No. 863,131. PATENTED AUG. 13, 1907.

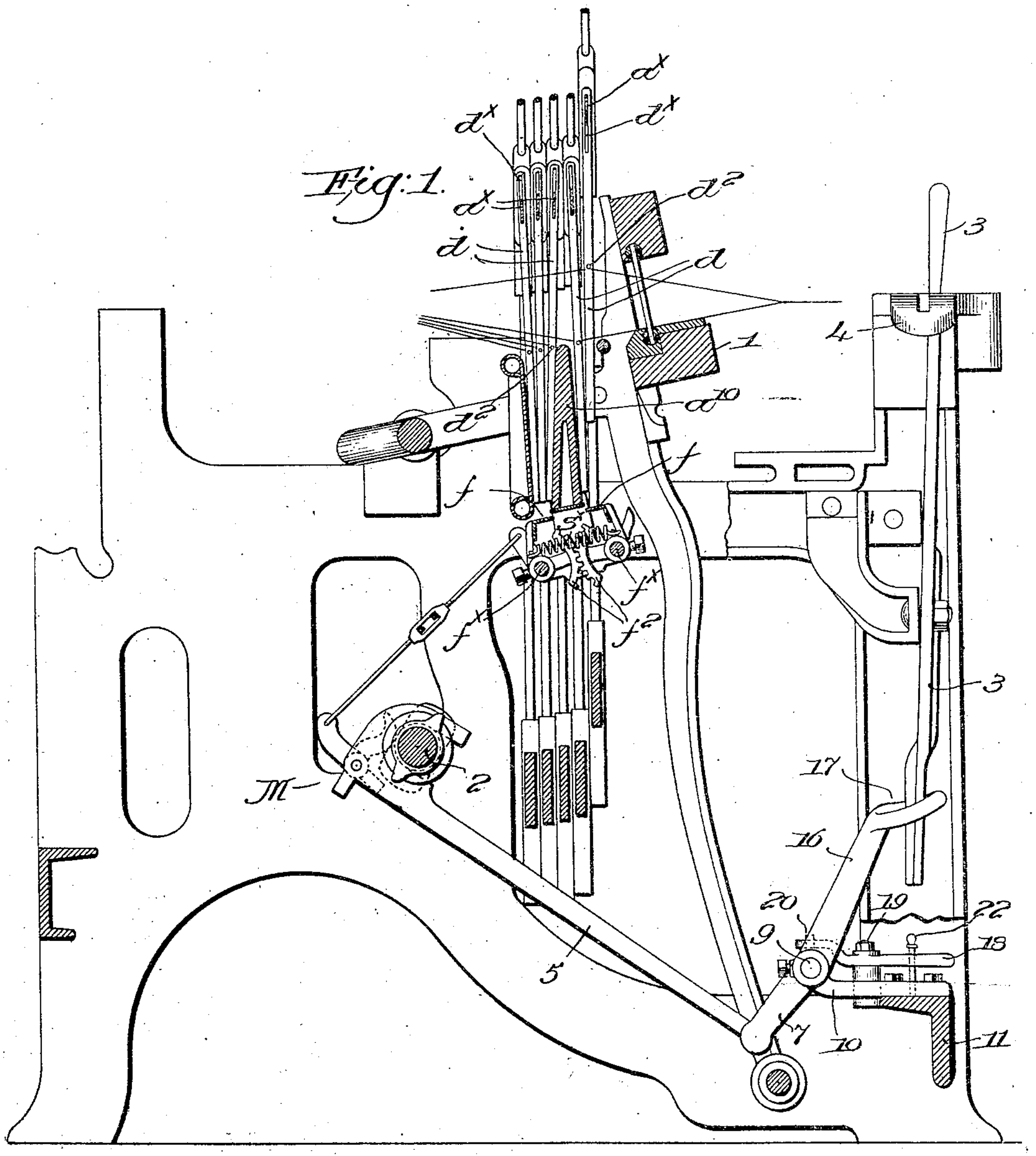
W. F. ANDREWS.

WARP STOP MOTION FOR LOOMS.

APPLICATION FILED JULY 30, 1906.

2 SHEETS—SHEET 1.

Fig:1.



