(No Model.) 3 Sheets—Sheet 1.

A. M. NEWLANDS.

ELECTRICAL STOP MECHANISM FOR KNITTING MACHINES.

No. 390,891. Patented Oct. 9, 1888.

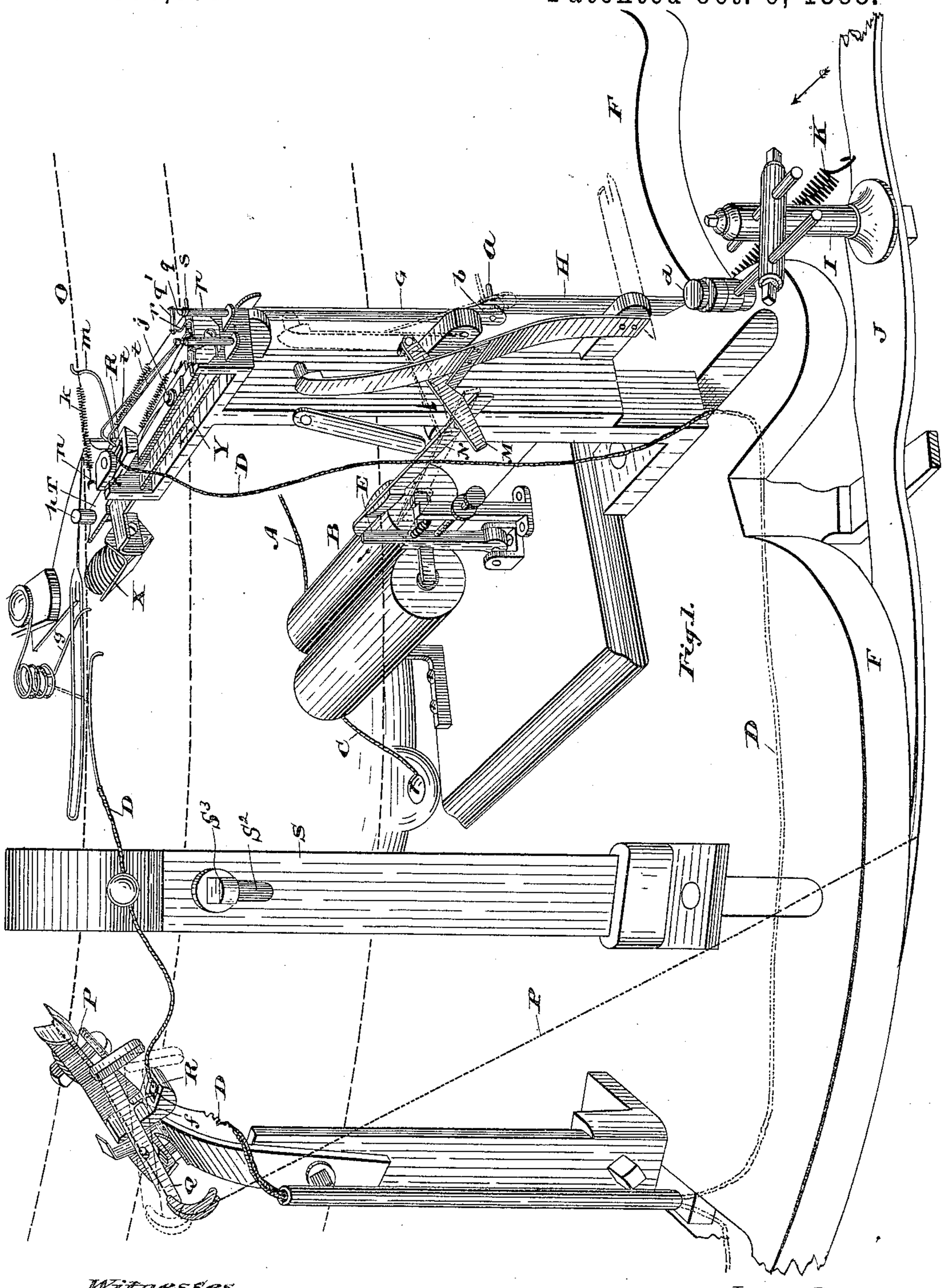

Fig. 1.

Witnesses.
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(No Model.) 3 Sheets—Sheet 2.

