P. W. Hart.

Loom.

No. 57,712. Patented Sept. 4, 1866.

Fig. 1

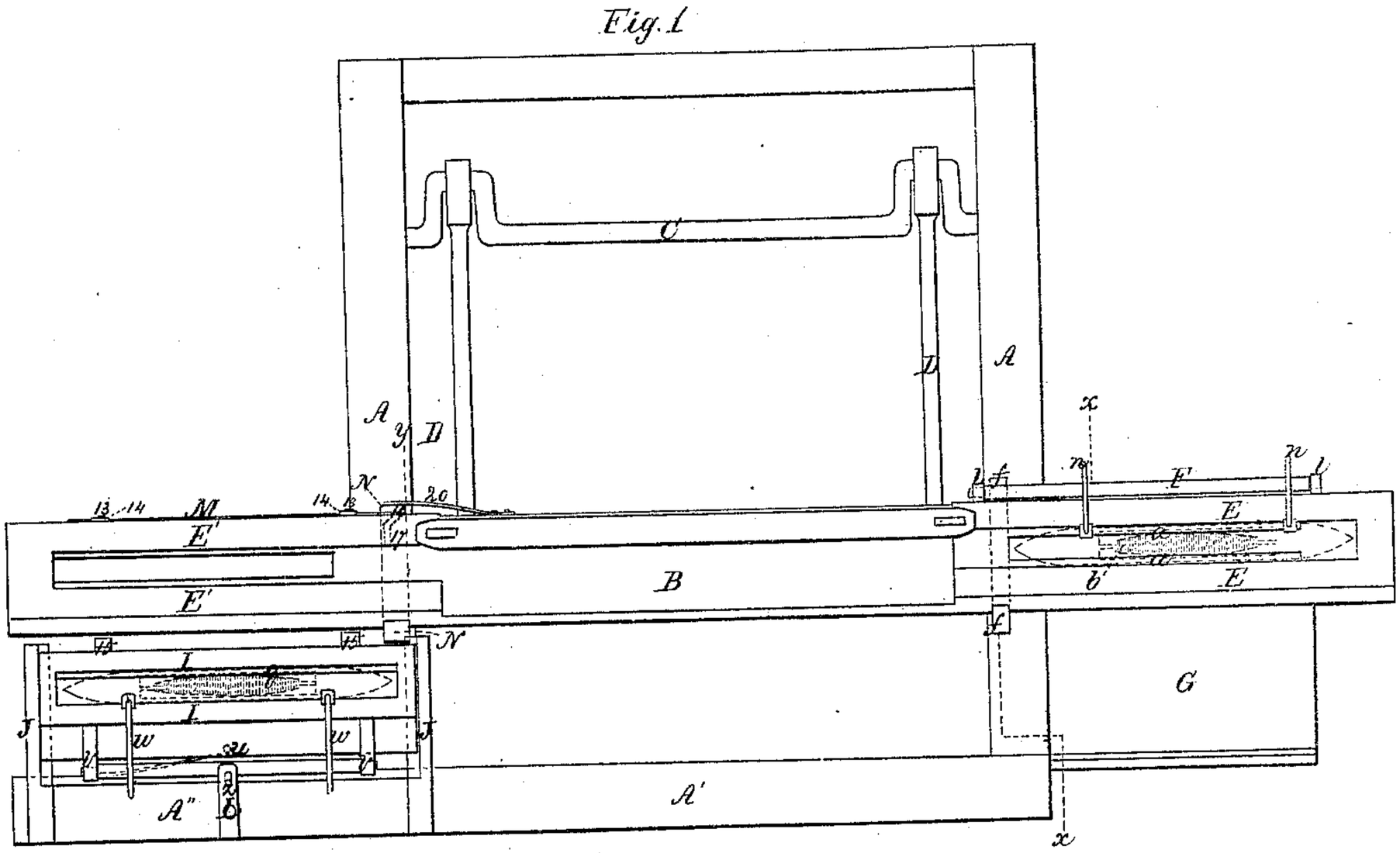


Fig. 2

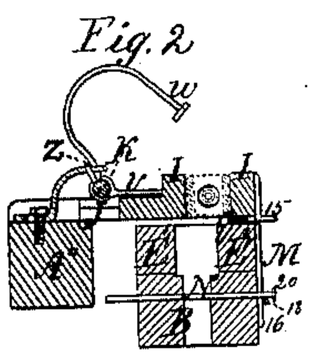


Fig. 3

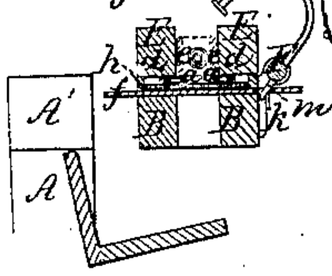


Fig. 4

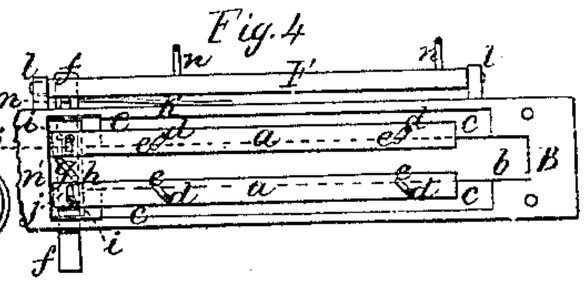


Fig. 5

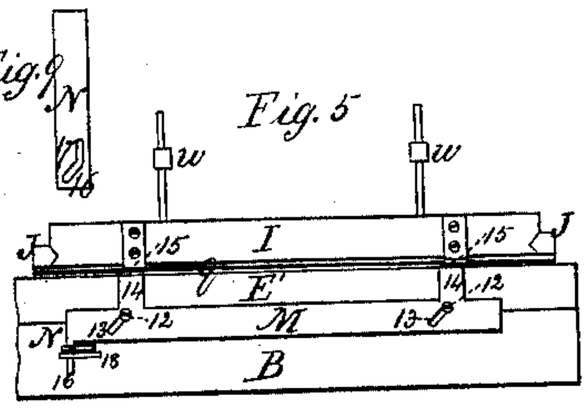


Fig. 6

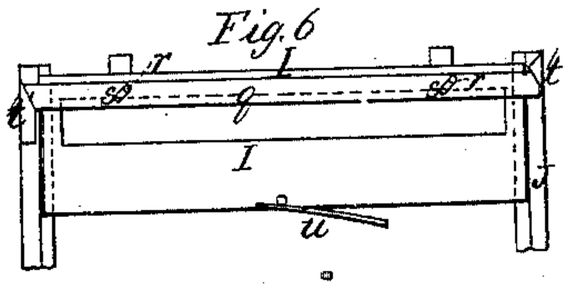


Fig. 7

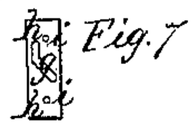
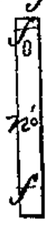


Fig. 8



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PHILO W. HART, OF STAMFORD, NEW YORK.

IMPROVEMENT IN POWER-LOOMS.

Specification forming part of Letters Patent No. **57,712**, dated September 4, 1866.

To all whom it may concern:

Be it known that I, PHILO W. HART, of Stamford, in the county of Delaware and State of New York, have invented a new and useful Improvement in Power-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, forming part of this specification.

This invention consists in certain means whereby, when the yarn of the shuttle of a loom breaks or gives out while the loom is in operation, the shuttle is ejected from the shuttle-box at one side of the loom, and its place in the loom supplied by another shuttle, containing a proper supply of yarn, by an automatic operation of the loom without the necessity of stopping it.

The shuttle-box on one end of the lay of the loom is made with an open bottom and a trap which, in case of the shuttle-yarn giving out or being broken, is opened, as the lay strikes up, by the action of a device somewhat similar to the fork and grid of the ordinary filling stop-motion, or of other suitable character, and the shuttle then either drops out or is pushed out through the bottom of the box by means of fingers attached to the shuttle-box or lay, and which are caused to operate by a portion of the same mechanism which opens the bottom of the shuttle-box.

At the opposite side of the loom there is attached to the breast-beam or other fixed part of the loom a shuttle-box, which may be termed the "spare shuttle-box," also having an open bottom and a movable trap, and in which is placed a spare shuttle, which, at the same time that the shuttle which has been in operation is ejected, or before the lay moves back again after such ejection, is delivered through the open bottom of the said spare shuttle-box into the shuttle-box on the corresponding end of the lay by the opening of the trap at the bottom of the said spare shuttle-box and the action of suitable fingers, the opening of the trap at the bottom of the spare shuttle-box and the operation of its ejecting-fingers being produced by the same mechanism as or mechanism substantially similar to that which produces the opening of the trap in the bottom of the shuttle-box on the other end of the lay and the ejection of the shuttle therefrom.

