

(No Model.)

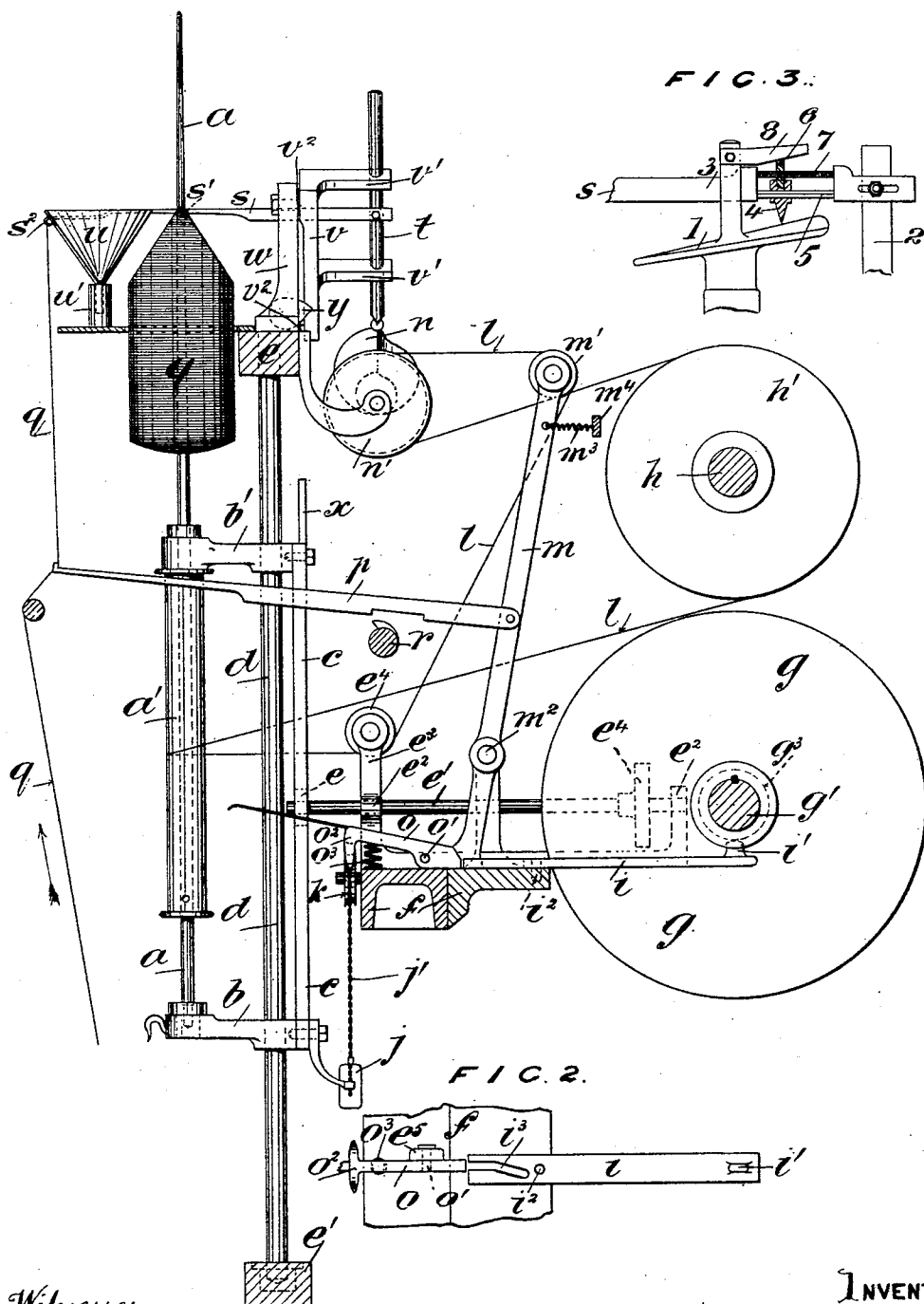
3 Sheets—Sheet 1.

J. D. WHYTE.
YARN WINDING MACHINE.

No. 586,279.

Patented July 13, 1897.

FIG. 1.



Witnesses
H. Van Dusen
E. A. Scott

INVENTOR
John Dempster Whyte
By his atty Richard

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FIG. 4.

