

Sept. 22, 1931.

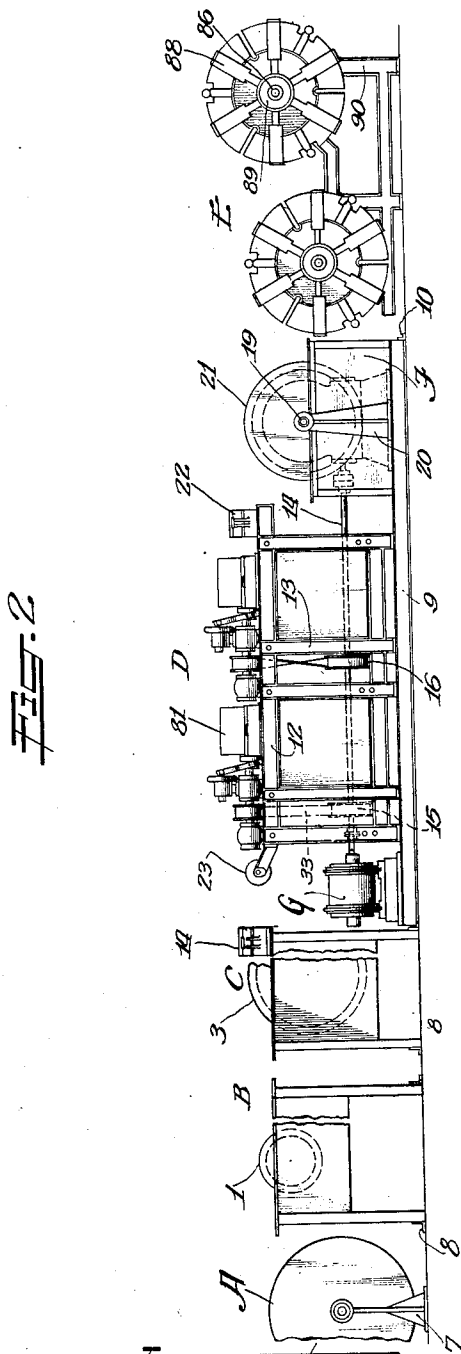
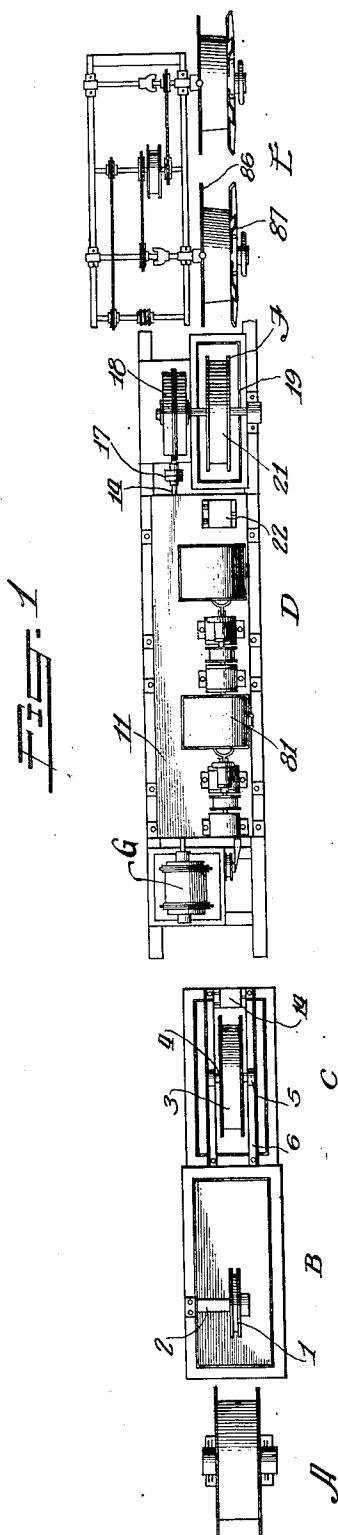
A. K. SANDERSON

1,823,989

WIRE POLISHING MACHINE

Filed April 12, 1929

4 Sheets-Sheet 1



Inventor:

Arthur K. Sanderson.

