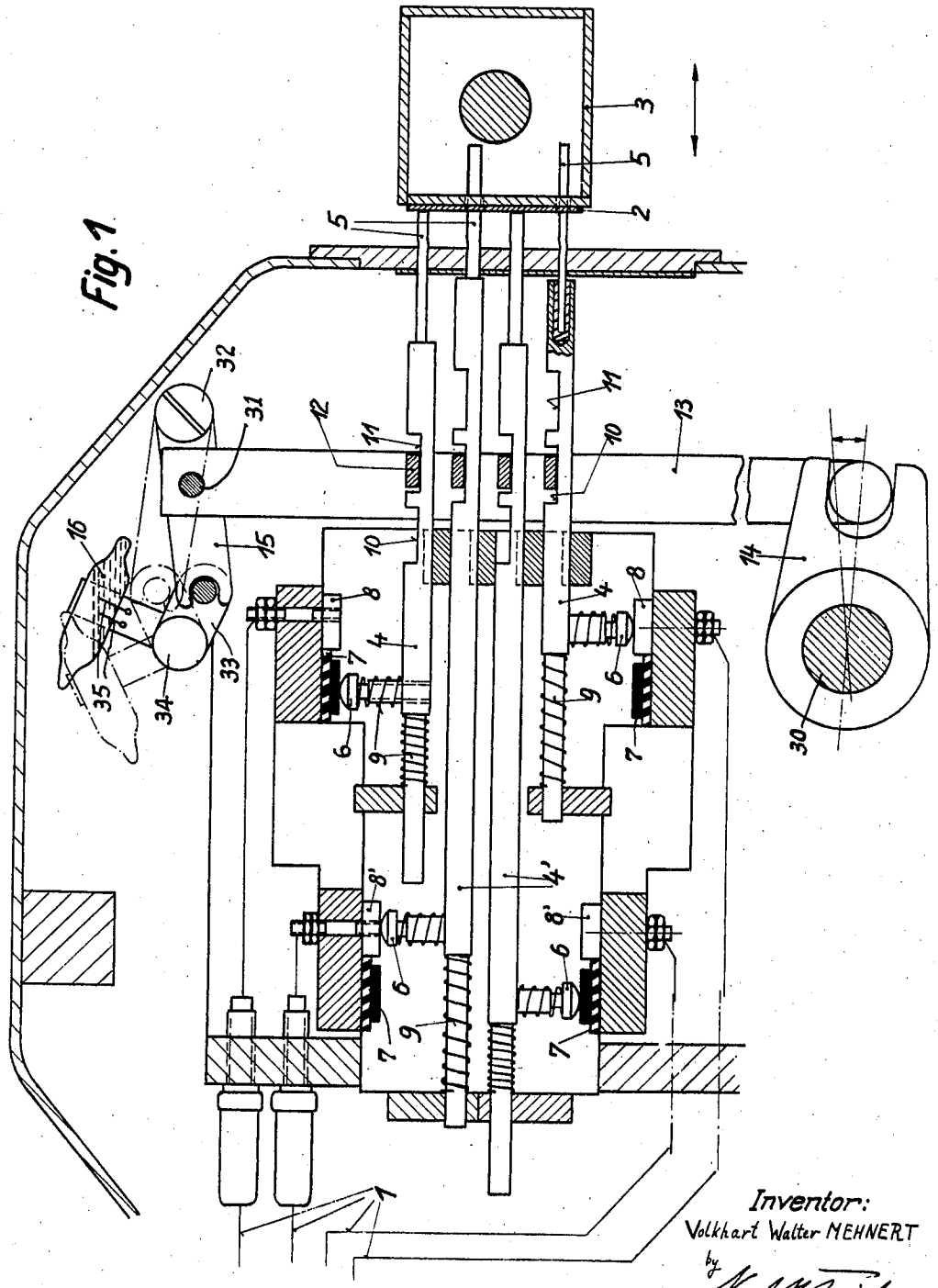
March 11, 1941. V. W. MEHNERT 2,234,271

KNITTING MACHINE WITH ELECTRICALLY CONTROLLED PARTS

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Fig. 1

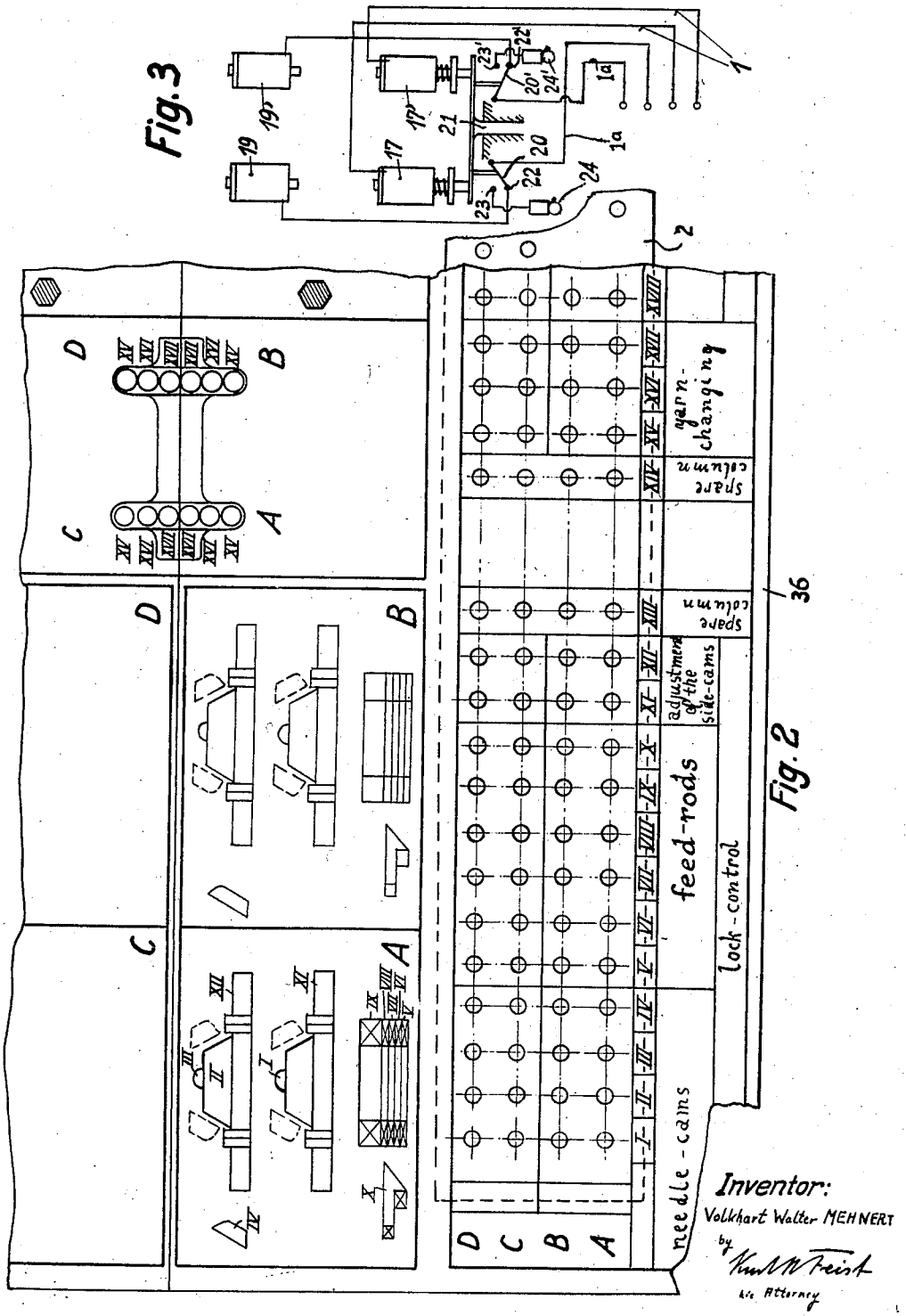


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KNITTING MACHINE WITH ELECTRICALLY CONTROLLED PARTS

Filed Feb. 26, 1938 2 Sheets-Sheet 2



Patented Mar. 11, 1941 2,234,271

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2,234,271

KNITTING MACHINE WITH ELECTRICALLY CONTROLLED PARTS

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7 Claims. (Cl. 66—154)

The invention relates to a knitting machine, and more particularly to a knitting machine in which the cams and other actuating parts provided at the carriage are electrically controlled to execute their reversal during the operation of the machine. It is one object of the invention to keep the lifters or lifting wires controlling said cams and parts free from current during the time while the reversing of said parts is executed, that is at the same time when the carriage changes its direction of strokes. Further objects of the invention consist in a particularly clear arrangement permitting an easy selection of the controlling parts and controlled parts.

