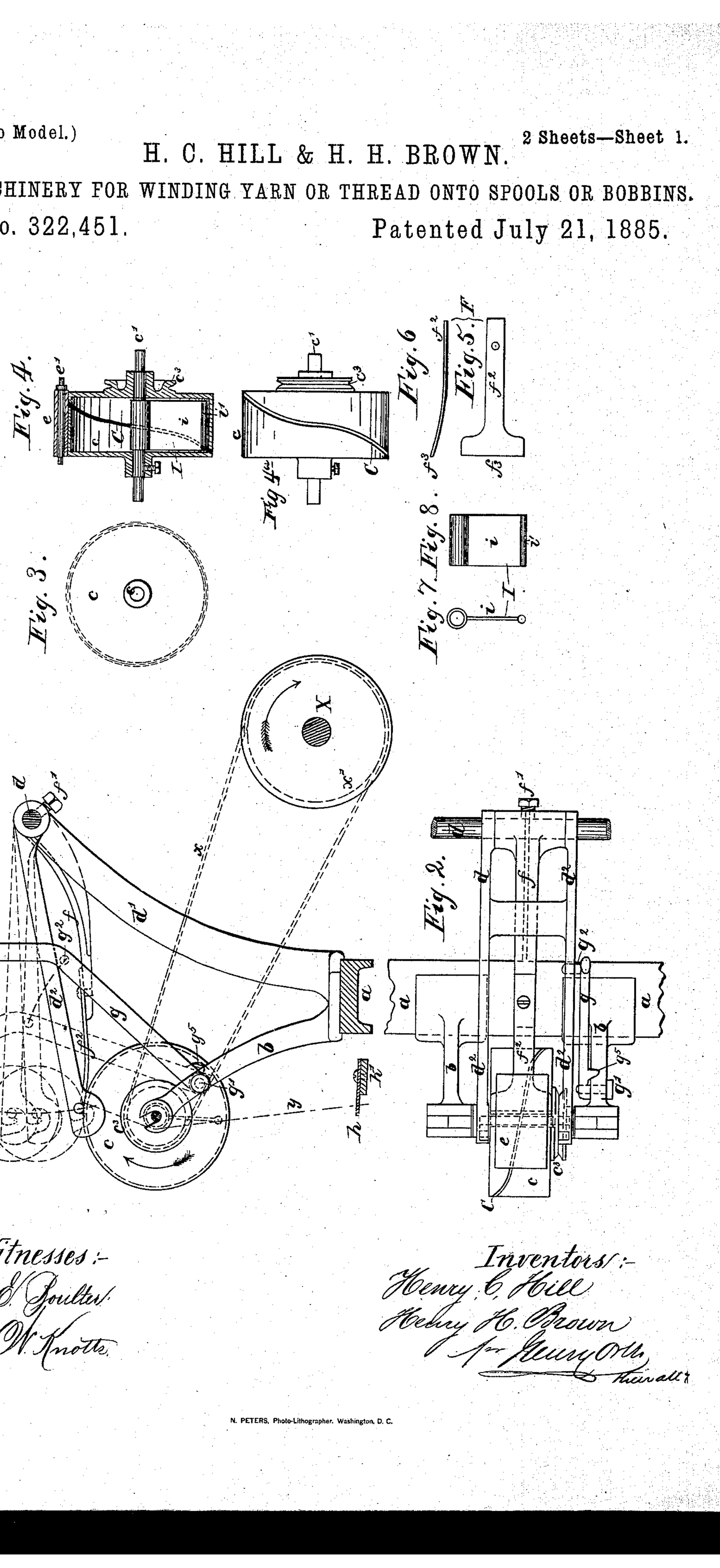
(No Model.) 2 Sheets—Sheet 1.

H. C. HILL & H. H. BROWN.

MACHINERY FOR WINDING YARN OR THREAD ONTO SPOOLS OR BOBBINS.

No. 322,451. Patented July 21, 1885.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 13.

