

D. NOBLE.

MACHINE FOR COVERING OR INSULATING WIRE WITH YARN OR ITS EQUIVALENT.

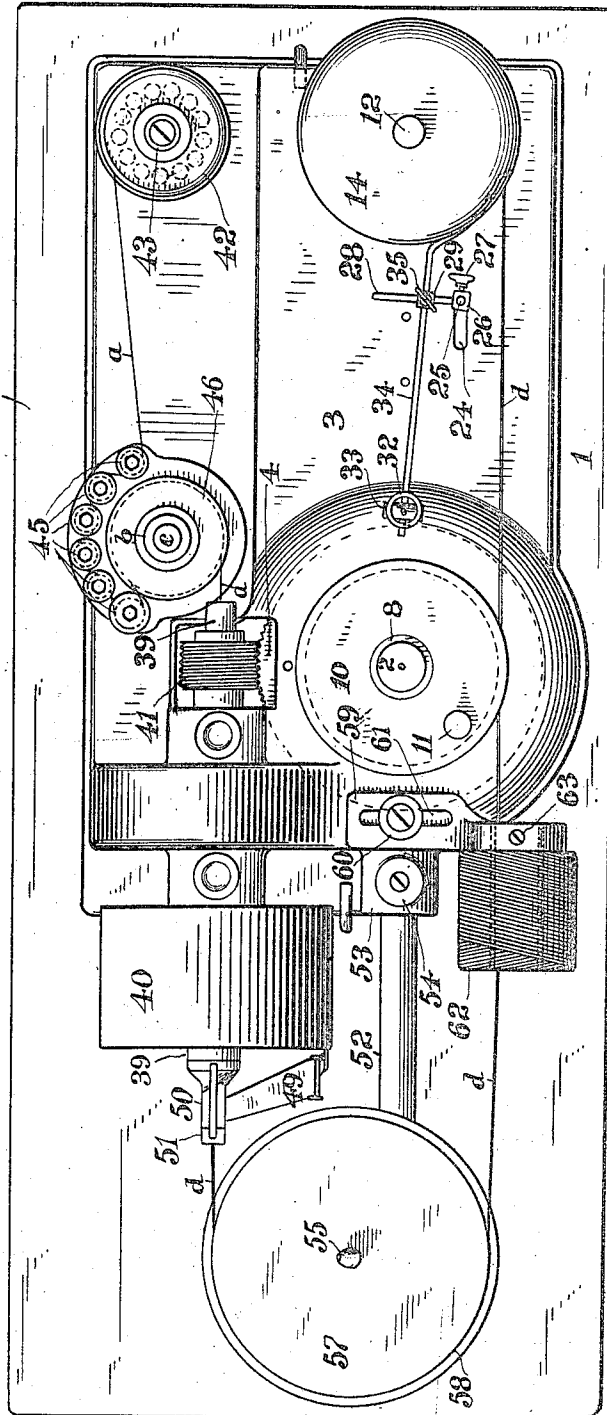
APPLICATION FILED MAR. 31, 1908.

965,928.

Patented Aug. 2, 1910.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

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[Signature]

