

E. PAQUETTE.
KNITTING MACHINE.
APPLICATION FILED MAY 22, 1911.

Patented Sept. 17, 1912.

3 SHEETS—SHEET 1.

1,038,638.

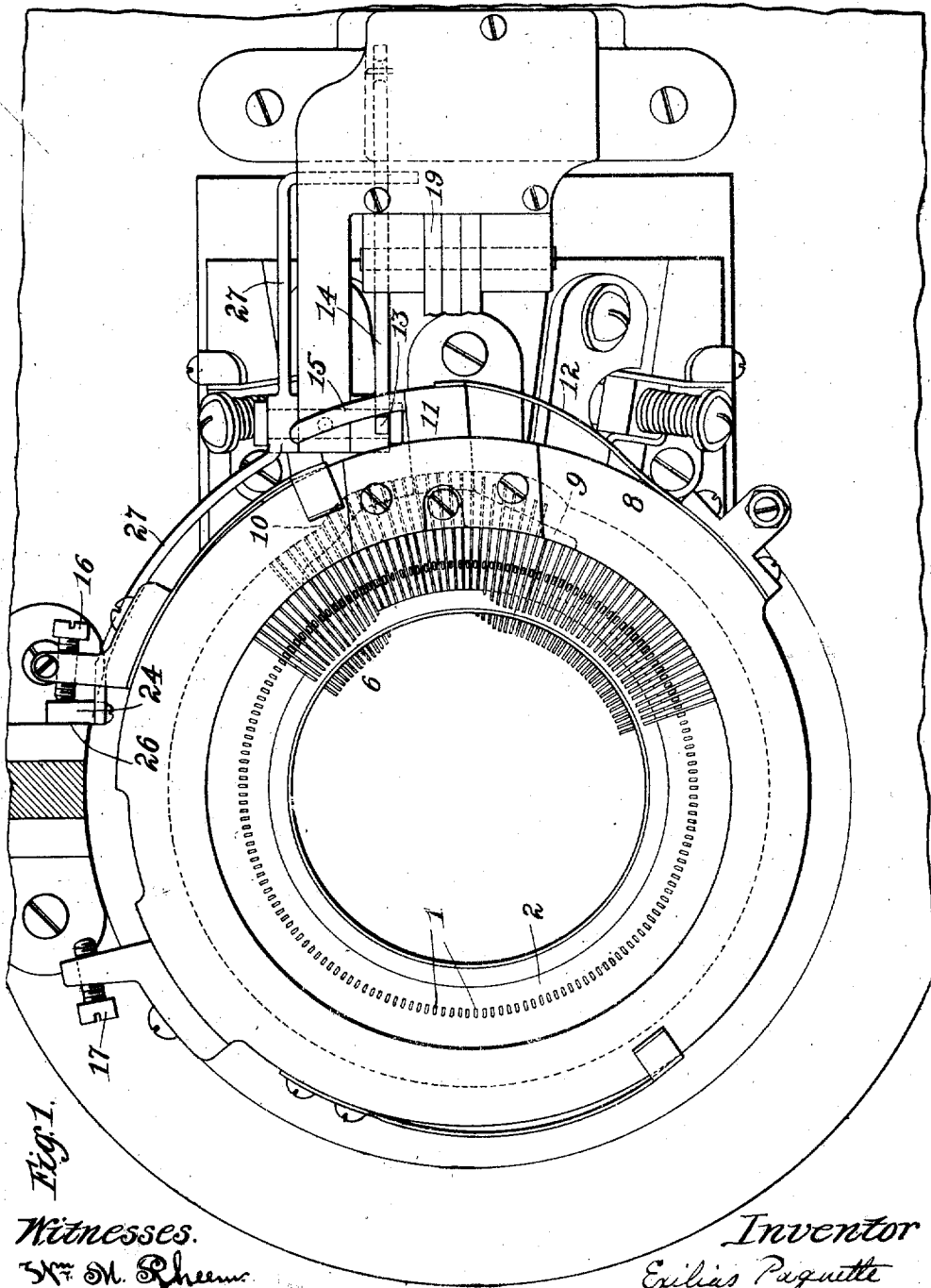


Fig. 1.

