No. 640,150. Patented Dec. 26, 1899.

J. H. NORTHROP.

WARP STOP MOTION FOR LOOMS.

(Application filed Dec. 1, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig: 1.

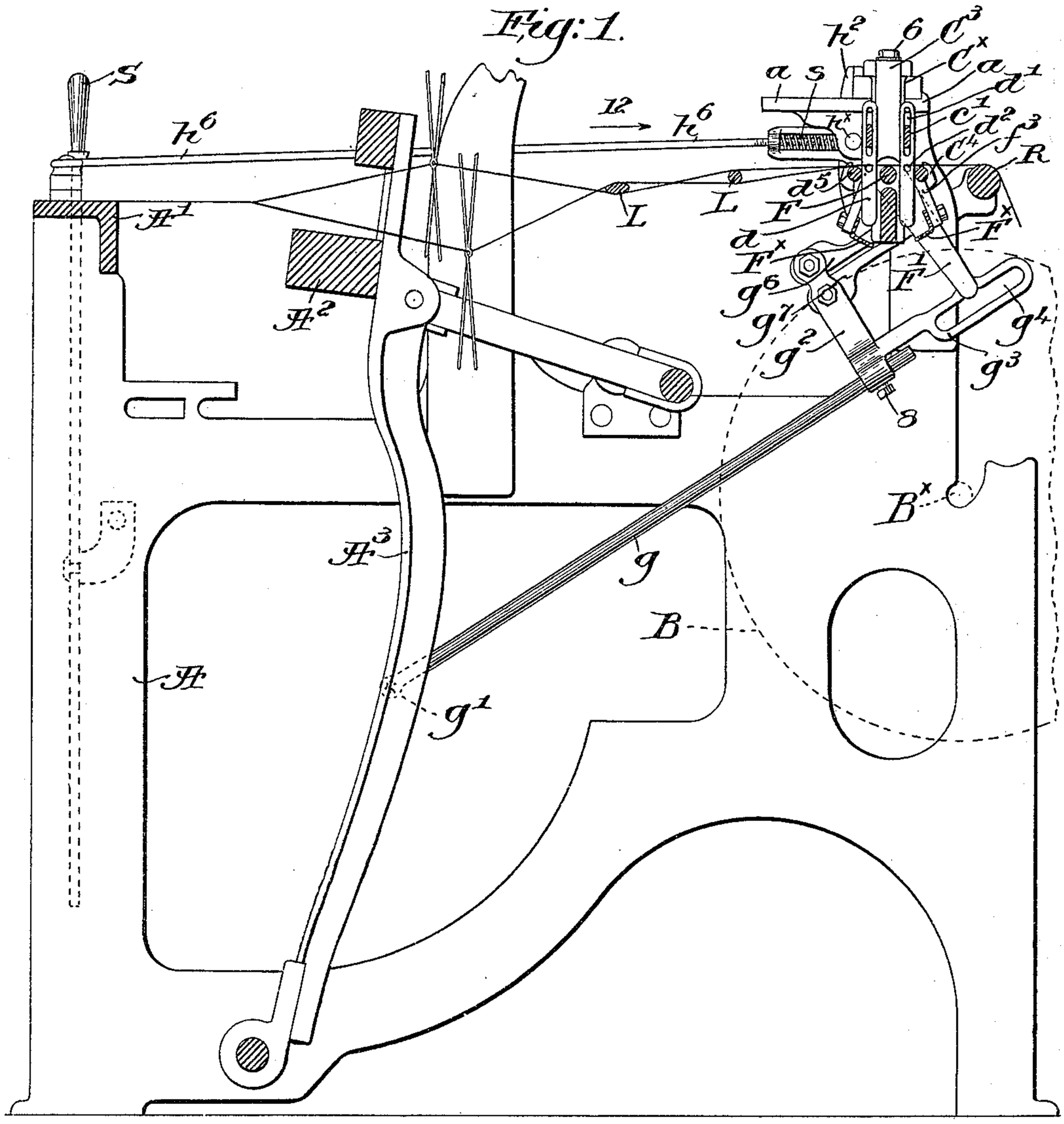
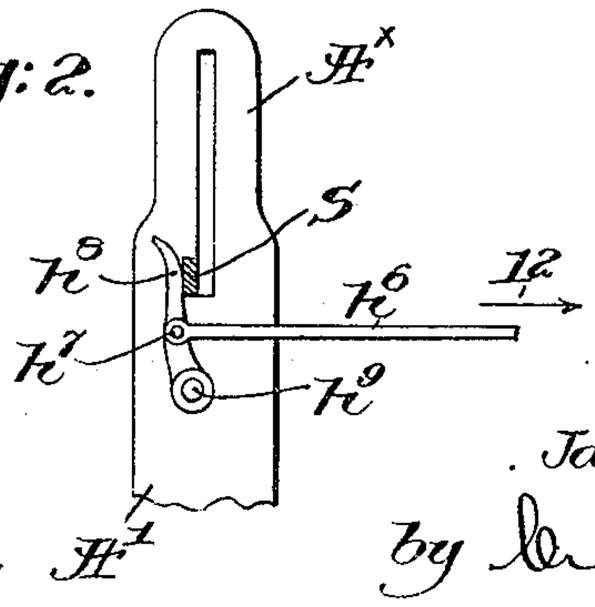


Fig: 2.



