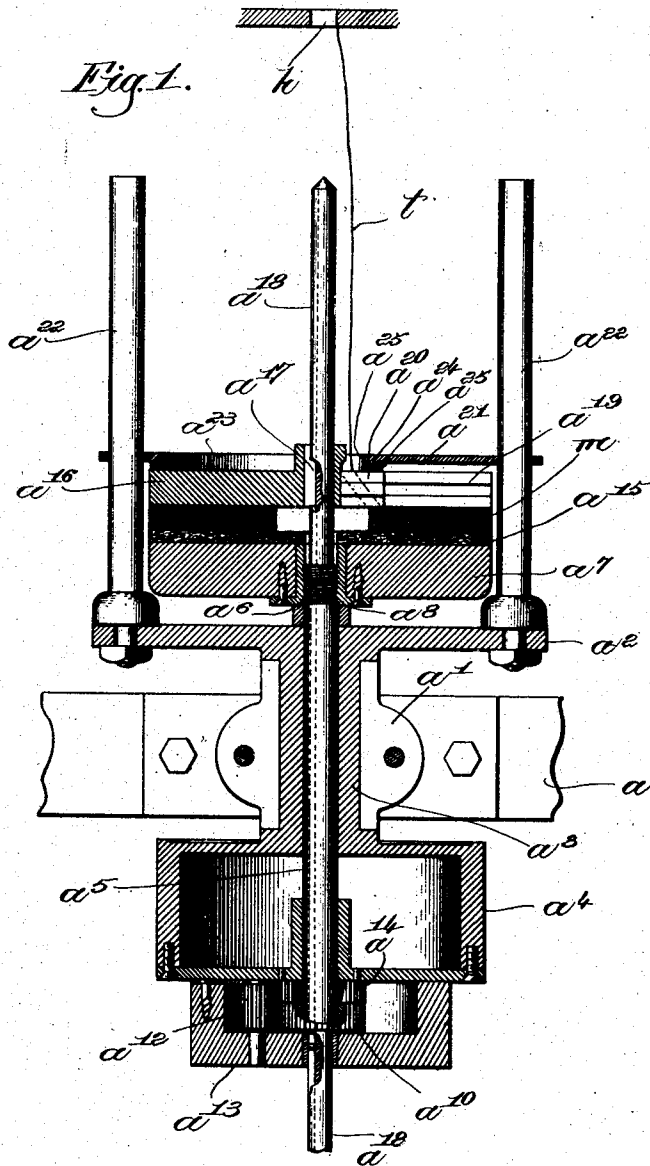


No. 795,980.

PATENTED AUG. 1, 1905.

C. W. HUBBARD.
WINDING APPARATUS.
APPLICATION FILED JUNE 29, 1903.

3 SHEETS—SHEET 1.



Witnesses.

Thomas A. Drummond
J. Wm. Lutton.

Inventor.

Charles W. Hubbard,
by Leroy & Gregory

attys.

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3 SHEETS—SHEET 2

Fig. 2.

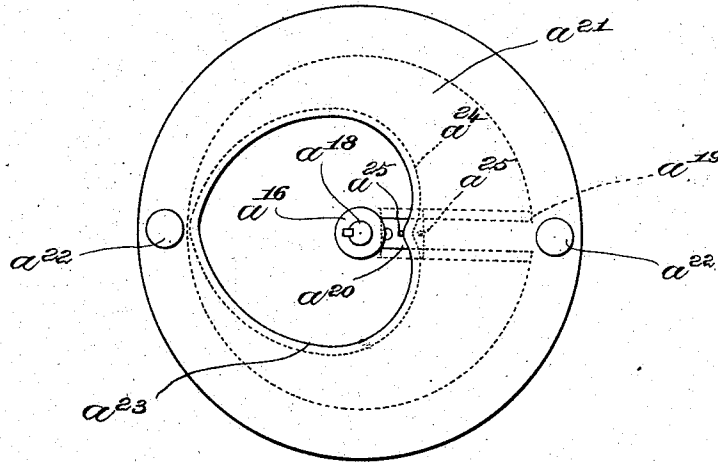


Fig. 3.

