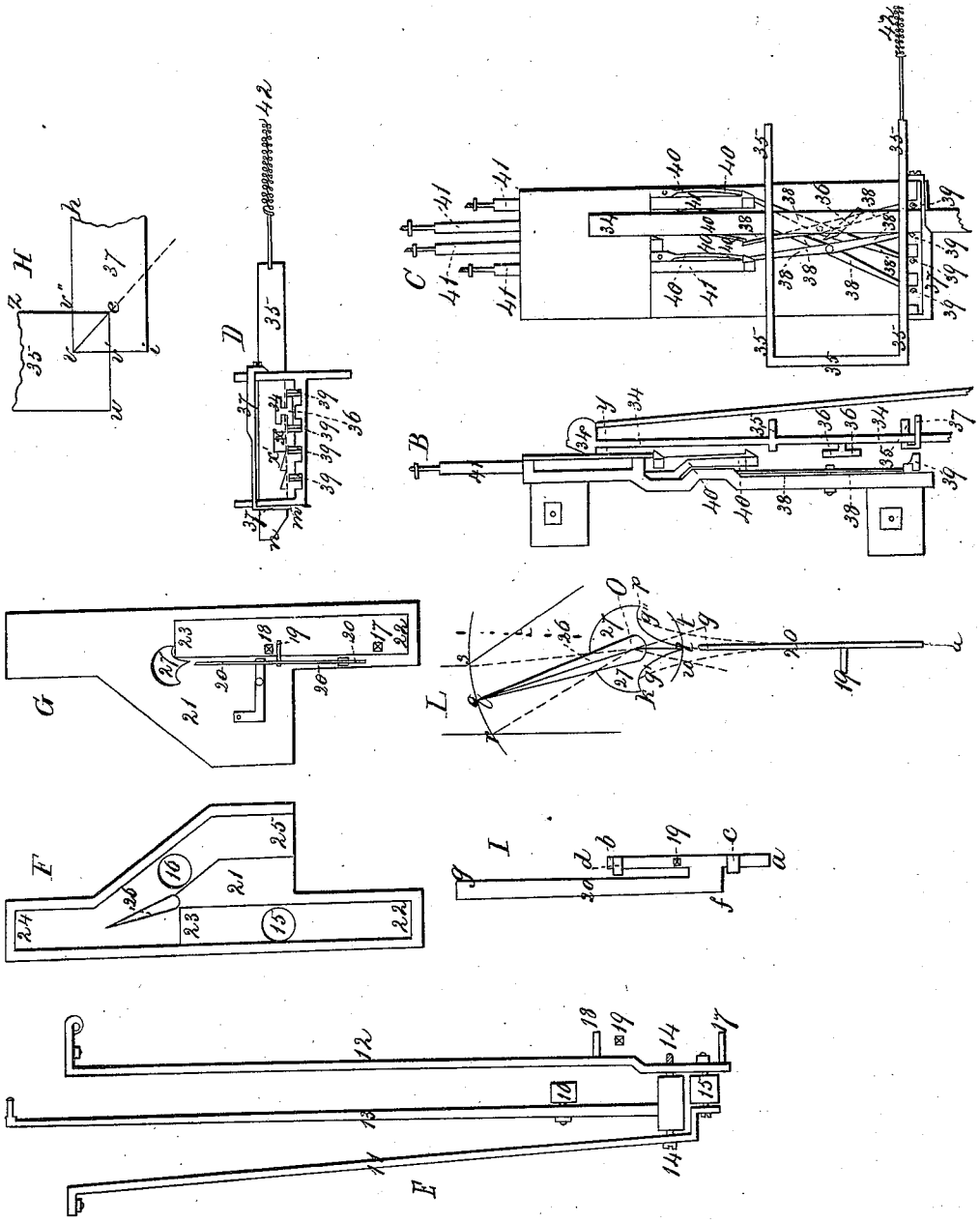
Sheet 1-3 Sheets.

