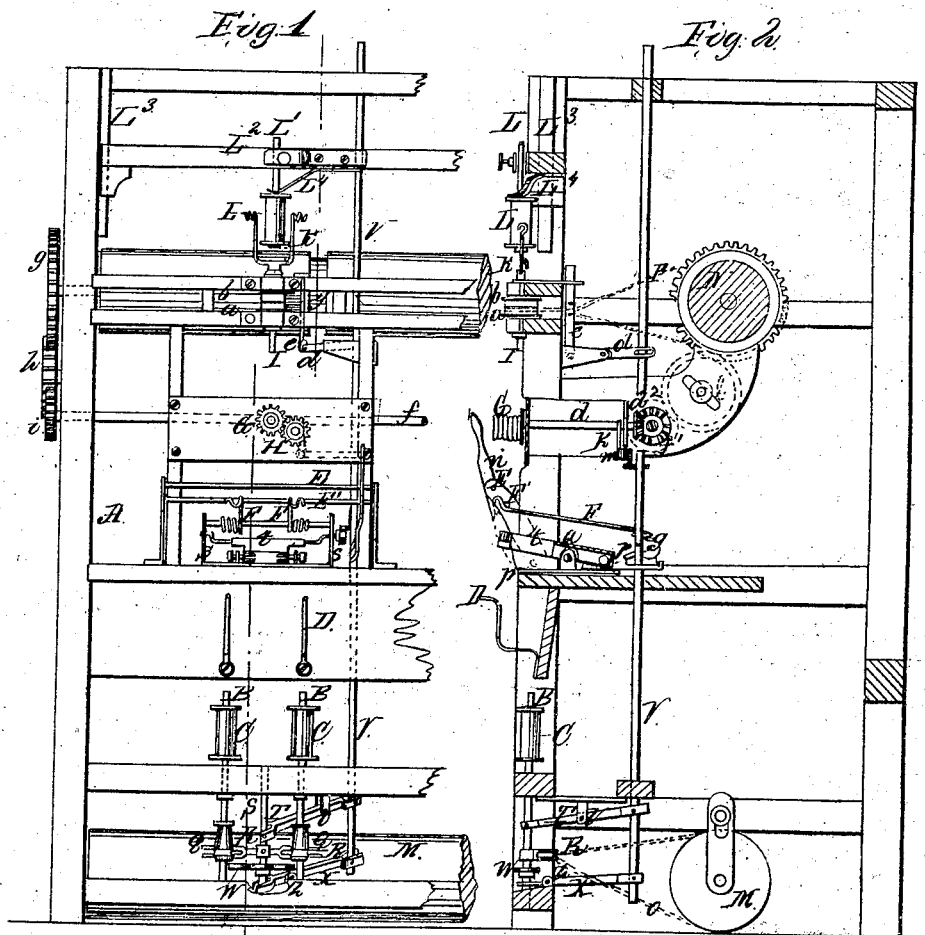


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N<sup>o</sup> 109,185.

Patented Nov. 15, 1870.



Witnesses  
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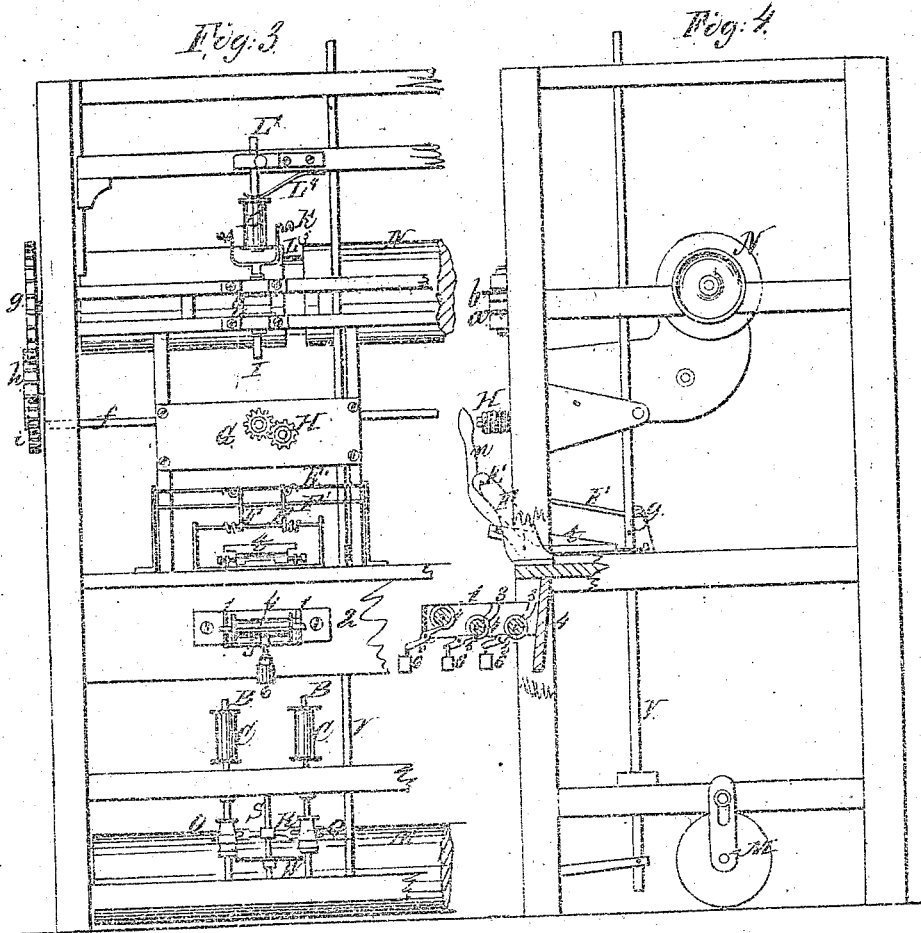
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# UNITED STATES PATENT OFFICE

