

905,185.

APPLICATION FILED MAY 22, 1907.

Patented Dec. 1, 1908.

2 SHEETS—SHEET 1.



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MECHANISM FOR FORMING GARTER TOPS ON STOCKINGS IN CIRCULAR KNITTING MACHINES.

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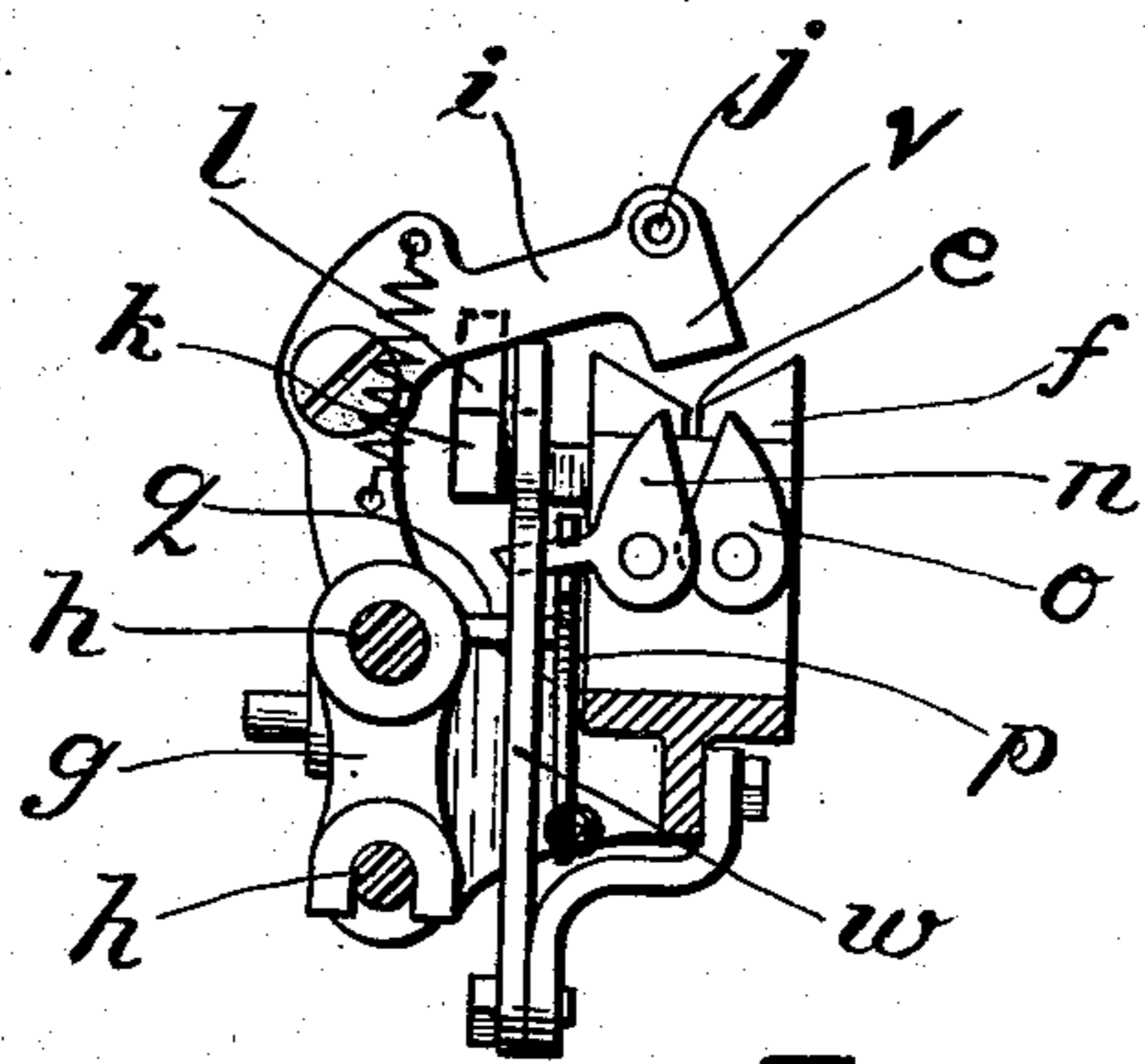
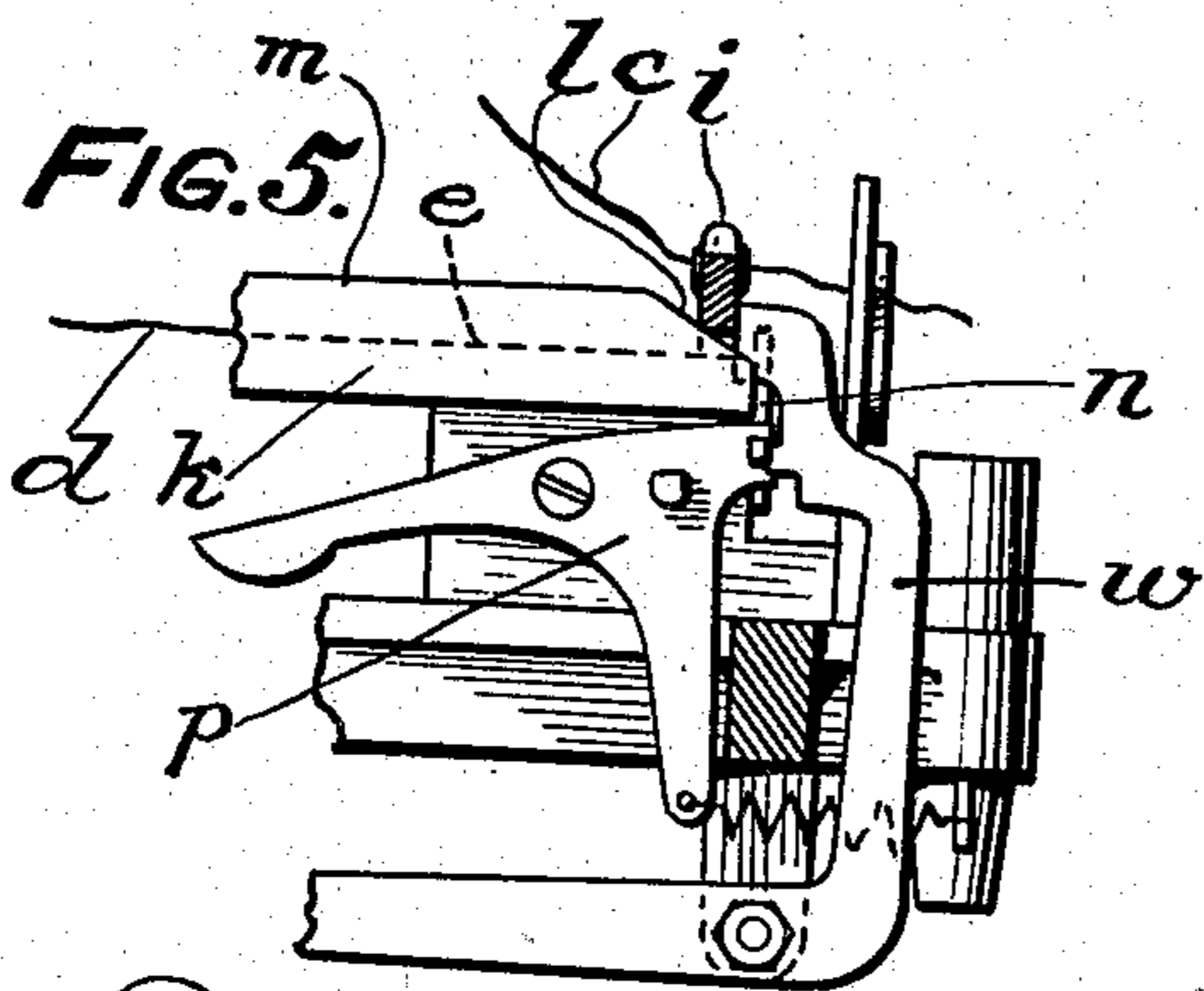


FIG. 2.

