

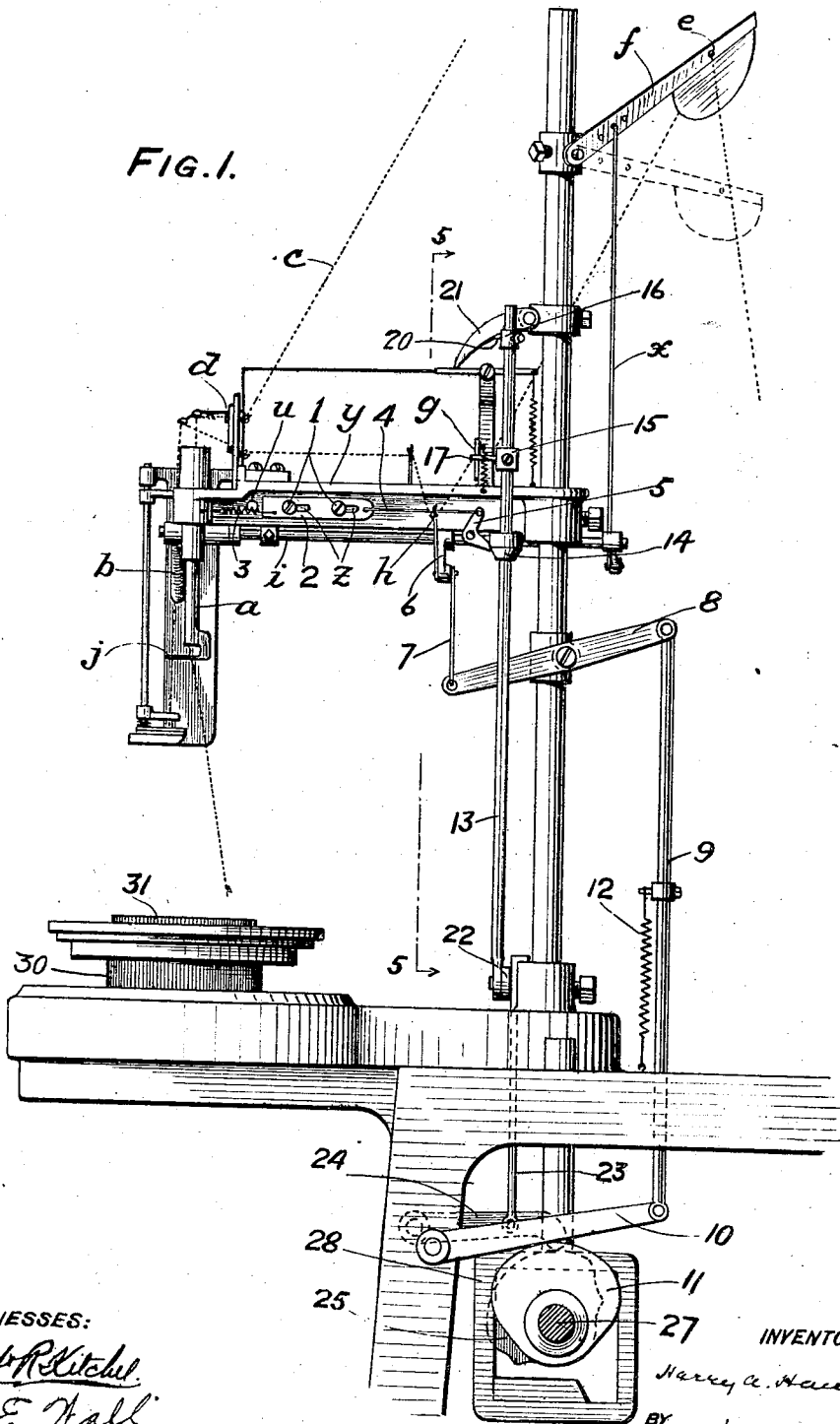
968,563.

H. A. HOUSEMAN.
CIRCULAR KNITTING MACHINE.
APPLICATION FILED MAR. 5, 1909.

Patented Aug. 30, 1910.

2 SHEETS—SHEET 1.

FIG. 1.



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2 SHEETS—SHEET 2.

