(No Model.)

J. J. ADGATE.

WEFT THREAD KNITTING MACHINE.

No. 332,374. Patented Dec. 15, 1885.

Fig. 1.

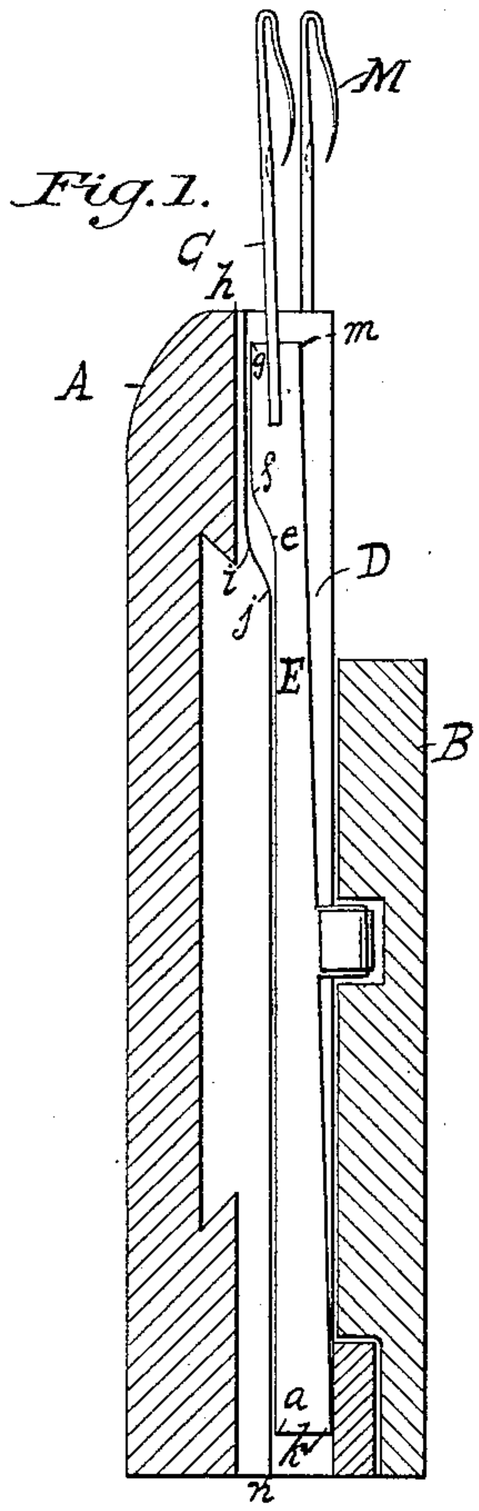


Fig. 3.

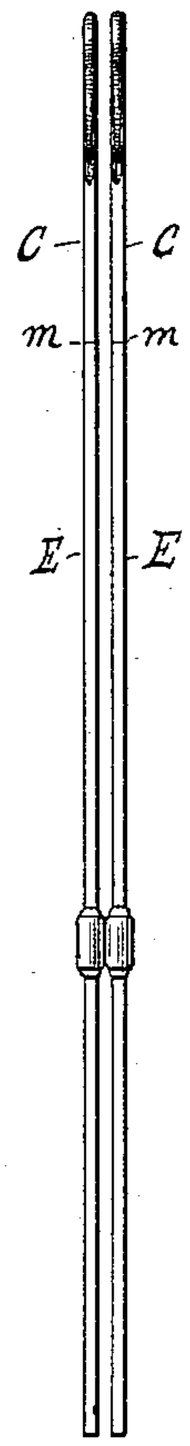


Fig. 2.

