

No. 895,455.

PATENTED AUG. 11, 1908.

T. HANSEN.
THREAD WINDING MACHINE.

APPLICATION FILED OCT. 3, 1903.

4 SHEETS—SHEET 1.

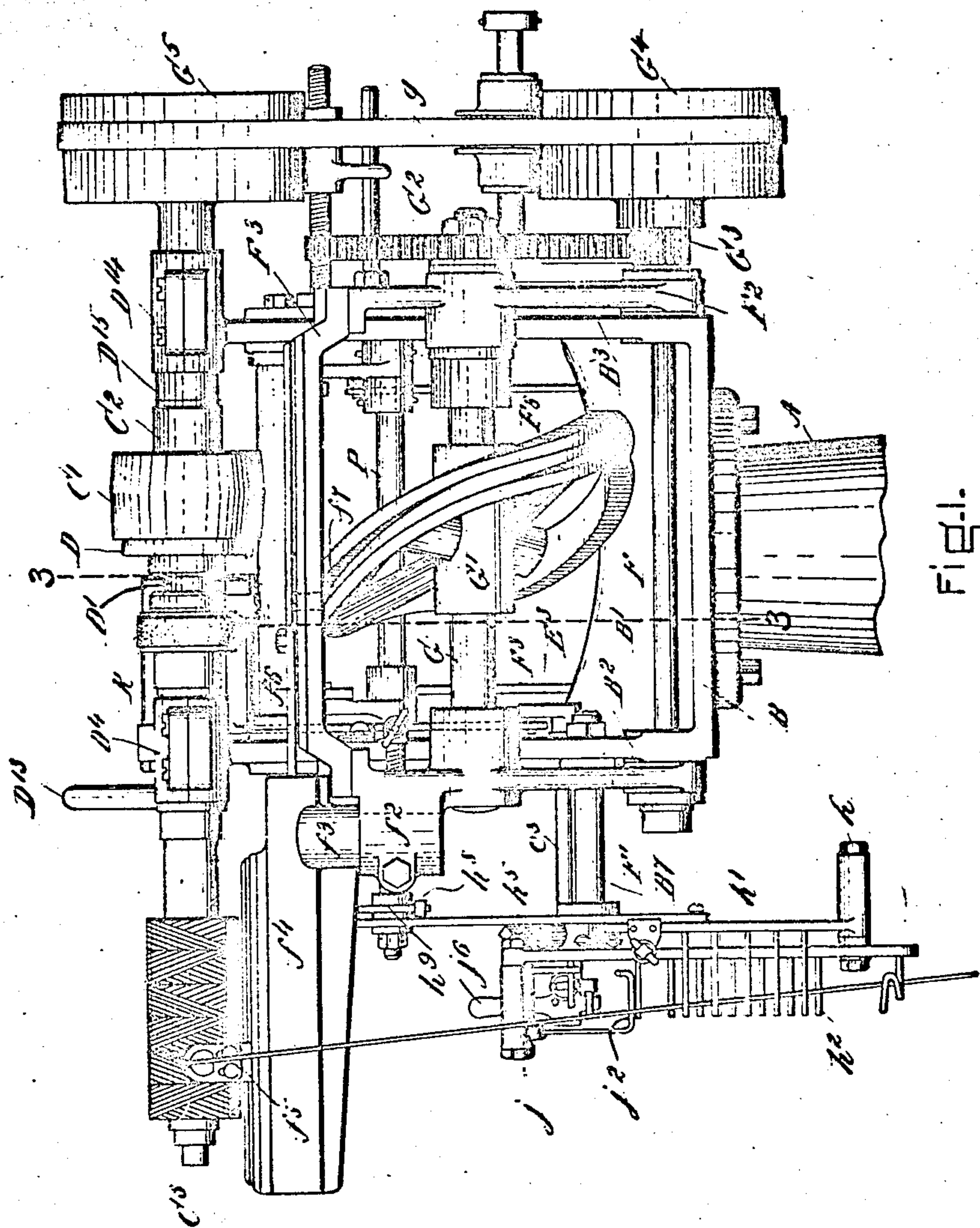


Fig. 1.

WITNESSES:
M. E. Flaherty.
M. V. Foley.

INVENTOR:
Thorvald Hansen
By Geo. O. G. Loren
his attorney

No. 895,455.

PATENTED AUG. 11, 1908.

