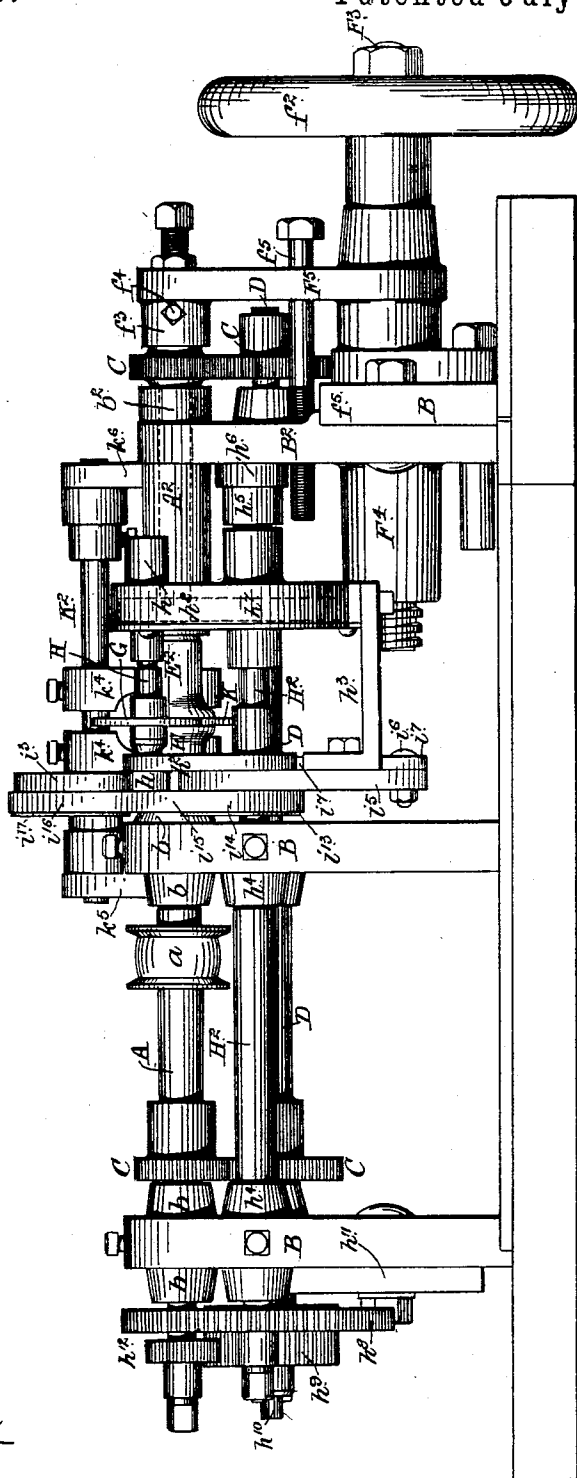


A. DEWHURST.
MACHINE FOR WINDING THREAD.

No. 586,423.

Patented July 13, 1897.

FIG. 1.



Witnesses:

E. J. Griswold

L. Menke

Inventor:

Algernon Dewhurst

By his attorneys

Howson and Howson

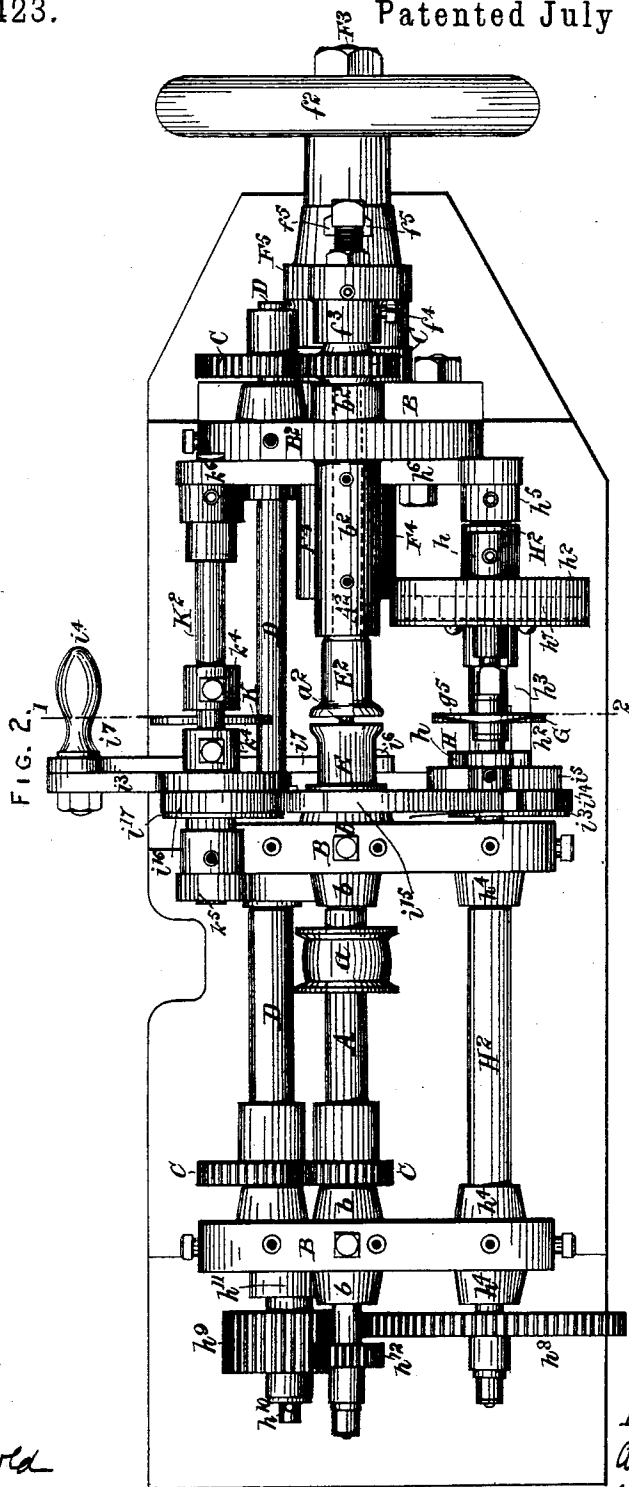
(No Model.)

9 Sheets—Sheet 2.

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Witnesses:

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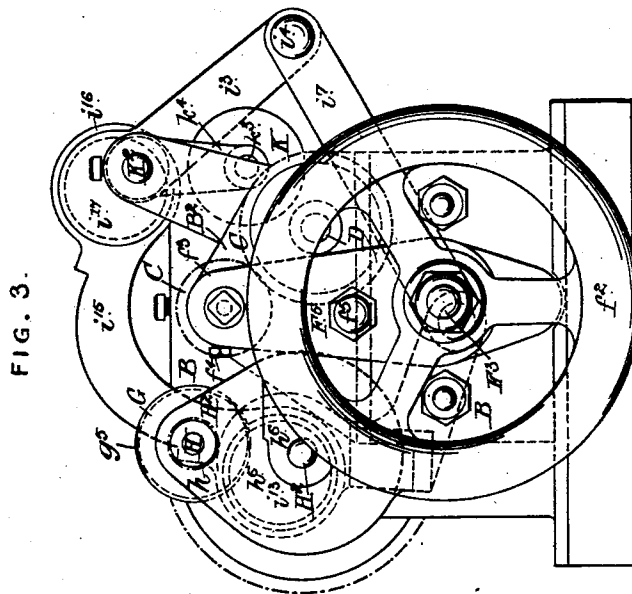
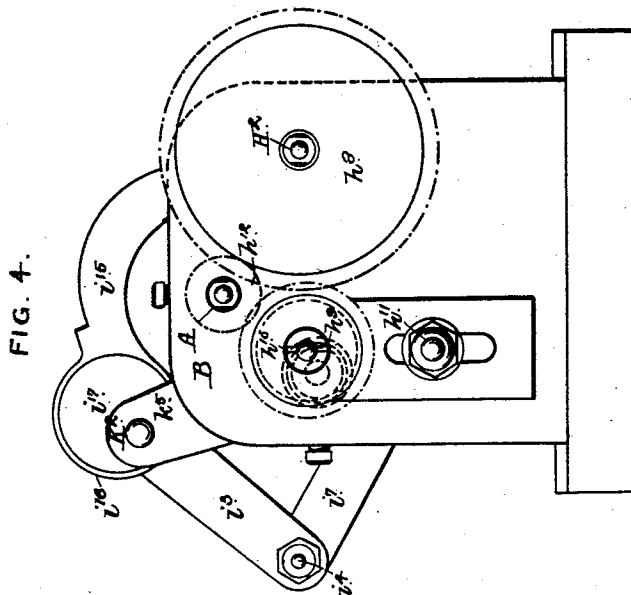
(No Model.)

