

(No Model.)

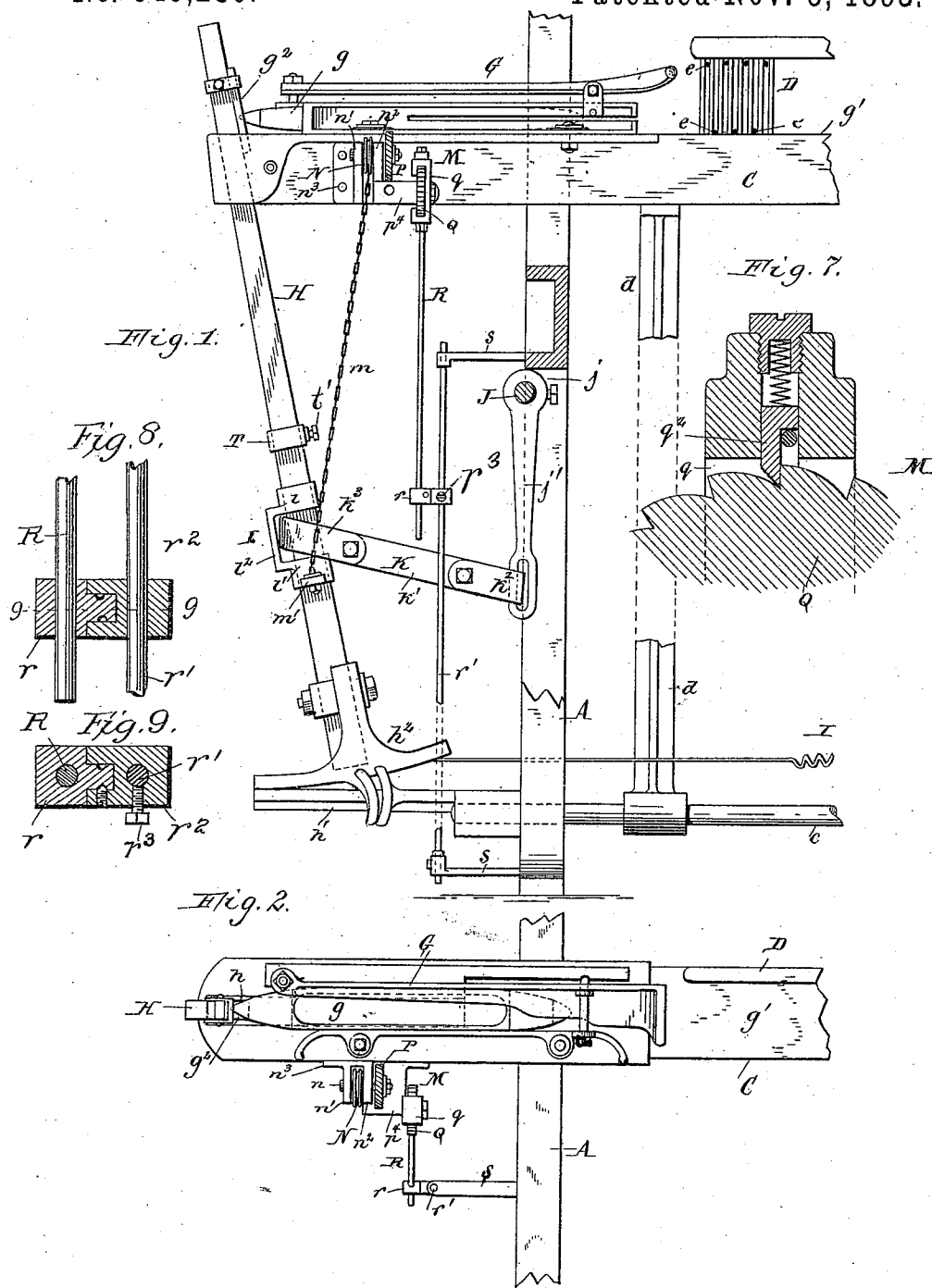
2 Sheets—Sheet 1.