Witnesses.

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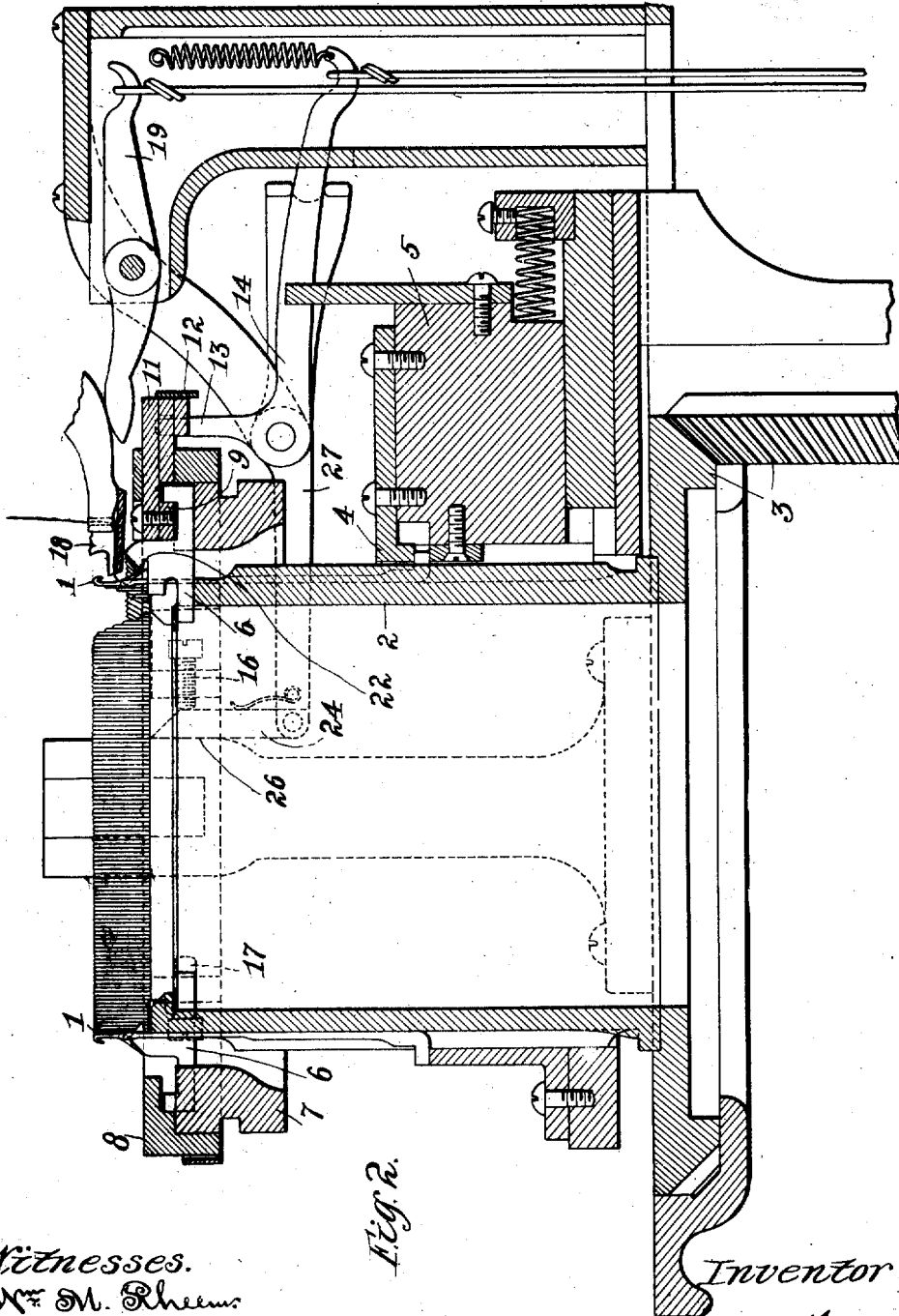


Fig. 2.

