May 20, 1947. H. LAKELAND 2,420,957

WARP LET-OFF MOTION OF LOOMS FOR WEAVING

Filed Dec. 3, 1945 4 Sheets-Sheet 1

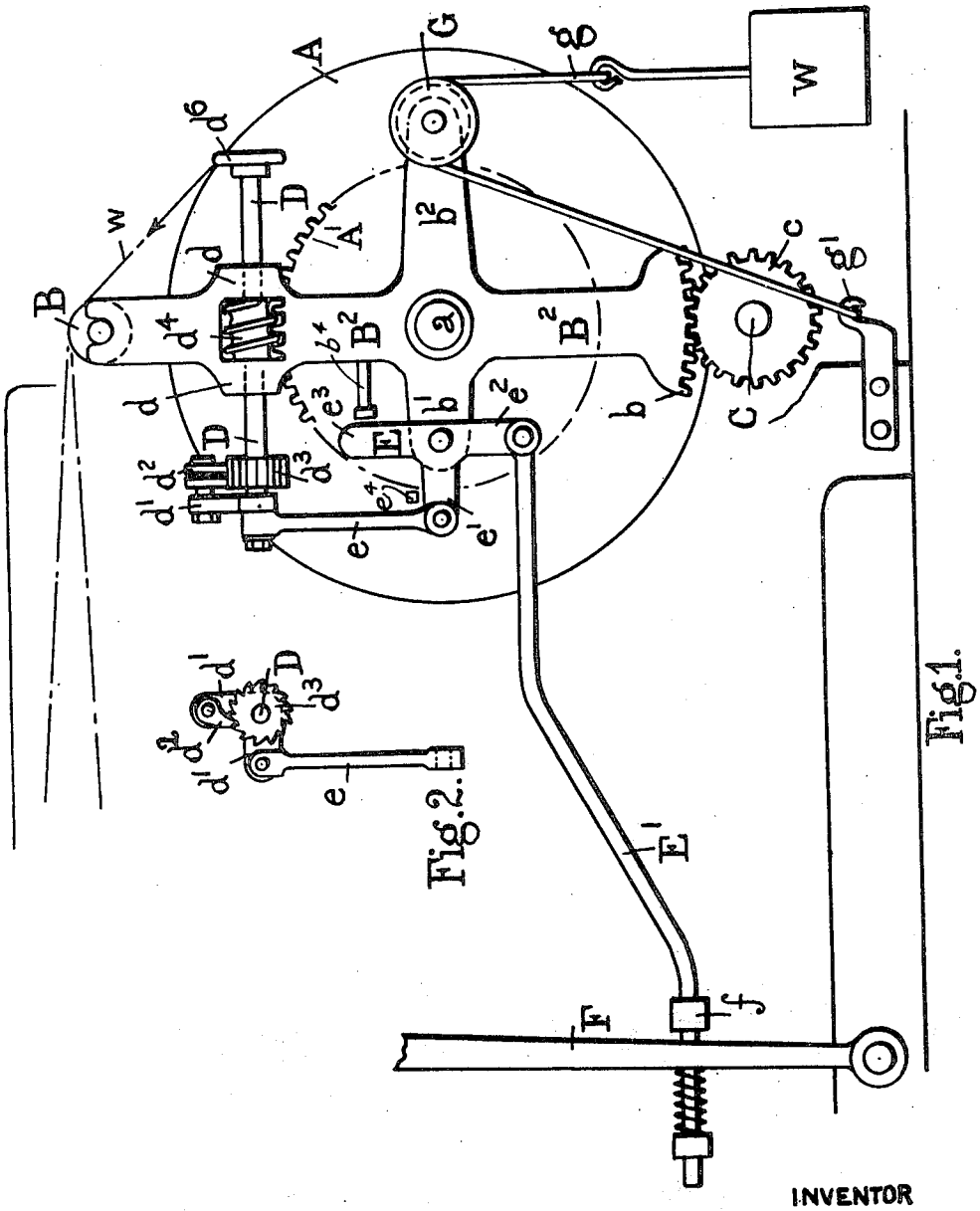


Fig.1.

Fig.2.

