Dec. 13, 1938. H. S. HORROCKS ET AL 2,140,078

MUTABLE DESIGN WHEEL FOR KNITTING MACHINES

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Fig. 4.

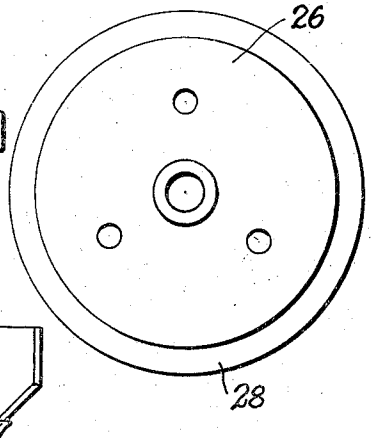


Fig. 3.

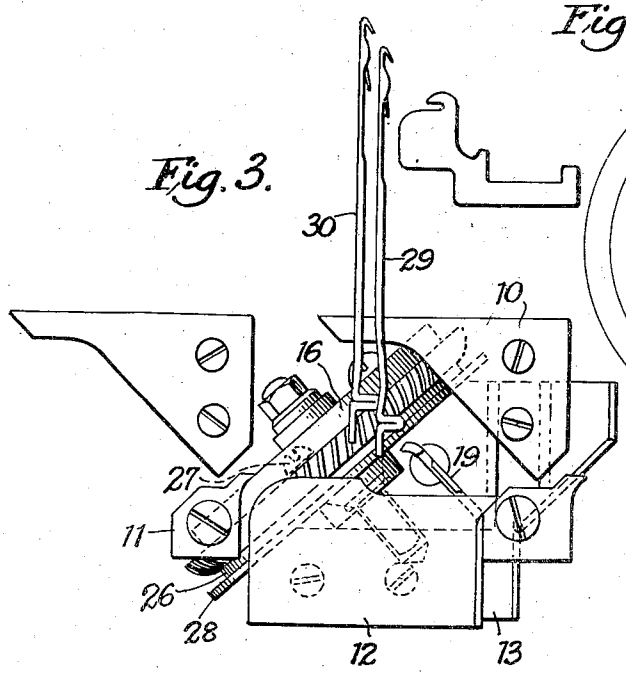


Fig. 2.

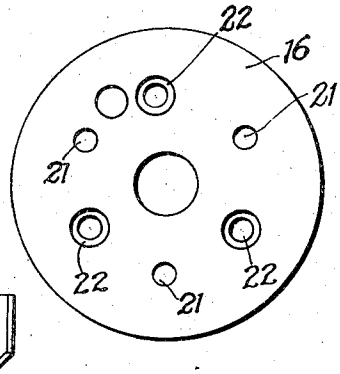
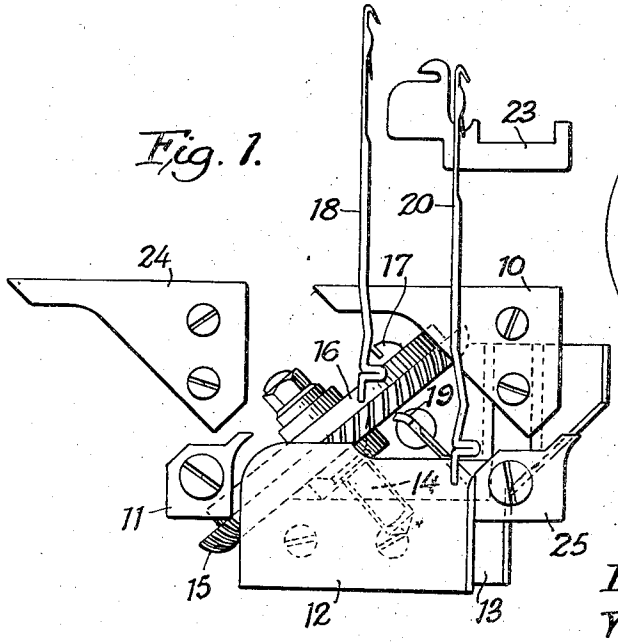


Fig. 1.



