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PATENTED FEB. 20, 1906.

A. A. JOHNSON.
WARP STOP MOTION FOR LOOMS.

APPLICATION FILED JUNE 10, 1905.

2 SHEETS—SHEET 1.

Fig. 2,

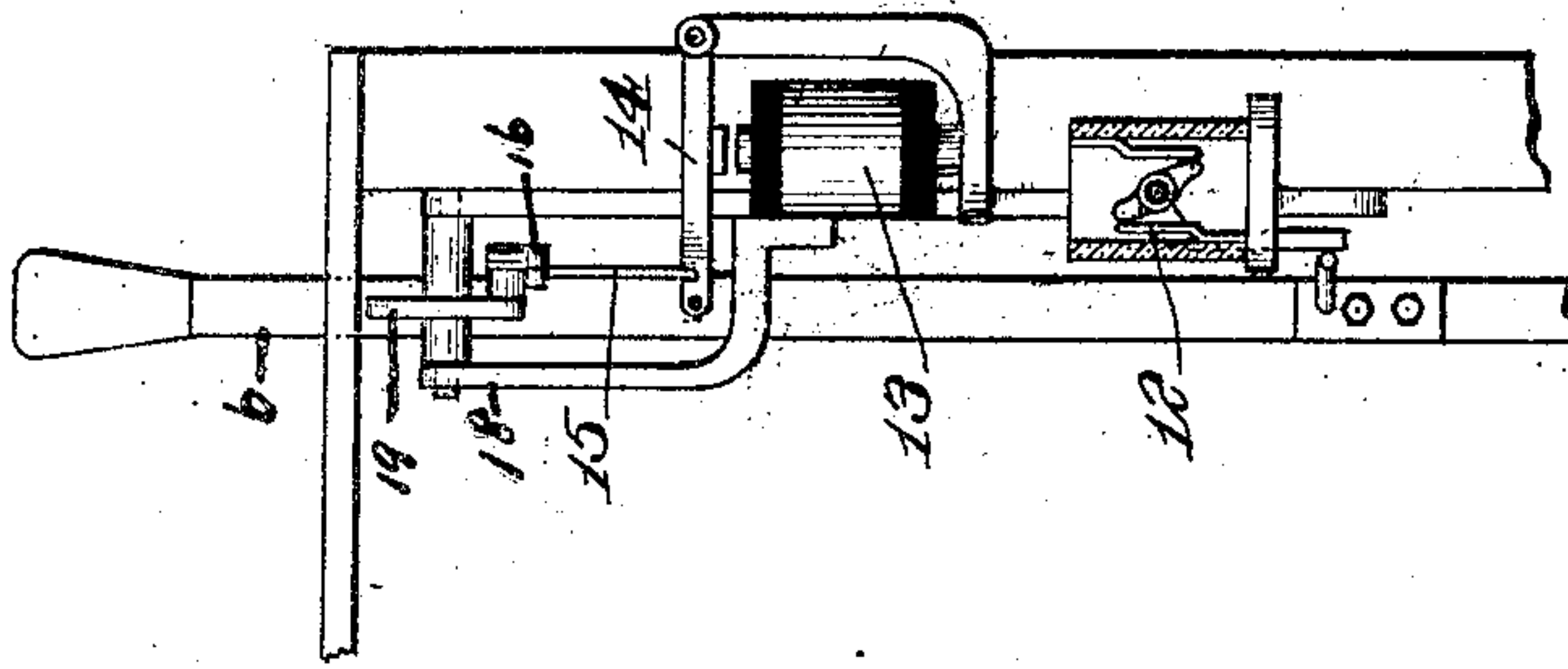
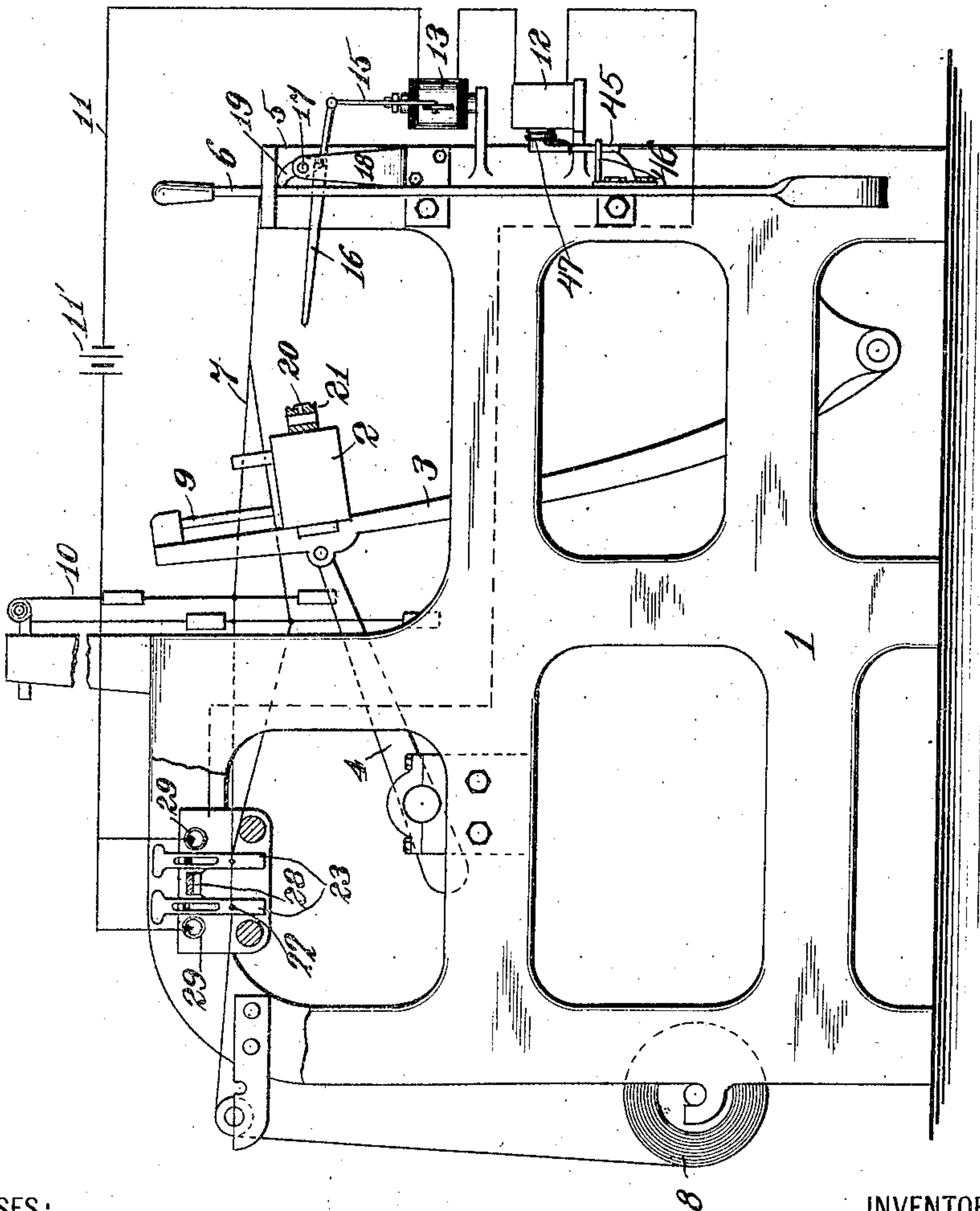


