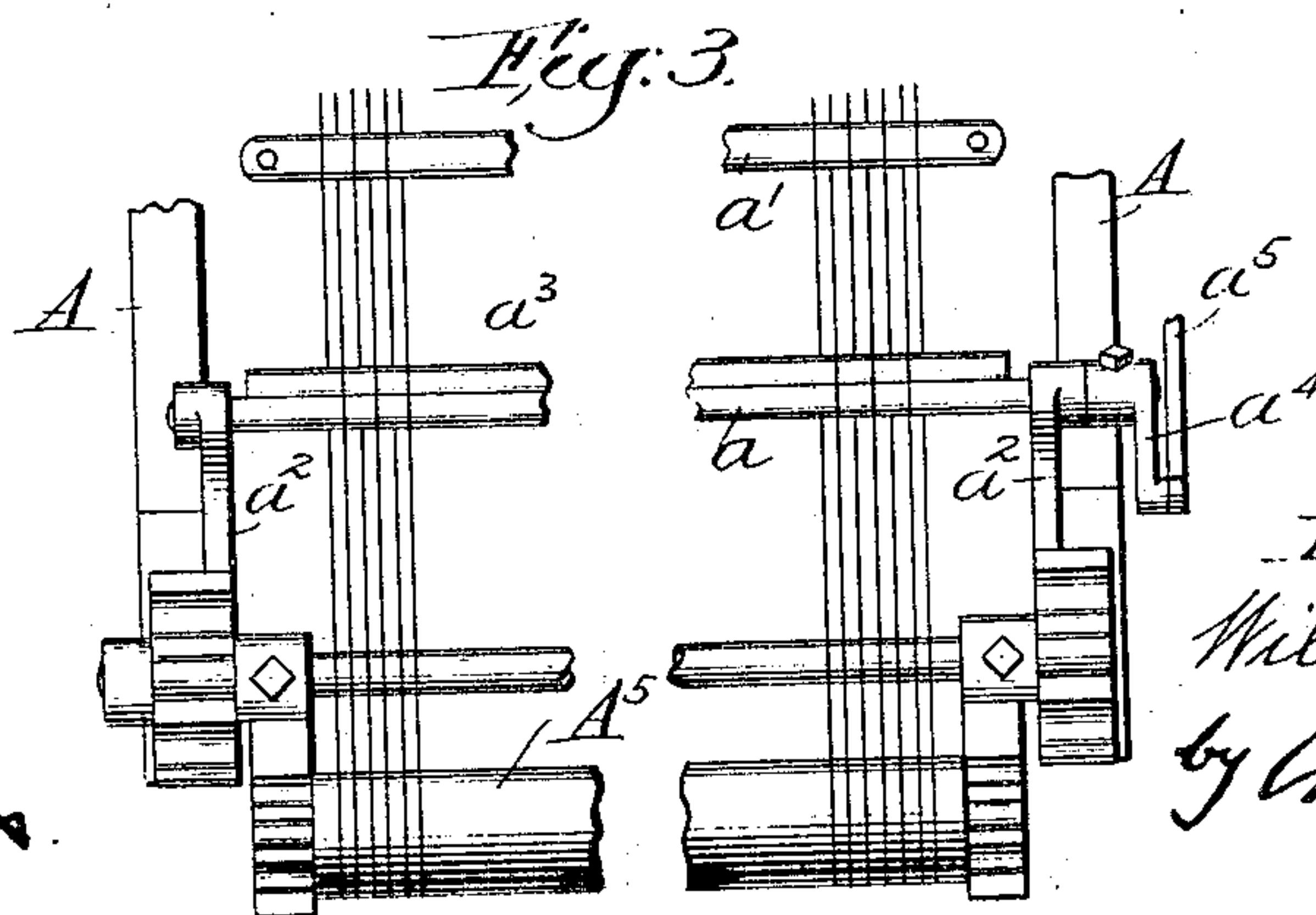