9 Sheets—Sheet 3.

A. DEWHURST.
MACHINE FOR WINDING THREAD.

No. 586,423.

Patented July 13, 1897.



Witnesses:

E. J. Griswold
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L. Wenke

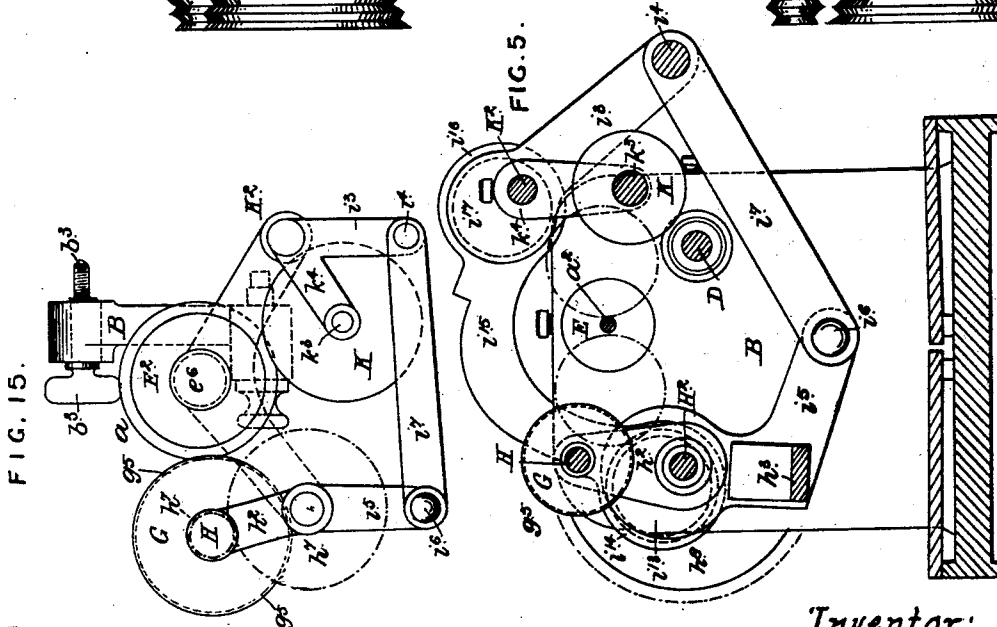
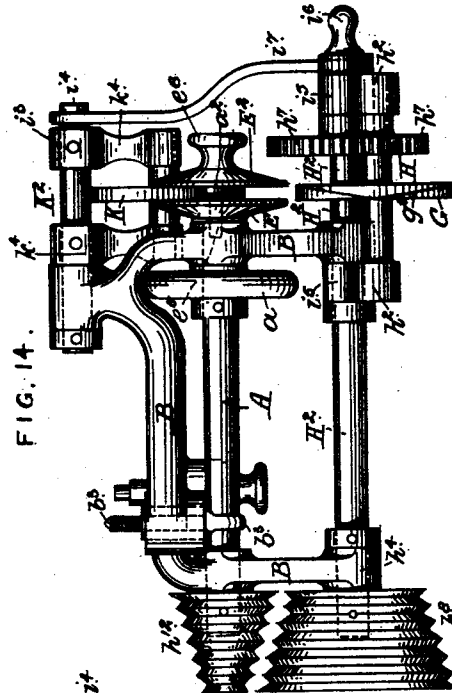
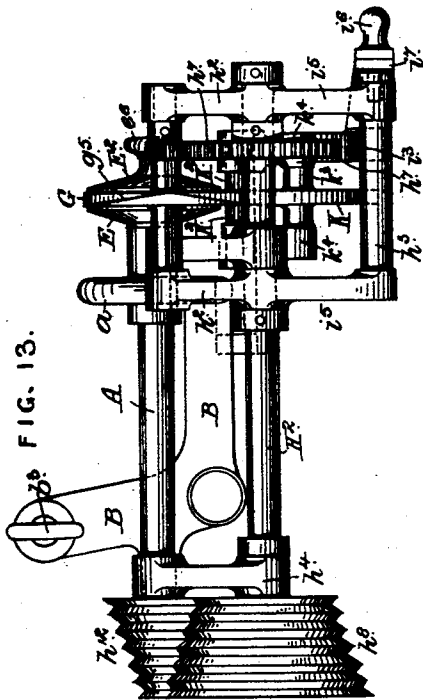
Inventor:

