(No Model.) 3 Sheets—Sheet 1.

C. A. LITTLEFIELD.

LOOM FOR CROSS WEAVING.

No. 371,081. Patented Oct. 4, 1887.

FIG. 1.

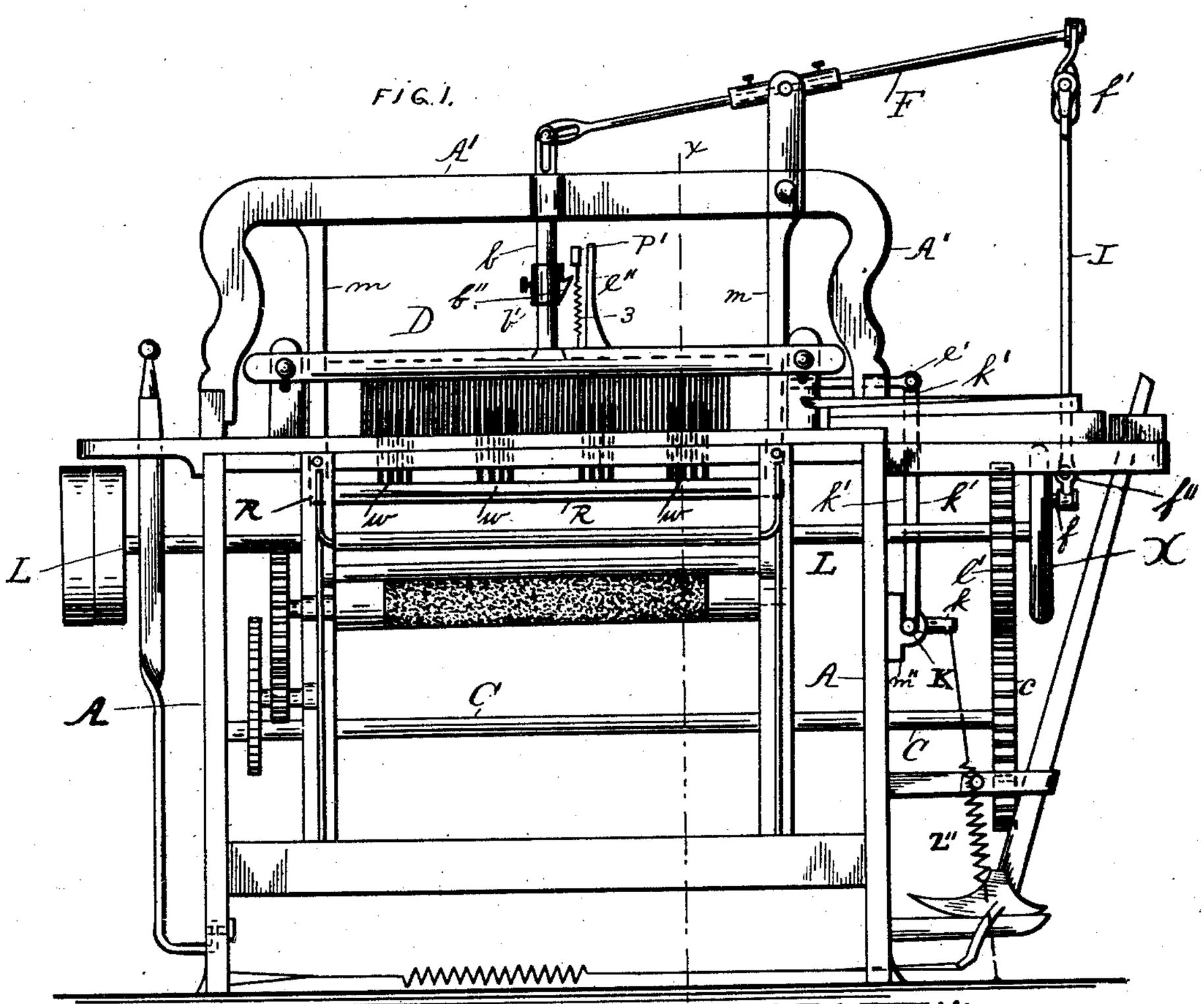
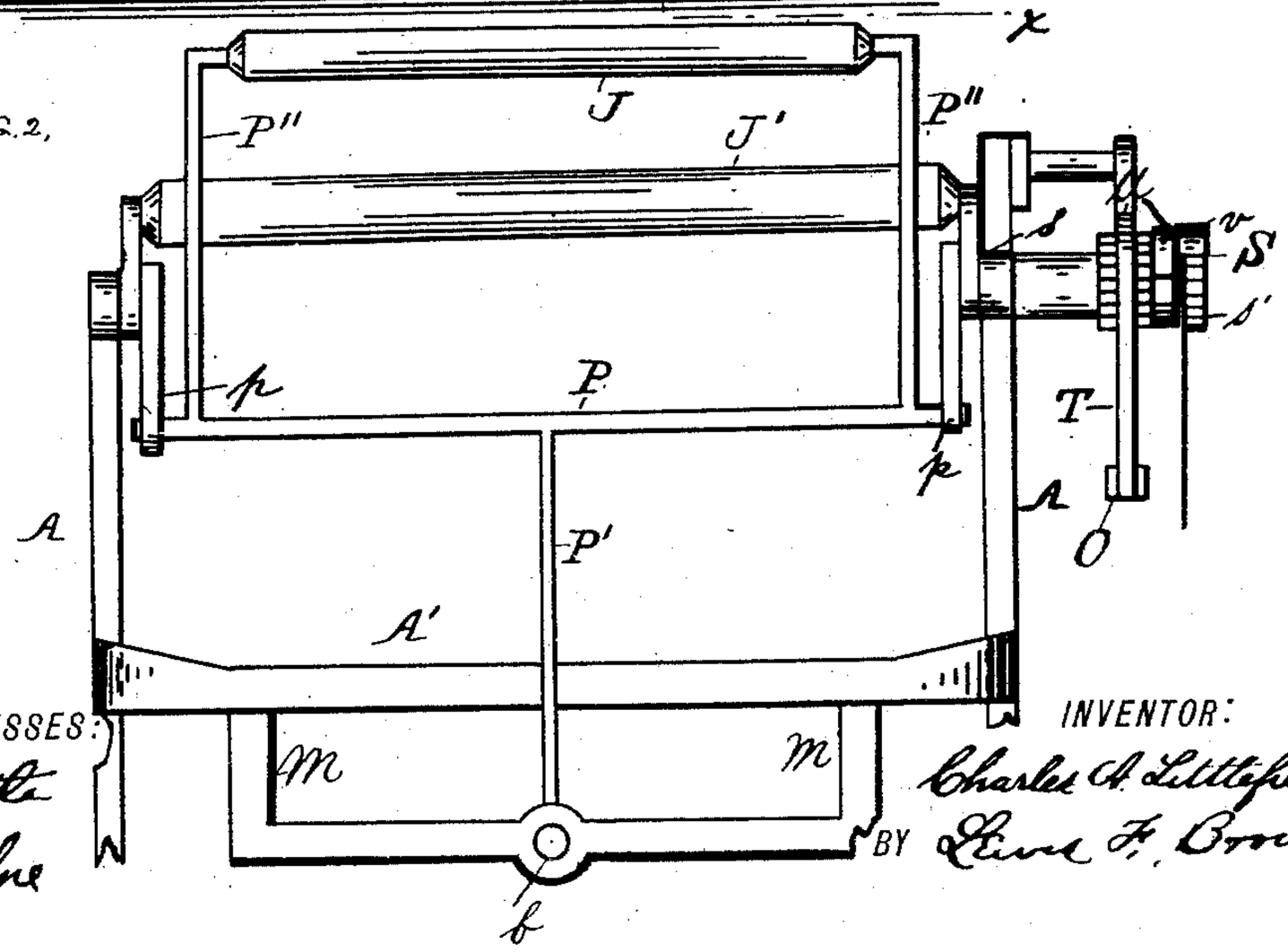


