

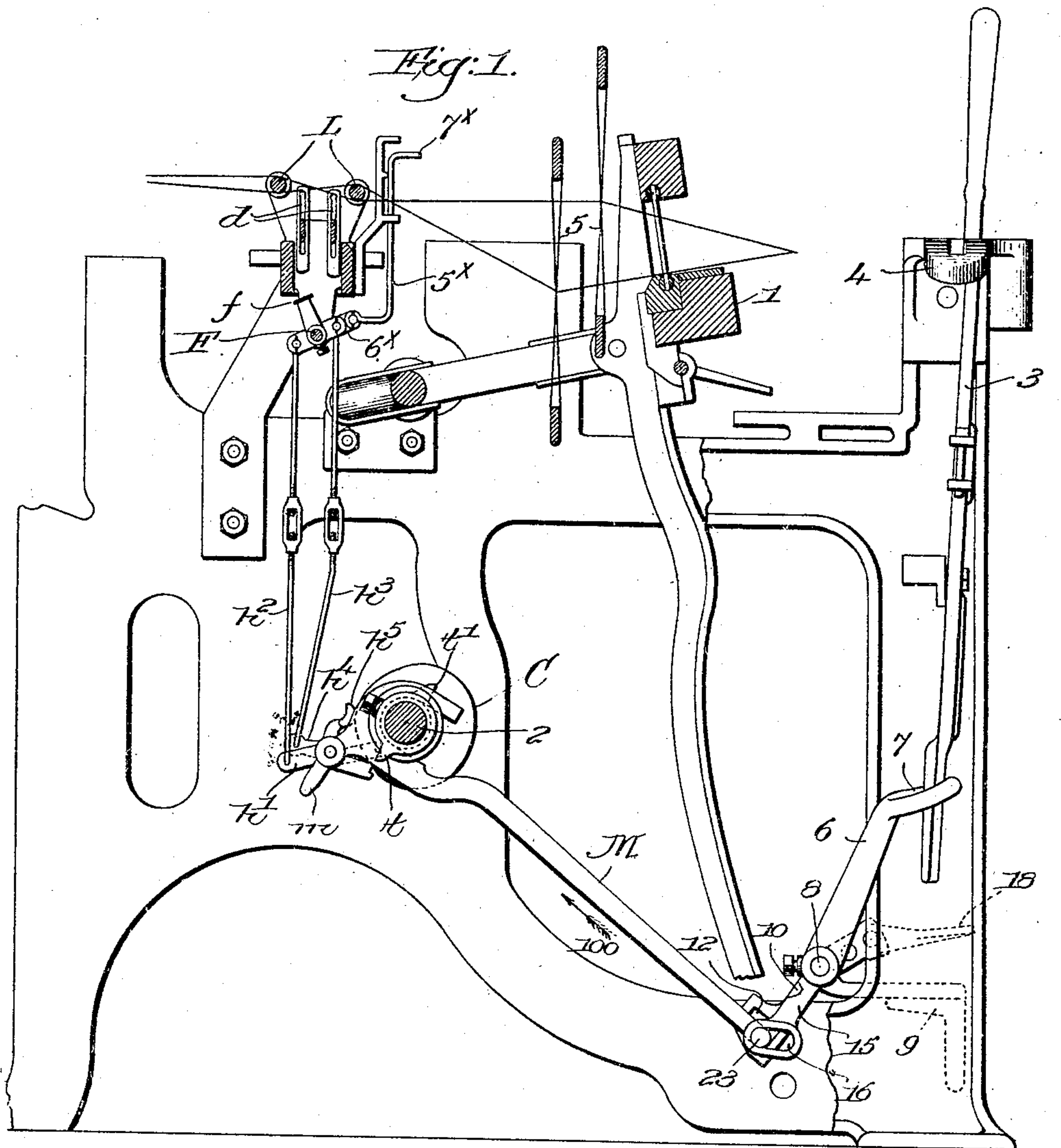
No. 863,130.

PATENTED AUG. 13, 1907.

G. B. AMBLER.
WARP STOP MOTION FOR LOOMS.

APPLICATION FILED AUG. 8, 1906.

3 SHEETS—SHEET 1.



Witnesses,
Edward H. Allen.
William F. May.

Inventor;
George B. Ambler;
by Leroy Gregory
attys.