Algernon Dewhurst
By his Attorneys
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A. DEWHURST.
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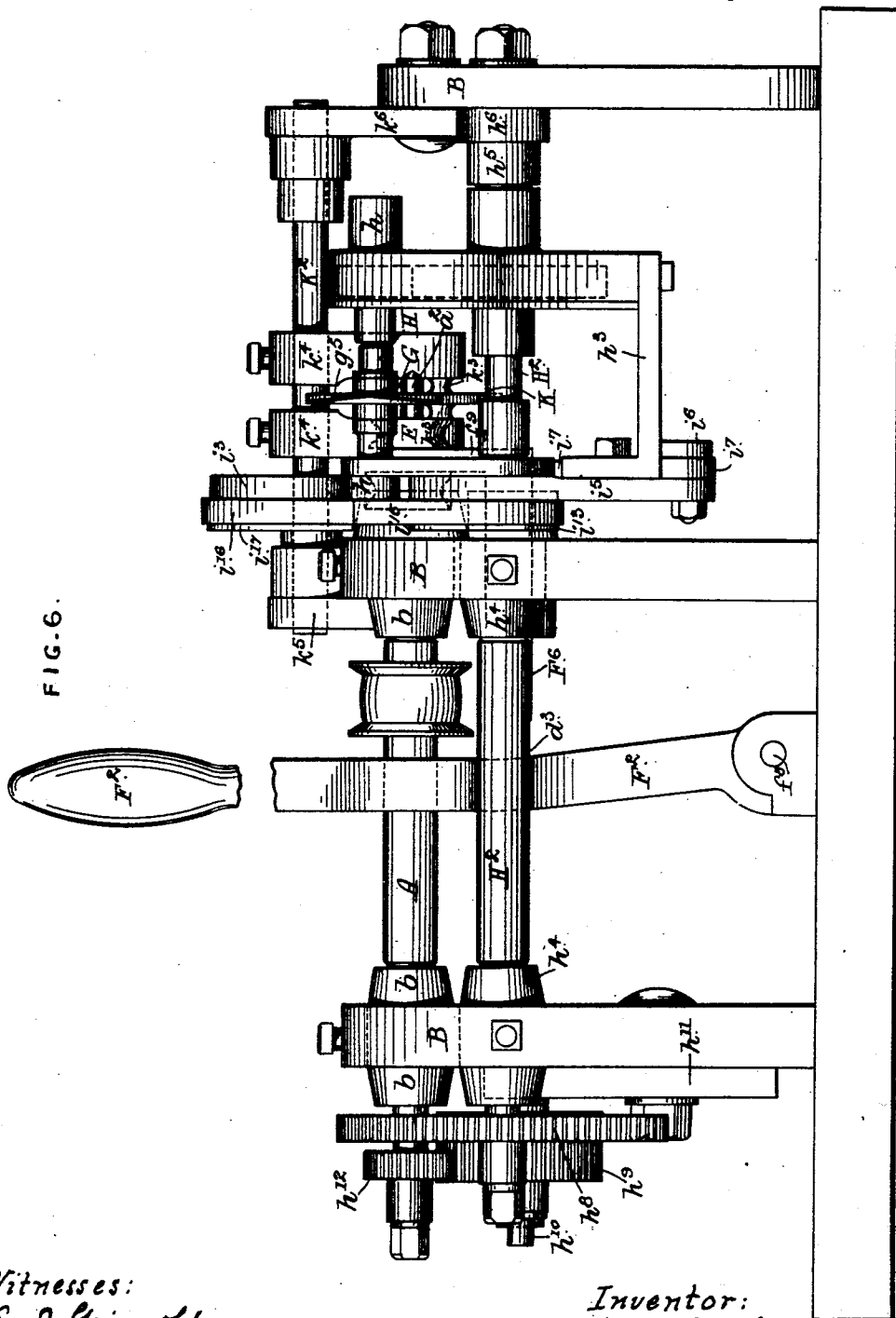
Witnesses:
E. J. Griswold
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Inventor:
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A. DEWHURST.
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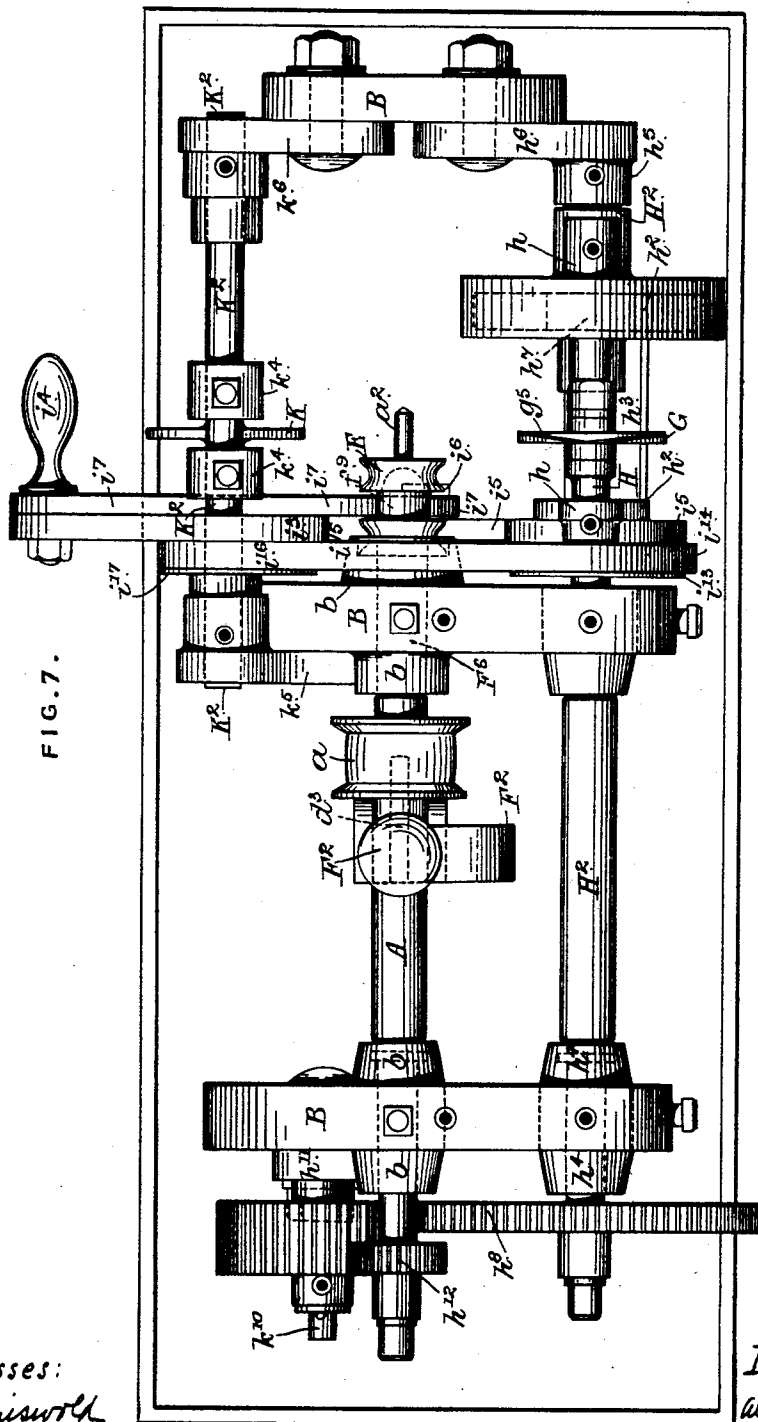
Witnesses:
E. J. Griswold
L. Wenke

Inventor:
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Howson and Howson

A. DEWHURST.
MACHINE FOR WINDING THREAD.

No. 586,423.

Patented July 13, 1897



Witnesses:
E. J. Griswold
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Inventor:
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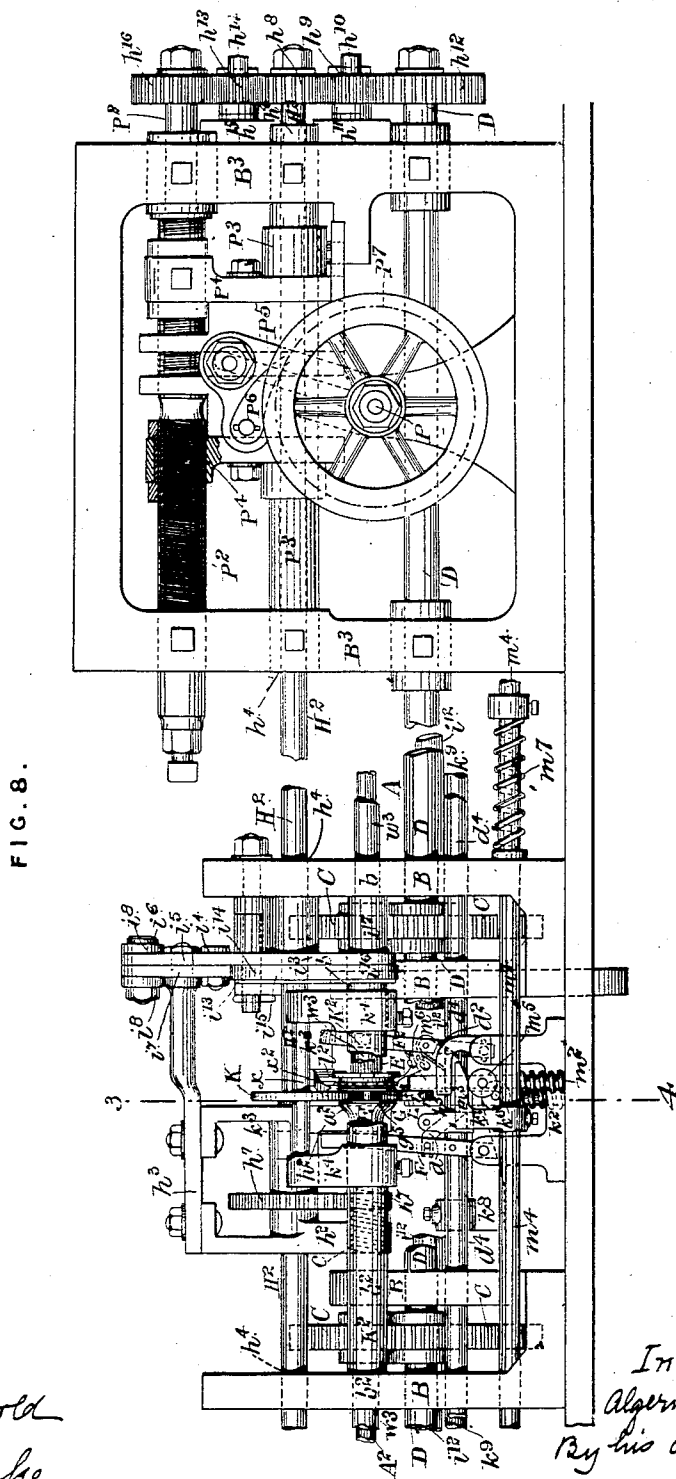
(No Model.)