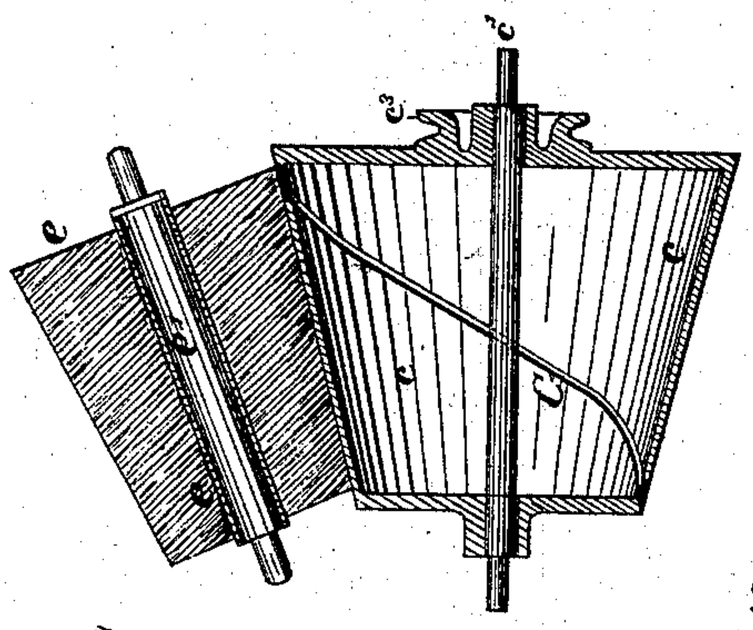


Fig. 12.

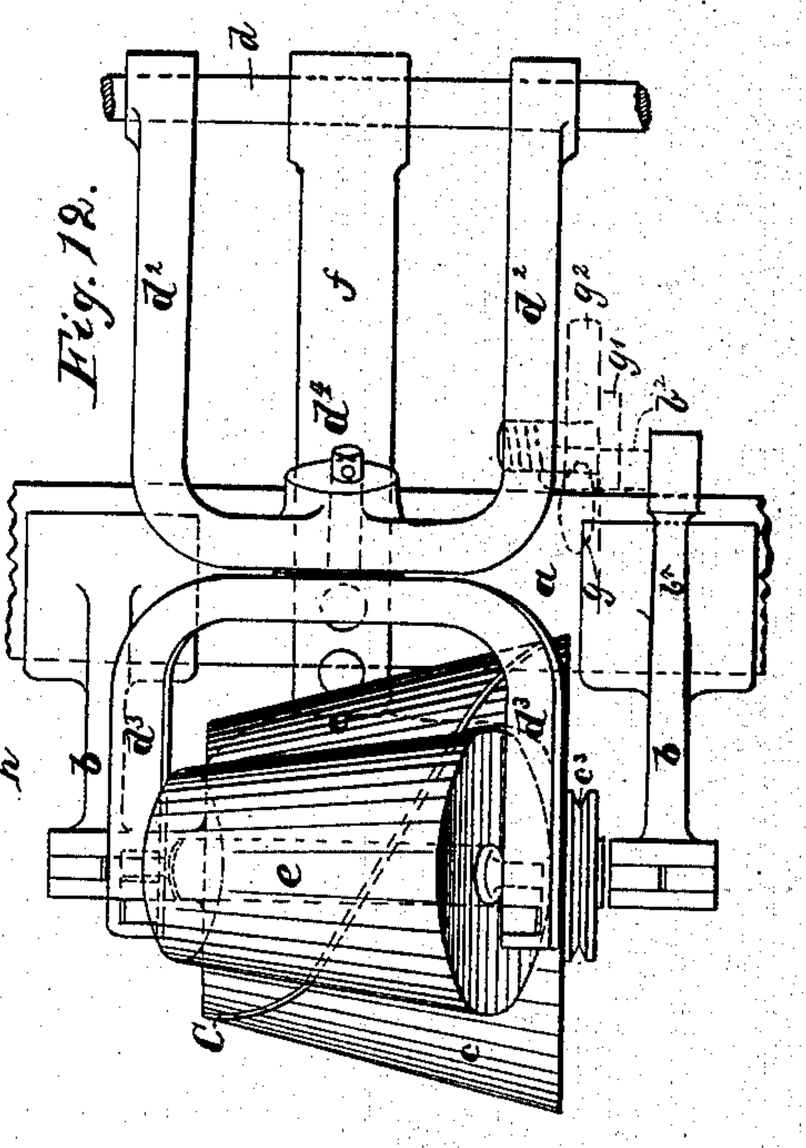


Fig. 9.