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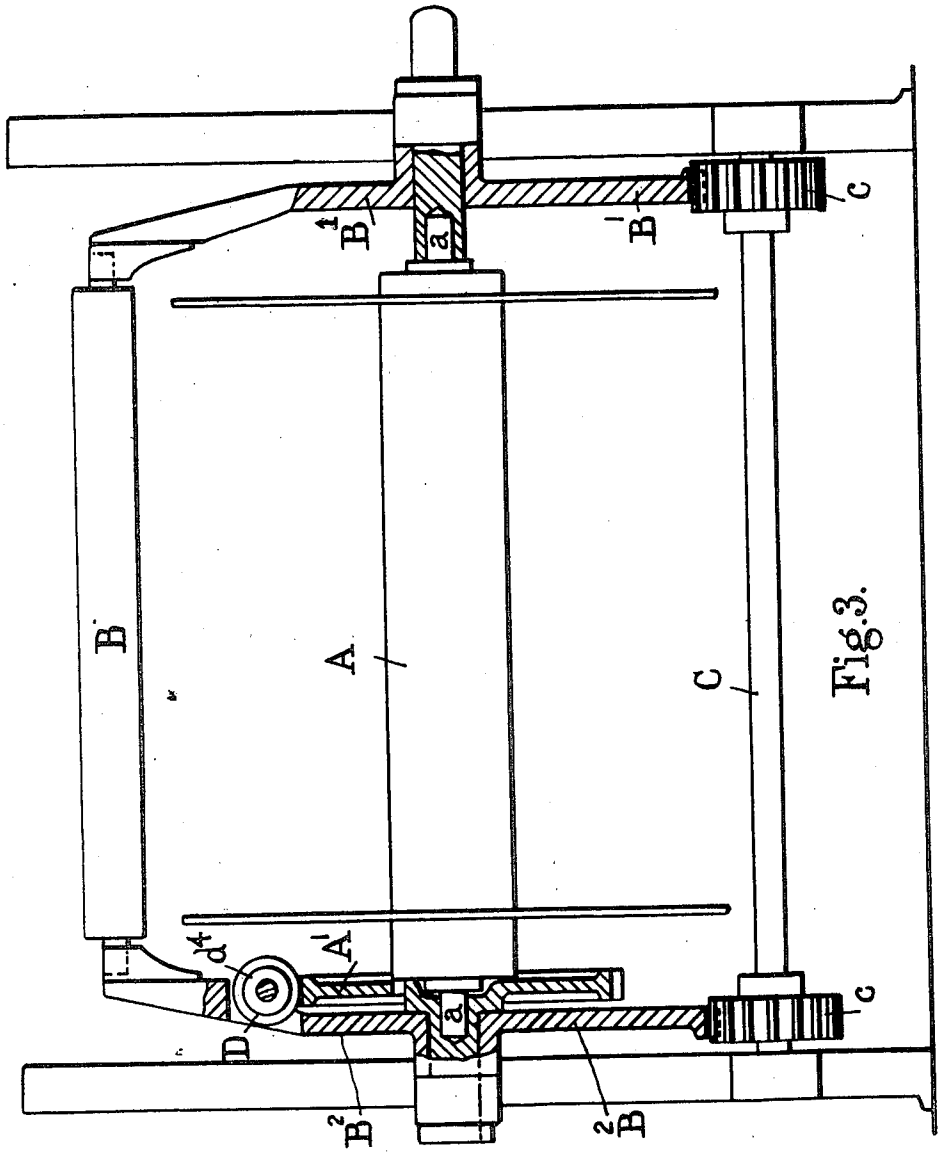


Fig.3.

