(No Model.) 4 Sheets—Sheet 1.

J. KEATS.

MACHINE FOR WINDING THREAD UPON DISK HOLDERS.

No. 456,671. Patented July 28, 1891.

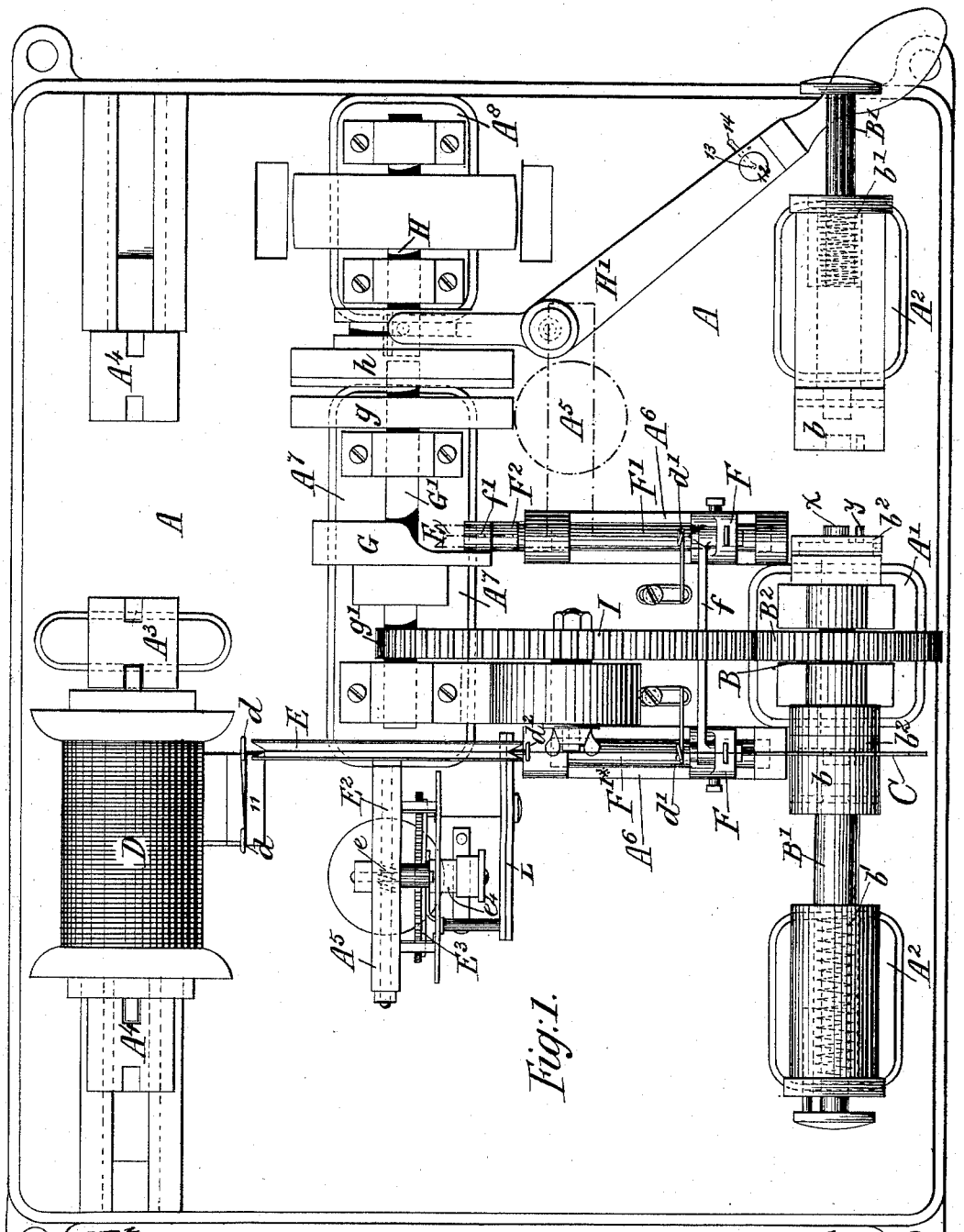

Fig. 1.

