No. 795,981. PATENTED AUG. 1, 1905.

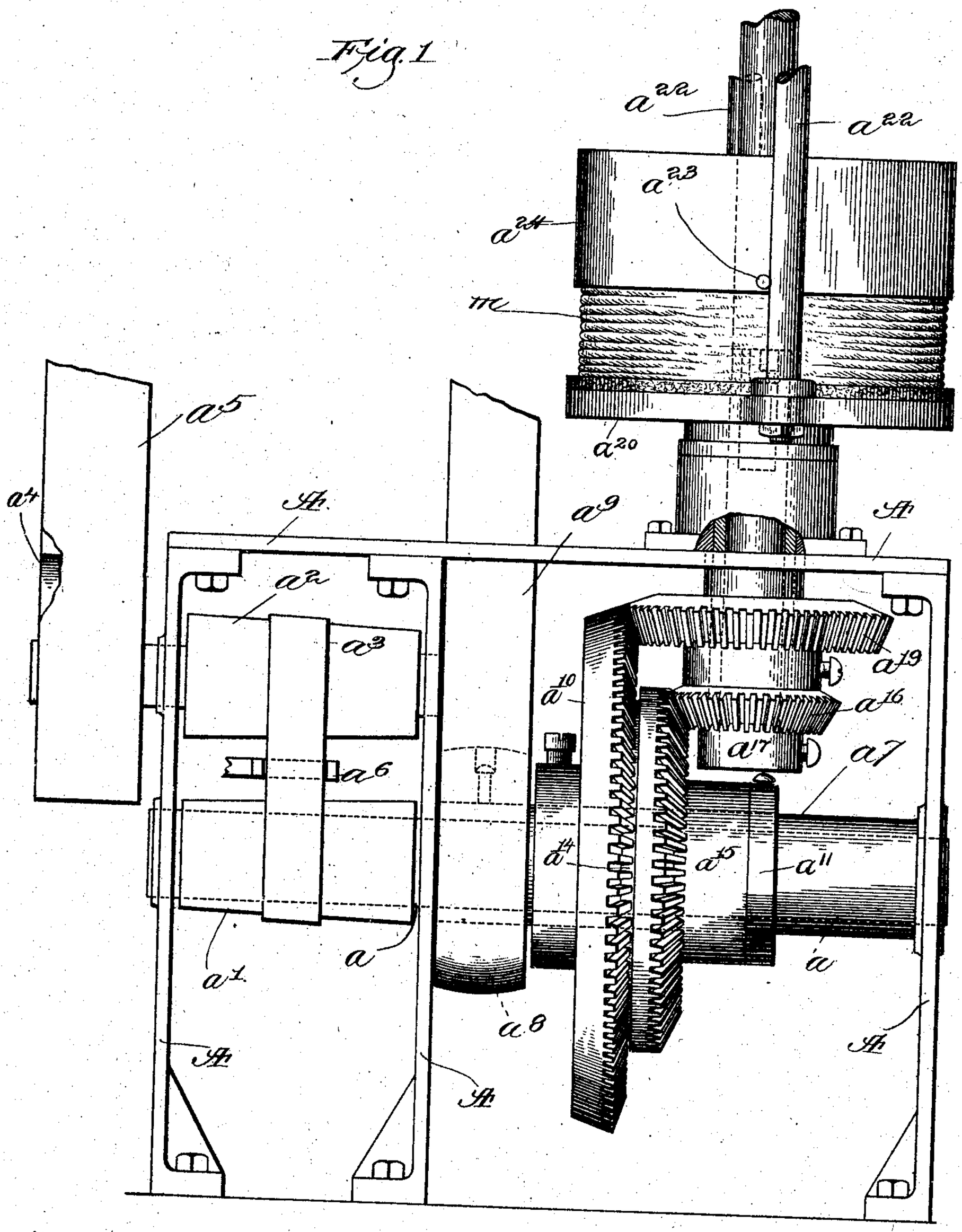
C. W. HUBBARD.

SPINNING AND WINDING MECHANISM.

APPLICATION FILED JUNE 29, 1903.

4 SHEETS—SHEET 1.

Fig. 1



Witnesses.
H. C. Sumsford.
S. W. Sutton.

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4 SHEETS—SHEET 2.

Fig. 2.