9 Sheets—Sheet 7.

A. DEWHURST.
MACHINE FOR WINDING THREAD.

No. 586,423:

Patented July 13, 1897.



Witnesses:

E. J. Griswold

L. Menke

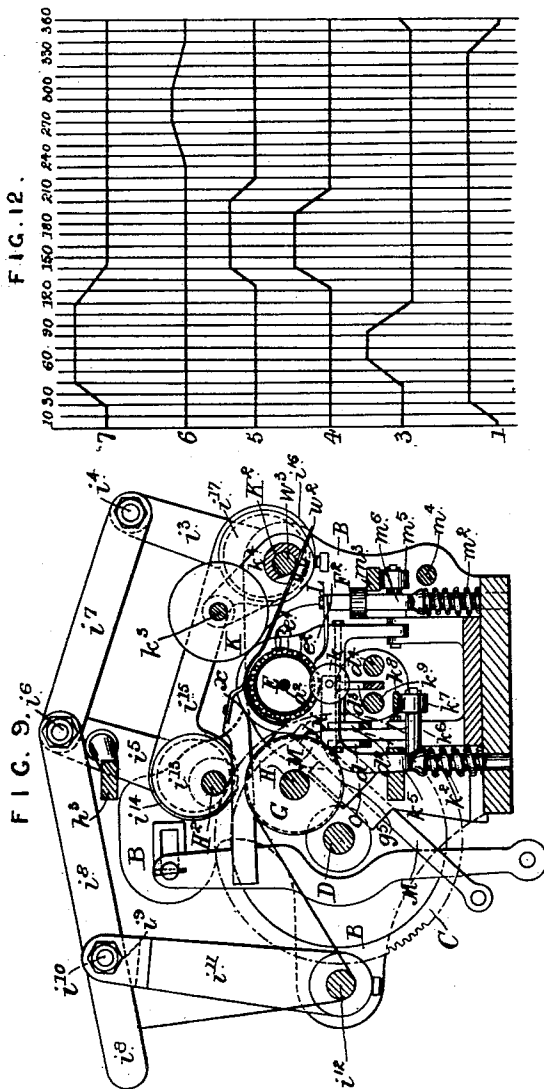
Inventor:
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By his attorneys

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A. DEWHURST.
MACHINE FOR WINDING THREAD.

No. 586,423.

Patented July 13, 1897.



Witnesses:

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Inventor:

Algernon Dewhurst
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Howson and Howson

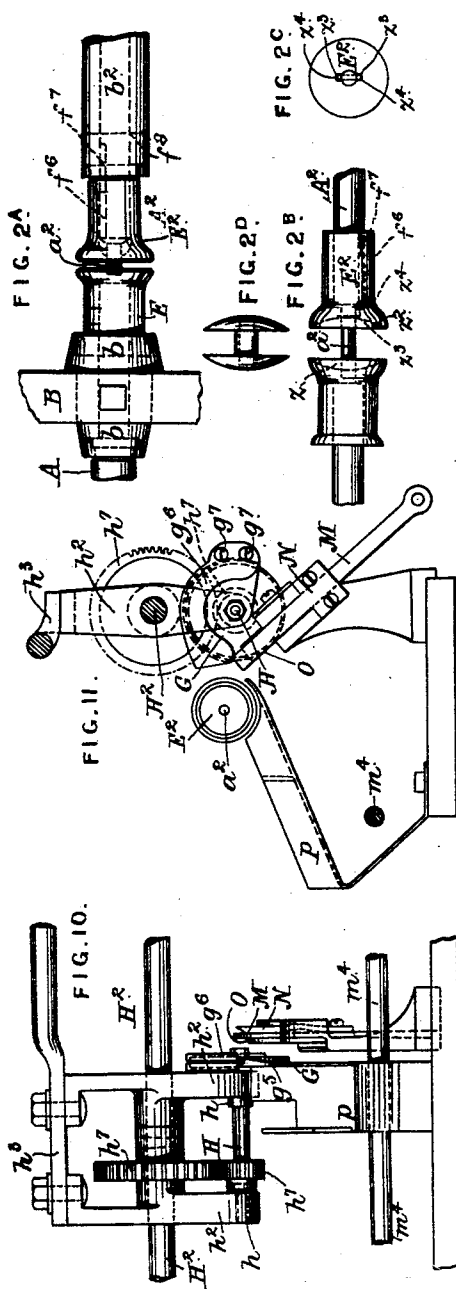
(No Model.)

9 Sheets—Sheet 9.

A. DEWHURST.
MACHINE FOR WINDING THREAD.

No. 586,423.

Patented July 13, 1897.



Witnesses:

E. J. Griewold

L. Wenke

Inventor:

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UNITED STATES PATENT OFFICE.

ALGERNON DEWHURST, OF SKIPTON, ENGLAND.

MACHINE FOR WINDING THREAD.

SPECIFICATION forming part of Letters Patent No. 586,423, dated July 13, 1897.

Application filed October 25, 1895. Serial No. 566,932. (No model.) Patented in England May 6, 1885, No. 5,609.

To all whom it may concern:

Be it known that I, ALGERNON DEWHURST, a subject of the Queen of Great Britain and Ireland, residing at Skipton, in the county of York, England, and a director of John Dewhurst & Sons, Limited, cotton-spinners and sewing-cotton manufacturers, have invented certain Improvements in Machinery for Winding Thread or the Like, of which the following is a specification.

My invention relates to machines for winding thread or the like into coils, cops, or cylinders or onto bobbins, spools, or tubes or the like, and more particularly to machines in which the thread or the like is wound in spiral form of coarse pitch—that is, with what is known as a “quick traverse”—and in which the speed of the traverse is caused to bear a uniform ratio to the speed of the winding-spindle by means of regulating devices—for example, by change-wheels such as are employed in the machines for which Letters Patent were granted to me in Great Britain, dated 6th day of May, 1885, No. 5,609, or in which the speed of the traverse as compared with that of the winding-spindle is caused to increase as the coil increases in diameter; and my invention has for its object to provide means whereby the thread can be traversed to and from one extreme end to the other end of the cop, coil, cylinder, or the like without any vibrating or reciprocating movement of the thread-guide, thereby reducing wear and tear. I provide a rotary thread-guide in combination with means for giving to the said guide a rotary movement by positively driving it from the same source as that from which the winding spindle or spindles is or are driven.

I will describe my invention as applied to machines for winding coils or cylinders of thread such as are described in the specification to the Letters Patent hereinbefore referred to, from which its application to other machinery of a similar kind will also be readily understood. In this machine two spindles, which I call the “front” and “back” winding-spindles, are employed arranged in axial line one with the other and having cheek-pieces thereon between which the coil of thread is wound upon the reduced end of one of the said spindles.

