

(No Model.)

3 Sheets—Sheet 1.

C. DENN.
MACHINE FOR LINKING WARPS.

No. 407,514.

Patented July 23, 1889.

Fig. 2.

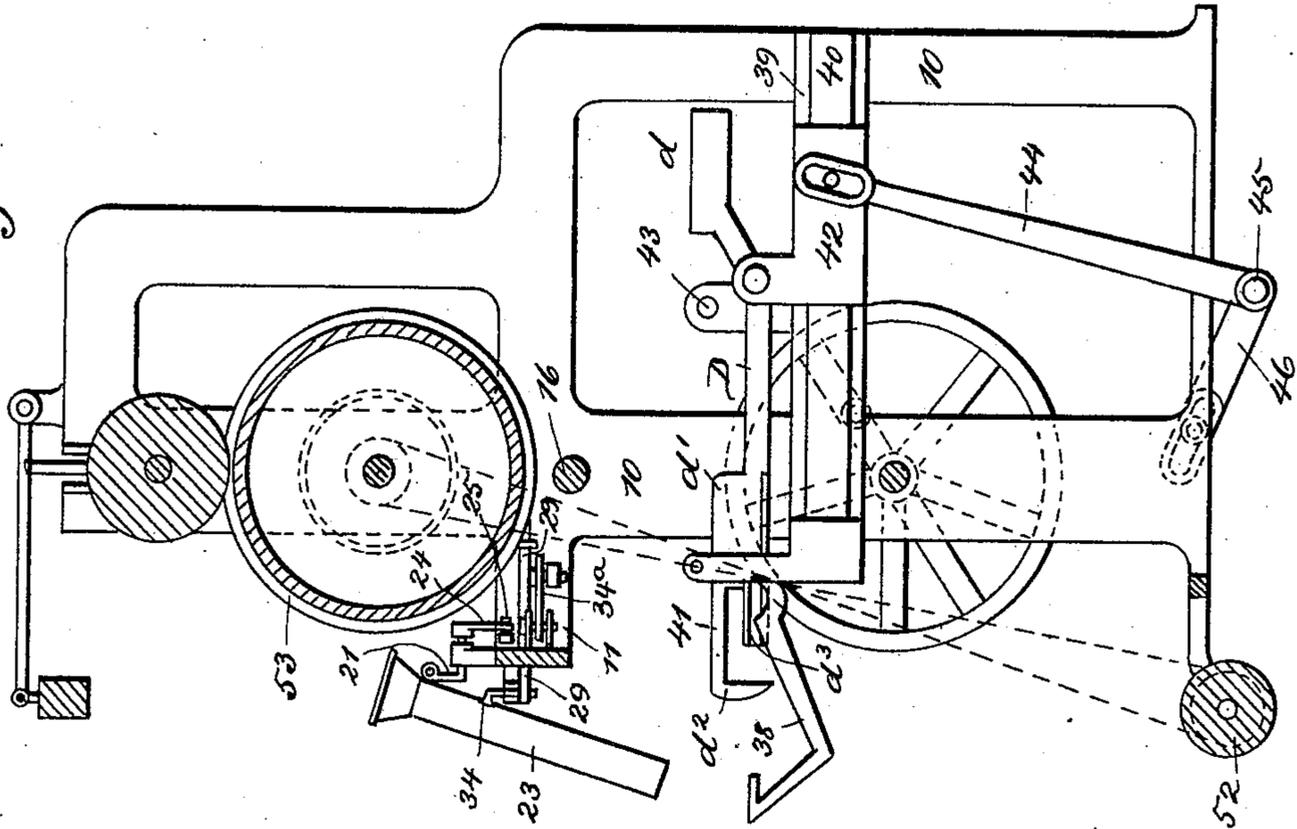
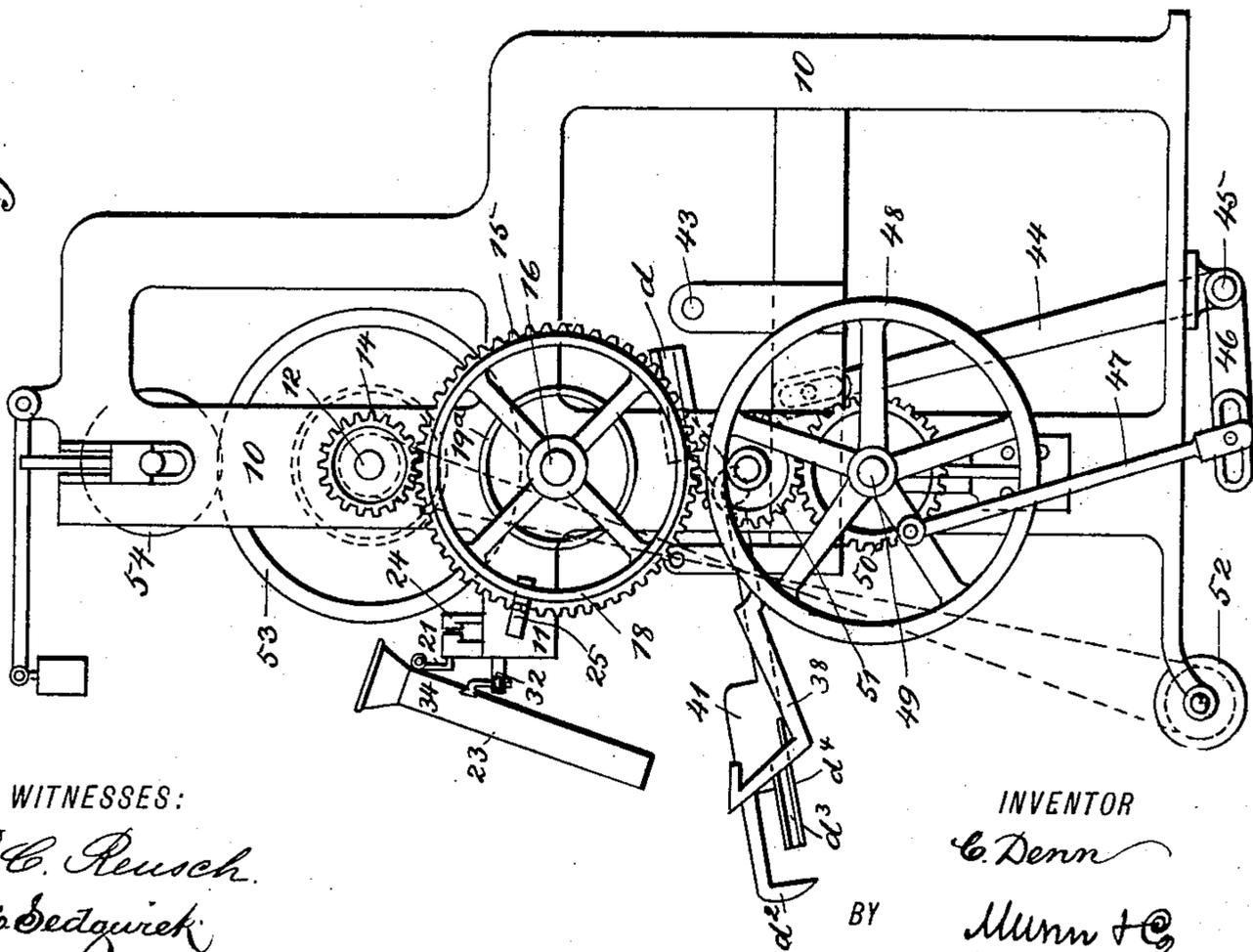


