Sheet 1, 2 Sheets

Walker & Hartley
Hand Loom

No. 57,226. Patented Aug. 14, 1866.

Fig. 1.

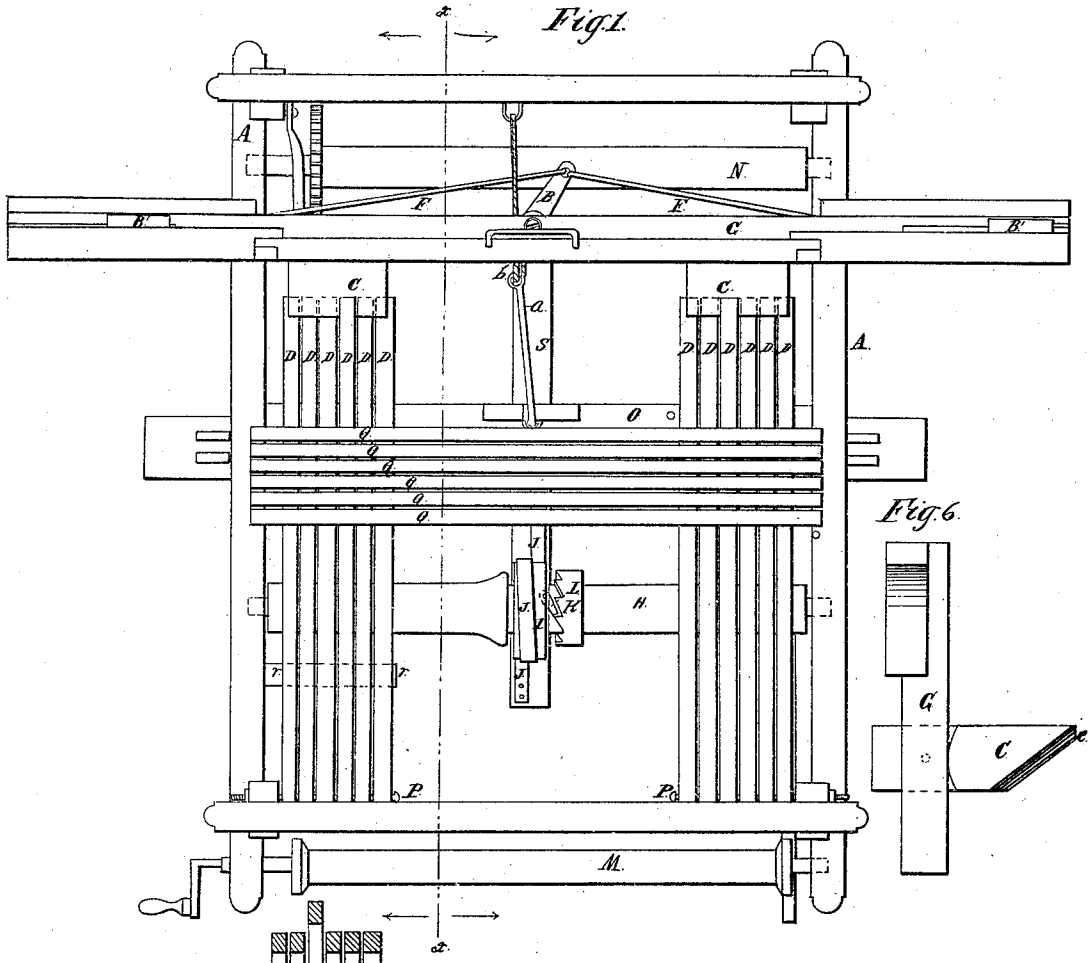


Fig. 6.

Fig. 2.

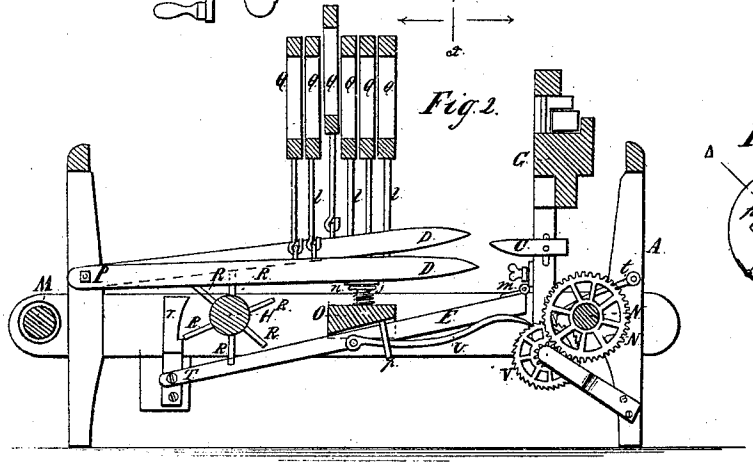


Fig. 8.