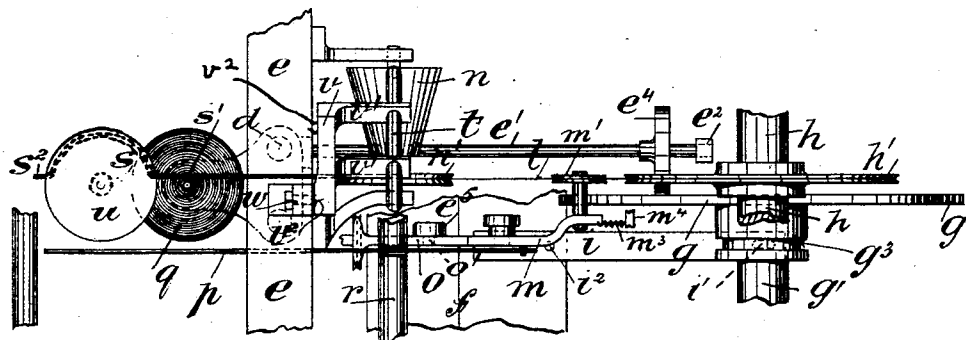


FIG. 8.

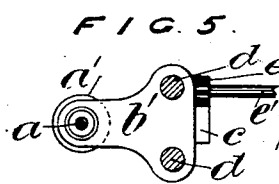


FIG. 7.

FIG. 6.

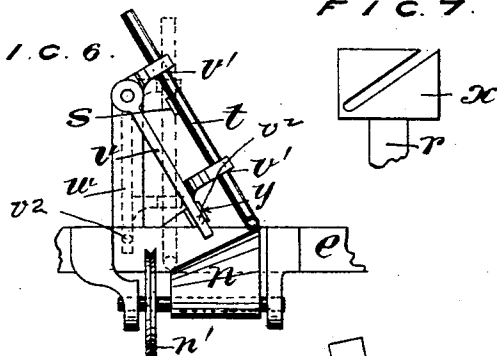


FIG. 11.

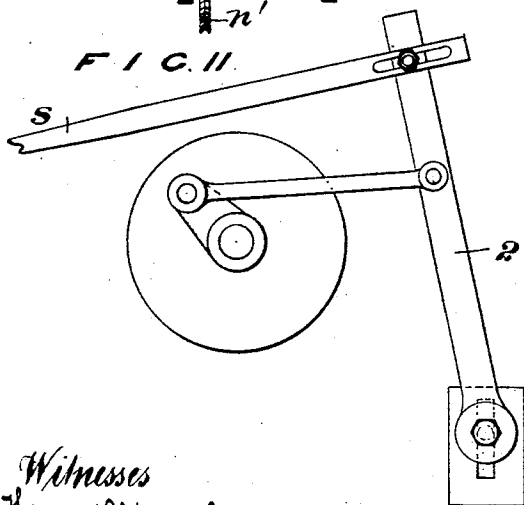


FIG. 9.

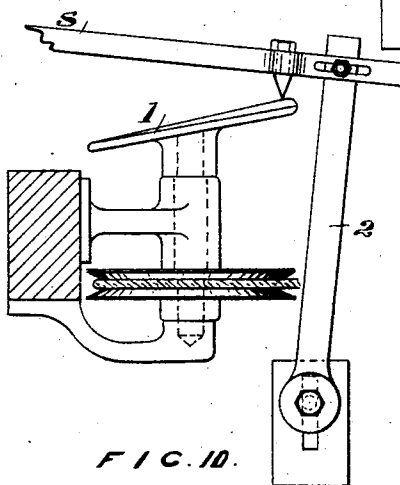


FIG. 10.



