(No Model.) 3 Sheets—Sheet 1.

W. H. NAYLOR.

DRIVING BAND TWISTING MACHINE.

No. 422,611. Patented Mar. 4, 1890.

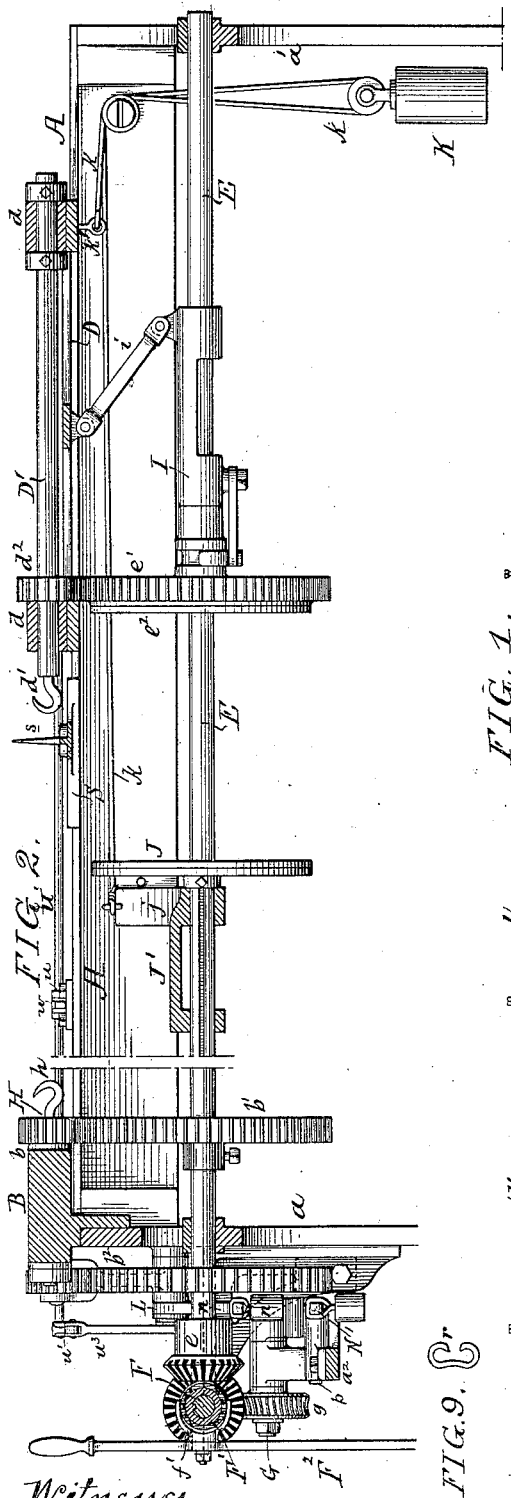

FIG. 2.

