

No. 663,432.

Patented Dec. 11, 1900.

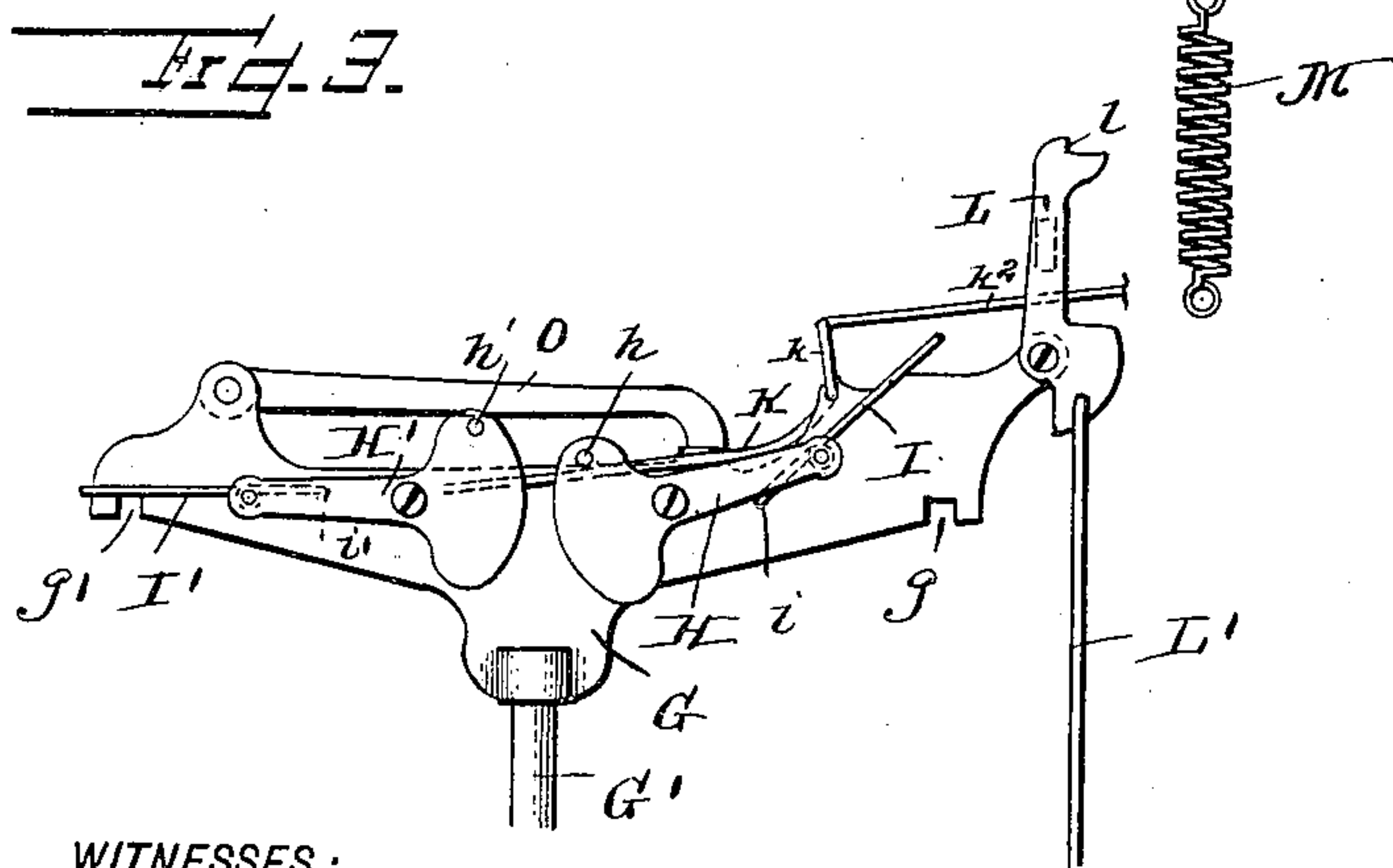