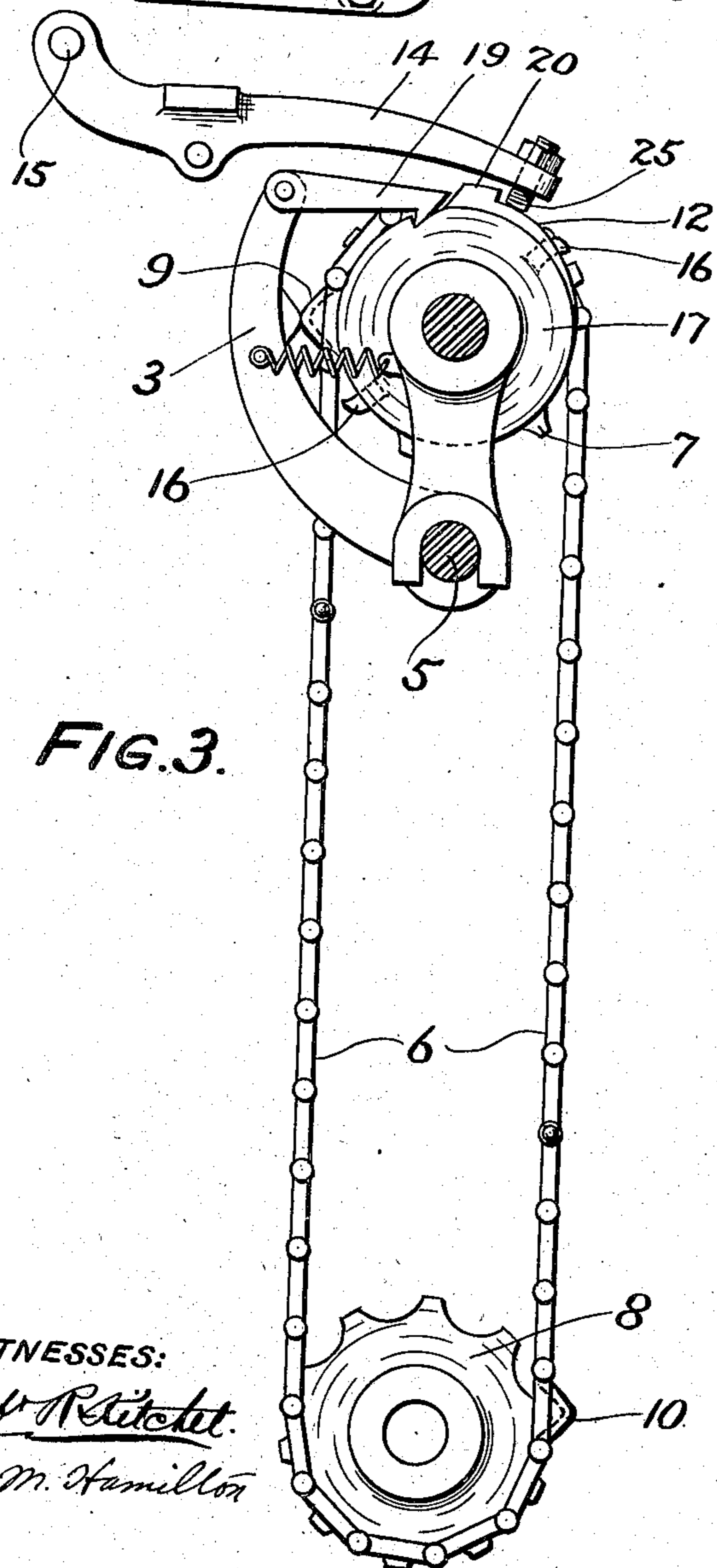


FIG. 3.

