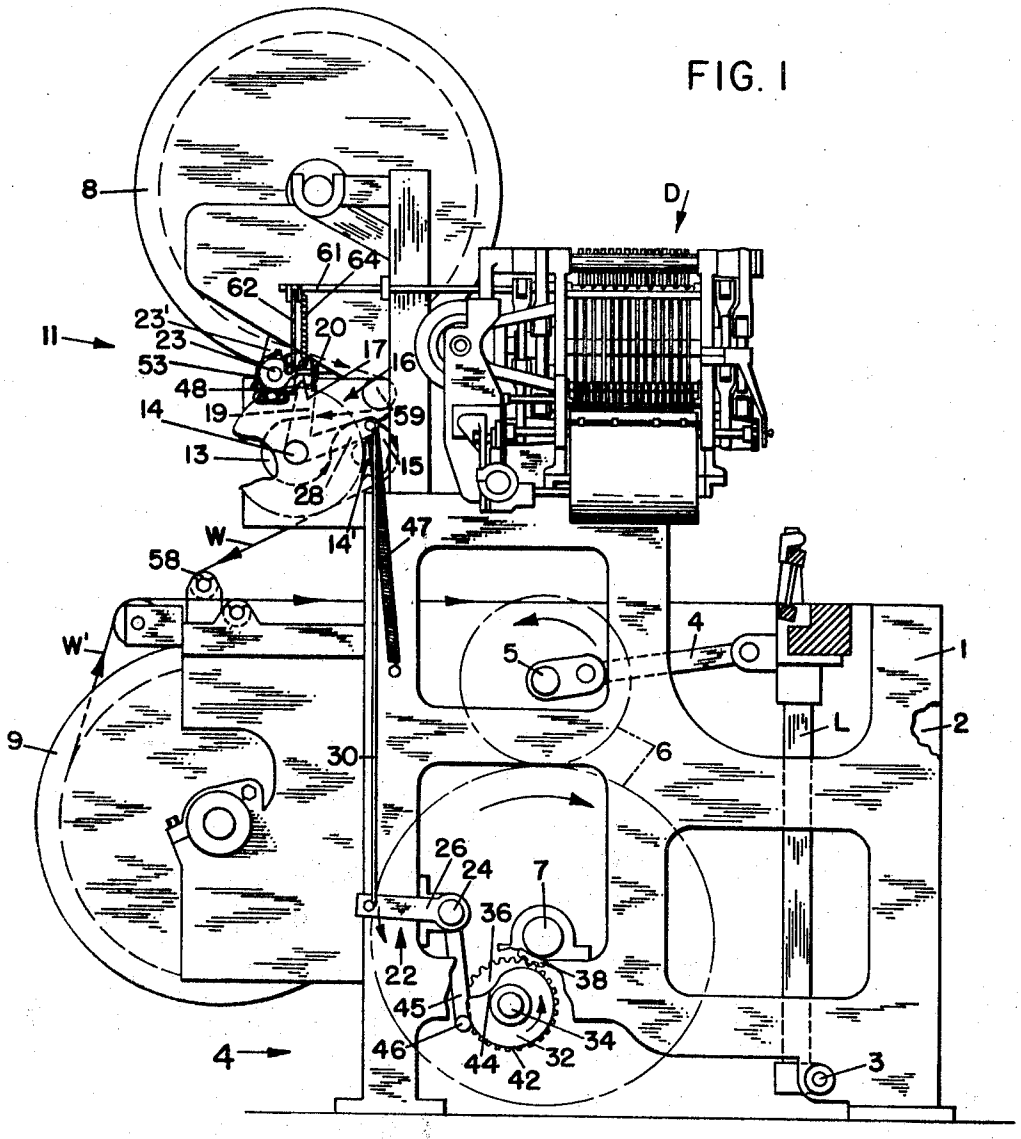
Feb. 4, 1969 C. P. BERGSTROM 3,425,457

LET-OFF FOR TERRY

Filed May 1, 1967 Sheet 1 of 2

FIG. 1



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LET-OFF FOR TERRY

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FIG. 2

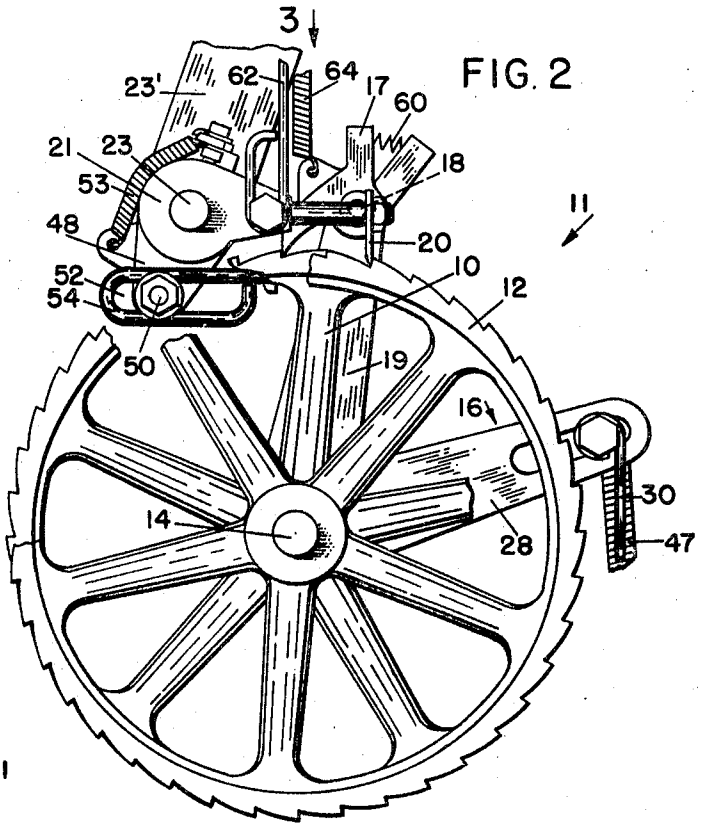


FIG. 3

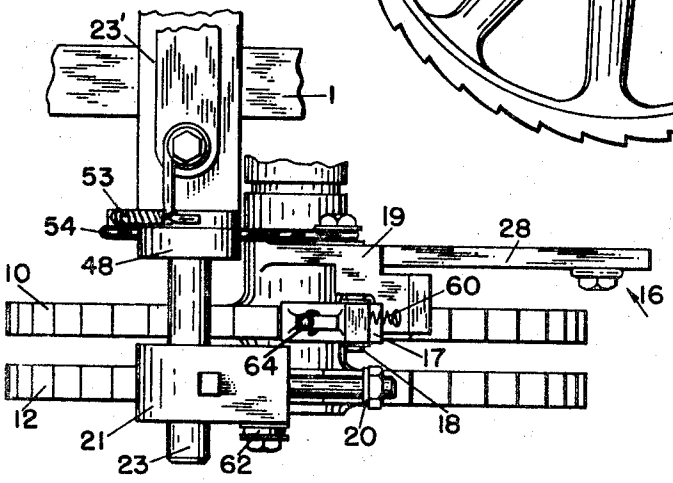
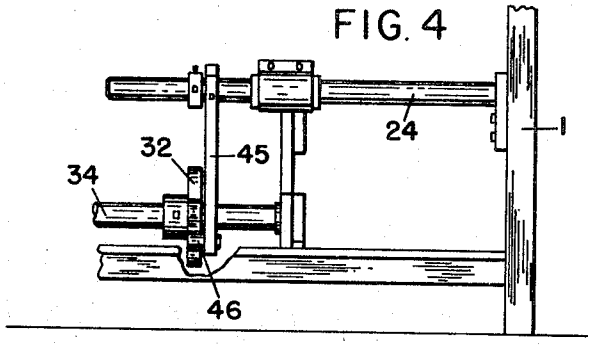


FIG. 4



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3,425,457

LET-OFF FOR TERRY

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U.S. Cl. 139—25 6 Claims
Int. Cl. D03d 39/22, 41/00; D03c 49/06

ABSTRACT OF THE DISCLOSURE

An apparatus for rotatably driving a feed roll, around which terry yarn from a supply loom is trained, to feed the yarn for the formation of terry loops; and for positively holding the roll against rotation between formations of terry loops. The roll is driven by a drive pawl and ratchet arrangement and held against rotation by a hold pawl and ratchet arrangement, the hold ratchet having teeth oriented in the opposite direction from the teeth of the drive ratchet and the hold pawl being disengaged from the hold ratchet when the roll is driven.

