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FOURDRINIER TYPE MACHINE FOR APPLYING PULP INSULATION TO WIRES

Filed Aug. 20, 1948

2 Sheets-Sheet 1

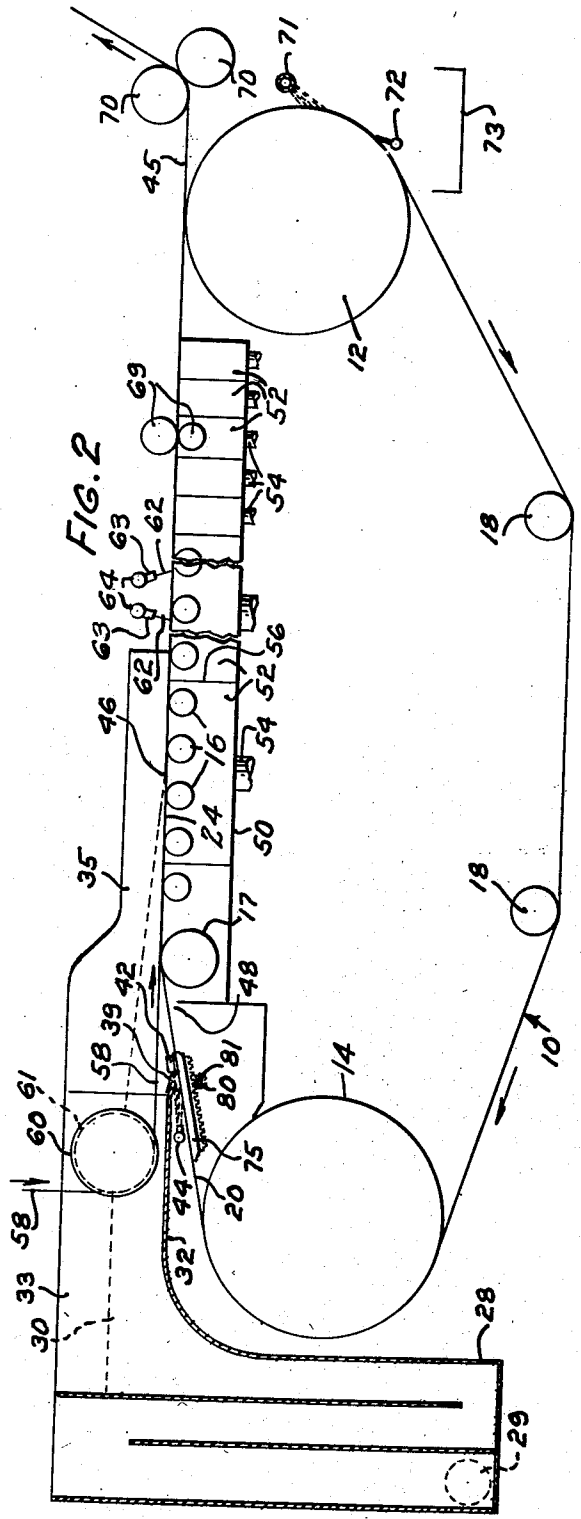