Bigelow & Butler.

Loom.

No. 6,035. Patented Jan. 16, 1849.



Sheet 2 - 3 Sheets.

Bigelow & Butler.

Loom.

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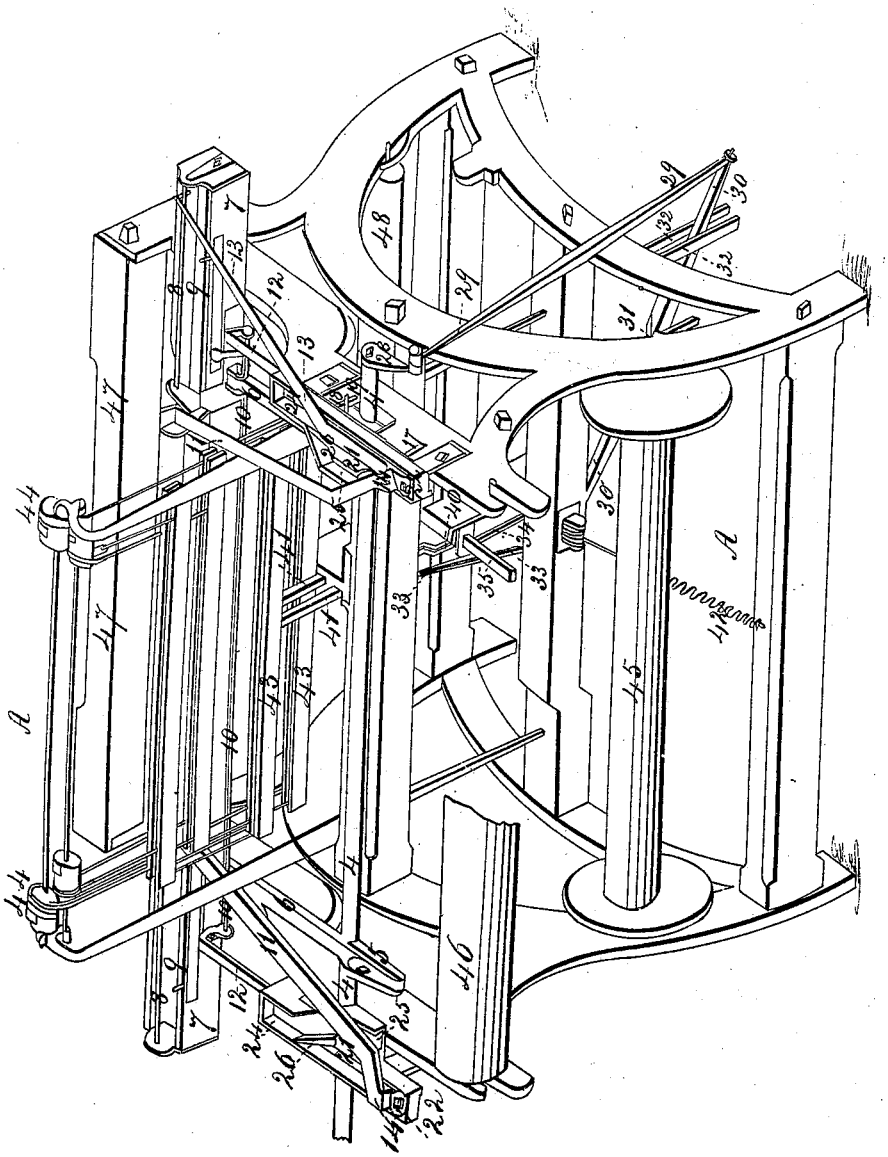

Sheet 3-3 Sheets.

Bigelow & Butler.

Loom.