The present invention relates to warp let-off and particularly for warps which have to be drawn off intermittently due to periodic usage such as warps for making terry loops in a terry towel loom.

Looms of this type operate on a multiple pick sequence as for example, "three pick terry" in which the lay makes two "partial beat-ups" while the reed is swung back relative to the lay at a slight angle from normal and then one full beat-up while the reed is in normal position. During the "full" beat-up, the terry loops are formed and require an excess of terry warp at this time. For this reason the exact amount of terry warp has to be drawn off from a separate beam from that of the ground warp.

The terry warp is usually drawn around a feed roll which is driven at the appropriate time through a pawl and ratchet wheel arrangement and an idler roll which is driven frictionally by the feed roll or through gearing. A brake is usually provided on the feed roll to prevent the ratchet wheel and feed roll from turning when the drive pawl moves through a return stroke. The ratchet wheel and feed roll have a tendency to rotate in the direction of feeding due to the constant tension created by the cloth take-up. This feature is very critical, for if the feed roll is not prevented from rotating while the pawl makes its return stroke, additional terry warp yarn may be drawn off. This additional amount, together with the usual amount drawn off by the action of the drive pawl will be more than the desired amount of terry warp. If the amount of terry warp being drawn off is not controlled there will be variations in the length of terry loops to produce a non-uniform terry fabric.

The use of a brake has never been completely satisfactory. It has to be strong enough to hold the feed roll against rotation in opposition to the tension created in the cloth take-up mechanism and yet be weak enough to allow the drive pawl to rotate the ratchet wheel and feed roll forward. This requires that the brake has to be accurately set for various conditions and has to be frequently adjusted during weaving. The problem becomes even more acute with unusually wide terry looms.

The present invention solves the above problem by providing a positive holding means for the roll such as a second ratchet wheel having teeth which are oriented in the opposite direction from the teeth of the drive ratchet and a hold pawl which can engage the second ratchet wheel to prevent the feed roll from turning. Means are provided to lift the hold pawl out of engagement with its respective ratchet wheel when the drive pawl moves through its driving stroke. Means are also provided to disconnect both pawls when a plain section of cloth is woven as for example, the border of a towel.

It is therefore an object of the present invention to provide a positive feeding and holding mechanism for intermittently releasing terry warp yarn and preventing any further release of terry yarn between periods of positive feeding.

It is a further object of the invention to provide means for disengaging the positive feeding and holding mechanism to weave plain fabric.

Other objects and the details of that which is believed to be novel will be clear from the following descriptions and claims taken with the accompanying drawings in which:

FIGURE 1 is a side elevation of a terry loom with the invention applied thereto;

FIGURE 2 is a fragmentary elevation on an enlarged scale of a portion of the warp feed device shown in FIGURE 1;

FIGURE 3 is a plan view of the warp feed device shown in FIGURE 2; and

FIGURE 4 is a fragmentary view looking in the direction of arrow 4, FIGURE 1.

Referring to FIGURE 1, the loom framework has loomsides **1** and **2**, a lay L mounted to rock about a rocker shaft **3** by means of connectors, one of which is shown at **4**. The connectors are reciprocated by a crankshaft or top shaft **5** which is connected by gearing **6**, indicated diagrammatically, to a bottom shaft **7**. As shown herein, the crankshaft **5** turns twice as fast as the bottom shaft, and turns in a counterclockwise direction as viewed in FIGURE 1. The loom is also equipped with a beam **8** containing terry warp W, a beam **9** containing ground warp W′ and a pattern mechanism which in this case is a dobby designated by the reference character D, but it is to be understood that other pattern means can be used.