The invention is now described in detail, illustrated by the drawings, showing in

Fig. 1 a longitudinal section through the control device in operating position,

Fig. 2 a diagram for explaining the arrangement of the punched holes in the control card, and

Fig. 3 a diagram of the arrangement of a safety control device.

By the shown control device each individual magnet actuating an adjustable cam of the locks, the yarn-changing, or another part of the knitting machine, is controlled through one of the out-going lines 1. Punched cards 2 that are laid across the governing or jacquard prism or roller 3 control the controlling device as will be described later on. The device shown in the drawings is provided with a plurality of lifting wires 4, 4' which are arranged in four rows one above the other, i. e. in two rows each for the locks in the front needle bed and the locks in the rear needle bed. Fig. 1 is a sectional view of the device and shows only one lifting wire of each row.

Each lifting wire possesses a contact knob 6 which is connected with one pole of an electric source (not shown) and may be brought into contact with either an insulated block 7 or a contact block 8 or 8' connected to a line 1 and the other pole of the electric source. The left hand end of each lifting wire is surrounded by a pressure spring 9 which is interposed between a stationary part of the device and a shoulder of the lifting wire and tends to urge the lifting wire to the right. Each lifting wire has two notches 10 and 11 which may be engaged with the bars 12 of a movable comb-like locking member 13. If the right hand notch 11 is engaged with the bar 12, the contact 6 engages the insulated block 7, and if the left hand notch 10 is engaged with the bar 12, the contact 6 engages the contact block 8 or 8'. The outer lifting wires 4 are shorter than the inner ones 4', so that the contact blocks 8 and 8' can be placed in a staggered position relative to one another.

The lower end of the locking member 13 is pivotally connected to a rocking lever 14 keyed to a rocking shaft 30 actuated by the main shaft (not shown) of the machine in any suitable manner. The upper end of the member 13 is pivoted to a lever 15 at 31. One end of said lever 15 is swingably mounted on the device at 32, the other end of said lever is hingedly connected to a lever 33 secured to a shaft 34 journalled in the device. Said shaft 34 carries a mercury switch 16 rigidly secured thereto, so that the mercury switch 16 may be tilted into the position shown in dash and dotted lines, when the rocking lever 14 lifts the member 13, which in turn swings the lever 15 about the pivot 32. The electrical connections between the terminals 35 of the mercury switch 16 and the lines connecting the contact blocks 8, 8' with the electric source are not shown in the drawings. It may be pointed out, however, that, if the switch 16 is in the position shown in full lines, the mercury bridges the terminals 35, so that the circuits are closed and all of the contact blocks 8, 8' are connected with the electric source, and that, if the switch 16 is in the position shown in dash and dotted lines, the mercury does not bridge the terminals 35, so that the circuits are interrupted and the contact blocks 8, 8' are disconnected from the electric source for a purpose to be described hereinafter.

The operation of the controlling device is as follows:

As soon as the locks situated on the carriage have operated the last needles before reversing, the lever 14 lifts the locking member 13, so that the contacts 8, 8' are disconnected from the electric source by means of the switch 16. Thus, no opening or closing sparks can occur at the contacts during the subsequent movements of the lifting wires 4, 4'. After a sufficient upward movement of the locking member 13 the bars 12 release the lifting wires 4 and 4' and all lifting wires will occupy, under the influence of the pressure of their spring 9 their starting position at the extreme right, as at this moment of the operation the jacquard prism 3 is moved to the right away from the position shown in Fig. 1. If the lifting wires 4, 4' are in their starting position, the knobs 6 contact the blocks 8, 8', and at the same time the jacquard prism 3 may perform a rotation caused by the main drive. Then,

the prism 3 is returned into the position shown in Fig. 1, whereby the card 2 attached to the side of the prism opposite to the ends 5 of the lifting wires controls the lifting wires.

Those lifting wires 4 or 4' that are opposite a hole in the control card 2 remain in the starting position with closed contacts 6, 8, while the other lifting wires are pushed to the left by the unpunched part of the card into the position in which the contact 6 is opposite the insulating block 7. Then, the member 13 is lowered, whereby its bars 12 are engaged with the notches 10 and 11 respectively of the lifting wires, so that the latters are locked in their positions adjusted by the control card. At the same time the mercury switch 16 connected to the member 13 is returned into the position connecting the contact blocks 8, 8' with the electric source. Now, the magnets connected to the blocks 8, 8' which contact one of the knobs 6, are excited and actuate the cams reversing the carriages of the knitting machine. The magnets connected to blocks 8, 8' which are free from a knob 6, remain inoperative. Fig. 1 shows the upper lifting wire 4 and the lower one of the lifting wires 4' in a position, in which the respective magnets are switched-off, while the upper lifting wire 4' and the lower lifting wire 4 are in a position, in which the respective magnets are switched-on.

