

# I. W. Lamb. Braiding Mach.

N<sup>o</sup> 24,565.

Patented Jun. 28, 1859.

Fig: 2

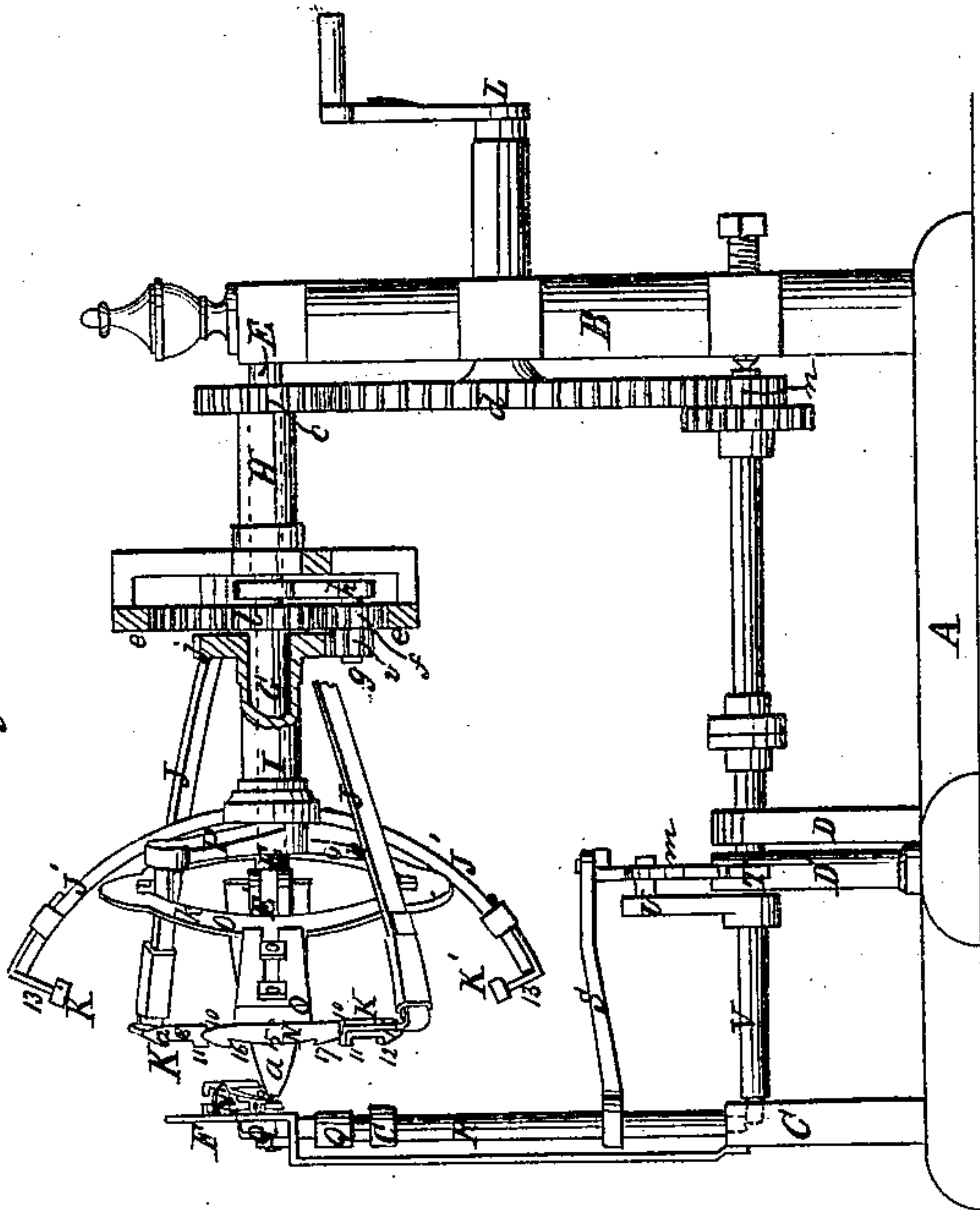


Fig: 3.