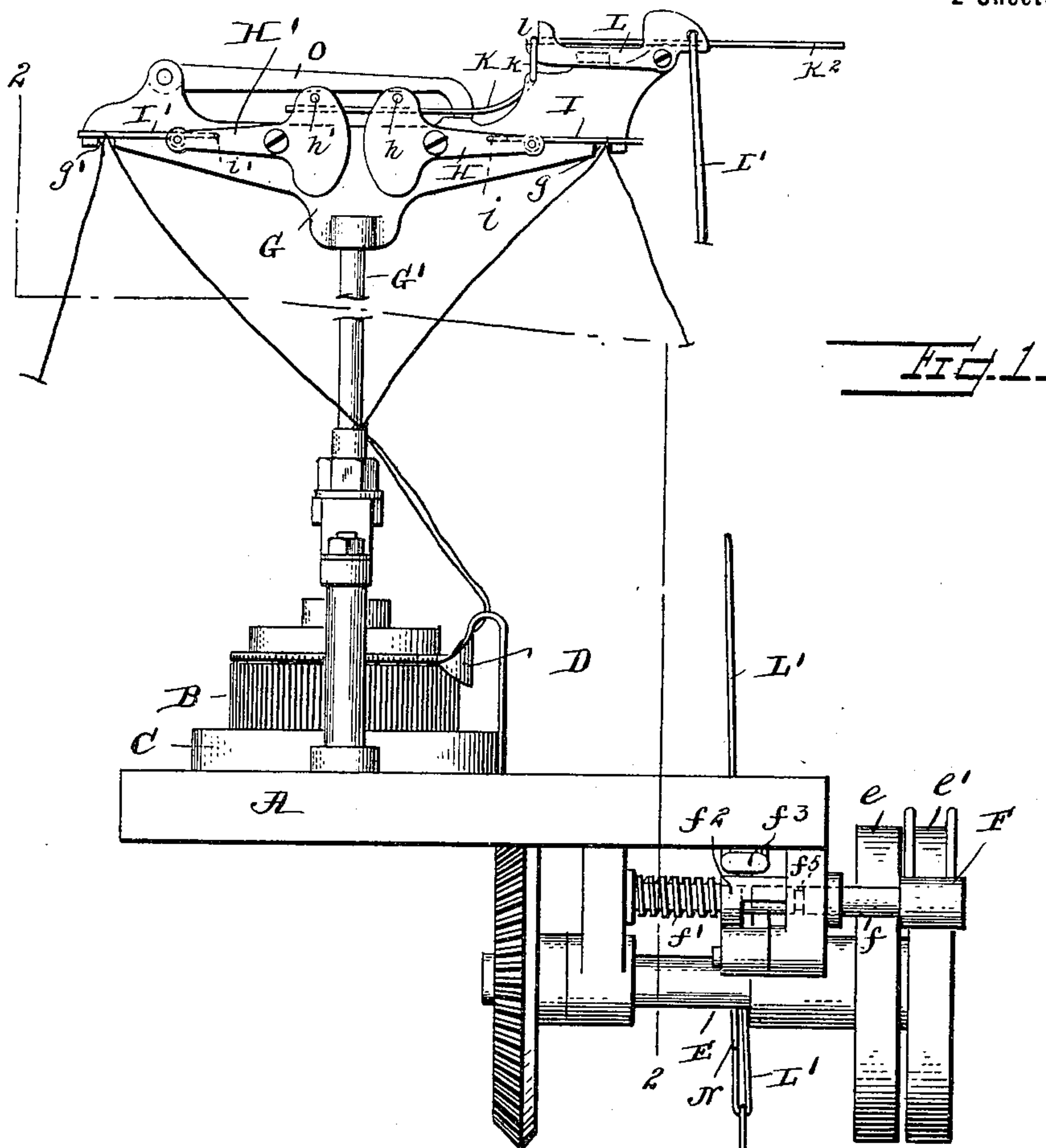
R. B. GOODYEAR.

