No. 713,836. Patented Nov. 18, 1902.

W. H. BAKER & F. E. KIP.

ELECTRICAL WARP STOP MOTION FOR LOOMS.

(Application filed Aug. 30, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

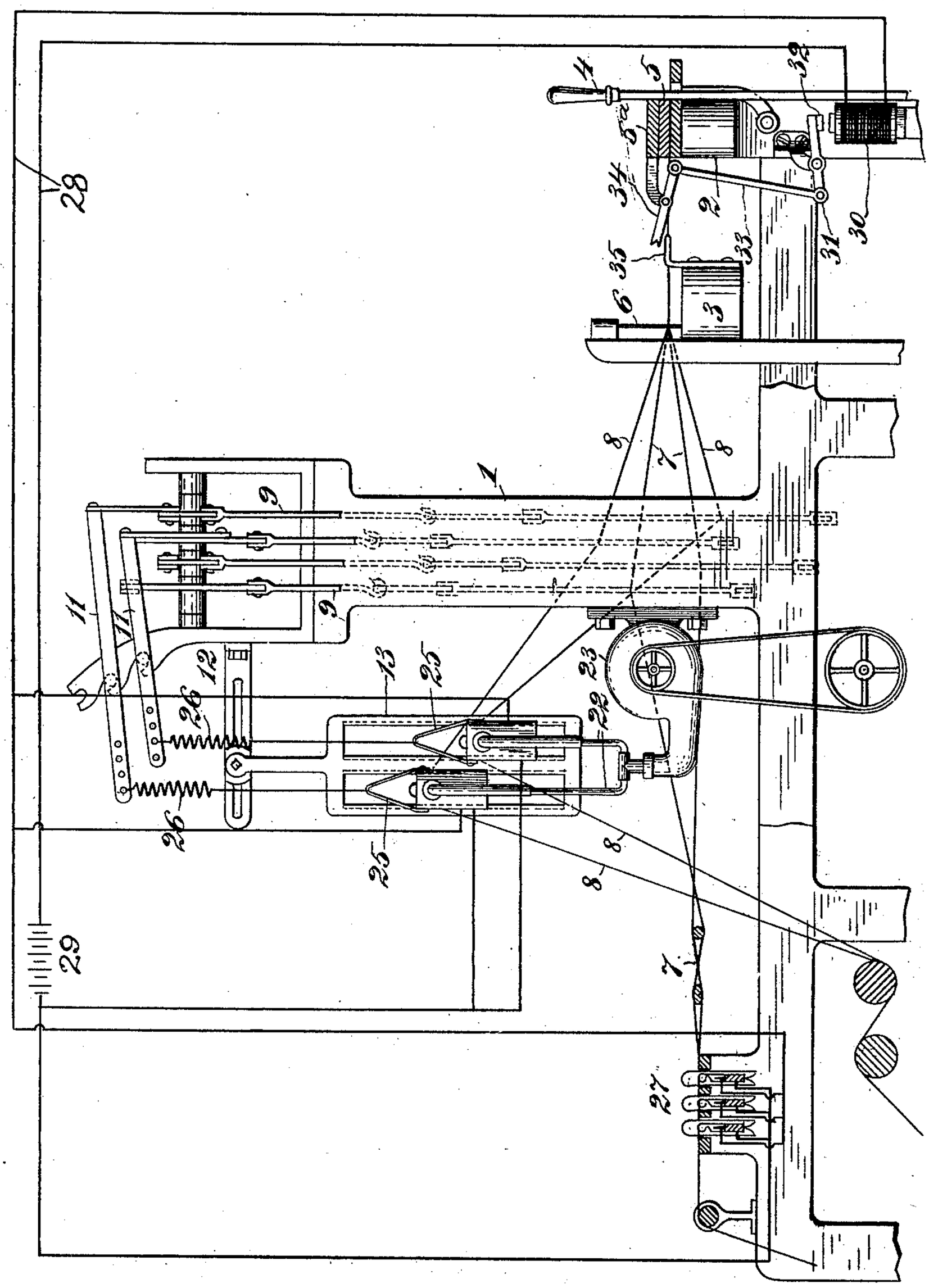

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Fig. 8.