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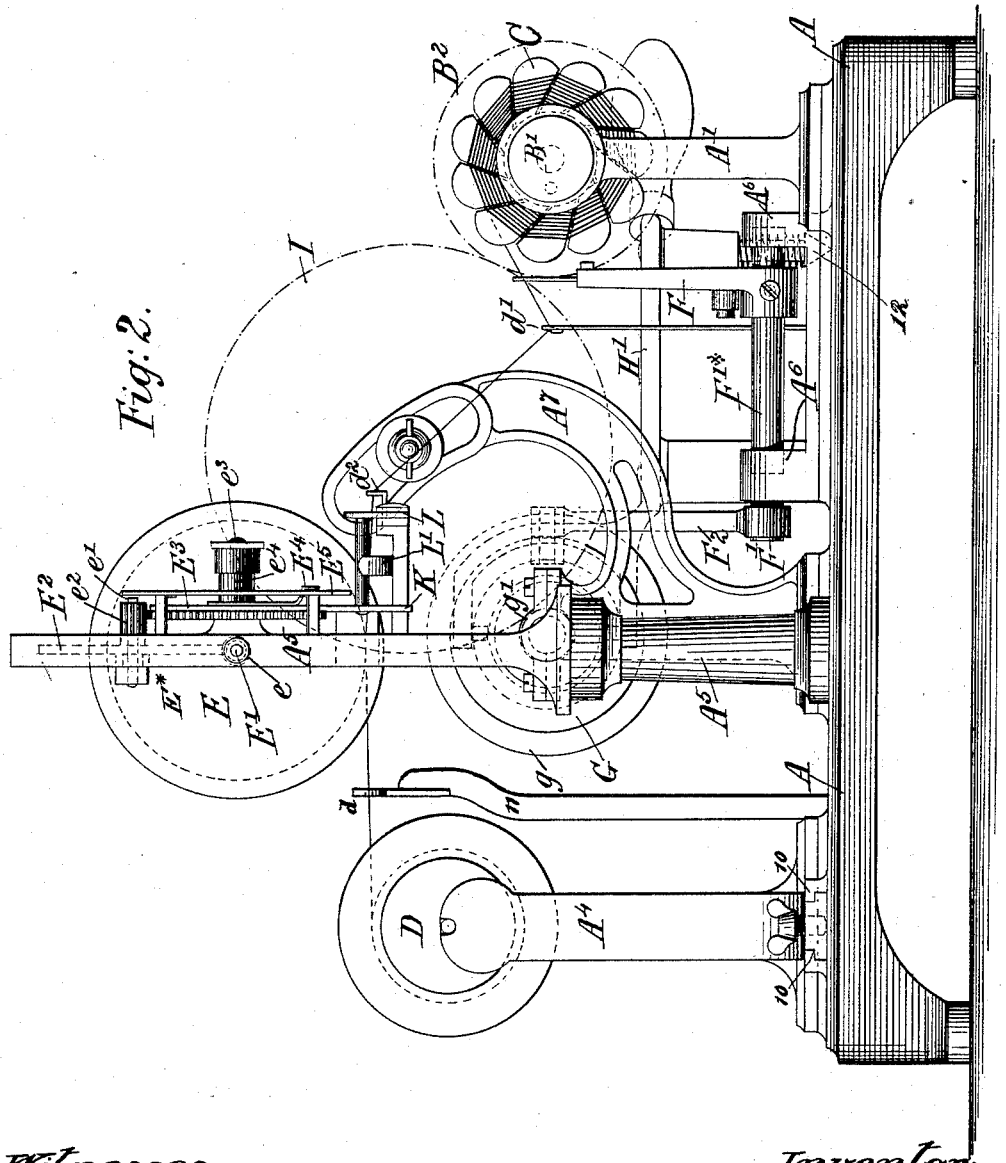
Fig. 8

Fig. 2.