The let-off mechanism for the terry warp is indicated by the reference character **11** and includes a feed roll **13** and an idler roll **15** fixed to shafts **14** and **14′** respectively which are supported by loomsides **1** and **2**. Idler roll **15** can be driven by feed roll **13** through frictional engagement or by equal gearing, not shown. A pair of ratchet wheels **10** and **12** are fixed to a portion of shaft **14** which extends outside of the loom side **1**. A bell-crank lever generally indicated at **16** has a pair of arms **19** and **28** and is freely mounted on shaft **14**. A drive pawl **17** is pivotally attached to arm **19** by a pin **18** in driving relationship with the teeth of ratchet **10**. A hold pawl **20** is attached to a lever **21** keyed about a stub shaft **23** which is supported by a bearing member **23′**. Hold pawl **20** is normally engaged with the teeth of ratchet **12** in holding relation. A second bell-crank lever generally indicated at **22** is pivoted on a stub shaft **24** and has a pair of arms **26** and **45**. Arm **26** is connected to arm **28** of bell-crank lever **16** by an elongated rod **30**. A cam **32** is fixed to a stub shaft **34** which is driven by a gear **36** which is in turn driven by a gear **38** fixed to bottom shaft **7**. Gear **38** makes three rotations for every two rotations of gear **36**. Since bottom shaft **7** makes one rotation for every two reciprocations of lay L, cam **32** makes one rotation for every three reciprocations of lay L or once for every three weft insertions.

Cam **32** has a high portion **42** and a low portion **44**. Attached to arm **45** of bell-crank lever **22** is a cam follower **46** which rides along the surface of cam **32** as it rotates in a counterclockwise direction as seen in FIGURE 1. Follower **46** is held in contact with cam **32** by a

tension spring 47. As follower 46 goes from the high portion 42 to the low portion 44, bell-crank lever 22 is rotated counterclockwise and causes bell-crank lever 16 to rotate clockwise. This motion causes the drive pawl 17 to rock back along drive sprocket 10 to engage a different tooth. A link 54 is attached at one end to the upper portion of arm 19 and is slidingly connected at its other end to arm 48 which is keyed to stub shaft 23. A projection 50 on arm 48 fits into a slot 52 in link 54 so that when lever 16 is rocked clockwise to rock the drive pawl to the right (as viewed in FIGURE 2) in preparation for a drive stroke, projection 50 rides in slot 52 until it reaches the end. This will occur as drive pawl 17 falls into engagement with the next tooth to be engaged and a slight additional motion of lever 16 will cause link 54 to rock stub shaft 23. When this happens, lever 21 will be rocked counterclockwise, thereby pulling hold pawl 20 out of engagement with ratchet wheel 12 against the action of a spring 53. As soon as the hold pawl is released, the cloth tension will start to pull the drive ratchet ahead (counterclockwise in FIGURE 2), but this will occur at a time in the terry cloth cycle when it is desired to let off terry warp. At this time follower 46 will be moving from the low point 44 back to the high portion 42 of cam 32 to cause lever 16 to rock in a counterclockwise direction against the action of spring 47. When this happens, drive pawl 17 will advance the drive ratchet a distance of one tooth. At the same time, hold pawl 20 is allowed to drop on the tooth previously being held and rides thereon until it encounters the next tooth on ratchet wheel 12. The mechanism for operating the drive pawl 17 is of known construction and operates in known manner with the exception of the timing of the stroke of pawl 17 as controlled by cam 32. The usual timing is such that the drive pawl is given a driving stroke which is immediately followed by a return stroke and then made to dwell until the next driving stroke. In the present invention, the drive pawl begins with a return stroke which is immediately followed by a driving stroke and then dwells until the next return stroke. In this way, drive pawl 17 and hold pawl 20 are both in tooth engaging positions so that feed roll is locked in both directions. This timing is also necessary because it is during the return motion of drive pawl 17 that hold pawl 20 is lifted out of engagement with ratchet 12. As described, the lifting of the hold pawl must occur just prior to feeding of terry yarn. The timing is such that pawl 17 drives feed roll for a short distance once every three picks and at a time in the terry cycle when terry yarn is needed to form pile loops. As viewed in FIGURE 1, when rolls 13 and 15 advance, warp W is drawn from terry warp beam 8 around a slack take-up roll 59, to the left around feed roll 13, then between feed roll 13 and idler roll 15. It is then drawn around idler roll 15 and down around a roll 58 where it joins the ground warp W'. From roll 58, warps W and W' are drawn into a shed and incorporated into the cloth to be woven.

