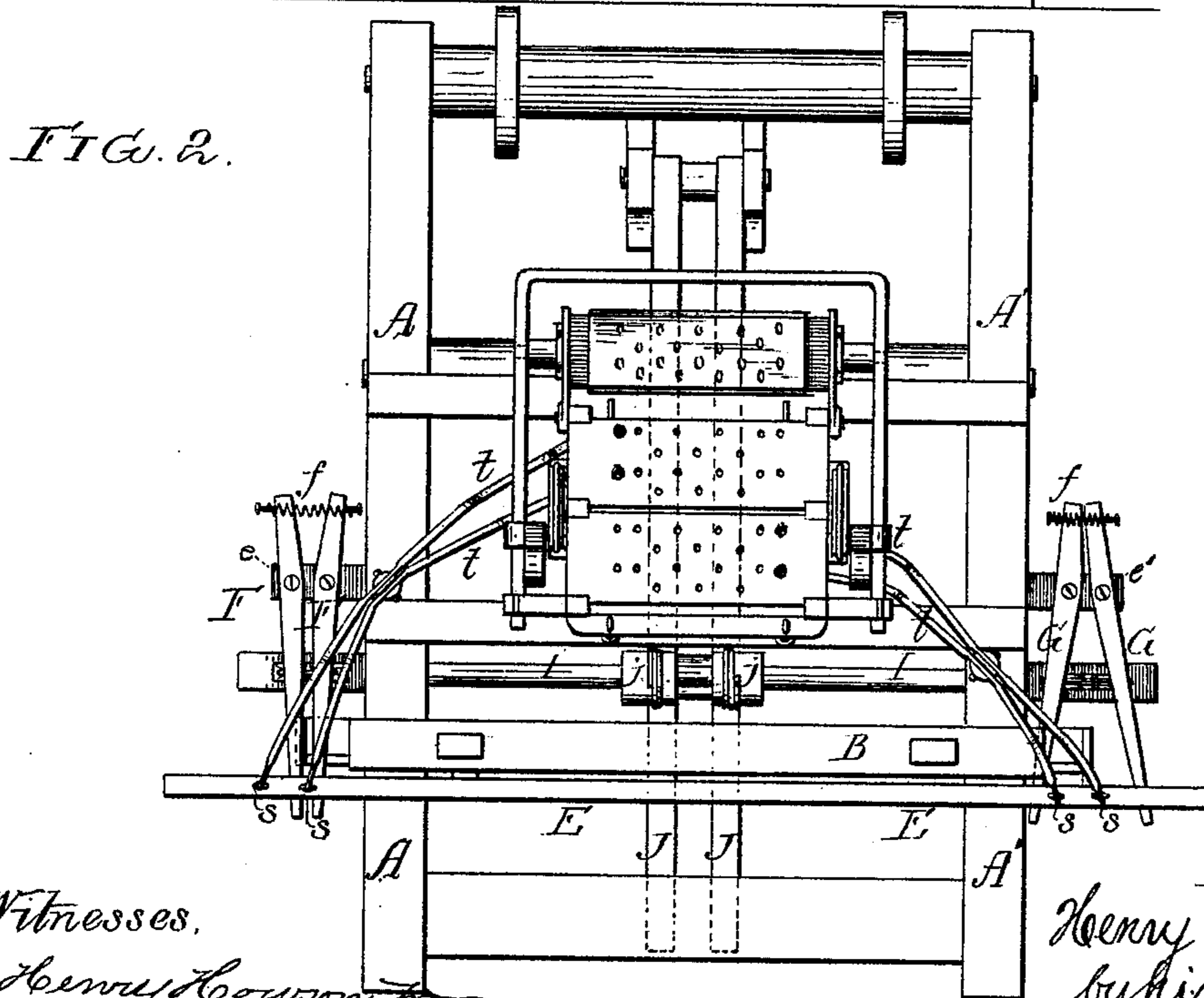
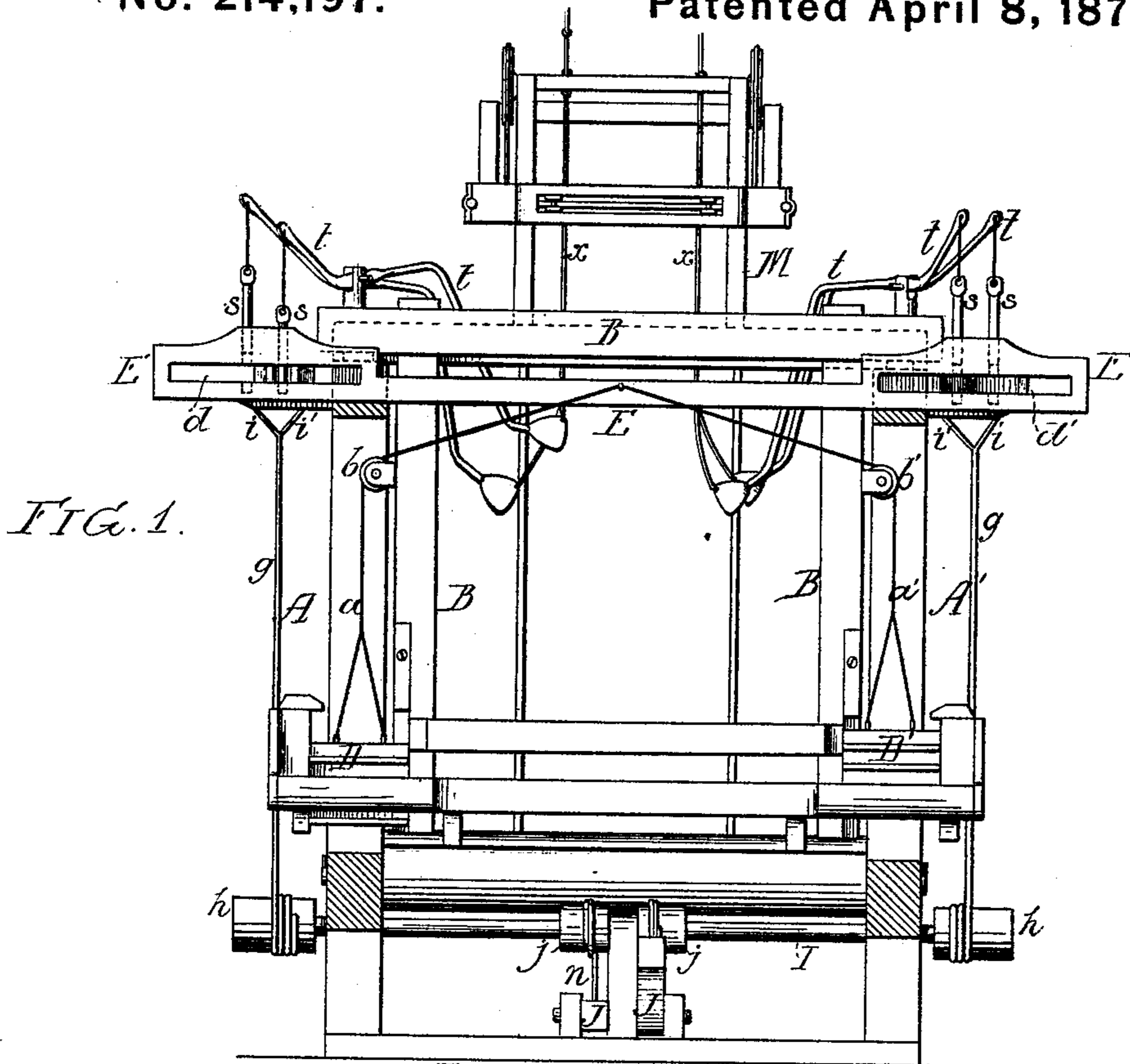


