Feb. 9, 1937. G. WEISS 2,070,035

WIRE COATING MECHANISM

Filed July 27, 1932 3 Sheets-Sheet 1

Fig. 1.

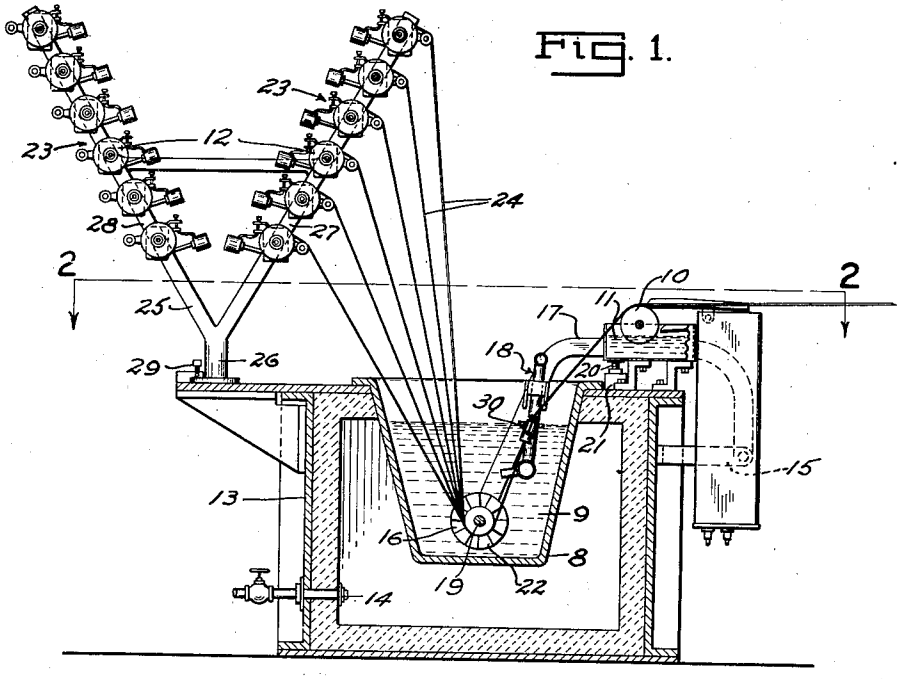
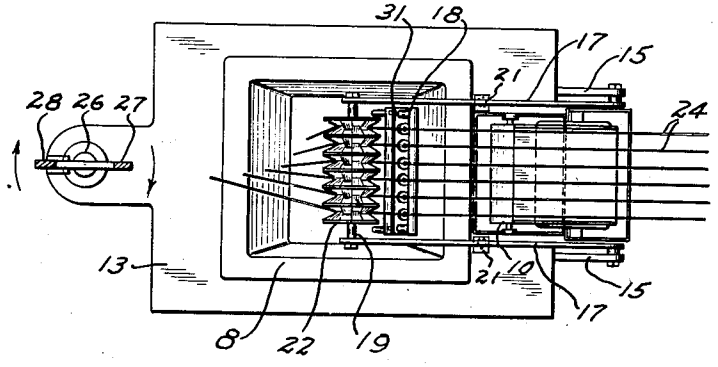


Fig 2



Inventor

George Weiss

By Brueton, Whitcomb & Davies

Attorneys

Feb. 9, 1937. G. WEISS 2,070,035

WIRE COATING MECHANISM

Filed July 27, 1932 3 Sheets-Sheet 2

Fig. 3.