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MACHINE FOR WINDING THREAD UPON DISK HOLDERS.

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Fig. 3.

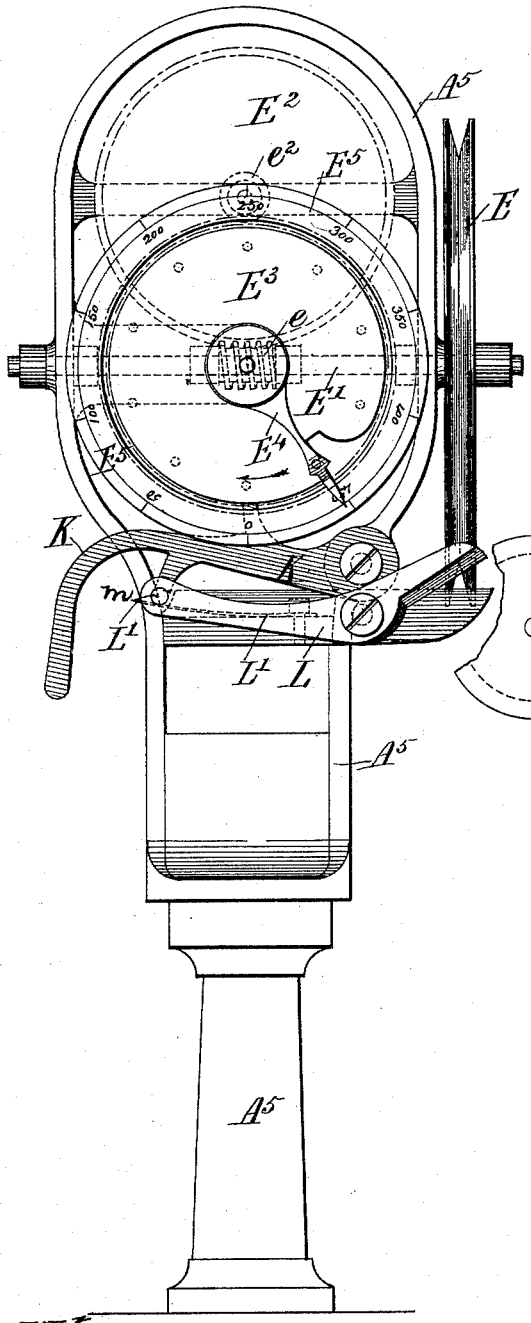
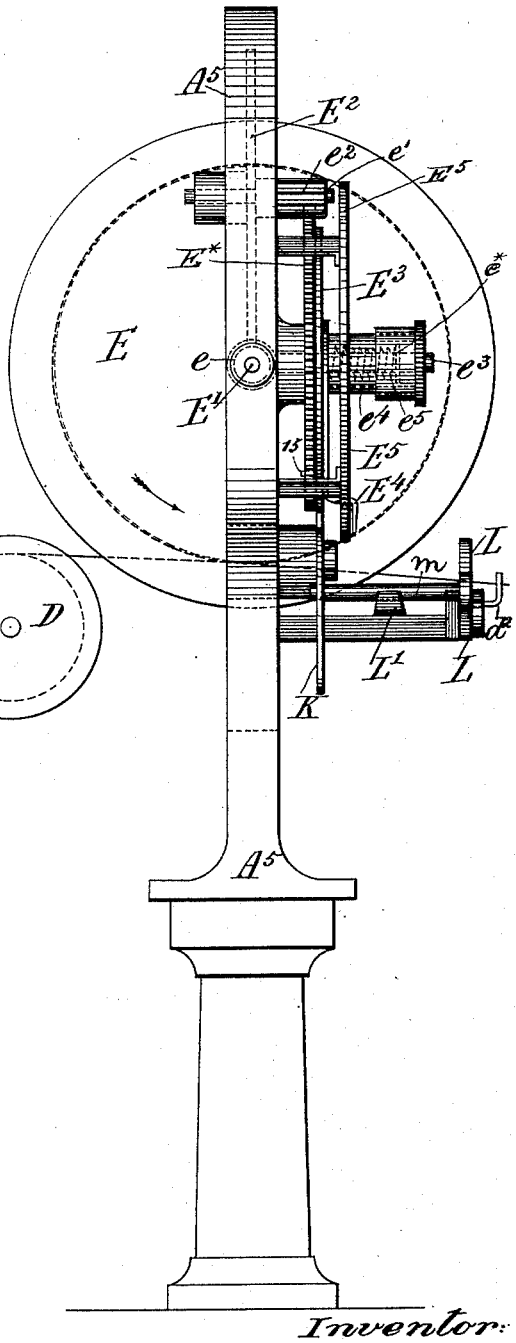