T. HANSEN.
THREAD WINDING MACHINE.
APPLICATION FILED OCT. 3, 1903.

4 SHEETS—SHEET 2.

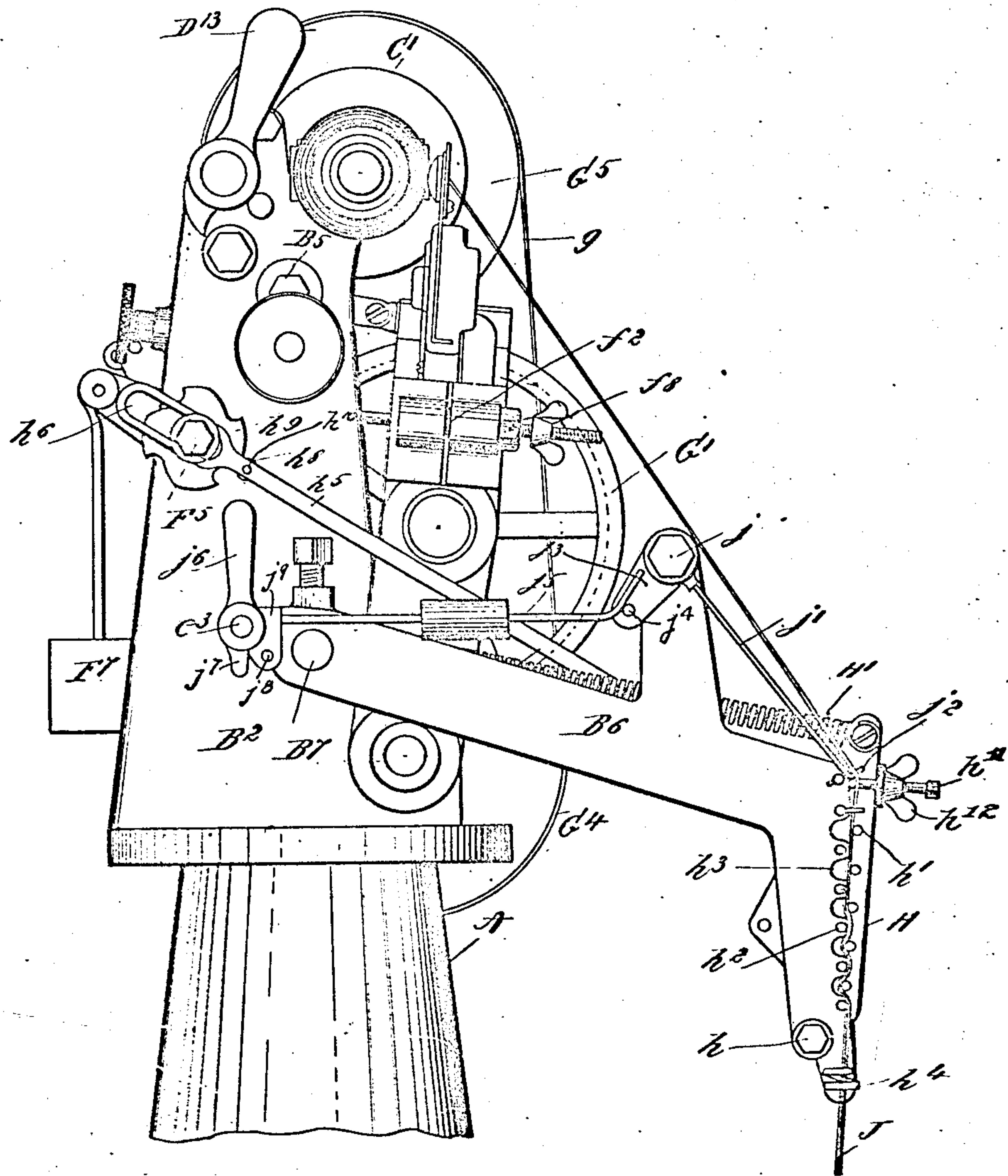


Fig. 2.

WITNESSES:
H. E. Flaherty.
M. V. Foley.

INVENTOR:
Thomas Hansen
by Guy O. S. G. G. G.
his atty

No. 895,455.

PATENTED AUG. 11, 1908.

T. HANSEN.
THREAD WINDING MACHINE.
APPLICATION FILED OCT. 3. 1903.

4 SHEETS—SHEET 3.

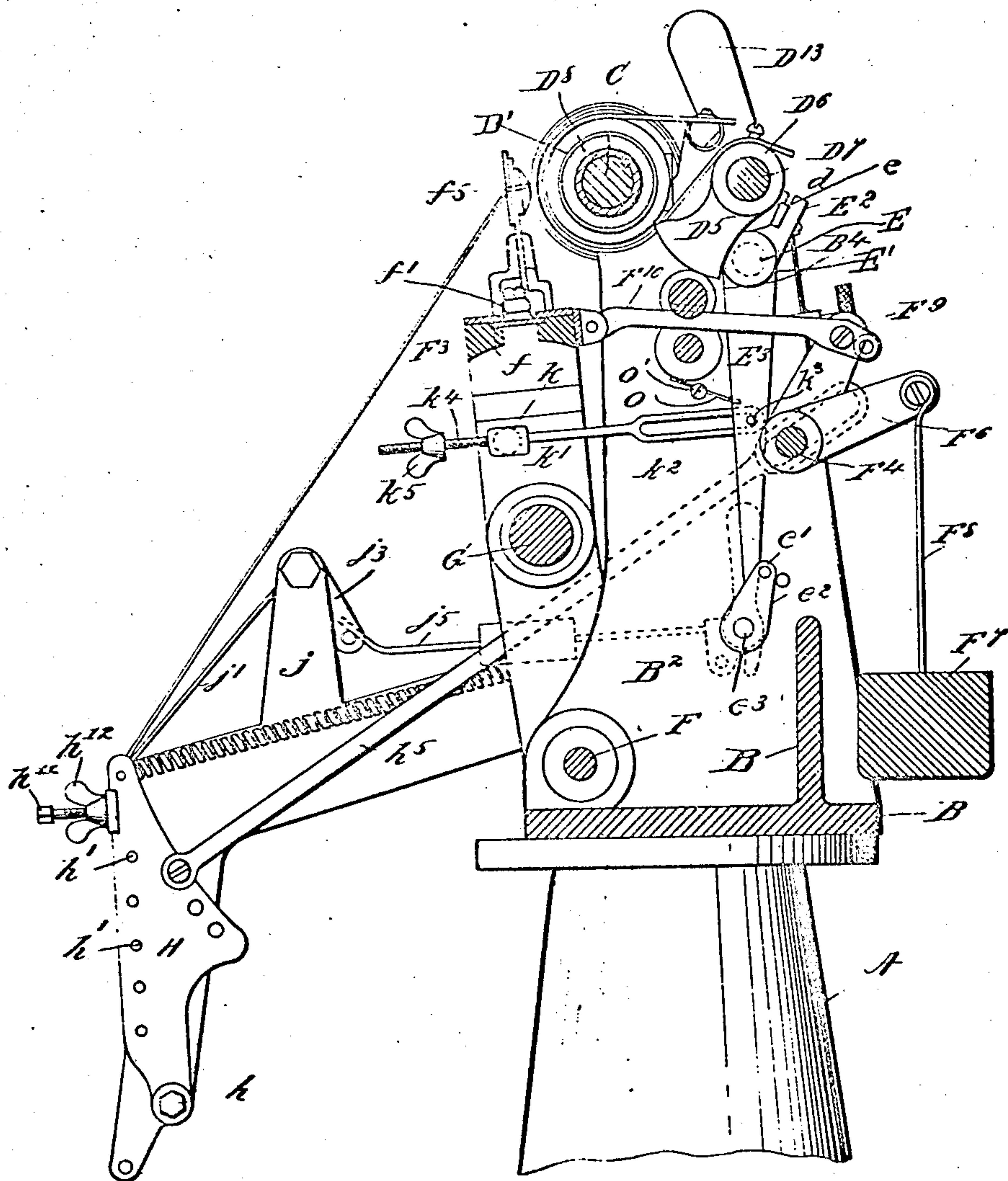


Fig.3.

