(No Model.) 3 Sheets—Sheet 1.

J. W. FOSTER.

THREAD WINDING OR SPOOLING MACHINE.

No. 535,616. Patented Mar. 12, 1895.

Fig: 1.

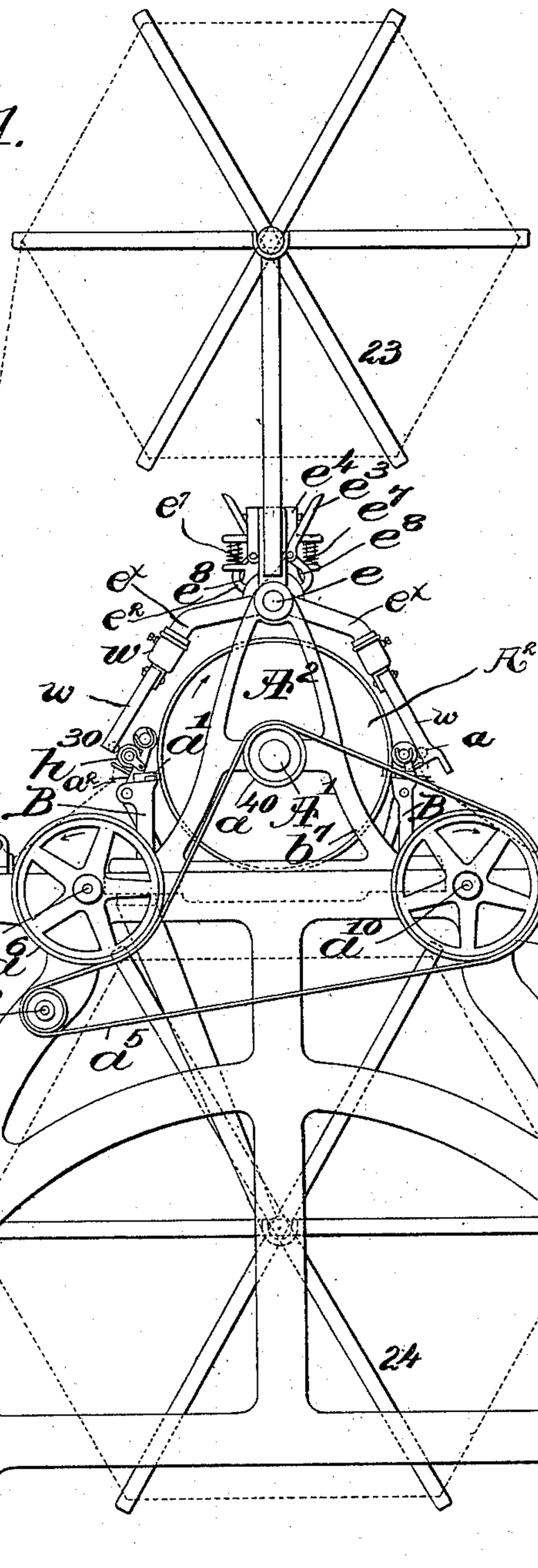

Fig: 2b.

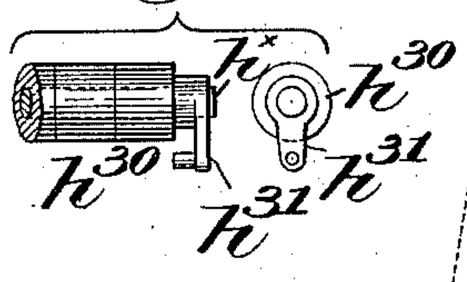

Fig: 2c.

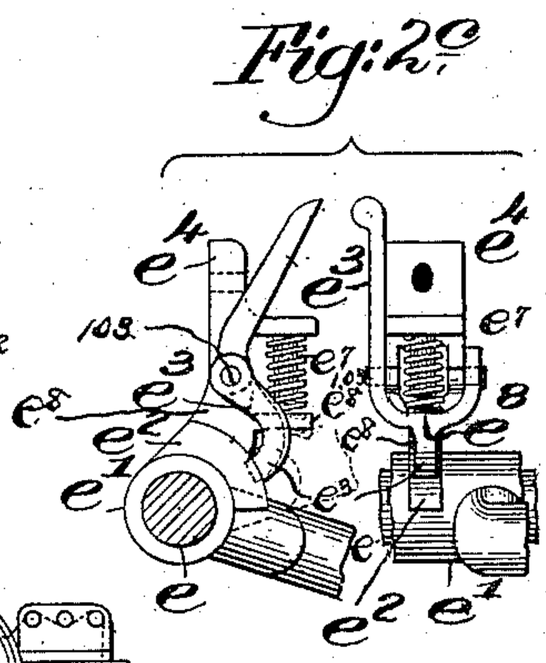

Fig: 2a.