FIG. 2

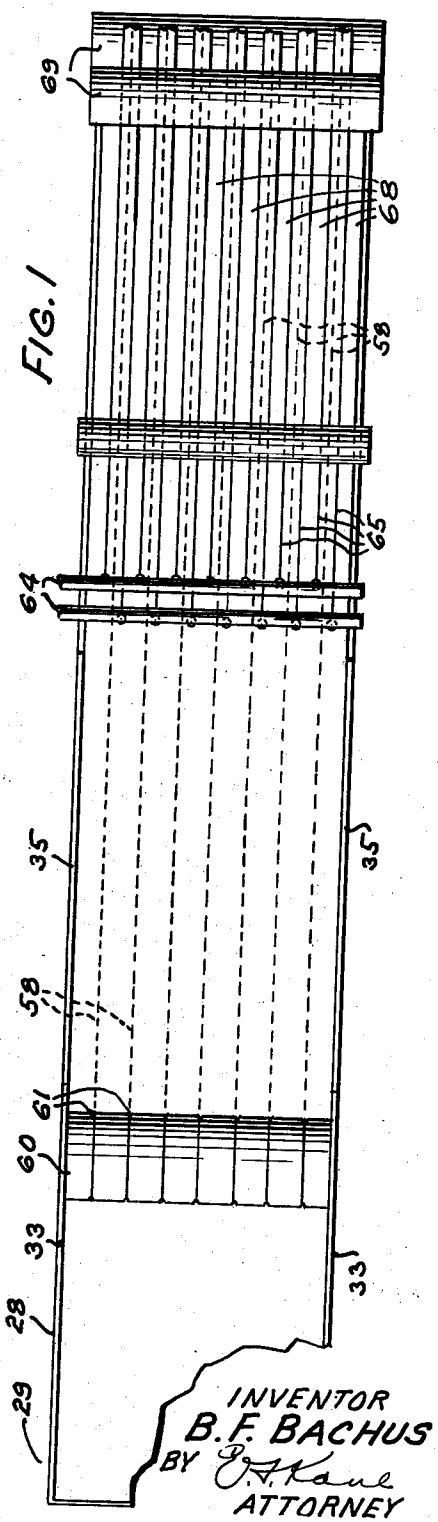


FIG. 1

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FIG. 3

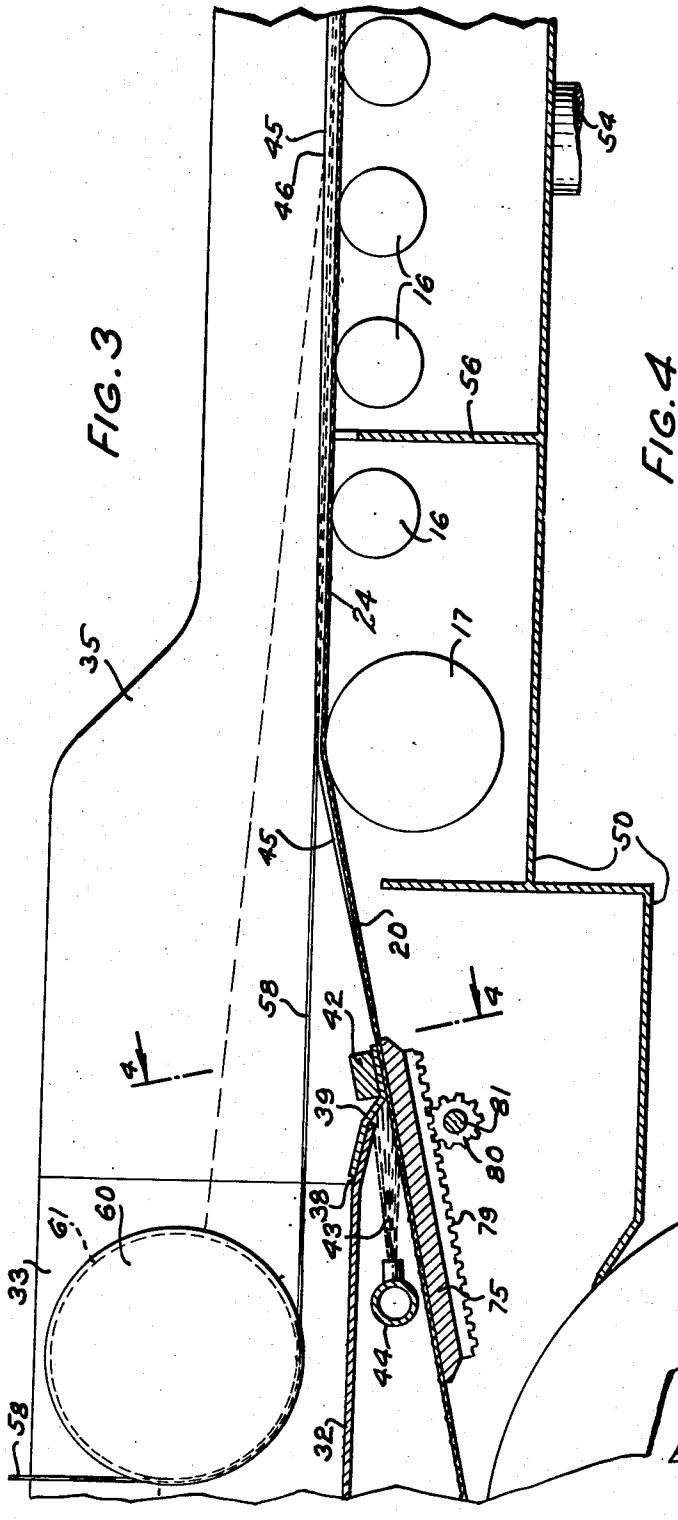
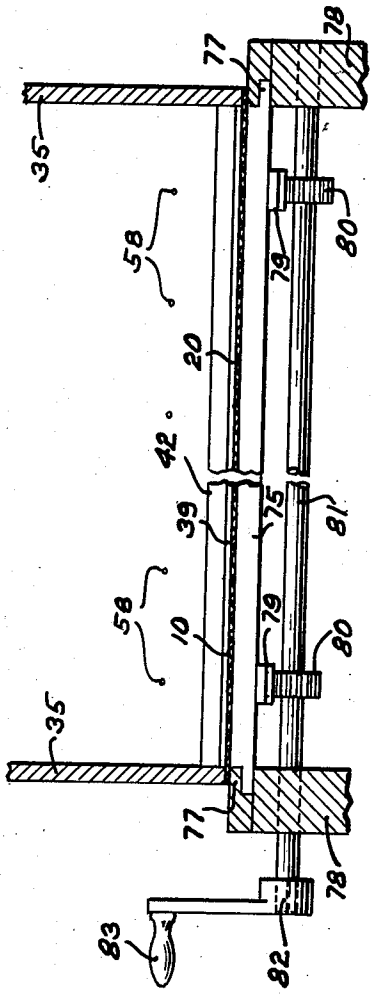


