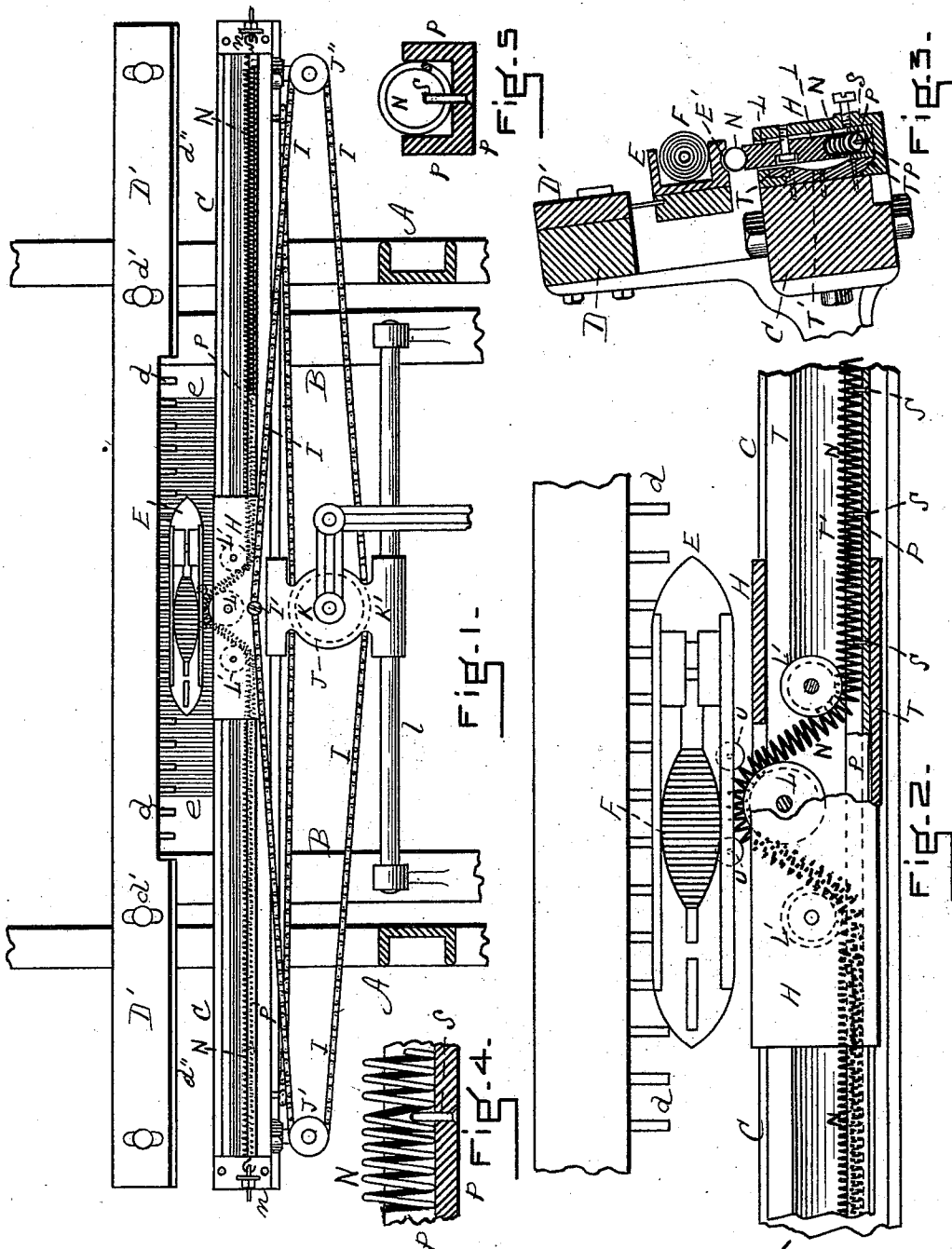


(No Model.)

E. H. GRAHAM.  
POSITIVE SHUTTLE MOTION FOR LOOMS.

No. 527,784.

Patented Oct. 23, 1894.



WITNESSES  
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# UNITED STATES PATENT OFFICE.

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## POSITIVE SHUTTLE-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 527,784, dated October 23, 1894.

Application filed June 23, 1894. Serial No. 515,494. (No model.)

### *To all whom it may concern:*

Be it known that I, EDMUND H. GRAHAM, a citizen of the United States, residing at Biddeford, in the county of York and State of Maine, have invented a new and useful Improvement in Positive Shuttle-Motions for Looms, of which the following is a specification.

This invention is intended to be an improvement in positive shuttle motions for looms of the general style illustrated and described in the Letters Patent of the United States, No. 474,555, granted May 10, 1892, and No. 503,956, granted August 29, 1893, and is particularly an improvement upon the invention which is the subject of the latter named patent. Moreover, my present improvement has especial reference to the improvement illustrated and described in my application filed in the United States Patent Office April 21, 1894, and numbered 508,453, in which a spiral spring is employed extending substantially from one end of the lay to the other and over the traveler, such spring being held by the traveler up into a recess in the underside of the shuttle, and conforming to the shape of such recess, whereby the shuttle is propelled by the traveler; the warp threads passing between the coils of the spring so that the friction, and hence breakage of the threads, is reduced to a minimum.