Witnesses,
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Fig: 3.

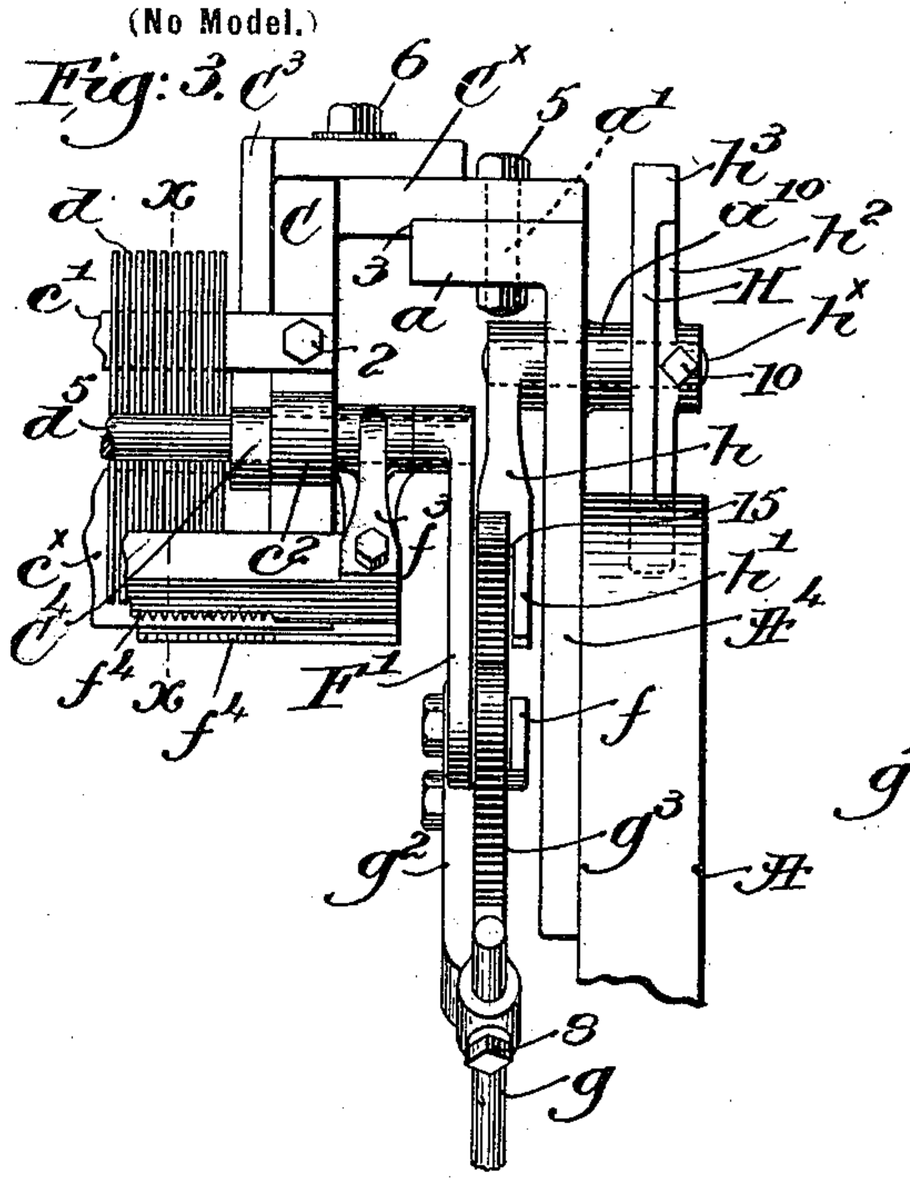


Fig: 4.

