2 Sheets—Sheet 1.

E. H. GRAHAM.

Shuttle-Operating Device for Looms.

No. 217,529. **Patented July 15, 1879.**

Fig. 4.

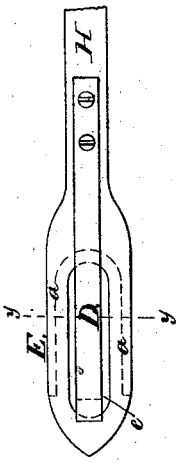


Fig. 2.

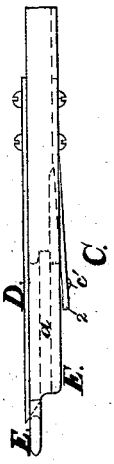


Fig. 3.

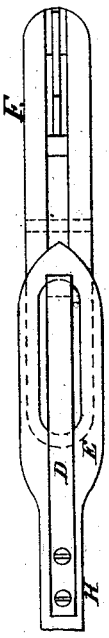
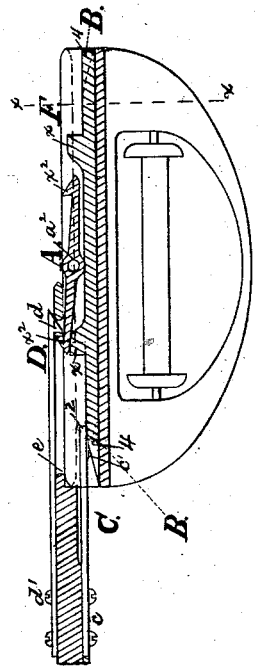


Fig. 1.



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Harry Jackson

Inventor:
Edmund H. Graham

2 Sheets—Sheet 2.

E. H. GRAHAM.

Shuttle-Operating Device for Looms.

No. 217,529. **Patented July 15, 1879.**

Fig. 7.

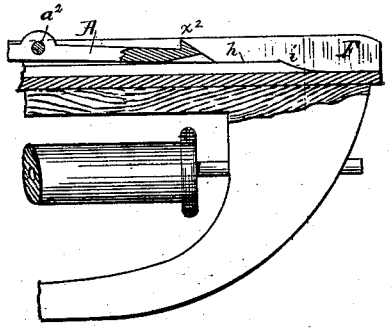


Fig. 5

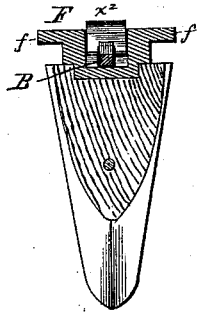
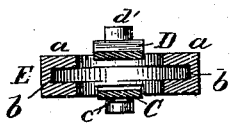


Fig. 6.



Attest:
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UNITED STATES PATENT OFFICE.

EDMUND H. GRAHAM, OF BIDDEFORD, MAINE, ASSIGNOR OF THREE-EIGHTHS HIS RIGHT TO REUBEN W. RANDALL, OF SAME PLACE.

IMPROVEMENT IN SHUTTLE-OPERATING DEVICES FOR LOOMS.

Specification forming part of Letters Patent No. **217,529**, dated July 15, 1879; application filed February 24, 1879.

To all whom it may concern:

Be it known that I, EDMUND H. GRAHAM, of Biddeford, in the county of York and State of Maine, have invented certain new and useful Improvements in Shuttle-Operating Devices for Looms, of which the following, taken in connection with the drawings forming part of this specification, is a full, clear, and exact description.

This invention relates to improvements in mechanism for operating the shuttles of looms in a positive manner, as by means of carriers situated at opposite sides of the loom, and adapted to alternately receive and deliver the shuttle from one to the other carrier at a point within the warp-shed, my present invention being an improvement on the mechanism described in United States Letters Patent No. 196,795, heretofore granted to me.

In this my present invention the shuttle is provided at its back with a pivoted latch, and with a sliding wedge to operate the latch at the proper times, the latch and wedge forming what I denominate a "lock."

The sliding wedge is moved alternately in opposite directions by devices projected from the shuttle-carrier, the said devices being by me denominated "keys," and spring-catches, also forming parts of the said carriers, are at the proper times made to engage with the hooks of the shuttle-latch, and the hooks at a later period are disengaged from the catches, as will be hereinafter described.

Figure 1 represents one of my improved shuttles and carriers in engagement, the back of the shuttle and the carrier being in section to show the operation of the parts; Fig. 2, an edge view of the carrier at the opposite end of the shuttle, the grooved portion of the carrier to embrace the back portion of the shuttle and the catch being shown in dotted lines. Fig. 3 is a rear-side view of Fig. 1, and Fig. 4 a rear-side view of the carrier shown in Fig. 2. Fig. 5 is a section taken across the shuttle on the line *x x*, Fig. 1; Fig. 6, a section taken across the carrier on the line *y y*, Fig. 4; and Fig. 7 is a partial longitudinal section of one end of the shuttle, the wedge being removed to thereby show one of the inclined ribs or shoulders to (at the proper time) lift the key above the end of the wedge.

The shuttle-carrier herein shown will, it will be understood, be reciprocated across the loom and be projected into the open shed of the warp by devices such as shown in my United States Patent No. 116,435, or by any usual devices for reciprocating shuttle-carriers.

Each shuttle-carrier is shown as composed of an arm, H, the outer enlarged end, E, of which is provided with side lips, *a*, grooved, as designated at *b*, (see Fig. 6,) and by dotted lines in Figs. 2 and 4, to fit over and inclose the projecting flanges *f f* of the metallic back F of the shuttle, to thereby embrace and hold the said shuttle steadily, so that it cannot tip or wabble.