The control prism can then be again moved away from the control device.

The whole action just described takes place during the reversing of the carriage, consequently e. g. within a space of time of ½ second to 1 second.

As pointed out above, each lifting wire controls an individual magnet, which in turn controls a part of the knitting machine. Each of the lifting wires could be electrically connected with any one of the magnets. Preferably, however, the lifting wires are electrically connected with the magnets according to a certain schedule, and the person punching the card 2 is furnished with a sheet 36 provided with printed symbols and drawings which he may place in front of the card 2 to be punched, as shown in Fig. 2, so that he may easily understand the operations of the controlling device caused by the holes to be made in the card 2. On the sheet 36 the horizontal rows are marked with letters A, B, C and D and the vertical columns are marked with numerals I, II, III, IV . . . The letters A, B, C and D refer to the locks of the knitting machine. For example the letter A refers to the left hand lock of the front needle bed, the letter B refers to the right hand lock of the front needle bed, the letter C refers to the left hand lock of the rear needle bed, and the letter D refers to the right hand lock of the rear needle bed. The numerals refer to various controllable elements of the locks and of the knitting machine. For example, the numerals I–IV refer to the needle cams, the numerals V to X refer to the feed rods, the numerals XI and XII refer to the side cams of the locks, and the numerals XV–XVII refer to the yarn changing. Thus, the point AI, i. e. the lowest point in column I, indicates a needle cam of the left hand lock of the front needle bed, or the point DIII indicates a needle cam of the right hand lock of the rear needle bed, etc. The symbols and drawings in the upper part of the sheet 36, wherein the same letters and numerals as in the rows and columns are used, diagrammatically illustrate the locks and controllable elements, so that the operator may easily recognize the respective needle cam, feed rod, side cam, etc., which is indicated by the points AI, DIII, etc. The columns XIII and XIV, which correspond to the width of the hinges in the card, are spare columns. Further columns not shown in the drawings may refer to the control of the strokes of the jacquard roller towards and away from the device and also to the control of the rotation of the control prism about its axis after a certain number of strokes. Further columns may refer to holes in the card 2, which may be provided for the control of a commutating device causing a reversal of current by changing-over the poles of the magnets. In this way a permanent magnetisation of the magnets is prevented which would disturb the exact operation of the electric control mechanism.

Obviously, the arrangement of the rows on the sheet 36 corresponds to the arrangement of the series of holes in the card 2 and to the arrangement of the rows of the lifting wires, 4, 4' in the controlling device. Thus, it will be apparent, that the lifting wires causing the operation of a certain part of the knitting machine, for example the operation of the locks, are arranged in horizontal rows (A, B, C, D) and that the various lifting wires effecting for equal operations, for example the operation of the needle cams, are arranged in vertical columns (1, 2, 3, 4) one of said vertical columns being shown in Fig. 1.

The operator punching the cards 2 also follows the illustrations and symbols on the sheet 36, so that mistakes in punching the cards may be easily avoided. As, however, mistakes may occur, I prefer to provide the controlling device with means which prevent a simultaneous excitation of two different magnets controlling conflicting operations. Fig. 3 illustrates an arrangement, by means of which the magnets 19, 19' cannot be excited, when the magnets 17, 17' are excited. The magnets 17, 17' are directly connected to the lines *l* coming from the controlling device. The magnets 19, 19', however, are not directly connected to the lines *la* coming from the controlling device. Switches 20 and 20' are arranged in the lines *la*. Said switches are mechanically connected to a member 21 secured to the armatures of the magnets 17, 17'. If the magnets 17, 17' are not excited, the switches 20, 20' contact the terminals 22, 22', so that the magnets 19, 19' are connected to the lines *la* and may be excited. If, however, the magnets 17, 17' are excited, the member 21 brings the switches 20, 20' into contact with the terminals 23, 23', so that the magnets 19, 19' are disconnected from the lines *la* and cannot be excited. Thus, if by some mistake, the cards are punched in such a way that both conflicting magnets 17 and 19 would come into action, the magnets 19 are rendered inactive owing to the described guarding means, and the error is brought to the attention of the operator before any damage is caused. If desired, an optical or acoustical signalling device 24, 24' may be connected to the terminal 23, 23', so that said signalling device is actuated, when a lifting wire closes the line *la*, while another lifting wire closes the line *l*, thus rendering the error immediately visible or audible to the operator.