STOP MOTION FOR KNITTING MACHINES.

(Application filed Apr. 11, 1900.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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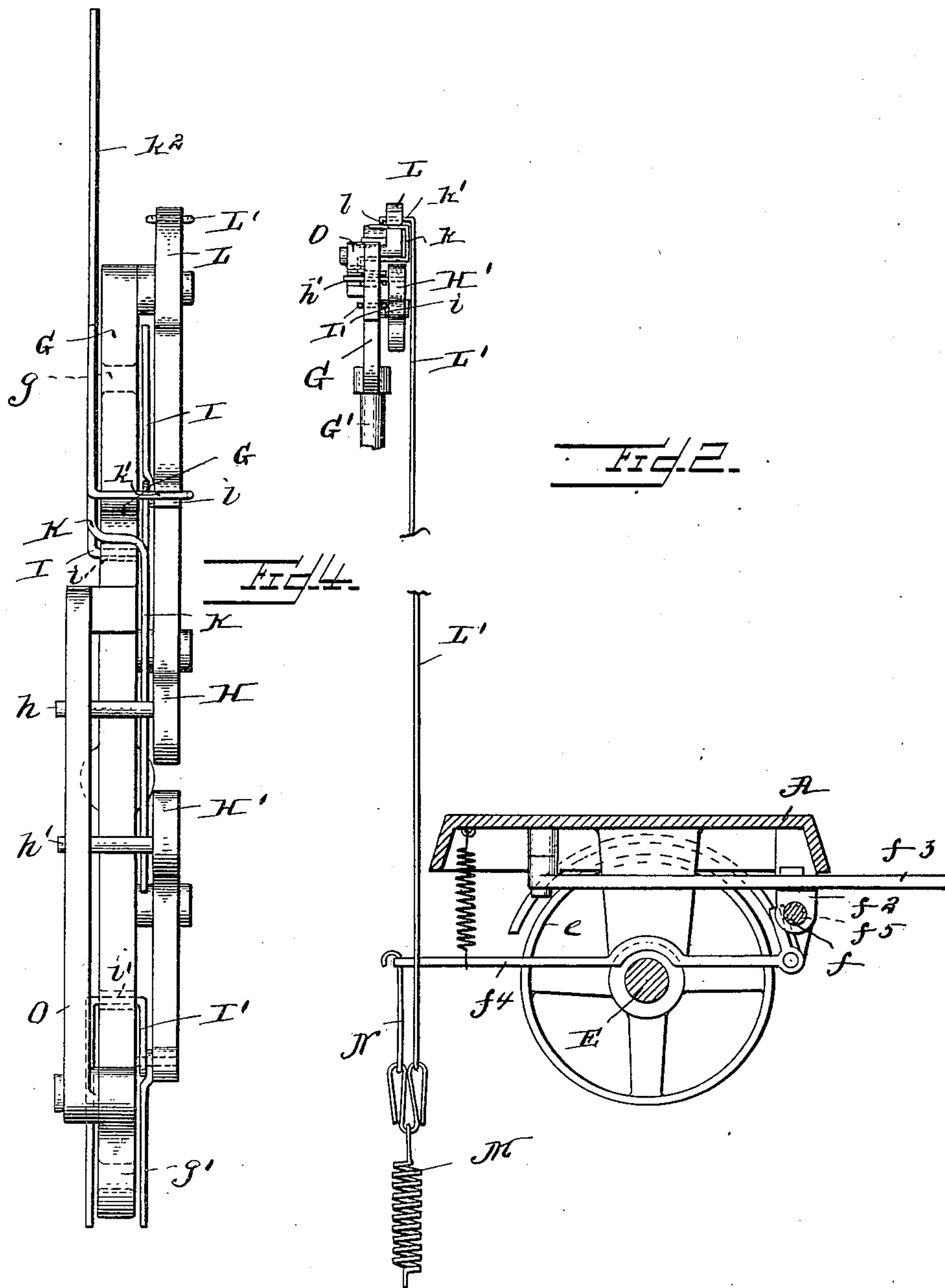
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UNITED STATES PATENT OFFICE.

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STOP-MOTION FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 663,432, dated December 11, 1900.

Application filed April 11, 1900. Serial No. 12,390. (No model.)

To all whom it may concern:

Be it known that I, ROBERT B. GOODYEAR, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Stop-Motions for 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 relates to stop-motions for knitting-machines.

It has for its object the automatic stopping of the machine in case of, first, the breaking of a thread, and, second, undue tension upon the thread.

It consists in combining with the means for disengaging the power and the driving shaft and the controlling devices for holding said means out of action a plurality of levers, one of which engages the thread and the other of which is in line of movement of the controlling devices, the levers being pivotally connected in such a way as to increase the leverage and enable a slight tension on the thread-engaging lever to normally hold the other lever out of engagement with the controlling devices, while permitting the last-named lever to move and actuate the controlling devices to disengage the power when the thread breaks or its tension relaxes.

It consists also in combining with the power-disengaging means, controlling devices, and thread-engaging lever a device normally restraining the movement of the thread-engaging lever in the direction in which the tension of the thread tends to move it, said device being so arranged that it will yield to permit the disengagement of the thread from the thread-engaging lever under abnormal tension of the thread, and thereby permit the controlling devices to operate as in the case of a break in the thread.