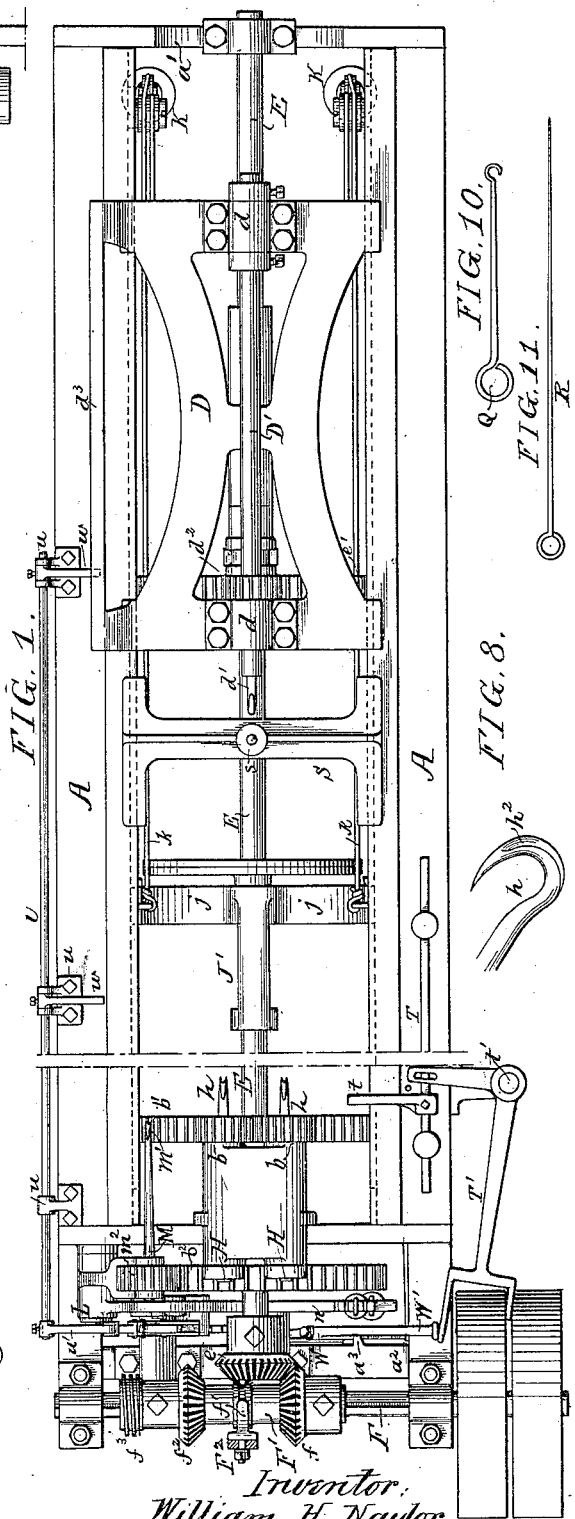

FIG. 1.

FIG. 10.

FIG. 11.

FIG. 8.

FIG. 9.

Witnesses:
Hamilton D. Turner,
Andrew B. Groupe.

Inventor:
William H. Naylor
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(No Model.) 3 Sheets—Sheet 2.

W. H. NAYLOR.

DRIVING BAND TWISTING MACHINE.

No. 422,611. Patented Mar. 4, 1890.

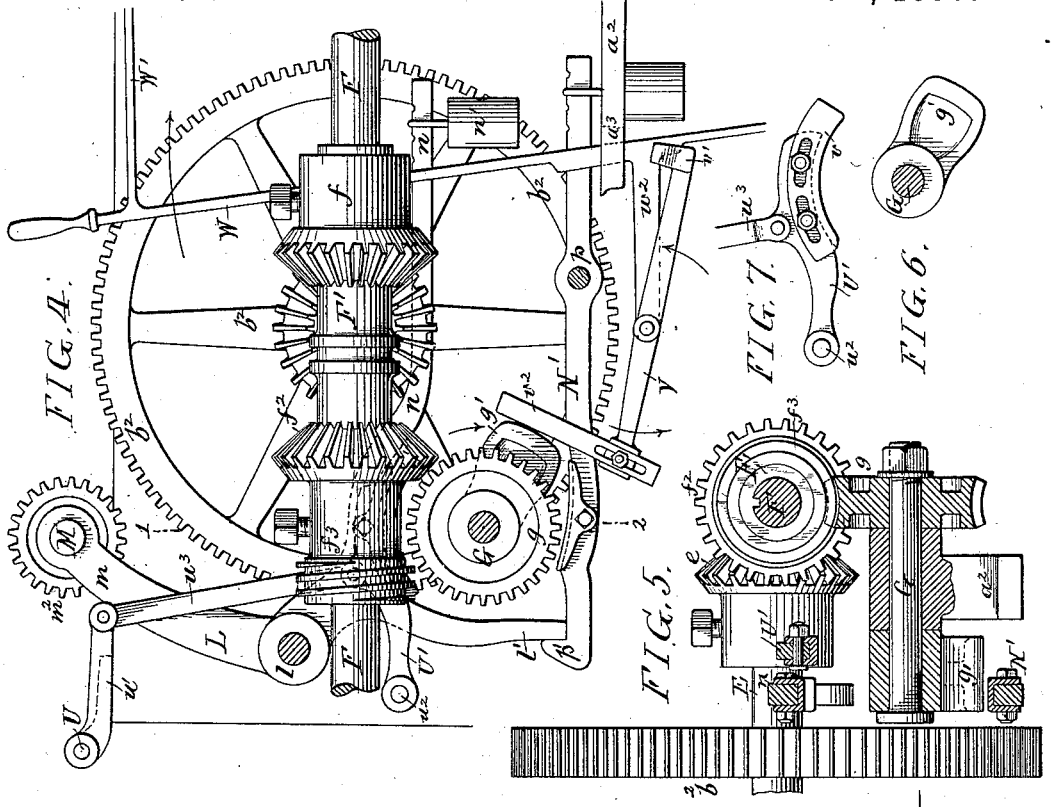

FIG. 4.