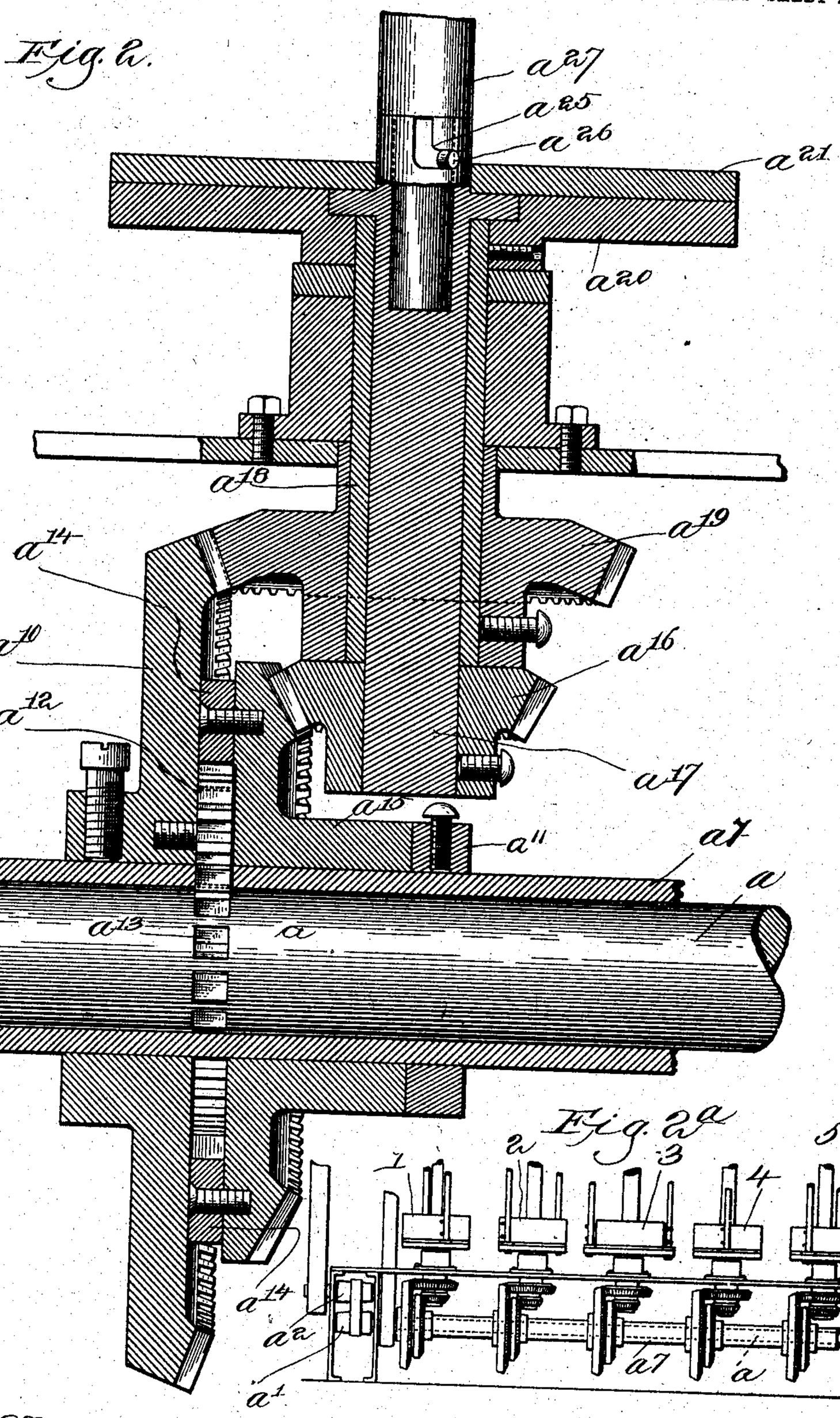

Fig. 2a.

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4 SHEETS—SHEET 3.

Fig. 3.