Witnesses
He van der Meer
E. A. Scott

INVENTOR
John Dempster Whyte
Richardson

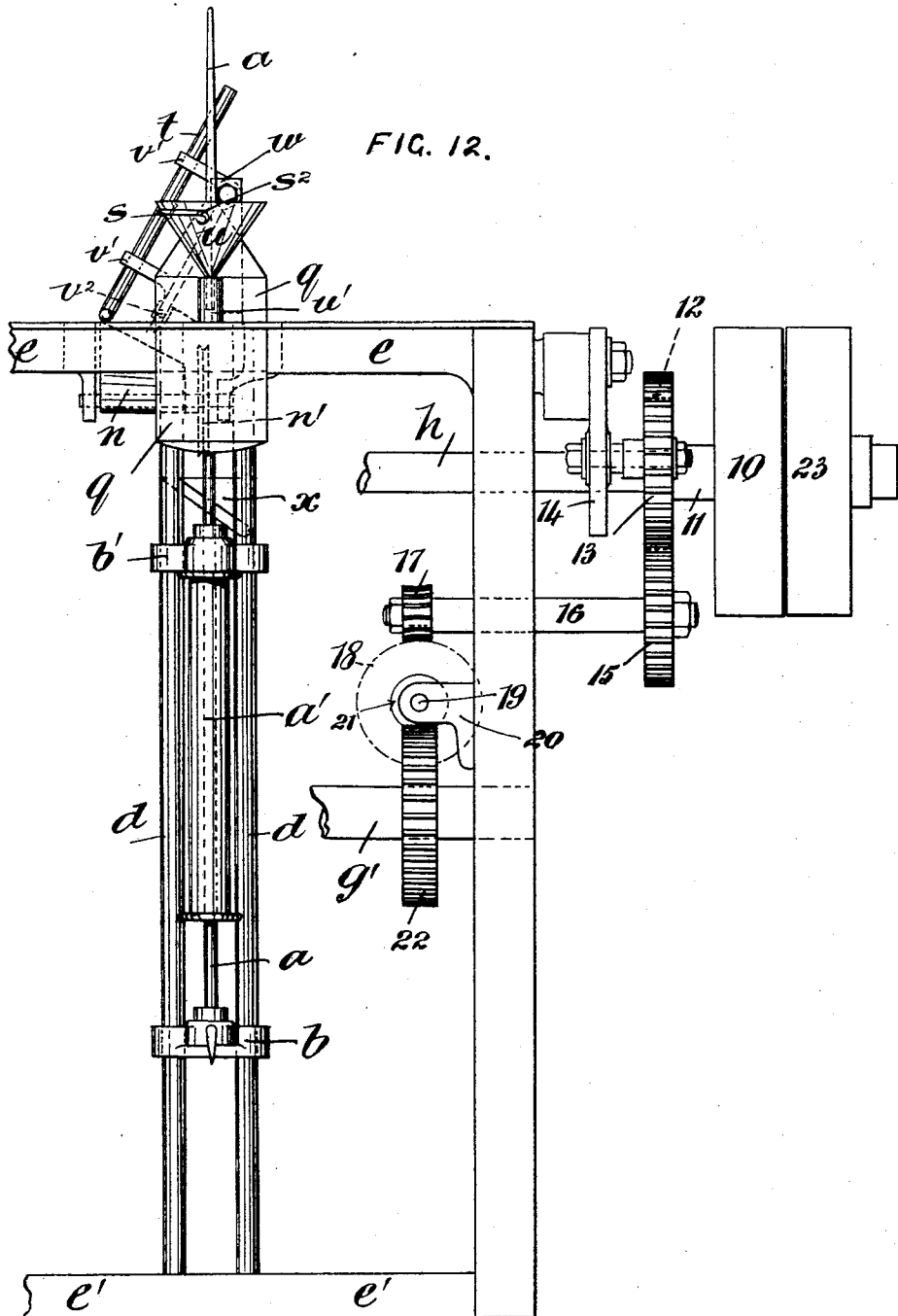
(No Model.)

3 Sheets—Sheet 3.

J. D. WHYTE.
YARN WINDING MACHINE.

No. 586,279.

Patented July 13, 1897.



Witnesses
Wm. S. Williams
H. W. Hopping

INVENTOR
John Dempster Whyte
By his Atty. *Richard L. ...*

UNITED STATES PATENT OFFICE.

JOHN DEMPSTER WHYTE, OF MANCHESTER, ENGLAND, ASSIGNOR OF ONE-HALF TO THE WHYTE'S PATENTS, LIMITED, OF BRADFORD, ENGLAND.

YARN-WINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 586,279, dated July 13, 1897.

Application filed October 24, 1896. Serial No. 609,961. (No model.)

To all whom it may concern:

Be it known that I, JOHN DEMPSTER WHYTE, engineer, a subject of the Queen of Great Britain and Ireland, and a resident of Manchester, in the county of Lancaster, England, have invented certain new and useful Improvements in Yarn-Winding Machinery, of which the following is a specification.