THOMAS N. DALE, JR., AND GEORGE KRAINK, OF PATERSON, NEW JERSEY.

## IMPROVEMENT IN MACHINES FOR SPINNING AND DOUBLING SILK, &c.

Specification forming part of Letters Patent No. **109,185**, dated November 15, 1870.

### *To all whom it may concern:*

Be it known that we, THOMAS N. DALE, Jr., and GEORGE KRAINK, of Paterson, in the county of Passaic and State of New Jersey, have invented a new and useful Improvement in Spinning, Doubling, and Twisting Machinery; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification.

Our invention relates to spinning and doubling silk in the same machine, but is also applicable to wool and other fibers.

We will first describe our invention in connection with all that is necessary to a full understanding thereof, and then clearly point it out in the claims.

Figure 1 is a front elevation of our improved machine, and Fig. 2 is a sectional elevation of the same when arranged for the manufacture of the warp. Fig. 3 is a front elevation, and Fig. 4 is a sectional elevation, of the same when arranged for the manufacture of the weft.

Similar letters of reference indicate corresponding parts.

The organzine or warp is made of two threads of raw silk by first twisting them separately, then doubling them, and finally twisting them together, the final twisting being done in the direction opposite to that of the first twisting, the thread being made very close and firm.

The tram or weft is made of threads of raw silk also, using two or more, which are first doubled and then twisted to make a soft and elastic thread more suitable for filling.

A is a suitable frame, of wood or metal, made considerably higher than the ordinary doubling or single row twisting-machines and as long as may be required for the number of spindles or sets of spindles to be used.

B represents the spindles on which the bobbins C, containing the raw silk, are placed, for spinning the separate threads and delivering them to the doubling apparatus and twisting apparatus at the same time. These spindles, being provided with suitable fliers, and operated by belts in the ordinary way, perform the first twisting operation on the single threads for the warp as they are drawn from the bobbins C. The said threads are conducted over the guide-wires D, wire E, and fallers F to the grooved doubling and drawing rollers G

H, thence to and through the hollow twisting head I, over the fliers K, or one of them, and to the bobbin L, where it is wound in the finished condition, the doubling being effected by the rollers G H, and the final twisting by the tubular twisting-head I and the fliers K.

By this simple means the several operations are readily and economically performed; but the successful execution of them together demands such an arrangement that in all cases the several threads to be united in one shall have exactly the same tension, or as nearly so as possible; and herein, and for lack of means for stopping all the parts simultaneously in case of the breaking of a thread, lies the difficulty which up to this time has prevented the performance of the said operations simultaneously and in one machine.

If the threads have not the same tension, or if one thread be broken, the imperfection made in the surface of the woven goods by the thus weakened warp-thread breaking in the loom is more marked in silk goods than any other, owing to the high finish of the same, and these imperfections are more to be guarded against on account of the expensive character of the goods; hence the importance of making the most perfect threads. We have therefore provided an arrangement of driving mechanism for gearing the spindles, twister, and doubling and drawing rollers together, so that all work is in the exact relation to each other required, and in case a thread breaks all the moving parts—*i. e.* the spindles, doublers, and twisters—will be simultaneously thrown out of gear.

M represents the cylinder for driving the spindles B; N, the one for driving the twist-ers I, and also the rollers G H. These two cylinders are, in practice, connected together by gear-wheels and a shaft, so as to be moved at the same relative speed, and the spindles and twisters are driven from them by belts O P in the ordinary way. The belts O work in the grooves of the pulleys Q, having the reduced or conical upper parts, onto which the belts are thrown by the shifters R, one pair being used for each pair of spindles when they are to be thrown out. This saves power and bands when only part of the spindles are to be used. The shifters R are connected to a vertical rod, S, which is worked by a lever, T, pivoted at U and connected to the drop-rod V.