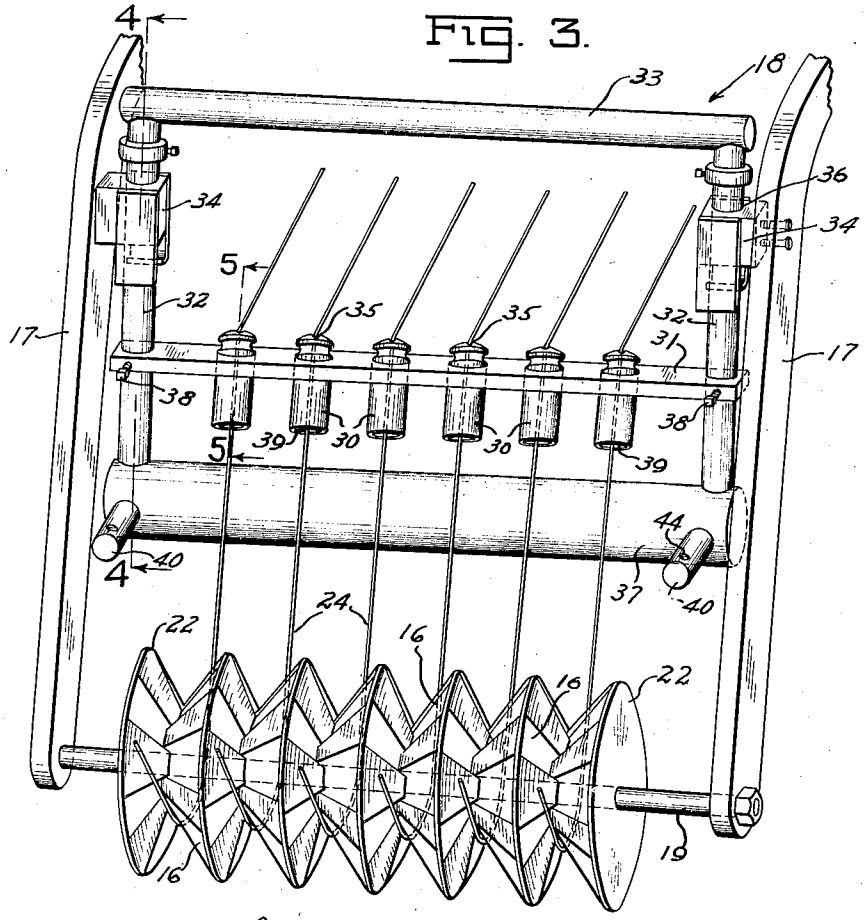


Fig. 4.

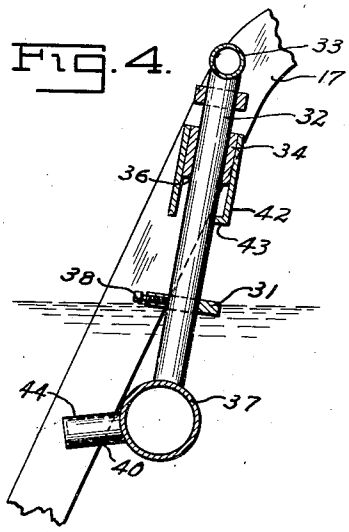
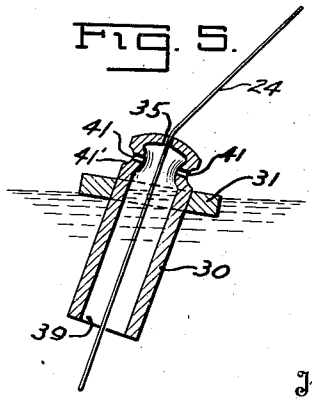


Fig. 5.



Inventor

George Weiss

By Breselton, Whitcomb & Davies

Attorneys

Feb. 9, 1937. G. WEISS 2,070,035

WIRE COATING MECHANISM

Filed July 27, 1932 3 Sheets-Sheet 3

Fig. 6.

