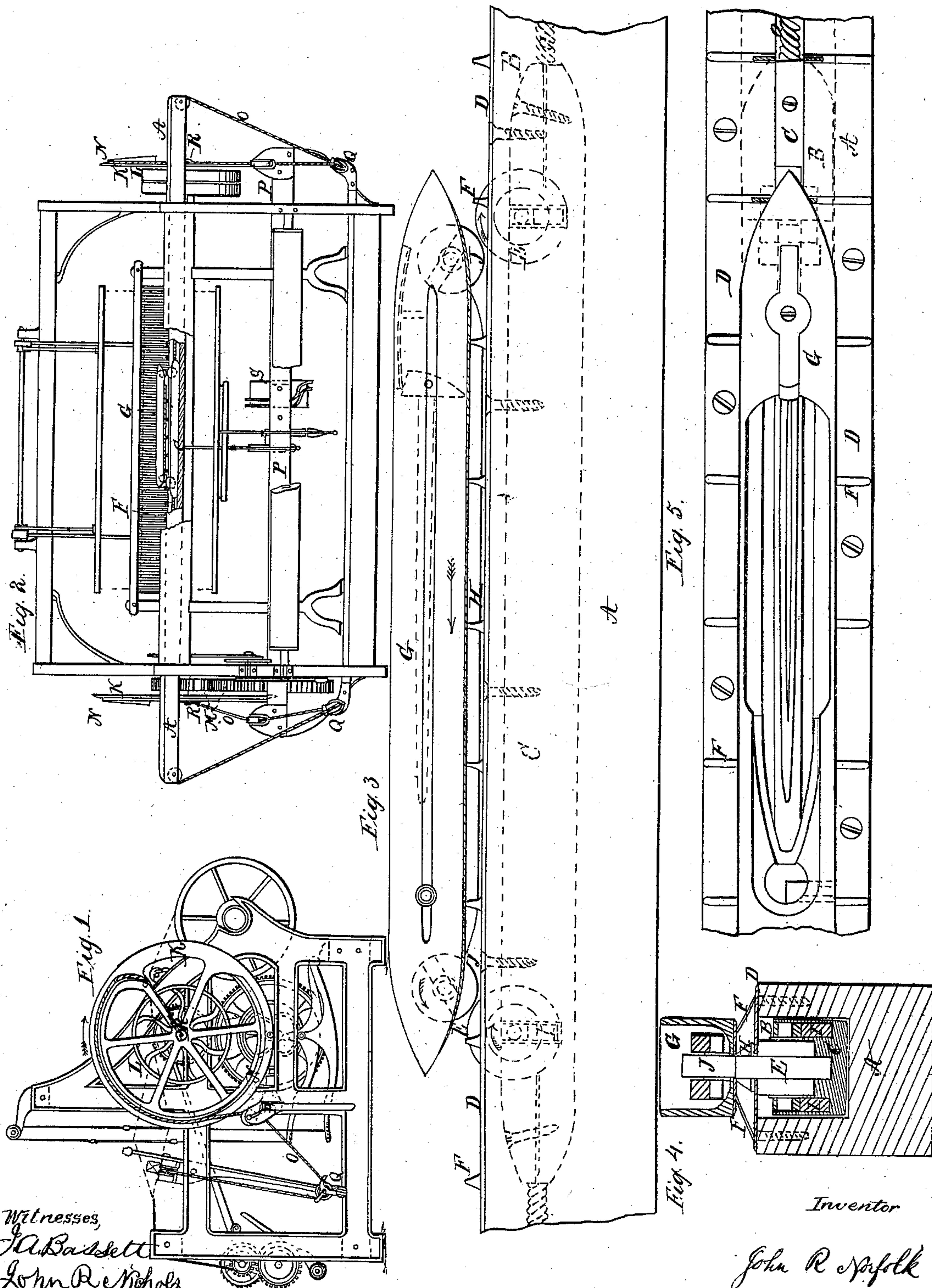


J. R. Norfolk. *Shuttle Motion.*

Nº 99,586.

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Witnesses,
J. A. Bassett
John R. Nichols

Inventor

John R. Norfolk

United States Patent Office.

JOHN R. NORFOLK, OF SALEM, MASSACHUSETTS.

Letters Patent No. 99,586, dated February 8, 1870.

IMPROVEMENT IN LOOMS.

The Schedule referred to in these Letters Patent and making part of the same

To all whom it may concern :

Be it known that I, JOHN R. NORFOLK, of Salem, in the county of Essex, and State of Massachusetts, have invented a new and useful Improvement in Looms; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1, sheet 1, represents an end elevation of the loom.

Figure 2, sheet 1, represents a front elevation, partially in section.

Figure 3, sheet 2, represents an elevation, on a scale of three-quarters to one inch, of the shuttle, shuttle-carriage, and portion of the lay and race-way.

Figure 4, sheet 2, represents a vertical section of the same.

Figure 5, sheet 2, represents a plan of the same.

Similar letters of reference indicate like parts in all the figures.

