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(54) **Title**: STRIPPING STRUCTURE AND METHOD FOR REMOVING ENAMEL INSULATION FROM LEAD ENDS

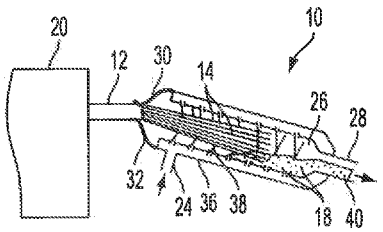


FIG. 2

(57) **Abstract**: Stripping structure (10) strips insulation from ends of a plurality of leads (14) of a lead bundle (12). Each lead (14) includes a conductor member (16) coated with the insulation (18). The structure (10) includes a housing (22) having wall structure defining a stripping chamber (26), an inlet (24) in fluid communication with the stripping chamber (26), and an outlet (28) in fluid communication with the stripping chamber (26). A cover (32) has an opening (30) for receiving an end of the lead bundle (12) in a sealing manner so that the leads (14) thereof are received in the stripping chamber (26). Stripping fluid (36) is in communication with the inlet (24). When the lead bundle (12) is received through the opening (30) with the leads (14) in the stripping chamber (26) and when the stripping fluid (36) is provided though inlet (24) and in the stripping chamber (26), the stripping fluid (36) strips the insulation (18) from the conductor members (16), with the stripping fluid (36)along with stripped insulation (18) exiting through the outlet (28).

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STRIPPING STRUCTURE AND METHOD FOR REMOVING ENAMEL INSULATION FROM LEAD ENDS

BACKGROUND OF THE INVENTION

[0001] The invention relates to electrical winding leads and, more particularly, to a method and structure for removing enamel insulation from ends of winding leads by using a chemical fluid.

[0002] Winding operations for transformers, motors and generators require removal of enamel coating or insulation from the windings leads of a lead bundle for making electrical connections. The conventional manual process includes heating the end of the individual winding leads of a lead bundle with a torch to burn off enamel insulation, placing the winding leads into an alcohol fluid, scrubbing each individual winding lead with a scour pad or the like to clean the lead, and returning the lead bundle to its original position. This process is labor intensive and time consuming.

[0003] Thus, there is a need to provide a structure and a method for chemically removing enamel from winding leads that is less time consuming, less labor intensive and is environmentally compliant. The present invention is directed to such a structure and method.

SUMMARY OF THE INVENTION

[0004] In accordance with the present invention, a stripping structure is provided for stripping ends of a plurality of leads of a lead bundle. Each lead includes a conductor member coated with insulation. The structure includes a housing having wall structure defining a stripping chamber, an inlet in fluid communication with the stripping chamber, and an outlet in fluid communication with the stripping chamber. A cover is coupled to the housing and has an opening constructed and arranged to receive an end of the lead bundle so that the leads thereof are received in the stripping chamber. Stripping fluid is in communication with the inlet and thus with the stripping chamber. When the lead bundle is received through the opening with the leads in the stripping chamber and when the stripping fluid is provided though inlet and in the stripping chamber, the stripping fluid strips the insulation from the conductor members, with the stripping fluid

along with stripped insulation exiting through the outlet.

[0005] In accordance with another aspect of an embodiment, a system is provided for stripping ends of a plurality of leads of at least one lead bundle. Each lead includes a conductor member coated with insulation. The system includes at least one stripping structure, first and second tanks, first and second pumps, a supply valve and a controller. Each stripping structure has a housing with a wall structure that defines a stripping chamber, an inlet in fluid communication with the stripping chamber, and an outlet in fluid communication with the stripping chamber. A cover is coupled to the housing and has an opening constructed and arranged to receive an end of a lead bundle so that the leads thereof are received in the stripping chamber. The first tank contains a stripping fluid and the second tank contains a rinse fluid. The first pump is associated with the first tank and is operable to pump the stripping fluid to the inlet of each stripping structure. The second pump is associated with the second tank and is operable to pump the rinse fluid to the inlet of each stripping structure. The supply valve has first and second inlets connected to the first and second pumps, respectively. The controller is operable to control the first and second pumps and the supply valve to selectively supply stripping fluid or rinse fluid to the inlet of each stripping structure.