WITNESSES:
A. C. Flaherty.
M. V. Foley.

INVENTOR:
 Howard Hansen
 by George O. G. Brown
 his attorney

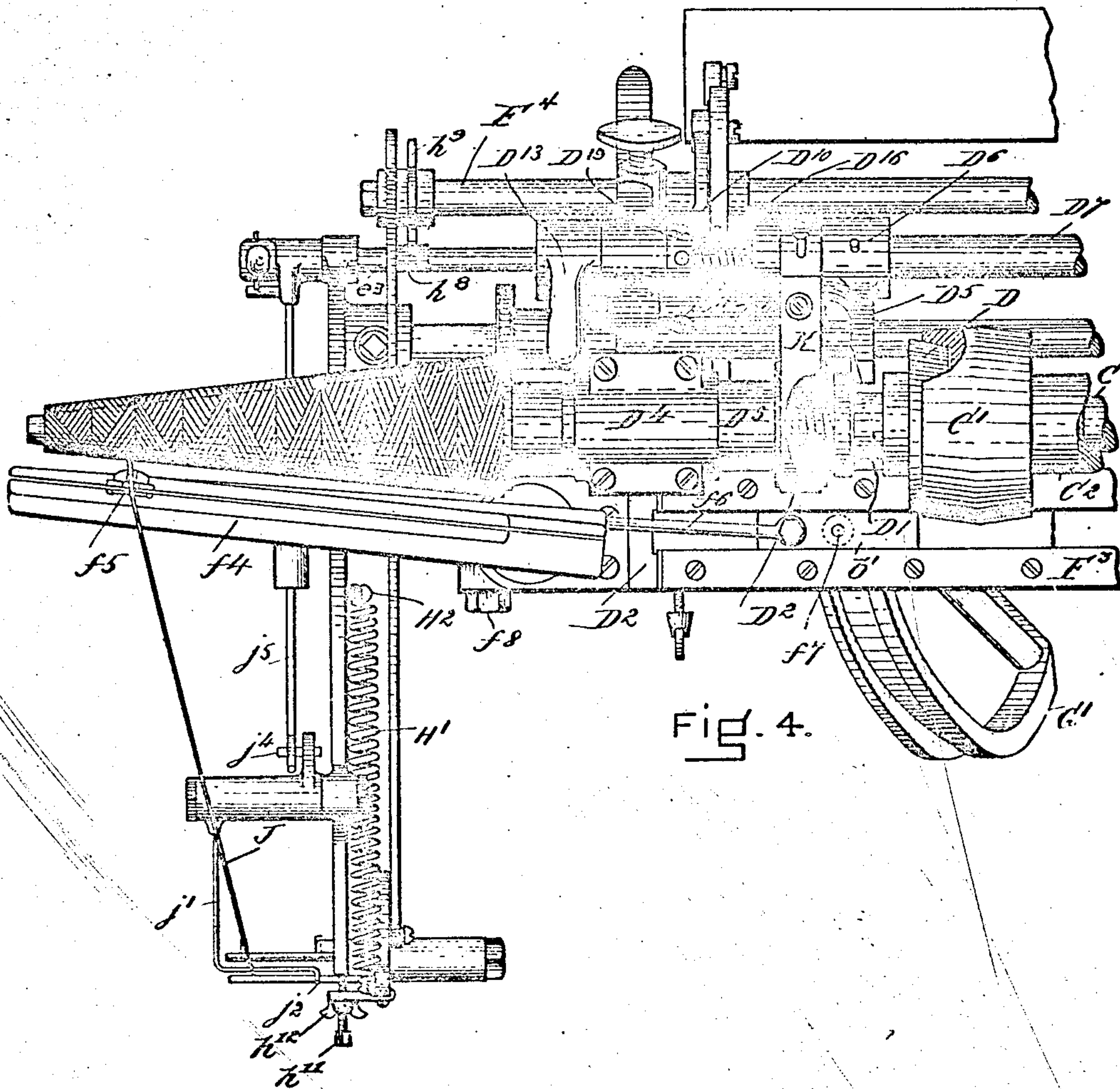
No. 895,455.

PATENTED AUG. 11, 1908.

T. HANSEN.
THREAD WINDING MACHINE.

APPLICATION FILED OCT. 3, 1903.

4 SHEETS—SHEET 4.



WITNESSES:

No. E. Flaherty.
M. V. Foley.

INVENTOR:

Thores Hansen
by Guy. O. G. Green
att'y.

UNITED STATES PATENT OFFICE.

THORVALD HANSEN, OF EVERETT, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO A. HUNBERRY, OF WALTHAM, MASSACHUSETTS.

THREAD-WINDING MACHINE.

No. 895,455.

Specification of Letters Patent.

Patented Aug. 11, 1908.

Application filed October 3, 1903. Serial No. 175,585.

To all whom it may concern:

Be it known that I, THORVALD HANSEN, of Everett, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Thread-Winding Machines, of which the following is a specification.