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4 Sheets-Sheet 2

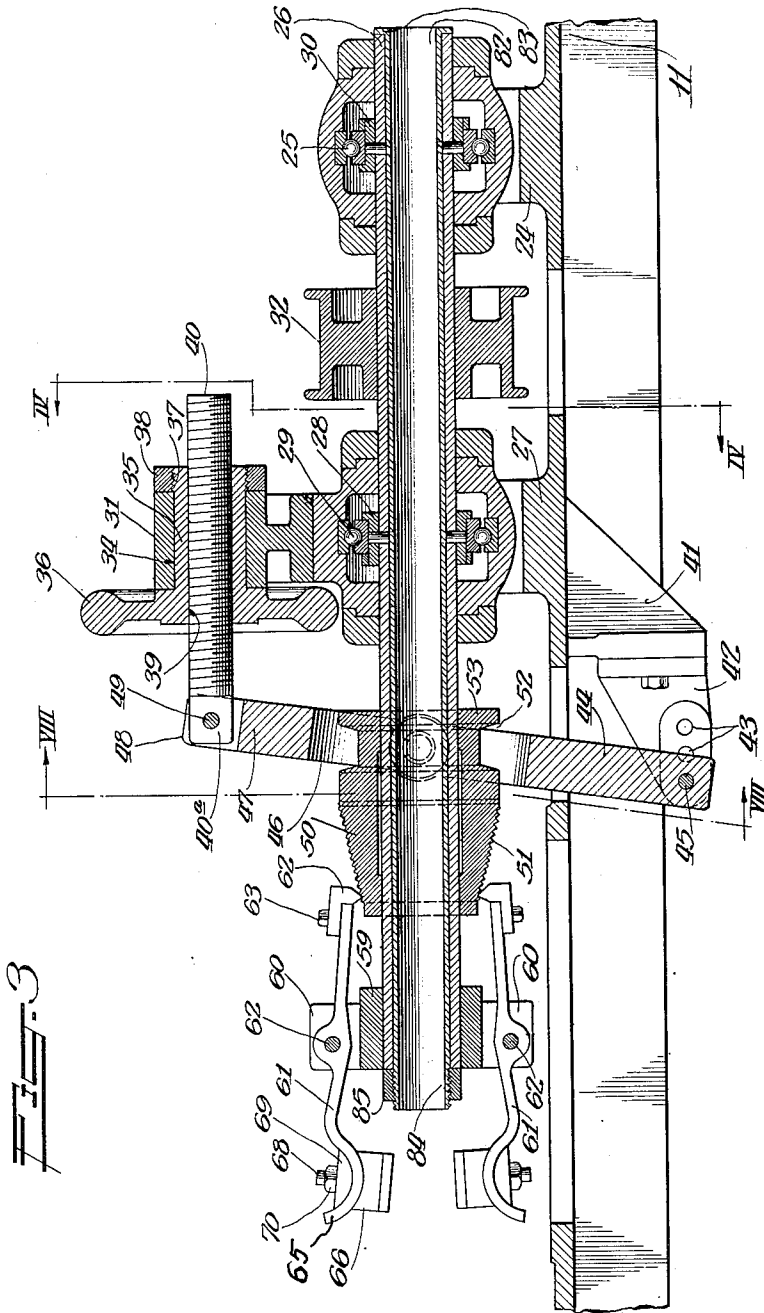


Fig. 3

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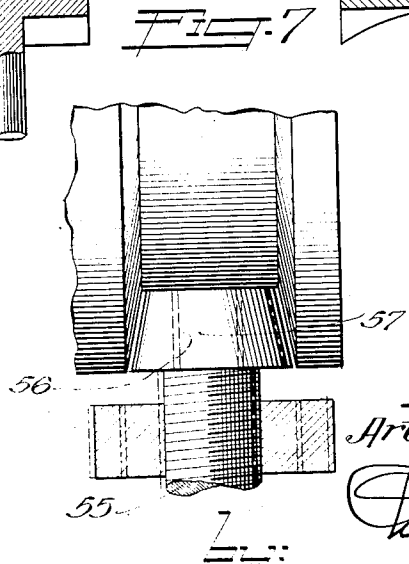
