

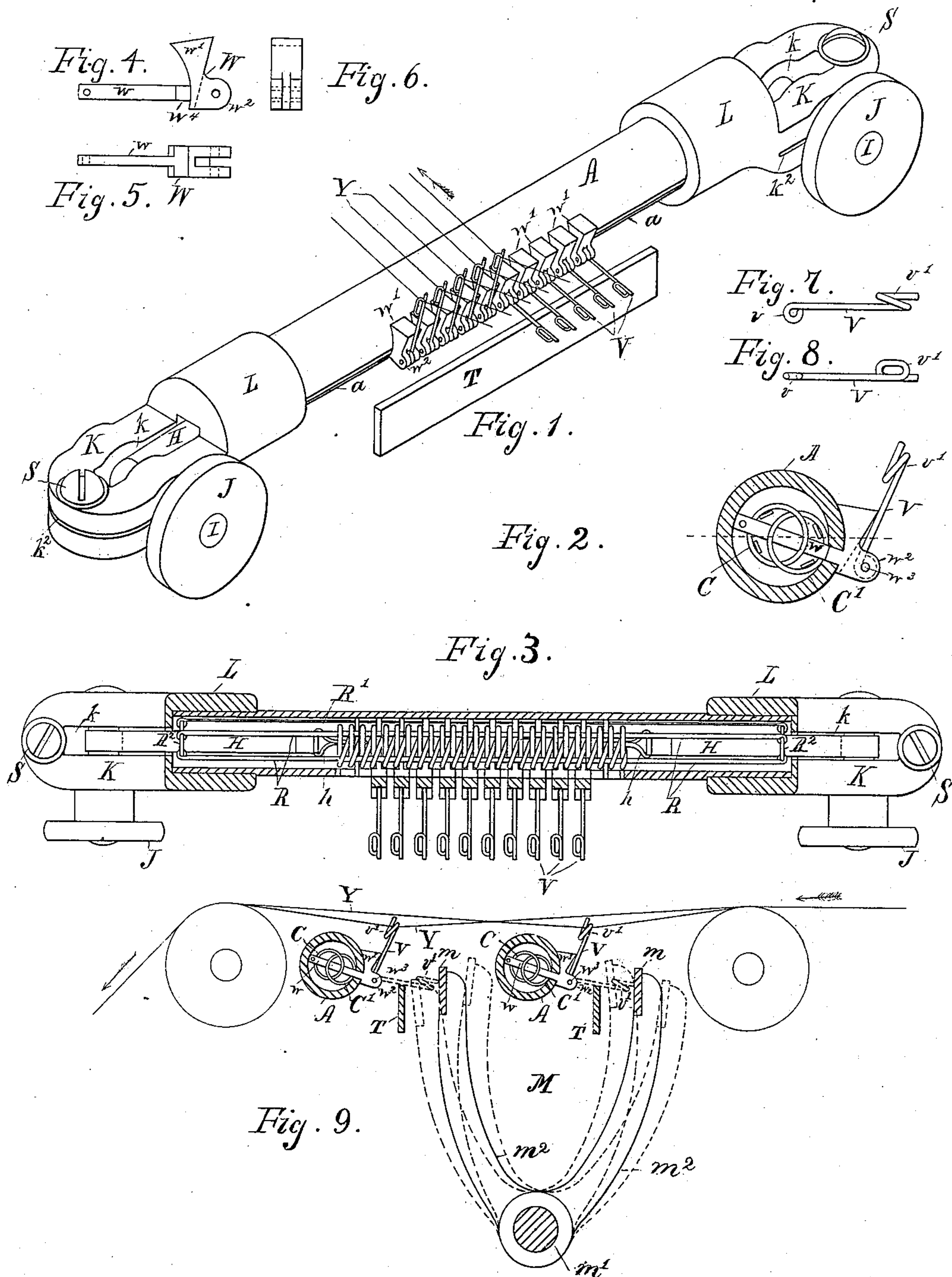
(No Model.)

T. C. ENTWISTLE.

EXPANSION DROP WIRE FOR WARPING MACHINES.

No. 333,118.

Patented Dec. 29, 1885.



Witnesses—
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UNITED STATES PATENT OFFICE.

THOMAS C. ENTWISTLE, OF MELROSE, MASSACHUSETTS.

EXPANSION DROP-WIRE FOR WARPING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 333,118, dated December 29, 1885.

Application filed September 20, 1884. Serial No. 143,545. (No model.)

To all whom it may concern:

Be it known that I, THOMAS C. ENTWISTLE, a citizen of the United States, residing at Melrose, in the county of Middlesex and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Expansion Drop-Wires for Warping, Beaming, and other Machines, of which the following is a specification.

