No. 630,096. Patented Aug. 1, 1899.

J. H. NORTHROP.

WARP STOP MOTION FOR LOOMS.

(Application filed Dec. 16, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

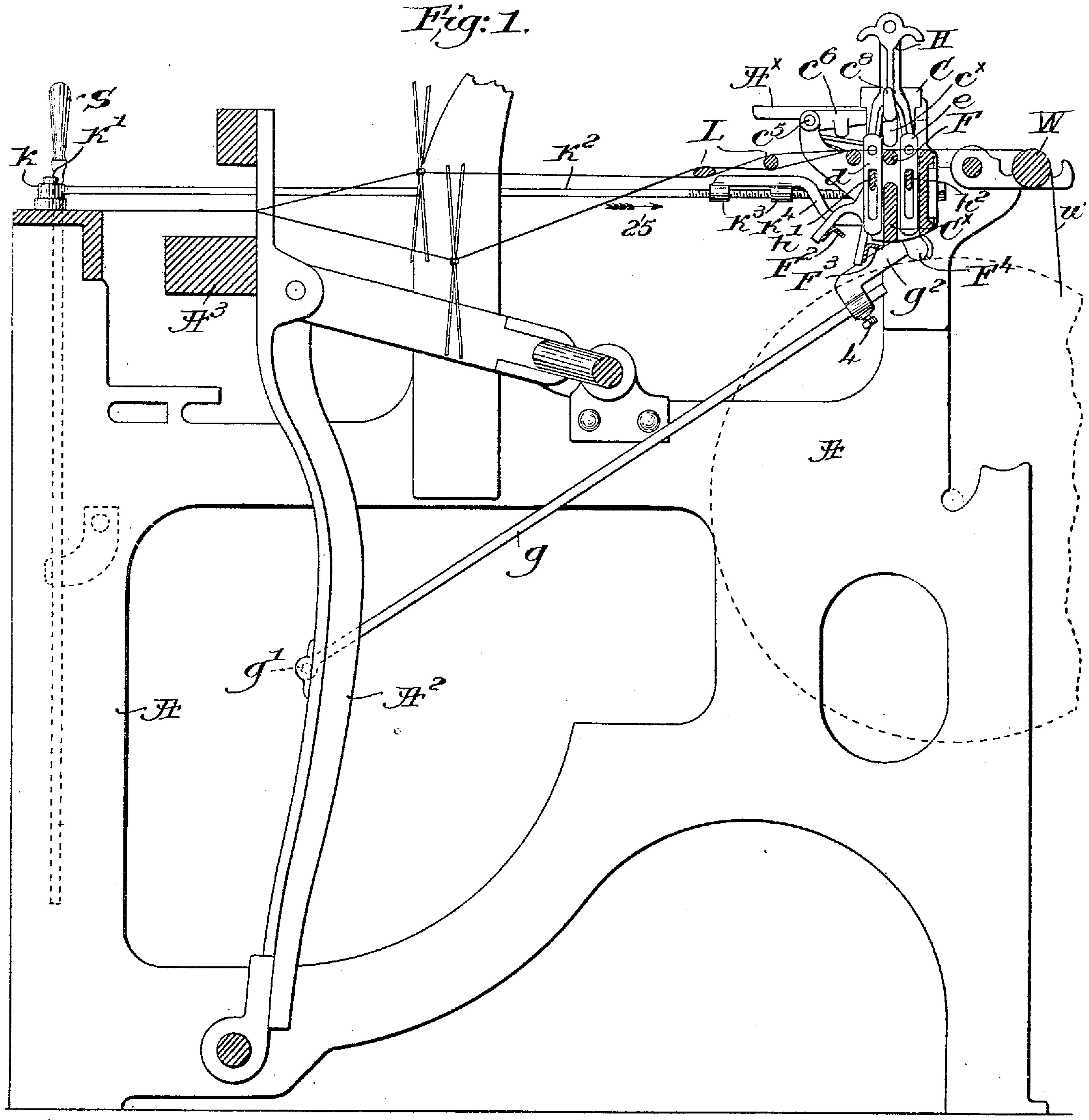
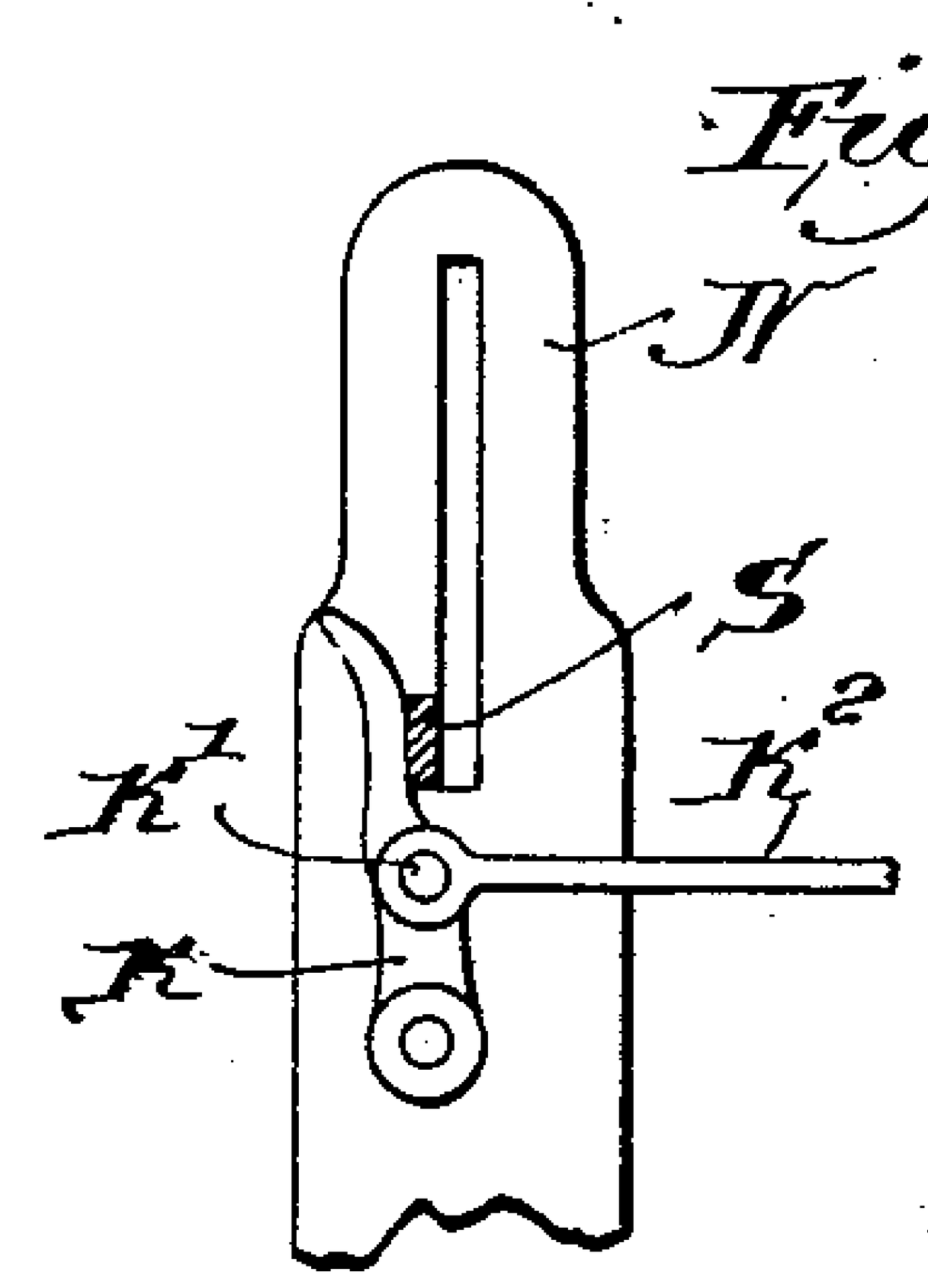