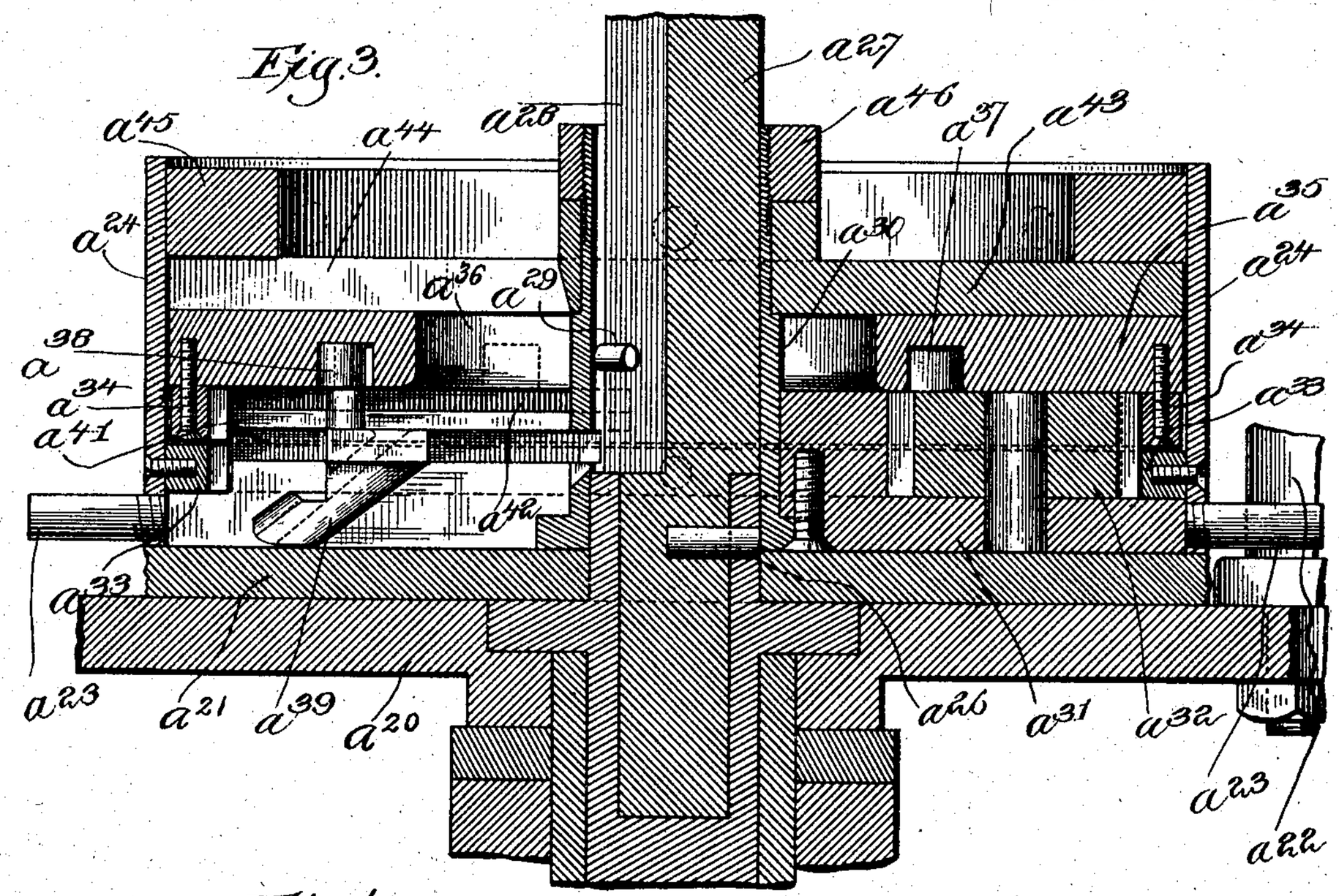