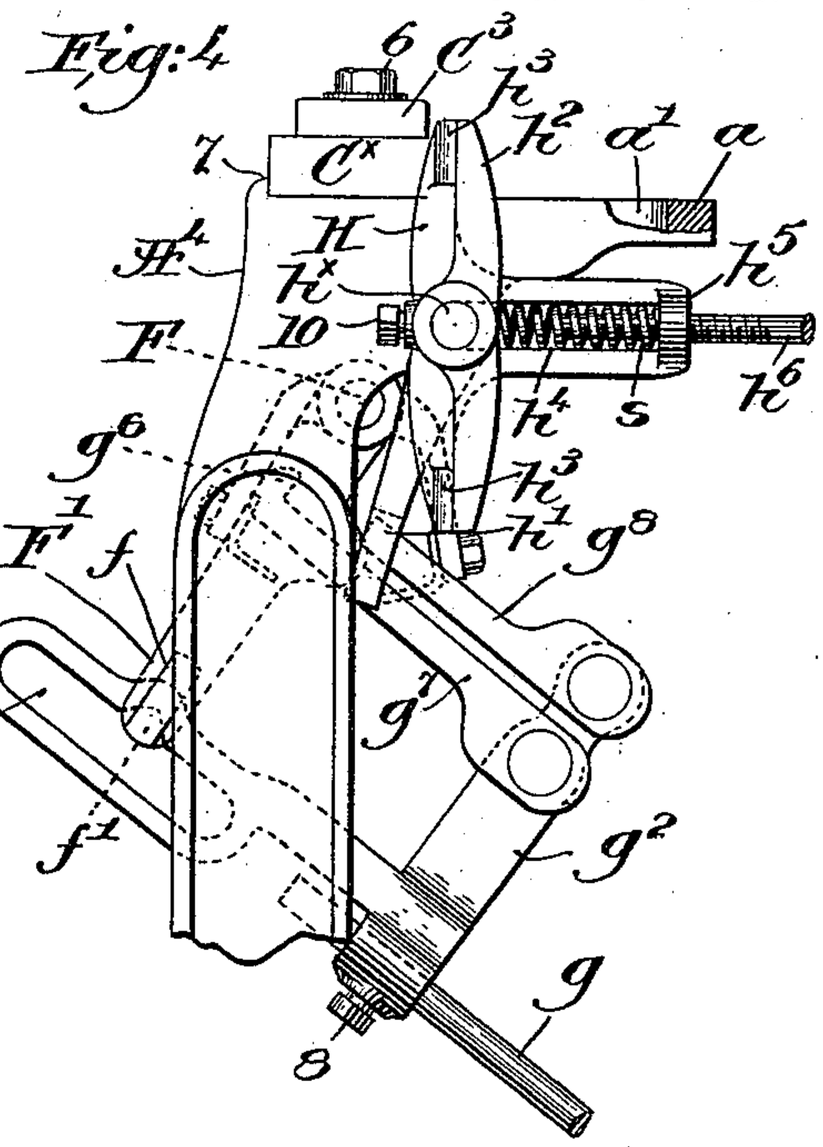


Fig: 5.

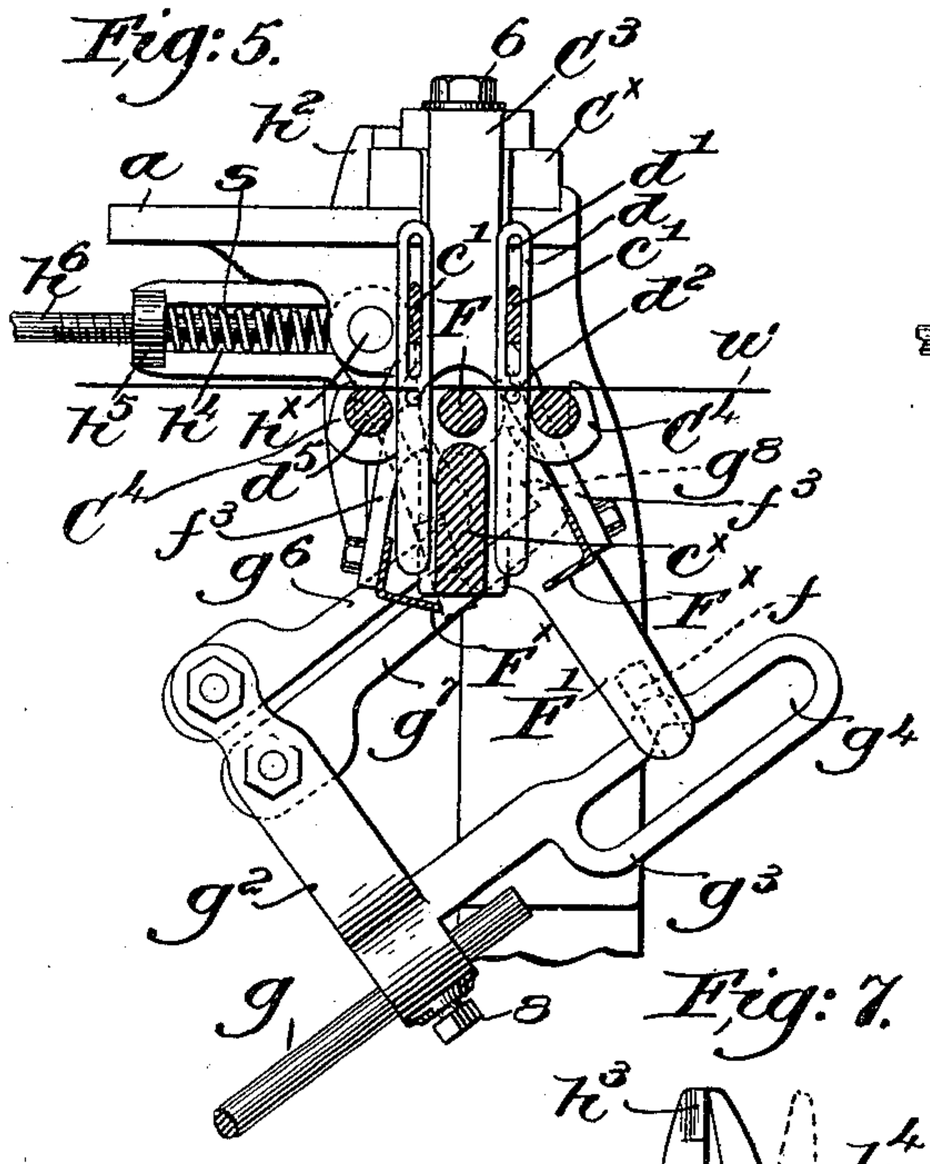


Fig: 6.

