No. 667,527. Patented Feb. 5, 1901.

# G. F. HUTCHINS.

## WARP TENSION MECHANISM FOR LOOMS.

(Application filed July 23, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

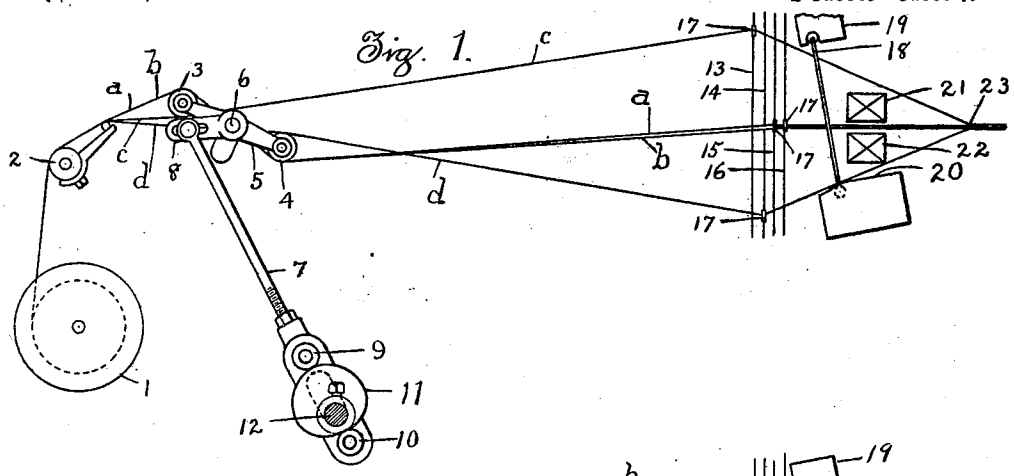



Fig. 2.

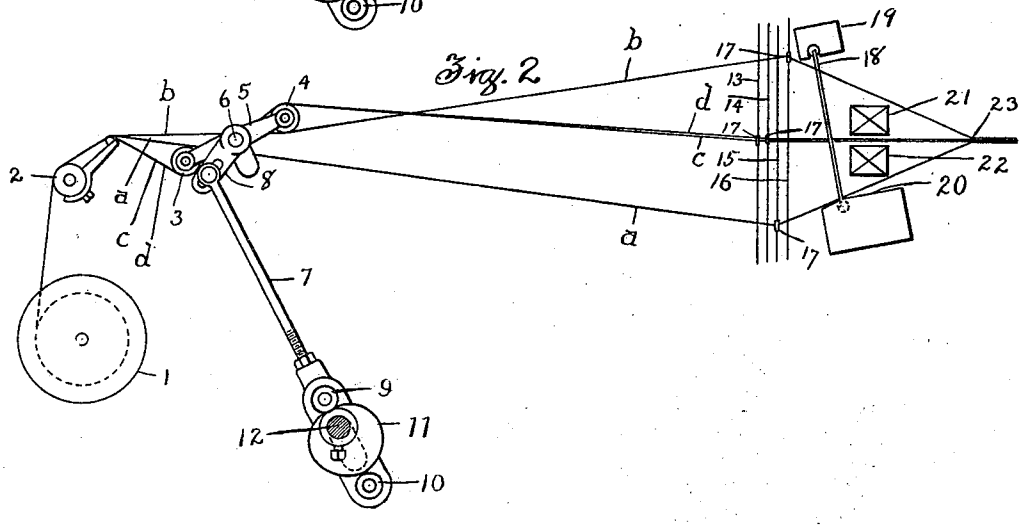
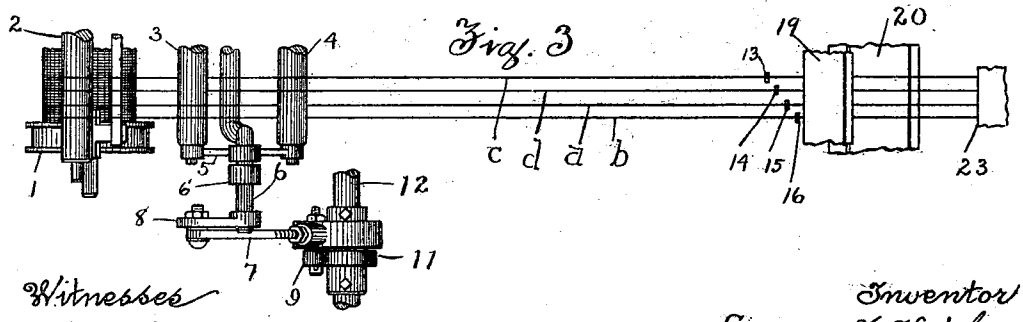