W. H. CRAIG.

SHUTTLE OPERATING MECHANISM FOR LOOMS.

No. 549,230.

Patented Nov. 5, 1895.



Witnesses:

Jacob Vusenblatt,
Theo. L. Popp

William H. Craig, Inventor.

By Edward Wilhelm
Attorney.

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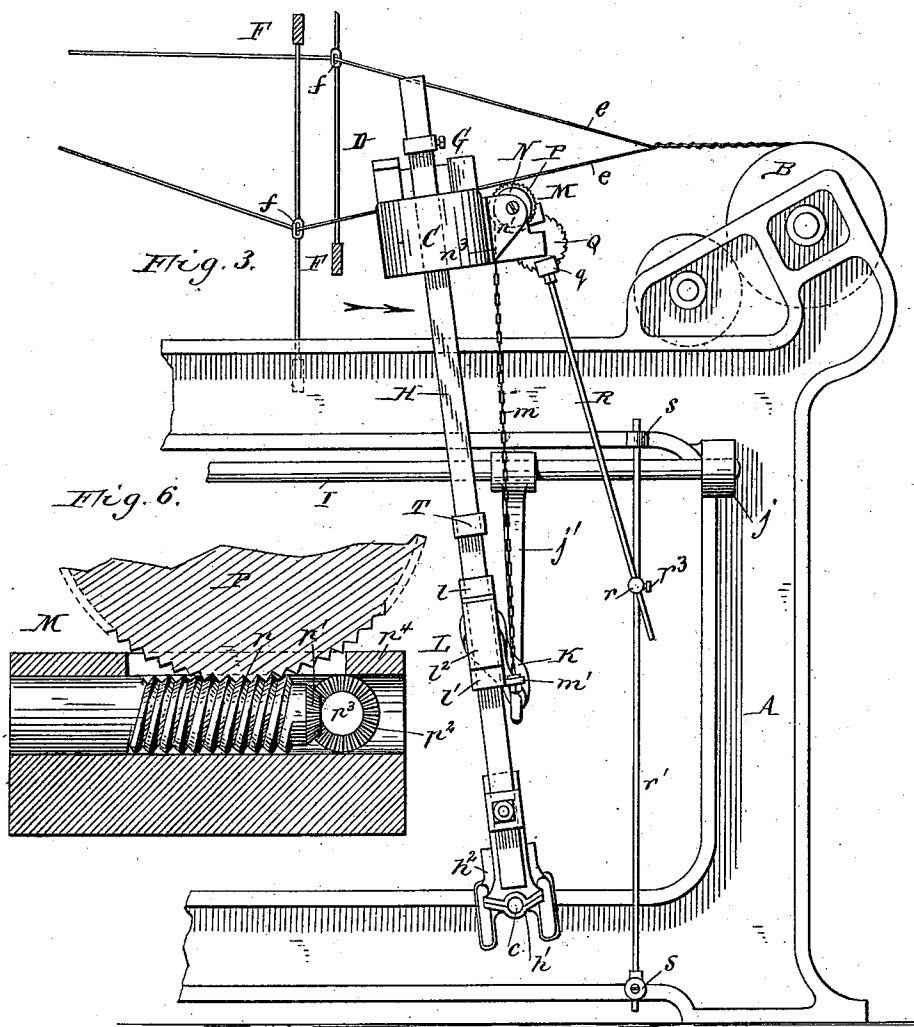
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UNITED STATES PATENT OFFICE.

WILLIAM H. CRAIG, OF SYRACUSE, NEW YORK, ASSIGNOR TO E. C. STEARNS
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SHUTTLE-OPERATING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 549,230, dated November 5, 1895.

Application filed August 5, 1890. Serial No. 361,116. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. CRAIG, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented a new and useful Improvement in Shuttle-Operating Mechanisms for Looms, of which the following is a specification.

