(No Model.) 2 Sheets—Sheet 1.

G. E. FRINK.

THICKENING THREAD MECHANISM FOR KNITTING MACHINES.

No. 497,315. Patented May 16, 1893.

Fig. 1.

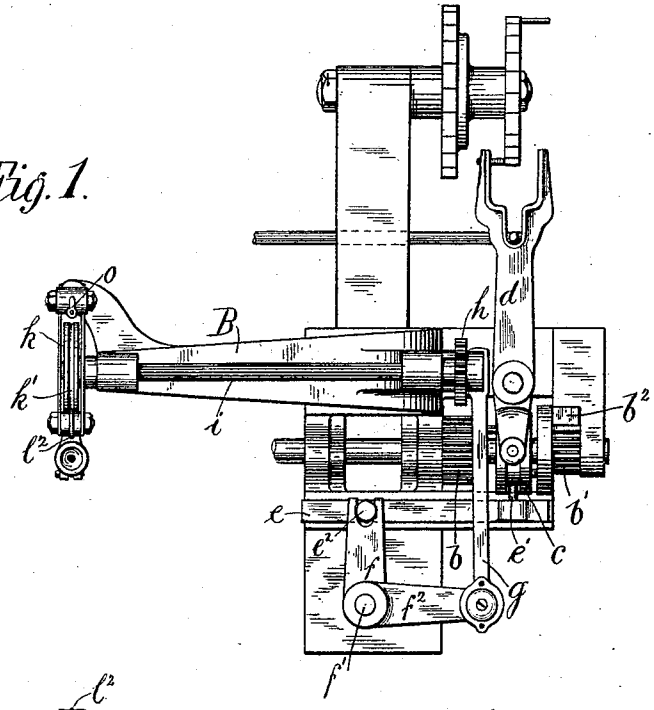
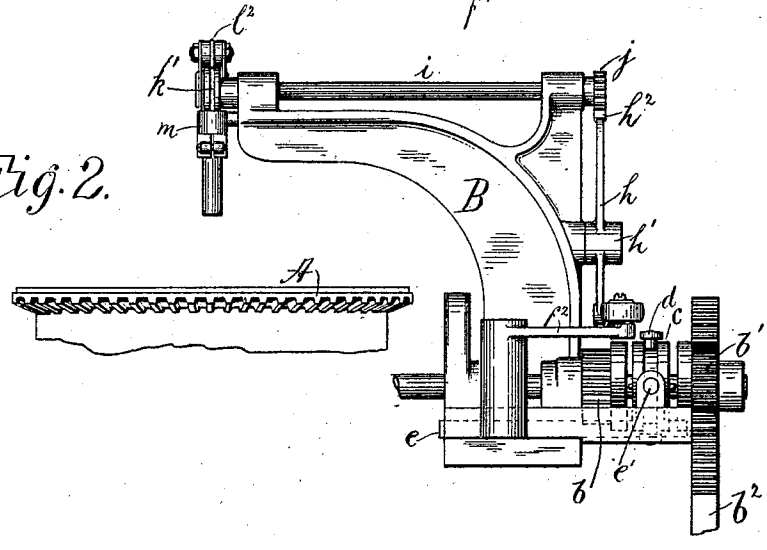


Fig. 2.



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S. J. Murphy.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

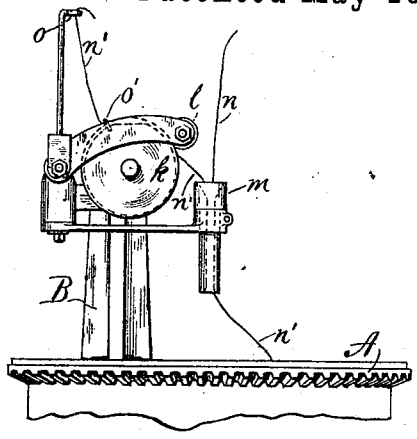

Fig. 5.

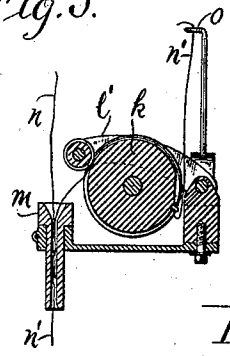

Fig. 3

Fig. 6

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UNITED STATES PATENT OFFICE.

GEORGE E. FRINK, OF PAWTUCKET, RHODE ISLAND, ASSIGNOR TO THE E. JENCKES MANUFACTURING COMPANY, OF SAME PLACE.