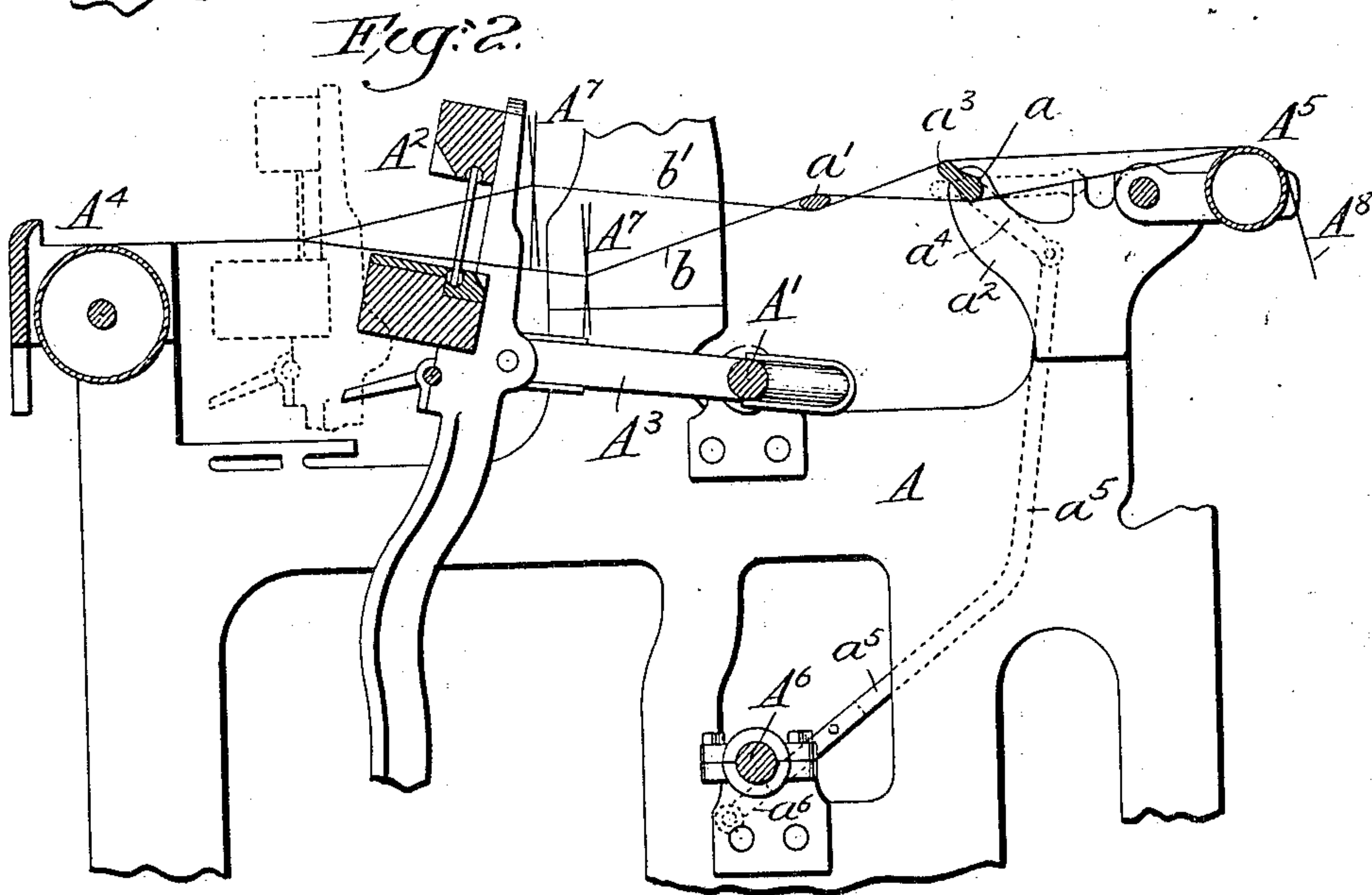