FIG. 5.

FIG. 7.

FIG. 6.

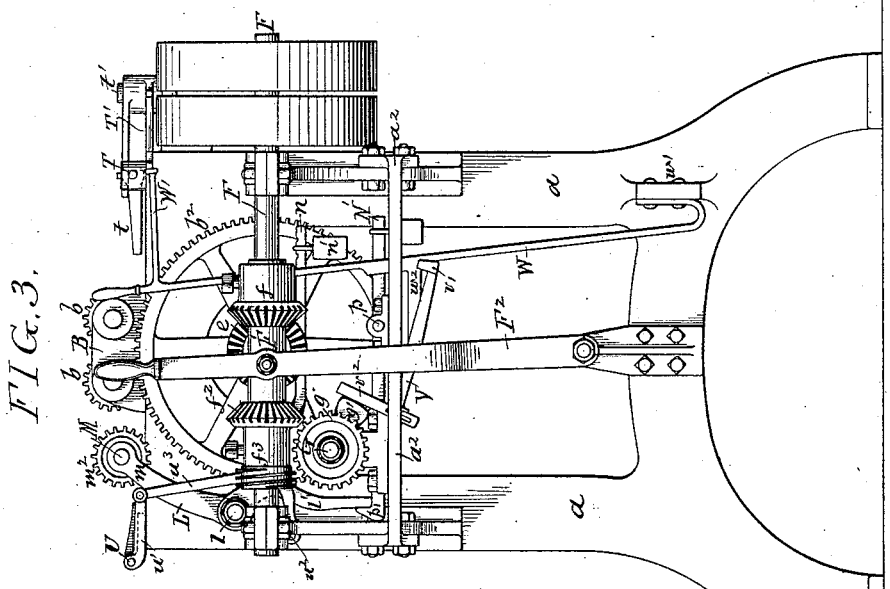

FIG. 3.

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(No Model.) 3 Sheets—Sheet 3.

W. H. NAYLOR.

DRIVING BAND TWISTING MACHINE.

No. 422,611. Patented Mar. 4, 1890.

FIG. 12.

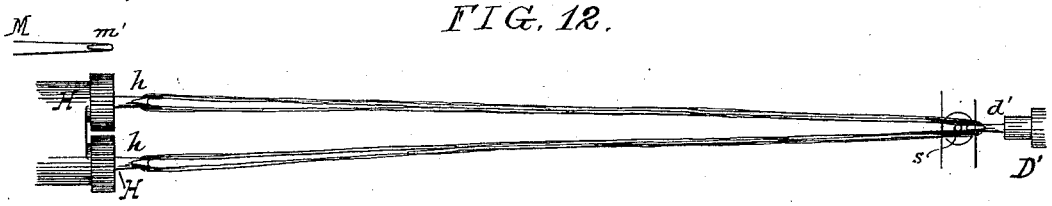


FIG. 13.

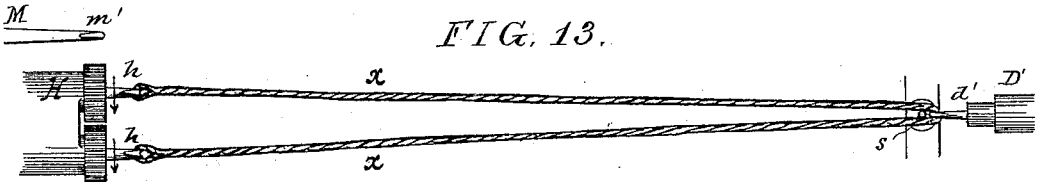


FIG. 14.

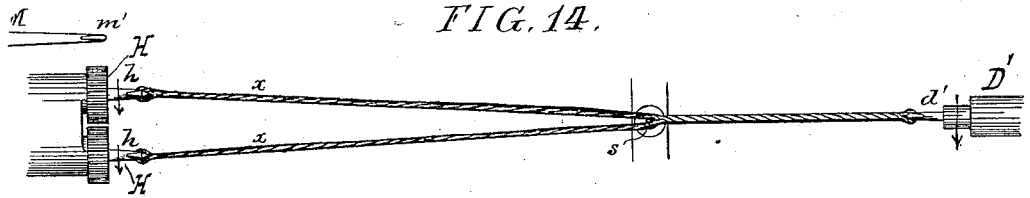


FIG. 15.