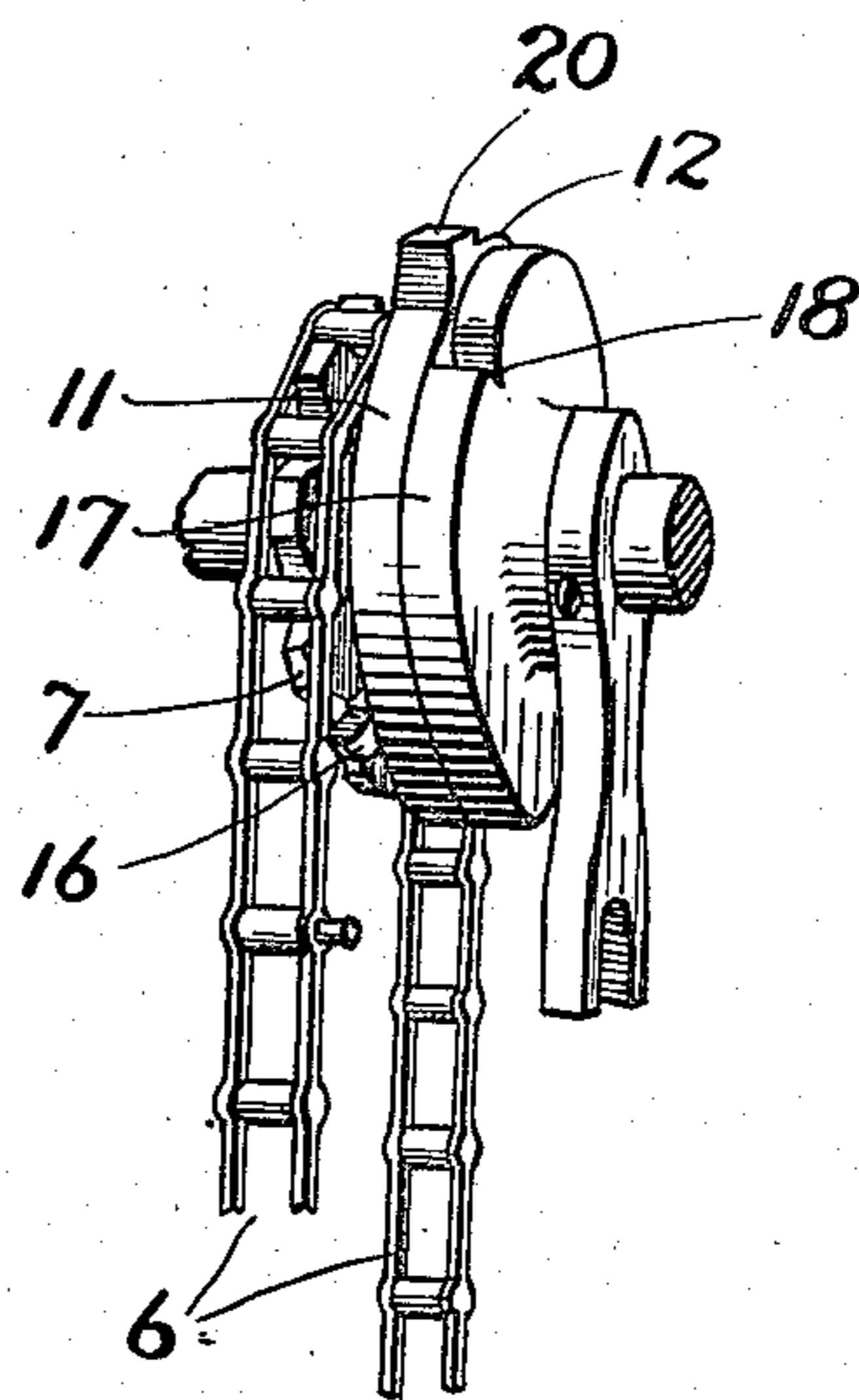


FIG. 4.

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# UNITED STATES PATENT OFFICE.

HARRY A. HOUSEMAN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO STANDARD MACHINE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## MECHANISM FOR FORMING GARTER-TOPS ON STOCKINGS IN CIRCULAR-KNITTING MACHINES.

No. 905,185.

Specification of Letters Patent.

Patented Dec. 1, 1908.

Application filed May 22, 1907. Serial No. 375,023.

To all whom it may concern:

Be it known that I, HARRY A. HOUSEMAN, a citizen of the United States, residing at Philadelphia, county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Mechanism for Forming Garter-Tops on Stockings in Circular-Knitting Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

In stockings where suspending garters are used, the attachment of the garter to the stocking and the strain at that portion of the stocking often ruptures the threads of the stocking.