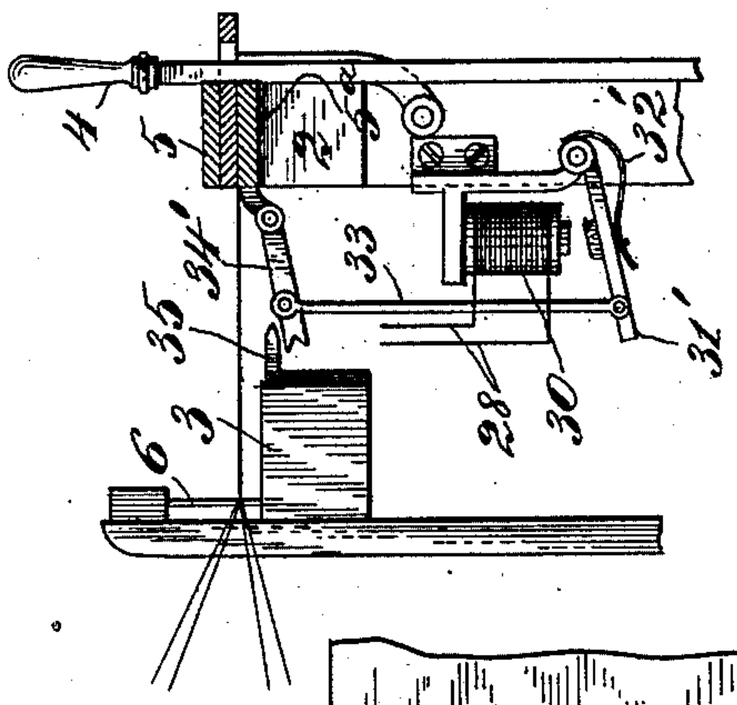
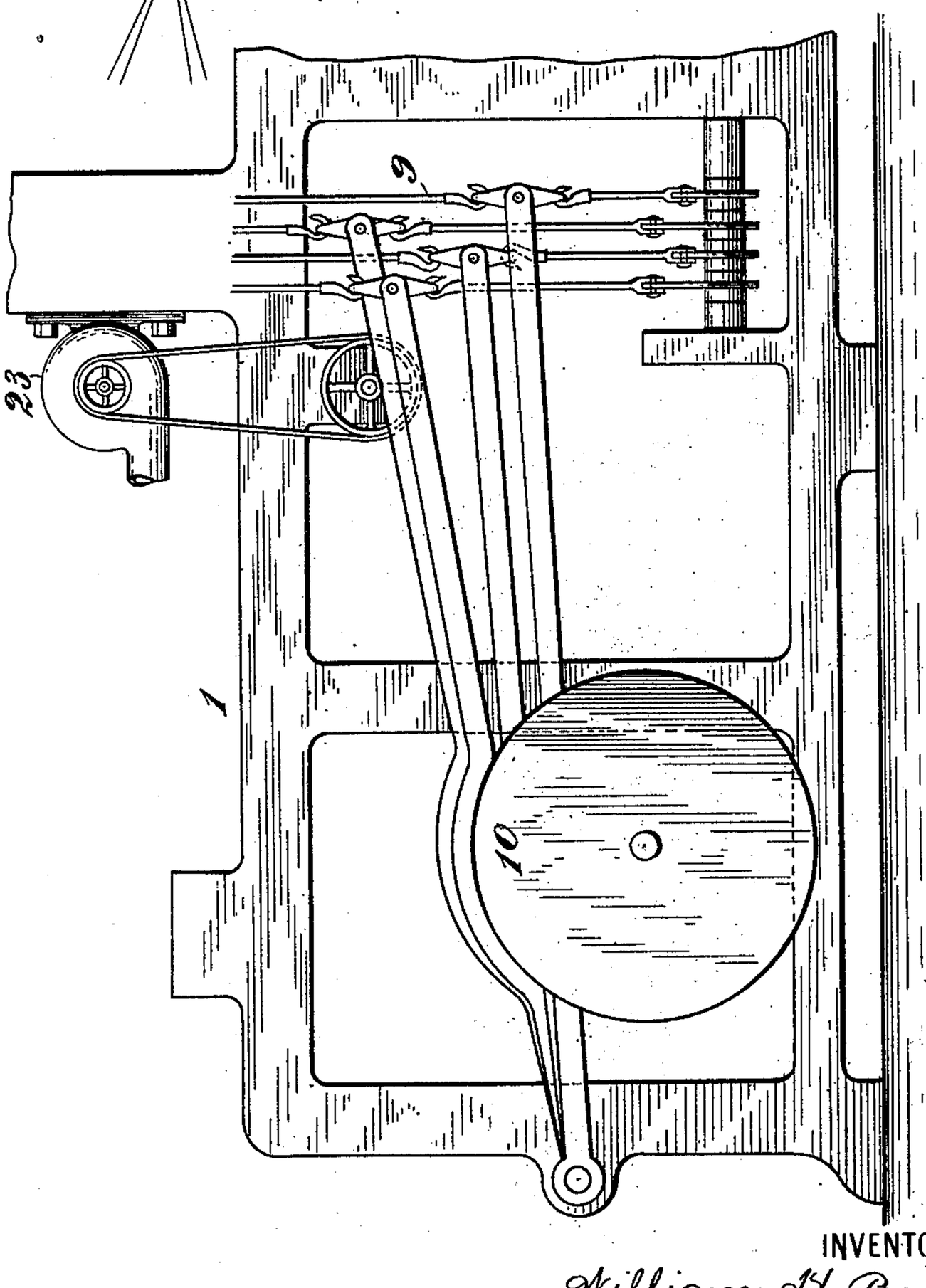


