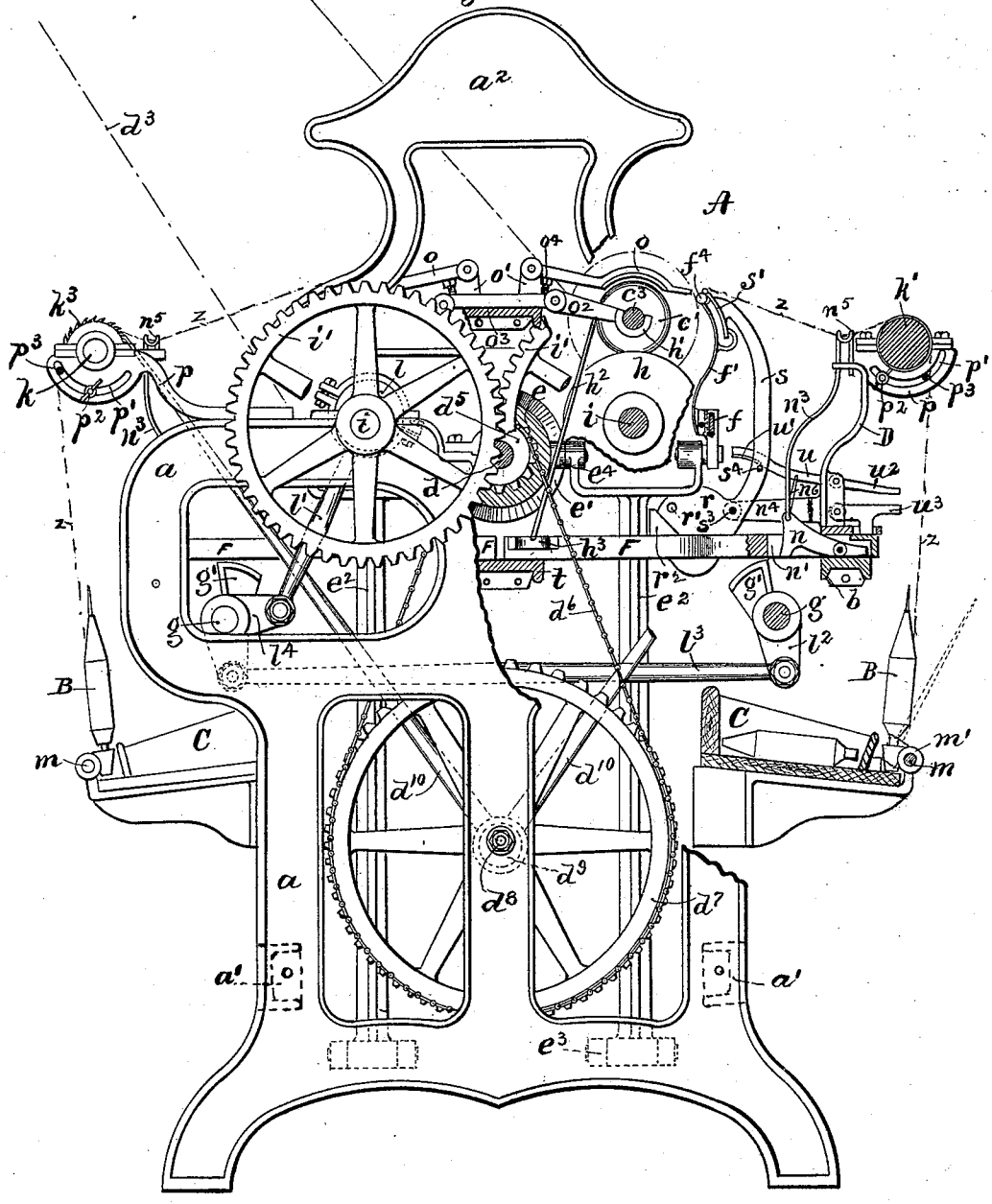
(No Model.) 5 Sheets—Sheet 1.

J. M. PARKER.

SPOOLING OR WINDING MACHINE.

No. 525,085. Patented Aug. 28, 1894.

Fig. 1.



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(No Model.) 5 Sheets—Sheet 2.

J. M. PARKER.

SPOOLING OR WINDING MACHINE.

No. 525,085. Patented Aug. 28, 1894.