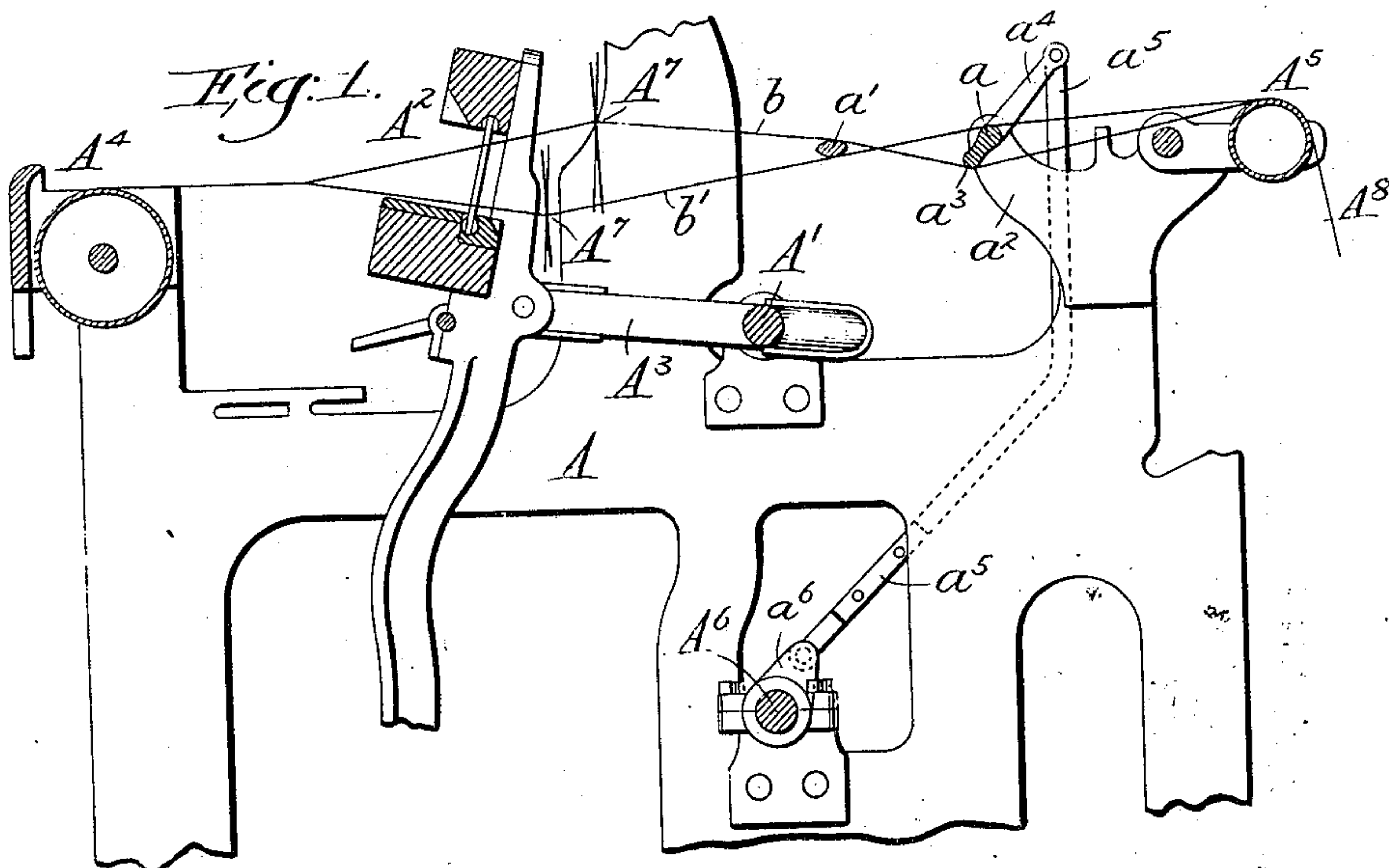


