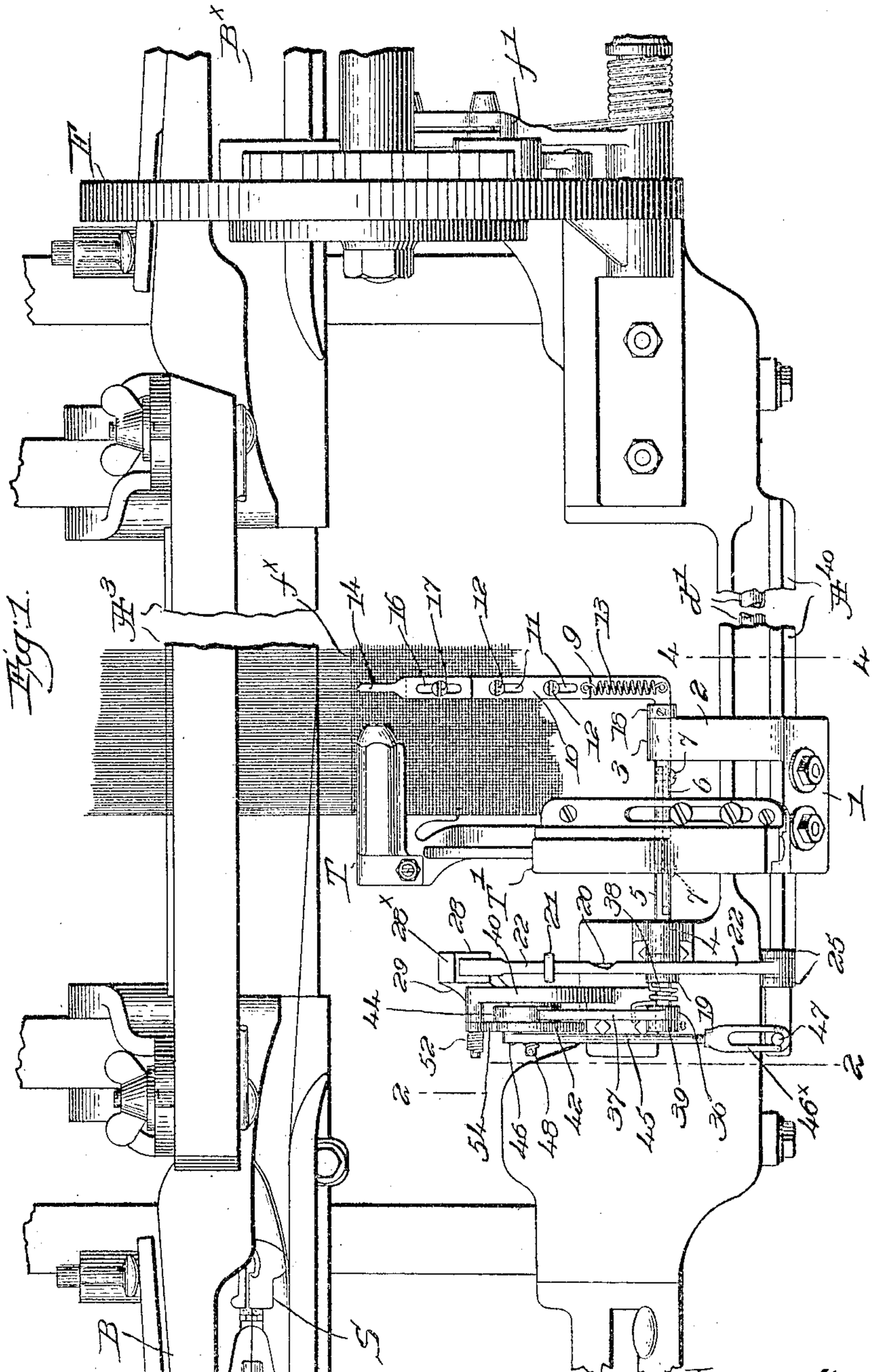
No. 887,484. PATENTED MAY 12, 1908.

G. H. LEITNER.

LOOM.

APPLICATION FILED MAR. 11, 1907.