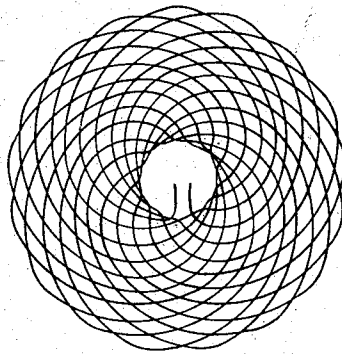
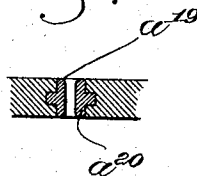


Fig. 4.



Witnesses.

Thomas J. Drummond
J. W. M. Lutton.

Inventor.

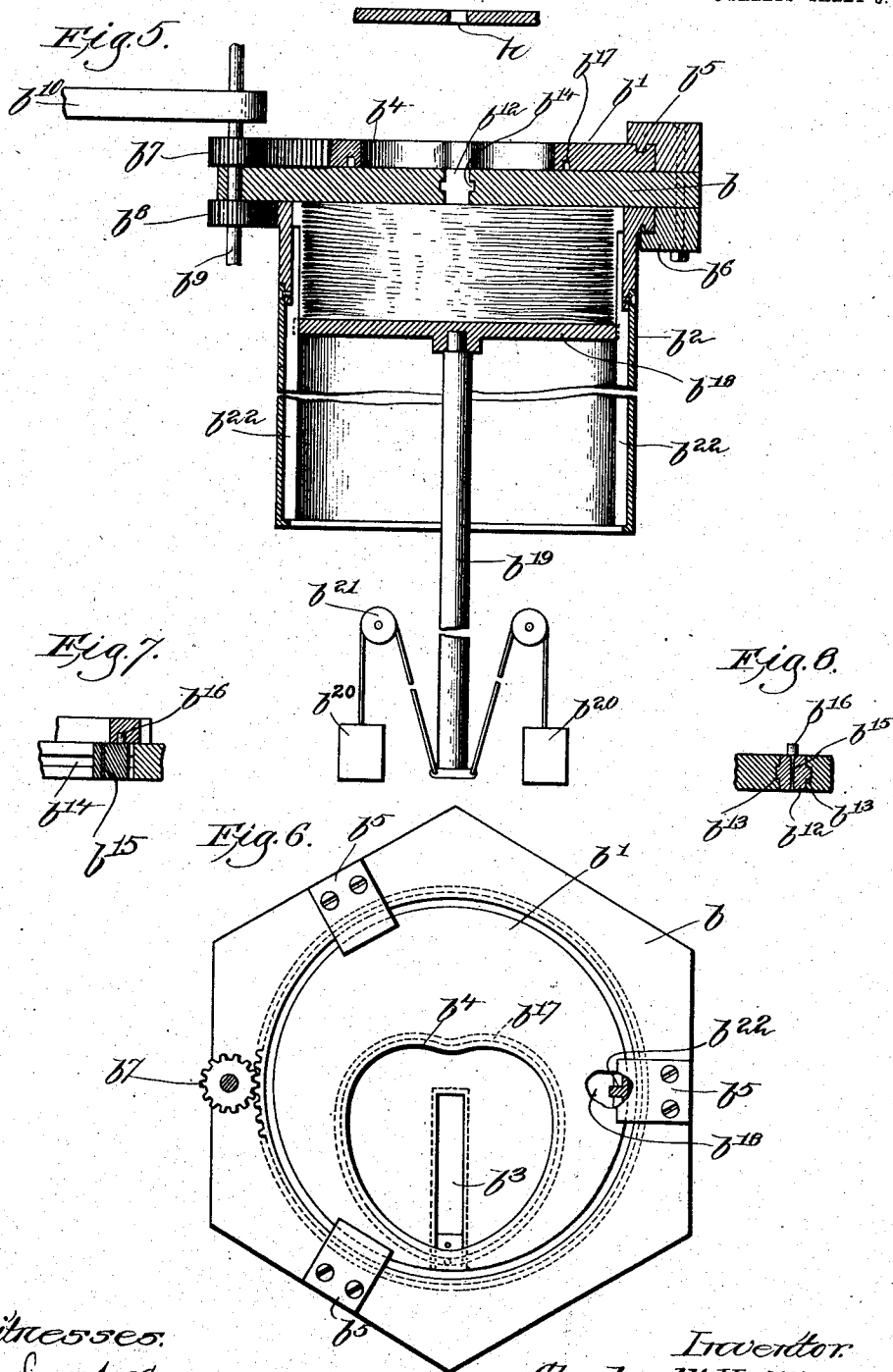
Charles W. Hubbard,
by Crosby & Gregory
Attys.

