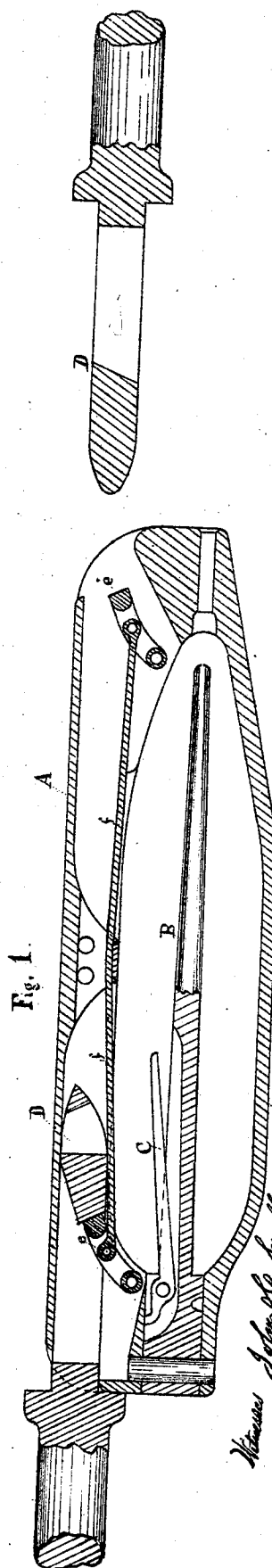


L. H. Graham's Improved Shuttle.

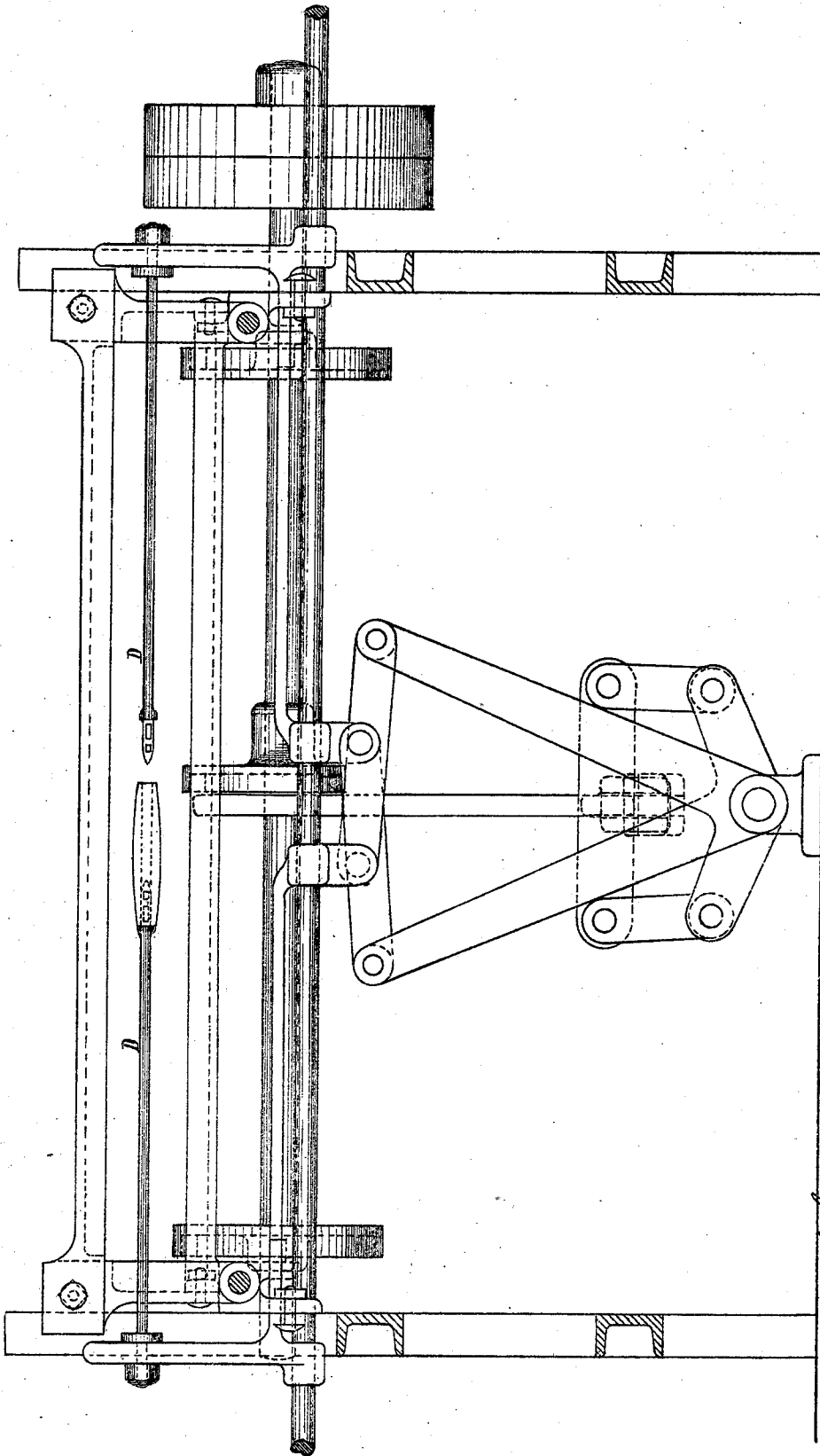
PATENTED JUN 27 1871

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