H. E. WELLS & D. H. MORAN.

Improvement in Electro-Magnetic Stop Motion for Kniting Machines, etc.

No. 123,315. Patented Jan. 30, 1872.

Fig. 1.

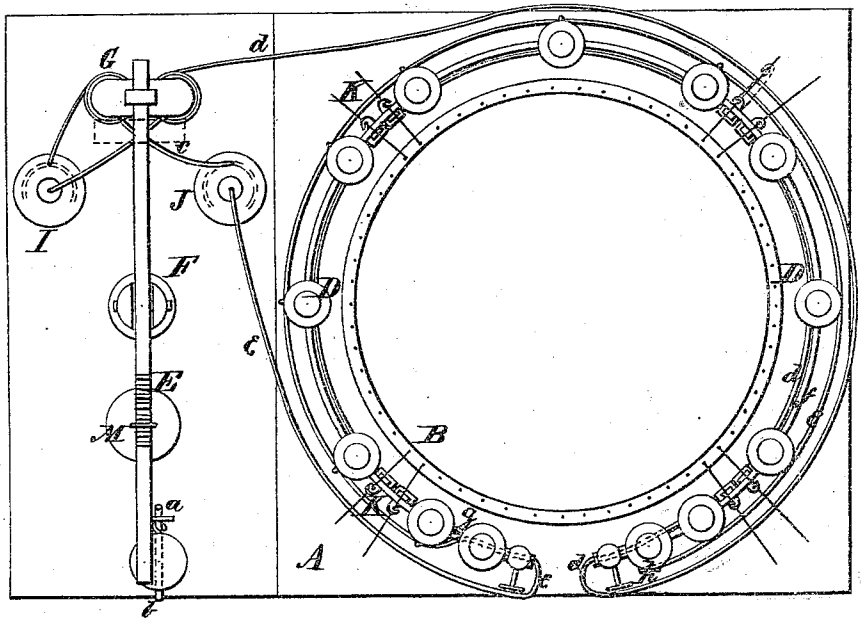


Fig. 2.

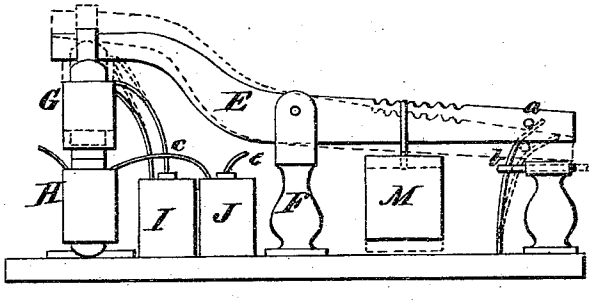
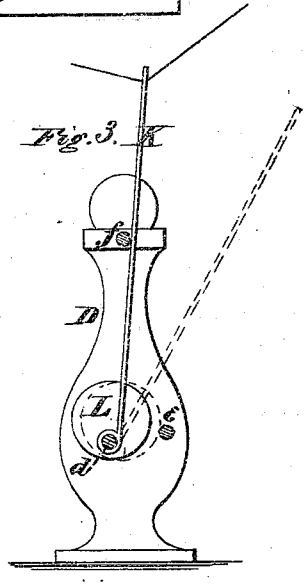


Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

HORACE E. WELLS AND DANIEL H. MORAN, OF VAN WERT, OHIO.

IMPROVEMENT IN ELECTRO-MAGNETIC STOP-MOTIONS FOR KNITTING-MACHINES, LOOMS, &c.

Specification forming part of Letters Patent No. 123,315, dated January 30, 1872.

SPECIFICATION.

To all whom it may concern:

Be it known that we, HORACE E. WELLS and DANIEL H. MORAN, of Van Wert, in the county of Van Wert and State of Ohio, have invented certain Improvements in Electro Stop-Motion for Knitting-Machines, Looms, &c., of which the following is a specification, reference being had to the accompanying drawing.

Our invention consists in the employment of two electro-magnets, or one electro-magnet and an ordinary horseshoe-magnet, in combination with certain novel mechanical contrivances, as a stop-motion for knitting-machines, looms, &c., as hereinafter fully described.

In the drawing, Figure 1 is a top-plan view of a portion of a knitting-machine with our stopping devices applied thereto in one of several ways that may be adopted. Fig. 2 is a side view of the magnets and batteries, and the mechanism connected therewith for controlling its driving apparatus. Fig. 3 is a side elevation of one of the thread-latches in position.

We are aware that electro-magnets, in connection with certain mechanical contrivances, have heretofore been employed as a stop-motion for looms; but in these cases only a single electro-magnet with a keeper is employed, and the mechanical contrivances are too delicate and complicated to produce that certain and prompt movement required for practical purposes. In their construction and operation the movement of the shifting device is effected by the attraction of the keeper by the magnet, and consequently the keeper has to be adjusted every time, so as to be within a certain relative distance from the magnet, and this distance will have to be varied to suit the varying strength of the magnet; and, again, as the distance moved by the keeper is short, a delicate "knocking-off device" has to be employed to secure any result. Besides, in these contrivances, a magnet is required to detect the breaking of each thread.

