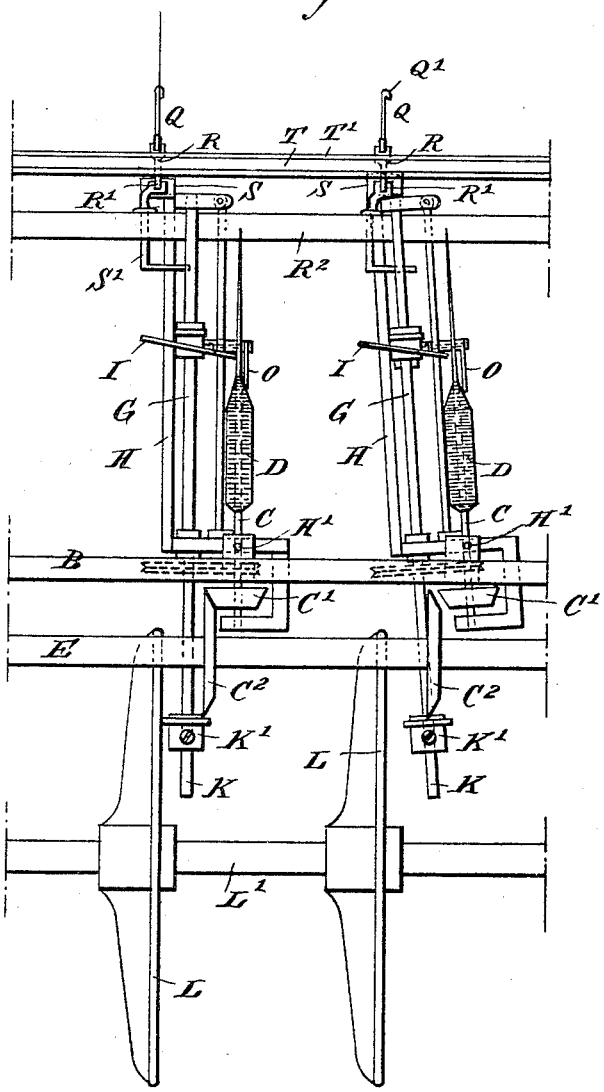
(No Model.) 2 Sheets—Sheet 1.

J. D. WHYTE.

MACHINE FOR WINDING YARN INTO COPS.

No. 458,927. Patented Sept. 1, 1891.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

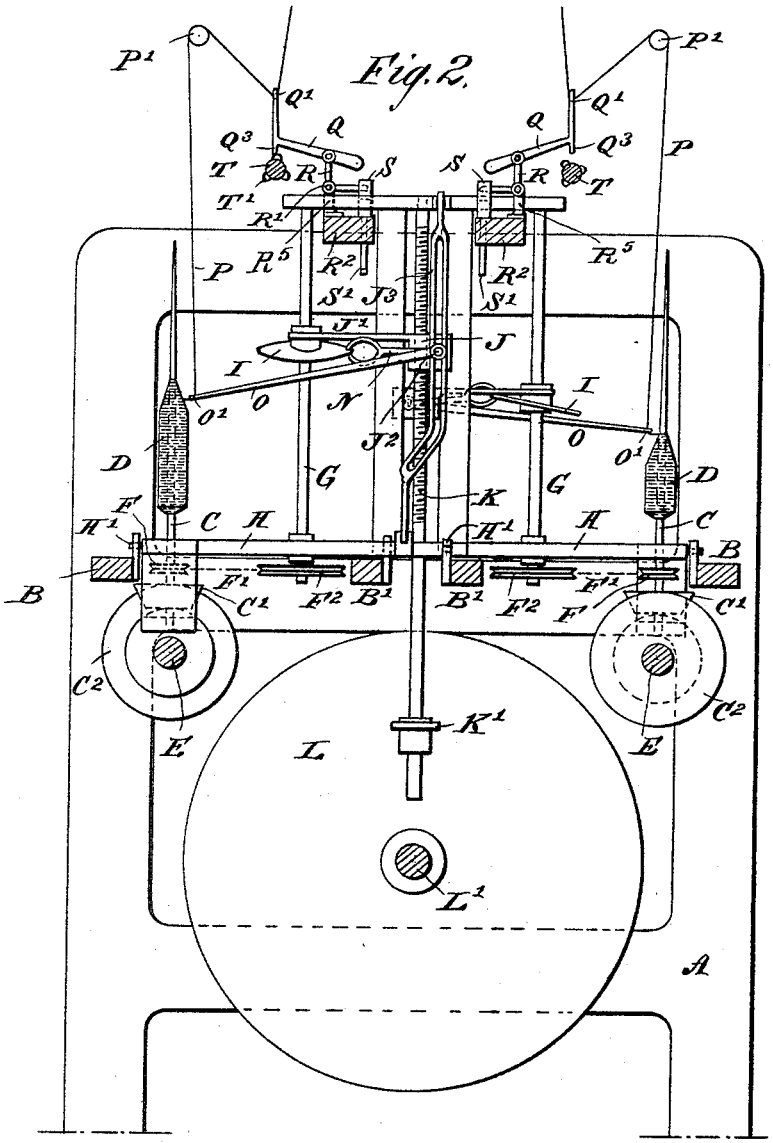
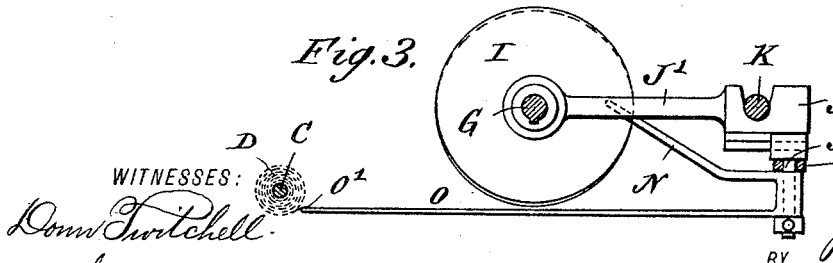


Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHN DEMPSTER WHYTE, OF MANCHESTER, ENGLAND.

MACHINE FOR WINDING YARN INTO COPS.

SPECIFICATION forming part of Letters Patent No. 458,927, dated September 1, 1891.

Application filed June 24, 1890. Serial No. 356,728. (No model.) Patented in England September 12, 1887, No. 12,331, and September 26, 1888, No. 13,863.

To all whom it may concern:

Be it known that I, JOHN DEMPSTER WHYTE, of Manchester, England, have invented a new and Improved Machine for Winding Yarn into Cops, (for which Letters Patent of Great Britain Nos. 12,331 and 13,863, dated September 12, 1887, and September 26, 1888, respectively, were granted to me,) of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved machine for winding yarn into cop form on bare spindles without pirns, spools, or tubes, such as yarn is commonly wound on, and also without cups, such as yarn is commonly wound in, to avoid all frictional contact with the yarn.

The invention consists of certain parts and details and combinations of the same, as will be hereinafter fully described, and then pointed in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement. Fig. 2 is a transverse section of the same, and Fig. 3 is a sectional plan view of part of the improvement.

The improved yarn-winding machine is provided with a suitably-constructed frame A, carrying at the front and rear the side rails B B. The vertically-arranged spindles C are mounted to turn in suitable bearings in a frame H, which is mounted to swing in suitable bearings in the rails B and B′, of which the latter are located longitudinally near the middle of the frame. On the lower end of each spindle C is fixed a beveled friction-wheel C′, which receives its rotary motion from frictional contact with a beveled wheel C^2 on the driving-shaft E, which is set in motion in any suitable manner from proper machinery.

On each of the spindles is secured a small pulley F, over which passes a belt or cord F′, extending inward and passing over a larger pulley F^2, secured on the lower end of a shaft G, arranged vertically and mounted to turn in suitable bearings in the frame H.

The shaft G is rotated from its respective spindle C, and on it is held to turn and to slide a cam I, preferably made in the shape of a disk set at an angle on the said shaft, as is plainly shown in Figs. 1 and 2. The vertical movement of the cam I is accomplished by an arm J′, engaging the hub of the said disk and secured on a half-nut J, engaging a screw-shaft K, mounted to turn in suitable bearings in the frame H, and carrying at its lower end a wheel K′, engaging the face of a large wheel L, secured on a shaft L′, mounted to turn in suitable bearings in the ends of the main frame A, and rotated in any suitable manner. The wheel K′ can be vertically adjusted by a set-screw or other device, as shown in Fig. 1, on the lower end of the screw-rod K, so as to hold said wheel in contact with the face of the wheel L farther from or nearer to the shaft L′, so that when the latter is rotated the wheel K′ is rotated with more or less speed, according to its distance from the transverse center of the shaft L′.

On the half-nut J is mounted a pivot J^2, engaging a vertically-arranged slotted guide J^3, held on the frame H. This pivot J^2 and its guide J^3 hold the half-nut J on the shaft K, and the arm J′ prevents the half-nut K from turning, so that when the shaft K is rotated, as above described, the said half-nut moves up or down on the screw-rod K.