This invention relates to that class of looms which employ a fly-shuttle which is thrown alternately from one end of the shuttle-race to the other by means of picker-staffs.

My invention is particularly designed for wire-weaving looms in which the weight of the wire bobbin or cop in the shuttle varies largely as the shuttle thread or wire is paid out.

Heretofore the devices by which the picker-staffs are actuated have been applied to the picker-staffs at a certain fixed point, so that the shuttle was thrown across the shuttle-race with the same force, whether the shuttle was full or nearly empty. This necessitated the attachment of the actuating device to the picker-staff at a medium point between the point at which the necessary force was exerted to propel the full shuttle and the point at which the force was exerted which was sufficient to propel the shuttle when nearly empty. In this construction the force of the throw was insufficient to properly propel a shuttle of considerable weight and the force was excessive when the shuttle was nearly empty. The object of my invention is to overcome this difficulty; and it consists in the mechanism whereby the throw of the picker-staff is varied in succession, so that the shuttle will be thrown across the shuttle-race with a gradually-decreasing force as the bobbin or cop unwinds and becomes less in weight.

In the accompanying drawings, consisting of two sheets, Figure 1 represents a front elevation, partly in section, of a portion of a loom, showing one of the picker-staffs and connecting parts provided with my improvements. Fig. 2 is a top plan view thereof. Fig. 3 is a side elevation thereof. Fig. 4 is a sectional elevation of the ratchet mechanism whereby the leverage of the picker-staff is gradually decreased. Figs. 5, 6, and 7 are

vertical sections in lines xx , yy , and zz , Fig. 4, on an enlarged scale. Fig. 8 is a vertical section of the swiveled post connecting the rock-arm of the ratchet mechanism with the vertical supporting-rod. Fig. 9 is a horizontal section in 9 9, Fig. 8.

Like letters of reference refer to like parts in the several figures.

A represents one of the side frames of a loom, and B a beam or roller journaled at the upper end thereof, to which the cloth passes as woven.

C represents the batten or lay which is supported on the rock-shaft c by arms d . The lay is provided with the usual reed D, through which pass the warp-threads $e e$, the said reed moving with the lay toward the woof and packing the same. The warp-threads pass through eyes $f f$, formed in the heddles F in the usual manner.

G represents the shuttle-box arranged near the outer end of the lay, and g the shuttle resting therein.

H represents one of the picker-staffs whereby the shuttle is propelled across the shuttle-race g' , formed on the upper side of the lay. Each of the picker-staffs is arranged with its upper end in a vertical slot h , formed in the outer end of the lay. The upper end of each picker-staff bears against the outer end of the shuttle g by means of a cushion g^2 . The lower end of the picker-staff H is supported on a bracket h' , secured to the outer end of the rock-shaft c by means of a rocking-shoe h^2 , whereby the point of contact between the picker-staff and the shuttle is caused to move in a horizontal line. The shoe of the picker-staff is provided with the usual spring I, whereby the upper end of the picker-staff is returned to its outermost position in the shuttle-box.

J represents a longitudinal rock-shaft journaled in suitable bearings j on the side frame and provided with a depending rock-arm j' . The lower end of the latter is connected with the picker-staff by means of a rod K, whereby a rocking motion is imparted to the picker-staff. The rod K is preferably composed of a central portion k' , an inner end loop k^2 , which passes through an opening in the lower end of the rock-arm j' , and an outer end

loop k^3 , which surrounds the picker-staff and is held in position thereon by a sliding loop L. The latter is preferably composed of two collars l' and a connecting-bridge l^2 , between
 5 which the outer loop of the connecting-rod is seated. The loop L, carrying the connecting-rod, is capable of sliding on the picker-staff, thereby varying the location of the point of
 10 connection between the rock-lever and the picker-staff. The arm j' rocks intermittently with a uniform movement and the loop and connecting-rod gradually slide down and approach the fulcrum of the picker-staff, where-
 15 by the throw of the picker-staff is gradually increased and a gradually-increasing velocity is communicated to the upper end of the picker-staff.

