No. 652,984. Patented July 3, 1900.

F. WADDINGTON.

LOOM SHEDDING MECHANISM.

(Application filed Dec. 29, 1897.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1

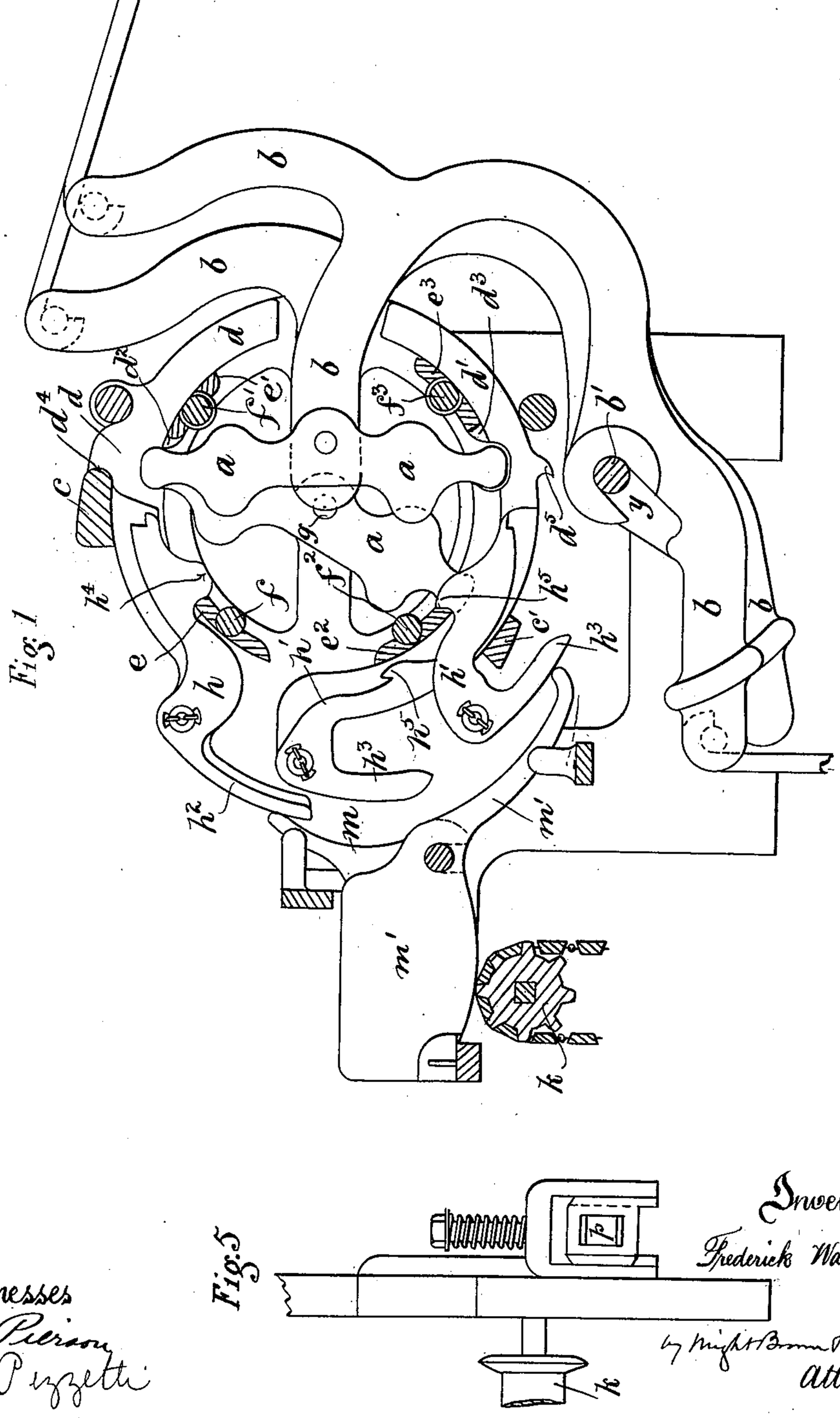

Fig. 5

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(No Model.) 5 Sheets—Sheet 2.