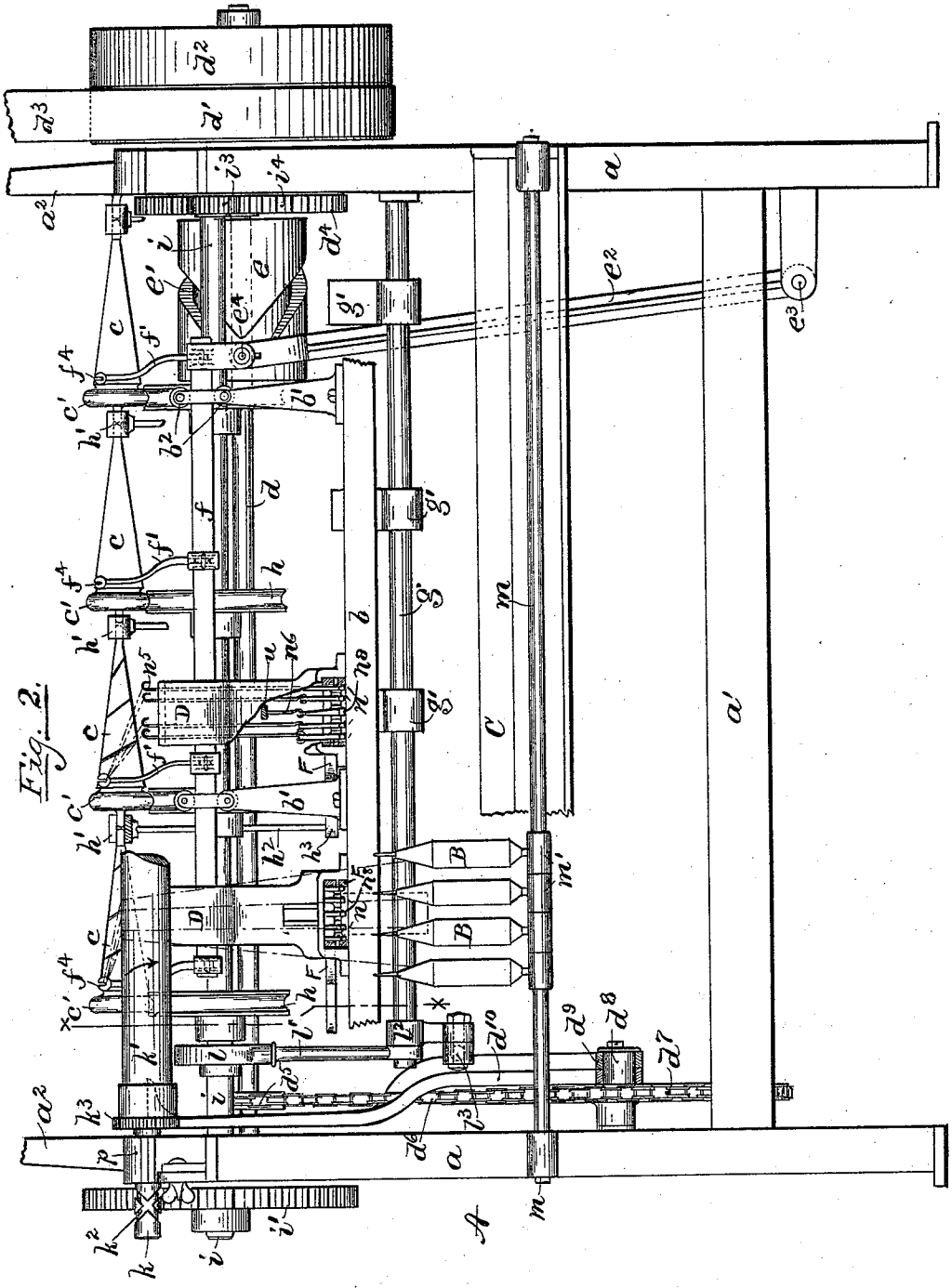

Fig. 2.

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(No Model.) 5 Sheets—Sheet 3.

J. M. PARKER.

SPOOLING OR WINDING MACHINE.

No. 525,085. Patented Aug. 28, 1894.

Fig. 3.