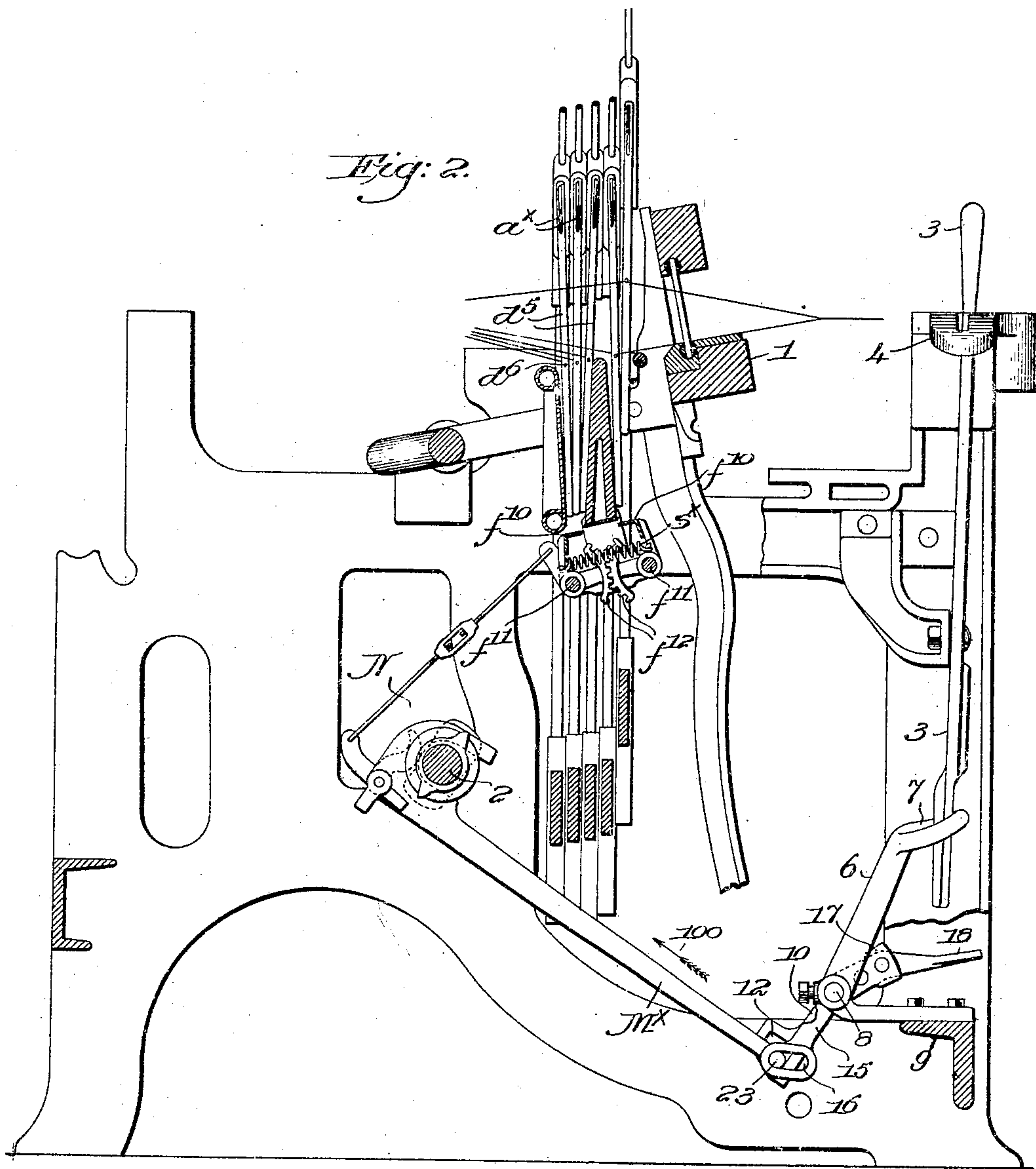
No. 863,130.

PATENTED AUG. 13, 1907.

G. B. AMBLER.
WARP STOP MOTION FOR LOOMS.

APPLICATION FILED AUG. 8, 1906.