Fig. 1.



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3 Sheets—Sheet 3.

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Fig. 7.

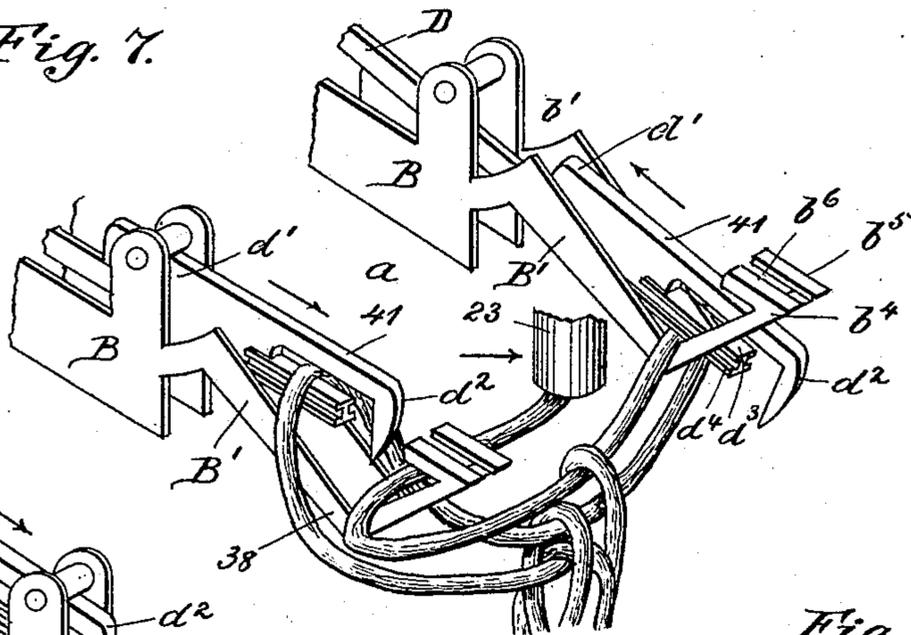


Fig. 8.

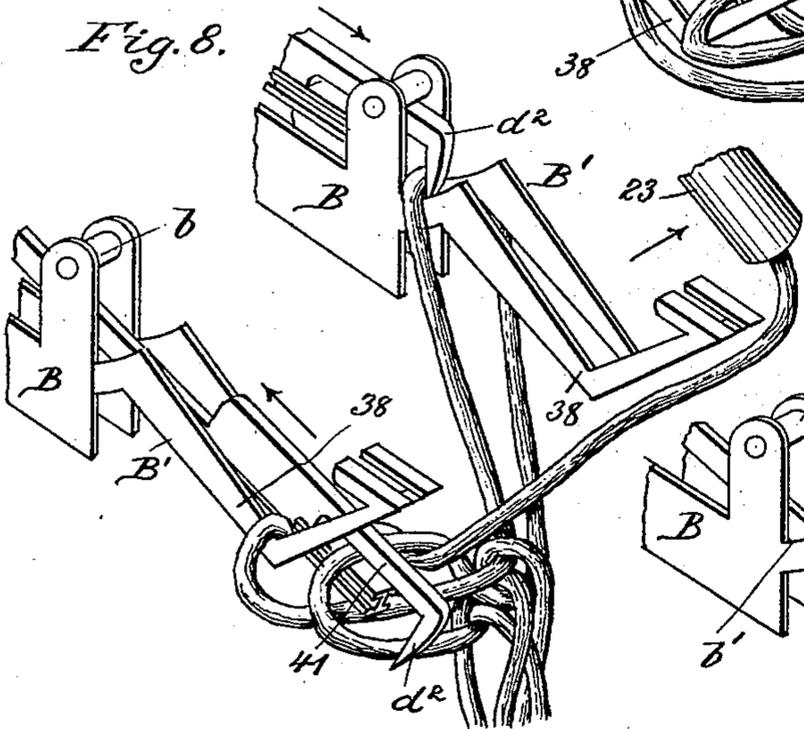


Fig. 9.