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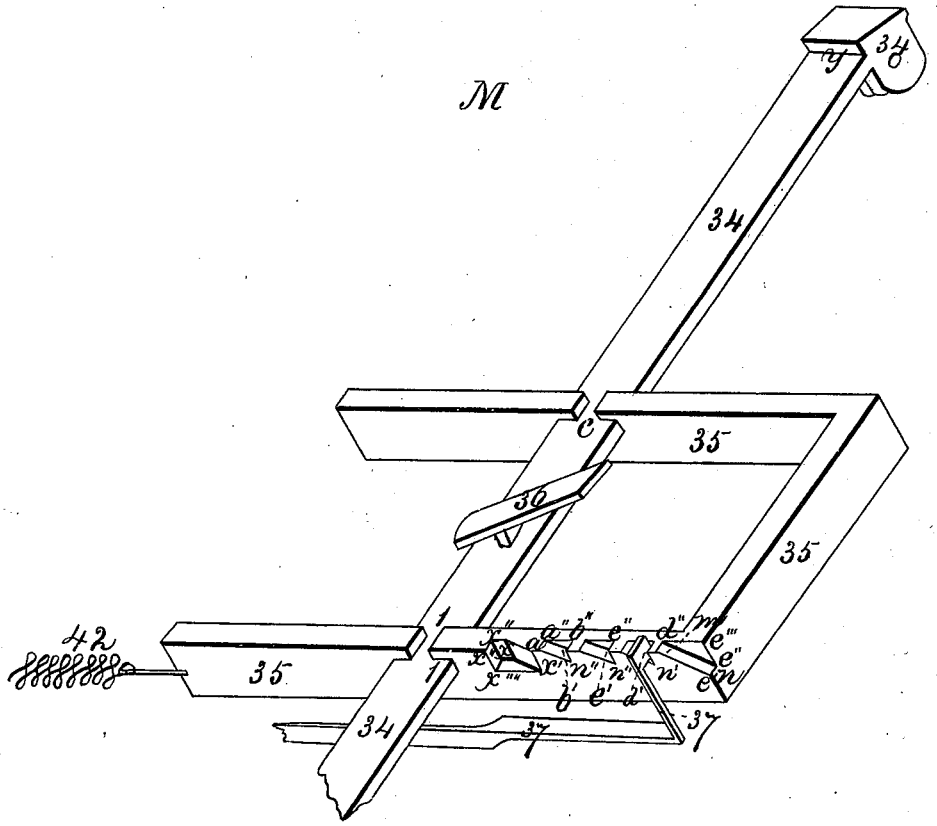

UNITED STATES PATENT OFFICE.

ALFRED BIGELOW AND J. BUTLER, OF GRANVILLE, OHIO.

LOOM.

Specification of Letters Patent No. 6,035, dated January 16, 1849.

To all whom it may concern:

Be it known that we, ALFRED BIGELOW and JUSTUS BUTLER, of Granville, Licking county, Ohio, have invented a new and useful Improvement in the Construction of Looms, which is described as follows, reference being had to the annexed drawing, making a part of the specification, in which—

A is an isometrical drawing of the loom.

B is a front view of the marcher plate and its appendages.

C is an end, and D a bottom view of the plate, and H is a figure to explain the operation of the catch 37.

M is an isometrical drawing of the marcher, oblique slide, marcher slide, and catch 37.

E represents the picker arm and picker staff, viewed from the end of the loom.

F represents the top, and G the bottom, of the picker table.

I is a side view of the slide spring 20.

L is a figure to explain the operation of the alternator 27, and picker valve 26.

In drawing A, 4 is the main shaft.