Fig. 4.



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(No Model.) 4 Sheets—Sheet 4.

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MACHINE FOR WINDING THREAD UPON DISK HOLDERS.

No. 456,671. Patented July 28, 1891.

Fig: 5.

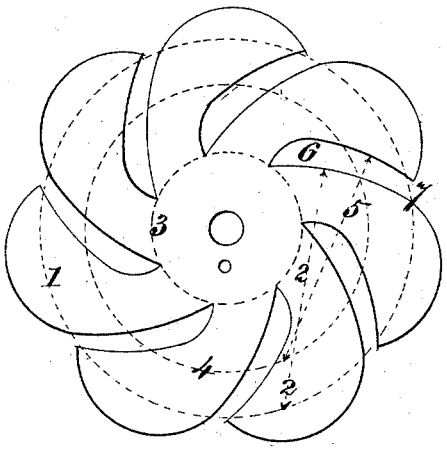


Fig: 6.

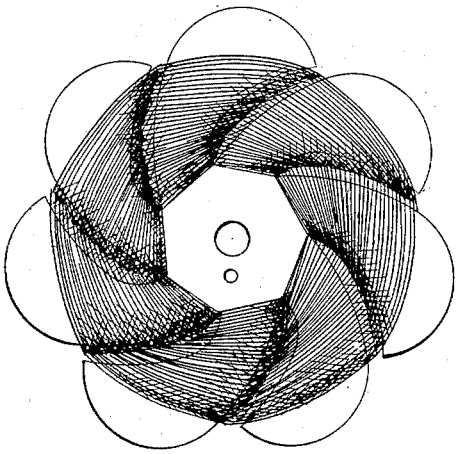
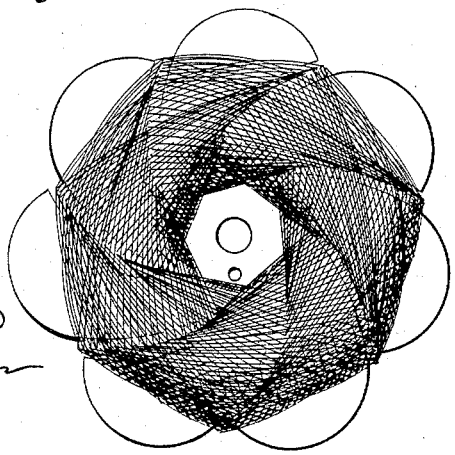


Fig: 7.



Witnesses:
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C. L. Sundgren

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UNITED STATES PATENT OFFICE.

JOHN KEATS, OF BAGNALL, NEAR STOKE-UPON-TRENT, ENGLAND.

MACHINE FOR WINDING THREAD UPON DISK-HOLDERS.

SPECIFICATION forming part of Letters Patent No. 456,671, dated July 28, 1891.

Application filed September 3, 1890. Serial No. 363,819. (No model.)

To all whom it may concern:

Be it known that I, JOHN KEATS, of Bagnall, near Stoke-upon-Trent, in the county of Stafford, England, have invented certain new and useful Improvements in Machines for Winding Thread upon Disk-Holders, of which the following is a specification.

This invention relates to machinery for winding thread upon the disk-holders which are the subject of my United States Patent No. 440,812, dated November 18, 1890.

The object of the said invention is to effect the winding of the thread on this class of holder with regularity and speed and in any given quantity.