My invention relates to expansion drop-wires for warping, beaming, and other machines; and it consists in the devices and combinations hereinafter described and claimed.

In the accompanying drawings, Figure 1 is an isometric view of my improved drop-wire box with brackets, drop-wires, and stop-bar, part of the drop-wires being supported by the warp-yarns, and the remainder of them having fallen upon the stop-bar; Fig. 2, a vertical cross-section of said box between two adjacent drop-wire brackets; Fig. 3, a horizontal central longitudinal section of the drop-wire box; Fig. 4, a side elevation of the drop-wire bracket detached; Fig. 5, a plan of the bottom of the same; Fig. 6, an end elevation of the outer or enlarged end of the same; Fig. 7, a side elevation of the drop-wire detached; Fig. 8, a plan of the bottom of the same; Fig. 9, a vertical cross-section of two drop-wire boxes between the drop-wires, a cross-section of the vibrator-shaft and vibrator, and of the stop-rod, the arms which connect said shaft with the vibrating bars being in side elevation, and two carrier-rolls being shown in end elevation.

Heretofore drop-wires of expansion-drop-wire boxes have been supported by the warp-yarns in front of such boxes, and the drop-wires having necessarily been made heavy, in order to be strong enough to stop the vibrator, and having been wholly supported by the yarns, their weight has caused the slack yarns to sag sufficiently to allow the drop-wires to be struck by the vibrator, thereby bringing into action the stop mechanism when no yarns were broken. To remedy this defect, to make a drop-wire box that shall occupy less room, and to provide improved means of varying the spaces between the drop-wires is the object of my invention.

The drop-wires of so-called "expansion-drop-wire boxes" in warping and beaming machines

are usually expanded or spread apart by the same means as are used to expand or spread apart the dents of expansion-combs in such machines.

For a drop-wire box I use a box like the comb-box described in an application, No. 143,046, filed by me September 15, 1884, for patent for improvement in combs for warping, beaming, and other machines, and now pending, except in the position of the longitudinal slot—that is, instead of the usual drop-wire box, consisting of two strips of wood or iron hollowed on their inner surfaces to receive springs, dents, guide-rods, and a guide and stop rod, I use a tube, A, (preferably metallic,) slotted from end to end on the back side thereof—that is, on the side toward the warp-beam at *a*. Within this tube or box A, I place a single pair of springs, C C', wound together at a single operation, in alternating spirals, in the usual manner. Between the coils of the springs I insert the flat shanks *w* of the drop-wire holders or brackets W. Each shank *w* is of about the thickness and depth of a dent in an ordinary expansion-comb, and is kept in its proper place in the springs, as such dents are, by guide-rods R, placed between it and the springs, and is prevented from being drawn out of the springs by the stop-rod R', which passes through a hole in each shank. The ends of the guide-rods and the stop-rod are looped around rings R²—one at each end of the tube A within the same. Each bracket W is provided with a head, *w'*, shaped on the side next the tube A to fit the outside of said tube, and is also provided with ears *w² w²* at its outer end, just below the head *w'*, between which ears is pivoted a drop-wire, V, on a horizontal pivot, *w³*.

The form of the drop-wire is shown in Figs. 7 and 8, one end being bent into a ring, *v*, to receive the pivot *w³*, and the other bent into a spiral or yarn eye, *v'*, of the usual form. In use a single warp-yarn, Y, is passed through each yarn-eye *v'*, and by tension and friction (the yarn running in the direction shown by the arrows in Figs. 1 and 9) holds the drop-wire in a nearly vertical position against the back of the head *w'* of the drop-wire bracket W. When a yarn breaks, the drop-wire through which that yarn runs falls down upon

the stop-bar T, which is of the usual construction and operation.

As an additional precaution to that afforded by the guide-rods and stop-rod against the drop-wire brackets rocking in the slot a , and throwing the drop-wires out of parallelism with each other when in their raised position, each shank w , just in front of the head w' , is thickened at w^1 on each side to the thickness of the head.

When any drop-wire rests upon the stop-bar, it lies in the path of the vibrating bar m of the vibrator M, and stops the same in its forward motion. The vibrator is of the usual construction and operation, and consists of a horizontal rock-shaft, m' , provided with arms m^2 , to the upper ends of which arms is secured the horizontal bar m .