My said invention relates to improved apparatus for winding yarn, and has for its object to widen the scope of usefulness of such machinery and to improve the quality of the work turned out thereby. For example, under my invention I am enabled to wind successfully upon the bare spindle and also to produce large cops for warping and other purposes, the contents of which would ordinarily be wound upon bobbins.

The improvements will be best understood by a detailed description of the annexed two sheets of drawings.

Figure 1, Sheet 1, is a side elevation of a spindle carrying a warp-cop in the act of being wound, the adjacent parts which effect and regulate the winding being shown in conjunction with the said spindle. Fig. 2 is a plan of two of the automatic stop-levers. Fig. 3 shows a modification of the mode of operating the yarn-guide. Fig. 4, Sheet 2, is a plan view of the combination of parts shown in Fig. 1. Fig. 5 is a detached plan of one of the spindle-carriers. Fig. 6 is a back view of the building-cam and pivoted stock appearing in Figs. 1 and 4. Fig. 7 is a separate view of the slotted plate which inclines the stock. Figs. 8, 9, 10, and 11 illustrate cop-building motions more especially adapted to the winding of the smaller weft-cops. Fig. 12 is a view at right angles to Fig. 1, showing, however, only the spindle, spindle-carrier, canted stock, cam-cone, and the slow-motion gearing.

It will be understood that although in the following description I will refer to one spindle and its accompanying parts, nevertheless it must be understood that a frame may be fitted with any convenient number of such spindles and parts.

To begin with, I lower the spindles as the winding-on proceeds, and to admit of this

each spindle *a* is independently carried in bearings in supports *b b'*, the said supports being braced together by a rack-bar *c*, extending between the supports. The supports *b b'* are formed in plan, as most plainly shown in Fig. 5, and slide on rods *d d'*, extending between fixed rails *e e'*, bolted to the end frames of the machine. With the afore-said rack-bar *c* there gears a toothed pinion *e*, carried on one end of a shaft *e'*, the said shaft being supported in bearings *e² e²* from the bracket *e³*, bolted to the fixed rail or beam *f*.

The inner end of the shaft *e'* is furnished with a friction-pulley *e⁴*, as shown in dotted lines, capable of adjustment on the shaft *e'*, so as to be set nearer to or farther from the center of the disk *g*. The friction-pulley *e⁴* rests in frictional contact with the disk *g*, which is one of a series of similar disks carried on a shaft *g'*, extending throughout the length of the winding-frame. The said shaft *g'* is caused to revolve slowly by worm-gearing driven from the roller-shaft *h*. The said slow-motion gear is as follows: A fast pulley 10 is mounted upon the shaft *h* and driven by means of a belt from any suitable source. Upon the boss 11 of the fast pulley is mounted a spur-wheel 12, by which motion is communicated to the spur-wheel 13, carried in adjustable bearings by the bracket 14, which is secured to the frame of the machine. The spur-wheel 13 gears with the spur-wheel 15, thus driving the shaft 16 and worm 17. The worm 17 drives a worm-wheel 18, which is mounted on a stud 19, carried in a bracket 20. Connected to the worm-wheel 18 is a worm 21, gearing with the worm-wheel 22, fixed upon the disk-shaft *g'*. The pulley 23 is loose upon the shaft and provides for the stoppage of the winding-frame. The spur-wheels 13 and 15 can be removed and replaced with spur-wheels of varying sizes, thus allowing for the shaft *g'* being driven at varying speeds. The disk *g* is secured to its shaft *g'* by a slip-feather and groove. The boss of the disk *g* has a groove *g³*, with which engages a pin *i'* on a horizontal lever *i*, pivoted at *i²* upon the fixed beam *f*. This lever and its functions will be hereinafter referred to.

The weight of the supports b b' and the spindle and other objects carried thereby is counterbalanced by a weight j , the cord or chain j' of which passes over a grooved brake-pulley k , carried on a stud projecting from the fixed beam f .

