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PATTERN MECHANISM HAVING ENDLESS PATTERN

Filed June 23, 1950

3 Sheets-Sheet 1

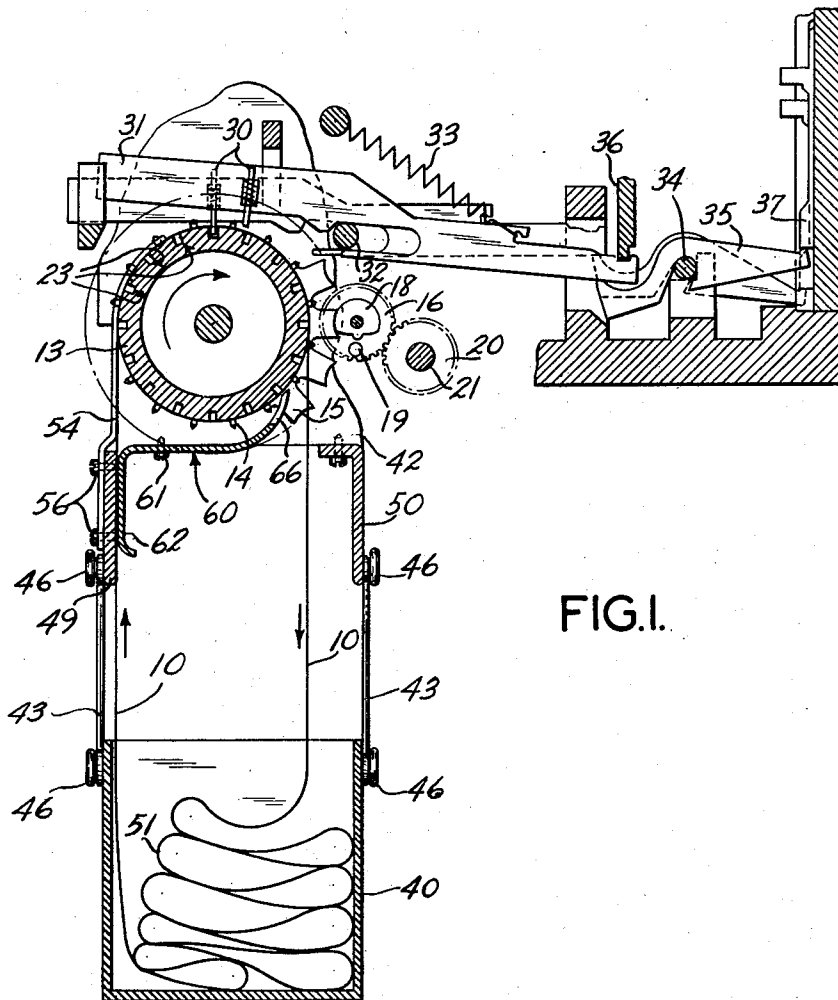


FIG. I.