3 SHEETS—SHEET 1.



Witnesses,
Edward F. Allen.
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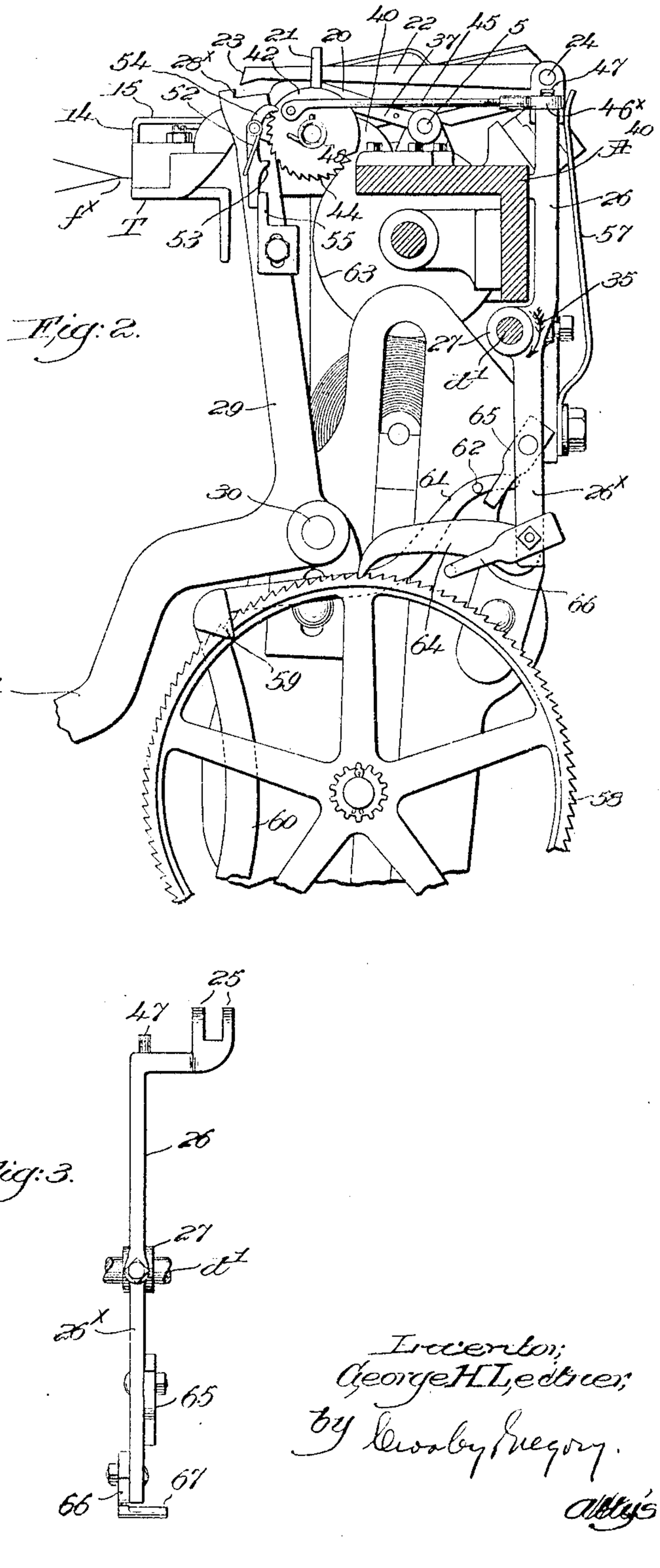

Fig: 2.

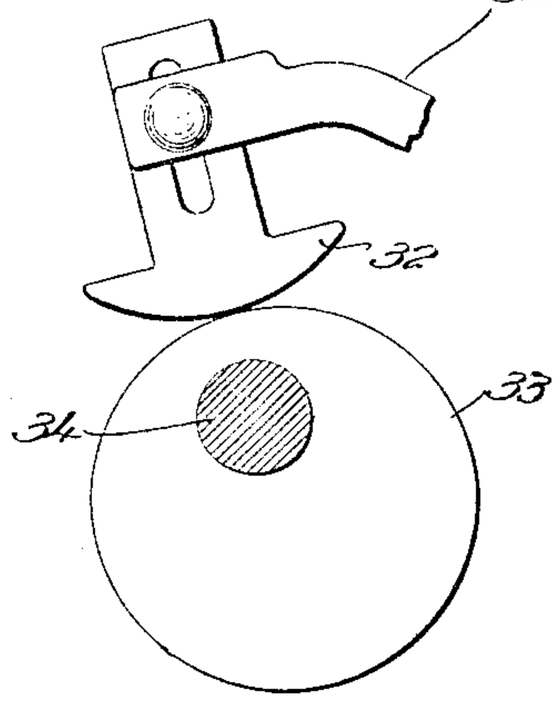

Fig: 3.

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3 SHEETS—SHEET 3.

Fig: 4.

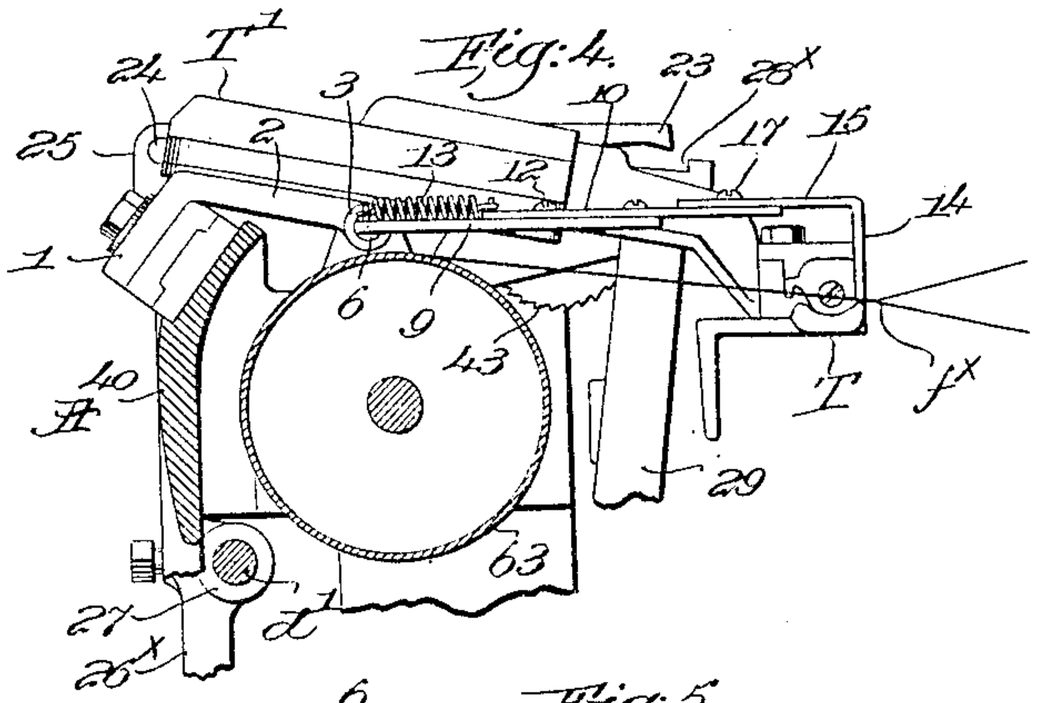


Fig: 5.

