Oct. 24, 1939. E. E. NEWTON ET AL 2,177,373

APPARATUS FOR HANDLING STRANDS

Original Filed Dec. 22, 1932 5 Sheets-Sheet 1

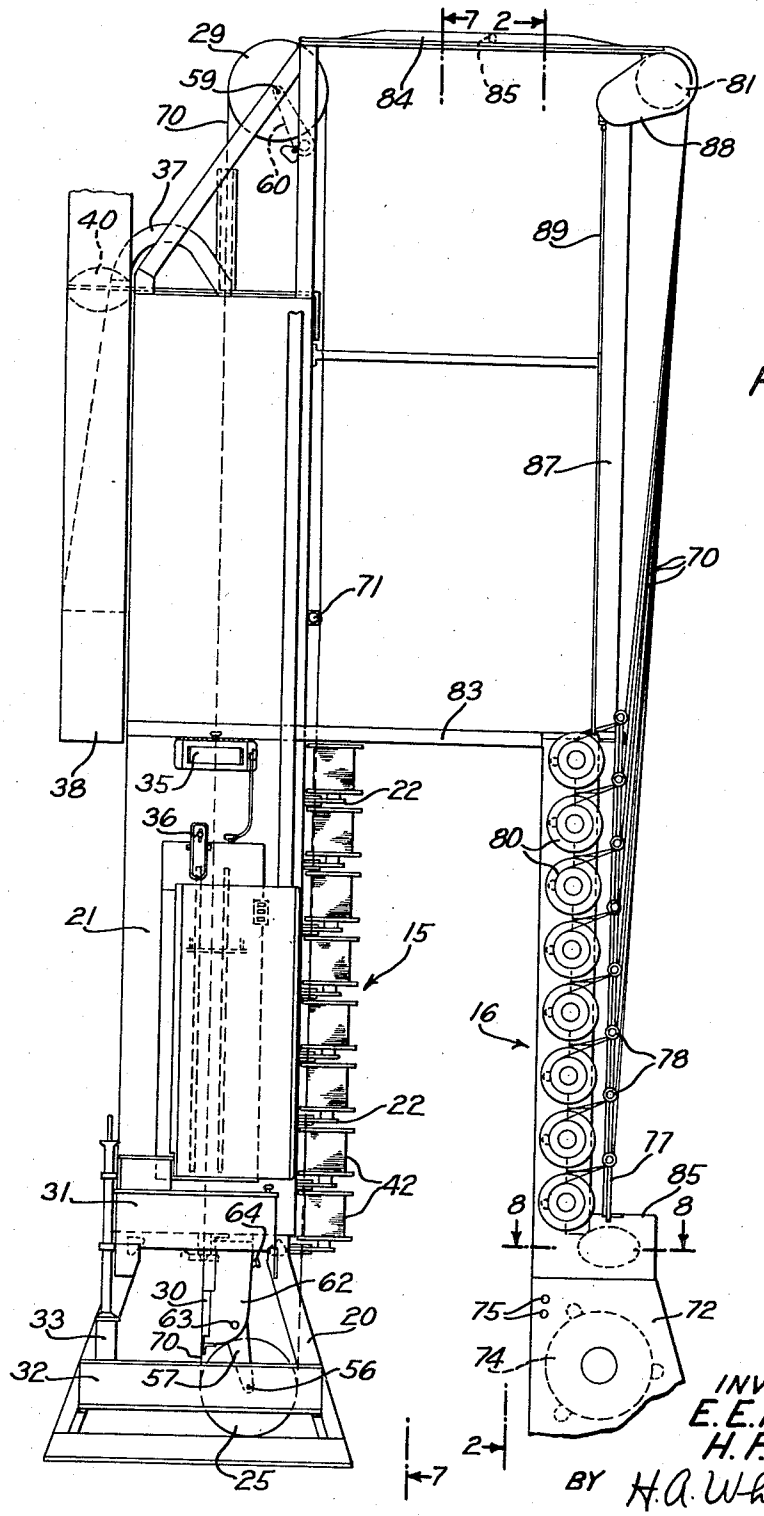


FIG. 1

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Original Filed Dec. 22, 1932 5 Sheets-Sheet 2

