

Sept. 5, 1933.

N. LEVIN

1,925,450

KNITTING MACHINE WITH INCLINED DESIGN WHEEL

Filed Aug. 1, 1931

2 Sheets-Sheet 1

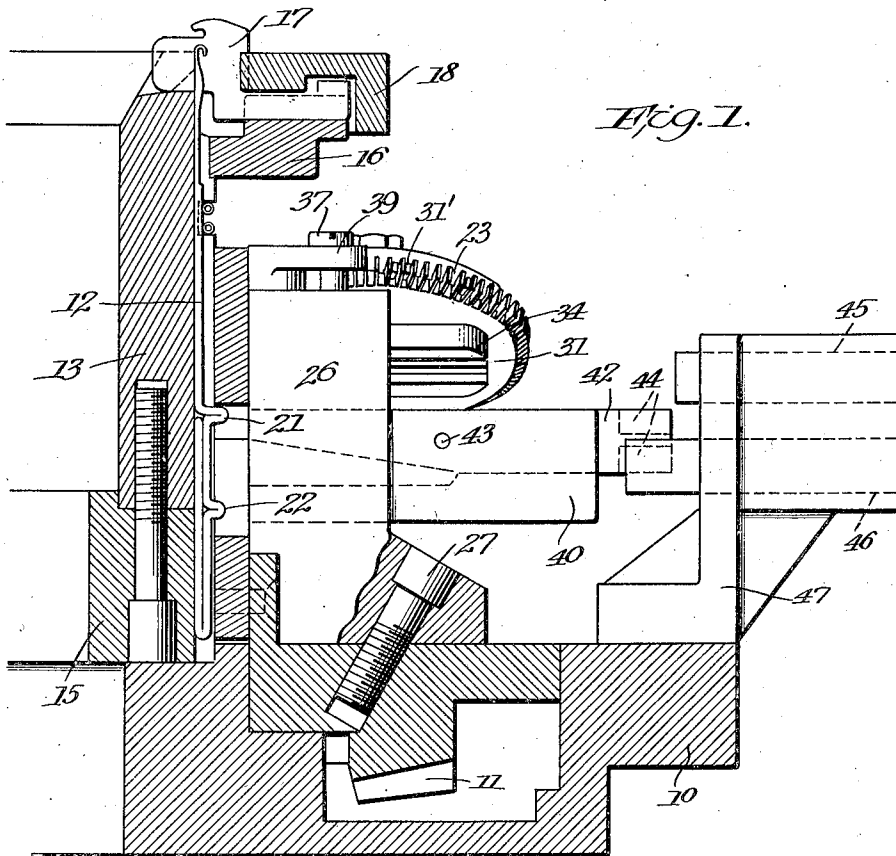


Fig. 1.

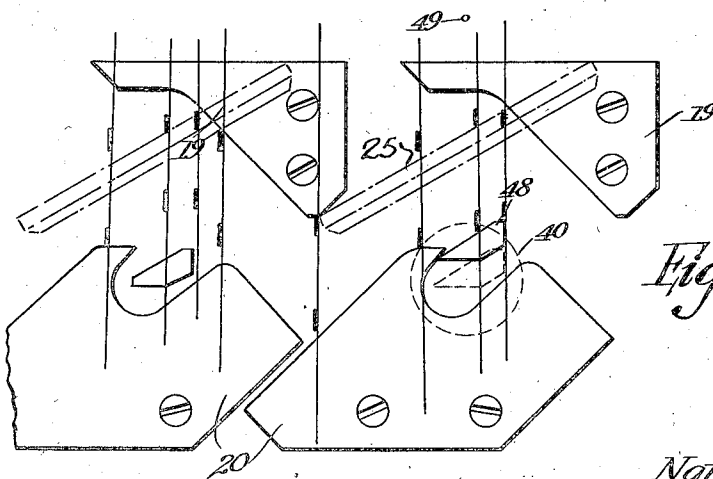


Fig. 2.

Inventor

Nathan Levin.