Fig. 2.



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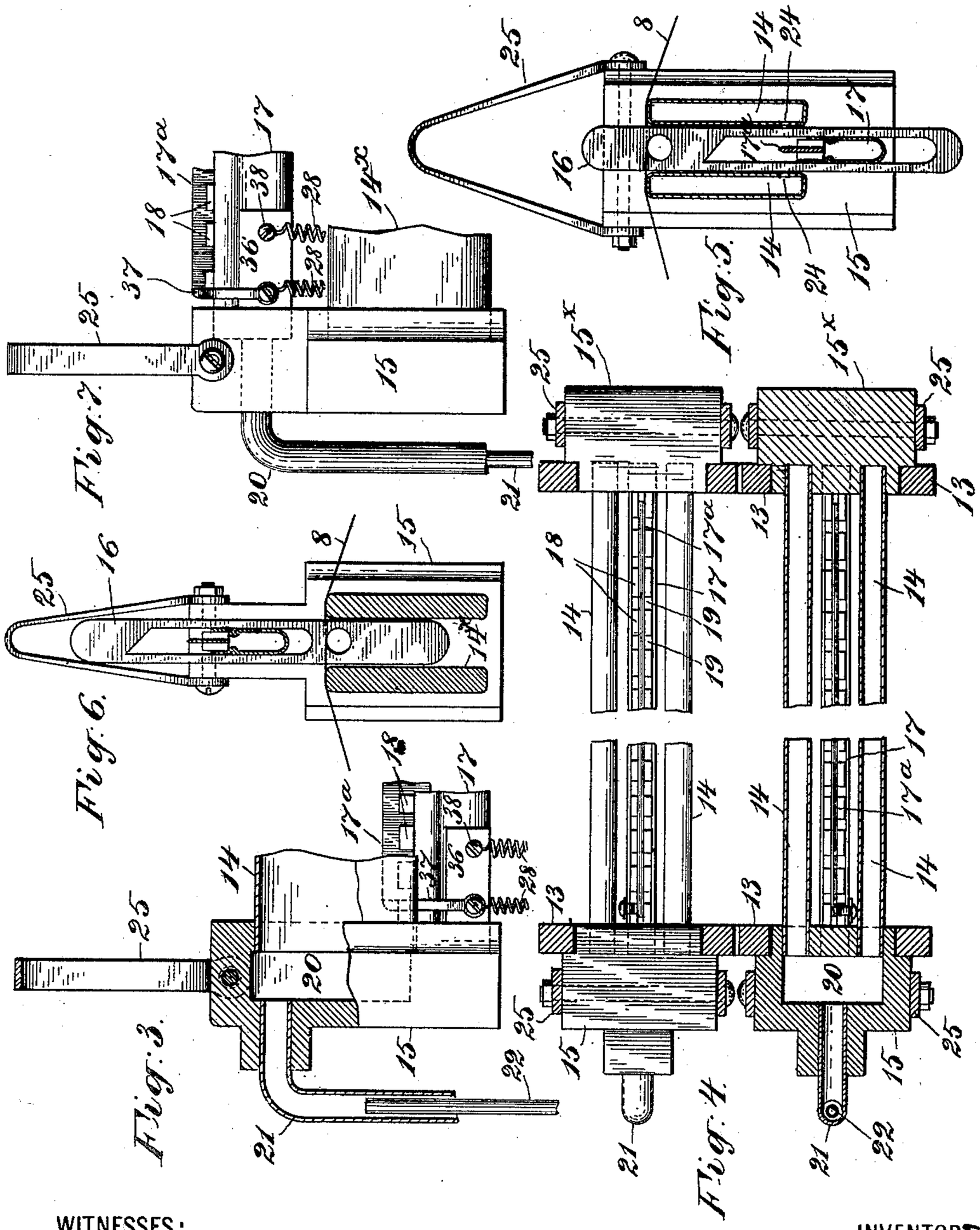