FIG. 2.



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INVENTOR:
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(No Model.) 3 Sheets—Sheet 2.

C. A. LITTLEFIELD.

LOOM FOR CROSS WEAVING.

No. 371,081. Patented Oct. 4, 1887.

FIG. 3.

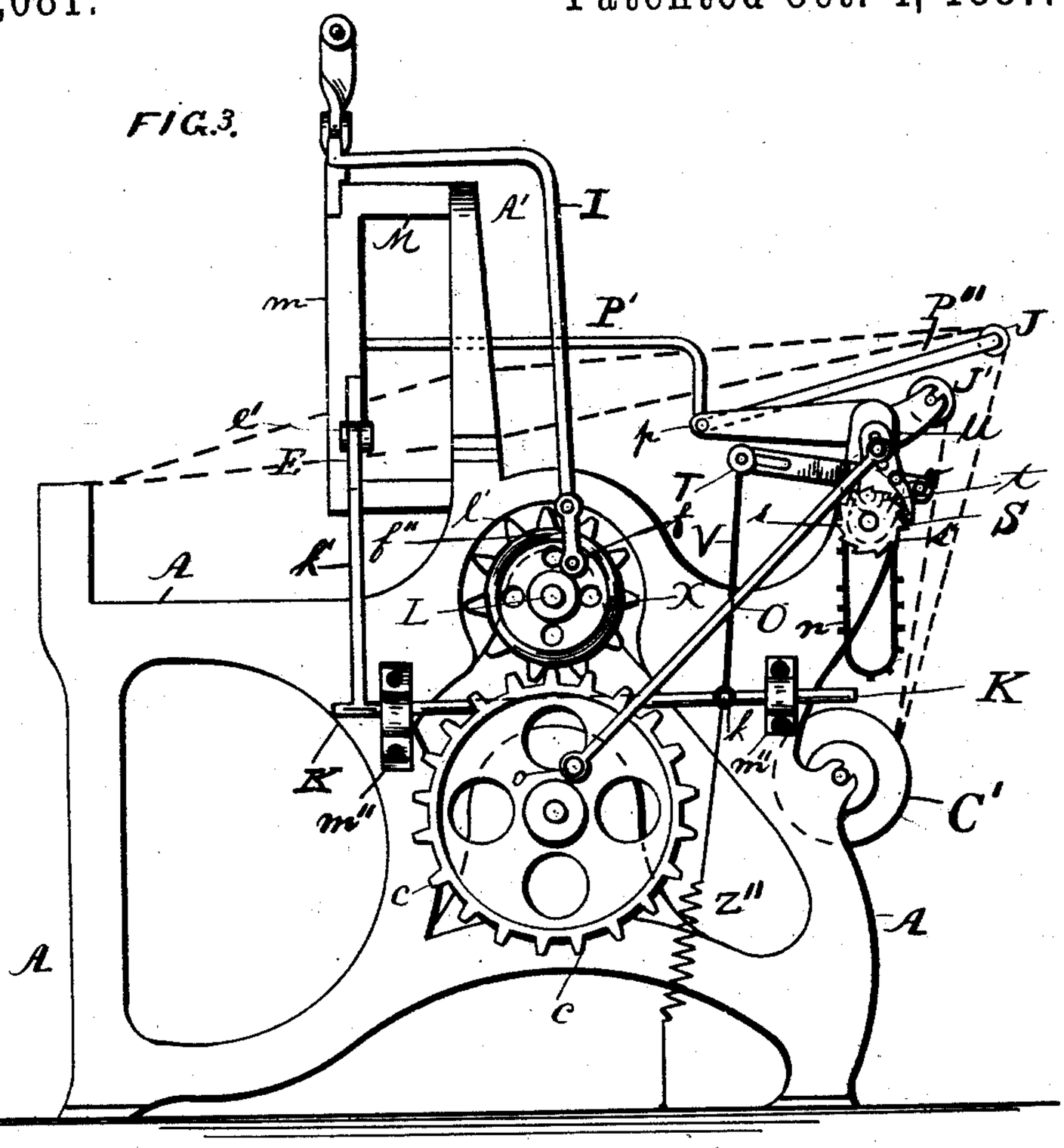
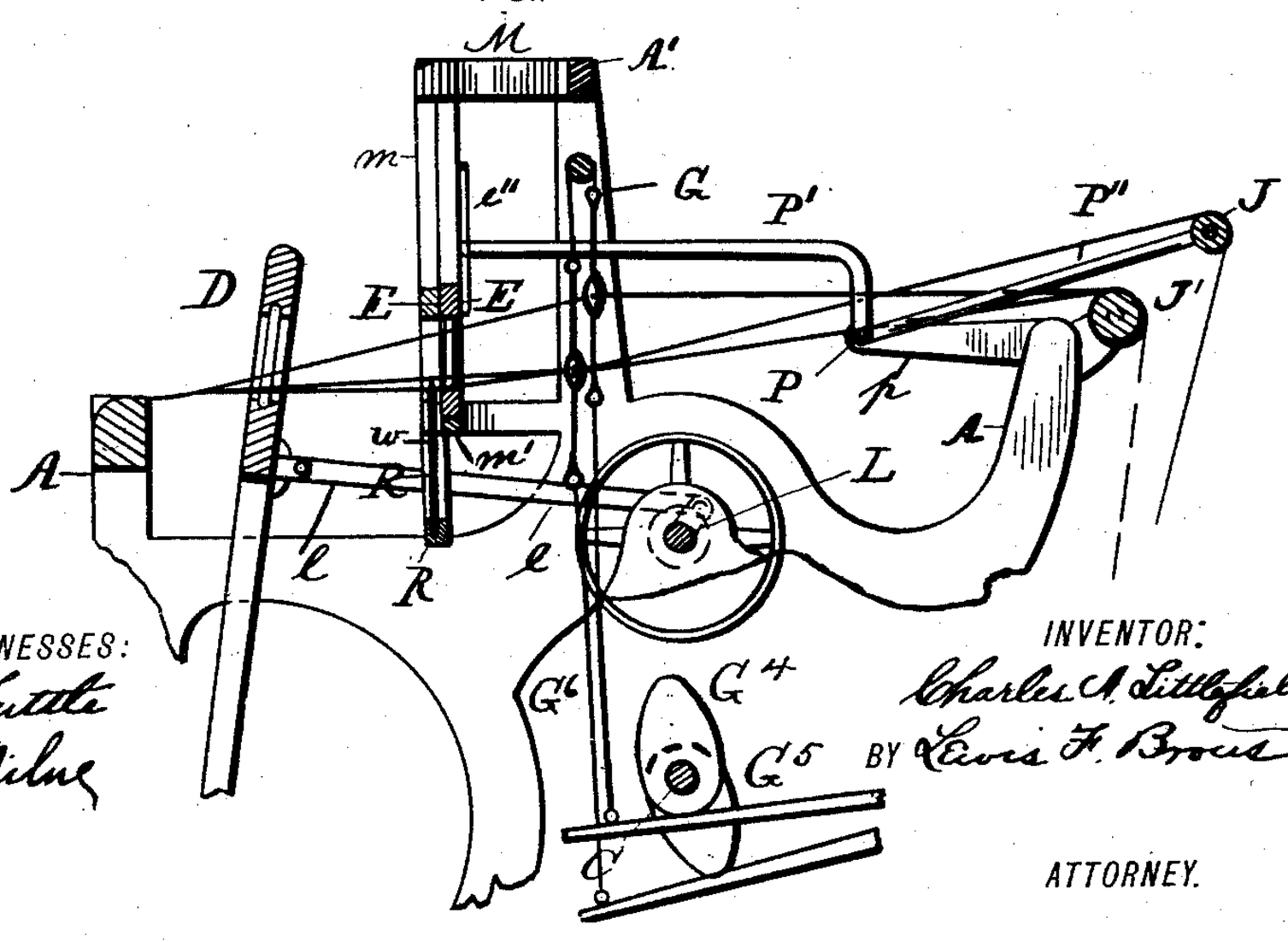