3 SHEETS—SHEET 2.



Witnesses,
Edward H. Allen.
William Finney

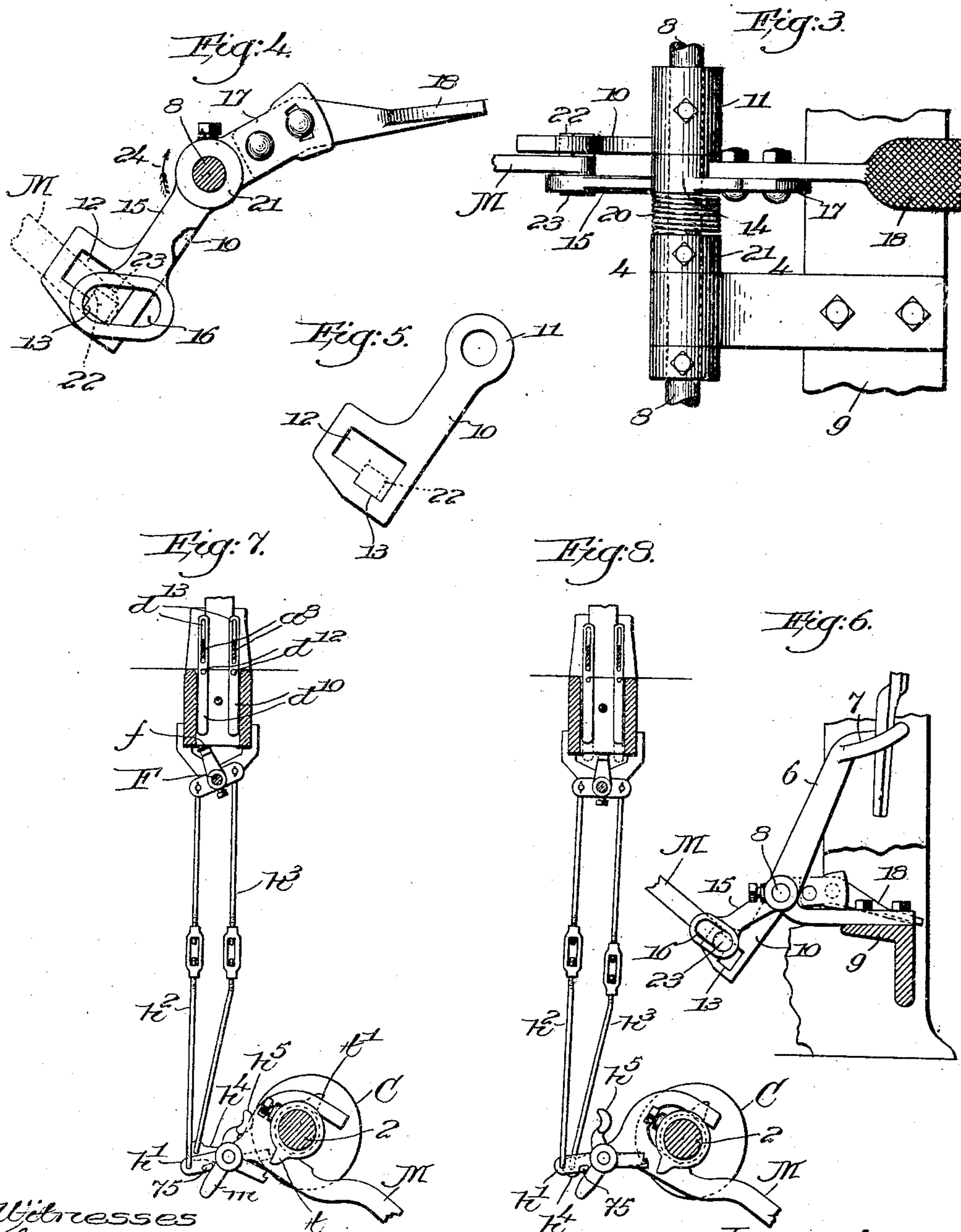
Inventor;
George B. Ambler,
by Leroy & Gregory
Attys.

No. 863,130.

PATENTED AUG. 13, 1907.

G. B. AMBLER.
WARP STOP MOTION FOR LOOMS.
APPLICATION FILED AUG. 8, 1906.

3 SHEETS—SHEET 3.



Witnesses
Edward F. Allen.
William Priary.

Inventor;
George B. Ambler,
by Crosby & Gregory
attys.

UNITED STATES PATENT OFFICE.

GEORGE B. AMBLER, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

WARP STOP-MOTION FOR LOOMS.