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UNITED STATES PATENT OFFICE.

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ELECTRICAL WARP STOP-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 713,836, dated November 18, 1902.

Application filed August 30, 1901. Serial No. 73,780. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM H. BAKER, residing at Central Falls, Providence county, Rhode Island, and FREDERIC E. KIP, residing at Montclair, Essex county, New Jersey, both citizens of the United States, have invented certain Improvements in Electrical Warp Stop-Motions for Looms, of which the following is a specification.

This invention relates to electrically-controlled warp stop-motions, and particularly to that class of such mechanisms wherein the electrical devices which control the stop-motion are applied to the pile-warps, as well as to the back warps. Respecting this class of stop-motions, reference may be had to our United States Patent No. 635,637, of October 24, 1899, as showing an electrical stop-motion applied to the back and pile warps of a loom for weaving pile fabrics and as illustrating diagrammatically the arrangements of the circuits, which we have not deemed it necessary to very fully illustrate in the present application, wherein the circuits will be or may be arranged the same as in our said patent. It may be well to state, briefly, that in this general class of stop-motions a thin metallic drop is suspended from each warp-thread, and these drops slidably embrace a bar which we denominate a "compound terminal." This compound terminal consists of a bar-terminal of the controlling-circuit, and with it the drops are at all times or normally in contact, and of a metal strip forming the other terminal of the controlling-circuit and set in, but insulated from the other or bar terminal. When a warp-thread breaks, the drop suspended thereon falls and closes the controlling-circuit through an electromagnet, which acts through proper stop mechanism to stop the loom. It is important that the contact-surfaces be kept free from lint, dust, or fluff; and it is the principal object of the present invention to provide means for keeping the contact parts of the pile-warp circuit-closers free from such lint or fluff.

Other features of the invention will be hereinafter fully described and their novel features defined.

In the accompanying drawings, which illustrate embodiments of the invention, Figure 1 is a side elevation of the loom, partly in section, at its ends; and Fig. 2 is a fragmentary side elevation of the lower portion of the loom, showing the cams and harness for operating the heddles. Figs. 3, 4, and 5 are detail views illustrating the construction of the supports for the pile-warps and the circuit-closing devices. Fig. 3 is a sectional side view. Fig. 4 is a sectional plan, and Fig. 5 is a vertical cross-section. Figs. 6 and 7 are views similar, respectively, to Figs. 5 and 3, showing a slightly-different arrangement of the circuit-closing devices. Fig. 8 is a sectional view illustrating a slightly-modified arrangement of the stop-motion.

Referring primarily to Figs. 1 to 5, 1 designates the loom-frame; 2, the breast-beam; 3, the lay; 4, the shipper-lever; 5, the ordinary knock-off lever commonly actuated by the weft-hammer and weft-fork. 6 is the reed. 7 designates the back warps. 8 designates the pile-warps. 9 designates in general the harness for operating the heddles. 10 designates the cams for operating the harness, and 11 designates the levers for raising and lowering the pile-warp supports at proper times to allow said warps to float. All of these features are in some form common in looms, and no attempt has been made herein to illustrate them fully.

The supports for the pile-warps will now be described.