Attorney

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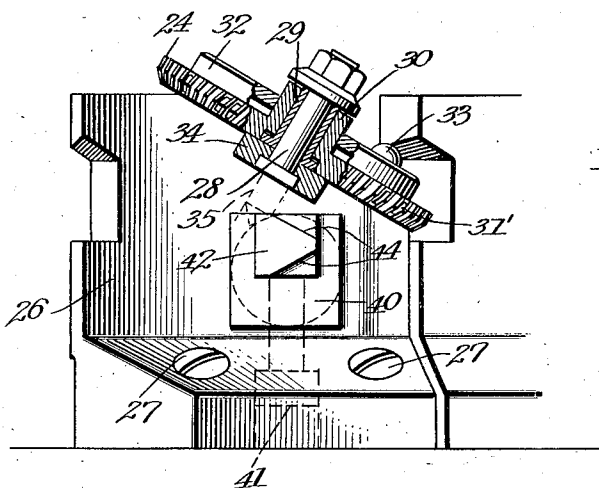
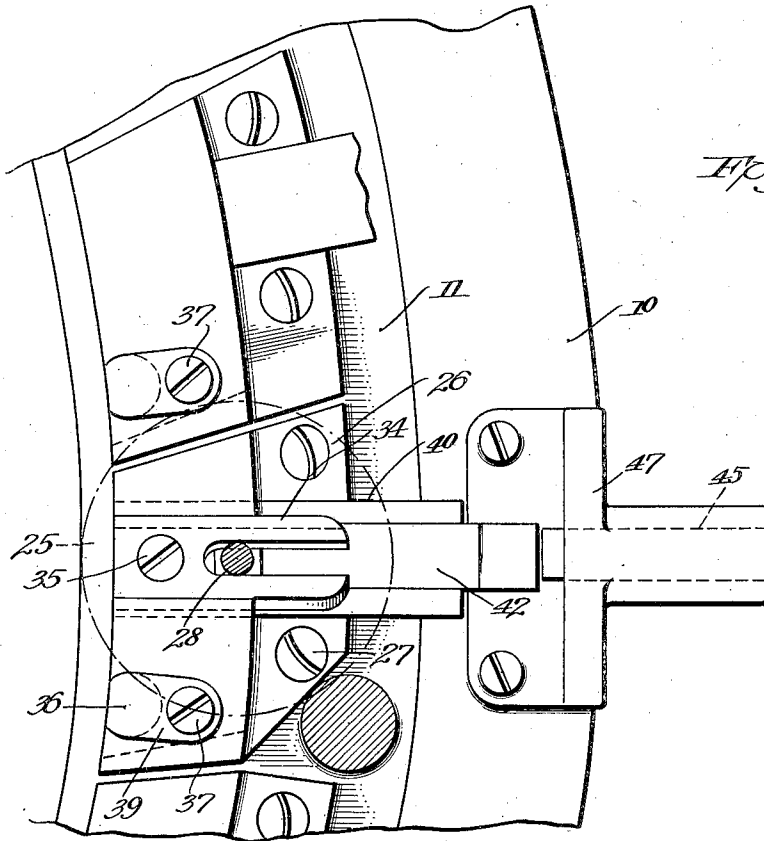
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2 Sheets-Sheet 2



Inventor

Nathan Levin,

A. W. DeLuw,

Attorneys

UNITED STATES PATENT OFFICE

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KNITTING MACHINE WITH INCLINED
DESIGN WHEELNathan Levin, Trenton, N. J., assignor to H.
Brinton Company, Philadelphia, Pa., a cor-
poration of Pennsylvania

Application August 1, 1931. Serial No. 554,568

7 Claims. (Cl. 66—50)

My said invention relates to a knitting machine with inclined design wheels and it is an object of the same to provide means whereby plain fabric may be interpolated between lengths of figured fabric produced by the aid of the design wheel or wheels. In machines of the character here in question the design wheels select certain needles and raise them; e. g. to normal knitting position, i. e., to latch-clearing position in a latch needle machine such as shown in the appended drawings, while non-selected needles may hold their old stitches and remain in the tuck position where they do not take the new yarn in a course or courses. By the use of my improvements I nullify the effect of the design wheel in that all needles are elevated and restored to their normal position in the needle wave before the needles reach the next adjacent yarn feed where they are to take yarn and make new stitches. It will be understood that the invention is more particularly intended for multiple feed machines though it may also be used in single feed machines.

Referring to the drawings, which are made a part of this application and in which similar reference characters indicate similar parts:

Fig. 1 is a partial vertical section of a circular independent needle knitting machine embodying my improvements,

Fig. 2, an elevation illustrating a cam set as laid out flat, and showing the relation of a design wheel to the cams of the set,

Fig. 3, a partial horizontal section and

Fig. 4, a detail of a design wheel and related parts viewed from the right in Fig. 1, with parts broken away.

