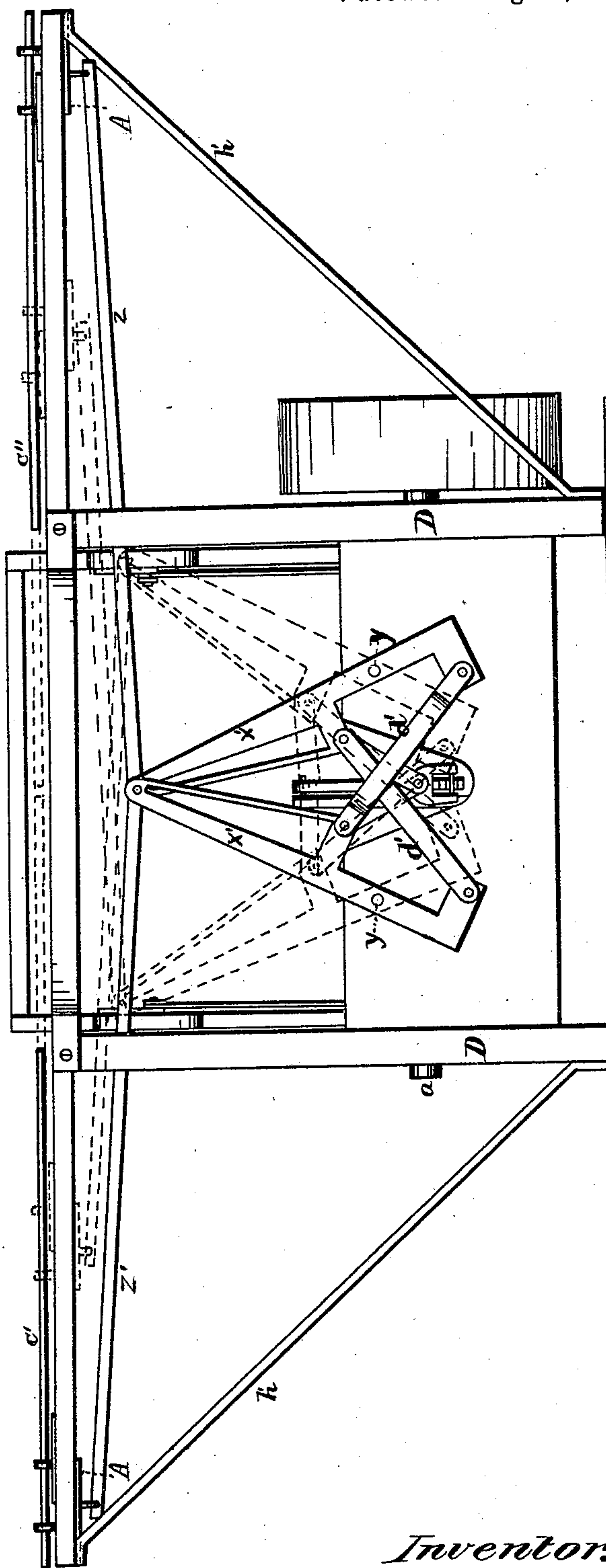


M. HARRIMAN.
Looms.

Patented Aug. 4, 1874.

No. 153,711.

Fig. 1.



Witnesses.

Frank H. Jordan.

Clifford Cummings

Inventor.

