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3,464,237

KNITTING MACHINE NEEDLE

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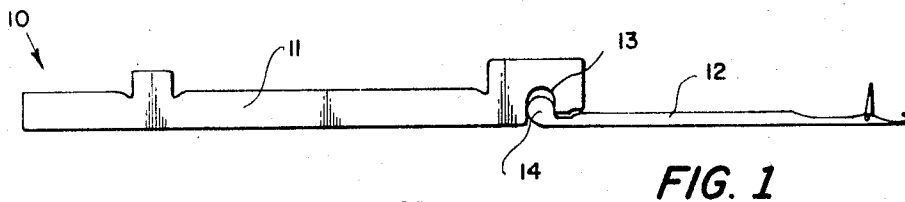


FIG. 1

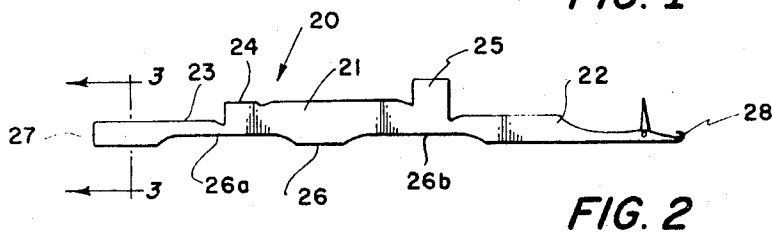


FIG. 2

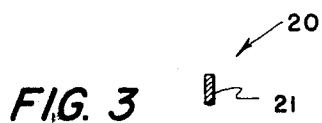


FIG. 3

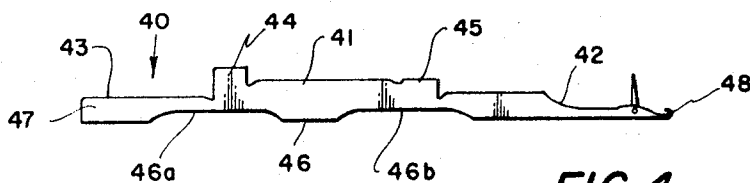


FIG. 4

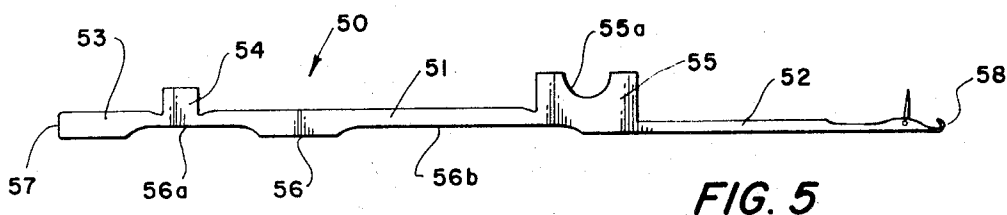


FIG. 5

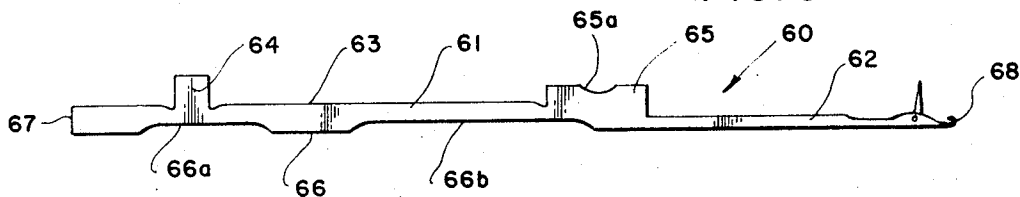


FIG. 6

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KNITTING MACHINE NEEDLE

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7 Claims

ABSTRACT OF THE DISCLOSURE

A knitting needle having integral shank and needle portion with cutouts on the back to reduce the needle weight and the needle contact area; cutouts may also be provided on the needle butt, and the needle is used in a circular knitting machine.

Background of the invention

The present invention relates to knitting needles for use in a circular knitting machine of the dial and cylinder type.

Knitting machines have been widely used for many years, these machines causing movement of the knitting needles in a predetermined pattern to knit yarn into cloth. The needles are positioned in tracks which confine them to longitudinal movement, which movement is imparted by cam elements of the machine engaging appropriate parts of the knitting needles known as butts. The needles are moved by the cam, and in order to reduce friction, lubrication is provided for the needles moving in the needle tracks. The needle tracks are slightly wider than the thickness of the needles, and the needles are typically bent so as to engage with light force the opposite sides of the needle tracks.