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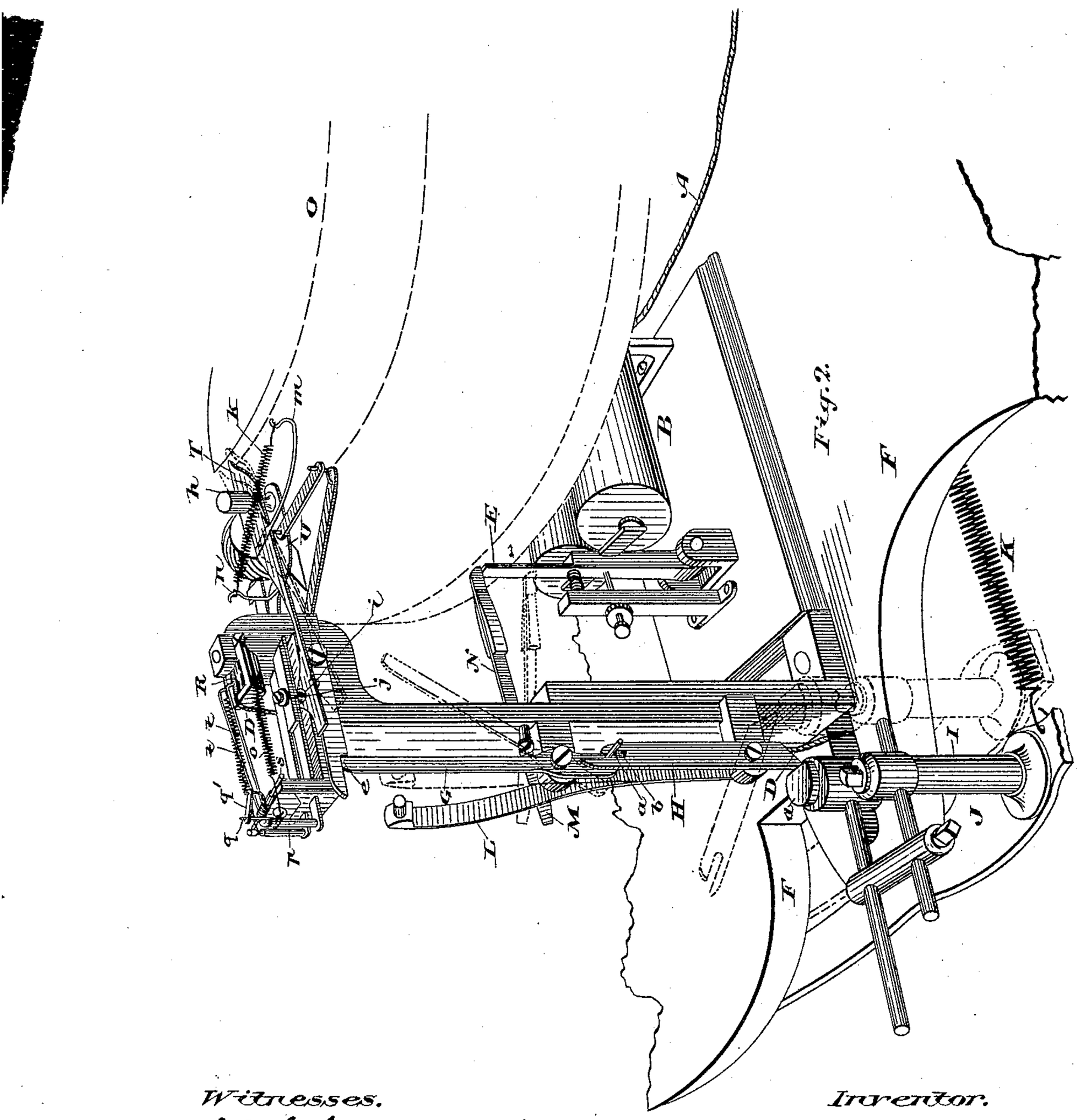

Fig. 2.

Witnesses.
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(No Model.) 3 Sheets—Sheet 3.

A. M. NEWLANDS.

ELECTRICAL STOP MECHANISM FOR KNITTING MACHINES.