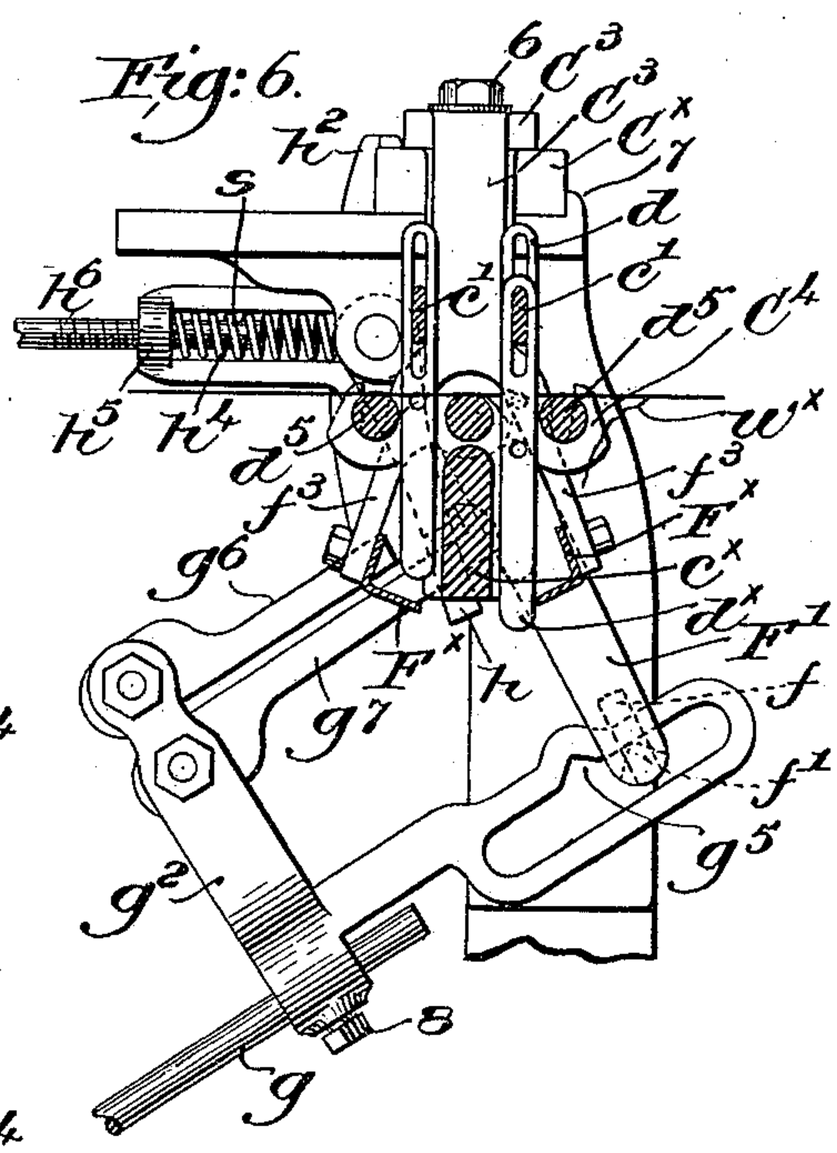
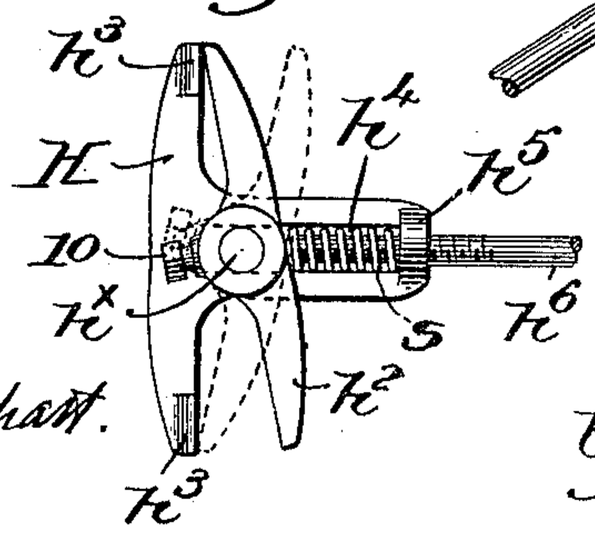


Fig: 7.



Witnesses,
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Inventor,
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UNITED STATES PATENT OFFICE.

JAMES H. NORTHROP, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO THE DRAPER COMPANY, OF SAME PLACE AND PORTLAND, MAINE.

WARP STOP-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 640,150, dated December 26, 1899.

Application filed December 1, 1898. Serial No. 697,949. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. NORTHROP, 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 drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object the production of a novel warp-stop-motion mechanism particularly adapted for use in connection with looms for weaving to effect the automatic stoppage of the loom upon breakage or undue slackness of one or more warp-threads.