It consists also in the general construction and arrangement of said mechanism with reference to the device for controlling the power connections and in various subordinate details of construction, all of which are fully described hereinafter.

In the drawings, Figure 1 is a partial side

elevation of the knitting-machine with the stop-motions attached. Fig. 2 is a section on the line 2 2 of Fig. 1 with the knitting-cylinder, cam-cylinder, and thread-carrier omitted. Fig. 3 is a side elevation of the stop-motion shown in Fig. 1, the parts being shown in the positions they assume after the disengagement of one of the threads with the stop-motion, due to breakage or undue tension upon the thread; and Fig. 4 is a plan view of the mechanism shown in Fig. 3, the parts being in the same position as in Fig. 1.

A is the main frame of a circular-knitting machine; B, the stationary needle-cylinder; C, the rotary cam-cylinder; D, the thread-carrier rotating with the cam-cylinder; E, the main driving-shaft; e, the fast pulley, and e' the loose pulley.

F is the belt-shifter, and f the belt-shifting rod.

f' is an extension-spring upon rod f and between the frame of the machine and a collar f² on the rod. This spring when free to act forces the rod f to the right and moves the belt over to the loose pulley.

f³ is a lever pivoted to the frame at one end, connected to the collar f² between its ends, and provided at the other end with a handle whereby the rod f may be manually moved to the left against the action of spring f' and move the belt into engagement with the fast pulley.

f⁴ is a spring-pressed lever pivoted to the frame of the machine and which is forced by its actuating-spring into engagement with a notch f⁵ in the rod f when the latter is moved to the left, as described, maintaining the belt on the fast pulley until the lever f⁴ is disengaged from the notch f⁵.

G is a frame for supporting the stop-motion, and G' an upright on the main frame and supporting the frame G.

H is a lever pivoted between its ends to the frame G.

I is a forked lever, which is pivoted to the frame G at i by means of its yoke extending through an orifice in the frame of slightly-greater diameter than the cross-section of the lever I. The arms extend from the pivot i on opposite sides of the frame G and across

a notch *g* in the frame *G*. One arm of lever *I* is pivoted between its ends to the lighter end of lever *H*, forming a compound thread-engaging lever *HI*. The thread extends from the cop over one arm of lever *I*, through and against the top wall of notch *g*, over the other arm of lever *I*, and down to the thread-carrier, the ordinary tension on the thread being sufficient to hold the levers *I* and *H* in the position shown in Fig. 1.

h is a pin on the heavier end of lever *H*.

K is a locking-lever pivoted between its ends to the frame *G*, the lighter end extending in a general horizontal direction underneath the pin *h*, but not contacting therewith, the other and heavier end consisting of the upright member *k*, the transverse horizontal member *k'*, and the horizontal member *k*².

L is a lever pivoted between its ends to the frame *G*. The longer end is provided with a catch *l*, which extends under and normally engages the member *k'* of lever *K*. The shorter end is connected to a vertically-extending rod *L'*, the lower end of which is secured to a spiral spring *M*, fastened below or to the frame of the knitting-machine. The lever *K* is normally held in position to lock the lever *L* by reason of the weight of the members *k*, *k'*, and *k*² being sufficient to overbalance the weight of the lighter end of lever *K*.

N is a rod connected at one end to the lever *f*⁴ and at the other end to the spring *M*.

If a thread breaks, the free ends of lever *I* are released, throwing levers *H* and *I* into the position shown in Fig. 3, (the loose bearing of the pivot in lever *I* permitting said movement,) the heavier end of lever *H* drops, the pin *h* strikes and depresses the lighter end of lever *K*, the member *k'* of lever *K* swings out of engagement with the catch *l*, releasing lever *L*, and the spring *M* contracts, drawing down the rod *N* and withdrawing lever *f*⁴ from notch *f*⁵, which permits the spring *f*⁷ to act to throw the belt-shifting mechanism to the right, thus stopping the machine.

To prevent the ordinary tension upon the thread from depressing the free ends of lever *I* so as to allow the escape of the thread from the notch *g*, I have provided the lever *O*, pivoted at one end on frame *G*, while the other end rests upon the frame. The free end of this lever is immediately over and in alignment with the pin *h*. If the thread passing to the thread-carrier is sufficiently strong, it may catch and for a short time resist breakage, under which circumstances it is desirable to stop the machine before the thread breaks. Under these conditions the tension on the thread will be sufficient to depress the free ends of lever *I* against the weight of lever *O* and permit the thread to escape from notch *g* and slide off the ends of lever *I*. The mechanism will then act as before described, precisely as in the case of a thread breakage.