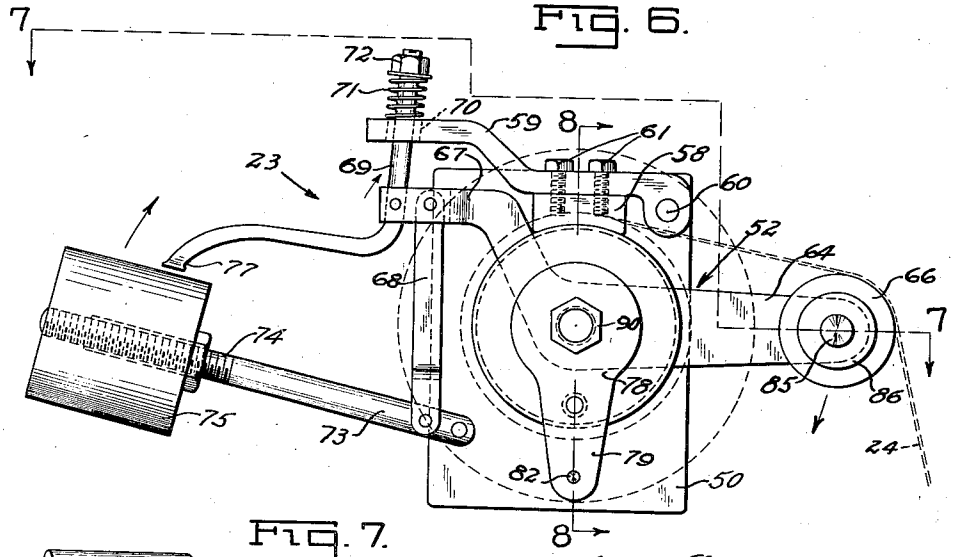


Fig. 7.

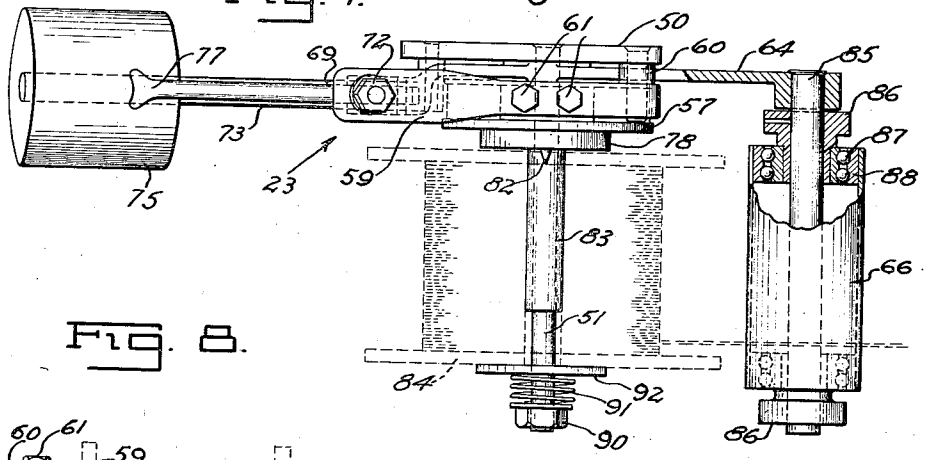
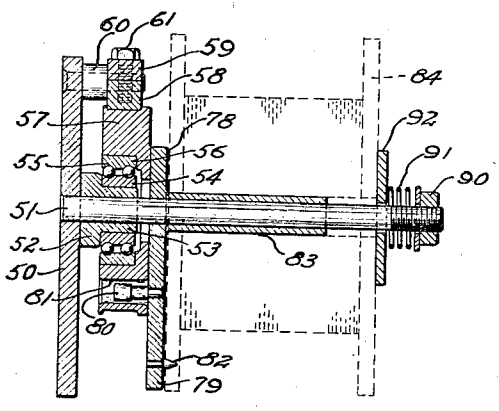


Fig. 8.



Inventor

George Weiss

By Brasellon, Whitcomb & Davies

Attorneys

Patented Feb. 9, 1937 2,070,035

UNITED STATES PATENT OFFICE

2,070,035

WIRE COATING MECHANISM

George Weiss, Des Plaines, Ill., assignor to Standard Cap and Seal Corporation, Chicago, Ill., a corporation of Virginia

Application July 27, 1932, Serial No. 625,048

5 Claims. (Cl. 91—12.6)

This invention relates to an improved method and apparatus for producing articles covered with a coating of another material and more particularly to an improved and efficient method and apparatus for applying a uniform coating of fluxible material to a wire or strand core.

