To all whom it may concern:

Be it known that I, JULIUS D. CONANT, a citizen of the United States, residing at Willimantic, in the county of Windham and State of Connecticut, have invented certain new and useful Improvements in Doubling and Rewinding Machinery, of which the following is a full, clear, and exact description.

This invention relates to doubling and rewinding machinery of the class in which a multiple of fine yarns of silk or other material are brought together and rewound upon a single spool.

The aim of my said invention is to provide a novel arrangement of guide-wires whereby a larger number of yarns can be handled and rewound in a given space than has been done before, so far as I am familiar with this class of devices, and incidentally to improve the drop-wires and connections by means of which the "stop mechanism" is controlled.

The accompanying drawings illustrate my invention, Figure 1 being a front elevation of a doubling and rewinding machine embodying my improvements, and Fig. 2 is a side elevation of the same. Fig. 3 is a plan view of the framework that supports certain guide-wires and also shows supports for the drop-wires, as I shall explain in detail later. In this view the shell 21, that supports the so-called "basket," is shown in section on the line 3 - 3 of the Fig. 1. Fig. 4 is a front elevation of a portion of the said basket and its supporting-shell and shows also one of the drop-wires hinged therein. Fig. 5 is a plan of a portion of the basket, a part of the same being broken away to disclose certain springs that form parts of the hinge-supports for the drop-wires. Figs. 6 and 7 are detached diagrammatic views of one of the take-up-spool carriers and the pulley by means of which said carrier is frictionally driven under normal conditions, and said figures also illustrate the upper end portion of an arm 19, which is brought into operative contact with the said spool-carrier whenever a strand breaks, and thus operates to raise the said carrier out of contact with the driving-pulley. In the Fig. 6 the said arm 19 is shown in its inoperative position—that is to say, out of engagement with the carrier—while in the Fig. 7 the said arm is illustrated in its operative position—that is to say, with its extreme end moved forward to lift the carrier 13 away from its driving-pulley. Fig. 8 is an elevation of one 55 of the drop-wires, and said view also shows a fixed wire 31, that prevents the drop-wires from falling inward, and a movable wire 34, that operates the "stop-motion" whenever a drop-wire falls outward. Fig. 9 is a similar 60 view of one of several special drop-wires located at the rear portion of the basket and provided with bends or notches that slip over the wire 34, that operates the stop-motion, and thus lock the said stop-motion in its operative position.

In the drawings the reference-numerals 10 indicate a take-up spool mounted to rotate with a carrier 11 of spindle form that is journaled in suitable bearings 12, one end of said spindle being enlarged, as at 13, to provide a roll of considerable size and weight that rests upon and is fractionally driven by a pulley 14, which revolves constantly.

15 denotes a reciprocating bar that bears a 75 notched guide 16, of porcelain or similar material, that serves to collect the several strands and lay them in regular coils upon the take-up spool 10.

Journaled immediately below the described 80 take-up spool and its driving mechanism is a rock-shaft 17 having attached thereto a pocket 18, adapted to receive common leaden shot or the like granular material that may serve as a readily-graduated weight, the said pocket 85 being located at one side of the vertical center of the rock-shaft 17. Extending upward from the said rock-shaft is an arm 19, whose upper (free) portion terminates in a substantially right-angular bend, the extreme end 90 being so located that it lies normally just out of engagement with the lower portion of the spool-carrier 13, being retained in such normal position by the described weighted pocket 18, which slightly overbalances the said arm 95.

The several strands or yarns that are to be brought together and rewound are drawn from bobbins 20, which are mounted to revolve freely on pins 20', that are so disposed with relation to each other and to the rewinding mechanism that the said strands may be led from the delivery-bobbins to the said rewinding mechanism without interference with each other.
Having described generally the delivery and take-up mechanisms, I will now proceed to describe the drop-wires and cooperating devices by means of which uniformity of tension is maintained on the several strands and also the automatic devices by means of which the rewinding mechanism is instantly stopped whenever a strand is broken.