This invention is an improvement over the invention described in the said application and has special reference to means for keeping the spring in its proper position, preventing lateral motion and vibration thereof, and unequal stretching or expansion of the coils.

The nature of the invention in detail is fully described below, and illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of a sufficient portion of a loom to illustrate the invention, portions of the frame being shown in vertical section, and a part of the box or frame containing the spring being represented as broken out. Fig. 2 is an enlarged detail in front elevation, showing the shuttle, carrier, &c. Fig. 3 is an enlarged sectional view, taken centrally and vertically with the parts in the position shown in Fig. 1. Fig. 4 is a

detail in front elevation, showing the relation of the pins to the spring in the frame or tray. Fig. 5 is a cross vertical section of the same.

Similar letters of reference indicate corresponding parts.

A represents portions of the frame of the loom, B the lay swords, and C the lay proper or lower rail of the lay.

D is the upper rail.

e is the reed.

E is the shuttle which runs between the two rails and is guided at its top by a row of pins *d* which project downward from the under side of a guide bar D' adjustably secured at *d'* to the upper rail.

*d''* are tongues secured to the lower edge of the guide bar in line with the pins, both pins and tongues entering a groove in the upper side of the shuttle as it moves along.

F is the cop.

H is the traveler sliding in the lower rail, and provided with the screw I' by means of which the rope I is secured to said traveler, said rope imparting motion to the traveler through connection with a pulley J in the block K and with the pulley J' J'' supported by the lay. By means of the perforated lower extension K', the block slides horizontally on the rod *l* supported by the lay-swords.

The arrangement of the rope, and the arrangement and construction of all the parts above named are fully set forth and described in the specification of Letters Patent No. 503,956 above referred to, and hence need no further detailed description here, except as they are affected by the nature and application of my improvement, which I will now proceed to describe.

The under side of the shuttle E is provided with a recess E' (Fig. 3) similar to that described in the application above referred to, and a spiral spring N is stretched from one end of the lay to the other, and has its ends adjustably secured thereto at *n* in any desired manner. This spring is for its entire length, excepting when it approaches the shuttle, horizontal, but as the shuttle is approached it extends under guide rolls L' sup-

ported within the traveler H and thence abruptly over the central roll L also supported within the traveler. This roll L is the one which holds the spring up into the recess E'.

5 By passing the spring under instead of over the rolls L', it is held perfectly horizontal until it is deflected abruptly up to the recess. The effect is, as described in the application above referred to, to impart motion to the

10 shuttle and carry it in spite of or through the intervening spring, which conforms to the shape of the recess above it. Of course as the shuttle is moving, there is always a major portion of the spring which is horizontal.

15 This is protected from lateral motion, such as swaying or vibration, as well as from sagging, by means of the long box or tray P which is secured to the lay as shown, and extends the length of the spring. This box is

20 necessarily open at the top to allow the spring to extend from it to the shuttle. Extending up from the bottom of the tray or trough P are numerous vertical pins S. These extend

25 between the coils of the spring and prevent stretching, so that the spring is kept of even tension throughout.

The traveler H moves in ways T (Figs. 2 and 3) which touch said traveler at top and bottom, the center of said ways being out of

30 contact with the traveler by reason of the concave or hollowed out shape shown at T', said plate and ways being secured to the lay.

It will be noticed that the spring is protected for its entire length, as when it leaves

35 the box or tray it passes to the rollers which are inside the traveler.

The object attained is the prevention of the breakage of threads by providing the spring whose coils they pass between, said spring

40 being substituted for the rack and pinion illustrated in the Letters Patent above referred to.

Anti-friction rolls U have their bearings in the shuttle and are located on each side of the

45 recess E' above the spring and in contact with the upper side thereof so that the shuttle may be driven without the presence of friction in the recess, the bearing of the spring being directly on the rolls.

50 Having thus fully described my invention,

what I claim, and desire to secure by Letters Patent, is—

1. In a positive shuttle motion for looms, in combination, the shuttle and traveler, the spiral spring extending horizontally between

55 said shuttle and traveler and pressed against the under side of the shuttle, and the box or tray secured to the lay and open at the top, said box or tray extending under and flanking the sides of the spring, substantially as

60 set forth.

2. In a positive shuttle motion for looms, in combination, the shuttle provided with the recess E', the traveler provided internally with the rolls L L', said roll L being situated

65 between and above the two rolls L' and the spring N extending through the traveler under the end rolls L' and over the central roll L, said spring being horizontal until the rolls are reached and then turning upward to the

70 recess in the shuttle, substantially as described.

3. In a positive shuttle motion for looms, the combination with the shuttle, the traveler, and a spiral spring extending between the shuttle

75 and the traveler, of a series of pins extending from the stationary portion of the machine between the coils of said spring, substantially as set forth.

4. In a positive shuttle motion for looms, in

80 combination, the shuttle, the traveler, a spiral spring extending between the shuttle and the traveler, a trough or box open at the top and placed under and flanking said spring, and a series of pins extending from said box be-

85 tween the coils of said spring, substantially as described.

5. In a positive shuttle motion for looms, in combination, the shuttle provided with the recess E', the traveler, a spring extending be-

90 tween said shuttle and traveler and forced up into a recess in the former, and rolls supported by the shuttle on opposite sides of the recess intermediate the shuttle and spring, substantially as set forth.

EDMUND H. GRAHAM.

Witnesses:

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