Feb. 24, 1953 H. A. WHITIN 2,629,407

SIDE SLIPPING WEFT DETECTOR

Filed May 2, 1951

FIG. 1

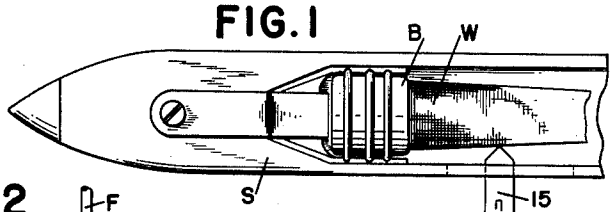
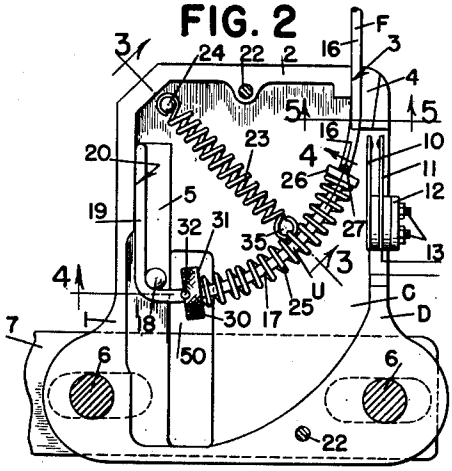


FIG. 2



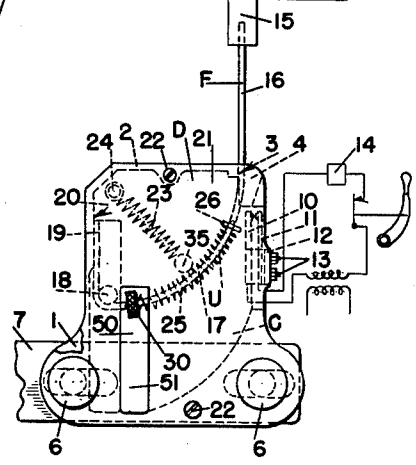


FIG. 9

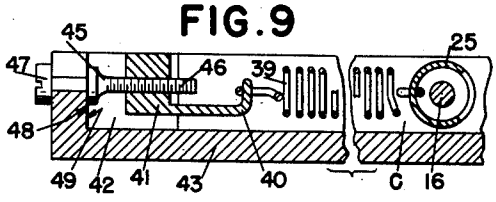


FIG. 4

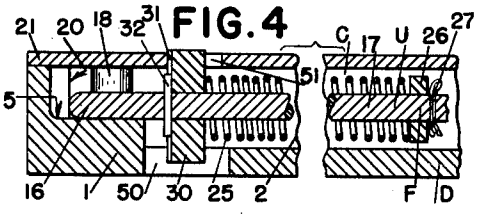


FIG. 5

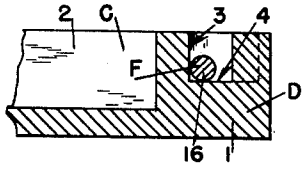


FIG. 6

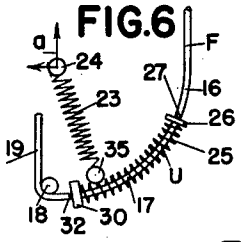


FIG. 7

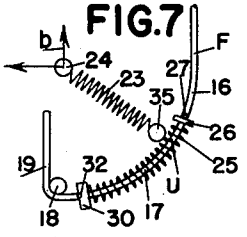


FIG. 8

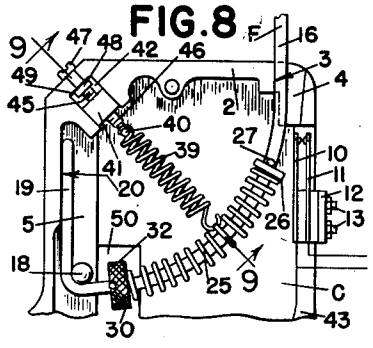
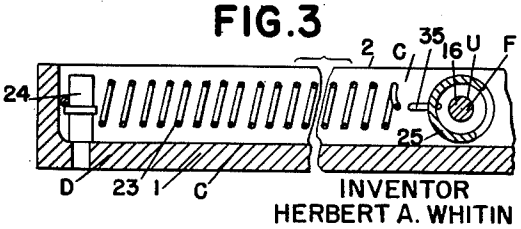


FIG. 3



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SIDE SLIPPING WEFT DETECTOR

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14 Claims. (Cl. 139—282)

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This invention relates to improvements in weft detecting mechanisms for looms more particularly of the side slipping type and it is the general object of the invention to provide simple means for adjusting tensions on the detector for regulating the force opposing both its forward non-indicating motion and its lateral indicating motion.