5 is one of the cranks that drive the lathe; 6 the lathe pitman; 7 is the lathe, 8 the picker rods, 9 the shuttle boxes, 10 the protection rod, 11 and 12 (drawings A and E) the upper and lower parts of the picker arm, 13 the picker staff (as seen in A and E); 14 the pin on which the staff turns (as seen in drawings A and E); 15 the roller that guides the arm (as seen in drawings E and F); 16 the picker roller (as seen in E and F); 17 and 18 are pins in the lower part of the picker arm (see drawings A, E and G); 19 is a pin in the slide, spring 20 (as seen in the drawings A, E and G); 20 is the slide spring (seen in G and I); 21 is the picker table (as seen in drawings A, F and G); 22—23 is a mortise in the picker table (see drawings F and G); 22, 24, 25 is a forked furrow in the top of the table (see drawings A, F); 26 is the picker valve (see drawings A F and L); 27 is the alternator (see drawings G and L), (for 28, 29, 30, 31 and 32 see drawing A); 28 is a crank, 29 a pitman, 30 a lever, 31 a fulcrum, 32 a guide for the lever 30, 33 is the marcher pitman (see drawings A and B); 34 is the marcher (see drawings A, B, C, M and D); 35 is the marcher slide, 36 is an oblique slide on the marcher, 37 the catch (for these see drawings B, C, D and M); 38 is a set of levers (see drawings B, C); 39 pins on the ends of the levers (see drawings B C and D); 40 is a set of catch springs (see drawings A B and C); 41 the heddle guide (see A, B and C); 42 a spiral spring (see drawings A, C, D and M); for the following see drawing A: 43 the heddle bars, 44 the heddle rollers, 45 is the warp beam, 46 the warp roller, 47 the breast beam, 48 the cloth beam.

Construction and operation.—The loom is driven by a strap on a pulley, similar to other looms. The main shaft, crank, lathe pitmen, lathe, shuttle box, protection rod, and the contrivance for rolling up the cloth, are all like that of other looms, and consequently need no description.

Description of the picker table.—The picker table is a table like piece of metal, bolted to the frame of the loom, having the straight branch of the furrow 22, 24 (see drawings A and F) parallel to the motion of the lathe. The crooked branch of the furrow 24, 25 (see drawings A, F) turns inward at the front end of the picker valve at an inclination with the other, 22, 24 (see A F) sufficient to give the required velocity to the picker staff, and a departure sufficient to move the picker staff the required distance. The remainder of the furrow 24, 25 (see drawings A F) is parallel to the first part, and to the furrow 22, 24 (see A and F).

The picker valve.—The picker valve is a wedge like piece set in the top of the picker table, at the junction of the furrows, with the point toward the front of the loom, its breadth is equal to the depth of the furrow, and its length equal to the distance across the straight furrow 22, 24 (see drawings A, F), in the direction of the oblique part of the crooked furrow, and equal to the distance across the crooked furrow in the direction of the straight furrow, so that when the valve is set across either furrow, it abstracts it, and clears the other. The axis of the valve is at the back or larger end, and extends downward through the bottom of furrow, protruding some distance below the bottom of the table.

The alternator.—The alternator is so called because it causes the picker valve to open the straight furrow, and shut the crooked one, at one stroke of the lathe, and to open the crooked furrow and shut the

straight one the next stroke. The alternator is a short cylinder with two contiguous equal parts taken out of its circumference, so as to form a point, and a shoulder on each side of the point (see drawings G and L). The center of the alternator is attached firmly to that part of the axis of the valve that protrudes below the table, so that the valve and alternator have the same vertical axis, and move around a common center. The alternator is fixed with respect to the valve in such a position that when the valve is half opened, the line that joins the point and center of the alternator, will be parallel to the straight furrow in the picking table, the point of the alternator lying between its center and the back of the loom.

The slide spring.—The slide spring is a piece of steel of uniform thickness, cut to the lateral form represented in drawing I. *a*, *b*, is the slide part. *c* and *d* are supporters that keep the slide in the same direction, 19 is a pin in the slide part of the spring, on which the pins in the lower part of the picker arm act in moving the spring backward and forward. *f*, *g* is the spring part, the end *g* acts on the alternator.

