(No Model.) 3 Sheets—Sheet 1.

J. W. FOSTER.

SPOOLING MACHINE.

No. 514,884. Patented Feb. 13, 1894.

Fig: 2.

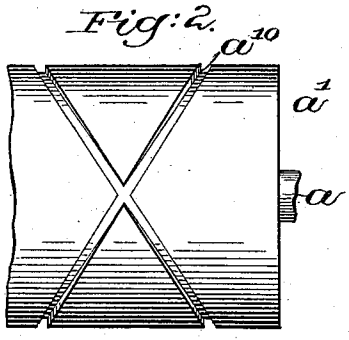

Fig: 1

Witnesses.
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(No Model.)

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Fig. 6.

Fig. 7.

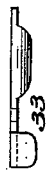


Fig. 3.

Fig. 4.

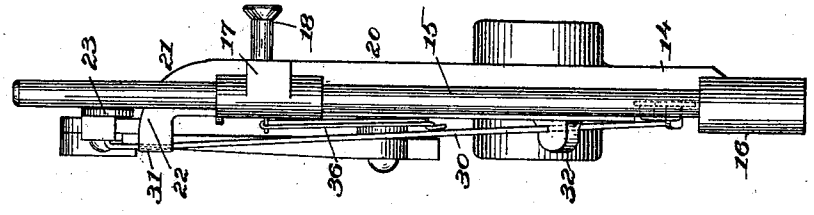
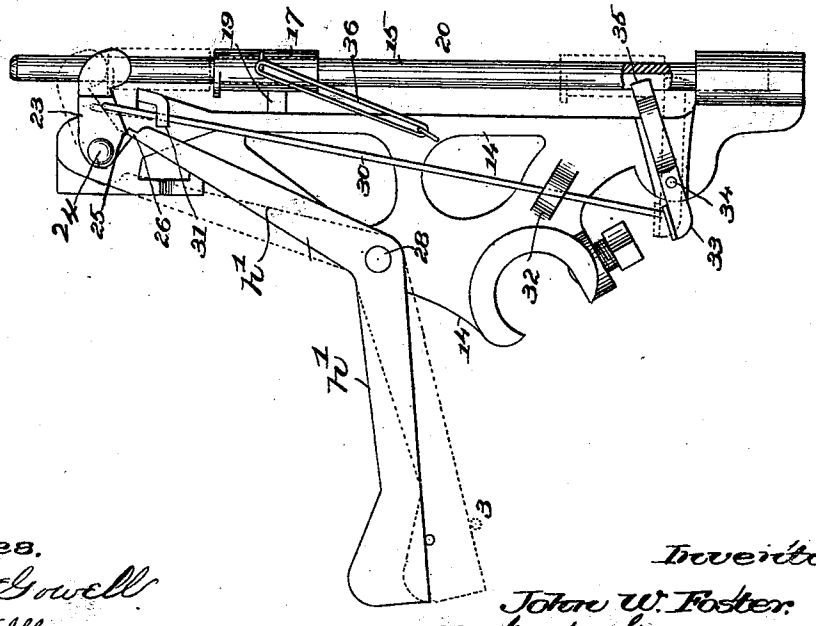


Fig. 5.



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(No Model.) 3 Sheets—Sheet 3.

J. W. FOSTER.

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Fig. 8.

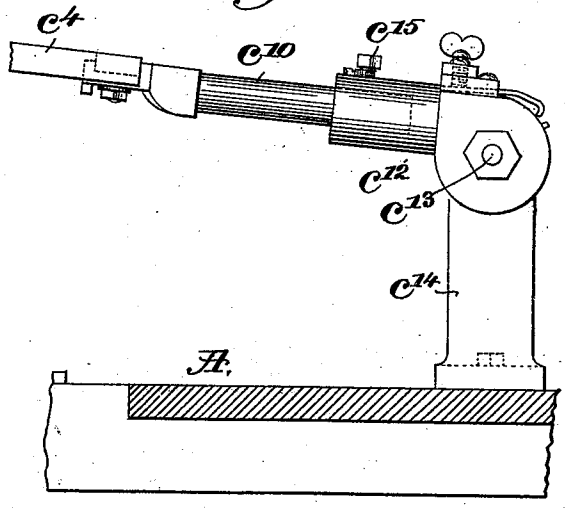


Fig. 9.