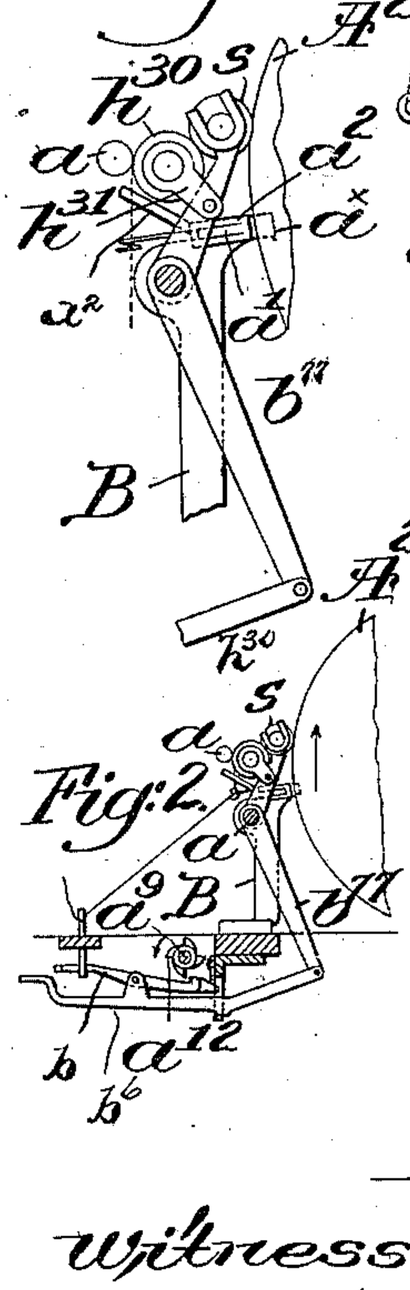

Fig: 2.

Fig: 3.

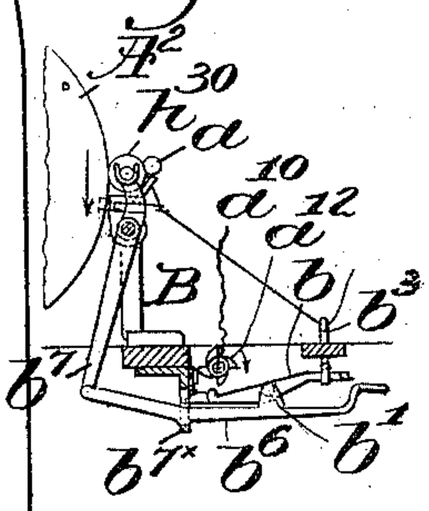

Fig: 1a

Witnesses.
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Inventor:
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by Crosby & Gregory Attys.

(No Model.) 3 Sheets—Sheet 2.

J. W. FOSTER.

THREAD WINDING OR SPOOLING MACHINE.

No. 535,616. Patented Mar. 12, 1895.

Fig: 4.