The current for actuating the magnets is supplied by a low tension generator not shown in the drawings which is mechanically operated from a drive of the machine. In this manner, the lines, magnets and other parts of the machine are without current when the latter is not working.

What I claim is:

1. A knitting machine with electrically controlled parts, comprising, a main drive, a plurality of magnets, each of said magnets being connected to one of said parts, a plurality of displaceable lifting wires electrically connected to said magnets for controlling same, a jacquard mechanism, said jacquard mechanism being connected to said main drive and being movable against said displaceable lifting wires for adjusting same, and a switch arranged in the electrical connection between said lifting wires and said magnets for a temporary interruption of said electrical connection during the adjustment of said lifting wires.

2. A knitting machine with electrically controlled parts, comprising, a main drive, a plurality of magnets, each of said magnets being connected to one of said parts, a plurality of displaceable lifting wires electrically connected to said magnets for controlling same, a jacquard mechanism, said jacquard mechanism being connected to said main drive and being movable against said displaceable lifting wires for adjusting same, a locking member for holding said lifting wires in an adjusted position, said locking member being connected to said main drive, and a switch arranged in the electrical connection between said lifting wires and said magnets for a temporary interruption of said electrical connection during the adjustment of said lifting wires, said switch being mechanically coupled with said locking member.

3. A knitting machine with electrically controlled parts, comprising, a main drive, a plurality of magnets, each of said magnets being connected to one of said parts, a plurality of contact blocks electrically connected to said magnets, a plurality of displaceable lifting wires, each lifting wire carrying a contact member adapted to contact one of said contact blocks for controlling said magnets, said contact blocks and said contact members forming the terminals of sliding contacts, said lifting wires being arranged in several rows, each row comprising a series of lifting wires, and a jacquard mechanism, said jacquard mechanism being connected to said main drive and being movable against said displaceable lifting wires for adjusting same.

4. A knitting machine as claimed in claim 3, said lifting wires being arranged in four rows, the lifting wires of the outer rows being shorter than the lifting wires of the inner rows, and the contacts carried by the lifting wires of the outer rows being nearer to the jacquard mechanism than the contacts carried by the lifting wires of the inner rows.

5. A knitting machine as claimed in claim 3, said lifting wires being arranged in several horizontal rows, each row comprising a series of lifting wires, the lifting wires of each row being arranged in such a manner that a plurality of vertical columns is formed, each vertical column comprising one lifting wire of each horizontal row, the lifting wires of the horizontal rows controlling magnets actuating various parts of the knitting machine, and the lifting wires of the vertical columns controlling magnets effecting equal operations of various parts of the knitting machine.

6. A knitting machine with electrically controlled parts, comprising, a main drive, a plurality of magnets, each of said magnets being connected to one of said parts, a plurality of displaceable lifting wires electrically connected to said magnets for controlling same, a jacquard mechanism, said jacquard mechanism being connected to said main drive and being movable against said displaceable lifting wires for adjusting same, pairs of said magnets causing conflicting operations of the controlled part of the knitting machine, and an interrupting switch arranged in the line leading to one magnet of said pair of magnets, said interrupting switch being controlled by the other magnet of said pair for preventing a simultaneous excitation of both magnets of said pair.

7. A knitting machine with electrically controlled parts, comprising, a main drive, a plurality of magnets, each of said magnets being connected to one of said parts, a plurality of displaceable lifting wires electrically connected to said magnets for controlling same, a jacquard mechanism, said jacquard mechanism being connected to said main drive and being movable against said displaceable lifting wires for adjusting same, pairs of said magnets causing conflicting operations of the controlled part of the knitting machine, an interrupting switch arranged in the line leading to one magnet of said pair of magnets, a signal device, said signal device being electrically connected to said interrupting switch, said interrupting switch being controlled by the other magnet of said pair for preventing a simultaneous excitation of both magnets of said pair, and said interrupting switch being adapted to connect said signal device with said line in the position for disconnecting said magnet from said line.

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