No. 868,130.

Specification of Letters Patent.

Patented Aug. 13, 1907.

Application filed August 8, 1906. Serial No. 329,656.

To all whom it may concern:

Be it known that I, GEORGE B. AMBLER, a citizen of the United States, and resident of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Warp Stop-Motions for Looms, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawings representing like parts.

The warp-stop-motion of a loom is designed particularly to detect failure of a warp-thread, (either its breakage or running out,) and thereupon effect the actuation of a loom-stopping instrumentality so that the weaver can remedy the fault. In such a case the faulty thread is usually found without much trouble by the weaver, so that the loom is not stopped for any considerable time, and automatically acting means have also been devised to facilitate the location of the faulty thread when the detectors are arranged in two banks, as for instance in United States Patent No. 794922, granted to Boivert July 18, 1905.

When a warp-thread becomes unduly slack the stop-motion often operates just as if the thread had failed, a great deal of trouble and delay being occasioned by such stoppages because a slack thread is often very difficult to locate, resulting in material loss of production on the loom. Frequently it is unnecessary to stop the loom for slack threads for often if the loom could run on the slackness would be gradually taken up, or during such continued operation the weaver would have ample time to find the slack thread and correct it if necessary. Ordinarily the loom cannot be started up after it has been stopped by operation of the warp-stop-motion until the cause of such operation has been discovered and removed, whether it be failure or undue slackness of a warp-thread, for if the loom is started the same cause will effect its immediate stoppage. Thus the time wasted on account of slack thread stoppages cannot be prevented.

My present invention has for its object the production of means whereby, by and at the will of the attendant or weaver, the loom can be started up and run, after stoppage by the warp-stop-motion, without first removing the cause of operation of the latter. Thereby, if the stoppage is due to a slack thread, the loom can be started up immediately and the slack thread woven up, or discovered at leisure, without decreasing the production of the loom.

In the present embodiment of my invention I render the warp-stop-motion ineffective to cause loom stoppage by means controlled by the weaver through a foot-operated device, leaving the hands free for other things.

The various novel features of my invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a partial transverse sectional view of a portion of a loom provided with a warp-stop-motion of the so-called "cotton-harness" type, with one practical embodiment of my invention applied thereto, the parts being shown in normal condition and the loom in operation; Fig. 2 is a similar view, but showing my invention applied to a loom provided with a warp-stop-motion of the "steel-harness" type, the controlling detectors for the stop-motion serving also as heddles; Fig. 3 is an enlarged top plan view of the means for rendering the operation of the warp-stop-motion ineffective to cause loom stoppage, in accordance with my invention; Fig. 4 is a cross-sectional detail on the line 4-4, Fig. 3, to be referred to; Fig. 5 is a detail in side elevation of one of the rocker-arms shown in Figs. 3 and 4; Fig. 6 is a side elevation of the controlling means shown at the lower right hand portion of Figs. 1 and 2 but in abnormal position, to prevent loom stoppage by operation of the warp-stop-motion; Fig. 7 is a cross-sectional detail of a modified form of cotton-harness warp-stop-motion in normal running condition; Fig. 8 is a view thereof showing the manner of centralizing the feeler after its arrest by a released detector, to relieve the latter from strain due to pressure of the feeler, as will be explained hereinafter.

Referring to Figs. 1 and 2, the lay 1, cam-shaft 2, shipper 3, and its notched holding plate 4, may be and are all of usual construction, the shipper when released acting to throw off the power from the loom and effect stoppage thereof.

In Fig. 1 the sheds are formed by harnesses 5 reciprocated in any suitable manner forming no part of my invention, and the warp-stop-motion shown therein is of the so-called "cotton-harness" type, substantially as in patent to Stimpson No. 673824, granted May 7, 1901, slotted detectors *d* being hung on the warp-threads between the lease rods *L*, one detector for each thread, the detectors being arranged as shown in two banks, a released detector in either bank being adapted to co-operate with and arrest a normally vibrated feeler *f*. The feeler rock-shaft *F* is connected by links *h*², *h*³, with arms *h*¹, *h*⁴ respectively, as in the Stimpson patent referred to, a follower *h*⁵ coöperating with the cam *C* on the shaft 2, the latter also being provided with tappets *t*, *t*¹, as in the patent just referred to. The arms *h*¹ and *h*⁴ are mounted on a hooked link *M*, movable longitudinally in the direction of the arrow 100, when the feeler is arrested, all as described in the Stimpson patent. In the latter, such movement of the link always operates a knock-off member or arm to release the shipper from its holding notch, and thereby effect loom stoppage, the release of a detector *d* being due either to failure or undue slackness of its warp-thread. Herein I have connected the stop-motion with the knock-off member in such a manner that the weaver can at will

render the stop-motion ineffective to cause release of the shipper.