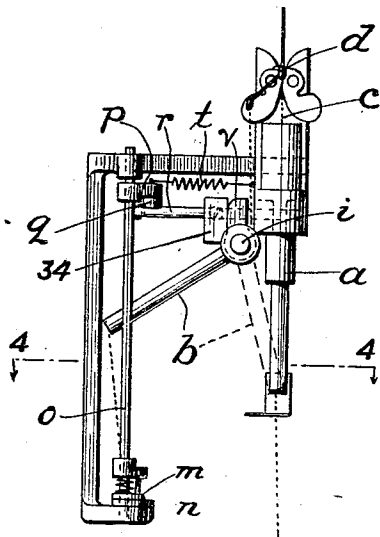
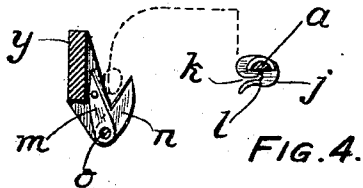
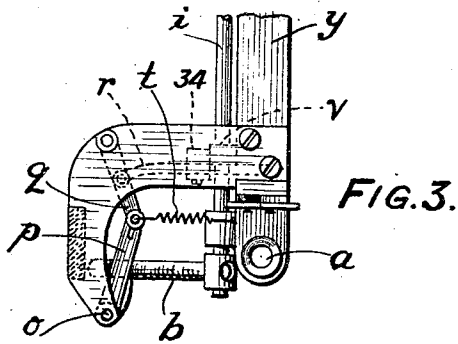


FIG. 2.

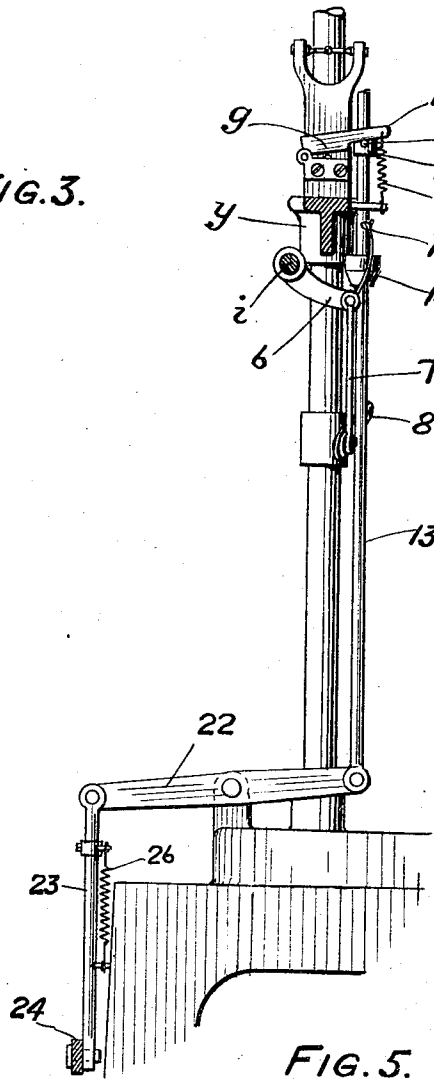


FIG. 5.

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UNITED STATES PATENT OFFICE.

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CIRCULAR-KNITTING MACHINE.

968,563.

Specification of Letters Patent. Patented Aug. 30, 1910.

Application filed March 5, 1909. Serial No. 481,405.

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 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.

My invention has for its object means for supporting the reinforce thread so that it is normally out of contact with the main thread and is brought into contact therewith automatically at the desired point of insertion, so that it will be carried into action by friction contact with the main thread.

It also consists in mechanism to throw the reinforce thread out of action at the end of its period of use and sever said thread. This, and means to provide for sufficient slack to allow the reinforcing thread to go into action and pass to the needles, in general, is the object of my invention. I accomplish this result, speaking generally, by the use of two thread guides, preferably tubes, through one of which passes the main thread, and through the other the reinforce thread. The reinforce thread, guide or tube, is pivoted so that it can move the reinforce thread into and out of contact with the main thread. I also provide cutters which are in the line of movement of the reinforce thread, when its guide or tube is moved away from the main thread guide or tube, which cutters are caused, after the thread is moved between them, to close and sever the thread. The mechanism to cause the movement of the reinforce guide or tube into action operates slack devices to draw forward sufficient thread to allow the reinforce thread to be moved into action by the main thread. In this reverse movement also the cutters are opened and locked from closing.