Fig. 3




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Fig. 4

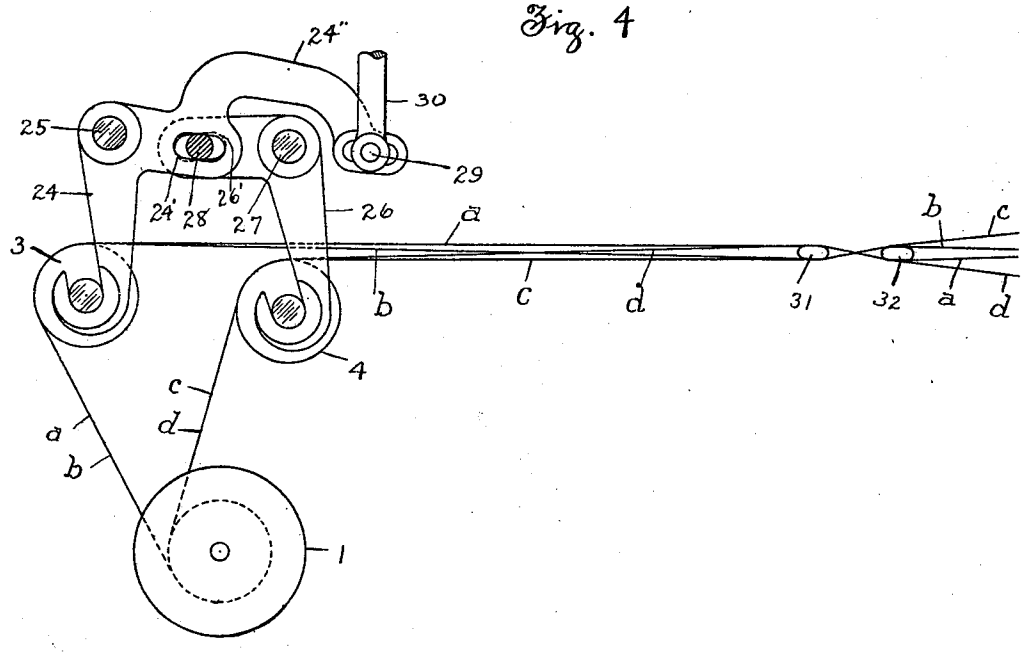
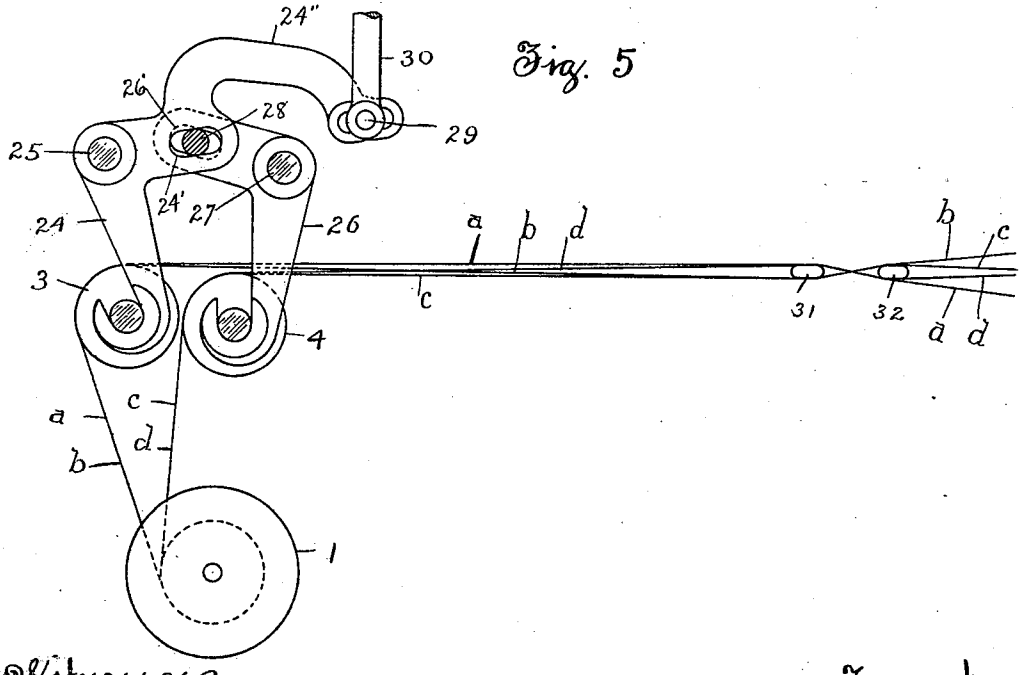



Fig. 5




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# UNITED STATES PATENT OFFICE.

