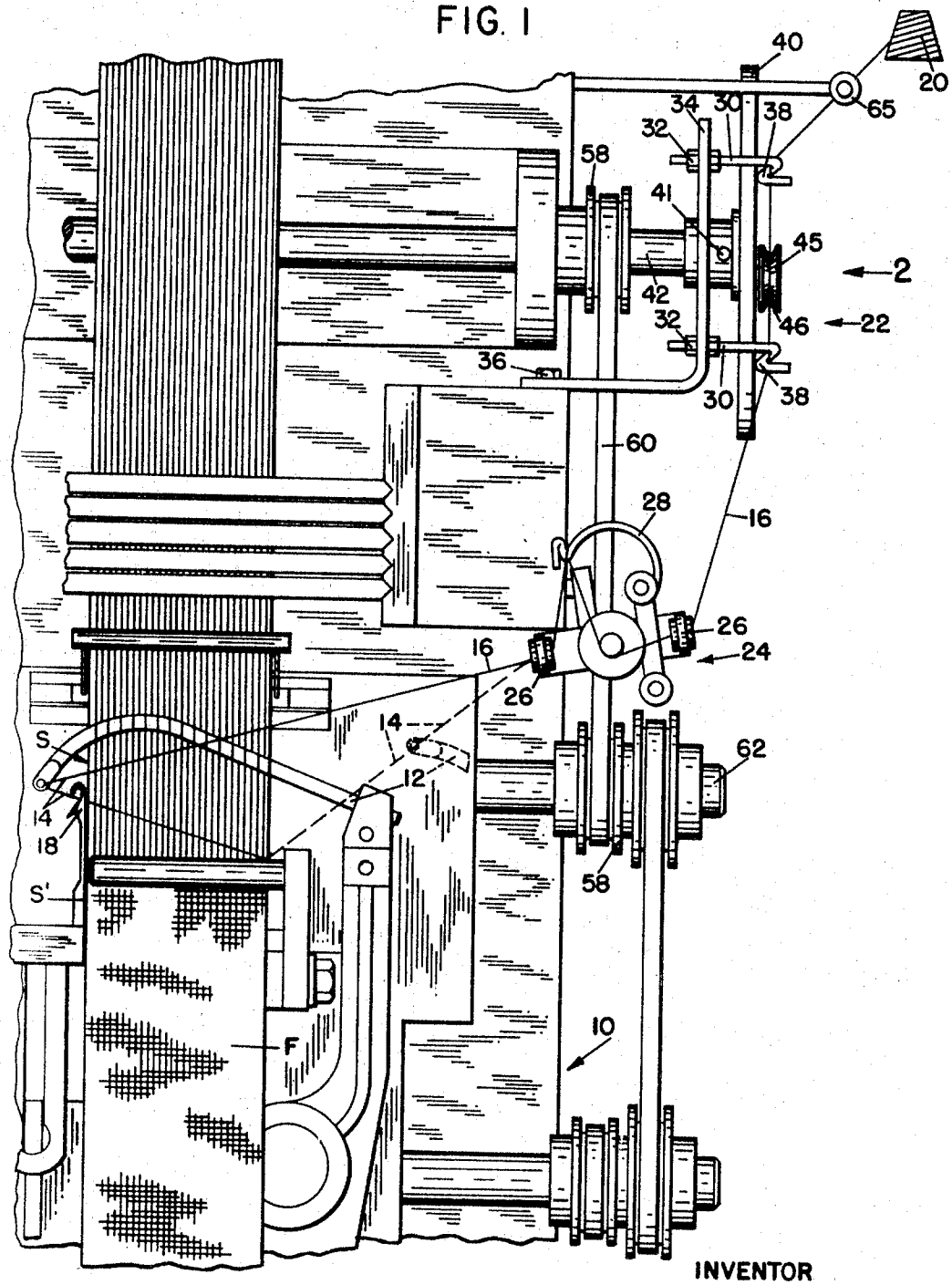
Aug. 12, 1969 M. C. MOSHER 3,460,584

WEFT FEEDING MECHANISM

Filed Jan. 15, 1968 2 Sheets-Sheet 1

FIG. 1



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Filed Jan. 15, 1968 2 Sheets-Sheet 2