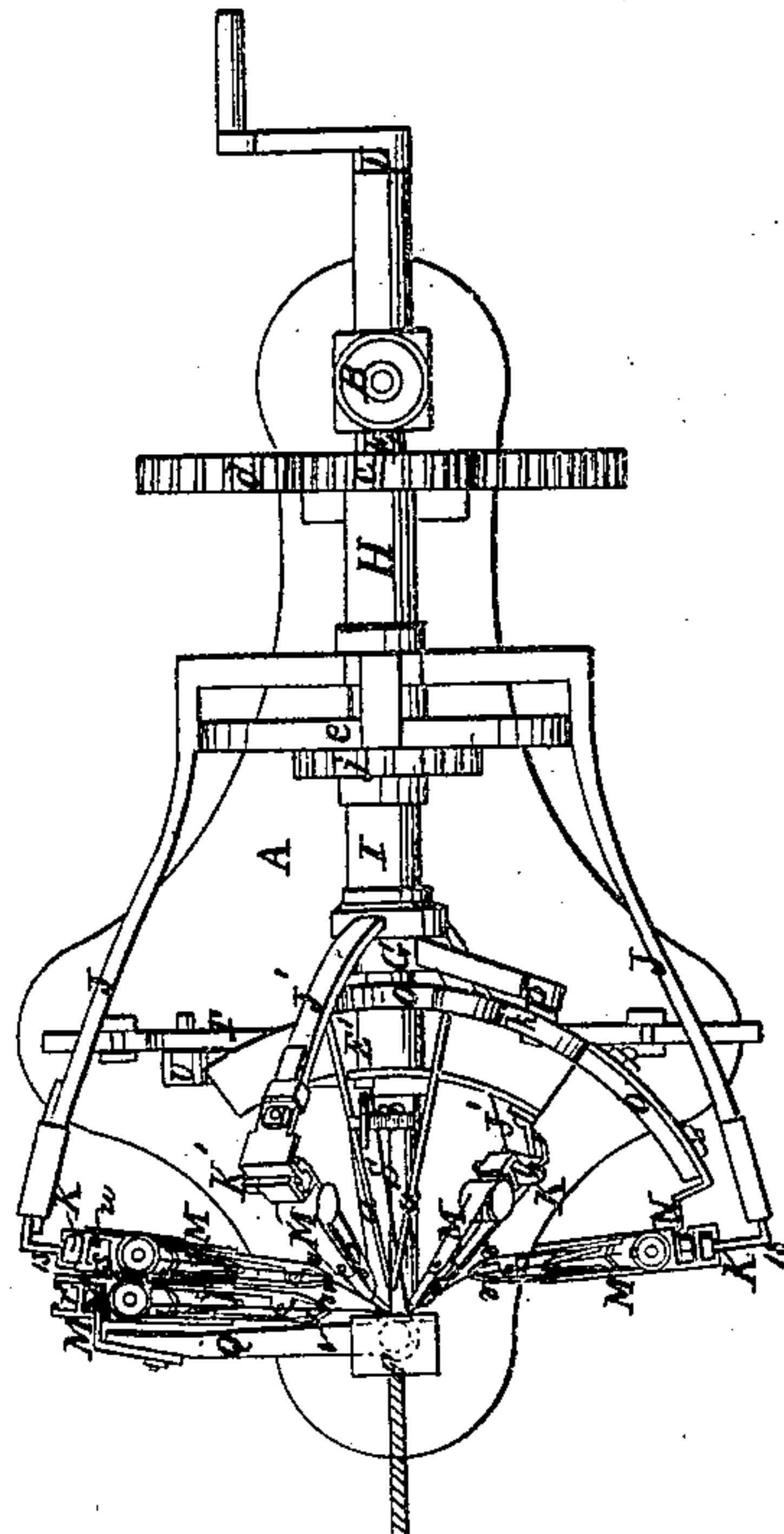


Fig: 7.