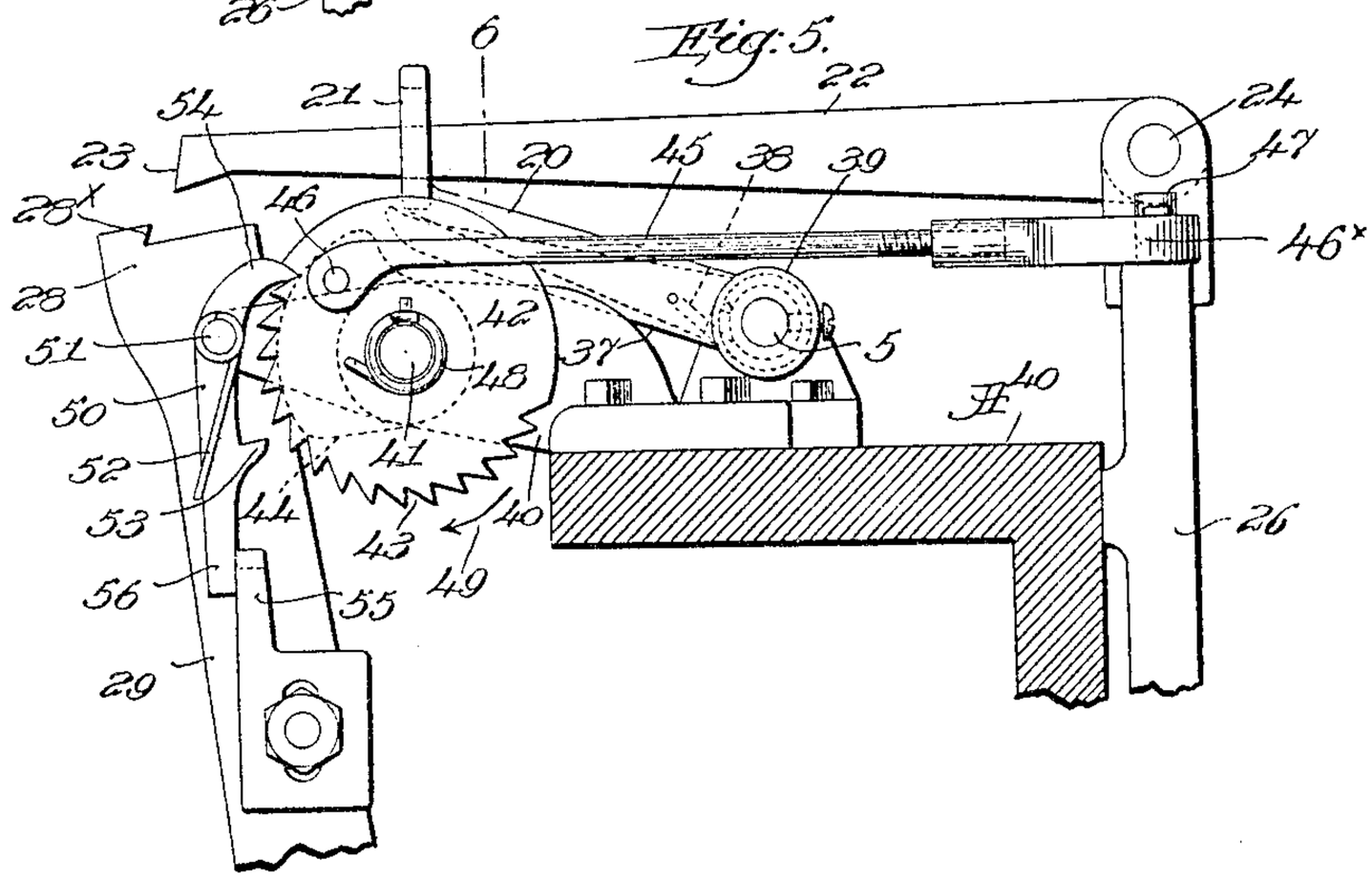


Fig: 7.

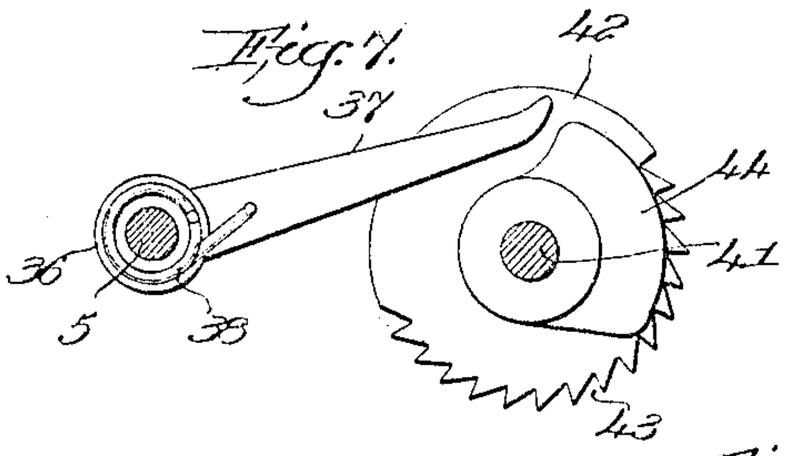


Fig: 6.

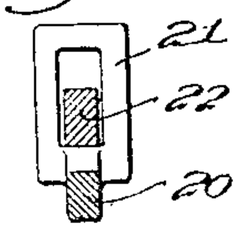
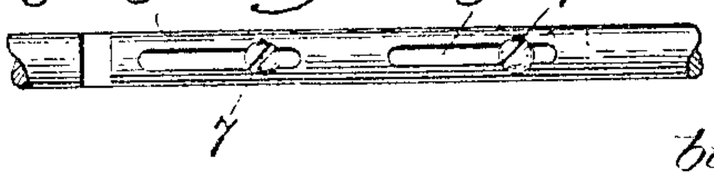


Fig: 8.



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UNITED STATES PATENT OFFICE.