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3 Sheets-Sheet 2

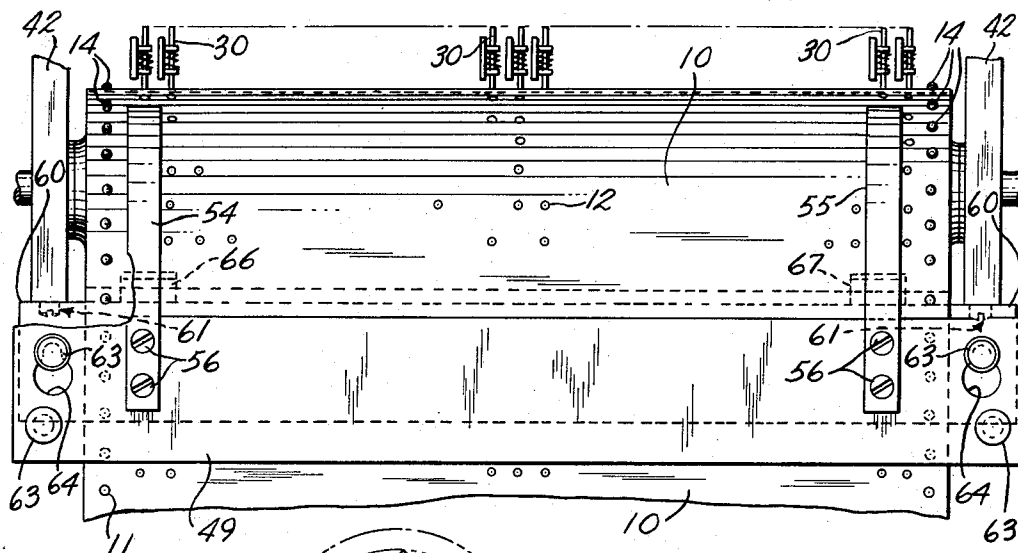


FIG. 2.

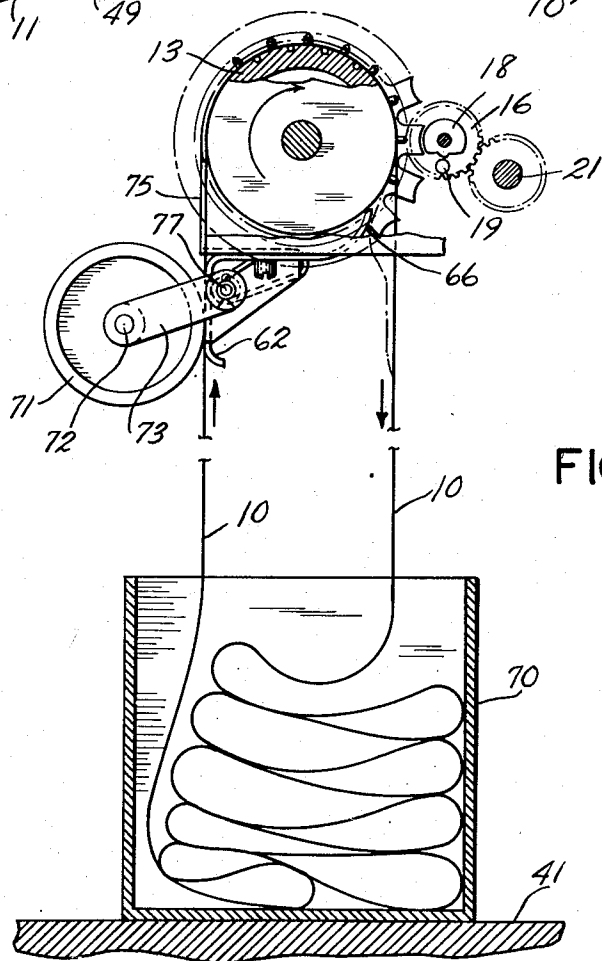


FIG. 3.