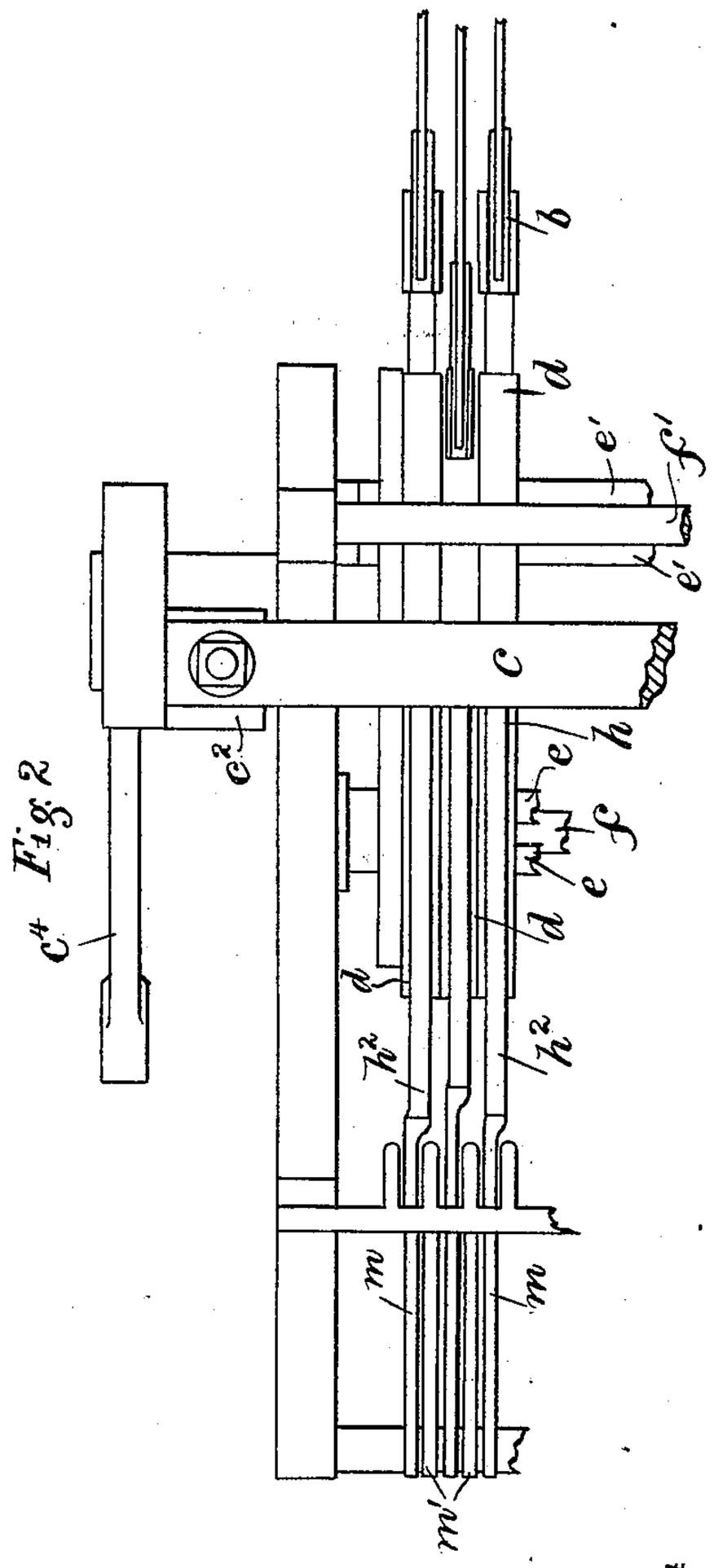

Fig. 2

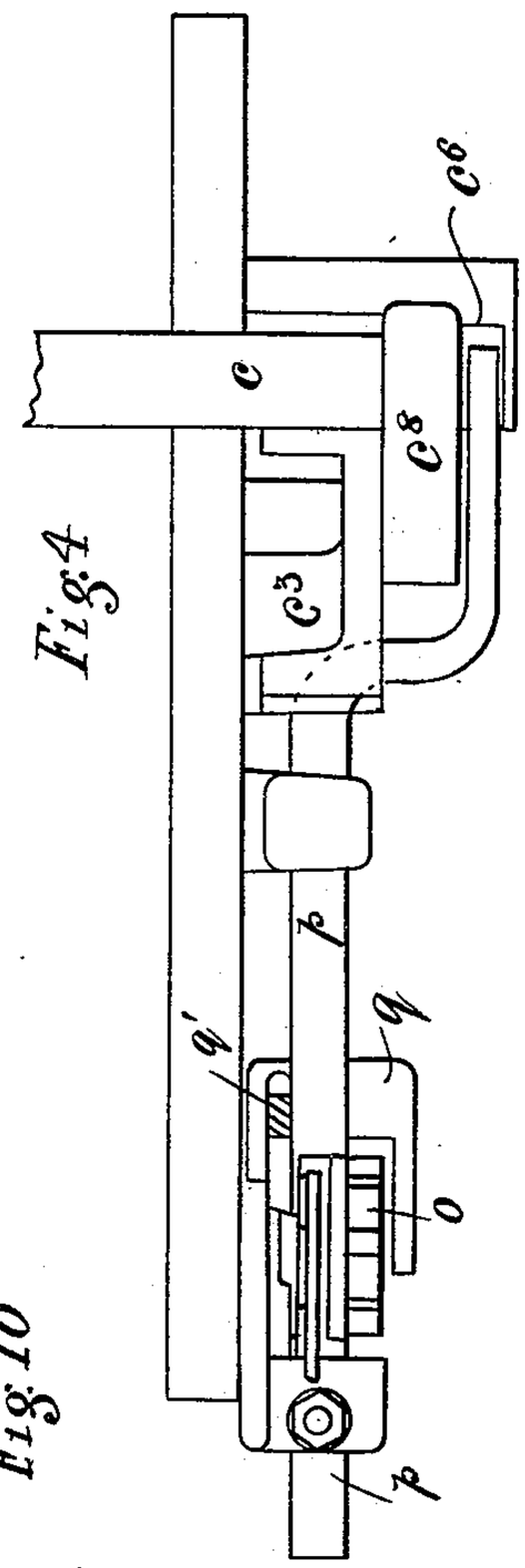

Fig. 4

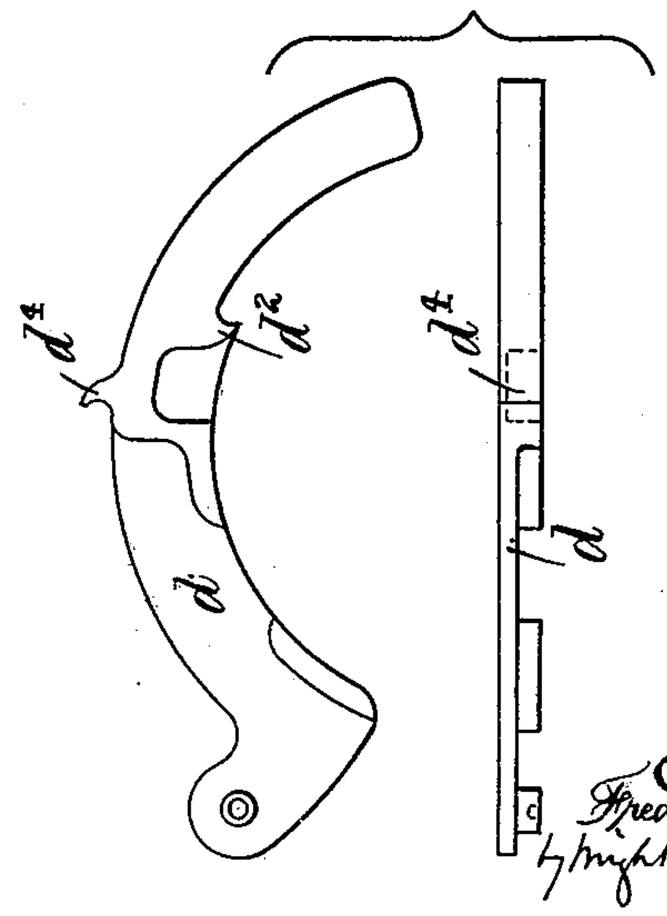

Fig. 10

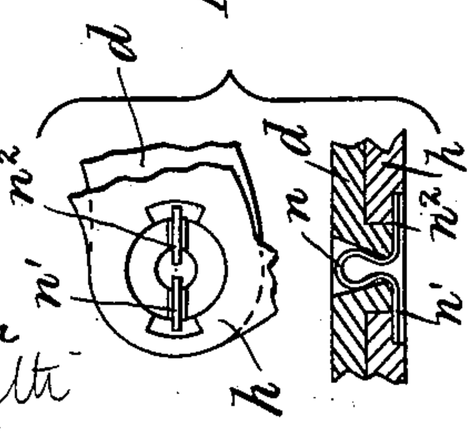

Fig. 9

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LOOM SHEDDING MECHANISM.

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(No Model.) 5 Sheets—Sheet 3.