THICKENING-THREAD MECHANISM FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 497,315, dated May 16, 1893.

Application filed March 9, 1892. Serial No. 424,341. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. FRINK, of Pawtucket, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Thickening-Thread Mechanism for Knitting-Machines; and I do hereby declare the following specification, taken in connection with the accompanying drawings, forming a part of the same, to be a full, clear, and exact description thereof.

My invention relates to mechanism to be applied to a knitting machine for inserting and removing an extra or reinforcing thread at proper intervals in the operation of the machine, as for instance in knitting the heel and toe of a stocking, and my invention consists in the combinations and arrangements of parts hereinafter described.

Referring to the drawings, Figure 1 represents a top or plan view of my invention. Fig. 2 is a front elevation of the same. Figs. 3 and 4 are opposite end elevations; and Figs. 5 and 6 are detailed views in section showing the thread gripping devices in different positions.

A represents the head of a knitting machine, which is to be supported upon a suitable frame, upon which frame the other parts are likewise to be mounted.

In the drawings my invention is shown as applied to that type of knitting machine which is adapted for knitting an entire stocking, which consequently knits at times round and round as in forming the leg and foot, and at other times knits forward and backward, as in forming the heel and toe. Machines of this character are provided with mechanism for imparting the necessary rotary and reciprocating motions when desired, and with a clutch for shifting from one motion to the other. This mechanism it will not be necessary to describe in this connection, and only a portion thereof is shown in the drawings, in which *a* represents the shaft which transmits the necessary motions to the knitting-head.

b, *b'* are two pinions loose upon the shaft *a*, one of which pinions, *b*, is to be continuously revolved by a suitable gearing, and to the other of which pinions, *b'*, an oscillating or reciprocating motion is to be imparted by the rack b^2, or in any other suitable manner.

c is a movable clutch connected to the shaft *a* by a groove and spline connection and adapted to be moved by a suitable lever so as to engage either the pinion *b* or the pinion *b'* as may be desired. The shifting of the clutch may be effected automatically at the proper times to change the machine from rotary to reciprocating motion, or vice versa, or said clutch may be shifted by hand, it being entirely immaterial, so far as the present invention is concerned, how said clutch is operated. In the drawings the clutch is shown as operated by the lever *d*, the fork of which lever engages a groove in the clutch in the usual manner.

e represents a sliding bar or rod supported and arranged to slide in the frame-work, and provided near its opposite ends with two projecting pins or studs *e'*, e^2. The stud *e'* is preferably provided at its end with a friction roll which rides in the groove of the clutch *c*, as shown in Fig. 1. The other stud e^2 is arranged to be embraced by the fork of a rock-arm *f* secured to a sleeve mounted upon a stud *f'* secured to the frame of the machine. Secured to this sleeve is another rock-arm f^2 to the free end of which is connected one end of a connecting rod *g*. The other end of said rod is connected to the lower end of a lever *h*, pivoted at *h'*, which said lever is provided at its upper end with a segmental gear h^2, as shown in Fig. 3.

Mounted in a bracket B is a shaft *i* which is provided at one end with a pinion *j*, arranged to be engaged and operated by the segmental gear h^2. Secured to the opposite end of said shaft *i* is a roll or roller *k* which is provided with a groove *k'* extending entirely around the periphery of the same. At one point in the periphery of said roll the groove *k'* is deepened as at k^2 for the purpose hereinafter described. Co-operating with the roll *k* is another roll *l*, preferably of smaller diameter, journaled in two arms *l'* pivoted to an extension of the bracket B, the arrangement being such that the roll *l* will be free under the action of gravity to rest against the roll *k*, as shown in the drawings. Surrounding the periphery of the roll *l* is an annular

projection or raised portion l^2 adapted to enter the groove k' in the roller k, as clearly shown in Fig. 1.

m represents a tube or guide through which both the main thread n and the extra or reinforcing thread n' pass on their way to the knitting-head. The extra thread n' is led through the thread eye o, and thence through a ring or eye o' secured in the groove k' of the roller k, as shown in Figs. 5 and 6, thence along said groove k', and between the roll k and the roll l, to the tube m, said thread being held in the groove k' by the projection l^2 on the roll l.