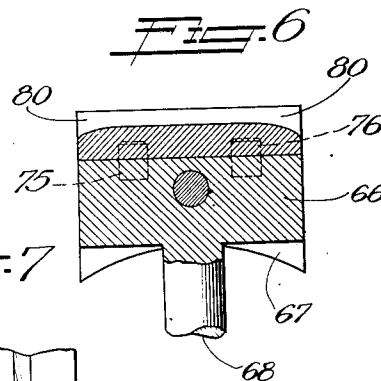
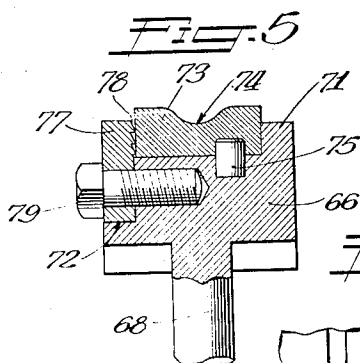
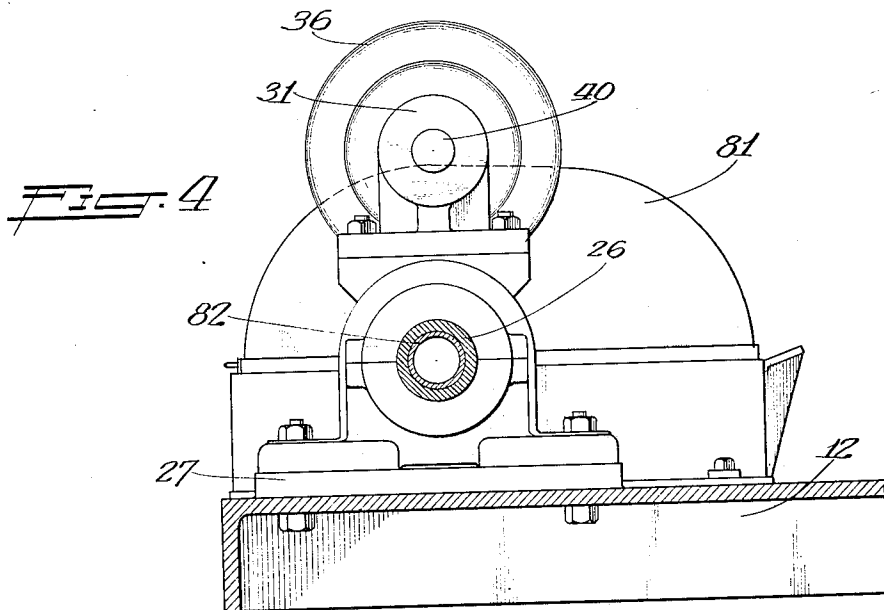
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4 Sheets-Sheet 3

