(No Model.) 3 Sheets—Sheet 1.

C. C. KLEIN.

TWISTING AND COP WINDING MACHINE.

No. 492,211. Patented Feb. 21, 1893.

FIG. 1

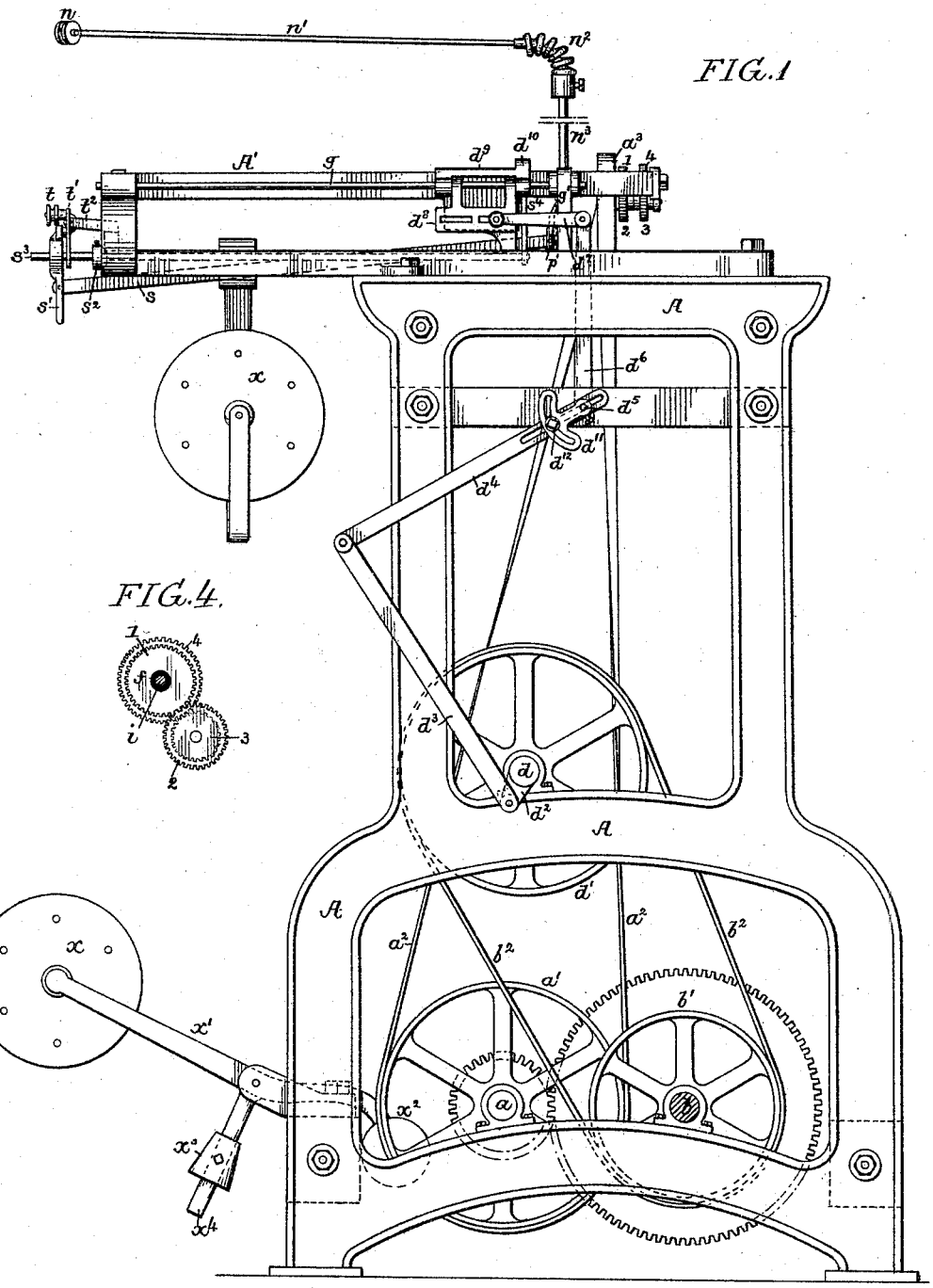

FIG. 4.