The invention contemplates an improved apparatus and method for producing coated cores by which the thickness of the coating on the core may be varied or regulated, and maintained uniform.

The invention embraces an improved apparatus for materially increasing the speed at which metallic coatings are applied to cores and the inclusion of means for applying a coating which is evenly distributed and which is free from dross and irregularities.

An object of the invention is the provision of means and apparatus for uniformly regulating the tension of a core to be coated so that the cross sectional area of the core is maintained constant during the coating process.

The invention also contemplates an efficient guiding structure for the core or strand which is automatically adjustable with respect to the level of the coating bath.

Further objects and advantages are within the scope of the invention such as relate to the arrangement of the elements of the structure, to various details of construction, economies of manufacture and numerous other features as will be apparent from a consideration of the drawings, and related description of a form of the invention which may be preferred, in which:

Figure 1 is a sectional elevation illustrating an embodiment of the invention;

Figure 2 is a top plan view of the structure shown in Figure 1;

Figure 3 is an enlarged perspective view of the guiding mechanism;

Figure 4 is a sectional detail taken substantially on a line 4—4 of Figure 3;

Figure 5 is an enlarged sectional detail taken substantially on a line 5—5 of Figure 3;

Figure 6 is a side elevation of the feed control mechanism;

Figure 7 is a top plan view of the structure shown in Figure 6 showing portions in section;

Figure 8 is a sectional detail taken substantially on a line 8—8 of Figure 6.

While I have illustrated the apparatus and method of my invention as used for coating wire with a fluxible material, it is to be understood that my invention is susceptible to any other uses and that I contemplate its utilization in any manner wherever the same may be found to be applicable.

The apparatus of my invention is inclusive of a receptacle containing a bath of molten fluxible material, for example, such as solder, lead, tin or the like; a guiding structure through which a core such as wire is passed, serving to remove the dross and at the same time define the thickness of the coating; also a means for controlling or regulating the tension on such a core as it is passed through the molten bath.

Referring to the drawings in detail, particularly Figures 1 and 2 thereof, I have illustrated an apparatus which preferably includes a receptacle 8 which may be a melting pot for the fluxible material 9, such as solder, or other fluxible substance, forming the coating material for the wire that may be taken from supply reels 12 and passed through the molten material. The receptacle 8 extends downwardly through the opening in the top of the furnace or heating chamber 13 which may be heated in any suitable manner, as for example, by a gas flame. An opening is provided in the side of the chamber 13 for admitting a gas or other fuel nozzle 14, the gas being ignited in order to heat the receptacle and melt its contents. Two brackets 15 are secured upon the exterior of the furnace 13, each bracket supporting an arm 17 pivotally secured thereto. The arms 17 journally support the core guiding means 22 and also serve as supporting means for a frame structure 18 below which is a shaft 19 fixedly connecting the other ends of the arms, whereby the arms are held in rigid relation. Upright posts 20 are adjustably secured to a support 21 mounted upon the upper portion of the furnace, each post engaging one of the arms 17 at an intermediate horizontal portion thereof. By adjusting the posts 20, the arms may be raised or lowered and are consequently adjusted about the pivots that connect them with the brackets 15, thus varying the relative position of the core guiding means 22.

By my apparatus I provide a structure in which one or more spools or reels of wire 12 may be coated while another spool or set of spools of wire is being placed in position on the frame, providing a substantially continuous supply of material to be coated. Thus, at one end of the furnace 13 is positioned the substantially Y-shaped member or frame 25, the lower portion 26 of which is suitably pivoted so that the arm portions 27 and 28 may be selectively swung into position over the receptacle 8. The member 25 may be locked or retained in adjusted posi-

tion by suitable means such as screw 29. Each of the arms 27 and 28 incorporates a plurality of wire or core control members 23 supporting the reels or spools 12, the wire from each of which passes downwardly to the mechanism hereinafter described.