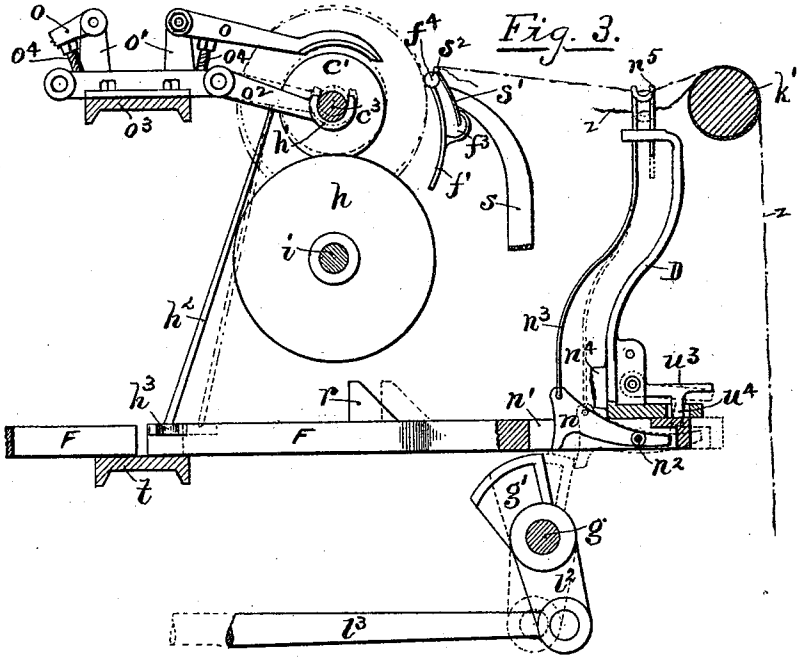
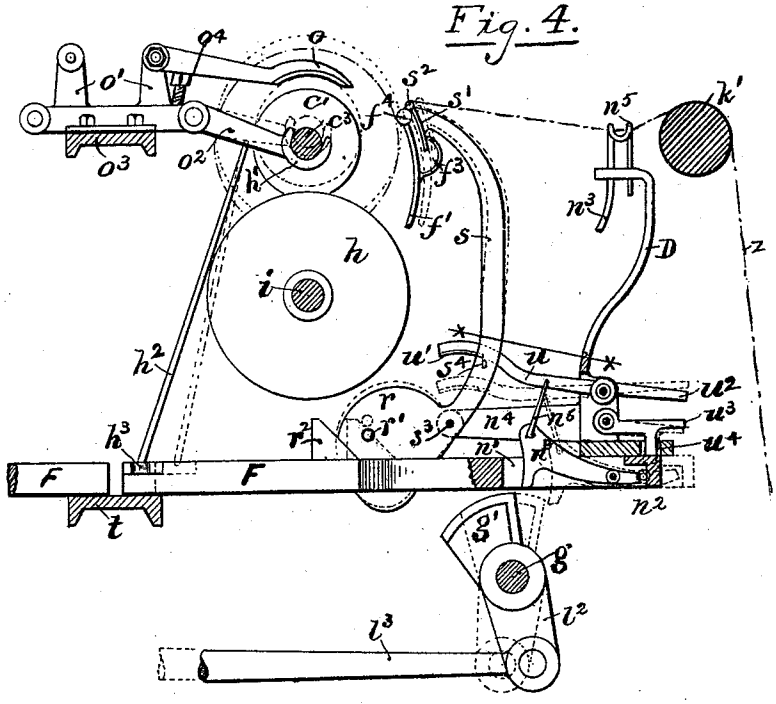


Fig. 4.



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(No Model.) 5 Sheets—Sheet 4.

J. M. PARKER.

SPOOLING OR WINDING MACHINE.

No. 525,085. Patented Aug. 28, 1894.

Fig. 5.

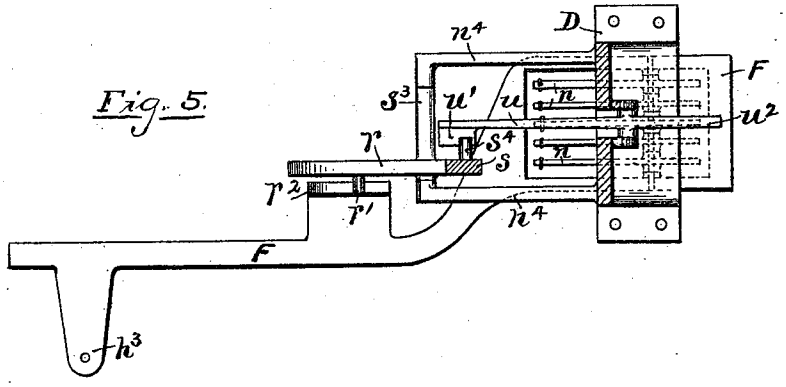


Fig. 6.

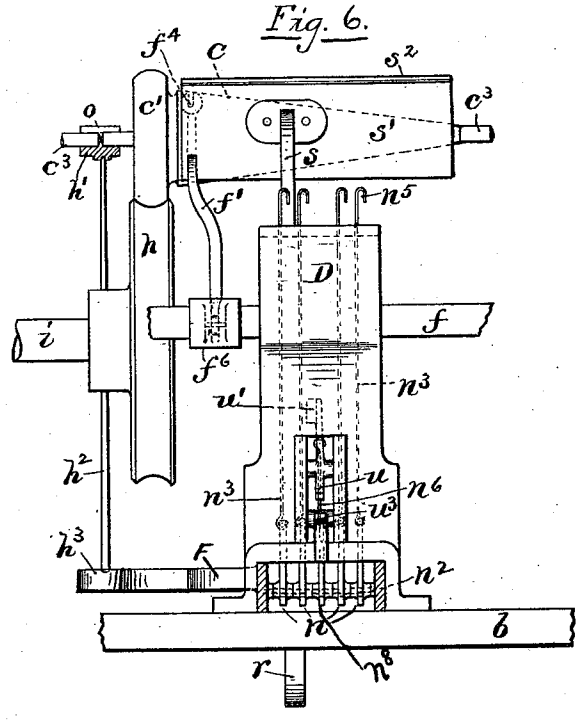


Fig. 8.