[0006] In accordance with yet another aspect of an embodiment, a method is provided for stripping ends of a plurality of leads of a lead bundle. Each lead includes a conductor member coated with insulation. The method provides a stripping structure having wall structure defining a stripping chamber, an inlet in fluid communication with the stripping chamber, and an outlet in fluid communication with the stripping chamber. The plurality of leads is placed in the stripping chamber. Stripping fluid is supplied to the inlet and into the stripping chamber to chemically strip the insulation from the conductor members. Waste fluid is permitted to drain from the outlet.

[0007] Other features and characteristics of the present invention, as well as the methods of operation and the functions of the related elements of the structure, the combination of parts and economics of manufacture will become more apparent upon consideration of the following detailed description and appended claims with reference to the accompanying drawings, all of which form a part of this specification.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The invention will be better understood from the following detailed description of the preferred embodiments thereof, taken in conjunction with the accompanying drawings, wherein like reference numerals refer to like parts, in which:

[0009] FIG. 1 is a schematic illustration of stripping structure provided in accordance with an embodiment;

[0010] FIG. 2 is a view of the stripping structure of FIG. 2, shown removing an enamel coating from winding leads;

[0011] FIG. 3 is a partial view of a lead bundle shown with enamel stripped from copper conductor members at an end thereof;

[0012] FIG. 4 shows a first system employing the stripping structure of FIG. 1; and

[0013] FIG. 5 shows a second system employing the stripping structure of FIG. 1

DETAILED DESCRIPTION OF ILLLUSTRATIVE EMBODIMENTS

[0014] It should be noted that in the detailed description that follows, identical components have the same reference numerals, regardless of whether they are shown in different embodiments of the present invention. It should also be noted that in order to clearly and concisely disclose the present invention, the drawings may not necessarily be to scale and certain features of the invention may be shown in somewhat schematic form.

[0015] With reference to FIGs. 1 and 2, stripping structure for stripping electrical insulation or coating from winding leads of a lead bundle is shown, generally indicated at 10, in accordance with an embodiment. As shown in FIG. 3, the lead bundle 12 is preferably a singular member comprised of a plurality of individual winding leads, generally indicated at 14. The winding leads 14 are preferably copper conductor members 16 coated with insulation 18 that are as used for large size transformers 20 (FIG. 2), motors, or generators. The insulation 18 may be enamel or a hardened polymeric resin.

[0016] Returning to FIG. 1, the stripping structure 10 includes an elongated housing 22 having an inlet 24 for receiving a supply of stripping fluid, a stripping chamber 26 in fluid communication with inlet 24, a drain or outlet 28 in fluid communication with the

stripping chamber 26 permitting stripping fluid to exit the structure 10, an opening 30 in plug or end cover 32 where the end portion of a lead bundle 12 is inserted so as to enter the stripping chamber 26. In the embodiment, the housing 12 includes an outer wall structure 31 and an inner wall structure 33, with the inner wall structure 33 defining the stripping chamber 26.

[0017] The end cover 32 is coupled to the housing and is preferably made of rubber so as to be flexible. The cover 32 provides a seal between the stripping chamber 26 and the lead bundle 12 that prevents liquid from leaking out of the opening 30. The stripping structure 10 also includes a plurality of nozzles 34 for directing stripping fluid into the stripping chamber 26. The nozzles 34 can have different opening sizes and are preferably replaceable.

[0018] With reference to FIG. 3, the winding leads 14 of the lead bundle 12 are provided in the stripping chamber 26. The leads 14 may need to be separated to allow a stripping fluid 36 to flow between leads 14. The leads 14 have a tendency to stick together due to the enamel, so if they are not separated the enamel may not be removed between the leads. The flexible end cover 32 is tightened by a clamp or the like around the lead bundle 12. A stripping fluid 36 is pumped into the chamber 26 with positive pressure. Preferably, the stripping fluid 36 is water-based and comprises an aromatic alcohol, such as benzyl alcohol, phenoxy propanol, phenoxy ethanol or any combination of the foregoing. Benzyl alcohol has been found to be an especially suitable aromatic alcohol. In one embodiment, the stripping fluid 36 comprises about 30 to 65%, more preferably about 45 to 55% by weight benzyl alcohol and about 20 to 60%, more preferably about 30 to 45% water. In this embodiment, the stripping fluid 36 may further include about 0.2 to 20% by weight of a peroxide, such as hydrogen peroxide. Other additives may include surfactants, inhibitors and other non-hazardous solvents. A commercially available paint stripping fluid that has been found quite suitable for use as the stripping fluid 36 is Aquastrip ACB manufactured by Hubbard-Hall. Other commercially available chemical fluids may be used that are suitable for stripping enamel or similar insulation coating from wire in compliance with EPA and OSHA requirements. The nozzles 34 create a shower jet 38 or bath onto the winding leads 14 with the agitation of the shower or bath washing away dissolving pieces of the