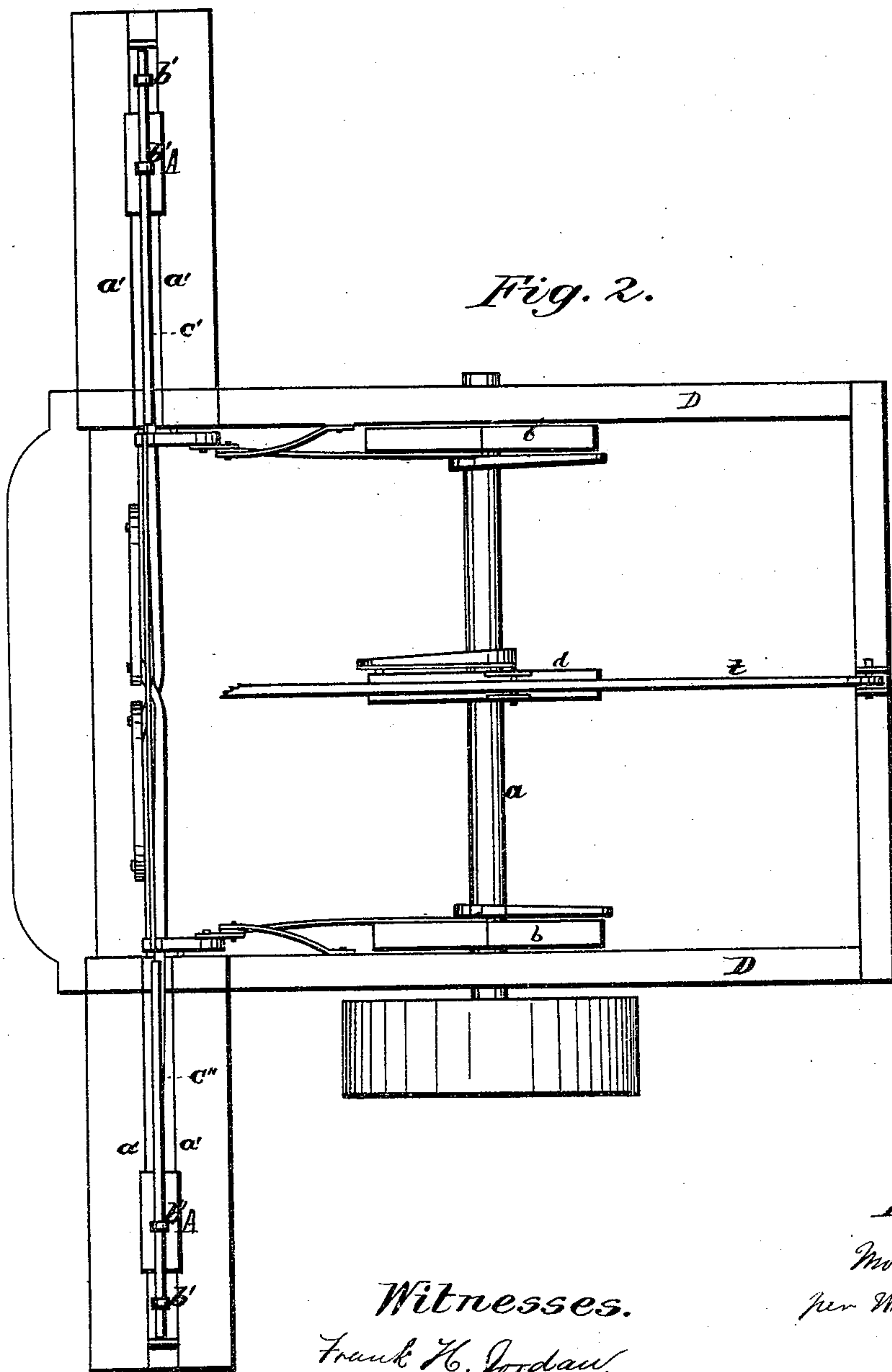
Moses Harriman.

per Wm Henry Clifford.
att'y.

M. HARRIMAN.
Looms.

No. 153,711.

Patented Aug. 4, 1874.



Witnesses.
Frank H. Jordan.
A. Clifford Cummings

Inventor.
Moses Harriman
per Wm. Henry Clifford
att'y.

M. HARRIMAN.
Looms.

No. 153,711.

Patented Aug. 4, 1874.

Fig. 3.