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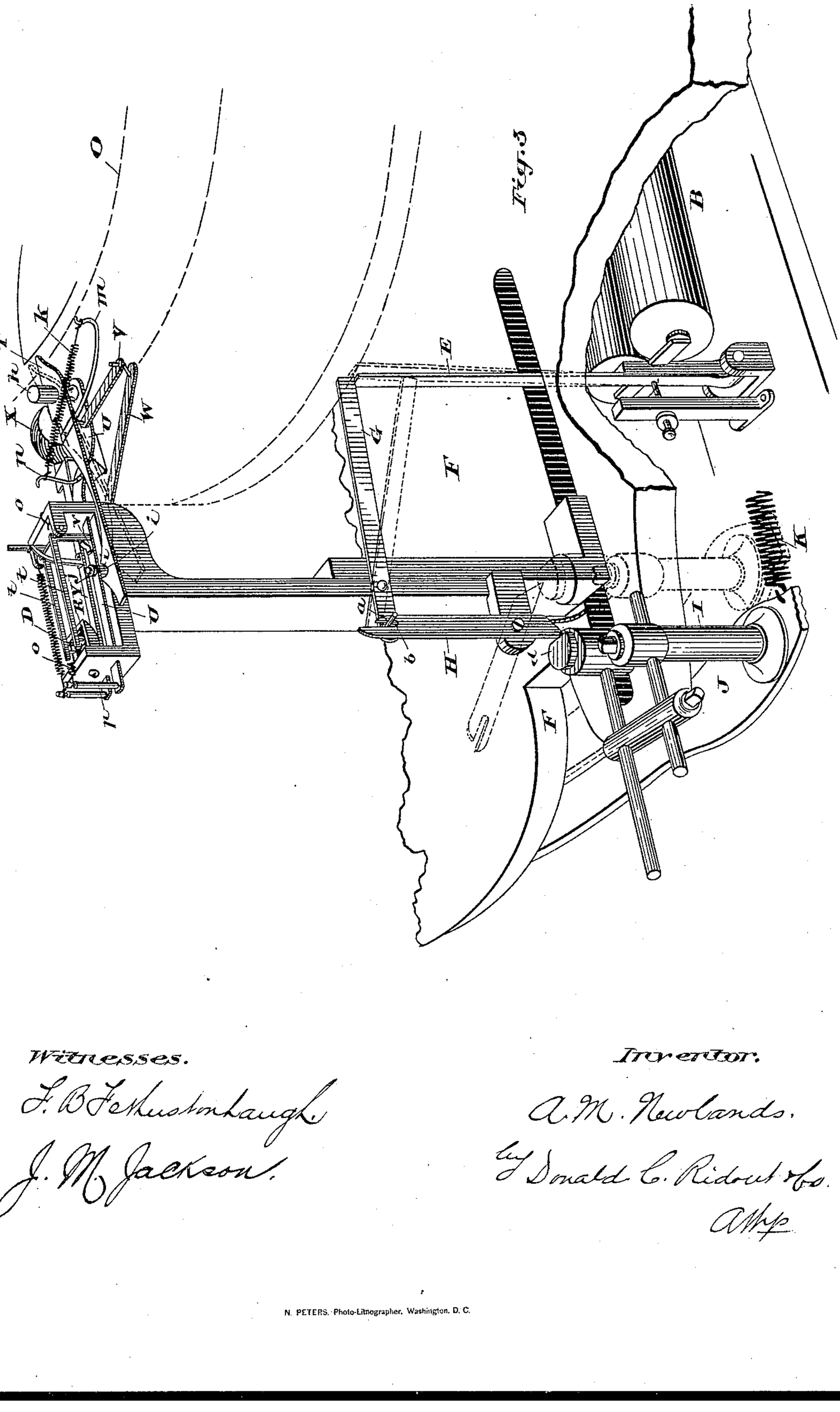

Witnesses.

F. B. Fenwick Langhorne

J. M. Jackson.

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UNITED STATES PATENT OFFICE.

ANDREW M. NEWLANDS, OF PRESTON, ASSIGNOR OF ONE-HALF TO ADAM WARNOCK, OF GALT, ONTARIO, CANADA.

ELECTRICAL STOP MECHANISM FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 390,891, dated October 9, 1888.

Application filed November 23, 1885. Serial No. 183,687. (No model.)

