

Jan. 28, 1958

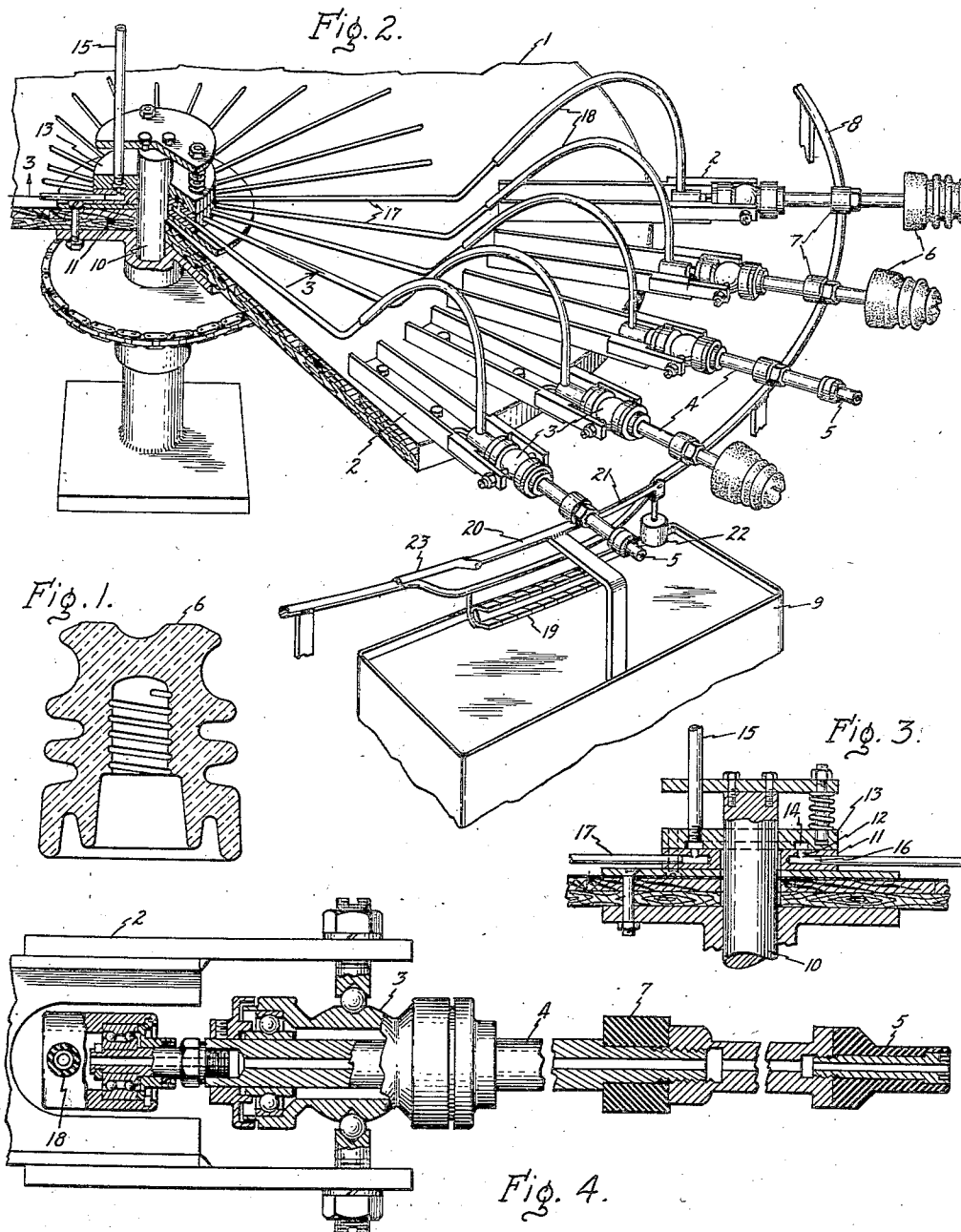
G. M. BOYD

2,821,157

MACHINE FOR MANUFACTURING ELECTRICAL INSULATORS

Filed July 26, 1954

2 Sheets-Sheet 1



Inventor
Godfrey M. Boyd,
by *Gilbert P. Tarkenton*
His Attorney.

1

2,821,157

MACHINE FOR MANUFACTURING ELECTRICAL INSULATORS

Godfrey M. Boyd, Catonsville, Md., assignor to General Electric Company, a corporation of New York

Application July 26, 1954, Serial No. 445,570

10 Claims. (Cl. 118—1)

This invention relates to improvements in a machine for manufacturing electrical insulators, and more particularly, to improvements in the machine for manufacturing electrical insulators disclosed in copending Brown et al. patent application Serial No. 464,084, filed October 22, 1954 and assigned to the same assignee as the instant application.