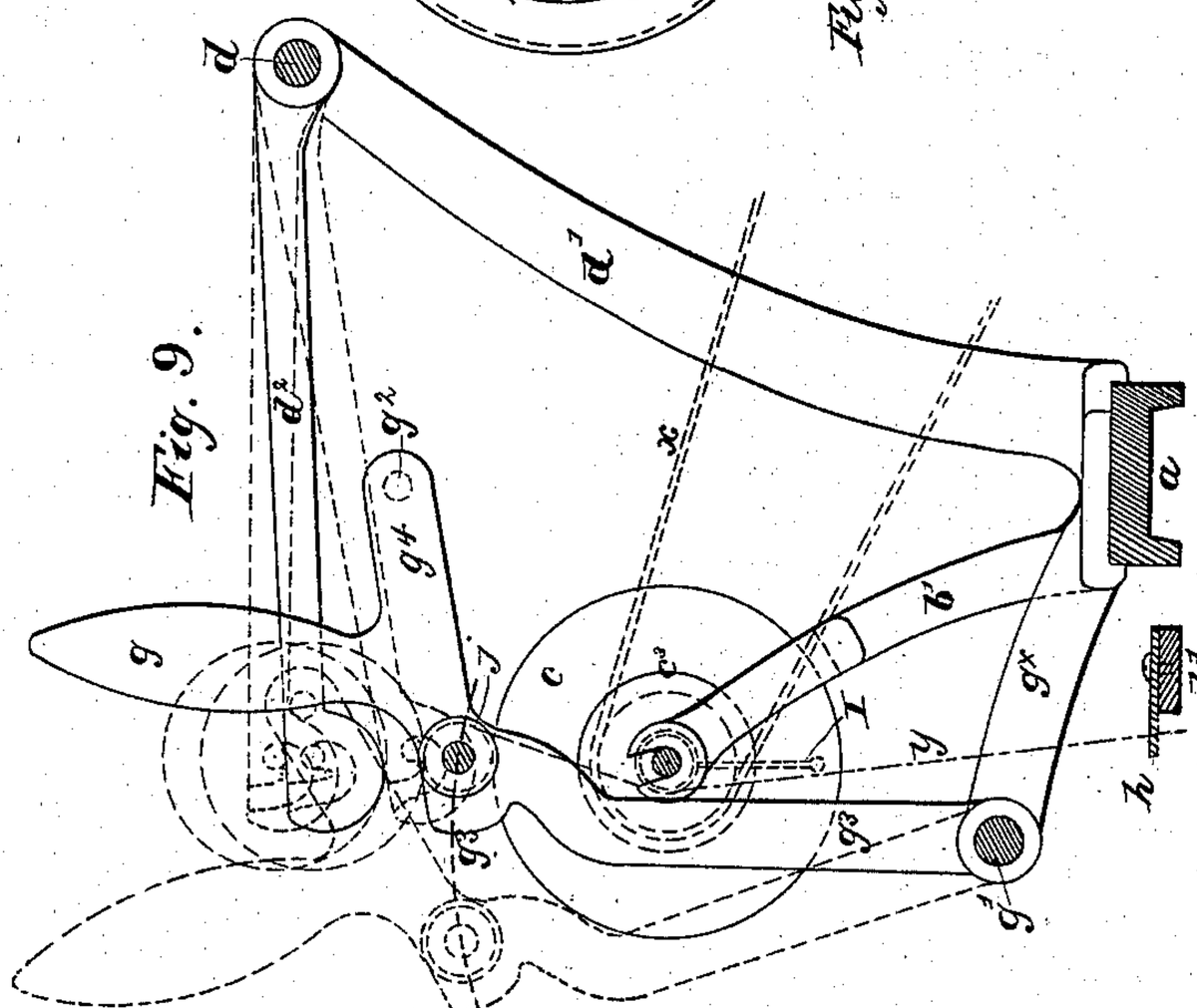
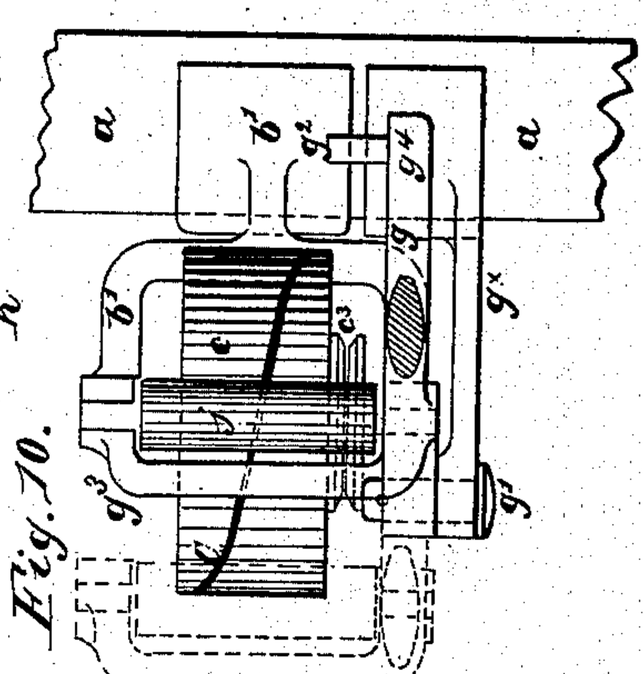