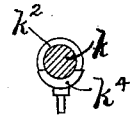
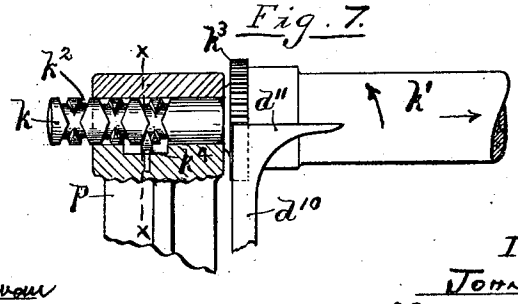


Fig. 7.



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(No Model.) 5 Sheets—Sheet 5.

J. M. PARKER.

SPOOLING OR WINDING MACHINE.

No. 525,085. Patented Aug. 28, 1894.

Fig. 9.

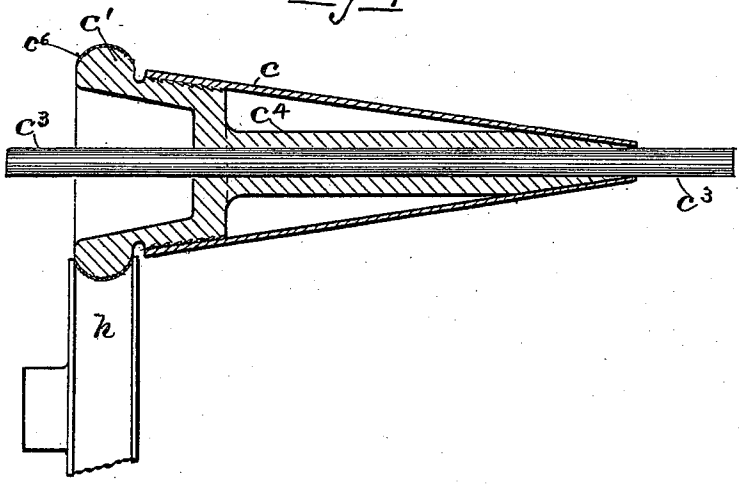
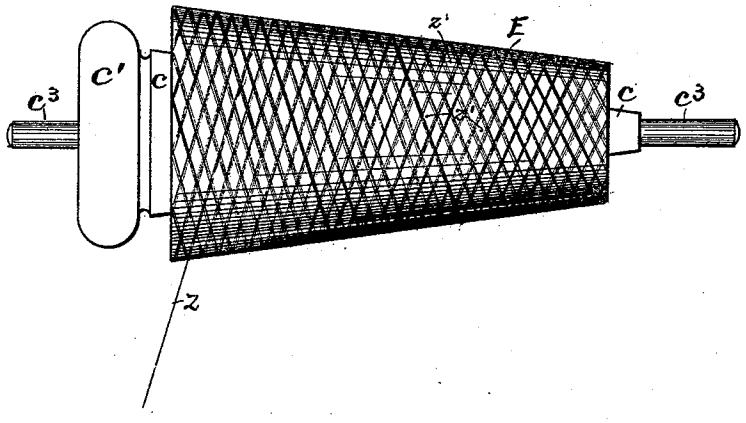


Fig. 10.



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Att'ys

UNITED STATES PATENT OFFICE.

JOHN M. PARKER, OF PAWTUCKET, RHODE ISLAND, ASSIGNOR TO THE EASTON & BURNHAM MACHINE COMPANY, OF SAME PLACE.

SPOOLING OR WINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 525,085, dated August 28, 1894.

Application filed September 25, 1893. Serial No. 486,407. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. PARKER, a citizen of the United States, residing at Pawtucket, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Spooling or Winding Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

In the production of spooling and winding machines adapted to the winding of thread or yarn, but more particularly to the class termed cone-winders, it has been found desirable to have them provided with means for automatically stopping the spool or cone upon the accidental breaking of the yarn. Such stop-motions should be conveniently accessible to the operator or attendant, positive in action and simple in construction. Moreover, the winding mechanism itself should be so connected or related to the stop-motion device that although the latter controls the winding to a certain extent yet the cone-driving mechanism may be kept in continuous operation.

In the machine forming the subject of my present invention I have sought to embody devices well adapted to produce the results referred to in the preceding paragraph. That is to say, the cone-driver revolves at a substantially regular rate of speed; the cone-holder runs in unison with the driver irrespective of the yarn-load, yet at the same time the holder is adapted to be automatically disconnected from the continuously running driver in the event of the breaking of the yarn, or whenever the spool or cone is filled with yarn. By means of my improvement I am enabled to wind the yarn more compactly, so that when it is filled and compared with a cone of equal size or diameter as usually wound it will be found that the amount of yarn on the former considerably exceeds that upon the latter.