Weft detectors of the side slipping type ordinarily employ some form of feeler tip having at least one tooth which will be imbedded in an ample supply of weft and move the detector forwardly without substantial angular motion, but slide along the bobbin to give an angular motion to the detector for the purpose of indicating weft when the bobbin is depleted of weft. A simple form of weft detector which has gone into common use employs a wire having the rear end thereof formed with one or more yarn penetrating teeth and having the forward end thereof offset laterally for attachment to a spring. The wire is slidable bodily on a base and is returned to both its normal rearward and non-detecting positions by a tensioning spring one end of which is held to the base. A weft detector of this kind does not ordinarily provide means for varying the resistance offered to the forward and lateral motions of the feeler wire with the result that it is not readily adaptable for use with a wide variety of wefts.

It is an important object of the present invention to provide the side slipping wire type of feeler with an adjusting means arranged along its length to be attached to a feeler tensioning spring similar to the spring customarily employed in such a feeler but so constructed that the point of application of the force of the tensioning spring can be varied so as either to increase or decrease the forces effecting return of the feeler wire to its normal position after a detecting or indicating movement thereof.

It is a further object of the invention to form the feeler wire with a curved part between its ends preferably concentric with the fixed end of the tensioning spring and surround the curved part with a rotatable adjusting or positioning spring operatively related to one end of the tensioning spring in such manner that rotation of the positioning spring will move the adjacent end of the tensioning spring with respect to the curved part of the wire feeler to change the obliquity of the axis of the tensioning spring with respect to the two directions in which the feeler wire is ordinarily capable of moving, one of these directions being forwardly on a non-

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indicating operation and the other being lengthwise along the bobbin being detected when an indication of weft exhaustion is given.

It is a still further object of the invention to provide the feeler wire with a stop to enter a notch or the like in an adjusting collar secured to the positioning spring and held by the latter due to the resilience thereof in such relation with the stop as to prevent turning of the positioning spring and loss of the desired adjustment of the tensioning spring. In order that the positioning spring may be rotated readily the base or support for the feeler wire has an opening therein adjacent to or registering with the collar so that the latter can be accessible from without the base to effect adjustments without removing any part of the weft detecting mechanism or disconnecting it from the loom.

It is another object of the invention to provide a simple feeler unit including a wire provided with stops and a positioning spring for a tensioning spring around the wire and having attached thereto a collar to cooperate with one of the stops to prevent rotation of the positioning spring on the feeler wire.

In order that the invention may be clearly understood reference is made to the accompanying drawings which illustrate by way of example two embodiments of the invention and in which:

Fig. 1 is a plan view of the preferred form of weft detector and associated shuttle and bobbin, the latter having an ample supply of weft,

Fig. 2 is an enlarged plan view of the weft detector with the cover removed and showing the feeler wire in normal position,

Fig. 3 is a detailed enlarged vertical section on line 3—3, Fig. 2,

Fig. 4 is a vertical section on line 4—4, Fig. 2, taken along the curved part of the feeler wire,

Fig. 5 is an enlarged vertical section on line 5—5, Fig. 2,

Figs. 6 and 7 are diagrammatic views showing the tensioning spring in two different positions relative to the feeler wire,

Fig. 8 is a view similar to a part of Fig. 2, but showing the modified form of the invention, wherein the length of the tensioning spring can be varied for the purpose of altering the force exerted by the spring on the feeler wire, and

Fig. 9 is a view similar to Fig. 3 but taken on line 9—9, Fig. 8.

Referring more particularly to Fig. 1, the shuttle S has a bobbin B on which is wound a mass of weft W the condition or amount of which is determined in a detecting operation by the weft

detecting mechanism designated generally at D. The detector mechanism comprises a base 1 having a rear wall 2 defining a shoulder 3 and has a feeler support surface 4 which may be at the same level as a similar support surface 5 at the opposite side of the base. The forward part of the base is secured by bolts 6 to a stand 7 which may be stationary or mounted for forward motion if the detector mechanism is used at the weft replenishing end of the usual bobbin changing multicolor loom.