The wire or core 24 that is supplied from the reels 12 is guided through the molten material or solder by the sheaves or core guiding means 22 supported by arms 17. Each of the sheaves is preferably formed hollow and has a peripheral grooved formation with openings 16 therethrough in its sloping sides that terminate in the deepest part of the periphery, which is preferably V-shaped in cross section. These sheaves are mounted to rotate upon shaft 19 carried by the lowermost ends of the arms 17 that extend into the molten bath 9 adjacent to the bottom of the receptacle or pot 8. After the wire leaves the sheaves 22, it passes to conduits or guides 30, and then over an idler or guiding roller 10 which is preferably immersed within an oil or other cooling bath 11 whereby a slight film of oil adheres to the coated wire to permit it to be immediately wound upon spools without the merging of the coating portions upon adjacent turns, the spools being actuated by mechanism (not shown) which draws the coated core from the coating mechanism.

Referring now particularly to Figures 3, 4 and 5, it will be noted that the arms 17 in addition to supporting the sheaves 22 also carry the frame structure 18 which forms a support for wire or core guiding means and which structure is inclusive of a plurality of tubular members 32 slidably positioned in blocks 34, the blocks being secured to arms 17. The tubular members 32 are joined at their upper ends by means such as a cross rod or bar 33 and at their lower ends by a float member 37 the purpose of which will be hereinafter more fully described. Rods 32 also support a bar member 31 which is adjustable thereon and which may be secured in adjusted position by means of screws 38. The member 31 carries a plurality of open ended conduits or guide bushings 30 which provide means for regulating the thickness of the coating applied to the core and which also perform the functions of removing the dross and smoothing the coating. The bores 35 in the guide bushings 30 are slightly larger than the wire including the coating. The conduits or guides 30 are inclined or sloped and are arranged with their upper ends above the surface of the molten metal and their lower ends being immersed in the molten metal. The lower ends of the conduits 30 being immersed in the molten metal and as the bores 39 of the guides are materially larger than the wire, each guide forms a smaller bath of molten material for the wire passing therethrough.

In the embodiment of the invention shown, I provide independent hollow guides 30 for each core, each guide 30 being so arranged and of such diameter that dross and other impurities are materially eliminated within the core guide. However, if any dross should be carried along with the core, this dross is scraped from a portion of the core by the wall of the bore 35 of the core guides 30 with which the core contacts, the objectionable dross upon the other portion of the wire flowing away with the dross removed by scraping. It has been found desirable to provide the holes 41 in an annular groove 41' in the upper portion of each of the guides 30, so that should dross be carried up with the core to the bore 35, such dross will flow downwardly to the holes 41, and may be removed therefrom by insertion of a cleaning tool in openings 41. The wire passes somewhat diagonally through the bores of the conduits and is slightly bent upon leaving the guides by contacting with the upper edges thereof. Such contacting of the wire with the bore 35 also removes portions of the coating and therefore serves in regulating the thickness of the coating. The thickness of the coating may be further varied by changing the elevation of the guides 30 with respect to the surface of the molten bath, the adjustable bar 31 serving as a means to position the conduits with respect to the surface of the molten material.

As a means for adjusting the bar 31 and its associated parts so that the bar may rest substantially on the surface of the molten material, the float member 37 has been provided, carried by the lower ends of the members 32. The float member 37 is provided with outwardly extending hollow elements 40 which are provided with screw plugs 44. It is to be noted that by supplying the hollow portions of the float member 37 and extensions 40 with suitable loading material, as for example solder or lead, the total weight of the floats may be varied to change the effective vertical position of the float with respect to the surface of the molten metal and thus the position of the bar 31 carrying the guides 30. Such change may readily be accomplished by removing the plugs 44 to supply the interior of the hollow element with loading material or to remove such material therefrom. By so adjusting the position of the floats 37, 40 and bar 31, the angle at which the core is withdrawn from the conduits 30 may be modified with the result that the pressure of the core against the edge of the bore 35 may be varied. Such variations of contact angle of the core with respect to the guides 30 will permit a controllable amount of the fluxible material to adhere to the core and thus the thickness of the coating may be varied at will.