Fig. 1,



WITNESSES:

Grace F. Heasley.
Harry Schrago.

INVENTOR

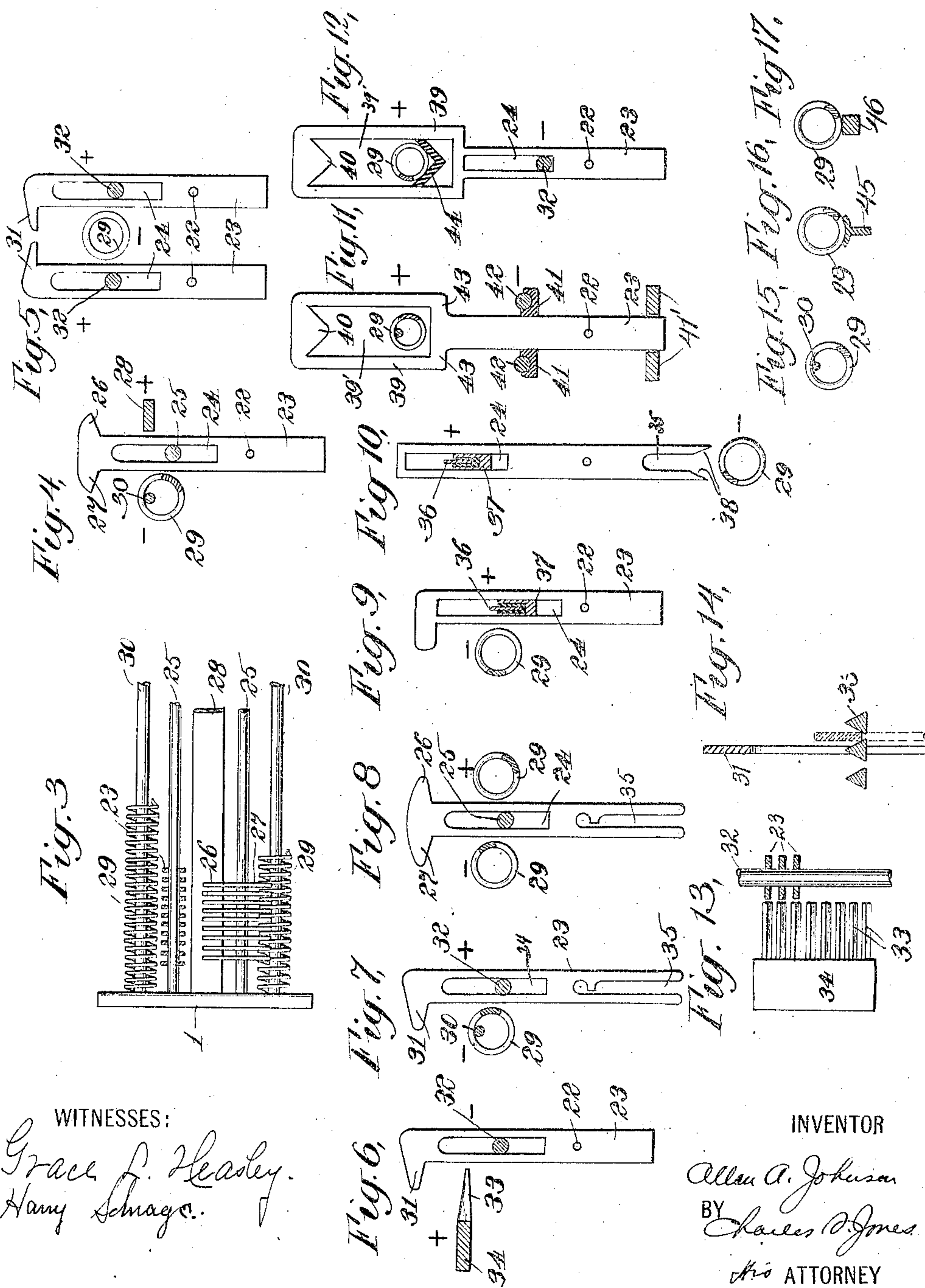
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UNITED STATES PATENT OFFICE.

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WARP STOP-MOTION FOR LOOMS.

No. 813,304.

Specification of Letters Patent.

Patented Feb. 20, 1906.

Application filed June 10, 1905. Serial No. 264,656.

To all whom it may concern:

Be it known that I, ALLAN A. JOHNSON, a citizen of the United States, and a resident of Central Falls, in the State of Rhode Island, have invented certain new and useful Improvements in Warp Stop-Motions for Looms, of which the following is a specification.