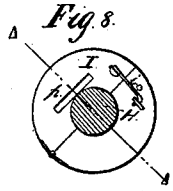


Fig. 9.

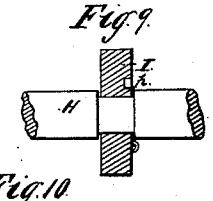
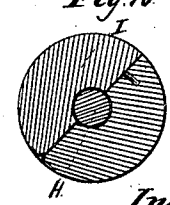


Fig. 10



Witnesses.
J. M. B. Lexington
Wm. Rau Overly

Inventors.
W. B. Walker
N. D. Hartley
Per Munn & Co
Attorneys

Sheet 2, 2 Sheets.

Walker & Hartley.

Hand Loom.

No. 57,226. Patented Aug. 14, 1866.

Fig. 3.

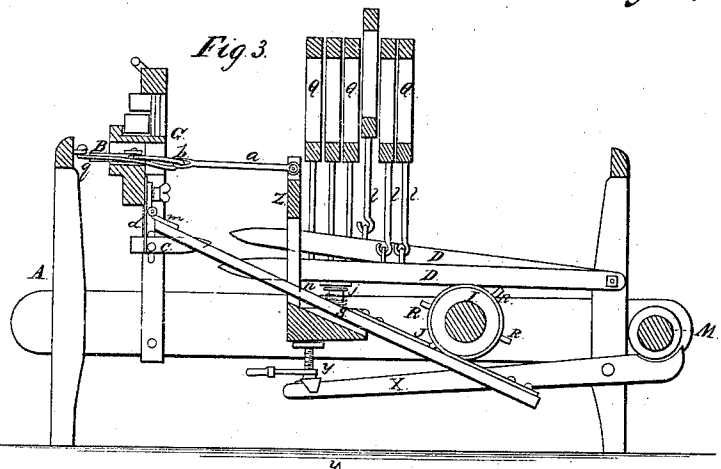


Fig. 4.

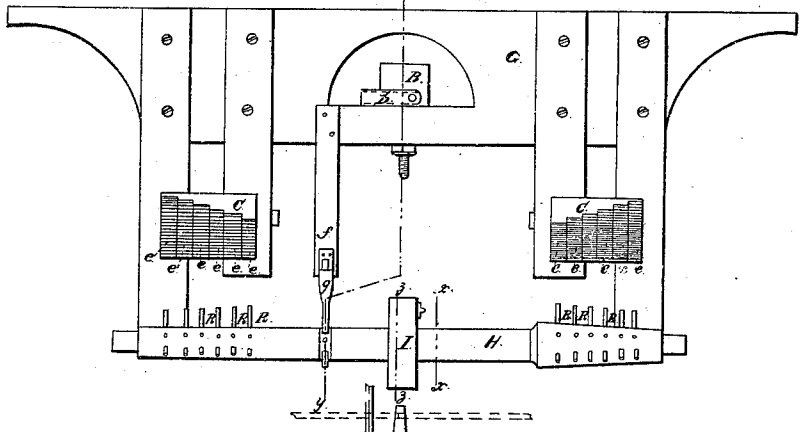


Fig. 5.

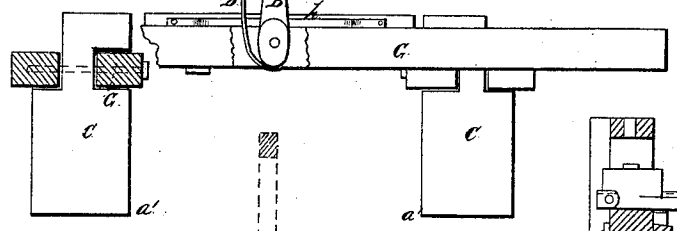
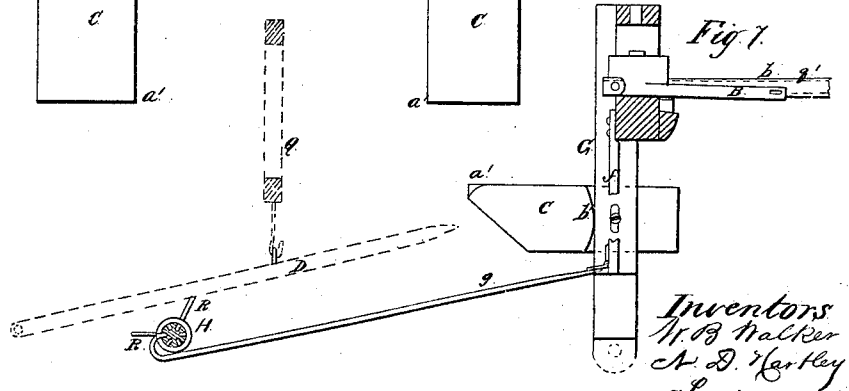