In the accompanying drawings, which represent a machine embodying my invention, Figure 1 is a plan view of the machine, and Fig. 2 a side elevation of the same. Fig. 3 shows detached from the machine and on an enlarged scale the measuring apparatus in front view, and Fig. 4 is an edge view of the same. Fig. 5 shows a disk thread-holder with seven arms formed to receive a large supply of thread. Fig. 6 shows a similar thread-holder charged with a supply of thread, the winding on of which has produced a pattern. Fig. 7 shows a similar holder, but somewhat differently wound, and thus producing a different pattern, the change being due to the different relative timing of the rotation of the holder and the reciprocation of the thread-delivery arm. Fig. 8 shows the thread-layer arm in detail.

A, Figs. 1 and 2, is the bed-plate of the machine.

B is a horizontal spindle fitted to receive at its opposite ends a disk thread-holder C. This spindle is mounted in bearings carried by a U-shaped standard A′, secured to the bed-plate A.

A^2 A^2 are a pair of standards set in line with the standard A′ and at opposite sides thereof and carrying sliding rods B′ B′. To the inner ends of these rods are fitted loosely collars *b b*, which are pierced to receive each a concentric and an eccentric pin *x* and *y*, respectively, projecting from the ends of the spindle B. It is upon these pins that the disks C C are placed, and it is for the purpose of holding these disks firmly in position that the collars *b*, which are free to rotate with the disk-spindle, are employed. Surrounding the rods B′ B′ are coiled springs *b*′, which lie between a projection on their respective rods and a fixed point of the bearings of the standards and serve to press the collars *b* into close contact with their respective thread-holders C. The threads to be wound on these holders are drawn from bobbins D D, which are held between fixed standards A^3 and movable standards A^4, which are adjustable in guides 10 10 on the bed-plate A and may be retained in position by the side pressure of the guides or by set-screws. The threads as they leave the bobbins D pass through tension-guide eyes *d d*, standing up from a standard 11 on the bed-plate, and thence severally around V-grooved measuring-pulleys E, keyed each to a transverse shaft E′, having their bearings in standards A^5 A^5. From these pulleys the threads are led through fixed guides d^2 *d*′ and thence to and through reciprocating thread-laying arms F F, standing opposite the thread-holders C, to which the threads to be wound are attached. These arms F F are carried by rock-shafts F′ F′*, mounted on standards A^6, attached to the bed-plate A, and they are connected together by a rod *f*. Keyed to the rock-shaft F′ is an arm F^2, which carries at its upper end a bowl *f*′ in front of a face-cam G. This cam is keyed to a transverse shaft G′, mounted in a frame A^7, made fast to the bed-plate. The cam-shaft G′ receives rotary motion through friction-disks *g h* from the main driving-shaft H, which is mounted in line therewith and is supported in a V-shaped standard A^8, attached to the bed-plate. The friction-disk *h* is free to slide on a feather on the driving-shaft, while the disk *g* is keyed to the cam-shaft. They are held in contact by a hand-lever H′, which is capable of locking with the bed-plate in two positions by means of a spring-pressed taper-pointed pin 12, (shown dotted in Fig. 2,) the said pin engaging in one or other of two holes 13 14 in the bed-plate, maintaining the friction-disks out of contact, as shown in Fig. 1, when in the hole 13 and holding the said disks in contact when in the hole 14. Such a pin being a common attachment to clutch-levers needs no further illustration or description.

It will now be understood that as the cam-

shaft G′ rotates a reciprocating motion will be given through the bowl of the arm F^2 to the rock-shaft F′, and through it to the thread-layers F F, which, when rotary motion is imparted to the holders C C, will lay the thread alternately on the opposite sides of the arms of those holders. The holder-spindle is driven from the cam-shaft G′, the latter being fitted with a pinion g', which gears into an intermediate wheel I, mounted loosely on a stud adjustable in a segment-slot of the frame A^7. This wheel I gears into a spur-wheel B^2, keyed on the holder-spindle B, and by replacing this spur-wheel by one having a greater or a less number of teeth and adjusting the wheel I into gear therewith the speed of rotation of the holders relatively to the reciprocating motion of the thread-layers F may be changed to suit the work in hand. Thus when holders of a greater or less number of arms than that for which the machine is adjusted are required to be filled the speed of rotation of the holders must be diminished or increased to suit the change of holder, and the same remark applies when it is desired to change the pattern of winding from, say, that shown in Fig. 6 to that illustrated by Fig. 7.