As contemplated herein indication of weft exhaustion will be given electrically, although the means for indicating weft exhaustion is not an essential feature of the invention. Two prongs or electrodes 10 and 11 are insulated from each other and are held on a small clip or stand 12 by means of screws 13 which may be insulated from the electrodes in usual manner. Wires leading from the electrode are part of a circuit diagrammatically shown in Fig. 1 and including an electromagnetic device, such as a solenoid 14, which when energized will effect a change in the operation of the loom, either stopping the latter or replenishing the weft in the shuttle S. The electrodes 10 and 11 are ordinarily separated but are caused to engage each other as will be set forth more fully hereinafter.

The weft detector unit, designated generally at U, includes a feeler finger F which may be made of a wire 16 to the rear end of which is secured a feeler tip 15 for cooperation with the weft W on a detecting beat of the loom. Wire 16 extends forwardly from the feeler tip 15 along the stop shoulder 3 and then curves forwardly and to the left preferably though not necessarily as an arc 17 toward a stop pin 18 which is fixed with respect to the base 1. The wire then extends to the left of and rearwardly as at 19 from the stop pin along a guide wall 20 upstanding from the base 1. A cover 21 extending over the base and held in place by screws 22 tapped into base 1 confines the curved part of the feeler wire and the straight part 19 thereof within the hollow cavity C of the base. A tensioning spring 23 has the rear end thereof held by a pin 24 upstanding from base 1.

Surrounding the curved part 17 of the feeler wire is a positioning means rotatable on the wire for the purpose of effecting adjustment of the tensioning spring 23. This positioning means as shown herein may be an open coil spring 25 the rear end of which engages a washer 26, see Fig. 2. A pin 27 secured to and extending through the wire 16 limits motion of the washer and the rear end of the positioning spring in a direction toward the feeler tip 15.

Secured as by welding or any other convenient means to the forward left end of the positioning spring is a knurled collar 30 the left face of which, as shown in Fig. 4, is provided with a transverse groove 31 to receive a stop pin 32 secured to the wire 16. The positioning spring is under some compression so that it will normally hold the stop pin 32 in the groove 31 to prevent rotation of the spring 25 on the feeler wire, but spring 25 is compressible to permit the collar to be moved to the right from the position shown in Fig. 2 to detach it from the pin 32, after which the collar can be rotated to cause the spring 25 to turn on the curved part 17 of the feeler wire.

In the preferred form of the invention the curved part 17 of the wire will be concentric with the pin 24 when the feeler F is in normal position as shown in Fig. 2. This however is not an essential relation. The forward end of the tensioning spring 23 has an open eye 35 which is engaged with one of the coils of the positioning spring 25 in such relation that as the latter spring turns the eye 35 can slip with respect to the open coils of the positioning spring and slide therealong so that the eye end of the tensioning spring can be moved with respect to the curved part 17 of the feeler wire to change the obliquity of the axis of spring 23 with respect to the forward and lateral directions of motion of feeler tip 15.

As shown diagrammatically in Fig. 6 the tensioning spring has had the forward end thereof moved to the left from the position shown in Fig. 2 by turning of the knurled collar 30. When in the position shown in Fig. 6 the tensioning spring will exert a considerable rearward force on the feeler, indicated by line *a*, enabling the feeler tip to penetrate relatively hard yarn during the detecting operation. In Fig. 7 the tensioning spring is indicated as having been adjusted in the opposite direction so that it exerts a relatively small force, designated at *b*, on the feeler tip 15 when the latter is detecting the condition of soft or relatively coarse wefts.

In the modified form of the invention much of the matter thus far described will be used, but instead of the pin 24 the rear end of the tensioning spring, shown at 39 in Figs. 8 and 9, will be held by a hook 40 on a positioning head 41 slidable in a pocket 42 formed in the base 43 which may in other respects be similar to base 1. The positioning head 41 is preferably non-circular and may conveniently be made of rectangular cross section so that it can slide in a right and left hand direction as viewed in Fig. 9 in the pocket but be held against rotation. An adjusting screw 45 has a threaded shank 46 screw threaded into the head 41 and is turned by means of a slotted head 47. A shoulder 48 on the screw engages an adjacent part 49 of the base 43 to hold the screw 45 in adjusted position. By turning the screw the head 41 can be moved along the pocket 42 to vary the tension of the spring 25. The features described in connection with Figs. 6 and 7 are present in the modified form, but in addition provision is made for varying the force exerted by the tensioning spring on the feeler arm F.