No. 819,742.

PATENTED MAY 8, 1906.

W. F. DRAPER.  
WARP TENSIONING MEANS FOR LOOMS.  
APPLICATION FILED NOV. 4, 1905.



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# UNITED STATES PATENT OFFICE.

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## WARP-TENSIONING MEANS FOR LOOMS.

No. 819,742.

Specification of Letters Patent.

Patented May 8, 1906.

Application filed November 4, 1905. Serial No. 285,844.

*To all whom it may concern:*

Be it known that I, WILLIAM F. DRAPER, a citizen of the United States, and a resident of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Warp-Tensioning Means for Looms, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The invention to be hereinafter described relates to looms, and more particularly to the warp controlling or tensioning means therefor, whereby the warp-threads may be woven slack or with very little tension and the resulting product be given good cover without defects attributable to overshoots or breakage of warp-threads.

In weaving fabrics with slack warp-threads or with warp-threads having very little tension it is found that overshoots are liable to occur—that is, the shuttle instead of passing between the two shades or planes of the warp-threads forming the shed would at times pass over some of the slack warp-threads in the upper shade or plane, thereby either producing defects due to such overshoots or breaking warp-threads.

With these matters in view the general object of the present invention is to provide means whereby overshoots and breaking of warp-threads are prevented, while still retaining the advantages due to the incorporation of substantially slack warp-threads into the loom product.

Generally stated, the present invention consists of means for taking up the slack of the warp-threads in the upper shade or plane of the shed during the flight of the shuttle and giving back such slack at the moment of beat-up, so that at such time the warp-threads may be in appropriate condition to give cover to the cloth.

It has heretofore been proposed to provide warp-tensioning means for looms in which a double shed is formed for weaving double-faced fabrics by means of two shuttles simultaneously picked. In such cases one set of warp-threads was raised above and another set depressed below the plane of the fabric, and still another set was maintained in substantially the fabric plane. As a result the

last-named set of warp-threads was slack when the two sheds were formed, and the tensioning means simply took up this slack to make the tension on all the warp-threads equal. At the moment of beat up there was tension on all the warp-threads. Likewise, tensioning means have been proposed in looms for weaving a single-ply fabric in which one set of warp-threads was raised and another set maintained substantially horizontal. Here again the tensioning means simply took up the slack of the horizontal set of warp-threads, and at the moment of beat-up all the warp-threads were under tension.

Other suggestions have been made for maintaining different tensions on the sets of warp-threads at the moment of beat-up in order to throw the weft or filling to one or the other surface of the fabric. None of these, however, provide for the weaving of cloth with slack warp-threads, nor do they disclose the purpose of taking up the slack in the upper shade or plane of the warp during the picking operation and then giving up such slack at the moment of beat-up, all of which constitutes the essentials of the present invention to be hereinafter broadly claimed.

In the accompanying drawings, which disclose one of the many forms the present invention may assume and only so much of a loom structure as is necessary to illustrate its application thereto, Figure 1 is a sectional elevation, parts being broken away, showing the warp controller or tensioning means in one position to take up the slack of the warp in the upper shade or plane of the shed. Fig. 2 is a similar view showing the warp-controller or warp-tensioning means in position to take up the slack of that set of warp-threads which was before in the lower shade or plane and which by the shedding mechanism has now been placed in the upper shade or plane of the shed. Fig. 3 is a detached plan view of the rear portion of the loom shown in Figs. 1 and 2.

Having reference especially to Figs. 1 and 2, the framework A, the crank-shaft A', the lay A<sup>2</sup>, the pitman A<sup>3</sup>, the breast-beam A<sup>4</sup>, the whip-roll A<sup>5</sup>, cam-shaft A<sup>6</sup>, the heddle-frames A<sup>7</sup> A<sup>7</sup>, and their appropriate operating



means for shedding the warp-threads are and may be of any usual or preferred form and construction.

The warp-threads (designated as a whole 5 by  $A^8$ ) are delivered from any suitable source of supply, pass over the whip-roll  $A^5$ , and are then split or divided, as usual, and pass alternately over and under lease-rods  $a$   $a'$ , then through the heddle-frames, the reed of the 10 lay, and thence to the breast-beam, in all of which respects the structure and arrangement may be as usual, except that the warp-threads are slack or have very little tension.