My invention relates more especially to that class of machines which are designed to wind cops with what is now well known as the "Fiji wind". In operating machines of this kind great care has to be taken as to the means for governing the tension and the pressure of the guide against the cop which two factors vary with different kinds of thread. It is therefore extremely desirable that machines of this class shall have a direct and easily adjustable tension and a carefully and well regulated means for applying pressure to the guide. It is also desirable that such machines should be of simple construction; that the parts be accessible and easily changed or adjusted. It is also desirable that such machines should have a stop motion which shall be simple and effective and capable of instant action.

My present invention consists accordingly in various details of improved construction relating especially to the features above noted and by means of which means I am enabled to obtain a very effective machine.

My invention will be understood by reference to the drawings, in which—

Figure 1 is a front elevation of a machine embodying my invention. Fig. 2 is an end elevation taken from the left of Fig. 1. Fig. 3 is a sectional view taken on line 3—3 of Fig. 1, adapted to show the stop mechanism, and Fig. 4 is an enlarged top view of a portion of the machine showing the means whereby it is enabled to wind a conical cop.

A is the post on which is mounted the frame. This frame is U-shaped comprising a base piece B, having a cross-strengthening web B¹, while the parts B², B³ are uprights in which the various shafts are supported. B⁴ is a tie bolt and B⁵ the nuts on the end of said bolt.

C is the main shaft which carries a pulley C¹ free to turn thereon. One face of this pulley forms a member of a clutch, the other member being a conical wheel D the hub of which has an annular groove D¹. The clutch member D is normally pressed against the

member C¹ by means of a spring D², one end of which bears against it. The other end of the spring D² rests against the interior wall of a chambered brake wheel D³ which turns with the shaft C and has a long hub which reaches to the shaft bearing D⁴ mounted on the top of the side B² of the frame of the machine. A second bearing D⁴ for the shaft C is supported on the side B³ of the frame. A collar D⁵ lies between the hub C² of the pulley C¹ and the bearing D⁴ to keep the parts in proper relation to each other. The clutch member D, D¹ moves lengthwise on the shaft, being splined thereto so that when it engages the member C¹ it turns therewith and causes the shaft to turn also.

In order to move the clutch member D from its normal position in contact with the clutch member C¹ I have shown an arm D⁵ mounted upon a sleeve D⁶ which is fast upon a rock shaft D⁷. Connecting with the sleeve D⁶ is a spring D⁸. This spring is attached also to a collar D⁹ provided with holes D¹⁰ about its periphery by means of which and a removable nut (not shown) it may be turned to adjust the tension of the spring D⁸. A set screw D¹¹ passing through a stud D¹² mounted on the upright B² and entering one of the holes D¹⁰ acts to hold this collar in place when it has been properly adjusted. The action of the spring D⁸ is to normally force the sleeve D⁶ in such direction as to lift the arm D⁵ into the groove D¹ and against the side of the hub to the clutch member D thereby throwing said member into a position of disengagement with respect to the other of said clutch members. To facilitate this action the end of the arm D⁵ and the edge of the groove D¹ are preferably beveled.

On a stud E projecting from the upright B², is a sleeve E¹ having a short upwardly projecting arm E² which is notched to provide a rest e for a dog d projecting from the rear of the sleeve D⁶.

D¹³ is a handle fixed to the rock shaft D⁷ by means of which the rock shaft D⁷ may be turned to withdraw the arm D⁵ from the groove D¹ so as to allow the clutch member D to engage the member C¹ and cause the shaft C to rotate. At the same time the dog d, owing to the action of the spring D⁸, will engage the rest e so that the parts will be set in this position and the shaft C will be caused to turn until such time as the dog is disen-

gaged and the clutch disconnected from the pulley C'. To cause this disengagement the sleeve E' is provided with a lever arm E³ against which bears a spring o arranged upon a stud o' fixed to the frame and which spring acts to hold the lever arm in such normal position that the dog d will engage the rest e. Adapted to engage the lower end of the lever arm is a pin e' on the end of an arm e² mounted on a shaft e³. This shaft e³ is supported near one end in the upright B², its other end being supported in the bracket B⁶ referred to below, and it carries at one end a handle j⁶ by which it may be turned by hand thereby operating the lever arm E³ against the tension of this spring o and disengaging the dog d and rest e. Automatic means for disengaging these parts are also provided and will be described below.

I have shown in the drawings two forms of spindle upon which thread is wound, and my description so far as the winding operation is concerned, will answer equally well for both cases. In either case there is provided at one end of the shaft C a spindle C³ for holding the cop tube. A guide frame, composed of uprights F¹, F² connected at their upper ends by a cross-piece F³, is adapted to swing towards and from the main shaft C on the shaft F journaled in bearings on the frame B. A cam shaft G is mounted in bearings on said arms F¹, F² above the shaft F and carries a cam G¹. The cam shaft G also carries a gear G² at one end adapted to engage with a pinion G³ mounted on one end of the shaft F. The shaft F is rotated by means of a cone pulley G⁴ which is connected by means of a suitable belt g with a second cone pulley G⁵ on the end of the shaft C. The upper ends of the arms F¹, F² are connected by means of a piece F³ having ways f in which runs a slide f¹. The arm F¹ also carries a boss f² in which is a vertical socket adapted to receive a stud f³ supporting a suitable guide-way f⁴ in which slides the thread guide f⁵. This thread guide f⁵ is connected with the slide f¹ by means of a connecting rod f⁶, the slide f¹ also carrying a cam pin f⁷ which engages the cam G¹, this construction being such that as the cam rotates a reciprocating movement is given to the slide f¹ and the thread guide f⁵. The boss f² is preferably slitted so as to form two jaws (see Fig. 2), which jaws are held together by a screw f⁸ so that the guide-way f⁴ may be adjusted and clamped either parallel with the ways f to wind a cylindrical cop as shown in Figs. 1, 2 and 3, or at an angle thereto to wind a conical cop as shown in Fig. 4, and the guide-way f⁴ is hollow to allow the connecting rod f⁶ to adjust itself to any ordinary angle at which the guide-way f⁴ may be set to the ways f.