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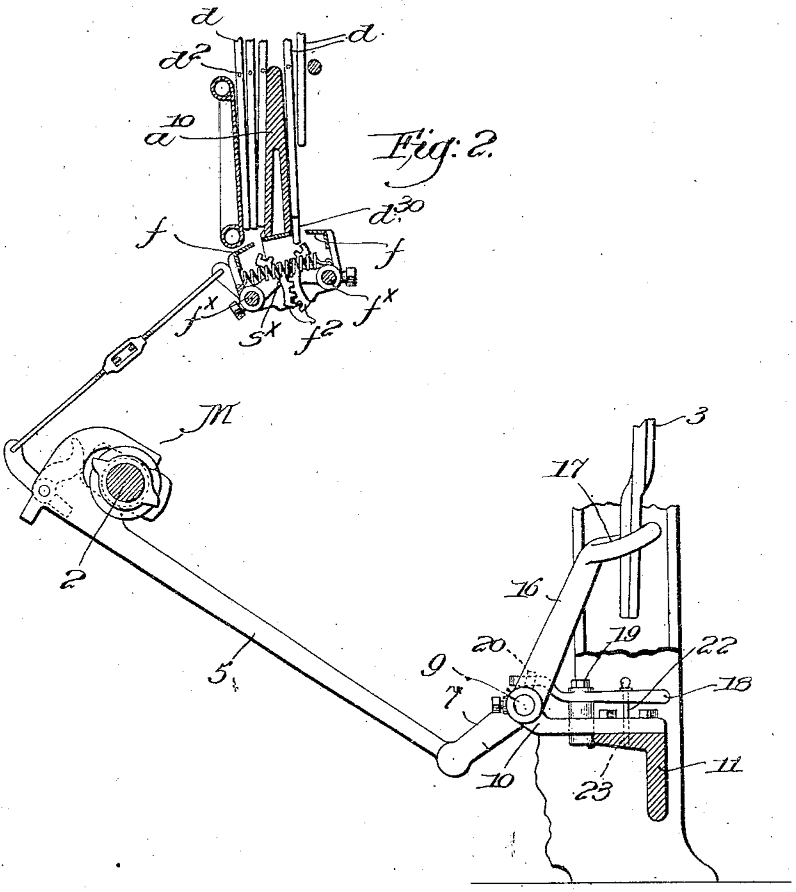

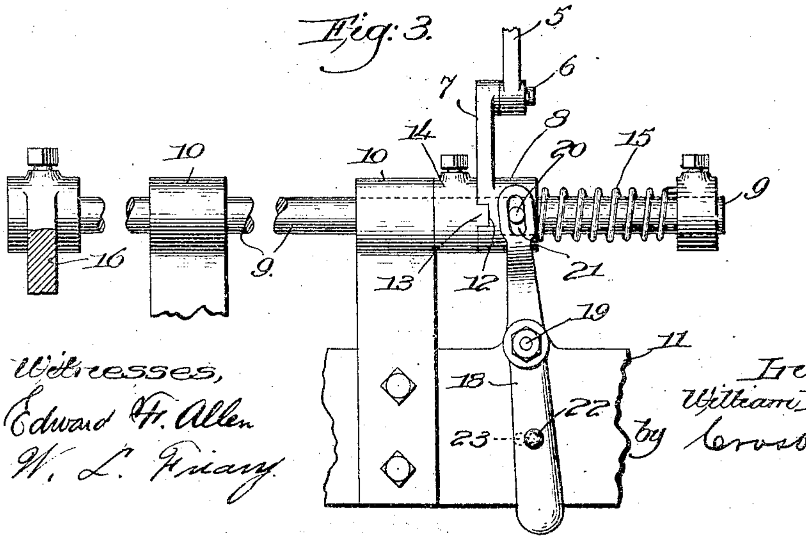

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UNITED STATES PATENT OFFICE.

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WARP STOP-MOTION FOR LOOMS.

No. 863,131. Specification of Letters Patent. Patented Aug. 13, 1907.

Application filed July 30, 1906. Serial No. 328,293.

To all whom it may concern:

Be it known that I, WILLIAM F. ANDREWS, a citizen of the United States, residing in Greenwood, county of Greenwood, and State of South Carolina, 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 drawing representing like parts.