Fig. 7.



Witnesses:
J. W. B. Covington
Wm. Pran Overly

Inventors
W. B. Walker
A. D. Hartley
Per Munn & Co
Attorneys

UNITED STATES PATENT OFFICE.

W. B. WALKER AND N. D. HARTLEY, OF SALEM, IOWA.

IMPROVEMENT IN HAND-LOOMS.

Specification forming part of Letters Patent No. **57,226**, dated August 14, 1866.

To all whom it may concern:

Be it known that we, W. B. WALKER and N. D. HARTLEY, of Salem, in the county of Henry and State of Iowa, have invented a new and useful Improvement in Hand-Power Looms; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1, Sheet I, is a plan of a loom made according to our invention. Fig. 2, Sheet II, is a vertical section thereof, looking toward the left, the plane of section being seen at *x*, Fig. 1. Fig. 3 is a vertical section in the same plane, looking toward the right. Fig. 4, Sheet III, is an elevation of the lay and of the treadle-shaft, the bar S, which is to operate this shaft, being omitted from the view. Fig. 5 is a top view of the lay. Fig. 6 is a side view of the lay. Fig. 7 is a sectional view on the bent line *y* of Fig. 4. Fig. 8 is a cross-section of the treadle-shaft on the line *x* of Fig. 4. Fig. 9 is a section of the treadle-shaft pulley on the line △ of Fig. 8. Fig. 10 is a cross-section of the pulley and treadle-shaft on the line *z* of Fig. 4.

Similar letters of reference indicate like parts.

The object of this invention is to simplify and improve that kind of hand-loom in which several leaves of harness are employed, which loom goes by the name of "hand-power loom," because the movements of some of its parts are effected by the hand of the weaver.

The invention consists in several particulars, one of which relates to the construction of the treadle-shaft and the means of imparting motion to it; another relates to means for changing the speed of rotation of the treadle-shaft with respect to the beats of the lay, so as to require more or fewer beats to one revolution of the shaft. By this means one is enabled to weave with three leaves of harness, or any other odd number, and produce goods of a peculiar style.

The letter A designates the frame of a loom. Its lay G carries on its top the reed-frame and reed, as usual. In the central part of the lay is pivoted the picker-staff B, from whose end extend the usual straps F, that are attached to the shuttle-drivers B′. On the swords of the lay are fixed depressors C C, which depress the forward ends of those treadles that are not raised by the pins of the treadle-shaft at the time the lay is moved backward toward the treadles and bring them down on spring-beds *n*, placed beneath the treadles on the cross-beam O.

The treadles D are arranged in double series along opposite sides of the frame, one of a pair being on either side, and each pair being attached, as usual, to the same heddle-leaf Q. The rear ends of the treadles are pivoted on horizontal rods P, which project inwardly from the rear posts of the frame. In this example I have shown six pairs of treadles and six leaves of heddles, which are operated by them through rods *l*.

The treadles are raised by pins R, which project from the treadle-shaft, said pins being arranged around the same at equal distances on its circumference, and one of them being placed beneath or opposite each treadle.

The treadle-shaft has bearings in the sides of the frame, and receives rotary motion by means of the reciprocations of the lay through an inclined bar, S, and a strap, J, which encircles the loose pulley I of the shaft, the ends of the strap being fastened in opposite directions to the bar.

The bar S is connected to the lay by a hinge-joint in the following manner: A slotted plate, *d*, hangs down from the middle of the lay, and receives on its back face the loose leaf of a hinge, *m*, which is held against it by means of a screw-bolt and nut, the bolt being free to slide up and down in the slot of the hanging plate when the screw is loosened for the purpose of adjusting the height of the bar S.