FIG. 4.



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(No Model.) 3 Sheets—Sheet 3.

C. A. LITTLEFIELD.

LOOM FOR CROSS WEAVING.

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FIG. 11.

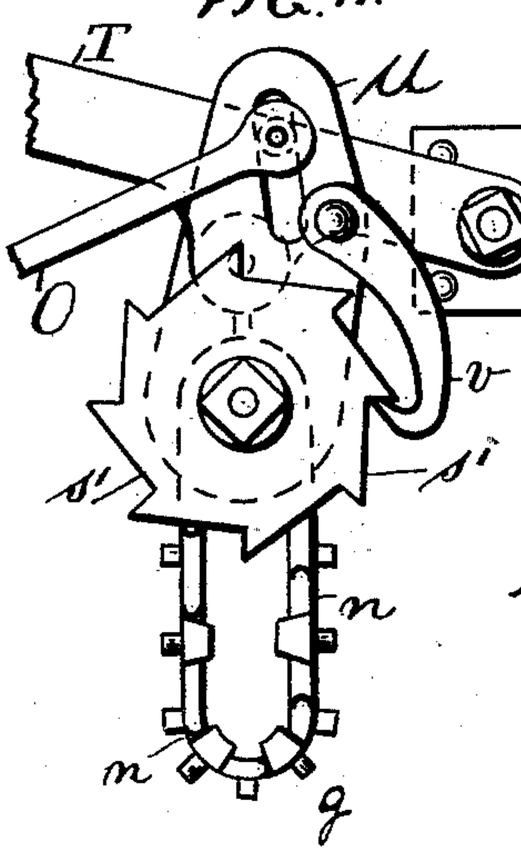


FIG. 5.