In order to automatically adjust the conduits to a desirable operating position with respect to the surface of the molten material, the bores 36 in the block members 34 are made substantially larger than the tubular members 32 in order that the members 32 may have a slight rocking movement and be freely slidable within the blocks. The blocks 34 may as shown in Figure 4 carry the substantially L-shaped members 42 having projections 43 extending toward the tubular members 32, which projections permit movement of the members 32 when there is no tension on the wires 24, but during the coating process the tension of the wires 24 passing through the guides 30 will exert a lateral pressure on the members 32, the latter being rockable in the blocks 34 will cause the members 32 to bear aganist the projections 43 thus firmly positioning the members 32.

When the tension of the wires is released, the float members 37, 40 and the tubular members 32 will be freely movable in the blocks 34 due to the fact that substantially no force is present after the release of the wires takes place, tending to hold the tubular members 32 in engagement with the projections 43. Thus, the bar 31 and conduits or guides 30 will be automatically repositioned with respect to the surface of the fluxible or coating material. In this respect it will be noted that should the level of the molten material become lower during the process, release of tension on the cores or wires at such times will permit the conduits or guides 30 to automatically be lowered

through float member 37 to proper position relative with respect to the surface of the coating material.

In order that the wire may be fed to the bath so as to minimize the danger of breakage as encountered heretofore, means have been provided for controlling or regulating the tension on the wire or core, and Figures 6, 7 and 8 illustrate an embodiment of such mechanism. Suitably carried upon the frame 25 illustrated particularly in Figure 1 is a plurality of friction applying or wire control members 23, secured thereto by means of a supporting plate 50. Positioned substantially centrally of plate 50 is a shaft 51 on which is loosely mounted a bracket member 52 having an outwardly extending hub portion 53 on which is mounted the inner race 54 of an anti-friction bearing 55. Suitably carried on the outer race 56 of bearing 55 is a brake drum 57, the outer surface of which is adapted to be contacted by a friction shoe or member 58 fixedly carried by an arm 59 pivotally supported as at 60 to plate 50. The friction shoe 58 may be secured to arm 59 by means of bolts 61. Bracket 52 is provided with an integral extension or arm 67 to which is pivoted one end of link 68 and link 69. Link 69 is screw threaded at its upper portion, which projects through an opening 70 in arm 59, a coil spring being interposed between the arm 59 and a nut 72 also carried by the threaded portion of link 69. The other end of link 68 extending downwardly from arm 67 is pivotally connected to a bar 73 which in turn is pivoted to plate 50. Cooperating with a screw threaded portion 74 of bar 73 is an internally threaded weight member 75 adapted to be adjustably positioned relative to bar 73. Link 69 has an extended portion curved downwardly and outwardly so that the extremity 77 thereof is juxtaposed with respect to the weight member 75.

Journalled upon shaft 51 and having a disc-like portion adjacent the brake drum 57 is a member 78 having an extended arm portion 79 which carries an inwardly projecting pin 80 adapted to cooperate with a transverse opening 81 provided adjacent the periphery of the drum 51. Arm 79 also carries a pointed pin 82 and a sleeve or hub portion 83 providing an elongated bearing adapted to receive the wire or core supply spool. The pin 82 is adapted to be imbedded in the flange of the spool 84 positioned on sleeve 83, the spool being retained thereon by means of the nut 90, a spring 91 and washer 92 being interposed between the spool 84 and the nut 90. It will be noted that due to the connection between drum 57 and spool 84 through the opening 81, pin 80 and arm 79, the brake drum is caused to revolve with the spool, and that the tension on the wire being withdrawn from the spool is governed by means of the frictional contact of shoe 58 with the periphery of the drum, the braking pressure being varied by moving weight 75 on the threaded portion of bar 73 to change the moment arm.

Carried on the bracket member 52 adjacent one of its extremities 64 is a stub shaft 85 which carries a pair of hub members 86 supporting bearings 87. Rotatably mounted upon the outer races 88 of the bearings 87 is the wire guiding drum 66 over which the wire passes as it is drawn from the spool 84.