My invention consists in the novel construction and arrangement of devices or instrumentalities co-operating in an organized machine for winding yarn or thread upon a cone in a zig-zag or wave-like manner, as will be more fully hereinafter set forth and claimed.

In the accompanying five sheets of drawings illustrating my improved spooling or winding machine, Figure 1, Sheet 1, is a front elevation, a portion of one side being broken away or in section. Fig. 2, Sheet 2, is a side view, some of the parts being omitted. Fig. 3, Sheet 3, is an enlarged transverse sectional view, taken substantially on line $x\,x$ of Fig. 2, showing the stop-motion mechanism. Fig. 4 is a similar sectional view of the same showing the relative position of the parts at the instant the filled cone is about to release said mechanism. Fig. 5, Sheet 4, is a horizontal sectional view, taken on line $x\,x$ of Fig. 4. Fig. 6 is a partial side elevation, in enlarged scale, of the stop-motion device. Fig. 7 is a side view, in partial section, of the traverse motion. Fig. 8 is a transverse sectional view, taken on line $x\,x$ of Fig. 7. Fig. 9, Sheet 5, is a longitudinal sectional view, enlarged, taken through the center of the cone and arbor, and Fig. 10 is a side elevation of a filled cone showing the manner of winding the yarn thereon.

My improved cone-winding machine as a whole is indicated in the drawings by A. It is what may be termed a double machine, that is the parts are so constructed and arranged that two series of cones may be wound simultaneously. As drawn the machine is adapted to build up four cones on each side; it is obvious, however, that its capacity may be increased by simply extending the machine longitudinally. The two end frames a are united by suitable ties a', b, o^3 and t, Figs. 1 and 2. The several operative parts of the machine are actuated by the central longitudinal shaft d through the medium of the power-transmitting belt d^3 and fast and loose pulleys d', d^2. The two cone-driving shafts i, i, are mounted on either side of shaft d and in substantially the same horizontal plane, a gear i^4 secured to the last-named shaft rotates one of the shafts i by means of a smaller gear i^3 fixed thereon, see Fig. 2. The latter

shaft extends through the front end frame and carries a gear wheel i' which drives a similar gear secured to the other shaft i, see Figs. 1 and 2; thus it will be seen that the cone-drivers i rotate simultaneously at the same rate of speed. To each of the shafts i are secured four driving wheels h, the peripheral surface being grooved or concave and adapted to frictionally engage with and rotate the cone-holders c^4, Fig. 9. These holders are secured to spindles c^3 mounted in bearings h' formed in the outer or free ends of swing arms o^2 pivoted to the upper frame tie o^3, see Figs. 1, 3 and 4. The enlarged or base ends c' of the holders are convex and fit into the grooves of the wheels h. If desired the driving surfaces may be covered with leather, c^6, or other suitable material for increasing the frictional contact. Each of the holders c^4 is adapted to receive a readily removable cone-shaped quill c or spool on which the yarn or thread z is to be wound. The yarn as it unwinds from the cops B passes over a tension roll k', and under a drop-wire and thence to the guide-eye f^4 of the traverse arm f' jointed at its lower end f^6 (Fig. 6) to the long horizontal traverse-bar f. The device for actuating the traverse-bar is constructed as follows: To the rear end portion of the driving shaft d is secured a double-acting barrel cam e having a cam-groove e' formed in its periphery, (Figs. 1 and 2) in which groove a roll e^4 is adapted to travel. The cam roll is mounted at the upper end of the inner arm of a forked vertical lever e^2 fulcrumed at e^3 to the lower portion of the rear end frame; the other or outer arm of the forked portion is connected with and actuates the traverse-bar; the latter being supported by guide-rolls b^2 mounted in the upper portion of standards or brackets b' secured to the frame-tie b, see Fig. 2. From the foregoing it will be apparent that the rotation of the shaft d will produce a reciprocating or to and fro movement of the bar f corresponding to the "throw" of the cam e; and since the latter is double it at the same time also actuates a similarly mounted traverse-bar located at the opposite side of the machine.

In machines of the class forming the subject of my present invention it is usual to combine a number of single strands or ends of yarn and wind them collectively to form the cone. In the drawings I have represented the cone as being composed of four strands leading from a corresponding number of cops B fixed on spindle-holders m' loosely mounted on a fixed rod or shaft m. These strands pass over a slowly revolving tension roll k' secured to a shaft k mounted in bearings formed in the end brackets p, Figs. 1 and 2. The brackets are provided each with a curved slot p' carrying a guide-rod p^3; thumb-nuts p^2 being employed to secure the rod in position after it has been adjusted. The strands of yarn in unwinding from the cops pass over the guide-rod to the tension-roll; the tension upon the yarn being regulated by the position of the rod with respect to said roll.

