July 11, 1967 K. J. HALL 3,330,304

WEFT TAKE-UP MECHANISM

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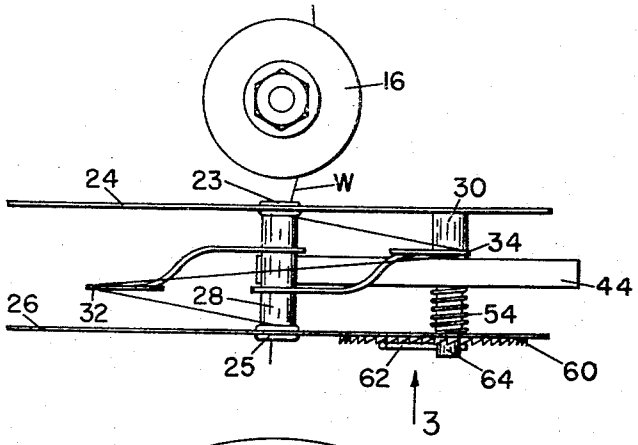

FIG. 2

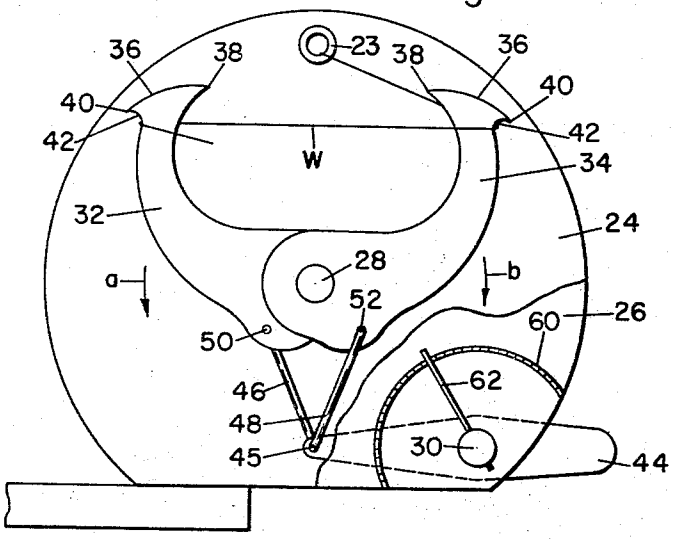

FIG. 3

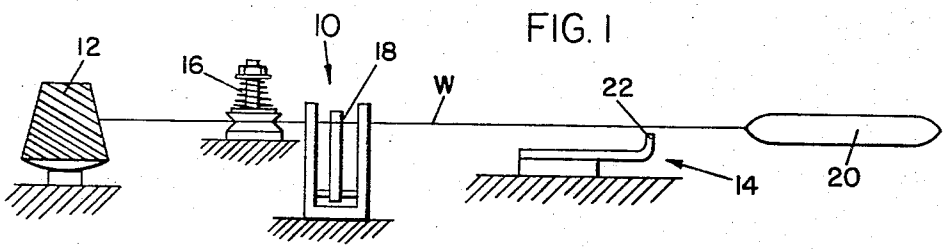

FIG. 1

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FIG. 4

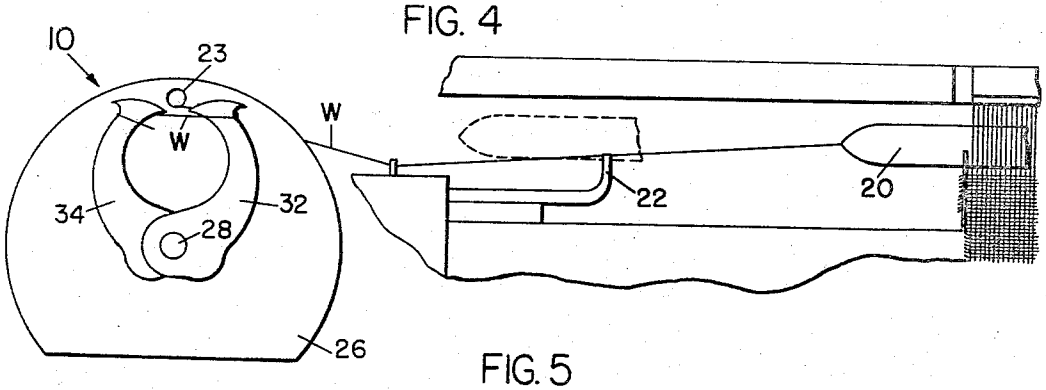


FIG. 5

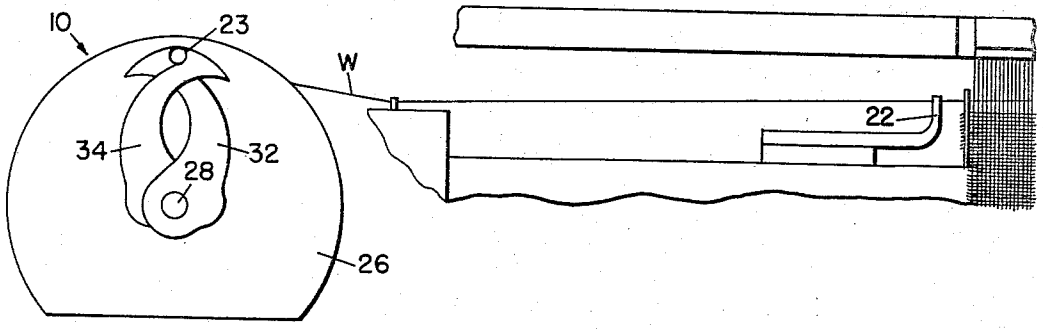


FIG. 6

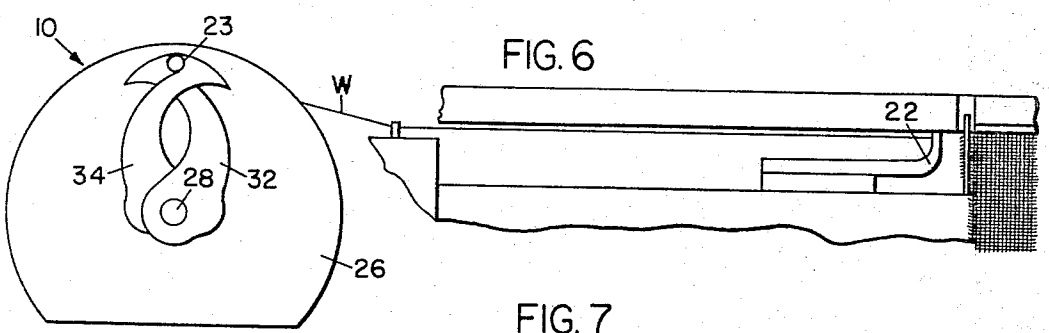
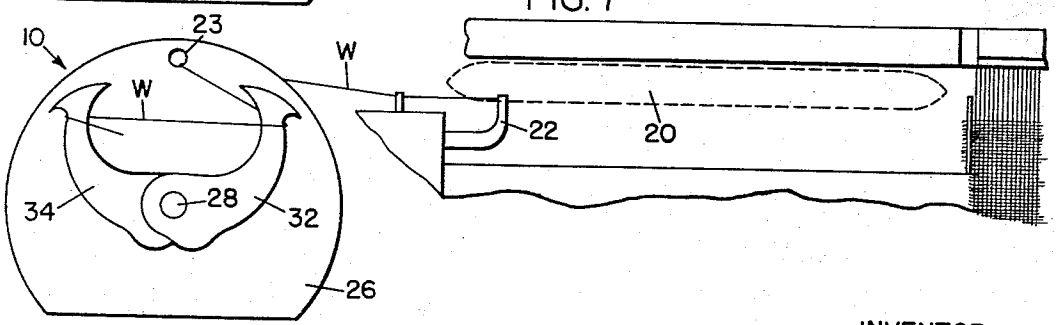


FIG. 7



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WEFT TAKE-UP MECHANISM

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4 Claims. (Cl. 139—122)

This invention relates to a weft take-up mechanism for looms operating with stationary weft supplies, and more particularly to looms of this type where weft is introduced into the warp sheds by a shuttle having grippers to which the weft is attached, as shown for instance in U.S. Patents Nos. 2,817,367 and 3,014,505. Since a weft is cut and re-inserted into a shuttle gripper for each pick, it is necessary to maintain constant tension and to prevent the weft from becoming slack in the vicinity of shuttle gripping.