Fig. 1a.



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No Model.) 2 Sheets—Sheet 2.

Fig: 2.

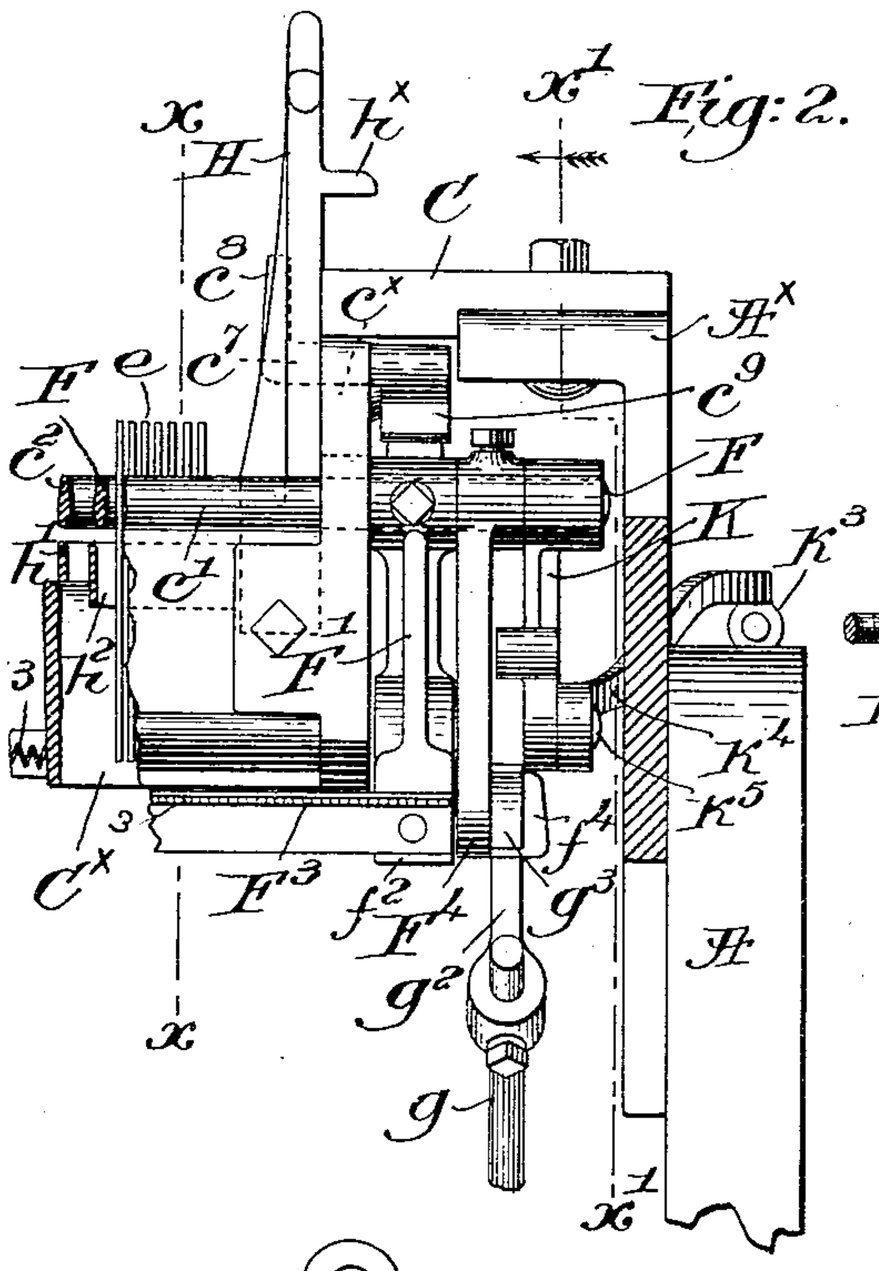


Fig: 3.

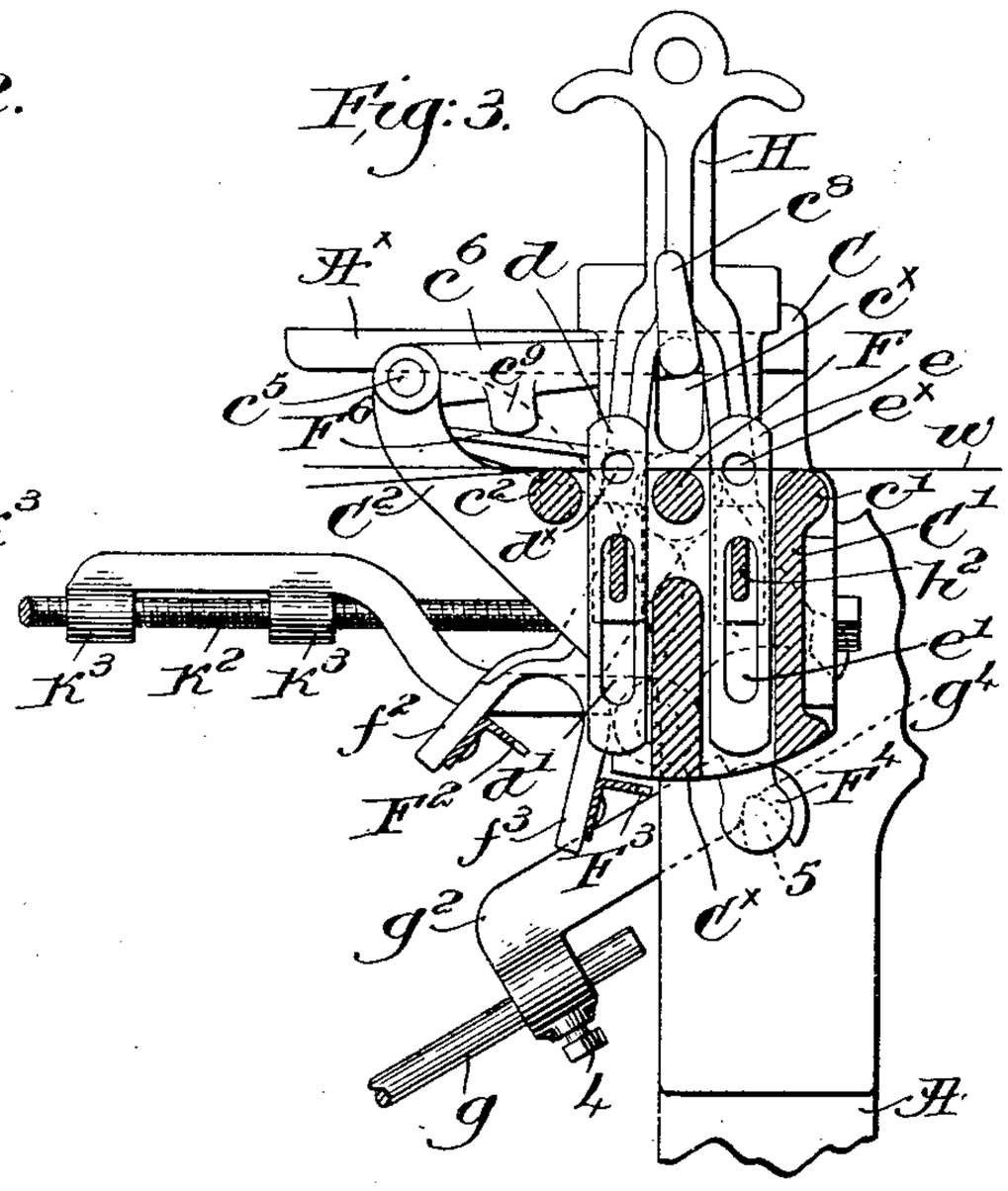


Fig: 4.