Secured to the loom-frame at its opposite sides are brackets 12, Fig. 1, from which depend slotted guides 13 for the warp-supports, of which two are herein shown, one for each pile-warp. Each warp-support consists of two bars 14, fixed at their respective ends in sliding heads 15. Intermediate the bars 14 is mounted in said heads the compound terminal, which is embraced by the drops 16, supporting the respective threads of the pile-warp. The compound terminal comprises a hollow metal bar 17, forming one terminal of the operating-circuit. Preferably this bar-terminal 17 will be of sheet metal, with an open slot along its upper edge in which is secured the other or strip terminal 17^a of the circuit. This terminal 17^a will be a strip of

metal, preferably copper, separated from the hollow bar 17 by blocks 18 of insulating material, these latter being spaced so as to leave openings 19 between them communicating with the hollow in the bar-terminal 17. This hollow bar opens into a hollow 20 in the head 15, and in said head and communicating with the said hollow 20 is secured a tube 21, the outer end of which is bent downward and receives telescopically a tube 22, communicating with the discharge of a blower 23, driven from any rotating shaft of the loom. The air from the blower 23 enters the hollow of the terminal bar 17 and is emitted in upwardly-directed jets through the outlets 19 between the blocks of insulating material 18, thus blowing off any fluff or lint that may accumulate on the strip-terminal 17^a and insuring electrical contact when a drop 16 falls.

In Figs. 3, 4, and 5 the supporting-bars 14 are also represented as hollow and as receiving air from the hollow 20, each supporting-bar having jet-apertures 24 in its inner face opposite the strip 17^a to assist in the removal of lint or fluff.

The heads 15 are each provided with a bail 25, and these bails are coupled by springs 26 with the levers 11, whereby the pile-warps are raised and lowered at proper times, and it is to accommodate the rising and falling parts to the stationary blower that the tubes 22 are made to telescope with the respective tubes 21.

It may be explained here that there will be two slotted guides 13, one at each side of the loom, as indicated in Fig. 4, and there will also be two heads 15 and $15^\times$ to carry the supporting-bars 14 and circuit-closing devices; but the head $15^\times$ need have no hollow 20 in it, as the air is received at one end only, as here shown.

The construction illustrated in Figs. 6 and 7 may be employed. In these figures the compound terminal is represented as situated above the warps 8. The drops 16 have the apertures for the warp-threads below the slots for the compound terminals, as will be seen in Fig. 6, and the bars $14^\times$ are solid or may be solid, as they do not receive air from the blower. This construction places the compound terminal above the plane of the warp-supporting bars, so as to make it somewhat more accessible for repairs.

As all pile-warps are of soft material and have a soft or light twist and as they are being constantly raised and lowered suddenly and rapidly for floating them from one back warp to the other, they are subjected to much friction, and fluff and lint in considerable quantity is constantly being formed by the chafing. Much of this fluff falls downward, and consequently it is of advantage to have the points where the drops rest on the warp-threads situated below the point where the contacts are made for closing the circuit, as this arrangement tends in a great measure to keep the points of contact free from fluff. Therefore this arrangement of the parts cooperates with the jets in keeping the contact-points clear or clean and assuring the closing of the circuit at all times by the falling of a drop.

We have shown for purposes of illustration a form of compound terminal wherein the two terminals are fixed together; but we wish it understood that we do not for all the purposes of our invention restrict ourselves to this construction. So long as the drop or drop device is adapted to fall and close the circuit when its supporting warp-thread breaks and said terminals are both situated above the points where the warps are supported the construction will be a full compliance with this part of our invention.

The electrical detecting devices for the back warps are seen at 27. These are well known and need not be described. The circuits 28 and the battery or generator 29 are indicated diagrammatically in Fig. 1.

In the circuits closed by the drops is the operating-electromagnet 30 of the stop-motion, and this latter will now be specifically described with especial rererence to Figs. 1 and 8.