Explanation of the motion of the valve 26.—Let *g*, *a* (see Fig. L), represent the line in which the slide spring 20 moves, 19 the pin by which the spring is moved, let *q*, O represent the valve 26 half open, and let *h*, *l*, *p* represent the alternator with its point on the line O, *l*, *a*, O being the common center. If the point of the valve 26 be moved to *r* it is plain that the point *l* of the alternator 27 will move along the arc *u*, *l*, *t* toward *t* past the line O, *l*, *a*. Now if a force be applied to the back of pin 19 the spring will move forward along the line *a*, *l*, O, and the point *g* will fall on the side *l*, *k* of the back point of the alternator and sliding out toward *k*, it will press on the shoulder *k* at *g'* in the direction *a*, *u*, *g'*, and move the point *q* of the valve along the arc *r s* to *s*, and the point of the alternator from *t* along *t*, *l*, *u* toward *u* past the line O, *l*, *a*. Again, if a force be applied to the front of the pin 19 the spring 20 will move back of the point *l* of the alternator 27, and the elasticity of the spring will bring it back to the line O, *l*, *a*. Now if spring 20 is driven forward as before the point *g* will fall on the side *l p* of the alternator 27, and sliding out toward *p* it will press on the shoulder *p* at *g''* in the direction of *a*, *t*, *g''*, and move the point *g* of 26 from *s* to *r*, and the point *l* of 27 from *u* toward *t* past O, *l*, *a* again. When the spring is drawn back again its elasticity brings it to the line O, *l*, *a*, and in the next forward motion of the spring 20 the point *g* falls on the side *l k* of 27 again, and so the operation proceeds, the spring 20 alternately pressing on the shoulders *k* and *p*, and the valve 26 alternately shutting the straight and crooked furrows.

The kicker arm.—The kicker arm consists of two parts extending from the back of the lathe for the purpose of affording a fulcrum for the picker staff, and a guide to the lathe. The upper part 11 of the picker arm passes over, and the lower part 12 passes under the table (in drawing A), and are connected through the mortise 22, 23 (see drawings A, F, G), by the axes of the rolls 15 and the staff 13 (see drawings A and E), the pins 17 and 18 are fixed in the bottom of the lower part of the arm perpendicularly downward in a position to come in contact with the pin 19 (see drawings A, E, G), the distance between the pins 17 and 18 is somewhat less than the distance that the lathe moves. The pin 19 of the slide spring 20 (see drawings A, E, G) is placed between the pins 17 and 18 so that in the backward motion of the lathe the pin 18 presses on the pin 19, moving it back a short distance, and in the forward motion of the lathe the pin 17 presses on the back of the pin 19, moving it forward to the place where 18 found it, 15 is a roller turning on a vertical shaft in the back of the picker arm, only seen in E and F. The picker staff 13 is a plain piece turning on its center 14 in the back part of the picker arm at one end, while the other sweeps back and forward along the picker rod. Near the axis of the picker staff is the picker roller 16 (see drawing E), that turns on a pin extending perpendicularly downward from the staff. The picker staff plays near to the upper surface of the picker table while the roller 15 runs in the mortise 22, 23 (see drawing F) and the picker roller 16 runs in the furrow in the table.

Operation of the picking valve.—When the lathe is driven forward, the pin 17 (see drawings A, E, G), presses on pin 19 (see drawings A, E, G), forcing the slide spring 20 (see drawing G) forward, the front end of which falling on one side of the point of the alternator 27 (see drawing G) slides out to the shoulder of 27, turning it and the valve in that direction. When the lathe is driven back the pin 18 (see A, E, G) presses on the pin 19 (see A, E, G) sliding 20 (see drawing G) back of the point 27. When the lathe is driven forward again the pin 17 presses on the pin 19, forcing the slide 20 (see drawing G) forward, which having gained its natural position, falls on the other side of the point of 27 and sliding out to the shoulder on that side shifts the valve across the other furrow.