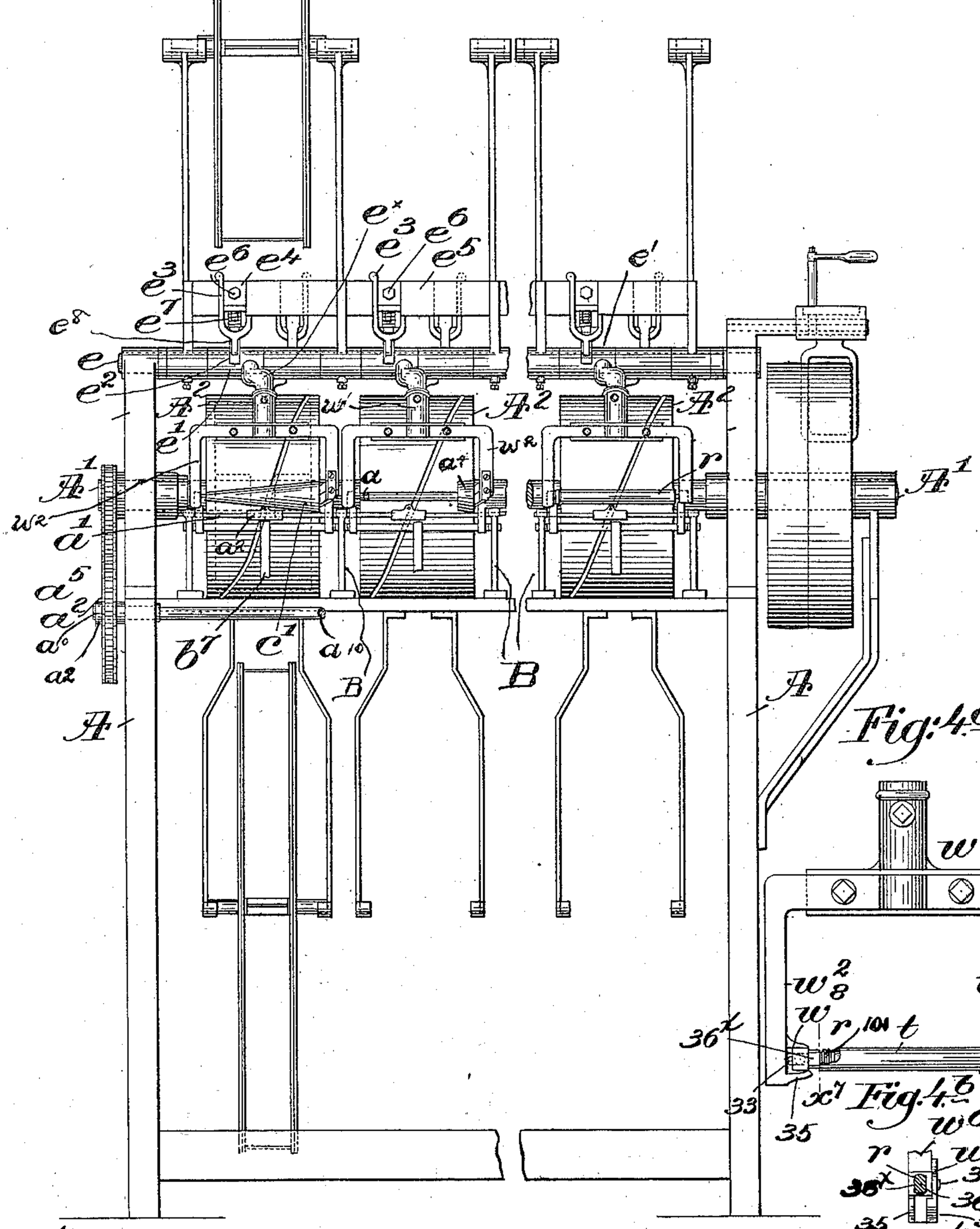

Fig: 4a.

Fig: 4b.

Witnesses.
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(No Model.) 3 Sheets—Sheet 3.

J. W. FOSTER.

THREAD WINDING OR SPOOLING MACHINE.

No. 535,616. Patented Mar. 12, 1895.

Fig: 14.

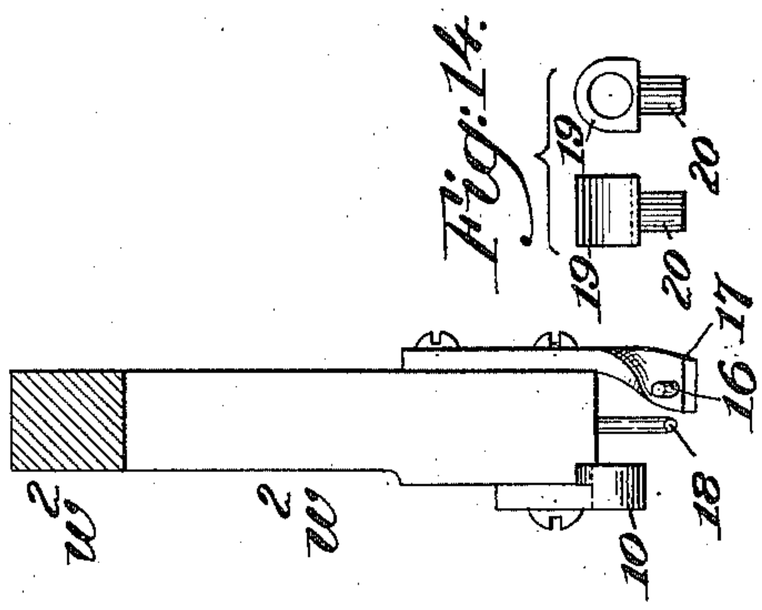


Fig: 12.

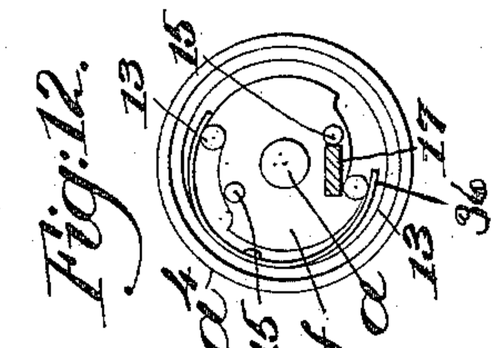


Fig: 7.

Fig: 10.

Fig: 11.

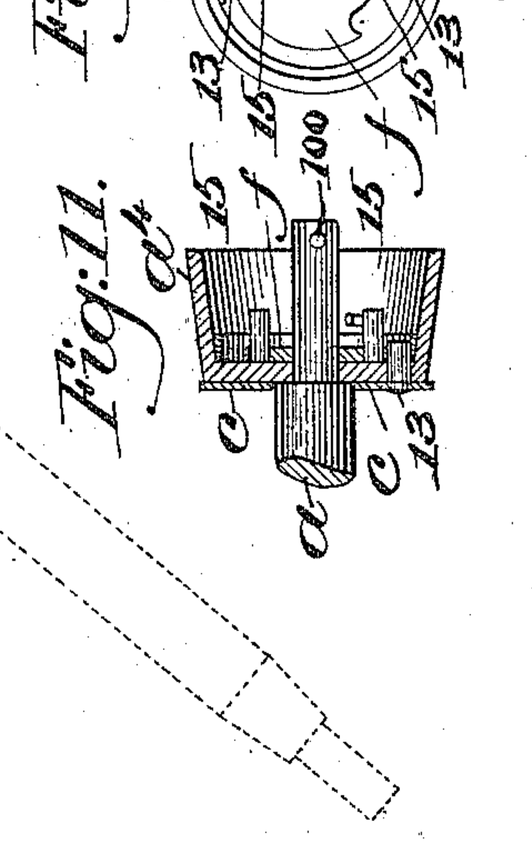


Fig: 5.