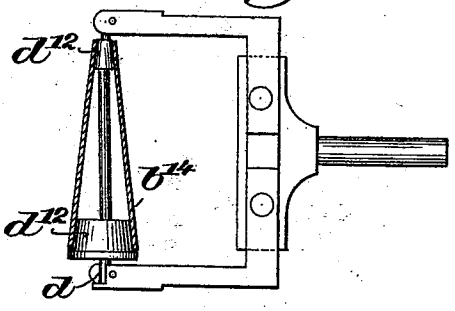
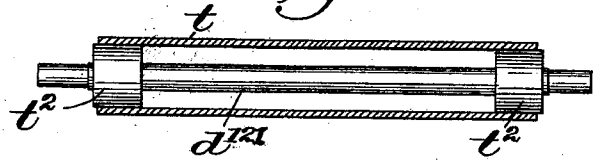


Fig. 10.



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UNITED STATES PATENT OFFICE.

JOHN W. FOSTER, OF WESTFIELD, MASSACHUSETTS.

SPOOLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 514,884, dated February 13, 1894.

Application filed April 25, 1893. Serial No. 471,763. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. FOSTER, of Westfield, county of Hampden, State of Massachusetts, have invented an Improvement in Spooling-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

In textile manufacture threads of cotton, silk, and of other fibers in form of skeins have subsequently to be wound into more compact form in order that the thread may be used in different manufactures or machines, and most frequently this skein thread is wound on the cones to form conical masses of thread, the cones being used in quill-winding machines, and in knitting and other machines. These skeins of thread are commonly stretched over swifts or reels and in practice it has been customary in getting the thread into conical masses to first wind the thread upon a spool and then redraw or rewind the thread from the spool upon a cone, thus requiring two handlings in order to get the thread into the form of a conical mass. This method has been practiced because heretofore it has been considered impracticable to satisfactorily and economically wind the thread directly from the skein upon a cone, and chiefly because of the differences in the diameter of the cone and the consequent variations in the amount of thread required to reach around the cone at its large and at its small end. It will be obvious that different portions of the surface of a conical shell mounted on a journal rotating at a certain speed will run at different surface speeds according to the diameter of the conical shell, and inasmuch as the speed of rotation of the swift or reel is determined by the strain of the rotating cone on the thread, the speed of rotation of the swift must consequently vary and a varying amount of thread will be let off. In my efforts to overcome this difficulty in cone winding so as to make it possible to wind thread, by which term, I mean to include any thread of any material, directly from the skein upon a conical shell, I have devised what I shall call a take-up or slack-thread controller, which I have so constructed as to enable it to take care of all the slack thread incident to the winding operation and due to variations in the diameter of the conical shell between its large and its small ends; and I have so devised said take-up or slack-thread controller that it will effectually care for and control the thread and insure the continuance of the winding operation, and I have also devised said device that it through intermediate devices will release a drop whenever a tangle or knot occurs in the skein which would tend to break the thread or prevent the proper rotation of the swift or reel containing the skein.

My apparatus has also been so devised that it will act upon the occurrence of a knot of improper size and effect the stopping of the winding operation until the defect has been removed, and said device will also act in case the thread breaks.

While my invention is most important and valuable in cone winding, yet it has very material advantages when used for winding thread from the skein onto a cylindrical shell or tube, for in use, the thread, whatever the external shape of the shell, is wound after the manner designated under the term "cross-winding" so that large masses of thread put onto the shells may be drawn off the ends thereof without rotating the thread masses when such practice is desired.