Although drive pawl 17 is pivoted on the upper end of arm 19, it is held in engagement with a tooth on ratchet wheel 10 by a compression spring 60. Pawl 17 is attached to arm 19 in this way for a purpose to be described.

After the body of a terry towel has been woven it is usually desirable to weave a section of "plain" cloth where no loops are needed for a border or separation between towel bodies. To do this, the terry warp has to be drawn through continuously with the ground warp. The pattern of the towel and length are controlled by pattern mechanism or dobby D, see FIGURE 1. A stub shaft 61 which is pivoted by one of the dobby jacks and controls the swing reed which is responsible for forming the terry loops, for instance, in a manner similar to that of stud 121 shown in U.S. Patent 2,799,297.

Attached to shaft 61 is a rod 62 and a spring 64 which are connected to pawls 20 and 17 respectively. When the pattern in the dobby calls for plain cloth to be woven, shaft 61 is partially pivoted to operate the swing reed, not shown, and at the same time to disconnect the pawls 17 and 20 from ratchet wheels 10 and 12 respectively. Pawl 20 is pulled directly upward around shaft 23 and pawl 17 is pulled up around pin 18 against the action of spring 60.

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 loom for weaving terry cloth, a let-off mechanism for controlling the amount of terry warp being let-off from a supply source comprising:
   (a) a shaft mounted for rotation on said loom;
   (b) a feed roll fixed to said shaft, around which said terry warp is trained;
   (c) a drive ratchet wheel fixed to said shaft for driving said shaft in one direction;
   (d) means to lock said shaft against rotation in said one direction;
   (e) a drive pawl arranged in driving relation to said drive ratchet wheel for intermittently driving same in said one direction; and
   (f) actuating means operated by the loom to release said locking means while causing said drive pawl to advance said drive ratchet wheel and said feed roll to let-off a predetermined amount of terry warp and to lock said shaft against rotation while moving said driving pawl in a return stroke preparatory to a driving stroke so that said feed roll will be held against further feeding of warp until the next driving stroke of said drive pawl.

2. The let-off mechanism as described in claim 1 wherein said locking means comprises:
   (a) a holding ratchet wheel fixed to said shaft and having teeth which are oriented in the opposite directions from the teeth on said drive ratchet wheel; and
   (b) a hold pawl arranged in holding relation with respect to said holding ratchet wheel.

3. The let-off mechanism as described in claim 2 wherein said hold pawl is pivoted on a stationary part of the loom and wherein said actuating means comprises:
   (a) a constantly rotating shaft on said loom;
   (b) a cam fixed to said shaft;
   (c) a cam follower which is moved by said cam;
   (d) a pivoted lever operatively connected to said cam follower and pivotally supporting said drive pawl for oscillating same in alternate driving and reciprocating strokes; and
   (e) a link attached at one end to said lever and operatively connected at its other end to said hold pawl for lifting said hold pawl out of engagement with said holding ratchet wheel prior to a driving stroke of said drive pawl.

4. The let-off mechanism as described in claim 3 wherein said constantly rotating shaft is an auxiliary shaft mounted in stationary bearings and which makes one revolution for every three weft insertions.

5. The let-off mechanism as described in claim 2 wherein said loom has a pattern mechanism and auxiliary means operatively connected to said pattern mechanism and said pawls to lift both of said pawls out of engagement with their respective wheels so that terry warp can be drawn freely when a pattern calls for the loom to weave plain cloth without terry loops.

6. The let-off mechanism as described in claim 1 wherein said locking means comprises:
   (a) an extension of said drive ratchet wheel on which there is a set of circumferential teeth which are oriented in the opposite direction from the teeth of said drive ratchet; and
   (b) a hold pawl arranged in holding relation with respect to the teeth on said extension.

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JAMES KEE CHI, *Primary Examiner.*

U.S. Cl. X.R.

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