In operating a loom provided with a warp stop-motion, designed to effect stoppage of the loom automatically upon the occurrence of a warp fault, (such as failure or undue slackness of a warp-thread) a great deal of trouble and delay is occasioned in actual practice by loom stoppages due to slack threads, which are frequently very difficult to find. Often the slackness is only temporary, *i. e.*, of such extent that if the loom could be run a short time the slackness would be gradually taken up, or the continued operation of the loom would give the attendant ample time to find the faulty thread and correct the fault if necessary. Heretofore, however, when loom stoppage has been effected by or through the warp stop-motion it has not been possible to resume the operation of the loom until the faulty thread has been found and the fault corrected, for otherwise the stop-motion would act at once to stop the loom each time it was started. Such stoppages when due to slack threads unnecessarily waste the time of the weaver and decrease the production of the loom, because, as has been stated, the fault would generally correct itself if only the loom could continue in operation.

My present invention has for its object the production of means whereby, by and at the will of the operator, a warp-stop-motion may be rendered ineffective to cause loom stoppage. If, therefore, the loom is stopped by or through the warp-stop-motion the weaver can, by my invention, immediately thereafter start the loom and continue weaving and at leisure discover and correct the fault if it is not cured by the operation of the loom itself.

My invention is also of great advantage when putting a new warp into a loom, because the warp-stop-motion can be rendered ineffective to stop the loom while the tension of the warp is being properly adjusted for weaving.

So far as I am aware it is broadly new to render a warp stop-motion ineffective to stop the loom while other functions of such stop-motion remain active, and accordingly my invention is not restricted to any particular type of warp-stop-motion nor to the particular means herein described and illustrated for accomplishing such result. I have therefore chosen one convenient form of warp-stop-motion for purposes of illustration and explanation, and have applied thereto one practical embodiment of my invention without in any way restricting my invention thereto.

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 sufficient portion of a loom provided with a warp-stop-motion, with one practical embodiment of my present invention applied thereto, the parts being shown with the loom in operation; Fig. 2 is a detail of a portion of the stop-motion shown in Fig. 1, but after the same has operated to cause loom stoppage, and the loom has been started, the loom-stopping function of the stop-motion being held in abeyance; Fig. 3 is a top plan view, enlarged, of one form of means for rendering the warp-stop-motion ineffective to cause loom stoppage.

The lay 1, cam shaft 2, shipper 3, and the notched holding plate 4 for the shipper, may be and are of well known construction, the shipper when released acting to throw off the power from the loom through any suitable instrumentality, such for instance as shifting a driving belt from a fast to a loose pulley, and so familiar to those skilled in the art as to require neither description nor illustration.

I have for purposes of illustration only shown herein, in Fig. 1, a warp-stop-motion wherein the stop-motion controlling detectors also serve as heddles, of the so-called "steel-harness" type, each of the harness-frames forming part of the shed-forming mechanism including an upper cross-bar $a^{\times}$ which serves as a support for and from which the detector-heddles d are suspended. Such detector-heddles are made in practice as long thin and flat metal strips longitudinally slotted at $d^{\times}$ near their upper ends to receive the supports $a^{\times}$, 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. The threads pass through warp-eyes d^2 in the heddles, as shown. Two oppositely moving feelers f, carried by rock-shafts $f^{\times}$, Figs. 1 and 2, are normally vibrated toward and from each other below the lower ends of the detector-heddles, which are divided into two groups by an upright plate a^{10}. Segmental intermeshing gears f^2 on the rock-shafts are herein shown causing them to rock oppositely in proper timing, a spring $s^{\times}$ effecting the inward or feeling stroke of the feelers. The outward stroke thereof is effected positively by or through suitable mechanism indicated at M, Figs. 1 and 2, operated by rotation of the cam-shaft 2.

So far as concerns the mechanism thus far described it is well known in the art and not of my invention, 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 on the feeling stroke when the harness-frame in which such heddle is located is down. Thereupon the mechanism indicated at M effects longitudinal movement of a link 5 from the position shown in Fig. 1, to that shown in Fig. 2, such movement operating to effect the actuation of an instrumentality to stop the loom.