Witnesses.
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3 SHEETS—SHEET 3.

Fig. 3.

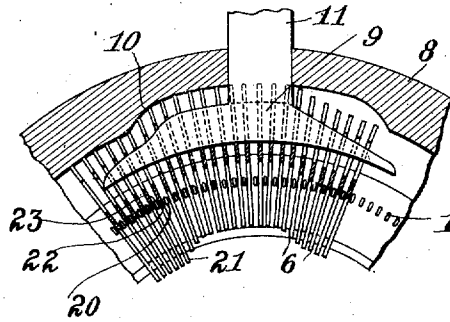


Fig. 4.

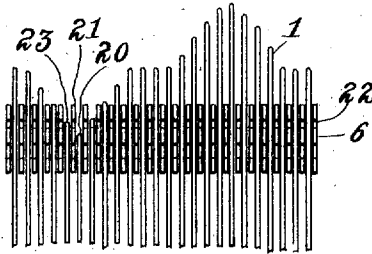


Fig. 5.

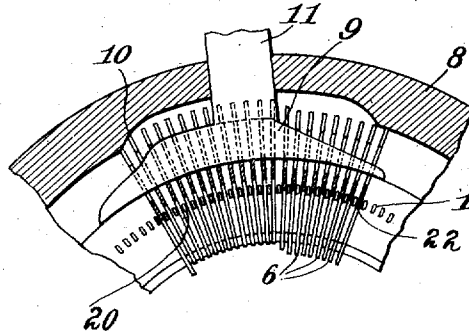
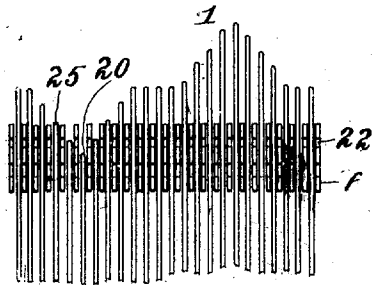


Fig. 6.



Witnesses.

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UNITED STATES PATENT OFFICE.

EXILIAS PAQUETTE, OF LOWELL, MASSACHUSETTS, ASSIGNOR TO LAWRENCE MANUFACTURING COMPANY, OF LOWELL, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

KNITTING-MACHINE.

1,038,638.

Specification of Letters Patent.

Patented Sept. 17, 1912.

Application filed May 22, 1911. Serial No. 628,764.

To all whom it may concern:

Be it known that I, EXILIAS PAQUETTE, a citizen of the United States, residing at Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Knitting-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to knitting machines, and more particularly to that class of circular knitting machines in which needles are mounted in the needle cylinder and are operated upon by cams and controlling devices arranged about the cylinder, the relative movements between the needles and needle operating cams requisite for knitting a tubular fabric provided at intervals with heel and toe pockets being produced by rotary and reciprocatory movements of either the needle cylinder or the support or cylinder on which the needle operating cams and controlling devices are mounted. Machines of this type are usually provided with cast-off devices for engaging and pressing inward the fabric at the knitting point so that the loops through which the needles have just drawn new loops are cast off or moved inward over the upper ends of the needles to a position where the needles will not pass up through them. In running the yarn on to the needles at the beginning of a new stocking or fabric, the cast-off devices press the yarn inward over the tops of the needles at the knitting point, so that the yarn is improperly distributed and looped about the needles, thus producing drop stitches and imperfections which frequently extend for a considerable distance along the knitted fabric. This defect in the operation of the machines in running on the new fabric is especially serious when knitting with mercerized or other hard or wiry yarns, and renders the automatic running off and running on of the fabric at the completion of each stocking impracticable.