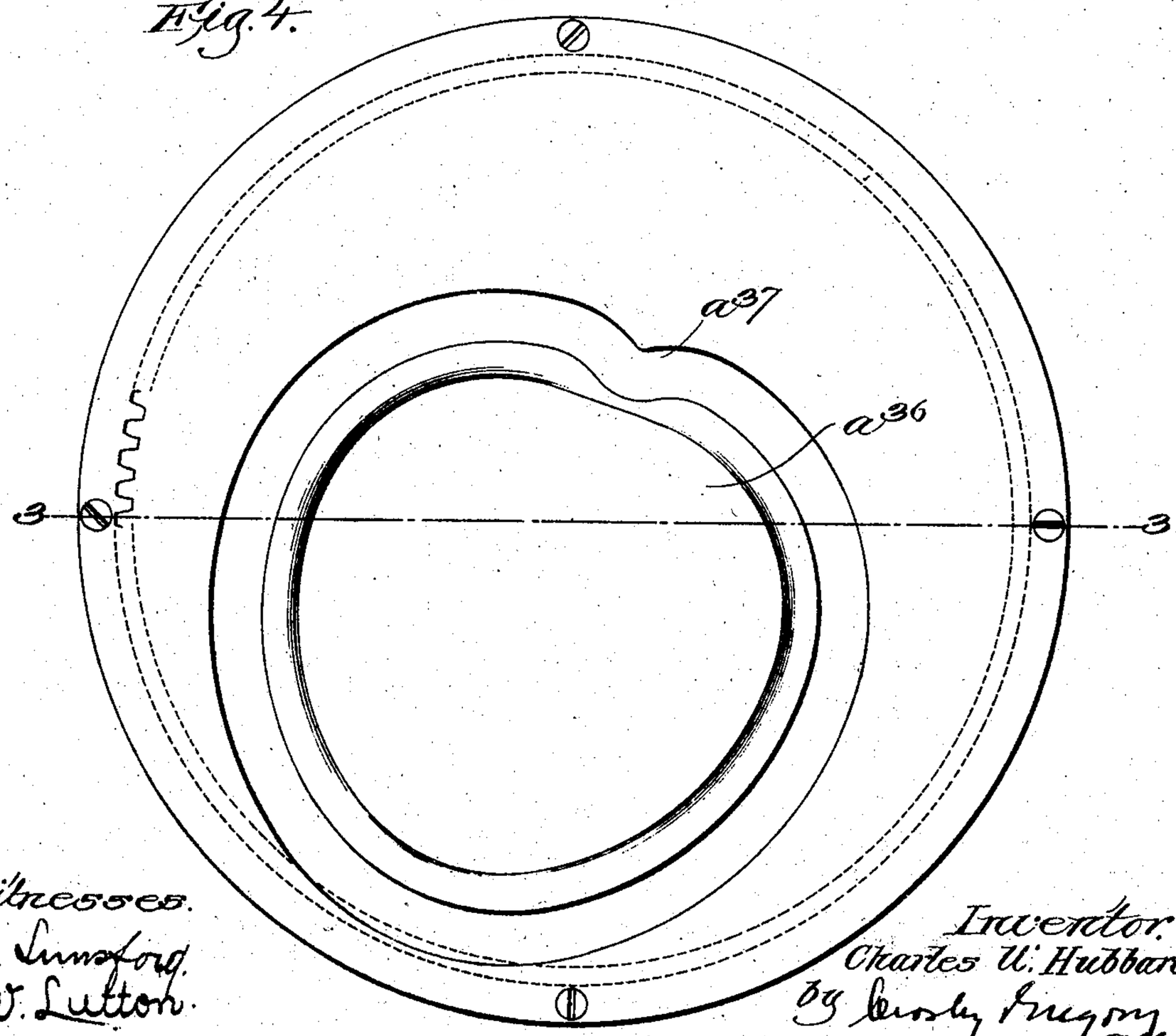