The lower end of the link 5 is pivotally connected at 6, see also Fig. 3, to an arm 7 the hub 8 whereof loosely embraces a rock-shaft 9 mounted in bearings 10 on a cross-girth 11 at the front of the loom near the base thereof. The hub 8 herein constitutes a coupling and is shown in Fig. 3 as having a notch 12 in one face to receive a lug 13 on a collar 14 fast on the rock-shaft 9, a spring 15 normally tending to retain the hub and collar in engagement locked together, forming a coupling or clutch to connect the shaft and arm 7 to rock together. This is, however, only a convenient and practical form of coupling or connection between the arm and shaft, and my invention is not restricted thereto, as any other convenient and suitable form of coupling may be used. It is generally customary to locate the link 5 at or near the center of the loom, and accordingly the shaft 9 is extended toward the shipper side of the loom, a knock-off arm or member 16 being made fast to the rock-shaft and having a cam-slotted upper end 17 through which the lower end of the shipper 3 passes, as shown in Figs. 1 and 2.

From the foregoing description it will be seen that a connection is provided between the shipper-releasing device or knock-off member and the warp-stop-motion, such connection including a coupling device, and under ordinary circumstances the longitudinal movement of the link 5 from the position shown in Fig. 1 to that shown in Fig. 2 will swing the arm 7 and rock the shaft 9, moving the knock-off member 16 to effect release of the shipper and consequent stoppage of the loom. As will be readily understood the longitudinal movement of the link is effected when the warp-thread of a detector-heddle fails or becomes unduly slack. Now if the loom be started, the coupling referred to being operative and the warp fault continuing, the stop-motion will immediately stop the loom again, for the detector which had coöperated with the feeler will again coöperate therewith.

It has been stated that many operations of a warp-stop-motion are due to slack threads, which are usually very difficult for the weaver to promptly locate, and it has also been pointed out that frequently the slackness would be woven up could the loom be started and its operation continued, or the weaver would be afforded ample time to locate the slack thread without loss of production by the loom. This highly desirable object I attain by rendering the coupling inoperative for any desired length of time, the loom-stopping function of the warp-stop-motion being held in abeyance so long as the coupling is inoperative. In other words I render the stopping mechanism of the stop-motion ineffective at the will of the weaver by disconnecting the stop-motion and the shipper knock-off member. Herein I accomplish such object by pivoting a handle 18 on the cross-girth at 19, and connecting it with the hub 8 by a pin 20 loosely entering a slot 21 in the handle.

When the handle is swung to the left, Fig. 3, the coupling is rendered inoperative, the notched coupling hub 8 being drawn away from the lug 13 and against the spring 15, disconnecting the arm 7 and the rock-shaft 9. Any suitable catch may be used to hold the handle when the coupling is inoperative, and herein a locking pin 22 passed loosely through the handle is adapted to drop into a hole or socket 23 in the cross-girth 11, (see dotted lines Fig. 2.) Supposing the loom to have been stopped by the warp-stop-motion, by reason of a warp fault, if the weaver does not at once discover whether the fault is a broken warp-thread or a slack thread he moves the handle 18 to render the coupling inoperative, the locking pin 22 dropping into its socket 23. The shipper is then moved to running position and the loom is started, and while the released detector will coöperate again with its feeler as shown at d^{30}, Fig. 2, the stop-motion is rendered ineffective to cause loom stoppage. Thus the weaving continues, and if the original cause of stoppage was a slack thread its slackness will be woven up or the weaver is given sufficient time to find it and then correct the fault if necessary. A failed warp-thread is much more readily located than a slack thread, but even if the initial stoppage was due to a failed thread the continued operation of the loom will not be objectionable, as the fault will be located before any damage is done to the cloth. As soon as the weaver discovers the thread at fault he either stops the loom to correct it, or if that is not necessary unlocks the coupling-controlling handle and the spring 15 restores the coupling to operative condition. The warp-stop-motion is thereby given control of the stopping instrumentality, and normal conditions are restored. The coupling is convenient to the weaver, and can be readily manipulated by him without leaving the front of the loom.

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

1. In a loom, a shipper, mechanism adapted to effect release thereof upon failure or undue slackness of a warp-thread, and means operative at will to render said mechanism ineffective with relation only to the shipper.

2. In a loom, a shipper, a knock-off member to release it, mechanism to normally actuate said member upon failure or undue slackness of a warp-thread and thereby release the shipper, and means actuated by the operator to prevent actuation of the knock-off member by or through said mechanism while the loom continues to run.

3. In a loom, mechanism adapted to effect the actuation of a stopping instrumentality upon failure or undue slackness of a warp-thread, and means operative at will to hold such actuation of the stopping instrumentality in abeyance while the loom continues to run.