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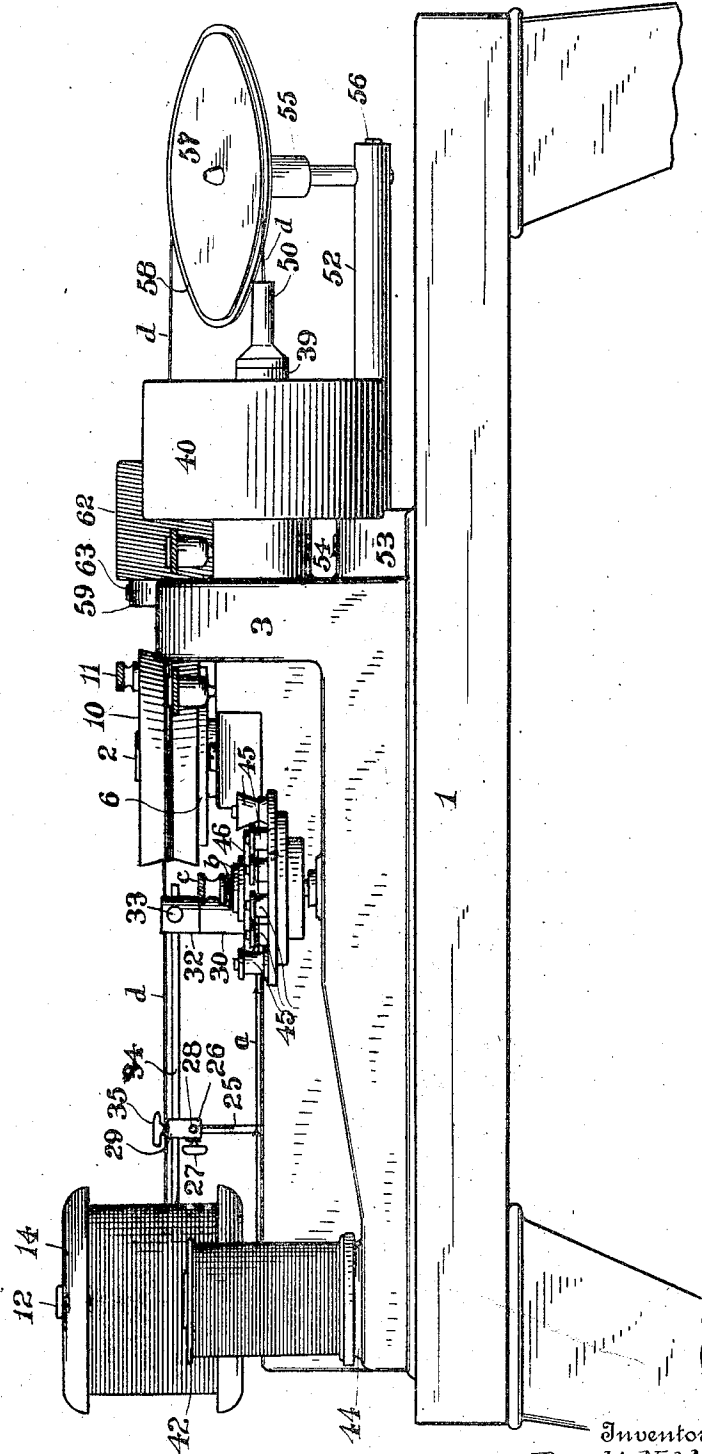
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4 SHEETS—SHEET 2.

Fig. 2.



