No. 727,429.

PATENTED MAY 5, 1903.

A. L. PATTERSON.

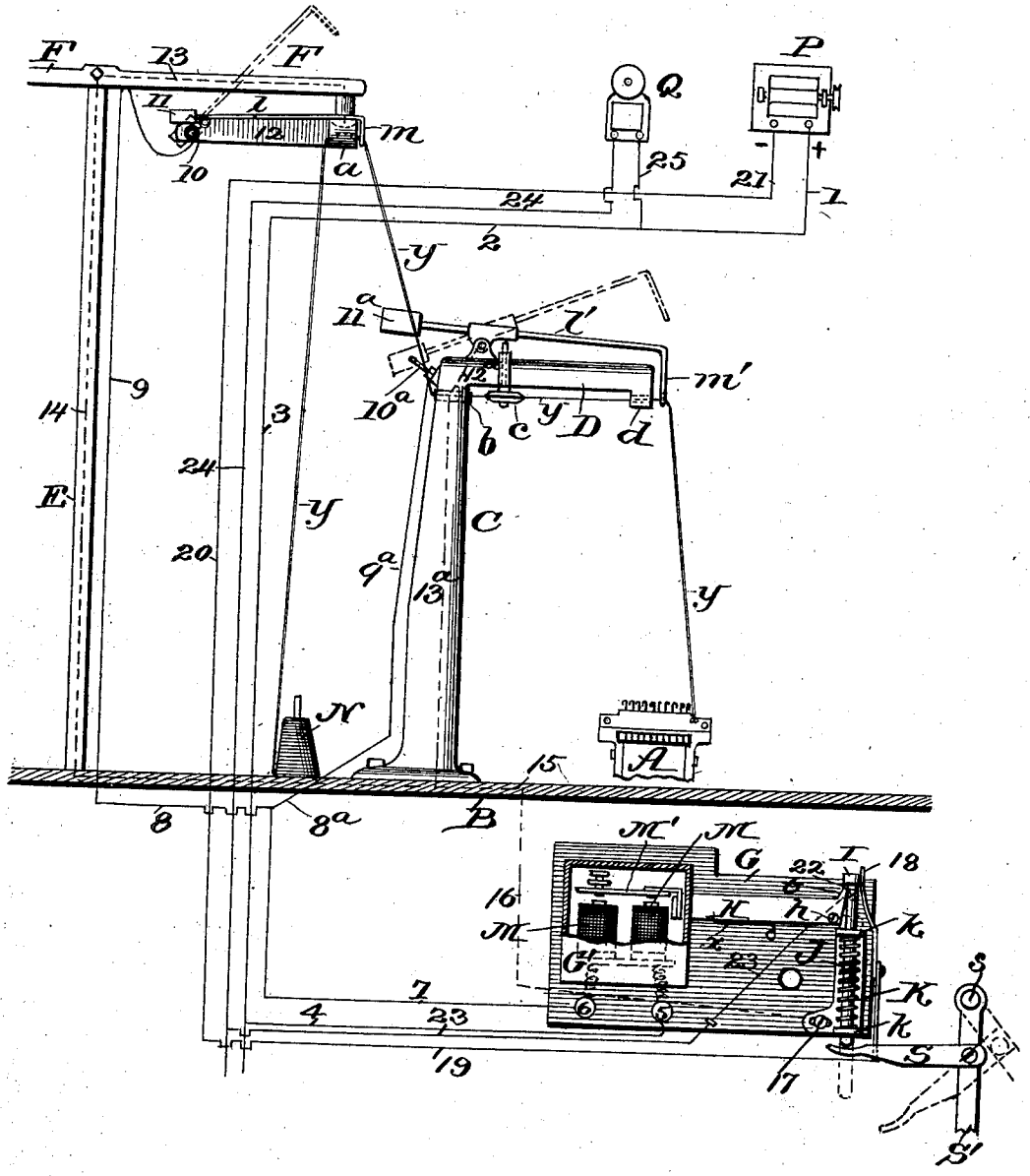
ELECTRIC STOP MOTION FOR KNITTING MACHINES.