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Inventor:
Charles C. Klein
by his Attorneys
Howson & Howson

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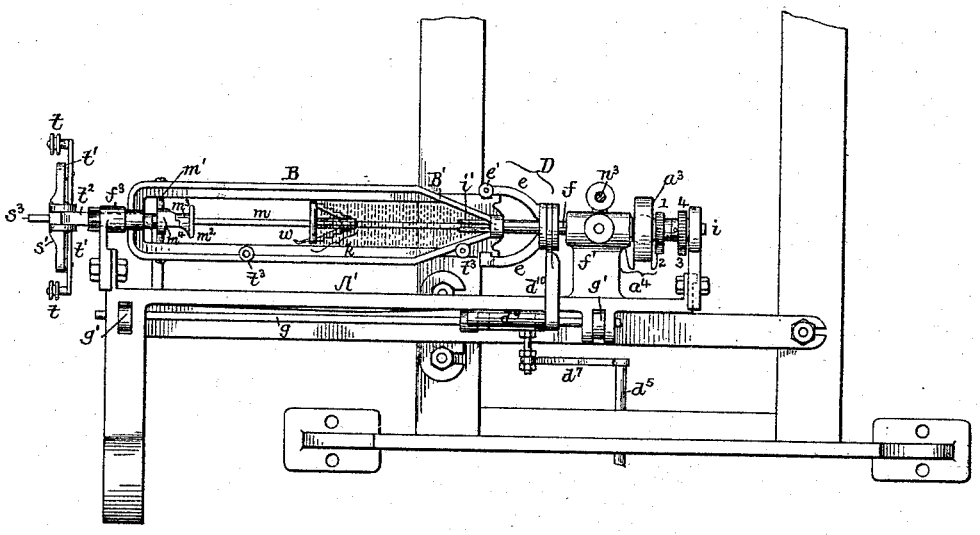
FIG. 2.



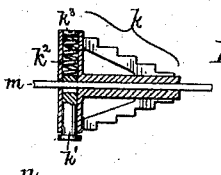


FIG. 5

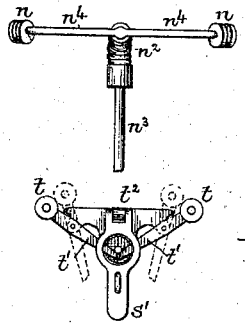


FIG. 7.

FIG. 6.

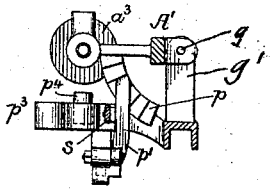


FIG. 8

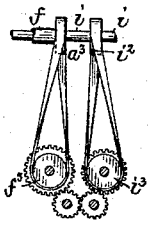


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FIG. 9.

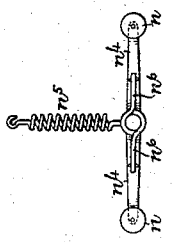


FIG. 12.

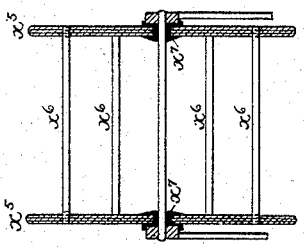
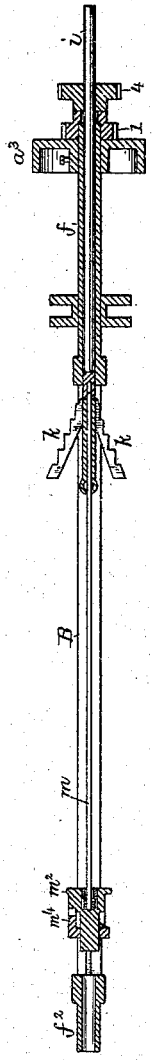


FIG. 3.