Various types of spring wires have been used to take up slack in the weft but their disadvantage lies in the difficulty of controlling the amount of spring-back and vibration, sometimes resulting in a tangling of the weft. Mechanical slack take-up devices have been used which prove to be cumbersome and unreliable, as the mechanical motion of pulling back has to be of the correct amount and has to occur at the correct time when slack is likely to occur.

It is an important object of the present invention to provide a spring biased slack take-up mechanism which will not have the disadvantage of the aforementioned mechanical motions and spring wire take-ups, and be capable of taking up slack weft smoothly, evenly and under relatively constant tension.

Another object of the invention is to provide a slack take-up mechanism which will allow the shuttle to draw weft under less tension than is normally required for weft insertion, during the critical state of shuttle picking where, due to inertial forces, the weft is most likely to be pulled out of the shuttle grippers.

A still further object of the invention is to provide said slack take-up mechanism with means to adjust the amount of tension by which slack is taken up.

Other objects and the details of that which is novel will be clear from the following description and claims taken with the accompanying drawings in which is illustrated an example of a device embodying the present invention.

In the drawings:

FIGURE 1 is a view diagrammatically illustrating the invention,

FIGURE 2 is a plan view of the weft take-up mechanism,

FIGURE 3 is a front elevation looking in the direction of arrow 3, FIGURE 2,

FIGURES 4–7 are diagrammatic views illustrating the operation of the invention.

Referring to FIGURE 1 the weft take-up mechanism, generally indicated at **10**, is shown disposed between an outside weft package **12** and a weft inserting mechanism generally indicated at **14**. The weft W extends from package **12** through a tensioning portion **16** of the take-up mechanism which can be any standard type friction tension and then through the take-up portion **18** of the take-up mechanism **10**, the weft then extends to the weft inserting mechanism **14**. Weft mechanism **14** includes a weft inserter or shuttle **20** and a presenter **22**. The weft is always connected to one or the other, to the shuttle during a weft inserting operation and to the presenter between a "pick-up" and presenting operations, see U.S. Patent No. 3,014,505.

Referring to FIGURES 2 and 3, the take-up portion **18** includes a pair of spaced plates **24** and **26** with guides **23** and **25** respectively in their upper portion thereof. Extending between plates **24** and **26** are two spaced pivot rods **28** and **30**. Rod **28** has pivotally mounted thereon a pair of spaced arms **32** and **34** each having a curved outer portion **36** which begins from a point **38** and ends at a point **40**, after which there is a reverse curve forming a rounded notch or thread engaging portion **42**. A lever **44** is pivotally mounted on pivot rod **30**. Pivotally attached at **45** to one end of lever **44** are a pair of connecting rods **46** and **48** pivotally attached at points **50** and **52** on arms **32** and **34** respectively. Also mounted on pivot rod **30** is a coil spring **54** attached at one end to rod **30** and at its other end to lever **44**. Spring **54** has a tendency to rotate lever **44** in a counter clockwise direction around rod **30** as viewed in FIGURE 3. This action through connecting rods **46** and **48** tends to rotate arms **32** and **34** in opposite directions around pivot rod **28** as indicated by arrows *a* and *b*, FIGURE 3.

In operation, the weft W which extends from tension portion **16** passes through guide **23**, around weft engaging section **42** on take-up arm **34** to the weft engaging section **42** in arm **32** around which it extends to and through guide **25** to weft inserting mechanism **14**.

The previously mentioned curved portions **36** on arms **32** and **34** operate as a self threading feature when a weft is introduced through the take-up mechanism either in an initial threading up or rethreading operation. In "threading," a weft is drawn through guides **23** and **25** and held taut while lever **44** is rotated counter clockwise as viewed in FIGURE 3, drawing take-up arms **32** and **34** toward each other until points **40** pass one another in directions opposite that indicated by arrows *a* and *b*. As take-up arms **32** and **34** move past each other their points **38** slip under the tightly held weft which begins to ride up over curves **36** which are at an increasingly greater distance from pivot rod **28** from points **38** to points **40**. After points **40** pass each other the weft snaps into weft engaging portions **42** so that upon release of lever **44**, arms **32** and **34** will move away from each other and the weft will assume the position shown in FIGURE 2 providing that the end of the weft being held is released and that there was enough weft being held to be taken up in the manner shown. The end of the weft leading from guide **25** can then be attached to weft inserting mechanism **14**.