When the machine is in operation, the toothed pinion e , engaging with the rack c , is slowly and continuously revolved by the frictional driving effects of the disk g on the friction-pulley e^4 in such a direction as to lower the spindle gradually as the winding of the cop proceeds. The spindle a is driven by a band l from the roller h' or its equivalent, the band passing partly around the barrel a' of the spindle, or it might be a sliding wharve, thence beneath a guide-pulley e^4 , carried by the bracket e^3 , thence over a pulley m' , carried on the upper end of a lever m , pivoted at m^2 upon a projection from the fixed rail f , thence to the pulley n' , which drives the spindle of the building-cam n , and so back to the roller h' . The lower end of the pivoted lever m acts so as at times to shift the disk g on its shaft clear of the friction-pulley e^4 and also so as to operate a brake-lever o , pivoted at o' to the bracket e^5 . The head o^2 of the brake-lever is formed of a crescent shape to fit over a portion of the periphery of the pulley k , over which the counterbalance-weight cord passes. The lever m also carries, loosely pivoted thereto, a drop lever or finger p , having an eye at its outer end through which the yarn q passes on its way to the cop. The finger p is thus upheld clear of a revolving or reciprocating cam r , which lies opposite to a notch or recess in the finger p .

Should the yarn accidentally break, the finger p drops, and the cam catching in the notch pushes the finger forward and thus pulls forward the pivoted lever m against the resistance of a spring m^3 , which connects the upper end of the lever to a fixed bar m^4 . The throwing forward of the lever and the pulley m' slackens the band l , which thus ceases to drive. At the same time the lower end of the lever m releases the heel of the brake-lever o , which falls partly by its own weight and partly by the pull of a spring o^3 , which brings the crescent braking-head o^2 down upon the pulley k and holds it firmly. This prevents the spindle and cop from dropping or moving after the breakage of the yarn, and it is very essential that this should be done; otherwise inequalities would arise in the cop.

It will be noted by an inspection of Fig. 2 that the operated end of the lever i is formed with a slot i^3 , the said slot being straight at first and then inclined. This is for the following reason: It will be clear that before relieving the friction-pulley e^4 from contact with the disk g it is necessary to apply the brake-lever o . Therefore during the movement of the lever m which releases the brake o the tail of the lever m is passing along the straight portion of the slot i^3 , and therefore does not

move the lever i ; but as soon as the brake has descended on and gripped the pulley k , thus preventing all perpendicular movement of the spindle, the tail of the lever m enters and moves along the inclined portion of the slot i^3 , thereby turning the lever i on its pivot and moving the disk g along the shaft g' sufficiently to disengage it from the friction-pulley e^4 . The parts are returned by the attendant to their normal position when piecing-up has been effected.

To effect the building of a cop—say, for example, a large warp-cop, such as the cop g , (shown in Fig. 1,) with a flattened or only slightly-rounded bottom—I provide means whereby the movement of the yarn-guide s commences when the cop is starting to be built with a minimum traverse and gradually increases while the bottom is being formed to a maximum traverse, with which traverse the main body of the cop is built and finished. This is brought about by the arrangements of mechanism hereinafter described. This general action is the same as that referred to in my English patent, No. 13,863, dated September 26, 1888, and in my United States patent, No. 458,927, dated September 1, 1891.

For the purposes of my invention I employ a cone-shaped cam n , which is best seen in Fig. 6 of the drawings, this cam being mounted on the spindle which carries the band-pulley n' , the cam being thus revolved. The smaller end of the cone-shaped cam represents the minimum traverse or throw of the yarn-guide s . The larger end represents the maximum traverse. Upon the cam there rests the lower end of a sliding jack t , the said jack t carrying the yarn-guide s . This guide s has an eye s' opposite to the spindle a , and when the cone u is used is prolonged to present another eye s^2 in proximity to the cone u . This cone u might be dispensed with, and its purpose when used is to regulate the taking up of slack of yarn from the creels, if such slack should arise. The cone u is carried in a loose pivot-bearing u' at the foot of the cone, as shown in Fig. 1, the cone being of the same slope as the angle of the top of the cop, but inverted relatively thereto, the small end of the cone being opposite to the base of the cop-nose, while the larger end of the cone is opposite to the peak of the cop-nose.