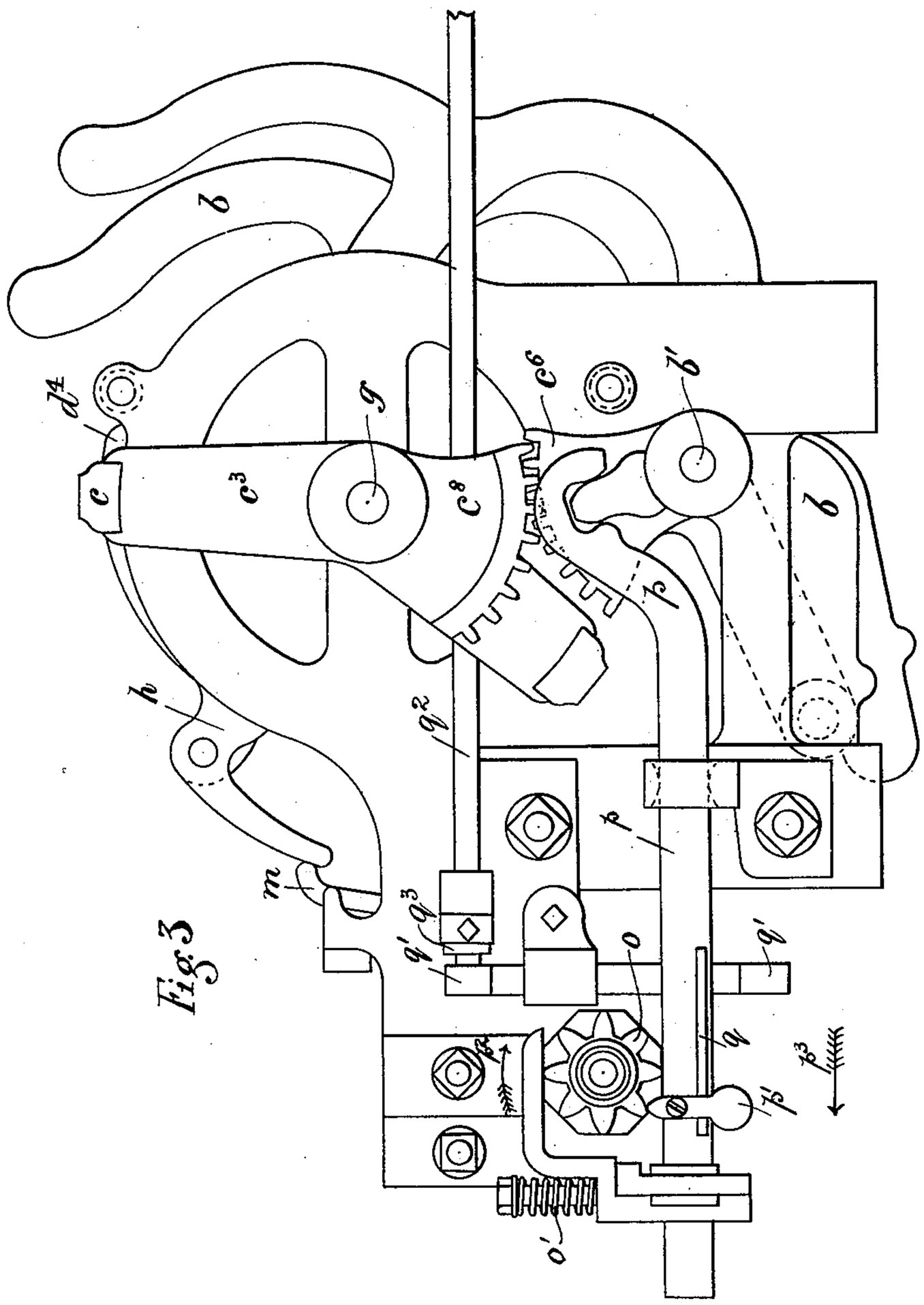

Fig. 3.

Fig. 8.

Fig. 7.

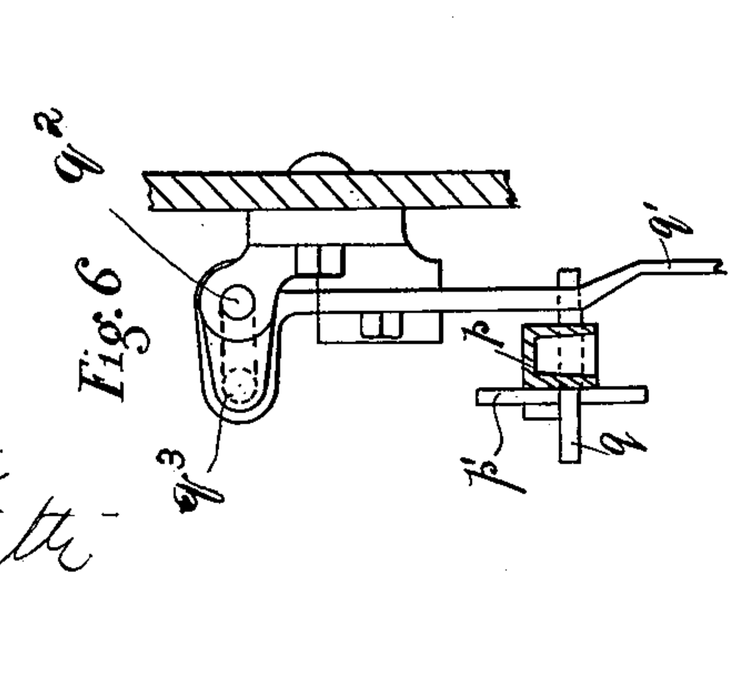

Fig. 6.

