

Feb. 7, 1939.

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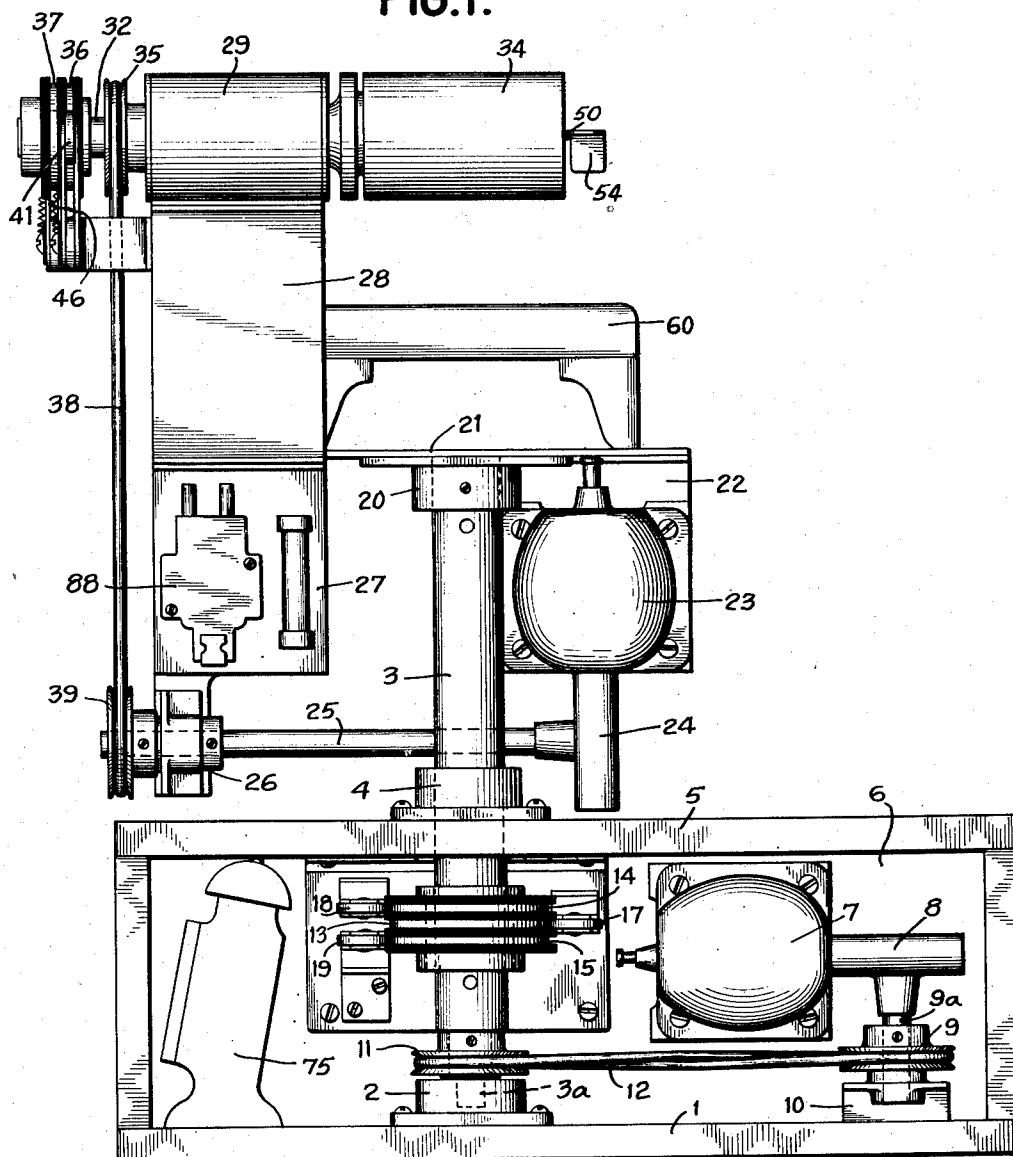
2,146,285

COATING MACHINE

Filed April 4, 1934

3 Sheets-Sheet 1

FIG. 1.