The operation of the parts above described is as follows: Assume that the machine is knitting a stocking and has just completed the leg portion thereof, the only thread employed for such leg portion being the thread n. At this time the roll k will be in the position shown in Fig. 5, and the extra thread n' will be gripped between the projection l^2 on the roll l and the bottom of the groove k' in the roll k, the end of said thread n' hanging in the guide m, but being prevented from being taken up and carried along by the main thread n by reason of the fact that said thread n' is so gripped between the rolls k and l. At the commencement of the heel it is desired that the extra thread shall be inserted to reinforce the heel. Upon the shifting of the clutch c to change the machine from rotary to reciprocating motion, that is, from left to right in Fig. 1, the sliding-bar e will by the movement of said clutch be likewise moved to the right by reason of the engagement of the stud e' with the groove of the sliding clutch-member. This movement of the bar e will cause a rocking of the shaft f' and through the connecting rod g a swinging of the lever h upon its pivot. The swinging of the lever h will through the segmental gear h^2 and the pinion j cause a turning of the shaft i and a corresponding movement of the roll k, that is, a movement from right to left in Fig. 5. The depression or deep place k^2 in the groove on the roll k is so located, as shown in Fig. 5, that said roll will have to be moved a considerable distance before such depression k^2 will be brought opposite the roll l. Consequently the effect of so moving the roll k will be positively to feed along the extra thread n' for a certain distance and until the depression k^2 is brought opposite the roll l and into the position shown in Fig. 6, when the grip of the rolls upon the thread n' will be released, and said thread will then be free to be taken up and carried along with the main thread into the machine. The parts remain in this position during the knitting of the heel, at the end of which it is desired to withdraw the extra thread. When now the clutch c is shifted back to change the machine from reciprocating to rotary knitting, the roll k will, by means of the connections above described, be returned from the position shown in Fig. 6 to the position shown in Fig. 5. The first movement of the roll K will remove the depression k^2 from opposite the roll l, and consequently cause the extra thread n' to be gripped between the projection l^2 on the roll l and the bottom of the groove k'. This gripping of the thread n' will cause said thread to be broken off somewhere between the gripping rolls and the knitting-head, said thread usually breaking close to the knitting-head. If the loose end of the thread n', when so broken off, were left hanging below the end of the tube m, it would be very liable to become so twisted about the main thread n as to cause a portion of the end of the thread to be broken off and carried along with the main thread and thereby form a bunch or imperfection in the work. This difficulty is obviated by the mechanism above described, for the movement of the roll k is continued for a considerable distance after the thread n' has been gripped and broken, and sufficiently far to draw the loose end of said thread into the guide m and so prevent its being twisted about the main thread. By the mechanism above described, it will be seen that the extra thread may be inserted and withdrawn at the proper times with no other manipulation than that of simply shifting the clutch in changing the machine from rotary to reciprocating knitting and vice versa, and that if said clutch is arranged to be shifted automatically the extra thread mechanism will likewise be entirely automatic. It will further be seen that the extra thread is not only gripped to cause it to be broken, but is positively withdrawn for a distance after it has been broken, and is likewise positively fed forward for a distance when it is to be inserted, whereby it will be certain to be taken up and carried along by the main thread.

Various means may be employed for producing the desired movements of the roll k at the proper times, and I do not wish to limit myself to the particular means shown and described. I prefer, however, to actuate the roll k from the shifting clutch as the most convenient means, especially when said clutch is arranged to be operated automatically.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An extra thread mechanism for knitting machines comprising two rolls arranged to grip the extra thread, one of said rolls being positively operated and provided with a depression, whereby when said depression is brought opposite to the other roll said thread will be released, substantially as described.

2. An extra thread mechanism comprising two rolls arranged to grip the extra thread, one of said rolls being provided with a depression, whereby when said depression is brought opposite to the other roll said thread will be released and be free to be taken up by the main thread, and means for moving the roll containing said depression to release or to grip said extra thread, substantially as described.

3. An extra thread mechanism comprising two rolls arranged to grip the extra thread, one of said rolls being provided with a depression, and means for moving the roll containing said depression to release or to grip said extra thread and to withdraw the loose end of said extra thread when broken off into the main thread guides, substantially as described.

4. An extra thread mechanism comprising two rolls for controlling the insertion and withdrawal of said extra thread, one of said rolls being provided with a groove upon its periphery, and the other with a corresponding projection upon its periphery, and one of said rolls having a depression therein, whereby as said last named roll is moved in one direction or the other said extra thread will be gripped or be released as may be desired, substantially as described.

5. The combination, with the shifting clutch of a knitting machine, of mechanism connected with and operated by said shifting clutch for inserting or withdrawing an extra or reinforcing thread, whereby as said clutch is shifted in one direction said extra thread will be inserted, and as said clutch is shifted in the opposite direction said extra thread will be withdrawn, substantially as described.

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Witnesses:
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