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3 Sheets-Sheet 3

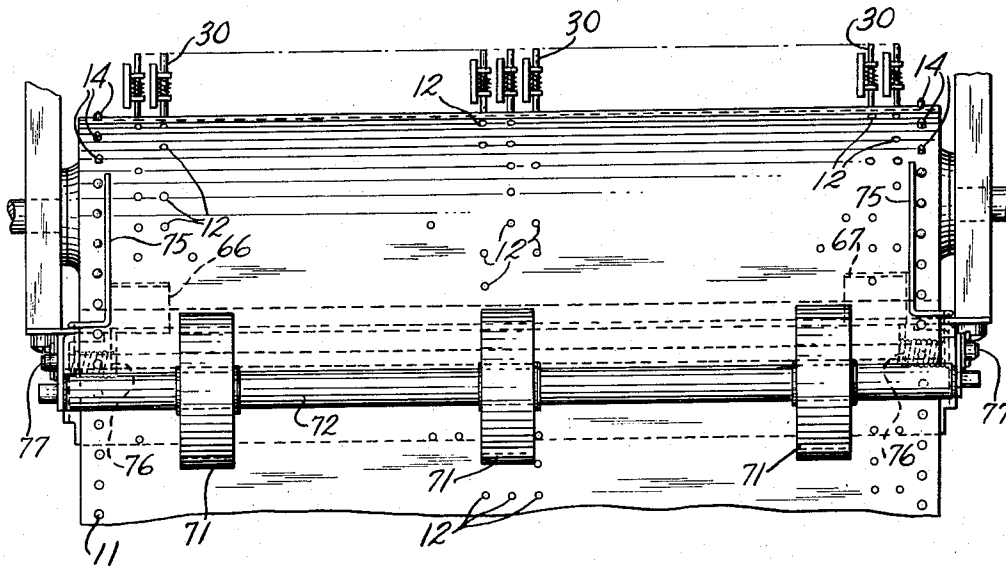


FIG. 4.

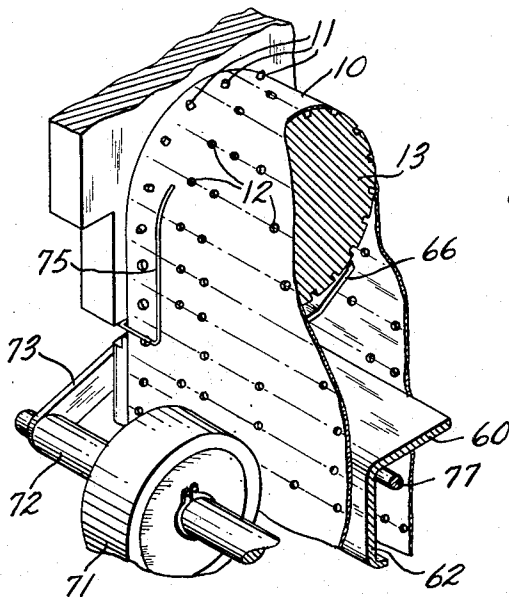


FIG. 5.

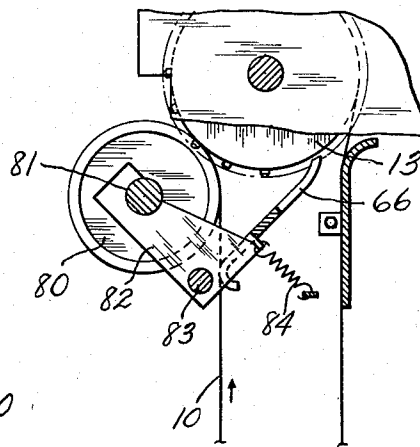


FIG. 6.

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2,696,092

PATTERN MECHANISM HAVING ENDLESS PATTERN

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Application June 23, 1950, Serial No. 169,829

8 Claims. (Cl. 66—50)

This invention relates to the handling of endless or belt-type patterns when in use.

Many looms, knitting and other machines are controlled by a pattern mechanism which makes use of endless patterns. Some of these patterns are short, and some are long, and some are quite long. Long patterns especially, frequently are hard to handle. Customarily these endless patterns are passed over and under a number of rolls which hold the pattern in a series of vertical loops, but at times even such an array of such loops becomes inconveniently large.

The present invention provides a more convenient apparatus and method for handling such patterns.

To this end, speaking generally, I collect the pattern, or rather, so much of it as is not passing over and immediately to and from the pattern drum at the moment, into a series of folds below the pattern drum, each more or less horizontally disposed. In the event that there are two or more pattern drums and two or more patterns or pattern sections, each pattern or section may be collected into its own series of folds below its respective drum. For the present purposes, a section of a complete pattern can be regarded as a pattern. As the pattern travels from the drum it is added, in the form of folds, to the pile of folds below the drum as it were, and as it passes to the drum it is drawn out from the bottom of the pile or stack, so that folds are constantly being abstracted from the bottom of the stack and added to at the top. Preferably I collect the folds in a tub placed below the pattern drum. I have found that when such a tub is used at least, the pattern passing from the drum tends to arrange itself in the desired folds with little or no assistance, and passes through the stack without entanglement. In addition, usually, I apply tension to the pattern as it passes onto the drum, by means of a presser or otherwise, to assure the proper seating of the pattern on the drum, and I provide a stripper to assure the pattern's leaving the drum at the proper place. Ordinarily at least the deposit of the pattern below its drum does not impose sufficient tension on the pattern to perform these functions well.