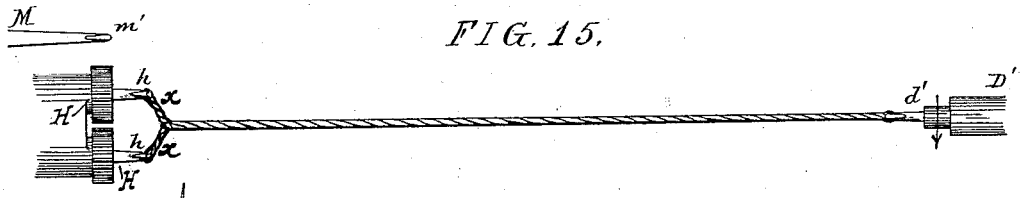


FIG. 16.

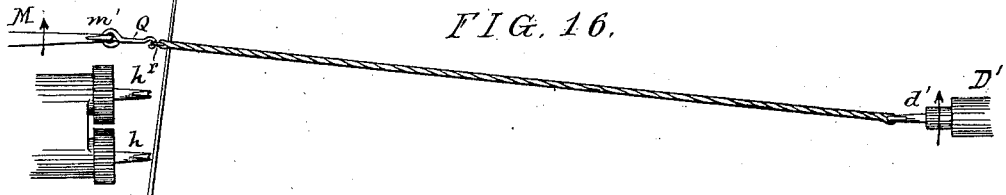
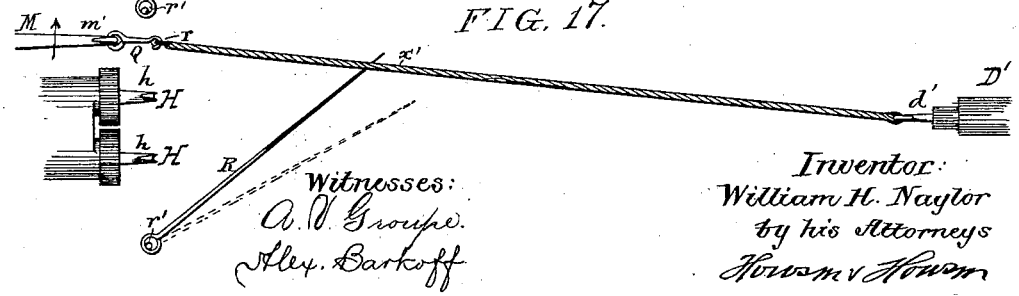


FIG. 17.



Witnesses:
A. V. Groupe.
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William H. Naylor
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UNITED STATES PATENT OFFICE.

WILLIAM H. NAYLOR, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO THOMAS B. LUZIER, OF SAME PLACE.

DRIVING-BAND-TWISTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 422,611, dated March 4, 1890.

Application filed June 22, 1889. Serial No. 315,203. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. NAYLOR, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Driving-Band-Twisting Machines, of which the following is a specification.

The object of my invention is to construct a simple and compact machine for twisting cords or driving-bands used especially in connection with spinning-machines, on which the twisting of the band can be completed without application to a second machine.

In the accompanying drawings, Figure 1 is a plan view of my improved band-twisting machine. Fig. 2 is a longitudinal section thereof. Fig. 3 is an end view thereof. Fig. 4 is an enlarged view of a portion of the end frame. Fig. 5 is a section on the line 1 2, Fig. 4. Fig. 6 is a detached view of the cam. Fig. 7 is a detached view of one of the levers acted upon by the cam. Figs. 8, 9, 10, and 11 are views of details of the invention. Figs. 12, 13, 14, 15, 16, and 17 are diagram views showing the process of twisting the band.

A is the bed of the machine, composed in the present instance of two longitudinal frames supported at each end by end frames *a a'*.

E is a shaft running the full length of the machine and having its bearings in brackets on the frames *a a'*. This shaft is geared to the driving-shaft F through the medium of bevel-pinions *e* and *f*, the pinion *f* being on a sleeve F', splined to the shaft F, so that it can slide upon but will turn with the shaft. This sleeve F' is controlled by a hand-lever F^2, pivoted to a bracket on the frame *a* of the machine, which is provided with two arms *f'*, which rest in an annular groove in the sleeve. Carried by the sleeve F' is a second bevel-pinion f^2 and a worm f^3. By moving the lever F^2 the bevel-pinion *f* can be moved out of gear with the bevel-pinion *e* and a bevel-pinion f^2 thrown into gear with the bevel-pinion *e*, thus reversing the movement of the shaft E, and the worm f^3 will be thrown into gear with the worm-wheel *g* on a shaft G, the object of which will be described hereinafter.