W is a brake, designed to be brought up

against the bottoms of the pulleys Q at the same time that the belts are thrown up, for arresting them at once. This brake slides up and down on the rod S, and is raised by a lever, X, pivoted at Z and connected to the drop-rod V. This brake-bar is moved back by gravity.

The belt P works through the shifter Y on the fast pulley *a* of the twister I, and is thrown up onto the loose pulley by its shifter when the drop-rod V falls, the said shifter being connected to the said rod by the lever *d* and arm *e*.

The drawing and doubling roller G is operated by a shaft, *d*<sup>1</sup>, and wheel *d*<sup>2</sup>, gearing with shaft *f* by a wheel, *f*<sup>1</sup>, thereon. This shaft *f* is driven by the cylinder N through suitable gear-wheels, *g h i*, which impart to it a positive motion. These wheels are, of course, arranged to give the requisite speed to the drawing-rollers; but it is sometimes necessary to change their speed for different kinds of work. This is done by changing the gear-wheels *h i*, for which purpose the stud-pin of the wheel *h* is arranged in a slot to admit of making the said changes. By such changes the twist of the warp or other thread being made may be varied.

The bearing of the shaft *d*<sup>1</sup> next to the shaft *f* is constructed so as to allow the shaft to slide to disconnect the gear-wheels *d*<sup>2</sup> *f*<sup>1</sup>, and the wheels are held in gear by a bell-crank, *k*, pivoted at *m*, and resting at one end on a stud-pin projecting from the drop-rod. The other end of the said crank-lever bears against the shaft *d*<sup>1</sup> when the drop-rod is raised, and holds it in gear.

*n* is a hand-lever, pivoted at *p*, and arranged with the said drop-rod for raising it, when it is desired to set the several parts in gear, by properly moving the belt-shifters and the bell-crank *k*. It is held up by the stud *q* on the end of the short bent tripping-rod *r*, mounted in the stands *s*, to be acted on by the hollow tilting lever *t*, pivoted at *u*, and arranged to be thrown up at the rear end to turn the said tripping-rod and let the drop-rod fall by the dropping of the faller-wires F, which, being held up against the rod F' by the threads, are let fall when they break on the front end of the tilting-lever *t*, thereby stopping all the apparatus at once by throwing off the belts, moving the lever *k* away from the shaft *d*<sup>1</sup> to let its wheel slip out, and bringing the brake W up against the pulley Q on the spindles B. This hollow lever *t* is provided with one or more tilting-balls, which greatly assist in carrying the front end down as soon as tilted far enough by the fallers to incline it that way.

We attach the tube I to the flier K, making it the support and means of rotating it, the driving-pulley being attached to it, and conduct the doubled thread up through the said hollow axis, and thence to the arm of the flier, thereby twisting the threads in the said tube.

The bobbin L, which receives the twisted

thread, is suspended by the fixed spindle L<sup>1</sup> on the bar L<sup>2</sup>, which is arranged to traverse up and down on the ways L<sup>3</sup>. The traverse motion may be produced by any suitable arrangement of means, which, not being part of our invention, is not shown.

The said bobbin L is provided with a friction-spring, L<sup>4</sup>, which may have a temper-screw or other suitable device for varying its pressure and the friction thereof, according to the condition of the bobbin, as when it is first put on, and before it has received much thread, it would run too light and fast, which would make the bobbins too soft. The said temper-screw is to be adjusted from time to time by the attendant.

For making the weft the threads of which are not to be twisted previous to doubling, we place the bobbins containing the same in the rack 1, which is detachably connected to the front board 2 of the machine, so as to be removed when not required. In this case the bearings in the rack for the journals of the bobbins are formed by the slots 3 in the side rails of the said rack. We propose to arrange these bearings as to depth so that they will support the bobbins 4 at equal distances from the rod E, over which the respective threads pass before going to the doubler-rolls, so that exactly the same length of thread from each bobbin will be under tension, thereby insuring the equality of the tension as much as possible.

Each bobbin in the rack is acted on by a friction-bar, 5, and weight 6 to produce the necessary tension.

Of course the spindles B are not used when doubling and twisting the weft; but these operations are in other respects the same as those described for the warp, and need not, therefore, be repeated.

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

1. The combination, with the bobbin-rack 1, constructed as described, of the drawing and doubling rollers G H and twister I K, arranged as set forth, for the purpose specified.
2. The bobbin-rack 1, constructed and arranged as described, in order that the spools may be located therein, as set forth, for equalizing the tension of the cords.
3. The combination, with the belt-shifters for the spindles B and twisters I, the brake W, and the lever for throwing in the shaft *d*<sup>1</sup>, of the drop-rod V and tripping-holder *q*, all substantially as specified.
4. The combination, with the drop-rod, belt-shifters, and brake, of the tripping-rod *r*, hollow tripping-lever *t*, having one or more balls therein, and the fallers F, all substantially as specified.

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