FIG. 2

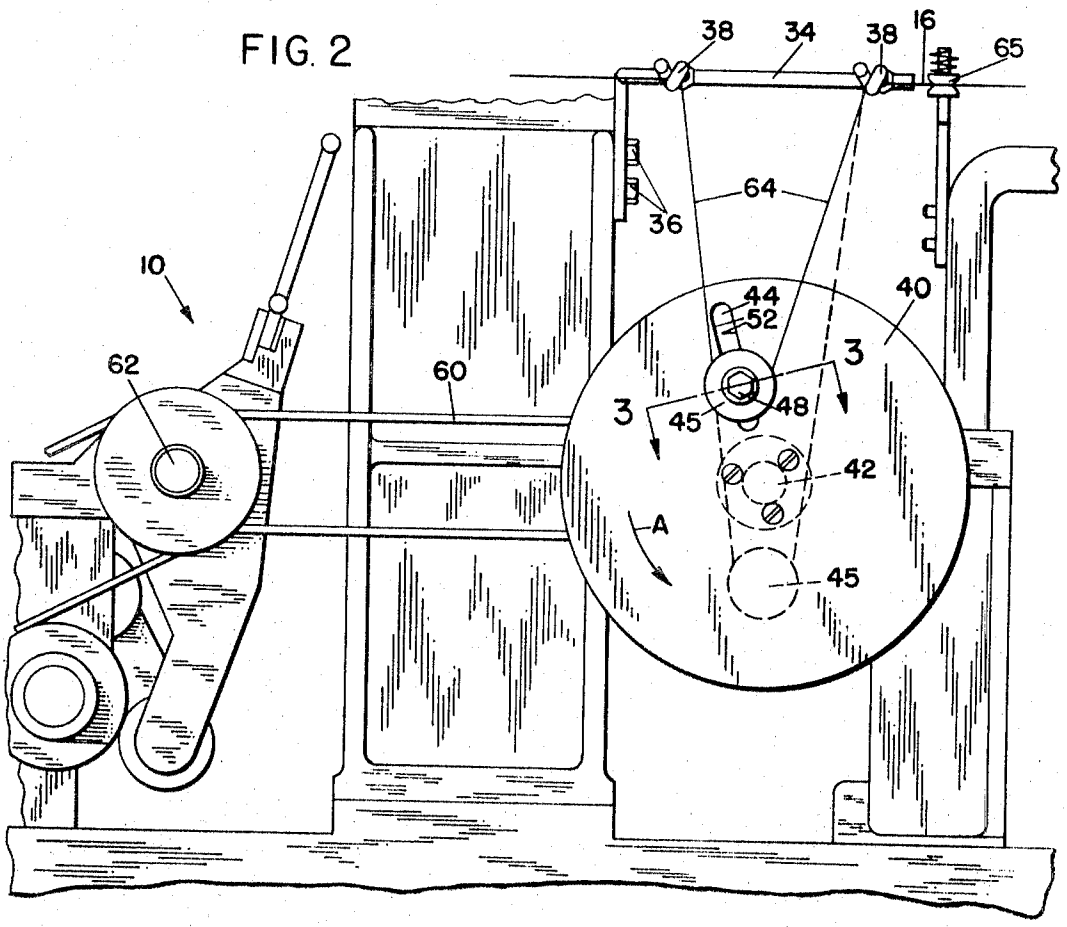


FIG. 3

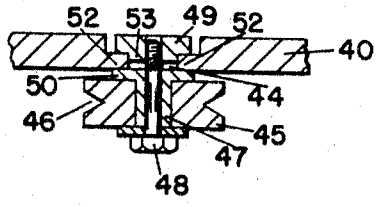


FIG. 4

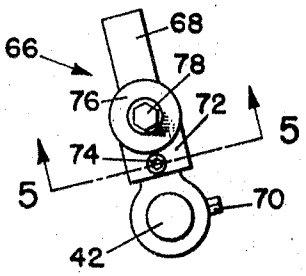
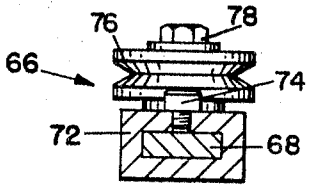


FIG. 5



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WEFT FEEDING MECHANISM

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U.S. Cl. 139—122 9 Claims

ABSTRACT OF THE DISCLOSURE

A weft feed mechanism for feeding weft from a stationary supply to a weft inserting member in which an adjustably mounted guide roller on a constantly rotating arm engages a portion of the weft which extends between two stationary guides. The mechanism draws weft from the supply during half of the rotation of the rotating arm and releases it to the weft inserting member during the other half of the rotation.