To enable others skilled in the art to apply my invention to use, I will proceed to describe it with reference to the drawings, in which—

Figure 1 is a plan of the framing, lay, and shuttle-boxes of a loom. Fig. 2 is a transverse vertical section of the breast-beam, the spare shuttle-box and its appurtenances, and the shuttle-box on the corresponding end of the lay in the planes indicated by the line *y y* in Fig. 1, the shuttle-box being shown, however, in its position when underneath the spare shuttle-box. Fig. 3 is a transverse section of the shuttle-box and its appurtenances on the other end of the lay in the plane indicated by the line *x x* in Fig. 1. Fig. 4 is a plan view of the last-mentioned end of the lay with the shuttle-box removed, showing the movable bottom of the latter and part of the mechanism for operating the same. Fig. 5 is a back view of the spare shuttle-box at the corresponding end of the lay and their appurtenances. Fig. 6 is an inverted plan of the spare shuttle-box. Figs. 7, 8, and 9 are views of some of the details.

Similar letters and numbers of reference indicate corresponding parts in the several figures.

A represents the framing of the loom; A′, the breast-beam; B, the lay; C, the crank-shaft; and D D, the connecting-rods.

E and E′ are the shuttle-boxes on the ends of the lay. The box E′ may be of ordinary construction; but E has an open bottom, and there is in the portion of the lay below it an opening, *b*, large enough for the shuttle to drop through. A shuttle is represented in red outlines in the box E.

a a are two sliding plates, which form the trap at the bottom of the shuttle-box E. These plates are fitted to work one under the front and the other under the back of the shuttle-box E, the portions of the lay in front of and behind the opening *b* being recessed in such manner (shown at *c c* in Fig. 4) as to bring the upper surfaces of the said plates flush with the surface of the raceway, and make the said surfaces form a continuation of the raceway within the shuttle-box. The said plates are

kept in place by means of screws *d d*, which pass through oblique slots *e e*, provided in the said plates, and which are screwed into the lay, the said screws allowing the said plates to move inward under the open bottom of the shuttle-box and over the opening *b*, as shown in Figs. 1, 3, and 4,) far enough to support the shuttle while in the shuttle-box.

Under the inner end of the shuttle-box E a plate, *f*, is fitted to slide transversely through the lay, and in this plate (of which Fig. 8 is a detached plan view) there is an upwardly-projecting pin, *n'*, which enters a bent slot, *g*, in a plate, *h*, arranged between the plate *f* and the trap-plates *a a*. This plate *h*, of which Fig. 7 is a detached plan view, is fitted to slide within the lay lengthwise of the shuttle-box, and it is connected with the plates *a a* by means of two pins or screws, *i i*, passing through transverse slots *j j* in the latter plates. A spring, *k*, attached to the back of the lay, presses the plate *f* forward in such manner as to bring its pin *n'* up to the front end of the bent slot *g* of the plate *h*, and so press the latter plate toward the center of the loom, and thereby to press the trap *a a* in the same direction; and while the latter plates are pressed in this direction their oblique slots *e e*, guided by the stationary screws or pins *d d*, are caused to hold the said plates with their inner edges far enough under the open bottom of the shuttle-box and over the opening *b* in the lay, as shown in Fig. 4, to form the continuation of the raceway within the shuttle-box and support the shuttle.

Pressure applied against the front end of the plate *f* forces it backward, and causes such movement of the pin *n'* in the slot *g* of the plate *h* as to move the latter plate and the trap-plates *a a* toward the end of the lay, and in this movement of the trap-plates *a a* the oblique slots *e e* and guide pins or screws *d d* cause them also to move outward from the shuttle-box in such manner that they will be entirely withdrawn therefrom, and leave the shuttle free to drop through the opening *b* in the lay.

F is a rock-shaft arranged at the back of the lay below the shuttle-box E and parallel therewith in bearings *l l* attached to the lay. This rock-shaft has projecting from its under side a pin, *m*, which enters a hole in the transverse sliding plate *f*, and has also attached to it two long curved fingers, *n n*, which are caused, by the movement of the rock-shaft, produced by the action of the plate *f* on the pin *m* when the said plate is pushed back, to be depressed into the shuttle-box for the purpose of pushing out the shuttle therefrom and through the opening *b* in the lay. The ends of the said fingers are not brought into contact with the top of the shuttle until after the plate has moved back far enough to open the trap *a a*, and when the pin *n'* in the said plate has arrived in the forward part of the bent slot *g* in the plate *h*, which is parallel with the sliding movement of the plate *f*. The spring *k*, when there is no pressure on the front end of the plate *f*, holds the said plate back in such a position that, by its action on the pin *m* of the rock-shaft, it holds the fingers *n n*, with their extremities, some distance above the shuttle-box.