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

Figure 1 is a side elevation of a portion of a knitting machine embodying my invention. Fig. 2 is a front view of a portion of the mechanism. Fig. 3 is a top plan view of same. Fig. 4 is a section on line 4—4 Fig. 2. Fig. 5 is a section taken on line 5—5, Fig. 1.

30 is the needle cylinder, 31 the needles therein.

a is the main thread tube or guide through which the main thread passes to the needles 31, b is the reinforce thread tube or guide. The main thread c passes through the tension device d into and through the tube a . The reinforce thread passes through an eye e in the slack arm f through the thread locking device g and over the supplemental slack arm h to, into and through, the tube or guide b . The tube b is secured to the rock shaft i so that it swings with said shaft i . The lower end of the tube a has the plate j through an orifice l in the center of which the main thread passes. This plate j also has the slot k , the mouth of which is in line with the reinforce thread in the swinging of tube b toward tube a so that the thread is caught in and guided by said slot k to the central orifice l and into contact with the main thread, which carries it to the needles 31.

m and n are the cutters, the movable cutter m is mounted on the vertical rod o connected at its upper end to the lever p , which lever is connected by slotted connection with lever q . The lever q is connected to the rod r , which is adapted to pass through orifice u in the frame y of the machine.

t is a spring, one end of which is connected to the levers p and q , and the other end to the frame of the machine. The action of this spring is to close, or tend to close, the movable cutter m , and move or tend to move, the rod r through orifice u .

Mounted upon the shaft i is the lug v which, in one movement of the rock shaft i strikes a lug 34 on the rod r and moves said rod against the action of the spring operating the levers p and q to move the movable cutter m to open.

The supplemental slack arm h is mounted upon an arm 6 carried by the rock shaft i and the pivoted slack arm f is positively connected by rod x to be moved in either direction by said shaft i .

Slidably mounted upon the frame y of the machine by means of the slots z and screws 1 is the locking plate 2. One end of this plate 2 is connected to one end of the spring 3, the other end of the spring being connected to a fixed part of the machine. The action of this spring is to draw, or

tend to draw, the plate across the opening *u*. The other end of this plate is connected to the strap or rod 4, the other end of the strap being connected to one arm of a bell crank 5.

By means of a crank 6, the rock shaft *i* is connected to the link 7, which in turn is connected to one end of the pivoted lever 8. The other end of the lever being connected to the rod 9, in turn is connected to the pivoted cam arm 10 acted on by the cam 11, a spring 12 holding this arm 10 in contact with the cam 11.

13 is a vertical rod having the collars 14, 15 and 16 thereon. The collar 14 in the movement of the rod in one direction, strikes the free end of bell crank 5. The collar 15 has the pin 17 upon which rests a projection 18 from the movable member of the thread locking device 9. This projection 18 is connected to one end of spring 19, the other end connected to a fixed part of the machine, the spring closing and tending to close the locking device. The collar 16 has a pin 20 which acts upon the tension spring finger 21. The rod 13, at its lower end, is connected to one end of pivoted lever 22. The other end of said lever 22 is connected by rod 23 with the arm 24 acted upon by cam 25, and held in contact therewith by spring 26.

The cams 11 and 25 are on the shaft 27. This is the shaft which carries the cam to operate the frame 28 to shift the driving of the machine from rotation to reciprocation, and vice versa, all of which is fully described in Letters Patent No. 538,518, issued to me April 30, 1895. In the present construction the driving ratchet, not shown, is caused to operate the cam 11 in advance of the shift, and the cam 25 simultaneously with the shift.

