J. SHORT.

5 Sheets--Sheet 1.

Improvement in Looms.

No. 129,602.

Patented July 16, 1872.

Witnesses:

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Jno. D. Patten

Inventor:

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Fig: 1.

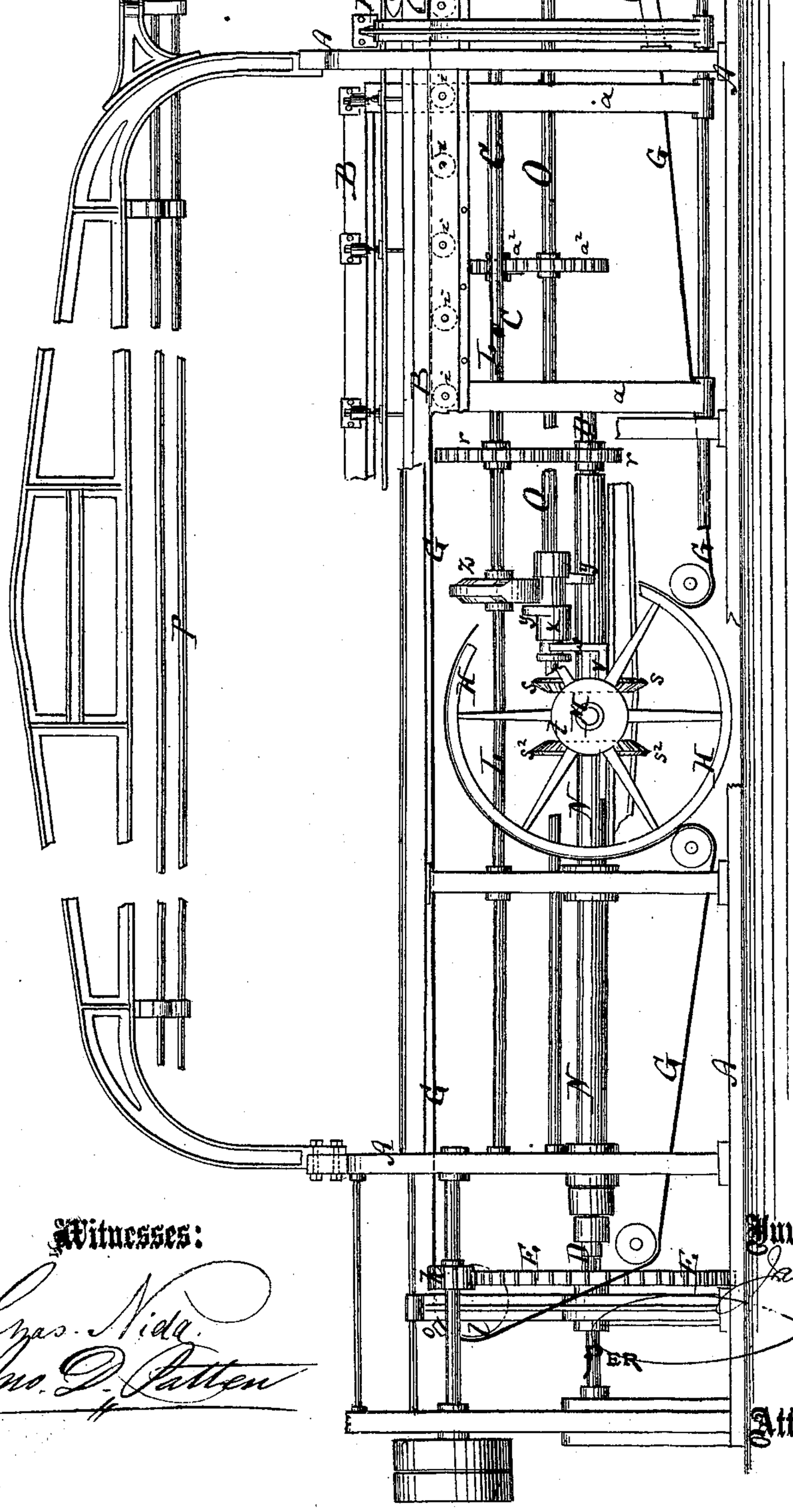
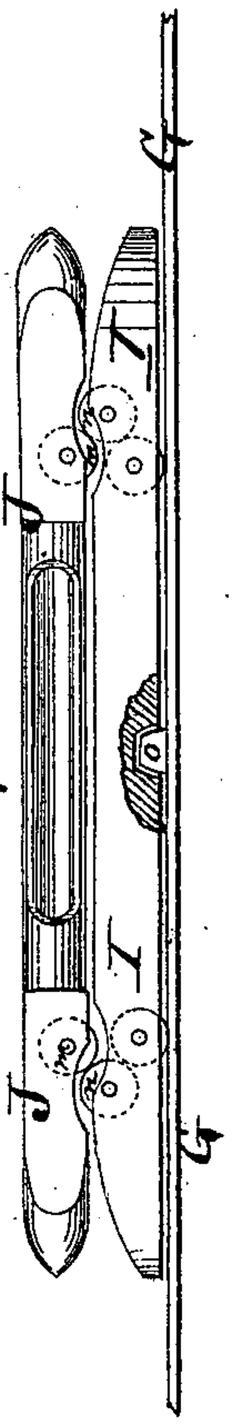