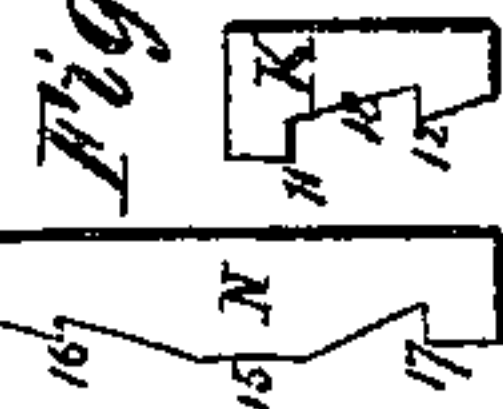


Fig: 6.

Fig: 1.

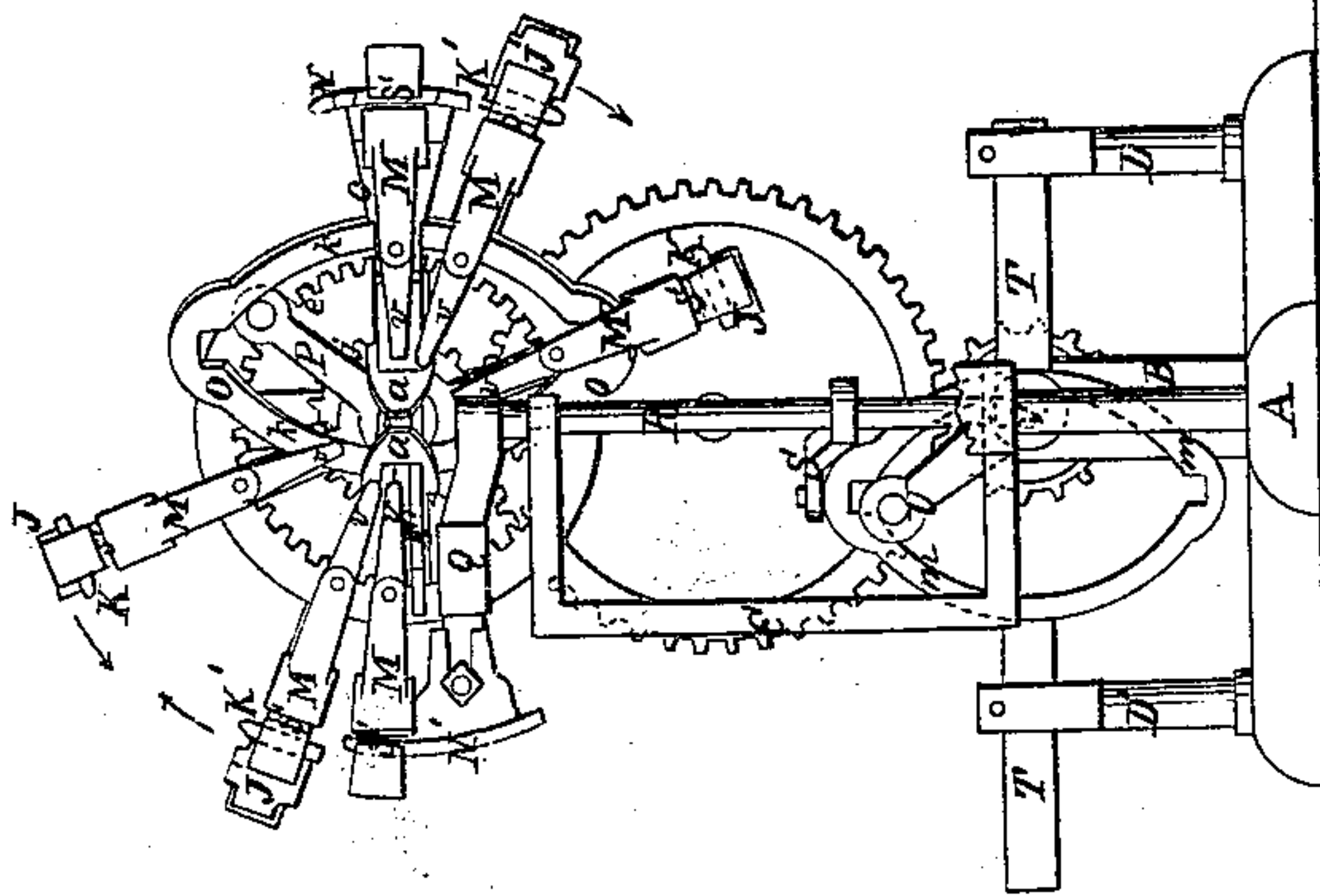


Fig: 4.

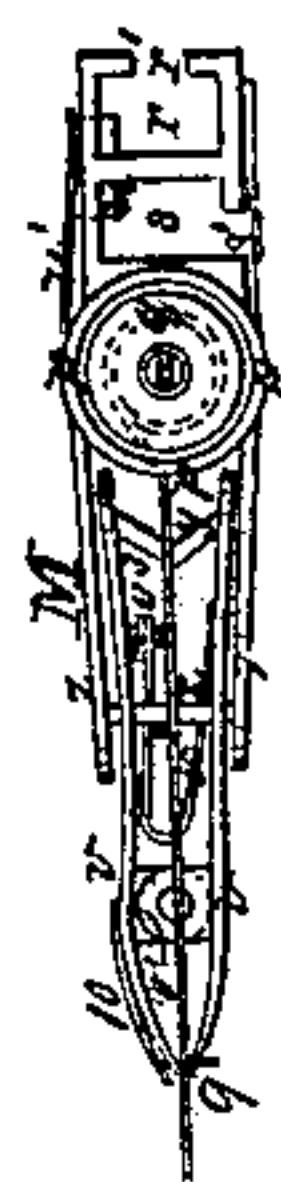


Fig: 5.



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# UNITED STATES PATENT OFFICE.

ISAAC W. LAMB, OF WEST NOVI, MICHIGAN.

## BRAIDING-MACHINE.

Specification of Letters Patent No. 24,565, dated June 28, 1859.

*To all whom it may concern:*

Be it known that I, ISAAC W. LAMB, of West Novi, in the county of Oakland and State of Michigan, have invented a new and Improved Braiding-Machine; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, forming part of this specification, in which—  
Figure 1, is a front view of the machine with the front plate broken away to show the parts behind. Fig. 2, is a side elevation of the same partly in section. Fig. 3, is a plan of the same. Fig. 4, is a top view of one of the shutters on a larger scale than the former figures. Fig. 5, is a longitudinal central section of the same. Fig. 6, is a face view of one of the shuttle carriers. Fig. 7, is a face view of one of the shuttle changers.

Similar letters of reference indicate corresponding parts in the several figures.

My invention consists in a machine of novel character for the braiding of whip lashes and other articles in a similar manner to that in which braiding is performed by hand.

To enable others skilled in the art to make and use my invention I will proceed to describe its construction and operation.

A, B, C, D, D<sup>1</sup>, is the framing of the machine.

