and the lever 40 associated with the thread delivery lever 37 as they move round, and impart to the devices associated therewith, the necessary movements at the particular time required. When the cam plate 47 is lowered, both cam surfaces will be clear of their respective levers as shown in Figs. 1 and 3.

The lever 34 is returned to its normal position and the scissor blades closed so as to sever the thread when it reaches the end of the cam surfaces 54, by means of a spring 56 (see Fig. 3) connected to the link 33 which is jointed to its upper end. The lever 40 is also returned to its normal position and the thread directing lever 37 retracted when the former reaches the end of the cam surface 55, by the action of a spring which is not shown, but may be disposed in a similar manner to that shown in connection with the lever 34.

In a machine with multi-feeders, it will be understood that the whole of the feeders employed may comprise thread changing mechanism of the construction described, and that the necessary adjustment of each from time to time will be effected by means of the members on the rising and falling cam-plate 47 described, which will be retained in its raised or operative position until all the thread change feeders employed have been re-adjusted to a corresponding extent, each time a thread change has to be made.

The position of trapper 17 as shown in Figures 2 and 4 is the position assumed by the trapper

when it releases the yarn or thread carried by the corresponding thread guide. In order to receive and trap the yarn or thread of its corresponding thread yarn, each trapper must first be moved further in toward the center of the needle cylinder, which is accomplished by the cams 20—23. When in the position shown in Figures 2 and 4, the trapper 17 would not take the yarn if the thread guide 10 was raised out of action. When the needles pass the trappers, they are depressed below the cylinder verge so that the yarn or thread, when the thread guide is raised out of action, takes up a position which is a chord relative to the circle of the needles. As the part of the thread opposite to the thread trappers at this time lies inside the needles, it is necessary, in order to take and trap the yarn, to move the trapper until the part 26 comes some distance within the needle circle, so that the yarn when raised by its guide will pass underneath the said part 26. The particular shape given the cams 20—23 have in Figure 4 only occasioned a partial rightward movement of the trapper 17. In Figure 4, the trapper 17 is shown in its thread releasing position, and, before the corresponding thread guide rises out of action again, the cam 21 is advanced so that the trapper 17 is first moved toward the right by the highest part of the cam into a position where the yarn will rise on the proper side of the dependent part 26. The three pins 50, 51, 52 produce the stepwise movement of the wheel 46 for this purpose. Each thread is thus released by an initial movement of the trappers, and then is guided by the thread finger to needle engaging position: and a further movement of the trapper must be effected before it can take and trap its thread again, when this thread is raised out of action by the thread guide.

The path of the needles is indicated by the dotted line 60 in Fig. 1, and it will be seen that the needles are raised where the thread fingers 1 to 4 are disposed, but descend before they reach the thread directing lever 37, so that the latter can not only move over them, but the needles will pass clear of the dependent ends 26 of the trapper slides 16 to 19 when they are projected.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a thread changing feeder mechanism for circular knitting machine having needles, the combination of a plurality of thread guides each movable between an idle position in which its thread is away from the needles and a position for presenting its thread opposite the machine needles, a corresponding number of thread trappers each for operation in conjunction with the thread of one of said thread guides, means for selectively actuating said thread guides and trappers, a thread controlling finger located between the thread guides and thread trappers, and means for actuating said finger to move a thread presented by one of said guides across the path of the needles.

2. In thread changing feeder mechanism for circular knitting machines having needles and a fixed frame, the combination of a plurality of thread guides adapted to travel relative to the frame and each movable between an idle position in which its thread is away from the needles and a position for presenting its thread opposite the

machine needles, a corresponding number of thread trappers each for operation in conjunction with the thread of one of said thread guides, means for selectively actuating said thread guides and trappers, a cam plate mounted on the fixed frame, and a lever connected to the thread controlling finger and actuated by said cam plate to actuate the thread finger to move a thread presented by one of said guides across the path of the needles.

3. In thread changing feeder mechanism for circular knitting machines having needles, the combination of a plurality of thread guides each movable between an idle position in which its thread is away from the needles and a position for presenting its thread opposite the machine needles, a corresponding number of thread trappers each for operation in conjunction with the thread of one of said thread guides, a common shaft having cams thereon for selectively actuating said thread guides and thread trappers, a thread controlling finger located between the thread guides and thread trappers, means for intermittently rotating said shaft whereby the thread guides and trappers are moved to thread-presenting and idle positions, and means actuated in timed relationship to said common shaft for actuating said finger whereby it will move a thread presented by one of said guides across the path of the needles.

4. In thread changing feeder mechanism for circular knitting machines including needles, the combination of a plurality of thread guides each movable between an idle position in which its thread is away from the needles and a position for presenting its thread opposite the machine needles, a corresponding number of thread trappers each for operation in conjunction with the thread of one of said thread guides, means for actuating said thread guides, a thread controlling finger located between the thread guides and thread trappers, means for actuating said finger to move a thread presented by one of said thread guides across the path of the needles, and means for actuating the trappers whereby said thread is held by the corresponding trapper until the thread controlling finger has delivered the thread to the needles.

5. In thread changing mechanism for circular knitting machines having a pattern mechanism, needles and a fixed frame and a rotatable member, the combination of a plurality of thread guides on said rotatable member and each movable between an idle position in which its thread is away from the needles and a position for presenting its thread opposite the machine needles, a corresponding number of thread trappers each for operation in conjunction with the thread of one of said thread guides, a thread controlling finger located between the thread guides and thread trappers, and means for actuating said thread guides, thread trappers and thread finger including a cam plate movable relative to the fixed frame between actuating and non-actuating positions by means of the pattern mechanism, and devices on the rotatable member actuated by said cam plate during the movement of said member when the cam plate is in actuating position and including connections to said thread guides, thread trappers and thread finger.

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