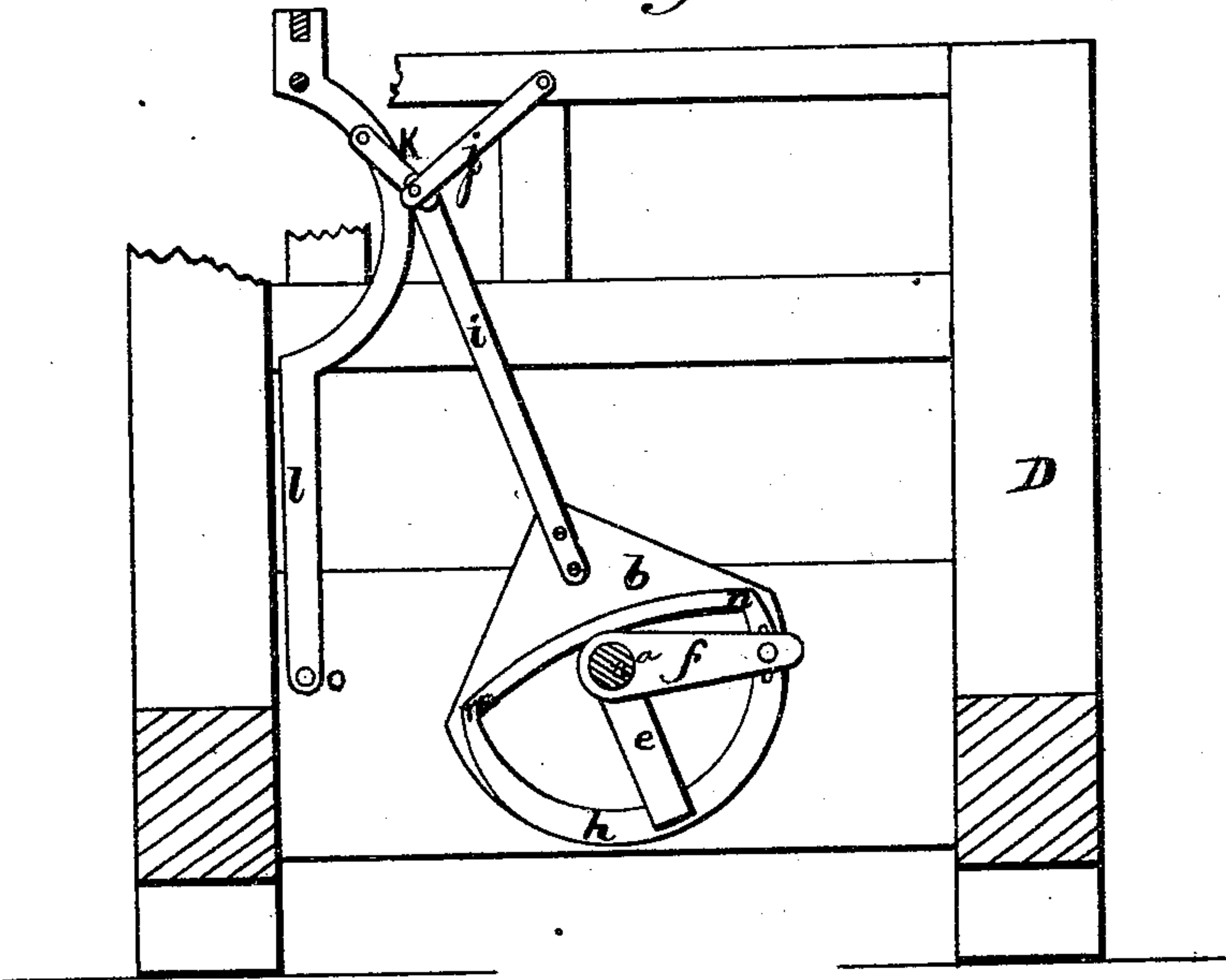
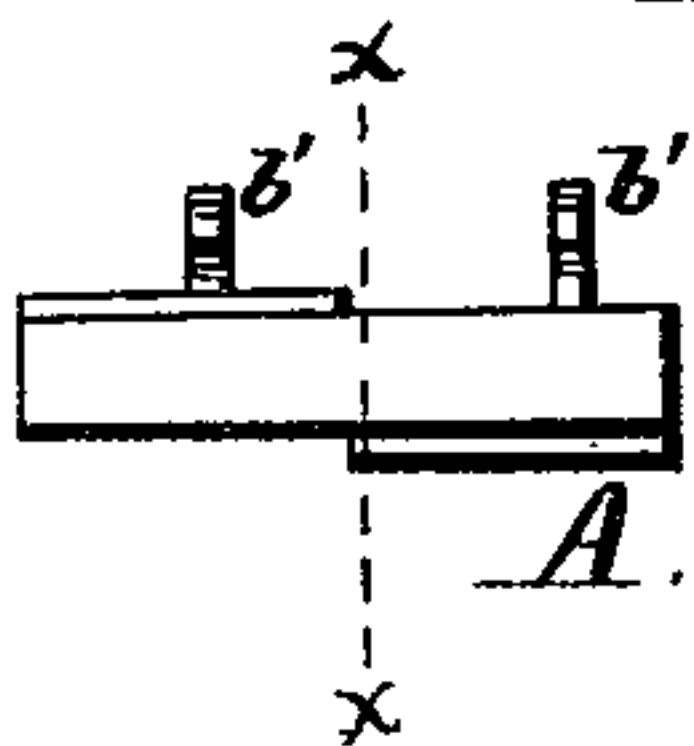