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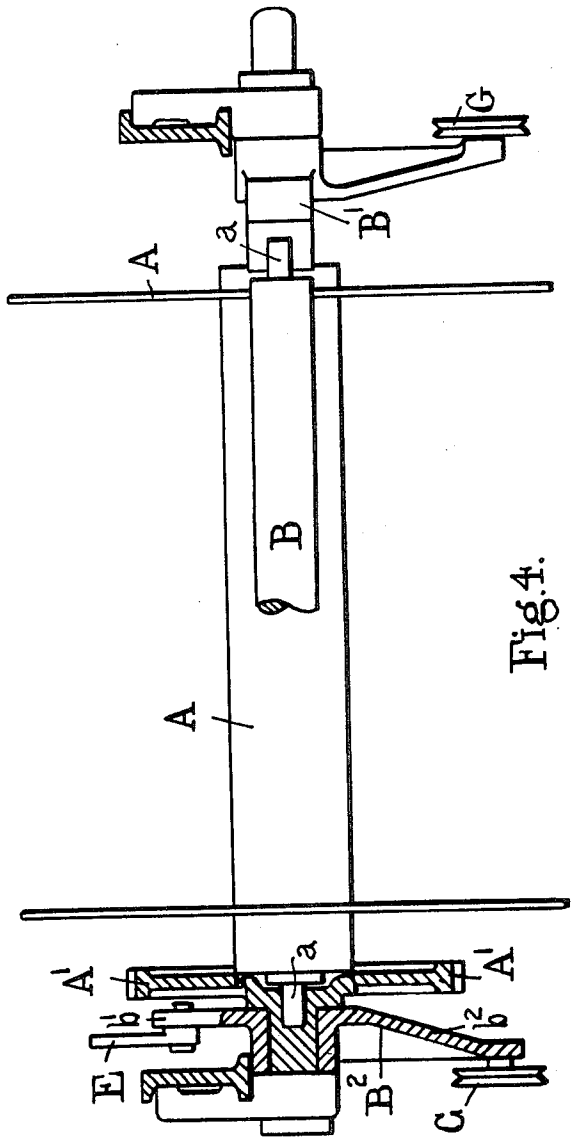


Fig.4.

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WARP LET-OFF MOTION OF LOOMS FOR WEAVING

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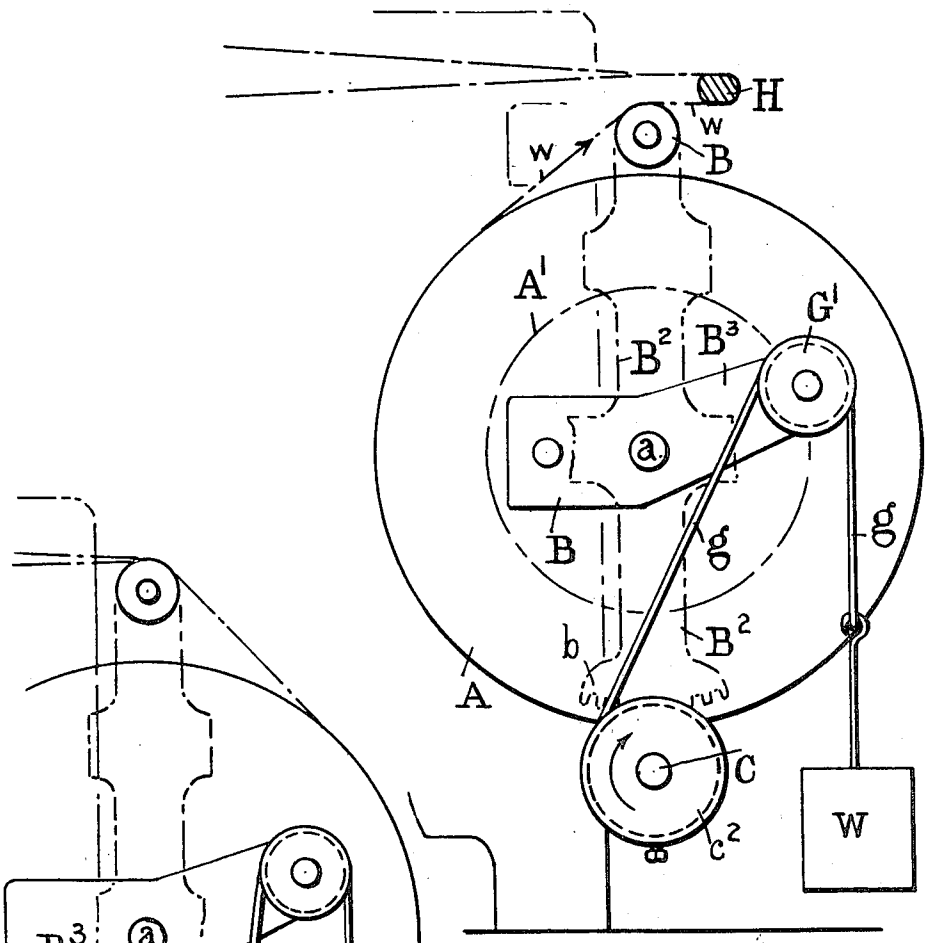


Fig.6.

