(No Model.) 2 Sheets—Sheet 1.

A. BEYER.

ELECTRICAL STOP MOTION FOR KNITTING MACHINES.

No. 477,986. Patented June 28, 1892.

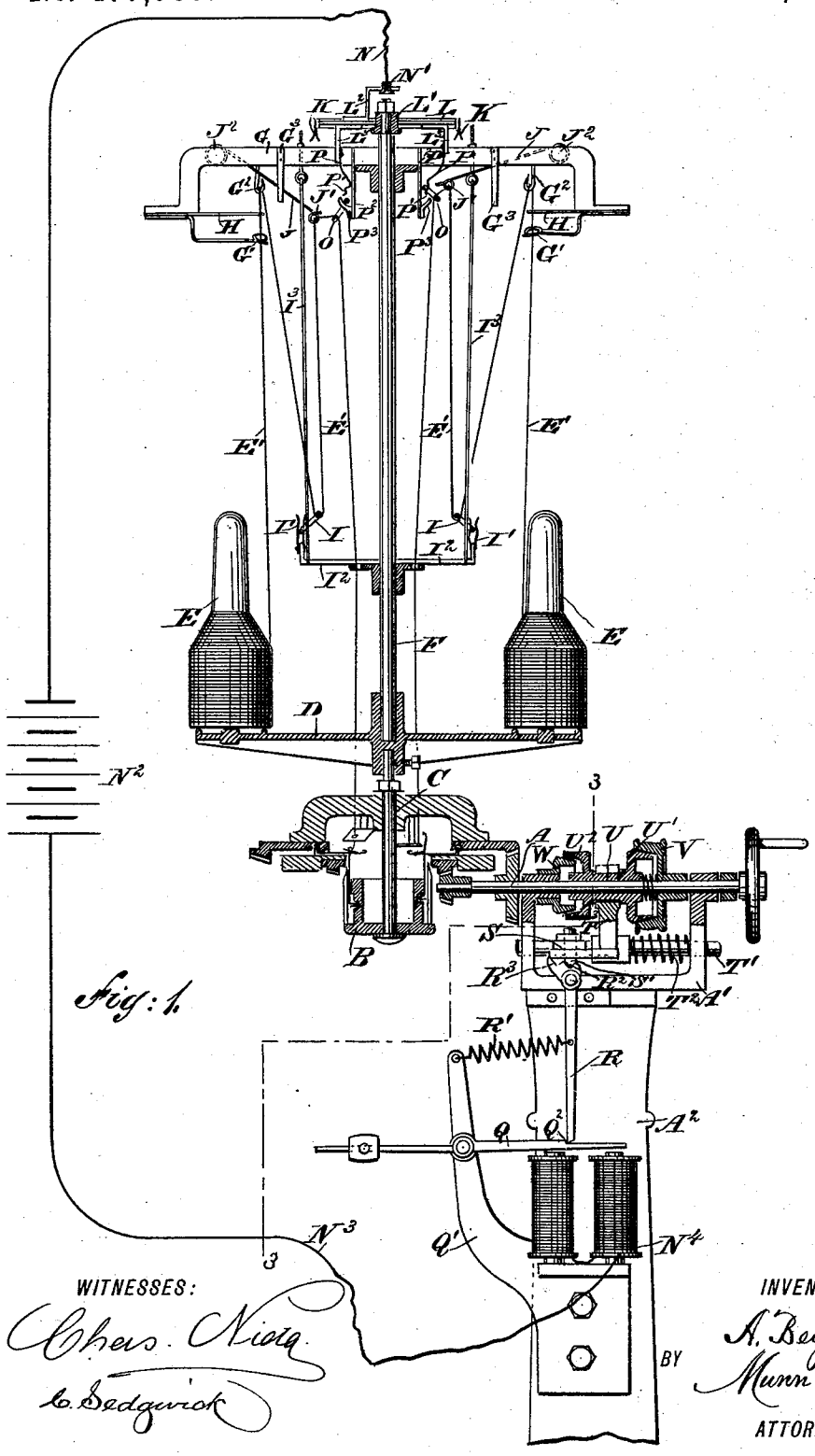


Fig: 1.