My invention has for its object to provide mechanism whereby, upon a circular knitting machine, a portion of the upper portion of the leg of the stocking is provided with a reinforced thread while the remainder of the leg is knit with a single thread, and further to elevate the needle cylinder while the double thread portion of the leg is being formed so as to decrease the tension. Finally to increase this tension simultaneously with commencement of the knitting of the single thread portion of the leg. Specifically, I accomplish this result by certain mechanisms in addition to what is described in Letters Patent of the United States, No. 850,476, dated April 16th, 1907, and No. 774,473, dated Nov. 8th, 1904, both issued to me.

In Patent No. 850,476 there is illustrated and described mechanism at the beginning of the formation of the heel and toe for bringing into alinement with each other, in a groove, a main and supplemental thread and at the end of the heel and toe moving the main thread out of the groove and clamping the supplemental thread and severing its connection with the fabric. I have added to this mechanism a lever which in its active position prevents the clamp and cutters from acting and providing mechanism which will at the proper time move said lever out of action. I operate this lever so that it is in action when the toe is completed and move it out of action when the portion of the leg desired to have the two threads is being formed and move it out of action at the end of the formation of the heel. By this arrangement the two threads are in action, not only

during the formation of the heel and toe, but during the formation of the upper portion of the leg, the garter top, and only one thread is in action during the formation of the remainder of the leg and the foot.

In my Patent No. 774,473 a gradual varying in the slack or tension of the loops is obtained by supporting the needle cylinder so as to be vertically movable and providing a cam roller upon which a follower, connected to the cylinder, rests. The cam roller has an inclined periphery at one portion so that when the roller is moved and the follower follows this inclined surface, the cylinder is gradually lowered, fashioning the stocking. This movement takes place during a formation of a portion of the leg and that portion is, by this means, fashioned. This portion is beyond that portion of the leg to which my present invention relates. In my present invention I modify the construction of this cam roller by providing a portion projecting to a greater extent than in the old form, and upon which portion the follower rests during the formation of the garter top. I also provide means which act to move the follower off this high point, and thus lower the needle cylinder simultaneously with throwing the lever out of action, at the end of the formation of the garter top, to allow the clamp and cutters to act.

I will now describe the embodiment of my invention illustrated in the accompanying drawings in which:

Figure 1 is a side view of a part of a knitting machine embodying my invention. Fig. 2 is a section on lines 2—2 of Fig. 1. Fig. 3 is a detail view showing operating levers and cam. Fig. 4 is a perspective view of a portion of Fig. 3. Fig. 5 is a detail view showing cutters closed.

*b* is the needle cylinder.

*d* is the supplemental thread which passes to the groove *e* in the block *f*.

*g* is a sliding frame movable longitudinally of block *f* upon rods *h*.

Connected to the frame *g* is a pivoted lever *i* through eye *j*, in which passes the main thread *c*.

*k* is a guide having at its ends a downward incline *l* and an intermediate high portion *m*.

In front of the block *f* is a cutter composed of the movable member *n* and a fixed

member *o*. The movable member *n* is acted on by a spring lever *p* tending to close the cutter. Upon the frame *g* is a pin *q* which, in the movement of the frame in one direction, strikes the tail piece *r* of the lever *p*, swinging it and opening the movable member *n*, the lever and the movable member being locked in this position. In the opposite movement of this frame *g* the locking device is released. The frame *g* is operated in one direction at the beginning of the formation of the heel and toe, and in the other direction at the end of said heel and toe through the bell crank 40 and rod *u*, all as described in my before mentioned patent No. 850,476, to which reference may be had for specific details.