insulation 18. Clean stripping fluid 36 is provided to the chamber 26 causing the draining waste fluid 40 to rinse away by gravity or by sucking that is created at drain 28. The inner wall structure 33 separates the clean fluid 36 from the waste fluid 40. In the embodiment, the drain 28 is located at a level below the opening 30 to facilitate draining. Once the insulation 18 is removed, the lead bundle 12 is removed from the stripping structure 10, resulting in the conductor members 16 being free from the insulation 18 at the ends thereof, as shown in FIG. 3. The stripping structure 10 is preferably made from stainless steel to protect it from the chemical fluid 36.

[0019] As shown in FIG. 1, the nozzles 34 are preferably distributed evenly on the inner wall 33 and are tilted away from the opening 30. A first set 42 of nozzles 34 is disposed on one side of a center axis A of the chamber 26 and a second set 44 of nozzles 34 is disposed on an opposite side of the center axis A. The nozzles 34 radially point towards the center axis A of the chamber 26 such that shower jets 38 of the fluid 26 cross the center axis A. Alternatively, the nozzles 34 can radially point in different directions such that the shower jets 38 create a high agitation and swirl of the stripping fluid 36. In yet another embodiment, the inner wall structure 33 and nozzles 34 can be omitted, providing a bath instead of shower jet of the stripping fluid 36 in the stripping chamber 26.

[0020] FIG. 4 shows a stripping system, generally indicated at 46, that employs the stripping structure 10 of FIG. 1. The system 46 includes a tank 48 containing fresh or clean stripping fluid 36. An immersion heater 49 is preferably provided in the tank 48 to heat the fluid 36 to a temperature in a range of about 100°F to 200°F, more preferably about 150°F. The heater 49 is temperature controlled. A pump 50 pumps the clean fluid 36 through a manifold valve 52 to the inlet 24 of the stripping structure 10. A vacuum 51, preferably provided by pump 56 can maintain clean fluid 36 in the nozzles 34. The draining waste fluid 40 (stripped insulation 18 and waste stripping fluid 36) is sent through manifold valve 54 and pump 56 to a top portion 58 of another tank 60. A filter 62 separates the top portion 58 of tank 60 from a bottom portion 64 thereof so as to filter the insulation 18 particles from the waste fluid 40 with filtered recycled fluid 36' in tank portion 64 being directed to tank 48 via a pump 66. The filter 62 is preferably a removable stainless steel mesh.

[0021] The system 46 also includes a tank 68 containing fresh water 70 for rinsing remaining waste fluid 40 from the conductor members 16. A pump 72 pumps the water 70 through the valve 52 to the inlet 24 of the stripping structure 10. The draining waste water 74 is sent through valve 54 and pump 76 to a top portion 78 of another tank 80. A filter 82 separates the top portion 78 of tank 80 from a bottom portion 84 thereof so as to filter the waste water 74, with filtered recycled water 70' in tank portion 84 being directed to tank 68 via a pump 86. The filter 82 is preferably a removable stainless steel mesh.

[0022] A controller 88, such as a PLC (programmable logic controller), is connected to and controls the operation of the pumps and valves in an automatic, closed-loop manner. At least one thermistor 85 determining temperature of the stripping fluid 36, at least one flow meter 87 determining the supply flow rate of the stripping fluid 36, and/or at least on pressure sensor 89 determining the supply pressure of the stripping fluid 36 can be provided. Signals from these devices alone, or in combination, can be sent to the controller 88 to control the operation of the pump 50.

[0023] The stripping structure 10 can be supported by a frame structure (not shown) or with an adjustable but self-supporting supply hose 90 or drain hose 92, or by both of these hoses 90, 92.

[0024] The system 46 further includes a mounting structure 94 to which the stripping structure 10, the tanks 48, 64 68, 80, the pumps 50, 56, 66, 72, 76, 86, the controller 88 and all of the other aforementioned components are mounted. The mounting structure 94 may be adapted to be lifted and moved by a forklift and/or can include rollers, casters or wheels 96 that are passive or driven. When provided with wheels 96, the system 46 can be pushed manually (wheeled) by one or more operators. In this manner, the system 46 can be moved from location to location within a facility, as needed. For example, the system 46 may be normally stored in a storage area of a transformer manufacturing facility, away from a winding area where the windings are formed. When needed, the system 46 is wheeled (or otherwise moved) from the storage area to the winding area, adjacent to a winding that needs to have its lead ends stripped.