The pushing back of the plate *f* to open the trap of the shuttle-box E and bring the fingers *n n* into operation to eject the shuttle when its yarn has given out or broken may be effected in various ways; but I propose, generally, to effect it by a modified arrangement of the forked lever and grid of the ordinary filling-stop motion, the grid being arranged in the usual position on the lay of the loom, and the said forked lever being secured to a rock-shaft attached to and parallel with the back of the breast-beam, and the said rock-shaft being furnished with a bent arm, which, until the shuttle-yarn has given out or been broken, is lifted up out of the way of the forward end of the sliding plate *f* by the pressure of the yarn against the fork of the lever, but which, when the yarn has broken or given out, is allowed to drop in front of the said plate, so that when the lay beats up the said plate comes in contact with the said arm, and is thereby pressed back relatively to the lay, and caused to open the trap and operate the fingers *n n*, and thereby eject the shuttle from the shuttle-box E, into which it had just entered. The ejected shuttle drops from the lay onto a shelf, G, attached to the framing of the loom in a suitable position.

I is the spare shuttle-box, arranged upon two fixed brackets, J J, which project backward from a portion, A'', of the breast-beam, which is extended beyond the opposite side of the loom to that on which the shuttle-box E is arranged, and in front of the shuttle-box E'. This spare shuttle-box I, having an open bottom, is so far elevated that the shuttle-box E' passes under it, as shown in Fig. 2, every time the lay beats up. It is so fitted to ways on the horizontal upper surfaces of the brackets J J as to be capable of a limited movement in a backward and forward direction.

q, Figs. 1, 2, and 6, is the trap at the bottom of the spare shuttle-box, consisting of a flat horizontal plate extending the whole length of the said shuttle-box, and attached to its bottom in rear of the opening therein by means of two screws, *r r*, passing through oblique slots *s s*, Fig. 6, in the said plate and screwing into the shuttle-box. This trap or plate has oblique ends, which work between two stationary oblique guides, *t t'*, secured to the under sides of the brackets J J in such manner as to produce, by the limited backward and forward movement of the spare shuttle-box on the said brackets, such a movement of the said trap or plate as will cause it to project a short distance under the opening in the bottom of the spare shuttle-box, as shown in Figs. 1, 2, and 6, to support the spare shuttle placed therein, or to be withdrawn from under the said opening to permit the passage of the said shut-

tle through the said opening. The spare shuttle is represented in red outline in Figs. 1, 2, and 6.

While the loom is in operation, with a proper supply of yarn in the operating-shuttle, and the said yarn unbroken, the spare shuttle-box is held back upon the brackets J J by means of a spring, *u*, attached to the part A″ of the breast-beam, and when the said shuttle-box is in this position the oblique guide *t*, Fig. 6, holds back the trap *q* in the position represented, in which it will support the spare shuttle.

K is a horizontal rock-shaft, arranged parallel with the spare shuttle-box and the breast-beam in bearings *v v*, attached to the front of the said shuttle-box, and carrying two fingers, *w w*, for pushing out the spare shuttle from the said shuttle-box into the shuttle-box E′ on the lay, in case of the said shuttle failing to drop out quick enough when the trap *q* is opened. This rock-shaft has also secured to it an upwardly-projecting pin, *z*, which enters a hole in a fixed arm, L, attached to the breast-beam, and thereby produces the necessary movement of the rock-shaft and fingers to eject the shuttle from the spare shuttle-box when the latter is pushed forward on the ways and its trap opened, as will be presently described.

When the spare shuttle-box is held back by the spring *u*, as represented in the drawings, the arm L holds the rock-shaft K and its fingers *w w* in such position that the latter will permit the spare shuttle to be inserted into the said shuttle-box.

