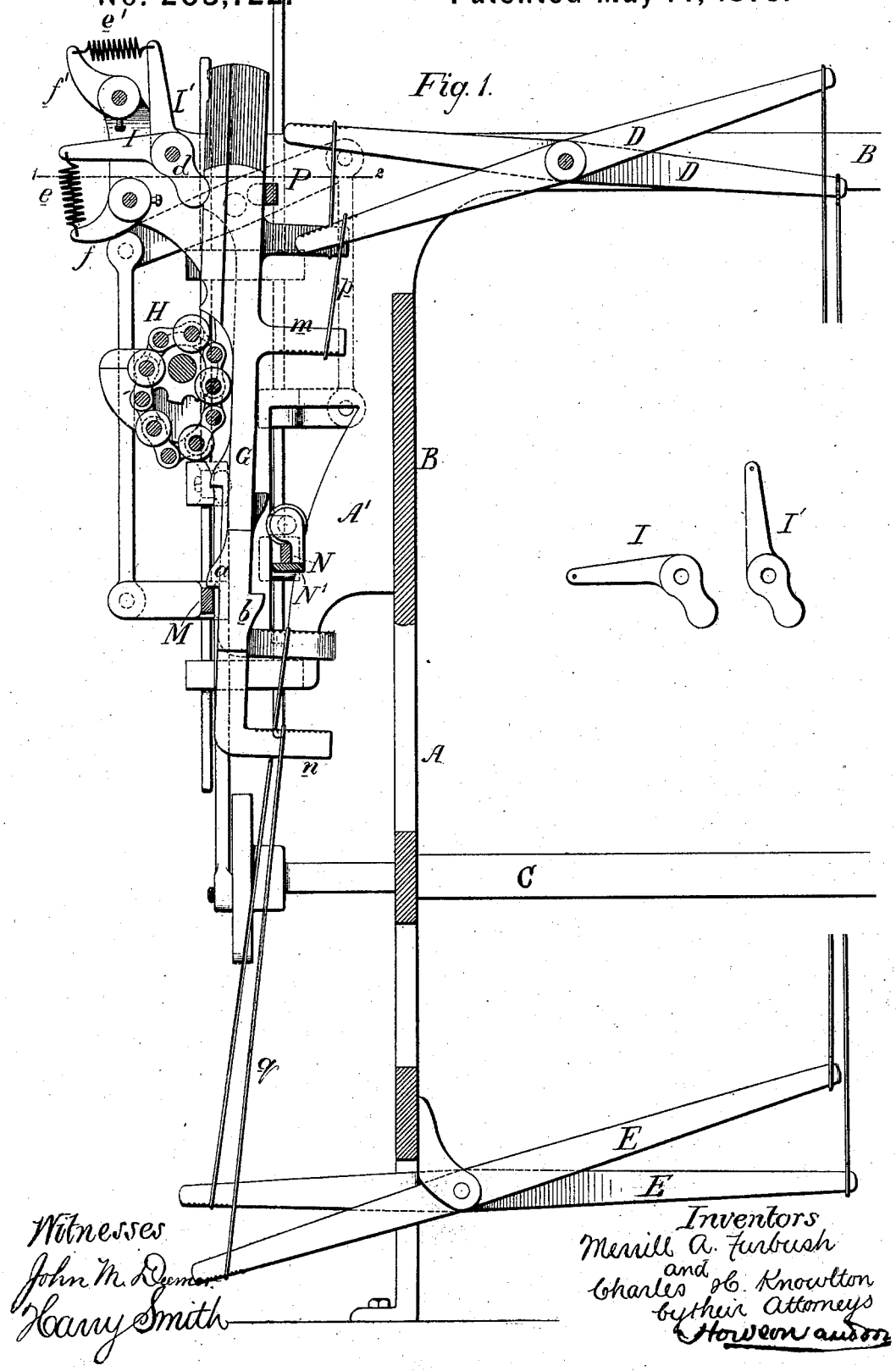
2 Sheets—Sheet 1.