[0025] Referring now to Fig. 5, there is shown a stripping system 100 constructed in accordance with a second embodiment of the present invention. The stripping system 100 includes an inlet manifold 102, an outlet manifold 104 and an associated flow system comprising a plurality of hoses 106, 108 and valves 110, 112. A plurality of stripping structures 10 are connected to the manifolds 102, 104 by the flow system. Although six stripping structures 10 are shown, more or less stripping structures 10 may be provided.

[0026] The inlet manifold 102 and the outlet manifold 104 may be separate structures, as shown, or may be separate sections of a single structure. The inlet manifold 102 has a single inlet connected by a pipe or hose to an outlet port of a supply valve 116. The inlet manifold 102 also has a plurality of outlets that are fitted with the valves 110 and are connected by the hoses 106 to the inlets 24 of the stripping structures 10, respectively. The outlet manifold 104 has a single outlet connected by a pipe or hose to an inlet port of a drain valve 118. The outlet manifold 104 also has a plurality of inlets that are fitted with the valves 112 and are connected by the hoses 108 to the outlets 28 of the stripping structures 10, respectively.

[0027] The supply valve 116 has a first inlet port connected by a pipe or hose to a pump 120, which is, in turn, connected by a pipe or hose to a stripper tank 124 holding stripping fluid 36. A second inlet port of the supply valve 116 is connected by a pipe or hose to a pump 122, which is, in turn, connected by a pipe or hose to a rinse tank 126 holding rinse fluid, such as water. The supply valve 116 is operable to selectively connect its first inlet port or its second inlet port to its outlet port. The operation of the supply valve 116 is controlled by a PLC 128, to which it is connected. In this manner, the supply valve 116 may be controlled by the PLC 128 to selectively supply stripping fluid 36 or rinse fluid to the inlet manifold 102 and, thus, the inlets 24 of the stripping structures 10, as will be described more fully below.

[0028] The drain valve 118 has a first outlet port connected by a pipe or hose to an inlet of a filter 130 and a second outlet port connected by a pipe or hose to an inlet of a filter 132. Outlets of the filters 130, 132 are connected to the stripper tank 124 and the rinse tank 126, respectively. Each of the filters 130, 132 includes separation media, such as stainless steel mesh, which is effective to separate (stripped insulation)

particulate matter from fluid. The drain valve 118 is operable to selectively connect its first outlet port or its second outlet port to its inlet port. The operation of the drain valve 118 is controlled by the PLC 128, to which it is connected. In this manner, the drain valve 118 may be controlled by the PLC 128 to selectively return waste fluid from the outlet manifold 104 to the stripper tank 124 or to the rinse tank 126, as will be more fully described below.

[0029] Although not shown, a heater is immersed in the stripper tank 124 to heat the stripping fluid 36. In addition, a temperature sensor (not shown) is installed in the stripper tank 124 to measure the temperature of the stripping fluid 36. The temperature sensor and the heater are connected to the PLC 128, which controls the heater to maintain the stripping fluid 36 at a temperature in a range of about 100°F to 200°F, more preferably about 150°F. This elevated temperature helps the stripping fluid 36 remove the insulation 18 from the ends of the winding leads 114. The stripper tank 124 may optionally be further provided with a motorized stirrer to keep the stripping fluid 36 agitated.

[0030] In addition to controlling the heater in the stripper tank 124, the PLC 128 controls the other controllable elements of the system 100, including the supply valve 116, the drain valve 118, the pumps 120, 122 and the valves 110, 112. More specifically, the PLC 128 has one or more microprocessors that execute a stripping control program that is stored on memory in the PLC 128. The stripping control program performs an automated method of stripping insulation 18 off of the leads 14 of a plurality of lead bundles 12. In this method, not all of the stripping structures 10 need to be utilized. Generally, the method includes a stripping stage and a rinse stage. The stripping control program utilizes stored operating parameters and inputs entered by an operator through a graphical user interface (GUI) on a movable display 140 having a touch screen. The display 140 is operably connected to the PLC 128. The inputs that may be entered through the GUI include an identification of the stripping structures 10 that will be utilized in the method, as well as changes to the operating parameters that an operator desires to make. When such changes are entered, they are stored in memory and utilized by the control program. The operating parameters of the method include the temperature of the stripping fluid 36, a strip time period and a rinse time

period. An operator may identify the utilized stripping structures 10 by touching icons on the screen of the display 140 representing the utilized stripping structures 10.