The outer end of the tension-roll shaft k is provided with a right and left spiral groove k^2 having a dog k^4 fitted therein, as seen in Fig. 7. By means of this well known device the revolving roll is given a reciprocating movement to and fro longitudinally for the purpose of varying the position of the strands of yarn running over the roll and thus preventing the yarn from grooving or cutting it. Rotary motion is imparted to the roll through the medium of a small sprocket-wheel d^5, secured to shaft d, and an endless chain d^6 actuated by said wheel and engaging with a larger wheel d^7 mounted to rotate on a fixed stud d^8; the inner hub of the last named wheel forms an eccentric d^9 (Figs. 1 and 2) on which two connections d^{10} are mounted, the upper or free end of each being elongated, as at d^{11}, Fig. 7, to form a pawl adapted to engage with the teeth of a ratchet-wheel k^3 secured to the roll k'; thus it will be seen that the large wheel d^7 operates to slowly turn the tension-roll intermittingly.

Each of the subsidiary cone-winders is provided with an independently operating stop-motion device, constructed and arranged substantially as follows: Each of the four threads z as it runs over the tension roll passes first under the hooked end n^5 of a light drop-wire n^3 mounted in the vertical frame or bracket D secured to the tie beam b; the thread next passes over the top rounded edge s^2 of the longitudinal normally stationary guide s' secured to the downwardly extending pressure bar s, fulcrumed at s^3 to rearwardly projecting arms n^4 formed on said bracket D; the thread as it leaves the guide s' is combined with the other three threads and runs through the eye f^4 of the hinged traverse-arm f' and onto the surface of the revolving quill c. It will be seen that each individual thread when running normally supports a drop-wire, the latter carrying a pivotally mounted dog n at its lower end adapted when dropped or released to engage the cam g' secured to the continuously actuated rock-shaft g extending longitudinally of the machine. The dogs n are pivoted at n^2 to a flat sliding dog-plate F; this plate is provided with an opening n' in which the dogs are mounted, the forward portion of the plate being guided by and extending through an opening formed in the lower portion of the bracket D; said plate is supported by the frame ties t and b. The rear portion of the plate is bent or offset laterally (Fig. 5) and provided with an ear h^3 in which is stepped a vertically extending rod h^2 whose upper end supports the swinging arm o^2 carrying a cone-spindle c^3. From the foregoing it will be apparent that upon the breaking of a thread the corresponding drop-wire will then instantly fall, thus placing the dog in position in front of and in engagement with the

moving cam g', which latter causes the plate F and its attached parts to move toward the front (limited by the cam-stroke), thereby at the same time, through the medium of the rod h^2, lifting the free end portion of the arm o^2 and disengaging the corresponding end c' of the cone-holder from the continuously revolving driver h (see dotted lines Fig. 3), and thus automatically stopping the rotation of the cone. In order to more quickly stop the latter I provide a brake o adapted to frictionally engage the upper side of the driving end of the cone when the arm o^2 is elevated. The relative position of the brake to the cone may be regulated by means of the adjusting screw or stop o^4.

The drop-wire bracket D is provided in front with a pivoted latch u^3 having a downwardly extending lug u^4 passing through an opening formed in the bracket. This latch automatically drops into engagement with the plate F and locks the latter in position whenever the plate is moved from its normal position, or upon the breaking of a thread, see Figs. 3 and 4.

In addition to the arrangement just described for automatically stopping the rotation of the cone upon the breaking of a thread and the consequent falling of the corresponding drop-wire, I further provide the machine with a device for automatically stopping the cone when the latter is loaded with yarn or filled to any predetermined size or diameter. This last-named device consists essentially of a size-lever u fulcrumed to the center of bracket D, its rear end having a laterally projecting contact surface or lug u', of suitable length, arranged to rest upon and be supported by a pin s^4 mounted in the side of the pressure-bar s, see Figs. 4 and 5. A dog n^8, similar to the drop-dogs before described, is fulcrumed to the plate F and is connected to the lever u by a short link n^6, see Fig. 4; thus it will be seen that the size-lever dog is adapted to move up and down in unison with said lever. The pressure-bar s, as before stated, is jointed to the bracket arms n^4 and is enlarged at its lower end to form a counter weight r in which is secured a laterally projecting pin r' adapted to contact with the upwardly projecting lug r^2 having an inclined face and forming a part of the dog-plate F. The weight r insures the normal contact of the guide-eye f^4 with the cone while the latter is being built up, but upon the breaking of a thread the action of the cam g' upon the dropped dog forces the plate F toward the front, thus bringing the lug r^2 into engagement with the pin r' and swinging the bar s and the traverse-arm away from the cone. Now, while the cone is being filled the pressure-bar swings away from the center of it in a corresponding degree until at the moment of the completion of the winding the movement of the bar s will have carried the pin s^4 past the end of the lug u' of the size-lever at which instant the latter automatically falls, thereby dropping the corresponding dog which is immediately engaged by the cam g' and thus moves the plate F from its normal position; the action of the plate being not only to lift the cone and its spindle from the driver but to swing the pressure-bar and traverse-arm still farther away from the cone, all as clearly shown in Fig. 4.

