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3,080,741

THROAT PLATE

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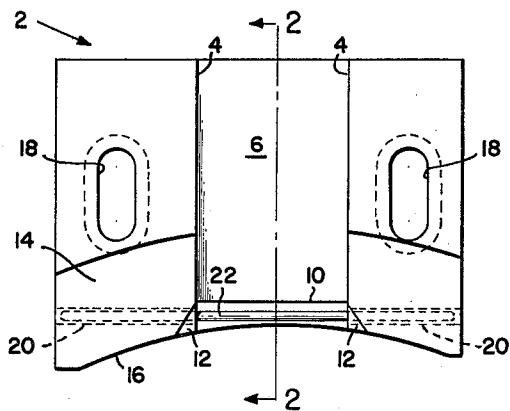


FIG. 1.

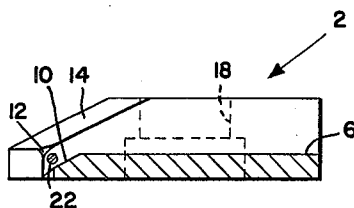


FIG. 2.

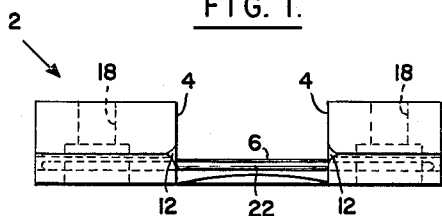


FIG. 3.

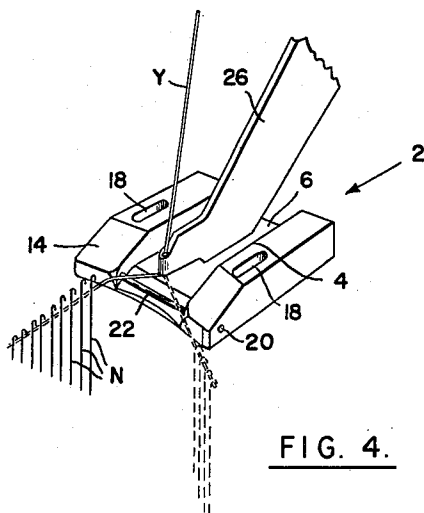


FIG. 4.

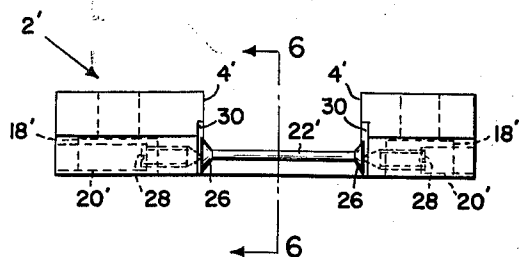


FIG. 5.

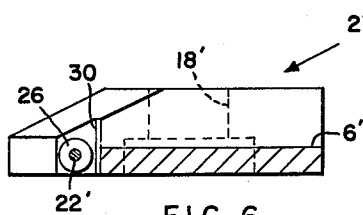


FIG. 6.

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THROAT PLATE

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This invention relates to a throat plate for a knitting machine particularly adapted to stand up during the knitting of abrasive yarns.

In circular knitting machines of the type particularly used for the production of hosiery it has generally been necessary to provide a guide over which yarn is led from an active yarn feeding finger in a definite path to the needles. The guiding element so provided is generally known as a throat plate, and a typical example of such a throat plate in a machine is shown in my Patent No. 2,576,962. A throat plate of this type is fitted into an opening in the latch ring which surrounds the upper part of the needle circle and is open at its top to permit the introduction of yarn feeding fingers into active position and their removal therefrom. Quite generally at a single feed point in such a machine a plurality of yarn fingers are provided which when in active position are held downwardly against and positioned by a rest surface or platform provided in the throat plate, the fingers being held in active position by spring pressure. Since such fingers are conveniently located side by side, and thus occupy different positions, on the throat plate when active, to secure uniform feed to the needles of all of the yarns the throat plate is provided with an opening which provides a pair of recesses at shoulders through and from which the yarns are guided to the needles during rotary and reciprocary knitting, one of the recesses being active during rotary knitting and during forward strokes in reciprocation, while the other of the recesses is active as a guide during reverse reciprocary strokes.

For the knitting of yarns of cotton, wool, rayon or the like, throat plates of hardened steel were quite satisfactory and the recesses would stand up very well against wear because these yarns had only minor abrasive qualities. However, with the introduction to the knitting industry of thermoplastic yarns, and particularly those of fine denier monofilament type, there was presented a serious problem due to the abrasive properties of such yarns, the yarns causing grooves to be worn in the throat plate particularly at the corner providing the feeding recess for the yarn during rotary knitting. The groove, when cut sufficiently deep by the abrasive action, was only the width of the yarn and would prevent the passage of a knot and consequently would cause the yarn to break. Increased friction on the yarn also resulted due to its effective greater circumferential engagement with the abraded groove.