Our contrivance, while it may be applied to looms, is especially adapted to knitting-machines, and more particularly to that class known as the Abel looms. In these forty or more separate threads are used, and upon the breaking of any one of them, unless the motion of the machine is promptly arrested, a hole is left in the fabric, and it is otherwise imperfect. The object of our invention is to secure a certain and prompt automatic stopping of the machine on the breaking of any of the threads, and this is accomplished by so arranging two electro-magnets, or one electro-magnet and a horseshoe-magnet, in connection with the machine, that while the machine is in operation the ends of the magnets shall be together, but only one of them must be charged, so that they will be held together by the one so charged, and also so that upon the breaking of a thread the other magnet shall be instantly charged, and, as a consequence of their now presenting similar poles, immediately repel each other and fly apart, and in the act of doing so arrest the operation of the machine.

A represents the base-plate of a knitting-machine, and B the circular body in which its needles are arranged. Around this body, and upon the base-plate A, a series or circle of insulated posts, D, are placed, as shown in Fig. 1. Below the base-plate A, or at its side, or at any other convenient place, a vibrating lever, E, is mounted on a post, F, and has attached to one of its ends an electro-magnet, G, and to its opposite end a pin, *a*, or other means for operating the shifting device of the machine, either directly, as by moving a spring, *b*, or by releasing a spring so as to operate it. Under the magnet, on the end of the lever E and in the same vertical plane with it, another electro-magnet, H, is arranged, being attached or made stationary. The ends of the two magnets, G and H, are directly opposite each other. The upper magnet is charged by a battery, I, and the lower one by a battery, J, these batteries being placed at any convenient distance. The upper magnet and its battery have direct connecting-wires. The lower magnet has one wire, *c*, making direct connection with the battery, while the other connection for completing the circuit is made as hereinafter explained. In or upon the insulated posts D are mounted three wires, *d*, *e*, and *f*, so as to run parallel with each other, but in different vertical planes, as shown in Figs. 1 and 3. One of these wires, *f*, is mounted in the upper ends of the posts, for a purpose hereinafter explained. The other two, *d* and *e*, are connected at one end to the battery J, one of them, *e*, directly, and the

other, *d*, through the wire about the lower magnet H and its continuation *c*, while their opposite ends terminate at *g* and *h*, all as clearly shown in Fig. 1. As these wires are not connected, there will be no operation of the battery J, and consequently no action of the electro-magnet H, until such connection is made. On the lower wire *d* are mounted loosely as many latches K as there are threads used in the machine. The upper ends of the latches are provided with a hook, through which the threads pass from the bobbins or spools to the needles. These threads, by their tension, when the machine is in operation, hold the latches up against the wire *f*, as shown in Fig. 3. At their lower ends the latches have attached to them a disk, L, arranged so as to move with them and eccentrically about the wire *d*, so that when any one of the latches K falls back its disk will wedge against the wire *e*, and thus form a perfect connection. In order that the latches may certainly fall, the wire *f* is arranged a little outside of the wire *d*, and the latches K are light and elastic, so as to throw back with a rebound or spring. Having thus constructed and arranged the electro-magnets and lever E with the other mechanical contrivances, a weight, M, is placed upon the end of the lever opposite to that on which the magnet is placed, and so that it can be adjusted to nearly counterbalance the power of the upper magnet G, and as shown in Fig. 2, and then the operation is as follows:

The machine is adjusted for operation by arranging its threads, which then hold all the latches K up against the wire *f* and their disks free from the wire *e*. The batteries I and J being charged, the upper magnet G, which has its circuit with its battery constantly entire, will, of course, be constantly operative, while the lower magnet, having its circuit broken, will not be active until its battery is put in operation by completing the circuit. In this condition the ends of the magnets, being brought together, will adhere, because the upper, G, is strongly electro-magnetic, and the other, not having any current passing through, acts as a keeper only. At the same time the weight M may be adjusted, as above stated. In bringing the magnets together in this way the opposite end of the lever is raised and the shifting device is moved so as to set the machine in operation. Now, the moment any one of the threads used breaks for any reason, the latch through which it passes, being released, will fall or spring back, and its disk will wedge sharply against the wire *e*, and thus form a perfect connection between the wires *d* and *e* and complete the circuit through the battery J, and the magnet H will instantly release or repel the magnet G, it being understood that their like poles are opposite each other. When released by this repulsion, the weight M aids in bringing down the end of the lever forcibly, and thus promptly stops the machine. The thread is then repaired and the machine put in operation as before. It will thus be seen that the machine is stopped, not by breaking the electric current, but by completing it, and thus bringing to bear its greatest and constant force to operate the shifting devices.

It is obvious that, in place of having the upper magnet electro-magnetic, an ordinary horseshoe-magnet might be used; but the former is preferred, because it secures more prompt and forcible action.

Having thus described our invention, what we claim is—

1. In combination with a knitting-machine or other similar apparatus, the use of electro-magnets, or of electro-magnets and horseshoe-magnets, constructed and arranged to operate, in connection with any suitable mechanical contrivances, substantially as herein described, so that the breaking of a thread used in the construction of the fabric shall instantly cause the magnets to fly apart and stop the machine, as set forth.

2. The combination of the magnets H and G and lever E with the latches K, provided with the disks L, when constructed and arranged to operate substantially as and for the purpose set forth.

3. In the use of electro-magnets as a stop-motion, as herein described, we claim the latches K, provided with the eccentric disks L or their equivalents, constructed and arranged to operate substantially as and for the purpose set forth.

4. In combination with the magnets G and H and lever E, we claim the adjustable weight M, substantially as and for the purpose set forth.

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DANIEL H. MORAN.

Witnesses:
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