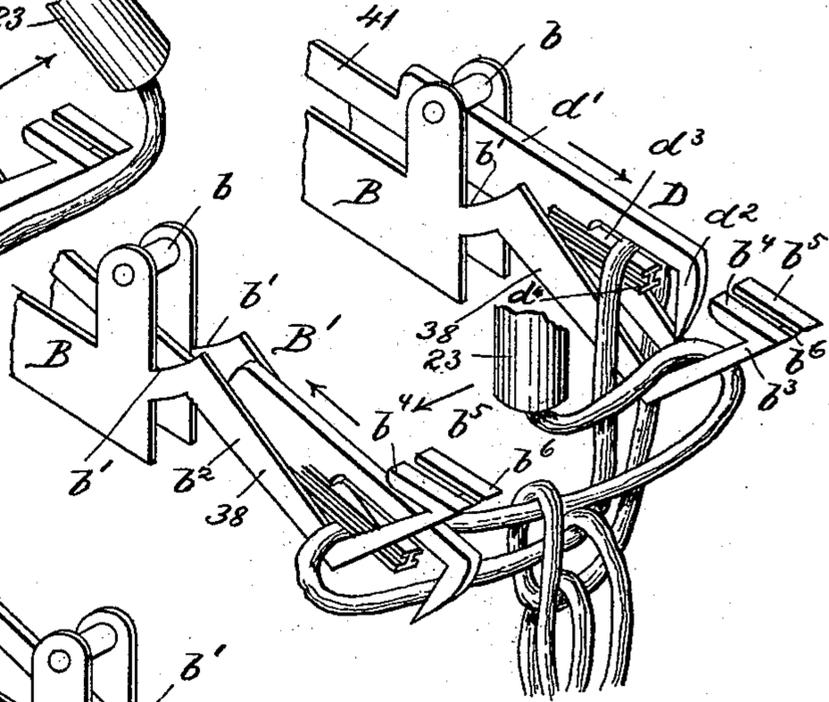
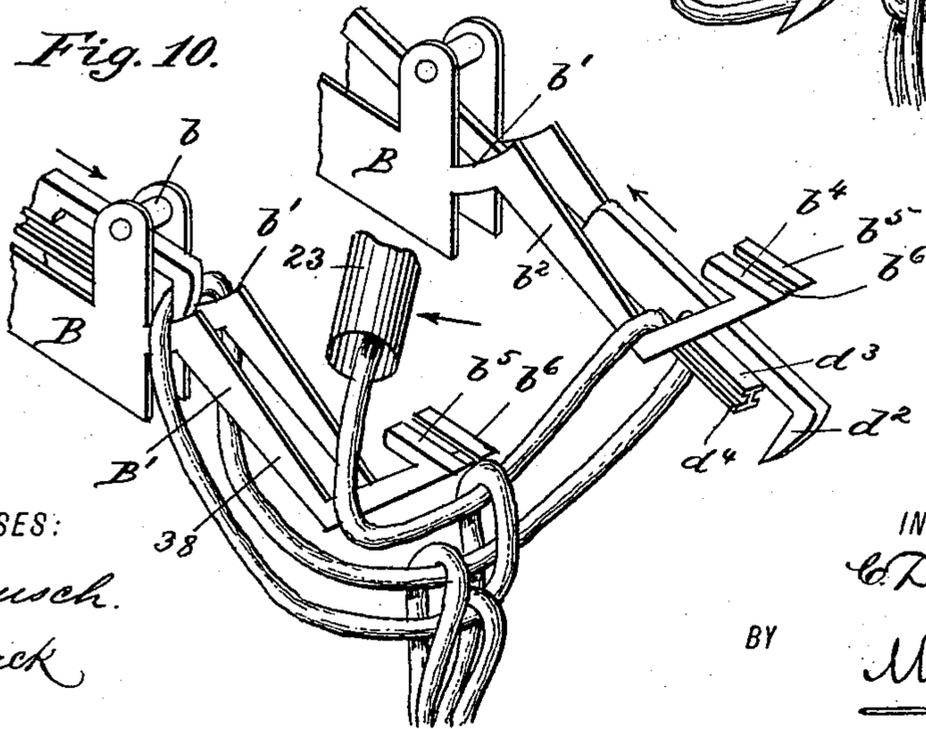


Fig. 10.



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UNITED STATES PATENT OFFICE.

CLAYTON DENN, OF PHILADELPHIA, PENNSYLVANIA.

MACHINE FOR LINKING WARPS.