The vibrator shown in Fig. 9 is double—that is, it has double arms and two vibrating bars on the same shaft, m' —to enable two drop-wire boxes to be used where a very large number of warp-yarns are being wound on the same beam, and where it is desired to bring the adjacent yarns nearer together than it is practicable to set the adjacent drop-wires. In such a case the drop-wires of one drop-wire box alternate with the drop-wires of the other box, one half of the threads (taken alternately) passing through one set of drop-wires and the other half of the yarns passing through the other set of drop-wires. When the shaft m' is rocked, the vibrating bar m swings back and forth, its extreme positions being shown by dotted lines. When the motion of the vibrator is arrested by the bar m striking against the end of a fallen drop-wire, the well-known stop-motion (not shown) is thereby brought into play and stops the machine in the usual manner, as shown and described in Patent No. 137,605, granted April 8, 1873, to George S. Follensbee and myself, for improvement in stop mechanisms for warping-machines.

The row of drop-wires is expanded by substantially the same means as are shown and described in the pending application above referred to—that is, by winding up on drums I I straps H H, (preferably metallic,) the inner ends of said straps being provided with loops h , which surround dents or pins h' , passed through the springs near the ends thereof, the other ends of the straps being secured to the drums in any convenient manner. The drums are revolved by means of hand-wheels J J, and are supported in brackets K K, projecting from the heads L L or hollow cylinders which surround the ends of the tube A, and are secured thereto by any convenient means. The drum-supporting brackets K K are drilled through transversely to receive the drums, are slotted longitudinally and vertically at k , to admit the straps H H, which pass out through holes in the centers of the ends of the heads. The drum-supporting brackets K K are provided with transverse slits k^2 , which lie in the same plane as the axes of the drums.

In each of the brackets K K, near the outer end of the same, there is a vertical clamp-screw, S, which screw passes freely through the part of the bracket K above said slit and enters a threaded hole in the lower part of said bracket K, so that turning up said screw partially closes the slit k^2 and pinches the drum sufficiently to prevent its being turned by the contraction of the springs.

It is common in drop-wire boxes to use two pairs of springs and to pass the dents which support the drop-wires through both pairs of springs. It frequently happens, from one cause or another, that one pair of springs will expand more readily than the other, and the dents will be thrown out of parallelism with each other, and the threads will be unequally spaced. An inequality of tension between the springs of the same pair will throw the dents out of line and cause them to be unequally spaced, unless a similar defect exists in the other pair, where two pairs are used in the same box. Besides the saving effected and the mechanical advantage obtained thereby, the use of a single pair of springs allows of the drop-wire box being constructed from cheap wrought-iron pipe.

Where the drop-wires are guided by vertical dents, the middle dent is usually held rigidly, and the springs are expanded by means of a right-and-left-hand screw placed within the box and turning in nuts, one of which is fastened to each end of the springs; but this method of expanding the springs is found to make an uneven spacing of the dents and drop-wires at the center of the box, owing to the unequal elasticity of the halves of the springs. I do not fasten the middle drop-wire bracket, but allow all the brackets to move freely. By turning either drum I expand the springs from the end farthest from the drum so turned, and the springs may be independently expanded from either end, thereby increasing the spaces between the drop-wire brackets.

In practice I set one end of the row of drop-wires at the proper place by turning the hand-wheel at that end of the row, and then set the other end of the row by turning the other hand-wheel, the proper length of the row of drop-wires when in use being equal to the distance between the heads of the beam.

The slit a being on the side of the box, a little below the middle of the same, it is impossible for any dirt or lint to get into the box and interfere with the expansion of the springs and the movement of the drop-wire brackets, much difficulty having been experienced from this cause with boxes open at the top.

I claim as my invention—

1. The combination of a box or tube provided with a longitudinal slit, springs placed within said box, drop-wire brackets having shanks placed in said slit between the coils of said springs, drop-wires having yarn-eyes and pivoted to said brackets, the straps connected, substantially as described, to said springs, the heads secured to said box or tube and pro-

vided with drum-supporting brackets, the drum turning in said brackets last named, said last-named brackets being slit in the plane of the axes of said drums, and means, substantially as described, of closing the sides of said slit upon said drums, said drums being connected to said straps, as and for the purpose specified.

2. The combination of a box or tube provided with a longitudinal slit, springs placed within said box, drop-wire brackets having shanks placed in said slit between the coils of said springs, drop-wires having yarn-eyes and pivoted to said brackets, the straps connected, substantially as described, to said springs, the

heads secured to said box or tube, and provided with drum-supporting brackets, the drums connected to said straps and turning in said brackets last named, said last-named brackets being slit in the plane of the axes of said drums, and a clamp-screw turning freely in the part of the bracket on one side of the slit, and screwing into the part of the bracket on the other side of said slit, as and for the purpose specified.

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