When the bobbin is filled, the sliding loop and connecting-strap are placed upwardly on
 20 the picker-staff at a point where the rock-lever will impart the proper throw to the picker-staff, so that the latter will propel the shuttle easily across the shuttle-race. As the bobbin unwinds, the shuttle becomes
 25 gradually lighter. A light shuttle is more readily set in motion than a heavy shuttle, but acquires less momentum, and it therefore requires less power and a greater velocity to properly throw a light shuttle through the
 30 shed. My improved mechanism therefore reduces the effective force gradually at the upper end of the picker-staff, while the velocity is increased as the bobbin unwinds. This is effected by a ratchet mechanism M, which
 35 controls the position of the sliding loop L and connecting-rod and permits the latter to gradually move nearer the fulcrum of the picker-staff. This ratchet mechanism is secured to the front side of the batten or lay and con-
 40 nected with the sliding loop L by a chain m . The latter is secured with its lower end to a laterally-projecting lug m' on the sliding loop, while its upper end is secured to a drum N, which is mounted on a shaft n . The latter
 45 is journaled in bearings n^1 n^2 , formed on a supporting-plate n^3 , secured to the front side of the batten or lay. This drum is capable of revolving on the shaft n in one direction and is held against movement in the
 50 opposite direction by means of a pawl o , arranged to slide in a radial opening o' , formed in the drum and engaging with ratchet-notches o^2 , formed in the shaft n .

o^3 represents a spring interposed between
 55 the pawl o and an adjusting-screw o^4 , whereby the pawl is held in engagement with the ratchet on the shaft, as represented in Fig. 5. The outer end of the shaft n is provided with a worm-wheel P, which engages with a
 60 worm p , journaled in the supporting-plate at right angles to the drum-shaft n . The outer end of the worm is provided with a bevel-gear p^1 , which meshes with a similar gear wheel p^2 , formed on the inner end of a short
 65 shaft p^3 . The latter is journaled in a bearing p^4 , formed in the supporting-plate, and is

secured therein by a pin p^5 engaging with a groove p^6 in the shaft p^3 .

Q represents a ratchet-wheel secured on the outer end of the short shaft p^3 , so as to turn
 70 therewith.

q represents a ratchet-lever pivoted to the outer end of the short shaft p^3 by a screw-bolt q' and provided with a spring-pressed pawl q^2 at its upper end, which engages with
 75 the ratchet-wheel Q. The lower end of the ratchet-lever is provided with a depending arm R, which slides in a swiveled post r . The latter is swiveled in a sleeve r^2 , as represented in Figs. 8 and 9. The sleeve r^2 is
 80 adjustably attached by means of a screw r^3 to a vertical rod r , which is secured to the side frame by means of brackets s s.

The picker-staffs, the arms supporting the batten or lay, and the lower arm of the ratchet-lever incline in a longitudinal direction of the machine when in a state of rest, as shown in
 85 Fig. 3.

When the batten carrying the reed oscillates toward the cloth-beam in the direction
 90 of the arrow in Fig. 3, in order to pack the last woof of the cloth, the lower end of the ratchet-lever slides through the swivel-post, but is held against lateral movement at that point. This oscillating movement of the reed
 95 and batten causes the ratchet-lever to turn the ratchet-wheel Q and actuate the drum through the medium of the bevel-gears, the worm, and the worm-wheel secured to the drum-shaft. Each oscillating movement of
 100 the batten turns the drum a small distance in the direction of the arrow, thereby unwinding a portion of the chain which supports the sliding loop on the picker-staff. By
 105 this means the connecting-rod is caused to descend gradually toward the fulcrum of the picker-staff and the throw of the latter is increased in the same measure as the weight of the bobbin decreases.