Figure 1, in side elevation shows a sufficient portion of a spooling machine with my improvements added to enable my invention to be understood; Fig. 2, a portion of the grooved drum for rotating the winding roll or driving the mass of thread being wound. Fig. 3, is an enlarged detail of the track and its supporting frame, and the stop-trigger and slack-trigger, viewing the same as in Fig. 1, but enlarged. Fig. 4, is a view of the devices in Fig. 3, looking from the left. Fig. 5, is a view looking at Fig. 3 from the rear side. Figs. 6 and 7, are details to be referred to, one showing the stop-trigger and the other the slack-trigger in plan view. Fig. 8, shows the remainder of the spindle-carrier broken off from Fig. 1. Fig. 9, is a top or plan view of the front end of the spindle carrier showing the spindle as adapted to hold a shell of conical shape; and Fig. 10, an enlarged detail showing the spindle shaped to receive a tubular shell.

The frame-work A is and may be as usual

in spooling machines, it being of suitable shape to sustain the working parts.

The machine in practice will or may have at each side a suitable longitudinal shaft a, provided at suitable distances apart with like drums a', one for each thread mass to be wound, each drum having suitable crossing grooves a^{10}, see Fig. 2, in which enters a suitable foot or shoe b^{12} of a suitable traverse guide b' adapted to slide back and forth on a guide bar b^2 as the said drum is rotated.

Each rotating drum a' has resting directly upon it a winding roll 24 which is rotated by the drum so long as the roll contacts therewith. The winding roll acts to rotate a spindle marked d in Figs. 1 to 9, it carrying, as supposed in said figures a conical shaped shell b^{14}, preferably of paper, upon which the thread y being delivered from the skein is wound. The spindle d has journals or ends mounted in bearings in a suitable carrier c^4 but partially represented in Fig. 1, the remaining part being, however, represented in Fig. 8, said carrier being so mounted as to be able to rise as the mass of thread wound on the shell increases in diameter. The journals of the winding roll rest in suitable bearings 25 at the upper ends of stands 26 attached to the stringer A^5.

The carrier c^4, see Fig. 8, has a shank c^{10} which enters, as shown, a socket piece c^{12} pivoted at c^{13} on an upright c^{14} erected on the lower frame-work, a suitable screw c^{15} permitting the yoke part of the carrier supporting the spindle d, to be tipped more or less, as when the spindle is to carry a conical shell, as b^{14}, best represented in Fig, 9, but as stated, while my apparatus is very essential for winding thread in conical masses, yet it may be used to great advantage to wind threads upon cylindrical paper tubes or shells, as represented in modification Fig. 10, wherein the cylindrical shell is marked t, the spindle being marked d^{121} it having cylindrical collars t^2 rather than conical collars d^{12} as represented in Fig. 9.

g represents a lever having at its inner end a lifting device f, which, when moved vertically, as will be described, acts upon the journals of the winding roll 24 and lifts said roll from its bearings 25 so as to break the contact of the said roll with the drum, and thus stop the rotation of the roll and also the winding operation of the thread upon the shell carried by the spindle.

The stringer A^5 constituting a part of the frame-work has a stud A^6 from which depends a leg g^2 pivoted at g^5, said leg having pivoted upon it at or near its lower end at g^3 a leg lever h, said leg lever having at its outer end a suitable projection, as 3, above which is suspended a co-operating drop h', represented as a lever pivoted at 28. The lever g at its upper side between suitable projections, is provided with a cam face, and the lower end of the leg or a part carried thereby presses on said cam face during the vibrations of said leg, as will be described, about its pivot g^5. The inner end of the leg lever h when elevated or put into its abnormal position by the falling of the drop h' will be struck by one of the projections m on a ratchet wheel connected with a shaft m' having its journals mounted in suitable bearings of a stand m^2 suitably attached to the frame-work, the said shaft in practice being rotated as provided for in United States Patent No. 404,831, granted to me June 11, 1889.

Many of the parts thus far specifically referred to by letter, such as the drum, the winding roll, the spindle-carrier, the lever g and lifting device are substantially the same as represented in my United States Patent No. 499,668, granted June 13, 1893.