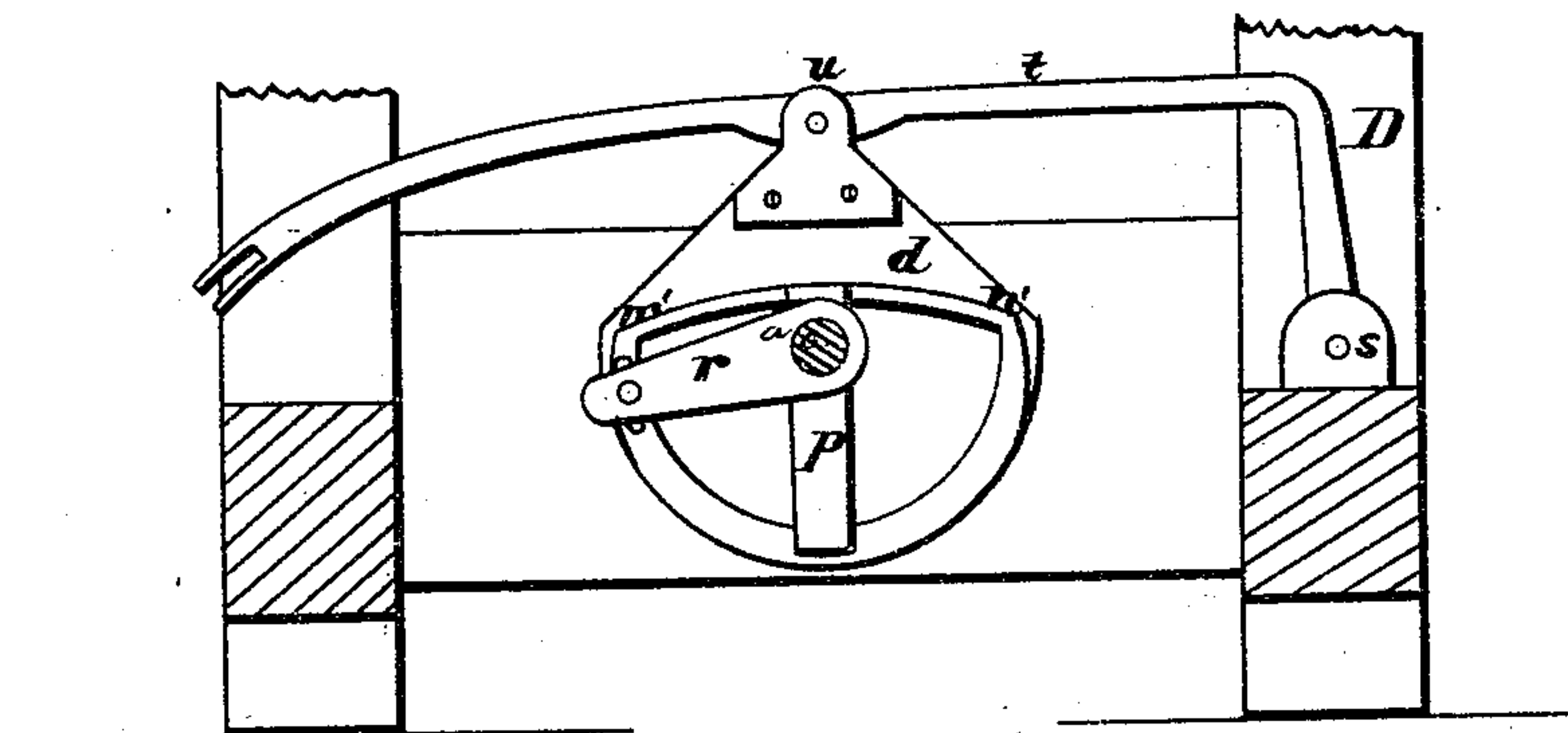