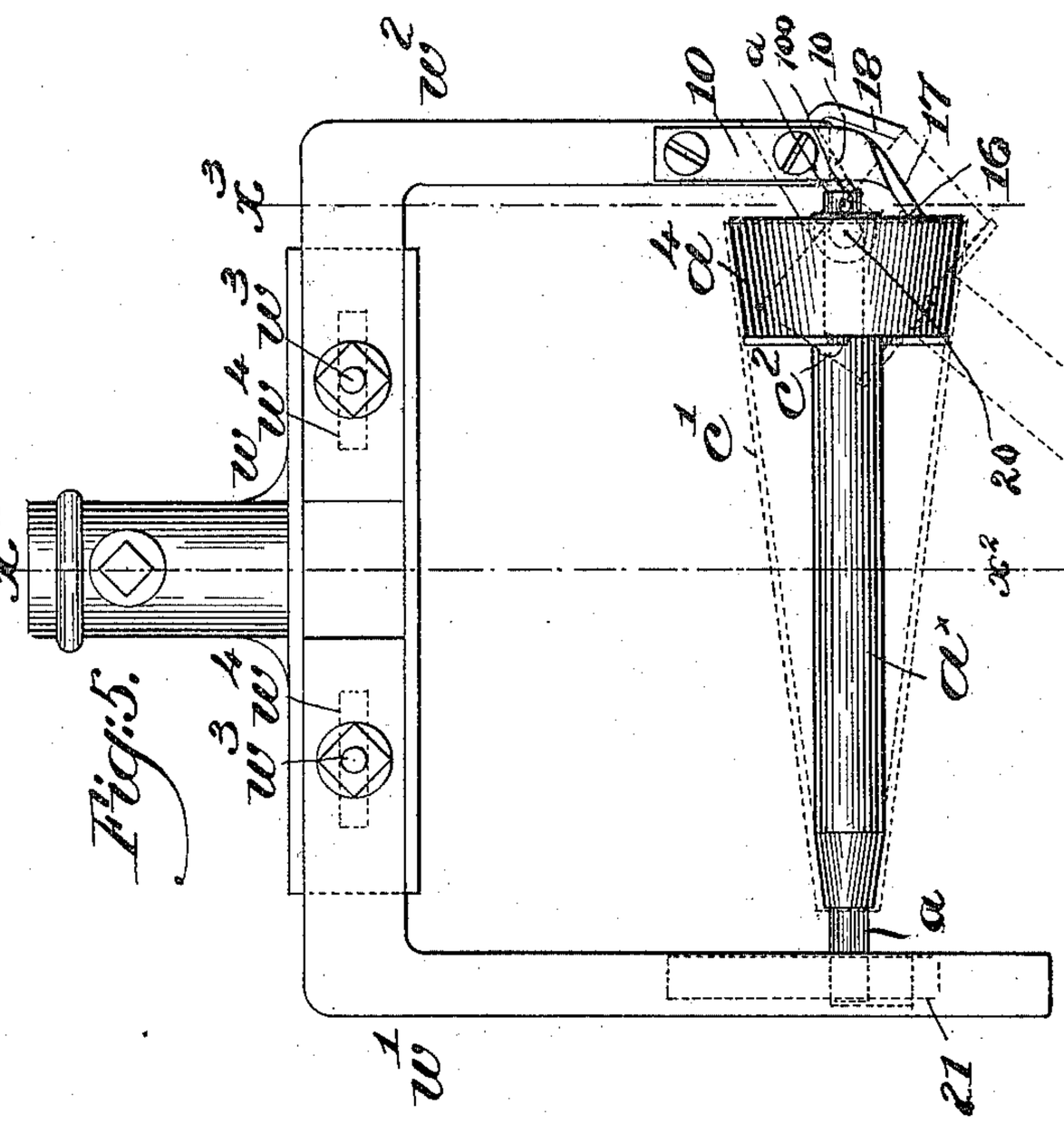


Fig: 9.

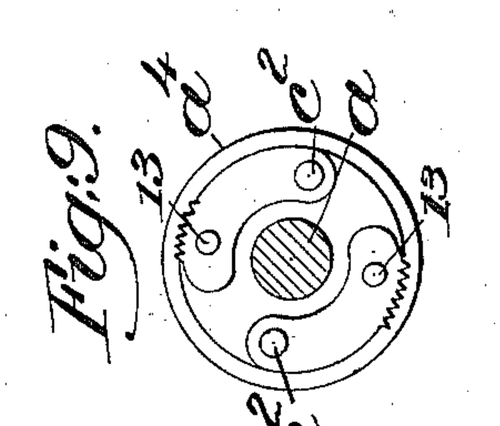


Fig: 6.