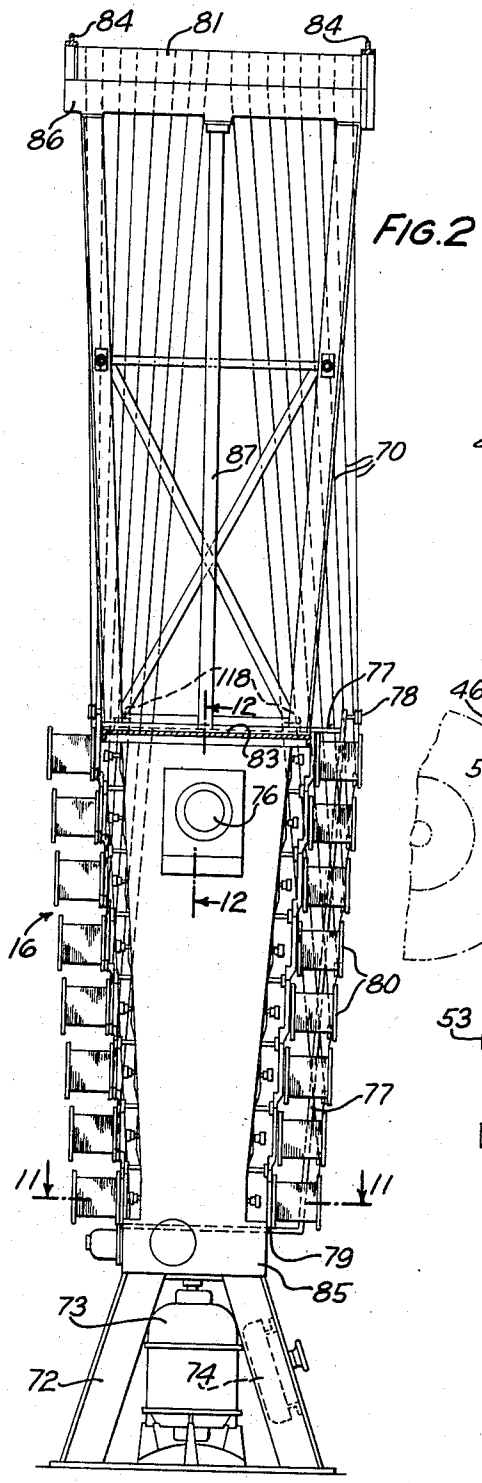


FIG. 2

FIG. 3

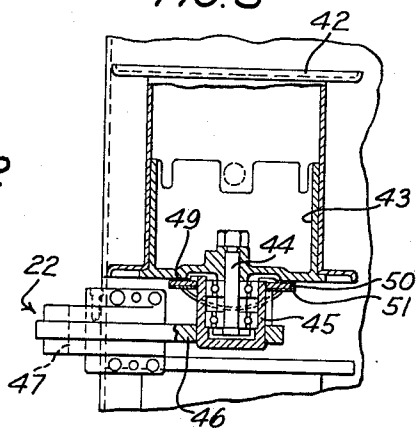


FIG. 4

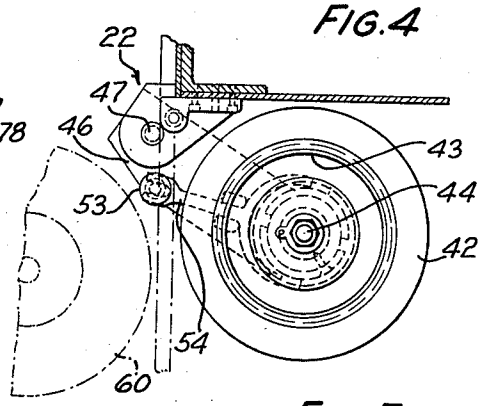


FIG. 5

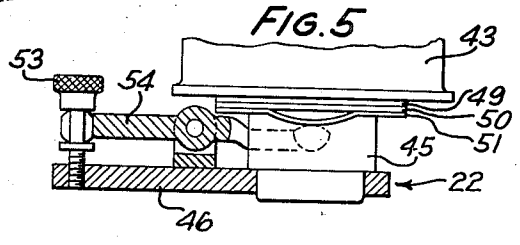


FIG. 6