[0031] In the description of the automated stripping method below, it should be appreciated that each of the stripping structures 10 has the structure and operation described above.

[0032] Before the start of the automated stripping method, the lead bundles 12 are inserted into the stripping chambers 26 of the stripping structures 10, respectively. The end covers 32 are then secured around the lead bundles 12. The operator may then begin the method by touching a start icon on the screen of the display 140 and identifying the utilized stripping structures 10. An acknowledgement icon may then appear on the screen, requiring the operator to touch the icon to acknowledge that the lead bundles 12 have been properly mounted inside the identified stripping structures 10. After the acknowledgement icon has been touched, the stripping stage of the method begins and the program opens the valves 110, 112 associated with the identified stripping structures 10. The program also opens the first inlet port of the supply valve 116 (with the second inlet port of the supply valve 116 remaining closed) and opens the first outlet port of the drain valve 118 (with the second outlet port of the drain valve 118 remaining closed). The program then starts the pump 120. As a result, stripping fluid 36 is pumped from the stripper tank 124, through the supply valve 116 (via the first inlet port) and thence into the inlet of the inlet manifold 102. The stripping fluid 36 flows through the inlet manifold 102 and exits through the outlets whose valves 110 have been opened. From the outlets of the inlet manifold 102, the stripping fluid 36 flows through the hoses 106 to the inlets 24 of the identified stripping structures 10, respectively. The stripping fluid 36 contacts the winding bundles 12 and starts to remove the insulation 18. The stripping fluid 36 then exits the identified stripping structures 10 through the outlets 28 thereof. From the outlets 28, the stripping fluid 36 flows into the inlets of the outlet manifold 104 whose valves 112 have been opened, passes through the outlet manifold 104 and then enters the inlet port of the drain valve 118. Thereafter, the stripping fluid 36 flows through the first outlet port of the drain valve 118 and then flows through the filter 130, which removes insulation particulate matter from the stripping fluid 36. The filtered stripping fluid 36 then flows back into the

stripping tank 124 where it is mixed with fresh stripping fluid 36 and then pumped back up to the stripping structures 10. This cycle continues for the strip time period, which is preferably between about 20 to 60 minutes, more preferably about 30 to 55 minutes, still more preferably about 45 minutes.

[0033] After the strip time period concludes, the program stops the pump 120 and then closes the first inlet port of the supply valve 116 and closes the first outlet port of the drain valve 118. The method then enters the rinse stage and the program opens the second inlet port of the supply valve 116 and opens the second outlet port of the drain valve 118. The program then starts the pump 122. As a result, rinse fluid is pumped from the rinse tank 126, through the supply valve 116 (via the second inlet port) and thence into the inlet of the inlet manifold 102. The rinse fluid flows through the inlet manifold 102 and exits through the outlets whose valves 110 have been opened. From the outlets of the inlet manifold 102, the rinse fluid flows through the hoses 106 to the inlets 24 of the identified stripping structures 10, respectively. The rinse fluid contacts the winding bundles 12 and washes them of stripping fluid 36 and loosened insulation 18. The rinse fluid then exits the identified stripping structures 10 through the outlets 28 thereof. From the outlets 28, the rinse fluid flows into the inlets of the outlet manifold 104 whose valves 112 have been opened, passes through the outlet manifold 104 and then enters the inlet port of the drain valve 118. Thereafter, the rinse fluid flows through the second outlet port of the drain valve 118 and then flows through the filter 132, which removes insulation particulate matter from the rinse fluid. The filtered rinse fluid then flows back into the rinse tank 126 where it is mixed with fresh rinse fluid and then pumped back up to the stripping structures 10. This cycle continues for the rinse time period, which is preferably between about 5 to 20 minutes.