As the wire is unreeled from the spool 84 it is desirable that the correct tension be applied to prevent the wire from stretching or breaking and with the arrangement above described these results are accomplished by setting the weight member 75 at the most suitable position. As it is desirable that the cross sectional area of the core be maintained constant or to substantially exact gauge, the weight 75 may be so regulated with respect to the cross sectional area of the core that no undesirable stress or pull effective to reduce that area will be present. Such regulation is provided by adjusting the weight 75 to the cross sectional area of the core being coated and maintaining that adjustment throughout the coating process, the automatic frictioning means compensating and regulating the tension present on the wire due to the withdrawing mechanism. Due to the fact that the guide 66 is carried by the pivoted arm 64 any abnormal strain on the wire 24 will cause guide 66 to move downwardly releasing the pressure of friction shoe 58 on brake drum 57 because of the upward movement of arm 67 resulting in corresponding upward movement of arm 59, the spring 71 acting as a shock absorbing means to prevent sudden release of pressure. As the weight 75 is also connected to arm 67 through link 68 and bar 73, the weight is raised upon downward movement of guide 66, but is prevented from sudden upward movement by the extension 77 which serves to temporarily check the upward movement of weight 75. Should the wire break or become slack during the coating process, the guide 66 moves upwardly due to the removal of tension thereon, which release of pressure causes downward movement of the weight 75 which in turn increases the frictional contact between the brake drum 57 and shoe 58 in which case the spool of wire is temporarily stopped to prevent further unreeling of the wire or to readjust the tension on the wire or core.

Thus it will be apparent that a substantially uniform tension will be exerted upon the wire at all times during operation of the machine and that the tensioning device can be regulated with respect to the cross sectional area of the core so that the resistance to the withdrawal of the core is such that the operation is accomplished without modifying the cross sectional area of the core.

It is apparent that, within the scope of the invention modifications and different arrangements may be made other than is herein disclosed, and the present disclosure is illustrative merely, the invention comprehending all variations thereof.

What I claim is:

1. In a coating mechanism, in combination, a coating bath; means for supplying a core to said bath; means to support and position a core guide within said bath; means carried by said guide positioning means and engageable with said core to regulate the thickness of the coating on said core; means automatically adjustable with respect to the surface of said coating bath and cooperating with said regulating means to maintain said regulating means at the surface of said bath.

2. In a coating mechanism, in combination, a coating bath adapted to receive a core to be coated; core guiding means immersed in said bath; means associated with said guiding means including a conduit having a portion engageable with said core for regulating the thickness of the coating on said core, said conduit being automatically positioned and maintained at the surface of said bath; and means for automatically adjusting the position of said regulating means with respect to the surface of said coating bath including a buoyant member submerged in said bath.

3. In a mechanism of the character described, the combination of a coating bath; means for supplying a core to said bath; means associated with said core supply means to control the tension of a core passing through said bath, said means including a tension responsive member; a core engaging member cooperating with said friction member; means for guiding the core through said bath; means engaging said core above the surface of said bath for controlling the thickness of the coating on said core; and automatically adjustable means cooperating with said guiding means for maintaining said controlling means above the level of said coating bath, said adjustable means dependent for functioning upon the tension on said core.

4. An apparatus of the character described, in combination a coating bath; means for supplying a core to said bath; means for guiding the core through said bath; means to apply tension on said core; means for regulating the thickness of the coating on said core, including means for automatically adjusting said regulating means with respect to said bath when the tension on said core is released, said means maintaining said regulating means above the surface of said bath; and means for retaining said regulating means in adjusted position when tension is applied to said core.

5. An apparatus of the character described, in combination a coating bath; means for supplying a core to said bath; core guiding means immersed in said bath; means for regulating the tension on said core; means associated with said guiding means for regulating the thickness of the coating on said core including a conduit having a core engaging portion; means for adjusting the position of said conduit to maintain the same above the surface of said bath, said adjusting means serving to automatically position said conduit with respect to said bath when the tension on said core is decreased.

GEORGE WEISS.