WITNESSES:

Chas. Neary.

C. Sedgwick

INVENTOR

A. Beyer

BY Munn & Co

ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

A. BEYER.

ELECTRICAL STOP MOTION FOR KNITTING MACHINES.

No. 477,986. Patented June 28, 1892.

Fig. 3.

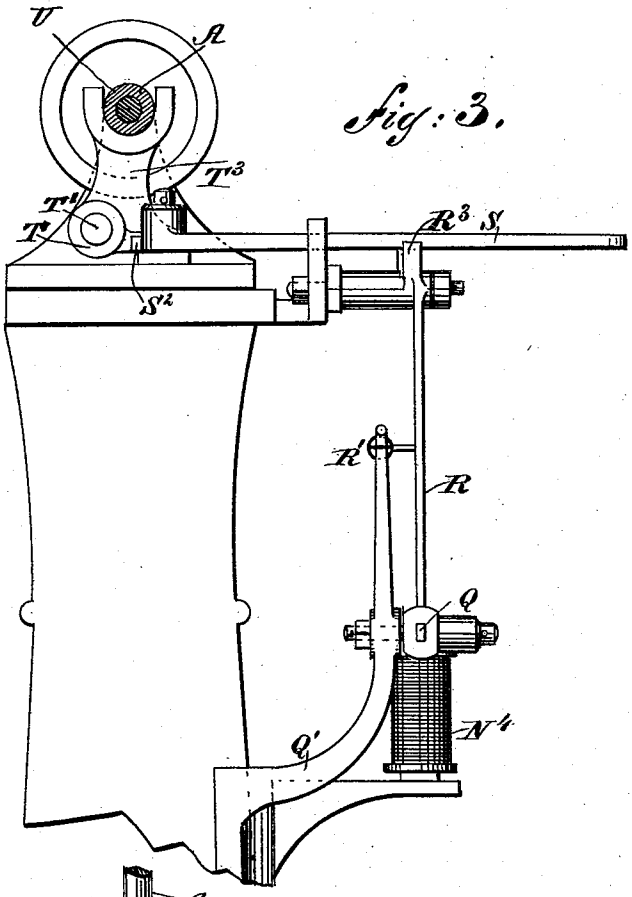


Fig. 2.

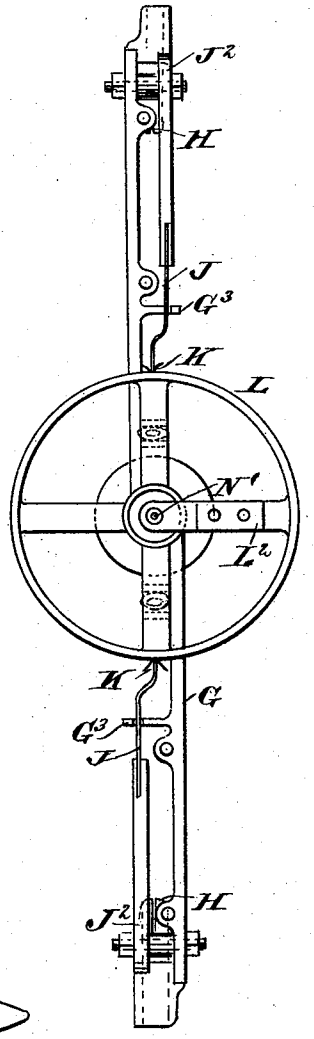
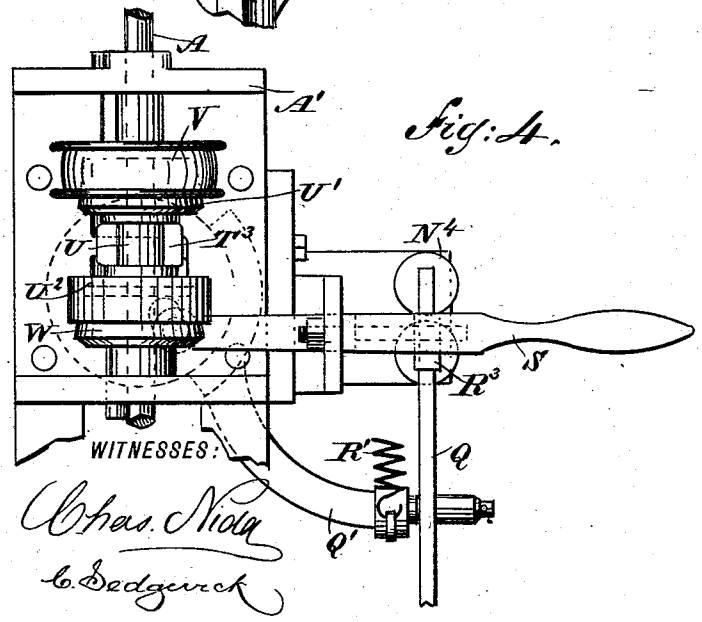


