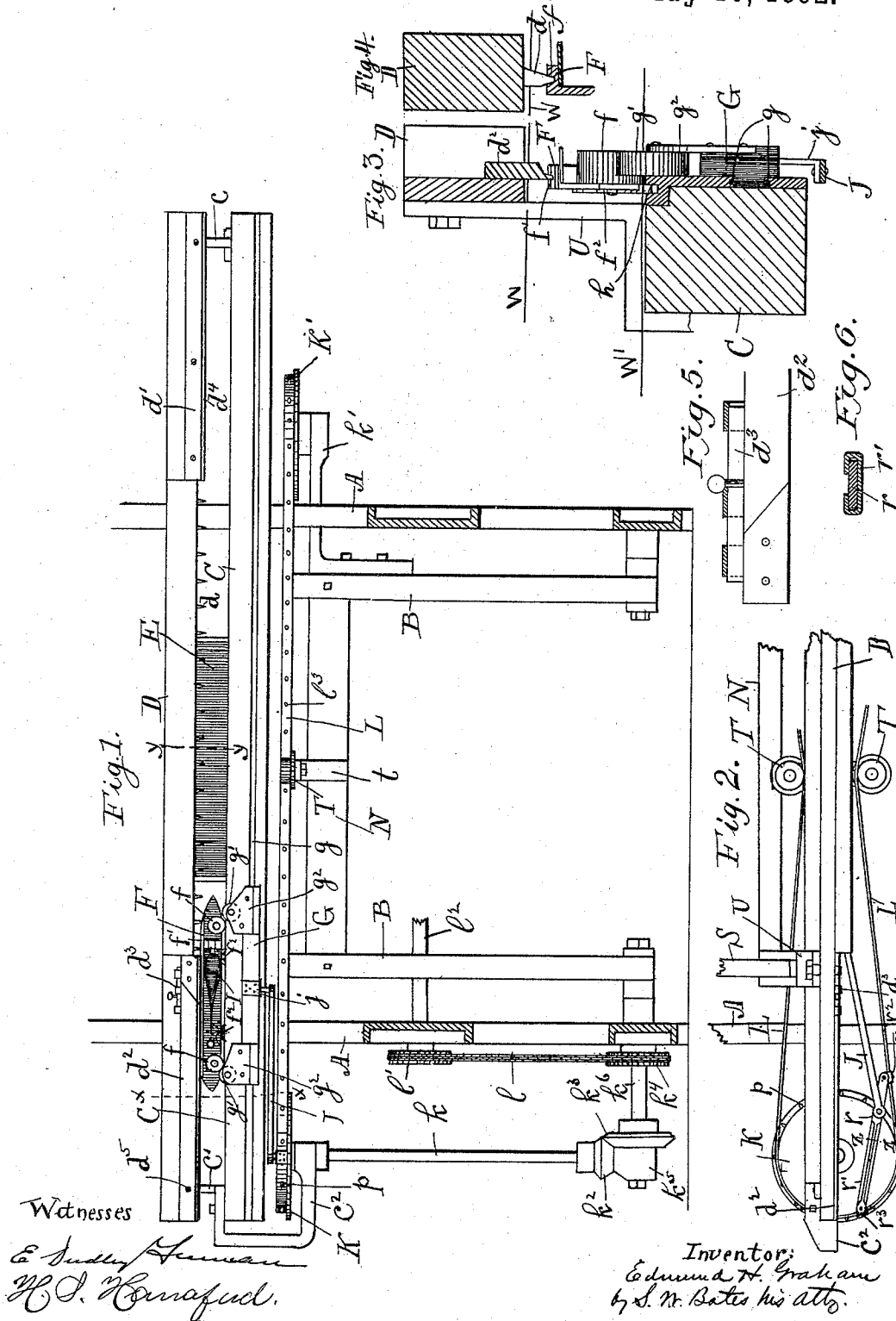


(No Model.)

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

No. 474,555.

Patented May 10, 1892.



Witnesses

E. Dudley Graham
H. D. Hornaford.

Inventor:
Edmund H. Graham
by S. M. Bates his atty.

UNITED STATES PATENT OFFICE.

EDMUND H. GRAHAM, OF BIDDEFORD, MAINE, ASSIGNOR OF ONE-HALF TO
LEVI WOODBURY, OF WASHINGTON, DISTRICT OF COLUMBIA.

POSITIVE SHUTTLE-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 474,555, dated May 10, 1892.