FIG. 10.

FIG. 11.



Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES C. KLEIN, OF ABINGTON, PENNSYLVANIA.

TWISTING AND COP-WINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 492,211, dated February 21, 1893.

Application filed April 20, 1892. Serial No. 429,880. (No model.)

To all whom it may concern:

Be it known that I, CHARLES C. KLEIN, a citizen of the United States, and a resident of Abington township, Montgomery county, Pennsylvania, have invented certain Improvements in Twisting and Cop-Winding Machines, of which the following is a specification.

My invention relates mainly to a cop winding machine in which two or more strands of yarn are twisted together at the same time that they are being wound into the form of a cop, although certain features of the invention are applicable to cop winding machines generally.

The invention comprises certain combinations of parts fully set forth and specifically claimed hereinafter, hence detailed reference thereto will be unnecessary in this part of the specification.

In the accompanying drawings: Figure 1, is a side view of a combined twisting and cop winding machine embodying my invention; Fig. 2, is a plan view of the same; and Figs. 3 to 12 are detached views illustrating features of the invention or special details in the construction of different parts of the machine.

A represents one of the end frames of the machine to suitable bearings in which are adapted the three shafts a, b and d. The shaft a is the driving shaft, and is rotated from any suitable source of power, spur or other connecting gearing, such for instance as represented in Fig. 1, connecting the shafts a and b. On said shaft b is a pulley b' which receives a belt b^2, the latter being also adapted to a pulley d' on the shaft d. On the shaft a is a pulley a' which receives a belt a^2 for driving a pulley a^3 on a shaft f which is free to turn in a suitable bearing f' on a swinging frame A' the latter being hung to a rod g which is mounted in lugs g' projecting upward from one of the top bars of the fixed frame of the machine. The shaft f carries one end of a flier B, a hollow shaft f^2 at the opposite end of the latter being adapted to a bearing f^3 also mounted upon the pivoted frame A'. The flier B is conical in form at that end which is connected to the shaft f, said conical end of the flier constituting a bearing B' of the desired form for the nose of the cop which is to be wound. (See dotted lines Fig. 2.)

Loosely mounted upon the shaft f and free to slide to and fro thereon is the grooved hub of a traverse guide D having two arms e which are guided at their forward ends on the flier, said traverse guide having a suitable roller or eye e' around which the strands of yarn pass before reaching the cop. The to and fro motion of the traverse guide D is effected by a crank d^2 on the shaft d, this crank acting through the medium of a connecting rod d^3 upon an arm d^4 which is slotted to embrace a rock shaft d^5, the latter having another arm d^6 connected by a link d^7 to a slide d^8 free to move to and fro upon the pivot rod g and engaging with a slide d^9 hung upon said rod and having an arm d^{10} which embraces the forked hub of the traverse guide.

Secured to the rock shaft d^5 is a slotted segment d^{11} the slot receiving a bolt d^{12} which also passes through the slot in the arm d^4, so that by this means provision is made both for the longitudinal adjustment of the arm d^4 to vary the length of stroke of the traverse guide, and also for circumferential adjustment of the rock shaft to determine the positions assumed by the guide when at the limit of its movements.