Fig. 4.



WITNESSES:

Chas. Nicola

C. Sedgwick

INVENTOR

A. Beyer

BY Munn & Co

ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ALBIN BEYER, OF BROOKLYN, NEW YORK, ASSIGNOR TO HENRY GERNSHYM & BROTHER, OF SAME PLACE.

ELECTRICAL STOP-MOTION FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 477,986, dated June 28, 1892.

Application filed October 5, 1891. Serial No. 407,694. (No model.)

To all whom it may concern:

Be it known that I, ALBIN BEYER, a subject of the King of Saxony, residing in Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Electrical Stop-Motion for Knitting-Machines, of which the following is a full, clear, and exact description.

The object of my invention is to provide a new and improved electrical stop-motion designed for use on knitting-machines, and which is simple and durable in construction arranged to arrest the motion of the machine whenever a thread runs out or becomes fastened between the spool and needles or breaks in any manner whatever, compensation as to thread being had for the momentum of the machine to prevent any of the thread from passing through the needles into the fabric to disappear in the latter.

The invention consists of an electric-circuit closer attached to the revolving spool-carrier and controlling an electro-magnet.

The invention further consists of a spring-pressed clutch-pulley and brake mechanism arranged on the main driving-shaft of the knitting-machine and controlled from the electro-magnets, the said devices being arranged in such a manner that when the clutch is opened the brake is applied, and vice versa.

The invention further consists of a thread-compensating device arranged on a revoluble spool-carrier and actuated shortly after the circuit-closer has closed the circuit.

The invention also consists of certain parts and details and combinations of the same, as will be hereinafter described, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement as applied to a circular-knitting machine, parts being in section. Fig. 2 is a plan view of the supporting-frame for the circuit-closers. Fig. 3 is an enlarged sectional end view of the stopping mechanism on the line 3 3 of Fig. 1, and Fig. 4 is a plan view of the same.

As illustrated in the drawings, the electrical stop-motion is applied to a knitting-machine of the circular kind, the said knitting-machine being provided with a main driving-shaft A, mounted to turn in suitable bearings in a frame A′, supported on a column or stand A^2. The main driving-shaft A is connected in the usual manner to actuate the needles in the needle-cylinder B and the plate-needles, so that further description of this part of the knitting-machine is not deemed necessary.