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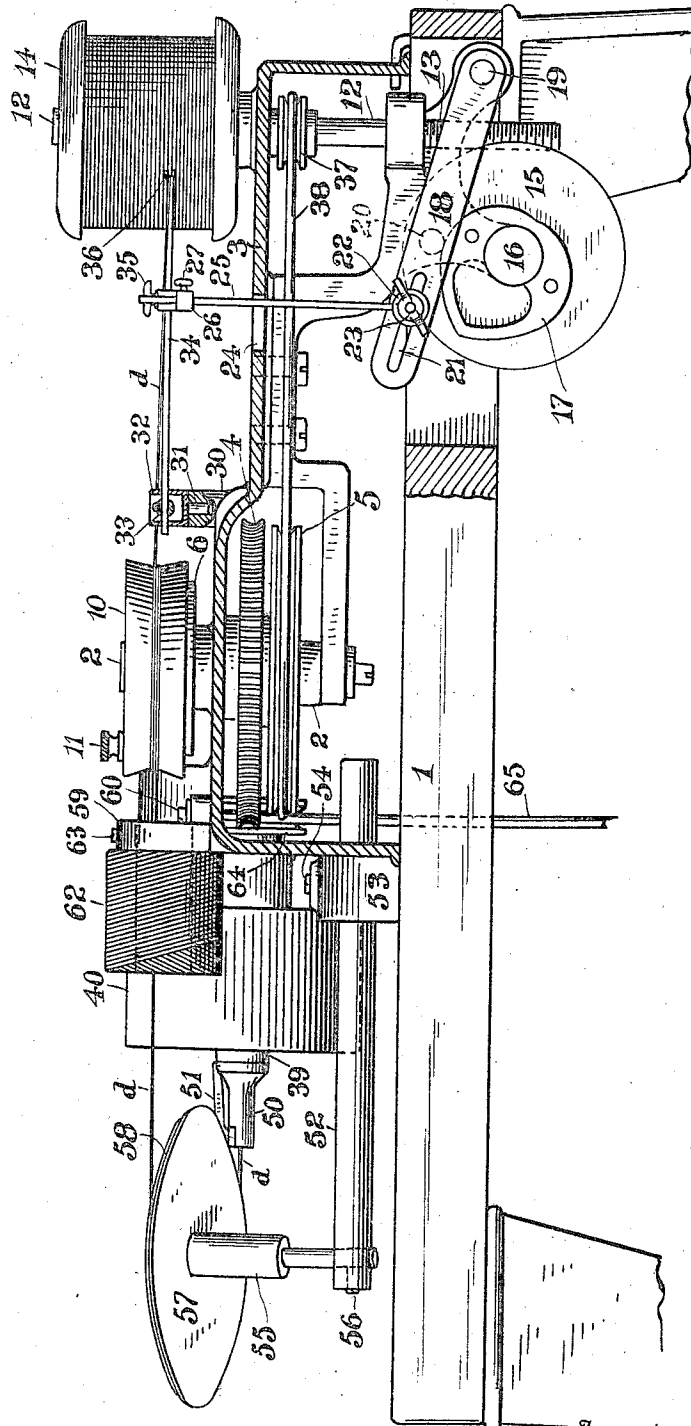
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4 SHEETS—SHEET 3.

Fig. 3.



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Fig. 4.

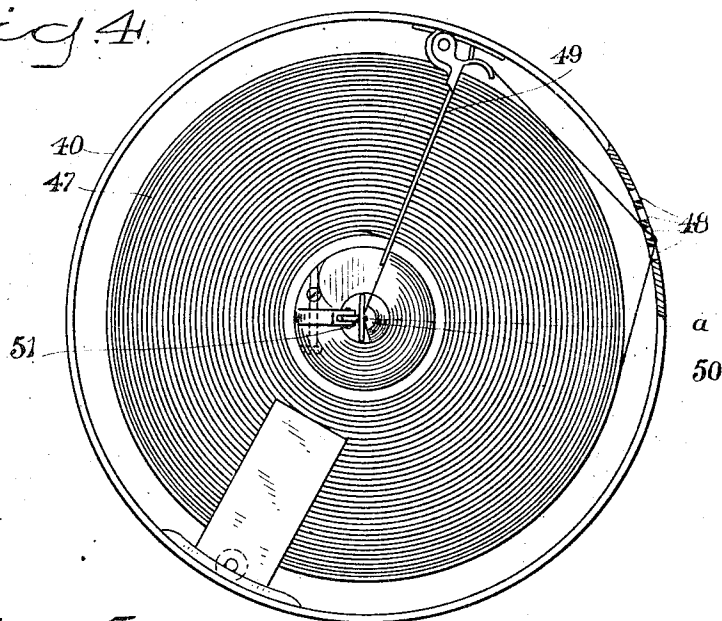


Fig. 5.