APPLICATION FILED OCT. 30, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

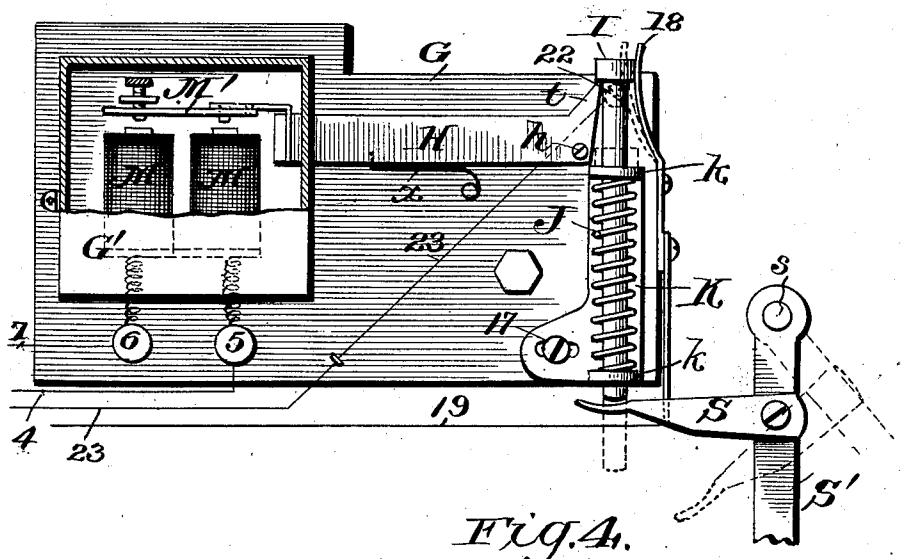


Fig. 4.

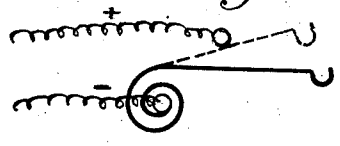
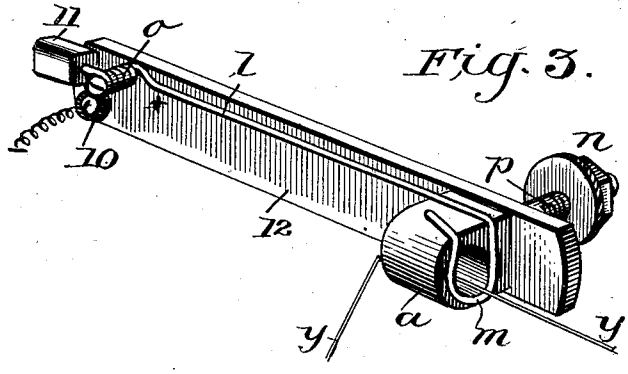


Fig. 3.



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UNITED STATES PATENT OFFICE.

ARTHUR L. PATTERSON, OF ALBEMARLE, NORTH CAROLINA.

ELECTRIC STOP-MOTION FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 727,429, dated May 5, 1903.

Application filed October 30, 1902. Serial No. 129,400. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR L. PATTERSON, of Albemarle, in the county of Stanly and State of North Carolina, have invented a new and useful Improvement in Electric Stop-Motions for Knitting-Machines, of which the following is a specification.

My invention relates to that class of devices known as "electric stop-motions" for knitting-machines or devices controlled by electromagnetic mechanism and circuits which automatically stop the operation of the knitting-machine whenever the yarn breaks or too much slack occurs from a failure of the tension devices to work properly.

My invention consists of a simple set of attachments which may be quickly and conveniently applied to any ordinary knitting-machine without any special alteration of or injury to the same, which I will now proceed to describe with reference to the drawings, in which—

Figure 1 is a partly-mechanical and partly-diagrammatic view of my invention shown applied to a knitting-machine. Fig. 2 is an enlarged detail, in plan view, of the magnetic releasing devices; Fig. 3, an enlarged detail in perspective of the yarn-eye and circuit-closing device, and Fig. 4 shows a modification of the circuit-closer.

In the drawings, Fig. 1, A represents the knitting-machine, and B is a table-surface which supports the same. From this table-surface there rises a vertical standard C, carrying at its upper end a horizontal arm D, and also another vertical standard E, carrying at its upper end a number of horizontal arms F. Each of these arms F carries the yarn *y* from a cop N to its own knitting-machine A. This yarn passes from the cop N to the guide-eye *a*, carried by arm F, thence to a hole *b* in standard C and through the tension device *c* on arm D, and thence through the yarn-eye *d* at the outer extremity of arm D, and thence to the knitting-machine A.

In carrying out my invention I employ two similar circuit-closers, one of which is to be set into action by the breaking of the yarn and is mounted on the arm F. The other circuit-closer is mounted on the arm D close to the knitting-machine and is designed to close the electric circuit solely from an undue amount of slack in the yarn, which would make bad work. This undue slack occurs at times from the failure of the tension device *c* to work properly, owing to an accumulation of lint between the two jaws of the tension device, which holds the jaws apart and prevents them from exercising a proper friction on the yarn.