FIG. 4



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FOURDRINIER TYPE MACHINE FOR APPLYING PULP INSULATION TO WIRES

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8 Claims. (Cl. 92—44)

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This invention relates to an apparatus for applying pulp insulation to wires and more particularly to a Fourdrinier type machine for applying a coating of pulp insulation to wires used as electrical conductors.

It is an object of the present invention to provide an improved apparatus for effectively and efficiently applying pulp insulation to wires.

In one embodiment of the invention, an endless Fourdrinier screen is supported in a manner to provide an upwardly sloping course and a horizontal course continuing from the upper end of the sloping course and a flow box for pulp stock is arranged to direct the discharge of the stock onto the sloping and horizontal courses of the screen along a portion of each adjacent their juncture to form a web of pulp which progressively increases in thickness as the web advances until it is completely formed and which web is of a thickness intermediate its initial and final thickness above the juncture of the sloping and horizontal portions of the screen. A roller mounted in the discharge end of the flow box guides a plurality of wires to be insulated onto the partially formed web of pulp at a point at the juncture of the inclined and horizontal courses of the screen, and the wires, as they advance with the web and the horizontal course of the screen, are covered by pulp as the web continues to be formed to its full thickness, after which the web of pulp with the wires imbedded therein may be slit longitudinally between the wires by cutting jets of water directed on the moving web to separate the insulated wires from each other. The amount of stock passing through the inclined course of the screen may be controlled by a plate supporting a portion of the sloping course of the screen and adjustably mounted to vary the size of the opening, and the consequent effective area of the inclined course of the screen, through which the stock passes. Thus the position of the plate controls the amount of pulp deposited on the sloping course of the screen and the thickness of the web of felt at the point where the wires are laid thereon.

Other objects and advantages of the invention will become apparent by reference to the following description and the accompanying drawings illustrating a preferred embodiment thereof in which

Figs. 1 and 2 are diagrammatic plan and longitudinal vertical sectional views, respectively, of a Fourdrinier type pulp machine embodying the invention;

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Fig. 3 is an enlarged vertical longitudinal sectional view through a portion of the apparatus; and

Fig. 4 is a transverse sectional view through a portion of the apparatus taken on the line 4—4 of Fig. 3.

Referring to the drawings, 10 represents a Fourdrinier type of endless wire screen entrained about a driven couch roll 12, breast roll 14, a plurality of horizontally disposed table rolls 16, a guide or shoulder roll 17 and suitable tension rolls 18. The breast roll 14 is positioned with its upper surface at a lower elevation than the upper surfaces of the table rolls 16 so as to provide the screen 10 with an upwardly sloping course 20 extending from the breast roll 14 to the roll 17 which has its upper surface level with the upper surface of the rolls 16. The screen 10, which is directed from the shoulder roll 17 forwardly to the couch roll 12, is supported in a horizontal plane by the table rolls 16 and constitutes a horizontal course 24 of the screen 10.