Witnesses John H. Small, A.
Otho J. Harrison.

Colmuccio D. St. Graham
Inventor.



Edmund H. Graham

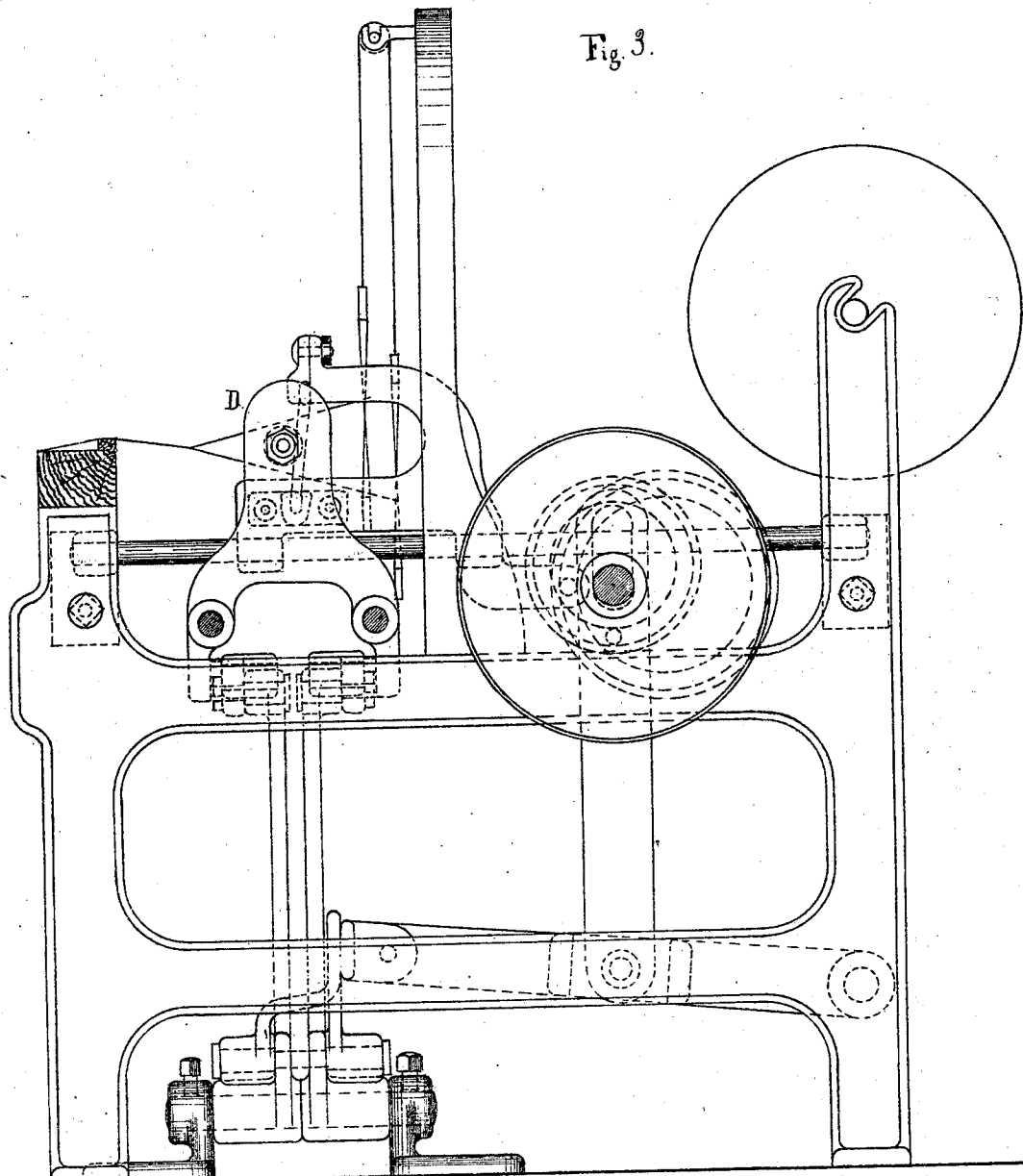
Fig. 2.