Fig. 4.



Witnesses.

Frank H. Jordan.
W. Clifford Cunningham



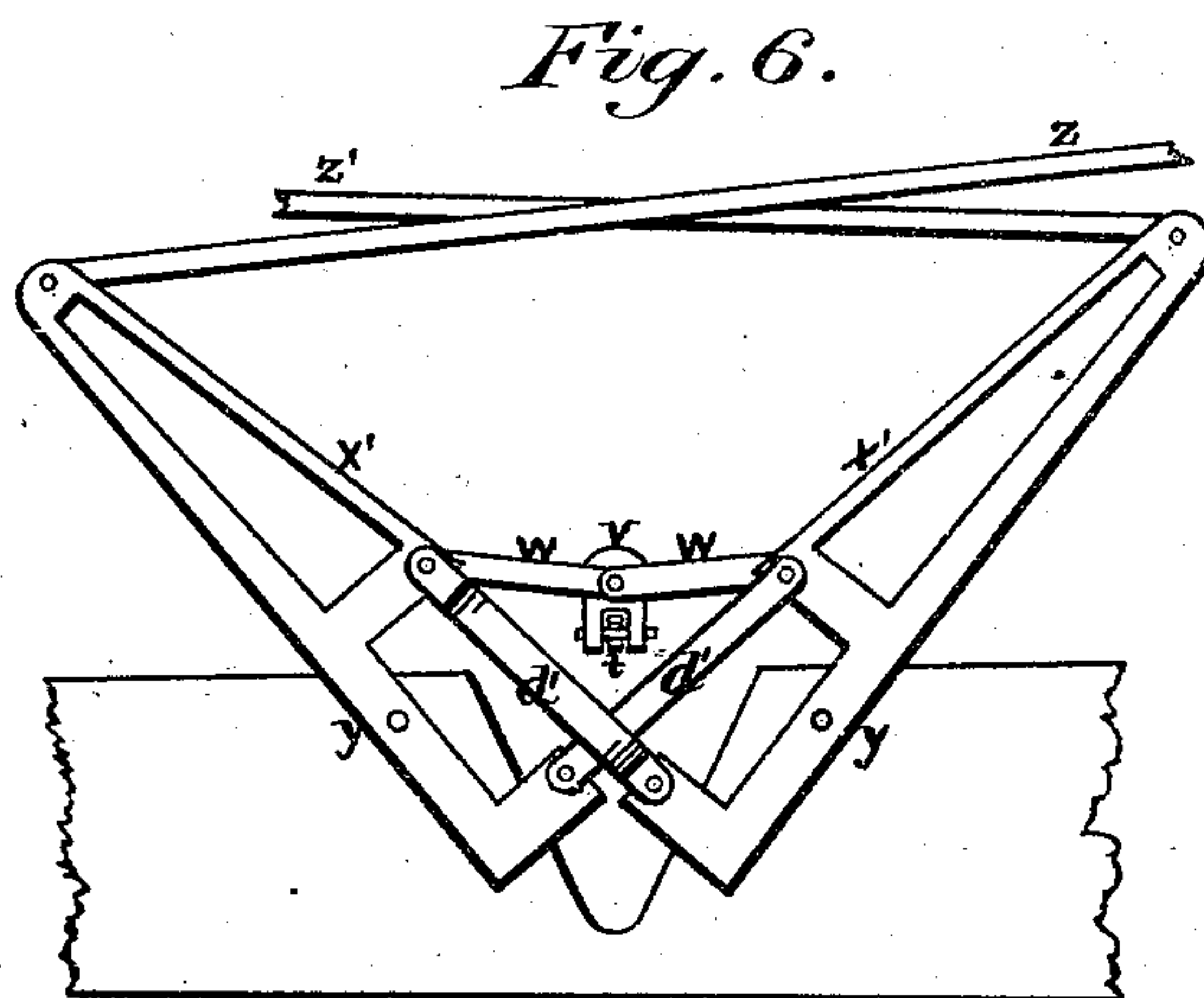