A flow box 28, adapted to receive pulp stock from a suitable source of supply through an inlet 29, is positioned adjacent the breast roll 14 and has a horizontal trough portion 30 positioned above the breast roll 14 and the sloping course 20 of the screen 10. The trough portion 30, comprising a bottom wall or outflow plate 32 and side walls 33—33, directs the discharge of pulp stock from the outflow plate 32 onto the upper portion of the sloping course 20 and the adjacent portion of the horizontal course 24 of the screen 10. Deckle plates 35—35, supported in alignment with and forming extensions of the side walls 33—33 of the trough 30, rest on the edge portions of the screen 10 and serve to confine the stock laterally within the edges of the screen 10. To form a seal between the bottom wall 32 of the trough 30 and the screen 10, a rubber sealing strip 38 is provided, which is secured to the downwardly directed edge 38 of the bottom 32 and extends therefrom in engagement with the screen 10. The sealing strip 39 extends across the width of the screen 10 between the deckles 35 and is maintained in engagement with the screen by a weight in the form of a metal bar 42 secured to the strip 39 in any suitable manner. To aid in maintaining the seal between the trough 30 and the screen 10 and prevent the back flow of pulp stock under the rubber sealing strip 39, a shower or spray of fresh water 43 from a pipe 44 is directed against the under side of the sealing strip and the adjacent portion of the screen 10. The force of the spray 43 of fresh water opposes

and neutralizes the tendency of the stock to flow downwardly and rearwardly under the sealing strip 39.

The stock disposed above the screen 10 (Fig. 3) will pass through the screen and a web 45 of pulp will be deposited thereon, the web progressively varying in thickness from the beginning thereof to a point generally indicated at 46 where the major portion of the liquid carrier of the pulp stock has been drained through the screen and all of the pulp has been deposited thereon. A substantial portion of the stock passes through an opening or gate 48 formed between the end of the sealing strip 39 and the roll 17 so that the initial portion of the web of pulp is formed on the upwardly sloping course 20 of the screen. At the juncture of the sloping and horizontal courses of the screen 10, the web has a thickness intermediate its initial and final thickness. Pans 50 are mounted underneath the upper flight of the screen 10 to intercept the water draining therethrough and vertical partitions 52 divide the pans into sections or boxes, some of which may be connected by pipes 54 to vacuum pumps (not shown) to accelerate the withdrawal of water from the pulp web. In the section under the sloping course 20 of the screen 10 and the section containing the roller 17, the water is drained through the screen 10 naturally or by gravity only.

At the portion of the web 45 where it is of intermediate thickness and where it curves around the roll 17, the wires 58, which are to be pulp insulated, are laid on the web of pulp. As shown herein, the wires 58 are guided for substantially horizontal movement tangentially onto the web of pulp at the point above the roll 17 by a wire guide roll 60 rotatably mounted in the trough 30 and having grooves 61 therein in spaced relation to each other axially of the roller 60 to space the wires laterally across the web 45. Since it is partly immersed in the stock in the trough 30 of the flow box 28, the roller 60 acts as a baffle and prevents the too rapid discharge of the stock onto the screen 10. If desired, the guide roll 60 may be located at a lower level to guide the wires 58 in an upwardly inclined direction tangentially onto the web 45 at a different point on the curved portion thereof.

As the liquid carrier of the stock continues to pass through the screen 10 during its forward movement in its horizontal course, pulp fibers are deposited on the web 45 and on the wires 58 to increase the thickness of the web and to cover the wires and imbed them in the web. The wires 58, arranged in parallel relation, and imbedded in the pulp web 45, are advanced with the web 45 and the screen 10 toward the couch roll 12 and at a point substantially midway of the horizontal course, the web 45 is cut or slit longitudinally between the wires 58 by jets or streams of water 62 to separate the pulp enclosed wires from each other. The cutting streams of water 62 are directed downwardly from a plurality of nozzles 63—63 on a pair of water supply pipes 64—64 extending above and transversely across the horizontal course 24 of the screen 10 and the cutting jets 62 from a pair of nozzles 63 are directed against the web on opposite sides of each of the wires and at predetermined spaced distances from the wire to form two slots or slits 65, which sever the pulp-enclosed wire from the rest of the web and trim the laterally extending wing portions of pulp adhering to the wire to the required size and leave strips 68 of waste pulp on the screen in between the pulp covered wires 58.

Most of the water remaining in the web 45 may be removed therefrom as the strips of pulp pass over the remaining suction boxes 52 and as they pass through a pair of pressure rolls 69, which press out some of the water and compact the pulp in the strips. The pulp insulated wires 58 are withdrawn from the Fourdrinier screen 10 by a pair of driven pressure rolls 70 and may be further processed by being passed individually through rotating polishing members (not shown), which wrap the wing portions about the wire and compact the insulation into cylindrical or sheath form around the wire, after which the wires may be wound on reels. The waste or intermediate strips of pulp 68 are removed from the screen 10 by a spray or shower of water directed thereagainst from a pipe 71 and by a doctor blade 72 engaging the screen 10 and deposited in a pan 73.