GEORGE H. LEITNER, OF AUGUSTA, GEORGIA, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

LOOM.

No. 887,484. Specification of Letters Patent. Patented May 12, 1908.

Application filed March 11, 1907. Serial No. 361,680.

To all whom it may concern:

Be it known that I, GEORGE H. LEITNER, a citizen of the United States, and resident of Augusta, county of Richmond, State of Georgia, have invented an Improvement in Looms, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

This invention has for its object the production of a loom for weaving embodying numerous novel features of construction and arrangement to be described hereinafter in the specification in connection with the accompanying drawings, wherein is illustrated one practical embodiment of my invention.

It is well known to those skilled in the art that looms wherein a change or replenishment of the running filling is effected automatically are of two broad types, to wit:— those wherein the filling in the running shuttle is changed or replenished, and those wherein a shuttle having a full supply of filling is substituted for the running shuttle in which the filling supply is more or less exhausted.

The operation of the mechanism which effects the change of filling, in either type, is brought about by or through the action of a filling-detector or fork which detects absence of running filling, usually between the cloth and the shuttle; by or through the action of a "feeler" which operates when the filling in the running or active shuttle is exhausted to a predetermined extent, and by or through a combination of filling-fork and filling-feeler.

In my present invention, as applied to a filling changing or replenishing loom, the change or replenishment of filling is brought about by or through the detection of a fault in the cloth itself, specifically by the absence of filling therein causing a thin place. To accomplish this result I govern the operation of the loom by or through a thin-place detecting instrumentality, so constructed and arranged that when filling absence in the cloth itself is detected a change in the operation of the loom is effected automatically, and in the present embodiment of my invention such change is the automatic replenishment of filling.

By means of my invention I eliminate the use of the well known filling-detectors or forks which coöperate with the running filling directly so long as it is intact, and I render unnecessary the employment of the so-called "feeler" to indicate predetermined exhaustion of such filling. A great simplification in the loom structure results, and the production of cloth with thin places is reduced to a minimum.

I have chosen to illustrate my invention as applied to a filling-replenishing loom of the Northrop type, such for instance as is shown in the United States Patent No. 529940 granted November 27, 1894, to Northrop, and in numerous later patents.

I have provided means to stop the take-up of the cloth and to let the same back upon the detecting action of the thin-place detecting means, in order that when the fresh filling is laid it will be beaten in next the last pick of old filling, eliminating the formation of a permanent thin place in the cloth. That is, when the detector acts it is because the filling is absent in the cloth, and a technical thin place has been formed, but it is only temporary, for by the stoppage of take-up and letting back of the cloth weaving with the fresh filling is resumed where the old filling failed.

There are certain novel features in connection with the thin-place detecting means *per se*, such as the immediate withdrawal of the detecting member from engagement with the cloth as soon as detecting action has taken place, and the subsequent return of the detecting member to engage the cloth, after a predetermined number of picks, the return movement being such as to prevent any tearing, piercing, or marring of the cloth.

As the detection of filling absence in the cloth results in a change in the operation of the loom, in the present embodiment of my invention, I have provided means whereby the detecting member is maintained inoperative, after detecting action, until the normal operation of the loom is resumed.

All of the foregoing novel features of my invention, with others not specifically referred to at present, will be fully described in the subjoined specification and particularly pointed out in the claims appended thereto.

Figure 1 is a top plan view of a sufficient portion of a loom to be understood, broken out between its sides, and having applied thereto one practical embodiment of my present invention, the greater part of the

take-up mechanism being omitted to avoid confusion; Fig. 2 is a detail on the line 2—2, Fig. 1, looking toward the right, showing the take-up mechanism in side elevation, and the means for controlling the operation thereof; Fig. 3 is a front elevation of the arm which is attached to the controlling or operating rock-shaft of the filling-replenishing mechanism and through which arm the thin-place detecting instrumentality governs such mechanism and the take-up mechanism; Fig. 4 is a transverse sectional detail on the line 4—4, Fig. 1, looking to the left, of a portion of the apparatus shown in Fig. 2 and viewed from the opposite side; Fig. 5 is an enlarged detail of the mechanism shown in the upper portion of Fig. 2, to more clearly illustrate the means for effecting a change in the operation of the loom when filling absence in the cloth is detected, and for effecting disengagement of the detector from the cloth after detecting action; Fig. 6 is a transverse sectional detail on the line 6—6, Fig. 5, to be referred to; Fig. 7 is an inner side view of a portion of the means for effecting disengagement of the detector from the cloth and for controlling the duration of such disengagement; Fig. 8 is a detail view in front elevation of the longitudinally adjustable rock-shaft on which the thin-place detecting member is mounted.

Referring to Fig. 1, the lay A^3 provided with shuttle-boxes B, $B^\times$, the shuttle S partly shown in the box B, and of any suitable automatically self-threading type, and the filling-replenishing mechanism, shown partially at the right, and including a transferrer f', and the hopper or filling-feeder F, only the inner end of the latter being shown, and the controlling rock-shaft d' by or through which the operation of the replenishing mechanism is effected, may be and are all of well known construction and operation in the Northrop type of loom, only one of the temples T being shown, and at the left hand side of the loom, it being understood that in practice a second temple will be located at the right-hand side to engage the adjacent edge of the cloth in usual manner.