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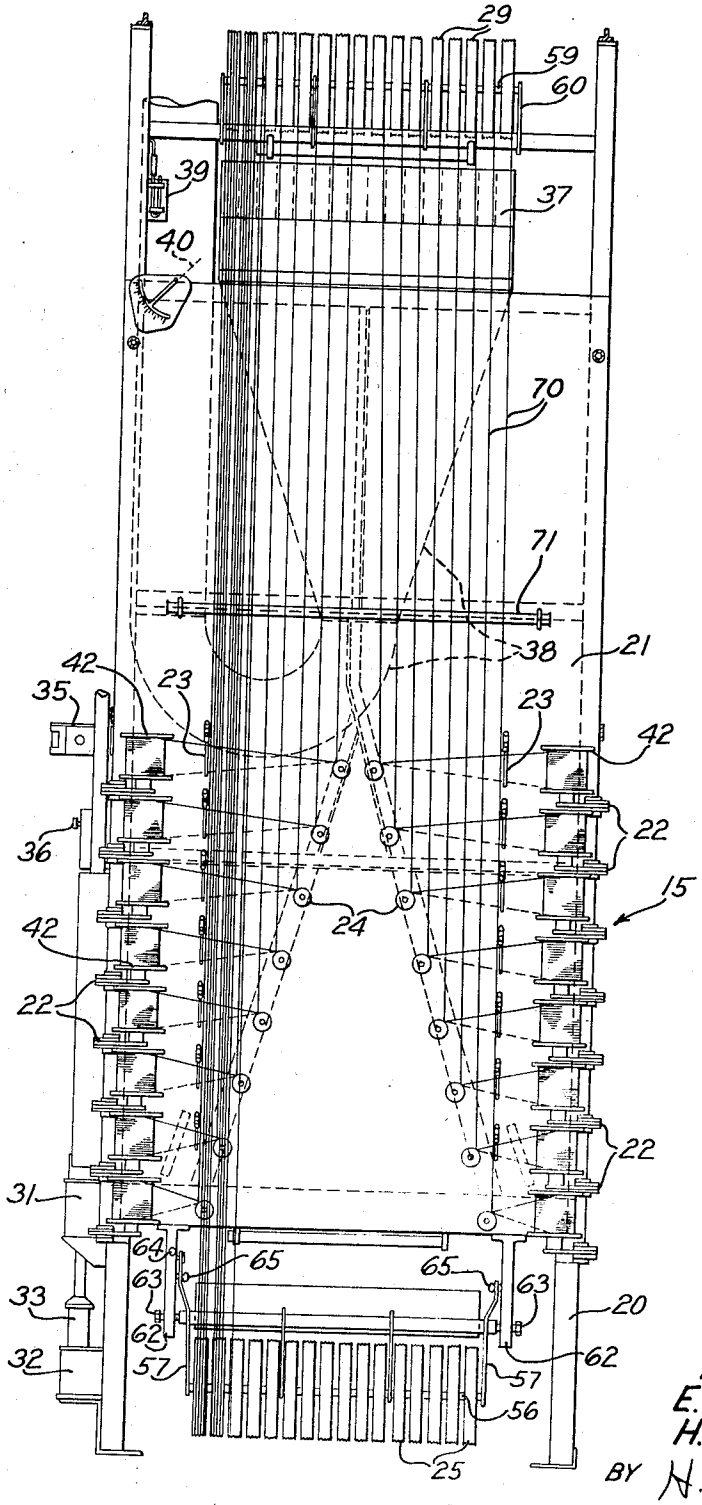


FIG. 7

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FIG. 8

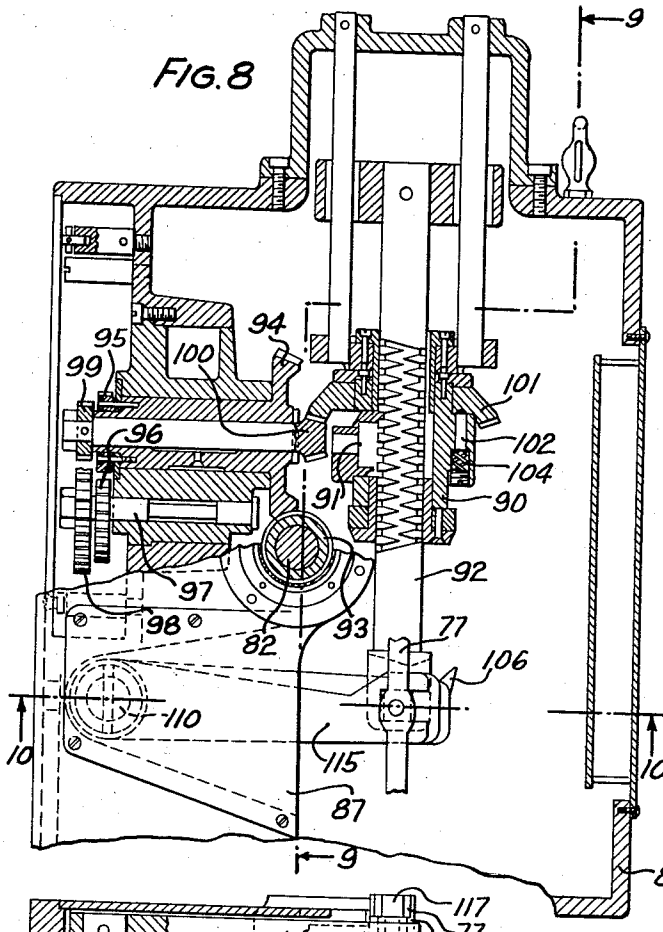
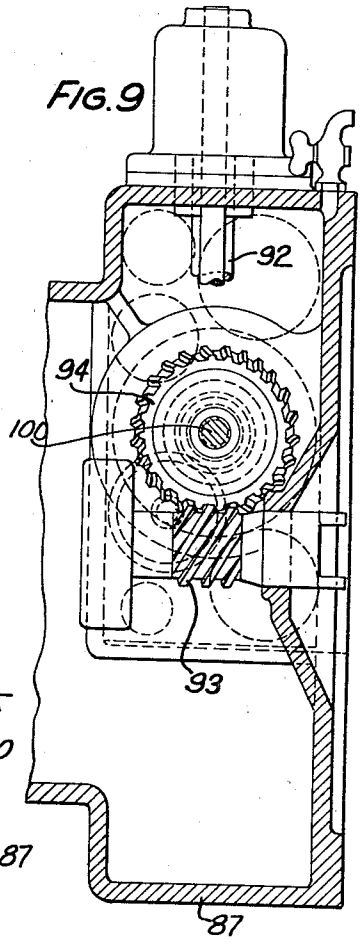