The present invention relates to warp stop-motions for looms, comprising drop devices suspended from and maintained in normal position by unbroken warp-threads out of electrical engagement with the terminals of an electric circuit. In mechanisms of this character it is obviously desirable that when a warp-thread breaks or becomes unduly slack the loom shall be instantly stopped. This requires that the circuit shall be maintained closed a sufficient length of time to move the magnet-armature and its connected dagger into proper position and to hold said dagger in position to engage the bunter after it has once been set and until after the shipper-lever has been released. Heretofore plain solid bars have been used as circuit-terminals, said bars being rigidly secured to the loom-frame. These become covered with fluff and lint, which interfere materially with good electrical engagement, and, moreover, owing to the shocks and jars to which loom-frames are subjected a fallen drop is liable to become dislodged and its engagement with the terminal bars interrupted, thereby breaking the circuit after it has been momentarily closed and failing to effect a closing of the circuit for a sufficient length of time to permit the movements of the parts necessary to knock off the loom. This objectionable feature is particularly inherent in drop devices having a projection extending from the body thereof or otherwise formed so that one point of contact with a terminal is outside of the line of descent of the body part of the drop.

The present invention secures the closing of the circuit the instant a drop falls and its maintenance in that condition at the terminals by means which positively engage and hold the drop in its fallen position when it contacts with a terminal. The most convenient way to do this is to construct one of the terminals in such manner as to constitute the drop-holding means, and in the following specification I have described a terminal so devised that it will hold a fallen drop by a

gripping or wedging action to prevent its dislodgement. The circuit will therefore be closed without liability of interruption to effect the knocking off of the loom.

The invention will be understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a loom, showing the application of the present invention thereto. Fig. 2 is a front view of a portion of the loom; Fig. 3, a plan view, with some of the drops in section, showing one arrangement of the circuit-terminals. Figs. 4 to 12, both inclusive, are enlarged views of different designs of drops, showing various modes of disposing them relative to the circuit-terminals; Fig. 13, a plan view, with the drops in section, of the form of terminal shown in Fig. 6; Fig. 14, a vertical sectional view thereof, and Figs. 15, 16, and 17, views showing different methods of supporting the wire terminal.

Similar reference-numerals indicate similar parts in the several views.

Referring to the drawings, the numeral 1 designates the loom-frame; 2, the lay; 3, the lay-sword; 4, the crank connection for vibrating the lay; 5, the breast-beam; 6, the shipper-lever; 7, the warps; 8, the warp-beam; 9, the reed, and 10 the heddles. These parts are and may be of the usual construction and arrangement in looms. The shipper-lever 6, as usual, occupies a slot in a bracket forming an extension of the breast-beam and engages a shoulder when the loom is running normal. When freed from said shoulder, a spring shifts said lever to stop the loom in the usual and well-known manner.

To set in motion the loom-stopping mechanism when a warp-thread breaks or becomes unduly slack, a controlling-circuit is employed, which circuit includes a cut-out switch 12, the coils of a magnet 13, and terminal bars, more fully described hereinafter. The drop devices are supported by unbroken and properly-tensioned warp-threads in such manner as to prevent electrical engagement between said drop devices and the circuit-terminals during the normal running of the loom and to permit such engagement when a warp-thread breaks or becomes unduly slack thereby close the circuit and effect the stopping of the loom.

In order that the invention may be fully

understood, I will first describe the relation of the controlling-circuit to the loom-stopping mechanism. The electromagnet 13 is conveniently mounted below the breast-
 5 beam on a bracket secured to the loom-frame, and its armature-lever 14, fulcrumed on said bracket, is connected by a link or wire rod 15 to one end of a dagger 16. Pivottally supported upon pins or studs 17 in a bracket
 10 18, secured to the loom-frame, is a knock-off lever 19, attached at its lower end to the dagger 16 and adapted at its upper end to engage the shipper-lever 6. The dagger 16 is normally in such position that upon each beat-
 15 up of the lay it will enter an opening 20 in a bunter 21, mounted on the lay or some other vibrating or moving part of the loom; but when the magnet 13 is energized through the closing of the circuit by a fallen drop the dag-
 20 ger 16 will be moved into such position as to be impinged upon by the face of said bunter, thereby moving the knock-off lever and freeing the shipper-lever to stop the loom, as will be readily understood. The drawings
 25 show a form of bunter described in United States Patent No. 778,132, dated December 20, 1904, although any other form of bunter may be used. During the normal running of the loom the circuit is closed through the
 30 switch 12 and open at the terminal bars—that is, during the normal running of the loom the electromagnet 13 is deenergized and the loom thereby prevented from knocking off, the circuit being closed only by a fallen drop when
 35 a warp-thread breaks or becomes unduly slack.