Fig: 2.



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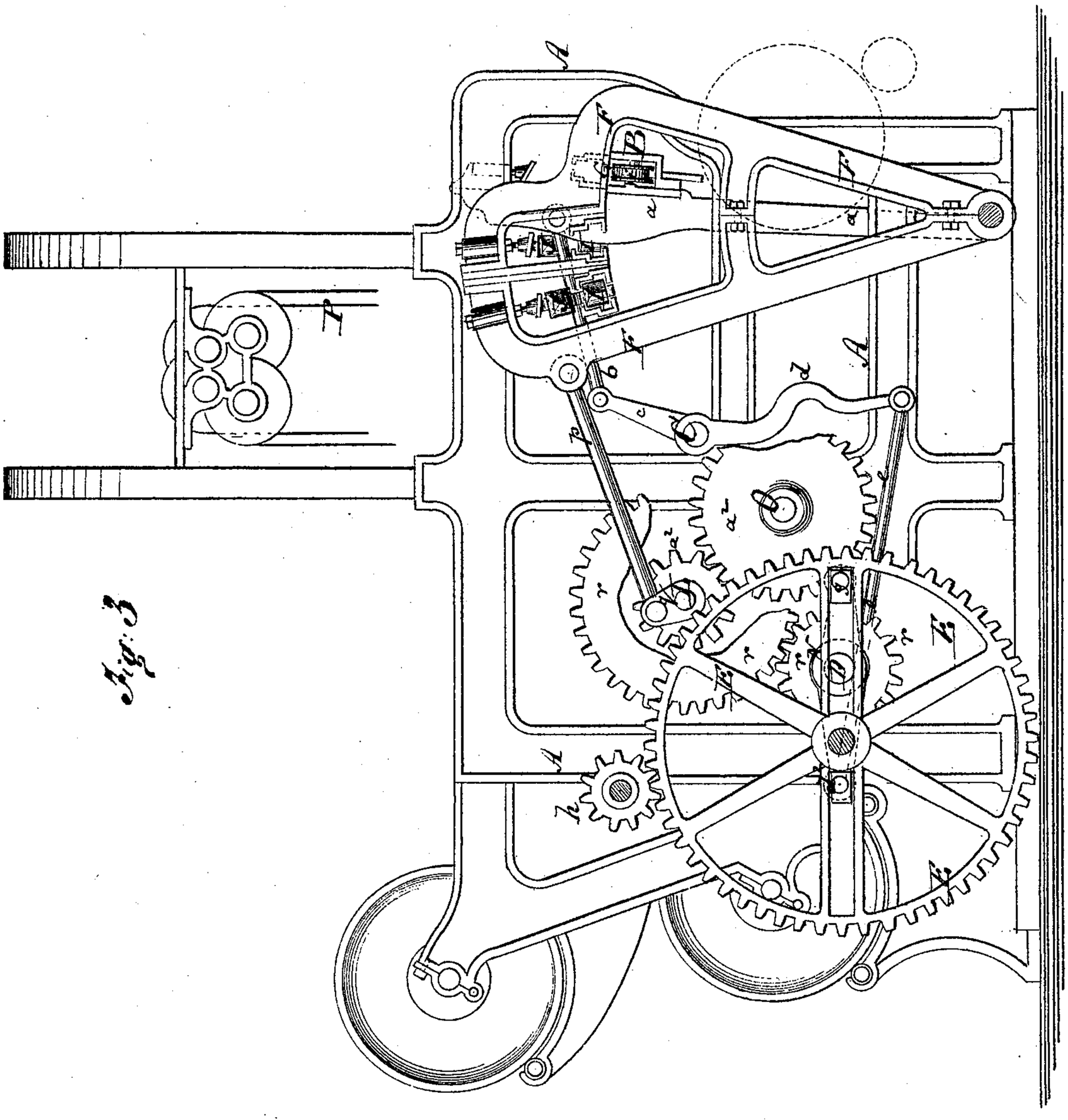