Power being applied to the pulley C' and the clutch being allowed to engage therewith,

not only is the power shaft C rotated so as to rotate the spindle C³ but also the pulley G⁵ which, through the belt g, pulley G⁴, pinion G³, and gear G², rotates the cam G¹ by means of which the guide is reciprocated. By making the pulleys G⁴ and G⁵ slightly conical the angular speed relation of the cam G¹ to the spindle C³ may be adjusted to regulate the number of reciprocations of the thread guide to rotations of the spindle. By changing the pulleys, etc., various speed relations may be established as desired.

The tension mechanism as shown comprises the bracket B⁶ above referred to and parts connected therewith. The bracket B⁶ is fixedly mounted on a stud B⁷ projecting laterally from the upright B². To the lower end of this bracket is pivotally connected at h a lever H having projecting therefrom a series of pins h¹ and from the bracket B⁶ a number of pins h² also project in the same direction. The face of the bracket is notched at h³ to allow the pins h¹ on the lever H to lie under certain conditions in a substantially vertical line with the pins h² on the bracket B⁶. At the bottom of the bracket B⁶ is a pigtail h⁴. The thread J is led up from the spool through the pigtail h⁴ and then between the pins h¹, h² as indicated in Fig. 2, and from thence up to the eye in the guide f⁵. The lever H is pulled towards the face of the bracket B⁶ by means of a spring H¹, one end of which is connected to said lever H; the other end being attached to a screw H² on the bracket B⁶. A rod h⁵ runs from the upper end of the piece H rearwardly, its rearward end being slotted as at h⁶. Through this slot h⁶ passes loosely the end of the rock shaft F⁴ and the screw F⁵ which screws into the end of the shaft holds the rod h⁵ in place. The rock shaft F⁴ is mounted in the uprights B², B³ and carries two rocker arms, one near each end. One of these arms only, F⁶, is shown in the drawings. A weight F⁷ is hung from these arms F⁶ by connecting rods F⁸. Two other rocker arms F⁹ on this same shaft F⁴ are connected by means of connecting rods F¹⁰ with the cross-bar F³ of the guide frame.

Upon the rod h⁵ is mounted a roll h⁸ mounted on a stud h¹⁰ on the rod h⁵ which engages with the surface of the cam wheel h⁹ fast on the shaft F⁴. This cam wheel is rocked by the movement of the shaft F⁴ through about a quarter of a revolution and its periphery is divided into four cam surfaces of different shape, either of which may act upon the roll h⁸ to push the rod h⁵ and lever H against the force of the spring H¹, thus controlling the relation of the two sets of pins h¹, h², with relation to each other and hence the tension on the thread J which passes between them according to the shape of the cam surface. These pins form what may be termed a tension passage in which friction is applied to the thread. The tension may be

varied according to the thread to be wound by altering the position of the wheel h^2 on the shaft so as to bring any desired cam surface into engagement with the roll h^3 . The position of the cam wheel h^2 on the shaft F^1 may be varied in any suitable manner, as by the use of a set screw, pin or other similar device. The cam surfaces may be four in number, or more or less as seems desirable, according to the variety of thread which a given machine is expected to wind.

To obtain a proper primary adjustment of the pins h^1 , h^2 relatively to one another as against the stress of the spring H^1 there is threaded in the lever H a screw h^{11} which bears against the arm B^4 . By adjusting this screw a proper primary adjustment of the respective pins to receive the thread may be obtained after which the screw may be held in its adjusted position by means of a winged nut h^{12} .

The purpose of the weight F^7 is to hold the thread guide close against the cop which it is winding and by reference to Fig. 2 it will be seen that as the thread guide and guide frame are gradually pushed out by the increasing size of the cop, the arm F^3 and weight F^7 are gradually lifted on which account by the change in leverage the force tending to hold the thread guide against the cop will diminish as the cop increases in size. At the same time the pushing out of the guide will cause the cam wheel h^2 to turn slightly so as to force the pins h^1 on the member H away from the pins h^2 , thus reducing the friction upon the thread, this being desirable because as the cop grows gradually larger, the speed of the spindle remaining constant, the surface of the cop travels faster so that the thread is drawn off from the supply more rapidly all the time, which would increase the actual tension on the thread if the tension device did not reduce the friction on the thread slightly, thus permitting a cop to be wound with even stress throughout.

In operating the machine when the cop tube is empty and the thread guide is against it, it is possible as has been stated above, by moving the handle D^{13} to cause the engagement of the dog d with its rest e ; and by moving the handle j^6 to disengage the dog d and rest e and so stop the machine at will. It is desirable, however, that the machine shall be stopped automatically when the cop is sufficiently full, or upon the breaking of the thread. To stop the machine when the cop is sufficiently full, the arm F^1 of the guide frame has on it a boss k through which is free to slide a connecting rod k^1 . This rod is slotted at one end by a slot k^2 in which is contained a pin k^3 attached to the lever arm E^3 . This slot is to permit the lever arm E^3 to be operated by the handle j^6 without moving the rod k^1 . The other end of the rod k^1 is threaded and has on it a thumb nut k^5 the

position of which on said rod may be adjusted at pleasure. As the thread guide f^5 and its supporting frame move outwardly the boss k strikes the thumb nut k^5 acting as a stop and causes the rod k^1 to be drawn forward thereby operating the arm E^3 to disengage the rest e from the dog d . The spring D^{16} then acts to throw the arm D^5 to engage the beveled side of the groove D^1 and disengage the clutch.

In order that the spindle may be stopped instantly a brake strap K is provided. One end of this strap is attached to the stud D^{12} . The other end thereof is attached to the sleeve D^6 , the strap passing around a brake wheel D^3 on the shaft C so that as the arm D^5 is thrown to disengage the clutch the brake operated by the spring D^{16} will act to stop the spindle.