E, is a stationary horizontal shaft secured firmly at one end in the principal upright standard B, of the framing and having secured firmly to its other end a horizontal arc-shaped cross head E<sup>1</sup>, to which are attached a pair of elastic nipper jaws *a, a*, between the back parts of which is situated a roller *b*, on which the whip lash or other article or the fabric which is to form the core of the braiding—when a core is used—is wound, and from whence such core passes between the tips of the jaws *a, a*, on its way to a hole in an upright plate F, said core being pinched by the nippers so that considerable tension may be produced upon it as it is drawn from the roller *b*, and through the plate F, by a take-up apparatus of the common or any suitable kind. The tips of the nipper jaws and the hole in the plate F, are so situated that a prolongation of the axis of the shaft E, would pass directly and centrally through them. The said shaft E, is also fitted with two sleeves G and H, the former of which, being the front one, has fitted to its exterior another sleeve I. The

sleeve H, carries two similar arms J, J, to the extremities of which are secured what I term the "shuttle carriers" K, K, one to each, said shuttle carriers being so arranged as to revolve in a plane nearly coincident to the points of the nippers *a, a*. The sleeve I, carries two similar arms J<sup>1</sup>, J<sup>1</sup>, shorter than J, J, and to the extremities of these arms are attached two other shuttle carriers K<sup>1</sup>, K<sup>1</sup>, like K, K. The arms J<sup>1</sup>, J<sup>1</sup>, and shuttle carriers K<sup>1</sup>, K<sup>1</sup>, though concentric with J, J, and K, K, are arranged to pass the latter in their revolution, the latter passing outside; and the shuttle carriers K<sup>1</sup>, K<sup>1</sup>, are arranged a little in rear of those K, K.

The sleeve H, is geared by spur gears *c*, and *d*, with the driving shaft L, of the machine which works in a bearing, or bearings, in or attached to the standard B. The said sleeve H also carries an internally-toothed ring *e*, which gear with a pinion *f*, which is fitted to turn loosely on a stud *g*, that is secured in a stationary arm *h*, that is attached to the shaft E, between the sleeves H, I; and the said pinion *f*, has attached to it another pinion *i*, which gears with a gear *j*, on the sleeve I. By this train of gearing the driving shaft, in its rotary motion, is caused to impart rotary motion to the two sleeves and their respective arms and shuttle carriers in opposite directions but to give the same number of revolutions to each.

The four shuttle carriers K, K, and K<sup>1</sup>, K<sup>1</sup>, carry each one shuttle M, but six or eight similar shuttles are to be employed in the machine and hence there must always be either two or four shuttles—according to the number employed—out of operation, and these are held by what I term the "shuttle changers" N, N<sup>1</sup>, two in number, one or two shuttles being upon each of the said shuttle changers according to whether six or eight are employed. The shuttle-carriers represented are constructed for the use of six shuttles, so I will for the present describe the machine as though only six were used. The shuttle changer N, operates in combination with the shuttle carriers K, K, and the shuttle changer N<sup>1</sup>, with the shuttle carrier K<sup>1</sup>. The first mentioned shuttle changer N, is attached to a carriage O, which slides in a groove in the cross head E<sup>1</sup>, the said carriage having an arc form in its horizontal section to correspond with the cross head, the arc being concentric, or nearly so, to the center of the hole in the plate F, op-



posite the nippers. The carriage O, derives its sliding motion from a cam or wiper P, in the sleeve G, said cam operating within a yoke R, R, which constitutes a portion of or is attached to the said carriage, the form of the said yokes being such that the shuttle changer N, advanced to meet each shuttle-carrier K, as the latter approach the path of that shuttle changer in their revolution, and becomes for a time stationary in such a position that the shuttle carrier will pass nearly close to it, and retires as soon as each shuttle carrier K, has passed it, to make way for the next shuttle carrier K<sup>1</sup>, which comes around near it. The sleeve G which carries the cam or wiper P, derives its rotary motion from the before described pinion f, said pinion gearing with a gear l, that is fast on the said sleeve.