The bent counter-weighted pressure-bar s, as stated, is pivotally mounted to the frame. To the upper end of the bar is secured a guide-plate s' whose upper edge s^2 is well rounded and over which the yarn freely passes to the corresponding guide-eye f^4; the guide-plate extends the length of the cone and is practically arranged at an angle with the axis of the holder spindles c^3, or in other words the plate itself is set parallel with the inclined surface of the cone. The plate s' also serves as a guide for the eye-carrying traverse-arm f', which latter is jointed at f^6 (Fig. 6) to the reciprocating traverse-bar f. The traverse-arm is kept in normal contact with the plate s' through the medium of the bent extension f^3, whose free end bears against the front surface of the plate, see Figs. 3, 4 and 6. From the foregoing it will be seen that the counter-weighted pressure-bar s automatically maintains the guide-eye f^4 in yielding contact with the inclined surface of the yarn-load while the guide-eye is traveling back and forth with the vibrating traverse-arm, notwithstanding the fact that the traverse-bar is at the same time moving in a plane parallel with the axis of the cone-holder.

I would state that although the cone itself may be stopped the traverse-bar is kept in continuous operation, therefore the upper end of the traverse-arm f' is liable to disarrange or roughen the surface of the yarn wound on the cone and thus destroy the work of the winder. Now, in order to prevent or guard against the contingency just referred to the lug r^2 of the removable plate F engages the pin r' of the lower portion r of the pivotally mounted pressure-bar s before described and swings the upper portion of the latter toward the front side of the machine, and at the same time by reason of the engagement of the guide plate s' with the front extension f^3 of the traverse-arm f' the latter is withdrawn from the cone, see dotted lines Fig. 4.

The two cam-shafts g vibrate in unison by means of the connecting rod l^3, which is jointed to arms l^2 secured to the front ends of said shafts; one of the latter having an arm l^4 to which is jointed an eccentric-rod l' actuated by an eccentric l secured to one of the cone-driver shafts i, see Fig. 1.

The operation of my improved cone-winding machine is as follows:—The cops B are taken from the boxes C and mounted upon the spindles or holders; the end, or ends, of the yarn or thread are next passed, as before described, to the quill c mounted on the revolving holder c^4, the movement of the latter combined with that of the reciprocating trav-

erse-arm being so timed as to wind the yarn spirally upon the quill. Now, in case say one of the strands of yarn breaks the dog-plate F will be quickly forced outwardly through the medium of the correspondingly dropped dog n, and traveling cam g', thereby lifting the cone-holder from the driver h and into engagement with the brake o; the lug r^2 at the same time forcing the pressure-bar, and guide-eye backwardly or toward the front and away from the cone, the latch u^3 meanwhile locking the plate in place. After piecing the broken end of the yarn, thereby lifting the dropped dog into position, the attendant next raises the latch and pushes the dog-plate rearwardly to its limit, thus lowering the cone into action again; the bar s, then returning to the normal position. When enough yarn has been wound onto the cone, as gaged by the parts u' and s^4, the size-lever falls, thereby dropping the corresponding dog n^8 below the plate F to be engaged by cam g', the action of the latter being to move the plate, thus lifting and stopping the rotation of the cone and at the same time swinging the pressure-bar s, and guide-eye away from it as just described. The size-lever may be vibrated by hand as desired by means of the handle u^2. The cone when filled may be readily taken from the bearings h' and removed from the holder c^4; the latter after being furnished with another quill is replaced in the machine, and the operation of filling again repeated. It will be seen that the cone-lifting rod h^2 of the dog-plate F is located contiguous to the driving end of the cone, the arrangement being such that the device operates to tilt and stop the rotation of the cone, the opposite end of the spindle at the same time resting in the normally supported bearing carrying the end of the adjacent revolving cone-spindle.

As before stated my improved winding machine is comparatively free from complicated devices, thereby rendering it efficient, easily operated and having great capacity. Owing to the fact that the machine is adapted to be kept in substantially continuous operation, it follows that practically no time is lost in piecing the yarn ends and removing the filled cones or bobbins.