I have herein shown a bracket or stand 1, secured to the support for the temple stand T', and having an arm 2, rearwardly extended over and beyond the breast beam A^{40}, and provided at its end with a bearing 3, a second bearing 4 being fixedly mounted on the left hand end of the breast beam, said bearings supporting a rock-shaft herein shown as longitudinally adjustable, and comprising two members 5 and 6, fitted together, and rigidly connected by suitable screws 7, the shanks of the screws passing through slots 8 in the member 6, so that the latter member can be moved transversely of the loom, the inner end of the shaft member 6 being rearwardly extended at 9, see also Fig. 4, to form a support or carrier for the thin-place detecting member to be referred to. Upon the carrier 9 is mounted a longitudinally slidable plate 10, provided with longitudinal slots 11 to receive the shanks of headed screws 12, which guide the plate 10, and at the same time retain it in place on the carrier, while permitting fore and aft movement thereof, a spring 13 attached to said plate at one end and at its other end to the carrier normally tending to hold the plate in the position shown in Figs. 1 and 4. The rear end of said plate has attached to it the detecting member proper, shown as a downturned finger 14 provided at its upper end with a flattened shank 15 longitudinally slotted at 16, Fig. 1, and adjustably held on the plate 10 by a set screw 17. By this construction the detecting member or finger 14 can be adjusted on the plate 10 toward or away from the fell of the cloth, so that under normal conditions, said detecting member will rest upon the cloth at the proper distance forward of the fell, such distance varying with the character of the cloth being woven, and with the manner in which the filling is beaten in. Ordinarily the detecting member rests upon the cloth at a distance from 4 to 10 picks forward of the fell.

When the running filling fails, the weaving operation continues until the cloth has been taken up a sufficient distance to enable the detector 14 to detect such absence of filling in the cloth being woven, and thereupon the detecting member drops down through the warp as is usual with thin place detecting devices, the rock-shaft 5, 6 at such time turning in its bearings.

A collar 18 is clamped on the shaft at the inner end of the bearing 3, and at the outer end of the bearing 4 is secured the hub 19 of a rearwardly extended and upwardly inclined arm 20, upturned at its extremity and shaped to present an upright, elongated guide 21, see Figs. 5 and 6. A latch 22 having at its rear end shaped to present a tooth 23 is extended loosely through the guide 21, and at its forward end the latch is fulcrumed at 24 between ears 25 formed on the lateral head of an upright arm 26, the hub 27 of said arm being secured on the controlling or operating rock-shaft d', hereinbefore referred to, as clearly shown in Fig. 2. Normally the latch is held in the position shown in Figs. 2 and 5, by the bottom of the guide 21 with its rear end or tooth 23 above the path of movement of the notched or shouldered head 28 of a vibrating actuator 29, fulcrumed on the loom-frame at 30, and having a depending extension 31 provided with a follower 32 which coöperates with a cam 33 on the usual cam-shaft 34 of the loom to be hereinafter referred to. This vibrating member or actuator is similar to the usual weft hammer of a loom, and in the present instance makes one complete reciprocation for every two picks,

and herein the head of the actuator begins its forward movement just before the pick of the shuttle to the right hand box $B^{\times}$, and returns just before the following pick. If the latch 22 is permitted to descend to bring its tooth 23 into the path of the shoulder $28^{\times}$ of the head of said actuator on the forward stroke of the latter, it will be manifest that the latch will be moved longitudinally to the right, viewing Figs. 2 and 5, and through its connection with the upright arm 26, the rock-shaft d' will be turned in the direction of the arrow 35, Fig. 2, to thereby effect the actuation of the replenishing mechanism when the shuttle is in the box $B^{\times}$ at the replenishing side of the loom. The coöperation of the latch and vibrating actuator is controlled by the thin-place detector hereinbefore described.

The member 5 of the adjustable rock-shaft 5, 6, is extended beyond the hub 19 of the arm 20, which latter is a species of detent for the latch, and on the extended portion of the shaft member 5 it loosely mounted the hub 36 of an arm 37 connected with the hub 19 by a spring 38. One end of the spring is fixedly secured to said hub and the other end to the arm 37, the winding of the spring being such that elevation of the arm 37 will tighten the spring. A collar 39 on the shaft member retains the arm 37 in place, and this arm I have termed a lifter or lifting device, to at the proper time lift the latch 22 from engagement or coöperation with the vibrating actuator 29, and the thin-place detector from the cloth.

From the foregoing description, it will be manifest that so long as the detecting member 14 rests upon the cloth, the detent 20 will be held in such a position that the latch 22 cannot be engaged by the shouldered head of the actuator 29, but as soon as the detector detects filling absence, it drops and turns the rock-shaft 5, 6, lowering the detent 20, and thereby placing the latch in position to be engaged by the actuator with the resultant operation of the filling-replenishing mechanism.

It is desirable to remove the thin-place detector from engagement with the cloth just as soon as possible after filling-absence has been detected, and this is accomplished through the lifting device or arm 37 in a manner now to be described.