The following-described means by which the object of the present invention is accomplished may be employed in connection with
 40 any kind of loom and with any form or design of drop device which is provided with two points of contact to engage the terminal bars, and particularly with a form in which one of the points of contact is outside of the line of
 45 descent of the body of a drop. These drops in practice are made of thin metallic strips having an aperture 22, through which the warp-thread is adapted to pass, the tension of the thread maintaining it during the normal run-
 50 ning of the loom out of electrical engagement with the circuit-terminals.

In Figs. 4 to 10, both inclusive, the drops are shown as provided with a projection or projections extending from the body por-
 55 tion thereof and adapted when the drop falls to contact with a terminal or the terminals of the circuit.

Referring more particularly to Figs. 3 and 4, the drops 23 are made of thin sheet metal, the body being comparatively long and nar-
 60 row and provided with a longitudinal slot 24, through which is passed a guide-bar 25, secured to the loom-frame. In this particular form the body of the drop is formed with two
 65 lateral projections 26 and 27, which are pref-

erably inclined on the under side to insure good contact with the circuit-terminals 28 and 29, their respective connections to the battery-wires being indicated by the plus and minus signs. The terminal 28 is shown as a
 70 plain bar. The terminal 29 is formed of a coiled spring, and to insure certainty of contact and effective locking of a drop in its fallen position the convolutions of said spring are sufficiently far apart or the spring itself of
 75 such elasticity as to permit the entrance of a drop or of its lateral projection between adjacent convolutions. The top of the terminal 29 is slightly above that of the terminal
 80 28, so that when a warp-thread breaks or becomes unduly slack the weight and momentum of the fallen drop will cause the projection 27 to pass between two adjacent con-
 85 volutions of the terminal 29. Thus when a drop falls the projection 27 will enter be- tween adjacent convolutions and engage the slightly-inclined coil of the spring with a
 90 glancing or shearing action, which in a measure locks the drop in such manner that the jar of the loom tends to more firmly secure it in its fallen position. Also, depending upon
 95 the closeness of the spring-coils, the drop will be gripped laterally, adjacent convolutions of the spring retaining a firm hold upon the drop and preventing any movement which
 100 would result in breaking the circuit. The fall being sufficient to bring the projection 26 into contact with the terminal 28, the circuit will be closed and the magnet 13 energized to stop the loom through the instrumentalities
 105 above described, the circuit being readily traced from battery 11' or other source of current to coils of magnet 13, switch 12, terminal 28, drop 23, terminal 29, to battery. It is to be understood that the terminals are
 110 suitably insulated from the frame.

The construction of terminal 29 insures the retention of the drop in its fallen position, as it is unable to escape the gripping or wedg-
 115 ing action exerted upon it by the coils of the spring between which it is held, and therefore the magnet 13 will remain energized until after the shipper-lever has been released. The guide-bar 25 maintains the drops in ver-
 120 tical position, and it will be noted that the width of the drop is less than the distance between the terminals, so that said terminals are outside of the path of descent of the body of the drop and within the path of the projec-
 125 tions 26 and 27. Fig. 3 also shows the utilization of one of the terminals, in this case the terminal 28, for two adjacent banks of drops, one bank being shown in section. When one
 130 terminal is thus utilized, the alternate terminals 29 are coupled up to one of the battery-wires, as shown in Fig. 1. To impart the requisite stiffness and freedom from deflection the spring-terminal 29 may be suspended on a wire 30, said wire not interfering with the proper engagement and adjustment of the
 135

drop with the terminals. Such construction is shown in Figs. 4, 7, 11, and 15. In Fig. 16 the terminal 29 is shown supported exteriorly on a bracket 45 and in Fig. 17 on a bar 46.