The letter M designates the warp-beam, the warp on which receives more or less tension through a friction-brake, X, pivoted on one of the back posts of the frame, and which is made to bear with more or less force on the beam by means of a screw and nut, *y*, the screw working in the under side of the cross-beam O. This beam extends from side to side of the frame, and is cut away a little at its center to make room for the bar S. The treadles, when down to their lowest position, rest on spring-

beds *n*, which are supported on spiral springs *j*, wound around pins that work through the beam O. The pulley I is set loosely on the treadle-shaft about midway of its length and in the same vertical plane with the path of the bar S, which is reciprocated with the lay. When the bar S is moved backward the pulley is rotated without imparting motion to the shaft; but when the bar is moved forward a spring-pawl, L, (see Fig. 1,) which is pivoted in a slot, *p*, (see Fig. 8,) in the side of the pulley engages with one of a series of ratchet-teeth cut on a ring, K, that is fixed to the shaft and turns the shaft the distance of one tooth. The pulley is made in sections, which are hinged to each other and are secured by a hook, *i*. The shaft is locked in the position in which it is left by the pawl by a hooked bar, *g*, (shown in Fig. 4, but not in Fig. 1,) which extends from an additional sword, *f*, of the lay, its hooked end being made, when the lay is moved forward, to enter one of a series of perforations made in the circumference of the shaft. The bar *g* may be guided and supported either above or below the shaft, as may be most convenient.

In the construction and arrangement of parts shown in Fig. 3 the picker-staff B is operated by the reciprocation of the lay through the strap designated by the letters *q* and *b* and the rod *a*, said rod being pivoted to the top of the double standard Z, between whose posts the reciprocating bar S is guided.

By the vibration of the staff B the blocks B′ B′ are driven against the shuttle with force sufficient to send it across from one side of the loom to the other side alternately.

In Fig. 5 we have shown a modification of devices for operating the picker-staff. In this modification we dispense with the rod *a* and use a strap which is limber and flexible at the part marked *b*, that goes around the head of the staff, but is comparatively rigid by being made of double thickness and stiffened at the part *q*, which is attached to the breast-beam of the loom. The whole strap is placed in an edgewise or vertical position, and the flexible part *b* is pivoted loosely to the rear part of the head of the staff B, so that it may be revolved or turned on its pivot.

When the lay is moved toward the breast-beam and the strap is relaxed the stiff portion thereof resists the tendency to become bent by reason of the approach of the ends of the strap toward each other, and causes the more limber portion, which is free to become bent, to turn upon its pivot and allow the whole strap to turn over so as to bring that edge up which was at first down. This operation results in bringing the strap to the other side of the staff, the limber portion of the strap being free to bend backward and around the head of the staff to which it is pivoted, when the strap will be found in readiness to move the staff in a direction contrary to its last vibration so soon as said strap is straightened out again by the inward movement of the lay. The staff is held stationary while the lay is being moved forward by friction, which is obtained in this example by the application of a spring, *h*, that presses upward against the under side of the staff and holds it still until the straightening of the strap overcomes the friction produced by the spring.

The cloth-beam N is rotated so as to take up the cloth as fast as it is woven by the motion of the lay G through the following devices: E is a connecting-rod, which is fastened to one of the swords of the lay by a nut and screw-bolt that goes through one of the leaves of a hinge, *m*, whose other leaf is fixed to the rod. The height of this connection with the lay can be varied to take up the cloth faster or slower by changing the place of the screw-bolt to a higher or lower position on the lay. The other end of the connecting-rod E is pivoted to a vibrating arm, *r*, which is pivoted at its lower end to the side of the frame below the place where the connecting-rod is pivoted to itself. The arm *r* is just behind the treadle-shaft, and its upper part is lengthened so as to extend behind the whole series of pins *r* on the adjacent end of that shaft. That face of the arm which is presented toward the shaft is cut away to a curve, which allows any of the pins R that have passed the top of the arm to move onward, but arrests the next pin, thereby checking the too rapid advance of the pins and insuring regularity in their rotation in accordance with the reciprocations of the lay. The rod E carries a pawl, U, which engages the teeth of a ratchet-wheel, V, whose shaft has a pinion that engages with a gear-wheel, W, on the cloth-beam. When the lay is brought forward the pawl U turns the ratchet-wheel the distance of one tooth, and thereby the cloth-beam is rotated so as to take up the cloth. The ratchet is held from turning back when the pawl is withdrawn by the backward movement of the lay by means of the detent *t*.