The various novel features of the invention will be hereinafter described at length in the specification, and particularly pointed out in the claims.

Figure 1 is a longitudinal sectional view of a sufficient portion of a loom to be understood with one embodiment of my invention applied thereto. Fig. 2 is a top or plan view of the usual notched holding-plate and showing more clearly the knock-off lever for releasing the shipper-handle. Fig. 3 is an enlarged detail, in rear elevation, of a portion of the stop-motion mechanism with the feeler-vibrating mechanism coöperating therewith. Fig. 4 is a side elevation of the mechanism shown in Fig. 3, viewed from the left-hand side of the loom. Figs. 5 and 6 are vertical sectional views taken on the line $x\,x$, Fig. 3, looking to the right, the mechanism in Fig. 5 being shown in normal position and in Fig. 6 with one of the detectors in abnormal position, due to breakage or undue slackness of its warp-thread; and Fig. 7 is a detached detail of the wiper-cam and coöperating portion of the knock-off mechanism to be described.

The loom-frame A, breast-beam A′, lay A^2, lay-swords A^3, one of which is shown in Fig. 1, the bearings $B^\times$ in the loom-frame for the journals of the warp-beam B, (shown partially in dotted lines,) the whip-roll R, the lease-rods L, the shipper-handle S, and the notched holding-plate $A^\times$ therefor may be and are all of well-known or usual construction.

On the loom sides I have herein secured two supports, shown as brackets A^4, having forwardly-extended and preferably horizontal supporting portions a, longitudinally slotted, as at a', (see Fig. 4,) said brackets forming supports for the warp-stop-motion mechanism, the latter, as will be described, being mounted and bodily movable on said brackets between the lease-rods and whip-roll and above the warp-beam.

Two depending Γ-shaped stands C are rigidly connected by a transverse bar or plate $c^\times$ and by thin detector supports or bars c', set on edge and secured, as by bolts 2, to the end stands C, the outwardly or laterally extended heads $C^\times$ of the latter being shouldered on their under faces at 3, Fig. 3, and resting upon the extended supports a of the brackets A^4, to which they are rigidly secured by clamping-bolts 5, extended through the slots a'.

I have herein shown two series of stop-motion-actuating detectors d, longitudinally slotted at d' to receive the transverse supports c', the length of the slots being greater than the depth of the supports to permit longitudinal movement of said detectors relatively thereto.

The stands C have bearings c^2 for a rock-shaft F, extended beyond one of the stands, as shown in Fig. 3, and at its outer end, between said stand and the bracket A^4, having a rigidly-attached rocker-arm F′. This rocker-arm is upturned at its free end to form a guard f, and between the guard and arm is located an oppositely-beveled toe f' for a purpose to be described. Brackets C^3 are secured to the inner sides of the end stands by bolts 6, and at their lower ends said brackets are bifurcated to straddle the rock-shaft F, as shown in Figs. 5 and 6, and are bent to form hook-like supports C^4, in which are held the ends of preferably cylindrical rods d^5, located just below the plane of and forming rests for the warps w as they pass through the eyes d^2 of the detectors, the said warp-rests being located outside of the two series of detectors, while the rock-shaft F, located between said series of detectors, forms an intermediate warp-rest, as clearly shown in Figs. 5 and 6. Vibratable feelers $F^\times$, shown as angle-irons, are attached

to arms f^3, rigidly secured to the rock-shaft F, so that as the latter is rocked the feelers will be vibrated back and forth below the lower ends of the detectors when the latter are controlled by normal warp-threads—that is to say, by warp-threads unbroken and under proper tension.

Should a warp-thread break or become unduly slack, as at $w^\times$, Fig. 6, its detector, as $d^\times$, will drop the length of its slot and its lower end will be interposed between the adjacent feeler and the separator $c^\times$ to thereby stop the inward movement of such feeler, and as the latter is connected with the rock-shaft F, as has been described, said shaft and its attached rocker-arm F′ will also be held stationary.

The acting edges of the feelers may be toothed, if desired, as at f^4, Fig. 3, to provide a better engagement with the detectors.

It will be noticed that the stop-motion mechanism so far described is bodily movable upon the extended supports a, this movement being desirable in order to provide for the ready insertion or removal of the warp-beam, the whip-roll being at the same time taken from its bearings. At such time the bolts 5 are loosened, and the mechanism carried by the end stands C is bodily slid forward on the supports a out of the way of the beam. When weaving is to be resumed, the mechanism is slid back into place against suitable shoulders 7 on the brackets A^4 and the clamping-bolts 5 tightened.