Inventors
Harry S. Horrocks,
William D. Gorman,
By
Attorney

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Fig. 7.

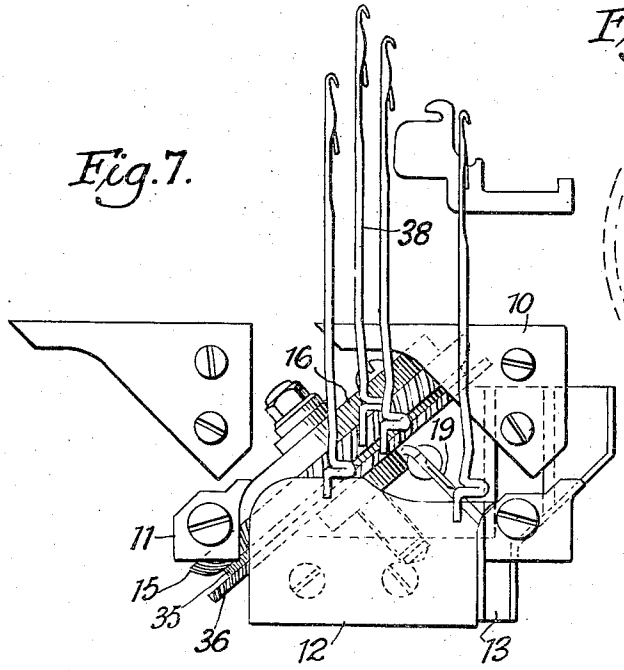


Fig. 8.

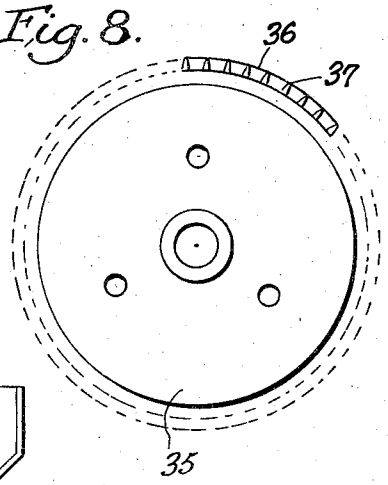


Fig. 5.

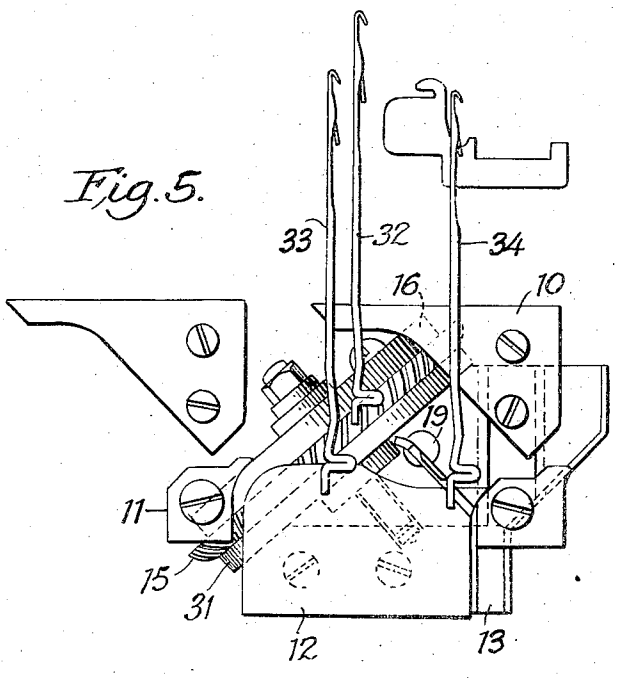
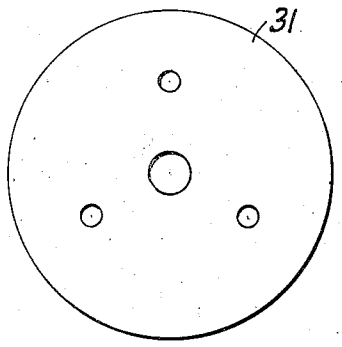


Fig. 6.