To all whom it may concern:

Be it known that I, ANDREW MARK NEWLANDS, of the village of Preston, in the county of Waterloo, in the Province of Ontario, Canada, woolen-manufacturer, have invented an Improved Electro-Magnetic Stop Mechanism for Automatically Arresting the Motion of a Knitting-Machine, of which the following is a specification.

This invention relates to certain new and useful improvements in stop-motions for knitting-machines; and the novelty resides in the peculiar combinations and the construction, arrangement, and adaptation of parts, all as more fully hereinafter described and claimed.

Figure 1 is a perspective view exhibiting the general mechanism connected with my invention. Fig. 2 is a perspective view of the mechanism from a different point of observation. Fig. 3 shows an alternative arrangement of levers for holding the belt-shifter or stop-lever out of action.

In the drawings like letters of reference indicate corresponding parts in each figure.

A represents a positive wire connecting the electro-magnet B with the battery, which may be located anywhere, and which it is not necessary to exhibit in the drawings.

C is a wire connecting the electro-magnet B to the frame of the machine, all parts of which are connected together, so that the circuit may be completed by connecting the negative wire at any point in the machine.

D is a negative wire leading from the battery and arranged to connect, as hereinafter described, with various parts of the machine.

E is the armature of the electro-magnet B. In Figs. 1 and 2 the electro-magnet B is placed above the table F, while in Fig. 3 it is placed below it, and, owing to the arrangement of levers hereinafter specified the armature in Fig. 3 is longer than when the mechanism is arranged as shown in Figs. 1 and 2. In this latter figure (Fig. 3) a lever, G, is pivoted on the frame of the machine, and its long arm is supported on the end of the armature E when the latter is not in contact with the electro-magnet B. The short end of the lever G is provided with a pin, *a*, to fit into a slot, *b*, made in the end of the lever H. This lever is also pivoted to the frame of the machine, and its lower or short end, when the machine is set as indicated, presses against the head *d*. This head is adjustably connected, as indicated, to the post I, which is attached to the belt-shifter or stop-lever J. As belt shifters or stop-levers are well understood by mechanics generally, it is not necessary to exhibit them complete in the drawings. It is merely necessary to say that when the belt-shifter or stop-lever J is in the position indicated by full lines in the drawings, the driving mechanism of the machine is in action and the machine is running. When the lever J assumes the position indicated by dotted lines in Figs. 2 and 3, the driving mechanism is thrown out of action and the machine is at rest. This action is effected by the spring K, one end of which is attached to the lever J and the other end to some convenient point in the frame of the machine.

In the arrangement of levers shown in Fig. 3 the lever J is held in the position indicated in full lines by the head *d* abutting against the lever H, the upper end of which is secured by the pin *a* on the lever G so long as the said lever is supported on the end of the armature E. When the armature E is attracted by the magnet B, it moves from beneath the lever G, the long end of which is sufficiently heavy to cause it to drop and lift the pin *a* out of the slot *b*, when immediately by the action of the spring K the said lever H is turned over, as indicated by dotted lines in Fig. 3, and the lever J springs into the position indicated by dotted lines in the said figure. In Figs. 1 and 2 the arrangement of levers is somewhat different. Instead of connecting the lever G directly with the armature E, as before described, the lever G is carried up vertically and fitted behind a notch, *e*, formed in the frame of the machine, as indicated in Fig. 2. So long as the lever G remains in the notch *e* the joint between it and the lever H is maintained, and the stop lever J is held in the position indicated by full lines. A spring-hammer, L, is placed behind the lever G, and is held away from it by the notched lever M, (see Fig. 1,) which notched lever rests on top of the pivoted lever N, which rests upon the end of the armature E, as indicated in Figs. 1 and 2. When the armature is attracted toward the magnet, the lever N drops and its short end knocks up-

wardly the notched lever M, so as to carry the notch clear of the projection on the spring-hammer L, when the said hammer immediately springs forward, strikes the lever G, and knocks it away from the notch *e*, when the joint between the levers G and H is broken and the lever J permitted to spring into the position indicated by dotted lines, when the motion of the machine is immediately arrested.

Having described the mechanism for operating the belt-shifter or stop-lever of the machine, I shall now proceed to explain how the circuit is made which actuates the armature to produce the result just explained.