The feeler-vibrating mechanism comprises a link or rod g, pivotally connected at g' with one of the lay-swords and having secured to its upper and rearwardly-extended end an L-shaped frame g^2 g^3, held in adjusted position by a suitable set-screw 8, the arm g^3 being longitudinally slotted at g^4, the upper side of the slot having a bevel-sided seat g^5 therein. (Clearly shown in Fig. 6.) The slotted portion of the arm g^3 travels between the arm F′ and the upturned guide f in such manner that when the loom is running properly the toe f' will rest in its seat g^5 by the weight of the actuating member g and the parts carried thereby, so that the reciprocatory motion given to said actuating member by the lay-sword will operate to rock the arm F′, and thereby vibrate the feelers. When either feeler is engaged by an abnormally-positioned detector and the arm F′ is held stationary, the beveled sides of the seat g^5 and toe f' coöperate to lift the slotted arm g^3, and thereby unseat the toe, as shown in Fig. 6, so that the longitudinal movement of the actuating member g can continue, the toe and its seat forming a slip connection between the arm g^3 or actuator and the feeler. The upturned arm g^2 of the frame carried by the actuator has rigidly bolted thereto two oppositely-acting bunters g^6 and g^7, the latter and longer of the two bunters being upturned at its outer end to form a shoulder g^8. These bunters obviously move in unison with the actuator of the feeler-vibrating mechanism and normally are out of the path of a controlling-dog h, mounted on a short rock-shaft $h^\times$, adapted to rock in a bearing a^{10} on one of the brackets A^4. The lower end of the dog is cut away to leave a depending guide-finger h' extending adjacent the sides of the bunters. A double wiper-cam h^2 is secured, as by a set-screw 10, to the short shaft $h^\times$, the oppositely-extended toes of the cam normally resting against the offset ends h^3 of a T-shaped casting H, slotted, as at h^4, Fig. 7, to receive the shaft $h^\times$. The foot h^5 of the casting has screwed thereinto a link h^6, extended forward and pivotally connected at h^7 to a knock-off lever h^8, fulcrumed at h^9 (see Fig. 2) on the breast-beam of the loom.

Referring to Fig. 7, it will be obvious that whether the shaft $h^\times$ be rocked in one or the other direction the wiper-cam will engage either the upper or lower portion h^3 of the casting H and will move the latter rearwardly to draw the link h^6 in the direction of the arrow 12, Figs. 1 and 2, and thereby operate the knock-off lever h^8 to release the shipper-handle from its holding-notch. A spring s is interposed between the shaft $h^\times$ and the threaded end h^5 of the casting H, said spring returning the casting and link h^6 to normal or inoperative position when the wiper-cam h^2 is in normal or inoperative position, Fig. 4.

From the foregoing description and the drawings it will be obvious that when the toe f' is in its seat in the slotted arm g^3 the bunters g^6 and g^7 will in their reciprocating motion pass below the lip 15 of the controlling-dog h, but when the toe is unseated it will act to lift the frame g^2 g^3 sufficiently to bring the bunters into the path of said lip, and one or the other of said bunters will engage and rock the dog to thereby effect the operation of the knock-off mechanism described.

If the actuator g of the feeler-vibrating mechanism is on its outward stroke, the bunter g^6 will engage and rock the dog rearwardly, but if said actuator is on its inward stroke the shoulder g^8 of the bunter g^7 will engage the dog on its opposite side and will rock the same forward. The latter condition pertains in Fig. 6, where the bunter g^6 is shown as just about to engage the controlling-dog and swing it forward as the actuator g continues its inward stroke.

Should one of the detectors in the front series drop, its coöperating feeler will be stopped by engagement therewith and the toe f' will be unseated on the rearward movement of the actuator g, and as such movement is completed the bunter g^6 will engage and swing the controlling-dog.

It will be noticed that the connection between the knock-off lever and the stop-motion mechanism is very direct and positive and that the bodily-movable part of the stop-motion mechanism can be readily moved upon

its supporting-brackets without interference with or disarrangement of the knock-off mechanism or the feeler-vibrating mechanism.

The separator $c^{\times}$ serves as a back-stop or support for an abnormally-positioned feeler.

So far as I am aware it is broadly new to so construct and mount stop-motion mechanism as to be bodily movable on its fixed supports toward and from the front of the loom for any purpose whatsoever. It is also broadly new to utilize the feeler rock-shaft or rocker as a warp-rest, and I believe it to be new to vibrate the feelers from a point practically in the plane of or adjacent the warp-threads. My invention is not therefore restricted to the precise construction and arrangement herein shown and described, as the same may be varied or rearranged in different particulars without departing from the spirit and scope of my invention.

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

1. In a loom, the main frame having bearings for the warp-beam, supports on the frame above said bearings and extended parallel to the loom sides, and warp-stop-motion mechanism mounted upon and adapted to be moved bodily upon said supports toward the front of the loom, to facilitate insertion or removal of the warp-beam.

2. In a loom, horizontally and forwardly extended supports on the loom sides, warp-stop-motion mechanism mounted on and adapted to be slid bodily upon said supports toward or away from the front of the loom, and means to secure said mechanism in place on the supports.

3. In a loom, forwardly-extended supports on the loom-frame, and warp-stop-motion mechanism mounted to slide bodily on said supports toward or from the front of the loom, said mechanism including actuating-detectors controlled by the warp-threads, and a coöperating, normally-vibrating feeler, to engage an abnormally-positioned detector.