A bracket 40 rearwardly extended from the breast beam between the detent 20 and the lifter 37, see Fig. 1, is provided with a lateral stud 41, on which is mounted a disk 42 having a series of ratchet teeth 43 on a portion of its periphery, and secured to or forming a part of said disk is a cam 44, adapted to at times coöperate with the lifter 37. A link 45 is pivotally connected at 46 to the disk, and is extended forwardly above the breast-beam, the front end of the link having attached to it a longitudinally slotted extension $46^{\times}$, which loosely receives an upright stud 47, projecting from the head of the upright arm 26. I provide a spring to normally retain the disk 42 and cam 44 in the position shown in Fig. 5, and herein such spring is shown at 48 loosely coiled around the outer end of the stud 41, and attached at one end thereto, the other end being secured to the disk. As the connection 46 between the link 45 and the disk is above the stud, it will be manifest that the spring-induced movement of the disk is limited by the engagement of the stud 47 with the outer end of the slotted extension $46^{\times}$. Now when the upper end of the arm 26 is swung outward, by coöperation of the vibrating actuator with the latch 22, the link 45 is moved to the right, viewing Fig. 5, and turns the disk 42 in the direction of the arrow 49, bringing the high portion of the cam 44 into engagement with and swinging upward the lifter 37, thereby winding up or tightening the spring 38, it being remembered that the latch 22 is at such time held depressed by coöperation with the shoulder $28^{\times}$ of the actuator. As the disk is turned in the direction of the arrow 49, the ratchet teeth 43 click past an escapement 50, pivotally mounted at 51 on the rear end of the bracket 40, said escapement being acted upon by a spring 52, which tends to throw the lower tooth 53 into engagement with the ratchet, and the upper tooth 54 out of such engagement. A finger 55 attached to the actuator 29 is adapted to engage the depending tail 56, of said escapement, as the actuator approaches its rearmost position, withdrawing the tooth 53 from the ratchet and moving the tooth 54 into engagement therewith. When the latch is dropped into engagement with the actuator, the latter is on its forward stroke, and releases the escapement before the link 45 begins to turn the disk 42 in the direction of arrow 49. Remembering that such rotation of the disk causes the cam 44 to wind or tighten the spring 38, and also remembering that the escapement will remain in engagement with the ratchet teeth when the disk has completed such rotative movement, it will be manifest that the instant the actuator begins to go back, disengaging the shoulder $28^{\times}$ and the latch-tooth 23, the spring 38 will expand or unwind, and swing upward the detent 20. Thereupon the latch is moved out of range of the actuator, and the rock-shaft 5, 6, is turned, to elevate the support or carrier 9, disengaging detector 14 from the cloth. The high portion of the cam 44 at such time is beneath the adjacent end of the lifter 37, so that the latter cannot return to normal position until the disk 42 returns to the position shown in Fig. 5. This return is effected intermittingly or in a step-by-step manner by the coöperation of the escape-

ment with the ratchet teeth 43. The spring 48 tends to turn the disk oppositely to the arrow 49, and as the vibrating actuator swings forward, the tooth 53 of the escapement is brought into engagement with the ratchet teeth and on the rearward stroke of the actuator the tooth 53 is disengaged and the tooth 54 moved into engagement with the ratchet teeth. This locking of the escapement permits the spring 48 to return the disk 42 and cam 44 step by step to normal position. It will be understood that as soon as filling-replenishment has been effected, the arm 26 and the rock-shaft d' return to normal position, assisted by a leaf spring 57, shown in Fig. 2, and bearing on the upper end of the arm 26. At this time, the stud 47 moves rearwardly in the slotted extension $46^{\times}$, the lost motion between the said arm 26 and link 45 being necessary to permit the gradual return of the disk to normal position.

The mechanism just described operates to withhold the detecting member from engagement with the cloth for a predetermined number of picks, and then causes a gradual descent of said member into reëngagement with the cloth, the gradual descent preventing any possibility of puncturing or tearing the cloth, as might happen were the detector allowed to drop quickly into detecting position. When the detector is just about to reengage the cloth, the cam 44 is just ready to release the lifter 37. The complete movement of said cam to normal position leaves such a clearance between it and the lifter as to present no obstacle to the descent of the detector and the latch, when filling absence is detected.

The operation of the take-up mechanism of the loom is stopped or arrested by or through detection action of the thin-place detector, and the take-up roll is released from the control of the take-up mechanism in order that let-back of the cloth may be effected, to carry the cloth back into proper position, so that when the fresh filling is shot across the loom, it will be properly beaten in. It is desirable to so adjust the thin-place detector that it will normally be engaged by the cloth as near the fell as possible, in order that when the detector operates the minimum amount of let-back will be necessary. That is, the greater the amount let back the lower the percentage of production on the loom, because the amount let back must be again taken up before normal weaving is resumed.

It is not desirable to vary the amount to be let back by varying the position of the detector with relation to the fell, it being understood that some variation in the let back must be provided on account of the varying tensions under which different kinds of fabric are woven. Hence, in order to vary the amount of let-back I have herein provided means independent of the position of the detector to effect such variation, and adjustable at the will of the operative.

Any suitable form of take-up mechanism may be employed, and herein I have shown a portion of the take-up mechanism comprising the ratchet 58, the coöperating take-up pawl 59 mounted on the pawl-carrier 60, Fig. 2, the latter having a forwardly extended upper end 61 having a lateral stud or projection 62, the ratchet 58 being operatively connected in any suitable manner with the take-up roll 63.

The take-up mechanism thus far described is substantially the same as in United States patent to Clement No. 643284, dated February 13, 1900. A detent pawl 64 normally coöperates with the ratchet 58, and prevents retrograde movement thereof.

The arm 26 is extended downward at $26^{\times}$ below the rock-shaft, and it has attached to it tappets 65, 66, the latter having a lateral projection 67 extended under the detent pawl 64 while the extremity of the tappet 65 is extended under the pin or lug 62 on the pawl-carrier. Both tappets are adjustably secured to the extension $26^{\times}$ by suitable clamping bolts, so that the position of the tappets may be changed with relation to the parts of the take-up mechanism with which they cooperate to shorten or lengthen the time during which let-back may be effected.

The cam 33 which operates the vibrating actuator 29 is herein shown as a circular or eccentric cam, having no dwell portion, as opposed to the usual cam, which has a dwell at the high portion. Now when a thin place occurs and the detector drops the latch 22 moves into engagement with the head of the vibrating actuator, and as the cam rotates the forward movement of the actuator operates through the latch and the arm 26 to turn the rock-shaft d', and at the same time the depending extension $26^{\times}$ is swung rearward, bringing the tappets 65 and 66 into operation to disengage the pawls 59 and 64 from the take-up ratchet 58. By such disengagement take-up is arrested, and let-back effected by reason of the tension of the cloth, and the amount of let-back is governed by the length of the period of such disengagement, the longer the disengagement the greater the amount of let-back, and vice versa. Owing to the shape of the cam 33 and the adjustability of the tappets 65 and 66 the duration of such disengagement can be varied from almost nothing to a very considerable extent. That is, by setting the tappets so that in the normal position of the extension $26^{\times}$ said tappets are very close to their respective coöperating parts the disengagement of the pawls from the ratchet 59 will begin earlier and will terminate later, making a long period of disengagement with a corresponding increase in the amount let

back. On the other hand, by setting the tappets away from their coöperating parts disengagement will begin later and will terminate earlier, shortening the period of disengagement and correspondingly decreasing the amount of let-back. It will be obvious, therefore, that by setting the tappets back the proper distance the let-back can be made as small as desired. With coarse weaves or high tensions on the cloth the adjustment referred to would be such as to make a very slight let-back, while with other weaves and lighter tensions the adjustment would be made to effect a greater amount of let-back.