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## WARP TENSION MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 667,527, dated February 5, 1901.

Application filed July 23, 1900. Serial No. 24,514. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE F. HUTCHINS, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Warp Tension Mechanism for Looms, of which the following is a specification.

My invention relates to looms, and particularly to warp tension mechanism for looms, in which two shuttles are used which are thrown simultaneously in the same direction or in opposite directions through the two sheds. In this class of looms two sheds must be formed, one for each shuttle, at every pick of the loom.

In the operation of the loom one harness carrying one set of warp-threads is raised above the plane of the fabric being woven, another harness carrying another set of warp-threads is lowered below the plane of the fabric, while the other two harnesses carrying the other sets of warp-threads are in the plane of the fabric being woven, thus forming two sheds having the two adjacent sides approximately in a common plane. The warp-threads are all of the same length between the let-off beam and the fell of the fabric; but the distance between the let-off beam and the fell of the fabric is less for the warp-threads which extend in the same plane as the fabric than for the warp-threads which extend above and below the plane of the fabric. Therefore in the beating up of the reed there will be slack in the warp-threads which extend in the plane of the fabric. The object of my invention is to overcome this slack in the warp-threads which extend in the plane of the fabric and to provide an improved tension mechanism which will put a uniform tension on all the warp-threads without regard to whether they extend in the plane of the fabric or above or below this plane.

I have shown in the drawings simple forms of tension mechanism embodying my improvements, which consist, essentially, of two rolls located above the warp-beam and extending transversely across the loom-frame at the back of the loom and mounted at each end in rocking arms or bearings to have a simultaneous motion.

Referring to the drawings, Figure 1 is a side view of warp-tension mechanism embodying my improvements, showing also the warp-let-off beam, the back roll, the harnesses, the reed, two shuttles, and the warp-threads extending from the warp-beam to the fell of the fabric. Fig. 2 corresponds to Fig. 1, but shows the opposite position of the tension mechanism and the warp-threads. Fig. 3 is a plan view of one end of the tension-rolls and other parts shown in Fig. 1. Fig. 4 shows a modified construction of the tension mechanism, and Fig. 5 shows the opposite position of the rolls and supporting-arms shown in Fig. 4.

I will now describe the mechanism shown in Figs. 1, 2, and 3 of the drawings. 1 is the warp-let-off beam; 2, the spring back roll. 3 and 4 are the two rolls of my tension mechanism, which extend transversely across the loom at the back of the loom above the warp-beam and in this instance between the back roll 2 and the harnesses. The rolls 3 and 4 are supported in this instance by means of a bearing or arm 5 (only one is shown) at each end of the rolls 3 and 4. Said arm 5 is secured on the shaft 6, which has a rocking or oscillating motion in bearing 6′. In this instance a positive rocking or oscillating motion is communicated at regular intervals to the shaft 6 and arms 5, carrying the tension-rolls 3 and 4, by means of a connector attached at one end to a crank-arm 8, fast on the shaft 6, and having at its other end two friction-rolls 9 and 10, mounted to turn on studs in said connector 7 and located upon opposite sides and adapted to travel on the periphery of the cam 11, fast on the shaft 12, which extends through the slotted end of the connector 7 and to which a regular rotary motion is communicated through connections to some driven part of the loom.

The four harnesses 13, 14, 15, and 16 are each provided with an eye 17 for the warp-threads, which are divided into four sets, one set for each harness, as shown. The reed 18 extends between the hand-roll 19 and the raceway 20 of the lay. The shuttles 21 and 22 pass through the two sheds formed by the warp-threads between the reed 18 and the fell 23 of the fabric.