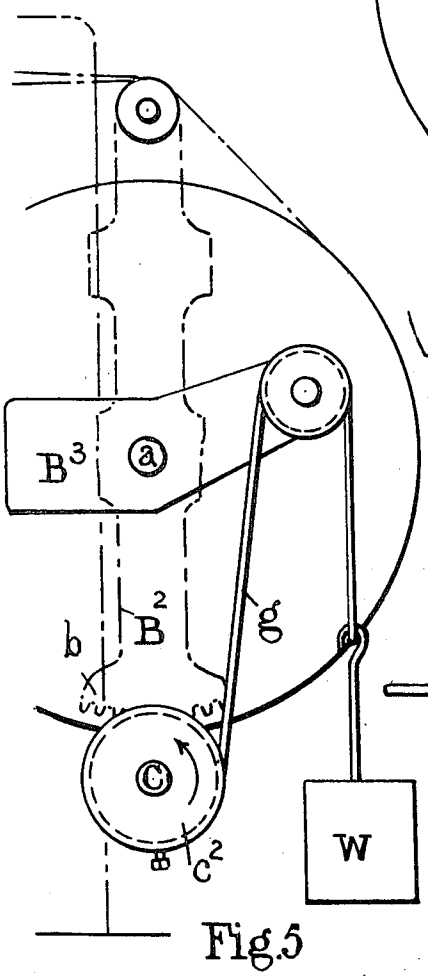


Fig.5

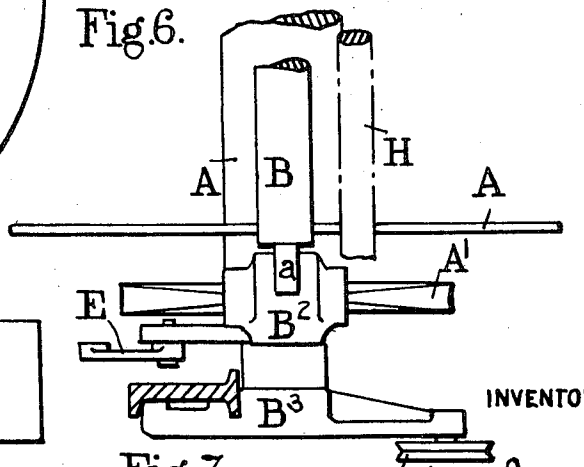


Fig.7.

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Patented May 20, 1947 2,420,957

UNITED STATES PATENT OFFICE

2,420,957

WARP LET-OFF MOTION OF LOOMS FOR WEAVING

Henry Lakeland, Frenchwood, Preston, England

Application December 3, 1945, Serial No. 632,330
In Great Britain November 28, 1944

5 Claims. (Cl. 139—110)

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This invention relates to improvements in warp let-off motions of looms for weaving.

The object of the invention is to provide a warp let-off motion capable of supplying warp at a substantially constant rate, irrespective of the amount of warp on the beam, and at the same time maintain the warp tension at a substantially constant value throughout the whole weaving operation on a range of weaves from light to heavy.

According to the invention the warp passes from the warp beam to the healds over a back carrier roller which is supported by a pair of swinging arms journalled about an axis concentric with the axis of the beam whereby the roller is movable to prevent over tensioning of the yarn during shedding and returning for the beat-up.

The swinging arms extend below the axis about which they pivot and their lower ends are segmental and provided with teeth which engage toothed wheels mounted on a shaft extending across the loom below the beam and carried in bearings secured to the frame of the loom whereby if any angular movement is given to one arm an equal angular movement is imparted to the other arm.