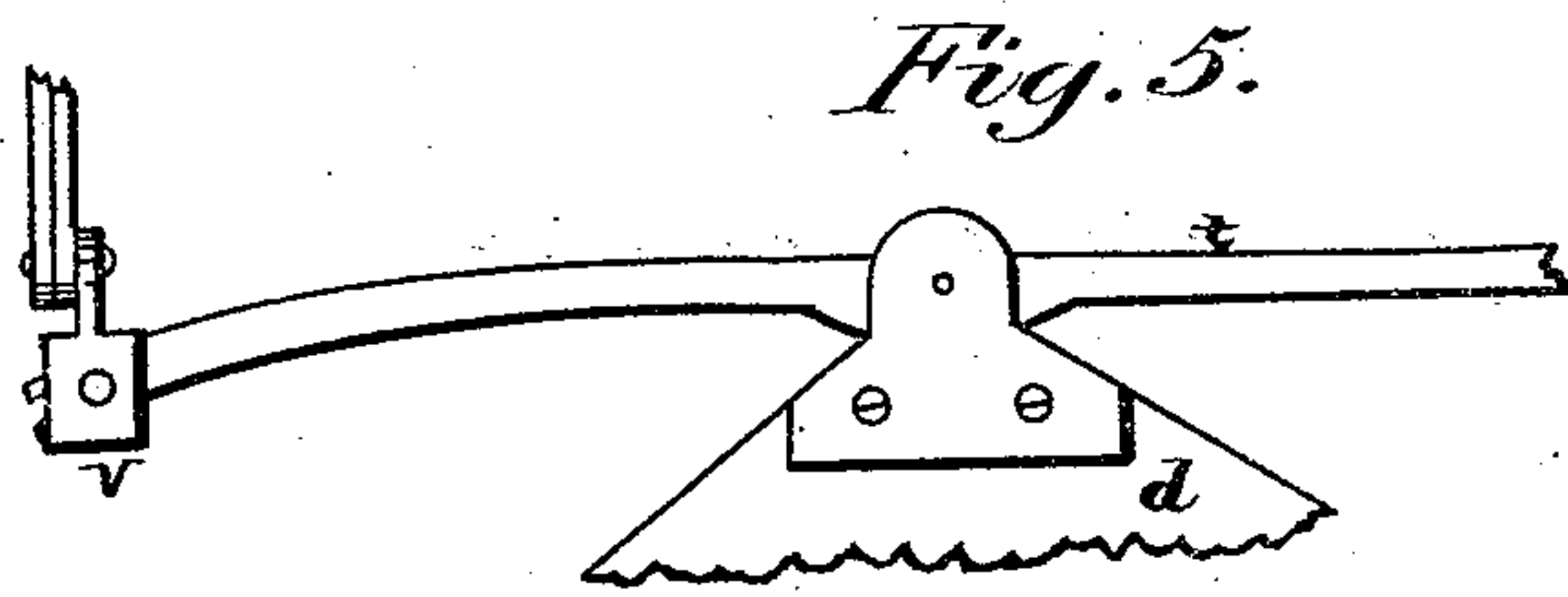
Inventor:

Moses Harriman
per Wm. Henry Clifford
Att'y.

