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FEELER DEVICE FOR AUTOMATIC WEFT REPLENISHING MECHANISM IN LOOMS

Filed Feb. 12, 1934

3 Sheets-Sheet 1

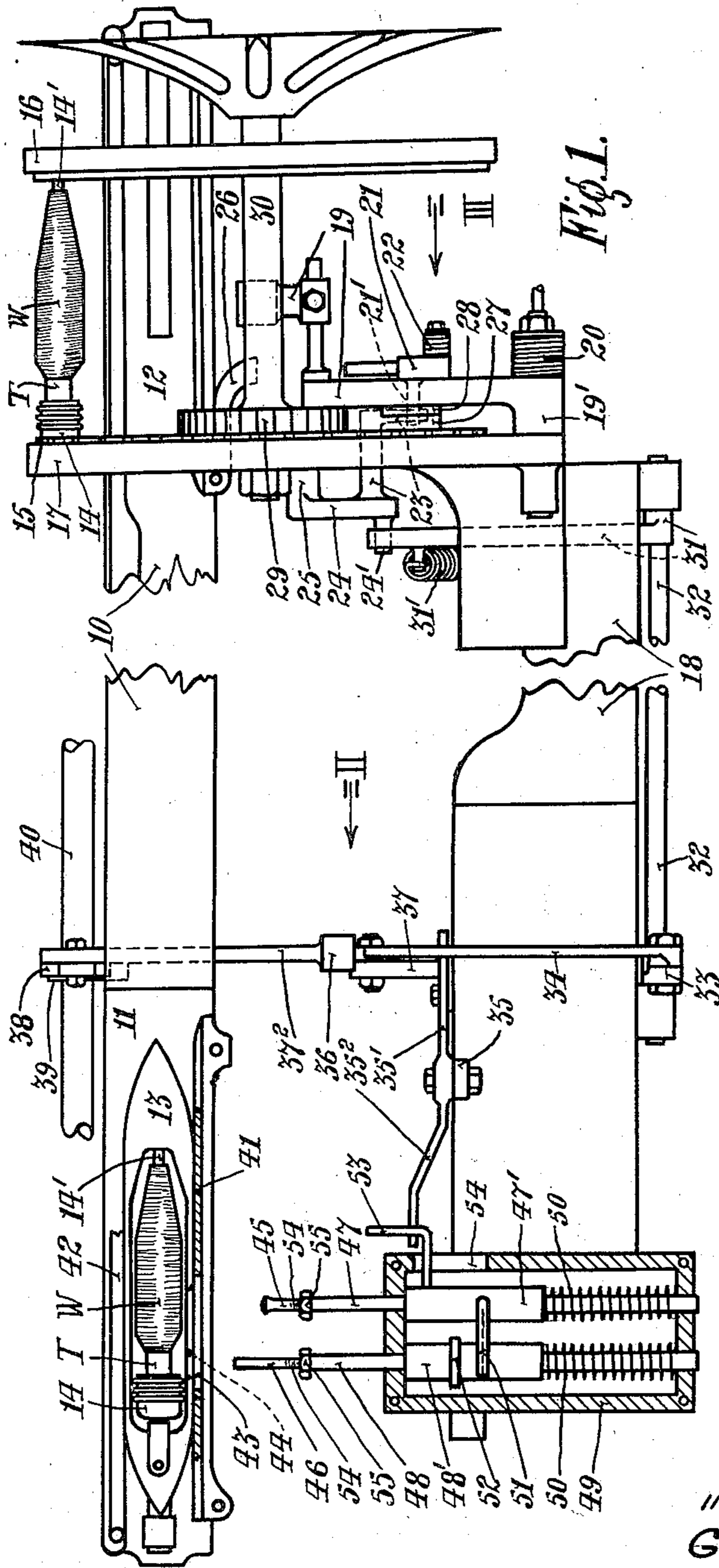


Fig. 1.