Background of the invention

This invention relates to weft feeding mechanism for looms in which weft is drawn from a stationary weft supply and fed to a weft laying mechanism. The invention particularly relates to looms which operate at high speeds such as a narrow fabric needle loom. Looms of this type as shown for example in U.S. Patents 3,194,276 and 3,224,467 use a reciprocating weft inserter such as a needle to lay a loop of weft into a warp shed and to move outside of the warp during the crossing of the warps for a new shed. This condition requires intermittent utilization of weft which creates a series of problems at high speeds. One problem is that of maintaining a constant tension of the weft in the vicinity of the weft inserting member. A sudden use of weft, followed by a period of nonuse results in maximum weft tension followed by a slackening of the weft. This condition is likely to create unevenness in the fabric. A second problem is that of the uneven draw of weft from the supply source. The intermittent use of weft causes a jerking of the weft which puts a high, sudden strain on the weft. This strain is likely to cause the weft to rupture. The jerking of the weft also sets up vibrations which cause it to create large whipping motions commonly called "ballooning." This makes the weft still harder to control and may cause it to become tangled on nearby structures.

There have been many attempts to solve the above problems but none have been completely satisfactory. Various intermittent positive feed devices have been developed which draw a certain amount of weft from the supply source and then release it to the weft inserter. This helps to prevent weft breakage and eliminates some of the weft slack near the inserter but does not eliminate jerking of the weft and does not create an even tension in the weft. The most successful weft feed arrangements have been those which utilize a constantly rotating feed member which draws weft from the supply source at constant rate to eliminate ballooning and jerking of the weft between it and the supply source. These devices are provided with a slack compensator, such as a spring located between the feed member and the weft inserter to take up slack filling and create an even tension in the weft. The compensator stores the weft as it comes from the feed member and then yieldingly releases it for insertion into the fabric. Examples of this type of feed arrangement can be found in U.S. Patent 3,224,467.

One disadvantage in this type of feed mechanism however, is that it is very difficult to control for evenness of feed and tension. Although these devices eliminate the unevenness of feed of the intermittent feed devices, they lack their precision. There is a certain amount of slippage of the weft on the feed member which will vary due to many factors such as variations in the weft, humidity and slight variations in tension. Any change in feed rate would result in variations in the fabric. Tension devices placed on either side of the feed members help to control slipping but increase the pull on the weft which may cause it to break or cause a twist back-up thereby creating bunches or knots in the weft.

Summary of the invention

It is therefore an object of the present invention to provide a positive feed mechanism which feeds weft to a weft inserter at a precise rate with a minimum of tension other than what is required for weaving and which will draw and feed weft smoothly, particularly at high speeds.

It is a further object of the invention to provide a feed mechanism which can be easily adjusted to feed a desired amount of weft.

These objects are accomplished by the provision of a weft feed mechanism which includes a constantly rotating feed member having a guide roll spaced from the center of rotation. The constantly rotating aspect of the feed mechanism is consistent with the movement of other parts on the loom which are also rotary because of the very high speeds. The guide roll engages a section of the weft which extends between two stationary guides located between the weft inserter and supply source. Although this arrangement does not draw weft at an exact uniform rate, it does draw it at a smoothly accelerating rate which has nearly the effect of continuous draw at high speeds. The feed mechanism draws a precise amount of weft and therefore can be operated with a minimum rate of tension thus eliminating breakage and twist back-up. Although it is desirable to use a slack compensator with the present feed device, it is no longer essential. The present weft feed device can be adjusted so that the weft drawing portion of its cycle will begin at the point where slack develops in the area of the weft inserter. Some of this slack results from an overfeeding of yarn due to the fact that the weft inserter has to go beyond the far edge of the cloth to enable a selvage to be formed. The present weft feed device will draw back all the slack from the weft inserter and then draw enough weft for the next weft insertion from the supply source. It is only necessary to create a slight tension between the feed device and the supply source so that the slack will be taken up before the weft is drawn from the supply. The present weft feed device therefore not only functions as a positive feeding device, but also as a tension control and slack take-up device.

