

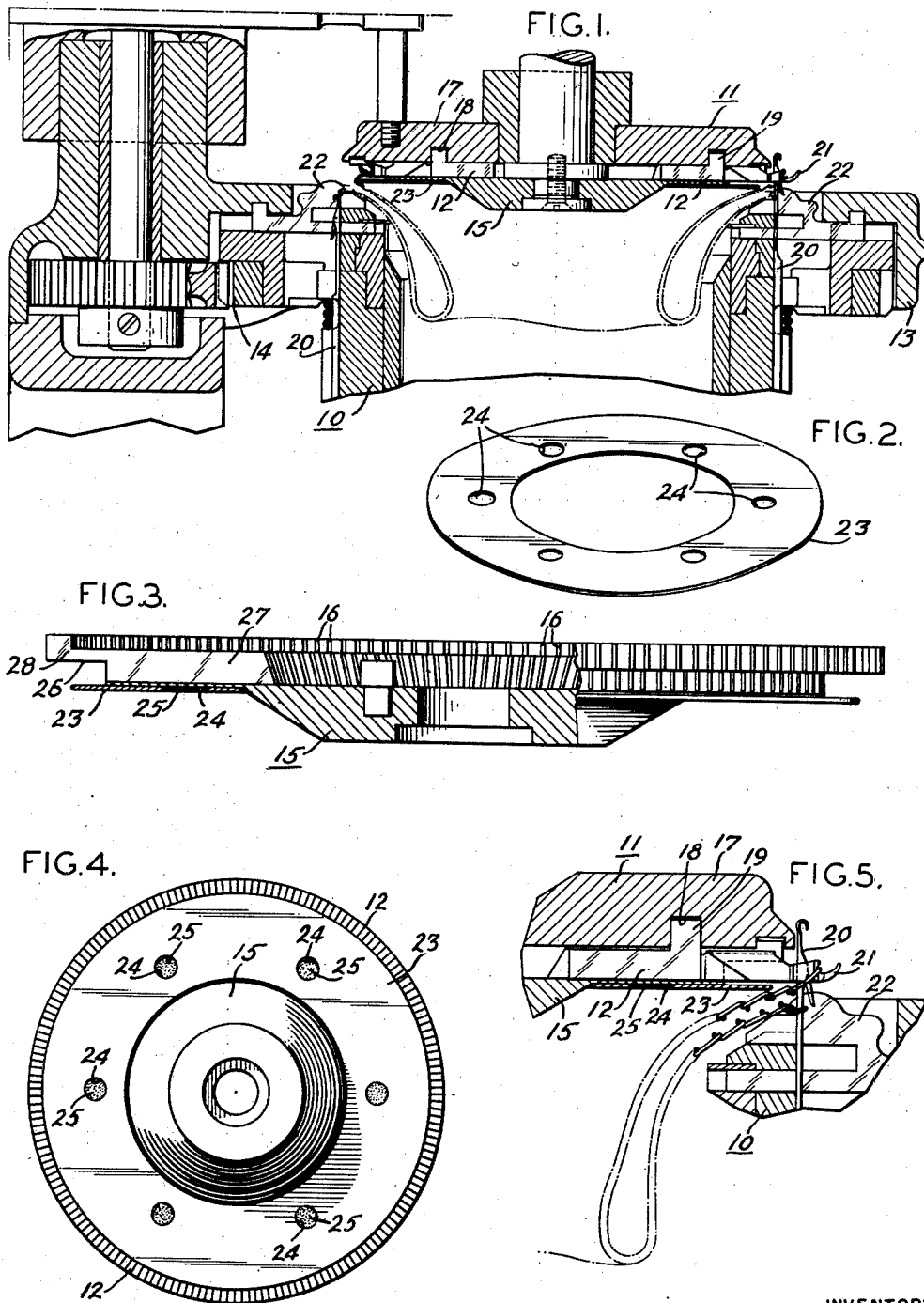
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CIRCULAR KNITTING MACHINES

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CIRCULAR KNITTING MACHINES

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The present invention relates to new and useful improvements in circular knitting machines and more particularly to hosiery machines of the type adapted for the automatic formation of a turned welt.