The shuttle changer N<sup>1</sup>, is attached to the arm Q, of a vertical shaft R, which is supported in fixed bearings in the standard C, and the said shaft has secured to it another arm S, which is connected with a horizontal slide T, working in guides in the standards D<sup>1</sup>, D<sup>1</sup>, the said slide containing a yoke m, m, in which works a cam or wiper U, that is secured to a horizontal shaft V, working in bearings in the standards C, D, and B, said shaft carrying also a gear n, gearing with the large driving gear d. The shaft V, derives a continuous rotary motion through the gear n, from the gear d, and cam or wiper U, rotating with said shaft, gives to the slide T, an intermittent reciprocating motion, and the connection of said slide with the arm S, of the shaft gives the arm Q, and the attached shuttle changer N<sup>1</sup>, a horizontal swinging motion, the nature of such motion being such that the said shuttle changer advances to meet each of the shuttle carriers K<sup>1</sup>, K<sup>1</sup>, as the latter approach its path in their revolution and becomes for a time stationary in such a position that the shuttle carrier will pass nearly close to it and retires as soon as each shuttle carrier K<sup>1</sup>, has passed it to make way for the next shuttle carrier K, which comes around.

The shuttles employed in this machine are of peculiar construction. The central portion of the shell of each consists of a cylindrical box p, which receives the bobbin q, snugly within it, and behind this box there is a long heel through which there are two nearly square openings r, s, the former to receive the shuttle carriers K K, K<sup>1</sup> K<sup>1</sup>, and the latter to receive the shuttle changers N, N<sup>1</sup>. The opening r, has a slot r<sup>1</sup>, all down its back, and the opening s, a slot s<sup>1</sup>, all down one side and in the side opposite the slot s<sup>1</sup>, there is a longitudinal slot t, which extends into both openings r, s, and which constitutes a passage for the admission into the said opening of a dog u, which is connected to the exterior of the shell by a spring

w<sup>1</sup>. In front of the box p, there are two long ears z, z, between which are received the legs of a pair of nippers v, v, which are jointed together by a pin v<sup>1</sup>. The legs of the nippers v, v, have between them a spring v<sup>2</sup>, which tends to close their jaws, the extremities of which constitute the point of the shuttle, and this spring has a set screw v<sup>3</sup>, (see Fig. 4) to adjust it to close the nippers more or less tightly. The legs of the nippers contain each a longitudinal slot x<sup>1</sup> (see Fig. 5) through which passes a stationary straight pin x, which is secured firmly in the ears z, z, and at their rear extremities the said legs are made of hooked form to catch on a V-shaped cross wire y, (see Figs. 4 and 5). The spring v<sup>2</sup>, not only tends to close the jaws of the nippers but by forcing their legs laterally against the oblique sides of the V-shaped wire y, makes the said wire act like a wedge to draw back the nippers toward the bobbin box p.

The spread or strand of which the braiding is composed passes from the bobbin q, through a slot p<sup>1</sup>, in the front of the box p, and directly to the jaws of the nippers, in the center of which it is kept by means of two transverse guide pins 8, 9, the former of which is secured to one jaw and the latter of which is secured to a spring 10, outside of one jaw and passes through both jaws. The latter pin 9, by being attached to the spring 10, is permitted when the jaws are opened a little wider than the thickness of the thread to be withdrawn far enough from the jaws to permit the insertion of the thread or strand between them. The friction produced upon the thread or strand as it is drawn from the bobbin q, through the jaws of the nippers v, v, keeps it at a proper tension between the jaws and the braiding point and makes the braiding of the required degree of tightness. The method of applying the nippers in the shuttle provides for a uniform friction upon and consequently a uniform tension of the thread or strand, which can be adjusted to the precise degree required by the set screw v<sup>3</sup>, that is applied to the spring v<sup>2</sup>. The friction and tension produced by this spring are made self-regulating by the action of the V-shaped wire y, for the pull of the thread or strand on the nippers as it passes through their jaws causes the hooks at the rear extremities of the nippers to be drawn against the inclined sides of the V-shaped wire and this pull against the wire tends to force the said rear ends toward each other and open the jaws to relieve the thread or strand, and this tendency is greater or less as the tendency to friction between the jaws becomes greater or less by reason of variations in the size of the strand or yarn or from other cause.