In order to stop the machine automatically in the case of the breaking of the thread I have mounted a lever on a stud j extending from the bracket B^6 . One arm j^1 of this lever is of wire which extends downward and has a finger j^2 bent at right angles thereto, which is adapted to engage the thread as it leaves the tension mechanism, the other arm j^3 of the lever projecting rearward and carrying a pin j^4 against which lies the end of a weighted rod j^5 attached to the swinging piece j^6 carrying the pin j^8 which is adapted to engage the prolongation j^7 of the handle j^6 . When these parts are set as shown in Fig. 2, the dog d and rest e will remain in contact, and the machine will continue to run. When the thread breaks the arm j^1 will fly up, releasing the weighted rod j^5 which will turn the rocker arm e^2 and move the lever E^3 disengaging the dog d and rest e .

I have referred above to the fact that in my machine means are shown for winding both a cylindrical cop and also a conical cop. The means for accomplishing this is extremely simple as it consists merely in substituting for a cylindrical spindle such as is indicated in Fig. 1, a conical spindle of ordinary construction such as is indicated in Fig. 4. The spindle is attached to the shaft C by a set screw, taper shank and socket, or other well known device. When the conical spindle is to be used the cylindrical spindle having been removed and the conical spindle put in its place, the screw f^3 is loosened and the arm f^3 carrying the guide-way f^4 is turned in the socket in the boss f^2 until the thread guide groove is parallel with the surface of the conical spindle when the screw f^3 is tightened again. It will be noted from Fig. 3 that the guide-way f^4 is hollow so that it affords a certain amount of space within which the connecting rod f^5 may adjust itself according to the angle to which the guide-way f^4 is set.

In describing the details of my mechanism above, I do not mean to limit myself to the

exact forms therein shown as the principles involved in their construction and operation may be embodied in other ways. The construction shown, however, is simple, and as the stop motion and tension are both carried, as it were, outside the machine, they are easily reached, arranged and adjusted according to the necessities of any given case, and all being mounted upon the same bracket, are compactly and simply arranged without any unnecessary multiplication of parts. The mounting of the shaft carrying the guide cam on the guide frame is new, I believe, and is an improvement upon the usual construction of machines of this class, because the guide frame as a whole can be easily removed for the purpose of changing the cam or for any other purpose, and the parts of the rest of the machine can easily be reached for repairs or cleaning.

One great advantage of mounting the cam shaft and the guide in the same frame lies in the fact that as the guide is pushed out by the growing cop the cam is pushed out at the same time and hence there is no friction upon the cam roll other than that due to the ordinary and legitimate engagement between the cam roll and the cam groove.

What I claim as my invention is:

1. In a winding machine, in combination a thread guide, a main shaft adapted to rotate in stationary bearings, a spindle on said main shaft, a guide frame adapted to swing to and from the main shaft, a cam adapted to revolve in bearings on said swinging frame, and adapted to reciprocate said thread guide, a guide-way adjustably attached to said guide supporting frame adapted to receive said reciprocating thread guide, as described.

2. In a winding machine, a main shaft, a spindle on said main shaft, a guide frame mounted to swing toward and from said main shaft, a thread guide, a guide-way adjustably attached to said swinging frame, a cam shaft adapted to revolve in bearings on said swinging frame, a cam mounted on said cam shaft, and adapted to reciprocate said thread guide in said guide-way, as described.

3. In a cop winding machine, in combination, a spindle, a guide frame, a guide-way adjustably attached to said guide frame, a thread guide adapted to reciprocate in said guide-way, a cam shaft mounted to revolve in said guide frame, a cam mounted thereon, means for connecting said thread guide and said cam to cause said thread guide to reciprocate, and means for holding said thread guide in operative position with relation to said spindle, comprising a rock shaft and a weight, and means whereby said rock shaft is connected with said weight and said guide frame, whereby the pressure of the thread guide on the cop is reduced as the cop increases in diameter.

4. In a winding machine, a spindle, a guide

frame, a guide-way, a thread guide adapted to reciprocate therein, and means whereby said thread guide is reciprocated, a tension mechanism and means whereby it may be adjusted automatically, comprising a stationary set of pins and an adjustable set of pins, said sets of pins being adapted to engage the thread, a rock shaft carrying a cam wheel, a cam roll bearing on said cam wheel, means whereby said cam roll is held against said cam wheel and is connected to said adjustable set of pins, and means whereby said rock shaft is connected to said guide frame, as and for the purposes set forth.

5. In a winding machine, a spindle, a guide frame, a guide adapted to reciprocate therein, means whereby said guide is reciprocated, a tension mechanism and means whereby it may be adjusted for a particular kind of thread, comprising a cam wheel having a plurality of cam surfaces, means whereby said cam wheel is connected to and operated by said guide frame, a cam roll adapted to run upon any one of said surfaces, and means whereby said cam roll is supported, a tension device and means whereby said tension device is connected to said cam roll support, said cam being adapted to be turned to present different faces to the cam roll, as described.

6. In a winding machine, a tension mechanism, comprising a stationary part and a movable part connected thereto, each part having a set of pins adapted to engage a thread, a winding mechanism comprising a spindle and a reciprocating thread guide, means for supporting said guide and means whereby said thread guide is pressed towards said spindle and the thread wound thereon during the winding operation, and means connecting said thread guide support and the movable part of said tension mechanism whereby said tension is decreased as the amount of thread wound increases, as set forth.

7. In a winding machine, a spindle, a guide frame, a guide-way adjustably attached to said guide frame, a thread guide reciprocating in said guide-way, a rock shaft connected to said guide frame, means whereby said rock shaft will cause the thread guide in said guide-way to press towards said spindle, a tension device, a cam wheel carried by said rock shaft, a cam roll and means whereby it is supported against said cam wheel and connected to said tension device whereby the position of said rock shaft and said guide frame will determine the relations of said tension device to the thread, as set forth.