John H. Small,
Alfred J. Marston.

Sheet 3.

E. H. Grahams Improved Shuttle.

Fig. 3.



Witness John W. Small
Alfred S. Warston

Edmund H. Graham
Inventor

UNITED STATES PATENT OFFICE.

EDMUND H. GRAHAM, OF BIDDEFORD, MAINE, ASSIGNOR TO HIMSELF AND
REUBEN W. RANDALL, OF SAME PLACE.

IMPROVEMENT IN LOOM-SHUTTLES.

Specification forming part of Letters Patent No. 116,435, dated June 27, 1871.

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 a new and useful Improvement in Shuttles for Weaving Cloth, of which the following is a specification:

My invention relates to that kind of a shuttle which is carried through the warp from side to side by being transferred from an arm operating horizontally from one side of the loom to another arm similarly constructed and working in the same manner from the other side of the loom. The ends of the arm working in a straight line horizontally, as above mentioned, simultaneously approach and recede from each other, and every time this motion is executed the shuttle bearing the woof is transferred from one arm to the other and carried through the warp. By the use of a shuttle constructed in such a manner as to be carried through the warp upon arms working horizontally, as above mentioned, weaving can be done at a high or low rate of speed, and the shuttle is accurately driven back and forth through the warp without danger of miscarriage.

Figure 1 of the drawing herewith represents a side elevation of the shuttle, showing the lock in the inside of the frame and the ends of the entering arms. Fig. 2 represents a side elevation of the loom, showing the manner in which the shuttle is operated. Fig. 3 represents an end of the loom, showing the position of the arm.

The following is a sufficient description of my improved shuttle to enable one skilled in the art to construct the same, reference being had to the drawing herewith, viz.:

The shuttle consists of an oblong metal frame of sufficient length to contain the cop of woof inside. The spindle on which the cop is placed extends longitudinally in the center of the inside, and may be sprung out from its position to such a distance as may be required to place the cop upon it. The shuttle is threaded through an eye in one end of the same, directly in front of the end of the spindle. There is inserted in the under side of the frame a flat spring, tapering each way from the middle. The center of this spring rests upon a narrow projection of the frame,

which raises it from the frame sufficiently to allow it to operate. Across the upper side of this spring, and detached therefrom, a narrow bridge, corresponding to the projection last mentioned, extends, which serves as a fulcrum for the spring when it is operated, and also keeps it in place. This spring is attached, at both ends alike, to what I denominate pawls, and in the operation of the invention this spring, attached only at the ends, is moved back and forth under the fulcrum, forming, alternately, a long and short lever on each side of the fulcrum. The pawls give and take the shuttle upon the entering arms which carry the shuttle through the warp. They are oblong and slightly curved in form, consisting of a short piece of steel doubled so as to give equal sides parallel to each other and leave a narrow space between. At the end of the space nearest the bend the end of the flat spring above mentioned is attached by a round pin passing through it, upon which the spring moves. The other end of the pawl is also attached to the frame of the shuttle by a round pin, which allows the pawl to work upon it. There is an opening in each end of the shuttle to admit the arms, by means of which the shuttle is operated. The two arms are constructed alike, with beveled ends, and having a groove or slit the width of the pawl extending lengthwise near the end.

The shuttle operates thus: Being placed upon one shuttle-arm on the outside of the warp it is held firmly in place by the pawl entering the groove of the arm, and the ends of the arms are made to approach each other from opposite sides. When the shuttle approaches the middle of the warp the arm which is to take it enters the opening in the other end of the shuttle, pushing against the pawl, which, operating by means of the flat spring upon the other pawl, unlocks the other arms at the same time it locks the shuttle upon the arm which has last entered, thus, alternately and automatically locking and unlocking the shuttle upon the arms, and carrying it through the warp from side to side as the arms approach and recede from each other, always holding it firmly and securely.

In the drawing, A represents the shuttle-frame;

B, the spindle; C, the spur attached to the base of the spindle; *f f*, the flat spring of the lock; *e e*, the pawls; D D, the arms which drive the shuttle.

I claim as my invention—

1. In combination with the automatic locking and unlocking device, the shuttle-arms D D, constructed and operating as described, and for the purposes set forth.

2. A shuttle, having an automatic lock, constructed in the manner substantially as and for the purpose hereinbefore set forth.

EDMUND H. GRAHAM.

Witnesses:

ALFRED T. MARSTON,
JOHN H. SMALL.