Referring to Figs. 1, 3, 4 and 5, a knock-off member 6 shown as having a cam-slot 7 at its upper end to receive the lower end of the shipper 3, is fixedly secured to the end of a rock-shaft 8 which is projected beyond the loom-side as shown in Fig. 1, the rock-shaft being suitably supported in bearings on the cross-girt 9 of the loom. An arm 10 has its hub 11 fixedly secured to the rock-shaft 8, the arm projecting rearwardly and downwardly and having an enlarged lower end provided with a notched coupling slot 12, 13, the notch being indicated at 13. Adjacent the end of the hub 11 I have mounted loosely upon the rock-shaft 8 the hub 14 of an arm 15 enlarged at its lower end to present an elongated cam-slot 16, clearly shown in Figs. 1, 2, 4 and 6, the hub 14 having an opposite upward extension 17 to which is secured a foot treadle 18 projecting above the cross-girt 9. A spring 20, Fig. 3, is coiled around the rock-shaft and connected at one end with the hub 14, the other end of the spring being held by a collar 21, fixed on the rock-shaft, the spring tending to maintain the treadle in the position shown in Fig. 1. The lower end of the link M is extended between the two rocker arms 10 and 15, and is provided with opposite lateral projections, one of which as 22 is squared and extends into the coupling slot 12, 13, while the opposite projection 23 is made cylindrical to freely enter the cam-slot 16. In Fig. 4, the lower end of the link and the projections or lugs are shown in dotted lines, with the parts in normal position, the lug 22 serving as a species of follower in the notched coupling slot.

When the parts are in the position shown in Figs. 1 and 4, the arm 15 acts through its cam-slot 16 to maintain the follower 22 seated in the notch 13, and when the link M is moved in the direction of the arrow 100 by the operation of the warp-stop-motion, both arms 10 and 15 and the rock-shaft 8 will be turned in the direction of the arrow 24, Fig. 4, such turning of the rock-shaft causing the knock-off member 6 to effect shipper release. If, however, the stoppage of the loom has been caused by a slack warp-thread, it is often unnecessary for the weaver to locate it, for by starting up the loom, such thread can usually be woven up. Accordingly the weaver places his foot upon and depresses the treadle 18, to the position shown in Fig. 6, thereby swinging the arm 15 relatively to the arm 10, and in the first part of such movement, the cam-slot 16 acts to lift the projections 23 and 22, removing the latter from the notch 13, thereby uncoupling or releasing the operating connection between the warp-stop-motion and the rock-shaft 8, so that the shipper can be thrown on and the loom started. The latter part of the movement of the cam-slot 16 acts to move the link M in the direction of the arrow 100, Fig. 1, until the follower 22 is out of contact with the cam C, thereby stopping the vibrations of the feeler f. The loom will continue to run while the treadle 18 remains depressed, while the feeler is held quiescent, as described, and though the thread remains slack and permits its detector to descend intermittently, there will be nothing to cause operation of the shipper-releasing means. As soon as the slack thread has been woven up, the treadle is released, the spring 20 returning the arm 15 to its nor-

mal position with relation to the arm 10, and the follower or projection 22 is thereby restored to operative position in the notch 13 of the coupling slot. If the thread which causes the initial stoppage of the loom is so slack that it cannot be woven up within a short time, the continued operation of the loom, rendered possible by uncoupling the stop-motion from the shipper-releasing means, will enable the weaver to locate the slack thread and correct the fault.