The shaft f is hollow and receives an internal shaft i which is driven at a speed somewhat greater or somewhat less than that of the shaft f, this difference in speed being effected in any desired manner, for instance, in the machine shown in Figs. 1 and 2, it is effected by means of a series of change gears 1, 2, 3 and 4, as shown in the diagram Fig. 4, the gear 1 being carried by the shaft f, the gears 2 and 3 by a short countershaft and the gear 4 by the internal shaft i, so that by properly proportioning the diameter of the wheels the said internal shaft i can be driven at any desired rate of speed in respect to that of the shaft f. The forward end of the shaft i terminates in a pair of spring fingers i' which, when the winding is first started, engage with a cone k free to slide on a skewer m one end of which is mounted in a recess in the end of the shaft i, while its other end is mounted in a collar m^2 free to turn in a swinging head m' which is pivoted to the flier B near the outer

end of the same, said collar m^2 having a cam m^3 for engagement with a cam m^4 on the swinging head m' in order to project the skewer into the opening in the end of the shaft i. The end of the skewer m has a bearing in the collar m^2 and the skewer is provided near said end with a flange m^5 which, by contact with an internal flange m^6 in the collar, prevents longitudinal movement of the skewer independently of the collar but permits the skewer to rotate freely therein. (See Fig. 10.) By turning the collar m^2 so that the cam surfaces m^3 and m^4 are moved out of engagement with each other the skewer can be retracted sufficiently to free its opposite end from the recess in the shaft i and can then be swung upward so as to permit of the removal of the cop therefrom.

While it is possible to start the winding of a cop upon the spring fingers i' of the shaft i, it is manifest that the yarn would at the start be wound much more slowly upon the spring fingers than upon the cop after the latter had attained its normal diameter, causing thereby excessive twist in the yarn first wound. To prevent this I provide the cone k which presents, approximately, the same surface to the yarn as would the nose of the full sized cop.

In the base of the cone k is a transverse recess as shown in Fig. 5, and within this recess is a sliding bolt k' with an opening for the reception of the skewer m, a spring k^2 being interposed between the inner end of said bolt k' and an adjusting screw plug k^3 at the end of the transverse opening in the cone, so that said bolt may always be pressed against the skewer with friction according to the requirements of the yarn and sufficient to prevent any accidental movement of the cone on the skewer without, however, preventing the free outward movement of said cone as the yarn is gradually wound between the same and the tapering nose B′ of the flier.

The spring fingers i' of the shaft i serve to positively clutch the cone k to said shaft until the winding operation has been well started, and when the cone has been moved so far outward on the skewer as to be free from said spring fingers, the latter are engaged directly by the yarn and take such hold upon the cop as to insure the rotation of the same within the flier at the same rate of speed as the shaft i, while, at the same time, the yarn delivers readily from said fingers and passes therefrom onto the skewer as the cop grows in length.

The machine as shown in the drawings is adapted for the twisting together of two strands of yarn, each hank being mounted upon reels x adapted to suitable hangers on the frame of the machine, the lower hanger x' being in the form of a lever having a fixed counterbalance weight x^2 and an adjustable counterbalance weight x^3, the latter being carried by a downwardly projecting short arm x^4 of the lever so that by adjusting the weight on this arm the tension upon the hank can be very accurately regulated and the hank thus kept properly stretched without being subjected to such undue strain as would interfere with the ready unwinding of the yarn. As each of the strands is very light, being of but half the size of the strand usually wound upon a cop winding machine, it becomes necessary to make the reels x very light, so as to relieve the strands from strain as much as possible. In order to secure both strength and the desired lightness in the reel x, therefore, I make the heads x^5 of the reel of a commercial article known as chair seating, which is composed of three layers of veneering glued together, and the cross bars x^6 I make of metal and provide each with a right hand screw thread on one end, and a left hand thread upon the other end, and introduce them into correspondingly threaded openings in the heads of the reel, thus preventing any possibility of their becoming loose, and at the same time forming a thorough brace for the heads. (See Fig. 12.)