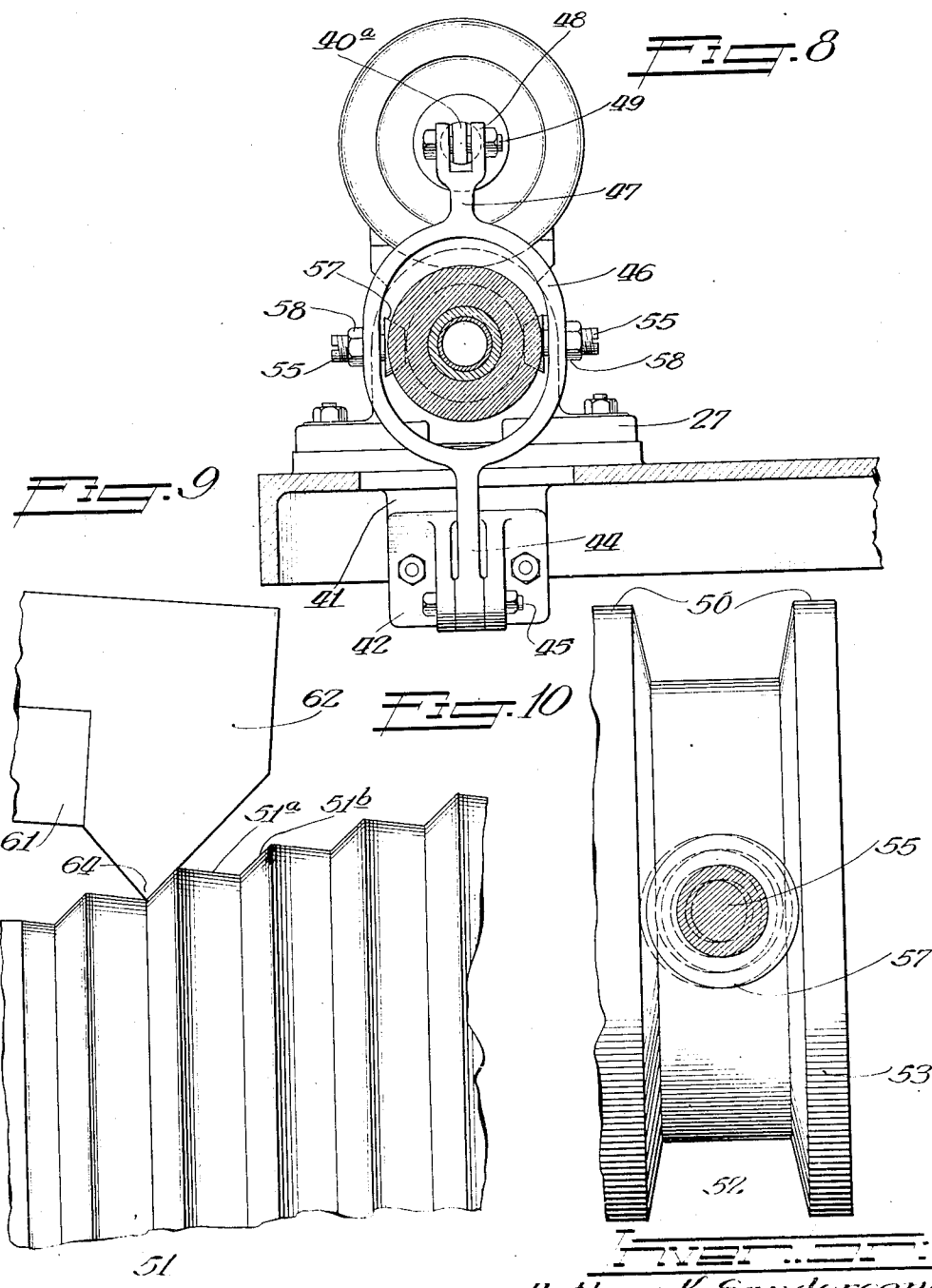


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4 Sheets-Sheet 4



Arthur K. Sanderson

Patented

UNITED STATES PATENT OFFICE

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WIRE POLISHING MACHINE

Application filed April 12, 1929. Serial No. 354,542.

This invention relates to a wire polishing machine and particularly to one for polishing weatherproofed wire.

There are in use at the present time machines for polishing waterproofed wire but these machines are so constructed as to necessitate stopping the machine for adjusting the polishing dies and also for cleaning the spindles through which the wire passes in its travels through the machine, spindles filling with wax requiring removal of the spindle and burning out of the wax before the machine can be put in operation. Such delay attendant on the adjustment of the dies and the cleaning of the spindles is costly and cuts down the efficiency of such machines to a great degree.

The machine of this invention overcomes the objections present in the machines now in use in that it provides for adjustment of the dies while the machine is in operation and also provides for ready removal of the auxiliary hollow spindles through which the wire passes when the same become clogged and the replacement by another one thus cutting down to a large extent the time lost incidental to such change.

An object of the invention is to provide a wire polishing machine in which the polishing dies may be adjusted while the machine is in operation.

Another object of the invention is to provide a wire polishing machine in which the auxiliary guide tubes or spindles may be readily removed and replaced by others when filled with wax, such removal and replacement being accomplished very quickly.

A further object of the invention is to provide a wire polishing machine in which the wire may be moved through the machine at a high rate of speed and polished while so moving.

A yet further object of the machine is to provide a wire polishing machine with several sets of dies between which the wire is

moved and which dies in turn are rotated at high speed and are capable of adjustment as the machine is in operation, the adjustment being dependent on the appearance of the wire as the same passes through the machine.

A further object is to so relate the dies and the adjusting means therefor that when pressure is relieved on the dies, the parts will remain in adjusted position.

A still further object of the invention is to provide a wire polishing machine which is economical to manufacture, highly efficient in use and easy to operate.

The above, other, and further objects of the invention will be apparent from the following description, accompanying drawings, and appended claims.

The form of the machine chosen to exemplify the invention is illustrated in the accompanying drawings and the views thereof are as follows:

Figure 1 is a top plan view of a machine constructed in accordance with this invention.

Figure 2 is a side elevational view of the machine illustrated in Figure 1.

Figure 3 is an enlarged central longitudinal section through one of the die heads of the machine illustrated.

Figure 4 is a vertical section taken on line IV—IV of Figure 3.

Figure 5 is a cross section through one of the die heads and its supported die.

Figure 6 is a longitudinal section through a die head and its supported die.

Figure 7 is a fragmental elevational view showing the relationship between the cone and its shifter roller when the parts are in motion and after the cone has been moved to proper position for adjusting the dies.

Figure 8 is a vertical section taken on line VIII—VIII of Figure 3.

Figure 9 is an enlarged fragmental view

showing the engagement between one of the die arms and the threads on a cone.

