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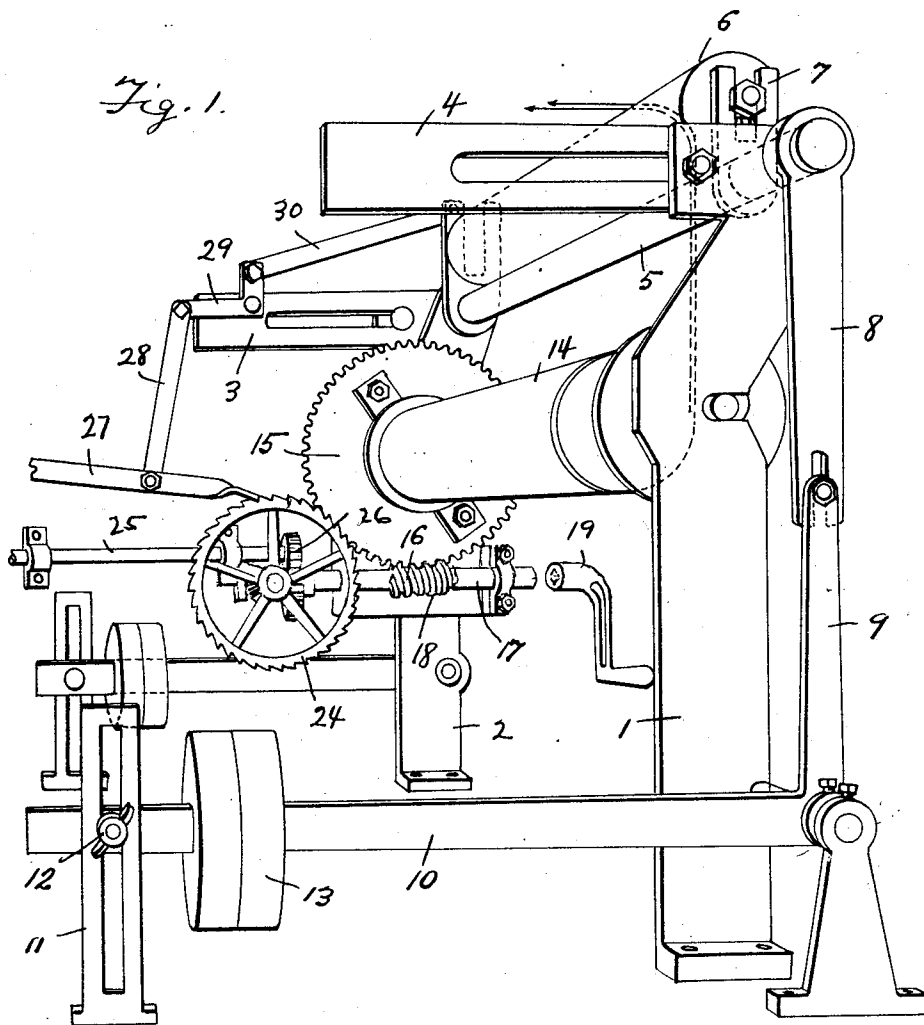
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WARP TENSION AND LET-OFF

Filed July 13. 1926

2 Sheets-Sheet 1



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Fig. 2.

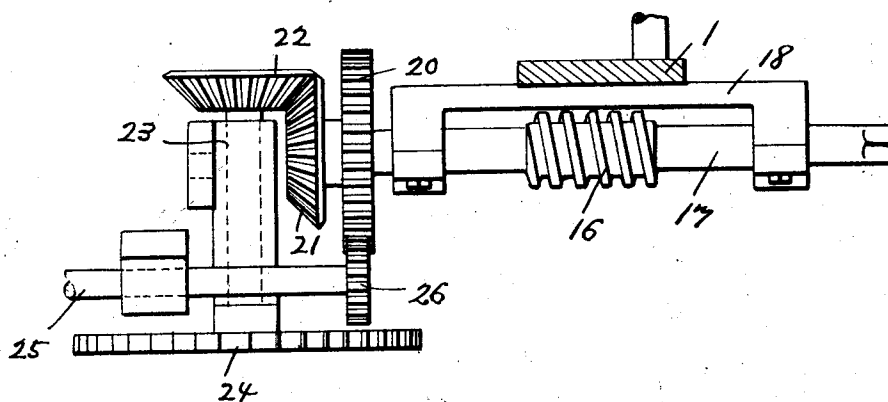
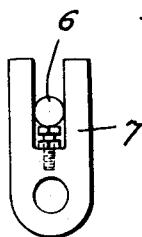


Fig. 3.



