(No Model.) 3 Sheets—Sheet 1.

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LOOM.

No. 365,420. Patented June 28, 1887.

Fig. 1

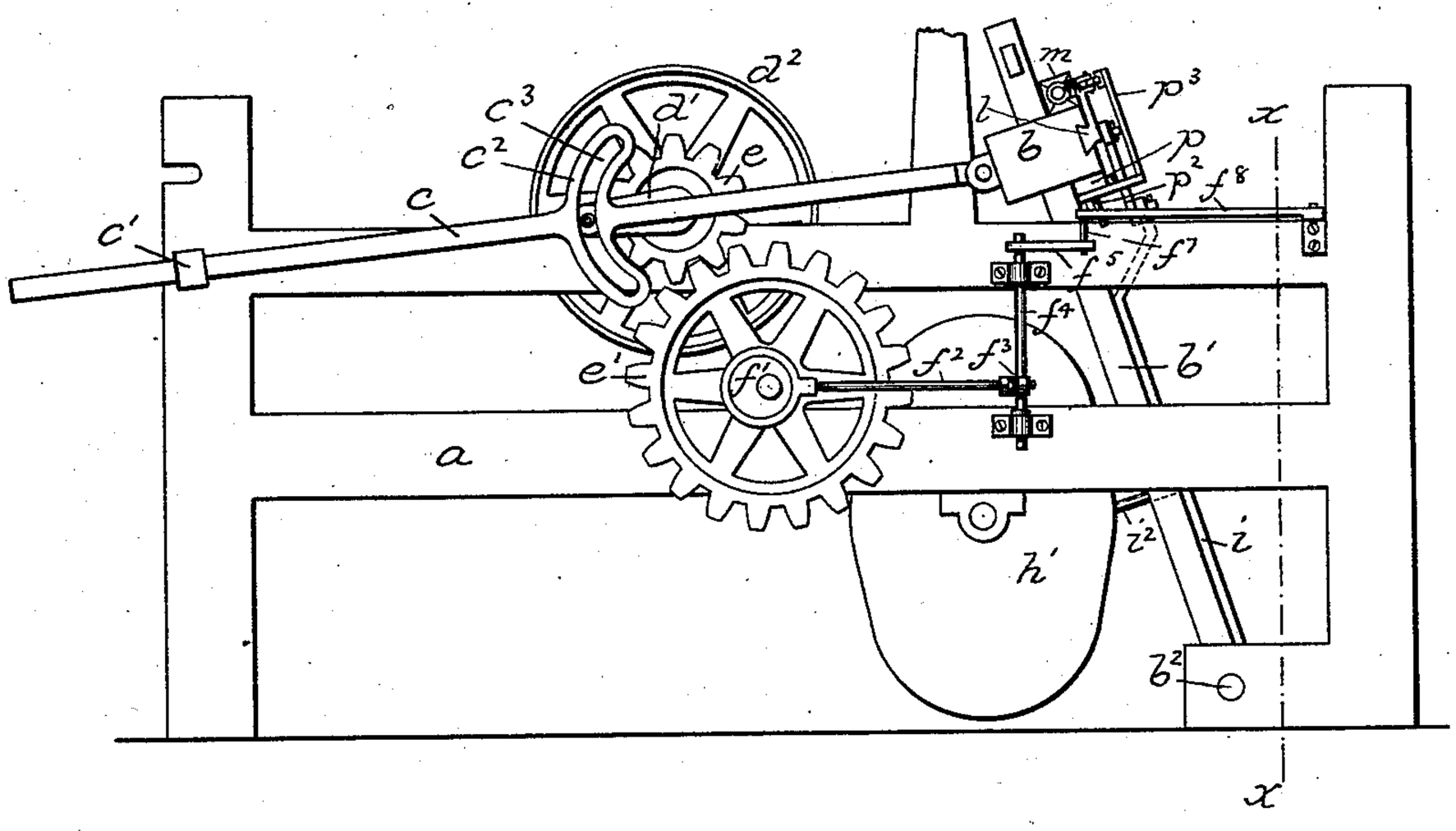

Fig. 2.