[0034] After the rinse time period concludes, the program stops the pump 122 and then closes the second inlet port of the supply valve 116 and closes the second outlet port of the drain valve 118. Thus, both the first and second inlet ports of the supply valve 116 are closed and the first and second outlet ports of the drain valve 118 are closed. At this point, the rinse stage is concluded and the program then closes the valves 110, 112, thereby completing the method. However, in another embodiment, an air purge stage may be performed after the rinse stage concludes. In this embodiment,

the inlet manifold 102 is provided with an air inlet and the outlet manifold 104 is provided with an air vent. The air inlet and the air vent are provided with normally closed valves, respectively. The air inlet is connected to a source of pressurized air. When the rinse stage is complete, the valves in the air inlet and air vent are opened and pressurized air is introduced into the inlet manifold 102. The air travels through the hoses 106 to the stripping structures 10 and thence through the hoses 108, back to the outlet manifold 104, where it exits through the air vent. The air passing through the stripping structures 10 flows over and dries the lead bundles 112. At the conclusion of the air purge stage, the valves in the air inlet and the air vent are closed, as are the valves 110, 112.

[0035] The system 100 further includes a mounting structure 150 to which the stripping structures 10, the tanks 124, 126, the pumps 120, 122, the PLC 128 and all of the other aforementioned components are mounted. The mounting structure 140 may be adapted to be lifted and moved by a forklift and/or can include rollers, casters or wheels 96 that are passive or driven. When provided with wheels 96, the system 100 can be pushed manually (wheeled) by one or more operators. In this manner, the system 100 can be moved from location to location within a facility, as needed. For example, the system 100 may be normally stored in a storage area of a transformer manufacturing facility, away from a winding area where the windings are formed. When needed, the system 100 is wheeled (or otherwise moved) from the storage area to the winding area, adjacent to a winding that needs to have its lead ends stripped.

[0036] It should be appreciated that each of the systems 46, 100 contains all of the materials and components necessary to remove insulation 18 from winding lead ends, except for a power source for the pumps and other electrical devices. This power can be supplied to each of the systems 46, 100 from a facility power source through one or more power cables. Thus, each of the systems 46, 100 is a mobile, self-contained system that may be used to perform a method of removing enamel or coating from winding lead ends in a less time consuming and labor intensive manner. Moreover, the methods performed by systems 46, 100 are environmentally compliant, are repeatable and can be performed with limited operator intervention.

[0037] The foregoing preferred embodiments have been shown and described for

the purposes of illustrating the structural and functional principles of the present invention, as well as illustrating the methods of employing the preferred embodiments and are subject to change without departing from such principles. Therefore, this invention includes all modifications encompassed within the spirit of the following claims.

What is claimed is:

1. Stripping structure for stripping ends of a plurality of leads of a lead bundle, each lead including a conductor member coated with insulation, the structure comprising:

a housing having wall structure defining a stripping chamber, an inlet in fluid communication with the stripping chamber, and an outlet in fluid communication with the stripping chamber,

a cover coupled to the housing and having an opening constructed and arranged to receive an end of the lead bundle so that the leads thereof are received in the stripping chamber, and

stripping fluid in communication with the inlet and thus with the stripping chamber,

wherein, when the lead bundle is received through the opening with the leads in the stripping chamber and when the stripping fluid is provided though inlet and in the stripping chamber, the stripping fluid strips the insulation from the conductor members, with the stripping fluid along with stripped insulation exiting through the outlet.

2. The structure of claim 1, in combination with the lead bundle having the plurality of leads, the lead bundle being received through the opening with the leads being disposed in the stripping chamber.

3. The structure of claim 1, wherein the insulation is enamel and the stripping fluid comprises benzyl alcohol.

4. The structure of claim 2, further comprising a plurality of nozzles in the housing constructed and arranged to receive the stripping fluid and direct the fluid into the stripping chamber.

5. The structure of claim 4, wherein the housing has an inner wall structure defining the stripping chamber and outer wall structure, the nozzles being provided on the inner wall structure.

6. The structure of claim 4, wherein the stripping chamber has a center axis, the nozzles being constructed and arranged to produce shower jets of the fluid that cross the center axis.

7. The structure of claim 6, wherein a first set of nozzles is disposed on one side of the center axis a second set of nozzles is disposed on an opposite side of the center axis.

8. The structure of claim 6, wherein the nozzles are distributed evenly on the inner wall structure and are tilted away from the opening.

9. The structure of claim 1, wherein the cover is made of flexible material and is constructed and arranged to seal about the lead bundle.