The needle-cylinder B is provided with a central rod C, on the upper end of which is fastened a spool-carrier D, provided with a suitable number of arms, each carrying a spool E, from which the thread E′ is unwound when the machine is in operation. The spool-carrier D supports a central rod F in alignment with the rod C and provided at its upper end with a frame G, located a suitable distance above the spools E. The frame G carries eyes G′ and G^2, through which passes a thread E′ from a corresponding spool E. Between the two eyes G′ and G^2 is arranged a slotted plate H, fastened to the frame G, and through the slot of which passes the thread E′, the said plate H serving to prevent the passage of any knot in the thread or yarn. After the thread or yarn E′ leaves the uppermost eye G^2 it extends downward and inward to pass through a ring I, preferably made of glass, and adapted to be held between the prongs of a spring-fork I′, attached to a bracket I^2, fastened to the rod F between the frame G and the spool-carrier D, but close to the latter. After leaving the eye I the thread E′ extends upward and passes an eye J′, formed on the free end of a spring J, provided with a coil J^2, attached in any suitable manner to the frame G. The spring J is arranged to swing upward or downward, the downward movement being accomplished by pressure and the upward movement by the reaction of the coil J^2. Each spring J is guided in its up-and-down swinging motion in a suitable guideway G^3, attached to the frame G, and has its upward-swinging motion limited by engaging a spring-fork K, attached to a light wheel L, having its hub L′ of a non-conducting material and attached to the upper end of the rod F. On this wheel L is also secured an arm L^2, in which is mounted to turn

a hub N′, located centrally above the rod F and connected with one end of a circuit-wire N, leading to a battery or other source of electricity and connected by a second circuit-wire N^3 with electro-magnets N^4. The thread E′, after leaving the eye J′ of the spring J, passes through a ring O, of glass or other non-conducting material, the said ring being supported in the bend P′ of a spring P, attached to a bracket L^3, extending downwardly from the wheel L. The spring P presses the ring against the rod P^2, attached to the frame G, the lower end of the said rod P^2 being provided with a hook P^3, serving to catch the ring O when drawn downward out of engagement with the bend P′ of the spring P. (See left side of Fig 1.)

When the ring O is engaged by the spring P and pressed against the arm P^2, the said spring and its wheel are electrically disconnected from the arm P^2, the frame G, and rod F, as the said ring O is made of a non-conducting material. When the ring O is withdrawn from the bend P′ of the spring P, the latter with its free end presses onto the arm P^2, thus establishing an electric connection between the wheel L and the frame G and the rod F.

The electro-magnets N^4, previously referred to, are mounted on a bracket Q′, attached to but insulated from the column A^2 of the knitting-machine. On this bracket Q′ is fulcrumed a lever Q, forming an armature for the electro-magnets N^4 by extending over the cores of the latter. On top of this lever Q is formed a shoulder Q^2, adapted to engage the lower end of a tripping-lever R, pivoted on the column A^2 and connected with a spring R′ for holding the lower end of the lever against the shoulder Q^2.

At the upper end of the lever R is formed a notch R^2, adapted to engage a point S′, secured to the bottom of a horizontally-disposed lever S, fulcrumed on the frame A′. A lug R^3 extends from the upper end of the lever next to the notch R^2 and is adapted to engage the side of the lever S for the purpose hereinafter fully described. On the inner end of the lever S is formed a lug S^2, engaging one side of an arm T, secured to a shaft T′, mounted to slide longitudinally in the frame A′ directly below the main driving-shaft A. A spring T^2 is coiled on part of the shaft T′ and presses with one end against the frame A′ and with its other end on a shoulder or hub formed on the arm T, which latter is also provided with an upwardly-extending arm T^3, provided at its upper end with a fork engaging a hub U, mounted to slide longitudinally and to turn with the main shaft A of the knitting-machine. On one end of this hub U is formed a conical frictional pulley U′, adapted to engage the correspondingly-shaped inner surface of the rim of a driving-pulley V, mounted to rotate loosely on the main driving-shaft A. On the other end of the hub U is secured a clutch-pulley U^2, adapted to engage the conical brake-pulley W, secured on one of the bearings for the main driving-shaft A. The two pulleys U′ and U^2 are so arranged relative to their respective pulleys V and W that when one is in mesh with its respective pulley the other is out of mesh. Thus when the pulley U′ engages the pulley V and the latter is rotated by being connected by belt or other mechanism with suitable driving machinery then the main driving-shaft A is rotated and the knitting-machine is in operation. When this takes place, the other pulley U^2 is out of mesh with the fixed pulley W. When the arm T^3 is moved to the left, the pulley U′ is disengaged from the driving-pulley V and the other pulley U^2 is thrown in frictional contact with the fixed pulley W, so that the main shaft A is braked and the motion of the knitting-machine ceases.