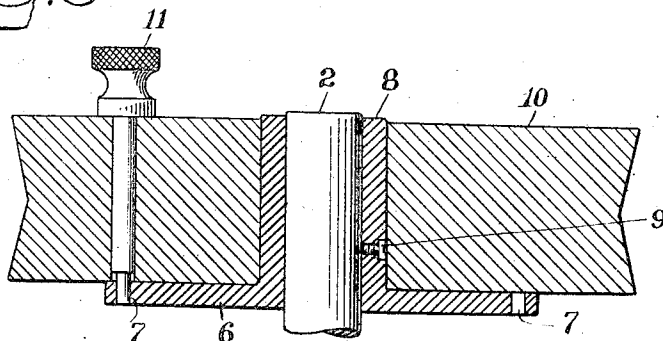
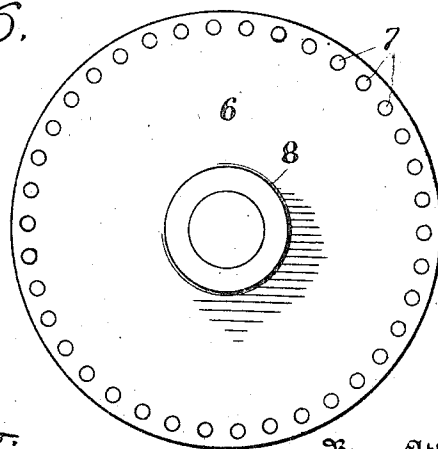


Fig. 6.



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UNITED STATES PATENT OFFICE.

DONALD NOBLE, OF BRIDGEPORT, CONNECTICUT.

MACHINE FOR COVERING OR INSULATING WIRE WITH YARN OR ITS EQUIVALENT.

965,928.

Specification of Letters Patent.

Patented Aug. 2, 1910.

Application filed March 31, 1908. Serial No. 424,361.

To all whom it may concern:

Be it known that I, DONALD NOBLE, a subject of the King of Great Britain, residing at Bridgeport, in the county of Fairfield and State of Connecticut, United States of America, have invented certain new and useful Improvements in Machines for Covering or Insulating Wire With Yarn or its Equivalent; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain improvements in machines for covering or insulating wire with yarn or its equivalent, and has for its object to provide means to control the feeding of the wire and the proper winding of the covered wire, and to prevent the latter from being twisted or broken, particularly during the operation of the covering of the same.

With these ends in view my invention consists in certain combinations and arrangements of parts hereinafter fully described and then particularly pointed out in the claims which conclude this description.

In the accompanying drawing Figure 1 is a plan view of my improvement—Fig. 2 an elevation of one side of the machine—Fig. 3 an elevation partly in section of the other side of the machine—Fig. 4 a front view of the rotary spinning drum which contains the cop of yarn and the devices for controlling the same during the process of covering the wire—Fig. 5 a detail sectional elevation of the feed disk, and Fig. 6 a detail plan view of the plate on which the feed disk is supported.

Similar characters of reference denote like parts in the several figures of the drawing.

Hitherto, a great deal of trouble has been experienced with fine magnet wire on account of breaking and twisting during the operation of covering; also, in feeding accurately according to the number of strands of yarn used and the size of wire. Furthermore, machines of this description have, as a rule, been so constructed that a considerable length of the covered wire has intervened between the covering mechanism and the instrumentalities for feeding the wire. To overcome these difficulties I have applied an accurate feeding mechanism directly to the heel end of the hollow spindle which carries the covering devices, and I have interposed

an idler, around which the covered wire is passed, between the spinning nozzle and the feeding disk and have made this idler universally adjustable in order that it may receive and pay off the covered wire in the same horizontal planes in which the spinning nozzle and feed disk are respectively located, while at the same time said idler may be adjusted nearer to or farther away from the spinning nozzle, as the occasion may demand, or may be removed entirely for the purpose of substituting a fresh cop of yarn within the spinning drum.

My present invention does not relate to the spinning drum and the elements carried thereby for guiding the yarn at the proper tension and winding it around the wire, and I therefore will enter into no detailed description of said drum and elements, since the improvement, presently to be described, has reference solely to the feeding of the wire, the proper control of the speed of the winding drum and the delivery of the covered wire from the spinning mechanism to the feed disk preparatory to the winding upon any suitable spool or reel.