On the pivot J^2 is secured an arm N, formed at its outer end with a fork which engages the cam-wheel I, so that when the latter rotates an oscillating motion is imparted to the said arm N. On the pivoted end of the latter is secured the thread-guide O, provided on its free end with the usual eye O′, through which passes the thread P onto the cop D. The thread P, before it passes into the eye O′, passes over a longitudinally-arranged rod P′, having previously passed through the eye Q′, after unwinding from the usual swift. The eye Q′, above mentioned, is formed on a lever Q, fulcrumed on one arm of a bell-crank lever R, the other arm of which lever is adapted to withdraw a block S, against which rests the upper end of the frame H. The bell-crank lever R is fulcrumed at R′ to a standard R^5 on the longitudinally-extending rail R^2, secured to the ends of the main frame A. The

lever Q is counterbalanced, and is provided with a downwardly-extending projection Q^3, adapted to engage, when the thread P breaks, with one of a series of lugs T′, formed on a shaft T, extending longitudinally and mounted to rotate in suitable bearings on the main frame A. It will be seen that when the thread P breaks the lever Q drops downward, so that its projection Q^3 is engaged by one of the lugs T′ on the shaft T, the effect of which is to draw the lever Q outward, so that the bell-crank lever R is actuated and moves the block S upward to permit the frame H to fall into an inclined position, as illustrated to the right in Fig. 1. The frame H oscillates on its fulcrums H′, so that the wheel K′ is thrown out of frictional contact with the large wheel L, and the motion of the shaft K ceases, and similarly the wheel C′ on the lower end of the spindle C is thrown out of frictional contact with the wheel C^2 and the motion of the spindle C ceases. As the shaft G derives its rotary motion from the spindle C, it will be seen that the falling of the frame H into an inclined position, as above described, causes the motions of the spindle C, the shaft G, and the screw-rod K to cease simultaneously. When the operator has mended the broken thread, the movement of the block S into position again behind the frame H causes the operation of winding to proceed as before. From the block S extends downward an arm S′, adapted to be engaged by the arm J′ to move the said block S away from the upper free end of the frame H to permit the latter to swing into an inclined position to stop the motion of the spindle C, the shaft G, and the screw-rod K, as previously described in reference to the breaking of the thread P. This movement takes place when the cop is formed—that is, when the half-nut J is in its uppermost position on the screw-rod K. In order that the beginning of the cop may not be tapering or conical, as at the close of the cop, but may have a thick instead of a tapered beginning, the traversing movement is shorter at the beginning than after desired thickness of the cop has been built up. The slotted guide-rod J^3, which holds the half-nut J on the screw-rod K is at its lower end slightly curved toward the spindle, as is plainly shown in Fig. 2. The pivot J^2, upon which the arm N is swiveled, is free to slide up or down in the slot of the guide J^3. The pivot being secured on the half-nut J, so as to slide backward or forward, is nearer to the spindle C, while it is in the curved lower end of the guide J^3. As the half-nut J is slowly carried upward, the pivot gradually recedes from the spindle until the pivot, having passed the curved part of the guide J^3, is now in the vertical straight part of the latter. Thus while the pivot is nearer to the spindle when near the bottom of the guide J^3 the forked ends of the arm N, in contact with the cam I, are farther from the edge of the cam I, and thereby give the thread-guide O a short throw, which short throw gives a corresponding short traverse in the laying on of the yarn upon the spindle C. As the curved part of the guide J^3 makes the pivot to gradually recede from the spindle, so the forked ends of the arm N upon the sides of the cam I gradually approach the edge of the said cam, and thereby the throw of the thread-guide O and the corresponding traverse in the laying on of the yarn upon the spindle become gradually longer until the pivot has begun to travel along the straight part of the guide J^3, and the throw of the thread-guide and the length of the traverse will then continue unaltered until the cop is finished and the thread-guide and the cam are lowered to begin a new cop. It will be understood that the onward movement of the half-nut J so far counteracts the lengthening of the traverse that the thread will not be traversed beyond the beginning of the cop, but all the lengthening of the traverse will go in the direction of the point of the spindle, thereby forming a thick instead of tapered beginning for the cop. It is understood that when the spindle C, the shaft G, and the screw-rod K are in motion the revolution of the cam I imparts the necessary traversing motion to the thread-guide O, so that the latter places the thread or yarn P upon the spindle, while the upward motion of the cam on the shaft G is properly building the yarn into the cop form. Inasmuch as a quicker or slower progress in that onward motion of the cam I will build yarns of the uniform thickness into a smaller or thicker cop form, and as for fine yarn a slower progress and for coarser yarns a quicker progress in that onward motion of the cam is necessary, an easy method of altering that rate of progress is obtained, so that cops may be built smaller or thicker, as may be desired, so that different kinds of thicknesses of yarns may be built into uniform thicknesses of cops. This is done by changing the wheel K′ on the screw-rod K, as previously described, to impart a faster or slower motion to the screw-shaft. When the cop is formed to the requisite length, the arm J′ of the half-nut J engages the arm S′ of the block S, so that the latter is moved out of its place and the frame H swings into an inclined position to stop the motion of the spindle C, the shaft G, and the screw-shaft K, as previously described. The operator then lifts the half-nut from the screw-rod K and allows the half-nut and the cam I to fall or to be moved down into their lowermost position to such part of the shaft G and screw-rod K as gives the desired beginning of the formation of the cop.