When the several parts are in the position illustrated in Figs. 1, 3, and 4, the lever R engages by its notch R^2 the pin S′, so as to hold the lever S in a normal position for running the knitting-machine, the inner end of the said lever S pressing the arm T to the right, so as to compress the spring T^2, at the same time holding the pulley U′ in frictional contact with the driving-pulley V and the other pulley U^2 out of frictional contact with the fixed brake-pulley W. When the lever R is tripped at the downward swinging of the lever Q, the spring T^2 presses on the arms T and T^3, so that the latter shifts the hub U to the left, thus moving the pulley U′ out of frictional contact with the pulley V and the pulley U^2 into frictional contact with the fixed brake-pulley W to stop the machine. As shown in Fig. 1, a coil-spring is also located between the pulleys U′ and V and surrounds the shaft A to assist in pressing the pulleys U′ and V out of frictional contact whenever the lever R is tripped.

The operation is as follows: When the machine is running, the thread from each spool E passes upward through the eye G′, through the slot of the plate H to the eye G^2, from the latter downward through the ring I in the spring-fork I′, and then the thread or yarn extends upward and passes through the eye J′ of the spring J, which latter is thus held in a desired position—that is, out of contact with the spring-fork K. (See right of Fig. 1.) The thread after leaving the eye J′ passes through the insulated ring O, held by the spring P against the arm P^2, and then the thread extends downward and passes through suitable eyes and guide-plates to the knitting-needles of the knitting-machine. As the several parts of the circuit-closing mechanism, with the exception of the wire N and hub N′, turn around with the spool-holder and the knitting-machine, the relative position of the several parts is not changed unless a thread runs out or a knot catches in the plate H, or the thread is drawn too tight between the spool E and the knitting-needles. If a thread runs out on the spool E, then the tension of the thread between