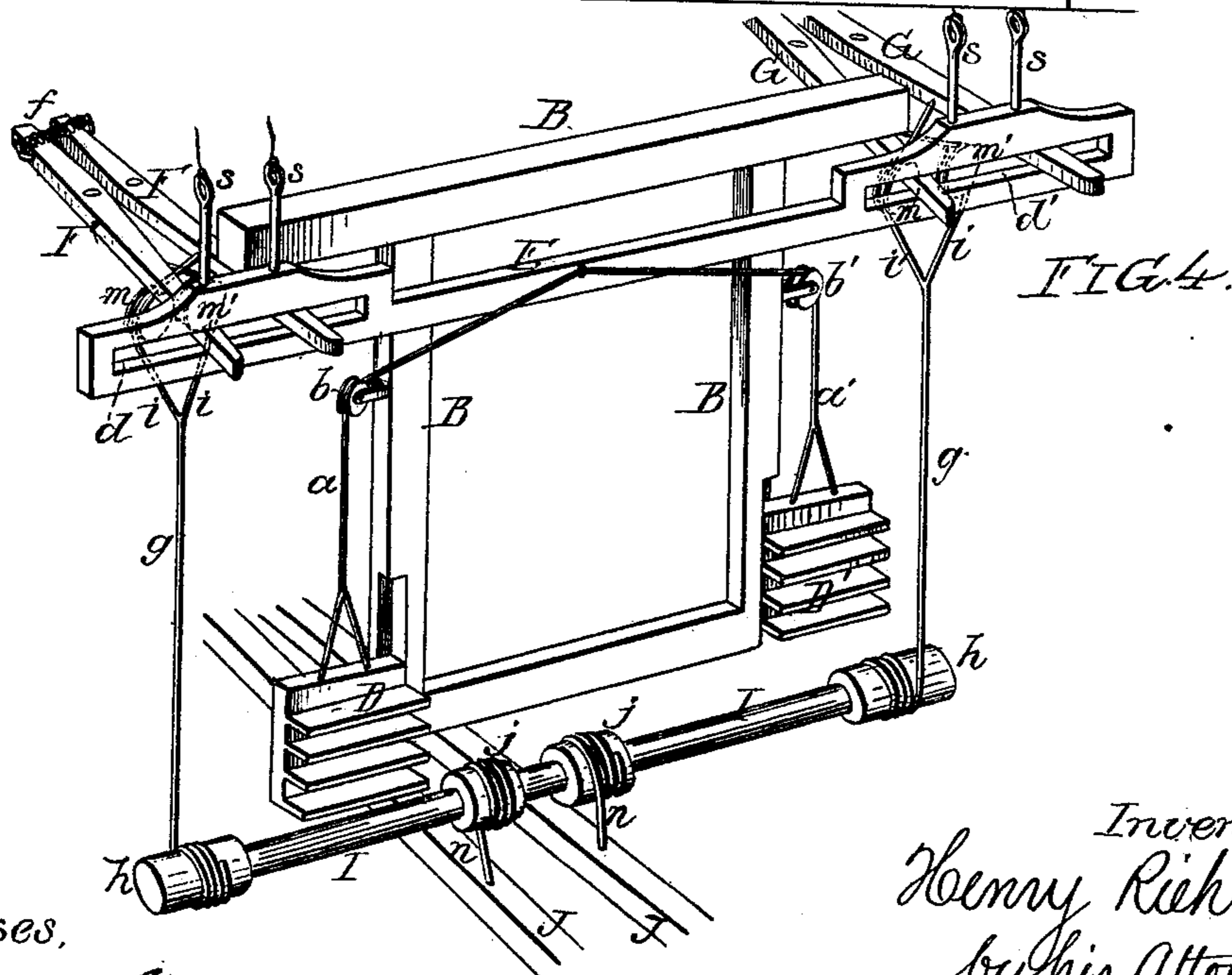
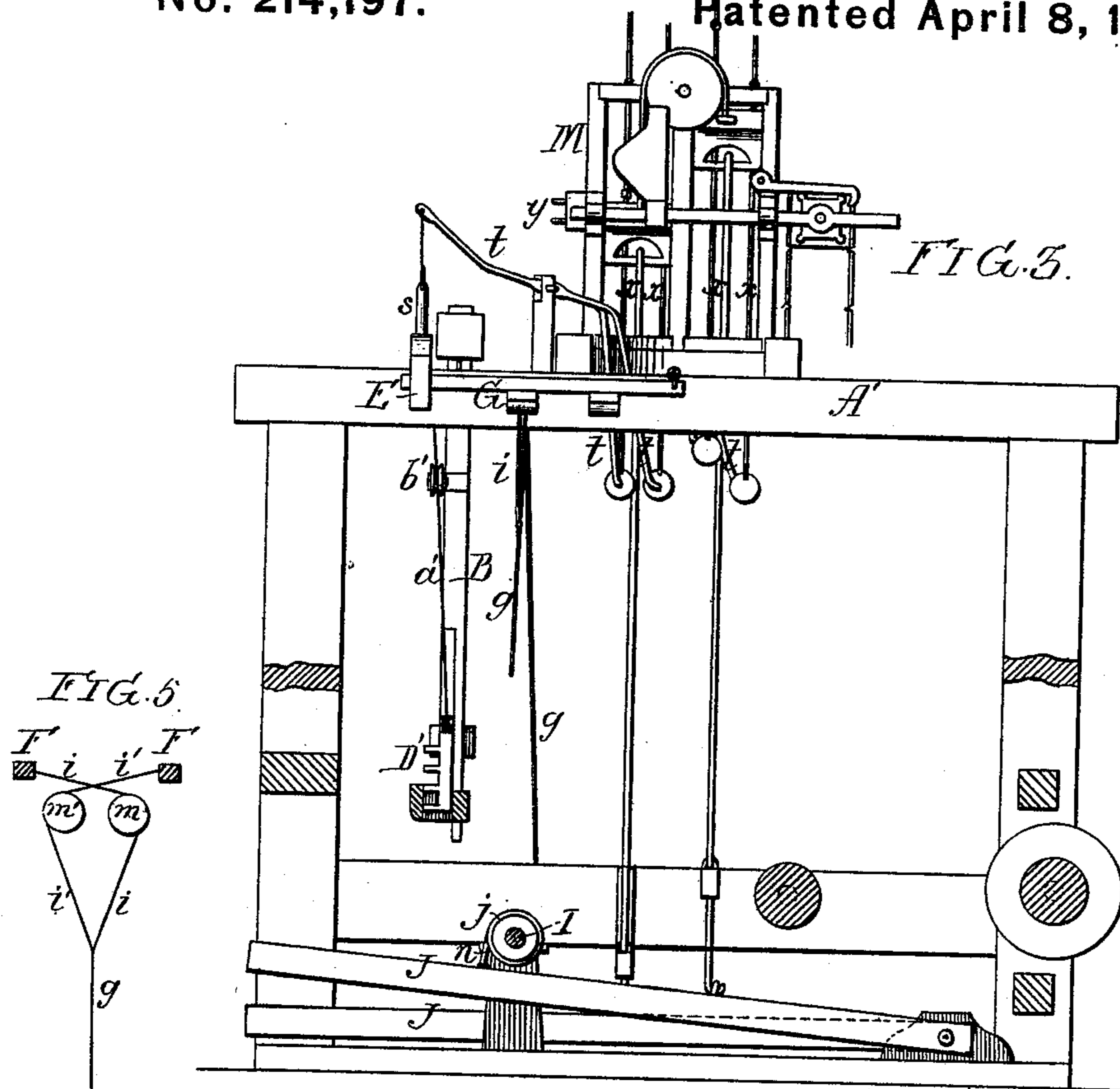
H. RIEHL  
Shuttle-Box Mechanism.  
No. 214,197. Patented April 8, 1879.