Inventors,
Harry S. Horrocks,
William D. Gorman,

By

Attorney

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MUTABLE DESIGN WHEEL FOR KNITTING MACHINES

Harry S. Horrocks and William D. Gorman, Philadelphia, Pa., assignors to H. Brinton Co., Philadelphia, Pa., a corporation of Pennsylvania

Application October 1, 1935, Serial No. 43,113

11 Claims. (Cl. 66—50)

Our invention relates to knitting machines and it is an object of the same to provide an improved design wheel of a type such as is commonly used in independent needle circular knitting machines for raising needles selectively, the primary feature of novelty consisting in the provision of readily interchangeable parts of novel character for such a wheel, whereby different pattern effects, etc., can be made in the knitted fabric by applying to the wheel one or another of such novel interchangeable parts or attachments.

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

Fig. 1 is an elevation of needle actuating parts at a feed, showing a design wheel without any of the attachments of our invention,

Fig. 2, a top plan of a disk forming part of said wheel, modified for the purposes of our invention,

Fig. 3, an elevation of needle actuating parts at a feed, the design wheel having one of our attachments applied thereto,

Fig. 4, a top plan of the attachment used in Fig. 3,

Fig. 5, an elevation similar to Fig. 3, but showing a different attachment on the design wheel and illustrating its action on the needles,

Fig. 6, a top plan of said attachment,

Fig. 7, an elevation similar to Fig. 3, but showing still another attachment applied to the design wheel, and illustrating the needle action, and

Fig. 8, a top plan of the said attachment.

In the drawings, reference character 10 indicates a stitch cam which may be the stitch cam of a single feed machine or may be a stitch cam of one of the sections of a multiple feed machine, there being one such section for each feed. A cushion cam 11 is here shown as raising the needles to a level above the welt level or normal idle level, said cam raising the needles to the height defined by the upper margin of a cam 12 or approximately so. A supporting member or section 13 to which the other parts are attached has a bearing for the pivot 14 of a design wheel 15 having slots about its periphery which may be filled with inserts in the usual manner; e. g., as in the patent to Sanders, 1,902,903, or in other suitable manner. A plate 16 serves to hold the inserts in place, this plate being secured to the wheel by screws 17. At points where the slots are thus filled the needles whose butts encounter the inserts are raised to tuck level, as in the case of the needle shown at 18 (Fig. 1) whereas the needles that encounter empty slots pass down through the slots (or, more accurately, such needles move along the top of the cam 12 without being raised, while the walls of the slots ride upward along the butts of the needles so encountered). A needle which is not raised by the wheel moves on along the top of the cam 12 without taking part in the knitting. It is desirable and often necessary to return the non-selected needles to welt level, and for this purpose we make use of a split cam 19 against which the butts of non-selected needles ride, thus returning such needles to welt level.

As shown in Fig. 2, the disk 16 is provided with three holes for screws 17, these holes being the small holes 21. In addition to these holes the disk has now been provided with three larger holes 22 for receiving screws not used when the wheel is in the condition indicated in Fig. 1, but used in the set-up of the other figures of the drawings.

In Fig. 1 reference character 23 indicates a conventional sinker at the usual level, both the sinker and the needles being turned at right angles to their normal position for clearer showing. A stitch cam 24 of an adjacent feed is also shown, as is a raising cam 25 of a feed that is at the opposite side of the feed or section more fully shown.

According to customary practice, and as shown in Fig. 1, a design wheel raises needles from one of three levels to the next level; i. e., from idle level to tuck level or from tuck level to knitting level, but it is not practical to raise from idle level to knitting level at one operation, nor has it been considered practical to make the same wheel raise needles at one time to one level and at another time to a different level, and it is an object of our invention to provide solutions for these problems.