10. A system for stripping ends of a plurality of leads of at least one lead bundle, each lead including a conductor member coated with insulation, the system comprising:

at least one stripping structure, each stripping structure comprising:

a housing having wall structure defining a stripping chamber, an inlet in fluid communication with the stripping chamber, and an outlet in fluid communication with the stripping chamber; and

a cover coupled to the housing and having an opening constructed and arranged to receive an end of a lead bundle so that the leads thereof are received in the stripping chamber;

a first tank containing a stripping fluid;

a second tank containing a rinse fluid;

a first pump associated with the first tank for pumping the stripping fluid to the inlet of each stripping structure;

a second pump associated with the second tank for pumping the rinse fluid to the inlet of each stripping structure;

a supply valve having first and second inlets connected to the first and second pumps, respectively; and

a controller operable to control the first and second pumps and the supply valve to selectively supply stripping fluid or rinse fluid to the inlet of each stripping structure.

11. The system of claim 10, wherein the insulation is enamel and the stripping fluid comprises benzyl alcohol.

12. The system of claim 11, wherein each stripping structure further comprises a plurality of nozzles in the housing constructed and arranged to receive the stripping fluid and direct the stripping fluid into the stripping chamber.

13. The system of claim 12, wherein in each stripping structure, the stripping chamber has a center axis, the nozzles being constructed and arranged to produce shower jets of the fluid that cross the center axis.

14. The system of claim 10, wherein the system comprises a plurality of stripping structures.

15. The system of claim 10, further comprising a heater for heating the stripping fluid in the first tank.

16. The system of claim 10, further comprising:

a drain valve having first and second outlets connected to the first and second tanks, respectively;

first and second filters connected between the first and second outlets and the first and second tanks, respectively; and

wherein the controller executes a program that performs a stripping method that comprises a stripping phase and a rinse phase, wherein during the stripping phase, the first pump is running, the first inlet of the supply valve is open and the first outlet of the drain valve is open, and wherein during the rinse phase, the second pump is running,

the second inlet of the supply valve is open and the second outlet of the drain valve is open.

17. The system of claim 10, further comprising a temperature measuring device, a pressure measuring device, and a flow measuring device, each associated with the controller, for respectively measuring temperature, pressure, and flow rate of the stripping fluid that is pumped to the inlet of each stripping structure.

18. A method for stripping ends of a plurality of leads of a lead bundle, each lead including a conductor member coated with insulation, the method comprising the steps of:

providing a stripping structure having wall structure defining a stripping chamber, an inlet in fluid communication with the stripping chamber, an outlet in fluid communication with the stripping chamber,

placing the plurality of leads in the stripping chamber,

supplying stripping fluid to the inlet and into the stripping chamber to chemically strip the insulation from the conductor members, and

permitting waste fluid to drain from the outlet.

19. The method of claim 18, wherein the stripping structure further comprises a plurality of nozzles receiving the stripping fluid, with the nozzles directing the stripping fluid into the stripping chamber.

20. The method of claim 19, wherein the stripping chamber has a center axis, the nozzles producing shower jets of the fluid that cross the center axis.