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WARP TENSION AND LET-OFF.

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This invention relates to an improved warp tension and let-off, of the resistance type to govern the tension of the warp and cloth in weaving, in a manner that will automatically maintain a perfectly uniform tension under all normal weaving conditions, from the time the loom starts weaving on the full warp beam until the warp is woven out.

In the present invention, the amount of tension required to properly weave the cloth that may be put in the loom, can be quickly and accurately weighed out at the start of the weaving, and the tension locked in this position, after which it will hold this tension perfectly, regardless of the size or diameter of the warp yarn on the beam, and without attention or adjustment until this class of work or the warp is finished.

This device is wholly mechanical, and simple in its action, and has no attachments such as auxiliary rolls, or pads to bear on the warp yarn on the beam, or devices that are acted on by the weight of the warp, and beam or variable springs to increase or decrease the tension as the warp weaves out, nor any chains, straps, springs or friction devices of any kind, and creates a floating, balanced tension, from the warp beam to the cloth and take up roll, thru the compound weighted levers, acting in unison with the whip roll rod, and the whip roll, and its control of the pawl on the ratchet, and automatically controlling the tension at a predetermined limit.

Other features and advantages accompany the invention and these will become apparent from the following description and drawing.

In the accompanying drawings forming a part of this application, and in which like numerals are employed to designate like parts throughout the same:—

Figure 1 is a perspective view of a warp tension and let-off constructed in accordance with the present invention.

Fig. 2 is an enlarged fragmentary detail view in section and elevation, showing the gear and worm drives.

Fig. 3 is an elevation of one of the details. Referring to the drawings in detail, the reference 1 designates an upright, and the reference character 2 designates a complementary upright at the opposite side of the machine, both uprights being substantially the same in construction, and provided at

their lower ends with feet whereby they may be firmly fastened to the floor.

Extending at right angles from the upper ends of the uprights are slotted attaching arms 3 and 4. Also located at this part of the machine is a horizontal whip rollbar 5, above which is the whip roll 6. Each bar is mounted for rotation in suitable bearings at the upper ends of said uprights. Interposed between the ends of the whip roll and the upper ends of the uprights, are special bearing brackets 7 for rotatably and swingably mounting said whip roll. The brackets are rigidly fastening to the whip-roll bar. The end portions of the whip roll bar 5 extend through bearings in the uprights and beyond said uprights.

Rocker arms 8 are fastened to the extended ends of the bar. The short vertical arm 9 of a rockably mounted bell crank lever is connected by a pin and slot connection with the lower end of each rocker arm. The horizontal arm 10 of the bell crank cooperates with an upstanding slotted retaining bracket or floor stand 11. In this connection, it might be stated that the arm 10 simply carries a stud extending through the slot in the bracket 11 and a thumb nut 12 is threaded on this shaft. Thus, the arm may be adjusted to and held in different elevated positions.

Obviously, this arm is adapted to accommodate a plurality of counter-balancing weights 13. The reference character 14 designates the rotatably mounted warp beam, at one end of which is a large driving gear 15. In mesh with the teeth of this gear is a worm 16 mounted on the shaft 17. The shaft 17 is mounted in appropriate bearings in special supporting bracket 18. One end of the shaft is of polygonal cross section for detachable connection of the hand crank 19 and the opposite end of the shaft is provided with a pinion 20 (see Fig. 2). Also at this end of the shaft is beveled gear 21 in mesh with a complementary beveled gear 22 on a short stub shaft 23. Further, mounted on this stub shaft, is a ratchet wheel 24. In addition, there is a shaft 25 provided with a small gear 26 in mesh with pinion 21, thus affording an operating connection between the shaft 25, the shaft 17, and the warp beam. Incidentally the hand crank 19 may be attached from the rear of the machine to the squared end of the shaft

17 by the loom fixer for initial adjustment of the warp beam. Also, it can be then removed and attached to the shaft 25, for adjustment from the front by the weaver.

5 As shown plainly in Fig. 1, an actuating pawl 27 cooperates with the teeth on the ratchet wheel. The pawl is of the reciprocatory type and is connected with and operated from the lay sword (not shown). A
10 lifting link 28 is connected to the pawl and further connected to a small bell crank 29 pivotally mounted on the arm 3, this bell crank being operated by an additional link 30 connected with one of the rockably
15 mounted bearing brackets 7.