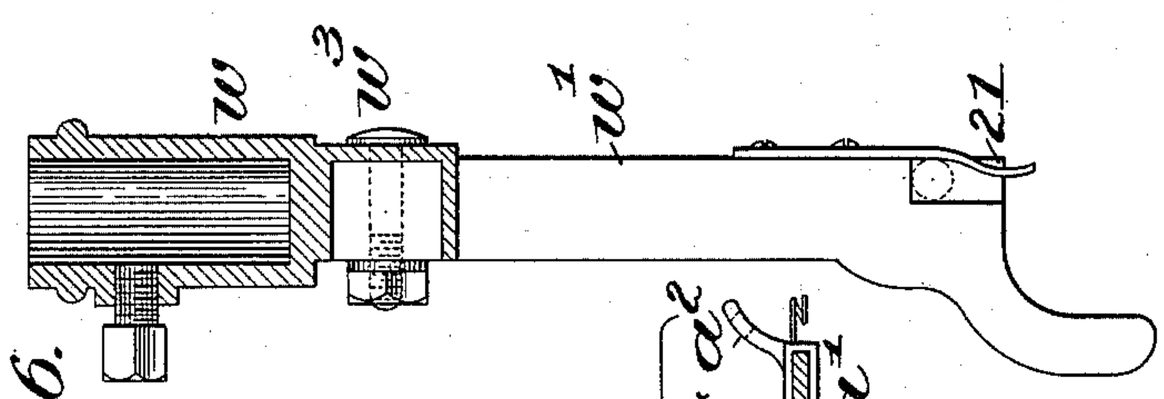


Fig: 13.

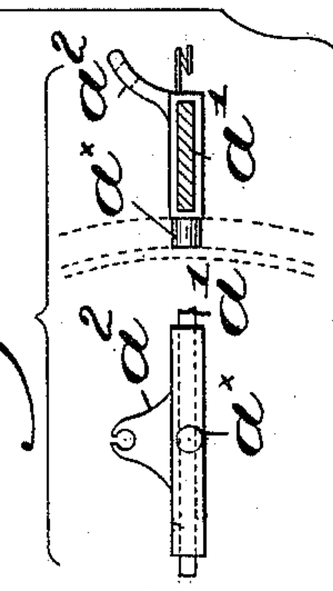
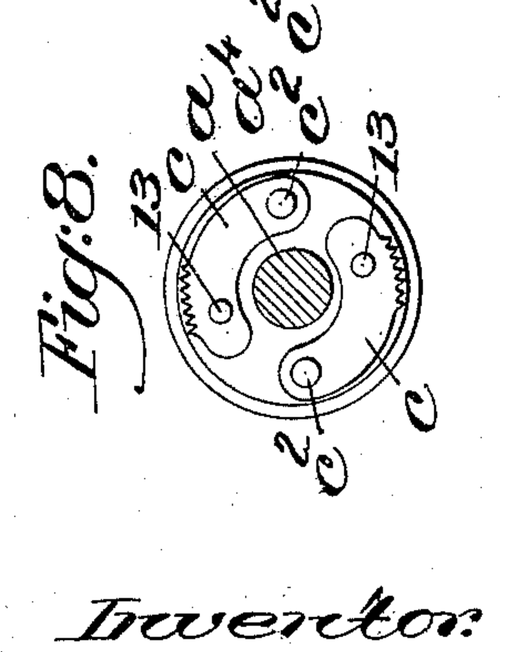


Fig: 8.



Witnesses.

A. C. Harmon.

Fred S. Gaunt of.

Inventor:

John W. Foster.

by Crosby Gregory Attys

UNITED STATES PATENT OFFICE.

JOHN W. FOSTER, OF WESTFIELD, MASSACHUSETTS, ASSIGNOR TO THE FOSTER MACHINE COMPANY, OF SAME PLACE.

THREAD WINDING OR SPOOLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 535,616, dated March 12, 1895.

Application filed April 23, 1894. Serial No. 508,565. (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 Thread Winding or Spooling Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters and numerals on the drawings representing like parts.

This invention has for its object the production of a machine for simultaneously winding thread or yarn onto a great number of cones or tubes.

In accordance with my invention, I arrange about a rotatable drum a plurality of yokes to sustain spindles for supporting cones or tubes, and also a plurality of sectional driving rolls, and in order that the thread or yarn may be wound in the same manner and direction onto the tubes or cones at opposite points of said drum, I interpose between the sectional driving rolls at one side of said drum an idle driver. I may take the thread or yarn directly from skeins or other sources of supply.

Figure 1 of the drawings shows an end view of a winding or spooling machine containing my improvements. Fig. 1^a shows stand $b^{7\times}$ detached. Fig. 2 is a detail showing part of the drum and the winding devices and stop motion mechanism used at the left side of the machine, viewing Fig. 1. Fig. 2^a shows some of the parts in Fig. 2 enlarged. Fig. 2^b shows part of the sectional driving roll at the left in Fig. 1, with its support enlarged, the driving roll at the opposite side of the drum being like it, but shown as differently supported; Fig. 2^c, a detail of the devices for holding up the yokes carrying the spindles. Fig. 3 shows the devices and stop motion used at the right; Fig. 4, a front elevation of the machine shown in Fig. 1, it being shown as broken out between its ends to save space on the drawings, one of the yokes being shown as containing a spindle adapted to receive and hold a paper cone, another yoke receiving a paper tube, while from the central yoke I have omitted a paper tube. Fig. 4^a shows, enlarged, the yoke holding the spindle for a paper tube; Fig. 4^b, a detail looking to the left from the dotted line x^7, Fig. 4^a. Fig. 5 is an enlarged detail of the yoke adapted to hold a paper cone, the cone being omitted, the dotted lines showing the spindle turned out of working position. Fig. 6 is a section in the line x^2, Fig. 5. Fig. 7 shows a section of the yoke in dotted line x^3, Fig. 5; Fig. 8, a face view of the head of the spindle with the cone-holding dogs retracted; Fig. 9, a similar view with the dogs out in operative position; Fig. 10, an inner side or rear view of said head; Fig. 11, a section in the line x^4; Fig. 12, a view similar to Fig. 10, but with the parts in a different position. Fig. 13 shows one of the thread guides a^2 detached, and Fig. 14 shows, detached, the bearing for the end of the spindle connected with the yoke.