M. HARRIMAN.
Looms.

No. 153,711.

Patented Aug. 4, 1874.



Witnesses.
Frank H. Jordan.
Ch. Clifford Cunningham

Inventor.
Moses Harriman
per Wm. Henry Clifford
Atty.

UNITED STATES PATENT OFFICE.

MOSES HARRIMAN, OF BIDDEFORD, MAINE, ASSIGNOR OF PART OF HIS
RIGHT TO EDMUND H. GRAHAM, GEO. W. HARRIMAN, WILBUR F. LUNT,
AND REUBEN W. RANDALL, OF SAME PLACE.

IMPROVEMENT IN LOOMS.

Specification forming part of Letters Patent No. **153,711**, dated August 4, 1874: application filed
February 2, 1874.

To all whom it may concern:

Be it known that I, MOSES HARRIMAN, of Biddeford, in the county of York and State of Maine, have invented certain new and useful Improvements in Loom Machinery; and I do hereby declare that the following is a full, clear, and exact description thereof, that will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Figure 1 is a front-end elevation. Fig. 2 is a top plan. Fig. 3 is a detail, showing the mechanism by which the motions of the lay are produced. Fig. 4 is a detail, showing the mechanism by which the motions of the shuttle are produced. A shows a side elevation of the slides from which motion is imparted to the shuttle. B is an inside view of the arm which works in the cams, illustrated in Figs. 3 and 4. C is a sectional view taken on the line *xx* of A. Fig. 5 is a side view of the attachment and connection of the lever which operates the toggle-arms. Fig. 6 is a side elevation of the arms and levers which communicate the motion of the lever in Fig. 5 to the slides which impart motion to the shuttle.

Same letters show like parts.

My invention relates to looms in which the shuttle and the lay are moved positively in both directions; and its object is to impart such motion to the lay that it shall not beat up with sudden or violent blows, and shall give a uniform pressure; also, to prevent the violent throw of the shuttle, and to pass the same by an equable motion. My invention consists in the combination, with a main shaft, of certain cams, arms, and levers to produce the above-named movement of the lay; and the combination, with a main shaft, of a cam, lever, arms, rods, and slides to impart the above-described motion to the shuttle.

a shows the main shaft of the machine, upon which are set three cams, *b b d*, two like the one shown in Fig. 3, and one placed centrally. (Shown in Fig. 4.) The office of the cams *b* is to impart to the reed or lay the motion here-

tofore described. The cam *b* rests loosely upon the shaft *a*, and does not revolve with it, the slot *e* receiving the shaft *a*, and thus allowing the cam to rest thereon. Rigidly attached to the shaft *a* is the crank-arm *f*, rotating with said shaft, and provided either with a stud or a pivoted dog, as shown at B, to work in the path *h* of the cam. Extending from and rigidly attached to the cam *b* is the rod or arm *i*, which is connected with the two short pivoted rods *j k*. (See Fig. 3) The rod *k* is pivoted to the lay-sword *l*, pivoted at *o*. The rotation of the shaft *a* carries the projection of the arm *f* through the path of the cam *b*. The beat and backward movement of the lay are effected while the stud of the arm *f* passes from *m* to *n*, and by means of the slight curvature of this cam-path and the toggle-arms the requisite pressure upon the weft-thread is obtained. It will be observed that, from the nature of the motion thus produced, the beat of the lay is neither sudden nor violent, and is uniform, whatever may be the velocity with which the machine may be operating. At the opposite side of the loom another system of devices is arranged similar to those shown in Fig. 3, the two operating simultaneously to produce the described motion.