In Fig. 1, the stop-motion is shown as provided with a visual signal 5X, having a finger-piece 7X; the said signal being connected at its lower end to an arm 6X fast on the feeler rock-shaft F, all substantially as in the Boivert patent No. 724922 hereinbefore referred to. When the loom is stopped by operation of the warp-stop-motion, the signal shows the weaver, in which bank the released detector is located, and if it is in the rear bank, he presses down the signal by means of the finger-piece 7X, releasing such detector from any pressure due to the feeler and holds it down while the loom is weaving up the slack-thread, after it has been started again. If the released detector is in the front bank, the feeler is rocked to the rear when the link M is moved as described, thereby moving away from the abnormally-positioned detector, the slack thread being free to be woven up without any attention from the weaver, so long as the treadle is depressed. This will be clear from an inspection of Fig. 6, for it will be seen that such depression of the treadle causes the lower front end of the cam-slot 16 to act upon the projection 23 and hold the link M in abnormal position, even after the shipper has been moved to running position, and whenever the link is in its upper or abnormal position the feeler will be held away from a released detector in the front bank. Consequently, with the signal device shown in Fig. 1 the weaver disengages the feeler from a detector in the rear bank by manual movement of the signal, but if the released detector is in the front bank the operation of the coupling device by the treadle insures disengagement of the feeler and the released detector. It is advisable to relieve the released detector from strain due to coöperation with the feeler, as otherwise the pull on the warp-thread might be great enough to break the thread on the beat up of the lay, and so, too, the released detector is not constantly hit by the feeler as would be the case were the feeler vibrations to continue.

In Fig. 2, I have shown the loom as provided with a so-called "steel-harness" type of stop motion, wherein the controlling detectors serve also as heddles, each of the harness-frames forming part of the shed-forming mechanism including an upper cross-bar aX which serves as a support for and from which the detector-heddles d⁵ are suspended. Said detector-heddles are provided with warp-eyes d⁶, and are slotted at or near their upper ends to receive the supports aX, the slots being long enough to permit relative longitudinal movement of a heddle when under certain conditions released by failure or undue slackness of its warp-thread. In this type of stop-motion, two oppositely moving feelers f¹⁰ are carried by rock-shafts f¹¹ geared together by toothed segments f¹², and drawn toward each other by a spring sX, which latter effects the feeling stroke. The outward stroke of the feelers is effected positively by mechan-

ism indicated in general at N, and operated by rotation of the cam-shaft 2. The construction and operation of the mechanism indicated at N is well known in the art, and needs no further description other than to state that when a detector-heddle is released by failure or undue slackness of its warp-thread, the lower end of such heddle will engage and arrest its feeler, when the corresponding harness-frame is down. Such arrest of the feeler operates to move the link M^x in the direction of the arrow Fig. 2, and if the lower end of the link is operatively coupled to the shipper-releasing means, the shipper will be released and loom stoppage effected. The link M and its longitudinal movement, and the coupling arrangement for operatively connecting it with or disconnecting it from the shipper-releasing means are all substantially as shown in Fig. 1 and which have been previously described in detail. The structure illustrated in Fig. 2 is therefore for the purpose of showing my invention in connection with a steel harness type of stop-motion, as well as with the cotton-harness type illustrated in Fig. 1.

It is unnecessary to provide any means to relieve a released detector-heddle from strain due to the feeler, so far as my present invention is concerned, because when the harness-frame in which the released detector-heddle is located rises, it will lift up such heddle with it, and out of range of the feeler, so that the lay can beat up without unduly straining the slack thread which has caused the operation of the stop-motion.

The specific details of construction and arrangement of the coupling device are not restricted to the single practical embodiment thereof herein shown, for various changes or rearrangements of details may be made therein by those skilled in the art without departing from the spirit and scope of my invention.

So far as I am aware it is new to provide means to hold quiescent the feeler in a warp-stop-motion while the loom continues to run, thereby preventing it from causing the stoppage of the loom; and also, so far as I am aware, it is new to provide means operated by the foot of the weaver to render the operation of a warp-stop-motion ineffective to cause loom stoppage, and accordingly, I do not restrict my invention merely to the practical embodiment herein illustrated.

In Figs. 7 and 8, a warp-stop-motion for cotton harnesses is shown, wherein the detectors d^{10} , arranged in two banks as shown in Fig. 1, are provided with warp-eyes d^{12} and are longitudinally slotted above such warp-eyes at d^{13} to receive supporting cross-bars a^8 .

The single feeler f mounted on the rock-shaft F is arranged to cooperate with a released detector in either bank, but in this arrangement no means is shown for signaling visually in which bank a released detector is located, as explained with respect to the mechanism shown in Fig. 1. In order therefore to centralize the feeler after its feeler movement has been arrested by a released detector, to relieve the latter from strain, some other means must be provided. In United States patent to Draper, No. 671666, dated April 9, 1901, mechanism is shown for effecting such detector release automatically.