The invention is illustrated in and will be described with reference to the accompanying drawings in which:

Fig. 1 is a side elevation partly in section of the motion, sufficient of the loom being shown to locate the motion in respect thereto;

Fig. 2 is a detail view of ratchet mechanism rotating the warp beam;

Fig. 3 is a rear elevation of the motion shown in Fig. 1;

Fig. 4 is a sectional plan of same;

Fig. 5 is a side elevation of the motion showing a modified form of weighting;

Fig. 6 is a side elevation of the motion showing a further modified form of weighting;

Fig. 7 is a plan of Fig. 6.

The warp beam A is journalled on the shafts a, one at each side of the loom, and two swinging arms B^1, B^2 are also journalled on the shafts a one at each end of the beam A, the arms being rotatable about the axis of rotation of the beam A.

The arms B^1, B^2, extend upwards beyond the beam A and their upper ends carry a back carrier roller B which is rotatably supported thereon, the warp w passing from the beam A over the roller B to the healds.

The arms B^1, B^2 also extend below the axis of the beam A and their lower ends are of segment

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shape and provided with teeth b. A shaft C extends across the loom below the beam A and is carried in bearings on the loom frame in which it can rotate. The shaft C carries a spur wheel c at each end which gear respectively with the teeth b on the arms B^1, B^2 so that any angular movement given to one arm is imparted to the other arm.

One of the arms, the arm B^2 in the drawings, is formed with lugs d in which a spindle D is mounted, the lugs d being located between the bearing for the carrier roller B and the axis about which the arm pivots. An arm or member d^1 is loosely mounted on one end of the spindle D and carries a pair of pawls d^2 which engage a ratchet wheel d^3 secured to the spindle D. A worm d^4 positioned in an aperture in the arm B^2 between the lugs d is also affixed to the spindle D and engages a worm wheel A^1 on the end of the beam A or secured thereto so that it is concentric therewith.

The arm B^2 is also formed with a horizontal extension b^1 the extension b^1 being towards the front of the loom. The extension b^1 carries a three armed lever E, one arm e^1 of which is pivotally connected by a connecting rod e to the loose member d^1 on the spindle D and the arm e^2 is pivotally connected to a push rod E^1 by which it can be oscillated. The push rod E^1 is displaced by the slay sword F on its backward movement coming into contact with an abutment f on the rod and this movement causes the lever E to be oscillated, the member d^1 on the spindle D to swivel and the spindle to be rotated by the pawls d^2 carried on the member d^1 rotating the ratchet wheel d^3 on the spindle. The worm d^4 on the spindle consequently rotates the worm wheel A^1 and with it the warp beam A.

As the let-off motion is capable of giving off more yarn from the beam A than the take-up motion of the loom requires it is necessary to control the swinging arms B^1B^2 in an approximately vertical position. This is effected by stop e^4 fitted to the loom frame and situated in the path of the arm e' of the lever E so that when the arms B^1, B^2 move clockwise under the influence of weights, as hereinafter described, the lever E becomes displaced and moves the push rod E' withdrawing the abutment f thereon from contact with the slay sword F.

To give displacement to the carrier roller B and tension to the warp yarn w passing over it weights are applied to the motion. These weights may be applied in various ways according to the structure of the cloth being woven.

Thus, for light weaves a weight may be suspended directly from rearward extensions b^2 of the swinging arms B^1B^2.

For light to medium weaves a pulley G is mounted on each extension b^2 (see Figs. 1 and 4) and a cord or cable g passed over the pulley, one end of the cord or cable being anchored to the frame of the loom at g^1 and a weight W attached to the other end. This gives a greater tension than simply suspending the weights from extensions b^2 of the arms.

For light heavy weaves a cord or cable g passes over a pulley G^1 carried by a fixed bracket B^3 on at each end of the beam. The end of each cord or cable g is anchored to a pulley c^2 on the shaft C (see Fig. 5) instead of to the frame of the loom, the weight W being suspended from the other end of the cord or cable g. The weights W thus tend to rotate the shaft C and through the wheels c and toothed segments b move the swinging arms B^1B^2.