FIG. 9



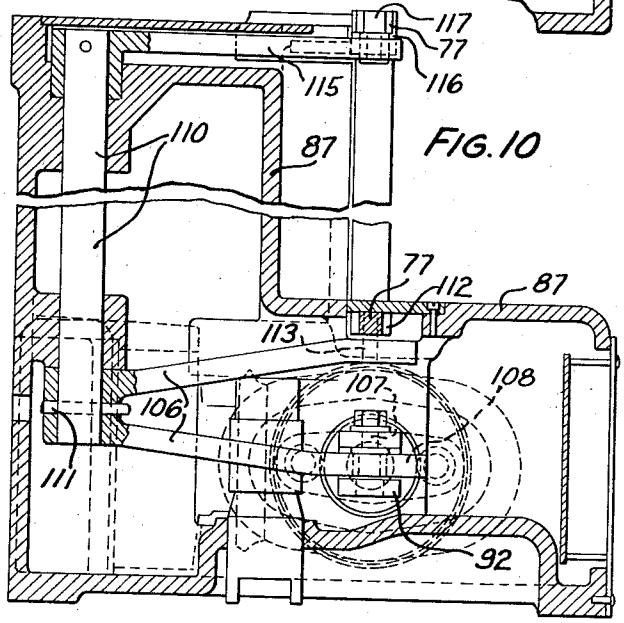


FIG. 10

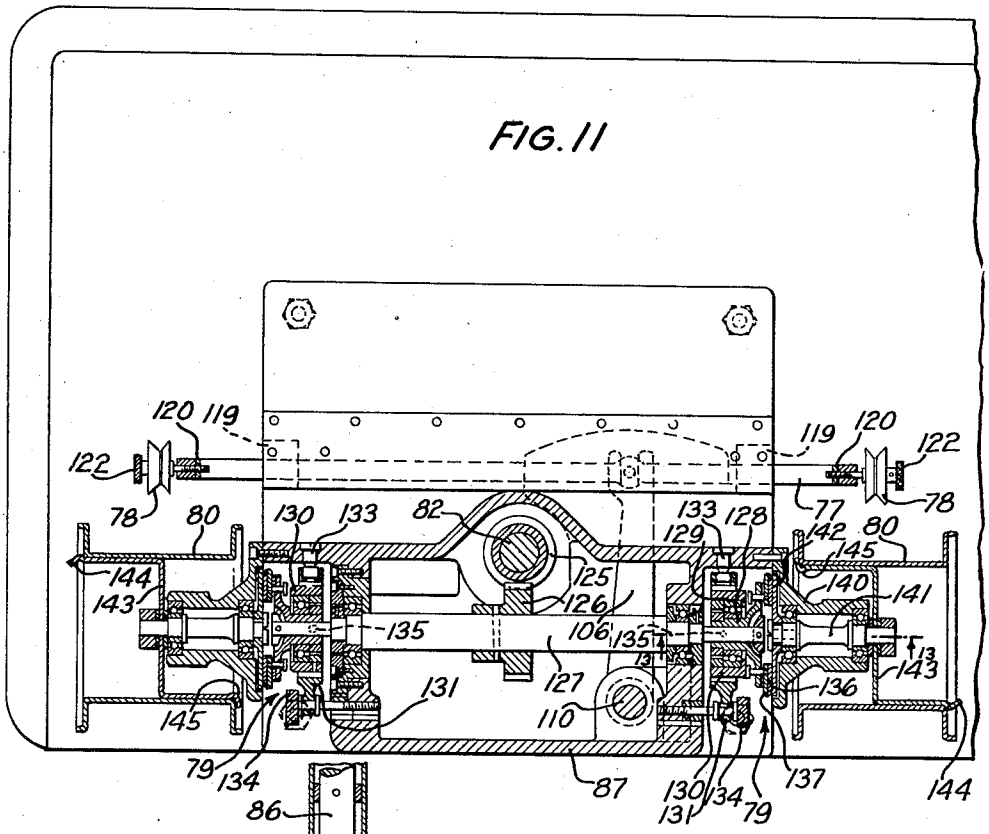
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FIG. 11