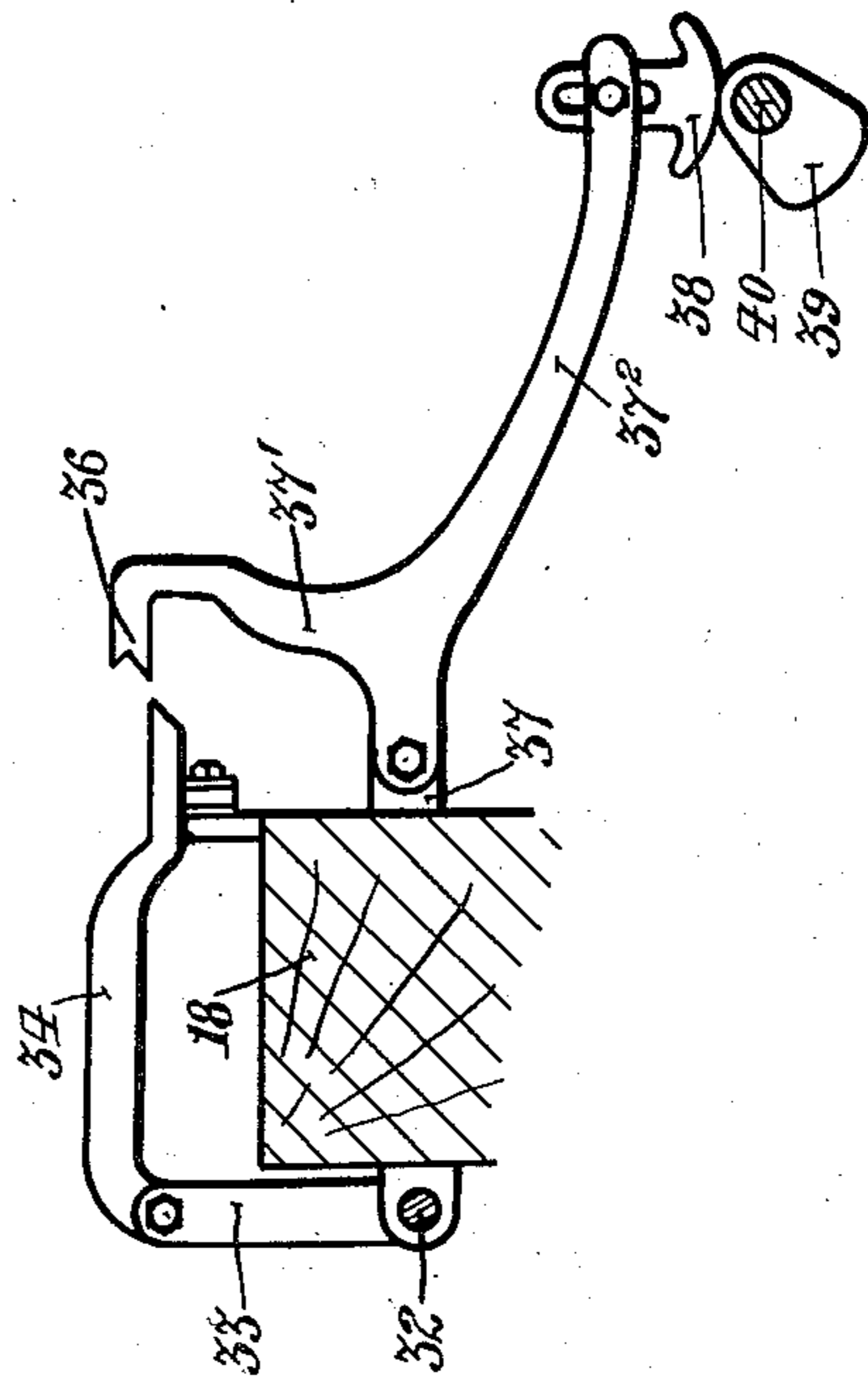


Fig. 2.

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Fig. 5.

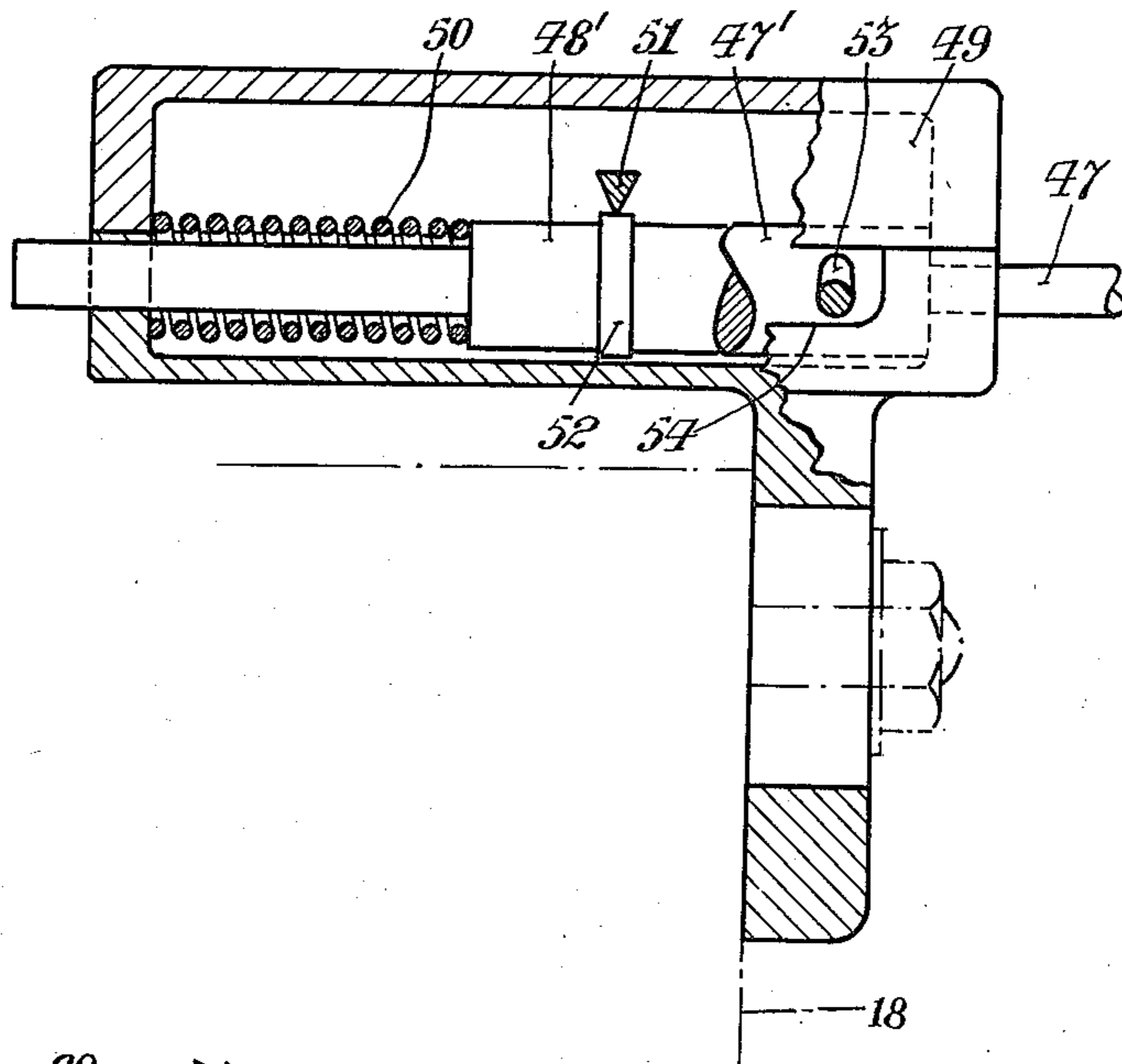


Fig. 3.