In some cases winding machines have been provided with mechanism constructed and arranged to actuate each cone or spool individually, that is to say each cone is rotated by means of a revolving drum, either cylindrical or cone-shaped, the entire face of the drum being in frictional engagement with the yarn-load of the cone during the operation of building. When thus wound it will be found that the "lay" or wind of the yarn is not uniform, it being comparatively fine and close, or normal, adjacent to the quill and coarse and open at the exterior; this result is due to the fact that while the motion of the traverse or guide which delivers the yarn to the cone is regular the rotation of the cone becomes slower as it increases in diameter and consequently the cone does not contain as much yarn as one of equal diameter having a constant or fine lay or wind throughout. By means of my improved machine the wind of the yarn upon the cone is uniform; it may be regulated so as to produce a close wind or an open wind as desired by simply changing the relative speeds of the drivers h and traverse-bar f. Fig. 10 represents a side view of an open-wind cone E, that is the spiral coils or convolutions cross each other at substantially regular intervals thus giving it the appearance of a reticulated surface; the openings z' being bounded by the superimposed threads z crossing each other, as just stated.

I claim as my invention—

1. In a winding machine, the combination with the yarn-holder or cone and driving mechanism therefor, of a movable pressure-bar having a guide-plate at its upper end extending longitudinally of and parallel with the side of the cone or of the surface of the yarn-load, a traverse-arm in frictional engagement with said guide-plate provided with a guide-eye in yielding contact with the yarn-load arranged to receive the strands of yarn and deliver them to the holder, a reciprocating traverse-bar having said traverse-arm jointed thereto, arranged whereby the pressure-bar and traverse-arm are adapted to move toward and from the axis of the holder, and mechanism substantially as described for automatically stopping the rotation of the holder upon the breaking of one of the threads or strands of yarn, said mechanism at the same time also operating to move the pressure-bar and traverse-arm away from the holder, for the purpose set forth.

2. The combination with spool or cone-driving mechanism, a reciprocating traverse-bar, a traverse-arm jointed to said bar provided with a guide-eye and a swinging counterweighted pressure-bar having a guide-plate s' in engagement with and laterally supporting the upper portion of said arm, of a size-lever u in normal contact with the pressure-bar, a drop-dog n^8 connected with said lever and mechanism for automatically stopping the rotation of the cone and swinging the said guide-plate and guide-eye rearwardly therefrom upon the disengagement of the size-lever from the pressure-bar, substantially as described.

3. In a winding machine, spool or cone-winding mechanism, a continuously reciprocating yielding traverse-arm f' provided with a guide-eye for the yarn, and a pivotally mounted counterweighted pressure-bar s provided with a guide-plate s' arranged in front of and in engagement with said traverse-arm and further provided with a stop or pin, as s^4, in combination with a size-lever in normal engagement with said stop, a drop-dog connected with the size-lever, a movable plate, as F, adapted to engage the pressure-bar having said dog mounted therein, a continuously-traveling cam, as g', arranged to contact with

the dog whenever the latter is dropped from its normal position, and a spool-bearing support, as h^2, mounted in and actuated by the dog-plate, all arranged and adapted for operation substantially as hereinbefore described.

4. In a winding machine, spool or cone-revolving mechanism, a continuously reciprocating yielding traverse-arm f' having a guide-eye for the yarn, a mounted pressure-bar s having a guide-plate s' in engagement with the traverse-arm, a series of drop-wires n^3, each adapted to be normally suspended by a strand of the thread or yarn being wound, and dogs n attached to said drop-wires, in combination with a movable plate F carrying said dogs, a latch for interlocking with the plate, a traveling cam arranged to contact with the dogs when the latter are dropped from the normal position, and a spool-bearing support h^2 mounted in and actuated by the dog-plate, all arranged and adapted for operation substantially as hereinbefore described.

5. The combination with spool or cone-revolving mechanism, of a swinging pressure-bar having a fixed guide-plate s' at its upper end extended the length of and arranged at an angle with the axis of the revolving cone and means to press said plate toward the cone, a reciprocating and swinging traverse-arm provided with a guide-eye interposed between said guide-plate and the cone surface for laying the yarn upon the cone, and having said arm in frictional engagement with and guided by said plate s', substantially as described.

6. Spool or cone-revolving mechanism, a swinging pressure-bar s having a guide-plate s' at its upper end and further provided with a stop or pin s^4, means connected with said bar for feeding and laying the strands of yarn upon the spool or cone, a size-lever u in normal contact with said pin s^4, and a drop-dog n^8 connected with the size-lever, in combination with a movable plate F carrying said dog, a latch for interlocking with the plate, a moving cam arranged to contact with the dog when the size-lever is disengaged from the pressure-bar, and mechanism connected with and actuated by the plate F for automatically stopping the rotation of the cone upon the disengagement of the size-lever from the pressure-bar, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN M. PARKER.

Witnesses:
GEO. H. REMINGTON,
IDA M. WARREN.