Fig. 3

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5 Sheets--Sheet 3.

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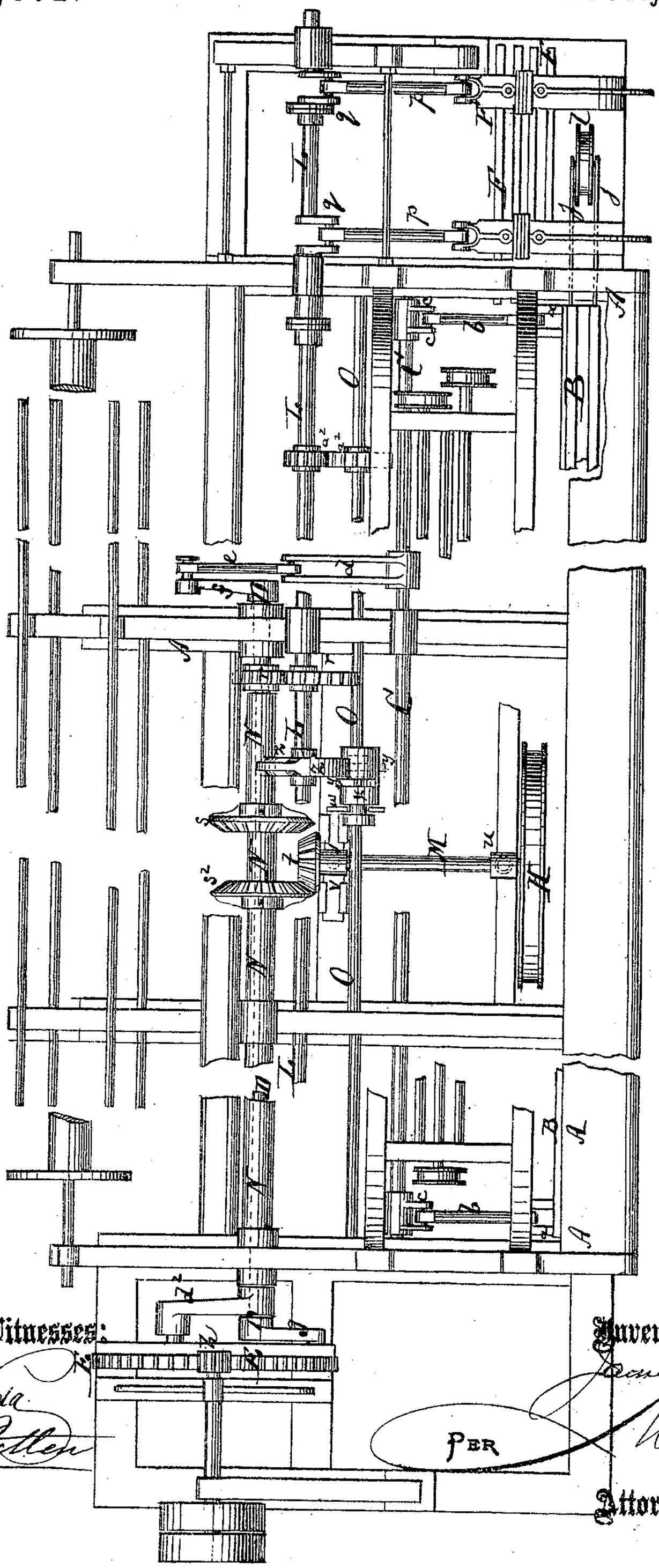