M, Figs. 1, 2, and 5, is a flat plate attached to the back of the shuttle-box E′ on the lay by means of two screws, 12 12, Fig. 5, passing through oblique slots 13 13 in the said plate and screwing into the said shuttle-box. This plate M has two upward projections, 14 14, on its upper edge, arranged opposite to two small plates, 15 15, which are attached rigidly to the back of the spare shuttle-box I, and which project downward slightly below the bottom thereof. The said plate M has a rigidly-attached pin, 16, Fig. 5, projecting downward from its end which is nearest the center of the loom, and this pin enters a bent slot, 17, in a flat plate, N, of which Fig. 9 is a detached plan view, and which is fitted to slide back and forth transversely through the lay B. Below the said plate N the said pin 16 passes through a fixed steadying-guide, 18, attached rigidly to the back of the lay. By a backward and forward movement of the plate N its bent slot 17 is caused so to act upon the pin 16 as to produce a longitudinal movement of the plate M, and in the longitudinal movement of the latter plate the slots 13 13, moving on the screws 12 12, cause it to have also an upward and downward movement, by which the extremities of the projections 14 14 are caused to be projected above and drawn below the top of the shuttle-box E′. A spring, 20, Figs. 1 and 2, attached to the back of the lay, presses against the rear end of the plate N in such manner that when said pressure is unopposed by pressure at the front end it holds the said plate forward in such a position that its slot 17, acting on the pin 16, keeps the plate M down in the position shown in Fig. 5, with its projections below the plates 15 15 on the back of the spare shuttle-box.

The rock-shaft hereinbefore mentioned as attached to the back of the breast-beam, and carrying the forked lever which operates, in connection with the grids on the lay, to effect the ejection of the shuttle from the shuttle-box E, is extended to a sufficient length toward the opposite end of the breast-beam to carry an arm situated opposite the plate N. This arm is lifted up out of the way of the plate N by the action of the yarn of the operating shuttle on the fork of the lever every time the lay strikes up, until the yarn of the said shuttle is broken or gives out, and consequently the shuttle-box E′ passes under the spare shuttle-box I without disturbing it; but when the said yarn is broken or gives out, and at the same time as the shuttle is ejected from the shuttle-box E, as hereinbefore described, the last-mentioned arm on the rock-shaft, not being lifted, drops in front of the plate N, and as the lay strikes up, the front end of the said plate N coming in contact with the said plate, pushes it back relatively to the lay, and thereby causes the plate M to be lifted up by the action of the slot 17 on the pin 16, and the projections of the latter plate are thereby caused to project high enough above the shuttle-box E′ to come in contact with the plates 15 15 of the spare shuttle-box I, which is thereby driven forward a short distance upon the brackets J J, while the shuttle-box E′ is below it. This forward movement of the spare shuttle-box I carries the trap *q* forward along the oblique surface of the guide *t′*, and produces the necessary longitudinal and backward movement of the said trap, relatively to the said shuttle-box, to withdraw the said trap from under the opening in the bottom of the said shuttle-box, and thereby permit the spare shuttle to drop therefrom into the shuttle-box E′, which is then directly under the spare shuttle-box and ready to receive the shuttle. As the spare shuttle-box moves forward the action of the stationary arm L upon the pin *z* of the rock-shaft K produces the downward movement of the fingers *w w*, by which the spare shuttle, in case it does not drop out, is ejected from the spare shuttle-box into the shuttle-box E, where it is in readiness to be driven through the warp by the next action of the picker on that side of the loom. A full shuttle having its yarn drawn out to a proper length from the eye is then placed as a spare shuttle in the spare shuttle-box, and while the operation of the loom proceeds without having ceased, the last-mentioned shuttle is ready to be deposited in the shuttle-box E′ when re-

quired, in the same manner as above described with reference to the shuttle previously contained in the spare shuttle-box.

The forward movement of the spare shuttle-box, above described, and the return movement effected by the spring *u* are necessary not merely for the purpose of effecting the operation of the trap and fingers of the said shuttle-box, but to keep the said shuttle-box long enough over the shuttle-box E to insure the delivery of the shuttle into the latter.

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

1. The sliding plate *f*, applied to work through the lay of the loom, and in combination with the movable trap at the bottom of the shuttle-box, substantially as and for the purpose herein described.

2. The fingers *w w*, attached to the lay of a loom, and operating in combination with the movable trap at the bottom of the shuttle-box, substantially as and for the purpose herein set forth.

3. The spare shuttle-box I, attached to the breast-beam or framing of the loom, having a movable trap at its bottom and operating in combination with a shuttle-box having a movable trap at its bottom on one side of the lay, substantially as and for the purpose herein described.

4. The combination of the spare shuttle-box, working on fixed brackets J J or their equivalent, attached to the breast-beam or other fixed portion of the loom, the rock-shaft K, carrying the fingers *w w*, and furnished with a pin, *z*, and the stationary arm L, the whole operating substantially as herein set forth.

5. The sliding-plates N M, in combination with each other, with the lay and one of the shuttle-boxes thereon, and with the spare shuttle-box, substantially as and for the purpose herein described.

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