M. A. FURBUSH & C. H. KNOWLTON.

Loom.

No. 203,722. Patented May 14, 1878.

Fig. 1.



Witnesses
John M. Dennis
Harry Smith

Inventors
Merrill A. Furbush
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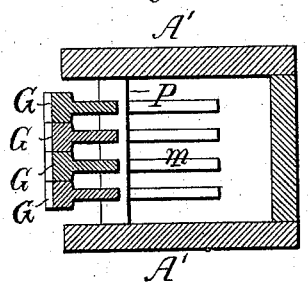
2 Sheets—Sheet 2.

M. A. FURBUSH & C. H. KNOWLTON.

Loom.

No. 203,722. **Patented May 14, 1878.**

Fig. 2.



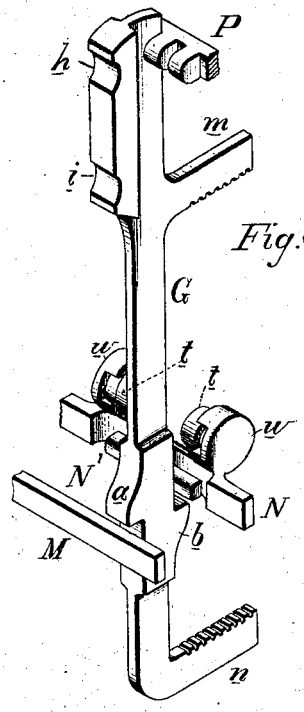


Fig. 3.

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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN LOOMS.

Specification forming part of Letters Patent No. **203,722**, dated May 14, 1878; application filed May 21, 1877.

To all whom it may concern:

Be it known that we, MERRILL A. FURBUSH, of Philadelphia, Pennsylvania, and CHARLES H. KNOWLTON, of Camden, New Jersey, have invented a new and useful Improvement in Looms, of which the following is a specification:

Our invention consists of certain improvements, fully described hereinafter, first, in vertical jacks for fancy-looms, and, second, in devices for retaining such jacks at the limit of their vertical movements.

In the accompanying drawing, Figure 1, Sheet 1, represents a vertical section of part of a loom-frame with our improved jack mechanism; Fig. 2, Sheet 2, a sectional plan on the line 1 2, Fig. 1; and Fig. 3, a perspective view of one of the jacks and operating mechanism.

A represents one of the end frames of the loom; A′ A′, projecting portions of the frame for the jack mechanism; B, the bridge for connecting the two frames together, and C the usual crank-shaft. G G G G are the "double-hooked jacks," as they are technically termed, each jack having two projections, *a* and *b*, one on each edge, as best observed in the perspective view, Fig. 4. M is the lifting-bar, and N the depressing-bar, for operating the jacks, these bars having the usual vertical reciprocating movement imparted to them from the crank-shaft C or other operating part of the loom through the medium of mechanism which it will be unnecessary to explain, as it constitutes no part of our present improvements, and as it may be altered or modified without interfering with the main features of our invention.

The depressing-bar N, by preference, does not act directly on the jacks, but through the medium of a movable plate, N′, in a manner and for a purpose explained hereinafter.

Each hook-jack has, near its upper end and at the rear edge, a notched projection, *m*, which is connected to one of the upper heddle-levers D by a wire or link, *p*, the lower end of each hook-jack having a notched projection, *n*, which is connected to one of the lower heddle-levers E by a link or wire, *q*, these connections being, as usual, so arranged that they shall have a tendency to maintain the lower end of the jack at the limit of its outward lateral movement, where its projection *a* shall be within range of the lifting-bar M, unless the chain H, which is provided with the ordinary rollers, and is operated in the usual manner, moves the jack inward to a position where the projection *b* of the jack is within range of the depressing-bar N.

This mode of controlling the position of the jacks partly by the chain H and partly by their connection with the harness is common to other looms of the class to which our invention relates; but the peculiar means of making the connection is a special feature of our invention, for a special purpose.