The frame A, of suitable shape to contain the working parts, has suitable bearings for a shaft A′, on which is secured a series of large drums A^2 arranged end to end and each provided with a spiral groove extended preferably, as shown, entirely about the drum, and as herein shown, from near one to near the other end of said drum. The frame has suitable uprights B, B, one at each side of the center of rotation of the drum, said uprights supporting respectively guide-bars a', shown best in Figs. 2^a and 4, upon which are mounted like thread guides a^2, a plurality of thread guides for each drum, said thread guides having each a suitable foot or projection $a^\times$, see Figs. 2^a and 13, to enter a groove in the drum, each groove receiving the feet of a plurality of thread guides.

The shaft A′ referred to, has fast upon it a sprocket gear a^{40}, over which is extended a sprocket chain a^5, said sprocket chain running against and about sprocket wheels a^6 and a^7, and about an idler a^8 and driving the shafts a^9 and a^{10}, said shafts having upon them suitable like ratchet wheels a^{12}, best shown in Fig. 3, said ratchet wheels constituting stop motion actuating devices, they being rotated continuously and being adapted to be engaged by certain leg levers b pivoted at b', whenever a thread breaks or becomes slack, for at such time a drop wire b^3 settles upon the outer end of the leg lever and raises its notched inner end into the path of movement of said ratchet wheel, the latter then pulling said leg lever in toward the center of the machine. These leg levers are pivoted each in

like manner, as at b', upon latches b^6 extended through guide stands $b^{7\times}$ attached to the frame-work, and each latch is jointed to a lever b^7 having at its upper end suitable open or enlarged bearings. The lever b^7, shown at the right in Figs. 1 and 3, receives the journals of a driving roll h^{30}, which may be substantially the same as the sectional driving roll in United States Patent No. 459,040, dated September 8, 1891, said driving roll being preferably made up of a shaft and a series of disks thereon as in Fig. 2^b.

Whenever the stop-motion ratchet wheel acts as described, it moves the lever b^7 referred to, and removes the said driving roll from frictional contact with the periphery of the drum, and consequently the rotation of said roll is stopped, and also the thread winding operation is stopped, as will be described.

At the left in Fig. 1, and in Figs. 2 and 2^a, the lever marked b^{77} is shaped somewhat differently from lever b^7, it being somewhat elongated at its upper end, and that lever, instead of supporting a sectional driving roll, supports a plain cylindrical roll s, which I denominate as an intermediate driving roll, it contacting directly with the drum A^2, and between said intermediate driving roll s and the spindle,—of whatever form,—see Figs. 1, 4^a and 5, carried by the yoke w, I interpose the sectional driving roll h^{30}, it having its journals in short links h^{31} pivoted upon the lever b^{77}. In this way, by the interposition at one side of the drum, of the intermediate driving roll, it is possible to make one drum a driver for a plurality of spindles arranged about its periphery at greater or less distances apart, and yet have the winding on all the spindles in the same direction.

I have used the term "lever" to designate the parts b^7 and b^{77}, which carry the rolls referred to, said levers being each composed of a rock shaft having one depending arm connected to a latch b^6 and two upwardly extended arms forked or shaped to constitute bearings for the rolls, said rock shafts taking bearings at their end in the stands B.

I have improved the construction of the yokes w, so that they may be used to support either a cone-holding spindle a see Figs. 4 and 5, or a tube-holding spindle r, see Figs. 4 and 4^a, and preferably the yoke will be subdivided, so that one part may be adjusted on the other to enable the yarn to be wound more or less close to the base end of the paper cone or tube, and I have also hinged or pivoted the spindle a for holding the paper cone c', so that the said spindle does not need to be removed from the yoke when it is desired to take off or to apply a cone.

The frame-work has bearings at its ends for a suitable rod e, upon which is mounted loosely the hubs e' carrying the yokes w, each hub having a suitable projection or shoulder, as e^2, see Fig. 2^c, which, when the yoke is lifted or turned up about the rod e, will be engaged by the hooked end of a lever e^3 pivoted at 103 upon a stand e^4 fixed to a cross-bar e^5 of the frame by a bolt e^6, said stand having a shoulder or projection against which acts one end of a spring e^7 which acts upon a shoulder or projection of a friction plate or brake e^8, also pivoted at 103, which bears upon the projection e^2 of the hub of the yoke when the yoke is in working position, the brake e^8 keeping the yoke down steadily in place. This brake, by the friction exerted upon the projection e^2 referred to, by or through the spring e^7, prevents the too easy rising of the yoke as the yarn is being wound onto the cone or tube, to be described, on the spindle a or r. The center of motion of the yoke having the projection e^2, and the center of motion of the brake, are sufficiently eccentric one to the other to cause the brake to exert a little more power as the yoke w rises than when it falls.