No. 795,980.

PATENTED AUG. 1, 1905.

C. W. HUBBARD.
WINDING APPARATUS.
APPLICATION FILED JUNE 29, 1903.

3 SHEETS—SHEET 3.



Witnesses:
H. C. Linsford.
J. Wm. Lutton.

Inventor:
Charles W. Hubbard,
by Leroy E. Gregory, attys.

UNITED STATES PATENT OFFICE.

CHARLES W. HUBBARD, OF BOSTON, MASSACHUSETTS.

WINDING APPARATUS.

No. 795,980

Specification of Letters Patent.

Patented Aug. 1, 1905.

Application filed June 29, 1903. Serial No. 163,482.

To all whom it may concern:

Be it known that I, CHARLES W. HUBBARD, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Winding Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention is an improvement in winding mechanism, and in the form herein shown and described might be termed a "disk spinning" device, one of my leading objects being to provide means which will enable me readily to handle large masses of yarn or material, thereby greatly facilitating the subsequent handling and use of the yarn and economizing in time, labor, and other expense at all points where the yarn has to be handled.

To make my object clearly understood, it may be well to direct attention to the great labor, delay, and expense ordinarily attending certain steps in the manufacture of textiles—as, for instance, on the present roving-frames the bobbins carry about two pounds of yarn and have to be changed every half-hour, whereas it is my object to make it feasible to use a thread mass of, say, thirty pounds, which will last about seven hours, and so on the spinning-frame where now a two-pound rove-bobbin is used I substitute at least thirty pounds, lasting four days, and likewise instead of the customary small spinning-bobbin (taking about one-third pound of yarn as it comes from the frame) I will substitute at least ten pounds, thereby requiring doffing only one-thirtieth as often as before. This great saving of labor, expense, and time is effected by providing compact and preferably self-sustaining thread masses of large size, from which the thread unwinds in transverse layers from one end only, said thread masses being preferably from three to five feet, less or more, in length, or, if desired, having the same capacity by reason of increased diameter. I accomplish this in the preferred embodiment of my invention herein set forth, in which I have chosen to illustrate the same in connection with spinning by means of a revolving flier within which the thread mass rotates, said thread mass having superimposed thereon co-operating members which cause the thread to be laid in eccentric loops or paths differentiated from each other by an increment or decrement sufficient to permit them to lie substantially flat, the layers thereof building up in succession with such compactness as may

be desired. By thus having the loops of thread laid in an eccentric path they overlap each other, so as to give the entire thread mass a compact, stable, and permanent structure.

Further details of my invention will be pointed out in the course of the following description, reference being had to the accompanying drawings, in which I have illustrated some of many possible embodiments of my invention.

In the drawings, Figure 1 represents in vertical transverse section a portion of a spinning-frame with my invention applied thereto. Fig. 2 is a top plan view thereof. Fig. 3 is a top plan view of the thread mass, or rather may be considered a diagrammatic view illustrating the system or order of winding. Fig. 4 is a fragmentary cross-sectional view to show in better detail the thread-guide. Fig. 5 is a central vertical section of another form of apparatus. Fig. 6 is a top plan view thereof, partly in section. Figs. 7 and 8 are sectional details to be referred to.