The magnet 30 is mounted on the loom-frame down below the breast-bream, and its balanced armature-lever 31, bearing the armature 32, is coupled by a link 33 with a balanced dagger 34, hinged to an auxiliary knock-off lever 5^a, mounted on the ordinary knock-off lever 5. When the circuit is completed through the magnet, it depresses the dagger-arm through said link into the path of a bunter 35 on the lay, so that when the lay beats up the shipper-lever is set free and stops the loom. The construction of the stop-motion seen in Fig. 8 is substantially the same as that above described, the main difference being in the arrangement of the parts. In Fig. 8 the electromagnet is inverted and elevates the dagger 34 into the path of the bunter, and the auxiliary knock-off lever is mounted on the under side of the bracket which carries the ordinary knock-off lever 5. The parts and the operation are the same.

It may be explained here that the operation of the main knock-off lever to stop the loom when the weft fails also serves to disengage the back pawl of the take-up beam and allow the latter to run back; but this release of the take-up beam is not desired when a warp-thread breaks, and hence the auxiliary knock-off lever is employed to stop the loom independently of the main knock-off lever.

This feature of an auxiliary knock-off lever adapted only to stop the loom, the main knock-off lever being adapted to release the take-up beam, is described in our United States Patent No. 635,637, of October 24, 1899, and therefore will not require further description or illustration herein. Moreover, means through which the main knock-off lever actuates the back pawl of the take-up beam will be found in ordinary looms.

Figs. 3 and 7 show best the manner of connecting the circuit-conductor 28 with the bar 17 and strip 17ª of the compound terminal. On the side of the bar, near one end usually, is a block 36 of insulating material to which is secured by a binding-screw the conductor 28 and a metal strip 37, soldered at its upper end to the strip 17ª. The other wire 28 is secured by a binding-screw 38 to the block, the screw passing through the block into the bar 17, thus making proper electrical connection.

Another important feature of our invention consists in the combination, with the metallic-circuit-closing drops which ride on the warp-threads, of the electric terminal which forms a guide for said drops, this terminal being provided with a space or chamber for receiving air or aeriform fluid under some pressure and outlets or jet-apertures so placed that the ejected fluid keeps the terminal free from lint or fluff at the contact-points. We believe we are the first to provide such a terminal, and therefore we claim it broadly and without reference to specific details of construction. It may be stated here with respect to this feature of the invention that whereas as herein shown it is only contemplated to admit the air or fluid to the hollow 20 in the head 15 it will be obvious that the head 15ª may also have a hollow in it and receive air. This will be readily understood without illustration.

Referring to Fig. 1, it will be noted, as before stated, that the dagger 34 and armature-lever 31 are balanced levers connected by the link 33, the weight of which serves to hold the armature and the operative arm of the dagger elevated by its weight, no spring being used. In Fig. 8 the dagger 34′ and armature-lever 31′ are not balanced, and a spring 32′ is used. Either construction may be used.

We would say that the balanced dagger and armature-levers may be used in connection with the ordinary knock-off lever of a loom as well as with an auxiliary knock-off lever, as their functions and operation as balanced levers would be the same in either case.

Having thus described our invention, we claim—

1. In a loom, an electrical warp stop-motion, provided with an electric terminal having in it a space or chamber to receive an aeriform fluid under pressure and a jet-outlet for said fluid, a drop device, and means for supplying said fluid.

2. In a loom, an electrical warp stop-motion provided with a hollow compound electric terminal provided with upwardly-directed jet outlets or apertures near the strip-terminal, means for producing a forced current of air, and an air-conduit between the hollow in said terminal and said current-producing means.

3. In a loom, an electrical warp stop-motion provided with warp-supports, a compound terminal adjacent to said supports, said terminal comprising a hollow-bar terminal, the strip-terminal set therein, the insulating blocks or pieces, which insulate the two terminals and leave jet-apertures from the hollow in the bar-terminal, and means for supplying air under pressure to the hollow in said terminal.

4. In a loom, the compound terminal comprising a hollow-bar terminal 17, of metal with an open slot along its upper edge, the strip-terminal 17ª, of metal, set in said slot, and the blocks 18 of insulating material interposed between the two terminals and separated so as to produce apertures 19, substantially as set forth.

5. In a loom for weaving pile fabrics, a vertically-movable support for the pile-warps, means for moving it, a hollow, compound terminal provided with upwardly-directed jet-apertures near the strip-terminal, said compound terminal being carried up and down with the said support, means for producing a forced current of air, and an air-conduit between said hollow terminal and current-producing means.