The treadle-shaft is perforated with numerous holes to allow the pins R to be changed in their location, so as to change the number of heddles that are to be worked. The holes are arranged in lineal distance, so as to bring a pin, when six treadles are operated, opposite each one of the treadles, and they are also arranged circumferentially, so as to come in contact with the treadles in proper succession.

When four treadles, and consequently four leaves of heddles, are to be operated the pins are changed in position and number accordingly, and as many changes can be made in the number and order of operation of the heddles as can be made in the number and order of operation of the treadles, providing, always, that the teeth of the ratchet ring or collar, K, be changed in like manner, said collar having six ratchet-teeth when six heddles are to be operated during one revolution of the shaft, and four teeth when four heddles are to be operated. By changing the number of teeth

on the ring and altering the position and number of the pins R on the shaft the working of the loom can be changed from three heddles upward for each revolution of the shaft.

A loom may have a collar, K, whose ends have four and eight teeth, respectively. By changing the collar end for end the time of revolutions of the shaft is changed from four to eight reciprocations of the lay, and in the same manner the plain end of collar K in Fig. 1 may be made with three teeth to produce one revolution of the shaft to three reciprocations of the lay when it is changed so as to be opposite the pawl L. The fewer the reciprocations of the lay to one revolution of the shaft the greater is the distance the reciprocating bar S has to travel. The change in its travel is made by raising it to a higher position on the lay.

A crank is applied to one end of the warp-beam for the purpose of facilitating the operation of beaming the warp.

The depressors C have their shoulders at b' rounded off to let their ends a' enter easily between the treadle as the lay is moved backward, thereby depressing the treadles more quickly than they would be if brought down by gravity. The bottoms of the depressors are beveled in two directions to facilitate the opening of the shed downward. We have divided the bottoms of the depressors also into parallel planes (here six in number) for the purpose of bringing the warp in the different heddles of the harness on a level with each other.

We make the treadle-shaft H of a tapering form at the ends which bear the pins R, so that as the shaft turns and the pins come in contact with the treadles the warp in the heddles will shed upward and equally in the same way that the warp will be carried down evenly by means of the planes of the beveled depressors.

Instead of making the ends of the shaft tapering, the same result may be reached by shortening the pins in the direction of the end of the shaft, as shown at the left end of the shaft in Fig. 4.

We provide several pulleys like the one marked I, only making them of different sizes, according to the number of motions of the lay to one revolution of the treadle-shaft, and being made in sections and hinged together, as shown in Figs. 8 and 10, they can be easily removed and replaced on the shaft as required, and the hinged parts locked as shown at i, Fig. 8, for changes in the character of the stuff to be woven. The smaller the pulley the less will be the number of motions of the lay to one revolution of the shaft, and the contrary is true when the pulley is enlarged.

We disclaim the invention of G. H. and H. T. Henderson, patented March 14, 1865.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. The driver-strap b, described and shown in Fig. 5, made substantially as described, so as to be stiff except in the part that is pivoted to and that embraces the head of the staff, for the purpose above set forth.

2. In combination, the picker-staff B, the said driving-strap $b\ q'$, made as shown, and the spring h, for holding the staff stationary while the strap is limbered up, substantially as described.

3. The depressors C C, having rounded shoulders b', their bottoms being inclined or beveled in two directions and having planes formed thereon corresponding in number with the number of treadles in the loom, substantially as described.

4. The reciprocating rod g, attached to the lay, whose hooked end engages with holes in the treadle-shaft to hold the shaft stationary when the lay is still, substantially as shown.

5. Making the pulley I in sections so that it can be removed from the shaft in order to change from one sized pulley to another, substantially as described.

6. The stop r, connected with the take-up rod E, which gives it a vibrating movement, for the purpose of acting as a stop to the pins R, and so aiding in making the shaft move around or rotate a regulated distance at each reciprocation of the lay, substantially as set forth.

7. The combination of the treadle-shaft having movable pins R, a ratchet, K, and a loose pulley and pawl, constructed as shown, with the adjustable bar S, which operates it from the lay, whereby a loom can be operated with three leaves of heddles and with other odd as well as even numbers by changing the position of the pins, adjusting the height of one end of the bar S on the lay, changing the number of ratchet-teeth, and changing the size of the pulley, substantially as described.

W. B. WALKER,
N. D. HARTLEY.

Witnesses:
A. J. WITHROW,
NATHAN HOCKETT.