8. In a winding machine, in combination, a spindle, a thread guide, a guide frame, a guide-way mounted thereon within which said thread guide may reciprocate, a cam shaft mounted in said frame and carrying a cam, means for connecting said thread guide

and said cam to cause said thread guide to reciprocate, a rock shaft carrying rocker arms, one of which is connected to said frame, the other carrying a weight, said rock shaft

5 also carrying a cam wheel, in combination with tension mechanism and means connecting said tension mechanism with said cam wheel whereby the movement of said cam wheel will vary the tension, as described.

10 9. In a winding machine, a spindle, a thread guide, a guide-way, a frame supporting said guide-way and means mounted in said frame whereby said thread guide is reciprocated, a clutch mechanism connected

15 with said spindle, a dog for maintaining said clutch mechanism in engagement to rotate said spindle and means for disengaging the dog operated from said guide carrying frame, comprising a slotted rod provided with a

20 thumb nut, said rod being adapted to slide in a lug attached to said guide frame, and said thumb nut being adapted to engage said lug, as and for the purposes set forth.

25 10. In a winding machine, in combination with a guide frame, a guide-way on said guide frame and a thread guide adapted to reciprocate therein, a shaft carrying a spindle, a freely running pulley and a clutch on said shaft adapted normally to engage said

30 pulley, and means operated by said guide frame for withdrawing said clutch from said pulley comprising an arm having a beveled end adapted to engage a corresponding surface on said clutch and move said clutch

35 along said shaft, a brake band and means connecting said brake band and said arm whereby the said brake band is operated to stop said spindle.

40 11. In a winding machine, in combination; a guide frame, a guide-way on said guide frame, and a thread guide adapted to be reciprocated therein, a shaft carrying a spindle; a freely running pulley adapted to be connected to said shaft, and a clutch adapted

45 normally to engage therewith, a brake, and means operated by said guide frame for withdrawing said clutch from said pulley, and operating said brake comprising a rock shaft having a beveled arm mounted thereon, a

50 spring tending normally to press said beveled arm into engagement with said clutch, and a band brake adapted to be operated by said rock shaft, as described.

55 12. In a winding machine, in combination with a swinging guide frame, a guide-way and a thread guide adapted to be reciprocated therein, a shaft carrying a spindle, a freely running pulley adapted to be connected to said shaft and a clutch adapted normally to

60 engage with said pulley, and means for operating said clutch, comprising an arm adapted to engage a corresponding surface on said clutch, a spring adapted to throw said arm into engagement with said clutch, a sleeve

65 provided with two lever arms, one of which

lever arms is adapted to engage said arm and hold it out of engagement with said clutch, and means for operating said lever arm whereby said arm may be released, comprising a connecting rod, one end of which is

70 connected with said lever arm, the other end of which is connected with said guide frame, whereby when said guide frame has been moved out by the bearing of said thread guide upon the material being wound upon

75 said spindle, and the thread wound thereon to a pre-determined diameter, said lever arm will be moved and said arm released, as and for the purposes described.

13. In a winding machine, in combination 80 with a guide frame, a guide-way and a thread guide adapted to be reciprocated therein, a tension mechanism a shaft carrying a spindle, a freely running pulley adapted to be connected to said shaft and a clutch adapted

85 normally to engage with said pulley, and means for operating said clutch, comprising a clutch operating arm adapted to engage a corresponding surface on said clutch, a spring adapted to throw said clutch operating arm

90 into engagement with said clutch, a lever arm adapted to engage said clutch operating arm and hold it out of engagement with said clutch, and means for operating said lever arm whereby said clutch operating arm may

95 be released, comprising a rocker arm, a rock shaft upon which it is mounted, a weighted rod connected with said rock shaft, a lever against one arm of which said weighted rod rests, the other arm of said lever engaging

100 the thread between its tension mechanism and the thread guide, whereby upon the breaking of said thread said lever will be released and said weighted rod will be caused to drop, as and for the purposes specified. 105

14. In a winding machine, a shaft, a spindle mounted thereon, a guide frame having a slide adapted to reciprocate therein, a guide-way and a thread guide adapted to reciprocate therein and means connecting

110 said slide and said thread guide comprising a connecting rod, the said guide-way being provided at one end with a stud about which the said guide-way is adapted to turn, and means to clamp said stud and guide-

115 way, whereby the said thread guide may be made to reciprocate in a line parallel with the surface of said spindle, as and for the purposes set forth.

15. In a winding machine, a shaft, a 120 spindle mounted thereon, a swinging guide frame having a slide adapted to reciprocate therein, a boss provided with a clamp, a guide-way, and a thread guide adapted to reciprocate therein, said guide-way being

125 provided with a stud adapted to fit into said boss, whereby said guide-way may be clamped at an angle to said swinging frame, said slide and said thread guide having a connection comprising a connecting rod 130

whereby the said thread guide may be made to reciprocate in a line parallel with the surface of said spindle.

16. In a winding machine, a shaft, a spindle mounted thereon, an adjustable guide-way, a thread guide adapted to reciprocate therein, said guide-way being provided with a stud about which the guide-way is adapted to turn, and means to clamp said stud in a fixed position whereby the said thread guide may be made to reciprocate in a line parallel with the surface of said spindle, as and for the purposes set forth.

17. In a winding machine, a shaft, a spindle mounted thereon, an adjustable guide-way, a thread guide adapted to reciprocate therein, said guide-way being provided at one end with a stud about which the said guide-way is adapted to turn, and means to clamp said stud and guide-way in a fixed position, whereby the said thread guide may be made to reciprocate in a line parallel with the surface of said spindle, as described.

18. In a winding machine, the combination of a winding spindle, a thread guide, a guide frame pivoted to swing to and from said spindle, a cam carried by said swinging frame, and means operated by said cam for reciprocating said thread guide.

19. In a winding machine, the combination of a main shaft, a winding spindle operated by said shaft, a guide frame mounted to swing towards and from said main shaft, a thread guide, a guide-way adjustably attached to said swinging frame, and a cam mounted on said guide frame and connecting with said thread guide for reciprocating the same in said guide-way.