Owing to the substantially slack condition 15 of the warp-threads, the shuttle is liable to make overshoots or pass above some of the warp-threads in the upper shade or plane of the shed as said shuttle is picked. Therefore means are herein provided for taking up 20 the slack in warp-threads of the upper shade or plane of the shed during the passage of the shuttle through the shed and thereafter giving up such slack at the moment of beat-up, the effect of which is to prevent such over- 25 shots, overcome breakage of warp-threads, and give cover to the cloth. As one of the many forms of such means the drawings show one of the lease-rods  $a$  pivotally mounted in bracket-arms  $a^2$ , secured to the loom-frame 30 and provided with a projecting shoulder  $a^3$ , extending transversely of the loom the full width of the warp. Secured to one end of the lease-rod  $a$  is an arm  $a^4$ , to which is connected an actuator  $a^5$ , which receives motion 35 from the cam-shaft  $A^6$  by means of a crank-arm  $a^6$ . From this construction it will be seen that if the lease-rod  $a$  is oscillated in its bearing-arms  $a^2$  the projecting shoulder  $a^3$  will be caused to bear first upon one set of warp-threads passing the lease-rod  $a$ , then upon 40 the other set of such warp-threads, as illustrated in Figs. 1 and 2, the operation being timed with respect to the shedding mechanism so that when the shed is formed the 45 shoulder  $a^3$  will bear upon the set of warp-threads forming the upper shade or plane, thereby taking up the slack in such set of warp-threads.

As usual in the character of looms illustrated, the cam-shaft  $A^6$  makes one revolution 50 to each two revolutions of the crank-shaft  $A'$ , and the shuttle is thrown when the lay is in its back position. Referring to Fig. 1, the shed has been formed, the lay is in its 55 back position, and the shuttle is now picked. At this time the lease-rod  $a$  is oscillated by the actuator  $a^5$  from the cam-shaft  $A^6$  to cause the shoulder  $a^3$  to depress or bear upon the set of warp-threads  $b$ , Fig. 1, forming the upper shade or plane of the shed, thereby taking 60 up the slack in such set of warp-threads. In a half-revolution of the crank-shaft and one-quarter revolution of the cam-shaft the filling or weft thread placed in the shed by

the shuttle will be beaten up. At this time 65 it is desirable that the warp-threads of the upper shade or plane of the shed should be slack in order to give cover to the cloth, and this results from the quarter-revolution of the cam-shaft  $A^6$ , which oscillates the lease-rod  $a$  to an intermediate position, so that the 70 shoulder  $a^3$  does not act on either set of warp-threads. On the next pick of the shuttle, Fig. 2, the set of warp-threads  $b'$ , before in the lower shade or plane of the shed, is in the 75 upper shade or plane of the shed, and the cam-shaft will have revolved one-half revolution from its position in Fig. 1, thereby turning the lease-rod  $a$  into the position shown in Fig. 2, with the shoulder  $a^3$  bearing upon the 80 set of warp-threads  $b'$ , the slack of which is thus taken up for the passage of the shuttle. On the beat-up the cam-shaft will have made three-quarters of a revolution, thereby carrying 85 the lease-rod  $a$  to an intermediate position, as before, and giving up the slack to the set of warp-threads  $b'$  in the upper shade or plane of the shed.

While the drawings illustrate and the specification describes the warp controller 90 or tensioning means as comprising a particular construction of one of the lease-rods with means for actuating it, it is to be understood that this is merely one of the many forms in which the present invention may be embodied, 95 and it is to be understood that the essentials of the invention, irrespective of mechanical details, reside in means for taking up the slack in the upper shade or plane of the shed during the flight of the shuttle 100 and for giving back such slack at the moment of beat-up.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is— 105

1. In a loom for weaving with slack warp-threads, the combination of the lay and shedding mechanism, of means for tightening or taking up the slack of the warp-threads 110 in the upper shade or plane of the shed during the picking operation and for slackening the warp-threads in said plane of the shed during the beat-up.

2. In a loom for weaving with slack warp-threads, the combination of the lay and 115 shedding mechanism, of means for holding the warp-threads in the upper shade or plane of the shed taut during the picking operation and for slackening said warp-threads in the upper shade or plane of the shed during the 120 beat-up.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM F. DRAPER.

Witnesses:

GEORGE OTIS DRAPER,  
ERNEST W. WOOD.