It will be understood that I have merely undertaken to show sufficient details of a usual spinning-frame to enable my invention as applied thereto to be readily understood.

Mounted on a suitable beam *a* in a journal-bearing *a'* is a flier *a''*, having a hollow shaft *a'''* depending therefrom and provided with a belt-pulley *a''''*. Within this hollow shaft *a'''* is a second hollow shaft *a'''''*, secured in any suitable manner, as by threads *a''''''*, at its upper end to a support or plate *a'''''''* by means of a bushing *a''''''''*, secured to said plate, said hollow shaft *a'''''* carrying a gear *a''''''''* at its lower end in mesh with a pinion *a''''''''''*, journaled in a pulley *a'''''''''''*, and also in mesh with a gear *a''''''''''''*, secured to the pulley *a'''''''''''*, already mentioned. This gearing is housed for convenience in the hollow belt-pulley *a'''''''''''*. The plate *a'''''''''* is provided on its upper side with a frictional surface *a''''''''''*, of felt or other proper substance, for starting the thread mass *m* upon. Resting on the thread mass is a presser plate or disk *a''''''''''''*, splined at *a''''''''''''''* on a spindle *a'''''''''''''''* to rotate therewith, said spindle being mounted in the sleeve or hollow shaft *a''''''''''* and secured to the lower belt-pulley *a'''''''''''*. Said disk *a''''''''''''* has a radial slot *a''''''''''''''* grooved to receive a thread-guide *a''''''''''''''''*, through which the thread *t* passes. Resting loosely above the disk *a''''''''''''* is a throw-plate or cam-plate *a'''''''''''''''*, mounted on the arms *a''''''''''''''''* of the flier and provided with a cam-shaped opening *a'''''''''''''''''* (shown clearly in Fig. 2) for permitting the thread to follow the movements freely of

the reciprocating thread-guide a^{20} , said thread-guide being reciprocated by any convenient means, herein shown as a flange a^{21} , depending from the edge of the cam a^{23} and engaged by pins a^{20} , projecting upwardly from the thread-guide. The cam a^{23} is of such shape that it will lay threads as nearly parallel to each other as is possible, and I have found the heart shape herein shown as accomplishing this result to the best advantage.

In the foregoing description of the mechanism I have described in detail the form of device which I prefer to employ when operating in connection with spinning; but it will be understood that I am not limited thereto, as many changes in form and arrangement may be resorted to without departing from my invention.

In operation the yarn t passes down from the usual drawing-rolls through a guide-hole h to the thread-guide a^{20} and is caused thereby to follow the contour of the heart-shaped cam while being laid on the thread mass while reciprocating in the slot a^{19} in the disk a^{16} . The degree of twist and the rapidity of winding depend upon the relative speed at which the pulleys a^4 and a^{13} are rotated. To make this clear, let us suppose that the pulley a^4 is stationary and the pulley a^{13} rotary. The rotary movement of said pulley a^{13} is imparted directly to the spindle a^{18} , and therefore to the thread-laying member a^{16} . This rotary movement of the pulley a^{13} also carries the gear a^{12} around the gear a^{14} , which we have assumed is stationary. Since the gears a^{10} and a^{14} have a different number of teeth, it will follow that such rotation of the pulley a^{13} will cause the gear a^{10} to either fall behind or advance slightly ahead of a^{14} , according to the relative number of teeth in said gears. The gear a^{10} , it will be remembered, is fast to the shaft a^3 and operates the thread-support a^7 . If instead of the pulley a^4 being stationary said pulley is revolved either in the same direction as the pulley a^{13} , but at a different speed or in the opposite direction, it will follow that the cam-plate a^{21} and the disk a^{16} will be rotated at different relative speeds. In any event, however, the thread-support a^7 is caused to either fall slightly behind or advance slightly ahead of the cam-plate a^{21} because of the construction and arrangement of gears a^{10} , a^{12} , a^{14} . Any suitable means may be employed for driving the pulleys a^4 and a^{13} so that the relative speed at which said pulleys are driven may be governed as desired. By means of this construction and this form of gearing I can determine with the utmost nicety the laying of the loops or successive strands of thread or yarn.