Application filed August 6, 1891. Serial No. 401,822. (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 certain new and useful Improvements in Positive Shuttle-Motions for Looms; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to positive shuttle-motions for looms; and it is designed particularly as a modification or improvement of the loom shown and described in another patent, No. 466,851, granted to me January 12, 1892.

The principal object of the invention is to provide means by which the shuttle as it moves back and forth within the shed of the warp will pass easily over the warp-threads which are above and below it.

In my present invention the shuttle is held between two guide-rails, one above and one below. In the upper rail is a row of pins which enter a groove in the top of the shuttle as the latter is drawn back and forth. The shuttle is mounted on rolls which travel on the flat surface of the lower rail, and it is guided or held in place by spur-wheels, which run in a groove and which pass easily over the warp-threads of the lower shed. The warp-threads of the upper shed are entirely above the shuttle, the upper row of pins reaching down through the warp and entering the groove in the top of the shuttle. The shuttle is moved by a traveler, which runs in a groove in the front of the lay, this traveler being connected with an endless band or chain by an arrangement of links, which allows of the greatest possible amount of dead motion at the end of each beat, all of which will be hereinafter fully described and pointed out.

I have illustrated my invention in the accompanying drawings, in which—

Figure 1 is a front view of the lay with the front part of the loom cut away. Fig. 2 is a plan or top view of the same, showing one end of the lay only. Fig. 3 is an enlarged cross-

section taken at xx of Fig. 1. Fig. 4 is a partial cross-section taken at yy of Fig. 1, and Fig. 5 is a detail section through bolt d^3 ; and Fig. 6 is a detail section on zz , Fig. 2, showing the construction of the extensible link which connects the endless band with the traveler.

A represents the frame of the loom, B the lay-swords, and C the lay proper. I shall hereinafter designate it as the "lower rail" of the lay. Above the lower rail C is an upper rail D, supported by standards $c c'$ at each end, and a standard U, located at the ends of the lay proper. The threads of the warp run between the rails C and D and through the reed E, which is secured in its usual position.

F is the shuttle, which runs between the two rails and is guided by them above and below. The top of the shuttle is guided by means of a row of pins d , which project from the under side of the upper rail. In the top of the shuttle is a groove f' , in which the pins enter as the shuttle moves along. At the ends of the lay the pins are replaced, as herein shown, by guides d' and d^2 , having on their lower edges tongues d^4 . These tongues are directly in line with the row of pins, and hence in position to enter the groove of the shuttle.

The guide d^2 is constructed in such a way as to admit of the removal of the shuttle. One end of the guide is pivoted at d^3 , while the other end is secured in place by means of a bolt d^3 . The shuttle F is mounted on rolls f , by which it is supported on the upper surface of the lower rail. The roll f is of considerable width, and one edge only rests on the rail, the front portion projecting out in front of the face of the rail. The shuttle is steadied as to its lower part by means of spur-wheels f^2 , pivoted at the rear of the shuttle. These spur-wheels run in a groove h , Fig. 3, which is formed in the top of the lower rail near its forward edge. The ends of the teeth of the spur-wheel do not touch the bottom of the groove h , and consequently do not take any of the weight of the shuttle, that being taken by the rolls f . The spur-wheels simply act as guides to keep it in position laterally.

I represents the cop in place on the shuttle-spindle, which is secured to the shuttle in any suitable manner and needs no special description. Motion is imparted to the shuttle by means of a traveler G. As here shown, the traveler is constructed with a dovetailed projection on its rear portion, which runs in suitable grooves *g*, formed in the lower rail, Fig. 3. It has plates *g*² at each end secured to its front face, and to these plates are pivoted rolls *g*¹, one at each end. The rolls *g*¹ are located directly beneath the rolls *f* and at one side thereof, so that they are in loose contact, the rolls of the shuttle being between the rolls of the traveler. Motion is thus imparted from the traveler to the shuttle by contact with one or the other of the rolls, according to the direction in which the traveler is going. Motion is imparted to the traveler by means of a link J, pivoted by one end to a lug *j*, which is secured to the traveler and projects downward from its under side. The opposite end of the link is connected with an endless band L, running over sprocket-wheels *k* and *k*¹, placed horizontally at each end of the lay. The link J is not here shown to be pivoted directly to the band, but it is pivoted to an extensible bar, here shown as formed in two parts *r* and *r*¹, so connected that they will slide on each other and shorten or lengthen, according as the ends approach or recede. The ends of the bar are pivoted to lugs *r*² and *r*³, secured to the band L, and the end of the link J is pivoted to one of the parts of the extensible bar. It will be seen that the effect on the shuttle of this arrangement of links will be to prevent its going so far as it would if the link was pivoted directly to the band, and during the time which would be taken in traveling the extra distance the shuttle is at rest. The reversing of the shuttle is thus more gradually accomplished than it otherwise would be.