In the drawings reference character 10 indicates the table of a circular knitting machine which table supports the ring gear 11 on which are mounted the needle cams for operating the needles 12 which are located in slots of the needle cylinder 13. The needle cylinder is fixed to the table 10 by means of an intermediate ring 15. The ring 15 is merely an extension for elongating the cylinder in cases where 13 represents an ordinary needle cylinder and in new machines the part 13 may be elongated to such an extent as to make the needle cylinder sufficiently high to accommodate needles of the length indicated. The cylinder carries at its upper end a sinker bed 16 holding sinkers 17 which are actuated by cams on a sinker ring 18, all as usual in machines of this type. The needle cams include stitch cams 19 and needle elevating cams 20. According to the arrangement here shown the needles are provided

with upper butts 21 and lower butts 22, the upper butts being acted on by the stitch cams for lowering the needles to knit and the lower butts being acted on by cams 20 for raising the needles sufficiently high to cause the butts 21 to enter into notches 23 between teeth 24 of a design wheel 25, long enough so that the needles will serve to turn the design wheel.

The cam ring is made up of a plurality of segments 26 attached to the ring gear by screws 27, there being preferably a segment for each feed. A segment 26 carries a stitch cam 19, a needle elevating tuck cam 20 and an inclined post 28 on which is mounted a bushing 29 for the hub 30 of the design wheel, said hub having a laterally extending flange 31 on which a plate 32 rests, said plate being secured to the flange by screws 33 for clamping inserts 31' between these parts, as usual, these inserts filling the space between adjacent teeth wherever they are used so as to engage the butts of corresponding needles as they pass underneath the stitch cam 19 and are elevated by a cam 20. Needles so selected are raised to a normal knitting position where they take a new yarn and are then pulled down by the stitch cam to draw a new stitch and cast off the old stitch. The needles whose butts engage in notches not provided with inserts are not raised to normal knitting position but only to tuck position, where they take the yarn without clearing their latches and so make tuck stitches, such as hereinafter described. As shown in Fig. 4 the inclined post 28 has at its lower end a head engaging under a bifurcated bracket 34, the post being located in a notch between the forks of said bracket so that the wheel may be adjusted radially of the machine into proper position and the bracket being secured to the segment 26 by a screw 35. The stitch cams 19 are mounted on rods 36 vertically movable in bores in the ring gear by means of screws 37 and coil springs (not shown) surrounding the screws below lateral extensions 39 of the rods 36, as well known in the art.

The segments 26 are also provided with holes to receive a tuck bar holder 40 held in place by a screw 41, the tuck bar holder carrying a tuck bar 42 pivoted at 43 and having at its outer end beveled faces 44 for engagement by similar faces on a pair of radially slidable rods 45, 46 in a bracket 47 on the table 10, which rods are moved in and out by suitable pattern mechanism so as to move the tuck bar about its pivot 43. At its inner end the tuck bar is provided with a cam 48 (Fig. 2) which cam is moved by the operation of

the tuck bar either into the operative position shown in full lines in Fig. 2 or into the idle position in notch 48 of tuck cam 20, as shown in dotted lines on said figure. When the cam 48 is in dotted line position the needles are all raised by engagement of their lower butts with the elevating cam 20 before they reach the position for engagement with the periphery of wheel 25, they being raised into such a position that their upper butts are engaged by corresponding inserts in the wheel to raise the needles to normal knitting position whereas at points where there are no inserts the upper butts merely engage in the notches to rotate the wheel and remain in such engagement only until the lower butts reach the top of cam 20 after which they pass the yarn feed at tuck position. If the cam 48 is in full-line or operative position it engages the lower butts of non-selected needles and elevates them to their proper position in the needle wave—actually a very little lower than the needles raised by the inserts of wheel 25, so as to insure good driving engagement of their butts with the teeth of wheel 25. It will be seen that, in effect, the cam 48 when raised nullifies the action of the wheel 25. It will be understood that any suitable number of segments 26 may be used according to the diameter of the machine, each segment carrying a stitch cam, a needle elevating cam, a wheel etc., as desired, and each segment takes the yarn from one feed whose circumferential position is indicated at 49.

The design wheel is in the position known to the art as "inclined", i. e., it is neither in a horizontal plane nor in a vertical plane, but in a plane such that it elevates needles selectively by an upward pressure on the butts of selected needles. The nullifying cam lies below the wheel in such a position that its active surface will be cut by a vertical plane in which plane lies a radius of the needle cylinder bisecting the design wheel. For brevity this position is designated in the claims as "centrally below" the wheel, though it will be understood that the cam is actually near the outer margin of the wheel and that the tuck bar is below a diameter of the wheel corresponding to a radius of the machine.