If for any reason, the detecting member 41 should not be disengaged from the cloth before let-back is permitted, the said detecting member can move rearwardly with the cloth, owing to the sliding arrangement of the carrier 10 on the arm 9, the spring 13 at such time yielding to permit the rearward movement of the detector, and thereby preventing tearing or other injury to the cloth by or through the detector. When the latter is lifted, and disengaged from the cloth, the spring 13 contracts and returns the carrier 10 to normal position with relation to the rocker arm 9.

As take-up is resumed, after the replenishment of filling has been effected, the normal operation of the loom is resumed, and weaving continues for several picks, and then the thin-place detector is permitted to resume its normal position, resting upon the cloth near the fell.

The longitudinal adjustment of the compound shaft 5, 6 enables me to adjust the thin place detector laterally with relation to the temple and by referring to Fig. 1, it will be seen that I can adjust the temple without necessarily changing the position of the thin-place detector relatively to the selvage of the cloth, for the temple can be moved as to the left, and the bracket or stand 1 will be moved with it, and when in proper position the collar 18 is reclamped on the thin-place detector rock-shaft, the said collar and the hub 19 of the detent preventing any longitudinal movement of the said rock-shaft in its bearings.

If the detection of filling absence should occur on the pick of the shuttle to the right, then the latch 22 will be permitted to descend, but it will drop onto the top of the actuator head, and the latter will slide under the latch as it moves to the rear, the latch tooth dropping in front of the shoulder $28^{\times}$ as the actuator completes its rearward stroke, and on the next or operative stroke, the rock-shaft d' will be turned and a change of filling effected. In other words, it is immaterial on which pick the absence of filling is detected because the rock-shaft d' will always be turned by or through such detection at the proper time to effect a change of filling when the shuttle is in the shuttle-box $B^{\times}$.

As there is no filling-fork to coöperate with intact filling, as the lay beats up, it is unnecessary to provide the raceway of the lay with a transverse recess through which the ends of the fork-tines pass, as the lay beats up, and therefore I am enabled to make the raceway continuous from one to the other shuttle-box. This is of advantage, as it removes any possibility for deflecting or changing the course of the shuttle through an interruption in the raceway such as is made by the usual fork-receiving recess.

The thin-place detector is set in practice at such a distance in front of the fell of the cloth that it will not be hit by the reed on the beat-up and the harder the beating in of the filling, as a general thing, the farther forward, away from the fell, must the detector be set. Such variation in the position of the detector is immaterial, however, for whether the distance between the detector and the fell be greater or less, the detector will operate as soon as filling-absence is detected.

It will be understood from the foregoing description that under normal conditions the cloth holds up the detector and the latter through the intervening connections holds the latch in its inoperative position, the detent member or arm 20 acting through the spring 38 to maintain the lifter 37 in the position shown in Figs. 5 and 7.

It is of course necessary that the latch shall be free to drop far enough to enter the path of the notched head of the vibrating actuator when filling absence is detected, and the clearance between the cam 44 and the adjacent end of the lifter permits this drop.

The toothed disk 42 will always return to normal position shown in Fig. 5, because the link 45 will limit its returning rotative movement, acting as a check or stop to limit the return movement, and prevent any accidental disengagement of the ratchet teeth and the escapement.

The adjustment for advancing or delaying the arrest of the take-up is dependent largely upon the tension on the cloth. If there is considerable tension, the arrest of take-up is delayed somewhat, while on goods woven with a lighter tension, the arrest of take-up is advanced, so that in either case the let-back will be amply sufficient to bring the fell back into position for the fresh filling to be beaten in properly.

While I have herein shown and described mechanism relating more particularly to take-up and let-back mechanism, which governs the take-up of the cloth and lets back the same, I have not herein claimed such mechanism broadly, as such claims are included in a divisional application Serial No. 388,848, filed by me the 16th day of August 1907.

My invention is not restricted to the pre-

cise construction and arrangement herein shown, as various changes or modifications may be made in different details of construction and arrangement by those skilled in the art without departing from the spirit and scope of my invention.

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

1. In a loom, mechanism to replenish automatically the filling in the running shuttle, means to control the time of operation of said mechanism, an actuator to at times cooperate with and effect the operation of said means, and a thin-place detector to effect cooperation between said means and the actuator when filling absence in the cloth is detected by the said detector.

2. In a loom, mechanism to replenish automatically the filling in the running shuttle, means to control the time of operation of said mechanism, said means including a rock-shaft and a latch operatively connected therewith, an actuator, a thin-place detector normally resting on the cloth adjacent the fell, and a detent governed by the detector and normally preventing coöperation of the latch and the actuator, detection of a thin place in the cloth by the detector acting through the detent to permit the actuator to coöperate with the latch and turn the rock-shaft.

3. In a loom provided with automatic filling-replenishing mechanism in combination, a thin-place detector, take-up mechanism, connections between said mechanisms and the detector, to effect filling replenishment and vary the control of the take-up mechanism upon the cloth when said detector detects a thin place in the cloth, and means to disengage automatically the detector from the cloth after detecting action.