Fig. 10.



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UNITED STATES PATENT OFFICE.

HENRY CHEETHAM HILL AND HENRY HILL BROWN, OF STALYBRIDGE, COUNTY OF CHESTER, ENGLAND.

MACHINERY FOR WINDING YARN OR THREAD ONTO SPOOLS OR BOBBINS.

SPECIFICATION forming part of Letters Patent No. 322,451, dated July 21, 1885.

Application filed March 10, 1884. (No model.) Patented in England May 10, 1882, No. 2,196, and November 27, 1883, No. 5,532.

To all whom it may concern:

Be it known that we, HENRY CHEETHAM HILL and HENRY HILL BROWN, citizens of Great Britain, residing at Stalybridge, in the county of Chester and Kingdom of Great Britain, have invented certain new and useful Improvements in Machinery for Winding Yarn or Thread onto Spools or Bobbins; and we 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 letters or figures of reference marked thereon, which form a part of this specification.

Our invention relates to mechanism more especially designed for winding yarn or thread either in a cylindrical or conical form onto spools without heads or onto spools or bobbins provided with heads in which a quick traversing or to-and-fro motion or distribution of the yarn or threads is required to bind the coils together to prevent raveling and build the ends straight and square to the end of the spool or bobbin. To effect this it is necessary that the traversing of the yarn or thread should be so rapid and the reversing of the traversing motion so sudden that the ordinary winding and traversing mechanism heretofore used will not answer the purpose satisfactorily, owing to the severe and rapid shocks at each reversal of the traversing motion of the yarn or thread.

The object of this our invention is to provide means whereby yarn or thread may be wound on spools or bobbins with or without heads, and either in a cylindrical or conical form, and whereby the said yarn or thread may be traversed on the spool with the required speed without subjecting the same to severe shocks or strain at each reversal of the traversing motion.

To this end the invention consists, essentially, in a driving-drum, by means of which the spool or bobbin is rotated either directly or indirectly, having an oblique or helical slot formed in its periphery, through which the yarn or thread passes and by which it is guided to and traversed on the spool or bobbin on which it is being wound, substantially as hereinafter described.