5 In Fig. 5 a form of drop is illustrated having but one projection 31, the bar 32 serving not only as a guide, but as one of the circuit-terminals, and the other terminal 29 formed of a coiled spring similar to that of Fig. 4.
10 The diameter or width of the terminal 32 is substantially equal to the width of the slot 24, so that said terminal and the drop are always in contact with each other, the circuit being closed by the engagement of the
15 projection 31 with the terminal 29. Two banks of drops are shown, the terminal 29 being utilized for both and lying outside of the path of descent of the body of the drop, but adapted to receive and hold a fallen drop by
20 reason of their projections 31. The drops may be divided into any number of desired or convenient groups or banks each having one individual terminal, as 32, and adjacent banks together utilizing the other terminal 29.

25 Figs. 6, 13, and 14 show another form of terminal consisting of a comb-like structure comprising a plurality of teeth 33, secured to a suitable base 34, the drops and teeth being shown larger and spaced farther apart than
30 in practice for the purposes of illustration. These teeth are preferably triangular in section, with the apexes uppermost and so placed relatively to the drops that the projections of the latter in falling will impinge against
35 the side of one of the teeth and slide between it and the adjacent tooth, so as to be firmly wedged between said teeth. In these figures the other circuit-terminal 32 serves as a
40 guide-bar to maintain the drops in an upright position, the teeth 33 of the other terminal lying outside of the path of descent of the body of the drop. It is not absolutely essential that the teeth 33 shall possess the
45 property of elasticity, if they are made of substantially the section shown in Fig. 14, inasmuch as the drop will be gripped laterally between the inclined faces of the adjacent teeth. It is, however, within my invention to make
50 these teeth differently from that shown in the drawings or in such form that they will be elastic, so that the projection on the drop will be firmly held to prevent the breaking of the circuit after a drop has fallen.

It will be readily understood that owing to
55 the light weight of the drops the conditions necessary to effect their retention in a fallen position require that the holding-terminal shall be comparatively delicate in construction—that is, if of the spring form the convolutions should not be too tightly wound or
60 coiled, and if of the comb type that the teeth should not be placed too close together to prevent the entrance between them of the projection of the drop.

65 Fig. 7 illustrates a drop and arrangement

of terminals similar to that of Fig. 5, except that the drop has two slots, one of which, 24, is closed and the other, 35, open at one end, thus adapting the drop to be placed over the
70 warp-thread, the latter resting against the upper wall of the slot 35 instead of threading the warp through the aperture 22, as shown in some of the other forms. In fact, all of the drops may be provided with similar open-
75 ended slots instead of with the thread-aperture 22.

Fig. 8 illustrates a form of drop with two projections 26 and 27 similar to that of Fig. 4, except that it has also an open-ended slot 35
80 similar to Fig. 7. In Fig. 8 both terminals are formed of coiled springs 29, so that a fallen drop will be firmly held at two points.

Fig. 9 shows still another modification in which the outside terminal 29 is formed of a coiled spring, and the inner terminal consists
85 of a thin metal blade 36, set into and insulated from a supporting-bar 37, said bar being secured to the loom-frame. One of the battery-wires is connected to the terminal blade 36 and the other to the terminal
90 29.

Fig. 10 shows a form of drop without a projection extending from the body thereof. In this case the terminal blade 36 is similar to that of Fig. 9 and the other terminal 29 a
95 coiled spring supported below and in the path of a falling drop. To insure the drop passing between two convolutions of the terminal 29, the lower ends of the drop are preferably beveled at 38. This form of drop also has two
100 slots, one of which, 24, is closed and the other, 35, open, the latter engaging the warp-thread.

Fig. 11 shows another form of drop and disposition of the circuit-terminals. The drop in this instance has a narrow elongated body 23, the upper end 39 of which is enlarged and
105 provided with a closed slot 39', said end having an inwardly-projecting portion 40, adapted when the drop falls to cut between adjacent convolutions of the spring-terminal 29, passing through the slots 39', but out of con-
110 tact with the side walls of said slot in the same manner that the outwardly-extended projections of Figs. 4 to 9 act. The drop of Fig. 11 is supported in a vertical position by
115 guide-bars 41 and 41', of insulating material, and in side contact therewith. The outer terminal bar 42 is suitably supported in one of the guide-bars, or two such terminal bars may be provided, one on each side of the
120 drop, as shown in the drawings, and coupled together by one of the battery-wires. Contact of the drop with terminal 42 is effected by means of a shoulder or shoulders 43, constituting the lower projecting edge of the enlarged end 39.
125

