

August 4, 1913.

DRAWING

9,435

A careful search has been made this day for the original drawing or a photolithographic copy of the same, for the purpose of reproducing the said drawing to form a part of this book, but at this time nothing can be found from which a reproduction can be made.

Finis D. Morris,

Chief of Division E.

UNITED STATES PATENT OFFICE.

DANIEL TAINTER, OF WORCESTER, MASSACHUSETTS.

ROTARY KNITTING-MACHINE.

Specification of Letters Patent No. 9,435, dated November 30, 1852.

To all whom it may concern:

Be it known that I, DANIEL TAINTER, of Worcester, in the county of Worcester and State of Massachusetts, have invented new and useful Improvements in Rotary Knitting-Machines; and I do hereby declare that the same are fully described and represented in the following specification and the accompanying drawings, letters, figures, and references thereof.

Of the said drawings Figure 1 denotes a top view of a machine having my improvements applied to it. Fig. 2 is a front elevation of the same. Fig. 3 is a side elevation of it.

The machine which I have improved is what is generally known as the French rotary machine, the character of which will be obvious from the drawings. It consists in part of a series of hooked needles *a, a, &c.*, arranged in a circle and affixed to a rotary platform or frame A. In connection with the said series of needles and as further parts of the machine, several burs, toothed, or fan wheels, B, C, D, a presser wheel E, and an inclined plane or cam bar F are employed to make the loops, form the stitches, cast them over the loops, the same being done during the rotation of the series of needles. It is to such a machine, one well known to persons skilled in the arts of knitting shirts or stocking knit fabrics, that my improvements are applied, which improvements I shall now proceed to describe.

The machine is supported on a horizontal table or platform G on which two columns H, H, are elevated and surmounted by a cross bar I having an arm K extended from it and constituting a support to the upper part of a vertical shaft L whose lower end rests and revolves when in motion in a bearing or stop piece M secured upon the plate G.

On the shaft L the driving pulley N is situated. It is made to rotate freely on the shaft and so as to be capable of being slid or moved up or down thereon by means of a shifting hand lever O. Clutch pins *b, b*, project from the upper face of the driving pulley and operate in conjunction with others *c, c*, extending downward from a gear wheel P that is fixed on and to the shaft and made to engage with a gear wheel Q fixed on the shaft or axle of the rotary series of hooked needles *a, a, &c.* The driv-

ing band or belt passes around the pulley N and when such pulley is clutched to the gear P and the belt is put in motion such gear and the shaft will be rotated, and of course create a rotative movement of the rotative platform A. On the upper part of the shaft L another gear wheel R is fixed, it being of the same size and having the same number of teeth as the gear P. The said gear R is made to engage with another gear S which is attached to frame T that rotates horizontally over the platform A. The size of the wheel S and its number of teeth are in exact accordance with the size and number of teeth of the wheel Q so that the frame T and the platform A rotate simultaneously with the same velocity.

The frame T carries a cloth roller or beam U which is arranged within it as seen in the drawings, the cloth or fabric as fast as it is woven being wound upon the same. It passes directly upward from the needles and winds upon the roller or beam. By combining the movement of the cloth beam with the rotating series of needles by means of a frame made to revolve in exact accordance with such series no horizontal twist is put in the cloth during the operation of the machine.

The frame F rotates on a stationary shaft *d*. On the lower end of the said shaft a cam *e* is fastened, a spring *f* that is attached at one end to the frame T being made to rest against the periphery of the cam. The said spring is jointed at its other end to a bent lever *g* that turns upon a fulcrum or pin *h* and has a draw pawl *i* jointed to its lower end, such pawl being made to work against the teeth of a ratchet wheel *k* that is fastened on one end of the cloth roller or beam. During such rotation of the frame T the spring *f* will be so moved over or against the periphery of the stationary cam *e* as to be moved laterally so as to cause such a movement or operation of the draw pawl as will make it turn the ratchet wheel and of course the cloth roller.

As the roll of cloth in the cloth roller increases in diameter and the amount of cloth produced is the same from time to time it will readily be seen that under the circumstances above detailed the rotary movement of the cloth beam would create two great a strain on the cloth. To render the strain

always alike or sufficiently so for all practical purposes I make use of the following described mechanism. That is to say, I apply the fulcrum pin *h* to a vertical slide *l* which is jointed or so applied to one arm of a bent lever *m* as to be capable of being moved up or down when said arm is so moved. The said lever *m* turns vertically on a fulcrum at *n*, and its longest arm curved as seen in the drawings is made to rest on the roll of cloth wound on the beam or roller U. A long slot *u* is cut or formed through the lever *g*, the fulcrum pin of said lever being made to pass through the said slot. The lengths of the two arms of the lever *m* should be so regulated as to cause a proper downward movement of the fulcrum *h*, or one sufficient to change from time to time (as the weaving or knitting of the cloth progresses) the distance of the fulcrum pin from the upper end of the lever *g* thus causing the forward and back motions of the draw pawl to grow less and less in distance and thereby diminish the amount of rotation of the cloth roller to an extent that may be desirable to enable it to take or wind up the cloth without an undue strain or with an even tension during the progress of knitting it and winding it on the roller.