The invention further consists in the combination, with the driving-drum, of a yarn or thread guide interposed between said drum and the bobbin being wound for the purpose of guiding the thread when it is desired to wind spools or bobbins with square ends, substantially as hereinafter more fully explained.

The invention further consists in the combination, with the slotted driving-drum and its shaft, of a shield or guard-plate loosely suspended from its shaft or tubular axis to prevent the yarn or thread in case of a breakage thereof to wind on said shaft or axis, substantially as hereinafter more fully described; and, lastly, the invention consists in certain details of construction and arrangement of parts, and in their co-operative combination, (a spool or bobbin winder,) substantially as hereinafter fully described.

Referring to the accompanying drawings, Figure 1 is a sectional elevation of so much of a spool or bobbin winder embodying our invention as will be necessary to illustrate the same. Fig. 2 is a top plan view of the part of the machine shown in Fig. 1. Fig. 3 is an end view of the driving-drum, the dotted peripheral lines indicating a drum having a corrugated periphery in contradistinction to such drums as have a smooth periphery. Fig. 4 is a vertical transverse section of the drum shown in Fig. 3, showing its driving-shaft and shield or guard plate in elevation, and a bare spool mounted on its spindle in position for winding the spindle being shown in elevation and the spool in section. Fig. 4ª is a side elevation of the driving-drum, its shaft, and driving-pulley. Fig. 5 is a top plan view, and Fig. 6 an edge view, of the yarn or thread guide applied between the driving-drum and the spool or bobbin to be wound when it is desired to wind such with square ends. Fig. 7 is an elevation, and Fig. 8 a side view of the guard or shield to be suspended from the axis or the driving-shaft of the winding-drum within the latter, to prevent the yarn or thread in case of breakage to wind on said axis or shaft. Fig. 9 is a view similar to Fig. 1, show-

ing a modified arrangement of the winding mechanism, in which a roller is employed to guide the thread in its traversing motion instead of the thread-guide shown in Figs. 5 and 6, said figures also showing other modifications in the arrangement of the lifting-lever. Fig. 10 is a plan view of Fig. 9, the handle of the lifting-lever being shown in section, the bracket d' and frame d^2 being removed to better illustrate the arrangement of the roller j. Figs. 11 and 12 are also views similar to Figs. 1 and 2, showing the application of a conical driving-drum in conjunction with a conical spool, said figures also showing a modified arrangement of lifting-lever. Fig. 13 shows by a detached sectional view the conical driving-drum and a like fitted bobbin or spool, the shaft of the former and the spindle for the spool being shown in elevation.

In the description of our invention it will be understood that the machine may have any desired or convenient number of winding and driving drums, and that the mechanism is supported from a suitable frame or stand, which we have deemed unnecessary to illustrate, as any suitable form of such frame or stand will answer the purpose, that the driving-shaft X extends the whole length of the machine and carries a number of driving-pulleys, x', equal to the number of winding-drums employed; also that the beam a, from which the driving and winding drums are supported, extends the full length of the machine, as well as the fulcrum-shaft d, from which the spools or bobbins are supported. And as all the sets of winding devices are alike in construction and operation, we have deemed it best to illustrate but one set, to avoid confusion and simplify the description.

a indicates the beam that extends from end to end of the machine, and b a pair of bracket-arms secured to said beam, the upper forked ends of which serve as bearings for the shaft c' of the winding or driving drum c.

It has been stated above that in winding spools or bobbins either with conical or square ends, so that the convolutions of the yarn or thread will bind one another and prevent raveling, it is necessary to impart to the yarn or thread a very rapid traversing motion along the spool or bobbin, and that the mechanism heretofore employed for this purpose will not answer, owing to the severe and rapid shocks to which the yarn or thread is subjected at each reversal of the traversing motion. This we obviate by means of a driving and winding drum of special construction, (shown in Figs. 3, 4, and 4^a,) which we will now describe.