In said Brown et al. patent application is disclosed a machine comprising a flat circular rotary horizontally disposed table having a plurality of radially extending mounting arms having forked portions at their radially outermost ends. To said forked portions are pivotally connected cylindrical radially extending bearing members. Journaled in said bearings for rotary movement are a plurality of hollow spindles. The radially outer ends of the spindles have vacuum pressure holding means thereon for loading the radially outer ends of the spindles with electrical insulators. The portions of said spindles between said radially outer spindle ends and bearings overlay and frictionally engage a generally circular track concentrically disposed about the table and generally within the plane of the table. Disposed radially outward of a portion of said track is a tank of liquid glaze coating material. Said track portion dips below the plane of the table whereby the radially outer ends of the spindles are caused to dip into said tank. When said machine is adapted for the glazing of pin type electrical insulators the radially outermost open ends of the spindles must be dipped below the surface level of the body of liquid glaze coating material in order to secure a complete liquid glaze coating of the body of the pin type insulator. If any of the spindles should happen to be unloaded when the radially outermost open ends of the spindles are dipped into the body of the liquid glaze, liquid glaze material will be drawn into the hollow spindles and the vacuum cam plates of the vacuum pressure holding system thereby injuring them.

As the spindles ride along the track rotary movement is imparted to the spindles about their axes due to the frictional engagement between the spindles and the track. When the spindles ride along the dipped track portion adjacent to the glaze tank, the spindles are pivoted at about an angle of 60° below the plane of the table. In such disposition of the spindles below the plane of the table, the component of force of the spindles against the dipped track portion may not be large enough to insure a whirling or spinning motion of the electrical insulators as they pass through the glaze tank.

Accordingly, it is an object of this invention to provide automatically operable means in the aforementioned Brown et al. machine whereby unloaded or empty spindles will bypass the liquid glaze tank, and it is a further object of this invention to provide automatically operable means in the aforementioned Brown et al. machine for increasing the frictional engagement of the rotary spindles with the dipped track portion during travel of the electrical insulators to the liquid glaze tank.

2

In a machine for manufacturing electrical insulators comprising a metallic spindle disposed in a horizontal plane, said spindle pivotally mounted for pivotal movement without said plane, said spindle moving along a track and having rotary movement imparted thereto by frictional engagement between said moving spindle and track, a portion of said track disposed without said plane to cause pivotal movement of said moving spindle without said plane, my invention comprises means for increasing said frictional engagement between said spindle and track portion comprising magnetic means attracting said spindle toward said track portion.

In a machine for manufacturing electrical insulators comprising a plurality of spindles disposed in a horizontal plane, said spindles pivotally mounted for pivotal movement without said plane, said spindles moving along a main track and having rotary movement imparted thereto by frictional engagement between said moving spindles and said main track, said spindles adapted to have electrical insulators mounted thereon, my invention comprises means for shunting spindles having no electrical insulators mounted thereon from said main track comprising a secondary track disposed in spaced relationship with respect to said main track and automatically operable means selectively shunting spindles having no electrical insulators mounted thereon from said main track to said secondary track.

The features of my invention which I believe to be novel are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood with reference to the following description taken in connection with the accompanying drawings.

In the drawings, Fig. 1 is a sectional side view of a pin type electrical insulator to be liquid glaze coated by the machine of Fig. 2. Fig. 2 is a partly broken away perspective view of the before discussed Brown et al. machine having one form of my invention incorporated therein. Fig. 3 is a sectional view of the vacuum holding plates of Fig. 2, the section being taken along the lines 3—3 of Fig. 2. Fig. 4 is an enlarged partly broken away view of one of the spindles of Fig. 2. Fig. 5 is an enlarged perspective front view of my said one form of invention. Fig. 6 is an enlarged perspective side view of my said one form of invention. Fig. 7 is a perspective view of another form of my invention. Like reference numerals will be used throughout the various figures to indicate identical parts.