The center of each reel head is provided with a bush x^7 of some malleable material held in place by an upsetting or riveting operation similar to that performed on an eyelet. The layers or plies of each head of the reel are so disposed that the grain in one ply crosses that of the adjoining ply, so that end grain must be presented to the threads of the connecting rods in at least one of the plies in each head and the proper hold of said rods upon the heads is thus insured. Moreover, the threaded ends of the rods serve to secure together the various plies at the points where said rods engage with the heads and any separation of the plies at the central portion of either head is prevented by reason of the eyelet form of the bushing. Each strand of yarn passes from its hank up to and over a guide roller n on a lever n^4, Fig. 7, attached to an arm n' which is connected by a coiled spring n^2 to a standard n^3 on the fixed frame of the machine, the spring being bent so as to permit the arm n' to project toward the end of the machine and thereby impart such lifting tendency to the outer end of the arm and to the rollers n as to subject the strands to the desired degree of tension. In addition to its lifting tendency the spring n^2 also acts by its torsion upon the arm n' and equalizing lever n^4, and in case the tension upon one of the strands is through any cause increased, the guide roller n over which it passes is thereby depressed and the opposite arm of the lever n^4 with its guide roller is elevated correspondingly, and this increases the tension upon the strand which passes over it in practically the same ratio in which the tension on the first strand was increased, thus equalizing the tension on both strands and insuring an even twist. A modification of this device is shown in Fig. 9 in which the lever n^4 is hung to a tension spring n^5 and is acted on by the ends of a spring n^6 which tend to keep it in a mid position. From the roller n each strand passes beneath a roller t carried by a lever t' hung

to a swinging frame s' which is hinged to a bracket t^2 on the end frame of the machine the strand passing from the roller t through the hollow shaft f^2 at the outer end of the flier, thence around guide rollers t^3 on the frame of the flier, thence around the roller e' on the traverse guide D, and thence to the nose of the cop which is being wound, hence, as the flier rotates, the strands passing through the hollow shaft at the outer end of the same are twisted and the twisted strands are wound into the form of a cob, the amount of twist being dependent upon the relative speeds of rotation of the flier and cob, and this being determined by the relative speeds of the shafts f and i which are regulated by the change gears before referred to.

The swinging frame A′ has, beneath the bearing f', a notched segment p with which engages a pawl p' hung to a depending bracket on the underside of a projection p^3 on the main frame of the machine, as shown in Fig. 6, so that the frame A′ can be supported in such position as to hold the pulley a^3 up into engagement with the driving belt a^2, but as soon as the pawl p' is withdrawn from engagement with the segmental rack p the frame A′ swings downward so as to cause a drop of the pulley a^3 and such a loosening of the belt a^2 as will prevent it from driving said pulley, the latter dropping into contact with a plug p^4 of wood or other frictional material mounted in the projection p^3 and serving as a brake to immediately arrest the movement of the pulley a^3.

In order to prevent the belt from falling off the pulley a^3 when in its slack state, and to guide the same when running, jaws a^4 are formed on the frame of the machine. The pawl p' is connected by a rod s to the swinging frame s' hung to the bracket t^2 at the end of the machine so that by an outward pull upon this frame the machine can be instantly stopped, and in order to provide for the stoppage of the machine when either of the strands become broken, said frame is provided with an opening through which, when the machine is in operation, plays a collar s^2 on a rod s^3 connected to a depending arm s^4 on the traverse guide D, and having consequently, a longitudinal motion parallel with the axis of the flier.

The inner ends of the levers t' which carry the guide rollers t for the strands of yarn are so arranged that when said levers are not supported by the strands the inner ends of the levers will project in front of the opening in the frame s' as shown by full lines in Fig. 7, and will, when in such position, be struck by the collar s^2 and cause the movement of the same to be transmitted to the swinging frame so as to pull the pawl p' out of engagement with the rack p and thus permit the drop of the frame A′ and the stoppage of the machine, it being understood that when the rollers t are in engagement with the strands of yarn and are supported thereby, the inner ends of the levers t' are drawn away from in front of the opening in the swinging frame s' as shown by dotted lines in Fig. 7, and hence do not interfere with the free passage of the collar s^2 into said opening.