The drum c, which, as shown in said figures, is of cylindrical form, though it may be of other form, as will hereinafter appear, may be made of one piece, and has an oblique or spiral slot, C, formed in its periphery, said slot being produced by a cutter in the same manner as when cutting a screw, except that the thread would only extend in one direction over one-half of the circumference and then return over the other half in a reverse direction to the point of starting, thus cutting the drum in half on oblique or spiral lines, extending from a point on one side of the periphery of the drum to a point diametrically opposite thereto on the other side of said periphery, the two halves of the drum being then secured to a shaft so as to form a space or slot, C, between them for the passage of the yarn or thread, by which slot said yarn or thread is guided and traversed on the spool. It is obvious, however, that the drum may be cast or formed in two parts of the proper form, so that when said halves are keyed or otherwise secured to their shaft c' a slot, C, of the proper shape will be formed between them.

The curve of the slot C is not of a uniform pitch or inclination from one side to the other in all cases; but said slot may be formed of greater or less pitch at one part than at the other.

The drum c is of such a diameter relatively to that of the spool to be wound as to give the required traversing motion to the yarn or thread being wound on said spool. Thus, for instance, if the diameter of the bare spool is one-sixteenth of the diameter of the drum, each revolution of the latter will give sixteen revolutions to the bare spool, and would therefore wind eight coils of yarn or thread in each direction at every revolution of the drum; but if the spool has filled until its diameter is one-fourth of that of the drum, each revolution of the latter would give four revolutions to the spool and wind only four coils in each direction.

A grooved pulley, c^3, is secured to the drum c or its driving-shaft; or said pulley may, as shown in Figs. 4 and 4^a, be formed in the enlarged hub of one half of the drum and driven at the required speed from a pulley, x', on the driving-shaft X.

d' indicates one of two or more bracket-arms secured to the beam a, the upper end of which serves as a bearing for the fulcrum-rod d, above referred to, from which the spools or bobbins are supported.

d^2 indicates a frame formed of two side pieces or cheeks connected by a cross-bar, as shown in Fig. 2. Said frame is secured at one end to the rod d. The outer ends of the side pieces or cheeks of this frame are provided with grooves that form the bearings for the ends of the spindle e' of the spool or bobbin e, said spindle being, as usual, made detachable from said spool or bobbin, which latter is made of paper, wood, or other suitable material.

As shown in Figs. 1 and 2, the spool or bobbin e is driven from the driving or winding drum c by frictional contact therewith, and it is obvious that when said drum is rotated it will rotate the spool or bobbin and wind the yarn or thread thereon.

If desired or required, the frictional contact between the drum and bobbin may be increased by employing a drum having a roughened surface, and under some circumstances such a

drum will be found of advantage. In view of the fact, however, that the yarn or thread as it passes out of the slot C of the drum to the bobbin does not come in contact with the surface of the spool or bobbin at the line or point of contact between the periphery of the latter and that of the drum, but at a short distance from said point or line of contact. As the spool or bobbin fills this distance increases and correspondingly reduces the extent to which the yarn or thread is traversed on the spool or bobbin, thereby gradually reducing the length thereof, resulting in a spool or bobbin having conical ends.

When it is desired to obtain a spool or bobbin with square ends, we employ a thread-guide, F, (shown detached in Figs. 5 and 6,) composed of a thin plate, f^2, that is secured to one end of an arm, f, mounted on the rod d between the side bars or cheeks of the frame d^2, as more plainly shown in Fig. 2. The arm f is adjustable on the rod d by means of a set-screw, f', so that the edge f^3 may be adjusted in proper relation to the winding-drum c and the spool or bobbin being wound.

In operation the outer end of the guide F projects between the drum and the bobbin or spool, with its edge f^3 lying across the slot C of the former, and as close to the periphery of both the drum and spool or bobbin as this is practicable without coming in contact with either of them.