Fig. 12 shows a drop of the same general design as Fig. 11, except that it is provided with an elongated closed slot 24, through which passes one of the terminals 32 in con-
130 tact with the wall of the slot and serving also

as a guide-bar for the drop. The other terminal 29 rests upon a suitable support 44 of insulating material, which is secured to the loom-frame and supported within the upper closed slot 39'. The preferred arrangement of drop devices is one to secure contact with the terminals above the warp in order to obviate any difficulty due to the accumulation of fluff or lint.

10 The cut-out switch 12 is supported upon a bracket secured to the loom-frame and provided with a lever 45 in contact with and adapted to be moved by a projecting arm 46 on the shipper-lever. When the circuit 11 is closed by a fallen drop, the shipper-lever will be released, as above described, and as said lever is moved the switch-lever 45 is moved, so as to break the circuit at the switch 12. When the loom is again set in motion by moving the shipper-lever 6 into engagement with its retaining-shoulder, the lever 45 will be moved by a spring 47 to close the circuit at switch 21. The purpose of the switch 12 is therefore to save the batteries by breaking the circuit as soon as the shipper-lever is released.

The purpose of the present invention being to provide means to hold a drop in its fallen position until after the shipper-lever has been released, and believing myself to be the first to accomplish that result, I do not desire to limit myself to the precise means shown and described and desire to claim the same broadly.

35 What I claim, and desire to secure by Letters Patent, is—

1. A warp stop-motion for looms comprising drop devices supported in normal position by unbroken warp-threads, a normally open electric circuit adapted to be closed through its terminals by contact therewith of a fallen drop, and means to hold a drop in its fallen position when a warp-thread breaks or becomes unduly slack so as to prevent an interruption of the circuit for a definite period.

2. A warp stop-motion for looms comprising drop devices supported in normal position by unbroken warp-threads, a normally open electric circuit adapted to be closed through its terminals by contact therewith of a fallen drop, one of said terminals having means to hold a drop in its fallen position when a warp-thread breaks or becomes unduly slack.

3. A warp stop-motion for looms comprising drop devices supported in normal position by unbroken warp-threads, a normally open electric circuit adapted to be closed through its terminals by contact therewith of a fallen drop, one of said terminals having means adapted to grip a drop laterally and hold it in its fallen position when a warp-thread breaks or becomes unduly slack.

65 4. A warp stop-motion for looms comprising

ing drop devices supported in normal position by unbroken warp-threads, a normally open electric circuit adapted to be closed through its terminals by contact therewith of a fallen drop, said terminals being above the plane of the warps and one of them having means to hold a drop in its fallen position when a warp-thread breaks or becomes unduly slack.

5. A warp stop-motion for looms comprising drop devices supported in normal position by unbroken warp-threads, a normally open electric circuit adapted to be closed through its terminals by contact therewith of a fallen drop, one of said terminals being formed of separable yielding sections between which the drop is adapted to be held when a warp-thread breaks or becomes unduly slack.

6. A warp stop-motion for looms comprising drop devices supported in normal position by unbroken warp-threads, a normally open electric circuit adapted to be closed through its terminals by contact therewith of a fallen drop, one of said terminals consisting of a coiled spring between the convolutions of which the drops are adapted to enter when a warp-thread breaks or becomes unduly slack.

7. A warp stop-motion for looms comprising drop devices supported in normal position by unbroken warp-threads, a normally open electric circuit adapted to be closed through its terminals by contact therewith of a fallen drop, said drop devices having slots therein through which one of said terminals is adapted to pass, the other terminal being supported outside of the drops, one of said terminals having means to hold a drop in its fallen position when a warp-thread breaks or becomes unduly slack.

8. A warp stop-motion for looms comprising drop devices supported in normal position by unbroken warp-threads, a normally open electric circuit adapted to be closed through its terminals by contact therewith of a fallen drop, a projection extending from said drops adapted to engage and be held by one of said terminals when a drop falls.