In the arrangement shown in Figs. 7 and 8, the rocker arm h' connected by the link h^2 with the feeler rock-shaft is provided with a lateral lug or projection 75 which projects far enough to at times engage the

yoke m , the latter being substantially as in the Stimpson patent No. 673824, and carried by the hooked link M. The spring which tends to swing the follower h^3 toward the cam C, as in the Stimpson patent, also tends to lift the link h^3 and thereby swing the feeler f to the position shown in Fig. 7, and such swing is limited by engagement of the lug 75 with the yoke m . If the feeler meets a released detector in either bank the link M is moved longitudinally in the direction of arrow 100, Fig. 1.

In Fig. 8 the link is shown in such abnormal position, the yoke m then being at a higher point than it occupied when the link was in normal position, and the tendency of the follower spring to depress the arm h' brings the lug 75 against the yoke, stopping the feeler in mid-position, as shown. Hence the released detector will be freed from feeler strain whether in the front or rear bank, the dotted lines in Fig. 8 showing the clearance between the released detector and the feeler. The weaver then having found that stoppage is due to a slack thread, puts his foot upon the treadle 18 and depresses it to the position shown in Fig. 6 and throws the shipper into running position, starting the loom. The depression of the treadle acts to maintain the link M in its abnormal position, Fig. 8, with the feeler centralized, and as the released detector is free from feeler strain the slack thread is woven up, or the weaver is given ample time to locate it and correct the slackness if necessary.

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

1. In a loom, mechanism to detect failure or undue slackness of a warp-thread, a shipper, a connection between it and the said mechanism to effect shipper release by the operation of said mechanism, and a treadle-actuated device to render said connection inoperative at will.

2. In a loom, a shipper, mechanism adapted to effect release thereof upon failure or undue slackness of a warp-thread, and foot-operated means to prevent release of the shipper while permitting said mechanism to continue in operation due to a slack thread.

3. In a loom, a shipper, releasing means therefor including a knock-off member and a rock-shaft on which it is rigidly mounted, mechanism rendered operative by failure or undue slackness of a warp-thread, a transmitter between said mechanism and the rock-shaft, to turn the latter and actuate the knock-off member, and a foot-operated controlling device to positively connect or disconnect the transmitter and rock-shaft.

4. In a loom, a shipper, an angularly movable knock-off member therefor, a rigidly connected arm having a notched slot, warp-stop-motion mechanism, a transmitting link operated thereby and having a follower to enter the slot and normally operate the knock-off member to release the shipper, and a controller actuated at the will of the operator to remove the follower from the notch and thereby disconnect the link and slotted arm, preventing operation of the knock-off member by the said stop-motion mechanism.

5. In a loom, a shipper, releasing means therefor, including a rocker-arm having a notched slot, warp-stop-motion mechanism, a transmitting member having a follower to enter the slot and when in the notch thereof to swing the rocker-arm, a controller having a cam surface to move the follower into or out of the notch, and a foot-treadle by which to operate the controller, disengagement of the follower from the notch permitting movement of the transmitting member independently of the rocker-arm, to thereby prevent shipper release.

6. In a loom, a shipper, releasing means therefor, including a rocker-arm fast thereon and having a notched slot, an adjacent controlling arm loose on the shaft and having a cam-slot and an attached operating treadle, mech-