It is the object of the present invention to overcome this defect in the operation of the cast-off devices, and to provide a construction which will enable the fabric to be run on at the beginning of a stocking or other knitted article without the production

of imperfections, whatever the character of the yarn being used.

To this end the invention contemplates the provision in a machine provided with devices for casting off the fabric at the knitting point, of means for rendering the cast-off devices inactive for several courses when running on the fabric. While the cast-off devices are inactive the yarn fed to the needles remains on the outer side of the needles, so that each time a needle rises it passes up through the loops previously drawn by it, or through the strands of yarn previously fed to it, as well as up through the loop last drawn. An annular bunch of yarn or fabric is thus formed about the needles, up through which each needle is thrust as it passes the knitting point. When the cast-off devices are rendered active after the yarn has been fed to the needles for several courses, each needle draws its loop of yarn down through the annular bunch, and then the bunch is forced inward over the top of the needle, so that the needle rises through the last drawn loop only. The individual loops are thus drawn and held by the needles with certainty and without danger of forming drop stitches or other specifications.

Any suitable means may be employed for rendering the cast-off devices inactive during the running on of the fabric which are suited to the construction and arrangement of the cast-off devices of the machine in which the invention is embodied. In embodying the invention in machines in which the fabric is cast off by web holding sinkers operated by cams on a sinker cam ring, it is preferred to render the sinkers inactive to cast off the fabric at the knitting point by shifting the ring beyond its normal position so that the sinkers are not advanced at the knitting point. This shifting of the sinker cam ring may be secured by devices which are simple in construction, and which are well adapted for use in an automatic machine.

The various features of the invention will be readily understood from an inspection of the accompanying drawings and the following detailed description of the mechanism illustrated therein.

In the drawings Figure 1 is a plan view showing the knitting head of a machine

embodying the invention in its preferred form; Fig. 2 is a vertical central section through the head, certain parts being omitted; and Figs. 3 to 6 are diagrammatic views showing the position of the sinker cam ring and sinkers during the running on and the subsequent knitting.

In the drawings the invention is illustrated as embodied in a knitting machine having substantially the same general construction and mode of operation as the machine shown and described in the patent to Hemphill, No. 933,443, patented September 7, 1909, and known as the "Banner" machine. In this machine the needles 1 are mounted in a needle cylinder 2 to which rotary and reciprocary movements are imparted through the bevel gears 3. The knitting cams 4, which act to form the knitting wave in the needles, are mounted upon a cam block 5, and are the same in construction and mode of operation as the knitting cam shown in the patent above referred to. The narrowing and widening pickers, and the cams for throwing the long butt or instep needles out of and into the active plane, are not shown in the drawings, and are the same in construction as the "Banner" machine referred to. The sinkers 6 are of the usual construction, and are mounted in a sinker ring 7 secured to the upper end of the needle cylinder, and are operated by cams carried by a sinker cam ring 8 which is also of the usual construction. The sinker cam ring is provided with a cam 9 for withdrawing the sinkers, and with a cam 10 for advancing them to cast off and hold down the fabric. The cam 9 is secured upon a slide 11 which is forced radially inward by a spring 12. The cam is held normally in position to withdraw the sinkers by one arm 13 of a bell crank lever 14 arranged to engage a projecting arm 15 on the slide 11. The sinker cam ring is also provided with the usual stop screws 16 and 17 for determining the position of the sinker cams with relation to the knitting cams during rotary and reciprocary knitting respectively. These stop screws cooperate with stops which are in fixed relation to the knitting cams in the usual manner. The yarn is fed to the knitting wave formed by the knitting cams through a yarn guide 18 which may be raised to withdraw the yarn from the needles, and thus run off the fabric at the completion of a stocking, and may be lowered to deliver the yarn to the needles in running on the fabric at the beginning of a new stocking. The yarn guide is raised and lowered at proper intervals through a lever 19 which is automatically operated from the pattern mechanism, as in the "Banner" machine.