The reference-number 21 indicates an approximately semicircular shell that is fixedly attached to the machine-frame by a bracket-arm 22, as is best seen in the Fig. 2. The upper portion of said shell is provided with an inwardly-extending plate or ledge 23, that is slitted radially and formed with angular depressions 24, which serve as the lower half parts of bearings that support certain drop-wires 25, one of which wires is particularly illustrated in Fig. 8. The lower or hinge end of said drop-wire is formed with short trunnions 26, that may lie in the depressions 24, already referred to, and in order to retain the said trunnions in hinged relation to the ledge 23 I secure to the said ledge by screws or otherwise flat springs 27, whose free end portions are bent upward, as at 28, immediately over the depressions 24, thus providing the upper half parts of the bearings in which the drop-wires are hinged. With a construction as just described the trunnions of the drop-wires may be readily entered between the free ends of the springs and the upper face of the ledge 23 and forced along the said ledge until they (the trunnions) drop into the angular depressions 24, when the springs snap down upon the ledge and then serve to prevent the accidental removal or displacement of the drop-wires from the basket.

Secured to the shell 21 is an upwardly-extending plate 29, that is slitted, as at 30, and curved inward, forming a basket in whose slots the drop-wires are guided and kept from contact with each other. Each of the drop-wires 25 is formed with an angular bend near its free end, which terminates in a suitable eye through which the strand of silk may be guided, and when the machine is in operation the said strand is under such tension that it readily supports the said drop-wire in a substantially vertical position. (See Figs. 1 and 2.) The several drop-wires are prevented from falling inward by a fixed wire-guard 31, that is bent to conform to the semicircular form of the basket 29 and whose free ends are clamped in a rigid frame 32 by means of screws 33. The frame 32 is here shown as formed of tubing that is secured to the machine-frame and is bent to extend along a portion of the front of the basket on opposite sides thereof, leaving an open space between the confronting portions of said frame 32, so that the strands of silk may be freely entered within the basket and drawn through the guide-eyes of the drop-wires.

Extending around the basket 29, but out of contact therewith, is a wire 34, that is connected with the weighted rock-shaft 17 by wires 35, the said wire 34 being so located that whenever one of the drop-wires 25 falls out toward it drops upon the wire 34 and overbalancing the weighted pocket 18 rocks the said arm 19, and thus moves the free end of the arm 19 into engagement with the spool-carrier 13 and stops the rotation of the take-up spool in the manner already explained. So long as the several strands remain intact and under tension the entire series of drop-wires 25 remain in a vertical position; but immediately upon the breaking of a strand the drop-wire therefore sustained by said strand at once falls outward by gravity upon the wire 34 and stops the take-up spool as explained. The instant the take-up spool is thus stopped the tension of all of the several strands is relieved and the drop-wires of the entire series fall outward upon the wire 34 and remain there until the strands are again placed under tension by the starting of the take-up spool.

In order to lock the wire 34 in its lowest position after the take-up spool has been stopped and thus prevent the said take-up spool from settling down upon its driving-pulley, I form one or more of the drop-wires 25 at the rear side of the basket with offsets or bends 36, which slip down over the said wire 34 as the latter drops, and thus locks the said wire against rising until such time as the drop-wires are raised to their normal (i.e., vertical) positions. So soon as all of the drop-wires are thus raised the wire 34, being relieved of the weight of the drop-wires, immediately rises to its normal position, as seen in the Figs. 1 and 2, thus moving the end of rod 19 out of operative engagement with the spool-carrier 13, when the said carrier at once settles down upon the friction-pulley 14 and the rewinding mechanism starts into action.

The semicircular form of the basket and drop-wires should be especially noted, as it forms one of the features of my invention and enables me to bring together a larger number of strands than has been possible heretofore in machines in which the several drop-wires have been arranged in alignment with each other. In the last-named machines the space required for several drop-wires to operate without conflict with each other is so great that the strands are separated and caused to draw at widely-different angles as they pass from the delivery bobbins to the drop-wires and thence to the take-up spool, making it impossible to provide a uniform tension on the said strands. It is therefore practicable to use in such machines only a few drop-wires, usually ten or twelve at the most. In contradistinction to such old forms of machines my described machine operates perfectly with twenty-five or more strands, the semicircular form of basket and drop-wires being such that the several strands are at all times kept in close relation to each other and are at no time during their passage from the delivery-bobbins to the take-up
spool deflected from a straight line to an extent that is in the least objectionable. In order to further equalize the tension of the said strands, I provide within the basket a guide-wire 37, that is approximately semicircular in form and whose ends are clamped within the ends of the frame 32 by screws 38. It will be seen by referring to Fig. 3 of the drawings that the side portions of the said guide-wire 37 are substantially parallel with the adjacent portions of the basket; but the rear or central portion of said guide-wire is nearly straight. The sides are notched at points opposite the drop-wires, the said notches serving to guide and separate the side strands, while the rear substantially straight portion is by preference not notched.