Figure 10 is a fragmental elevational view of the rear end of a cone showing in dotted lines the position of the shifter roller while moving the cone forwardly to actuate the dies towards each other and in full lines the position of the roller while the cone is being rotated after having been moved to proper position for adjustment of the dies.

The drawings will now be explained.

The illustrated exemplification of the invention includes a reel A, a wax tank B, a washing tank C, polishing machine D and take off mechanism E.

The polishing machine D may be used in connection with an insulating machine receiving the wire from such insulating machine as the same is insulated or else may receive the insulated wire from a reel or spool A.

The spool A, is filled with insulated wire as the same comes from the insulating machine which wire has been subjected to a waterproofing process. The wire and its insulation at this stage is rough and uneven.

The end of the wire on the spool A is led into the wax tank B and directed underneath a sheave 1 which is illustrated as being supported on the stub shaft 2 fastened to one side of the wax tank B. The wax in the tank B is high enough in said tank so that the wire will pass through the wax.

The wire is then threaded from the sheave 1 in the wax tank B and passed two or three times about a sheave 3 in the water tank C. The sheave 3 is supported on a shaft 4 secured in bearings 5 through suitable members such as angle irons 6 shown in Figure 1. The purpose of the water tank C is to cool the wax on the wire. Passing the wire around the sheave 3 a number of times lengthens the period of time the wire is in the water thus effectively cooling and solidifying the wax, thus making possible a smooth surface on the finished wire.

The reel A is supported on a standard 7 in a familiar manner. The tanks B and C are supported on the floor and are fastened to the floor by bolts or similar fastening means passing through angle brackets 8 suitably secured to the legs.

The polishing machine D includes a base secured to the floor and comprising channel members 9 connected at intervals in the length thereof by cross members 10. A table 11 is supported by a cast iron frame including longitudinal members 12 and legs 13 which frame is secured to the base 9 in any suitable manner.

The table supports the polishing die head which in the present instance consists of two similar heads.

A wiper 14 is arranged on the front wall of the water tank C to wipe the wire as the

same leaves the sheave 3 and passes into the polishing dies.

Figures 1 and 2 of the drawings show the tank C near the polishing machine D which showing is for convenience only as the machines are made with a considerable space between the water tank C and the polishing machine D so as to allow a motor G to be supported on the spaced channels 9.

A shaft 14 is supported longitudinally of the polishing machine between the top 11 thereof and the base 9 said shaft being supported in suitable bearings not shown. This shaft is driven by any suitable source of power such as an electric motor G which motor is mounted on the base 9 of the polishing machine. Two driving pulleys 15 and 16 are keyed to the shaft 14.

The end of the shaft 14 opposite to its connection to the motor is connected by means of a coupling 17 to a worm gear speed reducer 18 which reducer is supported on the base 9 of the polishing machine. A shaft 19 supported in bearings carried by legs 20 mounted on the base members 9 extends outwardly from the speed reducer 18 and is driven by said speed reducer. Beside the speed reducer 18 is a water tank F in which rotates a sheave 21 being driven by the shaft 19. The sheave 21 is relatively wide so as to take two or three turns of the wire thereabout. The sheave 21 driven through the speed reducer 18 by the motor draws the wire through the polishing machine and through the wax and water tanks B and C respectively and delivers the wire to the take off or reeling mechanism E.

The front end of the table carries a wiper 22, while the rear end has a roller 23, which receives the wire as the same issues from the wiper 14, and steadies the wire as it is fed into the dies of the machine D.

There are shown two pair of polishing dies on the polishing unit D.

Figure 3 is a longitudinal sectional view through one pair of the dies and a description of Figure 3 will suffice to include all the dies used in such machine.

A pillow block 24 is secured to the top 11 of the polishing machine D. The pillow block 24 supports a ball bearing 25 which bearing has deep grooves for absorbing radial and end thrusts. The pillow block 24 is of the split sleeve type which sleeve is pinned or otherwise secured to a hollow spindle 26 which spindle carries the dies and the adjusting mechanism for the dies.

A second pillow block 27 is supported on the table 11 and it carries a similar split sleeve 28 with which is associated a self aligning ball bearing 29 for absorbing radial thrust only.

A bracket 31 is fastened to the top of the second bearing or pillow block 27.

A pulley 32 is keyed to the spindle 26 be-

tween the two pillow blocks 24 and 27 for driving the spindle. A belt 33 drives the pulley 32 from the pulley 15 on the main drive shaft 14.