It will be understood that the invention is applicable to short patterns as well as long and very long patterns.

The foregoing is illustrated by the various forms of the invention which are shown in the accompanying drawings. In these drawings: Fig. 1 is a side view, partly in section, of a portion of a knitting machine and the form of the invention which I prefer at present. Fig. 2 is a front view of the elevation of the patterning mechanism of Fig. 1 showing particularly the tensioning mechanism which is adjacent the pattern drum. Fig. 3 is a side view partly in section to show particularly another form of tensioning mechanism. Fig. 4 is a front elevation of a patterning mechanism having the tension mechanism of Fig. 3. Fig. 5 is a fragmentary perspective view of a part of the apparatus of Figs. 3 and 4, showing particularly the tension means whereby the pattern is set snugly against the pattern drum. Fig. 6 is a side view partly in section illustrating still another form of tensioning mechanism.

The various figures of the drawing can be regarded as showing the same form of pattern mechanism, and one which is conventional. Also the invention is shown in the drawings as applied to knitting machines. It will be understood however that the invention is applicable to various forms of pattern mechanisms and can be applied to apparently, any machine or device that is controlled by endless patterns, at least those of the belt type illustrated.

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It should be noted that reference to a portion of the pattern as the "approaching portion" denotes that part of the pattern which is adjacent to the pattern drum and in a position to begin running around or to move on said drum, and that reference to the "departing portion" of said pattern refers to that portion, adjacent to or on the pattern drum which is about to cease contact with said drum or which moves off said drum after running around said drum.

In the machine illustrated, the pattern 10 is an endless belt of paper or some other relatively thin light material, and has a row of driving perforations 11 running longitudinally along each edge. Also it has other perforations 12 scattered over the pattern as required by the desired design (e. g. the design to be reproduced in the fabric knitted by the knitting machine in the present instance) or as required by other operations to be brought about by the pattern. The pattern 10 runs around a longitudinally slotted pattern drum 13 which has a series of pins 14 at each end of it to enter the driving perforations 11 of the pattern and thus advance the pattern as the drum 13 is rotated. In advancing the pattern, the drum 13 is rotated in the direction of the arrow in Fig. 1. In the present instance, the pattern drum 13 is rotated intermittently, step by step, although it is immaterial to the invention whether the pattern drum is rotated intermittently or continually. The intermittent rotation is produced by the usual Geneva type of mechanism which includes the customary toothed wheel 15, a driving gear 16 having a partially circular member 18 to interlock with the recessed ends of the teeth of the wheel 15 and a projecting stud 19 to mesh with the teeth of 15 to rotate the wheel, and a gear 20 meshing with the gear 16 and mounted on a, say, continuously rotating power shaft 21. As the shaft 21 is driven, the toothed wheel 15 and thereby the pattern drum 13 are rotated intermittently step by step as will be understood from the construction and prior practices.

Also in accordance with prior practices the drum 13 is provided with slots 23 extending lengthwise or longitudinally of the drum, there being, in the pattern mechanism illustrated, as many longitudinal rows of slots 23 as there are teeth on the wheel 15, so that each rotation of the gear 16 advances the pattern drum 13 and the pattern 10 the distance of one slot 23 to the next, center to center. The pattern mechanism illustrated has a number of selectors 31, so called, crossing the drum and the pattern 10 on it. Each selector 31 is pivotally mounted by a longitudinal slot on rod 32, carries a feeler pin 30 to feel the pattern, and is constantly tensioned outwardly, i. e. away from the center of the machine, and in a counterclockwise angular direction around its pivot rod 32, by spring 33. The inner end of each selector 31, i. e. that end more adjacent to the needle bank, rests on one end of a cooperating lever 35, and can be moved into the path of a cam 36 which moves along the bank of needles or needle jacks 37 of the knitting machine (e. g. the cam 36 rotates around the bank, if the knitting machine is a circular machine). Each cooperating lever 35 is pivotally mounted on rod 34 with its jack actuation end, i. e. that end more adjacent to the center of the machine, extending beneath the sliding jack 37 which it serves. A group of such selectors 31 and cooperating levers 35 may serve a corresponding group of adjacent needles or jacks 37 of the knitting machine, and in the present instance the pattern 10 serves such a group of selectors 31 to control the operations of the corresponding jacks 37.