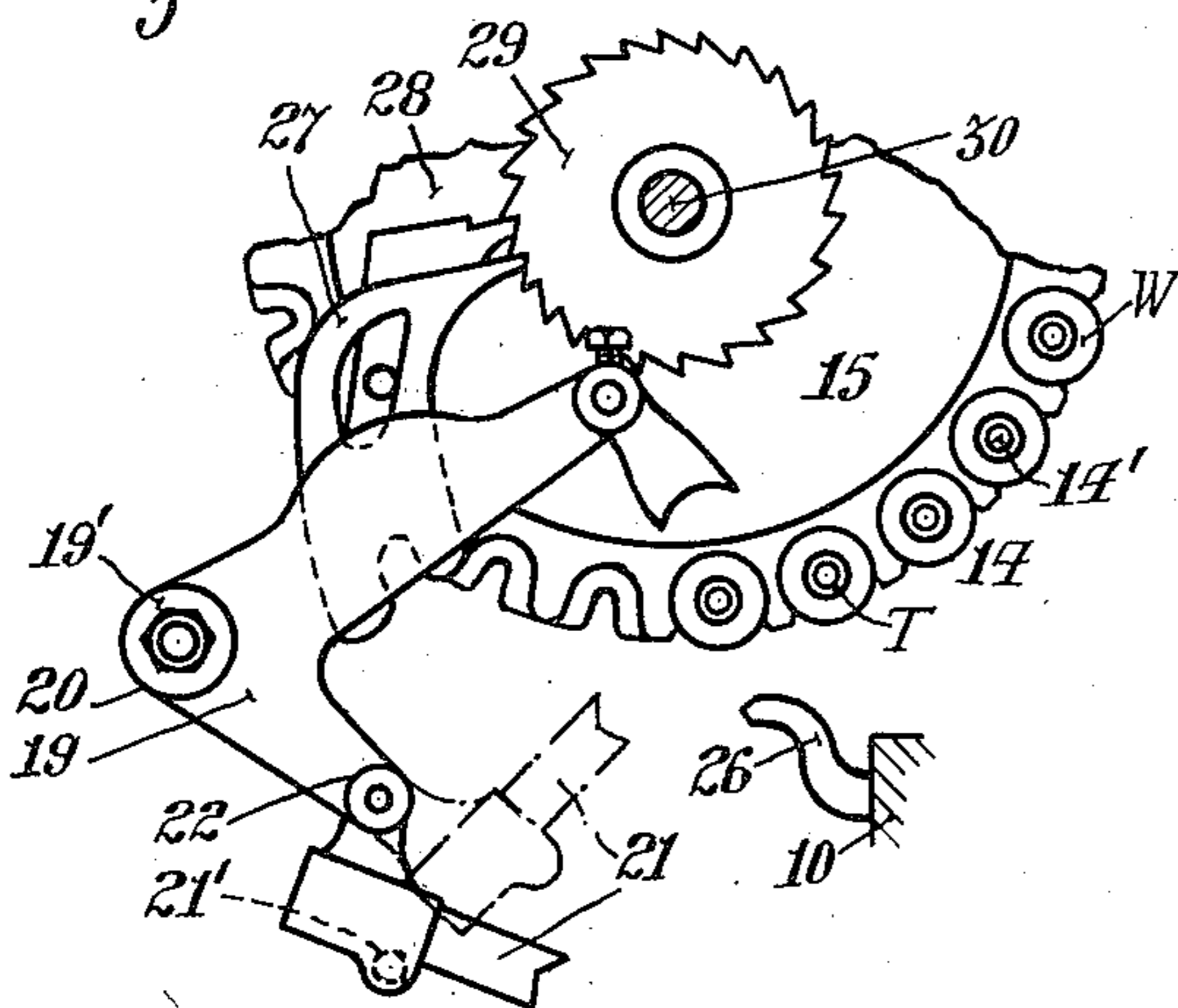
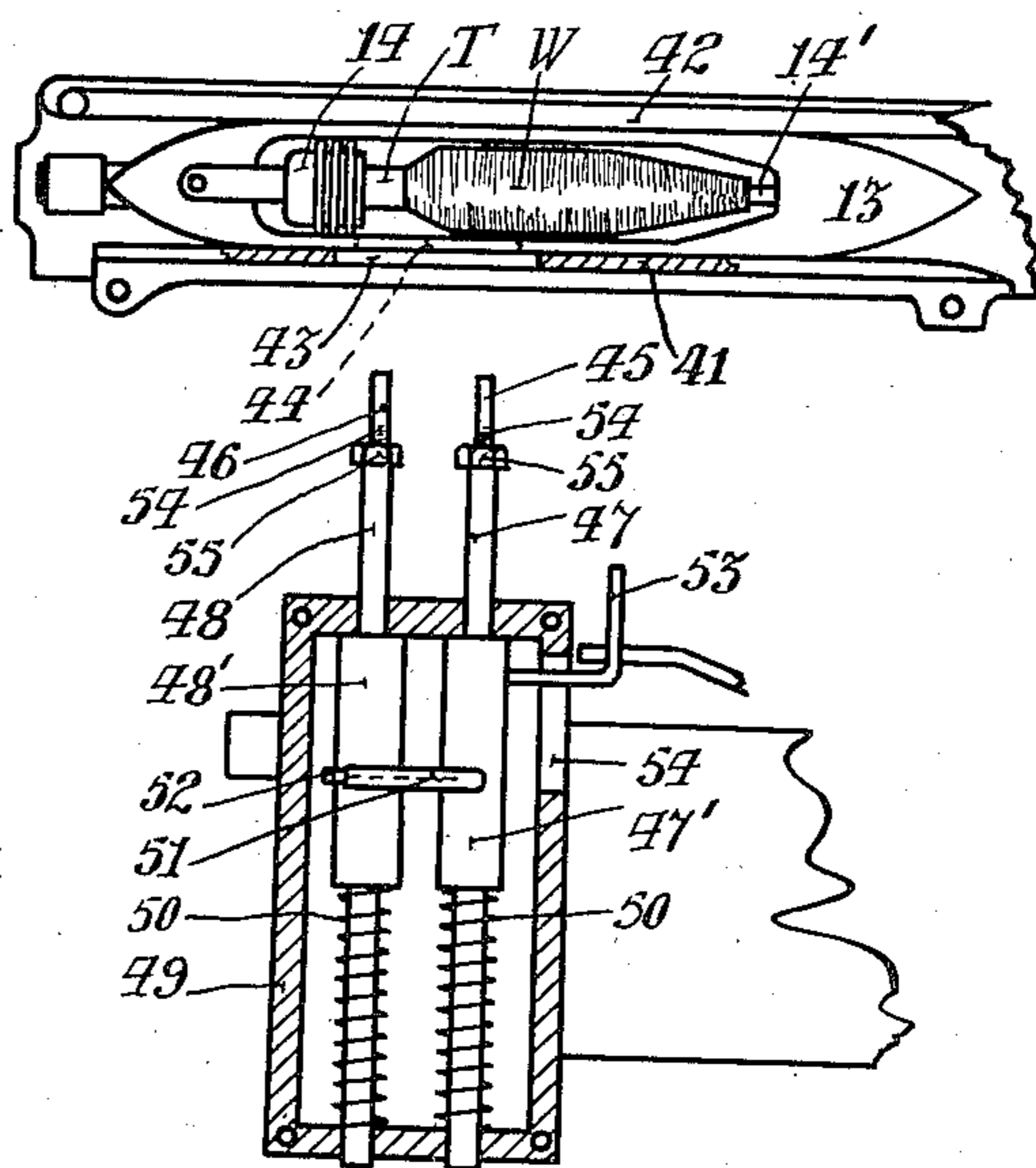