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Fig. 11

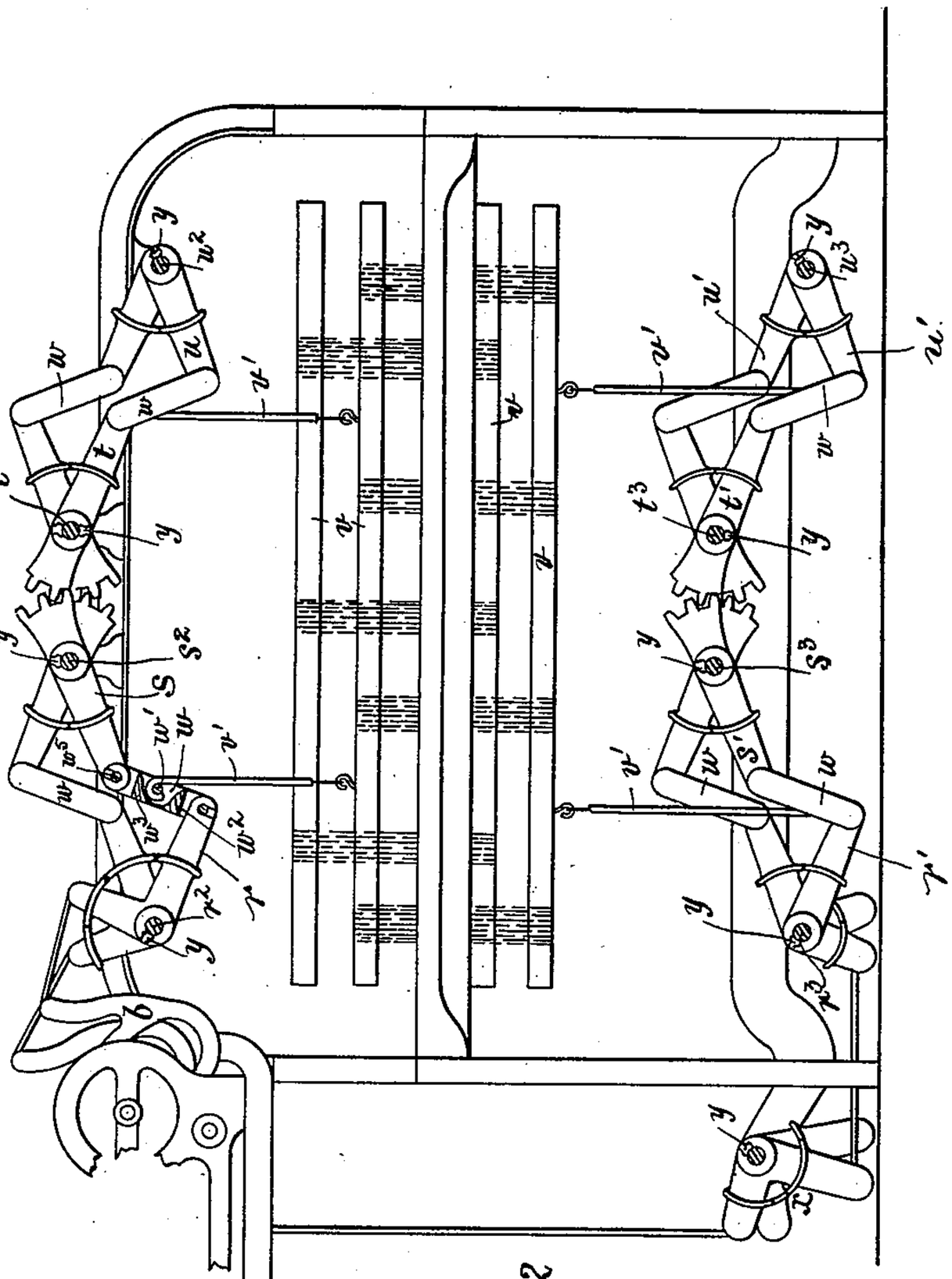


Fig. 12

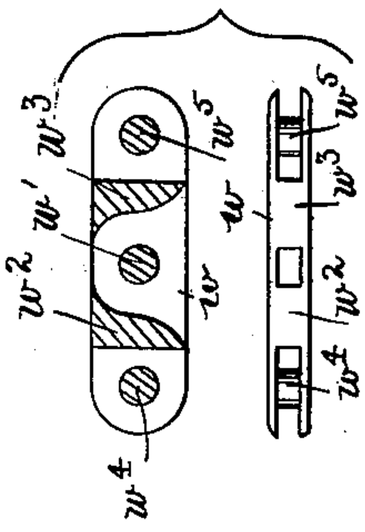
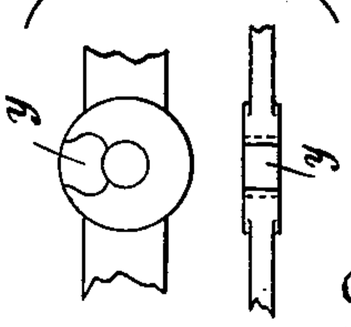


Fig. 13



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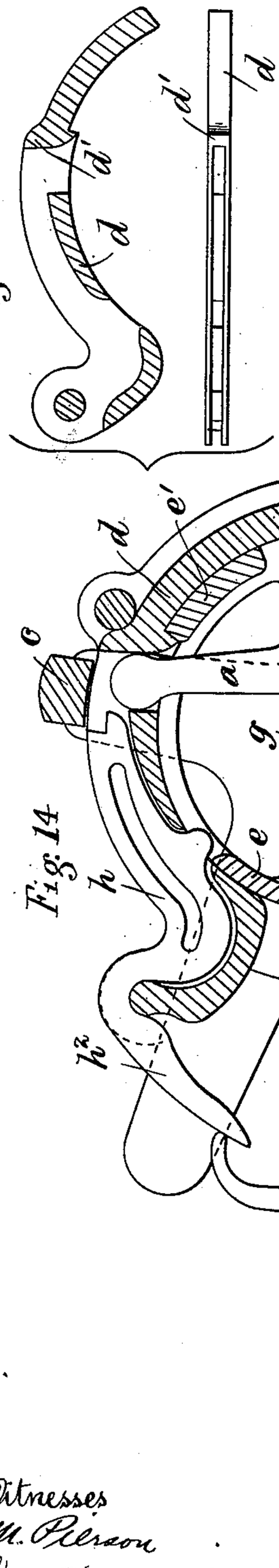