Brief description of the drawings

The invention and additional objects and advantages thereof, will be best understood from the following description when read in conjunction with the accompanying drawings in which:

FIGURE 1 is a fragmentary plan view of a loom with the invention applied thereto;

FIGURE 2 is a view in elevation looking in the direction of arrow 2, FIGURE 1;

FIGURE 3 is a cross section of the adjustable guide roll taken on line 3—3, FIGURE 2;

FIGURE 4 illustrates a modified weft feed member; and

FIGURE 5 is a cross section on line 5—5, FIGURE 4 and showing an adjusting means for the guide roller.

Description of the preferred embodiments

Referring particularly to FIGURES 1–3, the loom to which the invention is applied is generally indicated at **10**. The loom **10** has a weft inserting member **12** which is reciprocated between full and dotted line positions to insert loops **14** of a filling **16** into a shed generally indicated at S. The loops **14** are knitted together to form a selvage S' by a knitting needle **18**. In order to knit the loops, the filling inserter has to extend beyond the selvage as shown in full lines in FIGURE 1.

The filling **16** extends from a supply package **20** and passes through the novel weft feed device generally indicated at **22** and a slack takeup device generally indicated at **24** before reaching the weft inserter **12**. Slack takeup device **24** includes a pair of oppositely opposed guides eyes **26** and a spring **28** located between the guide eyes. The slack takeup device **24** is located between the feed device **22** and the weft inserting member **12**. The spring **28** engages the filling which extends between guide eyes **26**, and is effective to takeup any slack which develops during the reciprocation of weft inserter **12**.

The weft feed device **22** which is located between the slack takeup device **24** and the weft package **20** includes a pair of guide members **30** fastened at **32** to a support rod **34** which is in turn fastened to a stationary part of the loom at **36**. The outwardly extending ends of guide members **30** are formed into weft guiding loops or eyes **38**. Weft feeding device **22** also includes a feed member which comprises a disc **40** mounted by a set screw **41** on a shaft **42**. Disc **40** has a slot **44**, see FIGURE 2, which extends outwardly from the shaft **42**. A guide roll **45** having a central circumferential groove **46**, see FIGURE 3, is rotatably mounted on a bushing **47**. Roll **45** is held on bushing **47** by a bolt **48** which is threaded into a holding member **49**. Bushing **47** has an enlarged portion **50** which together with member **49** forms a clamp against the edges **52** of the slot **44**. The enlarged portion **50** also acts as a spacer to hold roll **45** away from the disc. Holding member **49** has a reduced portion **53** which fits into slot **44** and allows the roll to be guided adjusted along slot **44** when bolt **48** is loosened. Shaft **42** is driven by equal pulleys **58** and a belt **60** from a lay drive shaft **62**. Shaft **42** is therefore driven in timed relation to other motions on the loom and makes one revolution for each weft insertion.

During operation of the loom, the weft feeding mechanism operates as follows: The filling which extends between eyes **38** is looped around roll **45** into a loop **64**. The constantly rotating disc **40** is set on shaft **42** and timed so that roll **45** reaches the upper position, as shown in full lines in FIGURE 2, as weft inserter **12** reaches the full line position as shown in FIGURE 1. As weft inserter **12** moves from the full to the dotted line position in FIGURE 1, roll **45** moves from the full line to the dotted line position in direction of arrow A, FIGURE 2. During this motion, roll **45** draws a certain amount of filling from package **20**. The amount of filling drawn from the package **20** will be equal to the difference in total filling length between the dotted and full line positions of filling loop **14** minus the portion of the full line which extends beyond the selvage S. The length of filling so drawn will be equal to a weft insertion. This amount will be released to the weft inserter as the weft inserter moves from the dotted line position to the full line position in FIGURE 1 by the motion of roll **45** from the dotted line to the full line position in FIGURE 2. The roll **45** is adjusted along slot **44** at a distance from the center of the disc which is approximately equal to one-half of the width of the fabric F being woven. Finer adjustments can be made so that the device will feed an exact amount of weft to the weft inserter **12**.