In the bearing B, mounted on the frame *a*, are two spindles H H, having at their outer ends hooks *h*, over which the strands of the band to be twisted are placed. These spindles are geared to the shaft E through the medium of pinions *b b* and gear-wheel *b'*, which is secured on the shaft E, so that as the shaft E is revolved the hooked spindles H will likewise revolve.

D is a carriage adapted to travel on the bed A, and on this carriage are bearings *d d* for a shaft D', having at its outer end a hook *d'*, on which is strung the middle portion of the yarn to be twisted. The shaft D' has a pinion d^2, which gears with a gear-wheel *e'* loose on the shaft E and connected to a sleeve I, also on the shaft E. This sleeve I is connected to the carriage by a link *i*, Fig. 2. The sleeve I and the wheel *e'* travel with the slide D. The wheel *e'* is not turned by the shaft E until its friction-face e^2 comes in contact with a friction-disk J, splined to the shaft E. The friction-disk J has an independent movement on the shaft E, and back of this disk is a sleeve J', having arms *j*, guided on the bed-plate of the machine.

K are weights having wheels at their upper ends. Around each wheel passes a cord *k*, one end of which is connected to the slide D at *k'*, while the other end is connected to the sleeve J' on the shaft E, so that as soon as the disk and slide are released from the control of the band they are brought back to their normal position by the weights.

At one end of the bearing B is pivoted a lever L on a stud *l*. This lever has three arms. The upper arm *m* carries a spindle M, having at one end a hook *m'* and at the opposite end a pinion m^2, which can be thrown into gear with the gear-wheel b^2 on the shaft E, as shown in Fig. 3. The arm *n* of the lever L has a weight *n'*, and is provided with a shoe, against which a cam *g'* strikes. This cam is mounted on the shaft G, mentioned above. Directly below the arm *n* of the lever L is a lever N', which is pivoted at *p* to the frame of the machine, and is weighted at one end and provided with a lug *p'* at the opposite end engaging with an arm *l'* of the lever L. The cam *g'*, above described, also strikes this lever on its revolution, throwing the lever out of engagement with the arm *l'* of the lever L.

S is a slide adapted to ways on the bed A, and projecting from the slide is a pin *s*, which

passes between two strands of the cord or band, as shown in Figs. 12, 13, and 14, and is carried forward on the twisting of the bands.

On the bed A is a shifting-bar T, having a projecting arm t, against which strikes the slide S when it reaches a given point as it is pushed forward by the twisting of the band. A shifting-lever T′ is pivoted at t' to a bracket on the bed, and one arm of this lever engages with a pin on the shifting-rod T, while the other arm is forked for the reception of the belt, which passes over the driving-pulley on the main shaft F, one pulley being loose, while the other is tight on the shaft.

U is a shaft running nearly the full length of the machine, mounted in suitable bearings $u\ u$, one end of this shaft having an arm u', connected to a lever U′, (shown clearly in Fig. 7,) which is pivoted at u^2 to the end frame a of the machine. This lever U′ is connected to the arm u' by a rod u^3. The lever U′ carries a shoe v, adjustable on the lever, as shown clearly in Fig. 7. The cam g' on the shaft G acts upon this lever at a certain point, forcing it upward, consequently vibrating the shaft U, on which are two fingers $w\ w$, which pass under the bar d^3 on the carriage D and lift the carriage free from the control of the shaft E, so as to stop the movement of the shaft D′. The carriarge can be raised at different points and at different times, depending upon the adjustment of the shoe d on the lever U′.

To insure the stoppage of the machine at the proper time, I provide a spring-lever W, secured at W′ to a bracket on the end frame a, this spring-lever W carrying an arm W^2, to which is pivoted a lever V, having a wedge-shaped end v', adapted to pass between the lever W and a bar a^2 on the frame a. This bar has a lug a^3, back of which the lever W rests; but as soon as the wedge d' is forced between the lever and the bar the lever is pushed away from the lug, and, owing to its elasticity, springs forward in the direction of the arrow. A projecting arm W′ of the lever strikes the belt-shifting lever T′ and shifts the belt from the fast to the loose pulley.