Referring particularly to Fig. 2, shown therein is a machine for manufacturing electrical insulators comprising a flat circular rotary horizontally disposed table 1. Table 1 has a plurality of radially extending mounting arms 2 having forked portions formed at their radially outer ends. To said forked portions of arms 2 are pivotally connected cylindrical radially extending bearing members 3 adapted for pivotal movement within radially extending planes disposed perpendicular to table 1. Rotatably journaled in bearings 3 are hollow metallic radially extending spindles 4. The radially outer ends of spindles 4 have rubber or the like male vacuum pressure holder members 5 whereby pin type electrical insulators 6 such as shown in Fig. 1, can be mounted on the radially outer ends of spindles 4. Disposed on the spindles 4 between the bearings 3 and the radially outer ends of the spindles 4 are rubber or the like collars 7. The collars 7 of spindles 4 overlay a circular-like main track or rail 8 disposed concentrically with respect to table 5 and generally in the plane of the table 5. Radially outward of a portion of track 8 is positioned a tank 9 of liquid

glaze coating material. Said portion of track 8 adjacent to the tank 9 dips below the horizontal plane of table 1.

The table 1 is axially immovable and rotary about a fixed shaft 10. Fixed to table 1 and simultaneously movable therewith is a lower vacuum cam plate 11. See also Fig. 3. Formed in the upper surface of cam plate 11 are a plurality of blind bores 12 distributed about the circumference of an imaginary circle concentric with respect to the shaft 10. An upper vacuum cam plate 13 is fixed against movement and makes flat surface engagement with the cam plate 11. Formed in the underside of cam plate 13 is an arc-like channel groove 14. Groove 14 is disposed along the circumference of an imaginary circle concentric with respect to the shaft 10. The imaginary circles for the blind bores 12 and arc-like channel groove 14 have equal radii whereby the arc-like channel groove 14 is superposed with respect to and in communication with the blind bores 12. The arc-like channel groove 14 is connected to a not shown source of vacuum pressure by a conduit 15. The blind bores 12 are connected to the radially inner ends of the hollow spindles 4 by blind radially extending bores 16 formed in cam plate 11, conduits 17, and flexible hoses 18.

The machine parts thus far described are disclosed in greater detail in the heretofore mentioned Brown et al. patent application. As will be obvious to those skilled in the art, when the table 1 is rotated clockwise the spindles 4 will simultaneously move in a clockwise direction along the track or rail 8. Due to the frictional engagement between the spindles 4 and track 8 rotary movement will be imparted to the spindles 4 as they are carried along track 8 by table 1.

Referring now to Figs. 5 and 6, it will be seen therefrom that when the spindles ride along the dipped track portion of main track 8 adjacent to the tank 9 the radially outer ends of the spindles 4 will be dipped at an angle of about 60° below the horizontal plane of table 1. In such disposition of the spindles 4 the magnitude of frictional engagement between the spindles 4 and the dipped track portion of main track 8 may not be sufficient to insure a whirling or spinning action of the electrical insulators through the body of liquid glaze material in tank 9. Accordingly, in my invention I provide magnetic means for increasing the frictional engagement between the spindles 4 and the dipped track portion of track 8. The magnetic means comprises a bank of magnets 19 with like poles clamped together and connected to the dipped track portion of main track 8 to just clear the spindles 4 when they are in their downwardly pivoted position. As will be obvious to those skilled in the art, as the spindles 4 pass along the dipped portion of main track 8 the bank of magnets 19 will attract the metallic spindles 4 against the dipped portion of main track 8 to increase the frictional engagement therebetween whereby a whirling and spinning motion of the electrical insulators through the body of liquid glaze coating material in tank 9 is insured.

As will be seen more clearly from Fig. 6, when the spindles 4 are dipped downwardly to whirl the electrical insulators through the body of liquid glaze, the radially outer open ends of the spindles 4 are immersed in the body of liquid glaze coating material. If an unloaded or empty spindle were permitted to be dipped into the body of liquid glaze coating material, liquid glaze material would pass into the hollow spindles 4 and then on to the vacuum pressure holding means thereby injuring the machine parts such as the vacuum cam plate 11 and 13. Therefore, in my invention I provide means for automatically bypassing unloaded or empty spindles from the liquid glaze tank 9. One form of said means comprises a secondary track or rail 20 supported in vertically spaced relationship with respect to the dipped main track portion. Tracks 20 and 8 are connected together by a right-angle lever 21. Lever 21 is pivoted adjacent its joint portion to main track 8. One leg of

the lever 21 is horizontally disposed and extends to the track 20 and merges therewith. The other leg of the lever 21 is vertically disposed, points downwardly, and has a predetermined weight 22 connected thereto. When an unloaded spindle rides along the horizontally disposed leg of lever 21, the weight of the unloaded spindle will be insufficient to raise the weight 22 whereby the unloaded spindle will be shunted across the horizontal leg of lever 21 from the main track 8 to the secondary track 20. A spindle loaded with an electrical insulator will have a sufficient weight to pivot the horizontally disposed leg of lever 21 downwardly from its horizontal disposition whereby the loaded spindle will continue along track 8 for travel along the dipped track portion of the main track 8. Secondary track 20 may comprise the commencing end of a circular-like track whereby the bypassed unloaded spindles will not return to the main track 8 until they are loaded. However, where so desired the bypassed unloaded spindles can be caused to return to the main track 8 from the secondary track 20 by virtue of a lever 23 pivotally connected to the secondary track 20 and extending to and merging with the main track 8.