Referring now to Figs. 3 and 4, there is provided means whereby the wheel of Fig. 1 now raises all the needles to tuck level and further raises selected needles to knitting level, all without any alteration in the parts except for the wheel. This has been removed from its support and there has been attached to its under side a plate or disk 26 by means of screws passing through holes in the wheel and the disk 16 shown at 22 in Fig. 2 and having threaded engagement with holes provided therefor in the disk 26. As shown in Fig. 2, the holes at 22 are countersunk, and one of the screws just men-

tioned is shown in part in dotted lines at 27 in Fig. 3.

The disk 26 has an annular peripheral flange 28 extending to, or nearly to, the outer margin of the wheel. It being remembered that the wheel is substantially tangent to the needle circle it will now be evident that a needle, as at 29, which passes through a slot in the wheel (as to its butt) cannot drop immediately after its butt becomes disengaged from the walls of the slot but its butt rides on for a little while upon the flange 28, so that the needle passes the yarn at the tuck level and takes yarn while retaining its old loop. By reason of the fact that the slotted wheel is now located at a higher level, due to the interposition of the disk 26 between the wheel and the support on which the wheel rests, the butts of the needles engaged by inserts on the wheel will be raised to the knitting level before being released from said inserts, as indicated by needle 30. It will be evident also that the needle butts will engage the wheel somewhat sooner in their travel, as the front or upper face of the wheel has been somewhat advanced circumferentially of the needle circle, but this is immaterial and has no effect on the knitting.

In Fig. 5 again there has not been any change in any part save in the wheel. Here the disk 31 has been added to the wheel 15, being secured as in the case of disk 26, and so raising the wheel to a position where needles encountered by inserts in the wheel will be raised to the knitting level, as in the case of needle 32. All the needles approach the wheel at the level of needle 33, they having been raised from welt level by cam 11, and the needles whose butts encounter slots in the wheel pass through at the level of needle 33 and then down to the welt level, as at 34. The extreme diameter of the disk 31 being sufficiently smaller than that of the disk 26 the descent of the needles is not interfered with, but the wheel has been raised by the thickness of the disk, as in the case of disk 26 in Fig. 3.

In Figs. 7 and 8 there is shown still another form of interchangeable disk 35, similar to disk 26 in the thickness of its central or hub portion, but different in that its thin flange portion 36 is slotted as indicated at 37. The slots at 37 are similar to those of the design wheel but are spaced at greater distances, being here shown as being twice as far apart as the slots of the wheel. This is, however, a mere feature of design and will vary according to the effects that may be desired in the cloth.

In the case of the arrangement illustrated in Fig. 7, needles that are engaged by inserts in the wheel, or by any equivalent means, will be raised to knitting level, as the wheel has been raised from the position of Fig. 1, as explained in connection with the description of Fig. 2. Needles that encounter slots in the wheel will pass on through the wheel, but those that strike the disk 35 so that their butts rest on its upper surface will be raised to tuck level, as in the case of needles 29 of Fig. 2. At the points where the disk 35 is slotted the butts of the needles that pass down through the wheel find no support but pass on down through the disk, after which they may be engaged by the cam 19 to bring them down to welt level, if necessary.

It will thus be seen that by the use of our invention needles may be moved selectively from idle level to tuck level or to knitting level in a single operation; that they may at will be moved up selectively for only a single step or may go all the way to knitting level from idle level; or that at one operation at one feed they may be moved, some to tuck level and others to knitting level, while still others may remain at welt level.

The cushion cam is used in fine gauge machines to control the descent of the needles, as otherwise some needles may pass down too far due to their momentum or for other reasons, and so make irregular fabric. In coarse gauge machines the cam 12 may be relied on to raise the needles to proper position to be picked up by the wheel. Some such means is necessary in a device of this character for reasons set forth in Patent 2,000,837 and in order that the wheel may be enabled to raise the needles to knitting level. It is impossible to raise them from welt level all the way to knitting level by the wheel alone at a single operation, therefore we select needles at a higher level and return the unselected ones to welt level by a split cam.