According to my present invention the thread is conducted to the spindle, tube, spool, or bobbin on which it is to be wound by the aforesaid rotary thread-guide, the end of the thread being secured to the said spindle, tube, spool, or bobbin by any suitable retaining device, so as to cause the thread to be wound on the said spindle, spool, or the like when the spindle rotates. The said thread-guide consists of a disk or cylinder in one or more parts having in its periphery a cam groove or space so shaped that the thread which is placed therein is by the rotation of this disk or cylinder (without any longitudinal movement being given to the said disk or cylinder) caused to traverse to and fro from end to end of the coil and to lay the consecutive spirals of thread parallel and close together. The thread-guide is mounted on a short spindle carried by an arm (or by arms rigidly connected together) loosely mounted on a counter-shaft arranged parallel to the winding-spindles. The arm or arms may be connected by means of levers and connecting-rods or by eccentrics or by levers, connecting-rods, and eccentrics to a loosely-revolving presser arranged to bear on the coil as it is being wound, which presser by being connected to the thread-guide maintains the said thread-guide at a suitable distance from the coil as it is being made, the connection being such that as the coil increases in diameter and forces the presser farther from the axis of the winding-spindle the thread-guide will be moved correspondingly away from the axis of the said winding-spindle.

For operating the rotary parts of the machine any suitable arrangement of gearing may be employed, and change-wheels or other convenient means may be provided for varying, as required, the relative speeds of the thread-guide and winding-spindles.

A suitable arrangement of driving-gear consists as follows: On the winding-spindle is a pulley round which passes a driving-strap from any suitable motor. The winding-spindle carries a pinion gearing with a broad carrier-wheel mounted on a stud on an adjustable plate or bracket, with which carrier-wheel also gears a spur-wheel on a counter-shaft, from which, by means of gearing, rotation is given to the thread-guide. The gear-

wheels by which motion is transmitted from the winding-spindle to the counter-shaft are change-wheels, so that wheels of suitable sizes may be fitted to vary the speed of rotation of the thread-guide with relation to the speed of rotation of the winding-spindle, so as to cause the thread to be moved to and fro from end to end of the cop, spool, or cylinder of thread or the like in such a manner that whatever may be the thickness of the thread or the like to be wound each right-hand spiral can be laid in close juxtaposition to the preceding right-hand spiral, and each left-hand spiral can be laid in close juxtaposition to the preceding left-hand spiral.

In order that my invention may be clearly understood, I shall further describe the same with reference to the accompanying drawings.

Figure 1 is a side elevation, and Fig. 2 a corresponding plan, of a hand winding-machine constructed according to my invention for making one coil, cop, or cylinder at a time or for winding onto one bobbin, spool, or tube at a time. Fig. 2^A is a plan of the contiguous ends of the two winding-spindles. Fig. 2^B is an elevation of a modified form of cheek-pieces employed in winding thread or the like onto bobbins or spools. Fig. 2^C is a face view of one of the said cheek-pieces, and Fig. 2^P is a side view of a spool to be wound. Figs. 3 and 4 are elevations of the two ends of the machine; and Fig. 5 is a transverse sectional elevation made on the line 1 2, Fig. 2. Figs. 6 and 7 are respectively a front elevation and a corresponding plan of a hand winding-machine for winding one cop at a time upon one end of a single winding-spindle without the use of cheek-pieces. Fig. 8 is a front elevation with parts of the various shafts or rods broken away and portions of the apparatus removed to show more clearly the thread-guide and the winding mechanism of a self-acting machine of the Weild type for winding several cops, coils, spools, or the like at one time; and Fig. 9 is a transverse sectional elevation taken on the line 3 4, Fig. 8, the divided cap or cover of the thread-guide removed and all the distant parts of the machine omitted, the thread-hook, stationary cutter, and spring-plate for securing the end of the supply-thread being shown in this figure in their usual position and those parts of the machine which for convenience are in Fig. 8 broken away being in this figure shown in section. Figs. 10 and 11 are respectively a front elevation and a transverse sectional elevation of a portion of the machine, showing more clearly the thread-guide with its divided cap or cover, the thread-cutter, and thread-retaining device, also the sloping delivery trough or chute, Fig. 11 showing also the position of the winding-spindle; and Fig. 12 represents a plane projection of the cams, showing the relative positions of the cam-surfaces for effecting the various motions hereinafter described.

Figs. 13, 14, and 15 are respectively a side elevation, a plan, and an end view of the principal parts of a winding-machine constructed substantially in the same manner as that described with reference to Figs. 1, 2, 2^A, 3, 4, and 5, but on a much smaller scale, so as to render it suitable as an attachment to a sewing-machine.

The hand-machine represented by Figs. 1, 2, 2^A, 3, 4, and 5 may be used for winding thread or the like into coils, cops, or cylinders or the like either with or without central tubes, and may be bolted or otherwise fixed upon an ordinary table for hand-spooling, and may be driven from any suitable prime mover by means of a strap or tape passing round the wharve or pulley *a*, fast on the front winding-spindle *A*, which is fitted to rotate in bearings *b* in the frame *B* of the machine.

In axial line with the spindle *A* is mounted in bearings *b*² the back winding-spindle *A*², which is driven at the same speed as and from the front spindle *A* by means of the gearing *C* and shaft *D*. One end of the back spindle *A*² is reduced in diameter, as shown at *a*², to correspond to the size of the hole or passage to be left in the center of the coils or rolls of thread to be formed on which reduced portion, which may, if so desired, for winding upon tubes be constructed with expanding-springs or other expanding apparatus. The thread is wound between two cheek-pieces, collars, or heads *E E*², mounted, respectively, on the adjacent ends of the front and back spindles. These cheek-pieces, collars, or heads are fitted so as to rotate with their spindles. The cheek-piece *E*² is provided with a hole or passage in its center, through which hole the reduced portion *a*² of the spindle *A*² projects and enters a recess in the face of the cheek-piece *E*, the distance between the faces of the two collars or cheek-pieces being equal to the thickness or length of the coil or roll of thread to be formed.

G is a thread-guide which consists of a disk having in its periphery a cam groove or space *g*⁵ to receive the thread to be wound. This guide is fast on a spindle or shaft *H*, mounted in bearings *h* in arms *h*², connected together by a bar *h*³, so as to form a rigid frame, which frame is mounted loosely on a shaft *H*², arranged parallel to the winding-spindles *A A*², and mounted in bearings *h*⁴ in the frame *B*, and a bearing *h*⁵ in a bracket *h*⁶, bolted to a plate *B*², secured to the said frame.

The spindle or shaft *H* and the shaft *H*² are connected together by gearing *h*⁷. On the shaft *H*² is a spur-wheel *h*⁸, gearing with a broad carrier-pinion *h*⁹, mounted loosely on a stud *h*¹⁰ on an adjustable bracket *h*¹¹, bolted to the frame *B* of the machine.

Gearing with the broad carrier-pinion *h*⁹ is a spur-wheel *h*¹² on the front winding-spindle *A*. The wheels *h*⁸ *h*¹² are change-wheels, whereby the relative speeds of the winding-

spindles A A² and the spindle or shaft H, carrying the thread-guide G, may be varied as required.

K is a disk preferably of slightly greater diameter than the thread-guide G, the said disk being carried so as to rotate on an axis k^3 in arms k^4 , fast on a rocking shaft K², mounted in a bracket k^5 , bolted to the frame B, and in a bracket k^6 , bolted to the plate B². On the shaft K² is also fixed another arm i^3 , provided with a handle i^4 , by means of which the shaft may be turned in its bearings in the brackets k^5 k^6 , so as to cause the disk K to press on the thread as it is being wound on the reduced portion a^2 of the spindle A². The length of the arms k^4 from the center of the disk or presser K to the axis of the rock-shaft K² is the same as that of the arms h^2 from the center of the thread-guide G to the axis of the shaft H², the position of the rock-shaft K² being such that it and the shaft H² are equidistant from the axis of the winding-spindle.