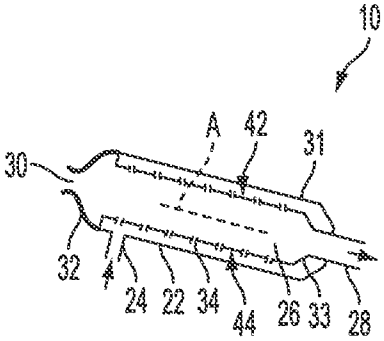


FIG. 1

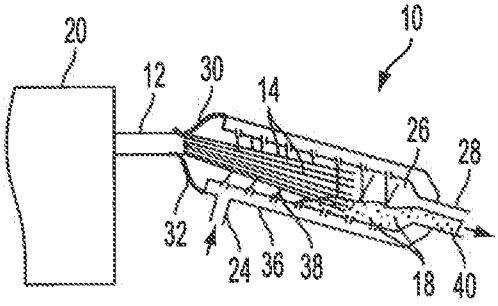


FIG. 2

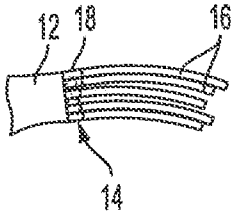


FIG. 3

FIG. 4

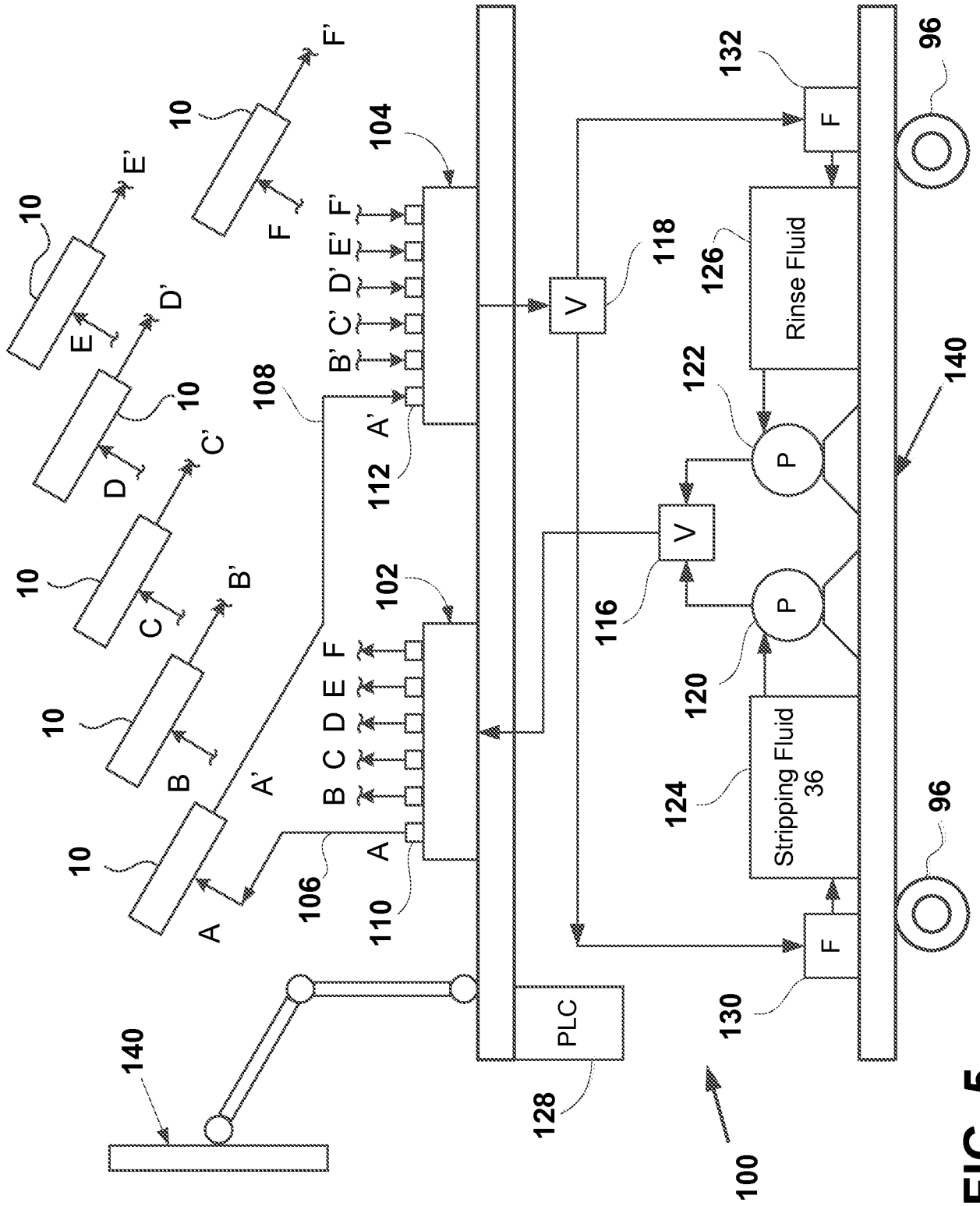

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A
A'
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B'
C
C'
D
D'
E
E'
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F'
102
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106
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116
118
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122
124
126
128
130
132
140
96
PLC
V
P
F
Rinse Fluid
Stripping Fluid
36
100

FIG. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/072473

A. CLASSIFICATION OF SUBJECT MATTER
INV. H02G1/12
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H02G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP H05 199631 A (SHOWA ELECTRIC WIRE & CABLE CO) 6 August 1993 (1993-08-06) abstract; figures 1-2	1,3-5,9, 10,12, 14-19 3,6-8, 11,13,20

X Y	JP H10 210621 A (DAIFUKU KK) 7 August 1998 (1998-08-07) abstract; figure 1	1,2,10, 15-18 3,11

X Y	KR 2011 0040092 A (TAIHAN ELECTRIC WIRD [KR]) 20 April 2011 (2011-04-20) the whole document	1,2,10, 14-18 3,11

Y	DE 898 931 C (SIEMENS AG) 7 December 1953 (1953-12-07) the whole document	3

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 March 2014	01/04/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Hermann, Robert

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/072473

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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1

INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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