4. In a loom, brackets mounted on the loom sides and having forwardly-extended supporting-arms, warp-stop-motion mechanism carried by said brackets and including depending end stands, a detector-support and warp-rest rigidly connecting them, actuating-detectors vertically movable on the detector-support and controlled by the warp-threads, a coöperating feeler, and a rock-shaft to which said feeler is attached, mounted in bearings on the end stands, the latter having laterally-extended heads to rest upon the extended arms of the brackets.

5. In a loom, forwardly-extended supports on the loom sides above the warp-beam bearings, and warp-stop-motion mechanism mounted on and bodily movable relatively to said supports toward and from the front of the loom, said mechanism including actuating-detectors and a coöperating vibratable feeler, combined with a knock-off device, and feeler-vibrating means, both supported on the loom-frame independently of the stop-motion mechanism and coöperatively connected therewith.

6. In warp-stop-motion mechanism for looms, a series of vertically-movable actuating-detectors maintained inoperative by normal warp-threads, a fixed support for and relatively to which the detectors are longitudinally movable, a vibratable feeler to engage and be stopped by an abnormally-positioned detector, fixed and rocking shafts located in front and behind the series of detectors, to form warp-rests, and connections between the rocking shaft and feeler, to vibrate the latter.

7. In warp-stop-motion mechanism for looms, a series of actuating-detectors maintained inoperative by normal warp-threads, a feeler to coöperate with an abnormally-positioned detector, and an operating rock-shaft for the feeler, said rock-shaft forming a warp-rest adjacent the detectors.

8. In warp-stop-motion mechanism for looms, a series of actuating-detectors maintained inoperative by normal warp-threads, a feeler to coöperate with an abnormally-positioned detector, and an operating member connected with and to normally vibrate the feeler, said member being located adjacent the plane of and forming a rest for the warp-threads.

9. In warp-stop-motion mechanism for looms, two series of actuating-detectors maintained inoperative by normal warp-threads, a feeler to coöperate with an abnormally-positioned detector of each series, and a rock-shaft connected with and to normally vibrate the feelers, the rock-shaft being located between the series of detectors and also forming a warp-rest.

10. In warp-stop-motion mechanism for looms, two series of longitudinally-slotted actuating-detectors maintained inoperative by normal warp-threads, a support extended through the slots of the detectors of each series, a separator interposed between the lower ends of the two series, coöperating feelers, one for each series of detectors, a rock-shaft above the separator and forming a warp-rest between the two series of detectors, and connections between said rock-shaft and feelers, to normally vibrate the latter.

11. In warp-stop-motion mechanism for looms, actuating-detectors, a vibratable feeler to coöperate with and be stopped by a detector in operative position, a rocker-arm movable with the feeler and provided with a toe, and a reciprocating actuator movable independently of the feeler and having a seat to receive said toe and thereby normally vibrate the feeler, stoppage of the latter unseating the toe while the actuator completes its movement.

12. In warp-stop-motion mechanism for looms, the lay-sword-actuating detectors, a

vibratable feeler to coöperate with and be stopped by a detector in operative position, a rocker-arm movable with the feeler and provided with a toe, and a reciprocating actuator movable independently of the feeler and pivotally connected with the lay-sword and having a seat normally maintained in engagement with said toe, stoppage of the feeler unseating the toe, and stopping means operated by or through the actuator as it completes its stroke after the toe has been unseated.

13. In warp-stop-motion mechanism for looms, actuating-detectors, a vibratable feeler to coöperate with and be stopped by a detector in operative position, a rocker-arm movable with the feeler and provided with a toe, and a reciprocating actuator movable independently of the feeler and having a seat to receive said toe and thereby normally vibrate the feeler, combined with a bunter carried by and rigidly connected with the actuator, and stopping means, including a dog, stoppage of the feeler unseating the toe and moving the bunter into position to engage said dog and thereby operate the stopping means as the actuator completes its stroke.

14. In a loom, a series of warp-stop-motion-actuating detectors maintained inoperative by normal warp-threads, a feeler to coöperate with an abnormally-positioned detector, a rock-shaft mounted in stationary bearings and connected with the feeler and having an arm provided with a toe, a longitudinally-reciprocating actuator having a seat formed therein to normally receive the toe and thereby rock the shaft, stoppage of the feeler by engagement with a detector operating to disengage said toe and seat, and stopping means for the loom actuated by or through the continued movement of the actuator after such disengagement of the toe.

15. In a loom, a series of warp-stop-motion-actuating detectors maintained inoperative by normal warp-threads, a feeler to coöperate with an abnormally-positioned detector, a rocker-arm connected with and to swing in unison with the feeler and having a toe, a reciprocating actuator movable independently of the feeler and held by gravity in operative engagement with the toe, stoppage of the feeler by an abnormally-positioned detector disengaging the toe and actuator, and stopping means for the loom operated by or through continued movement of the actuator after such disengagement.

16. In a loom, stop-motion-actuating detectors arranged in two series, a vibratable feeler for each, a connected rock-shaft, and a reciprocating actuator to normally rock said shaft and vibrate the feelers, combined with a shipper-handle, a knock-off lever, a link connected therewith and provided with oppositely-extended arms, a double wiper-cam to engage one or other of said arms and operatively move the link to release the shipper-handle, and means intermediate said cam and actuator, to rock the former in one or the other direction upon stoppage of a feeler, such stoppage primarily disengaging the actuator and rock-shaft.