In order that the knurled collar 30 may be readily accessible from without the base 1 or 43 the latter are formed with an opening 50 in the bottoms thereof adjacent to and under the knurled collar 30. The cover 21 may be formed with a similar opening 51 over the collar. As will be apparent from Fig. 4 the collar can be grasped by the fingers of the operator for the purpose of turning the positioning spring without removing the detector from stand 7, or the cover from the base.

During the detecting operation when ample weft is present on the bobbin B the feeler F will slide or float bodily in a forward direction on the base without substantial angular motion and the electrodes 10 and 11 will remain spaced from each other. During this operation the spring 23 is placed under increased tension and as the shuttle S moves away from detecting position the tensioning spring will contract and move the feeler F back to the position shown in Fig. 2. If during a detecting operation the feeler tip 15 should engage a depleted bobbin the feeler F will move laterally or to the right as viewed in Fig. 2 in the direction of the length of the shuttle to press the electrode 10 against the electrode 11,

whereupon the solenoid 14 will be energized to effect a previously described change in operation of the loom. After the indication has been given the spring 23 will contract and restore the feeler to its normal position.

From the foregoing it will be seen that the invention provides a simple form of side slipping weft detector mechanism including a feeler finger F and a tensioning spring together with adjusting means to vary the point of application of the force of the tensioning spring along the feeler so that the force tending to cause penetration of the weft by the feeler tip can be altered to suit the weft being woven. It will be seen that the adjusting feature comprises a positioning open coil spring rotatable on the feeler wire and having one of its coils engaged with one end of the tensioning spring so that as the positioning spring is rotated the end of the tensioning spring attached to it will be changed to vary the obliquity of the angle of the tensioning spring with respect to the two directions in which the feeler can move, that is, either forwardly on non-indicating beats, or laterally parallel to the shuttle when indicating exhaustion. Also, the positioning spring by its resilience tends to cause cooperation between the collar 30 and the pin 32 to prevent rotation of the positioning spring except at such times as the spring is compressed to detach the groove of the collar from the pin. In the preferred form of the invention the adjustment of the spring does not vary the force which it exerts on the feeler due to the fact that the section 17 of the wire 16 is concentric with the pin 24. In the modified form of the invention provision is made for varying the length of the tensioning spring by adjusting the rear end of the tensioning spring, but in this form as well as in the preferred form the chief variation in the effect which the tension spring has on the feeler is effected by change of the angle of the spring 23 with respect to the forward and lateral directions in which the feeler can move. The feeler unit U consisting of the wire 16, the stops 27 and 32, the positioning spring 25, and the collar 30 is common to both forms of the invention. The pins 27 and 32 collectively act as stop means to limit the positioning spring to a given length of the wire 16 for all angular relations between the spring 25 and the feeler finger F.

Having now particularly described and ascertained the nature of the invention and in what manner the same is to be performed, what is claimed is:

1. In a weft detector mechanism including a base, a floating side slipping weft feeler mounted for bodily movement on the base in a forward direction when engaging an ample weft supply and for movement in a lateral direction longitudinally of the shuttle when engaging a depleted supply of weft, a spring oblique with respect to said directions and having one end held to the base, and rotatable means on the feeler operatively connected to the other end of the spring and operatively connecting the feeler and spring enabling the latter to resist movement of said feeler in either of said directions, said rotatable means effective when rotated on the feeler to move said other end of said spring and alter the obliquity of the latter relative to said directions.

2. In a weft detector mechanism including a base, a floating side slipping weft feeler including a wire mounted for bodily movement on the base in a forward direction when engaging an ample weft supply and for movement in a lateral direction longitudinally of the shuttle when engaging a depleted supply of weft, a tensioning spring oblique with respect to said directions and having one end held fixed relative to the base, and rotatable means on the feeler comprising a positioning coiled spring surrounding the wire having one of the coils thereof operatively related to the other end of said tensioning spring and enabling the latter to resist movement of said wire in either of said directions, said rotatable means when rotated on the wire causing said other end of the tensioning spring to move along the positioning spring to vary the angle of obliquity of the tensioning spring relative to said directions.

3. The structure set forth in claim 2 wherein the wire has a stop thereon and a collar on the wire is secured to the positioning spring and is held due to the resilience of the latter against said stop and said collar and stop normally prevent rotation of the positioning spring on the wire.