In looms having a large number of heddle-frames, while all the jacks have the same vertical reciprocating movement, it is important that the heddle farthest from the reed should have the greatest and that nearest the reed the least movement, the movements of the intermediate heddles being graduated accordingly.

The movement of each heddle-frame can be graduated by adjusting the link, cord, or wire *p* on the lever D, to which that heddle-frame is connected, the link, cord, or wire *q* being correspondingly adjusted on the lower heddle-lever; but the connections must always have a tendency to control the outward movement of the jacks, and for this purpose should always have an inclination substantially like that shown in the drawing; hence the importance of the notched projections *m* and *n* on the jacks, on which the connecting-cords can be arranged at the desired inclination when they are adjusted on the levers to graduate the movements of the heddle-frames.

Another important feature of our invention is the retention of the jacks in the elevated or depressed position to which they have been moved by the lifting and depressing bars until they are again moved by the same in obedience to the pattern-chain.

Each jack has at its front edge, and near the upper end, two recesses, *h* and *i*, one above the other, the recesses of the first jack G, Fig. 1, being adapted to the end of the short arm *d* of the lever I, the long arm of which is con-

nected by a spring, *e*, to an arm, *f*, which can be so adjusted as to regulate the power exerted by the said spring.

The recesses of the second jack are adapted to a roller carried by the short arm of a lever, I′, the long arm of which is connected by a spring, *e′*, to an adjusting-arm, *f′*.

The third jack is combined with a spring-lever similarly arranged to that which is combined with the first jack, and this alternating arrangement is continued throughout the series of jacks for no other purpose than to permit the use of springs of appropriate size.

It should be understood that there is a stationary bearing-bar, P, against which the rear edges of the jacks are forced by the spring-levers, the bar being notched, as shown in Fig. 4, to guide the jacks and maintain them in their proper relative positions.

At the termination of each movement of each jack the end of one of the spring-levers, or a roller carried by the same, takes its place in one of the recesses, and serves to retain the jack in the position to which it has been moved until it is again, owing to the pattern-chain, brought under the influence of the lifting or depressing bar, to which the jack will readily yield, as the hold of the spring-lever on the said jack is comparatively slight. By this retention of the jacks the warp-threads are never moved, excepting to produce the desired pattern, and the lathe is allowed to strike the weft-thread home on a cross-shed.

As before remarked, the depressing-bar N does not act directly on the projections *b* of the jacks, but through the medium of the plate N′, which has lugs *t t* hinged to lugs *w w* on the depressing-bar N, the tendency of this plate being to remain in the position shown in Fig. 1, where it is within range of the projections *b* of such of the jacks as have been moved inward by the chain; but the depressing-bar forms no part of our present invention.

During the operation of the loom it often becomes necessary—as, for instance, when one or more picks have been lost—to manipulate the chain and jacks for the purpose of obviating defects in the fabric caused by this loss.

Should one of the jacks, while in an elevated position, be moved inward by a roller of the pattern-chain, the projection *b* of that elevated jack would be above the depressing-bar, and if the latter should be of the ordinary construction, it would, during its upward movement, strike the projection *b* of the said elevated jack, and as the latter cannot move outward, owing to the bearing in one direction against the bar P and in the opposite direction against the roller of the chain, the breaking or bending of the jack or other damage must occur. The plate N′, however, will yield when, during the upward movement of the lifting-bar N, the said plate comes in contact with the projection *b* of the jack, the plate resuming its normal position when it has passed these projections.

We neither claim friction devices for retaining jacks in the position to which they have been moved, nor notches to aid in this retention; nor do we desire to claim forming notches on the operating-levers to vary the movement of the heddles; but

We claim as our invention—

1. The vertical jacks G, provided with projections *m n*, each having notches, in combination with the heddle-levers and connecting devices, as set forth.

2. The combination of the vertical jacks, provided with recesses *h* and *i*, and the bearing-bar P with the spring-levers I and I′, as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

MERRILL A. FURBUSH.
CHARLES H. KNOWLTON.

Witnesses:
HERMANN MOESSNER,
HARRY SMITH.