The shuttle carriers K, K, and K<sup>1</sup> K<sup>1</sup>,



are all substantially alike, having their longitudinal profiles of a parallel arc form, as shown in Fig. 1, in one direction to correspond with the circles of their revolution and of the form shown in Figs. 2 and 6, in the other direction. Their transverse section is quadrangular and their heads 10, of such size as to be just capable of passing through the openings  $r$ ,  $s$ , in the shuttles when the dog  $u$ , is out of the way. Their opposite ends are pointed or rounded off. There is in one side a recess which forms two opposite catches or stops 11, 12, one a short distance from the head and the other a short distance from the point. The said recess is so formed as to give the carrier a wedge like form between the stops 11, 12, as shown in Fig. 6, and the catch 12, is less prominent than that 11. The shuttle carriers are respectively so arranged with regard to the direction of their respective revolutions that the pointed end is always in advance. They are attached to the respective arms  $J$ ,  $J$ , and  $J^1$ ,  $J^1$ , each by a tongue 13, extending all down its back, said tongue being of a thickness to pass through the slots  $r^1$ , in the backs of the shuttles.

The shuttle changers  $N$ ,  $N^1$ , are substantially alike, having their longitudinal profiles of a parallel arc form, so shown in Fig. 1, in the direction which corresponds with the revolution of the carriers and of the form shown in Figs. 2 and 7 in the other direction. They are widest near the middle of their length where they are parallel for some distance, as shown at 15, in Fig. 7, and where their size is such that they are just capable of passing through the openings  $s$ , of the shuttles. From this part 15, they are tapered on one side in an upward and downward direction for some distance, and then suddenly enlarged to form two catches or stops 16, 17, from whence they are again tapered toward their extremities, the upper of which are pointed or rounded off. The width of the shuttle changers from the edge of the stops 17, across to the opposite straight side, must be less than the greatest width of the taper portion of the shuttle carriers between the stops 11, 12. These shuttle changers are set opposite ways the sides on which are the stops being, in  $N$ , the front side, and in  $N^1$ , the back side. They are attached,  $N$ , to its carriage  $O$ , and  $N^1$ , to its arm  $Q$ , each by tongues 18, which sets off from the side opposite to that on which the stops 16, 17, are formed, said tongue being of a size to pass freely through the slots  $s^1$ , in the shuttles.

The operation of the machine with six shuttles is as follows: The core, when any is used, having been wound on the spool  $b$ , and its end fastened to the take-up device which may consist simply of a cord, weight and pulleys, as commonly used, and the

shuttles having had the threads or strands for the plaits wound on their bobbins  $q$ , and the bobbins put in the boxes  $p$ , and secured therein in any proper manner which permits them to rotate freely, and the end of the said threads or strands brought through the jaws at the front extremities of the shuttles, the machine is turned till the carrier arms  $J$ ,  $J$ , and those  $J^1$ ,  $J^1$ , meet or arrive opposite each other, which meeting will be over the shuttle changer  $N^1$ , and under the shuttle changer  $N$ . Two shuttles should then be placed on each shuttle changer with their points toward the nippers  $a$ , one being pressed down so far on each that its dog  $u$ , rests on the stop 17, and the other till its dog  $u$ , comes on to the largest part, 15, of the shuttle changer, in which position it rests upon the lower one, and one shuttle should be placed on each of the two carriers  $K$ ,  $K^1$ , that are situate below the shuttle changer  $N$ . The ends of the threads or strands are then either made fast either to the loop of the whip lash or to whatever core is used, or they are all secured to the take-up contrivance, and the machine is set in motion, so that the arms and shuttle carriers rotate in the respective directions indicated by arrows near them in Fig. 1. As the two empty carriers  $K$ ,  $K^1$ , come respectively over the two shuttle changers  $N$ ,  $N^1$ , the latter advance to meet them and the carriers enter the holes  $r$ , of the shuttles on the changers, and as the two upper ones of said shuttles have their dogs  $u$ , forced completely out from the said holes  $r$ , by reason of the said dogs being against the largest portion 15, of the changers, the shuttle carriers will pass completely through those shuttles and into the holes  $r$ , of the lower ones which are resting on the stops 17, but in entering these lower shuttles the parts 18, of the carriers being wider than the width of the changers across their teeth 17, 17, the carriers will force out the dogs  $u$ ,  $u$ , far enough to clear the teeth 17, and pass the said lower shuttles over the said teeth 17, and carry them along with them, the dogs being now between the stops 11 and 12 which prevent the shuttles dropping off. There is now a shuttle on each carrier and one on each changer, and the operation will proceed as follows, the movements of the carriers and the shuttle changers being as described. The shuttle carriers as they severally arrive at and are met by their respective shuttle changers carry the openings  $s$ ,  $s$ , of the shuttles over the changers till the dogs  $u$ ,  $u$ , pass over the teeth 16, and down the wedge-like surface below said tooth and arrive on the largest portion 15, of the changers when the dogs  $u$ , are forced completely or so nearly out of the holes  $r$ ,  $r$ , as to allow the stops 11, to pass and the carriers to pass completely out of them, and leave them upon the changers. The shut-