In operation, each feeler rests on the pattern 10 until one of the controlling perforations 12 is brought to it by the advance of the pattern 10 (these perforations 12 are so disposed as to fall onto the drum slots 23), and then the feeler 30 falls through the perforation 12 into one of the slots 23, and the continued rotation of the pattern drum 13, acting on the feeler 30, pushes the feeler pin 30 and its corresponding selector 31 inwardly toward the center of the machine thus putting the inner end of its selector 31 in the path of the cam 36. As the cam 36 reaches this selector 31, the cam depresses this end and swings it clockwise, thus actuating the corresponding lever 35 and thereby raising the corresponding needle or jack 37 to a position of projection. At the same time, the rocking

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of the selector 31 raises its feeler pin 30 from the pattern perforation 12 and drum slot 23; so that as the cam 36 leaves this selector 31 the cooperating spring 33 returns the selector 31 longitudinally and its feeler pins 30 to their initial position above the drum 13 and turns the selector 31 counterclockwise so that its feeler 30 is restored to the initial pattern feeling position on the pattern.

The power shaft 21 advances the drum one step (the distance between centers of two adjacent drum slots 23) just prior to each passage of the cam 36 past the group of selectors 31. Also each selector 31, with its feeler 30 and cooperating lever 35 and needle or jack 37, is capable of acting in the manner described. Except as a feeler pin 30 finds a perforation 12 in the pattern prior to a passage of the cam 36, its needle or jack 37 remains down in the non-projecting position during that passage of the cam. Accordingly the pattern mechanism is one which causes the individual needles or jacks 37 to be projected, or to remain retracted, for each passage of the cam 36 as the pattern or sequence of operation desired may require. The pattern mechanism so far described and illustrated is a common one and the foregoing description of it will suffice for the present purposes. The same mechanism can be regarded as employed with the arrangements of Figs. 3, 4, 5 and 6.

In accordance with the present invention, a substantially rectangular tub 40 or basket or other form of receptacle is provided below the pattern drum 13.

The rectangular length of the tub 40, that length which is parallel to the longitudinal length of drum 13, is slightly greater than the width of the pattern 10, and its width and depth are sufficient to accommodate, in horizontal folds, so much of the length of the pattern 10 as is not passing over the pattern drum 13 at the moment or hanging between the drum and the tub. Where two or more pattern drums 13 and patterns 10 are used on the same machine, such a tub 40 may be provided below each of the pattern drums, each tub for a single section of the pattern 10, or a single tub may be provided which is long enough to extend beneath two or more of the drums and thus used to accommodate a corresponding number of patterns. Each tub can be placed on the floor 41 on which, say, the controlled machine rests (e. g. notice the tub 70 of Fig. 3), or it may be suspended, as from the frame 42 of the machine, say by straps 43 engaging buttons 46 located on the tub 40 and brackets or plates 49 and 50 attached to the machine frame 42 (Fig. 1).

As a pattern drum 13 rotates, the portion of its pattern 10 which at any moment is leaving the drum, falls into the tub 40 and of its own volition tends to fold backwardly and forwardly to form loose, more or less horizontal, folds or loops 51, vertically disposed one above the other, substantially as indicated in Fig. 1. At the same time the portion of the pattern moving towards the drum 13, the approaching portion, is drawn from the currently lowermost loop. Thus as the pattern 10 advances over and runs around the pattern drum 13, loops of the pattern are added to the top of the pile and at the same time loops are withdrawn from the bottom of the pile. With such an arrangement considerable lengths of pattern can be carried in the tub and in a relatively small space.