4. The structure set forth in claim 2 wherein stop means on the wire confines the positioning spring to the same part of said wire for all angular positions of the positioning spring on the wire.

5. The structure set forth in claim 2 wherein said wire has a curved part thereof substantially concentric with said one end of the tensioning spring and said positioning spring is on said curved part of the wire.

6. In a weft detector mechanism including a hollow base provided with an opening therein, a floating side slipping weft feeler including a wire mounted for bodily movement on the base in a forward direction when engaging an ample weft supply and for movement in a lateral direction longitudinally of the shuttle when engaging a depleted supply of weft, a tensioning spring oblique with respect to said directions and having one end held fixed relative to the base, rotatable means on the feeler comprising a positioning coiled spring surrounding the wire and having one of the coils thereof engaged with the other end of said tensioning spring to enable the latter to resist movement of said feeler wire in either of said directions, and means adjacent to and accessible through said opening in the base to rotate the rotatable means on the wire to cause said other end of the tensioning spring to move along the positioning spring to vary the angle of obliquity of the tensioning spring relative to said directions.

7. In a weft detector mechanism including a base, a floating side slipping weft feeler including a wire having a first stop means thereon and mounted for bodily movement on the base in a forward direction when engaging an ample weft supply and for movement in a lateral direction longitudinally of the shuttle when engaging a depleted supply of weft, a tensioning spring oblique with respect to said directions having one end held fixed relative to the base, a positioning coiled spring rotatable on and surrounding the wire and having one of the coils thereof engaged with the other end of said tensioning spring, a collar on the wire secured to the positioning spring, and a second stop means on the wire to engage said collar and limit movement thereof on the wire away from the first named stop means, said collar and second stop means normally cooperating to prevent rotation of the rotatable means on said wire and said positioning spring being compressible to disengage the collar

from the second stop means to enable the positioning spring to be turned on said wire to vary the angle of obliquity of the tensioning spring relative to said directions.

8. In a feeler unit for a weft detecting mechanism having a tensioning spring, a wire having a feeler tip at one end thereof and having a part thereof intermediate the ends thereof curved, a positioning spring for engagement with the tensioning spring located on said curved part of the wire and rotatable thereon, and stop means on the wire confining the positioning spring to said curved part of said wire.

9. The feeler unit set forth in claim 8 wherein a collar is secured to one end of the positioning spring to facilitate rotation thereof on said curved part of said wire.

10. The feeler unit set forth in claim 8 wherein a collar is secured to one end of the positioning spring to facilitate rotation thereof on said curved part of said wire, and said collar and said stop means having cooperating parts normally held in mutual engagement by the positioning spring to prevent rotation of the latter on said curved part of said wire and said positioning spring is compressible to disengage said cooperating parts to permit rotation of said positioning spring on said wire.

11. In a weft detector mechanism including a base, a floating side slipping weft feeler mounted for bodily movement on the base in a forward direction when engaging an ample weft supply and for movement in a lateral direction longitudinally of the shuttle when engaging a depleted supply of weft, a tensioning spring for the weft feeler disposed obliquely with respect to said directions, adjusting means to vary the position of one end of said spring in a direction toward and from the weft feeler, and rotatable means on the feeler operatively connected to the other end of the tensioning spring and operatively connecting the feeler and spring to enable the latter to resist movement of said weft feeler in either of said directions, said rotatable means effective when rotated on the weft feeler to move said other end of said spring to alter the obliquity of the latter relatively to said directions and said adjusting means enabling a variation to be made in the force exerted by the tensioning spring on the weft feeler.

12. The weft detector mechanism set forth in claim 11 wherein the base is formed with a pocket and the adjusting means is movable along said pocket and is held by the base against rotation.

13. The weft detector mechanism set forth in claim 11 wherein the base includes a pocket and the adjusting means includes a positioning member of non-circular cross section operatively connected to the first named end of the tensioning spring and slidable along the pocket and held against rotation by the parts of the base at the sides of said pocket.

14. In a weft detecting mechanism including a base, a floating side slipping weft feeler mounted for bodily movement on the base in a forward direction when engaging an ample weft supply and for movement in a lateral direction longitudinally of the shuttle when engaging a depleted weft supply, a tensioning spring oblique with respect to said directions, means operatively relating one end of the spring to the feeler enabling the spring to resist motion of the weft feeler in either of said directions and effective to alter the obliquity of the spring relative to said directions, and additional means operatively related to the other end of the spring to vary the force exerted by the spring on the feeler.

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