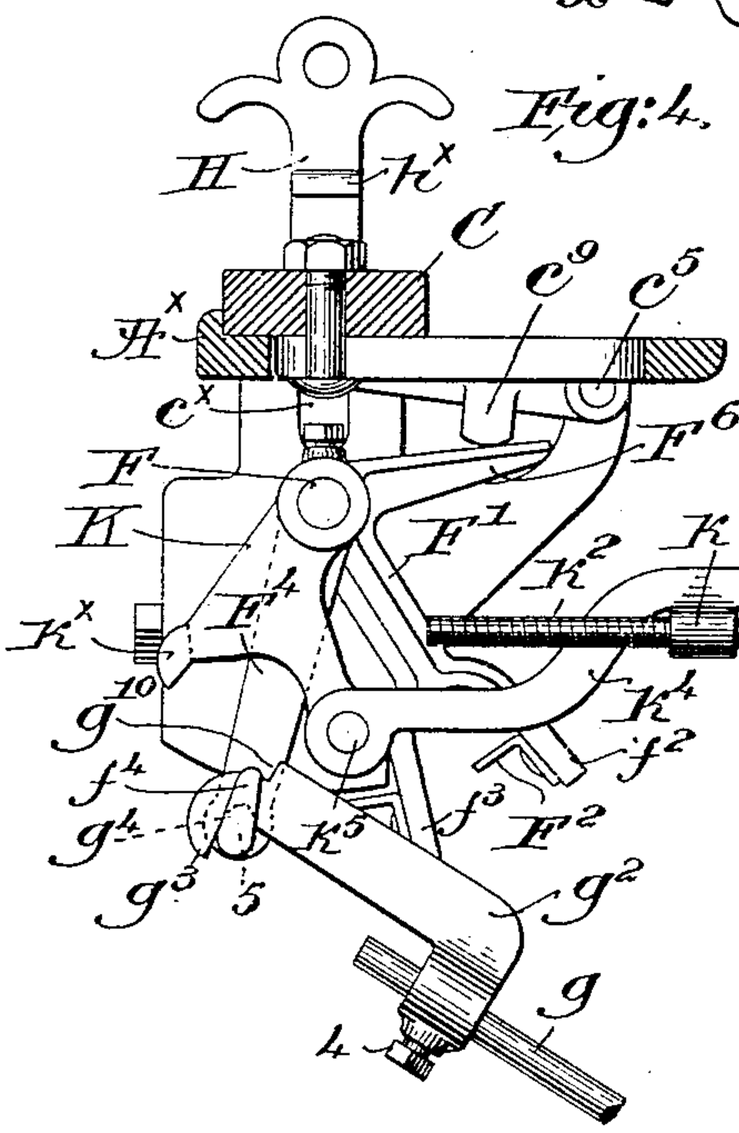


Fig: 5.