The main part of the circuit-closer is the same in both cases and consists of a light wire *l* or *l'*, having at one end a weight 11 or 11^a and at the other end a loop *m* or *m'*, which latter drops down in front of the yarn-guides *a* and *d*, so that the yarn passes both through the yarn-guides *a* and *d* and also through the wire loops *m* and *m'*, and consequently holds the weighted ends 11 and 11^a up during the normal action of the knitting-machine. If, however, the yarn breaks, then the weight 11 renders the light arm *l* resilient, causing it to rise, and weight 11 then passes into contact with an insulated pin 10 and closes the electric circuit by bringing these terminals together. So, also, if the yarn becomes unduly slack the resilient arm *l'* flies up from weight 11^a and bringing the weight 11^a into contact with the insulated pin 10^a closes these terminals of the circuit. This circuit-closer, which I will describe more fully hereinafter, is made through electromechanical devices to operate the belt-shifter to stop the machine and also to sound an alarm.

It will be understood that the resilient arms *l* and *l'* are, in general, of the form of the ordinary take-up on knitting-machines, and they may be made resilient, either by a weight on one end, as shown in Figs. 1 and 3, or they may each be constructed as a resilient spring-arm, as shown in Fig. 4.

The circuit-closer *l* is seen in enlarged detail in Fig. 3 and is specially designed to adapt it to easy and convenient attachment to any ordinary knitting-machine. The wire lever *l* is fulcrumed at *o* to a metal bar 12, which carries at one end the insulated circuit-terminal 10 and at the other end is formed with the yarn-eye *a*. This bar 12 has a rigid screw-stem *p* projecting from the rear side opposite the yarn-eye *a* and carrying a washer and nut *n*, by which the attachment is conveniently clamped to the arm F of the knitting-machine. The other circuit-closer is ful-

crumed directly to the top of the arm D and does not, as shown, embody the special features of Fig. 3, but it may have the same construction. In both these circuit-closers the arm is made resilient by a weight on the short end, and the circuit is closed by the weight coming in contact with an insulated terminal beneath the weight; but I would have it understood that this circuit-terminal may be located above the resilient arm and between its support and its free end, as seen in Fig. 4.

A distinctive feature of my invention is a substantially horizontal rigid bar having at the end thereof a yarn-guide opening lengthwise the bar and a resilient arm mounted upon said bar and normally occupying a parallel position to said bar and having at its end a loop immediately juxtaposed to and overlapping the end of said yarn-guide at the end of the supporting-bar, so as to be in coincidence therewith and so close thereto that the slight jerks on the yarn are not felt to any extent by the loop or eye of the resilient arm, but are borne by the stationary yarn-guide, whereby the resilient arm is prevented from being vibrated and accidentally closing the electric current from the jerks of the yarn and whereby also the friction of the yarn in passing through both the yarn-guide and the loop is scarcely any more than if it merely passed through the yarn-guide alone.

I will now describe the electromechanical devices for shifting the belt to stop the machine and afterward trace the circuits for the complete automatic action of the device.

G is a base for the magnetic releasing devices, which, although turned in Fig. 1 to show a plan view, is really mounted on the table B of the knitting-machine in a horizontal plane. In a box G′ is arranged a pair of electromagnets M, which act upon an armature M′, rigidly fixed to a lever H, which extends at right angles to the axis of the magnets through the side of the box and is fulcrumed at h to the base-plate and normally held up by a spring x. A toe t extends in a right-angular direction to the bar H and is adapted to lock under the head of a spring-bolt I. This bolt is arranged at right angles to the bar and is guided in upturned and perforated lugs k k, rising from a plate K, and a helical spring J is wound around the bolt between the lugs and has a tendency to throw the bolt to the dotted positions. In the path of this bolt there extends an arm S, projecting at right angles from a belt-shifting arm S′, pivoted at s. This arm is moved to the dotted position and shifts the belt to disconnect the driving mechanism of the knitting-machine whenever the spring-bolt I acts upon the arm S. Normally the parts occupy the position shown in full lines, with the bolt I retracted to compress the spring, and is retained in this position by the toe t of the lever H locking beneath the head of the spring-bolt. Whenever the electromagnet M is energized by the closing of the circuit, lever H is deflected, and the toe t being taken from beneath the head of the spring-bolt the latter responds to the tension of its spring and moving forcibly against the belt-shifting arm stops the machine.