In practice I prefer to rotate both the pulleys a^4 and a^{13} in the same direction, but at different speeds, although it is within my invention to rotate them in either direction

with any relative speed according to the results desired.

As shown in Figs. 1 to 4, the thread mass rotates, (for the purpose of getting the twist desired,) it being necessary so far as the mere winding is concerned, however, only that there shall be proper relative movement between the thread mass and the cam-plate and slotted disk, the cam-plate constituting a path-controller for the thread and the disk a winding member for depositing the thread on the thread mass and the two together giving the traverse to the thread in a plane perpendicular to the spindle a^{18} or to the axis of the thread mass.

In Figs. 5 to 8 I have shown my invention in another embodiment for simply winding. In this form of mechanism the winding plate or member b (corresponding to a^{10} in Figs. 1 and 2) is stationary and the path-controller or cam-plate b' and coöperating rotator or depending flier b^2 move, the former having a heart-shaped cam b^4 and being retained by brackets b^5 , similar brackets b^6 holding the flier. Said cam-plate and flier are provided with teeth in mesh with gears b^7 , b^8 , fastened on a shaft b^9 , driven by a belt b^{10} , one of said gears having a different number of teeth from the other, so as to give a corresponding increment or decrement of movement of the thread mass with relation to the path-controller b' for causing the successive loops of thread to be laid adjacent but not directly on top of each other, as already explained. A thread-guide or button b^{12} travels in the slot b^3 , having guide-ribs b^{13} at its opposite sides fitting grooves b^{14} , formed in the winding-plate b , said button at its inner end having a thread-passage b^{15} and at its outer end having a stud or pin b^{16} , traveling in a groove b^{17} , whereby it is reciprocated as required. The thread mass is built upon a support b^{18} , mounted to turn on a post b^{19} and normally held upwardly by any suitable means, as by weighted cords b^{20} , passing over pulleys b^{21} , the support b^{18} being caused to move with the rotator or flier b^2 by engaging vertical ribs or arms b^{22} , extending longitudinally thereof. As herein shown, I provide three distinct movements in Fig. 1—the flier a^2 and cam-plate a^{21} having one speed of rotation from the belt-pulley a^4 , and the supporting-plate a^7 and presser plate or winder a^{16} having two other movements, respectively provided by the gear a^{10} and the pulley a^{13} , while in Fig. 5 the same relative three movements are provided by having the rotator or flier b^2 move at a different speed of rotation from that of the cam-plate or path-controller b' , the winding plate or presser being stationary.

The relative speeds of the thread mass and the presser-plate determine the speed of winding, and the relative movement between the cam-plate and the presser-plate determines

the progressive laying of the loops, while in spinning the speed of the thread mass with relation to the speed of presser-plate determines, of course, the twist. As shown, each part rotates at a constant speed when winding, or, in other words, there is always a constant ratio between the speed of the winding member and that of the thread mass, as distinguished from a variable ratio.

It will be understood, of course, that the speed of the various parts may be changed for either fast or slow winding and to give more or less twist to the threads; but the relative speed of the winding member and the thread mass when the pulleys are rotating in the same direction is a constant quantity irrespective of the variations in the speed of either of said parts, this resulting from the construction and operation of the gears a^{10} , a^{12} , and a^{14} , as will be obvious.

As the disk a^6 , Fig. 1, moves around on the upper end of the thread mass or in Fig. 5 as the thread mass moves around beneath the plate b the thread is pulled down with a hard pressure and with unvarying precision, due to the pressure of the disk or plate and thread-guide as the thread passes from the lower end or edge of said guide, and as the disk or plate bears constantly on the thread mass there is no chance for the strands to change position when once laid.