The rotation of the drum can be regulated
 110 according to the weight of the woof-thread by raising or lowering the swivel-post on the vertical supporting-rod, which varies the throw of the ratchet-lever. When the bobbin in the shuttle has been consumed, a new one is
 115 put in place and the sliding loop is raised to its highest point on the picker-staff by turning the drum in the reverse direction by hand. This is readily permitted by the ratchet in the
 120 drum.

T represents an adjustable collar, which is secured on the picker-staff and limits the upward movement of the sliding loop. This collar is secured in position by means of the
 125 screw t' after the loom is properly adjusted and the highest position of the sliding loop has been determined, so that the rock-arm will throw the picker-staff with the exact force necessary to propel the filled shuttle across
 130 the shuttle-race.

By automatically varying the force of the throw of the shuttle, bobbins of greater ca-

capacity can be employed than when the shuttle is thrown with a uniform force. A great saving in time is also effected, as the stoppages for renewing the bobbins are less frequent.

5 I claim as my invention—

1. The combination with the picker staff, of an actuating device capable of adjustment on the picker staff toward and from the fulcrum thereof, and automatic mechanism connected
10 to said actuating device whereby the actuating device is shifted toward the fulcrum of the picker staff during the operation of the loom, substantially as set forth.

2. The combination with the picker staff, its actuating arm and the batten, of a shifting
15 connection between the arm and the staff whereby the picker staff is actuated from said arm, and a ratchet mechanism actuated by the movement of the batten and controlling the position of said shifting connection, sub-
20 stantially as set forth.

3. The combination with the picker staff, the actuating arm and the batten, of a shifting
25 connection between the arm and the staff whereby the picker staff is actuated from said arm, a drum, a chain wound upon said drum and attached to said shifting connection and means whereby said drum is turned during the operation of the loom, substantially as set
30 forth.

4. The combination with the batten, the picker staff and the actuating arm, of a shifting
35 connection between the arm and the staff whereby the picker staff is actuated from said arm, a drum connected with said shifting connection, and a ratchet lever whereby said drum is actuated, substantially as set forth.

5. The combination with the batten, the picker staff and the actuating arm, of a shifting
40 connection between the arm and the staff whereby the picker staff is actuated from said arm, a drum mounted on the batten and connected with said shifting connection, a ratchet wheel connected with said drum, and a ratchet
45 lever attached with one end to the ratchet wheel and near the opposite end to a part of the main frame, substantially as set forth.

6. The combination with the batten, the

picker staff and the actuating arm, of a shifting
50 connection between the arm and the staff whereby the picker staff is actuated, a drum mounted on the batten and connected with
said shifting connection, a swiveling post supported on the main frame, a ratchet wheel
55 connected with said drum, and a ratchet lever connected with one end to the ratchet wheel and arranged with its free end in the swiveling post, substantially as set forth.

7. The combination with the batten, the picker staff, the actuating arm, and the shifting
60 connection between the arm and the staff, of a drum mounted on the batten and connected with the shifting connection, a ratchet wheel connected with said drum, a ratchet
65 lever whereby the ratchet wheel is actuated and an adjustable support whereby the stroke of the ratchet mechanism is regulated, substantially as set forth.

8. The combination with the batten, the picker staff, the actuating arm and the shifting
70 connection between the arm and the staff, of a drum mounted on said batten and connected with said shifting connection, a ratchet wheel connected with said drum, a ratchet
75 lever connected with one end to the ratchet wheel and arranged with its opposite end in a swiveling post and a rod to which the post is adjustably secured, substantially as set forth.

9. The combination with the batten, the picker staff, the actuating arm and the shifting
80 connection between the arm and the staff, of a drum connected with the shifting connection, a worm wheel secured to the drum shaft, a worm meshing with said wheel, a ratchet
85 wheel, gears connecting said ratchet wheel with the worm, and a ratchet lever engaging with said ratchet wheel, substantially as set forth.

Witness my hand this 31st day of July, 90
1890.

WILLIAM H. CRAIG.

Witnesses:

CHESTER D. HOWE,
JOHN A. ARDNER.