Connected to the frame h^2 h^3 is an arm i^5 , hinged at i^6 to one end of a rod or bar i^7 , the opposite end of which rod or bar i^7 is, by means of a stud forming part of the handle i^4 , connected to the arm i^3 on the shaft K². The length of the arms i^3 and i^5 are equal to one another, and the length of the connecting bar or rod i^7 is equal to the distance between the axes of the shafts H² and K². Thus it will be seen that the imaginary lines K² i^4 , i^4 i^5 , i^5 H², and H² K² form a parallelogram and that the arms and connections of which three sides of it are composed move together in such a way that the angle H H² A is always equal to the angle k^3 K² A, so that as the disk or presser K is moved farther from the axis of the winding-spindle by the coil of thread as the said coil increases in diameter the thread-guide G will be correspondingly moved farther from the said spindle and so during the winding process be constantly kept just out of contact with the coil.

In order to insure great accuracy of the movement of the presser and the thread-guide to and from the winding-spindle, I prefer to apply an additional connection between the shafts H² and K², the said connection consisting of an eccentric i^{13} on the frame h^2 h^3 , of which eccentric the strap i^{14} forms part of a connecting-bar i^{15} , which at its other end forms also the strap i^{16} of another eccentric i^{17} , fast on the rock-shaft K², the lines of greatest throw in the two eccentrics being parallel one to the other and pointing in the same direction.

f^2 is a hand-wheel fast on a screwed stem F³, working in a stationary nut or internally-screwed boss F⁴, formed on the plate B², bolted to the frame B. On a plain or unscrewed part of this stem is loosely mounted between the boss of the wheel f^2 and a collar on the said stem an arm F⁵, provided at its upper end with a hollow boss f^3 , in which the outer end of the back winding-spindle A² rotates.

In the portion of the spindle A² which enters the hollow boss f^3 is formed an annular groove or recess, with the sides of which engages the end of a set-screw f^4 , screwed through the side of the said hollow boss. The engagement of this set-screw with the sides of the annular groove or recess causes the said spindle to move longitudinally with the movement of the screwed stem F³ and arm F⁵, but nevertheless admits of the rotation of the spindle in the said boss f^3 . The distance to which the back spindle A² can be moved longitudinally is governed by the head of a stud f^5 , which stud passes through a hole in the arm F⁵ and screws into the plate B², the distance to which the stud is made to project beyond the arm F⁵ regulating the extent of the longitudinal movement of the spindle. On the spindle A² is provided a longitudinal groove f^6 (see Fig. 2^A) to receive a key f^7 , fixed in the interior of the cheek-piece E², so as to cause the said cheek-piece to revolve with the said spindle, although admitting of the longitudinal movement of the said spindle in the said cheek-piece. The cheek-piece E² is moved away from the cheek-piece E by the outward longitudinal movement of the spindle A² until the rear end of the said cheek-piece comes into contact with a shoulder f^8 in the interior of the bearing b^2 , whereupon the movement of the cheek-piece is arrested and the spindle, by its continued movement, draws the reduced end a^2 thereof into the cheek-piece E², and so releases from the machine the coil of thread when wound.

In commencing to form a coil or roll of thread the thread from the thread-supply is laid in the cam groove or space g^5 of the thread-guide G, and the end of the thread is secured between the contiguous ends of the front and back spindles A A². The thread-guide G is then by means of the handle i^4 brought into position between the cheek-pieces E E². The machine is then started in the ordinary manner by friction-gearing worked by a treadle or otherwise, whereupon the spindles A A² will rotate and wind the thread upon the reduced portion a^2 of the back spindle A². When the coil has reached the required diameter, the thread-guide is removed from between the cheek-pieces by means of the handle i^4 , the thread is severed, the cheek-pieces E E² are separated one from the other by means of the hand-wheel f^2 , and as the motion of the hand-wheel is continued the reduced end of the spindle A² is withdrawn from the center of the coil, which, being released, falls from the machine into a suitable receptacle.

Figs. 6 and 7 illustrate a modified form of the machine hereinbefore described and in which modified machine the use of the back winding-spindle and its cheek-piece is dispensed with, and the cheek-piece E is fitted to slide longitudinally on the spindle A for the purpose of forcing from its reduced end a^2 the coil of thread or the like when wound.

The sliding movement of the cheek-piece E is effected by means of a lever-handle F², hinged at f³ to the base of the machine, the said lever being connected by a link d³ to a sliding bar F⁶, provided with a projection f⁹, which engages the sides of an annular groove or recess formed for the purpose in the periphery of the cheek-piece E, so that by moving the lever-handle F² in one direction or the other a corresponding movement can be imparted to the said cheek-piece. The bar F⁶ slides in an opening provided for the purpose in the frame B.

In the arrangement illustrated by Figs. 6 and 7 the brackets h⁶ and k⁶ are shown attached to a portion of the framework B, which is for the purpose carried up somewhat higher than usual.

Referring to Figs. 2^B and 2^C, which illustrate a modification in the construction of the cheek-pieces and of the contiguous ends of the winding-spindles A A² for winding thread or the like onto spools, one of which is illustrated by Fig. 2^D, the contiguous faces of the cheek-pieces E E² are respectively formed with recesses z z² to receive the correspondingly-shaped ends of the spool upon which the thread is to be wound. In the sides of the aperture in the center of the cheek-piece E² are one or more longitudinal slots z³ to admit of the passage of one or more projections z⁴, provided on the spindle A² for the purpose of engaging with the surface of one end of the spool to insure its rotating along with the winding-spindles.

Although in the drawings, Figs. 1, 2, 2^A, 2^B, 2^C, 3, 4, and 5, I have illustrated an arrangement wherein the cheek-piece E² and the spindle A² receive longitudinal movement, I do not restrict myself to this arrangement, as it is obvious that the cheek-piece E and spindle A may be arranged to move in place thereof or in combination therewith.

The self-acting machine of which Figs. 8 to 12 show certain portions is one of the Weild type modified in several respects, as described in the specification to the Letters Patent hereinbefore referred to.

In applying my invention to self-acting machines I may arrange any desired number of spindles in one machine and rotate them from one driving-shaft. I have, however, shown in Fig. 8 of my drawings only one pair of spindles, and in order to prevent unnecessary complication I have omitted from the drawings various details and parts common to such machines, but which are or may be used in combination with my improvements.