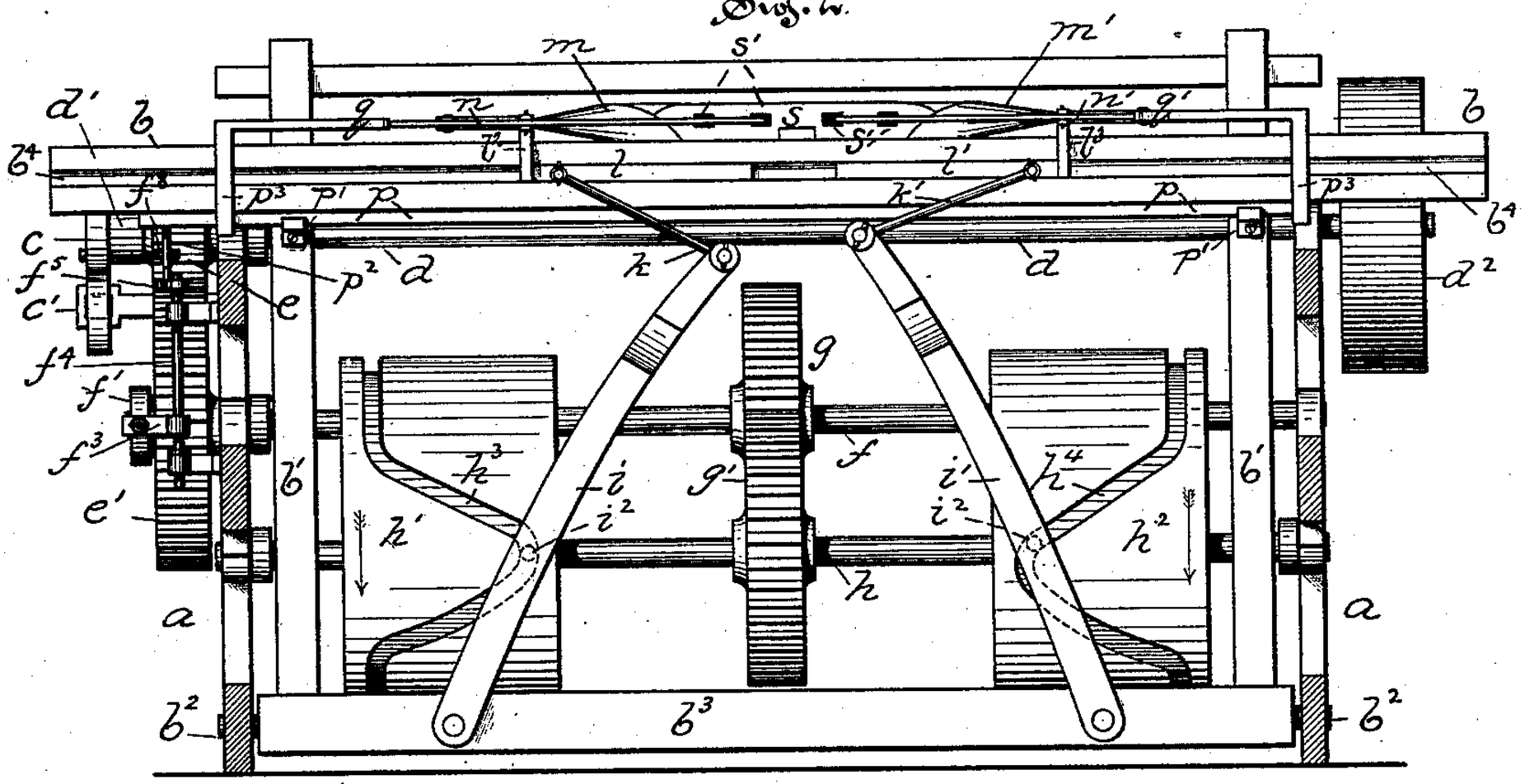