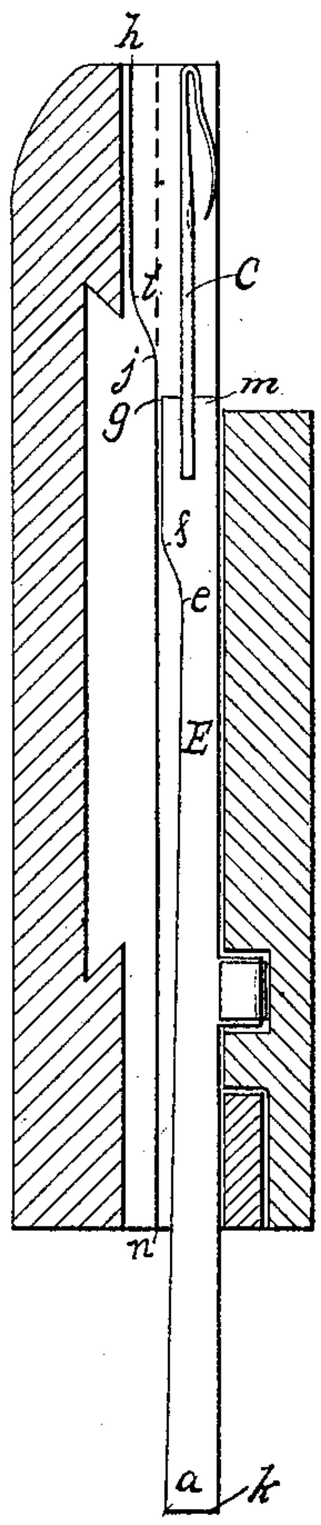
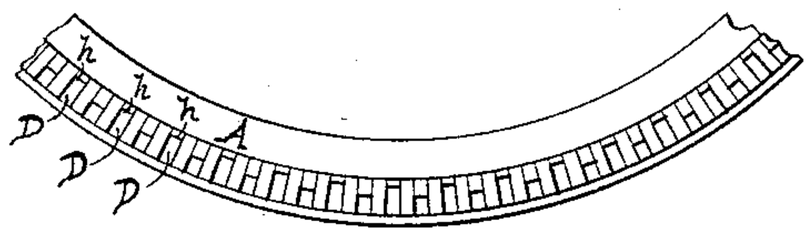


Fig. 4.



Witnesses:
John A. Ellis.
C. P. Ruth

Inventor:
Joseph J Adgate

UNITED STATES PATENT OFFICE.

JOSEPH J. ADGATE, OF NEW YORK, N. Y., ASSIGNOR TO THE ADGATE ROTARY LOOM COMPANY, OF SAME PLACE.

WEFT-THREAD KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 332,374, dated December 15, 1885.

Application filed January 11, 1884. Renewed May 20, 1885. Serial No. 166,177. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH J. ADGATE, of the city, county, and State of New York, have invented certain new and useful Improvements in Weft-Thread Knitting-Machines, of which the following is a specification.

My invention relates to that class of knitting-machines wherein certain needles are made to fall back as they ascend, behind and out of line with the vertical plane of the bottom of the needle-grooves, and with other needles moving vertically, so as to take in a second or weft thread, and by coming again into line with the vertically-moving needles incorporate it into the knitted fabric, as hereinafter more fully described. It is important that the needles which fall back should be brought into line at such a time as not to endanger the breaking of the cloth or yarn, and when in line should descend some distance vertically before the point of the beard reaches the upper edge of the needle-cylinder, and that while descending and ascending below this point the needle-jacks should bear smoothly and evenly with their forward edges against the retaining portion of the needle-cylinder, or the inner face of the cam-cylinder. I accomplish these and other advantageous results by means of my improved needle-jacks and needle-grooves, which I will now more particularly describe.

In the drawings, Figure 1 is a vertical sectional view of my invention, showing the needles and jacks partially raised and with the improved needle thrown back. Fig. 2 is the same, showing the needle depressed and thrown forward. Fig. 3 is a view in elevation from in front of two of my improved needles. Fig. 4 is a plan view from above of a section of my improved needle-cylinder.

Similar letters of reference designate similar parts in all the drawings.

A is the needle-cylinder. B is the cam-cylinder. C is the needle which falls back, and E is the needle-jack sliding in the groove or channel D in the needle-cylinder A. The front and rear edges of the needle-jack are parallel from the point *f* to the top, and taking this portion of the jack as a basis for considering the other portions, the front edge of the jack from *k* to *m* is straight and the rear edge from *a* to *e* is inclined, or formed at an angle sloping toward the front edge, as well also as to the rear edge, from *f* to *g*. At the point *e* the rear edge swells backward, as shown, to *f*, and then continues to its end *g*, as before described. In the rear of the needle-groove D, at its upper end, is a depression extending downward vertically from the upper edge of the needle-cylinder at *h* to the point *i*, from which point the rear of the groove swells outward gradually to *j*, (with a line similar to that of the part *f e* of the needle-jack of needle C,) and then continues in a vertical line to the bottom of the cylinder. The portion *h i* of the needle-groove is somewhat longer than the portion *g f* of the needle-jack, so that after the projection on the needle-jack has passed into the depression in the back of the needle-groove as the needle ascends the needle may rise some distance vertically (its part *g f* sliding against the part *h i* of the groove) before the upper end of the jack shall ascend to the upper end of the needle-groove. The forward edge of the needle-jack of needle C from the point *k* to its upper end at *m* inclines somewhat backward from a vertical line when in the position shown in Fig. 1, so that when the projection *f g* of the needle-jack is below the point *i* in the groove and the upper end of the jack is thrown forward this forward edge of the jack will be just even with the outer edge of the needle-groove, thus giving the jack a smooth and even bearing throughout the lower part of its course against the cam-cylinder or retaining-ring on the needle-cylinder, if the latter is used.