20. In a winding machine, the combination of a winding spindle, a reciprocating thread guide, a guide frame, means for pivotally mounting said frame to swing upon an axis towards and from said spindle, a cam carried by said swinging guide frame and mounted to turn within bearings located thereon, said cam connecting with said thread guide for reciprocating it, and means whereby said cam may be operated from power obtained at the point of the axis of turning of said guide frame.

21. In a winding machine, the combination of a winding spindle, a reciprocating thread guide, a guide frame, a rotary shaft upon which said frame is pivotally mounted, a cam carried by said guide frame for reciprocating said thread guide, said cam being adapted to turn in bearings located upon said guide frame, and means for operating said cam from said rotary shaft.

22. In a winding machine, in combination, a winding spindle, a thread guide, a movable guide frame, means for holding said thread guide in operative position with relation to said spindle, said means comprising a rock shaft

and a connection between said rock shaft and said guide frame whereby said rock shaft may be turned as said guide frame is pressed outwardly by the increasing diameter of the package wound, an overbalancing weight connecting with said rock shaft and adapted whereby the influence of said weight may become diminished as said rock shaft is turned by the outward movement of said guide frame away from said spindle and the pressure of the thread guide against the package wound may be governed through the motion of said rock shaft as it is turned by the guide frame when pressed outwardly as before described.

23. In a winding machine, the combination with a winding spindle of a thread guide, a movable guide frame for maintaining said thread guide to bear against the package wound whereby said thread guide and guide frame may be moved outwardly by said package as the package grows, a tension device, a pivoted member interposed between said guide frame and said tension device, a connection between said pivoted member and said guide frame whereby said member may be rocked by the motion of said guide frame as it swings away from the winding spindle, a weighted arm attached to said pivoted member and arranged whereby it may be moved from a horizontal to an angular position when said member is operated as aforesaid, and means also attached to said pivoted member whereby such means may be influenced by the motion imparted as aforesaid to said member for relieving the tension.

24. In a winding machine, the combination with a winding spindle of a thread guide, a movable guide frame for maintaining said thread guide to bear against the package wound whereby said thread guide and guide frame may be moved outwardly as the package increases in diameter, a tension device comprising a stationary set of pins and a movable set of pins cooperating therewith in engaging the thread, a rock shaft, a connection between said rock shaft and said guide frame whereby said rock shaft may be influenced thereby, and means interposed between said movable set of pins and said rock shaft whereby the position of said movable set of pins may be changed by the turning of said shaft and a change of tension effected.

25. In a winding machine, a tension mechanism comprising a stationary part and a movable part cooperating therewith, each part having a set of pins adapted to engage a thread, a winding mechanism comprising a spindle and a reciprocating thread guide, a movable guide frame for maintaining said thread guide to bear against the package wound on said spindle whereby said thread guide and guide frame may be moved out-

wardly by said package as the windings of the thread increase thereon, means whereby said thread guide is pressed towards said spindle and the thread wound thereon during the winding operation with a gradually lessening pressure, and means connecting said guide frame and the movable part of said tension mechanism whereby said tension is decreased as the amount of thread wound increases; as set forth.

26. In a winding machine, the combination with a winding spindle of a thread guide, a movable guide frame for maintaining said thread guide to bear against the package wound whereby said thread guide and guide frame may be moved outwardly as the package increases in diameter, a tension mechanism comprising a tension device having a fixed and a movable part, a cam, means whereby said cam is connected with and moved by said guide frame when operated by the package as aforesaid, and means whereby said cam by the operation thereof may move the movable part of said tension device and release the tension as described.

27. In a winding machine, in combination, a winding spindle, a thread guide, a movable guide frame, means for holding said thread guide in operative position with relation to said spindle, said means comprising a rock shaft and a connection between said rock shaft and said guide frame whereby said rock shaft may be turned as said guide frame is pressed outwardly by the increasing diameter of the package wound, an overbalancing weight connecting with said rock shaft and adapted whereby the influence of said weight may become diminished as said rock shaft is turned by the outward movement of said guide frame away from said spindle, a tension device and means whereby said device may be governed through the motion of said rock shaft as it is turned by the guide frame when pressed outwardly as before described.

28. In a winding machine, the combination of a winding spindle, a thread guide, a guide frame, means for mounting said frame whereby it may be moved outwardly by the

package wound on said spindle as said package increases in diameter, a shaft driving said spindle, a clutch by which said shaft may be thrown into and out of operation, a clutch-controlling mechanism normally acting to disengage said clutch, a catch for holding said clutch-controlling mechanism in an operative position, means for releasing said catch when said guide frame has been moved a predetermined distance by the package wound, a brake carried by said clutch-controlling mechanism, and means whereby said brake may be applied to stop the rotation of said driving shaft when said clutch-controlling mechanism has been released from said catch as aforesaid.

29. In a winding machine, the combination of a winding spindle, a thread guide, a guide frame, means for mounting said frame whereby it may be moved outwardly by the bearing of the package wound against said guide as said package increases in diameter, a shaft driving said spindle, a clutch mechanism for throwing the spindle-driving portion of said shaft into and out of operation, mechanism normally acting to disengage said clutch, a lever connecting with said clutch-controlling mechanism for holding it in a disengaged position, means whereby said lever may be operated to release said clutch-controlling mechanism into an engaging position upon the breaking of the running thread, said means comprising an overweighted arm pivotally mounted and connecting with said lever to operate it upon the dropping of said arm, and means engaging with the running thread for supporting said arm whereby upon the breaking of the thread said arm may be released to drop and operate said lever to disengage said clutch-controlling mechanism, as described.

In testimony whereof, I hereunto set my name this 17th day of September 1903.

THORVALD HANSEN.

Witnesses:

GEORGE O. G. COALE,
J. N. DOLAN.