17. In a loom, two series of warp-stop-motion-actuating detectors maintained inoperative by normal warp-threads, a vibratable feeler for each series, to engage and be stopped by an abnormally-positioned detector, feeler-vibrating means, two oppositely-acting bunters movable therewith, and stopping mechanism for the loom, including a controlling-dog normally out of the path of movement of said bunters, stoppage of a feeler operating to disconnect the vibrating means and move one or other of the bunters into position to engage and move the dog.

18. In a loom, warp-stop-motion mechanism including two vibratable feelers, normally-operative feeler-vibrating means, two oppositely-acting bunters movable therewith, a shipper-lever, knock-off mechanism therefor including a controlling-dog independent of the stop-motion mechanism and normally out of the path of movement of the bunters, and means operative upon stoppage of a feeler to disconnect the latter and its vibrating means and to move the corresponding bunter into position to engage the controlling-dog and thereby actuate the knock-off mechanism.

19. In a loom, stopping means therefor including a knock-off device, a double-throw wiper-cam to operatively move it, and an instrumentality operative upon failure of a warp-thread to rock the wiper-cam in one or the other direction.

20. In a loom, the shipper-handle, releasing means therefor, including a knock-off lever to release the shipper-handle, and a longitudinally-movable link having a transverse abutment, a rocking wiper-cam to engage the abutment and move said link longitudinally, and means operative upon failure of a warp-thread to actuate the wiper-cam.

21. In a loom, stopping means therefor, including a longitudinally-movable link, a double wiper-cam constructed and arranged to operatively engage and longitudinally move the link when rocked in either direction, and an instrumentality operative upon failure of a warp-thread to rock the wiper-cam.

22. In a loom, stopping means therefor, including a longitudinally-movable link, a double wiper-cam constructed and arranged to operatively move the link when rocked in either direction, and an instrumentality operative upon failure of a warp-thread to rock the wiper-cam, said instrumentality including two series of detectors maintained inoperative by normal warp-threads, and devices intermediate the detectors and the wiper-cam, to rock the latter in one or other direction depending upon the series in which a detector has moved into operative position.

23. In a loom, stopping means therefor, including a pivotally-mounted, double wiper-cam, and a dog attached to and to rock said cam, stop-motion-actuating detectors, ar-

ranged in two series and maintained in inoperative position by normal warp-threads, means controlled by a detector in operative position to move the bunters into the path of the dog, and two oppositely-acting bunters, one for each series of detectors, to coöperate singly with the dog and rock the wiper-cam in one or the other direction.

24. In warp-stop-motion mechanism, two series of normally-inoperative actuating-detectors, two feelers, one for each series, vibratable toward and away from the detectors, and a common support for said feelers, located above the acting edges thereof and serving as a warp-rest.

25. In warp-stop-motion mechanism, two series of normally-inoperative actuating-detectors, a rock-shaft located below and forming a rest for the warp-threads, two sets of depending, diverging arms fast on said rock-shaft, two feelers, each comprising an angle-iron attached to one of said sets of arms, with its acting edge located below the points of attachment to the arms, and two series of detectors maintained in inoperative position by normal warp-threads, and means to normally rock said shaft and thereby vibrate the feelers.

26. In warp-stop-motion mechanism for looms, actuating-detectors controlled by the warp-threads, a vibratable feeler to coöperate with and be stopped by a detector in operative position, an actuator for and to vibrate the feeler and movable independently of the latter, and a slip connection between the actuator and feeler, disconnected by stoppage of the feeler.

27. In warp-stop-motion mechanism for looms, actuating-detectors controlled by the warp-threads, a vibratable feeler to coöperate with and be stopped by a detector in operative position, an actuator for and to vibrate the feeler and movable independently of the latter, and a slip connection between the actuator and feeler disconnected by stoppage of the feeler, combined with stopping means for the loom, and a controlling-bunter therefor movable with said actuator.

28. In warp-stop-motion mechanism for looms, actuating-detectors controlled by the warp-threads, a vibratable feeler to coöperate with and be stopped by a detector in operative position, an actuator for and to vibrate the feeler and movable independently of the latter, and a slip connection between the actuator and feeler, disconnected by stoppage of the feeler, combined with stopping means for the loom, including a dog, and two oppositely-acting bunters movable with the actuator and adapted to coöperate singly with said dog.

29. In a loom, warp-stop-motion mechanism including two series of detectors maintained inoperative by normal warp-threads, two cooperating feelers, a common rock-shaft to which they are attached, an actuator for said rock-shaft, a slip connection between them, disconnected by stoppage of a feeler by a dropped detector; a shipper-lever, releasing means therefor including a controlling-dog, and oppositely-acting bunters adapted to cooperate singly therewith according to the location of a dropped detector, in one or the other series of detectors.

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

JAMES H. NORTHROP.

Witnesses:

GEO. OTIS DRAPER,

ALBERT H. COUSINS.