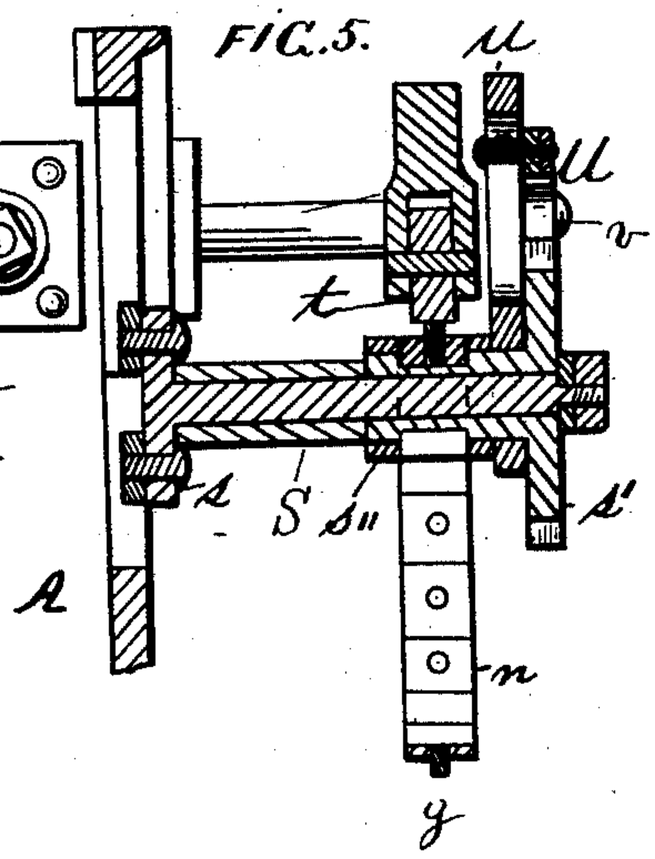


FIG. 12.

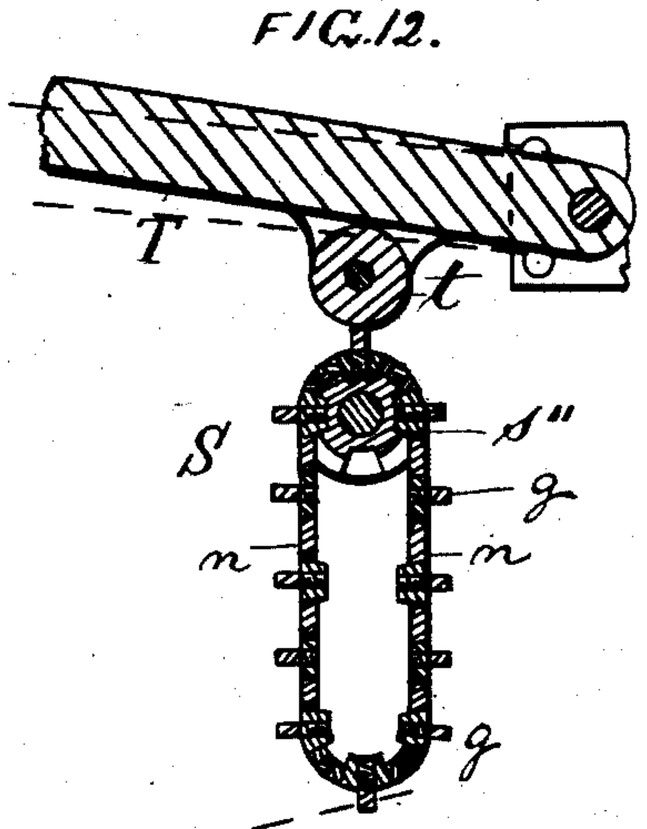


FIG. 6.