Fig. 4.



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4 SHEETS—SHEET 4.

Fig. 5.

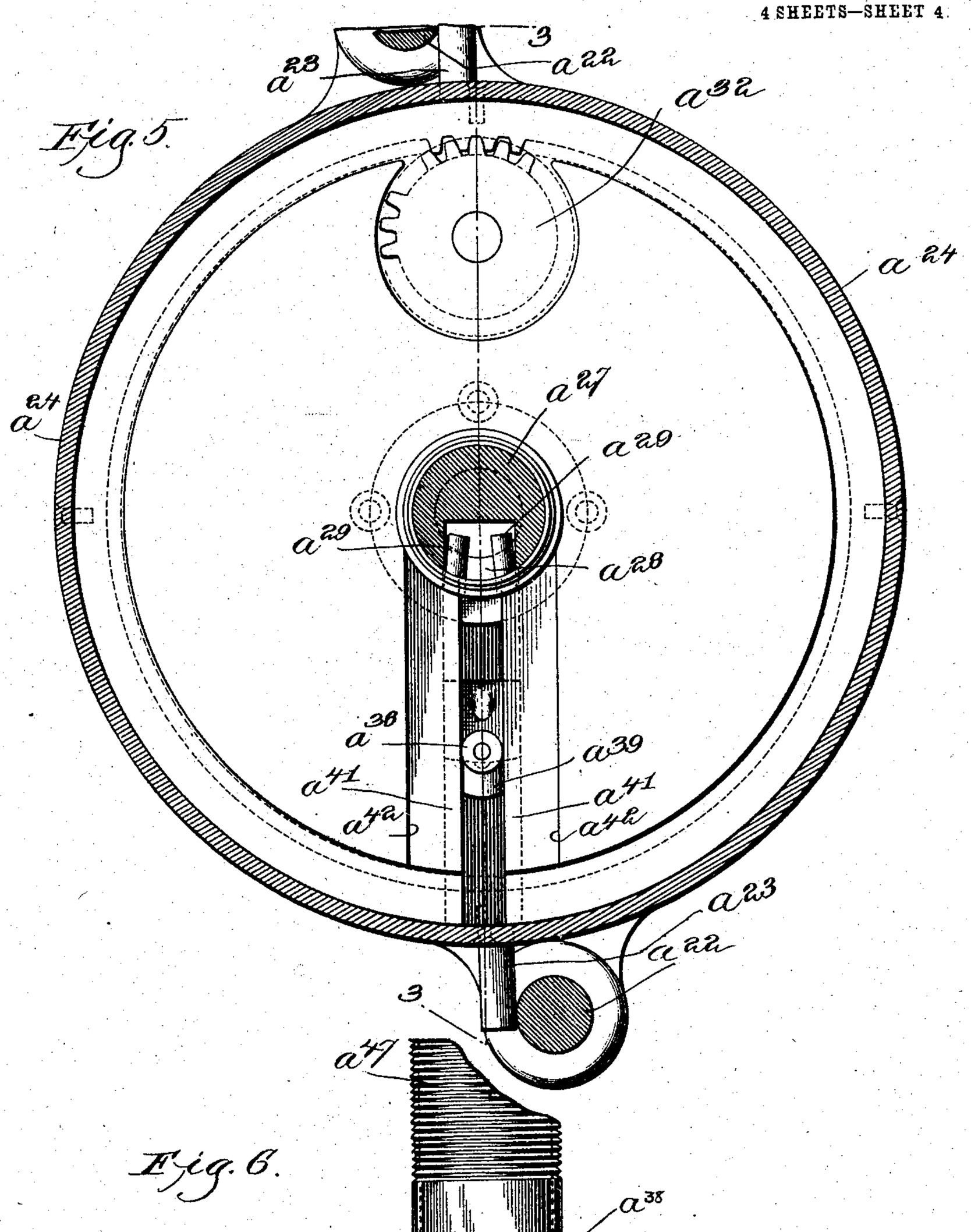

Fig. 6.

Witnesses.
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UNITED STATES PATENT OFFICE.

CHARLES W. HUBBARD, OF BOSTON, MASSACHUSETTS.

SPINNING AND WINDING MECHANISM.

No. 795,981. Specification of Letters Patent. Patented Aug. 1, 1905.

Application filed June 29, 1903. Serial No. 163,619.

To all whom it may concern:

Be it known that I, CHARLES W. HUBBARD, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Spinning and Winding Mechanism, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

My invention relates to winding mechanism, and has for its object the provision of means for winding in a compact body a thread mass built up continuously from one end, so that in use the thread or yarn is removed layer by layer from said end, or, in other words, the traverse of the thread is transverse to the axis as distinguished from the ordinary wind, which is parallel to the axis.

In the drawings, in which I have shown a preferred embodiment of my invention, Figure 1 shows the same in front elevation, parts being broken away for illustration. Fig. 2 is an enlarged central vertical sectional view of a portion of the mechanism. Fig. 2ª shows in side elevation my system of running a number of winding devices from one operating mechanism. Fig. 3 is a similar sectional view of a further portion of the mechanism, taken on the line 3 3, Figs. 4 and 5. Fig. 4 is a bottom plan view of the path-controller or cam-plate. Fig. 5 is a transverse sectional view showing in top plan the winding member or presser-plate. Fig. 6 is a front elevation of the parts shown in Fig. 5.

In a suitable frame A is journaled a shaft a, operated by cone-pulleys a' a^2, connected by a belt a^3 and driven by a pulley a^4 and belt a^5, the speed of the shaft a being varied by any convenient means, as by a usual shipper-fork a^6. On the shaft a is mounted a sleeve a^7, driven by a pulley a^8 and belt a^9, and on this sleeve or hollow shaft is mounted a bevel-gear a^{10}, carrying an epicyclic gear a^{12}, adapted to mesh with teeth a^{13}, provided in the shaft a. Coöperating with the gear a^{12} is an internal toothed gear or toothed ring a^{14}, carried by a bevel-gear a^{15}, loosely mounted on the hollow shaft a^7 against a collar a^{11} and adapted to mesh with a pinion a^{16}, fast on a vertical spindle-support a^{17}. Inclosing the spindle-support is a hollow vertical shaft a^{18}, on which is fast a bevel-pinion a^{19}, meshing with the gear a^{10}, and at the upper end of said shaft is a horizontal rotator or support a^{20} for the thread mass, a felt covering a^{21} being secured to the upper face thereof for providing the required frictional surface for starting the thread mass m. The rotator for convenience carries a flier or vertically-rotating member, consisting of opposite flier-arms a^{22}, adapted to engage pins a^{23}, Fig. 1, for rotating a housing a^{24}, (shown best in Figs. 1 and 3,) which housing merely rests on the rotator or thread mass.