Fig. 7.



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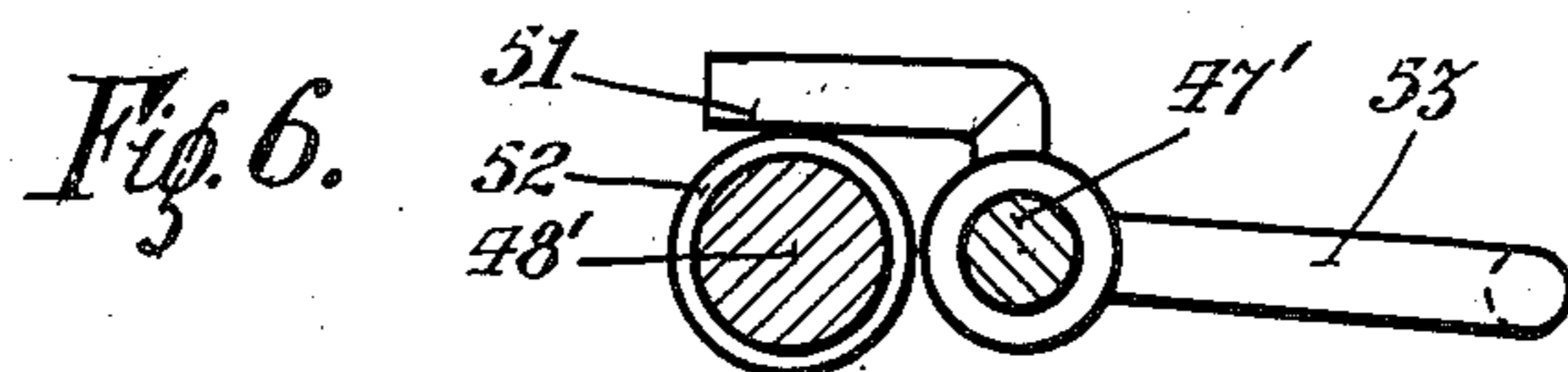
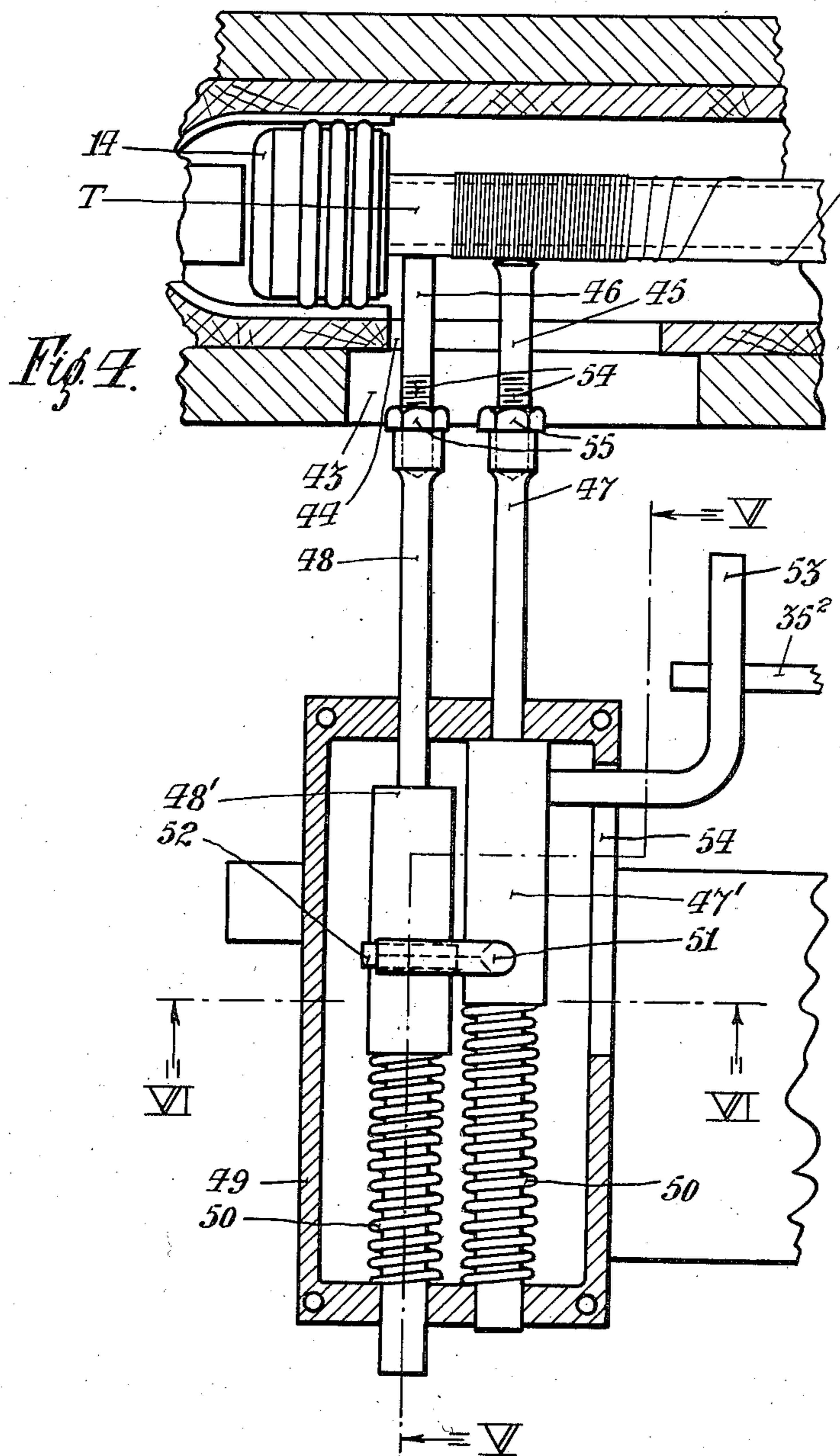
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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FEELER DEVICE FOR AUTOMATIC WEFT-
REPLENISHING MECHANISM IN LOOMSGeorge Frederick Norman Martin, Glasgow,
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9 Claims. (Cl. 139—277)