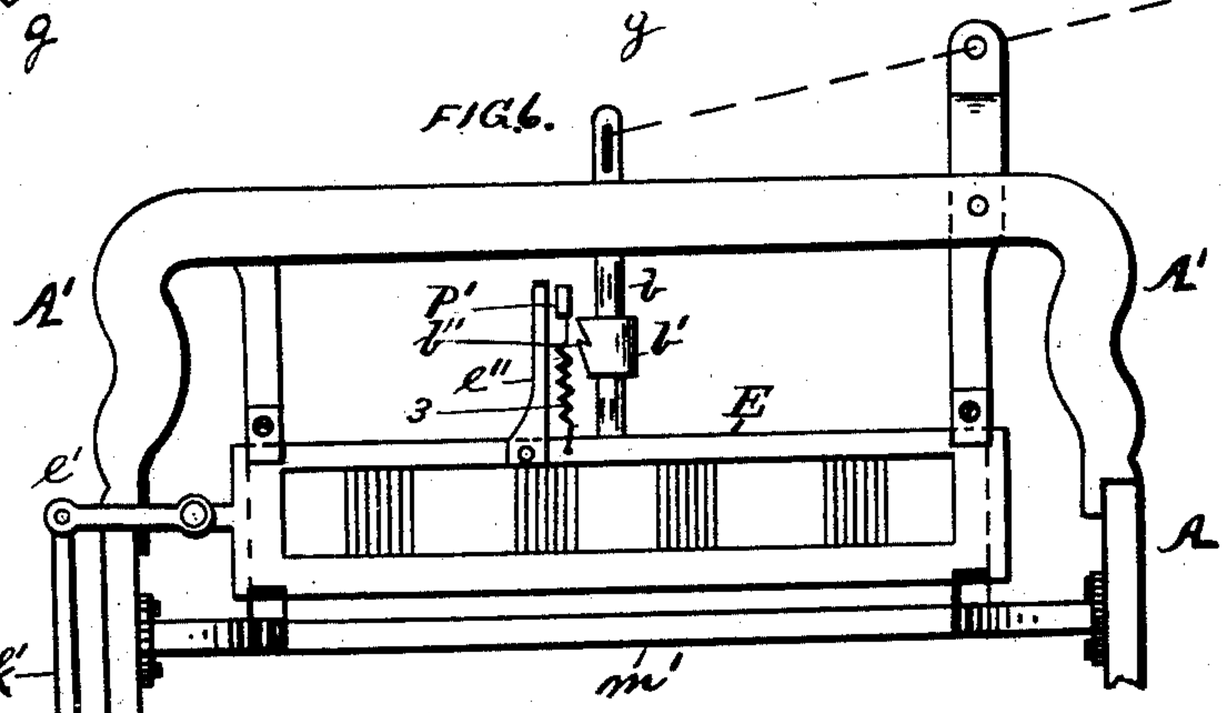


FIG. 8.

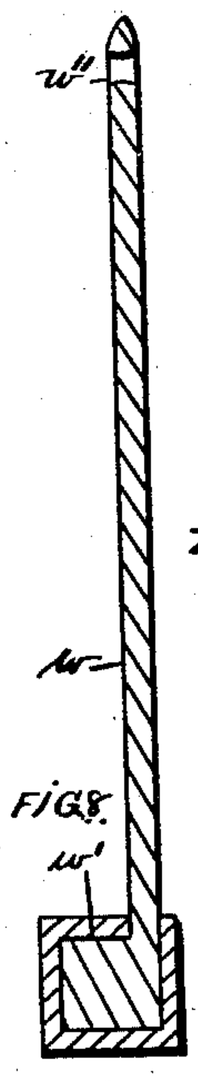


FIG. 7.

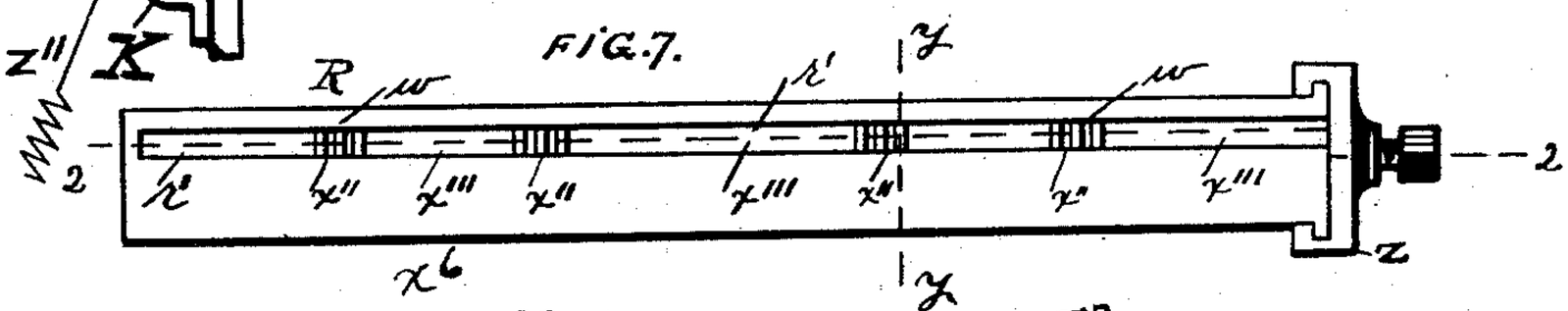


FIG. 10.

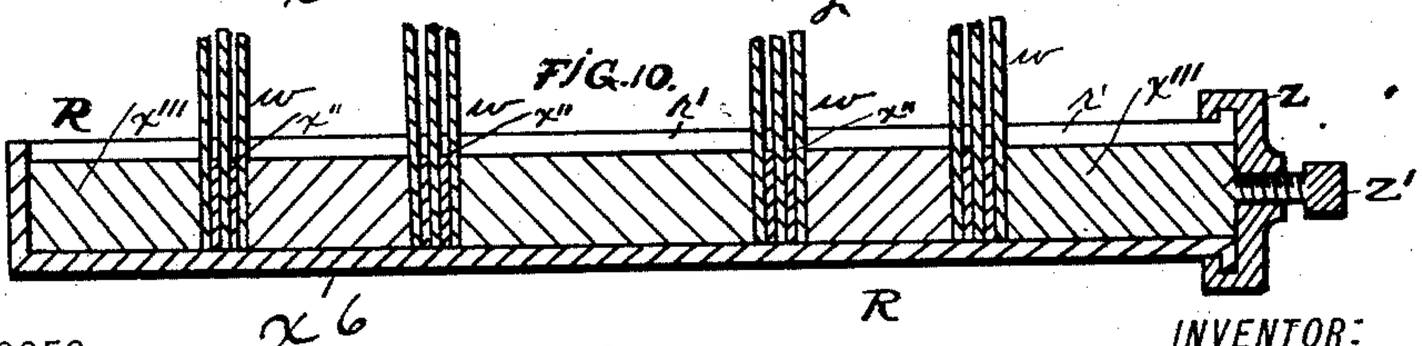
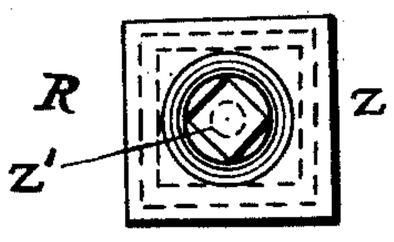


FIG. 9.