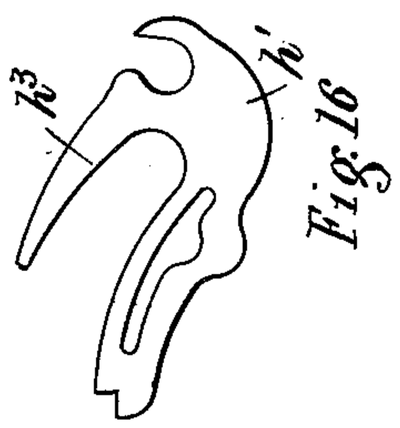

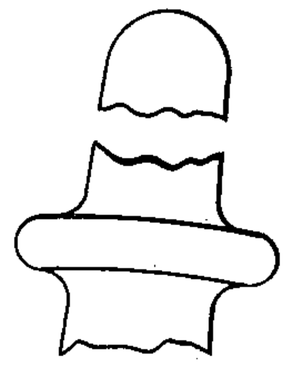

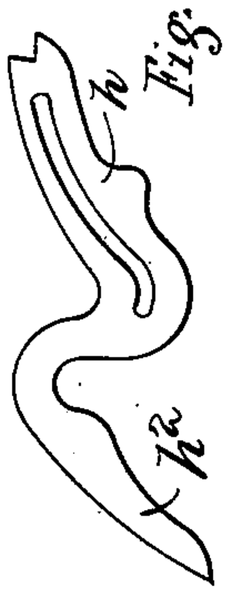

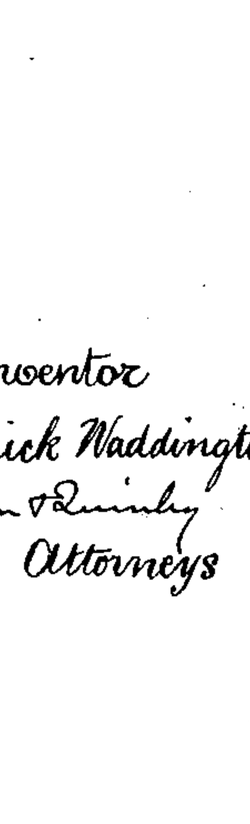

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UNITED STATES PATENT OFFICE.

FREDERICK WADDINGTON, OF KEIGHLEY, ENGLAND.

LOOM SHEDDING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 652,984, dated July 3, 1900.

Application filed December 29, 1897. Serial No. 664,346. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK WADDINGTON, a subject of the Queen of Great Britain, and a resident of Keighley, in the county of York, England, have invented a new and useful Improvement in Loom Shedding Mechanism, (for which I have obtained a patent in Great Britain, No. 11,268, bearing date June 8, 1895,) of which the following is a specification.

This invention has relation to pattern-controlled shedding mechanism in looms; and it has for one object to so construct the dobby or jacquard mechanism proper as to render the same more compact than heretofore and of inexpensive construction and also to dispense with certain parts commonly used heretofore.

The invention also has for its object to provide an improved feed mechanism for feeding the pattern-surface, and, lastly, it has for its object to so construct the mechanism for supporting and operating the harnesses as to move said harnesses in true rectilinear paths.

The invention consists in the improvements which I shall now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a longitudinal sectional view of a dobby constructed in accordance with my invention. Fig. 2 represents a plan view of one end of the dobby. Fig. 3 represents a side elevation of the dobby. Figs. 4, 5, and 6 represent plan, end, and sectional views of the mechanism for feeding the pattern-surface. Figs. 7 and 8 represent plan views of a portion of said mechanism, showing the parts in two different positions. Fig. 9 is a detail view, on an enlarged scale, showing in side elevation and horizontal section one of the joints between the slides and catches employed in the dobby. Fig. 10 is a detail view of one of said slides in side elevation and plan. Fig. 11 is a front elevation with parts of the frame omitted, showing the mechanism for supporting and operating the harnesses of the loom. Fig. 12 and 13 are detail views in section, plan, and elevation of parts shown in the preceding figure. Fig. 14 is a view corresponding to Fig. 1, showing a modified form of the dobby. Figs. 15 to 18, inclusive, are views in section, plan, and elevation showing in detail the slides and catches employed in this modification.

The same reference characters indicate the same parts in all the figures.

Referring for the present to Figs. 1 to 13, inclusive, I have shown a dobby provided with a suitable supporting-framework and with a series of harness or heddle operating levers b b, pivoted upon a cross-shaft b' and carrying a series of pivotally-mounted cross-levers a a. The ends of these latter at the top and bottom are engaged with a series of segmental sliding plates d d', suitably guided on the dobby-frame by means of cross-bars e e' e^2 e^3 on said frame, the said cross-bars being curved so as to form portions of the wall of a cylinder. To reduce friction, there may further be provided rolls f f' f^2 f^3, against which these segmental slides bear.

At their forward ends the several slides d d' carry two series of pivotally-mounted catches h h', formed at their forward ends with projecting toes h^2 h^3, engaged by the heels on a series of pivotal fingers m m', which are operated by a pattern-surface of the usual form carried on a pattern-cylinder k.

Above and below the slides d d' are mounted two reciprocatory draw-bars or lifters c c', the same being carried by two levers c^2 c^3, mounted independently on studs g g at opposite sides of the dobby. The center of oscillation of these levers corresponds with the center or axis of the general cylindrical structure formed by the slides d d'. As the inside of this cylinder is occupied by the ends of the heddle-levers b b and their pivotal cross-levers a a, it is convenient to operate the draw-bar levers c^2 c^3 from the cross-shaft b', which has a crank-arm c^4 secured to one end of it and receiving motion from a suitable part of the loom. On opposite ends of the shaft b' are secured gear-segments c^6, engaging with corresponding gear-segments c^8, secured to the hubs of the respective levers c^2 c^3, and thereby oscillating said levers when the shaft b' is oscillated in its bearings. The draw-bars c c' are preferably mounted on their levers at equal distances from the center of oscillation and in their forward reciprocations are adapted to engage notches formed in the

rear ends of the catches $h\,h'$ when said catches are suitably actuated by the pattern-fingers $m\ m'$. Those pattern-fingers m' which operate the lower set of catches h' normally support said catches, so as to hold their notched rear ends out of the path of the lower draw-bar c', allowing said notched ends, however, to fall into the path of the said draw-bar when the front ends of the corresponding pattern-fingers m' are lifted by pins on the pattern-surface. The upper catches h are normally held by their own weight in inoperative position, but in a similar manner may have their notched rear ends lifted into the path of the upper draw-bar c by the action of the pattern-fingers m. When any catch $h\,h'$ is thus moved into the path of its draw-bar, said draw-bar on its next forward stroke engages the catch and moves it and the slide d or d', to which it is attached, forward in a circular path, thereby drawing one end of the corresponding cross-lever a forward (as is seen with respect to one of said cross-levers in Fig. 1) and operating the corresponding harness-lever b and raising the corresponding harness, the other end of the cross-lever acting as a fulcrum during this operation.