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Fig. 3

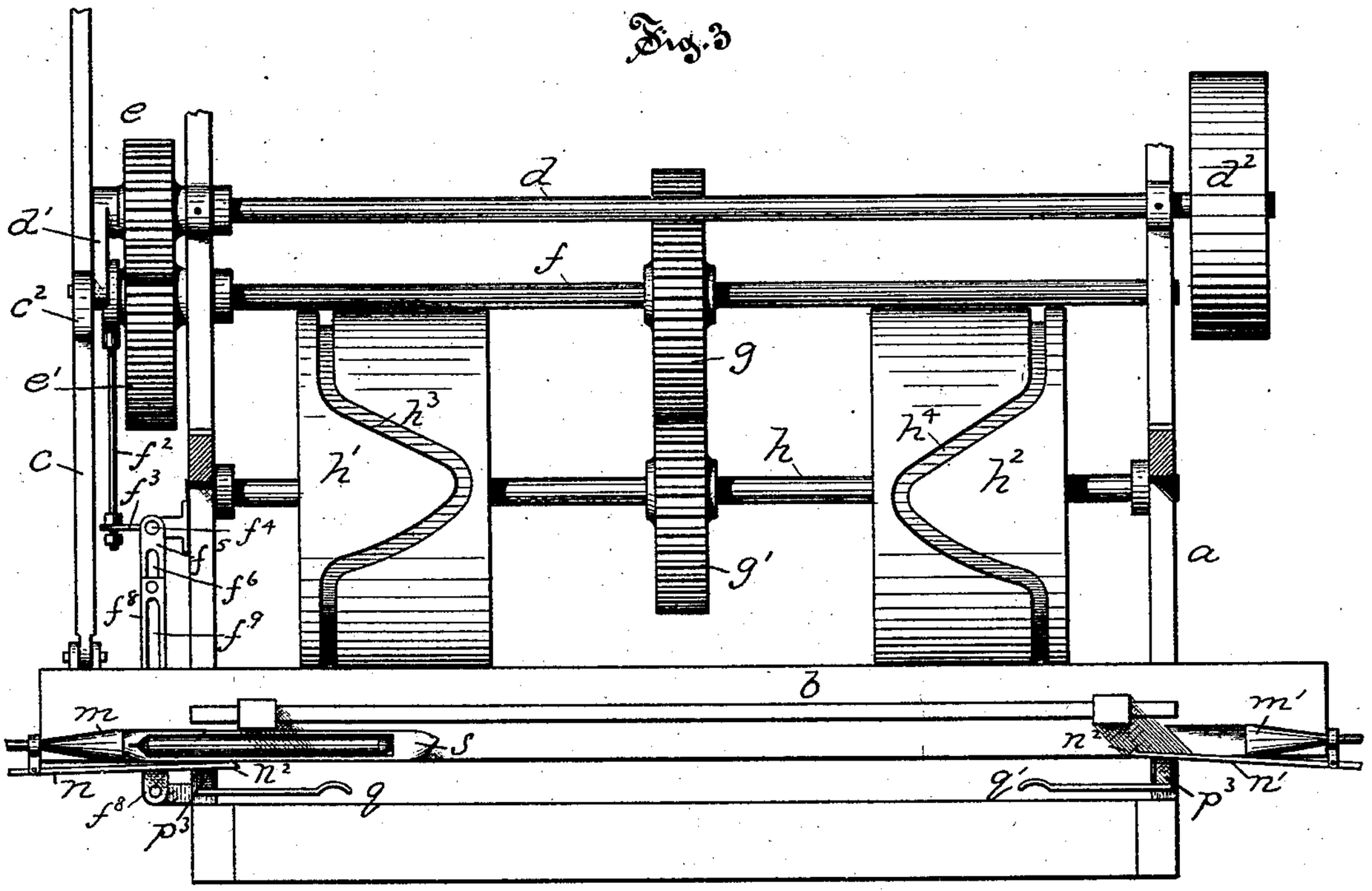