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J. SHORT. 5 Sheets--Sheet 4.

Improvement in Looms.

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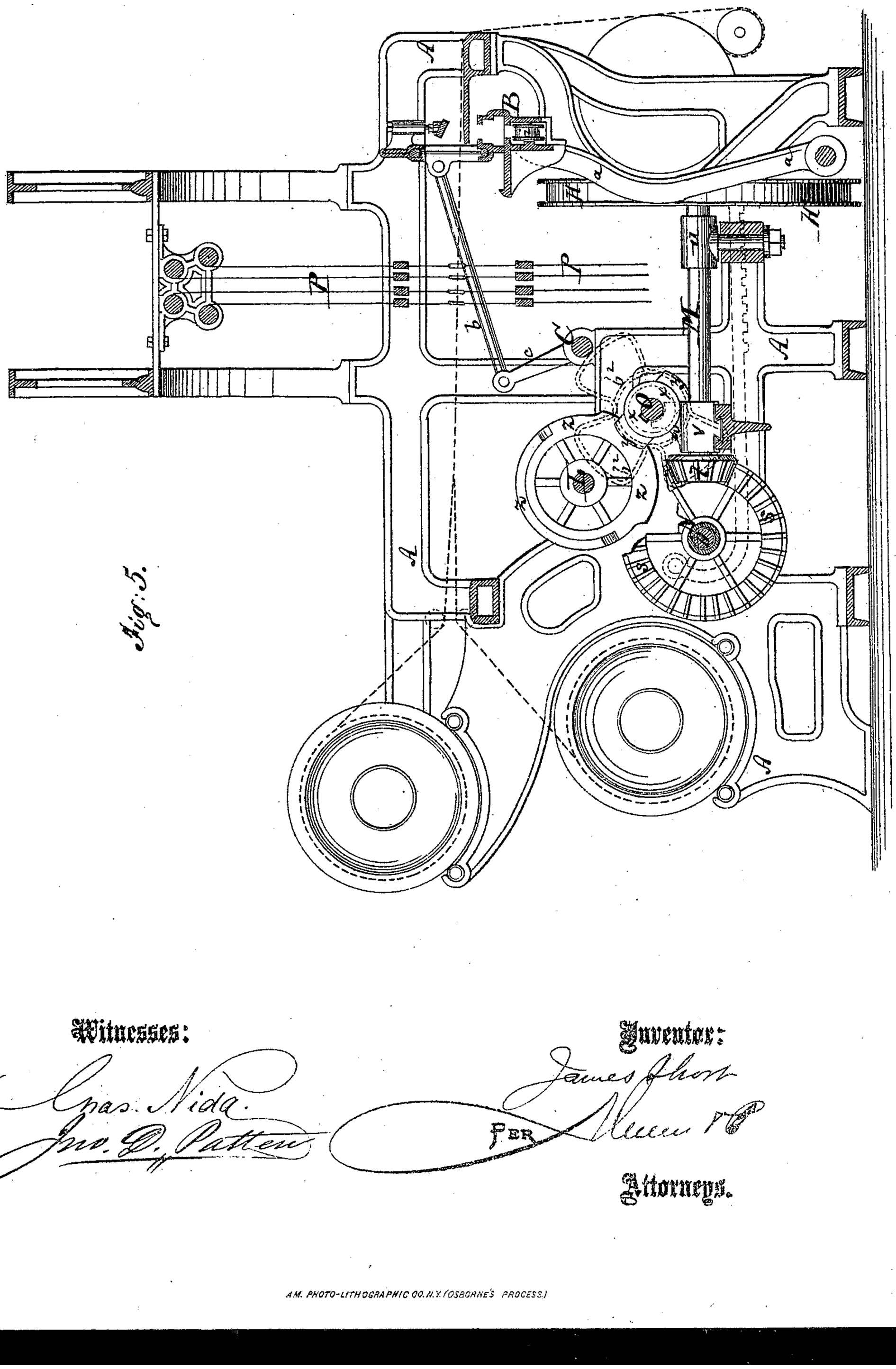

Fig. 5.