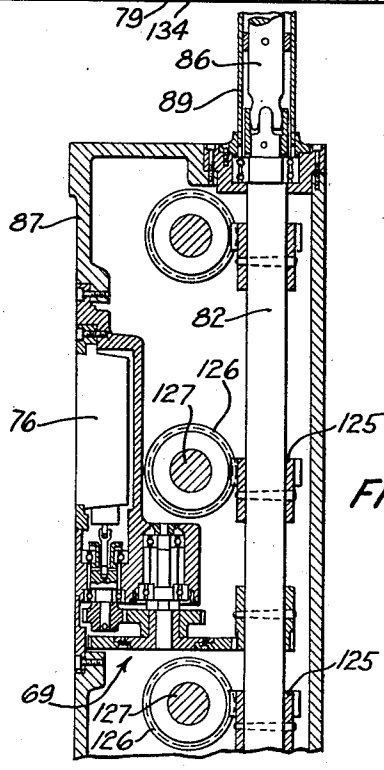


FIG. 12

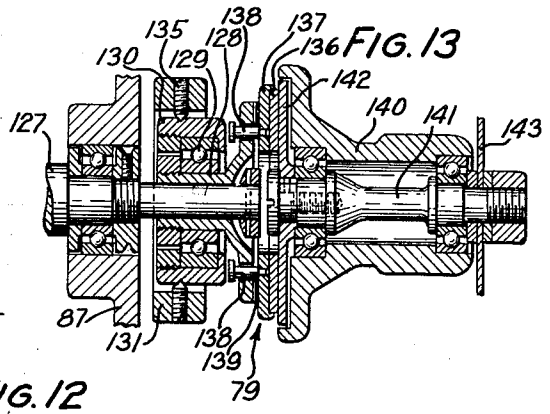


FIG. 13

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UNITED STATES PATENT OFFICE

2,177,373

APPARATUS FOR HANDLING STRANDS

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Original application December 22, 1932, Serial No. 648,414. Divided and this application January 14, 1936, Serial No. 59,062

3 Claims. (Cl. 242—25)

This invention relates to an apparatus for handling strands, and more particularly to wire handling apparatus, and this application is a division of our copending application Serial No. 648,414, filed December 22, 1932.

The invention is particularly applicable to an apparatus wherein wire is drawn from a supply spool, an enameling compound is applied a plurality of times and the wire is drawn through a baking oven a corresponding number of times to harden the enamel coatings, after which the enameled wire passes over a capstan which draws it at the desired speed through the apparatus and from which it passes to a take-up spool.

An object of the invention is to provide an improved apparatus for handling strands.

In accordance with one embodiment of the invention wires to be enameled are supplied to an enameling apparatus from a plurality of supply spools mounted on vertical axes and carried by a common vertically supporting framework. The wires are led by suitable guide means to idler sheaves, around lower rotatable multiple grooved pulleys, across the face of a pad saturated with an enameling compound, through a baking oven where the coatings of enamel are baked on the wire, around upper rotatable multiple grooved pulleys, and over a capstan to a plurality of take-up spools, upon which they are wound. Individual friction drives which are designed to allow for the difference in effective diameter between an empty spool and a full spool are employed to rotate the take-up spools.

Other objects and advantages of the invention will more fully appear from the following detailed description and accompanying drawings, in which:

Fig. 1 is a side elevation of a wire enameling apparatus embodying the invention;

Fig. 2 is an elevation of the inner end of the take-up unit taken along the line 2—2 of Fig. 1;

Fig. 3 is an elevational view, partially in section, of a supply spool holder;

Fig. 4 is a plan view of the supply spool holder;

Fig. 5 is an elevational view of the friction driving device for the supply spool partially in cross-section;

Fig. 6 is a plan view partially in section of the guide hook and idler sheave employed with the supply spool;

Fig. 7 is an elevation of the inner end of the strand coating unit taken on the line 7—7 of Fig. 1;

Fig. 8 is a sectional plan view of a portion of the take-up unit taken on the line 8—8 of Fig. 1;

Fig. 9 is a sectional elevation of a portion of the take-up unit taken on the line 9—9 of Fig. 8;

Fig. 10 is a sectional elevation of a portion of the take-up unit taken on the line 10—10 of Fig. 8;

Fig. 11 is a sectional plan view of another section of the take-up unit taken on the line 11—11 of Fig. 2;

Fig. 12 is a sectional elevation of a portion of the take-up unit taken on the line 12—12 of Fig. 2, and

Fig. 13 is an enlarged fragmentary sectional view taken on line 13—13 of Fig. 11.