This invention is concerned with automatic weft-replenishing mechanism for looms wherein a feeler device—which is mounted in the path of one of the two shuttle-boxes mounted at opposite ends of the lay, or sley, and which exercises its feeling action each time a shuttle occupies the said one of the shuttle-boxes—is adapted to control the actuation of an ejector and magazine when the supply of weft in the shuttle is almost exhausted, whereby the nearly exhausted bobbin, cop, tube, pirn or the like (referred to generally hereinafter as a weft-holder) is ejected from the shuttle and a fresh one supplied thereto from the magazine.

The present invention relates to the known type of feeler device wherein there are two differentially movable feelers one of which is operatively associated through some form of setting means with the weft-replenishing mechanism and is adapted to initiate the actuation of the said mechanism when the feelers bear a predetermined co-relationship at or about the end of the beat-up of the lay.

An object of the present invention is to provide an improved feeler device of the type stated which will function reliably at a moment in the cycle of operations when a weft-holder is almost exhausted of weft and independently of dimensional variations between the different weft-holders in association with which the arrangement would operate, such variations being generally present to a marked degree where said weft-holders include paper or like tubes whereon the weft is wound.

Another object of the invention is to provide an improved feeler device of the type stated comprising a pair of inter-engaging feelers one of which is repeatedly contacted and displaced to a progressively decreasing extent by weft wound on the core of a weft-holder, and the other of which is simultaneously contacted and displaced, but to a constant extent, by the core whereon the weft is wound. With such an arrangement, the actuation of the weft-replenishing mechanism is timed to take place when the weft-holder is almost exhausted of weft, and this timing can be effected with great precision, because the action of the feelers is dependent simply on the thickness of the body of weft on the weft-holder, and is therefore independent of the dimensions of the weft-holder itself. The invention should therefore be distinguished from any arrangement in which one of the feelers was contacted by some surface of the weft-holder other than that on which the weft was wound, because in any such arrangement small differences in the dimensions of different weft-holders would introduce corresponding variations in the timing of the feeler action.

In a preferred arrangement, the means of en-

gagement between the feelers is so made that, while there is a sufficiency of weft on the weft-holder, the feelers when displaced move purely endwise; and that, when the weft is almost exhausted, the core-operated feeler is so displaced relatively to the weft-operated feeler that one of them imparts to the other an additional movement, and the other feeler in consequence displaces a normally inactive setting member into a position in which said member is engaged by a striker, the weft-replenishing mechanism being thereby set for actuation.

In an alternative arrangement, the means of engagement between the feelers is so made that, while there is a sufficiency of weft, the displacement between the feelers is differential and in consequence one of the feelers receives an additional movement and displaces a setting member from an operative position into an inoperative position; and that, when the weft is almost exhausted, there is practically no differential movement, with the result that the setting member is left in its operative position, so that it is engaged by a striker, the weft-replenishing mechanism being thereby set for actuation.

In order that the invention can be clearly understood, the same will now be described by way of example with reference to the accompanying drawings, in which:—

Fig. 1 is a diagrammatic sectional plan showing a preferred construction of the improved feeler arrangement as applied to a Northrop loom having automatic weft-replenishing mechanism, only such parts of the loom and said mechanism being shown as are necessary to enable one conversant with the art to understand the invention.

Figs. 2 and 3 are fragmentary sectional diagrammatic views in the direction of the arrows II and III respectively in Fig. 1.

Fig. 4 is a sectional plan of the feeler arrangement drawn to a larger scale.

Fig. 5 is a sectional elevation of Fig. 4, the section being on the line V—V of Fig. 4.