My invention has for its object the production of a loom in which the reciprocating movement of the shuttle is obtained by a positive mechanism, which acts during its entire reciprocation, thereby dispensing with the picker-motion, and its accessories, and its various disadvantages; also, to increase the speed at which the loom can be safely worked; to weave wider goods than can be woven on the common loom; and to adapt, without material alteration of the loom, the devices used for this purpose to the ordinary forms of looms now in general use, and which the drawing is intended to represent.

The nature of my invention consists in an improvement in those looms in which the shuttle is carried across the lay of the loom, between the warps, by means of a shuttle-carriage below the warp, communicating motion to the shuttle by means of rollers arranged on the upper side of the shuttle-carriage, which are placed in contact with rollers on the lower side of the shuttle. The motion of the rollers in the shuttle-carriage is produced by contact of the rollers with the under side of the race-plate.

My invention further consists in actuating the shuttle-carriage by means of wheels which have a continuous rotary motion, communicating a reciprocating movement by the alternate winding of the cords on their peripheries. Thus all the parts moving the shuttle have a continuous rotary motion.

In the loom herein described and shown, the ordinary motions, with the exception of the picker, need not be disturbed. The stop and harness-motions, let-off, and take-up can be operated as is usual.

Referring to the drawing—

A represents the lay of the loom, which, for this

description, is seen most clearly in fig. 4. This lay may be made either of wood or metal, but I prefer to make it of wood; and, in adapting this invention to a common loom, I make use of the ordinary lay. It is open through its entire length, forming a groove, B, of sufficient size to allow the shuttle-carriage C to pass through it freely from end to end.

To the top of the lay is secured the race-plate D, which is made either of cast or malleable iron, or other suitable material, and has an opening through its entire length, of sufficient width to allow the rollers E E, in the shuttle-carriage C, to pass freely between it. It is secured to the top of the lay by suitable screws, and projects over the groove B, closing the top of the groove B, except the space required for the roller E to pass through it.

Attached to or cast upon the top of the race-plate D, is a series of guides, F, which are placed at suitable distances apart, and are so shaped as to receive a projection, H, on the lower side of the shuttle. I prefer to cast these guides on the race-plate.

At the ends of the lay, outside the warps, the guide is continuous, its opening corresponding in shape to the guide F.

It will be found most convenient to cast the race-plate in sections, for convenience of fitting up, and it can also be cast much lighter.

The rollers E E are fitted in the top side of the shuttle-carriage C, upon spring-bearings I I, which may be made of rubber; or a metal spring may be used.

These rollers have a flange on each side, bearing up against the under side of the race-plate, being pressed up by the action of the springs; or the carriage may have a spring-bottom, and the rollers, retained in fixed bearings, accomplishing the same result.

The shuttle-carriage C may be made either of wood or metal—by preference of wood—and should be of sufficient length, so that the rollers E E may bear outside of the rollers J J in the shuttle G.

I prefer to have the shuttle-carriage run on a strip of leather placed in and secured to the bottom of the groove in the lay.

The shuttle G is the common shuttle now in use, with the addition of the projection H, which is attached to the bottom of the shuttle, and the rollers J J, which are fitted in the ends of the shuttle, upon bearings similar to the bearings of the rollers in the shuttle-carriage.

The projection H, on the bottom of the shuttle, may be made of malleable iron, or other suitable material, and its shape is such as to correspond with the shape of the space between the guides F F, and is so

fitted as to allow it to be moved freely across, but not to be taken out; and a sufficient space is left between the bottom of the projection and the top of the race-plate, so as not to press hard against the threads of the warp during its passage across.

The wheels K, which actuate the shuttle-carriage, are mounted on the crank-shaft, outside the frame of the loom, and outside the driving-pulleys L and driving-gears M, and are made of cast-iron. They have a projection, N, cast upon the side, near the periphery, and of sufficient circumference to give the necessary movement of the shuttle-carriage across the lay.

The projection N is slightly grooved, for the purpose of retaining the cord O while being wound, and starts at the point where it is desired to commence the movement of the shuttle-carriage, and the groove for retaining the cord is continued around its circumference until it comes near to the point at which it is desired to stop the shuttle-carriage, when the projection is gradually sloped off, so that it does not retain the cord, and it is released.

The amount of space between the starting and stopping-points on the wheels corresponds to the time which it is desired to allow the shuttle to remain still while the cloth is being beat up, and the harnesses changed.

The wheels K are constructed as above described when the loom is intended to weave cloth of the common shirting widths. When it is desired to weave wider cloth, and, consequently, to increase the length of the movement of the shuttle-carriage, the wheels K must be geared so as to give the number of turns corresponding to the increased length of cord. In order to accomplish this result, the wheels K are placed on a separate shaft or stud, and geared from the crank or cam-shaft, so as to give the requisite speed; and the cord may be wound upon the projection N, a sufficient number of times to give the required movement of the shuttle-carriage. In this case, the width of the projection must correspond to the number of turns which the cord is required to be wound upon it.