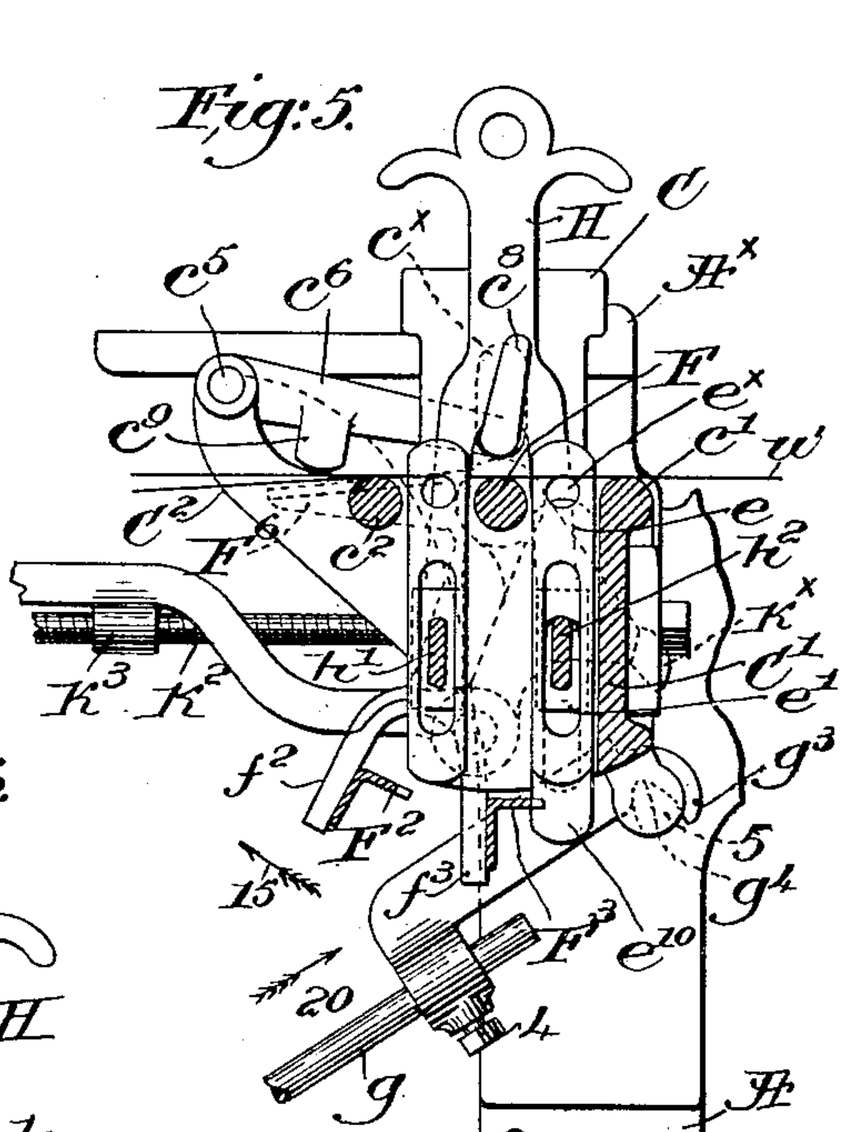
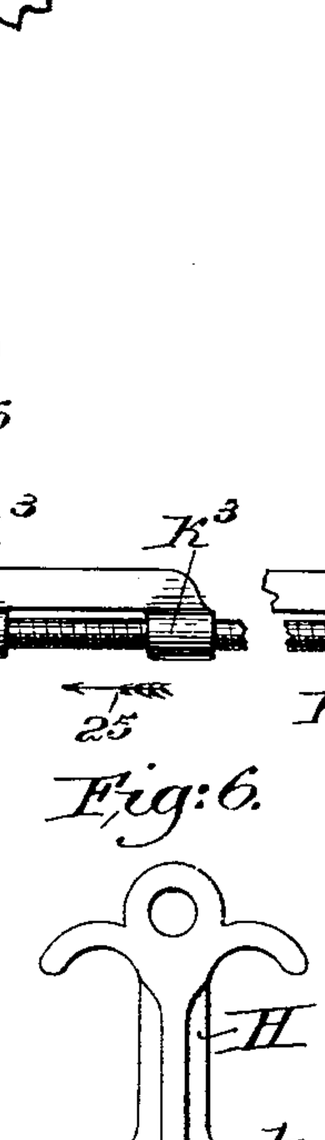


Fig: 6.



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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. 630,096, dated August 1, 1899.

Application filed December 16, 1898. Serial No. 699,440. (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 relates to warp-stop-motion mechanism for looms, and has for its object the production of various novel features of construction, as will be hereinafter fully described in the specification and particularly pointed out in the claims. The stopping means for the loom, forming a part of said mechanism, is controlled as to its operation by or through detectors, which in my present invention are located between the whip-roll and the lease-rods, and owing to such location said detectors derive little or no movement from the warp-threads, by which they are normally supported. This normal inaction of the detectors tends to permit the collection of dust or lint to clog the warp-eyes and also to interfere with the proper movement of the detectors on undue slackness or breakage of the warp-threads, and I have provided means herein for sufficiently agitating the detectors to keep their warp-eyes clear and also to insure their requisite movement at the proper time. In employing a plurality of series of detectors arranged in parallel banks or series each series of detectors has its own feeler, the latter being arranged in tandem and mounted upon a common support. The means for lifting the detectors periodically is operated by or through connections intermediate said means and the feeler-support.

Figure 1 is a vertical sectional view of a sufficient portion of a loom to be understood on the line $x\ x$, Fig. 2, looking toward the right, with one embodiment of my invention applied thereto. Fig. 1^a is a detail of the holding-plate for the shipper-lever and the knock-off arm for the latter. Fig. 2 is an enlarged partial rear elevation of the stop-motion mechanism shown in the upper right-hand corner of Fig. 1. Fig. 3 is a vertical sectional view of Fig. 2 on the line $x\ x$, the parts illustrated herein being shown in the same position as in Fig. 1. Fig. 4 is a vertical sectional view on the irregular line $x'\ x'$, Fig. 2, looking toward the left. Fig. 5 is a view similar to Fig. 3, but with one of the feelers in the position assumed when engaged by a detector in abnormal position; and Fig. 6 is a detail to be described.