1 is the bed of my improvement, 2 a vertically disposed shaft journaled in any suitable frame 3 supported on the bed, 4 a worm wheel, and 5 a pulley both of which are carried by said shaft in horizontal position.

6 is a platform provided with a series of perforations 7 near its periphery and having a hub 8 which is secured around the upper end of the shaft by means of a set screw 9, and 10 is the feed disk which rests upon said platform with the hub projecting loosely through the central portion of said disk, a pin 11 extending loosely through the disk and adapted to be engaged with the perforations 7 for the purpose presently to be explained.

12 is a vertical spindle journaled within the frame 3 and carrying a worm 13 at its lower end, and carried by the upper extremity of this spindle is any suitable spool or reel 14 on which the covered wire is wound.

15 is a worm wheel in mesh with the worm 13 and supported on any suitable short shaft 16 that extends from the bed 1, and 17 is a heart-shaped cam carried by said worm wheel.

18 is a lever pivoted at 19 to the frame 3 and carrying a friction roller 20 (shown in dotted lines) which rests by gravity against

the cam 17 so that it will be clear that as the cam revolves this lever will have a reciprocation in a vertical plane.

21 is an elongated slot in the free end of the lever 18 in which a block 22 is capable of moving freely, and 23 is a thumb screw whereby said block may be secured in any suitable adjustment throughout said slot, this manner of arranging the block and providing for its adjustment being a well known and common expedient and requiring no specific description. Carried by said block and extending upwardly therefrom through a suitable opening 24 in the frame is a rod 25 whose upper end passes freely through a box 26 and is secured thereto by means of a set screw 27 driven through said box against said rod, and extending laterally from this box is a pin 28 which passes loosely through a second box 29.

30 is a vertical post which rises from the frame and loosely inserted in a suitable socket in this post is a pin 31 whose head 32 normally rests against the post itself. This head is hollow and is open at the top, and journaled within the sides of this head is a cross pin 33 to which is secured the inner end of the guide rod 34 which latter passes through the box 29 and is secured thereto by means of a suitable thumb screw 35. The outer extremity of this guide rod 34 is formed into a claw 36 within which the covered wire is passed preparatory to winding upon the spool 14, the function of this guide rod and the adjustment of the parts carried and controlled by the lever 18 being hereafter more fully referred to.

The head 32 is capable of a rotary movement since the pin 31 fits loosely within the post 30, while the cross pin 33 is likewise capable of a rotary movement in a plane at right angles to the movement of said head, and also the latter can be elevated and lowered and will be guided in its movements by the engagement of said pin and socket, so that it will be clear that the rear extremity of the guide rod 34 has a universal pivotal connection.

37 is a pulley carried by the spindle 12 and connected with the pulley 5 by means of a slack or loose belt 38, the size of the pulley 37 being considerably smaller than that of the pulley 5 for the purpose presently to be explained.

39 is a hollow shaft which is journaled in horizontal disposition within the frame of the machine and carries at its outer end the winding drum 40 while its inner extremity carries a worm 41 which is in mesh with the worm wheel 4. The size of this worm 41 is predetermined with respect to the size of the worm wheel 4 so that the number of revolutions per minute of the winding drum is accurately known with respect to the corre-

sponding number of revolutions of the worm wheel 4. The worm wheel 4, being carried on the same shaft with the feed disk 10, determines the amount of wire received and paid out by such feed disk, and should such amount be greater or less according to the number of strands of yarn used and the size of the wire, feed disks of different diameters are substituted on the platform 6, but in all instances, as above set forth, the relative number of revolutions per minute of the winding drum and the feed disk are predetermined and fixed.