During the knitting of the stocking the sinkers are operated in the usual manner by

the sinker withdrawing and advancing cams, being withdrawn at the point where the loops are being drawn down by the needles, and being advanced at the knitting point to cast off the fabric and hold it down as the needles rise through the last drawn loops. The position of the sinker cams and sinkers with relation to the needles and knitting point during rotary knitting, is indicated in Figs. 3 and 4. As here shown, the needle 20 is in its lowest position, and the sinker 21 beyond this needle has advanced so that its shoulder 22 has engaged the fabric and carried it inward over the top of the needle, thus insuring the casting off of the fabric before the needle rises to the position of the needle 23. The sinker cam ring is held with the sinker advancing cam 10 in the position indicated in Fig. 3, so that the sinkers act to cast off the fabric at the knitting point by the engagement of the stop pin 16 with a fixed stop 24. After the stocking has been completed, the thread guide 18 is raised to run the completed stocking off the needles, and the bell crank lever 14 is operated to allow the sinker retracting cam 9 to move radially inward into the position indicated in Fig. 5. The thread guide 18 is then lowered to deliver the yarn to the needles, and to run on the next stocking. After the yarn has been fed to the needles for a number of revolutions of the needle cylinder, the bell crank lever 14 is again actuated to return the sinker withdrawing cam 9 to its normal position indicated in Fig. 3. These operations are automatically effected through the pattern mechanism of the "Banner" machine. During the running on of the fabric the sinkers are rendered inactive to cast off the fabric at the knitting point by shifting the sinker cam ring so that the sinker advancing cam 10 acts upon the sinkers beyond the knitting point, as indicated in Figs. 5 and 6. As here shown, the sinker beyond the needle 20 is not advanced by the cam 10 until the needle has been raised to the position of needle 23, and has therefore passed up through or back of the yarn or loops which have previously been fed to or drawn by it. So long as the sinker cam ring remains in this position, therefore, the yarn fed to the needles and the loops drawn will bunch up around the needles and under the hooks of the sinkers, and each time a needle draws a loop and rises it will not only pass up through the loop last drawn, but will also pass up through the bunch of yarn or fabric.

After the cam 10 has remained in inactive position for a number of courses, the sinker cam ring is shifted to bring the sinker operating cams into the position indicated in Fig. 3, and thus render the sinkers active to cast off the fabric at the knit-

ting point. In order that the sinker cam ring may be thus shifted, the stop 24 is so constructed and operated that it will allow the sinker cam ring to be shifted by its engagement with the sinker ring into the position indicated in Fig. 5 at the beginning of a stocking, or, when the fabric is to be run on, and will shift the sinker ring back into the normal position indicated in Fig. 3 after the yarn has been fed to the needles for any desired number of courses. As shown, the stop 24 consists of a cam block interposed between the stop screw 16 and the fixed post 26 with which the stop screw engages in the usual construction of "Banner" knitting machines. The stop block 24 is connected with one end of a lever 27, the other end of which is bifurcated to embrace the bell crank lever 14, so that the stop block is withdrawn when the bell crank lever is actuated at the completion of the stocking, and is returned to normal position when the bell crank lever is actuated at the end of the running off.

While it is preferred to render the sinkers inactive to cast off the fabric at the knitting point by shifting the sinker cam ring in substantially the manner shown and described, since this avoids the use of more or less complicated devices for otherwise modifying the movement of the sinkers, and may also be readily applied or adapted to existing machines without change in the sinker cams and rings, it will be understood that this is not essential to the broader features of the invention, and that the sinkers or other cast-off devices may be otherwise rendered inactive without departing from the invention.

While the invention has been shown and described as embodied in the "Banner" machine in which the needle cylinder is rotated and reciprocated, it will be understood that it is also applicable to machines in which the relative movement between the knitting cams and needle cylinder is otherwise secured.