4. A loom having, in combination, mechanism to effect its stoppage upon the occurrence of a warp fault, and means operative at will to prevent the only the unshipping of the loom.

5. A loom having, in combination, a shipper, mechanism adapted to effect release thereof upon the occurrence of a warp fault, and means governed wholly by the operator to render said mechanism inactive with respect to the shipper only for any desired interval of time.

6. In a loom, mechanism to normally effect a change in the operation thereof upon the occurrence of a warp

fault, and manually actuated means to at will render said mechanism ineffective only to change the operation of the loom.

7. In a loom, a shipper, warp stop-motion controlling detectors, a feeler adapted to engage a detector released by failure or undue slackness of a warp-thread, mechanism normally rendered operative by such coöperation of the feeler and a detector to cause release of the shipper, and means actuated by the operator to render said mechanism ineffective to release the shipper.

8. In a loom, a shipper, mechanism adapted to normally effect release thereof, upon failure or undue slackness of a warp-thread, said mechanism including a knock-off member, an actuator therefor, and a coupling between said member and actuator, combined with means to render the coupling inactive at the will of the operator, whereby subsequent action of the actuator will not affect the shipper.

9. In a loom, a shipper, a knock-off member therefor, an actuator for said member, normally connected therewith, a warp stop-motion mechanism adapted to operate the actuator upon failure or undue slackness of a warp-thread, and means operative at will to disconnect the knock-off member and its actuator, whereby the loom can be run notwithstanding a continuance of the warp fault.

10. The combination, in a loom, of a shipper, mechanism, including a coupling to effect release of the shipper upon failure or undue slackness of a warp-thread, and means to at will release the coupling and thereby render the said mechanism ineffective with respect to the shipper while the coupling is released.

11. The combination, in a loom, of mechanism to operate in a predetermined manner upon failure or undue slackness of a warp-thread, and adapted to thereupon effect the actuation of a stopping instrumentality for the loom, and means operated at will to prevent actuation of the stopping instrumentality while permitting said mechanism to operate in such predetermined manner.

12. In a loom, shed-forming mechanism including a series of stop-motion controlling detectors serving also as heddles, means adapted to effect the actuation of a stopping instrumentality by or through a detector upon failure or undue slackness of its warp-thread, and a device operative at will to prevent actuation of the stopping instrumentality upon occurrence of such warp fault while the shed-forming mechanism continues to operate.

13. In a loom, a shipper, a knock-off member therefor, a warp-stop-motion mechanism, an operating connection, including a coupling, between said mechanism and the knock-off member, and a manually operated coupling-controller at the front of the loom, to render the coupling inoperative and thereby at the will of the operator render the stop-motion mechanism ineffective with respect to the shipper.

14. In a loom, a shipper, a knock-off device therefor, a warp-stop-motion mechanism, and means, including a coupling adapted to be released at will, to operate the knock-off device by or through the stop-motion mechanism, release of the coupling removing the knock-off device from control of the stop-motion mechanism while the latter continues in operation.

15. In a loom, warp stop-motion mechanism normally adapted to effect stoppage of the loom upon the occurrence of a warp fault, and means to at will hold in abeyance the stopping function only of said mechanism.

16. In a loom, a shipper, a knock-off member therefor, a rock-shaft 9, a warp-stop-motion, including a link, and an arm 7 connected with the link to rock said shaft, combined with a manually controlled coupling 8 to connect said shaft and arm.

17. In a loom, a warp-stop-motion, including a link 5, an arm 7 connected therewith and adapted to be rocked upon the occurrence of a warp fault, a shipper, releasing means therefor, including a rock-shaft 9, a coupling 8 to connect it with the arm 7, to effect rocking of the shaft and release of the shipper, and a manually operated handle to throw the coupling out of operation.

18. In a loom, a shipper, a warp-stop-motion adapted to effect release of the shipper by or through a slack warp-thread, and means operative at will to render the stop-motion ineffective with respect to the shipper, whereby the loom can be run notwithstanding the slack warp-thread to weave the latter up.

19. In a loom, a shipper, an instrumentality to detect failure or undue slackness of a warp-thread, means intermediate said instrumentality and the shipper, to normally effect release of the shipper upon detecting action of said instrumentality, and a device to render said means inoperative at the will of the weaver while said instrumentality continues to operate.

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

WILLIAM F. ANDREWS.

Witnesses:
W. C. Culberson,
H. Grady Callison.