The construction being as described and the machine knitting on tubular knitting, the parts being then as shown in the drawings, the operation is as follows: The cam 11 goes into action just prior to the shift, rocking the shaft and swinging the thread guide or tube *b* toward the main thread guide or tube *a* so that the reinforce thread enters the slot *k*, in plate *j* and into contact with the main thread. Simultaneously the main slack and supplemental slack device are acted upon to provide sufficient reinforce thread. Finally, the cutters are opened through the lug *v* on the rock shaft *i* acting on the lug 34 upon the rod *r*. All of this occurs before the shift from rotation to reciprocation, so that it is insured that the reinforce thread is ready for action at the turn of the shift. When the shift occurs, cam 25 goes into action, lifting rod 13 and through the collar 15 and 16 opening the thread lock *g* and releasing the tension finger 21. The collar 14 moves away from

lever 5, allowing spring 3 to act to move plate 2 so that its face covers the orifice *u*. The reinforce thread then enters into the knitting and continues to knit until just before the reverse shift. When the cam 11 again goes into action, continuing its rotation it acts to allow the spring 12 to act to give a reverse movement to the rock shaft *i*. This moves the reinforce thread guide away from the main thread guide, so that the reinforce thread comes in contact with the outer face of the cutter. At the same time, the lug *v* is withdrawn from the projection or lug 34 on the rod *r*, but the knives are prevented from closing by reason of the plate 2 covering the orifice *u* and preventing the rod *r* from moving to close the movable cutter *m*. The reverse movement of this rock shaft also reverses the movement of the two slack arms, the reinforce thread being enabled to pass out freely, in the movement of its thread guide. The continued reciprocation of the machine will cause the thread to slip over the outer face of the cutter jaw and between the cutters, the outer surface being rounded for this purpose. Simultaneously with the shift, the cam 25, continues its rotation, allowing the rod 13, through the movement of the spring 26, to descend, the collar 14 moves the plate 2 away from the orifice *u* against the action of spring 3, the rod *r* under action of the spring *t* passes through the orifice *u*, and the cutters at once close, cutting the thread. This movement of the rod 13 also closes the thread locking device and puts the tension device again into action. The parts are then returned to the position initially described.

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

1. In combination, a guide for the main thread, an independent guide for the reinforce thread having a severed end, a horizontal pivot for the supplemental thread guide, adjacent to the main thread guide, the supplemental thread guide adapted in its movement to place the severed end of the supplemental thread in position to be drawn in by the main thread.

2. In combination, a guide in the form of a tube, for the main thread, an independent guide, in the form of a tube, for the supplemental thread having a severed end, said tubes being of substantially the same length, a horizontal pivot, adjacent to the main thread guide, for the supplemental thread guide, the supplemental thread guide being adapted in its movement, to place the severed end of the supplemental thread in position to be drawn in by the main thread.

3. In combination, a guide for the main thread, in the form of a tube, an independent guide in the form of a tube for the supple-

mental thread having a severed end, a horizontal pivot for the supplemental thread guide adjacent to the main thread guide, the supplemental thread guide being adapted in its movement to place the severed end of the supplemental thread in position to be drawn in by the main thread.

4. In combination, a thread guide for the main thread, a supplemental thread guide for the supplemental thread having a severed end, said guides being of substantially the same length, and a horizontal pivot, adjacent to the main thread guide, for the supplemental thread guide, the supplemental thread guide being adapted in its movement to place the severed end of the supplemental thread in position to be drawn in by the main thread.

5. In combination, a main thread guide for the main thread, a supplemental thread guide for the supplemental thread, a horizontal pivot for the supplemental thread guide, means to swing the supplemental thread guide on its pivot, the length of the supplemental thread guide being such that when swung toward the main thread guide the supplemental thread at the delivery end of supplemental thread guide is brought in contact with the main thread at the delivery end of main thread guide.

6. In combination, a main thread guide for the main thread, a supplemental thread guide for the supplemental thread, a horizontal pivot for the supplemental thread guide, means to swing the supplemental thread guide on its pivot, the length of the supplemental thread guide being such that when swung toward the main thread guide the supplemental thread at the delivery end of supplemental thread guide is brought in contact with the main thread at the delivery end of the main thread guide, a plate at the delivery end of the main thread guide, said plate having a central orifice, and an open end slot in line of movement of thread in supplemental thread guide, said slot leading to said central orifice.

7. In combination, a vertical main thread guide for the main thread, a supplemental thread guide for the reinforce thread, a horizontal pivot for the supplemental thread guide, adjacent to the main thread guide, a plate at the delivery end of the main thread guide, said plate having a central orifice, and an open end slot in line of movement of thread in supplemental thread guide, said slot leading to said central orifice.