Fig. 6 is a section on the line VI—VI of Fig. 4.

Fig. 7 is a sectional plan, to the same scale as Fig. 1, of an alternative construction of the improved feeler arrangement.

The working parts of the weft-replenishing mechanism—to which the improved feeler arrangement is applied in accordance with this invention—and the associated loom parts, including the lay and the shuttle-boxes, are of well known construction and operation; and these parts have therefore been illustrated simply in a diagrammatic manner in the accompanying drawings. As shown, the lay is denoted by 10, the left and right hand shuttle-boxes by 11 and 12 respectively, the shuttle by 13 and the weft-holders generally by 14. The weft-holders are of the

kind of which each includes a skewer 14' adapted to receive a paper or like tube T constituting a core whereon the weft W is wound. The weft-replenishing mechanism includes a pair of spaced magazine wheels 15, 16 which are rotatably mounted on a bracket 17 secured to the frame 18 of the loom and between which a circularly arranged series of full weft-holders are stored in readiness for transfer one at a time into the shuttle. For clearness, only one weft holder is shown in the magazine in Fig. 1. The weft-replenishing mechanism also includes an ejector consisting of a transfer hammer 19 pivotally mounted at 19' on the bracket 17 and provided with a return torsion spring 20. The hammer has pivotally mounted on it a latch 21 which is normally held against a pivotal movement under the action of a torsion spring 22 by a support 23 extending from a lever 24 fulcrumed at 25 on the bracket 17, the support 23 pressing down upon a lateral pin 21' on the latch 21. The latch cooperates with a striker, or so-called "bunter", 26 on the lay 10 in front of the right hand shuttle-box 12. The hammer 19 is also provided with pawl-and-detent parts 27, 28 cooperating with a ratchet-wheel 29 secured to the same shaft 30 as the magazine wheels 15, 16.

Normally, the latch 21 occupies the inoperative position in which it is shown by full lines in Fig. 3, and when the latch is so positioned the weft-replenishing mechanism remains inoperative. The latch 21 can however be raised into an operative position, in which it is shown by dotted lines in Fig. 3; and when the latch is so positioned the weft-replenishing mechanism is set for operation by the striker 26 on the lay 10.

The means for setting the weft-replenishing mechanism comprises the following:—An arm 31, which is secured to one end of a rock-shaft, or so-called "change motion shaft", 32 journaled on the frame 18, and which has one end in forked engagement with a pin 24' on the previously mentioned lever 24, the arm 31 being continuously pulled downwards towards its lowermost position by a strong spring 31' anchored below the frame 18; an upright crank arm 33, which is secured to the other end of the shaft 32; and a setting arm 34, one end of which is pivotally attached to the top of the crank arm 33, and the free end of which rests upon one arm 35' of a two armed lever 35', 35² fulcrumed on a bracket 35 on the frame 18. The said setting means is operated to set the weft-replenishing mechanism by a continuously moving striker 36 arranged to co-operate with the arm 34. The striker 36 is provided at the top of an upright 37' of a two-armed lever fulcrumed on a bracket 37 of the loom frame. The other arm 37² of this lever is provided with a cam-follower 38 which rides upon the rim of a cam 39 secured to a rotary shaft 40 driven at half speed by the loom mechanism. The arrangement is such that the striker 35 is forced forwards once during every two picks of the loom; and, if the setting arm 34 should be located in the path of the striker 36, the said arm will be forced forwards and will rock the crank-arm 33, rock-shaft 32 and arm 31, with the result that the lever 24, and support 23 thereon, will be raised, and the latch 21 will be permitted to rise under the action of its spring 22 into the operative position. Thus, the weft-replenishing mechanism will be set in readiness for actuation by the lay of the loom.

Assuming the weft-replenishing mechanism to be set as above described, its operation is as follows:—

During the next succeeding beat-up of the lay,

the shuttle being projected into the right hand shuttle-box 12, the striker 26 engages the raised latch 21 and forces the hammer 19 downwards to transfer the lowermost weft-holder 14 (see Fig. 3) into the shuttle and by the same action to eject the exhausted weft-holder from the shuttle, through the bottom thereof. The return movement of the hammer 19 under the action of its spring 20 causes the pawl-and-detent parts 27, 28 to turn the magazine wheels 15, 16 sufficiently to bring the second lowermost weft-holder into the lowermost position.

The above operation and the mechanism hereinbefore described for performing it are as aforesaid well known, and accordingly they need not be described in greater detail.

As shown in Fig. 1, the left-hand shuttle box 11 (that is, the box more remote from the weft-replenishing mechanism) includes as usual a front plate 41 and a pivotal rear plate 42. As shown, the front plate is provided with a feeler-slot 43. The shuttle 13, which is shown in the shuttle box 11, is also provided with a feeler-slot 44, which registers with the slot 43.

The improved feeler arrangement includes two small feelers 45, 46 constituting extensions of parallel rods 47, 48 (see also Figs. 4, 5 and 6) which rods are mounted side-by-side in a small casing 49 adjustably fixed to the frame 18 in such a position that the feelers 45, 46 can pass freely through the slot 43 in the front-plate of the shuttle-box. Both feeler rods are mounted for end-wise sliding and rotational movement in the casing. The arrangement is also such that the feeler 46 will be contacted by the weft-holding tube T of the weft-holder 14 in the shuttle, whereas the feeler 45 will be contacted by the weft W on said tube.