Just at the point of commencing to knit the heel and toe the frame *g* is moved backward, causing the main thread lever *i* to move upward, backward and downward, placing the main thread in the groove with the supplemental thread and the cutters are opened. At the end of the heel and toe formation the frame *g* is moved in the opposite direction, lifting the main thread out of the groove, the supplemental thread clamped by the toe *v* of the lever *i* and the cutters are tripped and act to sever the connection of the supplemental thread and the fabric, all as described in my Patent No. 850,476. In my present invention, I add thereto a lever *w*, the weight of end *x* holding it in its inner position. (See Fig. 1). When in this position and the lever *i* elevated and the cutters open, the lever *i* rests upon the lever *w* and the movable cutter is held from closing. This lever is moved out of action at the end of the formation of the heel and at the end of the formation of the garter top of the leg by the following mechanism. *y* is a vertical rod upon which the lever *w* rests. A pin *z* on the lower end of this rod rests upon one member of a bell crank 1 pivoted at 2. The other member of this bell crank 1 is, by a link, connected to the follower 3, pivoted at 5, resting upon the pattern chain 6. 7 and 8 are the pattern chain wheels. Upon the pattern chain are the lugs 9 and 10 in such position thereon as to correspond to the points respectively of the completion of the heel and the garter top. When either the lug 9 or 10 on the pattern chain operate the rod *y* the lever *w* is moved backward against the action of the weight and the supplemental thread is clamped and cut as herein described and as described in my Patent 850,476. When the lug passes and ceases to act on rod *y*, the rod falls and the lever *w* moves forward, which it does until it strikes lever *i* (see Fig. 5). The next movement of the frame *g* to bring the supplemental thread into action, moves the lever *i*, releasing the lever *w* and the weight moves it to its active position (Fig. 2). By this ar-

range ment the supplemental thread remains in action after the formation of the toe and until the garter top is formed and remains out of action during the formation of the remainder of the leg, is brought into action for the heel, allowed to go out of action at the end of the heel, remains out of action during the formation of the foot, and is brought into action for the formation of the toe.

It is necessary that coarser stitches should be formed during the formation of the garter top and should return to normal condition at the end of the formation of the garter top. I accomplish this in the following manner: 11 is a cam roller similar to that shown and described in my Patent No. 774,473 before mentioned. This cam roller is provided with the inclined surface 12 on its face, for the purpose of fashioning the leg as in said patent described. The needle cylinder is supported on the rod 13 which rests on the lever 14, pivoted at 15. On the outer end of this lever 14 is a follower 25, which rests upon the cam roller 11. This cam roller has the projections 16, which are operated by lugs on the pattern chain, as described in my Patent No. 774,473. Upon this cam roller at a point corresponding to the commencement of the knitting of the top portion of the stocking, I place a high projection 20 and which abruptly joins with the inclined portion 12. Upon the disk 17 carried with the cam roller, is the tooth or detent 18. Connected to the follower 3 is the pawl 19 which rests on the disk 17, and is in connection with detent 18 when the top of the leg is being knit. When the lever *i* is operated, as before described, to release the lever *w*, the cam roller 11 is moved, causing the follower 25 to pass abruptly from the high projection 20 to the inclined portion 12, lowering the cylinder at that point where the main thread alone is in action. There is but one tooth or detent 18 and thus, when the lever *i* is again operated to release lever *w*, the pawl 19 produces no effect upon the cam roller 11, for the tooth having passed beyond the pawl does not return to a position to be acted upon by the pawl until the upper portion of the leg of the stocking is being knit.

By the arrangement herein described, I am enabled to form the upper portion of the leg of such strength as to resist the strain of the garter. Further, the tension is decreased while the supplemental thread is then in action. Finally, the supplemental thread is automatically thrown out of action at the desired point in the leg and simultaneously the tension is released.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:

1. In a circular knitting machine, the com-

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bination with the needle cylinder and means for feeding a main thread and supplemental thread to the needle cylinder, of disconnecting means for the supplemental thread, means to release said disconnecting means, and supplemental means adapted to hold said disconnecting means inactive against the action of said releasing means.

2. In a circular knitting machine, the combination with the needle cylinder and means for feeding a main thread and supplemental thread to the needle cylinder, of disconnecting means for the supplemental thread, means to release said disconnecting means, and supplemental means, means to render said supplemental means active at predetermined times, and adapted when rendered active to hold said disconnecting means inactive against the action of said releasing means.

3. In a circular knitting machine, the combination with the needle cylinder and means for feeding a main thread and supplemental thread to the needle cylinder, of disconnecting means for the supplemental thread, means to release said disconnecting means, and supplemental means, means to render said supplemental means active at predetermined times, and adapted when rendered active to hold said disconnecting means inactive against the action of said releasing means, and when rendered inactive to allow said disconnecting means to act.