Operation of picking.—Suppose the lathe to be forward, the valve across the branch 24, 25 (see drawings A and F), the picker roller 16 (see drawings E and F), being of course, in that position of the lathe moved

up to 24, (this is a supposed position, the drawing representing the lathe as being near the back point of its motion).

Now, when the loom is put in motion, the picker roller will pass back and forward again in the straight branch 24, 22 keeping the point of the picker's staff at the outer end of the shuttle box.

In the next backward motion of the lathe the picker valve having shifted across the straight furrow, while the roller 16 was at 24. The roller 16 passes along the furrow 24, 22 (see drawings A and F), to the point of the valve, keeping the point of the staff at the outer end of the box, and rolling inward through the oblique part, carries the staff forward driving the shuttle across the warp, and then passing the parallel part keeps the staff at the front end of the box.

In the forward motion of the lathe the roller 16 carries the staff to the outer end of the box. The picker valve is again shifted, and so the operation proceeds, a like contrivance being had at both ends of the loom.

Treading apparatus.—The marcher plate is a piece of metal placed vertically under the center of the heddles. The heddle guides 41 (see drawings A, B, C), are small square bars sliding perpendicularly in mortises in the upper part of the marcher plate. The upper end of the guides 41 (see A) are attached to the heddle bars, the lower ends are furnished each with a hook in front and on one side, (in front with respect to the plate) (see drawings B and C). The upper ends of the catch springs 40 (see drawings B, C) are attached to the marcher plate, the lower ends extending down to the hooks of the guides 41 (see drawings B and C), when the guides are in their lowest position. The main part of the springs is in the same lateral plane with the heddle guides, the lower end of each spring being furnished with a pin extending back to the marcher plate. The springs 40 serve to hold the heddle guides 41 down and to move the levers 38 to their natural position. The levers 38 are placed in a plane back of the plane of the heddle guides. The fulcrums of the levers are near their centers, the upper ends extending up to the pins of the springs 40, the lower ends extend down to the bottom of the marcher plate and are furnished with pins 39 (see drawings B C and D), extending out to the plane of the heddle guides. The levers cross each other as seen in drawing C. The marcher 34 (see drawings A B M and C) is a uniform rectilineal piece furnished with a hook y (see drawings B and M) at the upper end. The marcher pitman 33 (see drawing B) is also attached to the upper end of the marcher. Near the lower end of the marcher is the oblique slide 36 (see drawings B M and C) between the marcher and the marcher plate in the same lateral plane with the pins 39, the marcher slides perpendicularly up and down in mortises 1 and 2 (drawing M) in the two parts of the marcher slide. The mortises 1 and 2 are formed, as seen in drawing M, so as to allow the connective 3 between the oblique slide and marcher to pass both parts of the marcher slide. The marcher slide 35 (see drawings C, M and D) is a uniform rectilineal piece bent to the form seen in drawing C, the two parts of the marcher slide are placed one above the other, and each part is passed horizontally through a mortise in a flange on each side of the marcher plate. To the lower part of this slide 35 is attached the spiral spring 42 (see drawings C M and D) which acts in the same horizontal line in which the slide moves.

The marcher catch 37, (see drgs. C M and D), is a spring, one end of which is attached to the marcher plate (dr. O) the other end extends across the plate, and is made to press on the edge of the marcher slide, the line of direction making equal angles with the two adjacent surfaces, as represented in Fig. H.