The catches $h\,h'$ have formed on their inner edges the projections or hooks $h^4\ h^5$, adapted to take over the cross-bars $e\ e^2$ on the dobby-frame when the said catches and slides are in normal position, thus preventing the inoperative catches and slides from being moved forward by frictional engagement with their moving neighbors.

As seen in Fig. 1, the levers $b\ b$ have harness connections at both ends, so as to positively raise and depress the harness-frames, and in such case the several slides $d\ d'$ will have formed on their outer edges hooks $d^4\ d^5$, which are engaged by the rear edges of the draw-bars $c\ c'$ on the back stroke of said draw-bars, so as to positively return the harness or heddle levers. Fig. 14, however, represents a form of dobby constructed to raise the harnesses only, the said harnesses being depressed by springs in a well-known manner, and the slides $d\ d'$ therefore in this case have no such projections $d^4\ d^5$. It will be seen that by thus constructing the dobby I have provided a very compact arrangement, the pivotal catches on the ends of the slides being brought forward and directly operated by the pattern-fingers.

A convenient method of attaching the catches to the slides is represented in Fig. 9, where it is seen that the said catches are provided with apertures occupied by short pivot-studs formed on the slides. Each pivot-stud is bored with a tapered hole contracted at its mouth, and in said hole is sprung a split pin or retainer n, the ends $n'\ n^2$ of which are bent over and overlap the catch h. The said catch is also slightly recessed on its face to receive the ends of the pin, and the pivot-stud is slotted to receive said ends, all as clearly shown in Fig. 9.

The mechanism for operating the pattern-cylinder k is organized as follows: o is a toothed wheel having radial teeth and affixed to the shaft of said pattern-cylinder, and p is a rod or bar mounted to slide in suitable brackets on the frame of the machine and reciprocated by engagement with a tooth carried on the shaft b', as represented in Fig. 3. On a stud at the forward end of said slide is loosely pivoted a weighted dog p', whose upper end is adapted to engage the teeth on the wheel o. The slide-bar p is forced into contact with the surface of the wheel o by means of a spring o'. q is a plate mounted to slide transversely in the bar p and having, as represented in Figs. 7 and 8, two abutments which are adapted to engage the dog p' on opposite sides below its pivot. When the said plate is in the position represented in Fig. 7, the forward abutment engages the dog and prevents its upper end from turning to the right, but permits the same to turn freely to the left. The dog will therefore operate the pattern-cylinder when the slide-bar p is moved in the direction of the arrow p^3 and will turn said pattern-cylinder around to the right. When the plate q is in the position represented in Fig. 8, its rear abutment engages the other side of the dog p' and holds the same so that the pattern-cylinder will be turned around to the left by the strokes of the slide-bar p in the direction of the arrow p^2. For the purpose of operating the plate q I provide a bar q', mounted to slide vertically in a suitable bracket on the frame of the machine and occupying a slot q^4 in the plate q, which is elongated to allow for the longitudinal reciprocation of said plate. At its lower end the bar q' is inclined or cam-formed, as shown in Fig. 6, so that when moved vertically it will move the plate q in one direction or the other. At its upper end said bar is slotted transversely and engaged by the wrist-pin of a short crank q^3, which is carried by a rod q^2, mounted in suitable bearings. This rod extends to a point within the reach of the weaver and when turned in one direction or the other will operate the plate q, as described, and cause the pattern-surface to be impelled either forward or backward, as desired.

Referring now to Figs. 11, 12, and 13, wherein I have shown an improved mechanism for supporting and operating the heddle or harness frames of a loom, $v\ v$ represent said harness-frames, and $r\ s\ t\ u$ and $r'\ s'\ t'\ u'$ represent two series of levers mounted above and below the harness-frames, respectively, on fulcrums $r^2\ s^2\ t^2\ u^2$ and $r^3\ s^3\ t^3\ u^3$. The middle levers in each set are formed with intermeshing gear-segments, so as to oscillate in unison, and the end levers are connected to said middle levers by means of links w. The middle and end levers—as t and u, for instance—are of such length and so arranged that the middle of the link w moves in a true vertical path. Cords or other coupling-pieces

v' v' connect the harnesses v v with studs or pins w', Fig. 12, placed centrally in the links w. The ends of the levers t u, &c., are slotted and pivoted on end studs w^4 w^5 in said links, and in the upward and downward movements of the levers their ends press alternately against said studs and against solid parts w^2 w^3 of the links. Those end levers at the left of the loom are formed as bell-cranks, as seen in Fig. 11, and are connected with and operated by the heddle-levers b in the dobby, as will be readily understood. By the described arrangement the harness-frames are moved vertically in rectilinear paths. Although I have shown a double arrangement of the levers for operating harness-frames, such as would be required in a wide loom, it will readily be understood that a single arrangement could readily be applied for narrow looms.