The loom-frame A, lay A^3, lay-swords A^2, the lease-rods L, whip-roll W, shipper handle or lever S, and its notched holding-plate N, Fig. 1^a, may be and are of usual or well-known construction in looms. The loom sides have erected upon them at the rear of the loom upturned brackets $A^\times$, to which are bolted L-shaped stands C, having each a vertical slot $c^\times$ in its depending portion, said depending portions being rigidly connected by a cross-plate or flattened bar $C^\times$, set on edge and forming a back-stop for a detector when engaged by the feeler, as will be described. An upright guide-plate C′ is also attached to the stands and extends across the loom in parallelism with the separator $C^\times$ and also forms a back-stop for a second series of detectors, which are shown in two series at $d\ e$ and provided, respectively, with warp-receiving eyes or openings $d^\times\ e^\times$, through which the warp-threads w are extended to normally support the detectors. These detectors are preferably formed as thin flat sheet-metal strips longitudinally slotted at d' and e', respectively.

The upper edge of the guide-plate C′ is preferably rounded, as at c', to form a warp-rest behind the detectors e, and in front of the detectors d a preferably rounded bar or rod c^2 forms a second warp-rest, mounted in forwardly-extended arms C^2, secured to or forming part of the stands C. The said stands provide bearings for a horizontal rock-shaft F, located immediately below or substantially in the plane of the warp-threads between the two series of detectors, said rock-shaft being extended beyond the stands at each of its ends to receive thereupon arms F′, one of such arms being shown in Fig. 2 bifurcated or branched at its lower end, as at $f^2\ f^3$, to support the feelers $F^2\ F^3$ for the two series of detectors, said feelers being arranged one in front of the other, or in "tandem," such term being hereinafter used and in the claims to

denote this arrangement of the feelers. Said feelers are shown as angle-irons suitably bolted to the branches and with the flanged portions substantially at right angles thereto and turned toward the detectors and normally movable in a curved path below their lower ends. The acting edges of the feelers may be notched, as at 3, Fig. 2, to prevent twisting of an engaged detector.

In Figs. 1 and 3 the feelers are shown at the beginning of their stroke toward the detectors, and in Fig. 5 I have shown one of the feelers, as F^3, in engagement with a detector e^{10} in abnormal position, due to breakage or undue slackness of its warp-thread.

On one end of the rock-shaft F, I have mounted an arm F^4, provided with a laterally-extended and upturned toe f^4 to be normally engaged by a portion of the actuating mechanism for rocking the feelers. Said actuating mechanism comprehends a link g, pivotally connected at g' with one of the lay-swords and having suitably secured to it, as by a set-screw 4, at its upper end an L-shaped head g^2, downturned or hooked at its free end, as at g^3, to enter between the arm F^4 and the upturned portion of its toe f^4, said head at the bottom of the hook being slightly recessed, as at g^4, (see dotted lines, Figs. 3, 4, and 5,) to rest upon and receive the laterally-extended portion of the toe f^4, the latter, as shown in Fig. 4, being preferably beveled or slightly rounded at 5. The weight of the head g^2 will serve to keep the hook in engagement with the toe to rock the arm F^4 as the link g is moved longitudinally by the movement of the lay, the forward movement of the lay retracting the feelers, as shown in Fig. 1, and such movement being positive, while the opposite or feeling movement of said feelers is largely effected by their weight and by the weight of the head g^2 acting upon the rocker-arm toe—that is to say, if a feeler engages a dropped detector, as in Fig. 5, such feeler will be prevented from further movement on that stroke and the actuating mechanism will complete its movement. This completion of the movement of the actuating mechanism causes the lower edge of the head to rise on the lateral portion of the toe f^4 and to slide thereupon, so that the head will travel in a different path, for a purpose to be described, it being of course understood that the arrest of the feeler will also arrest the arm F^4, rigidly connected to the rock-shaft F.

The inner upright faces of the downturned portions of the stands C provide bearings for vertically-movable supports H, one at each side of the loom and bifurcated at their lower ends to form separated legs h, rigidly connected by flat bars h' h^2, set on edge and extended, respectively, through the longitudinal slots of the detectors d and e, the length of the slots in the detectors being much greater than the depth of the bars, as clearly shown in Figs. 3 and 5. The legs h of the supports straddle the rock-shaft F and the separator $C^\times$, the rearmost leg of each support being movable up and down between the separator and the guide-plates C'.

The upturned arms C^2 of the stands C have pivotally mounted upon them at their upper ends at c^5 arms c^6, extended rearwardly and bent laterally and upward at their free ends at c^7 c^8, the lateral portions extending through the slots $c^\times$ and between the legs of the adjacent supports H to support the latter and control their vertical movement, the upturned portion c^8 serving as a stop to prevent displacement of the support. A depending lug or projection c^9 on each of the arms c^6 extends into the path of movement of a wiper-cam F^6, secured to or forming a part of the feeler-supporting arm F', fast on the rock-shaft F, so that when the said rock-shaft is moved in the direction of the arrow 15, Fig. 5, to retract the feelers the wiper-cams will be elevated and, acting upon the rocking arms c^6, the rear ends of the latter will be lifted and with them the vertically-movable supports H. This movement of the supports raises the lifter-bars h' h^2 until they engage the upper ends of the slots of the detectors a short time before the lifting movement is completed, so that when the feelers are fully retracted, as in Fig. 3, the lifter-bars will have raised the detectors to altogether support them and remove their weight from the warp-threads. This position of the parts is also shown in Fig. 1, and it will be seen that the warp-threads are thus relieved of the weight of the detectors as the filling is beaten in. On the opposite or feeling stroke of the feelers the wiper-cams F^6 descend, permitting the descent of the supports H until stops $h^\times$ thereon engage the tops of the stands C. The bottoms of the slots $c^\times$ support the arms c^6 in their lowest position, as there is some lost motion between the wiper-cams and the lugs c^9.