42 is the spool of uncovered wire which is mounted over a spindle 43 and rests upon a platform 44 that is supported on ball bearings (shown in dotted lines at Fig. 1) so that the friction which opposes the revolution of the spool will be reduced to a minimum, and the weight of wire carried by the spool will therefore be immaterial within reasonable limits. The wire, which I will denote by a , is led from this spool 42 through a series of arcuately disposed straightening rolls 45 and thence between the disks of a spring-controlled wheel tension 46 through the hollow shaft 39 to the covering devices. This wheel tension is journaled concentrically with the arc on which the rolls 45 are disposed and the wire is delivered from said tension within the hollow shaft 36 in a straight line which is parallel to the axis of such shaft so that there can be no possible kinking or twisting of the wire at that point. So far as the spring element of said tension is concerned it is quite ordinary since it consists merely in a volute spring 47 which rests upon the tension wheel and a thumb screw c which is driven against said spring, but with respect to the relative arrangement of this wheel tension and the straightening rolls and the delivery of the wire from the tension to the hollow shaft, my combined straightener and tension device is believed to be new.

As above stated, the covering devices form no part of my present invention, and it is only deemed necessary to state that the yarn cop 47 is located within the winding drum in the usual manner, and that the yarn is passed through suitable tension slots 48 in the periphery of the drum and thence down through a guide finger 49 to the spinning nozzle 50 where it is wound around the wire a which latter passes concentrically through a groove in the nozzle and as fast as it is covered with the yarn is polished by means of a spring controlled polisher 51 which is at the forward end of the nozzle.

52 is a rod parallel with the shaft 39 and adjustably secured within a housing 53 rising from the bed plate 1 by means of a set screw 54, and 55 is a headed pin which is disposed in a general vertical plane and whose lower extremity extends freely through the rod 52 and is secured in any

suitable horizontal adjustment by means of a set screw 56 driven in the end of this rod against the pin. On top of the headed portion of this pin is loosely journaled a disk 57 which is grooved around its periphery as seen at 58, this disk therefore being an idler which is capable of adjustment, by axially adjusting the rod 52, so as to bring one side of said disk higher than the other or to shift the disk in such manner that it will stand in a horizontal plane, the object of which adjustment will be more particularly referred to later on in this description.

The wire after it has been covered and which is denoted by *d* passes around said disk in the groove 58 and then several times encircles the feed disk 10 and is thence led through the claw 36 to the winding spool 14, the wire being passed several times around the feed disk in order that the latter may obtain a sufficient grip upon the wire so as to take it up as fast as it is covered without any slack and then pay it out to the winding drum.

59 is a bracket which is adjustably secured upon the frame of the machine by means of a set screw 60 which is passed through an elongated slot 61 in the heel of the bracket and driven into the frame, and 62 is a spare cop of yarn whose tube (shown in dotted lines) is detachably secured to the side of the bracket 59 by means of a screw 63, this cop being so disposed that the covered wire passes from the idler 57 directly through the cop tube to the feed disk, this arrangement being very essential since, when the cop in the winding drum is exhausted, the idler 57 is removed, and this spare cop detached from the bracket and inserted in position within the winding drum without breaking the wire. After a fresh cop has been thus inserted in the winding drum the idler is replaced in position with the wire around the same.

The horizontal plane of the feed disk may be the same as that of the spinning nozzle, although it is different in the present instance, but if said nozzle and disk are in the same horizontal plane then the idler would be adjusted so that it would likewise stand in the same plane, since it is quite essential that there should be no pronounced angular bending of the wire. But in the present improvement, the feed disk is elevated above the plane of the spinning nozzle, and therefore the idler has an angular adjustment such as would bring one side down to the horizontal plane of the spinning nozzle whereby the covered wire is delivered in a straight line and the other side up to the horizontal plane of the feed disk whereby such wire is likewise delivered to the feed disk in a straight line.

In the event that the plane of the feed disk was below that of the spinning nozzle

it will be obvious that the angular adjustment of the idler would be just the reverse to that described.