In the construction and use of a rotary series of needles, presser, stitch wheels, and cam bar of the above peculiar character for producing a tubular knit fabric it has been customary not only to make the same without any draft and take up mechanism, but to arrange the needles so that each should stand horizontally or so that the whole set should rotate in a vertical plane instead of a horizontal one as they do in my improved machine. In conducting the fabric from the machine as thus arranged it is led off horizontally or thereabout and attached to a cord by means of a swivel, the cord being made to pass over a stationary pulley placed at an equal height with and some eight or ten feet from the machine, the said cord having a weight attached thereto and running toward the floor of the room in proportion as the work was produced. The machine when thus in operation turns the work which by the uncertain and imperfect operation of the swivel is constantly being twisted or liable to be more or less twisted according to the distance the commencement of the work recedes from the needles. The effect of this is to produce an uneven and uncertain draft on the needles, thereby causing imperfections in the work besides retarding its operation or production and not unfrequently doing great damage to the machine itself. It also produces lateral drag of the work on the needles so as to cause the longitudinal lines of stitches to be made in helix lines or lines divergent from the general line or length of the piece or fabric,

whereby the fabric is not only injured in its appearance but is also otherwise damaged and in order even if restored by the process usually adopted to prepare it for sale returns back to its original appearance when washed. Unless the weight which is attached to the extreme end of the cord has the constant and watchful attention of an operative it is liable to run to the floor, thereby entirely stopping the draft, such draft being at all times necessary to keep the stitches of work on or at the head of the needles or to draw them thereto. The weight of the work being generally so great it is exceedingly inconvenient to knit more than a few yards say from three to five at a time before it becomes necessary to stop the machine and either cut off the work or roll it up as stated. When the fabric is produced in short pieces as described, much more waste occurs in making it up into shirts, drawers, or other articles than when it is produced in longer pieces, say forty to eighty yards in length as it can be made on my improved machine. By the old mode of operating the speed of the machine is much retarded in consequence of the frequent occurrence of accidents arising from causes above mentioned. The great care required to watch the machine in order to guard against such difficulties renders it necessary to employ very careful and experienced operatives in order to produce a fair quantity and quality of work.

By means of my improved machine operating in the manner described I not only am enabled to overcome some of the aforementioned disadvantages incident to the old machine and system of working it, together with disadvantages of minor importance; but I can produce with much less labor and little or no attention double or nearly double the work in the same time, the work produced in my machine being not only free from helical or divergent distortions in its longitudinal lines of stitches, but made with an even and sufficiently uniform draft or drag on the several needles throughout the time of its formation whereby a regularity in the elasticity and texture of the work is produced (so that it will not irregularly mill up when washed) which cannot without great difficulty and care be effected in the old machine by the old process of using it. The improvements I have made enable the machine to be run with much greater velocity or rapidity than it can in the old way, besides all the difficulties incident from twisting of the fabric are avoided.

By my method of combining the draft and take up roller or mechanism with the rotary series of needles and the presser, stitch wheels, and cam bar, there is not only no connection between the frame or rotary platform or table A and the frame T such as will extend through the fabric, but no

projection from the frame or table A to come into contact with the presser, stitch wheels, and cam bar or their respective supports during the simultaneous and equal rotations of both or either of the frames A, T.

Should the draft and take up roller or mechanism and the rotary series of needles be placed in one single revolving frame it will be discovered that such frame if extended upward within the circle of needles would pass through the fabric and thus the fabric could not be produced, drawn off the needles, and wound on the roller. So if such frame be made to project from within the circle of needles it would come in contact with the presser or other part of the rest of the knitting mechanism and therefore could not be rotated. Thus by the employment of one stationary frame (composed of the platform G, two columns H, H, and cross bar I or their equivalents) and two separate frames A, T, in sustaining the rotary circular row of needles, the rest of the knitting mechanism, the roller U and mechanism for operating it and the row of needles as specified, I am enabled to produce an automatic machine in which the above mentioned difficulties are avoided.

I do not claim the combining one or more draft rollers and a take up roller or drum in one frame which when put in rotation shall carry them simultaneously around with it so as to draw forward and wind up a rope or cord or like manufacture formed of strands twisted together, nor do I claim the application of a take up roller or mecha-

nism as used on either a common warp or flat braid knitting machine, but

What I do claim as my invention is—

1. To so combine a draft and take up roller and mechanism for revolving it with a rotary series or set of needles and other mechanism of the above mentioned peculiar kind for knitting, that such draft roller shall rotate simultaneously or with the same velocity with such series of needles so as to prevent the longitudinal rows of stitches from being produced in helical lines, and the evil consequences resulting to the fabric therefrom.

2. I also claim the arrangement of the draft and take up mechanism in connection with the knitting mechanism supported by two separate frames A, T, and also their connection with the mechanism for producing an equal and simultaneous rotation of these frames A, T, all substantially as described, whereby there shall not only be no connection between the frames A, T, to extend through the fabric, but no projection from the frame A to come in contact with the presser, stitch wheels, and cam bar or their respective supports during the simultaneous and equal rotations of both or either of the said frames A, T.

In testimony whereof I have hereto set my signature, this twenty ninth day of July A. D. 1852.

DANIEL TAINTER.

Witnesses:

R. H. EDDY,
G. W. CUTLER.