I will now specifically describe the improvements which I have added to the parts thus briefly referred to. The frame-work has upon it at suitable intervals suitable uprights or stands A^8 adapted to sustain a suitable swift or reel A^9 to contain a skein of thread, silk, or other material to be wound upon the shell of conical or other form. The frame-work has attached to it by suitable bolts suitable stands 19 constituting bearings for a rod or beam D to which I have secured by suitable screws 13 or otherwise the foot of a frame 14. The frame 14 supports a track 15, herein represented as a round rod held in a socket 16, the said track serving to guide a take-up or slack-thread controller, shown as a carriage 17, having a suitable stud 18, preferably of vitreous material, under or partially about which passes the thread y on its way from the reel to the traverse b' and the spindle d or the shell thereon which is to receive the thread, the said shell used in Fig. 1, being supposed to be conical as represented in Fig. 9, the shell in Fig. 1 being partially filled with thread so that it is not visible. The carriage 17 has a finger 19 which contacts with the smooth guiding surface 20 of the track frame when the carriage is being moved up and down on the track for distances suitable to control such slack threads as will enable the machine, all other things being equal, to be run properly. The surface 20 near its upper end is, however, curved upwardly, as at 21, so as to let the said finger 19 pass about the portion 22 on the track frame, and following said surface, owing to the pull of the thread upon the stud 18 due to a knot or obstruction in the thread at the swift or reel, cause said finger to pass under the stop trigger 23 shown as a latch pivoted at 24 on a part of the track frame, said finger in such position and under such circumstances acting to lift the stop trigger into the dotted line position Fig. 5, and cause the shoulder 25 of the stop trigger to be lifted off a toe 26 at the upper end of the drop h' pivoted at 28 on the track frame thus releasing said drop enabling it to fall and strike the pin 3 at the end of the leg lever h, thus lifting the inner or rear end thereof and putting it into the path of movement of

one of the teeth m of the ratchet or stop wheel m^2, said tooth in the further rotation of the wheel acting on one end of said leg lever to swing the leg to cause the same, or a part carried by it, to act on the cam surface at the upper side of the lever g and turn it about its fulcrum $g^\times$ thus moving the lifting device f upwardly and causing it, acting against the winding roll 24, to lift it from contact with the rotating drum a', such break of contact immediately stopping the rotation of the spindle d. To enable the winding operation, however, to be stopped in case the thread breaks or becomes too slack, I have connected to the stop-trigger 23 a rod 30 which is extended through suitable guides 31, 32, said rod acting upon one end of a slack-thread trigger 33 pivoted at 34 on the track frame, the opposite end of said lever being herein shown as entering a slot 35 in the track 15, said slot being convenient as it enables the lever to be so located as not to be strained laterally out of place, and so that it will always be within the range of movement of the carriage 17. In case the thread breaks it no longer supports the carriage 17, and as a result, it drops and strikes the slack-trigger, turns it from its full into its dotted line position Fig. 5, and through the rod 30 lifts the stop trigger, releasing, as before, the drop lever 27. I prefer in practice to restrain in a measure the upward movement of the carriage 17 under the pull of the thread coming from the swift or reel, so that certainly a safe amount of strain may be put upon the thread, to thus aid in overcoming any adhesion of one layer of thread to another before the carriage will rise far enough to swing about the track as described and lift the slack-trigger to effect the stopping of the winding mechanism, and to effect this result, I have added a spring 36 which may be of india rubber. It will be understood that the traverse b' guides the thread y and that the said traverse, moved by the crossing grooves rather widely distributed, causes the thread to be laid in long spirals, one layer crossing another diagonally layer after layer. A cross wound mass of thread, such as herein provided for, may readily be delivered from the thread mass of whatever form without rotating the thread mass.

Prior to my invention I am not aware that thread has been wound directly from skeins into a conical mass or upon a conical shell, or, in fact, a shell of any kind, and while I have shown one form of take-up or slack-thread controller which operates well to accommodate the maximum and minimum slack of the thread when winding the latter from the skeins upon different portions of the conical shell, yet this invention is not limited to the exact form of take-up or slack-thread controller shown, nor to the exact shape shown for the triggers, as it will be obvious to those skilled in the art that other forms of such devices might be employed to effect the same result without departing from the spirit and scope of my invention.