SPECIFICATION forming part of Letters Patent No. 407,514, dated July 23, 1889.

Application filed May 15, 1889. Serial No. 310,842. (No model.)

To all whom it may concern:

Be it known that I, CLAYTON DENN, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and Improved Machine for Linking Warps, of which the following is a full, clear, and exact description.

My invention relates to an improvement in machines for linking warps, and especially relates to an improvement upon a machine of this type for which Letters Patent were granted to myself November 9, 1883, No. 288,032, whereby a double instead of a single link may be made.

The object of the invention is to simplify the construction of that class of machines or apparatus employed for forming what are commonly called "chained" or "linked" warps immediately upon the yarn being delivered from the warp-machine.

A further object of the invention is to provide a means for chaining or linking warps more rapidly, regularly, and with greater certainty than heretofore, and also whereby the yarn will be double linked or chained, and while being so manipulated will be subjected to a minimum strain and injury.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters and figures of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the machine. Fig. 2 is a central vertical section on line 2 2 of Fig. 3. Fig. 3 is a front elevation, and Fig. 4 is a plan view, of the shifting mechanism and the yarn-tube. Fig. 5 is a section on line 5 5 of Fig. 4. Fig. 6 is a front elevation of the forks or hooks and a diagram illustrating the movements of the tube; and Figs. 7, 8, 9, and 10 are perspective views of the forks or hooks, illustrating the steps in the linking of the warp.

To the side standards 10 of a warp-machine, at the delivery end, a horizontal, preferably skeleton, frame 11 is secured, which frame is illustrated in plan view in Fig. 4. Above the frame in the said standards a transverse drive-

shaft 12 is journaled, carrying upon one projecting end a fast and loose pulley 13 and at the other end a pinion 14, which meshes with a spur-wheel 15, secured upon a spud-axle or short shaft 16, journaled in one side of the frame, as shown in Fig. 4. The short shaft 16 may, if desired, be replaced by a shaft extending from one standard to the other. Upon the shaft 16, outside of the gear, a cam-wheel 18 is secured, consisting, preferably, of a sectional wheel having the opposed edges so spaced as to form a camway 19, as shown in Figs. 3 and 4, and at the opposite side of the said spur-wheel a smaller wheel 19^a is keyed to the shaft 16, having a cam-face 20. The functions of the cams will be hereinafter described.

Upon the front bar of the horizontal frame 11, at or near its center, a lug is formed, in which an angled or L-shaped shaft 21 is journaled, the vertical member whereof projects upward outside of the lug, and has hinged to its extremity a tube or guiding-trumpet 23, in which the yarn is fed or delivered from the warp-machine. The tube 23 is hinged near its upper end, which is made flaring, and the inner end of the angled shaft, carrying the trumpet, is connected by a link 24 with a driving rod or bar 25, held to slide in bearings transversely of the horizontal frame, as shown in Figs. 4 and 5. One end of the driving-rod extends a sufficient distance beyond the frame to face the camway 19, and said end is provided with an attached pin 26, adapted to enter the said camway. The pin 26 is preferably provided with a loose friction sleeve or roller.

The camway 19 is so constructed that as the cam-wheel revolves an intermittent reciprocating motion is imparted to the driving-rod, which in turn, through its link-connection with the shaft carrying the tube, imparts a pendulum or laterally-rocking movement to the tube, also intermittent.

A second driving or shifting rod or bar 27 is held to slide transversely in the horizontal frame 11, parallel with and to the rear of the bar 25, contacting with the cam-wheel 18. This second driving or shifting rod is provided at one end with a friction-roller 28, contacting with the cam-face 20 of the smaller wheel 19^a, as shown in Fig. 4.

A bar 29 is held to slide in the horizontal frame 11 at a right angle to the driving or shifting rods, having a reduced inner end passing through a post 30, which end is encircled by a spring 31, bearing against a nut at the end of the bar and the post.

The outer end of the spring-actuated bar 29 has attached an arm 32, extending at a right angle therefrom in the direction of the warp-tube and terminating in an elongated loop or eye 33, adapted to receive one end of an angled pin 34, secured to the warp-tube or trumpet at or near its center, as shown in Fig. 5.