The belt-shifting mechanism, including the lever *f*⁴ for holding the same in position to engage the power-belt with the fast pulley, forms no part of my invention. Any other mechanism for throwing and retaining the power in engagement with the driving-shaft, such as a clutch, may be substituted for the belt-shifting mechanism described.

If two threads are to be fed to the thread-carrier, I duplicate the levers *H* and *I* and the notch *g*, as indicated by the letters *H'*, *I'*, and *g'*, Figs. 1 and 3, and extend the lever *K* to the left, so that it extends under the pin *h'* of lever *H'*.

It will be understood that my invention is applicable to any type of knitting-machines.

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

1. In a knitting-machine, the combination with means for disengaging the power and the driving-shaft, of controlling devices for holding said disengaging means out of action, a lever, pivoted between its ends and having one end heavier than the other, and in line of movement of said controlling devices, and a thread-engaging lever pivotally connected to the first-named lever to normally uphold the heavy end thereof, whereby a slight tension of the thread upon the thread-engaging lever will uphold the heavy end of the first-named lever and whereby when the thread is released or disengaged, the first-named lever will move to actuate said controlling devices and permit said disengaging means to operate.

2. In a knitting-machine, the combination with means for controlling the engagement between the driving-shaft and the source of power, of a tension device connected therewith and normally tending to actuate said means to cause the disengagement of the power and the driving-shaft, a frame, a lever pivoted between its ends to said frame, a second lever pivoted at one end to the frame and connected between its ends to the lighter end of the first-named lever, means for confining the thread passing to the thread-carrier between the frame and the free end of the second lever, whereby said levers are held in a definite position, and mechanism connected to and normally holding said tension device out of action but adapted, when the heavier end of the first-named lever drops, to be engaged by said lever and moved to release said tension device.

3. In a knitting-machine, the combination with means for controlling the engagement between the driving-shaft and the source of power, of a tension device connected therewith and normally tending to actuate said means to cause the disengagement of the power and the driving-shaft, a frame, a lever pivoted between its ends to said frame, a second lever pivoted at one end to the frame and connected between its ends to the lighter end of the first-named lever, means for confining

the thread passing to the thread-carrier between the frame and the free end of the second lever whereby said levers are held in a definite position, a device for limiting the movement of the levers in one direction under normal tension of the thread, mechanism connected to and normally holding said tension device out of action but adapted, when the heavier end of the first-named lever drops, to be engaged by said lever and moved to release said tension device.

4. In a knitting-machine, the combination with means for controlling the engagement between the driving-shaft and the source of power, of a tension device connected therewith and normally tending to actuate said means to cause the disengagement of the power and the driving-shaft, a frame, a thread-engaging lever, means for confining the thread between the frame and the thread-engaging lever under normal tension of the thread, whereby tension is imposed on said lever tending to move it in one direction, a device restraining the movement of said lever in that direction under normal tension of the thread, and mechanism connected to said tension device and adapted to be actuated by said lever and normally held in position to hold said tension device out of action, but adapted to move into position to release said tension device, whereby, when the thread is disengaged from the thread-engaging lever, the latter is moved to actuate said mechanism and move it into position to release said tension device.

5. In a knitting-machine, the combination with means for controlling the engagement between the driving-shaft and the source of power, of a tension device connected therewith and normally tending to actuate said means to cause the disengagement of the power and the driving-shaft, a frame, a thread-engaging lever tending to move in one direction, means for confining the thread between the frame and the thread-engaging lever under normal tension of the thread, whereby tension is imposed on said lever to hold it from moving in that direction, mechanism connected to said tension device and normally held in position to hold said tension device out of action but tending to move to release said tension device, a locking-lever engaging and holding said mechanism in its normal position and in line of movement of the thread-engaging lever, whereby when the thread is disengaged from the thread-engaging lever the latter will move and engage said locking-lever, whereby the latter will unlock said mechanism and release the tension device.