By referring to Fig. 5 it will be seen that when the lifter-bars are in their lowest position the detectors are perfectly free to drop, by reason of undue slackness or breakage of their warp-threads, into detecting position—that is to say, in the path of one or the other feeler—as shown at e^{10}. Not only does this slight lifting of the detectors periodically relieve the warp-threads of their weight, but it also serves to keep the detectors clear of lint or dust, the collection of which clogs the warp-eyes and also prevents the free movement of the detectors upon failure or slackness of warp-threads.

It sometimes happens that one or more of the warp-threads are not as taut as their fellows and yet not sufficiently slack to make it desirable to stop the loom, and when the detectors are lifted, as described, such slight slackness of warp-threads is counteracted and the unnecessary stoppage of the loom is prevented. A knock-off lever k, Figs. 1 and 1^a, is fulcrumed adjacent the shipper-lever and is pivotally connected at k' to one end of a

rod or link k^2 and preferably threaded to enter threaded ears k^3 of an arm k^4, pivotally connected at k^5 to a bunter-carrier, shown as an arm K loosely mounted on the rock-shaft F beyond the arm F^4 and provided with a bunter, shown as a shoulder $k^\times$ above the normal path of movement of the head g^2, the latter at its upper end, above the hooked portion thereof, being provided with a shoulder g^{10}. When by the operative engagement of the detector with one of the feelers the arm F^4 is held stationary, as described, the continued movement of the head g^2 in the direction of the arrow 20, Fig. 5, will operate to lift the head as the bottom of the toe f^4 is unseated from the recess g^4 to bring the shoulder g^{10} into position to engage the bunter $k^\times$, and thereby move the rod k^2 in the direction of the arrow 25, Figs. 1 and 4, swinging the knock-off lever to release the shipper-lever from its holding-notch. The operative means for normally vibrating the feelers is thus made effective through the bunter to act very directly upon the knock-off lever to release the shipper-lever, and thereby stop the loom.

By threading the rear end of the rod k^2 a ready means of adjustment for the knock-off devices and bunter is provided, as the bunter can thus be set to the proper position to cooperate with the shoulder g^{10} of the head at the proper time.

It will be understood that while there are two vertically-movable supports for the lifter-bars, one at each side of the loom, and means to lift said supports in unison it is unnecessary to employ more than one of the actuating-links g, with its head g^2 and the connected devices intermediate said head and the feeler rock-shaft.

My invention is not restricted to the precise construction and arrangement herein shown and described, as the same may be modified or rearranged in various particulars without departing from the spirit and scope of my invention.

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

1. In warp-stop-motion mechanism for looms, a series of longitudinally-slotted detectors normally supported by the warp-threads, adjacent fixed warp-rests, a feeler to engage a detector released by its warp-thread, a lifter-bar extended through the slots of the detectors, and means to periodically lift said bar sufficiently to support the detectors and relieve the warp-threads of the weight thereof.

2. In warp-stop-motion mechanism for looms, a series of longitudinally-slotted detectors normally supported by the warp-threads, adjacent fixed warp-rests, a feeler to engage a detector released by its warp-thread, a rock-shaft, a lifter-bar extended through the slots of the detectors, and means intermediate said rock-shaft and bar to thereby periodically lift said bar sufficiently to support the detectors and relieve the warp-threads of the weight thereof.

3. In warp-stop-motion mechanism for looms, a series of longitudinally-slotted detectors normally supported by the warp-threads, adjacent fixed warp-rests, a feeler to engage a detector released by its warp-thread, a rock-shaft, a wiper-cam on the rock-shaft, a lifter-bar extended through the slots of the detectors, vertically-movable supports therefor, and means connective of said supports and the wiper-cam and actuated by the latter to periodically lift the bar and sustain the detectors independently of the warp-threads.

4. In warp-stop-motion mechanism for looms, a series of longitudinally-slotted detectors normally supported by the warp-threads, adjacent fixed warp-rests, a feeler to engage a detector released by its warp-thread, a rock-shaft, a wiper-cam on the rock-shaft, a lifter-bar extended through the slots of the detectors, vertically-movable supports therefor, and a lever connected with one of said supports and provided with a toe to rest on and be moved by the wiper-cam, to periodically lift said bar by the rocking of the rock-shaft and sustain the detectors independently of the warp-threads.

5. In warp-stop-motion mechanism for looms, two parallel series of detectors maintained inoperative by normal warp-threads, two feelers, one for each series of detectors, arranged in tandem and adapted to be normally moved below said detectors, a rock-shaft between the series of detectors below and adjacent the warp-threads, forming a rest therefor intermediate the series of detectors, depending arms thereon to which the feelers are attached, and stopping means for the loom actuated by or through engagement of a feeler and a detector in abnormal position.