After the weft take-up mechanism is threaded and the weft attached to the weft inserting mechanism, it will operate in the following manner:

Referring to FIGURES 4–7 there is shown an example of a weft inserting operation which produces a great deal of slack and for which the invention is particularly useful.

As shown in FIGURE 4 the weft inserter **20** is in a position of just having been "picked-out" from the left-hand side of the loom and is beginning its flight through the shed. Spring **54** is such that arms **32** and **34** create less tension on the weft than tension portion **16**. Due to this difference in tension, arms **32** and **34** are drawn together as the shuttle is picked out drawing weft from what was distributed through the take-up arms. After arms **32** and **34** are brought together, the shuttle then draws weft from package **12** through tension portion **16**. The tension portion **10** is set to give the normal operating tension to the weft. Since, during the most critical stage when the shuttle is first picked out and, due to inertial forces, is most likely to lose the weft, it draws weft from the take-up arms under less than normal tension, thus alleviating somewhat this condition of likely weft loss. In FIGURE 6, the shuttle (not shown) has arrived at the other end of the loom and the weft presenter **22** is shown retrieving the weft at the edge of the cloth where it has just been cut. The presenter **22**, after retrieving the weft as shown in FIGURE 6 must then move back to its presenting position as shown in FIGURE 7 to be ready to

transfer the end of the weft to the inserter or shuttle **20** when it comes back to the dotted line position at the left-hand side of the loom. Due to the motion of presenter **22** from is position in FIGURE 6 to its position in FIGURE 7 slack would normally develop in the weft to the extent of the distance between these two points. Due to the present invention however, slack is never allowed to develop, as take-up arms **32** and **34** begin to move away from each other in the direction of the arrows shown in FIGURE 3 as soon as presenter **22** begins to move to the left from its position in FIGURE 6. As shown in FIGURE 7, arms **32** and **34** have taken up the full amount of weft equal to the traveled distance of presenter **22**.

As shown in the drawings there is employed two take-up arms but only one or more than two may be used depending on weaving conditions. It has been found, in the present application of the take-up mechanism, that two arms as shown, both moving in synchronism due to connecting rods **46** and **48**, provide smooth trouble-free operation of the take-up mechanism.

The tension applied to the take-up arms may be varied by means shown in FIGURES 2 and 3. In these figures there is shown a series of detent holding means **60** which are capable of engaging a detent **62** connected to the end of pivot rod **30** which extends beyond plate **26** at **64**. Holding means **60** are shown as a series of teeth extending from plate **26**, radially disposed around the pivoted center of pivot rod **30**. By moving detent **62** to any of the teeth **60**, rod **30** will be turned, either winding or unwinding coil spring **54** depending on the direction rod **30** is turned. The winding or unwinding of coil spring **54** will increase or decrease the tension on arms **32** and **34**. Although the detent holding means shown are teeth, the invention is not limited to this as other forms of holding means may be utilized such as a series of holes in cooperation with an appropriately shaped detent.

As will be evident from the foregoing description, certain aspects of the invention are not limited to the particular details of construction of the example illustrated, and it is contemplated that various and other modifications and applications of the invention will occur to those skilled in the art. It is therefore the intention that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of the invention.

What is claimed and desired to be secured by Letters Patent of the United States is:

1. In a loom having an outside weft supply and a weft inserting mechanism, a slack take-up mechanism disposed in the path of the yarn between said supply and said weft inserting mechanism, said take-up mechanism comprising:

(a) spaced weft guide members;

(b) first and second take-up arms pivotally mounted between said spaced guide members so as to pivot about a common axis; and

(c) a spring operatively connected to said first arm at a point spaced from one side of said axis and to said second arm at a point spaced from the other side of said axis whereby force exerted by said spring in one direction causes said arms to pivot about said axis in opposite directions.

2. In a loom as set forth in claim **1** wherein the spring is connected to said arms by means of a pivoted lever and linkages between said lever and said arms.

3. In a loom as set forth in claim **1** wherein means are provided to adjust the force exerted by the spring.

4. In a loom as set forth in claim **1** wherein each of said take-up arms is provided with a curved outer portion so shaped and so disposed as to cam a taut weft into a weft engaging portion on one side of said arm as said arms move past the weft in a direction opposite from that in which it moves to take-up slack weft.

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