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5 Sheets--Sheet 5.

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Improvement in Looms.

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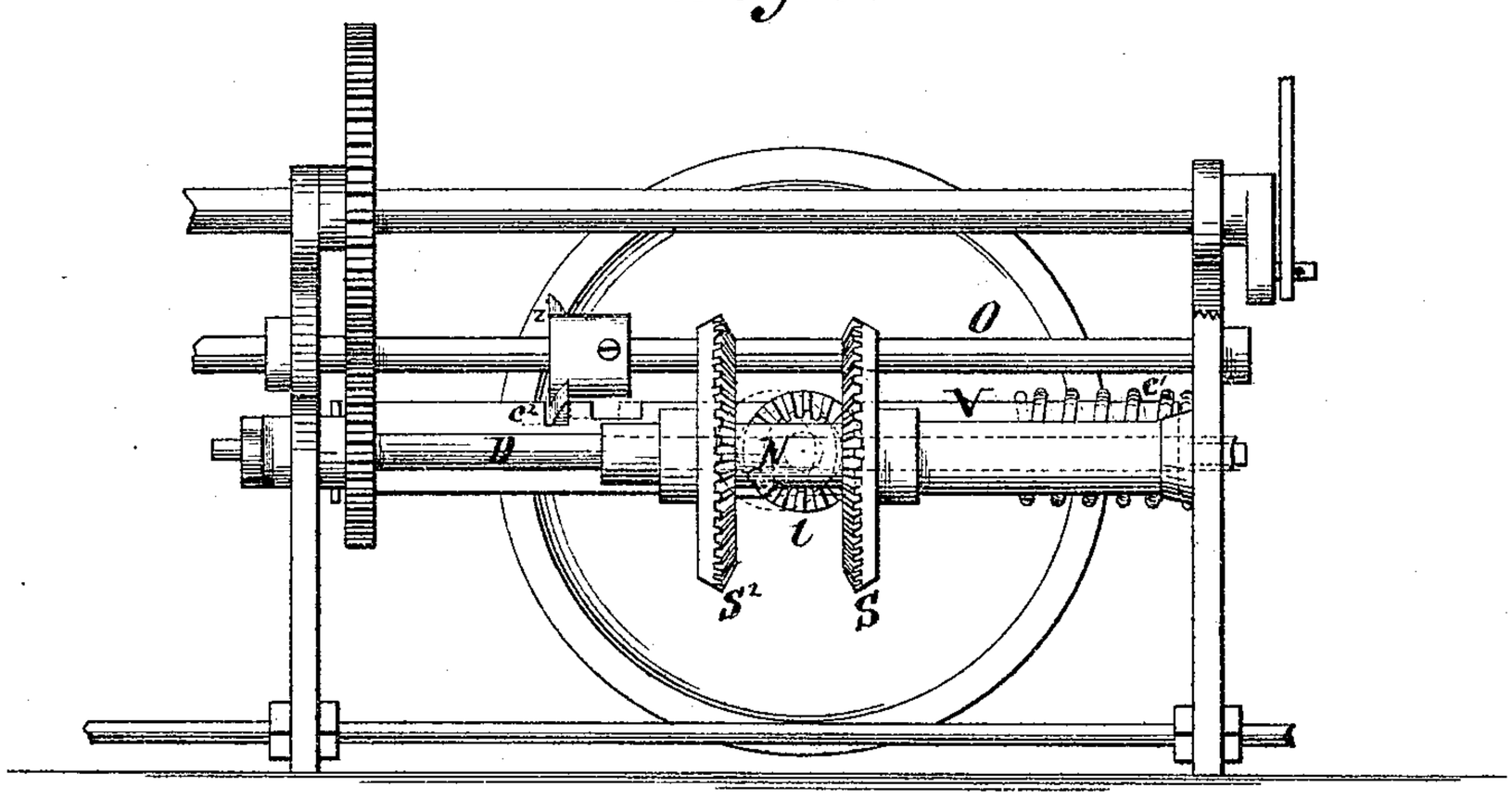
Fig. 6.