Referring to Figs. 8, 9, 10, and 11, B is a portion of the framework of the machine. A A² are respectively the front and the back winding-spindles, rotating, respectively, in bearings b b² and fitted with collars or cheek-pieces E E², as in the hand-machine hereinbefore first described. a² is the reduced portion of the front spindle A, upon which I prefer, in the case of a self-acting machine, to wind the

coil or roll of thread or the like; D, the driving-shaft; C C, the gearing for rotating the winding-spindles; G, the rotary thread-guide; H, the spindle or shaft which carries the thread-guide; h, the bearings of the said spindle or shaft; h², the arms in which it is carried; h³, the bar which connects the said arms, so as to form a rigid frame like that which I have described in connection with the hand-machine; H², the shaft upon which the said rigid frame is loosely mounted; h⁴, the bearings of the shaft H² in the framework B and B³; h⁷, the gearing which connects the shaft H² with the spindle or shaft H; h⁸, the spur-wheel on the shaft H², gearing with a carrier-pinion h⁹; h¹⁰, the stud which carries the said pinion; h¹¹, the adjustable bracket by which the stud h¹⁰ is attached to the framework B of the head-stock at the end of the machine; h¹², a wheel upon the driving-shaft D, by means of which motion is imparted to the carrier-pinion h⁹ and through it to the spur-wheel h⁸ and the guide G, the wheels h⁸ h¹² being change-wheels, whereby the relative speeds of the winding-spindle A and the spindle or shaft H, carrying the thread-guide G, may be varied as required; g⁵, the cam groove or space to receive the thread to be wound; g⁶, a divided cap or cover which I prefer to place over the rotary thread-guide in order to prevent the thread from slipping off it sideways while the spindles are stationary, the said cap or cover being attached to the rigid frame h² h³ by means of screws g⁷ or by some other convenient device; K, the presser which acts upon the thread while it is being wound upon the reduced portion a² of the driving-spindle A; k³, the axis on which the presser K revolves; k⁴, the arms which carry the presser K, the said arms being fast on the rock-shaft K², which I prefer, in the case of a self-acting machine, to make hollow and to mount loosely upon the sliding rod w³, a portion of the said rock-shaft being cut away, as shown in Fig. 9, to allow sufficient room for the horizontal movement of the hooked wire w², which is also mounted on the rod w³, and to allow the rock-shaft to make a partial revolution without its coming in contact with the hooked wire. v³ is the arm which in the case of the hand-machine hereinbefore first described is provided with a handle, but which in the case of a self-acting machine need not be so provided; v⁵, the arm connected to the frame h² h³.

v⁷ is the bar which forms the connecting-rod between the arms v³ and v⁵, which bar carries at one end a stud v⁴, by means of which it is hinged to the arm v³, the said bar being at its other end hinged to the arm v⁵ by means of a stud v⁶ and also to a link v⁸, the forked end of which carries the aforesaid stud v⁶, there being in the underneath portion of the said link v⁸ a curved notch or opening v⁹, (shown in dotted lines in Fig. 9,) the curve of which notch has the stud v⁶ for its center, and the said notch engages a stud v¹⁰, carried by the

forked end of an arm i^{11} , fastened by a set-screw to the shaft i^{12} , the connection being such that when the aforesaid notch is engaged with the aforesaid stud the presser, and along with it the guide, can, by a partial revolution of the aforesaid shaft i^{12} in one direction, be moved away from the winding-spindle, or can, by the shaft being permitted to make, under the action of the customary spring or weight, a partial revolution in the opposite direction, be moved closer to the winding-spindle; and when the link i^8 is raised so as to disengage the notch i^9 from the stud i^{10} the presser and the guide can be moved by hand to facilitate the piecing of a broken thread, or for any other purpose; i^{13} , the eccentric on the rigid frame h^2 h^3 ; i^{14} , the strap of the said eccentric; i^{17} , the eccentric on the rock-shaft K^2 ; i^{16} , the strap of this latter eccentric; i^{15} , the connecting-bar between the two eccentrics.

Gearing with the spur-wheel h^8 there is, in addition to the carrier-pinion already described, a second carrier h^{13} , mounted upon a stud h^{14} , attached to an adjustable bracket h^{15} , which is bolted to the framework B^3 of the head-stock at the end of the machine. Gearing with the said second carrier h^{13} is a spur change-wheel h^{16} , mounted upon the shaft P^2 , which, as is customary in Weild's self-acting spooling-machines, is made with right and left hand screws upon it for traversing the shaper-finger backward and forward across the shaper-plate. The shaper-plate and the shaper-finger, which are not shown in my drawings, are made like those in other machines of the Weild type; but, as in this machine there is not a traverse-rod for the sliding rocker P^3 to operate, it is mounted loosely upon the shaft H^2 , the position of which in the head-stock is, in order to suit the arrangement of the other portions of the machine, somewhat lower down than the usual position of the traverse-rod in ordinary machines, the rocker-arms P^4 being correspondingly longer than usual and the shaper-plate being placed somewhat lower than customary in order that it may be upon a level with the center of the shaft H^2 , and consequently on a level with the axis of the rocker P^3 .

From the sliding rocker P^3 is actuated the second rocker P^5 , to which is attached the usual pawl P^6 , which actuates the ratchet-wheel P^7 (shown in dotted lines in Fig. 8) and thus causes the ratchet-wheel shaft P to gradually rotate with an intermittent motion while the winding is in progress. The wheel h^{16} being, as already described, a change-wheel, it is possible by means of it to regulate the speed at which the screw-shaft P^2 rotates, and consequently the number of times that the shaper-finger traverses across any given shaper-plate for a certain number of revolutions of the shaft H^2 and for a certain number of revolutions of the driving-shaft D .

As is customary with machines of the Weild type, each time the shaper-finger makes a backward-and-forward movement across the

shaper-plate the pawl P^6 , attached to the rocker P^5 , moves the ratchet-wheel forward one tooth, and when the last tooth is being acted upon the winding portion of the machine is brought to a standstill and the cam portion for performing the other operations is set in motion. The shaper-plate being changeable, also to a limited extent adjustable, and the ratchet-wheel P^7 and the spur-wheel h^{16} being change-wheels it is possible by selecting a shaper-plate of the right form and wheels with the requisite number of teeth to regulate the number of revolutions that the winding-spindle makes during the winding of each cop or the like, and consequently the length of thread wound.

k is a loosely-revolving presser situated beneath the winding-spindle and supported by a forked stem k^5 , the said presser being under the action of a spring k^2 , operating upon the said stem, brought into contact with the coil of thread or the like after it has been wound and for the purpose of squeezing down upon its surface the loose end of thread after the severing of the coil from the thread-supply. For the purpose of holding the presser out of action until it is required to press upon the coil there projects from stem k^5 a stud k^6 , carrying a bowl k^7 , which is acted upon by a wedge-shaped block k^8 , mounted upon the sliding rod k^9 , which is operated by cam No. 5.

Further, as described in the hereinbefore-mentioned specification, e^2 are the rounded nicks in the collar or cheek-piece E ; e^4 , the spring catches or clips arranged around the said collar or cheek-piece; L , the hook which during the winding process disengages from the clip the starting end of the thread on the cheek-piece; E , the groove into which the hook enters; m^2 , the spring acting upon the said hook; m^3 , the wedge-shaped block for withdrawing the said hook; m^4 , the sliding rod upon which the block is carried; m^5 , the friction-bowl, against which the said block presses; m^6 , the stem of the hook, to which stem the said bowl is attached; m^7 , the spring, by means of which the sliding rod m^4 and the wedge-shaped block upon it are brought back into their normal position after having been operated by the cam on the ratchet-wheel shaft; M , the hook, which engages the thread between the coil and the thread-supply; N , the spring-plate, between which and the said hook the thread is drawn; O , the stationary cutter on the opposite side of the said hook; x , the instrument, by means of which the finishing end of the thread is disengaged from the rounded nick e^2 and laid snugly upon the periphery of the coil; x^2 , the annular groove which is made in the circumference of the collar or cheek-piece E and into which the instrument x descends; d^4 , the rod for operating the cheek-pieces; d^3 , the link, through which the said rod acts; F^2 , the lever acting upon the cheek-piece E ; F , the lever acting upon the cheek-piece E^2 ; d and d^2 , the thrust-pieces, by means of which the cheek-piece E^2

is caused to move forward for a certain distance at the same speed as the cheek-piece E and then at a more rapid rate in order to increase the space between them and to liberate the coil; p , the sloping trough or chute, by which the coil is conducted into a suitable receptacle; c , the helical spring, under the action of which the cheek-pieces return to their normal position ready for winding a fresh cop or the like and which keeps the cheek-pieces in that position during the winding process.