The wedge v' on the lever V is forced between the spring-lever W and the bar a^2 by the cam g' on the shaft G, which strikes an adjustable arm v^2 on the lever V at a certain point during its stroke, forcing the lever in the direction of the arrow, and consequently forcing the wedge between the spring-lever W and the bar a^2.

The operation of the machine is as follows: The yarn is placed upon the hooks $h\ h$ and h', as shown, for instance, in Fig. 12, and the machine then set in motion, the hooked spindles H revolving around their own centers in the direction shown by the arrows in Fig. 13, twisting the two strands $x\ x$ separately, as shown in said figure, and as they twist they draw up the hook d' and carriage D, and with the carriage the gear-wheel having the friction-face e^3, and as the band is twisted it becomes shorter, and consequently the carriage is moved until it comes in contact with the friction-face of the disk J on the shaft E. As soon as the friction-disk e^2 comes in contact with the disk J the shaft D′ is revolved in the direction of its arrow, Fig. 14, and consequently its hook d' will likewise revolve, twisting the two strands of the band around each other, the pin s, standing between the two strands of the band, as shown in said figure, now being forced toward the hooks $h\ h$.

It will be noticed that the hooked spindles H are putting a twist in the strands of the band reverse to that put in by the shaft D′, thus preventing the strands $x\ x$ of the band from becoming loose and soft by untwisting when the hooked spindle D′ twists the two strands together, as shown in Fig. 14. When the band is twisted to the point indicated in Fig. 15, the carriage S has reached a certain point, depending upon the twist wanted, and strikes an arm t of the shifting-bar T, and consequently the belt is shifted from the fast to the loose pulley on the shaft F, thus stopping the machine.

It may be noted here that the outer ends of the hooks H H are grooved at h^2, as shown in Figs. 1 and 8, so as to allow for the insertion of the hook r (shown in Fig. 9) into each eye of the band without first removing the band from the hooks. One end of the band-hook r is inserted into both strands, and the other end of the hook can be dropped over the hook m' on the shaft or spindle M, or can be attached to a second hooked bar Q, Fig. 10, as shown in Fig. 16. By providing this second bar the strand can be readily handled, and the hook m' can be larger, and consequently stronger, than if the small hook were used without the bar.

When the band is ready for removal from the hooks $h\ h$, it is in the condition shown in Fig. 15, and as soon as the band is removed from the hooks $h\ h$ and placed on the hook m' the needle R, Fig. 11, is placed between the two strands $x\ x$ and its eye placed over a pin r' on the frame, this pin acting as a pivot for the needle R. The hand-lever F^2 is then operated so as to move the sleeve F′, throwing the bevel-wheel f out of gear with the bevel-wheel e, and the bevel-wheel f^2 in gear with the bevel-wheel e, and the mechanism f^3 in gear with the gear-wheel g of the cam-shaft G. Thus when the belt is again shifted onto the fast pulley the direction of rotation of the shaft G will be reversed, and consequently the direction of the hooked shaft D′, thus backing off the twist in the band at the point where the needle R passes between the strands $x\ x$ of the band. This backing off is continued until the cam on the cam-shaft G strikes the latching-lever N′, releasing the lever L, carrying the hooked spindle M and causing its pinion to engage with the wheel b^2 on the shaft E, revolving the spindle M, in the direction of its arrow, Figs. 16 and 17, and retwisting the band while the hooked shaft D′ is untwisting the band. Thus the needle

will travel between the strands of the band from the point shown in Fig. 16 to the point x', Fig. 17, at which point the needle passes from between the strands of the band owing to its being pivoted to the pin r'.

The carriage D, carrying the shaft D′, is raised by the finger w, as dictated by the cam d', and the backing-off motion ceases; but the spindle M still revolving continues the twist in the band, closing the opening made by the needle, and consequently hardening the band until the cam G′ strikes the arm v^2 of the lever V, forcing the wedge v' between the lever W and the frame a^2, thus releasing the lever W and shifting the belt from the fast to the loose pulley and stopping the machine.

During the time the carriage D is raised and the shaft M continues the twist in the band the weight of the shaft is sufficient to prevent the band from turning it, although if necessary in some cases sufficient friction may be applied, through the medium of the bearing-boxes, to overcome any tendency to turn after its pinion is clear of the gear-wheel on the shaft E.