My invention has a wide field of usefulness and, as already intimated, I do not intend to restrict the same in all my claims to spinning, inasmuch as simply by omitting the twisting or spinning feature it is of great advantage in winding generally, or wherever it is desired to prepare a wound thread mass, as explained further in my concurrent application, Serial No. 163,619, where I have shown another embodiment of my present invention.

As the traverse is simply along a radial line, such as the slot a^{10} or b^3 , instead of being lengthwise of the spindle, it follows that there is practically very little limit to the length of the thread mass being wound, and instead of being limited to a few pounds weight it may readily be of such large size as may be desired.

The heart-shaped loops, as shown in Fig. 3, are preferred because I have found that by this means I am enabled to pack the thread mass compactly and satisfactorily, bringing the longer curved sides of each loop approximately parallel to the corresponding portions of the preceding loops.

As the thread mass makes a complete rotation, thereby permitting the laying of approximately one loop, the path-controller or cam-plate has traveled slightly more than one rotation, (or slightly less, as the case may be,) the thread being thereby laid correspondingly ahead of its preceding path, and this process continues as the thread mass and cam continue to rotate, one loop being formed each time

and laid progressively, each loop having a series of successive points at different radial distances from the center of the axis and each layer, including a plurality of loops, extending across the thread mass.

I prefer to have the loops extend around the center or axis of the thread mass, as shown in Fig. 3, this serving to give the greatest stability and firmness of position; but it will be understood that I do not limit myself thereto, and also it will be understood that by the term "loop" I mean a back-and-forth or out-and-return laying of the thread.

My invention provides a thread mass which affords a great advantage over the system heretofore employed in certain kinds of manufacture—as, for instance, in carpet-mills, where it is now customary to take the yarn from the spinning-frame in six-ounce bobbins and put it on ten-pound spools, &c., instead of which the desired ten-pound mass of thread may be provided directly by my machine, and therefore go from the spinning-frame directly to the loom without the delay and expense of reeling and spooling.

If the thread mass wound is very large, it is slipped off from the spindle, together with the upper plates and supporting-plate, which retain it until otherwise disposed of by suitable means; but if it is not sufficiently large to require this it will not be necessary to disturb the base-plate.

I do not herein claim all the features of the invention shown, as some of them are also shown and claimed in my concurrent application aforesaid, and also it will be noted that I claim herein generically various of the features of invention which are common to the three mechanical embodiments contained in this and the aforesaid concurrent application.

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

1. In a machine of the kind described, a winding member for winding a thread mass under pressure in layers extending transversely of the axis of said thread mass, and means for rotating said thread mass and said winding member at different speeds which have a constant ratio.

2. In a machine of the kind described, winding mechanism including means for delivering under pressure a continuous thread for building up a thread mass, means for traversing said delivery means transversely of the axis of the thread mass, and means for rotating the thread mass at a constant speed.

3. In a machine of the kind described, a winding member for winding a thread mass under pressure in layers extending transversely of the axis of the thread mass, and mechanism for rotating said thread mass and said winding member, said mechanism including means for maintaining a constant relative speed between said winding member and said thread

mass irrespective of the variations in speed thereof.

4. In a machine of the kind described, a support for the thread mass, a slotted plate for engaging the building end of the thread mass, means for relatively moving the thread mass and said slotted plate, a cam-plate rotating about the axis of the thread mass, and cooperating with said slotted plate for delivering the thread along the slot of the latter and means to rotate said cam-plate.

5. In a machine of the kind described, a support for the thread mass, a slotted plate for engaging the building end of the thread mass, means for relatively moving said plate and thread mass, and a cam-plate having the same axis as the thread mass, and also having a heart-shaped cam cooperating with said slotted plate for delivering the thread along the slot of the latter.

6. In a machine of the kind described, a winding member engaging the thread mass at the point of delivery of the thread thereto, a cam-plate controlling the path of delivery of said thread, and means to rotate said cam-plate and winding member at different speeds.

7. In a machine of the kind described, a winding member engaging the thread mass at the point of delivery of the thread thereto, a cam-plate controlling the path of delivery of said thread, and means to rotate said cam-plate, said winding member, and said thread mass, at different relative speeds.