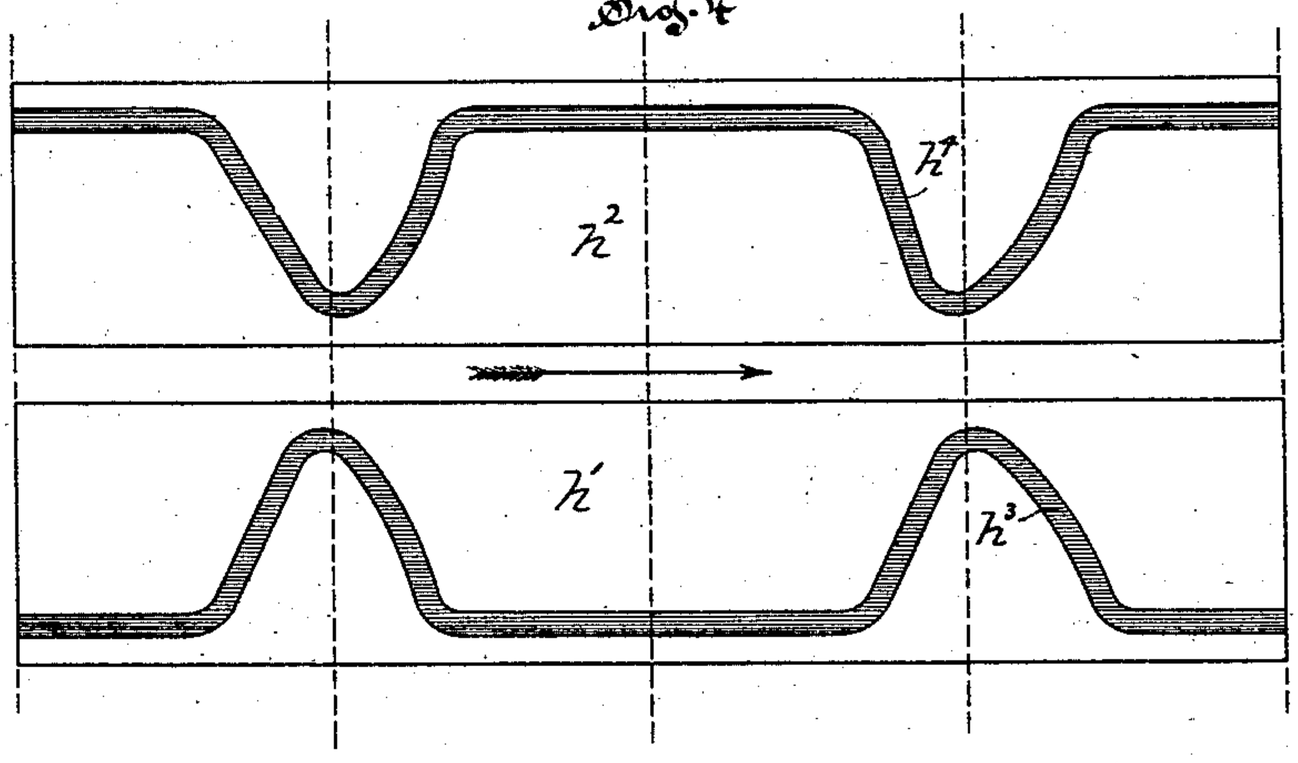