The main bodies 47¹, 48¹ of the feeler rods are acted upon by recoil springs 50 which strive to press shoulders on said bodies hard against the rear end of the casing and thereby maintain the feelers fully projecting. The feelers are arranged in inter-engagement, the body 47¹ having a V-section projection 51 which normally rests upon the body 48¹ and which co-operates with a step 52 thereon consisting of a washer-like enlargement or collar. The body 47¹ is also provided with a small bent rodlike stop 53 which passes laterally through a slot 54 in the side wall of the casing 49 and engages above the lever arm 35², so that the other lever arm 35¹ serves as a support for the setting arm 34. The projection 51 bearing on the body 48¹ prevents rotation of the body 47¹ under the upward pressure of the arm 35². The arrangement is such that, when the arm 34 occupies its normal position of support, it is located clear of the striker 36; so that, when the striker advances, it misses the arm 34, and the setting means 31, 32, 33, 34 remain inactive.

In the operation of the feeler arrangement, the feelers are displaced when the lay 10 advances for a beat-up whenever a shuttle occupies the adjacent shuttle-box 11 (that is, at every second beat-up in the loom under consideration). While there is a sufficiency of weft W on the weft-holder, the feeler 45 will be contacted and displaced before the step 52 can reach the projection 51. It will however be clear that, in the case of a given weft-holder, the feeler 46 is always displaced to the same extent by the tube T constituting the core whereon the weft W is wound; whereas, the feeler 45 is displaced to a progressively decreasing extent by the gradually diminishing weft. The feeler parts are so dimensioned that, when a time

is reached at which the weft is almost exhausted, the step 52 will move into register with the projection 51 (see Fig. 4) and will lift it (see Fig. 5) with the result that a slight rotational movement will be imparted to the feeler body 47¹. In consequence of this rotational movement, the projecting stop 53 will be forced down and the lever arm 35² will likewise be forced down, so that the lever arm 35¹ will be raised sufficiently to displace the arm 34 into the path of the striker K. Thus, when the striker 36 advances immediately thereafter, the setting means 31, 32, 33, 34 will be displaced in such a manner that the weft-replenishing mechanism will be set in readiness for actuation by the lay 10 when it advances at the next succeeding beat-up. Since this beat-up will follow a pick performed by the shuttle containing the almost exhausted weft-holder, the shuttle will then be located in the right-hand shuttle-box 12 adjacent to the weft-replenishing mechanism; and, accordingly, the exhausted weft-holder will be ejected by a full weft-holder transferred from the magazine by the hammer 19, in the usual manner hereinbefore briefly described.

Provision is made for adjusting the lengthwise relationship of one feeler to the other to suit different conditions. The provision made in the construction illustrated comprises screw-threaded connections 54 between the feelers proper 45, 46 and the rods 47, 48, lock nuts 55 being provided to lock the feelers in their positions of adjustment. It is therefore possible to pre-determine with accuracy the moment when the feeler arrangement will bring about weft-replenishment.

With reference now to the alternative construction illustrated in Fig. 7, the arrangement is such that the projection 51 rests upon the step 52 in the normal position of the feelers; that is, when the bodies 47¹, 48¹ are pressed by the springs 50 against the rear end of the casing 49. The arrangement is therefore such that, normally, the laterally projecting stop 53 maintains the lever arm 35² depressed; so that the other lever arm 35¹ supports the setting arm 34 in the path of the striker 36. In the operation of the feeler arrangement, so long as there is a sufficiency of weft on the weft-holder, each time the feelers are contacted and displaced, the displacement is differential, and the projection 51 must immediately move off the step 52. Thus, a rotational movement is imparted to the feeler body 47¹ by the weight of the setting arm 34 through the intermediary of the lever 35¹, 35² and the stop 53, the arm 34 dropping clear of the striker 36, and the setting means 31, 32, 33, 34 remaining inactive. When, however, the weft-holder is almost exhausted of weft, there is practically no differential displacement of the feelers 45, 46, with the result that the projection 51 remains upon the step 52 and consequentially the arm 34 remains supported in its normal position in the path of the striker 36. Thus, when the striker 36 advances, it engages the arm 34; so that the setting means is actuated, and the weft-replenishing mechanism set in readiness for actuation by the lay of the next beat-up.

The improved feeler arrangement is applicable to weft-replenishing mechanisms in general, although it is especially suitable for use in looms using weft wound on paper or like tubes, existing feeler arrangements having been found unsuitable for such looms, in some cases because of the substantial dimensional variations between different

tubes and in other cases because of the nature of the material of which the tubes are made.

The improved feeler arrangement has been found, in practice, to function with reliability and can be adjusted to bring about the weft-replenishing operation at a predetermined point within comparatively fine limits, so that economy in weft is ensured.

In the following claims, reference is made to the "core" of the weft holder. It is to be understood that the word "core" is intended to mean the small-diameter body upon which the weft is wound and excludes the usual large-diameter base of the holder which base is located beyond one end of the core.

I claim:—

1. A feeler device for weft-replenishing mechanism in a loom provided with a shuttle adapted to receive a weft-holder whose core is mainly wound with weft but has a portion exposed, said loom having means to pre-set said mechanism for actuation by a working part of the loom, said means including a displaceable setting member cooperating with a movable striker adapted to operate said means; said feeler device comprising a pair of spring-return feelers, a step on one feeler, which latter is mounted for endwise movement, and projections on the other feeler, which is mounted both for endwise and turning movement, one projection cooperating with said step and the other projection serving to support the setting member; one feeler being arranged to feel the weft and to receive therefrom an endwise movement whose extent decreases as the weft is unwound, and the other feeler being arranged to feel the said exposed portion of the core and to receive therefrom an endwise movement of constant extent, the arrangement being such that when the diminishing weft reduces to a predetermined amount the step and cooperating projection cause the turnable feeler's other projection to position the setting member in the striker's path, the weft-replenishing mechanism thus being pre-set.

2. A feeler device as claimed in the preceding claim 1 and adapted for use in combination with weft-holders each including a skewer portion on which a tube is located, said tube being mainly wound with weft but having an end portion left exposed to the action of one of the feelers.