While I make use of the ordinary worm gear attached to the warp beam and driven by a worm and shaft in connection with a pawl and ratchet, I claim as novel the manner of connection and control and action of
20 the pawl on the ratchet by the swinging balanced whip roll thru its compound swinging connection with the weighted levers and the gradual automatic change in the position of the whip roll towards the fell of the
25 cloth as the warp weaves out, without interfering with any other normal action of the device to automatically increase the forward movement of the warp beam as the diameter of the warp on the beam decreases and thus
30 deliver the warp in the quantity needed, and under control until the warp is finished, and during the period the normal action of the whip roll, thru its connections as noted, maintains a perfectly uniform tension.

While the whip roll has a normal but irregular movement back and forward in unison with its compound lever connections to control and keep the tension uniform,
40 this movement does not materially increase as the warp on the beam weaves out, as the gradual change in the position of the whip roll previously noted, allows this normal vibration of the whip roll to operate the
45 pawl to increase the movement of the ratchet until the warp is finished.

All these movements are flexible and automatic as when a slight excess of warp is delivered by the beam thru the action of the
50 pawl on the ratchet, the balanced whip roll moves back as this excess is being delivered, thus holding the tension uniform, and by this same action of the pawl on the ratchet the balanced whip roll moves back as this
55 excess is being delivered, thus holding the tension uniform, and by this same action decreases the amount of warp to be delivered by the succeeding strokes of the pawl on the ratchet. If the action of the pawl on the
60 ratchet fails to deliver enough warp at any stroke or strokes of the pawl the whip roll moves forward and makes up the deficiency and by this action increases the amount of warp to be delivered by the succeeding
65 strokes of the pawl and on these same prin-

ciples all the normal defects that come up during the weaving operations are forestalled and prevented.

It is believed that by considering the description in connection with the drawings, 70 persons familiar with inventions of this class will be able to obtain a clear understanding of the same, and the manner in which it cooperates with the customary loom. Therefore, a more lengthy description is thought 75 unnecessary.

Minor changes coming within the field of invention claimed may be resorted to if desired.

Having thus described my invention, what 80 I claim as new is:—

1. In a warp tension and let-off of the class described, a pair of uprights, arms whereby said uprights may be connected with the frame of a loom, a warp beam 85 mounted for rotation between said uprights, a whip roll mounted for simultaneous rotation and swinging motion between said uprights above said warp beam, a rocker arm for said whip roll, a bell crank mounted for pivotal movement and connection with said rocker arm, an adjusting weight carried by said bell crank, a stand, a connection between the bell crank and the stand whereby the bell crank may be held against movement, a second bell crank mounted on one of the aforesaid arms, a link connection between the whip roll and one arm of the bell crank, an actuating pawl cooperable with said ratchet wheel, a link connection between said second bell crank and pawl, and an operating connection between the ratchet wheel and warp beam.

2. In a warp tension and let-off of the class described, a pair of vertical uprights 105 provided at their upper ends with bearings, horizontal arms carried by the upper ends of said uprights, said arms being adapted for connection with the frame of a loom, a warp beam mounted for rotation between said uprights, a whip roll bar journaled for rotation in said bearings, bearing brackets fastened to said whip roll bar for rocking movement, a whip roll mounted for rotation upon said brackets, adjustable balancing means for said whip roll bar and whip roll, a driving gear carried by said warp beam, a ratchet wheel, an operating connection between the ratchet wheel and said gear, a reciprocatory actuating pawl cooperable with the ratchet wheel, a bell crank pivotally mounted on one of the aforesaid arms, a link connection between one of said brackets and said bell crank, and a lifting link connection between said bell crank and said pawl. 120

3. In a warp tension and let-off, of the class described, a pair of spaced uprights provided at their upper ends with bearings, a whip roll bar journaled for rotation in said bearings, a whip roll carried by said 130

bar, a warp beam mounted for rotation upon said intermediate portion of said uprights, a driving gear carried by said beam, a ratchet wheel, an operating connection between the
5 ratchet wheel and said gear, a reciprocatory actuating pawl cooperable with said teeth of said ratchet wheel, regulating means for said pawl connected with the pawl and said whip roll bar, and balancing means for said bar comprising a rocker arm fastened to one
10 end of the bar, a pivotally mounted bell crank having pin and slot connections with said rocker arm, and counter-weights mounted upon said bell crank.

In testimony whereof I affix my signature.

JOHN JULIUS RUHREN.