By giving the needle and jack the described form I am enabled to use a short and very rigid needle, and one which will knit with great exactness, owing to the absence of spring in the needle itself, and will not be easily broken or bent.

The operation of my invention is as follows: The needle C, being depressed to the lowest point, Fig. 2, will, as the needle-cylinder revolves, be raised gradually in a vertical line parallel with the straight or vertical needles M until the part *f g* of the jack of needle C reaches

the depression *h i* in the groove, when the point of the needle-beard of said needle C will be about a quarter of an inch above the top of the needle-cylinder. The inclined surface *e f* of the jack coming above the inclined surface *i j* in the needle-groove, the needle and jack (being pulled backward and inward by the tension of the cloth) will be drawn out of line with the straight or vertical needles M as they ascend through the next quarter of an inch, and will assume the position shown in Fig. 1. The needle C will then ascend vertically, as already explained, to receive the weft-thread, and until the top of the jack is even with the top of the needle-cylinder. When about to make its stitch, the needle C will first descend vertically, receiving the weft-thread, till the incline *e f* comes against the incline *i j*, when it will be thrown forward and into line with the vertical needles, with its point above the forward or locking thread, which it will take in as it descends vertically in its groove from this point. The straight or vertical needles M work in channels, the bottoms of which are straight throughout, as shown by the dotted line in Fig. 2. A plan view of these channels is also shown in Fig. 4, in which they alternate with the channels D. It is not necessary to provide any mechanism to throw back the needles at the right moment. I utilize the tension of the cloth for this purpose, which in machines for knitting circular always tends to draw the needles backward against the needle-cylinder and toward the center of the machine, particularly when the needles are in their elevated position. I am thus enabled to do away with any special arrangement of presser-wheels or cam projections on the forward edges of the needle-jacks. At the same time the needle C is brought forward rapidly by the peculiar form of the needle-jack and needle-cylinder before described, after taking in the second or weft thread, and is completely in line some distance before it descends to make its stitch and take in the forward or locking thread.

By means of my improvements I am enabled to knit a weft-thread fabric with great exactness and perfection, with little, if any, liability of breaking the knitted thread or of bending or breaking the needles, and to separate and bring together the needles in an effective and satisfactory manner, and with a minimum of friction and wear and tear of their jacks.

Having thus described my invention, what I claim is—

1. The needle C, having its lower portion or jack, E, formed with a straight portion, *f g*, and with inclined portions *a e* and *e f* on the rear side thereof, substantially as described and shown, and for the purpose set forth.

2. The needle C, having its lower portion consisting of the needle-jack E, formed with a straight portion, *f g*, and with inclined portions *a e* and *e f* on the rear side thereof, and with the front side thereof straight from *k* to *m*, substantially as described and shown, and for the purpose set forth.

3. A needle-cylinder, A, having a series of needle-channels, D, therein, the bottoms of which are formed of straight portions *n j* and *i h*, and of the inclined portion *j i*, and with a second series of needle-channels therein, the bottoms of which are straight throughout, substantially as described and shown.

4. The combination of a series of needles, C, each having its lower portion or needle-jack formed with a straight portion, *f g*, and with inclined portions *a e* and *e f* on the rear side thereof, with the cam-cylinder, substantially as described, and with a needle-cylinder, A, having a series of channels, D, therein, the bottoms of which are formed of the straight portions *n j* and *i h*, and of the inclined portion *j i*, substantially as shown and specified.

5. The combination of a series of needles, C, each having its lower portion or jack formed with a straight portion, *f g*, and with inclined portions *a e* and *e f* on the rear side thereof, with the cam-cylinder, substantially as described, and with a needle-cylinder, A, having a series of needle-channels, D, therein, the bottoms of which are formed of the straight portions *n j* and *i h*, and of the inclined portion *j i*, and with a second series of needle-channels therein, the bottoms of which are straight throughout, substantially as shown and specified, and for the purpose set forth.

JOSEPH J. ADGATE.

Witnesses:
S. P. KITTLE,
WILLIAM D. NEILLEY.