8. In combination, a vertical main thread guide, in the form of a tube, for the main thread, a supplemental thread guide, in the form of a tube, for the supplemental thread, said tubes being of substantially the same length, a horizontal pivot, adjacent to the main thread guide for the supplemental thread guide, a plate at the delivery end of

main thread guide, said plate having a central orifice, and an open end slot in line of movement of the thread in said supplemental thread guide, said slot leading to said central orifice.

9. In combination, a main thread guide, for the main thread, in the form of a tube, a supplemental thread guide, for the supplemental thread, in the form of a tube, a horizontal pivot for the supplemental thread guide adjacent to the main thread guide, a plate at the delivery end of main thread guide, said plate having a central orifice, and an open end slot in line of movement of the thread in the supplemental thread guide, said slot leading to said central orifice.

10. In combination, a main thread guide for the main thread, a supplemental thread guide for the supplemental thread, said guides being of substantially the same length, and a horizontal pivot adjacent to the main thread guide for the supplemental thread guide, a plate at the delivery end of the main thread guide, said plate having a central orifice, and an open end slot in line of movement of the thread in said supplemental thread guide, said slot leading to said central orifice.

11. In combination, a main thread guide for the main thread, a supplemental thread guide for the supplemental thread, a horizontal pivot for the supplemental thread guide, means to swing the supplemental thread guide on its pivot, the length of the supplemental thread guide being such that when swung toward the main thread guide the supplemental thread at the delivery end of the supplemental thread guide is brought in contact with the main thread at the delivery end of the main thread guide, cutting mechanism in line of movement of the supplemental thread guide away from the main thread guide, and means to operate said cutting mechanism to cut when said supplemental thread is in operative relation thereto.

12. In combination, a main thread guide for the main thread, a supplemental thread guide for the supplemental thread, a horizontal pivot for the supplemental thread guide, means to swing the supplemental thread guide on its pivot, the length of the supplemental thread guide being such that when swung toward the main thread guide the supplemental thread at the delivery end of the supplemental thread guide is brought in contact with the main thread at the delivery end of the main thread guide, and means to provide slack from the supplemental thread in the movement of its guide toward the main thread guide.

13. In combination, a main thread guide for the main thread, a supplemental thread guide for the supplemental thread, a horizontal pivot for the supplemental thread

guide, means to swing the supplemental thread guide on its pivot, the length of the supplemental thread guide being such that when swung toward the main thread guide the supplemental thread at the delivery end of the supplemental thread guide is brought in contact with the main thread at the delivery end of main thread guide, and means to lock the supplemental thread when its guide is in its retracted position.

14. In a circular knitting machine, the combination with the movable reinforce guide and the reinforce thread therein, and the main thread guide and main thread therein, of cutters having a spring for closing said cutters, a stop for restraining said spring, a cam and intermediate connection between said cam, and cutters adapted in the rotation of said cam to move said reinforce thread guide away from the main thread guide, means to render said cam active prior to the shift from reciprocation to rotation, and a second cam, and intermediate connections between said second cam and the stop, adapted in the rotation of said second cam, to release said stop, and means to render said second cam active simultaneously with the shift from reciprocation to rotation.

15. In a circular knitting machine, the combination with the movable reinforce guide and its reinforce thread therein, and the main thread guide and its thread therein, of cutters, a spring for closing said cutters, a stop for restraining the movement of said spring, a cam and intermediate connection between said cam and reinforce thread guide, and cutters adapted in the rotation of the cam to open said cutters and swing said reinforce thread guide toward the main thread guide, and to release said cutters and move the reinforce thread guide away from the main thread guide, and a second cam adapted in its rotation to move said stop into action and release said stop, means to cause the first portion of the rotation of the first cam to take place prior to the shift of machine from rotation to reciprocation, and the remaining portion of the rotation prior to the return shift, and means to cause the first portion of the rotation of the second cam to take place simultaneously with the shift from rotation to reciprocation, and the remaining portion of the rotation simultaneously with the return shift.

16. In a circular knitting machine, in combination, a main thread guide, and main thread therein, a reinforce thread guide and reinforce thread therein, means to move said reinforce thread guide away from the main thread guide prior to the shift from reciprocation to rotation, a movable cutter, the exterior face of which is curved, in line of movement of the reinforce thread, and means to operate said movable cutter simul-

taneously with the shift from reciprocation to rotation.