The thickness of the partially formed web 45 at the beginning of the horizontal course 24 of the screen or at a point above the roller 17 is determined by the quantity of water passing through the sloping course 20 of screen 10 and through the gate 48 and may be varied by varying the rate of linear movement of the screen 10 but preferably is controlled by varying the area of the sloping portion of the screen through which the stock passes. The length or longitudinal distance of the opening or gate 48 between the end of the sealing strip 39 and the roller 17 may be varied by adjusting the position of the strip 39 relative to the rollers 17 but preferably the length of the gate or opening 48 is controlled by a slide or movable plate 75 positioned underneath and in engagement with the inclined portion of the screen 10. The plate 75 supports the screen at this point and is mounted for movement parallel thereto, the ends of the plate 75 being rabbeted (Fig. 4) and supported in guideways 77 formed in the side frames 78—78 of the apparatus. Racks 79 formed on the underneath side of the plate 75 are engaged by gears 80—80 fixed to an adjusting shaft 81 which, in turn, is mounted for rotation in the side frames 78—78. The squared end 82 of the adjusting shaft 81 may be engaged by a suitable handle 83 and rotated to advance or retract the slide 75 and thus regulate the width of the opening gate 48, and thus control the rate of passage of water therethrough and the thickness of the web at the beginning of the horizontal course of the screen 10.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. In an apparatus for applying pulp insulation to wires, an endless Fourdrinier screen mounted for advancing movement in one direction and having an upwardly sloping course and a horizontal course extending from the upper end of the sloping course, a flow box for receiving a supply of liquid pulp stock and having a discharge chute including an outflow plate, for directing said stock onto the upper portion of the sloping course and the adjacent portion of the horizontal course of said screen to form a web of pulp of progressively increasing thickness along a predetermined portion of said screen and having a thickness at the juncture of said sloping and horizontal courses intermediate that of the initial and completed portions of the web,

and guide means in said discharge chute disposed above said outflow plate and said screen for guiding a wire horizontally onto said web of pulp at the juncture of said sloping and horizontal courses of said screen for movement with said web along the horizontal course of the screen.

2. In an apparatus for applying pulp insulation to wires, an endless Fourdrinier screen mounted for advancing movement and having an upwardly sloping course and a horizontal course extending from the end of the sloping course, a flow box for receiving a supply of liquid pulp stock and for discharging said stock onto the sloping and the horizontal courses of said screen adjacent the juncture of said courses to form a web of progressively increasing thickness along a predetermined portion of said screen and having a thickness at the juncture of said sloping and horizontal portions intermediate that of the initial and completed portions of the web, a guide in said flow box for guiding a wire horizontally onto said web of pulp at the juncture of said sloping and horizontal courses of said screen for movement with the web and the horizontal course of the screen, and means for varying the area of said sloping course of said screen through which said stock passes to vary the thickness of the incomplete web at the juncture of the sloping and horizontal courses of said screen.

3. In an apparatus for applying a pulp insulation to wires, an endless Fourdrinier screen mounted for advancing movement and having an upwardly sloping course and a horizontal course extending from the upper end of the sloping course, a flow box for receiving a supply of liquid pulp stock and having a trough portion disposed above and adjacent the sloping course of said screen for directing the discharge of said stock onto the upper portion of a sloping course and the adjacent portion of the horizontal course of said screen to form a web of pulp of progressively increasing thickness along a predetermined portion of said screen whereby the thickness of the web at the juncture of said sloping and horizontal courses is intermediate that of the initial and completed portions of the web, a flexible sealing strip extending from the trough portion of said flow box in engagement with the sloping course of said screen, means for urging said sealing strip into engagement with said screen, means for directing a spray of water onto said sealing strip and said screen where they meet to prevent the flow of stock under said sealing strip, and means in the trough portion of said flow box for guiding a wire longitudinally onto said web of pulp at the juncture of said sloping and horizontal courses of said screen for movement with said web and said horizontal course of said screen.