In the arrangement of Figs. 1 and 2, tension is applied to seat the approaching portion of the pattern 10 on the drum 13 and the driving pins 14, as the drum turns and the pattern advances, by a pair of presser plates or fingers 54 and 55 located near the longitudinal ends of the drum 13 and adjacent to the driving pins 14, said fingers engaging and directly pressing the pattern into engagement with the drum as will be recognized from the drawing. These presser plates or fingers 54 and 55 may be made of spring metal, and may more or less partially encircle the pattern drum 13 as shown, at least to a point sufficient to assure proper seating. Such pressers or fingers may be attached to the machine frame in various ways of course, e. g. by the bracket 49 and bolts 56. Additionally, if desired, or even as an alternative, the approaching portion of the pattern 10 may be drawn between a pair of smooth surfaced plates, such as 49 and 62 for example, Fig. 1, which press more or less tightly against the pattern 10 to somewhat restrain said pattern's movement toward the drum 13 and thus create tension on the pattern around the drum 13. As a matter of construction for example, an extension 60 of the plate 62 may be fastened at 61 to two side pieces of the frame 42, and the plate 49 may be

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fastened to the ends of 62 as by bolts 63, some of which may be set through elongated holes 64, enlarged at their lower ends, in the outer plate 49 for convenience of assembly. Usually however little or no additional tension whatsoever is needed by a pressure device such as plates 49, 62, since presser fingers such as 54 and 55 usually are sufficient to cause the approaching portion of the pattern to seat fully and properly on the pattern drum.

It is usually desirable also to provide a stripper to aid or assure the pattern's leaving the pattern drum, as the drum rotates, after the pattern has run around the drum for the desired circumferential distance. This may have, for example, the form of two fingers 66 and 67 angularly extending toward and rather close to a point on the surface of the pattern drum 13 somewhat adjacent to the two rows of driving pins 14 and about at or a little way from the desired point on the underside of the pattern drum 13 where the pattern 10 can properly leave the pattern drum 13 as the drum rotates, as will be apparent from Figs. 1 and 2. Each stripper acts as a sort of plow to strip the pattern 10, i. e. to assure proper removal of the departing portion of the pattern 10 from the drum 13 and the driving pins 14 before the pattern 10 follows the drum 13 around far enough to cause difficulty. Such a stripper or stripper fingers may be extensions of or connected to the extension 60 of plate 62 for example, Fig. 1, or may be provided in some other way.

Speaking generally, substantially any device that directly presses the pattern 10 to the face of the pattern drum 13, e. g. in the manner of the fingers 54 and 55, or any device that puts restraining tension on the approaching portion of the pattern 10 and thereby indirectly presses the pattern 10 onto the drum 13, can serve as a presser to assure the seating of the approaching portion of the pattern 10 on the drum face and the engagement of the driving pins 14 in the driving perforations 11 of the pattern 10. Thus Figs. 3 and 4 illustrate another form. In this instance a smooth surfaced plate 62 is provided as before adjacent to the path of the approaching portion of the pattern 10 coming to the drum as in the previous form. However, a roller or series of rollers 71, carried by a shaft 72 which is hung by swinging links 73 from the frame of the machine, is also provided and is so disposed as to press the pattern 10 against the plate 62, say as the roller or rollers is drawn downwardly by gravity. This compression slightly restrains the approaching portion of the pattern 10 against movement towards the drum 13 and thus puts tension on the pattern 10 thereby causing the pattern to seat snugly on the drum 13 as the drum rotates. With this form of device however, the pattern 10 tends to bunch up, in a fold or wrinkle as it were, above the roller or rollers 71, at least when the drum is advanced intermittently. Apparently this is due to the inertia of the roller or rollers 71 which tends to keep them rotating after the pattern drum 13 comes to rest, and thereby forces the pattern upwardly towards the pattern drum a little after each stopping of said drum. For this reason I do not contemplate much use of this form of presser, except where the pattern drum 13 may be driven continuously rather than intermittently. As before, a stripper, or stripper 66, may be used with such a presser.