Machines of this type may comprise the conventional needle cylinder and a dial for transfer bits normally located at the top of and operating on the same axial center as the cylinder. As normal knitting progresses in a machine of this type, the fabric passes to the interior of the needle cylinder through the clearance space or throat between the upper end of the cylinder and the outer or peripheral portion of the dial. In machines of this type it is necessary to have as great a throat clearance as possible between the needles and bits for the free passage of the knitted material. To accomplish this and still provide sufficient support for the transfer bits, I have proposed that the lower dial member be made of smaller circumference than the upper dial member as disclosed in my co-pending application Serial No. 495,261, filed March 18, 1955.

These prior dial constructions have one substantial disadvantage in that during the transfer operation the knitted material may become caught between the transfer bits and the guide slots in the lower dial member during retraction of the transfer bits with resulting "hang up" necessitating stopping the operation of the machine and involving impairment of the stocking fabric and possible damage to the needles. This fouling tendency is accentuated by the natural tendency of the knitted fabric to contract beneath the dial and also to the tendency of the material to raise upwardly with the needles at the moment of transfer.

A principal object of the present invention is to provide a dial construction comprising novel means for preventing the aforescribed "hang up" of the knitted fabric.

Another object of the invention is to provide guard means beneath the dial that will prevent the knitted material from being snagged as described and which at the same time will not preclude a maximum throat clearance.

A still further object of the invention is to provide a machine of the stated type having the features and characteristics set forth permitting friction-free passage of the looped fabric to the interior of the needle cylinder and preventing snagging of the knitted fabric and yarn.

These and other objects of the invention, and the various features and details of construction by which they are attained, are hereinafter more fully set forth with reference to the accompanying drawings, in which:

Fig. 1 is a fragmentary transverse sectional view of a knitting machine having a dial constructed in accordance with the present invention;

Fig. 2 is a perspective view of the guard member for the knitting machine of the invention;

Fig. 3 is a side elevational view partially in section of the lower dial member in which the transfer bits are mounted;

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Fig. 4 is a bottom plan view of the lower dial member and guard of Fig. 3, and

Fig. 5 is an enlarged fragmentary sectional view showing the position of the bits, needles and fabric during the transfer operation.

With reference to the drawings, a machine embodying the present invention comprises the usual needle cylinder 10 and a dial 11 for the transfer bits 12, the dial being mounted as shown adjacent the upper end of the cylinder with the peripheral portion thereof overlying the cylinder. The machine also comprises the usual sinker ring 13 which embraces the upper end of the needle cylinder and elements of the dial drive mechanism, designated generally at 14.

The dial 11 comprises two primary parts, namely a lower rotary dial member 15, which as shown in Fig. 3 is provided in its upper surface with a circumferential series of radial slots 16 for the reception of the transfer bits 12; and an upper relatively stationary cap member 17 having a cam groove 18 at the underside thereof which receives the butts 19 of the bits 12. Rotation of the member 15 of the dial structure, which takes place about the axis of the needle cylinder, results in projection and retractive movements of the bit 12 in their respective grooves 16.

The bits 12 are of the type comprising an eye at their outer ends which, when the bits are fully extended, will occupy positions as shown in Fig. 1 wherein they are in vertical alignment respectively with needles 20 in the cylinder 10. When, as in the transfer operation, certain of the needles 20 are moved upwardly to a high position as shown in Fig. 1, the said needles will enter the eyes of the aligned bits 12. The forward walls of the eyes are split, or divided vertically, in conventional manner so that when the needles are in the raised position and the bits are withdrawn, the needles will escape through the split forward walls of the bits and will pick up the loops of yarn from the hooked outer ends 21 of the bits 12 to complete the transfer operation. The general form of bits of this type and the manner in which they cooperate with the needles in the transfer operation is well known in the art.

As shown in Fig. 1, the fabric of the loop which forms the turned welt of a stocking produced on a machine of this character, is started on the hooks 21 of the bits 12 in known manner, and passes inwardly as the knitting progresses into the cylinder through the throat between the top of the cylinder and the dial. This throat clearance must be of sufficient width to afford free passage for the double layer of fabric which forms the welt and also must provide space for the sinkers 22 which cooperate with the needles during the knitting operation. It is desirable also that the working tips of the transfer bits be as close as possible to the normal operating position of the cylinder needles, since the greater the distance between the transfer bits and this normal operating position, the longer will be the loops in the initial courses laid on the hooks 21 of the bits 12, and these undesirably extended loops will eventually be carried into the base of the welt in the transfer operation. In addition, it is essential that the transfer bits have adequate support in the dial to permit their projection into an operative position with respect to the needles without deflections which might result in interference between the bits and the needles. To provide such support, the radial extent of the lower dial member 15 must be as great as possible.