Another form of my invention for causing unloaded or empty spindles to bypass the glaze tank 9 is disclosed in Fig. 7. A bypass track or rail 24 is vertically spaced from the dipped portion of the main track or rail 8. A track switch lever 25 pivoted at its left-hand end to track 24 extends to the main track 8. A not shown source of compressed air is connected by a two-way air valve 26 and an air conduit 27 to the lower end of a compressed air actuator 28. The piston of the actuator 28 has a piston rod connected thereto extending through the upper end of the actuator 28. Said piston rod carries a link 29 having one end thereof disposed in a slot 30 formed in the switch lever 25 adjacent its pivoted end. An upwardly spring biased valve actuating element has a portion 31 thereof disposed in the path of travel of the spindles along the main track 8. Unloaded spindles will have an insufficient weight to depress the portion 31 whereby unloaded spindles will ride thereover and travel from main track 8 across track switch lever 25 to bypass track 24. Loaded spindles will be heavy enough to depress portion 31 whereby the valve 26 is operable to cause actuation of actuator 28 and opening of track switch lever 25 whereby said loaded spindles will continue along main track 8 to the dipped portion of the main track 8. The two-way valve 26 has an atmospheric exhaust port 32 and a not shown spring biased valve element therein whereby the actuator 28 is exhausted and the switch track lever 25 is automatically closed after each opening thereof by a loaded spindle before the next succeeding loaded or unloaded spindle reaches portion 31.

While there have been shown and described particular embodiments of the invention, it will be obvious to those skilled in the art that changes and modifications can be made without departing from the invention, and that it is intended by the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a machine for manufacturing electrical insulators comprising a plurality of spindles disposed in a horizontal plane, said spindles pivotally mounted for pivotal movement without said plane, said spindles moving along a main track and having rotary movement imparted thereto by frictional engagement between said moving spindles and main track, said spindles adapted to have electrical insulators mounted thereon, means for shunting spindles having no electrical insulators mounted thereon from said main track comprising a secondary track disposed in spaced relationship with respect to said main track and automatically operable means selectively

5

shunting spindles having no electrical insulators mounted thereon from said main track to said secondary track.

2. In a machine for manufacturing electrical insulators comprising a plurality of radially extending metallic spindles disposed substantially in a like horizontal plane, said spindles journaled adjacent their radially inner ends in cylindrical radially extending bearings, said bearings pivoted for pivotal movement within radially extending planes disposed substantially normal to said horizontal plane, radially outer ends of said spindles adapted to have electrical insulators loaded thereon, means for moving said spindles along a main track, portions of said spindles between said bearings and radially outer ends overlying said main track and said spindles having rotary movement imparted thereto by frictional engagement between said spindle portions and main track, a tank of liquid glaze coating material disposed radially outward of a portion of said main track, said main track portion concavely configured below said horizontal plane to cause said radially outer ends to be dipped below said horizontal plane into said tank, means for increasing said frictional engagement between said spindle portions and said main track portion comprising magnetic means attracting said spindle portions towards said track portion, and automatically operable means shunting unloaded spindles from said tank comprising a secondary track and a counterweighted lever pivoted to said main track spanning said main and secondary tracks.

3. In a machine for manufacturing electrical insulators comprising a plurality of metallic rotary movable pivotally mounted radially extending spindles disposed in a like horizontal plane, said spindles rotatably journaled adjacent their radially inner ends in cylindrical radially extending bearings, said bearings pivotally mounted for pivotal movement within radially extending planes disposed perpendicular to said horizontal plane, radially outer ends of said spindles adapted to have electrical insulators loaded thereon, portions of said spindles between said bearings and radially outer ends overlying and frictionally engaging a circular-like main track generally disposed in said horizontal plane, a tank of liquid glaze coating material disposed radially outward of a portion of said main track, said track portion dipping below said horizontal plane to cause said radially outer ends to be dipped into said tank, magnetic means adjacent said main track portion for increasing said frictional engagement between said spindle portions and main track, and automatically operable means causing unloaded spindles to bypass said tank comprising a secondary track connected to said main track by a lever pivotally connected to one of said tracks, a pneumatic actuator connected to said lever and to a source of pneumatic pressure by a pneumatic valve for disconnecting said secondary track from said main track, and an actuating element for said pneumatic valve having a portion thereof protruding into the path of movement of said spindle portions along said main track.