Referring to the drawings, there is shown in Fig. 1 a wire enameling apparatus which comprises, in general, an enamel coating unit 15 and a wire take-up unit 16.

The enamel coating unit 15 is fully described and claimed in our copending application above referred to. It is believed sufficient to state herein that this unit comprises a framework designated generally at 20 which supports an oven 21, a plurality of supply spool brackets 22, an equal number of U-shaped guide hooks 23, an equal number of idler sheaves 24, an equal number of independently rotatable multiple grooved pulleys 25 below the oven 21, an equal number of independently rotatable multiple grooved pulleys 29 above the oven, an enamel applicator pad designated generally at 30, an enameling compound supply tank 31, an enameling compound drainage tank 32, an enameling compound pump 33, a temperature indicating device 35, a temperature control device 36, an exhaust hood 37, an exhaust condenser 38, an exhaust manometer 39 and an exhaust damper 40.

The supply spool brackets 22 (Figs. 1, 3, 4, 5 and 7) which support the supply spools 42 are mounted in two columns on the framework 20 at the inner end of the enamel coating unit 15 on one side of the oven 21 so that the axes of the spools in each column are in a common vertical plane. Each of the supply spool brackets 22 includes a drum 43 (Figs. 3, 4 and 5) upon which the supply spool 42 is mounted. The drum 43 is mounted on a vertical stud shaft 44 which shaft is journalled in a housing 45 on an arm 46 pivoted at 47. This construction permits movement of the supply spool drum 43 and the spool 42 from the normal position shown in full lines in Fig. 4 to the position shown in dotted lines at the left of Fig. 4.

To prevent the supply spools 42 from overrunning suitable friction means are provided. These friction means comprise a pliable felt friction ring 49 which bears on the lower surface of the drum 43, a stationary metallic friction ring 50 which bears against the lower surface of the felt friction ring 49, and a spring ring 51 which bears against the lower surface of the metallic ring 50. The metallic ring 50 and spring ring 51 are slidably keyed on the housing 45 to prevent the rotation of these two rings with respect to the housing 45. An adjusting screw 53 is provided so that the pressure of a bifurcated lever 54 against

the spring ring 51 can be controlled to regulate the pressure on the felt ring 49 located between the rotary drum 43 and the stationary metallic ring 50.

The multiple grooved pulleys 25 at the lower end of the enamel coating unit are of a relatively large diameter and preferably made of an aluminum alloy. The pulleys 25 are independently rotatable on a shaft 56 mounted in a rotatable frame 57. The multiple grooved pulleys 29 at the upper end of the enamel coating unit are also of a relatively large diameter and preferably made of an aluminum alloy. The pulleys 29 are independently rotatable on a shaft 59 mounted in a fixed frame 60. The fixed frame 60 is supported by the framework 20 and the rotatable frame 57 is fulcrumed on pad brackets 62 by means of two pivot screws 63.

An adjusting screw 64 mounted in one of the pad brackets 62 controls the position of the rotatable frame 57 and the pulleys thereon to the right or left as viewed in Fig. 1. Two wing screws 65 are provided to lock the rotatable frame 57 in its desired position. This adjustment permits varying the pressure of the wires 70 on the pad 30, which in practice will vary from practically no pressure to about 25 ounces, depending on the size of the wire being enameled.

Each of the pulleys 25 and 29 are provided with a plurality of peripheral grooves, one for each pass of wire, as additional coats of enamel are applied. The diameter of the peripheral grooves in each of the pulleys 25 and 29 are slightly larger in order of sequence of the portions of wires 70 passing over them.

The individual guide hooks 23 (Figs. 6 and 7) are provided to guide the wires 70 as they pass from the supply spools 42 to the idler sheaves 24. The guide hooks 23 and idler sheaves 24 are mounted on the framework 20 and are arranged to guide the wires from the supply spools 42 transversely behind and out of engagement with the vertical moving portions of the wires 70.

A glass bar 71 (Figs. 1 and 7) is provided above the guide hooks 23 to prevent the portions of the wires 70 which are moving downward on the outside of the oven 21 from vibrating to an extent which would permit them to come in contact with the outer wall of the oven 21.

The take-up unit 16 comprises a box shaped base 72 which supports a motor 73, motor speed control means comprising a rheostat 74, and motor switching means 75, a speed indicating device 76, a traverse frame 77 having a plurality of traverse guide pulleys 78 therein, and an equal number of frictional drives 79 for take-up spools 80 and a capstan 81. Frame 20 and box shaped base 72 mutually support and are connected by a platform 83 and a pair of braces 84. A mandrel 85, supported by the pair of braces 84, has a plurality of peripheral grooves equal in number to the number of pulleys 29 and is adapted to form a member to which loose ends of wire may be attached when threading the wires 70 through the machine or when one of the wires breaks during the operation of the machine.