For the purpose of securely fixing the heddle-levers b and the levers r s t u, &c., upon their respective pivotal shafts b' and r^2 s^2 t^2 u^2, &c., I form said levers with open-ended slots of sufficient width to receive said shafts, and these slots I close by means of removable retaining-pieces y, as clearly represented in Figs. 1 and 13. The walls of the slots are preferably made of irregular form or divergent inside of their mouths or outer ends, and the pieces y are correspondingly shaped and adapted to be inserted and removed by lateral movement with respect to the levers.

As the several levers of each kind are grouped closely together, with their hubs in contact, the filling-pieces y do not need other retaining means than their friction in the slots and the proximity of neighboring levers, and since the filling-pieces are so retained without means for binding them on the shaft the levers and said pieces are free to oscillate on said shaft independently of each other. Owing to this provision for placing and holding the levers on the shaft, said levers cannot possibly "jump" from the shaft when moving rapidly, and, moreover, the slots may be formed in any direction in the hubs of the levers—either above, below, or to one side of the shaft—as may be most convenient without liability of the levers or their filling or closing pieces becoming displaced.

I claim—

1. In a loom shedding mechanism, a dobby-frame, a series of heddle-levers, a series of cross-levers pivoted thereto, segmental slides engaging the ends of said cross-levers, guides on the dobby-frame supporting said slides and guiding the same in circular paths, said slides and guides making a structure of general cylindrical form, draw-bars moving in circular paths, and pattern-controlled mechanism adapted to effect operative engagement between said draw-bars and slides.

2. In a loom shedding mechanism, a series of heddle-levers, a series of cross-levers pivoted thereto, segmental slides directly engaging opposite ends of said cross-levers, and making a structure of general cylindrical form, stationary guides supporting said slides and arranged to direct them in circular paths, oscillating draw-bar levers, draw-bars attached directly thereto and moving in circular paths outside of the slides, and pattern-controlled mechanism adapted to effect operative engagement between said draw-bars and slides.

3. In a loom shedding mechanism, a series of heddle-levers, a series of cross-levers pivoted thereto, a series of slides engaging said cross-levers, a series of pattern-controlled catches pivotally mounted on said slides, the connection between said catches and slides comprising a pivot-stud on one of the members, on which the other member turns, the said stud being formed with a recess contracted at its mouth, and a split pin sprung into said recess and having its ends bent over to overlap the said other member, and draw-bars adapted to engage the catches and cause the operation of the heddle-levers.

4. In a loom shedding mechanism, a shaft, a series of levers loosely pivoted thereon side by side, and having hubs in contact with each other and slotted radially to permit of the lateral removal of said levers from the shaft, and closing-pieces fitted in said slots and held therein longitudinally of the shaft, only by friction and the proximity of neighboring lever-hubs, said levers and their closing-pieces being free to oscillate on the shaft independently of each other.

5. In a loom shedding mechanism, a pattern-cylinder and means for rotating the same in either direction, said means comprising a toothed wheel on the cylinder-shaft, a regularly-reciprocated member, a dog pivoted to swing freely on said member and operating when in a central or intermediate position to move said toothed wheel, and means for stopping said dog on one side or the other to cause it to operatively engage the toothed wheel on the forward strokes only, or on the backward strokes only, of the reciprocating member.

6. In a loom shedding mechanism, a pattern-cylinder and means for rotating the same in either direction, said means comprising a toothed wheel on the cylinder-shaft, a regularly-reciprocated member, a dog pivoted to swing freely on said member and operating when in a central or intermediate position to move said toothed wheel, a part movable on the reciprocatory member and having two abutments adapted to stop the dog on opposite sides respectively, thereby causing it to operatively engage the toothed wheel on the forward strokes only or on the backward strokes only, of the said reciprocatory member, and manually-operated means for moving the said part.

7. In a loom shedding mechanism, a dobby-frame, a pattern-cylinder and means for rotating the same in either direction, said means comprising a toothed wheel on the cylinder-shaft, a reciprocatory sliding bar, a dog

loosely pivoted thereto, a member movably mounted on said slide and having two abutments adapted to engage said dog on either side and forming rigid stops therefor, causing the dog to operatively engage the toothed wheel on the forward strokes only, or on the backward strokes only of said slide, and a cam mounted on the dobby-frame and engaging and operating said slide to bring one or the other of said abutments into action.

8. In a loom shedding mechanism, a dobby-frame, a series of heddle-levers, a series of cross-levers pivoted thereto, pattern-controlled mechanism engaging said cross-levers and forming a substantially-cylindrical structure inclosing the same, draw-bars coöperating with said mechanism to operate the heddle-levers, levers pivoted independently to the dobby-frame on opposite sides thereof and supporting said draw-bars, a cross-shaft, means for oscillating said shaft, and toothed gear connections between said shaft and the draw-bar-supporting levers whereby the latter are simultaneously oscillated.

9. In a loom shedding mechanism, the combination of a heddle-frame, the independently-pivoted levers *t u*, means for oscillating said levers, the link *w* connecting said levers, and a connection between said link and the harness-frame, whereby the latter is moved in a rectilinear path by the oscillation of said levers.

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