The function of the cone u is to provide for a constant delivery of the yarn from the creels from which it is wound and thus prevent sagging and jerking of the yarn. When yarn is wound upon a cop without the use of the cone u , it is evident that, as the speed of the spindle is constant, more yarn is wound upon the base or thickest portion of the cone of the cop than upon the apex or thinnest portion of the cone. Thus the yarn gradually sags or becomes slack as the yarn-guide approaches the apex of the cop. To prevent this sagging of the yarn and maintain it taut, the yarn is

first passed around the inverted cone u and through the eye s^2 of the yarn-guide, and from thence to the eye s' . The yarn, therefore, as it is being wound upon the base of the cop-nose passes around the lower part of the inverted cone u . As the yarn-guide raises the yarn toward the apex of the cop, the yarn is also correspondingly guided up the inverted cone, thus taking up the slack of the yarn.

The cone u , representing the same cone as the nose of the cop, but inverted, acts as a compensating means to keep the yarn taut, taking up little yarn when the yarn is being wound upon the thickest portion of the cop, but gradually taking up more yarn as the yarn-guide rises to the apex of the cop.

The aforesaid sliding jack t slides in bearings $v' v'$ on the stock v , the said stock being loosely pivoted at v^2 upon a bracket w , bolted to the fixed rail e . When the cop is being commenced, the pivoted stock and jack $v t$ are about perpendicular, as indicated, for example, in dotted lines in Fig. 6, a friction-bowl at the foot of the jack resting on the smaller end of the conical cam n . When the winding on commences, the smaller end of the conical cam reciprocates the jack t only slightly, the spindle a at the same time beginning to be lowered by the action of the toothed pinion e on the rack c .

The top support b' of the spindle carries a plate x with an inclined slot, as plainly shown in Fig. 7, the inclined slot being occupied at the commencement of the building of the cop by a pin v^2 , projecting from the back of the pivoted stock. As the slotted plate x descends with the lowered spindle-support b' the influence of the slot acting on the pin moves the lower end of the pivoted stock to one side—that is, toward the larger end of the conical cam n . The longer this side movement of the jack or stock is continued the larger becomes the traverse of the yarn-guide s , the guide both rising and lowering a little more at each traverse, which, coöperating with the simultaneous lowering of the spindle, produces the required flattened bottom to the cop.

When the stock v has been so far moved that the jack t rests on the larger end of the cam n , as is shown in full lines in Fig. 6, the plate leaves the pin on the stock, and at the same time to keep the stock in its angular position a jawed locking-clip y falls over by its own weight and secures the stock in its inclined position, the building of the cop then proceeding under the maximum traverse until completion.

An advantage derived from the throwing of the stock v into the angular position is that as the winding on proceeds the yarn-guide s is traversed at the same angle as the nose of the cop, the guide thus lying close to the cop as the building proceeds. The cam n is preferably made with a quick-drop ridge or step in its circumference, as plainly shown in Fig. 1, so as to move the yarn-guide s quickly

away from the nose of the cop at the moment of reversal and so prevent an over-wound or soft peak to the nose.

I do not confine myself to the conical cam n as a means of obtaining the building traverse of the yarn-guide. I might, for instance, in place of the described cam, jack, and stock use the inclined or wobbling disk 1. (Shown in Fig. 3.) Here I employ a pivoted lever 2, carrying on its free end an arm 3, to a prolongation of which the yarn-guide s is attached. A strut 4 is mounted on the arm 3, the said strut sliding on a square rod 5 and engaging with a collar 6, carried on a screw 7, held in the arm 3. A prolongation of the shaft which carries the cam-disk 1 is fitted with a fixed arm 8, which sweeps over the collar 6 as the cam revolves and by advancing the collar on the screw at the same time advances the strut from the center toward the outer circumference of the disk 1.

The fixed arm 8 is made long enough to operate the collar and strut during the building of the bottom of the cop. When the collar 6 has moved out of the range of the fixed arm 8, the maximum traverse has been attained and goes on till the cop is completed.

The arc vibrated through by the outer end or eye of the yarn-guide s is approximate to the inclination of the cop-nose. (See, for example, Fig. 8.) Fig. 8 also shows a form of grooved disk-cam 9, which might be used to give the traverse to the yarn-guide s . In this example, which, together with the remaining examples of traversing mechanism, is intended to be applied more especially in the winding of the smaller weft-cops, there is no attempt to vary the traverse at the commencement of the cop, a flattened bottom to such smaller cops not being an essential.

In Fig. 9 the disk-cam 1 used is similar to the cam shown in Fig. 3 and acts in the same manner, except that there is no attempt made to vary the traverse, as in Fig. 3, the maximum traverse being preserved from first to last. In this wobbling cam-disk 1 there is a ledge or step, as more plainly shown at Fig. 10, to give the desired quick reverse at the peak of the cop-nose.