Explanation of the operation of the catch 37.—Let z, c, w, Fig. H, represent a section of the marcher slide and let h, v, i, represent the catch in its natural position with respect to the slide—now we may suppose $e\ v$ to represent the quantity and direction of the force that holds the catch in its position, and we may suppose e, v' to be that part of e, v that causes the catch to pass the line e, z, and e, v'' that part of $e\ v$ that causes the catch to pass the line e, w. Now if the side v, h, of the catch 37, is placed on w, e, the force e, v'' is destroyed by the reaction of the side w, e, while the force e, v' is unimpaired, therefore the point v will be found at v'. By the same reasoning, if the slide $i\ v$ be placed on e, z it may be shown that v will be found on v'', hence it is plain that when the catch is placed on either side e, z or e, w, of the slide, it will remain on that side until it is shifted. Now this shifting is effected by means of the inclined plane n, m, (see draw. M and D) and the cavity x and inclined plane $x\ x'$. The breadth $e'\ e''$ (dr. M) of the inclined plane n, m, the breadth $d'\ d''$, $c'\ c''$, $b'\ b''$, &c. of the notches, and the breadth $x''\ x'''$ of the cavity x, are equal to each other, and greater than the distance that 37 moves in that direction. The depth $d'\ n'$, $c'\ n''$, $b'\ n'''$, &c. of the notches is less; and the depth $x''\ x''''$ of the cavity x, and the depth $e'''\ e''$ of the inclined plane $n\ m$, is greater than the distance which 37 moves in that direction. The side of 37, toward the spring 42, is supported by the marcher plate (see dra. D) the other

side sustains the pressure of 42 from the perpendicular part of the notches (see dra. M). Now when the slide is drawn forward, the marcher catch 37 at *m*, falls successively into the notches from *m* to *x*, preventing the spring 42 from drawing the slide back until the point *x* reaches the catch, where it regains its natural position by falling into the cavity *x*, (dr. M). When the slide is drawn back the catch 37 slides up the inclined plane *x x'* on to the side adjacent to the notched side where it offers no resistance to the backward motion of the slide. When the slide has reached the extremity of its backward motion the catch 37 regains its natural position again. When the slide is drawn forward again the catch is raised on to the notched side by the action of the inclined plane *n m*, (dr. M) and then falls into the notches as before.

Operation of treading.—When the main shaft is put in motion, by means of the crank 28, the pitman 29, the lever 30, and the marcher pitman 33, the marcher 34 is made to perform its motion. When the marcher 34 (see drs. B M and C) is drawn down, the oblique slide 36 (see B M and C), by pressing on one of the pins 39 (see drws. B C and D), moves the lever 38 aside, (see B and C), which moves the catch spring 40 (see B and C), aside out of the hook in the heddle guide 41, (see B and C), leaving it at liberty to rise. At the same time the hook *y*, on the marcher catches the front hook on the corresponding heddle guide, and draws it down to the lower end of the catch 40, which falls into the hook on the side of the guide, preventing it from rising. When the marcher rises again, the catch spring 40 having moved the lever 38 to its natural position, the upper point of the oblique slide 36 catches on the other side of the pin 39, which moves the marcher and marcher slide forward where they are held by the marcher catch 37 and spring 42, in a position to act on the next heddle guide, and thus the operation proceeds until all the heddles have been shifted; the connection of the heddle guides with the heddles and heddle rollers being such that when one guide is drawn down, the corresponding one being let loose, is drawn up at the same time. When the last guide is brought down, the marcher, on rising, is moved forward as usual; but as soon as the slide 36 passes the pin 39, the catch 37 having fallen by the side of slide 35, at *x*, the marcher slide and marcher are shifted back by the spring 42, in a position to act on the first heddle guide again. There the marcher commences its regular journey and passes through, as before. By this contrivance, any number of heddles may be worked in any order by the arrangements of the levers 38 and the rollers 44.

What we claim as our invention, and desire to secure by Letters Patent, is as follows:

1. We claim the combination of the picker valve alternator, and slide spring, operated in the manner and for the purposes described.

2. We claim the combination of the picker table, picker arm, picker staff, picker roller and roller 15, arranged in the manner and used for the purpose set forth.

3. We also claim the combination of the marcher, oblique slide, marcher slide, marcher catch, levers 38, catch springs and heddle guides, constructed in the manner and for the purpose set forth.

ALFRED BIGELOW.
JUSTUS BUTLER.

Witnesses:
WALTER L. CLEMONS,
WM. CLEMONS.