While the twisting mechanism is being thrown out of gear by the shifting devices above described, the cam g' raises the arm n of the lever L, throwing the pinion m^2 out of engagement with the gear-wheel e^2, the arm l' of the lever L being held in position by the lug p' on the lever N′, described above. The bevel-gears on the sleeve F′ can be moved to their normal position and a new band formed in the manner described above.

I claim as my invention—

1. The combination, in a band-twisting machine, of the bed-plate, spindles h h, carrying hooks, mechanism for driving said spindles, and the carriage D, also carrying a spindle and a hook, with the shaft E, having a friction-disk J, and a gear-wheel E′, sliding with the carriage and adapted to engage with the friction-disk J as the band is twisted, substantially as described.

2. The combination, in a band-twisting machine, of the bed-plate and the hooked spindles with a sliding carriage, a hooked spindle thereon, a driving-shaft F, a sleeve thereon, bevel-wheels f f^2 on said sleeve, a shaft E, geared to the hooked spindles h and to the hooked spindle on the carriage, a bevel-wheel e on said shaft, and a lever for throwing one or other of the bevel-wheels f f^2 into gear with the bevel-wheel e, substantially as and for the purpose described.

3. The combination, in a band-twisting machine, of the hooked spindles H H and pinions thereon with a supplemental hooked spindle M, a pinion thereon, a longitudinal shaft having wheels adapted to gear with the pinions on the spindles H and M, and a driven hook-shaft D′, substantially as described.

4. The combination, in a band-twisting machine, of the driving-shaft, the longitudinal shaft geared thereto, a traveling hooked spindle, gearing whereby the same is driven from the longitudinal shaft, a spindle M, a shaft G, a worm-wheel thereon, a worm on the driving-shaft meshing with said worm-wheel, a cam on said shaft G, a lever carrying the spindle M and acted on by said cam, and gearing whereby the said spindle is driven from the longitudinal shaft, substantially as specified.

5. The combination of the bed-plate A, the shaft E, and the driving-shaft F, geared thereto, with the hooked spindles H, driven by said shaft E, a carriage D, mounted on the bed-plate, a hooked spindle thereon, a friction-disk o^2, adapted to slide on said shaft E and geared to the last-mentioned spindle, a friction-disk J, also on said shaft, and a weight and cord, one end of which cord is connected to the sleeve and the other to the carriage, substantially as described.

6. The combination of the driving-shaft, a sleeve thereon carrying a worm, the shaft G, carrying a worm-wheel, a cam on said shaft, a shaft E and gear-wheel thereon, and gearing whereby said shaft is driven from the driving-shaft, with a lever acted upon by said cam and carrying a hooked spindle, on which is a pinion adapted to mesh with the gear-wheel on the shaft E, and a catch-lever engaging with the spindle-carrying lever and acting to hold it out of gear with the gear-wheel on the shaft E, substantially as specified.

7. The combination, in a band-twisting machine, of the hooked spindles H H and M and mechanism for driving the same with a carriage, a hooked spindle thereon, the rotated shaft E, gearing whereby the spindle is driven from said shaft, a shaft U, having fingers w w, adapted to pass under said carriage, a lever U′, connected to said shaft, and a cam adapted to act on the lever and to vibrate the shaft and lift the carriage, substantially as and for the purpose set forth.

8. A hook for a band-twisting machine having a groove h^2 cut in its exterior face, substantially as described.

9. The combination, in a band-twisting machine, of the spring lever W, the belt-shifting lever adapted to be acted upon by the spring-lever, with a wedge-lever carried by the spring-lever, a lug on the frame of the machine, back of which the spring-lever rests, and a cam adapted to operate the wedge-lever and to force the spring-lever away from the lug on the frame of the machine and shift the belt, substantially as described.

10. The combination, in a band-twisting machine, of the frame of the machine, the hooked spindles H H, and mechanism for revolving the same, with a carriage, a hooked shaft or spindle D′ thereon, mechanism for revolving the spindles H H and shaft or spindle D′, and a slide S, mounted on the frame and having a pin s for passing between the

strands of the band to be twisted, and adapted to slide upon the frame during the twisting of the strands of the band together, substantially as described.

11. The combination, in a band-twisting machine, of the bed, the belt-shifter, and the shifting-rod carrying an arm with a slide S, carrying a pin adapted to pass between the strands of the band to be twisted, the slide being so formed as to strike the arm of the shifter-rod on its forward motion, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM H. NAYLOR.

Witnesses:
WILLIAM D. CONNER,
HARRY SMITH.