Instead of the particular drum herein shown, I may substitute as an equivalent the form of drum shown in my United States Patent No. 499,665, granted June 13, 1893, and so also the spindle and the cone or conical shell upon which the thread is wound may be substantially as in my United States Patent No. 499,667, granted June 13, 1893.

This invention is not limited to the exact form of carrier shown for the cone, nor to the exact form of traverse mechanism for laying the thread from end to end of the cone in long spirals.

The lever g, the leg, the leg lever, the ratchet wheel, and the drop constitute what may, for brevity be designated as "stop-motion devices," but instead of the particular devices shown, I may use any other usual or suitable stop motion devices intermediate the stop-trigger and the devices for rotating a shell of whatever form, said stop motion devices, when acted upon by or through the take-up or slack-thread controller stopping the winding of the thread on the drum.

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

1. A spooling machine containing the following instrumentalities, viz:—a spindle to carry a shell to receive thread; a carrier for said spindle; devices to rotate the said spindle; a suitable swift to hold a skein of thread; a stationary track; a take-up or slack-thread controller supported by and adapted to slide on said track; a stop trigger adapted to be acted upon by or through the said take-up or slack-thread controller on the occurrence of obstruction to the proper delivery of the thread from the skein, and stop motion mechanism between said stop-trigger and the device for rotating the said spindle, to operate, substantially as described.

2. In a machine for winding thread from the skein into cone form, a drop, a stop-trigger to keep it in its normal condition; and an inclined fixed track or guide; combined with a take-up or slack-thread controller longitudinally movable on said track or guide and adapted to take up or control the slack thread presented in the coning of the thread due to differences in diameter of the cone from one to its other end and adapted to act upon said trigger to stop the winding operation when the proper delivery of the thread is obstructed, substantially as set forth.

3. In a machine to wind thread from a skein directly upon a shell, the following instrumentalities, viz:—a reel; a track; a take-up or slack-thread controller; a stop-trigger; a drop; a leg lever adapted to be moved by said drop when the latter is released; a support for the leg lever; a lifting lever; means to move the leg lever and effect the lifting movement of the lifting lever; a drum; a winding roll, and

a support for the spindle, combined with a spindle adapted to hold a shell for the reception of the thread coming directly from the skein, the combination being and operating, substantially as described.

4. In a machine to wind thread from the skein directly upon a shell, a reel; a track; a take-up or slack-thread controller; a stop-trigger; a drop; a leg lever adapted to be moved by said drop when released, a support for the leg lever, a lifting lever, means to move the leg lever and cause the lifting movement of the lifting lever; a drum provided with crossing grooves; a winding roll; and a support for a spindle, combined with a spindle adapted to hold a shell for the reception of the thread coming directly from the skein, and with a traverse or thread guide having a projection to enter the grooves of the drum and be reciprocated thereby, the combination being and operating, substantially as described.

5. A spooling machine containing the following instrumentalities, viz:—a spindle to carry a tube; a carrier therefor; devices to rotate the said spindle; a suitable reel or swift to hold a skein of thread; a track, a carriage adapted to slide thereon, and a slack thread trigger adapted to be acted upon by the said carriage when the thread breaks, and stop motion mechanism between said trigger and the device for rotating the spindle, to operate, substantially as described.

6. In a spooling machine, the track-frame, its track and a carriage adapted to slide thereon, a stop-trigger, a drop normally held out of operation by said stop-trigger and winding devices; and stop mechanism between said stop-trigger and winding devices, combined with a slack thread trigger also adapted to be operated by the said carriage, and connecting devices between the slack-trigger and the stop-trigger, to operate, substantially as described.

7. In a spooling machine, the following instrumentalities, viz:—a reel to hold a skein of thread, a winding drum and devices to rotate it and rotate the spindle and tube to receive the thread from the said skein, a track, a carriage adapted to be moved on said track by the thread, a stop trigger located near one end of the track, stop mechanism located between the stop-trigger and winding devices, a slack-trigger located near the other end of the track, and a drop and devices intermediate said triggers whereby the drop lever may be released when the thread ceases to be delivered from the reel or when it breaks, substantially as described.

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

JOHN W. FOSTER.

Witnesses:
A. F. LILLEY,
C. G. BECKER.