In the transfer operation, the knitted portion of the stocking tends sometimes to move upwardly with the needles when the latter are elevated as described, and this together with the natural tendency of the knitted fabric to contract will sometimes cause the fabric to be pinched between the transfer bits and the edges of their

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guide slots as they move rearwardly in the lower dial member 15. In accordance with the present invention therefore, a flat annular guard plate 23, as illustrated in Fig. 2 of the drawings, formed for example of stainless steel, is secured at the under side of the lower dial member 15, said guard extending outwardly beyond the periphery of the proximate portion of the lower dial member and being spaced from the lower edges of the bits 12. The guard plate has a plurality of small openings 24 therein and may be secured to the lower dial member 15 by a suitable solder, such as silver, as indicated at 25, the solder lying flush with the lower surface of the guard plate and spreading over the confronting surfaces of plate and dial member.

It will be noted that the peripheral portion of the lower dial member 15 is undercut as indicated at 26, Fig. 3. The upper portions 28 of the partition elements 27 which constitute the walls of the bit-retaining slots 16 project outwardly radially substantially to the periphery of the upper dial or cap member 17, whereas the lower portions of the elements 27 terminate well inwardly of said periphery and also well inwardly of the outer periphery of the guard plate 23. Thus, while the upper portions of the guide slots 16 extend between the projecting portions 28 to the extreme peripheral edge of the lower dial member 15, the lower portions of the slots terminate inwardly of the outer peripheries of both the member 15 and the guard plate 23. The guard plate thereby excludes the fabric and the component loops of yarn from the areas at the outer ends of the guide slots where the aforesaid "pinching" occurs and precludes the resulting costly "hang ups." Since the plate itself is spaced from the lower edges of the bits 12 there can be no pinching of the fabric or yarn between the guard plate and the bits.

It is evident also that the desired effect is attained without undue increase in the axial thickness of the peripheral portion of the lower dial member and therefore without undue restriction of the throat between the dial and cylinder. This arises from the use of a thin and rigid guard plate separately formed and attached by suitable means to the under surface of the dial member. In this way the bottom wall of the member and the projecting part of the guard is kept to a minimum thickness.

While a particular embodiment of the invention has been illustrated and described herein, it is not intended the invention be limited to such disclosure and changes and modifications may be incorporated and embodied therein within the scope of the following claims.

I claim:

1. In a knitting machine of the type described, a dial

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having radial slots, transfer bits mounted for radial reciprocation in said slots, and a guard at the underside of said dial and comprising a smooth edge portion describing a circle concentric with the dial, said circle lying outwardly of the outer ends of the lower portions of said slots and below the said bits.

2. A dial according to claim 1 wherein the guard consists of a thin plate.

3. A dial according to claim 2 wherein the outer edge of the plate is spaced from the lower edges of the bits.

4. In a knitting machine of the type described, a dial having a lower portion providing a support for transfer bits and radial ribs extending upwardly from the bit-supporting surface and forming therebetween radial guide slots for said bits, said ribs projecting beyond the peripheral edge of said supporting surface and being undercut in the projecting portions, and guard means at the underside of the dial presenting a smooth edge extending continuously around the dial axis beyond the said peripheral edge and below the plane of said surface.

5. In a knitting machine of the type described, a dial comprising relatively movable contiguous upper and lower members, said lower member having a body portion of substantially lesser radial extent than the upper member, ribs on the upper face of said lower member defining a plurality of radial slots, a plurality of transfer bits mounted in said slots for radial movement in said dial lower member, said ribs extending beyond the peripheral edge of the body portion to afford correspondingly extended guide surfaces for the bits, and a guard plate secured to the lower surface of said body portion extending outwardly therefrom beyond the peripheral edge thereof and spaced from the lower edges of said bits.

6. A dial according to claim 5 wherein said extended portions of the ribs are undercut, said undercut limiting the said guide surfaces to the upper portions of the bits.

7. In a knitting machine of the type described, a needle cylinder, a dial at the upper end of said cylinder with its peripheral portion overlying and in spaced relation to the cylinder, means forming radial slots in the lower portion of the dial forming guideways for transfer bits, said lower portion including said slots being undercut at the outer periphery so as to increase the effective space between the peripheral portion of the dial and the upper end of the cylinder, and a thin rigid guard plate projecting outwardly below and beyond the inner side of said undercut.

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