As before described, the electro-magnet B is connected to a battery and to the machine, and the other wire leading from the battery is arranged so that through any of the causes mentioned the said wire is brought into communication with the machine and the circuit thereby completed.

As the construction of a knitting-machine is well understood, it is not necessary to show in the drawings the cylinder or other parts of the machine; but I may mention that the upper dotted line, O, represents the line of the needles. The dotted line P represents the thread, which passes through a lever, Q, pivoted on the ordinary thread-guide.

R is a cup attached to the thread-guide, and is insulated therefrom, as the said guide of course forms a part of the machine. This cup is filled with mercury, through which the wire D passes. It will be seen that the thread P supports the lever Q, and that the moment the said thread breaks the said lever Q will drop into the position indicated by dotted lines, (see Fig. 1,) when the point *f*, attached to the lever Q, drops into the mercury contained in the cup R, which instantly completes this circuit, causing the armature E to spring toward the electro-magnet B, and therefore the mechanism hereinbefore described is put into action.

The object of providing a cup of mercury is to insure instantaneous contact, as it permits the point *f* to sink into it, thereby passing anything which might accidentally be on the surface, and which would otherwise prevent the making of the circuit. This point in my invention I consider of great importance, as in a knitting-machine it is practically impossible to keep all the surfaces free from fluff or other material, which, being non-conductors, would prevent the circuit being made. It will be noticed in Fig. 1 that the wire D extends beyond the cup R, and is supported by the adjustable post S, from which it is properly insulated. This post may be adjusted so as to bring the exposed end of the wire D opposite to the spring-wire *g*, which is connected to the frame of the machine, and is intended to be located on the inside of the work, while the end of the wire D is on the outside of the work.

The upper end of the post S may be adjusted vertically in any suitable way, it being shown in the present instance as made in two parts, one of said parts being provided with a slot, S^2, through which passes a set-screw, S^3, into the other part. (See Fig. 1.)

Should a hole occur in the work, and should it by any chance pass the mechanism which I shall describe farther on, the end of the wire *g* will catch in the hole, and as the work is carried on a revolving cylinder the said wire *g* is carried by the work from the position in which it is indicated by full lines in Fig. 1 to the position in which it is indicated by dotted lines in the same figure, by which motion it is brought in contact with the exposed end of the wire D, when the circuit will be instantly made and the mechanism hereinbefore described put into action for stopping the machine. The pointed lever T is pivoted on the post *h*, connected to the sliding plate U. On the long end of the lever T a notch, *i*, is made to fit over the stud *j*, attached to the sliding plate U, as shown.

k is a spring, one end of which is attached to the finger *m*, extending from the lever T, while the other end of the spring is connected to a finger, *n*, attached to the sliding plate U, so that the tendency of the spring shall be to hold the notch *i* in connection with the stud *j*.

o is a spring, one end of which is connected to the frame of the machine, while the other end is attached to the post *p*, connected to the sliding plate U. The tension of this spring *o* pulls the plate U toward the center of the cylinder of the machine, so that the point of the lever T shall press against the work being knitted at a point immediately below the points of the needle, so that in the event of any hole occurring in the work the point of the lever T will naturally fall into the hole through the tension of the spring *o*. I show plans for utilizing this motion of the plate U to complete the circuit. In both cases I connect the negative wire D to the mercury contained within the insulated cup R, similar to the one before referred to.

In Figs. 1 and 2 I place on the end of the post *p* a pin, *q*, which is connected by a link, *q'*, to a wire, *r*, attached to the horizontal spindle *s*, on which the wire *t* is fastened, which latter wire is crooked, as indicated in the drawings, and extends over the mercury in the cup R. When the lever T drops into a hole in the work, the forward movement of the plate U is conveyed through the pin *q* and link *q'* to the horizontal spindle *s*, causing it to rock and drop the end of the wire *t* into the mercury contained in the cup R, thereby instantly completing the circuit and causing the stop mechanism to be put into action, as hereinbefore described.

In Fig. 3 the action is the same, except that I dispense with the pin *q* and link *q'*, change the position of the cup R, and change the wire *t* into the form of a bell-crank lever, the short end of which projects down to the top of the plate U, on which a stop, *v*, is placed, as shown

in Fig. 3, which stop will, on the forward movement of the plate U, cause the wire *t* to fall into the mercury.