I will now describe the arrangement of the warp-threads and the action of the tension-rolls 3 and 4 thereon: The warp-threads pass from the warp-beam 1 over the back spring-roll 2 and are then divided into four sets *a*, *b*, *c*, and *d*. The two sets *a b*, Fig. 1, which extend substantially in the plane of the fabric being woven, pass over the upper roll 3 and under the lower roll 4, as shown, while the other two sets of warp-threads *c* and *d* (one of which, *c*, extends above the plane of the fabric, and the other, *d*, extends below the plane of the fabric) pass between the rolls 3 and 4. When the tension-rolls 3 and 4 are in the position shown in Fig. 1, the slack is taken up in the central warp-threads *a b*, so that all the warp-threads are under uniform tension and there is no slack as the lay beats up. When the harnesses move to change the sheds and carry the two sets of warp-threads *c* and *d* to the plane of the fabric and the set of warp-threads *a* below and the set of warp-threads *b* above the plane of the fabric, then the tension-rolls 3 and 4 change their position by the rocking of the shaft 6 and the arms 5 (in this instance positively moved by the mechanism shown) to the position shown in Fig. 2, in which tension is applied to the central warp-threads *c* and *d*, as shown, to overcome any slack in said warp-threads as the lay beats up.

I will now describe the modified construction of the rocking arms or supports of the tension-rolls. (Shown in Figs. 4 and 5.) Referring to Figs. 4 and 5, there is a separate rocking arm or support for each end of the rolls 3 and 4, over which the warp-threads pass from the warp-beam 1, and the arms or supports are of angle shape, and one arm, as 24, for the roll 3 is pivoted at 25 to have a rocking or swinging motion on its pivotal support, and the other arm, as 26, is pivoted at 27 to have a rocking or swinging motion on its pivotal support. There is a pin 28 extending through and adjustable in the elongated slots 24′ and 26′ in the arms 24 and 26, which pin forms a connection between the two arms, so that the two arms 24 and 26 and the tension-rolls 3 and 4, carried thereby, will have a simultaneous motion toward and away from each other to regulate the tension on the warp-threads. I have shown in this instance the arm 24 provided with an extension 24″, in this instance made integral therewith, which extension at its free end is provided with a slot and is connected by a pin 29 with an arm or connector 30, leading to a driver for communicating a regular motion to said arm 30, the extension 24″, and the arms 24 and 26, and tension-rolls 3 and 4. Two sets of warp-threads, as *a* and *b*, pass over the back roll 3, and the other two sets, as *c* and *d*, pass over the front roll 4. Two lease-rods 31 and 32 may be used to divide the warp-threads, as shown.

The moving apart of the rolls 3 and 4, as shown in Fig. 4, puts a tension on the warp-threads *a* and *b*, extending in the plane of the fabric, to overcome any slack in said warp-threads, and the moving together of the rolls 3 and 4, as shown in Fig. 5, puts a tension on the warp-threads *c* and *d*, carried to the plane of the fabric by the movement of the harnesses, to overcome any slack in said warp-threads.

The advantages of my improvements will be readily appreciated by those skilled in the art. By means of the two rolls of the tension mechanism, which have a simultaneous rocking or oscillating movement, any slack in the warp-threads extending in the plane of the fabric is overcome, thus equalizing the tension on all the warp-threads and preventing any slack in any of them.

I prefer to communicate a positive rocking motion to the tension-rolls at regular intervals; but, if preferred, the mechanism for moving the rolls may be dispensed with and the rolls so arranged relative to each other and located that the movement of the harnesses to change the shed will cause the rolls to have a simultaneous motion to regulate and equalize the tension on the warp-threads, so that there will be no slack in the warp-threads as the lay beats up. In this way the rolls act to counterbalance each other, so that there is very little strain on the warp-threads.

It will be understood that the details of construction of my warp tension mechanism may be varied, if desired, from what is shown in the drawings.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a loom, the combination of a shedding mechanism for simultaneously forming two sheds in the warp-threads, said sheds having the two adjacent sides approximately in a common plane, a tension device to secure uniform tension on all the threads, said tension device comprising arms pivotally connected to the loom-frame, rods or bars connecting said arms and means to move said arms in unison to cause the rods or bars to take up the slack of the warp-threads in the common plane.

2. In a warp tension mechanism, separate arms or supports, a single rod or roll carried by each of said arms or supports and over which a part of the warp-threads pass, said separate arms or supports having a pivotal motion to simultaneously move the two rolls or rods toward each other, and away from each other, to regulate the tension on the warp-threads and means to impart such motion to the rods or bars, substantially as shown and described.

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