6. In a knitting-machine, the combination with means for controlling the engagement between the driving-shaft and the source of power, of a tension device connected therewith and normally tending to actuate said means to cause the disengagement of the power and the driving-shaft, a frame, a thread-engaging lever tending to move in one direc-

tion, means for confining the thread between the frame and the thread-engaging lever under normal tension of the thread, whereby tension is imposed on said lever to hold it from moving in that direction, a device engaging the thread-engaging lever and holding it from movement in the other direction under normal tension of the thread, mechanism connected to said tension device and normally held in position to hold said tension device out of action but tending to move to release said tension device, a locking-lever engaging and holding said mechanism in its normal position and in line of movement of the thread-engaging lever, whereby when the thread is disengaged from the thread-engaging lever, the latter will move and engage said locking-lever, whereby the latter will unlock said mechanism and release the tension device.

7. In a knitting-machine, in combination, a compound thread-engaging lever tending to move in one direction but restrained therefrom by its engagement with the thread, a second lever pivoted near one end, a locking-lever engaging the long end of the second lever and in line of movement of the compound lever, means connected with the short end of the second lever and adapted to disconnect the power from the driving-shaft of the machine but held inactive during the locking of the second lever, whereby the disengagement of the thread from the compound lever will permit the latter to move and actuate the locking-lever to unlock the second lever.

8. In a knitting-machine, the combination with a frame, of a lever pivoted thereto adapted to be engaged by the thread passing to the thread-carrier, said frame having a notch through which said thread passes, a second lever pivoted between its ends to the frame and connected at one end to the first lever, a third lever pivoted between its ends to the frame and having one end in line of movement of the second lever, a fourth lever pivoted between its ends and engaging the other end of the third lever, a tension device, means controlling the engagement between the driving-shaft and the source of power, and connections from the tension device to the power-engagement-controlling means and the other end of the fourth lever, substantially as described.

9. In a knitting-machine, the combination, with a frame, of a lever pivoted thereto adapted to be engaged by the thread passing to the thread-carrier, said frame having a notch through which said thread passes, a second lever pivoted between its ends to the frame and connected at one end to the first lever, a third lever pivoted between its ends to the frame and having one end in alignment with the second lever, a fourth lever pivoted between its ends and engaging the other end of the third lever, a fifth lever pivoted to the frame and in alignment with the second le-

ver, a tension device, means controlling the engagement between the driving-shaft and the source of power, and connections from the tension device to the power-engagement-controlling means and the other end of the fourth lever, substantially as described.

10. In a knitting-machine, the combination with means for disengaging the power and the driving-shaft, of a lever for holding said means out of operation when in a locked position, a locking-lever engaging said lever and holding it in a locked position, and a thread-engaging lever adapted when engaged by the thread to be held out of engagement with the locking-lever, but adapted when released from the tension of the thread to engage said locking-lever and move it to unlock the first-named lever, the frame of the machine having a notch, and the thread being adapted to extend through the notch and over the thread-engaging lever, whereby abnormal tension upon or breaking of the thread will withdraw it from said notch and release said thread-engaging lever.

11. In a knitting-machine, the combination with means for disengaging the power and the driving-shaft, of controlling devices for holding said disengaging means out of action, a lever, pivoted between its ends and having one end heavier than the other, and in line of movement of said controlling devices, and a thread-engaging lever pivoted at one end to the frame of the machine and between its ends to the light end of the first-named lever and adapted to be engaged by the thread at its outer end, whereby a slight tension of the thread upon the thread-engaging lever will

uphold the heavy end of the first-named lever and whereby when the thread is released or disengaged, the first-named lever will move to actuate said controlling devices and permit said disengaging means to operate.

12. In a knitting-machine, the combination with means for disengaging the power and the driving-shaft, of controlling devices for holding said disengaging means out of action, a lever, pivoted between its ends and having one end heavier than the other, and in line of movement of said controlling devices, and a thread-engaging lever pivotally connected to the first-named lever to normally uphold the heavy end thereof, whereby the normal tension of the thread upon the thread-engaging lever will uphold the heavy end of the first-named lever, a device engaging the first-named lever and limiting the movement thereof in the direction in which the thread, under normal tension, tends to move it, but adapted to yield under abnormal tension, and means for disengaging the thread and the thread-engaging lever under abnormal tension of the thread, whereby when the thread is broken or its tension abnormally increased, the first-named lever will move to actuate said controlling devices and permit said power-disengaging means to operate.

In testimony of which invention I have hereunto set my hand at Philadelphia, Pennsylvania, on this 2d day of April, 1900.

ROBERT B. GOODYEAR.

Witnesses:

M. F. ELLIS,

J. M. SHINDLER, Jr.