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UNITED STATES PATENT OFFICE.

CHARLES A. LITTLEFIELD, OF FALL RIVER, MASSACHUSETTS, ASSIGNOR TO ELIAS A. TUTTLE AND JAMES T. MILNE, BOTH OF SAME PLACE.

LOOM FOR CROSS-WEAVING.

SPECIFICATION forming part of Letters Patent No. 371,031, dated October 4, 1887.

Application filed September 20, 1886. Serial No. 214,070. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. LITTLEFIELD, a citizen of the United States, residing at Fall River, in the county of Bristol, State of Massachusetts, have invented a new and useful Improvement in Looms for Cross-Weaving, of which the following is a sufficiently clear and exact description to enable others skilled in the art to which it appertains to make and use the same.

This invention relates to looms for weaving leno and similar fabrics, in which some of the warp-threads are caused at intervals to cross or partially twist around adjacent warp-threads.

Heretofore in weaving such fabrics it has been usual to employ what are known as "doup" or "dupe" heddles; but the wear and strain to which the loops of these heddles are subjected soon destroy them, and render their employment very expensive. Moreover, such heddles cannot be employed to advantage upon high-speed looms.

The object of my invention is to replace the ordinary devices by devices which shall be more durable, and also shall enable the loom to which they are applied to be run at a comparatively high rate of speed.

My invention consists of devices hereinafter fully described, and specifically pointed out in the claims at the close of this specification, comprising a vertically-movable comb, through eyes in the extremities of the dents or teeth of which a portion of the warps are passed, first having passed through the eyes in the heddles of one of the heddle-frames, a laterally-sliding reed which serves to effect the lateral displacement of the warps around which the threads of the needle are crossed, connected pattern devices for controlling the lateral movement of the reed, a support and guide for the said reed, and a whip-roll moved by and in unison with the comb for the purpose of easing the warp-threads at the moment of crossing.

In the accompanying drawings, Figure 1 is a view in front elevation of a loom embodying my invention. Fig. 2 is a plan view of portions thereof. Fig. 3 is an end elevation thereof. Fig. 4 is a view of a part thereof in vertical section. Figs. 5, 6, 7, 8, 9, 10, 11, and 12 are views of details.

A is the loom-frame. A′ is the arch thereof.

L is the crank-shaft, connected by pitmen *l* to the lay D, Fig. 4, in the usual manner.

C is the cam-shaft, driven from the crank-shaft by gears *l′ c*, as usual.

G is the usual harness or heddles, which may be operated in any ordinary manner. In Fig. 4 I have represented them as actuated by means of cams G^4, engaging treadles G^5, connected with the heddle-frames by cords G^6.

C′ is the beam for the warp-threads, and J is a whip-roll, over which pass from the beam C′ the portions of the warp-threads which pass through the eyes in the dents or needles of the comb hereinafter described.

J′ is a roll over which pass such portions of the warps as are merely drawn through the harness and not through the eyes in the dents or needles of the comb.

M is a frame-work applied to the arch A′, and constructed with vertical guides or side pieces, *m m*, between which moves vertically the comb R, and with a horizontal cross-piece, *m′*, connecting the side pieces, *m m*, upon which cross-piece the reed E moves laterally.

Comb R has connected therewith a slide-rod, *b*, moving within an opening therefor in the frame-work M, and connected at its top with the inner end of a lever, F, pivoted to a bracket upon frame-work M, as shown in Fig. 1, and connected at its outer end by a link, *f′*, to a rod, I, which in turn is connected at its lower end by a link, *f″*, to a crank-pin, *f*, upon the fly-wheel X, mounted on the end of the crank-shaft.

Reed E is connected by a link, *e′*, to a vertical arm, *k′*, of a horizontal rock-shaft, K, mounted at the side of the loom. An arm, *k*, on this rock-shaft has attached thereto one end of a spring, *z″*, the other end of which is attached to the loom-frame or to the floor, and this spring acts to draw the reed E toward the right-hand side of the loom. The arm *k* is connected by a rod, V, to an arm, T, pivoted to the loom-frame and resting upon the pattern-chain *n*, the links of which are provided with projections *g*, according to the pattern to be produced. This chain *n* passes around

a barrel, *s''*, having connected therewith a ratchet-wheel, *s'*, which is engaged by a pawl, *v*, upon a swinging arm, U, connected by a rod, O, to a crank-pin, *o*, upon the gear *c*.