By means of the described thread-guide the thread as it passes out of the slot C of the drum rubs against the edge f^3 of the guide, and thence passes to the spool or bobbin, thereby keeping the length of the traverse of the thread upon the spool uniform from the beginning to the end of the winding, thus producing a spool or bobbin having its ends wound square instead of conical. A spool or bobbin may also be wound with square ends formed by driving the same indirectly from the driving-drum, as will hereinafter appear.

g is a hand-lever fulcrumed on the bracket-arm b, at g', Figs. 1 and 2. g^2 is a stud or pin projecting from the said lever, upon which rests one of the side bars or cheeks of the frame d^2, that supports the spool or bobbin. Near its fulcrum the lever g has a lug or projection, g^5, that extends over the bracket-arm b, and serves to hold the lever in proper position, as shown in Figs. 1 and 2.

The yarn or thread y passes upward from the bobbin or cap, supported from a spindle on the stand or frame of the machine, (not shown,) to and through a curl or slotted guide-plate, h, that is secured to a flat bar, h', that also extends the full length of the machine. From the curl or guide-plate the yarn or thread passes through the slot C in the drum c, thence over the edge f^3 of the thread-guide F to the spool or bobbin e.

In case of a breakage in the thread it will be seen that the broken end in the drum c would be liable to be caught by and wound on the drum-shaft. To avoid this we provide a shield or guard, I, (shown detached, Figs. 7 and 8,) and composed of a thin plate, i, hung loosely upon the shaft of the drum c, within the latter, as more plainly shown in Fig. 4, so as to hang always in a vertical plane. The lower or free edge, i', of the shield is beaded or rounded to prevent the yarn or thread from being cut. As the yarn or thread passes into the drum c, through the slot C, it rubs against the edge i' of the shield, and should such yarn or thread break said shield will throw the broken end off and prevent its winding on the shaft. As shown, the shield or guard is of a width nearly equal to the width of the drum. As the spool or bobbin fills it rises with its support, and should the yarn or thread break during the winding the said spool or bobbin may be moved and held out of contact with the drum c by means of the lever g, which to that end is tilted forward to the position shown in dotted lines, Fig. 1, thus lifting the bobbin clear of the driving-drum and enabling the operator to rotate the same and find and tie the broken thread.

As the driving and winding drum c is rotated by the friction of the belt X its rotation may readily be arrested by hand, the thread passed through the slot of the drum, and the bobbin or spool again brought in contact therewith by pushing back the lever g.

As shown in Fig. 1, the bearing-grooves in the frame d^2 for the spindle of the spool or bobbin are curved upwardly at their inner ends to prevent the spool or bobbin being lifted out of them either during the operation of winding or when the same is lifted clear of the drum through the lever g.

In Fig. 1 the frame d^2, that supports the spool, is shown in full lines in the position it assumes relatively to the drum when a bare spool or bobbin is applied; in dotted lines, a little above, in the position it assumes when the spool or bobbin is wound full; and also in dotted lines, still further above, in the position it assumes when the spool or bobbin has been lifted clear of the drum c by means of the hand-lever g.

It has been stated above that a square-ended spool or bobbin may be wound by driving the same indirectly from the driving-drum c, and this may be effected by means of a roller interposed between said drum and the spool or bobbin being wound.

In Figs. 9 and 10 I have shown a roller, j, interposed between the drum c and the spool or bobbin, the latter being driven from the roller, instead of being driven directly from the drum. The roller j has its bearings in the hand-lever g, that is fulcrumed at g' on a bracket-arm g^x, which latter is secured to the beam a. The free end of the lever has an arm, g^3, projecting therefrom at right angles, and terminating in a forked bent portion that forms the bearing for one end of the roller-journal, the other end having its bearing in a hole formed in the lever g, as more plainly shown in Fig. 10.