The cord O is attached to the end of the shuttle-carriage, and passes over leading-pulleys in the end of the lay, down to or near the rocker-shaft Q, under pulleys or eyes at that point, and up through a pulley or eye placed on the end of the shifting-bar P. It terminates in a swivel, R, which is connected with the axis of the wheel K.

The shifting-bar P changes the cord O on to and off the projection N, on wheel K, at each movement of the shuttle across the lay, and it is operated by the shifting-cam S, which is placed on a shaft geared from the driving-shaft of the loom.

The shifting-bar may be placed in any position where it will least interfere with the other working-parts of the loom.

The operation of my improved loom is as follows:

The warp and harnesses being hung as is usual, and the cop placed in the shuttle, the shuttle and carriage are placed at either end of the lay. While in this position, one of the cords will be slack, and the other drawn tight, or nearly so. The shifting-bar will draw the cord to the position on the right-hand side of the loom, indicated in fig. 2, sheet 1—that is, close to the wheel K, in a line with the projection N. Any suitable power being applied to the loom through the driving-pulleys L, the wheel K is rotated in the direction of the arrow, fig. 1, winding the cord on the projection N, and drawing the shuttle across the lay. The rollers E E, in the shuttle-carriage, are rotated by contact with the under side of the race-plate, in a reverse direction to the movement of the carriage. The arrow in fig. 3, sheet 2, shows the direction of this movement. The rollers J J, in the shuttle, are rotated in the same direction by contact with the roll-

ers E E, the warp being slightly raised as it passes between the rollers E and J. Any inequalities in the thickness of the warp-threads are compensated for by the elasticity of the spring-bearings of the roller J J in the shuttle. While the shuttle is passing through, the lower shed of the warp is below the surface of the guides, and lies upon the surface of the lay between the guides. When the cloth is beat up, the guides are below the warp, and the cloth is beat up by the reed in the usual manner.

The dotted lines in fig. 1, sheet 1, indicate the position of the warp with the shuttle passing through.

It is obvious, that by varying the starting and stopping-angle of the projection N on wheels K, the shuttle-carriage may be made to start and stop at any required degree of speed. If it be required to have the shuttle enter and leave the warp gradually, increasing the speed as it enters, and decreasing it as it leaves, a longer curve may be given to the projection N at these points, which will secure the required result. It will be found, however, that with the shape shown in most classes of fabrics, the starting of the shuttle in the manner shown will be easy and regular, and the speed across the warp uniform.

The swivel R is for the purpose of taking out the turn in the cord O, which is made as the cord is wound, thus keeping it at a uniform length.

A separate shuttle may be used, placed in a carriage, occupying the position of the shuttle G, which may be taken out and replaced with the same facility as the ordinary shuttle, and which, for convenience, may be preferred to the fixed shuttle.

For weaving fabrics of the ordinary narrow width, when but one turn of the cord is required around the wheel, the shifting-bar may be dispensed with. In this case, the wheel K must be large enough, so that the cord O shall occupy less than half the circumference of the wheel.

The starting-points are set opposite each other.

The mechanism employed in moving the shuttle is simple and durable. Having a continuous rotary motion, it avoids the concussions and jars incident to the picker-motion, which injures and ultimately destroys the loom. Less power is required to operate it.

The warp is not liable to be injured by pressure of the shuttle, and the shuttle, running free from the reed, cannot chafe or injure it.

The adjustments of the shuttle and shuttle-carriage are simple, and, once fitted properly, will wear and operate with great uniformity and durability. It may be applied to common looms now in general use for weaving cotton, wool, silk, hemp, flax, jute, and other fabrics, with but slight alterations and expense.

I am aware that the shuttle has been carried across the lay of the loom by means of a shuttle carriage, as shown in several English and American patents. My devices accomplish this purpose more perfectly than any I have ever before known.

Having thus fully described my invention,

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

1. A shuttle-carriage, with the rollers arranged on its upper side, and in contact with the under side of the race-plate, so as to communicate motion to the rollers in a direction reverse to that of the shuttle, the said rollers being held up to the race-plate by springs or their equivalents, substantially in the manner described and shown.

2. A shuttle, carried through the warp by a shuttle-carriage, and guided in its passage across the lay by a series of guides on the upper side of the race-plate, which will allow the warp to pass freely between said guides, and so arranged as to prevent the shuttle from deviating from its proper course, or flying out while in its passage through the warp, and provided, at its

ends, with rollers, journaled on spring-bearings, and arranged in contact with the rollers in the top of the shuttle-carriage.

3. The continuously-rotating flanged or grooved wheels K and shuttle-carriage O, connected by cords or equivalents, the wheels being constructed substantially as described, so that the shuttle-carriage is reciprocated from a continuously-rotating shaft.

4. The wheels K and cords O, in combination with the cam S and shifting-bar, or their equivalents, to guide the cords on and off the flange, as described.

Witness my hand, this 19th day of July, 1869.

JOHN R. NORFOLK.

Witnesses:

J. A. BASSETT,

JOHN R. NICHOLS.