8. In a machine of the kind described, a support for the thread mass, a winding member, a cam-plate for controlling the path of delivery of said thread, and flier-arms for rotating one of said mechanisms.

9. In a machine of the kind described, a support for the thread mass, a cam-plate for controlling the path of delivery of the thread, flier-arms for positively rotating one of said devices, and a winding member for engaging the winding end of the thread mass and laying the thread thereon.

10. In a machine of the kind described, a support for the thread mass, a flier having arms adapted to rotate about said support, a winding member bearing on the winding end of said thread mass, and a cam-plate controlling the path of the thread wound by said winding member, said cam-plate being rotated by said arms.

11. In a machine of the kind described, a flier having flier-arms extending therefrom parallel to the axis, a thread mass support, a winding member mounted coaxially of said flier, and a cam-plate carried by said arms and movable freely along the same, said winding member engaging the building end of the thread mass and moving upwardly therewith.

12. In a machine of the kind described, a central spindle, a hollow shaft surrounding the same, a thread mass support rotated by said shaft, a winding member for engaging the

building end of the thread mass, said member being rotated by said spindle, and means for moving the thread radially of said winding member as the latter rotates.

13. In a machine of the kind described, a central spindle, a thread-mass support, a winding member and a cam-plate coaxial of said spindle, and means for giving different speeds of rotation to said thread-support and said cam-plate.

14. In a machine of the kind described, a central spindle, a thread-mass support, a winding member, and a cam-plate coaxial of said spindle, and means for giving to each of said last three mentioned devices separate relative movements.

15. In a machine of the kind described, a flier, means for supporting the thread mass while being wound, mechanism for depositing the thread upon said thread mass, means for rotating said flier, means for rotating said supporting means at a speed different from the flier, and means for operating said depositing mechanism at a different speed from that of the said other two mechanisms.

16. In a machine of the kind described, a flier, means coaxial thereof for supporting a thread mass being wound, thread-depositing means, and driving mechanisms connected together for operating the aforesaid three different mechanisms at relatively different speeds.

17. In a machine of the kind described, a support for the thread mass, a winding member engaging the winding end thereof and provided with a slot having longitudinal ways, a thread-guide held to move in said ways, and a cam-plate provided with means engaging said thread-guide and moving the same for controlling the path of delivery of the thread to said thread mass.

18. In a machine of the kind described, a flier, a thread-support independent of said flier, a winding member, a cam-plate, and operating mechanism therefor.

19. In a machine of the kind described, a flier, a thread-support independent of said flier, a winding member, a cam-plate, said flier having arms for rotating said cam-plate, and means for rotating said thread-support.

20. In a machine of the kind described, a support for the thread mass, a spindle around which the thread mass is built up, and a winding member rotated by said spindle for operating on one end of the thread mass.

21. In a machine of the kind described, a support for the thread mass, a spindle around which the thread mass is built up, and a winding member rotated by said spindle for operating on one end of the thread mass, said winding member being freely movable longitudinally of but non-rotatable on said spindle.

22. In a machine of the kind described, a support for the thread mass, a spindle around which the thread mass is built up, and a wind-

ing member rotated by said spindle for operating on one end of the thread mass, and provided with a radial slot, a thread-guide in said slot, and means for traversing said thread-guide.

23. In a machine of the kind described, a support for the thread mass, a winding member, and a cam-plate cooperating with the latter, said cam-plate having a heart-shaped cam located eccentrically of said winding member for controlling the path of delivery of the thread thereto said thread mass, winding member and cam-plate having the same axis.

24. In a machine of the kind described, a

flier, and thread-laying mechanism, a pulley for driving one of said mechanisms, a pinion carried by said pulley, a gear in mesh with said pinion, a second gear in mesh with said pinion and having a different number of teeth from said first-mentioned gear, and means for positively driving said second gear.

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

CHARLES W. HUBBARD.

Witnesses:

GEO. H. MAXWELL,
J. ETHEL TARR.