It will be understood that while I have described and indicated a vertical arrangement of the spindles and their parallel shafts said spindles and their parallel shafts may be arranged in an oblique or horizontal position, provided the necessary alterations in the application of the driving and stop motions are made. Further, that any such number of

spindles as is desired may be arranged in the length of the machine, each one having its accompanying traversing motion, and, further, that while only one thread is represented as being wound into each cop in Figs. 1 and 2 two or more threads may be wound at the same time, in which case drop-wires for each thread may be arranged.

I do not limit myself to the precise construction of the various parts shown and described, as the same may be varied to accomplish the same result or may be adapted to other machines.

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

1. In a yarn-winding machine, a cop-building device comprising a thread-guide mounted to swing, a revoluble cam-wheel for imparting a swinging motion to the said thread-guide, a revoluble screw-rod, and a nut mounted to travel on the said screw-rod and carrying with it the said cam-wheel and thread-guide pivot, substantially as shown and described.

2. In a yarn-winding machine, a cop-building device comprising a thread-guide mounted to swing, a revoluble cam-wheel for imparting a swinging motion to the said thread-guide, a revoluble screw-rod, a nut mounted to travel on the said screw-rod and carrying with it the said cam-wheel and thread-guide pivot, and a slotted guide bent at its lower end and engaged by the said nut to prevent the latter from turning on the said screw.

3. In a yarn-winding machine, the combination, with a revoluble spindle, of a cop-building device comprising a thread-guide mounted to swing and having its free end extending in close proximity to the said spindle, a cam-wheel rotated from the said spindle and adapted to impart a swinging motion to the said thread-guide, and means, substantially as described, for imparting a simultaneous traveling motion to the said cam-wheel and the pivot of the said thread-guide, as set forth.

4. In a yarn-winding machine, the combination, with a revoluble spindle, of a cop-building device comprising a thread-guide mounted to swing and having its free end extending in close proximity to the said spindle, a cam-wheel rotated from the said spindle and adapted to impart a swinging motion to the said thread-guide, a traveling nut carrying with it the pivot for the said thread-guide and the said cam-wheel, and a revoluble screw-shaft engaging the said nut, substantially as described.

5. In a yarn-winding machine, the combination, with a revoluble spindle, of a cop-building device comprising a thread-guide mounted to swing and having its free end extending in close proximity to the said spindle, a cam-wheel rotated from the said spindle and adapted to impart a swinging motion to the said thread-guide, a traveling nut carrying with it the pivot for the said thread-guide and the said cam-wheel, a revoluble screw-shaft engaging the said nut, and a slotted guide engaged by the said nut, substantially as described.

6. In a yarn-winding machine, the combination, with a cop-building device, substantially as described, of a small wheel held adjustable on the screw-shaft of the said cop-building device, and a driving-wheel mounted to turn and engaging with one of its faces, the peripheral surface of the said small wheel to rotate the latter slower, or faster, according to the position of the said small wheel nearer to or farther from the center of the said driving-wheel, substantially as described.

7. In a yarn-winding machine, the combination, with a pivoted frame and a movable block adapted to support the free end of the said frame to hold the latter in a vertical position, of a screw-shaft mounted to turn in the said frame, and a half-nut held to travel on the said screw-shaft and adapted to disengage the said block from the said frame to permit the latter to swing into an inclined position, substantially as shown and described.

8. In a yarn-winding machine, the combination, with a pivoted frame and a movable block adapted to support the free end of the said frame to hold the latter in a vertical position, of a screw-shaft mounted to turn in the said frame, a half-nut held to travel on the said screw-shaft and adapted to disengage the said block from the said frame to permit the latter to swing into an inclined position, a main driving-wheel, and a small wheel held on the said screw-shaft and engaging the face of the said driving-wheel until the said frame swings into an inclined position, substantially as described.

9. In a yarn-winding machine, the combination, with a pivoted frame, of a screw-shaft held to turn in the said frame, a half-nut held on the said screw-shaft, a block supporting the free end of the said frame and adapted to be engaged by the said half-nut to permit the said frame to swing into an inclined position, a small wheel held on the said screw-shaft, and a driving-wheel engaging the said small wheel until the said frame oscillates, substantially as shown and described.

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