For medium heavy weaves a fixed rest H (see Figs. 6 and 7) around which the warp w passes is arranged to the rear of the carrier roller B carried by the arms B^1B^2 to take the shock of the beat-up. The cables g to which the weights W are attached pass round pulleys G^1 carried by brackets B^3 the other ends of the cables being connected to the pulleys c^2 at each end of shaft C. In this arrangement the cords g are secured to the opposite side of the pulley c^2 to that in Fig. 5. Thus, when the weights W are applied the shaft is rotated and moves the arms B^1B^2 in counterclockwise direction which gives tension to the warp threads w since they pass over the moving carrier roller B and round the rest H on their way to the healds. In this arrangement the displacement of the right angled lever to restrict let-off is actuated by a control pin on the swinging arm.

For very heavy weaves double fixed rests are employed, the warp threads passing over the moving carrier roller and then pass first round one fixed rest and then round the other fixed rest to withstand the greater shock of the beat-up and the weight supporting cable is passed round the pulley on the shaft connecting the swinging levers in the opposite direction to that in the preceding arrangement for medium heavy weaves. This has the effect of displacing the swinging arms outwardly and giving tension to the warp threads.

If for any reason, such as unweaving, it is necessary for the warp tension to be released, a hand wheel d^6 is provided on the spindle D so that by rotating it, the swinging arms B^1B^2 are allowed to become displaced until stops b^4 on the arms engage the frame of the loom or stops thereon when the warp has become slack. To re-apply the tension the hand wheel d^6 is rotated in the opposite direction.

I claim:

1. A warp let-off motion of a loom for weaving comprising the combination with a warp beam from which the warp is unwound of a pair of swinging arms, one at each end of the warp beam and journalled about an axis concentric with the axis of the said beam, a back carrier roller over which the warp passes rotatably mounted in said arms a toothed segment on one end of each arm, a shaft parallel to the axis of the warp beam, a toothed wheel affixed on said shaft gearing with the segment on one arm, a second toothed wheel affixed on shaft gearing with the segment on the other arm whereby the two arms will move in unison and weighting means for influencing said arms to cause the back carrier roller to apply tension to the warp passing over it.

2. A warp let-off motion of a loom for weaving comprising the combination with a warp beam from which the warp is unwound of a pair of swinging arms, one at each end of the warp beam and journalled about an axis concentric with the axis of the said beam, a back carrier roller over which the warp passes rotatably mounted in said arms, a toothed segment on one end of each arm, a shaft parallel to the axis of the warp beam, a toothed wheel affixed on said shaft gearing with the segment on one arm, a second toothed wheel affixed on shaft gearing with the segment on the other arm whereby the two arms will move in unison and weighting means for influencing said arms to cause the back carrier roller to apply tension to the warp passing over it, an extension on one of the swinging arms projecting towards the front of the loom, a lever pivoted on said extension, a spindle carried on the arm carrying the pivoted lever, a worm affixed on said spindle, a ratchet wheel affixed on said spindle, a pawl engaging the ratchet wheel pivotally mounted on said spindle, a worm wheel connected to the warp beam, a rod connecting the pawl to the pivoted lever whereby the oscillation of the lever operates the pawl to rotate the ratchet wheel and through the spindle, worm and worm wheel impart a rotary movement to the warp beam, and connecting means between the pivoted lever and a slay sword to oscillate the lever on the backward movement of the slay.

3. A warp let-off motion of a loom for weaving comprising the combination with a warp beam from which the warp is unwound of a pair of swinging arms, one at each end of the warp beam and journalled about an axis concentric with the axis of the said beam, a back carrier roller over which the warp passes rotatably mounted in said arms, a toothed segment on one end of each arm, a shaft parallel to the axis of the warp beam, a toothed wheel affixed on said shaft gearing with the segment on one arm, a second toothed wheel affixed on shaft gearing with the segment on the other arm whereby the two arms will move in unison, an extension on each of said arms projecting towards the rear of the loom, a pulley carried by each of said extensions, a cord passing round each pulley and anchored at one end to a stationary part of the loom, a weight affixed to the other end of said cord for influencing the swinging arms to cause the back carrier roller to apply tension to the warp passing over it, an extension on one of the swinging arms projecting towards the front of the loom, a lever pivoted on said extension, a spindle carried on the arm carrying the pivoted lever, a worm affixed on said spindle, a ratchet wheel affixed on said spindle, a pawl engaging the ratchet wheel pivotally mounted on said spindle, a worm wheel connected to the warp beam, a rod connecting the pawl to the pivoted lever whereby the oscillation of the lever operates the pawl to rotate the ratchet wheel and through the spindle, worm and worm wheel impart a rotary movement to the warp beam, and connecting means between the pivoted lever and a slay sword to oscillate the lever on the backward movement of the slay.