5 tles on the carriers in being forced down  
 the changers, drive down the shuttles al-  
 ready on the chambers of the large part 15,  
 and down to the stops 17, where they are  
 arrested, till the carriers have entered so  
 far that their stops 12, have passed the dogs  
*u, u*, and their wedge-like parts 18, have  
 forced out the dogs far enough to permit  
 them to pass over the teeth 17, of the  
 10 changers. The dogs *u, u*, of the shuttles be-  
 ing then between the stops 11, 12, of the car-  
 riers, cannot drop off the latter which carry  
 them around till they again meet the shuttle  
 changers.

15 By the combined operation of the shuttle  
 carriers and shuttle changers, as herein de-  
 scribed, the plaits from the several shuttles  
 are braided together in a precisely similar  
 manner to that of braiding by hand, and  
 20 as the plaits are held very near to the braid-  
 ing point, and the tension is always uniform,  
 there will be little or no liability of any  
 breakage of the plaits and consequent in-  
 terruption in the operation of the machine.

25 To adapt the machine represented in the  
 drawing for braiding with eight plaits it  
 is only necessary to provide longer shuttle  
 changers so that two shuttles may always  
 be retained on each, the additional length  
 30 being in the parallel portion 15, so that the  
 shuttle carriers may, after leaving one shut-  
 tle on the changers pass through the upper  
 one the two that were previously upon it

and take off the lower one. It may also be  
 adapted to four plates by the employment 35  
 of change gearing of suitable character to  
 reduce the number of movements of the  
 shuttle changers by one half, so that they  
 will each only advance to meet and operate  
 in combination with one of the shuttle car- 40  
 riers.

What I claim as my invention, and de-  
 sire to secure by Letters Patent, is—

1. The combination of the two sets of  
 shuttle carriers *K, K, K<sup>1</sup>, K<sup>1</sup>*, rotating in 45  
 opposite directions in concentric circles and  
 the shuttle changers *N, N<sup>1</sup>*, having the move-  
 ments described, the whole operating sub-  
 stantially as herein set forth.

2. The construction of the shuttles, each 50  
 with two openings *r, s*, and with a spring  
 dog *u*, entering both openings to operate in  
 combination with the inclined surfaces and  
 stops of the shuttle carriers and shuttle  
 changers, substantially as and for the pur- 55  
 pose described.

3. The combination with the shuttles of  
 the nippers *v, v*, and their several append-  
 ages and appliances by which their bite or  
 friction upon the plaits are regulated and 60  
 rendered uniform, substantially as and for  
 the purposes herein described.

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Witnesses:

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