- anism operated by failure or undue slackness of a warp-thread, and a transmitting member actuated by said mechanism and having lateral projections cooperating respectively with the said notched slot and the cam-slot, the
- 5 controlling arm by its position acting to maintain one of the projections in or out of the notch of the rocker-arm slot, to operatively connect or disconnect, respectively, the shipper releasing means and the mechanism operated by the occurrence of a warp fault.
- 10 7. In a loom, a shipper, releasing means including a rocker-arm, mechanism operated by failure or undue slackness of a warp-thread, a transmitting member actuated thereby, a coupling between said member and the rocker-arm, and a controller governed by the foot of the weaver
- 15 to open or close the coupling and thereby prevent or cause the actuation of the shipper releasing means by said warp-governed mechanism.
8. In a loom, a shipper, releasing means therefor, including a rock-shaft having an arm fast thereon provided
- 20 with a coupling slot, an adjacent arm loose on the shaft, having a cam slot and an attached foot-treadle, a link between the arms having a coupling lug to enter the coupling slot and an opposite lug to enter the cam slot, and mechanism operated by failure or undue slackness of
- 25 a warp-thread to actuate the link and operate the shipper releasing means when the coupling lug is locked in the coupling slot, relative movement of the slotted arms by the weaver acting through the cam slot and its cooperating lug to disengage the coupling lug and slot and thereby
- 30 prevent operation of the shipper releasing means.
9. In a loom, a shipper, releasing means therefor, including a rock-shaft, a fast and a loose arm thereon, a foot-treadle on the latter, mechanism operated by failure or undue slackness of a warp-thread, a link actuated by
- 35 said mechanism, and connections between the link and said arms, to normally rock the shaft and effect shipper release by operation of said mechanism, relative angular movement of the arms by the weaver, through the treadle, disconnecting the link and fast arm to thereby prevent
- 40 rocking of the shaft by the link.
10. In a loom, in combination, two banks of stop-motion-controlling detectors each governed by a single warp-thread, a vibrating feeler to be arrested by a released detector in either bank, a vertically-movable visual signal
- 45 connected with the feeler and having a finger-piece, a shipper, releasing means therefor, adapted to be operated by or through arrest of the feeler, a coupling between said releasing means and the feeler, and a controlling device for the coupling, operated by and at the will of the weaver,
- 50 release of the coupling by said device preventing shipper release when the feeler is arrested, manual movement of the visual signal at such time relieving the released detector from strain and permitting the loom to be run to weave up a slack thread.
- 55 11. In a loom, in combination, a warp-stop-motion including controlling detectors each governed by a warp-thread and arranged in two banks, and a vibrating feeler to be arrested by engagement with a released detector in either bank; a shipper, releasing means therefor adapted
- 60 to be operated by or through arrest of the feeler; an in-

strumentality controlled and operated by the weaver to cause or prevent actuation of the shipper-releasing means by the stop-motion, and means to centralize the feeler with respect to the two banks of detectors when said instrumentality is operated.

12. In a loom, a shipper, releasing means therefor, a warp-stop-motion operated by failure or undue slackness of a warp-thread, a connection including a coupling, between the stop-motion and said releasing means, to normally effect shipper release by the operation of the stop-motion, and means actuated by the foot of the weaver to render the coupling inoperative, whereby upon movement of the shipper to running position after release due to the stop-motion the loom will operate irrespective of continued operation of the warp-stop-motion.

13. In a loom, mechanism, including a normally vibrating feeler, to detect failure or undue slackness of a warp-thread, a shipper, an instrumentality to effect shipper release by the operation of said mechanism, and means to render said instrumentality inoperative at will and stop the vibrations of the feeler.

14. In a loom, in combination, a warp-stop-motion, including controlling-detectors each governed by a warp-thread and arranged in two banks, a normally vibrating feeler to be arrested, by engagement with a released detector, a shipper, releasing means therefor normally operated by or through feeler arrest, and means operated by the weaver to render the shipper-releasing means irresponsive to feeler arrest and to stop feeler vibrations with the feeler centralized with respect to the two banks of detectors.

15. In a loom, in combination, a warp-stop-motion, including detectors controlled by the warp-threads and a vibrating feeler to engage a detector released by failure or undue slackness of its warp-thread, shipper-releasing means adapted to be operated by or through such engagement, and means actuated by and at the will of the weaver to prevent such operation of the shipper-releasing means and stop movement of the feeler during the time the said releasing means is held from operation.

16. A loom provided with a shipper and shipper-releasing means, combined with a warp-stop-motion adapted under normal conditions to cause the actuation of said releasing means upon the failure or undue slackness of a warp-thread, said stop-motion including a normally vibrating feeler, and means operated by and at the will of the weaver to render the releasing means irresponsive to an operation of said warp-stop-motion, and also to simultaneously stop vibration of the feeler, whereby, upon loom stoppage by or through a slack thread the weaver can start up the loom to weave up the slack, the stop-motion remaining quiescent and the shipper-releasing means inoperative during such weaving.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

GEORGE B. AMBLER.

Witnesses:

CLARE H. DRAPER,
FRANK J. DUTCHER.