The traverse frame 77 comprises a lower horizontal member, an upper horizontal member and substantially vertical side members connecting the horizontal members, the guide pulleys 78 being secured to the side members.

The capstan 81 comprises a steel cylinder of large diameter with a thick soft rubber cover which provides sufficient friction to prevent slipping of the wires 70 by merely passing them over the top.

The base 72 houses the vertical motor 73, motor switch 75 and rheostat 74 for controlling the motor speed. On the produced axis of the motor shaft and driven at the motor speed are two shafts 82 (Figs. 8, 11 and 12) and 86 (Fig. 12). The shaft 82 is flexibly coupled to the motor 73 and extends to the height of the compartment or box 87. The shaft 82 is coupled at its upper extremity to the shaft 86 which latter shaft extends to a capstan housing 88 (Fig. 1) within which housing suitable gearing is provided to drive the capstan 81. The shaft 86 is housed in a tube 89 (Figs. 1 and 12).

Suitable gearing, indicated generally at 69 (Fig. 12) is provided in the box or compartment 87 to drive the speed indicating device 76 from shaft 82.

In the lower portion of the compartment or box 87, a sleeve 90 (Fig. 8) houses a pawl 91 which engages with the right and left hand screw of a non-rotatable traverse bar 92. The sleeve 90 is driven from the shaft 82 through a worm 93, a worm gear and sleeve integral therewith 94, gears 95 and 96, shaft 97, change gears 98 and 99, a shaft and bevel pinion 100 integral therewith, bevel gear 101 and a spring pin 102. If the pawl 91 becomes jammed on a diamond point of the right and left hand screw of the traverse bar 92, the torque of the bevel gear 101 will overcome the pressure of a spring 104 causing the spring pin 102 to recede from a drilled spot recess in bevel gear 101, which permits the bevel gear 101 to rotate without introducing dangerous stresses in any of the parts. The pitch of the traverse mechanism, to accommodate the different sizes of wires being coated, is changed by changing change gears 98 and 99.

One end of the traverse bar 92 is connected to one arm of a bifurcated lever 106 (Figs. 8 and 10) by means of a screw 107 and a square block 108 which is assembled in a slot in the arm of the lever 106. The movement of the traverse bar 92 in and out, as viewed in Fig. 10, imparts first a clockwise and then a counterclockwise motion to a vertical bar 110 which is secured to the bifurcated lever 106 by means of a taper pin 111. The upper arm of the bifurcated lever 106 is fastened to the bottom of the traverse frame 77 (Fig. 10) through a square block 112 and a stud 113 secured to the traverse frame 77 and imparts an oscillatory motion to the traverse frame 77. The bar 110 imparts the same motion to the top of the traverse frame 77 through a single lever 115 (Figs. 8 and 10), a square block 116 and a stud 117. Suitable guides 118 and 119 (Figs. 2 and 11) at the top and bottom respectively of box 87 maintain a straight line motion of the traverse frame 77 as it oscillates.

Threaded into the frame 77 (Fig. 11) and extending through a plurality of flat springs 120 are a plurality of adjusting screws 122 on each of which is rotatably mounted a sheave 78. The adjusting screws 122 are set to bring the sheaves 78 into correct registry with the take-up spools 80 so that the wires 70 may be laid evenly on the take-up spools 80. The flat springs 120 impart pressure endwise of the screws 122 to preserve their adjustments.

Pinned to the vertical shaft 82 (Fig. 11) are a plurality of spiral gears 125 meshing with an equal number of spiral gears 126 which are secured to an equal number of horizontal shafts 127. The friction drives 79 are secured to each end of the shafts 127 and each is constructed as

follows: Slidably keyed to the shaft 127 is a sleeve 128 (Figs. 11 and 13) the outer side of which is secured to the inner race of a ball bearing 129. The outer race of the ball bearing 129 is fixed in ring 130. A ring shaped yoke 131 with a cylindrical projection on one side and a forked projection diametrically opposite to the cylindrical projection surrounds the ring 130. A fulcrum screw 133 extends through and is secured in a projection from the compartment or box 87. The screw 133 extends into the cylindrical projection of the ring shaped yoke 131. A double collar screw 134 is assembled in the forked projection of the yoke 131 and is threaded into the compartment or box 87. Two pivot screws 135 are secured in the ring portion of the yoke 131 on a diameter normal to the plane of the axis of shaft 127 and screws 133 and 134. The pivot screws 135 pivot in diametrically opposite holes in the ring 130. When the screw 134 is turned, the ring shaped yoke 131 is rocked about the fulcrum screw 133 and by means of the pivot screws 135, ring 130, and ball bearing 129, a movement is imparted to the sleeve 128 longitudinally to the shaft 127.