Witnesses.

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UNITED STATES PATENT OFFICE.

JAMES SHORT, OF NEW BRUNSWICK, NEW JERSEY.

IMPROVEMENT IN LOOMS.

Specification forming part of Letters Patent No. 129,602, dated July 16, 1872.

Specification describing a new and Improved Loom, invented by JAMES SHORT, of New Brunswick, in the county of Middlesex and State of New Jersey.

This invention relates to a positive-motion loom with a suitable number of shuttles, of which either one can be used at any one time, all others being held at rest until they are to be used one after another, which permits the weaving of many-colored fabrics on a loom whose length of shuttle-motion is unlimited. The shuttle-carrier is detachable from the belt, so that it can be detained at one end of the loom and the belt moved along in the same direction without disturbing the position of the carrier. At the ends of the shuttle-race are vibrating frames, each frame containing a series of shuttle-boxes or end sections of the race, and a shuttle and carrier within each section. At the end of any one shuttle-motion either one of these sections or boxes can be moved to bring another shuttle within line of the main shuttle-race and in connection with the belt. An important feature of the invention consists in imparting to the belt such motion, and in so connecting it that it can, after having moved a shuttle in one direction, be continued in the same direction to bring another shuttle from the end whence the former was conveyed; although, if required, the belt may also be moved in the opposite direction either to return the first shuttle or to move another on the return stroke. By this motion of the belt in either direction, in connection with a suitable box-shifting mechanism, I am enabled to take at any one stage of the operation any one shuttle from either end of the loom for use. Thus, whatever the number of shuttles employed in a fabric and the number of different-colored spools they carry, the operator has power to use them in suitable succession.

Apart from the above-mentioned principal feature of my invention there are other improvements necessary for their execution or for facilitating the same. Thus there is a cam mechanism for automatically regulating the belt-motion on a predetermined design. With similar purpose the above-mentioned vibrating frames are moved to bring the several shuttles into action in the required succession.

My improved loom also contains a new arrangement of cranks and devices for moving the shuttle-race and the end sections with reference to each other, all as hereinafter more fully described.

In the accompanying drawing, Figure 1 represents a front elevation of my improved loom. Fig. 2 is a detail longitudinal section of the shuttle, shuttle-carrier, and belt, showing their connection. Fig. 3 is an end elevation, partly in section, of the loom; Fig. 4, a top view, partly in section, and Fig. 5 a vertical transverse section of the same. Fig. 6 is a side elevation, showing means for reversing the motion of band-wheel.

Similar letters of reference indicate corresponding parts.

A represents the frame of the loom. B is the shuttle-race, supported by arms *a a* on a rock-shaft or pins, so that it may be vibrated forward and back to serve the purpose of a lay or batten. By means of rods *b b* this shuttle-race and batten is connected with the cranks *c c* of a rock-shaft, C, from which it receives the desired motion. A crank, *d*, Fig. 3, of the shaft C, is, by a rod, *e*, connected with a crank, *f*, Fig. 4, of a revolving shaft, D, so that the rotations of the latter produce the oscillations of the shaft C, and the consequent vibrations of the batten B. A crank, *g*, Fig. 4, at the outer end of the shaft D, has its wrist-pin fitted into the slot or groove of a wheel, E, the center of said wheel being so far eccentric to the axis of the shaft D that the wrist-pin of the crank *g* may nearly but not quite reach the center of the wheel, the slot or groove extending diametrically across the face of the latter, as shown in Fig. 3. When the wheel E is revolved by connection with a driving-pinion, *h*, or otherwise, with even speed, it will, by its connection with the shaft D, also impart rotary motion to the same. But this motion of the shaft is not at all even or equal, for the crank when, in the outer part of the slot or groove turns much quicker than when in the inner part or nearer the center of the same; therefore the shaft makes one part of its rotation very quick, while the other part is so slow as almost to be stationary. The effect of this motion on the shaft C and batten B is that the latter is moved quickly forward and back to lay the thread and return, and then held at rest to allow the shuttle-motion. The ends of