The bracket 31 is bored at 34 to receive the hub 35 of a hand wheel 36. The hub has its other end threaded at 37 to receive a nut 38 for retaining the hub in the bracket 31.

The hand wheel 36 and its hub 35 are provided with a threaded axial opening 39 through which extends a screw 40 which screw may be moved axially in either direction depending on the direction of rotation of the hand wheel 36.

A bracket 41 of cast iron is secured to the table and an arm 42 is bolted to said bracket. The arm 42 is provided with a plurality of apertures 43 or in lieu of said apertures a slot might be provided. A yoke having a lower portion 44 is connected by means of a bolt 45 to the arm 42 with said bolt 45 passing through any one of the apertures 43 in said arm. The yoke has a substantially circular mid-portion 46 with an upper portion 47 terminating in spaced ears 48 for connection by a bolt 49 to one end of the screw 40 so that said yoke may be rocked about its pivot 45 as said screw 40 is moved axially.

A cone 50 slides on the hollow spindle 26 for axial movement with respect to the same, and is free to turn on the spindle and assume new positions and equalize wear. The inclined portion of said cone is provided with threads 51 while the rear end of said cone is provided with an annular groove 52 and a rear end 53. The circular intermediate portion 46 of the yoke has at diametrically opposite points threaded apertures for the reception of threaded pins 55 the inner ends of which pins are reduced in diameter at 56. A truncated conical roller 57 is carried on the reduced end 56 of a pin 55 and enters the groove 52 of the cone. There are two of such rollers 57 at diametrically opposite points of the yoke as shown clearly in Figure 8. Nuts 58 engage the pins 55 outwardly of the yoke for positioning the cones 57 properly in the groove 52 of the main cone 50. The rollers 57 are for the purpose of moving the cone 50 axially under influence of the screw 40 as the same in turn is moved by the hand wheel 36. The threads 51 of the cone 50 are shown enlarged in Figure 9 and are formed with the faces 51a at an angle of 15° to the horizontal and with the faces 51b at an angle of 30° to the horizontal or to the axis of the cone 50.

A hub 59 is keyed or otherwise secured to the end of the spindle 26 beyond the cone 50 for rotation with said spindle. Said hub is provided with spaced ears 60 at diametrically opposite points. The ears 60 are arranged in pairs at diametrically opposite points. Two forged steel spring arms 61 are pivoted intermediate the ends thereof at 62 to the ears

60 of the hub 59, that is there are two arms 61 connected to a hub 59 and arranged at diametrically opposite points on said hub. The rear ends of each of the arms 61 are provided with angle knife members 62 each of which has a portion attached to the rear end of the arm 61 by a bolt 63 and a pointed end 64 for engaging the groove 51 on the cone 50. The other ends of the arms 61 are provided with concavo-convex bent ends 65 arranged with the convex surfaces toward each other as shown in Figure 3.

A die holder 66 having a concave surface 67 corresponding to the convex curvature of the end 65 of the arm 61 and provided with a threaded extension 68 is passed through a suitably arranged aperture in the end 65 of the arm. A curved washer 69 having an aperture for receiving the pin 68 is placed against the concave surface of the end 65 and a nut 70 engages the threaded pin 68 of the die holder 66 for retaining the die holder block 66, the washer 69 in position on the end of the spring arm 61. Each of the arms 61 is provided with a die holder 66 in the manner described.

Figures 5 and 6 show the construction of the die holder 66 where it will be observed that the die holder is formed with a longitudinal shoulder 71 and a longitudinal recess 72 formed in the opposite face of the block 66. A die block 73 having a concave face 74 is applied to the die holder block 66. The block 66 is provided with two pins 75, 76 in spaced relation. A block 77 having a serrated inner surface 78 is applied in the recess 72 and is held therein by a stud 79 passing through a suitable aperture in the plate and threaded into the block 66 for removably retaining the die 73 in position in the die block holder 66. It will be observed that the ends of the die blocks 73 are flared at 80 for allowing smooth entrance and exit of the wire with respect to the dies 73.

The dies and the cone 50 are covered by guards 81 which may be hinged or otherwise associated with a table 11 so as to be readily removable when desired. The purpose of the guards 81 is to prevent injury to the operators and also to prevent flying of the wax as the wires are being polished.

The screw 40 is provided with a reduced end portion 40a which is apertured for the connection 49 with a yoke.