The band L, which I use as a substitute for a sprocket-chain, has holes *l*³, which fit over pins *p* in the periphery of the sprocket-wheels K and K¹. Guide-pulleys T, placed intermediate between the sprocket-wheels, serve to tighten the band and keep it in place. These pulleys are joined to a bracket *t*, secured to a cross-bar N, extending from one lay-sword to the other. The sprocket-wheel K¹ is an idler and is journaled on a bracket *k*¹, attached to the sword of the lay, and the wheel K is secured onto the upper end of an upright shaft *k*, the shaft being supported by a bracket C². The lower end of the shaft revolves in a step or bearing *k*⁵, and in the same bearing runs the end of a horizontal shaft *k*⁶. A gear *k*³ on the end of the shaft *k*⁶ drives the gear *k*² on the lower end of the shaft *k*. On the shaft *k*⁶ is also a sprocket-wheel *k*⁴, connected by means of a sprocket-chain *l* with another sprocket-wheel *l*¹ on the cam-shaft *l*², only a portion of

which is shown. It will be seen that the shaft *k* takes its motion from the cam-shaft. S represents one of the pitmen which operate the lay.

The operation of my device will be readily understood from its construction. The traveler is reciprocated by the link J, which passes around with the band L, the motion of the traveler being suspended for a considerable time at the end of the stroke, while the extensible bar *r r*¹ passes around the sprocket-wheel, as previously shown. This prevents the too-sudden reversing of the motion and enables the loom to run with greater speed. The motion of the traveler is imparted to the shuttle, as described, and the latter passes back and forth through the shed of the warp. The upper threads W, Fig. 3, are lifted above the top of the shuttle, the pins *d* extending down between them to steady the shuttle, and the lower threads lay flat on the top of the lower rail and are run over by the rolls *f*, which do not tend to disturb them. The spur-wheels *f*² also run over the lower warp-threads; but the spurs pass readily between the threads and into the groove *h*.

I claim—

1. In a positive shuttle-motion for looms, the combination, with the lay, of two rails attached thereto, one above the other, pins in the upper rail, the lower rail being provided with a groove, of a shuttle adapted to reciprocate between said rails, having a groove in its upper side adapted to receive said pins, spur-wheels journaled in bearings attached to said shuttle and adapted to run in the groove of the lower rail, a reciprocating traveler for driving said shuttle, having anti-friction driving-rolls and anti-friction rolls on said shuttle in loose contact with the rolls of said traveler, and means for operating said traveler, substantially as described.

2. In a positive shuttle-motion for looms, the combination of a pair of rails between which the warp extends, with a shuttle reciprocating between and guided by said rails, one of said rails having a groove, and spur-wheels pivoted to said shuttle and running in said groove, substantially as shown.

3. In a positive shuttle-motion for looms, the combination, with a pair of rails, one above the other, the lower being provided with a groove, of a shuttle reciprocating between said rails and guided by them, spur-wheels pivoted to said shuttle and adapted to run in said groove, anti-friction rolls pivoted to said shuttle and resting on the top of the lower rail and extending out in front of said rail, a reciprocating traveler, and guides for supporting the same attached to the front of said lower rail and having pivoted thereto anti-friction driving-rolls which come in loose contact with the rolls on said shuttle, substantially as shown.

4. In a positive shuttle-motion for looms,

the combination, with the lay, of a reciprocating traveler, guides for supporting the same attached to the lay, a sprocket-wheel at each end of the lay, shafts to which said sprocket-
5 wheels are secured, means for rotating said sprocket-wheels, a sprocket-chain passing over said sprocket-wheels, an extensible bar pivoted at each end to the sprocket-chain, and a link pivoted to one of the parts of said

extensible bar and to the said traveler, substantially as shown.

In testimony whereof I affix my signature in presence of two witnesses.

EDMUND H. GRAHAM.

Witnesses:

GEO. R. ANDREWS,

J. E. ETCHELLS.