The yoke w, as herein shown, is adapted, see Figs. 4 and 5, to hold not only a spindle a having at one end a cone-engaging base a^4, but also a regular spindle, as r, upon which may be placed a cylindrical tube. The yoke has what may be denominated as a central head, having a socket to fit a projection $e^\times$ of the hub e', the arms of the yoke, marked w' and w^2, being shown as detachably connected thereto, but in an adjustable manner, by a suitable bolt w^3 and slot w^4, best shown in Fig. 5. As herein shown the head of the yoke is provided with grooved ways, in which slide projections forming parts of the arms w^2 and w'.

In Fig. 7, see also dotted lines Figs. 4 and 5, the yoke arm w^2 has a bearing 10 adapted to receive loosely a lug 20 extended from a bearing block 19, see Fig. 14 and dotted lines Fig. 5, having through it a hole for the reception loosely of the inner end of the spindle a, said spindle having a hole for the reception of a pin 100, to thereby keep the spindle from dropping out of said bearing. The spindle has a conical base a^4 provided with suitable slots to receive pins 13 of dogs c mounted to turn about the studs c^2, see Figs. 5, 8 and 9, set in said base merely to act as pivots for said dogs. The pins 13 are each extended through a cam-slot or notch, see Figs. 10 and 12, in a disk f contained within the base a^4, the cam-shaped edges of said disk acting on the pins 13 when the spindle and base a^4 are rotated independently of the disk f. Springs 36 acting on the dogs or their pins 13 keep said pins against the edge of said disk f. The disk f has, as shown, two pins 15, and when the spindle and disk with it are turned out, as in dotted lines Fig. 5, and the spindle is rotated, said pins will contact with stops 16 or 17, according to the direction of rotation of the spindle, said stops forming part of the yoke arm w^2. When a pin meets a stop the disk will be arrested, so that further rotation of the spindle and its base will cause the pins 13 to travel over the edge of the disk, and according to the direction of rotation of said spindle and

base with its attached dogs, said dogs will be either thrown out as in Fig. 9, to engage the interior of the paper cone c' and confine it to the spindle and base, or they will be retracted, as in Fig. 8, to release their hold upon the cone to let it be removed from the spindle, the cone having been filled with yarn. I have provided the yoke with a spindle stop 18 against which the spindle base a^4 will strike when the spindle is turned out into position to have a conical tube taken from it or put onto it, as represented by dotted lines Fig. 5.

My Patent No. 499,667, dated June 13, 1893, shows a spindle with a disk and dogs substantially like those herein referred to, but said spindle has journals at each end to run in fixed bearings of the yoke, while, as herein shown, the spindle is mounted at one end in a pivoted bearing, or so mounted in the yoke that the spindle may be turned outwardly when desired, as stated. The opposite or free end of the spindle a enters a suitable bearing, made as a notch, behind a spring 21.

When it is desired to wind yarn upon a plain tube t, I have only to remove the yoke arm w^2, and instead, substitute a yoke arm w^6 of suitable shape to receive and hold a bearing for the spindle r, as shown in Figs. 4^a and 4^b, and at the left in Fig. 4.

Referring to Figs. 4^a and 4^b, the arm w^6 has a lug provided with a hole which receives a stud 34 forming part of a bearing w^8, so that said bearing may tip on said lug, as described of the bearing 19. The bearing w^8 receives in it one end of the spindle r, and a pin 33 is extended through the spindle to prevent the latter from dropping out of the bearing when one end of the spindle is turned aside out of the yoke, as has been described of spindle a. The spindle near its scored part is flattened or slabbed off at two opposite sides, as at $36^\times$, so that as said spindle is turned outwardly, said flattened part may enter between two lugs 35 extended from the yoke arm, the two lugs straddling the spindle and preventing it from being rotated while the operative removes or applies a tube t to the spindle and fixes said tube onto the scored or threaded part 101. See Fig. 4^a.

Referring to Fig. 1, the first yoke at the right, see also left of Fig. 4, is supposed to be holding a spindle provided with a paper cone, and between said paper cone and the drum A^2 is interposed a sectional driving roll, mounted in bearings of lever b^7 connected with the stop-motion devices. Fig. 3 shows by a circle the said spindle a separate from the yoke and the stop-motion mechanism co-operating with that side of the machine, and it will be seen the drum A^2 directly rotates the driving roll, and the latter the spindle, the yarn being wound upon said spindle or the paper cone thereon by the direct contact of said cone or the accumulated yarn thereon against the sectional driving roll.

I have herein shown each drum as driving spindles at diametrically opposite points, but this invention is not limited to the number of spindles which each drum may rotate, nor to the number of degrees apart about the cylinder that they may be located; nor is my invention limited to the exact devices employed in the stop-motion mechanism.

I have herein represented the machine as provided with supports for swifts 23 and 24, one set of swifts being located above, and the other set below the drum shaft A', the yarn from said swifts being led under and between suitable tension rods or devices on its way to the thread guides of the machine.

Prior to my invention I am not aware that a spindle co-operating with a yoke and adapted to support a paper or other light shell of conical or tubular shape, has ever been connected loosely with a yoke, so that the spindle may be turned outwardly when it is desired to remove from it a filled cone or tube and to enable an empty cone or tube to be applied to the spindle, so this invention is not limited to the exact construction shown for the spindle or to the exact construction of its bearings.