A soft felt friction ring 136 is secured to a metal ring 137 which ring 137 is slidably mounted on sleeve 128 by means of three headed pins 138. A corrugated spring ring 139 is located between ring 137 and sleeve 128 and surrounds the three pins 138. A bracket 140 is secured to the projection from the compartment or box 85 and houses a shaft 141 having its axis in line with shaft 127. A friction disc 142 is secured to the inner end of the shaft 141, and a spool holder 143 is secured to the other end of the shaft 141. When the yoke 131 is rocked toward the take-up spool 80 the sleeve 128 slides in the same direction and compresses the spring ring 139. This increases the pressure between the driving friction ring 136 and the driven friction disc 142. The driving friction ring 136 is rotated at all times a little faster than the maximum desired speed for the spool 80 and driven disc 142 but the rotation of the spool is retarded by the tension of the wire 70 between the capstan 81 and the spool 80. Therefore, regardless of the diameter of the spooled wire upon the spool 80, the spool 80 will rotate only as fast as is permitted by the delivery of wire from the capstan 81 and the tension in the wire 70 is regulated by the pressure between the friction surfaces. The rotation of the spool 80 may be stopped by disengaging the friction surfaces.

The spool holder 143 is formed from a sheet of spring steel and has a body in the shape of a ring with six equally spaced radial arms extending therefrom. Three alternate arms extend outward and are formed to have an embossment on the end thereof as shown at 144 and the other three extend inward and are formed to have a shoulder on the end thereof as shown at 145. The sheet steel from which the spool holder 143 is formed is of sufficient thickness to insure proper spring in the arms 144 to permit sliding a take-up spool 80 over the embossments at the end of the arms 144, and when the spool 80 is in its normal position against the shoulder of the arm 145 to provide sufficient spring pressure against the inside of the spool drum of the take-up spool 80 to drive it.

The machine as disclosed is capable of simultaneously enameling sixteen individual strands of wire 70. In the operation of the machine each of the wires 70 to be coated is fed from a supply spool 42 and passes in an approximately horizontal direction through a U-shaped guide hook 23 and over an idler sheave 24, downward to the groove on the left side of a rotatable multiple grooved pulley 25 and around the pulley, upward through the oven 21 to the groove on the left side of a rotatable multiple grooved pulley 29 and around the pulley, downward on the outside of the oven 21 to the next groove in the pulley 25 and around the pulley, upward in contact with the saturated face of the pad 30 (to receive the first coat of enamel), through the oven (where the enamel coating just applied is thoroughly baked onto the wire), to the next groove in pulley 29, from which the wire 70 passes several more times around the pulleys 25 and 29, contacts with the pad 30 and passes through the oven 21.

After the last pass of the wire 70 passes through the oven, the wire 70 passes over the groove on the right side of pulley 29 and in an approximately horizontal direction, under the mandrel 85 to the rubber covered capstan 81, over the capstan 81 and downward over a guide pulley 76 to a take-up spool 80.

The tension on the wire 70 is controlled by regulating the adjusting screw 53 which controls the friction on the supply spool 42 and by regulating the adjusting screw 134 which controls the friction on the drive 79 of the take-up spool 80. The desired pitch of the traverse frame 77 is obtained by inserting the proper change gears 98 and 99. The motor 73 is started by operation of the starting button 75 and its speed adjusted by the control rheostat 74. The motor 73 drives the capstan 81 and oscillates the traverse frame 77 causing the wires 70 to be drawn through the apparatus.

While the invention has been described with special reference to the embodiment illustrated herein, it is to be understood that various modifications may be made therein without departing from the spirit of applicants' invention, the scope of which is defined by the appended claims.

What is claimed is:

1. In a strand handling apparatus, a reel mounting comprising a supporting member, a pivoted member carried by the supporting member, a stud shaft carried by the pivoted member and adapted to receive a reel, and frictional means comprising a felt ring, a metallic ring and an adjustable spring ring opposing the rotation of the stud shaft.

2. In a strand handling apparatus, a pivotal support, a reel supporting member rotatable in a free end of the support, and frictional means opposing the rotation of the member, said means comprising a felt ring coaxial with the reel supporting member and a spring ring yieldably pressing the felt ring against a surface of said member.

3. In a strand handling apparatus, a reel mounting comprising a pivotal support, a rotatable reel supporting member mounted in the free end of said support, and frictional means opposing the rotation of said member, said means comprising a felt ring coaxial with the member, a spring ring yieldably pressing the felt ring against a surface of said member, and a metallic ring between the felt ring and the spring ring.

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