The longitudinal movement imparted to the needles has in some cases caused the hook end of the needle to be vibrated, the vibrations beginning at the point of engagement by the knitting machine cam, this being the butt, and travelling along the length of the needle to the hook. When a dial needle, for example, is extended, it has only a small clearance of the order of $\frac{5}{1000}$ inch from its cooperating cylinder needles. Consequently, vibrations of the needles will cause them to strike and break, and in some instances has been a major source of unsatisfactory operation.

Further, machines utilizing known needles have produced knitted fabric with oil streaks or oil soilage therein, it having been found that the oil, supplied to the needles and needle tracks in a fine mist, has been transferred along the needle to the hook, and then to the yarn being knit. It has been necessary, therefore, to clean the fabric which has thus been soiled, thereby adding to the cost of production, or to discard the soiled fabric.

Machines using prior art needles have operated at a maximum speed of fifteen revolutions per minute; at this speed, on a known machine the needles are reciprocated some 650 times per minute. As a consequence, and despite the fact that the machines operate in an air conditioned and cooled space, the temperatures of the machines have been as high as about 90° F., causing undesirable dimensional changes in the machines leading to machine breakage and expensive down time.

Summary of the invention

The present invention provides in a circular knitting machine stamped sheet metal knitting machine needles which have cutouts at the back of the needle, and in some instances also on the butt of the needle. These cutouts reduce the needle weight by approximately thirty-eight percent and reduce the contact area of the needle back

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by approximately forty to fifty percent. The cutouts at the needle back are preferably two in number, spaced both from the heel and the hook of the needle, with the cutouts being at least partially opposite the butts.

In comparative tests, needles in accordance with the present invention have operated with greatly reduced vibration, thereby substantially lowering the frequency of needle breakage. The fabric knit with the needles of the present invention have had much less oil soilage, thereby reducing the cost of production. The speed of the machine, using the present invention needles was increased by twenty percent, to eighteen revolutions per minute, without harmful effect. The temperature of operation of the machine was reduced to about 48° F., thereby diminishing heat stresses and load on the machine and its part, and avoiding breakage and down time.

Brief description of the drawing

FIGURE 1 is a view of a prior art knitting machine needle.

FIGURE 2 is a view of a dial needle in accordance with the present invention.

FIGURE 3 is a cross-sectional view taken on the line 3-3 of FIGURE 2.

FIGURE 4 is a view of another dial needle in accordance with the present invention.

FIGURE 5 is a view of a cylinder needle.

FIGURE 6 is a view of another cylinder needle.

Description of the preferred embodiment

Referring now to the drawings, wherein like or corresponding reference numerals are given to like or corresponding parts throughout the several views there is shown in FIGURE 1 a prior art needle 10 comprising a sheet metal shank 11 and a needle 12. The shank 11 has a cutout portion 13, and the rear of the needle 12 is shaped at 14 to generally conform to the cutout 13. Machines using needles of the configuration illustrated in FIGURE 1 have presented the deficiencies and operational difficulties noted above, including oil soiling, a maximum speed of fifteen revolutions per minute, and an unsatisfactory high temperature.

In FIGURE 2 there is shown a combination knitting needle 20 in accordance with the present invention. Needle 20 is made of stamped sheet metal and comprises a shank generally designated 21 and a needle portion 22. The needle portion 22 is integral with the shank 21, and is of generally rectangular transverse cross section, as may be seen in FIGURE 3. The front 23 of the needle 20 is provided with a low rear butt 24 and a high front butt 25. In known manner, the butts 24 and 25 are contacted by cams to cause the needle 20 to move back and forth in a needle track. The needle track is engaged by the back 26 of the needle 20, back 26 being provided with cutouts 26a and 26b. Cutout 26a is adjacent to but spaced from the heel 27 of the needle 20, and will be seen to be partially opposite the rear butt 24. Cutout 26b is spaced from 26a and extends forwardly beneath the front butt 25. The forward end of cutout 26b is closer to the hook 27 than is the forward surface of front butt 25. The depth of the needle from the front 23 to the back of 26 reduced by approximately fifty percent by the cutout 26a and 26b.