17. In a circular knitting machine, in combination, a main thread guide and main thread therein, a reinforce thread guide and reinforce thread therein, said reinforce thread guide being movable toward and from the main thread guide, cutting mechanism in line of movement of the reinforce thread in the movement of its guide away from the main thread guide, slack devices for the reinforce threads, and means to simultaneously move the reinforce thread guide toward the main thread guide and to operate said slack device and open said cutting mechanism prior to the shift of the machine from rotation to reciprocation.

18. In a circular knitting machine, in combination, a main thread guide and main thread therein, a reinforce thread guide and reinforce thread therein, said reinforce thread guide being movable toward and from said main thread guide, cutting mechanism in line of movement of the reinforce thread in the movement of its guide away from the main thread guide, slack devices for the reinforce threads, and means to simultaneously move the reinforce thread guide toward the main thread guide and to operate said slack device and open said cutting mechanism prior to the shift of the machine from rotation to reciprocation, and to move said reinforce thread guide away from the main thread guide and return said slack devices prior to the shift of the machine from reciprocation to rotation.

19. In a circular knitting machine, in combination, a main thread guide and main thread therein, a reinforce thread guide and reinforce thread therein, said reinforce thread guide being movable toward and from the main thread guide, cutting mechanism in line of movement of the reinforce thread in the movement of its guide away from the main thread guide, a lock for holding said cutters open, and a lock for the reinforce thread, and means to simultaneously release said cutting mechanism lock and move said reinforce thread lock into action after the shift of the machine from reciprocation to rotation and to bring said cutting mechanism lock into action and release said reinforce thread locking device after the shift from rotation to reciprocation.

20. In a circular knitting machine, in combination, a main thread guide and main thread therein, a reinforce thread guide and reinforce thread therein, said reinforce thread guide being movable toward and from said main thread guide, cutting mechanism in line of movement of the reinforce thread in the movement of its guide away from the main thread guide, a rotating cam and connection between said cam and said

reinforce thread guide, cutting mechanism and slack devices, said cam in a part of its rotation moving said reinforce thread guide toward the main thread guide, opening said cutting mechanism and moving said slack devices into action, and in the remainder of its rotation moving said reinforce thread guide away from the main thread guide, and returning said slack devices, and means to give said cam the first part of its rotation prior to the shift of the machine from rotation to reciprocation and the remainder of its rotation prior to the shift of the machine from reciprocation to rotation.

21. In a circular knitting machine, in combination, a main thread guide and main thread therein, a reinforce thread guide and reinforce thread therein, said reinforce thread guide being movable toward and away from said main thread guide, cutting mechanism in line of movement of the reinforce thread in the movement of its guide away from the main thread guide, a lock for holding said cutters open, and a lock for the reinforce thread, a rotating cam and connection between said cam and said cutting mechanism lock, and said reinforce thread lock, said cam in one part of its rotation moving said cutting mechanism lock into action and releasing said reinforce thread, said cam in the remainder of its rotation moving said cutting mechanism lock out of action and bringing said reinforce thread lock into action, and means to give said cam the first part of its movement simultaneously with the shift of the machine from

rotation to reciprocation and the remainder of the movement simultaneously with the shift of the machine from reciprocation to rotation.

22. In a knitting machine, the combination with a device for moving a supplemental thread away from a main thread, of a cutter having a curved outer face in line of movement of the supplemental thread in such movement.

23. In a circular knitting machine, in combination, a rock shaft, a reinforce thread guide carried by said rock shaft, a reinforce thread therein, cutting mechanism in line of movement of the reinforce thread in one movement of the reinforce thread carrier, a lug carried by said shaft adapted in one movement of the shaft to open said cutting mechanism.

24. In a machine of the character described, cutting mechanism for the reinforce thread, a spring tending to operate said cutting mechanism to cut, a plate mechanism between said plate and spring adapted in one position of the plate to resist the action of said spring, and means to move said plate into and out of said position substantially as described.

In testimony of which invention, I have hereunto set my hand, at Philadelphia, on this 3rd day of March, 1909.

HARRY A. HOUSEMAN.

Witnesses:

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E. E. WALL.