Fig. 4



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(No Model.) 3 Sheets—Sheet 3.

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LOOM.

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Fig. 5

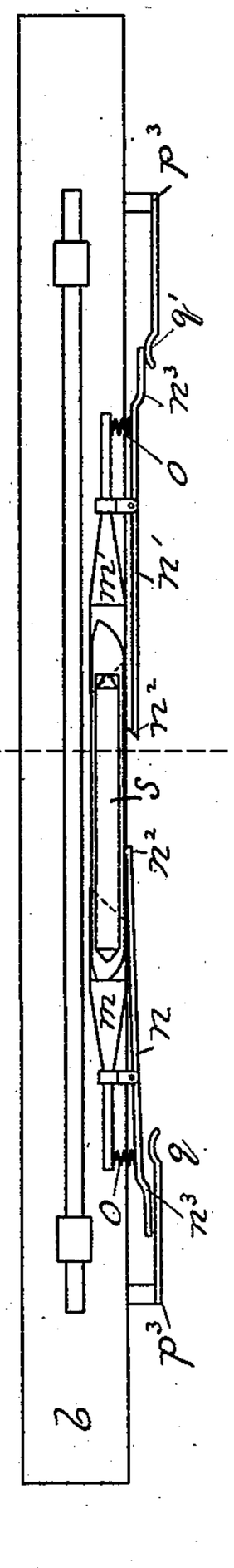
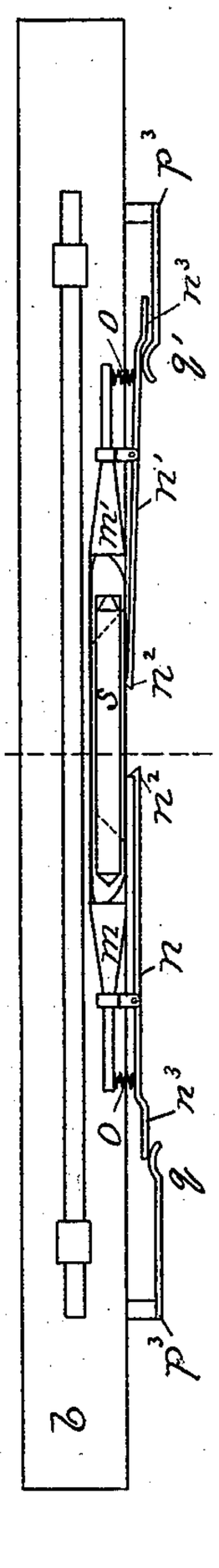


Fig. 6



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UNITED STATES PATENT OFFICE.

JACOB WIDMER, OF NEW HARTFORD, CONNECTICUT.

LOOM.

SPECIFICATION forming part of Letters Patent No. 365,420, dated June 28, 1887.

Application filed May 7, 1884. Serial No. 130,619. (No model.)

To all whom it may concern:

Be it known that I, JACOB WIDMER, of New Hartford, in the county of Litchfield and State of Connecticut, have invented certain new and useful Improvements in Looms; and I do hereby declare that the following is a full, clear, and exact description thereof, whereby a person skilled in the art can make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Like letters in the figures indicate the same parts.

Figure 1 is a side view of part of a loom in elevation, those parts being omitted which are not immediately connected with my improvement. Fig. 2 is a front view of the same, with parts broken away in front of the plane denoted by line *x x* of Fig. 1. Fig. 3 is a top view of the same. Fig. 4 is a plan view of the periphery of the cam-wheels as developed. Figs. 5 and 6 are diagram views in detail of the top of the lathe-beam, to illustrate the means for moving the shuttle along the shuttle-race and the operation of the locking mechanism.

My invention relates to the class of positive-motion looms; and it consists in the novel construction of parts and their combination, as will be hereinafter more fully described, and specially as pointed out in the claims made hereto.

In the accompanying drawings, the letter *a* denotes the main frame of a loom made of any desirable material, as iron cast to shape; *b*, the lathe-beam borne on the swinging frame b', pivoted to the lower part of the frame *a* and swung to and fro in a vertical plane upon the pivots b^2 by means of the rod *c* and connected mechanism. This rod *c* is pivotally connected to the back of the lathe-beam at one end, and is supported in the bearing c', fast to the frame at a point near the back of the frame, and has a curved slot, c^3, in a widened part, c^2, about midway of the rod; and into this slot projects and works a pin on the outer end of the crank d', fast to one end of the main driving-shaft *d*, which is held in suitable bearings in the frame, and is driven by means of a belt passing over the pulley d^2, also fast to the shaft *d*. Near the end of this shaft is secured the cog-wheel *e* in mesh with the cog-wheel e', which is fast to the rotary shaft *f*. This shaft *f* bears near its center and fast to the shaft a cog-wheel, *g*, in mesh with the cog-wheel g', that is secured to the rotary cam-shaft *h*, which bears the cam-wheels h' h^2, having each a peripheral cam-groove, h^3 h^4. These cam-wheels are elliptical in cross-section or contour, in order that during the vibrations of the lathe by the movements of the reciprocating rod *c* the face of the cams will follow the movements of the lathe, and thus keep the pins i^2 of the levers i i' in the cam-grooves, notwithstanding the vibrations of the levers with the lathe.