Significantly, the needle 20, in comparison with an identical needle not having the cutouts 26a and 26b is reduced in weight approximately thirty-eight percent, and the back contact area is reduced approximately fifty percent. By the expression "back contact area" is meant the area of contact along the back or back surface 26 between the heel 27 and hook 28 which engages a needle track in normal operation.

FIGURE 4 discloses a needle 40 which is, like needle 20, FIGURE 2, a dial needle. Needle 40 is substantially

the same as needle 20, with the exception that the rear butt 44 is high and the front butt 45 is low. Otherwise, needle 40 has a stumped out sheet metal shank 41 with an integral needle extension 42 having a hook 48 at the end thereof. Shank 41 has a front 43 and back 46 with cutouts 46a and 46b, the heel of needle 40 being designated 47.

In FIGURE 5, there is shown a cylinder needle 50 in accordance with the invention, needle 50 being an integral, stamped sheet metal needle comprising a shank 51 and needle portion 52 having a hook 58. Extending from the front 53 of needle 50 is a low rear butt 54 and a high front butt 55 is characterized by a cutout 55a which extends inwardly from the surface most remote from the back of 56. Back 56 is provided with cutout 56a and 56b which, as in the case of needles 20 and 40, reduce the depth between the needle front 53 and needle back 56 by approximately fifty percent. Cutout 56a is spaced from the heel 57 and is generally opposite rear butt 54. Cutout 56b is spaced forwardly of 56a. The forward end of cutout 56b lies beneath the front butt 55, so that at least a portion of cutout 56b is opposite butt 55. Cutout 56a is substantially directly opposite butt 54.

The weight reduction provided by the various cutouts of needle 50 is, as with needles 20 and 40, approximately thirty-eight percent. On the other hand, the reduction of back contract area is approximately forty percent.

The needle 60 shown in FIGURE 6 is essentially the same as the needle 50, having shank 61 and needle portion 62, with butts 64 and 65 extending from the front 63. In this case, rear butt 64 is a high butt and front butt 65 is a low butt, and is provided with a cutout 65a in the same position as cutout 55a of needle 50. The back 66 is provided with a rear cutout 66a spaced from the heel 67 and with a front cutout 66b spaced forwardly of the cutout 66a. The weight reduction and contact area reduction of needle 60 are the same as for needle 50.

The cutouts at the back of the various needles 20, 40, 50 and 60 serve the additional functions of stopping or attenuating vibrations caused by the cam impacts; they also serve to prevent or reduce "pumping" of oil to the hook, particularly the front cutouts.

The needles as described herein have resulted in the superior performance of circular knitting machines in which they have been used, increasing production, reducing soilage, reducing operating temperature and reducing needle breakage, all as indicated herein above. These needles are manufactured of known materials, utilizing known manufacturing processes, so that they are economically produced.

It will be obvious to those skilled in the art that various changes may be made without departing from the spirit of the invention and therefore the invention is not limited

to what is shown in the drawings and described in the specification but only as indicated in the appended claims.

I claim:

1. In combination with a circular knitting machine having needles carried in a dial and a cylinder, a needle comprising a flat sheet metal shank of generally rectangular transverse cross section and having an integral needle portion extending therefrom, said needle having a groove-contacting back and a front provided with butt means for engagement with cam means, said needle having cutout means at the back of the shank for reducing the back contact area by approximately forty percent to fifty percent as compared to a corresponding needle without said cutout means, the depth of said shank at said cutout means being relatively great at places therealong spaced from said cutout means and relatively small at least at some portions of said cutout means.

2. The structure of claim 1, said cutout means reducing the needle weight by approximately thirty-eight percent as compared to a corresponding needle without said cutout means.

3. The structure of claim 1, said cutout means being spaced from the heel and hook.

4. The structure of claim 1, there being two said cutout means and two said butt means, each said cutout means being at least partially opposite a said butt means.

5. The structure of claim 1, said butt means further comprising cutout means.

6. The structure of claim 5, said cutout means at the back and butt means reducing the needle weight by approximately thirty-eight percent as compared to a corresponding needle without said cutout means.

7. The structure of claim 1, said cutout means extending for approximately one-half the depth into said needle shank from the back to the front.

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RONALD FELDBAUM, Primary Examiner

U.S. Cl. X.R.

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