It will be noticed in my invention that the arms carrying the driving rolls which rotate the spindle have connected directly to them the latches carrying part of the stop-motion mechanism, so that the said stop-motion mechanism directly moves said arms so as to place the driving-roll carried thereby out of frictional contact with the driving drum.

Each of the stops 16, 17, and the lugs 35 constitute what I shall in the claims refer to as "restraining devices," they serving to prevent the rotation of the spindle when turned outwardly in the yoke.

I might use one pin 15, but two such pins are preferable, for the dogs may then be operated with less rotative movement of the spindle.

Prior to my invention, I am not aware that one and the same groove in a drum has ever been employed to reciprocate a plurality of thread guides, and that in connection with such thread guides a thread winding machine has been provided with a plurality of yokes to sustain a plurality of spindles upon which the thread is wound.

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

1. In a thread-winding machine, a pivoted yoke, and a spindle-bearing pivoted upon one arm of said yoke, combined with a spindle having its end inserted loosely in a hole in said bearing, means to prevent the escape of said spindle from said bearing, and means carried by said spindle to engage and hold a surrounding shell upon which thread is to be wound, substantially as described.

2. In a thread-winding machine, a yoke having a connected stop; a spindle-bearing pivoted on one arm of said yoke; a spindle having one of its ends mounted loosely in one of said bearings and provided with an attached

conical base, means to prevent the said spindle from dropping out of said bearing; a movable dog mounted on said base and adapted to engage the interior of a conical shell surrounding the spindle, said dog being provided with a projection; combined with a disk *f* rotatable on or with relation to said spindle, and having a pin or projection, whereby when the spindle is turned outwardly from said yoke and is partially rotated, a pin or projection of the said disk meets said stop and restrains the rotation of the disk, while the spindle and its base are further rotated, to thereby actuate the dog, substantially as described.

3. In a thread-winding machine, a rotatable drum having a spiral groove; a plurality of thread-guides adapted to be reciprocated each by said groove; a plurality of yokes located about the periphery of said drum at different points; a rotatable spindle pivotally mounted at one end on one arm of said yoke, and a plurality of spindle driving rolls located at different distances apart about the center of rotation of said drum, movable bearings to guide and sustain said driving rolls in their rotation, and change of position with relation to said drum, combined with stop motion mechanism co-operating with the movable bearings or supports for the driving rolls, whereby when a thread breaks the contact of a driving roll with the drum is broken, to thus stop the rotation of the roll and spindle actuated thereby, substantially as described.

4. In a thread-winding machine, a rotatable drum having a spiral groove; a plurality of thread guides adapted to be reciprocated each by said groove; a plurality of yokes one at each side of said drum, each yoke having a pivoted bearing; a plurality of spindles one for each yoke, each spindle being mounted to rotate freely in a pivoted bearing, means to retain the spindles in their bearings; a plurality of spindle driving rolls, one to co-operate with each spindle; and movable bearings or supports for the journals of said driving rolls, combined with an intermediate driving roll located at one side of said drum and between it and one of said driving rolls, to thereby reverse the direction of rotation of said roll, in order that the threads to be simultaneously wound on the spindles at opposite sides of the center of said drum may go in like manner from each thread guide onto said spindles, substantially as described.

5. In a thread-winding machine, a drum having a groove; a plurality of thread guides reciprocated by said groove; a plurality of yokes surrounding said drum and provided with pivoted spindle bearings, spindles mounted in said bearings, a plurality of sectional driving rolls adapted to rotate said spindles, and movable bearings therefor, combined with an intermediate driving roll, one sectional roll at one side of said drum being acted upon by the drum, while at the opposite side of said drum the sectional roll is driven by the intermediate driving roll, substantially as shown and described.

6. The driving drum and the pivoted yoke composed of a head and separate detachable side arms each adjustable on said head independently of the other, combined with a pivoted spindle bearing; a spindle mounted to rotate in said bearing, the adjustment of said arms on said head enabling the spindle to be moved longitudinally with relation to the driving drum and cause the thread to be wound more or less close to the ends of the thread-receiving shell carried by the spindle, substantially as described.

7. A rotating drum; a yoke having a spindle provided with devices to engage a shell surrounding the spindle; and a sectional driving roll interposed between said drum, and the shell on said spindle, combined with a movable lever having at its upper end forked arms to constitute bearing supports for the journals of the frictional driving roll, and with stop motion mechanism connected with said lever, whereby upon the breakage of a thread the said lever is turned to move the sectional driving roll away from the surface of the drum, substantially as described.

8. In a thread winding machine, a rotatable drum having a groove, a thread guide having a projection to enter said groove, a lever provided with arms having bearings to receive an intermediate driving roll, a yoke having a spindle adapted to receive and hold a paper shell upon which thread is to be wound, and means to move said lever on the breakage of a thread, combined with a sectional driving roll driven by said intermediate driving roll, and bearings for said sectional roll connected with the lever carrying the intermediate driving roll, 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:
LILLIE LAMBSON LILLEY,
ALFRED F. LILLEY.