To the cross-bar b^3 of the lathe-frame are pivoted upon each side of the center the two levers i i', which move in a plane parallel to the lathe-frame and bear pins i^2, that project into and are held in the cam-grooves h^3 h^4, respectively, as the lathe swings. These levers are pivotally connected at their upper ends by means of the connecting-rods k k' with the shuttle-slides l l', that are reciprocated in a dovetailed groove, b^4, in the front of the lathe-beam as the levers are swung back and forth by means of the cam-wheels. These slides have each on their outer end an upward-projecting arm, l^2 l^3, to which is fastened a shuttle-carrier, m m', so held as to be moved back and forth along the race on the top of the lathe-beam. Each slide-arm bears also a latch, n n', having a hook, n^2, on its inner end, and so pivoted as to move in a plane at substantially right angles to the plane of the lathe-frame. Each latch has near its rear end an offset, n^3, and this part is held outward by means of a spring, *o*, arranged as shown in Figs. 5 and 6. A slide-bar, *p*, is supported in bearings p' below the lathe-beam, and is reciprocated by means of the eccentric f', fast to the shaft *f*, and by means of the connected intermediate mechanism, consisting of eccentric-rod f^2, arm f^3, which is fast to the vertical rock-shaft f^4, supported in bearings fast to the frame, arm f^5, fast to the upper end of the rock-shaft, having a slot, f^6, into which projects a pin, f^7, fast to the rear end of the lever f^8, which is pivoted at its other end to the frame, and bears substantially along its whole length a slot, f^9, into which projects and moves a pin, p^2, fast to the slide-bar *p*. This slide-bar *p* bears arms p^3,

which project outward, upward, and then laterally in the plane of movement of the latches, and bear the projecting trip devices $q q'$, which co-operate with the offsets n^3 on the latches in effecting the transfer of the shuttle from one carrier to another.

The shuttle-slides bear the shuttle-locking mechanism and the slide-bar bears the unlocking mechanism of the loom. The within-described mechanism is so proportioned and combined that the lathe beats up twice at each revolution of the cam-wheels, each of which bears two cams, by means of which and the connected parts, as described, the shuttle is fed back and forth. This motion of the shuttle in bearing the filling in weaving is performed while the lathe is swung back, as shown in Fig. 1, the shuttle being held at either limit of its play, while the lathe swings forward to beat up the filling.