It is quite necessary that as little opportunity as possible should be given for the breakage of the wire after it leaves the spinning nozzle, and my improvement overcomes all difficulties heretofore experienced in this respect, since, by the inward adjustment of the rod 52, the idler may be brought as close as possible to the spinning nozzle, and this distance between said idler and nozzle may be varied as desired. This near proximity of the idler to the spinning nozzle also reduces, to a minimum the tendency of the wire to twist or kink while it is being covered. The spare cop is so located on its bracket that it will not interfere with the straight draft of the covered wire between the idler and the feed disk, and this is brought about by the adjustment of the bracket as will be clearly understood.

A feed disk large in diameter would of course receive and pay out a greater amount of wire at a single revolution than would a disk of smaller diameter, and the size of the feed disk depends upon the number of strands of yarn used in the winding operation and the size of the wire, since the greater the length of wire covered in a given time by the winding mechanism, the greater will be the length of wire which must be taken up and paid out by the feed disk. Therefore, I provide feed disks of different sizes, and if it becomes necessary to provide for the feeding of a greater amount of wire within a given time, I merely replace a feed disk with one of a greater diameter, or, I utilize a smaller feed disk in case a smaller amount of wire is to be taken care of. In this connection, I would say that I have accurately determined the various proper sizes of feed disks necessary to provide for the different windings and sizes of wire now known commercially, but this is a comparatively simple matter owing to the fact that, in my improved machine, the number of revolutions per minute of the winding drum with respect to the corresponding number of revolutions of the worm wheel 4 is accurately known.

As hereinbefore stated, the covered wire is paid out from the feed disk through the claw 36 to the winding spool 14 which latter is revolved by means of the slack belt 38, and therefore it will be clear that, when the diameter of the winding on this spool 14 is comparatively short, the spool will be rapidly revolved so as to take up the wire without any slack owing to the fact that the pulley 37 is very small compared with the pulley 5, and as the diameter of these windings on the spool get larger the belt will slip more or less, the greatest slipping of the belt occurring of course at the time when the

winding has completely filled the spool, but under none of these conditions, however, is the friction of the belt so great that a breakage of the wire would occur. As the wire is wound on the spool, the guide rod 34 will be automatically elevated and lowered owing to the vertical reciprocation of the lever 18 by means of the heart cam 17 and the connections between said lever and guide rod, whereby the wire will be wound around the spool evenly from top to bottom.

In the event that a tall spool is used, the obvious adjustments of the rod 25 will be made at the outer end of the elongated slot 24, and possibly it may be necessary to adjust the rod 25 as far down within the box 26 as possible, and in making windings around a short spool, the adjustments will be obvious and require no additional explanation. Of course, it will be obvious that the threads of the worm 13 and worm wheel 15 may be of such character as to effect a more or less rapid revolution of this wheel whereby the guide rod 34 will be caused to be moved more or less rapidly between the upper and lower ends of the reel 14, but this is a matter which is dependent on the gage of the covered wire. The claw 36 holds the wire to the winding, and the manner in which the heel end of the guide rod is pivoted permits said rod to be moved in any plane necessary for a neat and proper winding of the wire.

64 is a pulley carried by the hollow shaft, and 65 a belt connected up with any suitable motor, which I have not shown as it forms no part of my invention, whereby the machine is put in operation.

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

1. A machine for covering wire with yarn or its equivalent, comprising covering mechanism and feeding mechanism, a rotary idle disk interposed between said mechanisms around the periphery of which disk the covered wire extends, and means for effecting planetary adjustments of said disk.

2. A machine for covering wire with yarn or its equivalent, comprising covering mechanism and feeding mechanism, a rotary idle disk suitably supported and interposed between said mechanisms and around which the covered wire extends, means for adjusting the location of said disk with respect to its proximity to the covering devices, and means for effecting planetary adjustments of said disk whereby the sides of the latter will be brought to the respective horizontal planes in which the covering and feeding mechanisms operate.