6. In a loom for weaving pile fabrics, a vertically-movable support for the warps, means for moving it, a hollow, compound terminal provided with upwardly-directed jet-apertures near the strip-terminal, said compound terminal being carried up and down with the said warp-support, means for producing a forced current of air, and an air-conduit consisting of telescopic tubes situated between said air-forcing means and the said hollow, compound terminal.

7. In a loom for weaving pile fabrics, the combination with the warp-supports connected by heads, the said heads, and the means for moving said supports up and down, of the compound terminal carried by said heads, comprising the hollow-bar terminal, the strip-terminal set therein, the insulating blocks or pieces 18, which insulate the two terminals and leave jet-apertures 19, and means for supplying air under pressure to the hollow bar 17, substantially as set forth.

8. In a loom, the combination with a controlling electric circuit including a generator and electromagnet, an auxiliary knock-off lever, the shipper-lever, and a movable dagger on the auxiliary knock-off lever, of means connecting said dagger with the armature-lever of the electromagnet, the lay, a bunter thereon adapted to impinge on the dagger and stop the loom when the electromagnet is excited, and means for completing the operating-circuit through said magnet when a warp-thread breaks.

9. In a loom, the combination with the shipper-lever, of an independent and auxiliary knock-off lever for actuating said shipper-lever alone, a movable dagger carried by said independent knock-off lever, the operating electric circuit, including a generator and electromagnet, means coupling the armature-lever of said magnet with said dagger for shifting the same, a bunter on a moving part of the loom for actuating the auxiliary knock-off

lever through said dagger, and means for closing the operating-circuit when a warp-thread breaks.

10. In a loom, the combination with the controlling electric circuit, including a generator, and means for closing said circuit when a warp-thread breaks, of an electromagnet in said circuit and mounted on a stationary part below the level of the breast-beam, its armature-lever, an auxiliary knock-off lever, the shipper-lever, a bunter carried by the lay, a dagger hinged to the auxiliary knock-off lever, and a link connecting said dagger with the armature-lever, whereby said dagger is moved into the path of the bunter when the circuit is completed through the magnet.

11. In an electrical warp stop-motion for looms, the combination with circuit-closing drops supported on the warp-threads, and an operating electric circuit adapted to be closed by the falling of one of said drops, said circuit including a generator and an electromagnet, an auxiliary knock-off lever, a dagger movably attached to said auxiliary knock-off lever, means coupling said dagger to the armature-lever of said magnet, and electromechanical means controlled by said circuit for stopping the loom when said circuit is completed by the fall of a drop.

12. In an electrical warp stop-motion for looms, the combination with the controlling-circuit, including a generator and controlling-electromagnet, and means for completing said circuit when a warp-thread breaks, of a dagger in the form of a balanced lever pivotally attached to a knock-off lever of the loom, the said knock-off lever, means connecting one arm of said balanced dagger with the armature-lever of the controlling-magnet, and means, coöperating with said balanced dagger when the controlling-circuit is closed by the breaking of a warp-thread, to actuate mechanism to stop the loom.

13. In an electrical warp stop-motion for looms, the combination with the controlling-circuit, including a generator, a controlling-electromagnet and terminals, and drop devices mounted on unbroken warp-threads and adapted, on the breaking of their supporting-threads, to close said circuit at the terminals thereof, of the shipper-lever, an auxiliary knock-off lever, a pivotally-balanced, lever-like dagger carried by said auxiliary knock-off lever and held normally in inoperative position, connecting means between one arm of said dagger and the armature-lever of the electromagnet, whereby the excitation of said magnet shifts said dagger into its operative position, and means adapted to impinge upon said dagger and through it actuate the loom-stopping mechanism.

14. In an electrical stop-motion for looms, the combination with an electric circuit and a controlling-electromagnet having a balanced armature-lever, a shipper-lever, and a knock-off lever, of a balanced lever-like dagger mounted on the knock-off lever, a connector between one arm of said dagger and one arm of the armature-lever, and means for impinging on said dagger when the latter is in its operative position to stop the loom.

In witness whereof we have hereunto signed our names, this 9th day of August, 1901, in the presence of two subscribing witnesses.

WILLIAM H. BAKER.
FREDERIC E. KIP.

Witnesses:
PETER A. ROSS,
F. W. WIMAN.