From the foregoing description it will be seen that the thread support or rotator a^{20} is driven through the gears a^{19}, a^{10}, and shaft a^7 directly by the belt a^9, while the spindle-support a^{17} is driven by the belt a^5, (through a^{13} a^{12} a^{14} a^{15} a^{16},) so that the relative speeds thereof may be varied with the utmost precision simply by moving the belt-shifter a^6.

It is desirable to have as little motion, and hence as little wear, as possible between the gear a^{12} and the teeth a^{13}, and accordingly I prefer to have the pulleys a^4 a^8 of the same size and running at the same speed in the same direction. With such a construction the gears a^{10} and a^{15} will rotate in unison.

The relative sizes of the gears a^{10} a^{19} is such with relation to the relative sizes of the gears a^{15} a^{16} that the shaft a^{18} and spindle-support a^{17} are rotated at different speeds, the spindle-support preferably being rotated faster than the shaft a^{18}, although the invention would not be departed from if said spindle-support rotated slower than said shaft. The relative speed of said shaft and spindle-support can be changed by merely shifting the belt a^3 on the cone-pulleys, for by this latter operation the shaft a will be given a faster or slower speed than the gear a^{10}, such difference in speed between the shaft a and gear a^{10} giving a differential movement to the gear a^{15}, as will be obvious. While I prefer this arrangement of gearing for changing the relative speed of the spindle-support and vertical shaft a^{18}, I do not wish to be limited thereto, as other devices for accomplishing this end may be employed without departing from the invention.

At its upper end the spindle-support a^{17} is provided with a bayonet-slot a^{25} to receive a pin a^{26}, projecting from the lower end of a spindle a^{27}, which extends upwardly, as required, according to the length of thread mass which it is desired to wind, this bayonet-joint arrangement being provided for facilitating the removal and handling of large thread masses when wound. Said spindle-support is also provided with suitable means for positively rotating certain portions of the winding

mechanism, said means being herein shown for convenience as a longitudinal groove a^{28}, adapted to receive pins a^{29}, (see Figs. 3 and 5,) carried for convenience by a sleeve a^{30}, fast on a presser-plate or winding member a^{31}, which is of a size to be received in the housing a^{24}. Said winding member carries a toothed pinion a^{32}, which engages with a circular rack or internal gear a^{33}, secured to the housing a^{24}. This internal gear a^{33} is narrow, so as to permit the pinion a^{32} also to engage a second internal gear or toothed ring a^{34}, secured to the under side of a cam-plate or path-controller a^{35}, which rotates loosely within the housing a^{24} and is shown in detail in Fig. 4.

The gears a^{33} a^{34} have a different number of teeth—as, for instance, forty-five and forty-four respectively—and as both of said gears a^{33} a^{34} mesh with pinion a^{32} it results that as the gear a^{33} completes one rotation the pinion a^{32} will thereby have transmitted to the gear a^{34} an increment of rotation corresponding to one tooth, thereby laying the successive loops of thread slightly forward of each other.

The cam-plate a^{35} has an opening a^{36}, through which the thread may pass, and a cam-groove a^{37}, in which travels a stud a^{38}, projecting upwardly from a thread guide or button a^{39}, whose wings a^{40} extend into grooves a^{41}, formed in the radial slot a^{42} of the winding member a^{31}, the thread-opening of said thread-guide extending obliquely, so as to deliver the thread as far from the center as possible. Above the cam-plate a^{35} is a protecting and retaining cover-plate a^{43}, having a slot a^{44} in alinement with the thread-slot of the winding member and retained in place by a ring a^{45}, secured to the housing and also by an adjusting-nut a^{46} on the threaded upper end a^{47} of the sleeve a^{30}, which compels it to rotate with the winding member a^{31}.

In operation the first layer of thread or yarn is started on the felt-covered support a^{20}, over which the winding member a^{31} is rotated by the spindle a^{27}, said winding member and support a^{20} being given a relative movement corresponding to the twist to be put into the yarn, and this can be varied to any extent desired simply by shifting the belt a^{3} on the cone-pulleys. As the winding member deposits the yarn on the upper end of the growing thread mass the cam-plate or path-controller is given an increment or decrement of movement according to the number of teeth in its gear a^{34} compared with those in the gear a^{33}, thereby laying the successive heart-shaped loops side by side with such compactness as may be required for the purposes in hand. By shifting the belt a^{3} to the right, Fig. 1, the speed of the inner shaft a is decreased, thereby increasing the speed of the presser-plate with relation to the thread mass, and hence accelerating the winding. By shifting the belt a^{3} to the left the speed of the shaft a is thereby increased, and hence the speed of the gears a^{15}, a^{16}, spindle-shaft a^{17}, and winding-plate are decreased with relation to the movement of the thread mass, thereby winding or taking up less thread. If it is desired to spin without winding, the belt a^{3} is shifted to such a position as to cause the two gears a^{16} a^{19} and their two shafts a^{17} a^{18} to rotate together. The thread passes down through the slots a^{44} a^{42} and opening a^{36} to the thread-guide a^{39} and is delivered from the lower edge of the latter directly against the thread mass, where it is held firmly against displacement by being pinched down hard under the plate or winding member a^{31}.