the shuttle-race B are between two frames F F, both of which are pivoted at their lower ends to the frame A. Each of the frames F contains two or more grooves or channels, arranged horizontally and of the same form in cross-section as the shuttle-guide in the batten B, so that either one of the channels in one and both of the frames F can be placed in line with the shuttle-race B, to constitute an exact continuation of the same. G, Fig. 1, is the shuttle-belt—*i. e.*, the belt or band by which the shuttle-carriers and shuttles are conveyed through the race-way. This belt is connected with an operative drum, H, beneath the shuttle-race in such manner that when said drum is turned in one direction or the other the belt will be moved in one direction or the other through the race-way. Within the race-way the belt is supported on small friction-rollers *i*, that hang in the race-way, and, therefore, the upper part of the belt is moved forward and back whenever the race-way is swung to serve as a batten. In arms *j j*, Fig. 4, projecting from the ends of the race-way underneath the channels of the frames F, are the bearings of rollers *l l*, over which the belt passes downward, as shown in Fig. 1. These rollers *l* are about under the middle of the channels F, lengthwise considered. The number of shuttle-carriers I used at any one time on the loom should at least be one less than the joint number of channels in the two end frames F. Thus, if each end frame F has two channels, making four in all, three shuttle-carriers and shuttles can be used, or five when each end frame has three channels. Every shuttle-carrier I has its own shuttle J, which rests with its wheels *m m* on and between wheels *n n* of the carrier, as is clearly shown in Fig. 2, the lower warp-threads passing between the said wheels *m n* during the shuttle-motion in manner usually employed in positive-motion looms. The connection between the belt G and a shuttle-carrier, I, is established by means of an ear or lug, *o*, projecting from the former into a mortise or recess in the under side of the latter, in the manner clearly illustrated in Fig. 2. When the belt has conveyed a shuttle-carrier to one end of its course, placing it into one channel of a frame, F, and the belt should then continue to move in the direction in which it was moved to so convey the carrier, the lug *o* will, as it passes over the roller *l*, be withdrawn from the recess of the carrier, leaving the same in the frame F. At the same time another lug, *o*, on the belt may enter the recess in another carrier at the other end of the loom and convey such other carrier in the same direction in which the first was moved. If, however, instead of being moved in the same direction, the motion of the belt were reversed, it would take the first carrier and shuttle back, unless before the return motion the frame F receiving such first carrier and shuttle had been vibrated to bring another channel with another carrier and shuttle in line with the race-way, in which case such other shuttle will be carried along by the belt during the return motion of the latter. In this manner any one of the shuttles may be connected with the belt and carried through the warp. The frames F F are shifted at the termination of each shuttle-motion to withdraw, if necessary, the carrier last used from the belt and bring another in contact with it, or may be left at rest to retain the same shuttle in action, all in accordance with the design to be produced. The motion imparted to these frames F is, therefore, of great importance, as it really regulates the successive use of the shuttles. The motion of the vibrating frames F F, Fig. 3, is, by means of rods *p* and cranks *q*, derived from a shaft, L, which is, by gear-wheels *r, r*, Fig. 4, connected with the shaft D, and consequently turned with a similar alternation of rapidity and slowness, so that each frame F will be moved to shift the shuttles while the batten is laying the weft, and then will remain at rest. In the present case I have arranged for using two shuttle-boxes on each side of the loom, and the gear-wheels *r*, which transmit motion from D to L, are as one to two in their relative diameters in order to let the shaft L turn once while D turns twice. This, with a suitable arrangement of the cranks, will have the effect of swinging the frames F forward, and then leaving them at rest during one throw of the batten, and of swinging them backward and then leaving them at rest during the subsequent throw of the batten, so that two boxes are alternately in line with the batten at each throw of the shuttle. This arrangement of moving the frames F may, however, be varied in accordance with the greater or less irregularity of the design to be produced. Thus, when the shuttle last moved is to be returned by the next belt-motion, the frame F receiving it should not at all be moved, but should remain stationary. In fact, I desire it to be understood that I do not confine myself to any particular mechanism for shifting the end frames F. The belt wheel or drum H, Fig. 1, is mounted upon a shaft, M, receiving rotary motion from one of two bevel-wheels, *s* s^2, Fig. 4, that are affixed to a rotating tube, N, which loosely embraces the shaft D. The bevel-pinion *t* on the shaft M is in gear with one of the wheels *s* or s^2, the motion being reversed as the contact with these wheels is changed. The shaft M is consequently so hung in a swivel-bearing, *u*, and in a sliding bearing, *v*, Fig. 5, that, by motion imparted to the latter, it can be carried in contact with one or the other of the bevel-wheels *s* or s^2, thereby to turn the drum H and belt G in one direction or the other. On the shaft O (see Fig. 6) is located a wedge-cam, *z*, which works in the notch c^2, and shifts bearing-bar V so that pinion *t* is brought into gear with bevel-wheel *s*. As soon, however, as the cam has passed through said notch the spring c^1 throws back the bar V and causes the pinion *t* to gear with the bevel-wheel s^2. The shaft O derives its rotation from the shaft L by means of the gear-wheels a^2 a^2, Fig. 1. A modification of this shifting mechanism is shown