4. In an apparatus for applying pulp insulation to wires, an endless Fourdrinier screen mounted for advancing movement and having an upwardly inclined portion and a horizontal portion forming a dihedral angle, a flow box for receiving a supply of liquid pulp stock and having a discharge chute for directing the discharge of said stock onto said inclined and horizontal portions of said screen adjacent the apex of said portions to form on said screen a web of pulp which in thickness is only partially formed at the apex of said inclined and horizontal portions of said screen, means forming a seal between the discharge chute and the inclined portion of said screen to prevent the stock from flowing down said inclined portion of said screen, roller means in said flow box for guiding a wire to be pulp insulated onto the partially formed web of pulp at the apex of said inclined and horizontal portions of said screen for movement with said web and said horizontal portion of said screen, and means for varying the area of said inclined portion of said screen through which some of the liquid in said stock may pass comprising a plate engaging the under side of said inclined portion of said screen at said sealing means, and means for moving said plate parallel to said inclined portion of said screen.

5. In an apparatus for applying pulp insulation to wires, an endless Fourdrinier screen mounted for advancing movement in one direction, roller means for supporting said screen to provide an upper horizontal portion and an inclined portion extending downwardly from one end of said horizontal portion and including a supporting roller forming a rounding surface at the juncture of said portions, a flow box for receiving a supply of pulp stock and having a chute portion above and adjacent the inclined portion of the screen for directing the stock onto the inclined and horizontal portions of said screen to form a web of pulp of progressively increasing thickness along a predetermined portion of said screen and having a thickness at the curved portion formed by said supporting roller intermediate that of the initial and completed portions of the web, means forming a seal between said chute and the inclined portion of the screen to prevent the flow of stock downwardly on said inclined portion of the screen, deckle members engaging the edge portions of the screen for limiting the lateral flow of stock on said screen, roller means mounted in said chute and for guiding wires to be pulp insulated tangentially onto the curved portion of said web for movement with said web and said horizontal portion of said screen, and means for varying the length of said inclined portion of said screen through which said stock passes comprising a plate engaging the underneath side of said inclined portion of said screen at said sealing means, and means for moving said plate parallel to and longitudinally of said inclined portion of said screen.

6. An apparatus for applying pulp insulation to wires comprising a screen mounted for movement through a first substantially straight course and a second substantially straight course obliquely disposed relative to each other and having a common juncture therebetween, pulp guide means including an outflow plate disposed in close proximity to the first course of the screen for receiving a supply of a liquid pulp stock from a source of supply and directing said stock onto the first course of the screen for movement with said screen through said first and said second courses to form a web of pulp of a predetermined final thickness and of progressively increasing thickness along a portion of said screen and having a thickness at the juncture of said first and said second courses intermediate that of the initial and the completed portions of the web, means for forming a seal between the outflow plate and the screen to prevent the flow of pulp stock therebetween, and wire means disposed at a level above said outflow plate for guiding a wire substantially parallel to said second course of said screen and onto the web of pulp at the juncture of said first and said second courses of said screen for movement with said web.

7. An apparatus for applying pulp insulation to wires comprising a Fourdrinier screen mount-

ed for movement through a first substantially straight course and a second substantially straight course obliquely disposed relative to each other and having a common juncture therebetween, pulp guide means including an outflow plate disposed in close proximity to said first course of the screen for receiving a supply of a liquid pulp stock from a source of supply and directing said stock onto the first course of the screen for movement with said screen through said first and said second courses to form a web of pulp of a predetermined final thickness and of progressively increasing thickness along a portion of said screen and having a thickness at the juncture of said first and said second courses intermediate that of the initial and the completed portions of the web, means forming a seal between the outflow plate and the screen to prevent the flow of pulp stock therebetween, wire guide means disposed at a level above said outflow plate for guiding a wire substantially parallel to said second course of said screen and onto the web of pulp at the juncture of said first and said second courses of said screen for movement with said web, and means for varying the area of said first course through which the liquid of said liquid pulp stock passes to vary the thickness of the web at the juncture of the first and the second courses of said screen.

8. An apparatus for applying pulp insulation to wires comprising an endless Fourdrinier screen mounted for advancing movement and having an upwardly sloping course and a substantially horizontal course extending from the upper end of the sloping course, means for receiving a supply of liquid pulp stock, said pulp receiving means having a discharge portion including an outflow plate disposed above said upwardly sloping course of said screen for directing said stock onto the upper portion of the sloping course for movement with the screen through the sloping and the substantially horizontal courses of said screen to form a web of progressively increasing thickness along a predetermined portion of said screen and having a thickness at one end of said substantially horizontal course intermediate the initial and completed portions of the web, and wire guide means disposed at a level above said outflow plate for guiding a wire substantially horizontally onto the web of pulp at said one end of said horizontal course of the screen.

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