Witnesses,  
Henry Howson  
Harry Smith

Inventor,  
Henry Riehl  
by his Attorneys  
Howson and Son

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# UNITED STATES PATENT OFFICE.

HENRY RIEHL, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF HIS RIGHT TO WALTER C. CLARK, OF SAME PLACE.

## IMPROVEMENT IN SHUTTLE-BOX MECHANISMS.

Specification forming part of Letters Patent No. **214,197**, dated April 8, 1879; application filed October 9, 1878.

*To all whom it may concern:*

Be it known that I, HENRY RIEHL, of Philadelphia, Pennsylvania, have invented a new and useful Improvement in Shuttle-Box Mechanism for Looms, of which the following is a specification.

The main object of my invention is to provide a hand-loom with mechanism whereby the proper operation of the drop-boxes under control of the jacquard will be effected. This object I attain in the following manner, reference being had to the accompanying drawings, in which—

Figure 1, Sheet 1, is a front view, partly in section, of a hand-loom with my improvements; Fig. 2, a plan view of the same; Fig. 3, Sheet 2, a longitudinal section of the loom; Fig. 4, a diagram illustrating the essential features of the invention without the loom-frame; and Fig. 5, a diagram illustrating one of the features of the invention.

A A' represent the opposite side frames of the loom, to suitable bearings at the top of which are adapted the usual knife-edged projections on the swinging lay B, the operation of which is effected by hand, in the ordinary manner. To suitable guides at the opposite sides of the lay are adapted the frames carrying the drop-boxes D D', which are supported by a bar, E, through the medium of cords *a a'*, the latter passing over pulleys *b b'* on the frame of the lay, and being connected to the bar E at or near the center of the same. The top bar of each of the side frames, A A', of the loom is slotted for the reception and guidance of one end of the bar E, which is arranged immediately in front of the lay B, and is enlarged at each end, the enlarged portions projecting beyond the side frames, A A', and having formed in them slots *d d'*, to the former of which are adapted the ends of the long arms of a pair of levers, F, pivoted to a projecting stud, *e*, on one side frame, A, while the slot *d'* receives the ends of the long arms of a similar pair of levers, G, pivoted to a stud, *e'*, on the opposite side frame, A'.

By means of devices hereinafter described, the long arms of each pair of levers F G are caused to alternately approach and recede from each other, the arms of the pair of levers F

approaching each other when the arms of the pair of levers G recede from each other, and vice versa.