It is possible to make the tucking disk without a flange by undercutting the wheel at its periphery to provide space between the wheel and said disk to receive the butts of the needles, in which case the tucking disk would be perfectly flat yet the same space would be provided for the needle butts. In such case, however, the wheel is thicker by the amount necessary to provide space for the butts of the needles, since the slotted part of the wheel must be of the usual thicknes so that it may receive the usual inserts and provide the necessary width for driving engagement by the needle butts to rotate the wheel. The combined thickness of the wheel and the tucking disk is therefore greater than in the forms illustrated, and hence in such form of the invention the section must be made somewhat lower so that the wheel will be properly located with reference to the needles.

It will be obvious to those skilled in the art that the number and arrangement of the slots in the disk 35 may be varied at pleasure and that many other alterations and variations may be made in the disclosed invention, all without departing from the spirit thereof; therefore we do not limit ourselves to what is shown in the drawings as illustrative of the invention and described in the specification, but only as required by the state of the known art.

Having thus described our invention, what we claim is:

1. In a circular independent needle knitting machine, a radially slotted design wheel, said wheel having means to raise needles selectively from an idle level to tuck level, a support for said wheel, and means adapted to be inserted between said wheel and said support for cooperating with the wheel to cause all the needles to be raised selectively either to tuck level or to knitting level.

2. In a circular independent needle knitting machine, a radially slotted design wheel, said wheel having means to raise needles selectively from an idle level to a tuck level, a support for said wheel, and means adapted to be inserted between said wheel and said support for cooperating with the wheel to cause needles to be raised selectively either to tuck level or to knitting level, said means being arranged and constructed to leave certain unselected needles at an idle level.

3. A device as in claim 1, said means comprising a disk having a diameter substantially the same as that of the wheel.

4. A device as in claim 2, said means comprising a disk having a diameter substantially equal to that of the wheel, the outer part of the disk being constructed and arranged to lift certain

needles while leaving others at an idle level.

5. In an independent needle knitting machine, a radially slotted design wheel mounted on an axis oblique to the shanks of the needles, said wheel having means for raising needles selectively from an idle level to tuck level, a support for said wheel, and means adapted to be inserted between said wheel and its support for causing the wheel to raise needles selectively to knitting level while other needles remain at an idle level.

6. A device as in claim 5, said means comprising a disk adapted to be mounted concentrically with the wheel and having a diameter not greater than that of the unslotted portion of the wheel.

7. In a circular independent needle knitting machine, a radially slotted design wheel having means to raise needles selectively from an idle level to tuck level, a support for said wheel, a disk adapted to be mounted concentrically with said wheel, the outer part of said disk having slots corresponding in position to certain slots of the wheel but fewer in number than the slots of the wheel, whereby needles whose butts pass through slots of the disk remain at an idle level.

8. In a circular independent needle knitting machine, a radially slotted design wheel, said wheel having means to raise needles selectively, a support for said wheel, and means adapted to be inserted between said wheel and said support for causing said wheel to raise needles selectively from an idle level to a knitting level, said insertable means then raising to tuck position needles not selected by said design wheel.

9. In a circular independent needle knitting machine, a radially slotted design wheel mounted on an axis oblique to the shanks of the needles, said wheel having means to raise needles selectively, a support for said wheel, and means adapted to be inserted between said wheel and said support for causing said wheel to raise needles selectively from an idle level to a knitting position, said insertable means then allowing needles not selected by said wheel to pass through at an idle level.

10. In a circular independent needle knitting machine, a radially slotted design wheel, said wheel having means to raise needles selectively, a support for said wheel, and means adapted to be inserted between said wheel and said support for causing said wheel to raise needles selectively from an idle level to a knitting position, said means being slotted radially so as to engage selectively the needles not selected by the wheel and to raise them selectively to tuck position while allowing the remaining needles to pass through at an idle level.

11. In an independent needle knitting machine providing an idle level, a tuck level and a knitting level for the needles, needle selecting means comprising a design wheel mounted on an axis oblique to the shanks of the needles, a support for holding said wheel in position to raise needles selectively from an idle level to a tuck level, and a plurality of differentiated disks adapted to be positioned interchangeably between said wheel and its support for varying the distribution of the respective needles to said levels at said wheel.

HARRY S. HORROCKS.
WILLIAM D. GORMAN.