As an attempt to overcome this problem, there has been employed a throat plate having an insert consisting of a molded piece of hard ceramic material cemented in position. While this expedient, exemplified by McKinley and Whitehead Patent 2,896,434, was successful, problems of cracking and chipping were involved due to the extreme brittleness of the hard ceramic material.

The general object of the invention is to avoid abrasion without the use of ceramic material. Briefly, in accordance with the invention an elongate roller element is rotatably mounted between a pair of shoulders on the throat plate and defines a yarn guiding surface. This roller element rotates slowly under the frictional action of the yarn and abrasion of the element is diminished by virtue of the continuous presentation of new surface portions thereof to the yarn. As a further matter, the roller element presents a smooth rounded surface over which

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the yarn may readily slide from side to side of the throat plate in the course of reversals in the direction of knitting.

Further objects and advantages will become apparent from the following description, read in conjunction with the accompanying drawing in which:

FIGURE 1 is a plan view of a desirable form of throat plate provided in accordance with the invention;

FIGURE 2 is a vertical cross-section taken on the plane indicated at 2—2 of FIGURE 1;

FIGURE 3 is a front elevation of the throat plate shown in FIGURE 1;

FIGURE 4 is a perspective view illustrating the association of the throat plate with the needles and a typical yarn feeding finger;

FIGURE 5 is a front elevation of a modified embodiment of the invention; and

FIGURE 6 is a vertical cross-section taken on the plane indicated at 6—6 in FIGURE 5.

The throat plate comprises a supporting element 2, that may be formed of steel or other suitable material, on which there are provided shoulders having inwardly facing sides 4 bounding a central platform surface 6. The front end of the platform 6 is chamfered as indicated at 10, and the front corners of the sides 4 are chamfered as indicated at 12, the lower portions of the latter chamfers being adapted to act, when necessary, as additional smooth yarn guiding surfaces. The front or inner edge 16 of element 2 is arcuate and concentric with the axis of the needle cylinder so as to extend circumferentially in close proximity to the needles, and the front upper surface of element 2 is sloping as indicated at 14. The supporting element 2 is arranged to be secured in the usual latch ring, in a recess of the latter, by screws passing upwardly through elongated shouldered openings 18 which provide for radial adjustment with respect to the latch ring and needle cylinder, such a mounting being conventional.

In accordance with the invention passages or bores 20 are drilled transversely through both sides of the supporting element 2 in the area adjacent the chamfer 10. Bores 20 are in alignment, and form bearings for a rod-like hard steel roller element 22. The upper surface of roller element 22 lies in approximately tangential relation to the upper surface of platform 6, and intersects the vertical sides 4 at points immediately adjacent and above the lower ends of the previously mentioned chamfers 12. From FIGURE 1 it will be noted also that the forward edge of roller element 22 is substantially tangent to the arcuate edge 16. When the throat plate is placed in the recess of the latch ring the outer ends of the bores 20 are blocked, thereby retaining the roller element 22 in these bores. In actual construction, the roller element 22 may be of the order of a few hundredths of an inch in diameter, and preferably is formed of a hardened steel similar to that used for sewing needles. In fact, the roller element 22 may be formed of the actual stock from which such needles are made.

Referring to FIGURE 4, there is particularly shown the relationship of the improved throat plate with respect to yarn feeding devices and the needles. A single yarn feeding finger 26 is illustrated in its active position, feeding a yarn Y. It will be understood that in accordance with usual practice there may be a number of such yarn fingers located side-by-side and arranged to be lowered either singly or in groups to active positions wherein they rest upon the platform 6 under spring action. The yarns such as Y are fed through eyes in these fingers 26, which have their lower ends raised slightly above the level of the platform. Conditions for rotary knitting are shown in FIGURE 4, and in this case the yarn Y in travelling from the fingers 26 to the needles N, which then are rotating in a counterclockwise direc-

tion, and passes over and in engagement with the roller element 22. As will be evident from FIGURE 4, different yarns will emerge from roller element 22 in similar paths irrespective of the lateral positions of the several yarn fingers. It will be evident that during reverse reciprocatory strokes of knitting a similar yarn guiding path is effected by roller element 22.