A removable sleeve 82 having one end provided with a flange 83 is inserted in the spindle 26 and extends throughout the length of said spindle projecting beyond the opposite end of the spindle from that with which the flange 83 contacts. The extended end 84 of the sleeve 82 is threaded and a nut 85 threaded onto said threaded end of the sleeve for retaining the same in position in the spindle 26.

The wire passes through the sleeve 82 in its movement through the machine and surplus wax eventually fills the sleeve. It is customary in wire polishing machines in use at the present time to stop the machine and burn out the accumulated wax by hot rods which operation requires a considerable amount of time. The removable sleeve 82 of this invention therefore when filled with wax so as to impede the progress of the wire through the sleeve may be readily removed after the machine has been stopped by taking off the nut 85 and withdrawing the sleeve from the other end of the spindle 26 whereupon another sleeve may be inserted, the wire threaded therethrough and operation of the machine resumed. Such removal and replacement of the sleeve requires but very little time.

The take off or reeling unit E illustrated in connection with this invention forms the subject matter of a copending application, and therefore will not be referred to herein in detail.

The take off mechanism E briefly consists of a plurality of drums there being two such drums shown in the drawings the drums being similar in every respect. A drum comprises a rear flange 86, a conical surface 87 and fingers 88 which latter are pivoted to a central hub 89 for collapse to remove the bundle of wire wound on the drum. The drums are supported in a frame 90 of case iron and connected with suitable gearing from the motor for rotation when the polishing machine is being operated. The drums are alternately filled by the wire delivered to the same from the sheave 21 in the water tank F and when one drum has been filled the fingers 88 are collapsed, the bundle of wire withdrawn during the time that the other drum is being filled.

The operation of the machine is as follows:

Wire which has been covered in an insulating or similar machine may be fed directly to the wax tank B or may be delivered to said tank from a reel or spool A the present invention being illustrated in connection with a spool A on which is wound the insulated wire as the same comes from the insulating machine and after having been properly waterproofed.

The end of the wire is threaded under the sheave 1 in the wax tank B and then two or three times about the sheave 3 in the water tank C then threaded through the wiper 14 and through the sleeve 82 of the adjacent polisher. The wire is passed between the dies 73 and then into the sleeve 82 of the second polisher. The wire is then led from the second polisher through the wiping block 22 passed several times around the sheave 21 in the water tank F and then connected to one of the take up drums of the winding unit

E. The belt connecting the pulleys 15 and 16 on the drive shaft 14 with the pulleys 32 on the spindle 26 of the dies are arranged to drive the spindles in opposite directions that is one in a right hand direction of rotation and the other in a left hand direction of rotation for increasing the polishing effect of the wire.

The machine having been threaded in the manner just described the motor is started and the wire drawn through the machine by the sheave 21 in the water tank F the spindles 26 rotating at high speed carrying with the spindles the hub 59 carrying the die and also the cones 50. Proper engagement of the die 73 with the wire is secured by manipulation of the hand wheel 36 as by turning the same the screw 40 is moved axially to spread the rear ends of the spring arms 61 and thus bring together the dies 73 supported in the other ends of said arms. The wax in the tank B is hot so as it will readily adhere to the wire passing through said tank. The wire is turned about the sheave 3 in the water tank C several times to properly cool the wire prior to its engagement with the polishing dies. The machine is designed to operate at a speed of approximately 192 feet per minute. The operator in charge of the machine watches the wire as the same issues therefrom and by proper manipulation of the hand wheel 36 on the several die sets is able to secure a finely and completely polished finished wire as the same issues from the machine. When one of the take off drums has been filled the wire is cut and fastened to the other drum for winding a bundle of wire thereon while the first one is emptied and made ready to be filled when the second drum is filled. Such interchange takes place as long as the machine is in operation.

The bundles of wire so wound are then removed for wrapping into bundles ready for shipment.

Adjustment of the yoke with respect to the arm 42 to accommodate movement of the cones 50 to control the dies for wires of various diameters is made possible by provision of the plurality of apertures 43 for the connecting bolt 45, hence it is readily apparent that the machine is susceptible of adjustment through a wide range of wire diameters for securing proper polishing of such wire.

It will be observed that this machine lends itself very readily to the proper polishing of insulated wire in that the dies are readily adjustable while the machine is in operation and that because of the provision of the sleeve 82 a minimum time of stoppage for replacement of a filled sleeve with a clean one is effected.