4. In a circular knitting machine, the combination with the needle cylinder and means for feeding a main thread and supplemental thread to the needle cylinder, of disconnecting means for the supplemental thread, means to release said disconnecting means, and supplemental means adapted to hold said disconnecting means inactive against the action of said releasing means, and means to render said supplemental holding means active during a predetermined number of rotations of the machine.

5. In a circular knitting machine, the combination with the needle cylinder and means for feeding a main thread and supplemental thread to the needle cylinder, of disconnecting means for the supplemental thread, means to release said disconnecting means, and supplemental means adapted to hold said disconnecting means inactive against the action of said releasing means, means to render said supplemental holding means active during a predetermined number of rotations of the machine and means, at the end of said rotations, to render said supplemental holding means active.

6. In a circular knitting machine, in combination, cutting mechanism for severing the connection between the supplemental thread and the needle cylinder, means to bring said cutting mechanism into action, a supplemental locking device, in one position

adapted to hold said cutting mechanism from action, and means adapted, at predetermined times, to move said supplemental locking device out of operative position.

7. In a circular knitting machine, in combination, cutting mechanism for severing the connection between the supplemental thread and the needle cylinder, means to bring said cutting mechanism into action, a supplemental locking device, in one position adapted to hold said cutting mechanism from action, and means adapted, at predetermined times, to move said supplemental locking device out of operative position, and means to increase the tension simultaneously with the movement out of action of said supplemental locking device.

8. In a circular knitting machine, in combination, cutting mechanism for severing the connection between the supplemental thread and the needle cylinder, means to bring said cutting mechanism into action, a supplemental locking device, in one position adapted to hold said cutting mechanism from action, means adapted, at predetermined times, to move said supplemental locking device out of operative position, and means to lower the needle cylinder simultaneously with the movement out of action of the said supplemental locking device.

9. In a circular knitting machine for knitting stockings, in combination, cutting mechanism for severing the connection between the supplemental thread and the needle cylinder, means to bring said cutting mechanism into action, a supplemental locking device, in one position adapted to hold said cutting mechanism from action, a pattern chain, mechanism adapted, when struck, to move said supplemental locking device out of operative position, and a lug on said pattern chain adapted, at the end of a predetermined number of rotations of the machine in the formation of the initial portion of the leg, to strike said mechanism.

10. In a circular knitting machine for knitting stockings, in combination, cutting mechanism for severing the connection between the supplemental thread and the needle cylinder, means to bring said cutting mechanism into action, a supplemental locking device, in one position adapted to hold said cutting mechanism from action, a pattern chain, mechanism adapted, when struck, to move said supplemental locking device out of action, and lugs on said pattern chain, one adapted, at the end of a predetermined number of rotations of the machine in the formation of the initial portion of the leg, to strike said mechanism, the other adapted, at the end of the reciprocation of the machine in the formation of the toe, to strike said mechanism.

11. In a circular knitting machine for knitting stockings, in combination, cutting

mechanism for severing the connection between the supplemental thread and the needle cylinder, means to bring said cutting mechanism into action, a supplemental locking device, in one position adapted to hold said cutting mechanism from action, a pattern chain, mechanism adapted, when struck, to move said supplemental locking device out of operative position, means acting simultaneously therewith to increase the tension on the machine, and a lug on said pattern chain adapted, at the end of a predetermined number of rotations of the machine in the formation of the initial portion of the leg, to strike said mechanism.

12. In a circular knitting machine for knitting stockings, in combination, cutting mechanism for severing the connection between the supplemental thread and the needle cylinder, means to bring said cutting mechanism into action, a supplemental locking device, in one position adapted to hold said cutting mechanism from action, a pattern chain, mechanism adapted, when struck, to move said supplemental locking device out of operative position, means, acting simultaneously therewith, to lower the needle cylinder, and a lug on said pattern chain adapted, at the end of a predetermined number of rotations of the machine in the formation of the initial portion of the leg, to strike said mechanism.