4. A warp let-off motion of a loom for weaving comprising the combination with a warp beam

from which the warp is unwound of a pair of swinging arms, one at each end of the warp beam and journalled about an axis concentric with the axis of the said beam, a back carrier roller over which the warp passes rotatably mounted in said arms, a toothed segment on one end of each arm, a shaft parallel to the axis of the warp beam, a toothed wheel affixed on said shaft gearing with the segment on one arm, a second toothed wheel affixed on shaft gearing with the segment on the other arm whereby the two arms will move in unison, a fixed arm adjacent to the swing arm at each end of the warp beam, a pulley carried by each fixed arm, a pair of pulleys carried by the shaft to which the two toothed wheels are affixed, one pulley being below the pulley on one fixed arm and the other below the pulley on the other fixed arm, a pair of cords, the end of one of which is affixed to one pulley on the shaft and the end of the other of which is affixed to the other pulley on the shaft, the cords passing respectively around the corresponding pulley on a fixed arm, and a weight affixed to the other end of each cord, for influencing the swinging arms through the shaft and toothed wheels thereon to cause the back carrier roller to apply tension to the warp passing over it, an extension on one of the swinging arms projecting towards the front of the loom, a lever pivoted on said extension, a spindle carried on the arm carrying the pivoted lever, a worm affixed on said spindle, a ratchet wheel affixed on said spindle, a pawl engaging the ratchet wheel pivotally mounted on said spindle, a worm wheel connected to the warp beam, a rod connecting the pawl to the pivoted lever whereby the oscillation of the lever operates the pawl to rotate the ratchet wheel and through the spindle, worm and worm wheel impart a rotary movement to the warp beam, and connecting means between the pivoted lever and a slay sword to oscillate the lever on the backward movement of the slay.

5. A warp let-off motion of a loom for weaving comprising the combination with a warp beam from which the warp is unwound of a pair of swinging arms, one at each end of the warp beam and journalled about an axis concentric with the axis of the said beam, a back carrier roller over which the warp passes rotatably mounted in said arms, a toothed segment on one end of each arm, a shaft parallel to the axis of the warp beam, a toothed wheel affixed on said shaft gearing with the segment on one arm, a second toothed wheel affixed on shaft gearing with the segment on the other arm whereby the two arms will move in unison, a fixed arm adjacent to the swing arm at each end of the warp beam, a pulley carried by each fixed arm, a pair of pulleys carried by the shaft to which the two toothed wheels are affixed, one pulley being below the pulley on one fixed arm and the other below the pulley on the other fixed arm, a pair of cords, the end of one of which is affixed to one pulley on the shaft and the end of the other of which is affixed to the other pulley on the shaft, the cords passing respectively around the corresponding pulley on a fixed arm, and a weight affixed to the other end of each cord, for influencing the swinging arms through the shaft and toothed wheels thereon to cause the back carrier roller to apply tension to the warp passing over it, a fixed back rest located above the back carrier roller, around which fixed back rest the warp passes after passing around the back carrier roller whereby additional tension is applied to the warp, an extension on one of the swinging arms projecting towards the front of the loom, a lever pivoted on said extension, a spindle carried on the arm carrying the pivoted lever, a worm affixed on said spindle, a ratchet wheel affixed on said spindle, a pawl engaging the ratchet wheel pivotally mounted on said spindle, a worm wheel connected to the warp beam, a rod connecting the pawl to the pivoted lever whereby the oscillation of the lever operates the pawl to rotate the ratchet wheel and through the spindle, worm and worm wheel impart a rotary movement to the warp beam, and connecting means between the pivoted lever and a slay sword to oscillate the lever on the backward movement of the slay.

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