The flier-arms a^{22} and thread mass travel at the same speed, so that the latter cannot be displaced or jogged out of shape by falling against said arms, and all the winding mechanism is carried in one compact body retained by the housing a^{24}, which rises therewith as the thread mass builds up, so that there is no possibility of the parts getting out of adjustment or separated and lost; but, on the contrary, when the thread mass has been wound the winding mechanism is simply slipped off from the spindle practically in one piece, as it were, and none of the oily and delicate parts are exposed, but they are all retained out of sight within the housing, so that they can neither injure nor be injured.

When the thread mass is finished, the housing a^{24} and its contained mechanism is slipped off, the spindle is rotated so as to remove it from its bayonet-joint fastening in the spindle-support a^{17}, suitable clamping devices are applied to said spindle at the opposite ends of the thread mass, and the latter and spindle are transported for packing or use, the spindle being subsequently removed.

By the construction above explained it is practicable to wind a thread mass of almost any length and size, and also any degree of twist may be given thereto.

The operating mechanism (shown in detail best in Figs. 1 and 2) is compact and provides means for adjusting the winding with extreme accuracy to different sizes of yarns. The leading advantage thereof, however, is to permit a series of thread masses to be wound at the same time from the same driving-shaft, (it being understood that the belts a^{5} a^{9} are both operated from the same main shaft,) for, as will be evident from Figs. 2, 2^{a}, the shafts a a^{7} can continue indefinitely to the right and as many winding mechanisms 1 2 3 4 as desired may be connected therewith, it being merely necessary to secure in place on the hollow shaft a^{7} gears a^{10} and a^{15} for each winding mechanism. Were it not for this or an equivalent construction it will be evident that each winding mechanism would have to be separately belted or geared to a counter-shaft or main driving-shaft, which would render the apparatus impracticable for general factory use under the conditions commonly prev-

alent in modern factories. Moreover, by my invention the entire series of winding devices can be quickly adjusted to any special requirements, and the adjustment of one adjusts all, because the adjustment takes place simply by shifting the belt-shipper a^6.

My mechanism is readily adaptable for use in other arrangements—such, for instance, as is shown in my copending application, Serial No. 163,483, filed June 29, 1903. In said application I have claimed generically the feature of driving the parts at different speeds, having a coöperating cam-plate and winding member, using the flier as a driving means, having a heart-shaped cam-plate on the winding member, &c., and therefore do not claim these features herein. I wish it understood, however, that I do not restrict my present invention to the mechanism herein shown, inasmuch as many changes in form, arrangement, and combination of parts may be resorted to without departing from the spirit and scope of the invention.

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

1. In a machine of the kind described, winding mechanism, for winding a thread mass, including flier-arms, and means for rotating the thread mass and said flier-arms in unison.

2. In a machine of the kind described, a flier having at its base a support for the thread mass, a winding member, means to rotate it, and a cam-plate for controlling the path of the delivery of the thread to said thread mass.

3. In a machine of the kind described, a support for the thread mass, winding mechanism including a winding-plate and a cam-plate for winding the thread on one end of said mass, means for rotating said support with relation to said winding mechanism for putting twist into the thread as it is being wound, and means for varying the amount of twist.

4. In a machine of the kind described, a support for the thread mass, a winding member and cam-plate for laying the thread in transverse layers at one end of the mass, means for giving different speeds of rotation to said support and said winding member, and means for varying the speed of one thereof with relation to the other.

5. In a machine of the kind described, a support for the thread mass, a winding member and path-controller, and a housing containing said member and controller for winding the thread in transverse layers at one end of said mass, said housing and its contained mechanism being bodily removable.

6. In a machine of the kind described, a support for the thread mass, mechanism for depositing the thread in transverse layers at one end of said thread mass, and gearing for operating said mechanism, said mechanism being bodily removable from the thread mass when the latter has been wound.

7. In a machine of the kind described, a winding member, a path-controller, a housing containing said parts, means coöperating therewith for protecting said contained parts, and operating mechanism.