Referring to Fig. 12, No. 1 shows in plane projection the cam for moving the rotary guide and the presser connected to it away from the winding-spindle after a cop or the like has been wound and for causing the said guide and the said presser to enter the space between the two cheek-pieces when the machine is preparing to wind a fresh cop.

No. 3 shows in plane projection the cam for raising the hook M, so that it will be in readiness to catch hold of the thread as soon as the said thread has, by means of the hooked wire w^2 , been drawn across the path of the said hook M.

No. 4 shows in plane projection the cam for causing the instrument x to enter the groove x^2 and to turn the end of the thread onto the surface of the cop, so that when the few additional revolutions which I prefer to impart to the cop are in progress the end of the thread will be neatly pressed down upon the periphery of the cop.

No. 5 shows in plane projection the cam for actuating the small compacting-presser k , which is only brought into play after the cop has been formed and just before the commencement of the few extra revolutions which I have referred to.

No. 6 shows in plane projection the cam for causing the cheek-pieces E E² to slide endwise along their respective spindles A A² in order that the finished cop may be forced off the winding-spindle.

No. 7 shows in plane projection the cam which causes the hooked wire w^2 to draw the thread within reach of the hook M after each cop has been wound.

In commencing to wind a coil or the like the thread from the supply-bobbin is passed under the shaft i^{12} , then laid in the nick or space between the two portions of the divided cover g^6 , then drawn across the end of that half which is nearest to the cheek-piece E, thence into one of the rounded nicks e^2 in the collar or cheek-piece E, and the end of the thread is secured beneath one of the spring catches or clips e^4 , arranged around the collar or cheek-piece E. The thread having been thus secured to the cheek-piece E the winding mechanism is started, and as the spindles A A² and the guide G rotate the thread is drawn into the cam groove or space g^5 in the periphery of the guide G and is wound upon the reduced portion a^2 of the winding-spindle

A, being traversed rapidly to and fro from one side of the opening between the two cheek-pieces to the other side of it by means of the cam groove or space g^5 in the periphery of the rotating guide G, each right-hand spiral of thread after the first half-revolution of the guide, if made with a double traverse, as shown in my drawings, being parallel to the preceding right-hand spiral, the two being either in actual contact with one another or at a certain distance apart, as may be required, and each left-hand spiral of thread after the first half-revolution of the guide, if made with a double traverse, being parallel to the preceding left-hand spiral, the proximity of the two corresponding with that of the right-hand spirals and being regulated by means of the change-wheels h^8 and h^{12} , which are made use of to determine how many revolutions the winding-spindle shall make for each revolution of the rotary guide. After the winding-spindles have made a number of revolutions the detaching-hook L, actuated by the usual cam on the ratchet-wheel shaft, enters the groove l^2 , engages the thread between the rounded nick e^2 and the spring-catch e^4 , thereby pulling the starting end of the thread from the hold of the said spring-catch and setting free the starting end of the thread. Having performed this operation, the detaching-hook L is permitted by its cam to return under the action of the spring m^7 to its normal position. When the cop has acquired the requisite diameter, or when the required length of thread or the like has been wound, the winding portion of the machine is stopped in the ordinary way by the escape plate or disk in the head-stock of the machine being liberated and allowed to make a partial revolution, the shaper-plate and ratchet-wheel in the head-stock having, as previously explained, been so arranged as to bring this about at the right moment. The cam-shafts being at the same moment and by the same movement of the escape-plate set in motion, the rotary guide, and with it the presser K, are removed from between the cheek-pieces. The hooked wire w^2 then passes between the rotary guide and the coil-nick, engages the thread between the two, and draws the said thread aside into the path of the hook M, by which it is drawn down against the spring-plate N on one side of the hook and against the stationary cutter O on the other side of the hook, the stationary cutter severing the thread on the coil from the thread-supply and the spring-plate retaining hold of the severed end of the supply-thread. The coil having been thus severed from the thread-supply, the winding mechanism may be, as described in the specification to the Letters Patent hereinbefore referred to, set in motion, the loosely-revolving presser k having been previously brought into contact with the surface of the coil and the instrument x having been caused to descend into the groove x^2 .

As soon as the winding-spindles begin to revolve the said instrument x engages the finishing end of the thread, pulls the said thread out of the rounded nick e^2 , and lays it snugly upon the surface of the coil, where it is pressed down by coming as the cop revolves in contact with the presser k . The winding-spindles after having made a few revolutions may, as described in the specification to the Letters Patent hereinbefore referred to, be again brought to a stand and the cam-shafts be permitted to complete the revolution which was interrupted. The continued movement of the cam-shafts causes the presser k to return to its normal position and the cheek-pieces to slide along their respective winding-spindles, thereby pushing the cop off the small end a^2 of the winding-spindle A and allowing it to drop down the sloping trough or chute, the hooked wire and the instrument x having in the meantime returned to their normal position. As the cams continue to rotate the cheek-pieces return to their normal position, the thread-guide G, and with it the presser K, enter the space between the said cheek-pieces, the driving-belt is thrown onto the winding-pulley, and the winding-spindles are set in motion, one of the spring-catches e^4 having as the winding-spindles began to revolve engaged the starting end of the thread between the rotary guide and the point where it was held by the spring-plate N and pulled the said thread away from the hold of the said spring-plate. The end of the thread being retained by the spring-catch e^4 , the said thread is carried round by the winding-spindle as it rotates, and the winding of a fresh cop commences.

In the machine represented by Figs. 13, 14, and 15 the parts corresponding to those in the hand-machines previously described are designated by the same reference-letters. It will be observed, however, that in this arrangement the back winding-spindle is omitted, and the cheek-piece E^2 is attached to the spindle A by a screw e^5 , projecting from its center and screwing into the reduced end a^2 of the spindle A, and is provided with a milled knob or handle e^6 for convenience of placing in position and withdrawing the said cheek-piece and removing from the spindle the coil when wound. It will also be observed that in place of the wharve a in the previously-described machine a small friction-pulley a is substituted therefor, which by turning the whole machine on its supporting-pivot b^3 can be brought into contact with the fly-wheel or other suitable rotating part of the sewing-

machine, so as to drive the winding mechanism.

It will further be observed that in place of change-wheels for varying the relative speeds of the thread-guide and the winding-spindle a pair of cone-pulleys $h^8 h^{12}$ is provided for the purpose.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In machines for winding thread or the like, the combination of a rotary thread-guide having a cam groove or space in its periphery to receive the thread to be wound, with means for rotating said thread-guide and means for maintaining the said guide at a uniform distance just clear of the surface of the coil or the like as it is being wound, substantially as hereinbefore described.

2. In machines for winding thread or the like, the combination with the winding-spindle, of the rotary thread-guide having a cam groove or space in its periphery to receive the thread to be wound with a disk or presser, with means for rotating the thread-guide and arms so connecting the thread-guide to the said disk as to constitute a parallel motion whereby as the presser is moved outward from the winding-spindle by the coil of thread or the like as it increases in diameter, the thread-guide is simultaneously moved out from the winding-spindle in the same proportion so as to retain the said thread-guide out of contact with the coil, substantially as hereinbefore described.

3. In machines for winding thread or the like into coils, or the like, the combination of a winding-spindle and mechanism for positively driving the same, with a rotary thread-guide having in its periphery a cam groove or space to receive the thread, mechanism for positively driving the thread-guide, and change-wheels connecting these driving mechanisms, whereby the speed of the thread-guide is caused to bear a uniform ratio to the speed of the winding-spindle, and such ratio that each spiral of thread will be laid in close juxtaposition to the preceding spiral, no matter what thickness of thread is being wound, all substantially as hereinbefore described.

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

ALGERNON DEWHURST.

Witnesses:

JNO. HENRY WADE,
H. O. WADE.