the spool and the needles ceases, so that the spring J is released from its downward pressure, flies upward, and engages the fork K of the insulated wheel L. The electric current can now pass from the battery through the wire N, hub N′, and arm L^2 to the wheel L, and through the connected fork K and respective spring J to the frame G, from which the current passes through the rod F and the knitting-machine to the levers R and Q, arm Q′, and magnets N^4, to return from the latter by the wire N^3 to the battery, thus completing the circuit. As soon as the circuit is completed by the spring J engaging the fork K the armature-lever Q is attracted by the electro-magnets N^4 and the tripping-lever R is released, so that the spring T^2 and the spring between the pulleys U′ and V shift the hub U and the pulleys U′ and U^2 to the left, thus disconnecting the driving-wheel V from the shaft A and applying the brake, in the manner previously described, by the pulley U^2 engaging the fixed pulley W. The machine is thus stopped and a new threaded spool can be inserted and connection made with the end of the thread of the previous spool. In case a knot is in the thread or yarn it catches on the under side of the plate H, so that the tension of the thread between the plate H and the needles is increased to such an extent that the ring O is pulled out from the bend P′ of the spring P and drops and catches in the hook P^3. As soon as the ring O is disengaged from the spring P the latter makes connection with the arm P^2, so that the circuit is again closed by connection being established between the wheel L and frame G. The above-described operation is then repeated relative to the stopping and braking mechanism, it being understood that the lever was in its normal position. The momentum of the machine is so great that even with the brake mechanism applied the thread having such undue tension as above described would break between the plate H and the needles. To avoid this and to pay out sufficient thread until the machine is finally stopped is the object of the ring I and its connections, above described. It will be seen that when the ring O is hooked onto the hook P^3 a further tension on the thread causes an upward pull on the ring I, so that the latter is disengaged from its spring-fork I′ and is pulled upward on the guide-rods I^3 by the thread. The knitting-machine is thus furnished with a sufficient amount of thread to complete the several courses of knitting until the machine is finally and completely stopped. When the machine is stopped, the knot in the thread or yarn is removed, so that a thread can readily pass through the plate H after the operator pulls down on the ring I and again engages it with the spring-fork I′. The operator also takes hold of the ring O and pushes the same upward in engagement with the bend P′ of the spring P in the manner previously described, and shown at the right in Fig. 1. The machine can then again be started, the lever S being moved into its normal position—that is, in engagement with the lever R—and the latter is engaged at its lower end with the shoulder Q^2 of the armature-lever Q. Now in case the yarn or thread breaks between the spool and the needles the tension on the spring J is released and the latter makes its connection with the fork in a similar manner as when the thread runs out, as above described. In case the yarn or thread becomes fastened from any cause whatever between the spool and the needles, then the pull on the ring O disconnects the latter from the spring P, so that the latter makes connection between the ring L and frame G in the manner above described relative to the catching of a knot in the plate H. The spring P holds the ring O with less force in position than the ring I is held in its spring-fork I′, so that whenever undue tension is on the yarn or thread the ring O is pulled out before the ring I is disconnected from its spring-fork. Thus the stopping mechanism is actuated before the compensating device represented by the ring I and spring-fork I′ is set in motion by the momentum of the machine. It is understood that when the armature-lever Q is attracted by the magnets N^4 the lower end of the lever R is disengaged from the shoulder Q^2 and the spring R′ pulls on the said lever to move the upper end of the latter to the right. This movement of the upper end of the lever causes the lug R^3 to press the lever S to the right until the pin S′ is free to slide out of the notch R^2, caused by the action of the spring T^2 pressing on the arm T^3 on shaft A′, having the arm T, which latter presses on the inner end of the lever S, so as to cause the front end of the lever to swing to the right.

In setting the lever S for starting the machine the lever is moved to the left so as to engage the lug R^3, which latter is thus swung into a vertical position, and the pin S′ engages the notch R^2 at the same time the lower end of the lever abuts against the shoulder Q^2 of the counterbalanced lever Q.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. An electrical stop-motion for knitting-machines, provided with an electric-circuit closer attached to the revolving spool-carrier and moving with the same, substantially as shown and described.

2. In an electrical stop-motion for knitting-machines, the combination, with a frame attached to the spool-carrier and moving with the same, of a spring attached to the frame and formed on its free end with an eye for the passage of the yarn, and a catch supported from the spool-carrier and insulated from the said frame and adapted to be engaged by the said spring when the tension on the yarn ceases, substantially as described.

3. An electrical stop-motion comprising a frame supported on the spool-carrier, a spring

supported on but insulated from the spool-carrier, and a ring through which passes the yarn, made of non-conducting material and adapted to be interposed between the said spring and the said frame, substantially as shown and described.

4. An electrical stop-motion provided with a stationary circuit-wire, a hub for the end of the said wire, and an insulated support carrying one member of a circuit-closer and having a bearing for the hub, substantially as shown and described.

5. In an electrical stop-motion, the combination, with a revoluble wheel, of a fixed hub having a bearing in the said wheel and a circuit-wire having one end fastened in the said hub, substantially as shown and described.

6. In a stop-motion, a yarn-paying-out device comprising a ring, through which passes the yarn, and a spring-catch for holding the said ring in position under normal tension of the yarn and releasing it when under undue tension, substantially as shown and described.