Before describing the devices by which the shuttle is operated it is necessary to specify that my machine is intended to be used with a shuttle which is passed to and fro while supported by rods. The shuttle carries a spring-catch, which receives at its opposite ends alternately one of two reciprocating rods, releasing itself from one as it is connected with the other, and vice versa. Such a shuttle is now the subject of Letters Patent of the United States.

Upon the main shaft *a* is set the cam *d* in the same manner as was specified concerning the cam *b*—that is to say, the said shaft *a* passing through the said cam in a slot, *p*, similar to the slot *e* in the cam *b*. The arm *r* is similar in structure to the arm *f* before described. The effect of the arm *r* upon the cam *d* is also exactly the same as the effect of the arm *f* upon the cam *b*. When the arm *r* is passing

from m' to n' of the cam-path the cam is raised to the extent of the length of the arm r , the slot p permitting of such motion. Pivoted to the frame D at s is the bent arm t , also pivoted or otherwise connected with the top of the cam d at u . The forward end of the lever t is bifurcated, and embraces a short bolt in a block, v , Fig. 5. This block is pivoted to the toggle $w w$, Fig. 6, which has the outer ends of its arms connected with the upright levers $x' x'$. These levers are pivoted to the frame of the machine at y , and move backward and forward in a vertical plane, as indicated by the dotted lines in Fig. 1 and shown in Fig. 6. They separate, as shown by the dotted lines, when the toggle w is straightened, and they come together when the toggle is bent. The toggle w is straightened when the forward end of the lever t is raised by the rising of the cam d , and the toggle w is bent when the lever t is drawn down by the cam d . Upon the upper ends of the levers $x' x'$ are pivoted the rods $z z'$, which are pivoted at their outer ends to the slides A. These slides are of the forms shown in the details A and C, and move on tracks $a' a'$, as shown in Fig. 2. The rings b' carry the rods $c^1 c^2$, which are intended to alternately penetrate the shuttle and pass it backward and forward, as heretofore described, which is accomplished as follows: When the arm t is made to rise by the movement of the cam d the toggle w is straightened, and the slides A are then made to approach each other, being drawn by the cross-rods $z z'$. The descending motion of the rod or lever t brings the levers $x' x'$ toward each other and throws the slides at their greatest distance apart. When these motions of the slides take place their rods $c^1 c^2$ alternately catch the shuttle, the end of one of the rods entering its end of the shuttle, and so operating the catch of the shuttle as to release its hold upon the other rod, and

so the shuttle is moved backward and forward through the warp, as desired.

The levers $x' x'$ are made of the form shown in Fig. 6 for the purpose of having them of sufficient firmness and rigidity; and the pivoted braces $d' d'$ are supplied, as illustrated, for the same purpose.

The tracks $a' a'$ may be rendered adjustable and removable by the use of slots and adjusting-pins, or any equivalent device for the purpose. The rings b' in the slides A may also be made adjustable, so as to carry their rods and the shuttle to a proper elevation.

The stud or projection which works in the paths of the cams, and which is designated by r' in the detail B, can be pivoted to diminish friction and prevent any sudden or jarring motion in the operation of the cams.

If desired, the braces h' may be made branching, so as to afford the best support for the tracks upon which the slides move.

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

1. In combination with the slides A, the rods $z z'$, reciprocating levers $x' x'$, toggle $w w$, and lever t , as set forth.

2. The combination of the pivoted levers $x' x'$, braces $d' d'$, toggle $w w$, block v , lever t , and cam d , constructed and operating as herein set forth.

3. The combination of cams b , constructed and operating as described, crank-arms f with rods i , toggles $k j$, and lay-sword l , as herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 26th day of January, 1874.

MOSES HARRIMAN.

Witnesses:

GEORGE P. GOODWIN,
WILBUR F. LUNT.