4. In a loom provided with automatic filling-replenishing mechanism, in combination, a thin-place detector, take-up mechanism, connections between said mechanisms and the detector, to effect filling replenishment and vary the control of the take-up mechanism upon the cloth and permit let back when the detector detects a thin place in the cloth, and means to remove the detector from engagement with the cloth after detecting action and maintain it out of engagement until the take-up mechanism has resumed control of the cloth.

5. In a loom, in combination, automatic filling-replenishing mechanism, means to detect absence of filling adjacent the fell of the cloth and between the edges thereof, and devices governed by said means and operative upon detecting action thereof to effect the actuation of the replenishing mechanism.

6. In a loom provided with automatic filling-replenishing mechanism and take-up mechanism in combination, a thin-place detector, and connections between it and said mechanisms to effect filling replenishment and vary the control of the take-up mechanism upon the cloth upon detection by said detector of a thin place in the cloth.

7. In a loom, a thin-place detector normally resting on the cloth adjacent the fell, and means to remove automatically the detector from engagement with the cloth after the detection of filling absence therein, such disengagement of the detector and the cloth being effected independently of the cloth.

8. In a loom, in combination, mechanism to effect automatically a change of filling, and means to cause the actuation of such mechanism by or through detection of filling absence within the fabric being woven.

9. In a loom, in combination, mechanism to replenish automatically the filling in the running shuttle, and means to detect the absence of filling within the woven fabric and thereupon cause the actuation of said mechanism.

10. The combination, in a loom provided with mechanism to replenish automatically the running filling, of means to effect the actuation of said mechanism by or through detection of filling absence between the selvages of and within the fabric being woven.

11. The combination, in a loom, of a thin-place detector, mechanism to replenish automatically the running filling, and connections between said mechanism and the detector to effect the actuation of the former upon detecting action of the latter.

12. In a loom, in combination, means to detect within the cloth absence of filling, filling-replenishing mechanism actuated by such detection, and means to automatically let back the cloth by or through the operation of said detecting means.

13. In a loom, a thin-place detector normally resting on the cloth near the fell, means to effect a change in the operation of the loom upon detection by said detector of filling absence in the cloth, and an instrumentality to remove automatically the detector from engagement with the cloth after detection of filling absence therein, such removal of the detector being effected by said instrumentality, independently of the cloth.

14. In a loom, a thin-place detector normally resting on the cloth near the fell, a support for and on which the detector is longitudinally movable, yielding means to retain the detector in operative position on the support, and an instrumentality to lift automatically the support and thereby disengage the detector from the cloth after detection of filling absence therein.

15. The combination, in a loom, of a thin-place detector normally resting on the cloth near the fell thereof, means to effect a change in the operation of the loom by or through detection by said detector of filling absence

in the cloth, and an instrumentality to render said detector inoperative after detecting action thereof and maintain it inoperative until the normal operation of the loom is resumed.

16. The combination, in a loom having filling-replenishing mechanism and take-up mechanism adapted to at times let back the cloth, of an instrumentality to detect the absence of filling in the cloth and effect automatically the actuation of the replenishing mechanism, and also stop take-up and let back the cloth, and means to effect disengagement of the detecting instrumentality from the cloth after detecting action and maintain it disengaged until normal weaving has been resumed.

17. In a loom, means to effect a change in the operation thereof, including a latch, and a vibrating actuator to coöperate therewith and cause the operation of the means, a thin-place detector, a detent governed thereby to normally maintain the latch inoperative, a lifter, a spring connecting it with said detent, a cam to act upon the lifter and tighten the spring, means to actuate the cam when the latch is engaged by the vibrating actuator upon detection of a thin place by said detector, the tightened spring acting through the detent to disengage the latch from the actuator on the return stroke of the latter and simultaneously to lift the thin-place detector from the cloth, and mechanism to return said cam to normal position thereafter and permit the spring and the lifter to resume their normal positions, whereby the detector is again brought into engagement with the cloth.

18. In a loom, a thin-place detector normally resting on the cloth near the fell, means to effect a change in the operation of the loom by or through detecting action of said detector, said means including a vibrating actuator, and mechanism to render the detector inoperative temporarily after detecting action, said mechanism including a lifter to elevate the detector, a spring controlled cam having an attached ratchet, means to turn the cam by or through the vibrating actuator to coöperate with the lifter when filling absence in the cloth is detected, thereby disengaging the detector from the cloth, an escapement coöperating with the ratchet to permit gradual return of the cam and lifter to normal positions, whereby the detector is again brought into engagement with the cloth, and means to effect the actuation of the escapement by the vibrating actuator.

19. In a loom, a thin-place detector normally resting on the cloth near the fell, means the actuation whereof is effected by detecting action of said detector, mechanism to render the detector inoperative immediately after detecting action thereof, and a retarding device forming part of said mechanism to retain said detector inoperative during a predetermined number of picks.

20. In a loom, in combination, a rock-shaft, a connected support or carrier extended rearwardly above the cloth, a longitudinally-movable plate mounted thereon, and a thin-place detector adjustably connected with said plate.

21. In a loom, in combination, a rock-shaft, a connected support or carrier extended rearwardly above the cloth, a longitudinally-movable plate mounted on the support, a spring to retain said plate in normal forward position, and a thin-place detector connected with the plate and depending therefrom to normally rest upon the cloth near the fell.

22. In a loom, in combination, take-up mechanism, including take-up and detent pawls and a ratchet with which they coöperate, means to detect the absence of filling in the cloth, a member movable into abnormal position upon detection of such filling absence, actuating means for said member, including a circular cam or eccentric, and devices adjustably mounted on said member and adapted to disengage said pawls and the ratchet when said member is moved into abnormal position, to arrest take-up and permit let-back, duration of the period of disengagement being increased or decreased according to adjustment of said devices to effect earlier or later disengagement relatively to the high point of said cam.

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

GEORGE H. LEITNER.

Witnesses:
A. S. MORRIS,
GEO. H. GERCKE.