As previously described, the takeup device **24** takes up the slack produced by the over-travel of the weft inserter. The takeup device could be eliminated if desired by adjusting the timing on the feed device so that roll **45** begins to draw weft earlier in the cycle. By placing a tension device between the feed device and the supply package as indicated at **65**, the weft feed device will draw the slack from the weft inserter first before drawing from the supply package. Roll **45** will be adjusted from the center of shaft **42** so that the amount of yarn drawn from the full line position to the dotted line position in FIGURE 2 will equal the slack plus the amount of weft needed to lay a double pick as represented by loop **14**. When the roll moves from the dotted line position to the full line position in FIGURE 2, the amount of filling given up to the weft inserter will also equal the amount of filling needed to insert a double pick plus the slack. When the weft feed device is used in this way, the only tension that is required is that produced by tension device **65** which can be very light.

Referring to FIGURES 4 and 5, there is shown a modified feed member generally indicated at **66**. Feed member **66** includes an arm **68** adjustably fastened to shaft **42** by a locking screw **70**. A tubular slider **72** having a rectangular cross section fits on arm **68** and is slidable thereon. A screw **74** holds slider **72** to arm **68** in the desired position and can be loosened to allow the slide to be adjusted on arm **68**. A roll **76** similar to roll **45** is rotatably mounted on slider **72** by a pin **78**. Arm **68** and roll **76** will be rotated by shaft **42** in the same manner as described for disc **40** and roll **45**.

It should be apparent that other forms of constantly rotating feed members may be used together with other means for adjustably mounting a feed roll thereon by those skilled in the art without departing from the spirit of the invention. The scope of the invention is more accurately defined in the following claims.

I claim:

1. A weft feeding mechanism for advancing weft from a stationary supply to weft inserting means in a loom, wherein the weft is used intermittently in a weft inserting cycle, comprising:

(a) a pair of spaced stationary weft guides located between said stationary supply and said weft laying means through which said weft extends;

(b) a constantly rotating feed member which makes one rotation for each weft laying cycle; and

(c) a feed guide attached to and protruding from one face of said feed member at a distance from the center of rotation thereof and being the only protuberance extending from said face for continuous engagement with the portion of said weft which extends between said spaced guides, whereby weft is drawn from said package during a portion of the rotation of said feed member and released to said weft inserting means during another portion of the rotation of said feed member.

2. The weft feeding mechanism as described in claim **1** wherein said feed guide comprises a roller pivotally mounted on said feed device and having a circumferential groove for engaging said weft.

3. The weft feeding mechanism as described in claim **1** wherein said feed guide is attached to said feed member by means for adjustably positioning and holding said feed guide at varying distances from the center of rotation of said feed member, whereby the amount of weft which is drawn from said supply and released to said weft inserting means can be varied.

4. The weft feeding mechanism as described in claim **3** wherein said feed member has a slot which extends away from said center of rotation and said means for adjustably positioning and holding said feed guide comprises a clamp which is guided in said slot and which supports said feed guide.

5. The weft feeding mechanism as described in claim **4** wherein said support member is a disc.

6. The weft feeding mechanism as described in claim **4** wherein said feed member is a crank arm and said

means to adjustably position and hold said feed guide comprises:

(a) a sleeve slidably mounted on said crank arm and which supports said feed guide; and

(b) means for releasably locking said sleeve to said arm in any position on said arm.

7. The weft feeding mechanism as described in claim 6 wherein said sleeve has a threaded hole through one side thereof and said locking means is a screw.

8. A weft feeding and slack takeup mechanism in a loom wherein weft is drawn from a stationary supply source to a weft inserting means to be used intermittently in a weft inserting cycle, said mechanism comprising:

(a) a pair of spaced stationary yarn guides located between said stationary supply and said weft laying means;

(b) a constantly rotating feed member which makes one rotation for each weft laying cycle; and

(c) a feed guide attached to and protruding from one face of said feed member at a distance from the center of rotation thereof and being the only protuberance extending from said face for continuous engagement with a portion of said weft which extends between said spaced yarn guides, whereby slack weft

is taken up and additional weft is drawn from said supply source during one portion of the rotation of said feed member and released to said weft inserting means during another portion of the rotation of said feed member.

9. The weft feeding mechanism as described in claim 8 wherein said feed guide is attached to said feed member by means for adjustably positioning and holding said feed guide at varying distances from the center of rotation of said feed member, whereby the amount of weft drawn from said supply and released to said weft inserting means can be varied.

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HENRY S. JAUDON, Primary Examiner

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