Figs. 3 and 4 also illustrate another form of pressing finger, fingers 75, which of course, like the fingers 54 and 55, may be used alone or in conjunction with a device similar to rollers 71 and plate 62 which puts tension on the approaching portion of the pattern 10. Each of these fingers 75 is made of a spring wire which bears on the pattern at the drum and extends to a bar 77 carried by the frame of the machine, around which each finger 75 is wrapped loosely, in the form of a coil spring 76. The free end of the coil spring portion 76 is fixed to the bar 77. In this instance the coil spring portions 76 provide angular stress which forces the fingers 75 toward the drum. The fingers 75 may more or less encircle the pattern drum 13 to a point sufficient to assure proper seating of the pattern on the drum as shown and preferably are located adjacent to the two rows of driving pins 14 thus assuring snug seating of the driving perforations 11 on the drum driving pins 14. As before, a stripper or strippers 66, may be used with this presser.

An additional form of tensioning device is shown in Fig. 6. In this form, one or more rollers 80 are loosely revolvable on a shaft 81 carried at its ends in, say, brackets 82 which are hinged at 83 to the frame of the

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machine in such a position that the roller or rollers 80 can contact the approaching portion of the pattern 10 and press it against the face of the pattern drum 13. A spring or springs 84 serve to press the roller or rollers 80 toward the pattern drum 13, and the tension of this spring can determine how tightly the roller or rollers 80 press or seat the pattern 10 to the pattern drum 13. However I have found that this form of presser tends to put considerable tension on the pattern, and more pressure frequently than is required when the pattern 10 is made of paper or other similarly light flexible material, and hence causes unnecessarily rapid wear when the pattern is made of such material. As before, a stripper or strippers, say, 66 may be used with such a presser.

It will be understood that my invention is not limited to the details of construction and operation illustrated and described above except as appears hereafter in the claims, and that the claims are intended to include not only the elements specifically mentioned in them, but also the equivalents of those elements.

I claim:

1. Pattern controlling apparatus for an endless pattern mounted on a rotatably mounted pattern drum, said apparatus comprising a pattern receiving tub disposed underneath the pattern drum, at least one presser to engage that portion of the pattern which moves onto the pattern drum and to press it into engagement with said pattern drum, and a pattern stripper to engage that portion of the pattern which moves off the pattern drum to strip it therefrom.

2. Pattern controlling apparatus for an endless pattern mounted on a rotatable pattern drum, said apparatus comprising a tub disposed underneath the pattern drum to receive therefrom that portion of the pattern which leaves the pattern drum and to supply the pattern drum with that portion of the pattern which moves onto said pattern drum, at least one presser to engage the portion of the pattern which moves onto the pattern drum and to force it into engagement with said drum, and a

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pattern stripper to engage the portion of the pattern which leaves the pattern drum and to strip it therefrom.

3. Pattern controlling apparatus in accordance with claim 2 wherein the presser comprises a plate to press the pattern against the drum.

4. Pattern controlling apparatus in accordance with claim 2 in which two pressers are provided to engage the pattern, said pressers comprising plates situated substantially adjacent the ends of the pattern drum.

5. Pattern controlling apparatus in accordance with claim 2 wherein two pressers are provided to engage the pattern, said pressers comprising a pair of spring-urged fingers which partly encircle the pattern drum to press the pattern against said drum, said spring-urged fingers being situated substantially adjacent the ends of the drum.

6. Pattern controlling apparatus in accordance with claim 2 wherein the presser comprises a roller and a fixed plate opposite said roller between which the pattern moves, said roller being in engagement with the pattern to press it against the fixed plate.

7. Pattern controlling apparatus in accordance with claim 2 wherein the presser comprises a roller which is spring-urged into engagement with the pattern to press it against the pattern drum.

8. Pattern controlling apparatus in accordance with claim 2 wherein the presser comprises two plates between which the pattern moves, said plates being compressed to each other to slightly restrain said pattern's movement to the drum.

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