8. In a machine of the kind described, a support for the thread mass, mechanism for depositing the thread on said thread mass, means for operating the same, a spindle passing through the same and through the thread mass, and means for detachably connecting said spindle with said operating means for transmitting movement from the latter to said mechanism.

9. In a machine of the kind described, a support for engaging the thread mass at one end, mechanism for engaging the thread mass at the other end and depositing the thread, and means including a spindle and flier-arms extending longitudinally of the thread mass for positively moving said mechanism.

10. In a machine of the kind described, a support for the thread mass, a coaxial spindle, a winding member for operating on one end of the thread mass, a path-controller for controlling the path of delivery of the thread, and gearing between said winding member and path-controller for giving them different relative movements.

11. In a machine of the kind described, a support for the thread mass, a coaxial spindle, a winding member for operating on one end of the thread mass, a path-controller for controlling the path of delivery of the thread, a pinion revolving with one of said parts, means for rotating said pinion, and a gear carried by the other of said parts and in mesh with said pinion for driving its part at a different speed from said other part.

12. In a machine of the kind described, a winding member for winding thread on one end of a thread mass, a cam-plate for controlling the path of the thread, a pinion carried by one of said parts, means for rotating the part carrying said pinion, independent means for rotating said pinion, and a gear on said other part for communicating motion thereto from said pinion.

13. In a machine of the kind described, a winding member, means for positively rotating it, a pinion carried thereby, means for rotating said pinion, a cam-plate, and means driven by said pinion for rotating said cam-plate at a different speed from said winding member.

14. In a machine of the kind described, a winding member having a radial slot, a thread-guide traveling therein, and means for reciprocating said thread-guide, said thread-guide having a thread-opening having delivery at its lower end farther from the center of said winding member than its entrance end.

15. In a machine of the kind described, winding mechanism including a rotatable winding member, a cam-plate thereon, a

cover-plate, and a housing inclosing all of said mentioned parts.

16. In a machine of the kind described, a rotatable winding member, a cam-plate thereon, means for relatively rotating said two members, a cover-plate, and means for adjustably holding said parts in position.

17. In a machine of the kind described, a support for the thread mass, means for laying the thread operating on one end of the thread mass, and driving mechanism for said parts, including a hollow shaft, a second shaft within the same, a gear fast on said hollow shaft, a pinion carried by said gear and in driven connection with second said shaft, means connecting said gear with one of said first-mentioned parts, and means connecting said pinion with the other of said first-mentioned parts, for respectively driving the same.

18. In a machine of the kind described, a support for the thread mass, thread-laying means operating on one end of the thread mass, and driving mechanism for said parts, including a hollow shaft, a second shaft within the same, a gear fast on said hollow shaft, a pinion carried by said gear and in driven connection with said second shaft, a gear in mesh with said first-mentioned gear for driving said support, a spindle connected to said winding mechanism, and gearing between said spindle and pinion for driving the spindle by the latter.

19. In a machine of the kind described, a support for the thread mass, a spindle, thread-laying means connected with said spindle, a gear rotating with said support, a second gear rotating with said spindle, a hollow shaft, a gear thereon, in mesh with said first-mentioned gear, a gear loose on said hollow shaft, in mesh with said spindle-gear, an independently-driven shaft within said hollow shaft, and a pinion driven by said inner shaft and driving said loose gear.

20. In a machine of the kind described, a plurality of winding mechanisms, each including a winding member, a path-controller for controlling the path of delivery of the thread, and means for giving a relative rotation to the thread mass, winding member, and path-controller, and concentrically-arranged driving-shafts for all of said winding mechanisms.

21. In a machine of the kind described, a plurality of winding mechanisms, each having two parts rotating about the same axis and a single speed-adjusting device for all of said winding mechanisms, provided with means for simultaneously changing the relative speeds of rotation of said respective rotating parts of all of said winding mechanisms.

22. In a machine of the kind described, a plurality of winding mechanisms, each having two rotating parts, and a hollow shaft geared to one of said parts and another shaft carried within said hollow shaft geared to the other of said parts.

23. In a machine of the kind described, winding mechanism for winding a thread mass, said mechanism having two rotating parts, operating-gears therefor, mounted concentrically, and means for rotating said gears.

24. In a machine of the kind described, winding mechanism for winding a thread mass, said mechanism having two parts rotating about the same axis, operating-gears therefor, means for rotating one of said gears, at a fixed speed, rotating means for the other gear and means for varying the speed of rotation thereof.

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

CHARLES W. HUBBARD.

Witnesses:

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