in Figs. 1 and 4 of drawing. The sliding bearing *v*, in this modification, has a projecting arm, *w*, (see Fig. 1,) entering a groove of a sleeve, *x*, which is hung loose on a shaft, O. The sleeve *x* has two projecting wings, *y y*. The shaft L carries a cam-disk, *z*, which, during the rotation of L, comes with its oblique faces alternately against one and the other of the wings *y y*, and thereby causes the sleeve *x*, and with it the slide *v*, to be moved so as to shift the shaft M into gear with one or the other of the wheels *s* s^2. The mechanism for thus shifting the shaft M may, however, be materially varied. The tube N, which carries the wheels *s* s^2, is fitted loose upon the shaft D, and has a crank, d^2, at its end, whose wrist-pin enters the slot or groove of the wheel E in the same manner as the crank *g* of the shaft D enters the same slot or groove, the two cranks, however, being in the respective halves of said slot or groove. The rotation of the tube N will thus also be alternately fast and slow, but in so far different from that of the shaft D that the belt G will be moved while the race-way is at rest, and vice versa.

In Figs. 1 and 4 but one frame, F,—that on the right-hand side—is shown; but every loom will, of course, have one such frame F at each end, unless the shuttle-motion can invariably be duplicated, in which case but one frame F need be used.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In combination with the detachable shuttle-carrier having recess to receive lug *o*, the belt G and actuating mechanism, substantially as described, to reciprocate the belt in either direction, as and for the purpose set forth.

2. In a positive-motion loom, the band-wheel H mounted upon a vibrating shaft, M, which derives its motion from one of two wheels *s* s^2, and is automatically changed from contact with the same, as set forth.

3. In combination with the batten, the frames F, operated by a shaft, L, in gear with a shaft, D, that actuates the batten, both being arranged and operating with relation to each other in the manner and for the purpose described.

4. The grooved wheel E, combined with the cranks *g* d^2 of shaft D and tube N, as and for the purpose described.

5. The tube N carrying wheels *s* s^2 and crank d^2 that works in groove of wheel E, in combination with wheel H, shaft M, and slide-bar V, as and for the purpose described.

6. In combination with swivel-shaft M having wheel H and pinion *t*, the cam *c* on shaft O and the sliding bar V, notched at c^2 and having spring c^1, as set forth, for reversing the motion of the band-wheel of a friction-motion loom.

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