6. In warp-stop-motion mechanism for looms, two parallel series of detectors maintained inoperative by normal warp-threads, two feelers, one for each series of detectors, means to periodically lift the detectors and relieve the warp-threads of their weight, feeler-actuating mechanism, and operative connections between it and the detector-lifting means.

7. In warp-stop-motion mechanism for looms, two parallel series of longitudinally-slotted detectors maintained inoperative by normal warp-threads, two feelers, connected lifter-bars extended through the slots of the detectors, means to actuate the feelers, and connections between said means and the lifter-bars, to periodically lift the latter and relieve the warp-threads of their weight.

8. In warp-stop-motion mechanism for looms, two parallel series of longitudinally-slotted detectors maintained inoperative by normal warp-threads, a rock-shaft between the series of detectors, two feelers, lifter-bars extended through the slots of the detectors, vertically-movable supports for said bars, bifurcated to embrace the rock-shaft, connec-

tions between the latter and said supports, to raise and lower the supports as said shaft is rocked, and means to rock the said shaft.

9. In a loom, a series of detectors maintained inoperative by normal warp-threads, a rock-shaft, a feeler carried thereby to coöperate with a detector in abnormal position, means to normally rock said shaft and vibrate the feeler, a rocking bunter loosely mounted concentric with the rock-shaft and adapted to be engaged and moved by said means upon operative engagement of a feeler with a detector, and stopping mechanism for the loom actuated by such movement of the bunter.

10. In a loom, a series of detectors maintained inoperative by normal warp-threads, a coöperating feeler, to engage a detector in abnormal position, a pivotally-mounted bunter, a common support for the feeler and bunter, and serving also as a warp-rest, means to normally move the feeler and to engage and swing the bunter upon operative engagement of a feeler with a detector, and stopping mechanism for the loom actuated by movement of the bunter.

11. In a loom, a series of detectors maintained inoperative by normal warp-threads, a coöperating feeler to engage an abnormally-positioned detector, a rock-shaft to which the feeler is rigidly attached, an arm on said shaft provided with a toe, and a longitudinally-movable actuator having a hooked end to engage the toe and swing the arm, thereby vibrating the feeler, operative engagement of the feeler with a detector disengaging said toe from movement with the actuator.

12. In a loom, a series of detectors maintained inoperative by normal warp-threads, a coöperating feeler, to engage a detector in abnormal position, a pivotally-mounted bunter, a common support for the feeler and bunter, and serving also as a warp-rest, means to normally move the feeler and to engage and swing the bunter upon operative engagement of a feeler with a detector, a shipper-lever, a knock-off arm therefor, and a link connecting said arm and bunter, swinging of the latter on its support operating to release the shipper-lever.

13. In a loom, two series of detectors maintained inoperative by normal warp-threads, a rock-shaft between said series, two feelers in tandem depending therefrom to vibrate below the detectors, a bunter loosely mounted on said shaft, a shipper-lever, a releasing device therefor operated by movement of said bunter, an arm fast on the rock-shaft, and actuating means to normally engage and rock said arm, coöperative engagement of the feeler with an abnormally-positioned detector stopping said arm and thereby releasing its actuating means and bringing the latter into position to engage and move the bunter.

14. In a loom, the lay, a series of detectors maintained inoperative by normal warp-threads, a feeler to coöperate with an abnormally-positioned detector, means to lift the detectors and relieve the warp-threads of their weight as the lay beats up, feeler-actuating mechanism operatively connected with the lay, and devices connective of said mechanism and the detector-lifting means.

15. In warp-stop-motion mechanism for looms, a series of actuating-detectors normally supported by the warp-threads, a coöperating feeler movable toward and from said detectors, and means to reciprocate the feeler and periodically lift the detectors from the warp-threads, the lifting being effected on one stroke of the feeler and the feeling movement of the latter on the other stroke.

16. In warp-stop-motion mechanism for looms, a series of actuating-detectors normally supported by the warp-threads, a coöperating feeler movable toward and from said detectors, a rock-shaft, connections between it and the feeler and the detectors, to move the feeler toward and away from the detectors and to periodically raise and lower the latter, to intermittingly relieve the warp-threads of the weight of the detectors.

17. In warp-stop-motion mechanism for looms, a series of actuating-detectors normally supported by the warp-threads, a rock-shaft, means to lift the detectors and thereby relieve the warp-threads of their weight, and actuating connections between the rock-shaft and said means, to lift the detectors on the stroke of the feeler toward them.

18. In warp-stop-motion mechanism for looms, a series of detectors maintained inoperative by normal warp-threads, a coöperating feeler, a rock-shaft with which said feeler is connected and having a rocker-arm, a positively-reciprocating actuator, and a connection between it and the rocker-arm, automatically disconnected when movement of the rock-shaft is arrested, and normally serving to effect the rocking of the shaft, and vibrating movement of the feeler by reciprocation of the actuator.

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

JAMES H. NORTHROP.

Witnesses:
FRANK J. DUTCHER,
HENRY LAWRENGE.