At the same time that the machine is stopped an alarm is sounded on an electric bell by the closure of another circuit, which is effected as follows: A spring 18 and a screw or pin 22 are made the terminals of the signal-circuit, and the spring 18 is normally held away from the pin 22 by the head of the spring-bolt; but when the bolt moves away from its locked position spring 18 comes into contact with the pin 22 and closes the signal or alarm circuit.

I will now describe the electrical operation of the device in connection with the circuits.

P is the electric generator or battery which supplies the current, and Q the alarm-bell, which are connected in circuits, as indicated, and which are designated by numerals. The circuit-closers l and l' being set for normal action, the current from the generator flows as follows: wire 1 2 3 4, binding-post 5, electromagnet M, binding-post 6, wire 7, wires 8 and 9, to insulated pin 10, where the circuit is open, and also up wires 8^a and 9^a to insulated pin 10^a, where the circuit is also open. If, however, the yarn breaks, weight 11 touches insulated pin 10, or if the yarn is too slack weight 11^a touches insulated pin 10^a. Now the fulcrum of each of the levers l and l' is in electrical connection with the metal of the machine, and when closure of the circuit occurs between 11 and 10 the current passes from 10 to 11 12 13 14, to and along the table B, and if the closure of the circuit occurs between 11^a and 10^a the current passes from 10^a to 11^a 12^a 13^a, to table B. From this point the current passes by the imaginary dotted lines 15 and 16 (which is really the metal table-surface) to screw 17, thence by plate K and bolt I to spring 18 and wires 19, 20, and 21 to the other pole of the generator or battery P. Now if the circuit has been closed by either of the circuit-closures and bolt I has been thrown to shift the belt at the same moment the spring 18 closes contact with screw 22, and the current then flows as follows: from generator P to wires 1 25, bell Q, wires 24 23, pin 22, spring 18, wires 19 20 21, to the other pole of the generator.

One advantage of my stop-motion is that the circuit-closer can be attached very easily to any ordinary knitting-machine by simply passing the screw-stem p of the circuit-closer through the ordinary yarn eye or hook of the machine and tightening the nut and washer. It is also very simple, occupies very little space, is rigid when fastened, and does not add any friction or resistance to the thread.

If desired, an annunciator may be arranged in connection with the various machines to show what machine is thrown out of action.

I do not confine myself to the exact construction and arrangement of parts shown, as

variations in the same may be made without departing from my invention.

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

1. In an electric stop-motion, the combination of a horizontal supporting-bar having a yarn-guide at its end opening lengthwise the bar, a resilient arm mounted upon said bar in normally parallel position, and having a loop at its end overlapping the end of the yarn-guide immediately adjacent thereto and in coincidence with the same to receive the yarn therethrough, and an electric circuit arranged to be closed by the movement of the resilient arm when released from the yarn, and an electromagnetic stop mechanism, having its electromagnet connected in said circuit, substantially as described.

2. In an electric stop-motion, the combination of a horizontal supporting-bar having a yarn-guide at its end opening lengthwise the bar, and having also at the same end on the opposite side of the bar a right-angularly-projecting screw-stem and nut, a resilient arm fulcrumed at the other end of the bar and bearing at its outer end a loop overlapping the end of the yarn-guide immediately adjacent thereto and in coincidence with the same to receive the yarn therethrough, electromagnetic stop device, an electric circuit and circuit-terminals arranged to be brought together by the release of the resilient arm, substantially as described.

3. In an electric stop-motion, an electromagnetic belt-shifter comprising an electromagnet, an armature, a bar fixed rigidly thereto and in alinement therewith and extending at right angles to the axes of the magnets and having at its extreme outer end a fulcrum and a laterally-projecting toe, a spring arranged beside said bar to hold the armature away from the magnets, a headed bolt arranged at right angles to the said bar and having its head arranged adjacent to and adapted to be caught by the toe of the bar, a coiled spring wound around the bolt and belt-shifting devices acted upon by the bolt when the latter is released from the toe of the bar, substantially as described.

4. In a stop-motion for a knitting-machine, an electromagnetic shifter comprising an electromagnet, an armature, a bar fixed rigidly thereto and fulcrumed near its outer end and provided with a spring and a laterally-projecting toe, a spring-actuated bolt arranged at right angles to the bar and adapted to be held by its toe, a switch-spring and electrical terminal, said switch-spring being held out of contact with the electric terminal by the spring-bolt when set, a belt-shifting arm adapted to be struck by the spring-bolt and an electromagnetic signal arranged in the switch-circuit substantially as and for the purpose described.

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Witnesses:
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