The object of pivoting the lever T is to prevent the said lever from dragging the work, as the moment it enters the hole the movement of the work on the revolving cylinder will tilt the lever, as indicated by dotted lines in the drawings, thereby enabling the work to slip off. A link, V, jointed, as indicated, at one end to the plate U and at the other end to an arm, W, attached to the frame of the machine, is provided for the purpose of holding the end of the plate U against the pressure caused by the revolving of the cylinder.

With the view of providing means for putting the stop-motion into action should fluff or anything similar collect on the face of the work, I attach a burr, X, to a sliding plate, Y, carried in the same way as the sliding plate U and provided with similar attachments, which are simply reversed, so that when the burr X comes in contact with the fluff or other obstruction the plate Y is pushed back, and through this motion the wire *t*, connected to it, is dropped in the mercury contained in the cup R.

What I claim as my invention is—

1. The combination, with the frame of a knitting-machine, of an electro-magnet, B, wire A, connecting the same with a battery, the wire C, connecting said magnet and frame, cups of mercury, R, the pointed lever T, the spring-actuated sliding plate U, movable communicating-points *t t*, connected to said frame, connections between plates U and the points *t t*, and the wire D, leading from the battery and communicating with said cups of mercury, the latter being insulated from the frame of the machine, but arranged to receive said communicating-points and complete the circuit, and thereby magnetize the electro-magnet B, substantially as specified.

2. The combination, with the electro-magnet B and its armature E, of the belt-shifter or stop-lever J, having head *d*, the spring K, for actuating said lever, a lever normally supported by said armature, the lever H, provided at its upper end with a slot, *b*, and normally held in a vertical position with its lower end in engagement with the head *d* of the stop-lever, and intermediate latching devices, substantially as described, between said levers, as set forth.

3. The lever N, notched lever M, spring-hammer L, and the armature E, designed to support the lever N, fitting below the notched lever M, which holds the spring-hammer L, as specified, in combination with the lever H, the electro-magnet B, belt-shifter or stop-lever J, the frame of the machine, lever G, and mechanism by which the electro-magnet B is magnetized so far as to attract the armature E and withdraw the support from the lever N, causing the said lever N to raise the notched lever M clear of the spring-hammer L, causing the same to knock the lever G clear of the notch *e*, formed in the frame of the machine, thereby releasing the belt-shifter or stop-lever J, substantially as and for the purpose specified.

4. In a knitting-machine, the combination, with the frame, an electro-magnet permanently connected to said frame, the wires D and A, cup of mercury, R, insulated from said frame, but connected with said wire D, the spring-actuated sliding plate U, pointed lever T, pivoted thereto, vertically-moving wire *t*, arm W, attached to the frame of the machine, and link V, connecting said plate and arm, substantially as and for the purpose specified.

5. In a knitting-machine, the combination, with the frame thereof, an electro-magnet having one pole permanently connected to said frame, the wire D, and a cup of mercury, R, insulated from the frame of the machine, but connected with the wire D, of the sliding plate U, pointed lever T, pivoted to said plate, and intermediate connections, substantially as described, between said cup and plate, substantially as and for the purpose specified.

6. In a knitting-machine, its frame and electro-magnet permanently connected to said frame, the wire D, and a cup, R, containing mercury and insulated from the frame of the machine, but connected with the wire D, as specified, the sliding plate U, stud *j*, the pointed lever T, pivoted to said sliding plate and having a notch, *i*, to fit over the stud *j*, and a spring, *k*, for actuating the lever T, as specified, in combination with the wires A and *t* and the spring, as designed to hold the point of the lever T against the work, so that in the event of said point falling into a hole in the work the wire *t*, which is connected to the sliding plate U, is thrown into the mercury in the cup R, substantially as and for the purpose specified.

7. In a knitting-machine, an electro-magnet permanently connected to its frame, the wire A, the wire D, and a cap, R, containing mercury and insulated from the frame of the machine, but connected with the wire D, as specified, in combination with the sliding plate U and the burr X, attached to said sliding plate, the frame of the machine, a spring, *o*, and a wire, *t*, connected with said sliding plate and designed to fall into the mercury contained in the cup R, substantially as and for the purpose specified.

Preston, November 16, 1885.

A. M. NEWLANDS.

In presence of—
C. E. YATES,
ALBERT BOERSCH.