In each of the enlarged ends of the bar E, about midway of the slots *d d'*, are formed, in the present instance, two vertical openings, to which are adapted bolts *s*, hung to the short arms of levers *t*, the latter being pivoted to suitable posts on the top frame of the loom, and having weighted long arms, to which are connected cords *x* of a Jacquard machine, M.

When the weighted long arm of either of the levers *t* is lifted by the cord to which it is connected, the bolt *s*, carried by said lever, is allowed to fall, so that it extends across the slot *d* or *d'* in the bar E, and is thus brought into position to be struck by one of the long arms of one of the pairs of levers F G, and thereby transmit the movement of said arm to the bar E and to the boxes hung thereto.

The cords *x* are lifted by the usual lift bar or bars of the Jacquard machine, the operation of the cords being effected by the cards on the card-cylinder through the medium of the needles *y*, so as to cause the depression first of a bolt, *s*, at one end of the bar E, and then of a bolt at the opposite end of said bar, the depression occurring when the arms of the pair of levers which are to operate on the bolt are separated, so that the bolt will be struck when the arms approach each other.

It should be understood that the cords *x* and the needles *y*, for operating the same, are supplementary to the usual harness-cords and needles, and that extra sets of holes are punched in the cards to correspond with the extra needles *y*.

It has not been deemed necessary to describe the usual harness-cords, or the mechanism for operating the Jacquard apparatus by means of the treadles, as these parts are the same as those usually employed in looms of the class to which my invention relates, and are fully shown in the drawings.

It will be seen that the extent to which the bar E is moved in one direction or the other, and consequently the extent to which the drop-boxes D D' are raised or lowered, will depend upon which of the bolts *s* has been allowed to fall into the path of the long arms of the le-

vers F or G; and as this operation of the bolts *s* is governed by the Jacquard apparatus, it follows that the boxes will be automatically adjusted as the loom operates.

As the two sets of boxes balance each other, the movement of the bar E can be effected with comparatively little exertion.

The means which I prefer to adopt in order to effect the vibration of the levers F and G is shown most clearly in Figs. 4 and 5.

The short arms of each pair of levers are connected together by a spring, *f*, and to their long arms are connected the upper ends of cords *i i'*, which pass in opposite directions over pulleys *m m'*, hung to suitable bearings on the side frames, the pairs of cords *i i'* being then united to single cords *g*, the lower ends of which are wound around drums *h* at the opposite ends of a transverse shaft, *l*, near the bottom of the loom. This shaft *l* has other drums, *j*, around which are wound cords *n*, connected to treadles *J*, as shown in Fig. 4.

The cords *g* and *n* are so wound around the pulleys *h* and *j* that the depression of the right-hand treadle *J* will cause a downward pull upon the cord *g* at the right-hand side of the loom, and a consequent movement toward each other of the long arms of the pair of levers G, while the depression of the left-hand treadle *J* will cause a like operation of the cord *g* and levers F at the left-hand side of the loom.

Although I prefer to use the arrangement of pivoted levers and the devices for operating the same which I have shown and described, because I have found them in practice to be simple and effective, I do not confine myself strictly to this arrangement. For instance, a reciprocating bar or bars might be substituted for the pair of pivoted levers, and different

modes of reciprocating said bars or vibrating said levers might be adopted.

I claim as my invention—

1. The combination, in a loom, of the drop-boxes D D', arranged at opposite ends of the lay B, a guided bar, E, cords *a a'*, and pulleys *b b'*, for suspending the boxes from said bar E, a Jacquard apparatus, and devices, substantially as set forth, for reciprocating said bar E to an extent determined by the Jacquard apparatus, as specified.

2. The combination of the bar E, the drop-boxes D D', suspended therefrom, the bolts *s*, carried by the bar, the Jacquard apparatus, and connecting mechanism, the reciprocating or vibrating bars or levers F G, and devices for operating the latter, all substantially as set forth.

3. The combination of the bar E, the bolts *s*, and weighted levers *t*, and the Jacquard mechanism, as set forth.

4. The combination of a pair of levers having an elastic connection, *f*, the cords *i i'*, connected to the levers and passing in opposite directions over pulleys *m m'*, and devices, substantially as described, for operating said cords, as set forth.

5. The combination of the levers F G, having elastic connections *f*, the cords *i i'*, the pulleys *m m'*, the cords *g*, the shaft *l*, and its pulleys *h j*, the cords *n*, and the treadles *J*, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY RIEHL.

Witnesses:

HENRY HOWSON, Jr.,  
HARRY SMITH.