In operation, the rapidly moving yarn tends to spin the roller element, but as this is resisted by the friction of the roller within bores 20 the element rotates slowly. This rotation, however, is sufficient to prevent abrasion, primarily for the reason that a new surface constantly is being presented to the yarn and therefore the formation of the nucleus of a groove is prevented. Furthermore, the roller element 22 may be free to shift axially to a limited extent within the bores 20 to prevent a concentrated area of the element from being constantly subjected to abrasion by the yarn. Normally, yarn passes from the yarn finger over the roller element 22 to the needles N without touching the chamfers 12, with the possible exception that when a feed goes into action the yarn may temporarily be carried into engagement with one of the chamfers. Therefore, the chamfers 12 are not subjected to appreciable wear, the roller element 22 being primarily responsible for guiding the yarn. Typically, in a conventional throat plate the yarn, in passing from one side thereof to the other, traverses an arcuate edge such as the edge 16. Thus, in a sense, a yarn must move "uphill" along this arcuate surface as it approaches the opposite side of the throat plate. This action may interfere with the positioning of the yarn in proper relationship to the needles when they begin to knit. However, it will be evident that in accordance with the invention as the yarn shifts from one side of the throat plate to the other the surface along which the yarn slides, namely the roller element 22, is straight. It has been found that, therefore, the yarn moves quickly and easily from one side to the other, insuring its correct positioning when the needles begin to knit.

In the embodiment of the invention described with reference to FIGURES 1 through 4, the supporting element 2 has chamfers as indicated at 12 which at certain times may cooperate with the roller element 22 to guide the yarn. Alternatively, as shown in FIGURES 5 and 6 the roller element may be provided with tapered shoulders at its ends to function in much the same manner as the previously mentioned chamfers. Elements shown in FIGURES 5 and 6 that are identified by primed reference numerals, correspond to previously described elements identified by the same numerals in FIGURES 1 to 4. As will be seen, the roller element 22' is provided with outwardly conical shoulders 26. The vertical sides 4' are milled out at 30 to provide clearances between the outer ends of shoulders 26 and the supporting element. The purpose of such clearances is to allow axial adjustability of roller element 22'. Such adjustability is provided by the particular means for mounting the element 22', which include tapered centers 28 threaded into the inner ends of bores 20' and providing points entering center openings in the roller ends. Thus the roller element 22' may be axially positioned by adjustment of the threaded centers 28 on which it rotates.

During operation of the knitting machine the throat

plate according to FIGURES 5 and 6 functions in essentially the same manner as the throat plate previously described. In the case of FIGURES 5 and 6 the roller element 22' is mounted on centers 28, and the shoulders 26 serve to prevent dropping of the yarn between the ends of the roller element and the sides 4', which would cause snagging. Also, by the provision of such shoulders greater freedom in the positioning and number of yarn fingers is afforded, in that fingers can be positioned closer to the sides 4' than in the case of FIGURES 1 to 4.

The yarn does not engage the stationary supporting element 2' and the yarn guiding action is provided wholly by the roller element 22', which, therefore, is the only element subject to abrasion and wear. However, because the roller element 22' rotates under the frictional action of yarn travelling from the yarn feeding fingers to the needles new yarn guiding surfaces, including shoulders 26, continuously are being presented and such wear consequently is minimized as previously discussed.

It will be understood that various departures from the specifically disclosed embodiment of the invention may be made without departing from the scope thereof as defined by the following claims:

What is claimed is:

1. In a circular knitting machine, a throat plate comprising roller means and means mounting said roller means for rotation about a substantially horizontal axis, said roller means being engageable with yarn extending from yarn feeding means to the knitting elements of the machine to thereby guide the yarn.

2. A throat plate according to claim 1, including means limiting movement of yarn along said roller means in a direction along said axis thereof.

3. A throat plate according to claim 1, wherein said roller means is approximately tangential to the needle cylinder.

4. In a circular knitting machine, a throat plate having a concavely arcuate front edge bounding the knitting elements of the machine and a roller element rotatably mounted by said throat plate in approximately tangential relation to said edge, said roller element being adapted to engage and guide yarn extending from yarn feeding means to said knitting elements.

5. A throat plate for a circular knitting machine comprising a solid elongate roller element and means rotatably mounting said roller element, the periphery of said roller element being engageable with yarn being fed for guiding thereof.

6. A throat plate for a circular knitting machine comprising a roller element and means providing opposed shoulders, said roller element being rotatably mounted in and extending between said shoulders and being engageable with yarn being fed for guiding thereof.

7. A throat plate according to claim 5, including means providing a platform arranged to be engaged by and position a yarn finger, said roller element having its upper surface in substantially tangential relation to the upper surface of said platform.

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