A special advantage of my improvement consists in the manner in which the shuttle is transferred from carriage to carriage without shock, and with a practical continuance of the motion, although not in the carriage in which it first starts. The method of effecting this is as follows: The shuttle, beginning at the right-hand end of the lathe-beam, is moved forward along the race by means of the cam-groove h^4, the cam-wheels turning in the direction of the overlying arrows. At the same time the carrier m is moved forward from the left-hand end of the lathe by means of the cam-groove h^3, the carriers moving toward each other for a time at about the same rate of speed; but the cam-grooves are so formed in the wheels that the pin projecting from the lever i' reaches the highest point of the cam-groove h^4, and, passing it, starts the carriage m' on its backward motion before the carriage m has reached the forward limit of its play. The carriage m now moves faster in its forward motion than the carriage m' does in its backward motion, so that the shuttle s is pushed into the carriage m'. During this movement of the shuttle and carriage the eccentric and its connected mechanism have moved the slide-bar so that the trip q' moves forward in the same direction as the carriage m', but at a much less rate of speed, and this movement of the trip q' continues until the forward end of the shuttle bears against the face of the opposite carriage, m, when the backward movement of the trip begins. As the trips $q\,q'$ are rigidly connected to the slide-bar, it follows that their movements are the same in direction and extent, so that as the backward motion of the trip q' raises the latch n' the latch n is released, and its hooked end, catching into a socket, s', in the side of the shuttle, fastens the latter in the carriage m, which continues its backward motion. This begins, as before described, a short time before the shuttle has been placed in it by the forward motion of the opposite carriage. This opposite carriage, m', is returned to the right-hand end of the lathe, and the shuttle borne by the carriage m to the opposite end of the lathe, thus carrying the filling-thread once through the shed. While the crank-pin moves from one extremity to the other of the slot c^3 in the rod c, the lathe remains at the backward limit of its play, as seen in Fig. 1; and it is during this "dwell" that the transfer of the shuttle from one end to the other of the lathe is effected. The rotation of the driving-shaft now forces the rod c and the lathe b forward and beats up the filling, the pins on the levers $i\,i'$ being during this time in the part of the grooves in the cam-wheels by which no movement of the levers is produced. Now, as the cam-wheels continue to revolve, the pins of the levers reach the limit of the straight or dead race of the cam-grooves and are directed into the cam-sections of the grooves, and the shuttle-operating levers thus reciprocated. The form and arrangement of the cam-grooves and the dead-race are shown developed in Fig. 4 of the drawings, wherein it will be seen that the cam-grooves are arranged opposite to each other in the cam-wheels, and that the reversing-points of the groove of one cam-wheel are arranged in advance of the other, by which arrangement the return movement of one of the shuttle-operating levers begins before the other shuttle-operating lever has reached its forward limit of stroke, and the shuttle is thus transferred without shock.

As shown in Fig. 4, the cam-grooves are of duplicate construction, but disposed in reverse arrangement on the respective cam-wheels, in order that the lever carrying the shuttle may effect its delivery and transfer, as heretofore described, the movements of the mechanism being identical, except in the respects that the shuttle-operating levers reach their limit of stroke in alternate precedence.

A special advantage results from the above-described method of moving the rod c by a crank on the driving-shaft, as the rod, and therefore the lathe, are moved forward against the filling-thread with a quicker motion and a gradually-increasing pressure in beating up the filling when the crank-pin in the rotation of the shaft and crank travels downward along the inner face of the slot c^3, thus obviating the shock which results from the blow when the ordinary crank and connecting-rod are used.

I claim as my invention—

1. The combination, with the driving shaft d, mounted on the loom-frame, the shaft f, the shaft h, said shafts bearing gear-wheels meshing in operative arrangement, the lathe, and the lathe-reciprocating mechanism d' and c, of the cam-wheels h' and h^2, mounted on the shaft h and made of elliptical form in cross-section, and provided with cam-grooves $h^3\,h^4$ on opposite faces of the ellipse, the levers $i\,i'$, pivoted to the cross-bar of the lathe and provided with pins to set within and traverse the said cam-grooves, the connecting-rods $k\,k'$, the shuttle-slides $l\,l'$, and the shuttle-carriers $m\,m'$, substantially as described.

2. The combination, with the lathe of a

loom, the vibrating levers, and the shuttle-slides arranged to be reciprocated by said levers, of the locking devices, consisting of the spring-actuated latches n n', with hook n^2 and offsets n^3, and the unlocking device, consisting of a bar, p, formed with an arm, p^3, having the trip-catches q q', and means for reciprocating said bar, all substantially as described.

3. The combination, with the lathe of a loom and mechanism for vibrating it, of cam-wheels formed with cam-grooves in their faces, one of said cam-grooves being arranged with its reversing-point in advance of the reversing-point of the cam-groove in the other cam-wheel, and shuttle-operating levers pivoted to the lathe-frame and having pins arranged in said cam-grooves, whereby the return movement of one of the shuttle-operating levers shall begin before the other shuttle-operating lever has reached its forward limit of the stroke, and the shuttle thus transferred without shock, substantially as described.

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