In Fig. 11 I make use of a crank instead of a cam to give the required oscillation to the yarn-guide. Here also there is no attempt to vary the traverse. My improved method of winding confers advantages both in warping and weaving with cops so wound. For example, in warping-frames the absence of the usual bulky bobbins economizes space, and, the yarn being drawn either from the interior or the exterior of the cops, the latter may be placed on closely-pitched cop tongues or spindles or into holders mounted closely together on uprights or on a frame, the noses or ends of the cops being toward the warp mill-reeds.

What I claim as my invention is—

1. In combination the cop-holding spindle,

the yarn-guide and means for operating the same to produce a cop with a flattened bottom, said means comprising the sliding jack *t*, the pivoted stock *v* carrying the jack, means for operating the same about its pivot and the conical cam *n* for operating the sliding jack, substantially as described.

2. In combination the cop-holding spindle, the means for raising and lowering the same, the yarn-guide, the sliding jack carrying the same the pivoted stock carrying the sliding jack means moving with the spindle for canting the stock on its pivot and the conical cam for operating the sliding jack, substantially as described.

3. In combination, the spindle with the vertically-movable frame carrying the same, the yarn-guide, the sliding jack carrying the same, the pivoted stock carrying the sliding jack, the conical cam for reciprocating the sliding jack, and means for moving the pivoted stock on its pivot consisting of the slotted plate *x* connected with the spindle-frame to move therewith, substantially as described.

4. In combination, the spindle, the driving-band therefor, the lever *m* carrying an idle-wheel about which the band passes, the finger *p* connected to the lever and held in position by the thread, the cam *r* for operating the finger when the thread breaks, the vertically-movable frame for the cop-spindle, means for moving the same comprising the friction-disks, the lever for throwing said disks out of connection when the thread breaks, said lever being controlled by the lever *m* and the finger *p*, the weight for counterbalancing the spindle-frame and the brake for controlling the action of said weight, said brake being controlled by the lever *m*, substantially as described.

5. In combination, the vertically-movable cop-spindle, the means carrying the same, driving means for operating the spindle in one direction, a brake for holding the spindle against movement when the driving mechanism is thrown out and means controlling said driving means and brake, said controlling means being in turn controlled by the thread and to operate upon the failure of the same, substantially as described.

6. In combination the spindle, a carrier-frame therefor, said spindle and carrier-frame being movable vertically, driving means for moving the carrier-frame and spindle in one direction, driving means for turning the spindle, and means controlled by the thread for

throwing both of the driving means out of action when said thread breaks, substantially as described.

7. In combination, the spindle, the vertically-movable carrier therefor, driving means for moving said carrier, the driving means for turning the spindle consisting of the endless band and the pulleys means controlling both the vertical and rotary movements of the spindle comprising the lever carrying a wheel engaging the band, and the connections between said lever and the means for moving the carrier vertically, substantially as described.

8. In combination the spindle with a carrier for moving the same vertically the driving means for moving said carrier, the band for turning the spindle, the yarn-guide, means for giving the same a traversing movement said means being operated by the band, a lever having a wheel engaging the band, said lever being controlled by the thread whereby both the turning of the spindle and the traversing of the guide will be stopped when the thread fails, said lever also controlling the driving means which operates the spindle-carrier vertically, substantially as described.

9. In combination, the rotary spindle, the yarn-guide, means for giving said guide a traversing movement, a band engaging said means and also giving the spindle its rotary movement, a lever having a wheel engaging the band, said lever having means engaging and controlled by the passage of the thread, means for driving the band and means to actuate the lever with its wheel to slacken the band when the thread breaks, substantially as described.

10. In combination with the spindle for holding the cop, the yarn-guide, and a cone arranged adjacent to the cop-spindle for taking up the slack, substantially as described.

11. In combination the cop-holding spindle, the yarn-guide, the stock adapted to be canted, the sliding jack *t* carrying the yarn-guide and means for canting the stock from a vertical position at the commencement of the build of the cop to form the flattened or slightly-rounded bottom of the cop, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

JOHN DEMPSTER WHYTE.

Witnesses:

JOSHUA ENTWISLE,
RICHARD IBBERSON.