The manipulation of the yoke to actuate the cone 50 of course presses the rollers 57 against the front of the groove 52 in the cone

as forward movement of the cone is resisted by reason of the spring arms 61 carrying the dies. When the cone has been moved axially a distance to properly set the dies with respect to the wire passing through the machine the hand wheel 36 is then given a very slight turn in the opposite direction so as to move the rollers 57 out of contact with the side walls of the groove 50 in the cone. This of course stops rotation of the rollers 57 and reduces to a large extent noise attendant on operation of a machine of this character and also relieves pressure while the cone is in motion. The faces 51a of the cones being inclined in the manner described prevent backward movement of the cones when pressure is relieved on same by movement of the rollers 57 to inactive position. It is necessary to normally move the cones axially to vary the die adjustment.

In use of the machine such as herein described, it is contemplated that two of these be placed side by side with a passage between, the machines in such event being arranged in right and left hand manner and one operator will then have charge of the two polishing machines.

The fingers 88 on the winding spools of the take off mechanism E are collapsible by movement of the hub 89 on the spool shaft so as to allow ready removal of a bundle of wire wound on the spools. The fingers are held in active position which is that shown in the drawings by moving the hub along the shaft in a direction opposite to that which it is moved to collapse these fingers whereupon the hub is locked to retain the fingers in active position serving as the front flange members of the spools.

The formation of the threads 51 on the cone 50 in the manner herein described together with the shape of the pointed members 62 on the spring arms 61 is such as to prevent disengagement of these pointed members 62 when the machine is in operation, even though rollers 57 have been moved to inactive position.

The invention has been described herein more or less precisely, yet it is to be understood that changes may be made in the arrangement and proportion of parts and that equivalents may be substituted without departing from the spirit and scope of the invention.

The invention is claimed as follows:

1. A wire polishing machine including in combination a hollow spindle, an axially movable cone on said spindle, a pair of arms pivotally supported on said spindle and having the inner ends thereof in engagement with said cone and the outer ends thereof extending beyond the end of said spindle, dies on the outer ends of said arms, means for sliding said cone on said spindle for varying at will the distance between said dies, and

means for rotating said spindle, said cone having peripheral grooves in its surface and the inner ends of said arms having wedge like ends for engaging said grooves.

2. A wire polishing machine including in combination a plurality of die heads, a die head comprising a horizontally disposed rotatable spindle, bearings supporting said spindle, a removable sleeve within said spindle, a cone on said spindle, a pair of die arms supported by said spindle adjacent said cone and having the ends of said arms extending beyond the end of said spindle, said cone having grooves in its surface, the rear ends of said arms having wedges for engaging the grooves of the cone, means for moving said cone to vary the effective space between the dies, means for rotating the spindle of one die head in one direction, and other means for rotating the spindle of another die head in the opposite direction.

3. A wire polishing machine including in combination a horizontally disposed rotatable spindle, bearings supporting said spindle, a hollow sleeve removably associated within said spindle, a cone on said spindle, said cone having grooves in its surface, arms pivotally supported near the ends of said spindle and having the inner ends thereof engaging the face of said cone, the other ends of said arms supporting die blocks, dies removably arranged in said die blocks, a yoke associated with said spindle, means for oscillating said yoke to move said cone axially, the inner ends of said die arms having wedge like members thereon, the spaces defining the grooves in said cone being arranged at different angular positions with respect to the cone axis, and said wedge members having a face conforming to the angularity of one of the side faces of a cone groove for contact therewith to prevent displacement thereof, and means for rotating said spindle.

4. A machine for polishing wire having a coating of wax or the like, said machine including in combination, a rotatable hollow spindle, bearings supporting said spindle arranged to take radial and axial thrusts thereof, a cone movable on said spindle, a hub carried by said spindle positioned adjacent said cone, a pair of axially extending arms mounted pivoted on said hub, said arms being arranged with the inner ends thereof engaging said cone, dies supported at the outer ends of said arms and spaced beyond the delivery end of said spindle, means manually adjustable to move said cone to adjust the distance between said dies while they are rotating, means to rotate said spindle, and removable guide means for the coated wire, said means comprising a sleeve extending through said spindle and removably secured thereto.

5. A wire polishing machine including in combination rotating pivoted arms carrying

spaced opposed dies one end of said arms being wedge-shape, a cone having a stepped grooved surface for engagement with the wedge-shape end of said arms, and manual means to move said cone whereby said dies are adjustable in spaced relation to each other while rotating.

In testimony whereof I have hereunto subscribed my name at Aurora, Illinois, Kane county.

ARTHUR K. SANDERSON.

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