An elbow-lever 34^a, having one member shorter than the other, is fulcrumed upon the inner face of the front bar of the frame 11, as shown in Fig. 4, each member of the lever being provided with an elongated eye, respectively numbered 35 and 36 at their outer extremities. The eye 35 of the shorter lever member slides upon the driving or shifting rod 27 around a pin 37 integral with its upper face, and the eye 36 slides in contact with the under face of the spring-actuated bar 29, also around a pin.

When the cam-wheel 18 presses outward the driving or shifting rod 27 by means of its lever-connection with the spring-actuated bar 29, the latter and its arm are forced outward against the tension of the spring 31, moving the warp tube or trumpet also outward by inclining its lower end. When a depression is reached in the cam-face 20 of the cam-wheel 19^a by the driving-rod 27, the spring 31 expands and the warp-tube is drawn inward. At this moment the cam-wheel 18 acts to press outward the driving or shifting bar 25 and laterally reciprocates the warp-tube. The camway 19 and cam-face 20 are finished to so act upon the rods 25 and 27 that when one is in motion the other is idle.

The warp-tube in its several movements is made to follow the path indicated by the dotted lines in Fig. 6 in linking the warp over the twin hooks 38, which hooks are of substantially the same construction as illustrated and described in my former patent, heretofore referred to. Two sets of twin hooks are, however, employed instead of one, as in the said patent.

Between the frame 11 and the lower end of the main-frame standards 10 to the inner face of each of said standards a plate 39 is secured, having formed upon its inner face a dovetail rib 40, as best shown in Fig. 2. To each opposed ribbed plate, at its inner end, a twin hook 38 is rigidly secured, comprising a longitudinally-slotted body B, provided at its outer end with opposed upwardly-extending ears, between which a friction-roller *b* is journaled, as best shown on Sheet 3 of the drawings.

From each section of the body B, at the front, the hooks or forks B' proper are projected outward beyond the main frame. These hooks extend upwardly in a cam-line from the body to form the cavity *b'*, from

thence at an inclination downward, as illustrated at *b*², and at an acute angle upward and outward, as at *b*³, in Sheet 3. The upper outer end of each hook, constituting a pair, is provided with an inward horizontal extension *b*⁴, having a flange *b*⁵ upon its inner face, the flanges of each pair of hooks being spaced to form a guideway *b*⁶. A looper 41 is provided for each of the twin hooks, comprising an angled body D, having a weight *d* integral with its inner end and enlarged at its outer end, as shown at *d'* in Fig. 2. In the under surface of the enlarged end an angled recess is produced, forming a vertical pin or picker *d*² at its extremity and a horizontal tongue *d*³, upon the sides of which tongue longitudinal ribs *d*⁴ are constructed, adapted for contact with the flanges *b*⁵ of the twin hooks when the looper is carried forward, the entire head of the looper being made so thin as to readily pass between the opposed hooks of a set. At the angle in the body of the looper it is fulcrumed upon a projection of a block 42, grooved to slide upon the dovetail rib 40, as illustrated in Fig. 2. The weighted end of the looper is grooved to receive upon its inward travel a guide-roller 43, pivoted upon a stud of the main frame, which roller compels the looper to assume a horizontal position.

Each block 42 is actuated by a link 44, having its lower end connected with a short shaft 45, one shaft being journaled beneath the main frame at each side. From each shaft a crank-arm 46 is projected, and each crank-arm is connected by a pitman 47 with a wrist-pin upon a wheel 48, one wheel being secured to each projecting end of a shaft 49, journaled in the main frame, as shown in Fig. 3.

The shaft 49 at one end is provided with a gear-wheel 50, which receives its motion from a gear 51, loosely mounted upon a spud-axle, said latter gear being driven by meshing with the spur-wheel 15 upon the cam-shaft. Thus all the parts are driven from the main drive-shaft 12. In order to draw the linked warp downward to some extent, a friction-roller 52 is journaled in its path, driven from the main shaft, as shown in Figs. 1, 2, and 3.