Each carrier at its enlarged end is cut away, as at *e*, leaving an opening for the passage of the catch part *d* of the spring-catch D, connected with the arm of the carrier at one side by screws *d'*, and at the opposite side of the carrier is the so-called key C, it being a piece of spring metal, connected to the arm at *c*, and provided with a ward or lug, *c'*, and having its forward end, 2, terminated at such a distance from the catch part *d* as will permit the key to operate the wedge B, and the latter the pivoted double latch A, at the proper time, and leave the end 2 of the key and the catch part *d* at just such proper distance apart as will insure that the catch parts engage the hooks x^2 of the latch A.

The metallic back part, F, of the shuttle, besides being grooved at its edges to be embraced and held by the portion E of the carrier, as described, is also grooved longitudinally along its central portion to form a deep central groove for the reception of the double wedge-bar B, provided with two wedges or tappets, *x x*, intermediate between its ends, and each side this groove for the wedge-bar are shouldered portions *h h*, substantially level with the top portions of the wedge-bar between the tappets *x* and the adjacent ends of the bars; but near the ends of the shuttle, as indicated in Figs. 1 and 7, these shouldered portions are beveled or sloped downward toward the extreme ends of the shuttle,

thereby forming inclines *i*, as indicated, by which to lift the free or forward ends 2 of the keys from a position directly in contact with the ends 4 of the wedge-bar (the positions the keys occupy when they are sliding the wedge-bars to rock the double latch A upon its pivot a^2) to a position above the ends 4 of the wedge-bar, as shown in Fig. 1, the wedge-bar in the said figure having been moved far enough to lift the left-hand end of the latch into a position to be engaged by the catch D.

The wedges X have their sloping faces toward each other, and their slope is such, and they are at such distance apart with relation to the length of the latch A, that as one end of the latch is being raised by the passage of one wedge under it the other end of the latch is permitted to descend into the space between the two edges, as shown in Fig. 1.

Fig. 1 shows the shuttle engaged and held by the catch of the left-hand carrier.

It will be supposed that the two carriers are approaching each other from opposite sides of the loom, and that the shuttle is at or near the center of the warp-shed.

As the carrier at the right of the shuttle meets the shuttle the latter is first grasped at its edges and back; then the end 2 of the key C strikes the end 4 of the wedge-bar, slides it in the direction of the arrow, Fig. 1, and leaves the tappet *x* at the left of the bar to pass from beneath the left-hand end of the latch A, and the tappet *x* at the right-hand end of the bar to pass under and lift the right-hand end of the said latch, so that the beveled end of its hook will be in position to act upon the beveled end of the spring-catch D, and lift it, so that as the catch part *d* passes the beveled hook of the latch A the spring-catch will descend and engage the hook securely.

The carriers being now separated, it will be found that the left-hand carrier, which brought the shuttle partly into the shed, has released the shuttle by the movement of the lock, and that the right-hand carrier has engaged the shuttle, and is operating to complete the passage of the shuttle through the warp-shed.

In a working loom the movement of the carriers and shuttle is very rapid, and, were it not for the ward or lug *c'* on the key, the wedge-bar might become accidentally moved and fail to operate the latch A at that exact period of time when the carrier-catch D is to engage the hook of the latch.

The sole and only function of the ward or lug *c'* is to project slightly below the level of the top of the extreme end of the wedge-bar B after the end 2 of the key has been lifted above and from contact with the end 4 of the said wedge-bar, and act as a stop to prevent the wedge-bar being moved accidentally for such distance as would disarrange the proper operation of the lock with relation to the catches.

The ward or lug *c'* does not strike or act to move the wedge-bar in the shuttle, but only to check its back movement when the end 2 of the key is lifted from the end of the bar B. During the time that the end of the key is lifted above the bar B and rests upon the shoulders *h* the wedge-shaped faces of the hook and catch pass each other.

Having described my invention, I claim—

1. The combination, with the shuttle-body, of an attached double latch and a movable wedge-bar, substantially such as described, to operate the latch, as and for the purpose set forth.

2. The shuttle-body grooved at its back and provided with shoulders and inclines, as described, and the sliding double wedge-bar adapted to slide in the said groove between the said shoulders, and a pivoted latch, combined with carriers, their catches, and keys to operate upon and move the wedge-bar for the proper distance, substantially as described.

3. The shuttle having the flanged back, and the pivoted latch having bevel-faced hooks, and a shuttle-carrying arm grooved to embrace the flanged shuttle-back, and a bevel-faced spring-catch, combined with means to hold the latch stationary while the beveled face of a catch passes the beveled face of the hook of the latch, substantially as described.

4. The shuttle, flanged at its back, and its double-ended pivoted latch and the sliding double wedge-bar to operate it, combined with the shuttle-carrier, grooved and adapted to embrace the flanged back of the shuttle, the spring-catch to operate upon the latch, and the yielding key to move the wedge-bar the proper distance, substantially as described.

5. The shuttle-body, grooved at its back and provided with shoulders and inclines, as described, and the sliding double wedge-bar adapted to slide in the said groove next the said shoulders, combined with the shuttle-carrier, and its key provided with a ward or lug to check the accidental backward movement of the wedge-bar after having been moved forward by the key, and after the key has been lifted from the end of the wedge-bar, substantially as and for the purpose described.

EDMUND H. GRAHAM.

Witnesses:
JOSEPH F. SIMONDS,
HENRY JACKSON.