7. In a stop-motion, a yarn-paying-out device comprising a ring, through which passes the yarn, a spring-catch for holding the said ring in position under normal tension of the yarn and releasing it when under undue tension, and a guide-rod for the said ring, substantially as shown and described.

8. In an electrical stop-motion, the combination, with a ring of non-conducting material and through which passes the yarn, of a frame connected with one pole of the electric supply and a spring connected with the other pole of the electric supply and held separated from the said frame by the said ring until undue tension on the yarn pulls the ring from between the spring and frame and permits the spring to connect with the frame, substantially as described.

9. In an electrical stop-motion, the combination, with a ring of non-conducting material and through which passes the yarn, of a frame connected with one pole of the electric supply and a spring connected with the other pole of the electric supply and held separated from the said frame by the said ring until undue tension on the yarn pulls the ring from between the spring and frame and permits the spring to connect with the frame, and a hook on the said frame to catch and support the said ring after leaving the spring, substantially as shown and described.

10. In an electrical stop-motion, the combination, with a ring of non-conducting material and through which passes the yarn, of a frame connected with one pole of the electric supply and a spring connected with the other pole of the electric supply and held separated from the said frame by the said ring until undue tension on the yarn pulls the ring from between the spring and frame and permits the spring to connect with the frame, and a slotted plate through which passes the yarn previous to its passing through the said ring, the said plate being adapted to catch a knot in the yarn and hold the yarn, thus creating undue tension on the yarn and ring to pull the latter from the spring, substantially as shown and described.

11. In an electrical stop-motion, the combination, with a ring of non-conducting material and through which passes the yarn, of a frame connected with one pole of the electric supply and a spring connected with the other pole of the electric supply and held separated from the said frame by the said ring until undue tension on the yarn pulls the ring from between the spring and frame and permits the spring to connect with the frame, and a yarn-paying-out device comprising a ring, through which passes the yarn previous to passing through the first-named ring, and a spring-catch for holding the said second ring under a tension somewhat higher than the first-named ring is held by its spring, substantially as shown and described.

12. In an electrical stop-motion, the combination, with a ring of non-conducting material and through which passes the yarn, of a frame connected with one pole of the electric supply and a spring connected with the other pole of the electric supply and held separated from the said frame by the said ring until undue tension on the yarn pulls the ring from between the spring and frame and permits the spring to connect with the frame, a yarn-paying-out device comprising a ring, through which passes the yarn previous to passing through the first-named ring, a spring-catch for holding the said second ring under a tension somewhat higher than the first-named ring is held by its spring, and a slotted plate for catching knots and through which passes the yarn previous to passing to the said ring of the paying-out device, substantially as shown and described.

13. In an electrical stop-motion for knitting-machines, the combination of the driving-shaft, the electro-magnets, and devices controlled by the latter for effecting the stoppage of the driving-shaft, with the spool-carrier and frames supported from the spool-carrier, said frames being provided with circuit-closers adapted to be operated by the yarns, substantially as shown and described.

14. In an electrical stop-motion for knitting-machines, the combination, with a main driving-shaft, of a driving-pulley held loosely on the said shaft, a hub mounted to slide on and to turn with the said shaft and provided with two pulleys, of which one engages the said driving-pulley, a fixed brake-pulley adapted to be engaged by the other hub-pulley, a spring-pressed shifting mechanism for operating the said hub to disengage one hub-pulley from the driving-pulley and to engage the other hub-pulley with the fixed brake-pulley, a tripping mechanism connected with the said shifting mechanism, and means for controlling the said tripping mechanism by

an electric circuit to release the said shifting mechanism, substantially as shown and described.

15. In an electrical stop-motion, a circuit-closer comprising a frame, a spring adapted to make contact on the said frame to close the circuit, and a ring through which passes the yarn, made of a non-conducting material and adapted to be interposed between the said spring and frame, substantially as shown and described.

ALBIN BEYER.

Witnesses:
THEO. G. HOSTER,
C. SEDGWICK.