To guide the yarn to the trumpet, a grooved roller 53 is secured in front of the same upon the main shaft 12, over which the yarn is adapted to pass from the warp-machine, and an adjustable friction-roller 54 is made to bear upon the grooved roller to facilitate the feed.

I desire it to be understood that although I have specifically described the construction of the hooks and loops other equivalent construction may be employed, it being only necessary that two sets of twin or double hooks be employed in connection with a trumpet capable of the movements heretofore described.

It will be understood that the crank-arms 46 are so secured to their several shafts 45 that the several loopers will be thrown forward thereby alternately.

I will now describe a few movements of the

trumpet, illustrated in Sheet 3 of the drawings, which figures may be read in connection with the diagram shown in Fig. 6.

In Fig. 7 the trumpet has been carried forward, traveling, for instance, from the point h to h' upon the diagram, a link has been formed upon the twin hooks at the right, and another is being laid upon the hooks at the left, the looper upon the right has passed forward and in its rearward throw will carry the link back and deposit it in the cavities b' , and the looper upon the left is in the act of going forward to take up the link just placed upon the hooks, and carries with it the link formerly placed in the cavities to drop the same over the end of the hooks.

In Fig. 8 the trumpet has been given a lateral throw and has passed, for instance, to the point h^2 on the diagram, and is about to lay a link upon the right-hand hooks, the right-hand looper being shown as just depositing the link previously laid in the cavities b' .

The loop carried forward by the left-hand looper in Fig. 7 is represented as about to be dropped, and upon the return of the looper the link upon the left-hand hooks will be carried upward, to be carried forward again upon the tongue of the looper.

In Fig. 9 the trumpet has passed from h^2 to h^3 to take its outward throw, and is just about commencing such throw. The link is laid upon the right-hand hooks, and the right-hand looper is carrying the link formerly held at the rear of the hooks forward to drop the same, and the left-hand looper is shown at rest in position, when again moved to carry the link upon the left-hand hooks rearward to the cavities therein.

In Fig. 10 the right-hand looper is shown at rest, and the trumpet as laying a link upon the left-hand hooks, the link having been dropped by the right-hand looper, and the left-hand looper is represented as just depositing a link in the cavities b' . The trumpet is illustrated as having just completed its inward throw, and on commencing its lateral throw over the hooks, having traveled beyond the point h^4 in the diagram, it is in position to return to h^3 .

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a machine for chaining or linking warps, the combination, with the warp-guiding trumpet, of an angled rock-shaft hinged at one end to the trumpet, a spring-actuated bar having a slotted arm at its outer end, a pin passing through the slot into the trumpet, and means, substantially as described, for operating the said rock-shaft and bar to impart a lateral movement in two directions to the lower end of the trumpet, substantially as set forth.

2. In a machine for chaining or linking warps, the combination, with a warp-guiding trumpet, a cam-wheel having a peripheral camway, and a smaller wheel having a cam-face mounted upon the same shaft, and shifting-rods contacting with the cam-surfaces of each wheel, of an angled rock-shaft hinged at one end to the trumpet, a link-connection between the shaft and the shifting-rod of the larger cam, a spring-actuated bar connected with the shifting-rod of the smaller cam, a slotted arm projected from said bar, and a pin secured to the trumpet and passing through the slot in said arm, substantially as shown and described.

3. In a machine for chaining or linking warps, the combination, with an angled rock-shaft, a warp-guiding trumpet pivoted to the shaft and provided with an angled pin below its pivot-point, a shaft carrying a large wheel having a camway, and a smaller wheel having a cam-face, a shifting-rod actuated by the larger cam, a connection between the said rod and angled shaft, a spring-actuated bar provided with a slotted arm engaging the angled pin of the trumpet, a shifting-rod actuated by the smaller cam, and a connection between said shifting-rod and arm-carrying bar, of sets of stationary twin hooks below the trumpet and loopers sliding between the members of the hooks, and means for operating the loopers, substantially as shown and described.

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Witnesses:

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