3. A feeler device for weft-replenishing mechanism in a loom provided with a shuttle adapted to receive a weft-holder whose core is mainly wound with weft but has a portion exposed, said loom having means to pre-set said mechanism for actuation by a working part of the loom, said means including a displaceable setting member cooperating with a movable striker adapted to operate said means; said feeler device comprising a pair of spring-return feelers, a step on one feeler, which latter is mounted for endwise movement, projections on the other feeler, which is mounted both for endwise and turning movement, one projection cooperating with said step and the other projection serving to support the setting member, and an adjustment device in at least one feeler to vary precisely the effective length thereof; one feeler being arranged to feel the weft and to receive therefrom an endwise movement whose extent decreases as the weft is unwound, and the other feeler being arranged to feel the said exposed portion of the core and to receive therefrom an endwise movement of constant extent, the arrangement being

such that when the diminishing weft reduces to an amount precisely gauged by the adjustment device to coincide with almost complete exhaustion of the weft from the core, the step and the cooperating projection cause the turnable feeler's other projection to position the setting member in the striker's path, the weft-replenishing mechanism thus being pre-set.

4. A feeler device for weft-replenishing mechanism in a loom provided with a shuttle adapted to receive a weft-holder whose core is mainly wound with weft but has a portion exposed, said loom having means to pre-set said mechanism for actuation by a working part of the loom, said means including a displaceable but normally stationary setting member cooperating with a movable striker adapted to operate said means: said feeler device comprising a pair of spring-return feelers, a step on one feeler, which latter is mounted for endwise movement, and projections on the other feeler, which is mounted both for endwise and turning movement, one projection cooperating with said step and the other projection serving to support the setting member; one feeler being arranged to feel the weft and to receive therefrom an endwise movement whose extent decreases as the weft is unwound and the other feeler being arranged to feel the said exposed portion of the core and to receive therefrom an endwise movement of constant extent, the arrangement being such that when the diminishing weft reduces to a predetermined amount the step displaces the cooperating projection and turns the turnable feeler, whose other projection displaces the setting member into its operative position in the striker's path, the weft-replenishing mechanism thus being pre-set.

5. A feeler device as claimed in the preceding claim 4 and adapted for use in combination with weft-holders each including a skewer portion on which a tube is located, said tube being mainly wound with weft but having an end portion left exposed to the action of one of the feelers.

6. A feeler device for weft-replenishing mechanism in a loom provided with a shuttle adapted to receive a weft-holder whose core is mainly wound with weft but has a portion exposed, said loom having means to pre-set said mechanism for actuation by a working part of the loom, said means including a displaceable but normally stationary setting member cooperating with a movable striker adapted to operate said means: said feeler device comprising a pair of spring-return feelers, a step on one feeler, which latter is mounted for endwise movement, projections on the other feeler, which is mounted both for endwise and turning movement, one projection cooperating with said step and the other projection serving to support the setting member, and an adjustment device in at least one feeler to vary precisely the effective length thereof; one feeler being arranged to feel the weft and to receive therefrom an endwise movement whose extent decreases as the weft is unwound, and the other feeler being arranged to feel the said exposed portion of the core and to receive therefrom an endwise movement of constant extent, the arrangement being such that when the diminishing weft reduces to an amount precisely gauged by the adjustment device to coincide with almost complete exhaustion of the weft from the core, the step displaces the cooperating projection and turns the turnable feeler, whose

other projection displaces the setting member into its operative position in the striker's path, the weft-replenishing mechanism thus being preset.

7. A feeler device for weft-replenishing mechanism in a loom provided with a shuttle adapted to receive a weft-holder whose core is mainly wound with weft but has a portion exposed, said loom having means to pre-set said mechanism for actuation by a working part of the loom, said means including a displaceable setting member cooperating with a movable striker adapted to operate said means: said feeler device comprising a pair of spring-return feelers, a step on one feeler, which latter is mounted for endwise movement, and projections on the other feeler, which is mounted both for endwise and turning movement, one projection adapted normally to move off-and-on said step at each beat-up of the loom and the other projection serving to simultaneously displace the setting member into a position clear of the striker; one feeler being arranged to feel the weft and to receive therefrom an endwise movement whose extent decreases as the weft is unwound, and the other feeler being arranged to feel the said exposed portion of the core and to receive therefrom an endwise movement of constant extent, the arrangement being such that when the diminishing weft reduces to a predetermined amount the last-mentioned projection fails to move off the step, and so the other projection maintains the setting member in the striker's path, the weft-replenishing mechanism thus being pre-set.

8. A feeler device as claimed in the preceding claim 7 and adapted for use in combination with weft-holders each including a skewer portion on which a tube is located, said tube being mainly wound with weft but having an end portion left exposed to the action of one of the feelers.

9. A feeler device for weft-replenishing mechanism in a loom provided with a shuttle adapted to receive a weft-holder whose core is mainly wound with weft but has a portion exposed, said loom having means to pre-set said mechanism for actuation by a working part of the loom, said means including a displaceable setting member cooperating with a movable striker adapted to operate said means: said feeler device comprising a pair of spring-return feelers, a step on one feeler, which latter is mounted for endwise movement, projections on the other feeler, which is mounted both for endwise and turning movement, one projection adapted normally to move off-and-on said step at each beat-up of the loom and the other projection serving to simultaneously displace the setting member clear of the striker, and an adjustment device in at least one feeler to vary precisely the effective length thereof; one feeler being arranged to feel the weft and to receive therefrom an endwise movement whose extent decreases as the weft is unwound, and the other feeler being arranged to feel the said exposed portion of the core and to receive therefrom an endwise movement of constant extent, the arrangement being such that when the diminishing weft reduces to an amount precisely gauged by the adjustment device to coincide with almost complete exhaustion of the weft from the core, the last-mentioned projection fails to move off the step, and so the other projection maintains the setting member in the striker's path, the weft-replenishing mechanism thus being pre-set.

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