The projections on chain *n*, acting through the intermediate devices, act in such a manner as to impart to the reed E a movement from right to left.

Projecting from the top of reed E is an arm, *e''*, which, when said reed is moved toward the left-hand side of the loom, comes in contact with the forwardly-projecting arm P' of the frame P' P'', and presses the said arm laterally into position to be engaged by the spur *b''* on the collar *b'*, made fast to the rod *b*. When the comb R next rises to carry the threads passed through the eyes in the dents or teeth thereof to the top of the shed, the projection or spur *b''*, by engagement with the arm P', rocks the frame P' P'', which is pivoted at *p p*, and carries in its rearwardly-extending arms P'' P'' the whip-roll J, so as to give the necessary slackness to the threads as the comb rises, the forwardly-extending arm P' having attached thereto one end of a spring, 3, connected at its opposite end to the top of the reed E. This spring acts to raise the whip-roll J.

Instead of whip-roll J, which is provided when all the threads are wound in common upon beam C', and over which the threads of comb R are passed, as shown, a separate warp-beam containing the warp-threads passed through the eyes of comb R may be carried on the arms P'' P''.

The dents in reed E and teeth in comb R may be spaced as desired, according to the pattern to be produced.

In Fig. 4 I have shown the threads which pass through the eyes of comb R also passed through the eyes of the front heddle-frame.

In operation, the reed being in its right-hand position, the comb R and front heddle-frame are simultaneously raised, a pick of weft is made, and then, the comb R and the front heddle-frame being depressed and the rear heddle-frame being raised, the reed E is shifted laterally, carrying with it, from points above one side of the dents of comb R to points above the other side thereof, the threads raised by the rear heddle-frame. Comb R is then raised to carry its threads to the upper plane of the shed and a pick of weft is made.

In order to afford the necessary slack in the threads of the comb to permit the elevation thereof, whip roll J is depressed by means already described. Comb R and the front heddle-frame are depressed and the rear heddle-frame raised, reed E is moved in the reverse direction, comb R is again raised, another pick of weft is made, and so on. The timing of the lateral movements of the reed E is controlled by the pattern devices connected therewith.

Sheds in the warps suitable for plain weaving are made by harness G, as usual, the threads being crossed only when a pin on the pattern-chain acts to move reed E laterally. The teeth or dents *w* of the comb R have eyes *w''* near the free extremities thereof, as shown in Fig. 8. The comb, and, if desired, the reed E also, is constructed as follows: Dents *w* are formed with enlarged heads or ends *w'*, which are fitted within a hollow rib or bar, x^6, as shown in Fig. 10, said bar being slotted on one side at *r'* for the stems of said dents or teeth. Spacing-pieces *x''* are placed between adjacent dents or teeth in each set or group, and the various sets are separated by filling-blocks *x'''*. One end of bar x^6 is closed, as shown, and the other is flanged externally to receive the cap *z*, through which is passed the screw *z'*, by means of which the parts within the bar are tightly pressed together.

I claim—

1. The combination, with comb R, independent reed E, and means for imparting a vertical motion to the said comb and a lateral movement to the said reed, of stationary guides *m*, between which the comb moves vertically, said guides having the part *m'*, upon which the reed is sustained, as and for the purpose set forth.

2. The combination, with the comb R, independent reed E, means for imparting a vertical movement to said comb and a lateral movement to the said reed, and stationary guides *m*, between which the comb moves vertically, said guides having the part *m'*, upon which the reed is sustained, of the harness G and means whereby the said harness is operated in conjunction with the vertically-moving comb and laterally-moving reed, substantially as set forth.

3. The combination, with reed E, link *e'*, and rock-shaft K, having arms *k k'* affixed thereto, of rod V, arm T, the pattern-surface, means for operating the said surface, and spring *z''*, substantially as described.

4. The combination, with the frame P, having three distinct members or arms, P' P'' P'', and warp-beam or whip-roll J, mounted in the arms P'' P'', of the upright bracket *e''*, reed E, and means for moving said reed laterally, collar *b'*, rod *b*, means for moving the same vertically, and spring 3, all constructed and arranged to operate in the manner and for the purpose set forth.

5. A reed or comb bar, slotted as described, having removable needles or teeth *w*, intervening space-pieces *x''*, blocks *x'''*, cap *z*, and set-screw *z'*, as set forth.

In testimony that I claim the foregoing as my invention I have subscribed my name in the presence of two witnesses.

CHARLES A. LITTLEFIELD.

Witnesses:

ELIAS A. TUTTLE,

JAMES T. MILNE.