I will now describe the means which I employ for determining the length of thread to be wound upon the holders. As the holder-spindle B carries two disk-holders, and as two reciprocating arms are used, as described, to lay the threads upon these holders, so the measuring mechanism to be now explained will be constructed in duplicate, each mechanism having a motion independent the one of the other.

Figs. 3 and 4 show the complete measuring apparatus for one thread, it being designed to cut off the wound thread at a maximum length of five hundred yards. Upon the shaft E′ is mounted a worm *e*, which gears into a worm-wheel E^2, mounted on a stud-axle *e′*, projecting forward in front of the standard A^5. The worm-wheel E^2 carries a pinion e^2, which, as the maximum length of thread required to be wound is set at five hundred yards, contains ten teeth. This pinion gears into a spur-wheel E* of one hundred teeth, which may be termed the "measuring-wheel," mounted on a stud-axle e^3, projecting from the standard A^5, and upon the same stud-axle is mounted a cam-plate E^3, having a tubular boss e^4, through which the stud-axle projects to receive a cross-pin e^*. (Shown dotted in Fig. 4.) This tubular boss forms a box for the reception of a coiled spring e^5, which surrounds the stud-axle, and bears at one end on the cross pin e^* and at the other against the bottom of the box, and consequently against the cam-plate E^3. The cam-plate is formed with a radial notch cut in its periphery, and overlying this notch is an index-hand E^4, which is designed to travel over a graduated ring E^5, made fast to the standard A^5. In the face of the measuring-wheel E* is a ring of ten holes, made at equal distances apart and intended to receive a pin projecting from the inner face of the index-hand E^4 and passing through the said notch in the cam-plate. The index-hand constitutes a handle for turning the cam-plate for the adjustment of the latter relatively to the measuring-wheel E* and as a locking device for locking the said cam-plate to the said wheel, and the said index-hand is made elastic toward and from the cam-plate for the purpose of engaging its pin 15 with and disengaging it from either of the ten holes in the said measuring-wheel. It is by this contrivance, which allows of the cam-plate being shifted axially, that the length of thread desired to be wound upon the holder is regulated. Thus, for example, if the full measure of five hundred yards is required the cam-plate will be so adjusted on the measuring-wheel E* as to insure the index-hand making a complete revolution before the winding is stopped. If, however, it is desired to wind only four hundred hards, the cam-plate with its index-hand will be moved forward the distance of two holes prior to starting the winder, and the pin from the index-hand will be allowed to drop into the second hole from the starting-point. Thus on the completion of the rotation of the index-hand, although "500" is marked upon the divided ring E^5, four hundred yards only of thread will have passed through the measuring apparatus.

The shifting of the cam-plate, it will be understood, from one position to another on the measuring-wheel E* will readily be effected by first drawing back the cam-plate against the resistance of the coiled spring e^5, then shifting it round, so as to bring the locking-pin of the index-hand over the desired hole in the measuring-wheel, and leaving the spring free to effect the relocking of the parts. When the index-hand has reached the desired limit of indicated measurement, the notch of the cam-plate will be brought over a projection on a lever K, which is fulcrumed on the standard A^5 and is held elastically in contact with the periphery of the cam-plate.