3. A machine for covering wire with yarn or its equivalent, comprising a hollow shaft carrying at one end the devices for covering the wire with yarn and at the other end a

worm, a rotary feed disk, a worm wheel moving in harmony with said disk and meshing with said worm, a rotary idle disk located at the end of said shaft from which the covered wire is drawn and interposed between said end and feed disk, a spool on which the covered wire is wound, and means for suitably revolving said spool, the uncovered wire being passed through the hollow shaft to the covering devices and then around the idler and feed disk to the winding spool.

4. A machine for covering wire with yarn or its equivalent, comprising a hollow shaft carrying at one end the devices for covering the wire with yarn and at the other end a worm, a shaft journaled at right angles to said hollow shaft and carrying a feed disk and a worm wheel which latter meshes with said worm, the uncovered wire extending from a suitable spool through the hollow shaft to the covering devices and thence in covered condition around the feed disk whereby the revolution of the latter will draw the uncovered wire through the hollow shaft to the covering devices, a rotary idle disk located at the end of said shaft from which the covered wire is drawn and interposed between the covering devices and feed disk around which idle disk the covered wire is passed, a winding spool around which the covered wire is wound as it is paid out from the feed disk, and means for properly controlling the winding of the wire around said spool.

5. In a machine of the character described, a spool from which the uncovered wire is fed, a rotary hollow shaft carrying at its forward end the wire covering devices, an arcuate series of straightening rolls, and a spring controlled wheel tension concentrically journaled with respect to said rolls, the wire being passed around said rolls and tension and thence directly through the hollow shaft to the wire covering devices.

6. In a machine for covering wire with yarn or its equivalent, the combination of the hollow rotary shaft carrying at its front end the devices for covering the wire and at its rear end a worm, a shaft at right angles to said hollow shaft and carrying a feed disk and a worm wheel which meshes with said worm, a rotatable idler disk interposed between the devices for covering the wire and the feed disk and capable of adjustment whereby the covered wire will be received at one side of the idler disk in the same horizontal plane in which said wire is delivered from the covering devices and delivered at the other side of said idler in the same horizontal plane with the feed disk, a properly speeded reel for winding up the covered wire, and means for imparting rotation to said hollow shaft.

7. In a machine for covering wire with

yarn or its equivalent, the combination of the
 hollow shaft carrying at its forward end the
 wire covering devices and at its rear end a
 worm, the shaft at right angles to said hollow
 5 shaft and carrying a feed disk, a pulley and
 a worm wheel which meshes with said worm,
 a rotatable and adjustable idler disk inter-
 posed between said wire covering devices
 and feed disk, a spare yarn cop suitably sup-
 10 ported on the frame of the machine, a
 spindle carrying at one end a reel on which
 the covered wire is wound and having a
 worm formed on its other end, a pulley car-
 ried by said spindle and smaller in size than
 15 the first named pulley, a slack belt connect-
 ing said pulleys, a worm wheel engaged with
 the worm on the spindle and carrying a
 heart cam, a pivoted lever carrying a fric-
 tion roll which rests by gravity against said
 20 cam, a rod adjustably secured to the outer
 end of said lever, a box to which the upper
 end of said rod is adjustably secured said

box carrying a laterally projecting pin, a
 second box through which said pin loosely
 extends, a guide rod having an universal 25
 pivot at one end and adjustably secured to
 said last named box and having its free end
 formed into a claw which extends in prox-
 imity to said winding reel, and the arcuate
 series of straightening rolls and the spring 30
 controlled wheel tension concentric there-
 with, around which rolls and tension the
 wire is led through the hollow shaft to the
 covering devices around the idle disk
 through the spare yarn cop thence wrapped 35
 several times around the feed disk and
 passed through said claw to the winding
 up reel.

In testimony whereof I affix my signature
 in presence of two witnesses.

DONALD NOBLE.

Witnesses:

F. W. SMITH, Jr.,
 M. T. LONGDEN.