In order to provide for the automatic stoppage of the machine when the full cop has been wound I provide the cone k with a projecting hook w which, when a cop of full length has been wound, and the cone reaches the limit of its outward movement, catches the twisted strands as the latter pass from the hollow shaft at the outer end of the flier to the first of the guide rolls t^3 thereon, this hook being so constructed as to cut the strands or simply so as to catch and hold the same so as to cause them to become broken by the pull of the cop upon them, the result in either case being the stoppage of the machine through the medium of the automatic stop motion which I have just described.

In cases where there are likely to be frequent changes in the extent of twist imparted to the strands, I prefer to apply change gears to the shafts a and b so that one change of gear at this point will affect the entire machine, for it should be understood that in practice a large number of twisting and winding mechanisms will be mounted upon the same frame and driven by the same shafts a and b. In this case I prefer to drive the pulleys a^3 on the shafts f from belt wheels f^5 on one of the shafts say the shaft a, and pulleys i^2 on the shafts i from belt wheels i^3 on the other shaft, so that any change in the speed of the shafts a and b will effect a corresponding change in the speed of the shafts f and i. This arrangement is represented in diagrammatic form in Fig. 8.

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

1. The combination in a twisting and cop winding machine, of a rotating flier having a portion providing a continuous bearing for the nose of the cop, with a cop driving spindle, and means for independently rotating said flier and spindle, substantially as specified.

2. The combination in a twisting and cop winding machine, of a rotating flier having a portion providing a continuous bearing for the nose of the cop, with a spindle for driving the cop, a traverse guide rotating with the flier, and means for independently driving the flier and spindle and for reciprocating the traverse guide, substantially as specified.

3. The combination in a cop winding machine, of a bearing for the nose of the cop, a cop driving spindle having spring fingers which engage directly with the cop at the nose of the same, and means for rotating said spindle, substantially as specified.

4. The combination in a cop winding machine, of a bearing for the nose of the cop, a non-reciprocating spindle engaging with the cop at the nose of the same, a skewer which

supports that portion of the cop which projects beyond the spindle, and means for rotating said spindle, substantially as specified.

5. The combination in a cop winding machine, of a bearing for the nose of the cop, a spindle for driving said cop, a pivoted skewer for supporting the cop as it is wound, and means for rotating the said spindle, said skewer having no positive driving connection with the spindle, substantially as specified.

6. The combination in a cop winding machine, of a bearing for the nose of the cop, a cop driving spindle having a recess in the end thereof, a pivoted skewer for supporting the cop as it is wound, and means for rotating the spindle, said skewer having at one end a bearing in the end of the cop driving spindle, but being adjustable longitudinally so as to cause the end of the same to enter or leave the recess in the end of the spindle, substantially as specified.

7. The combination in a cop winding machine, of a bearing for the nose of the cop, a pivoted frame carrying a cam collar and having a cam for engagement therewith, a cop driving spindle having a recessed end, a skewer adapted at one end to said recess, and at its opposite end to the cam collar, and means for rotating the cop driving spindle, substantially as specified.

8. The combination in a cop winding machine, of a bearing for the nose of the cop, a spindle for driving the cop, a skewer for supporting the cop, means for rotating the spindle, a cone mounted so as to slide longitudinally on said skewer, and a frictional retarder for said cone, substantially as specified.

9. The combination in a cop winding machine, of a bearing for the nose of the cop, a spindle for driving the cop, means for rotating said spindle, a skewer for supporting the cop, a cone free to slide longitudinally on said skewer, and a spring friction device carried by the cone and bearing on the skewer, for retarding the movement of said cone on the skewer, substantially as specified.

10. The combination in a cop winding machine, of a bearing for the nose of the cop, a spindle for driving the cop, a swinging frame carrying said bearing and spindle, a driving pulley on said spindle, a driving belt for said pulley, a rack and pawl for holding said swinging frame in position to cause the pulley to remain in driving engagement with its belt, and means for releasing the pawl, substantially as specified.