L is a pair of scissors for severing the thread on the completion of a given length of winding. These scissors are carried by the standard A^5, one arm being fixed and the other being borne upward by a flat spring L′ for the purpose of bringing down the movable blade and closing the scissors. The movable arm is fitted with a pin M, which underlies the lever K and serves to hold it in contact with the periphery of the cam-plate. The thread to be wound passes between the cutting-blades of the scissors on its way by the fixed eyes d' d^2 to the thread-layer F. When, therefore, the notch in the cam-plate is presented to the projection on the lever K, this lever will be forced up by the spring L′, acting through the underlying pin of the free arm of the scissors, which arm will now rise and bring down its cutting-blade to sever the thread. On this severance being effected the winding action of the machine will cease. The duty of the at-

tendant will now be, first, to throw out of action the friction-disk *h*, and, having thereby stopped the rotation of the spindle B, to draw back the elastic collars *b*, remove the filled holders, replace them with empty disks, and re-engage the elastic collars with the spindle. The attendant will next, by depressing the levers K, open the scissors and permit of the threads being drawn forward, inserted in their respective thread-layer arms, and attached to their respective disk-holders to repeat the operation of winding. As this pulling forward of the threads will cause the rotation of the V-grooved measuring-pulleys E, a corresponding movement in the measuring apparatus will through the worm and worm-wheel gearing take place, and the amount of thread thus carried forward preparatory to the resumption of the winding will be properly indicated. To insure the proper delivery of the thread to the holders it is necessary that these should be accurately adjusted, so as to stand in line with the thread-layers when in their intermediate position. For this purpose the holder-spindle is provided with collars b^2, which are threaded to fit screws cut on the spindle B, and as the collars *b* are free to yield to pressure the adjustment of the screwed collars b^2 will determine the proper position of the holders with relation to the thread-layers. These thread-layer arms, as will be seen in Fig. 8, are slotted longitudinally to allow of the thread rising therein as the accumulation on the holders takes place, thus avoiding the deflection of the thread which would otherwise occur as the holders become filled.

Referring now to the diagram Fig. 5, which represents the form of holder which I prefer for receiving, say, five hundred yards of thread, and illustrates the mode of constructing the same, it will be seen that the back of the arms, or that portion which receives the thread upon it, is the arc of a circle the center of which is on the dotted circle 1, and that this arc, having a radius indicated by the dotted line 2, is struck from the periphery of an inner circle 3. The opposite side of the slot is formed by an arc which is struck from a circle 4, with a radius indicated by the dotted line 5. This gives a slightly wedge-shaped slot, decreasing in breadth from the point 6 to the point 7. This proportion of slot provides for the proper accumulation of the thread to form the pattern shown at Fig. 6, the thread being laid alternately to the right and left of the adjoining arms.

Fig. 7 shows a different mode of laying the thread upon the holder. In this figure the thread is laid alternately to the right and left of two consecutive arms, the uneven number of the arms serving to secure, as in the first example, the requisite progression of the coiled thread. In order to produce this pattern, it will be requisite to double the speed of rotation of the disk-holders relatively to the reciprocating motion of the thread-laying arms.

The mode just described for shaping a seven-armed disk-holder will be found applicable for constructing holders of, say, nine or eleven arms, and the proportions will hold good with holders of different diameters varying, say, from three to four inches.

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

1. The combination, with a rotary thread-holder for winding thread and mechanism for giving rotary motion to the said holder, of a grooved pulley adapted to be driven by the passage about it of the thread on its way to said holder, a measuring-wheel geared with and driven by said grooved pulley, a cutter between said grooved pulley and the said rotary holder, and a cam carried by said measuring-wheel for producing the operation of said cutter, substantially as herein described.

2. The combination, with a rotary thread-holder for winding thread and mechanism for giving rotary motion to said holder, of a grooved pulley adapted to be driven by the passage around it of thread on its way to said holder, a measuring-wheel geared with and driven by said grooved pulley, a spring-actuated cutter between said grooved pulley and said holder, a cam adjustably attached to said measuring-wheel for controlling the action of said cutter, a graduated ring concentric with said measuring-wheel, and an index-finger for said ring affixed to said cam and furnished with a pin for engaging with said measuring-wheel to secure the adjustment of the cam thereto, all substantially as herein set forth.

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