My invention is particularly advantageous in connection with a multiple feed knitting machine, in that the tuck bar holders are located directly beneath the design wheels, thus requiring a minimum of space and permitting the use of a maximum number of feeds. Preferably the cam ring will be made in segments, each of which segments has or may have a design wheel and a tuck bar thereon. It will be evident that the tuck bar holder, being secured in a hole in a cam ring segment can readily be detached when desired. The devices constituting my invention may be made up and sold as an attachment to a knitting machine of known type, such attachment comprising the intermediate ring 15 for lengthening of the needle cylinder and the segments 26 carrying the design wheels and the tuck bar holder with the tuck bar, together with the controlling mechanism on bracket 47 which is operable by conventional pattern mechanism.

In the use of my machine it will obviously be desirable not to raise the upper needle butts so high that they rise above the inclined design wheel since in such case they would not drive the design wheel. By elevating them just sufficiently to keep them in driving relation with the wheel it will be effectively driven, as is obvious.

While the preferred construction is one in

which the secondary needle butts are between the primary butts and the lower ends of the needle shanks it will be understood that a butt can be formed at the bottom of the needle as in British Patent No. 279,651 or the lower end of the needle shank may be otherwise enlarged for engagement by the nullifying cam.

It will be obvious to those skilled in the art that many changes may be made in my device all without departing from the spirit of my invention and therefore I do not limit myself to what is shown in the drawings and described in the specification but only as indicated in the appended claims.

I claim:

1. In a knitting machine, a series of independent needles having upper and lower butts, needle cams including a stitch cam acting on the upper needle butts, an inclined design wheel for lifting needles selectively, and a movable nullifying cam having an active face parallel to the plane of said design wheel said face coacting with the lower butts of the needles when the nullifying cam is in operative position, substantially as set forth.

2. A device as in claim 1, said nullifying cam being located centrally below the design wheel and serving to hold the non-selected needles at approximately the same level in the needle wave as if selected by the design wheel, substantially as set forth.

3. In an independent needle circular knitting machine, a series of needles having upper and lower butts, a stitch cam, a peripherally-slotted design wheel operating in advance of the stitch cam to raise selected needles to latch-clearing level, a fixed cam having a needle-elevating face acting on the lower butts of the needles for raising them to tuck level with their upper butts in position to be further elevated by said design wheel, and a vertically movable cam having an active face parallel to the plane of said wheel whereby said cam when elevated holds the upper butts in line with the butts of selected needles, substantially as set forth.

4. In a multiple-feed circular knitting machine, a series of needles having upper and lower butts, a series of cam sets each comprising a stitch cam, a design wheel operating in advance of each stitch cam for elevating needles selectively, an elevating cam acting on the lower butts of the needles to bring their upper butts into operative relation to the design wheel, and a nullifying cam having an active face parallel to the design wheel, said nullifying cam being movable from an idle position to an active position wherein it acts on the lower butts to maintain the non-selected needles in normal position in the needle wave, substantially as set forth.

5. A device as in claim 4, said nullifying cam being located centrally below the design wheel and said elevating cam having a recess to receive the nullifying cam in its idle position, substantially as set forth.

6. In a multiple-feed circular knitting machine, a series of independent needles having upper and lower butts thereon, a series of similarly arranged stitch cams acting on the upper butts, a peripherally-slotted inclined design wheel in advance of each stitch cam for selectively elevating needles to normal knitting level while permitting other needles to remain at tuck level, a fixed cam for raising the needles to tuck level, and a movable nullifying cam having an active face parallel to the plane of said design wheel said face engaging the lower butts of the needles when

the nullifying cam is in operative position, substantially as set forth.

7. An attachment for a circular independent needle multiple-feed knitting machine having needles with upper and lower butts thereon, said attachment including a supplementary needle cylinder adapted to be positioned underneath the ordinary needle cylinder with the needle slots of the two cylinders in alinement, a cam ring comprising a plurality of segments each carrying a stitch cam for acting on the upper butts of

the needles, a design wheel for selectively raising the needles to normal knitting level, a tuck cam for raising the needles to tuck level, and a movable tuck bar located on a radius of the machine corresponding to a diameter of the design wheel, said tuck bar having a cam face parallel to the plane of the design wheel for acting on the lower butts of the needles to nullify the action of said design wheel when the tuck bar is in operative position, substantially as set forth.

NATHAN LEVIN.

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