To an extension, g^4, of lever g is secured the stud or pin g^2, upon which rests one of the side bars or cheeks of the frame d^2, by means of which the spool or bobbin is lifted clear off the roller j when said lever is thrown forward into the position shown in dotted lines, Fig. 9, in case of a breakage in the yarn or thread, to enable the operator to rotate the spool or bobbin, find and tie the broken ends, as hereinabove described. This forward movement of the lever also throws the roller j out of contact with the drum c, and leaves a space to pass the thread between it and said drum, so that when lever g is thrown back into its normal position, the roller j carries the thread along with it, and the frame is lowered at the same time to bring the spool or bobbin in contact with the roller to be rotated thereby through the drum, with the thread in proper position for winding. A spool or bobbin may also be wound in a conical form by employing a conical drum, c, and a like-shaped spool or bobbin, e, as shown in Figs. 11 and 12, the arrangement being the same as that shown in Figs. 1 and 2, except that the spool or bobbin is supported from a swiveling frame. In this case it is necessary, however, to give the slot in the drum c such a shape as to traverse the thread more rapidly at the small than at the large end of the spool or bobbin.

When spools or bobbins wound in the form of a cone are required, it is usually necessary that the yarn or thread be wound on a correspondingly-shaped bare spool or bobbin, and the same form is retained throughout the winding. In such case provision for swiveling the spool-frame is not absolutely necessary; but, if provided, is not a disadvantage, as it allows the spool to bed truly upon the periphery of the slotted cone-drum.

As shown in Figs. 11 and 12, the frame that supports the spool or bobbin is formed in two parts—one, d^2, swiveled, as at d^4, to the forked portion d^3, in the arms of which the bearings for the spindle of the spool or bobbin are formed, thus permitting the surface of the cone-wound spool or bobbin e to bed and accommodate itself to the periphery of the cone-drum c. In this arrangement the thread-guide F may be employed, as in Figs. 1 and 2, and a hand-lever, g, acting upon the rear portion, d^2, of the two-part frame, that supports the spool or bobbin, instead of acting on the forward swiveled portion, d^3, thereof.

The hand-lever is of the form shown in dotted lines in Fig. 11. It is pivoted on a stud, g^6, projecting from one of the side bars, d^2, of the bobbin-frame, and has an arm terminating in a hook, g^9, that catches on a stud, b^2, projecting from an arm, $b^\times$, of the bracket-arm b when said lever is moved backward to lift the frame d^2 d^3 and hold the bobbin clear of the driving-drum. The lever has a second hook, g^7, that catches on a stud or pin, g^8, projecting from one of the side bars of the part d^3 of the bottom frame to hold the lever in its normal position.

Having now particularly described and ascertained the nature of our said invention, what we claim is—

1. The driving and thread or yarn traversing drum c, having a peripheral slot, C, and a roughened surface, substantially as and for the purpose specified.

2. The combination, with the driving and yarn or thread traversing drum c and the spool or bobbin support provided with a peripheral slot, C, of a thread-guide interposed between said drum and support, as described, for the purpose specified.

3. The combination, with the driving and thread or yarn traversing drum c, having a peripheral slot, C, of the shield or guard I.

4. The combination, with the driving and thread or yarn traversing drum having a peripheral slot, C, and a pivoted support for the spindle of the spool or bobbin, of a thread-guide interposed between the drum and bearings for said spindle, substantially as and for the purpose specified.

5. The combination, with the driving and yarn or thread traversing drum c, having a peripheral slot, C, and a pivoted support for the spindle of a spool or bobbin, of a thread-guide interposed between the drum and spindle of the spool or bobbin rotated by said drum, and rotating said spindle, as described, for the purposes specified.

6. The combination, with the driving and thread or yarn traversing drum c, having a peripheral slot, C, a shield or guard, I, suspended from the axis of and within the drum, and a pivoted support for the spindle of a spool or bobbin, of a roller interposed between the drum and spindle and a pivoted lever, g, for supporting said roller, as described, for the purposes specified.

7. The combination, with the driving and thread or yarn traversing drum c, having a peripheral slot, C, and the pivoted support for the spindle of a spool or bobbin composed of the parts d^2 d^3, swiveled together, of the lever g, substantially as and for the purpose described.

In testimony whereof we affix our signatures in presence of two witnesses.

HENRY CHEETHAM HILL.
HENRY HILL BROWN.

Witnesses:
PETER J. LIVSEY,
JAMES WOOD.