4. In a machine for manufacturing electrical insulators comprising a flat rotary horizontally disposed table carrying a plurality of mounting arms having forked portions at their radially outer ends, a plurality of radially extending cylindrical bearings pivoted to said forked portions, a plurality of spindles rotatably journaled in said bearings, radially outer ends of said spindles having male vacuum pressure holding means thereon for loading said radially outer ends with pin type electrical insulators, portions of said spindles between said radially outer ends and said bearings overlying and frictionally engaging a circular-like main rail concentrically disposed with respect to said table and generally within the plane of said table, a tank of liquid glaze coating material disposed radially outward of a portion of said main rail, said main rail portion dipping below the plane of said table for dipping said radially outer ends in said tank, means for prohibiting

6

unloaded spindles from being dipped into said tank comprising a bypass rail in vertically spaced relationship with respect to said main rail portion, a right angle lever having one leg thereof horizontally disposed and the other leg thereof vertically disposed and pointing downwardly, said right angle lever pivoted adjacent the joint portion thereof to said main rail, said one leg extending to said bypass rail and a predetermined weight connected to said other leg whereby only said unloaded spindles will be shunted along said one leg from said main rail to said bypass rail.

5. In a machine for manufacturing electrical insulators comprising a flat rotary horizontally disposed table carrying a plurality of pivotally mounted radially extending cylindrical bearings, a plurality of spindles rotatably journaled in said bearings, radially outer ends of said spindles having male vacuum pressure holding means thereon for loading said radially outer ends with pin type electrical insulators, portions of said spindles between said radially outer ends and bearings overlying and frictionally engaging a circular-like main rail concentrically disposed with respect to said table and generally within the plane of said table, a tank of liquid glaze coating material disposed radially outward of a portion of said main rail, said main rail portion dipping below the plane of said table for dipping said radially outer ends into said tank, means for prohibiting unloaded spindles from being dipped into said tank comprising a bypass rail in vertically spaced relationship with respect to said main rail portion, a lever spanning said bypass rail and said main rail and pivoted adjacent one end thereof to said bypass rail, a source of compressed air connected by an air valve and an air conduit to an end of a closed cylinder, a piston in said cylinder having a piston rod extending through another end of said cylinder, a link having one end thereof disposed in a slot formed in said lever adjacent said one end, and an upwardly spring biased air valve actuating element having a portion thereof disposed in the path of movement of said spindle portions along said main rail whereby only said unloaded spindles are shunted across said lever from said main rail to said bypass rail.

6. An apparatus having a rotary spindle which is adapted to be loaded with a component of an article of manufacture, said spindle being mounted for rotation about its axis and along a main track, a pair of track portions, and automatic means operable to selectively transfer said spindle from said main track when unloaded to one of said track portions and when loaded to the other of said track portions.

7. An apparatus having a plurality of rotary spindles which are adapted to be loaded with components of articles of manufacture, said spindles being mounted for rotation about their axes and along a main track, a pair of track portions, and means operable to automatically transfer from said main track loaded spindles to one of said track portions and unloaded spindles to the other of said track portions.

8. In a manufacturing machine having a rotary work carrying spindle which is rotatable about its axis and movable along a track, means for shunting said spindle from said track when in an unloaded condition comprising another track and automatically operable means for shunting said spindle when in an unloaded condition from said first mentioned track to said another track.

9. An apparatus having rotary spindles which are adapted to carry components of articles of manufacture, said spindles being mounted for rotation about their axes and along a main track, a pair of track portions, and automatic means operable to selectively transfer said spindles from said main track when loaded to one of said track portions and when unloaded to the other of said track portions and then to return said spindles to said main track.

10. In a manufacturing machine having an article carrying rotary spindle which is rotatable about its axis and

movable along a track, means for causing said spindle when in an unloaded condition to bypass a work station positioned adjacent said track comprising another track and means automatically operable to first transfer said spindle when in an unloaded condition from said first mentioned track to said another track and then to return said transferred unloaded spindle back to said first mentioned track.

5

References Cited in the file of this patent

UNITED STATES PATENTS

1,530,589	Amory -----	Mar. 24, 1925
2,104,062	Temple -----	Jan. 4, 1938
2,209,006	Smith -----	July 23, 1940
2,357,783	Snelling -----	Sept. 5, 1944
2,461,308	Brown -----	Feb. 8, 1949