13. In a circular knitting machine, in combination, cutting mechanism for severing the connection between the supplemental thread and needle cylinder, means to hold and release said cutting mechanism, a lever, means to normally hold said lever in such position as to prevent the cutting mechanism acting when released, and means, at predetermined times, to move said lever out of said normal position and allow said cutting mechanism when released to act.

14. In a circular knitting machine, in combination, cutting mechanism for severing the connection between the supplemental thread and needle cylinder, a lever, means to normally hold said lever in such position as to prevent the cutting mechanism acting, and means, at predetermined times, to move said lever out of said normal position and allow said cutting mechanism to act, the cutting mechanism, when in active position, being in line of movement of said lever and holding it from returning to its normal position.

15. In a circular knitting machine, in combination, cutting mechanism for severing the connection between the supplemental thread and needle cylinder, means to hold and release said cutting mechanism, a lever, means to normally hold said lever in such position as to prevent the cutting mechanism acting, when released, and means, at predetermined times, to move said lever out of said normal

position and allow said cutting mechanism when released to act, and means, simultaneously with said last mentioned movement of the lever, to increase the tension of the machine.

16. In a circular knitting machine, in combination, cutting mechanism for severing the connection between the supplemental thread and needle cylinder, a lever, means to normally hold said lever in such position as to prevent the cutting mechanism acting, means, at predetermined times, to move said lever out of said normal position and allow said cutting mechanism to act, and means, simultaneously with said last mentioned movement of the lever, to lower the needle cylinder.

17. In a circular knitting machine for knitting stockings, in combination, cutting mechanism for severing the connection between the supplemental thread and needle cylinder, means to hold and release said cutting mechanism, a lever, means to normally hold said lever in such position as to prevent the cutting mechanism acting when released, and means adapted, at the end of a predetermined number of rotations of the machine, in the formation of the initial portion of the leg, to move said lever out of said normal position and allow said cutting mechanism to act.

18. In a circular knitting machine for knitting stockings, in combination, cutting mechanism for severing the connection between the supplemental thread and needle cylinder, means to hold and release said cutting mechanism, a lever, means to normally hold said lever in such position as to prevent the cutting mechanism acting when released, and means, adapted, at the end of a predetermined number of rotations of the machine, in the formation of the initial portion of the leg, and means adapted at the end of the reciprocations of the machine to form the heel, to move said lever out of said normal position and allow said cutting mechanism to act.

19. In a circular knitting machine, in combination, cutting mechanism for severing the connection between the supplemental thread and needle cylinder, a lever, means to normally hold said lever in such position as to prevent the cutting mechanism acting, a pattern chain, a lug thereon, a lever, adapted to be struck by said lug, and connection between said last mentioned lever and the cutting mechanism locking lever, whereby, when said lever is struck by the lug, said cutting mechanism locking lever is moved out of the normal position.

20. In a circular knitting machine, in combination, cutting mechanism for severing the connection between the supplemental thread and needle cylinder, a lever, means to normally hold said lever in such position as to

prevent the cutting mechanism acting, a pattern chain, lugs thereon, a lever, adapted to be struck by said lugs, and connection between said last mentioned lever and the cutting mechanism locking lever, whereby, when said lever is struck by either of the lugs, said cutting mechanism locking lever is moved out of the normal position.

21. In a circular knitting machine, in combination, cutting mechanism for severing the connection between the supplemental thread and needle cylinder, a lever, means to normally hold said lever in such position as to prevent the cutting mechanism acting, a pattern chain, a lug thereon, a lever, adapted to be struck by said lug, connection between said last mentioned lever and the cutting mechanism locking lever, whereby, when said lever is struck by the lug, said cutting

mechanism locking lever is moved out of the normal position, a needle cylinder supported so as to be vertically movable, a cam roller, a lever supporting said cylinder, said needle cylinder supporting lever having a follower resting upon said cam roller, a tooth in said cam roller, a pawl carried by said lug operated lever and adapted, in one position of the cam roller, to strike said tooth and move said cam roller when the lug operated lever is operated by the lug.

In testimony of which invention, I have hereunto set my hand, at Philadelphia, on this 20th day of May, 1907.

HARRY A. HOUSEMAN.

Witnesses:

M. M. HAMILTON,  
A. M. URIAN.