9. A warp stop-motion for looms comprising drop devices supported in normal position by unbroken warp-threads, a normally open electric circuit having terminals extending transversely of the warps, said drop devices having a projection extending from the body thereof and adapted to contact with one of said terminals which lies outside the path of descent of the body of the drop, and one of said terminals having means to hold a drop in its fallen position when a warp-thread breaks or becomes unduly slack.

10. A warp stop-motion for looms comprising drop devices supported in normal position by unbroken warp-threads, a normally open electric circuit adapted to be closed

through its terminals by contact therewith of a fallen drop, said drop devices being formed of sheet metal having a longitudinally-slotted body with a contact projection extending therefrom, one of said circuit-terminals having means to hold a drop in its fallen position when a warp-thread breaks or becomes unduly slack.

11. A warp stop-motion for looms comprising drop devices supported in normal position by unbroken warp-threads, a normally open electric circuit adapted to be closed through its terminals by contact therewith of a fallen drop, said drop devices being formed of sheet metal having an elongated body provided with two slots therein one of which is open at one end and the other closed at both ends, and one of said circuit-terminals having means to hold a drop in its fallen position when a warp-thread breaks or becomes unduly slack.

12. A warp stop-motion for looms comprising drop devices supported in normal position by unbroken warp-threads, a normally open electric circuit adapted to be closed through its terminals by contact therewith of a fallen drop, said drop devices being formed of sheet metal having an elongated body provided with two slots therein one of which is open at one end and the other closed at both ends, one of said circuit-terminals passing through the closed slots and serving also as a guide for the drops, and one of the terminals having means to hold a drop in its fallen position when a warp-thread breaks or becomes unduly slack.

13. A warp stop-motion for looms comprising drop devices supported in normal position by unbroken warp-threads, a normally open electric circuit adapted to be closed through its terminals by contact therewith of a fallen drop, said drop devices being formed of sheet metal having an elongated body provided with two slots therein one of which is open at one end and the other closed at both ends, a contact projection extending from the body of the drop, one of said circuit-terminals passing through the closed slots and serving also as a guide for the drops, and the other terminal lying outside the path of descent of the body of a falling drop and adapted to receive and hold the drop by said projection when a warp-thread breaks or becomes unduly slack.

14. A warp-stop motion for looms comprising drop devices supported in normal position by unbroken warp-threads, a normally

open electric circuit adapted to be closed through its terminals by contact therewith of a fallen drop, said drop devices having a projection extending from the body thereof above the warp and adapted to contact with one of the circuit-terminals, the point of contact of said terminal and projection being outside the path of descent of the body of the drop, and one of said terminals having means to hold a drop in its fallen position when a warp-thread breaks or becomes unduly slack.

15. A warp stop-motion for looms comprising drop devices supported in normal position by unbroken warp-threads, a normally open electric circuit adapted to be closed through its terminals by contact therewith of a fallen drop said circuit-terminals extending transversely of the warps, said drop devices being arranged in banks or groups between adjacent circuit-terminals and each drop having a contact projection, one of said terminals having means to hold a drop in its fallen position when a warp-thread breaks or becomes unduly slack.

16. A warp stop-motion for looms comprising drop devices supported in normal position by unbroken warp-threads, a normally open electric circuit adapted to be closed through its terminals by contact therewith of a fallen drop said circuit-terminals extending transversely of the warps and one of them arranged between adjacent banks or groups of drop devices and having means to hold a drop in its fallen position, and a projection extending from the body of the drop and adapted to contact with and be held by said terminal when a warp-thread breaks or becomes unduly slack.

17. A warp stop-motion for looms comprising drop devices supported in normal position by unbroken warp-threads, a normally open electric circuit having terminals extending transversely of the warps and lying outside the path of descent of the body of a falling drop, said drop devices having projections extending from the body thereof adapted to contact with said terminals, one of said terminals having means to hold a drop in its fallen position when a warp-thread breaks or becomes unduly slack.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ALLAN A. JOHNSON.

Witnesses:

FRED. M. ARMSTRONG,
W. H. CROWNINSHIELD.