The arrangement of the several delivery-bobbins is illustrated in the Figs. 1 and 2, in which it will be seen that the two outer rows of bobbins are arranged in substantially the same vertical plane as the basket and drop-wires, and the strands from these bobbins lead to and are controlled by the drop-wires on the opposite sides of the basket, said strands being kept from interference with each other by the described notches in the wire 37. Located in the rear of the described outer rows of delivery-bobbins are other bobbins whose strands or yarns lead upward to the unnotched rear portion of the guide-wire 37 and thence to the eyes of the drop-wires at the rear portion of the basket. By this arrangement of bobbins and guide-wire 37 I am able to lead the several strands from the delivery-bobbins to the drop-wires at practically the same angles, thus providing a uniform degree of tension on all of the strands. The guide-wire 37 is secured in position by screws 38 and may be readily adjusted forward or backward to vary the angle and resulting tension of the strands that lead to the drop-wires at the rear portion of the basket.

The described manner of grouping the drop-wires in a half-circle instead of arranging them in a right line has the further obvious advantage that when the said wires drop and are extended radially their free ends are widely separated and ample space is provided between the ends of the adjacent drop-wires for the attendant to work in, whereas in machines of the ordinary type, in which the wires are arranged in a right line, the wires always preserve the same parallel and close relation to each other whether elevated or dropped.

The described manner of hinging the several drop-wires independently renders it very easy to remove any one of them without disturbing the others of the series, this feature being a decided advantage over the ordinary method of stringing all of the drop-wires on a single wire that serves as a pintle on which the said wires are hinged.

My described machine, while it embodies a number of operative parts because of the multiplicity of drop-wires, is not, in fact, complicated. It is so nearly automatic in its action that skilled operatives are not required, and I find in practice that it performs a greater amount of work in a given space and with less attention than the older forms of doubling and rewinding machines, in which the drop-wires are arranged in an extended right line.

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

1. A rewinding-machine, in combination with delivery and take-up mechanisms, a plurality of drop-wires hinged at their lower ends, and arranged in substantially semicircular basket form as herein set forth.

2. A rewinding-machine, in combination with delivery and take-up mechanisms, drop-wires arranged in substantially semicircular basket form as herein set forth, and means cooperating with said drop-wires for automatically stopping the take-up spool upon the breaking of a strand.

3. In combination, in a rewinding-machine, a plurality of hinged drop-wires arranged in substantially semicircular basket form, and a corresponding multiple of delivery-bobbins arranged in different planes whereby the strands may lead from said delivery-bobbins to the drop-wires at approximately the same angles.

4. In combination, in a rewinding-machine, a plurality of drop-wires hinged to a support to move in divergent planes, means consisting of a semicircular, slitted, shell of basket form for separating said drop-wires, and an adjustable guide-wire 34 located adjacent to said drop-wires.

5. In combination, in a rewinding-machine, a semicircular basket consisting of a shell 21 and inwardly-curved slotted plate 29, the shell being provided with a ledge 23 that is formed with depressions as set forth, springs 27 coacting with said depressions to provide bearings, and drop-wires trunnioned in said bearings.

6. In combination, in a rewinding-machine, a semicircular shell, an inwardly-curved and slotted basket, a series of drop-wires located in said slots, and means substantially as specified for independently hinging the said drop-wires in the said shell.

Signed at Willimantic, Connecticut, this 7th day of December, 1901.

JULIUS D. CONANT.

Witnesses:

JOHN A. CONANT,
FRANK H. ALLEN.