11. The combination in a stop motion device for winding frames, of the driving mechanism, arresting devices therefor, a swinging frame having an opening therein, a rod having a projection for entering said opening, means for reciprocating said rod, thread guide levers having portions adapted to project in front of the opening, and means for transmitting the movement of the swinging frame to said arresting devices of the machine, substantially as specified.

12. The combination in a cop winding machine, of a bearing for the nose of the cop, a spindle for driving the cop, means for rotating said spindle, a swinging frame carrying said cop spindle and bearing, a traverse guide and reciprocating mechanism for said traverse guide pivoted concentrically with the swinging frame, substantially as specified.

13. The combination of the swinging frame carrying the winding devices, the traverse guide and reciprocating mechanism therefor comprising a frame engaging with the traverse guide and pivoted concentrically with the swinging frame, a slide engaging said pivoted frame, and means for reciprocating said slide, substantially as specified.

14. The combination in a cop winding machine, of stop motion devices operative on the breaking of the yarn, a bearing for the nose of the cop, a spindle for driving the cop, means for rotating said spindle, and a slide movable in advance of the cop and having a projection for engaging the yarn so as to insure the stoppage of the machine when the full length of the cop has been wound, substantially as specified.

15. The within described equalizing device for twisting and winding machines, the same consisting of a lever having arms projecting oppositely from the pivot point, one of said arms having a guide for one of the strands, and the other arm a guide for the other strand, in combination with a torsion spring tending to maintain said lever in mid position, substantially as specified.

16. The within described hank reel holder consisting of a lever having three arms, one carrying the reel, the second projecting substantially in line with the first and having a fixed counterbalance weight, and the third projecting substantially at right angles to the first and second and having an adjustable counterbalance weight, substantially as specified.

17. The within described equalizing device for twisting and cop winding machines, the same consisting of a lever having arms projecting oppositely from the pivot point, one of said arms having a guide for one of the strands, and the other arm a guide for the other strand, in combination with a fixed support, an arm carrying the lever, and a coiled spring carrying said arm and mounted upon the fixed support so as to constitute an elastic connection between said support and the arm, substantially as specified.

18. The combination of the twisting and winding devices with the equalizing lever having opposite arms, one of which has a guide for one of the strands, and the other a guide for the other strand, an arm carrying said lever, and a coiled spring serving both to lift said arm and to exert torsional strain thereon, substantially as specified.

19. The combination of the skewer having a collar thereon, with the swinging head having a cam collar mounted thereon and recessed to

form a bearing for the end of the skewer, said cam collar having a flange, which, by engagement with the collar on the skewer, serves to confine the latter longitudinally to the cam collar, substantially as specified.

20. The combination of the traverse guide with the rock shaft having an arm connected to said traverse guide, a second arm fixed to the rock shaft and having a segmental slot, a third arm slotted longitudinally for the reception of the shaft, and a bolt adapted to said slots and serving to secure the slotted arms together, substantially as specified.

21. The within described reel consisting of opposite heads each having a number of plies disposed so as to cross the grain and a series of connecting rods having right and left threaded ends adapted to correspondingly threaded openings in the heads, said series of rods forming a skeleton body for the reel, substantially as specified.

22. The within described reel consisting of opposite heads each having a number of plies disposed so as to cross the grain, a series of connecting rods having right and left threaded ends adapted to correspondingly threaded openings in the heads, said rods being disposed so as to form a skeleton body for the reel, and a central bushing for each head in the form of an eyelet, substantially as specified.

23. The combination in a combined twisting and cop winding machine, of a rotating flier having a rigid portion providing a bearing for the nose of the cop, a cop driving spindle, and means for independently rotating said flier and spindle, the cop being free to yield longitudinally as successive layers of yarn are wound thereon, substantially as specified.

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

CHAS. C. KLEIN.

Witnesses:
HERBERT PUSEY,
HARRY SMITH.