Having explained the nature and object of the invention, and specifically described one form of mechanism in which it may be embodied, what I claim is:—

1. A knitting machine, having, in combination, needles, means for forming a knitting wave in the needles, devices for casting off the fabric at the knitting point, and means for interrupting the operation of the cast-off devices during the running on of the fabric, substantially as described.

2. A knitting machine, having, in combination, needles, means for forming a knitting wave in the needles, devices for casting off the fabric at the knitting point, and mechanism acting to render the cast-off devices inactive in running on the fabric and again active after the yarn has been fed to

the needles for several courses, substantially as described.

3. A knitting machine, having, in combination, needles, means for forming a knitting wave in the needles, sinkers, means for actuating the sinkers to cast off the fabric at the knitting point, and devices for rendering the sinkers inactive to cast off the fabric when running on the fabric, substantially as described.

4. A knitting machine, having, in combination, needles, means for forming a knitting wave in the needles, sinkers, sinker cams for actuating the sinkers to cast off the fabric at the knitting point, and means for throwing the sinker cams out of active relation with the needles at the knitting point when running on the fabric, substantially as described.

5. A knitting machine, having, in combination, needles, means for forming a knitting wave in the needles, sinkers, a sinker cam ring, and means for shifting the ring out of its normal position when running on the fabric, and returning it to normal position after the yarn has been fed to the needles for several courses, substantially as described.

6. A knitting machine, having, in combination, needles, means for forming a knitting wave in the needles, sinkers, a sinker cam ring, a stop for determining the position of the ring during the knitting, and mechanism for actuating the stop to vary the position of the sinker cam ring during several courses when running on the fabric, substantially as described.

7. In an automatic circular knitting machine, the combination with the needle-carrying cylinder, a yarn-feeding device and a sinker-head-ring secured to the cylinder, of sinkers movably mounted in said cylinder and head-ring, a sinker-cap-ring capable of short vibratory movements in a horizontal plane, superposed upon the head-ring and provided with a circular path and relatively stationary cams for controlling the in and out movements of the sinkers, and means for automatically changing the angular position of the sinker-cap-ring with respect to the yarn-feeding device at certain points in the knitting operation, for the purpose set forth.

8. In an automatic circular knitting machine provided with a revoluble needle and sinker-carrying cylinder, a thread-feeding device, a main cam-shaft having a cam element mounted thereon, a sinker-cap-ring surmounting said cylinder, and suitably disposed and timed devices adapted to be actuated and controlled by said cam for causing the sinker-cap-ring to be angularly moved at a predetermined point or points during the knitting of a stocking, for the purpose herein set forth.

9. A circular knitting machine, having, in

combination, a needle cylinder and needles, sinkers, a sinker cam ring, and means for temporarily moving the sinker cam ring a limited angular distance out of its normal knitting position in running on the knitting yarn at the commencement of a stocking, substantially as described.

10. A circular knitting machine, having, in combination, a revoluble needle cylinder having needles and sinkers movably mounted thereon, a sinker cam ring capable of angular movement surmounting said cylinder, and automatically controlled means for temporarily moving the sinker cam ring out of normal knitting relation, substantially as described.

11. In an automatic circular knitting machine provided with a revoluble needle and sinker cam cylinder and a thread feeding device, the combination therewith of a sinker cam ring suitably disposed with relation to said cylinder and its sinkers arranged to normally vibrate within fixed limits in a horizontal plane, and independent automatic mechanism for temporarily moving the ring a short predetermined distance out of normal relation to the thread feeding device, substantially as described.

EXILIAS PAQUETTE.

Witnesses:

ANDREW G. SWAPP,
BENJAMIN W. CLEMENTS.

Correction in Letters Patent No. 1,038,638.

It is hereby certified that in Letters Patent No. 1,038,638, granted September 17, 1912, upon the application of Exilias Paquette, of Lowell, Massachusetts, for an improvement in "Knitting-Machines," an error appears in the printed specification requiring correction as follows: Page 1, line 83, for the word "specifications" read *imperfections*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office

Signed and sealed this 22d day of October, A. D., 1912.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.

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