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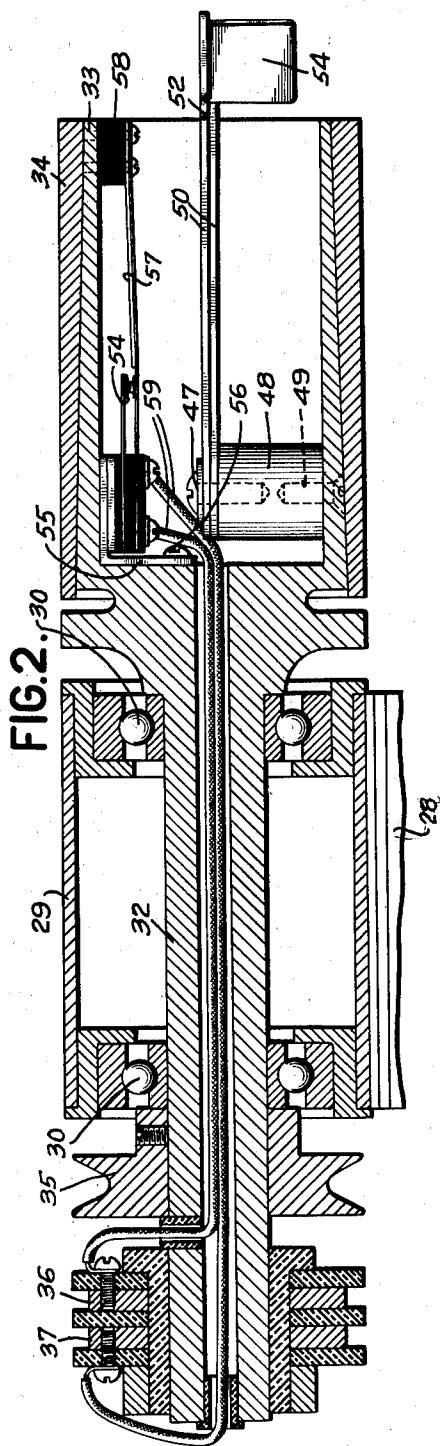


FIG. 4.

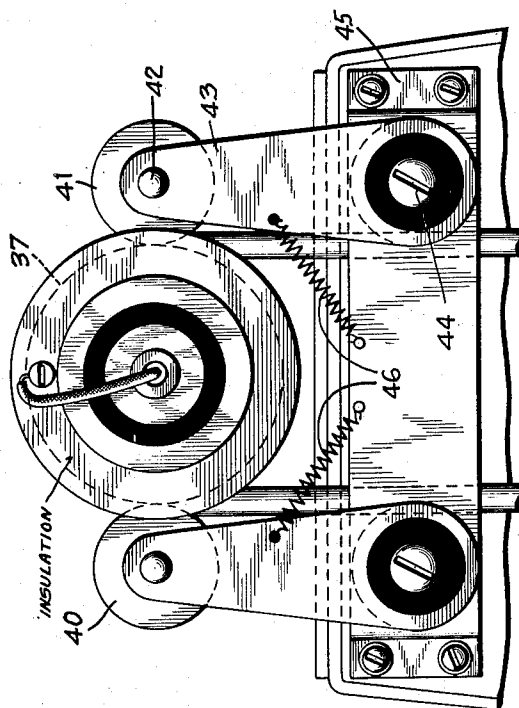
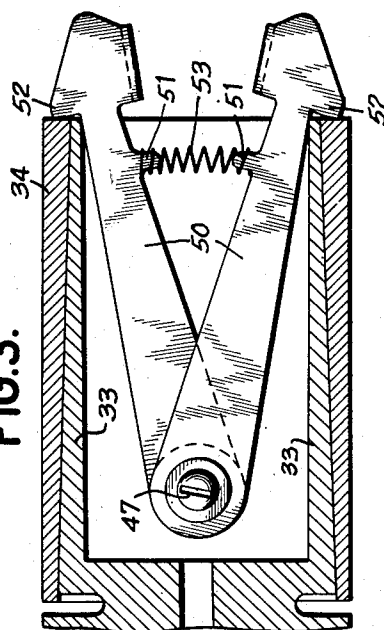


FIG. 3.



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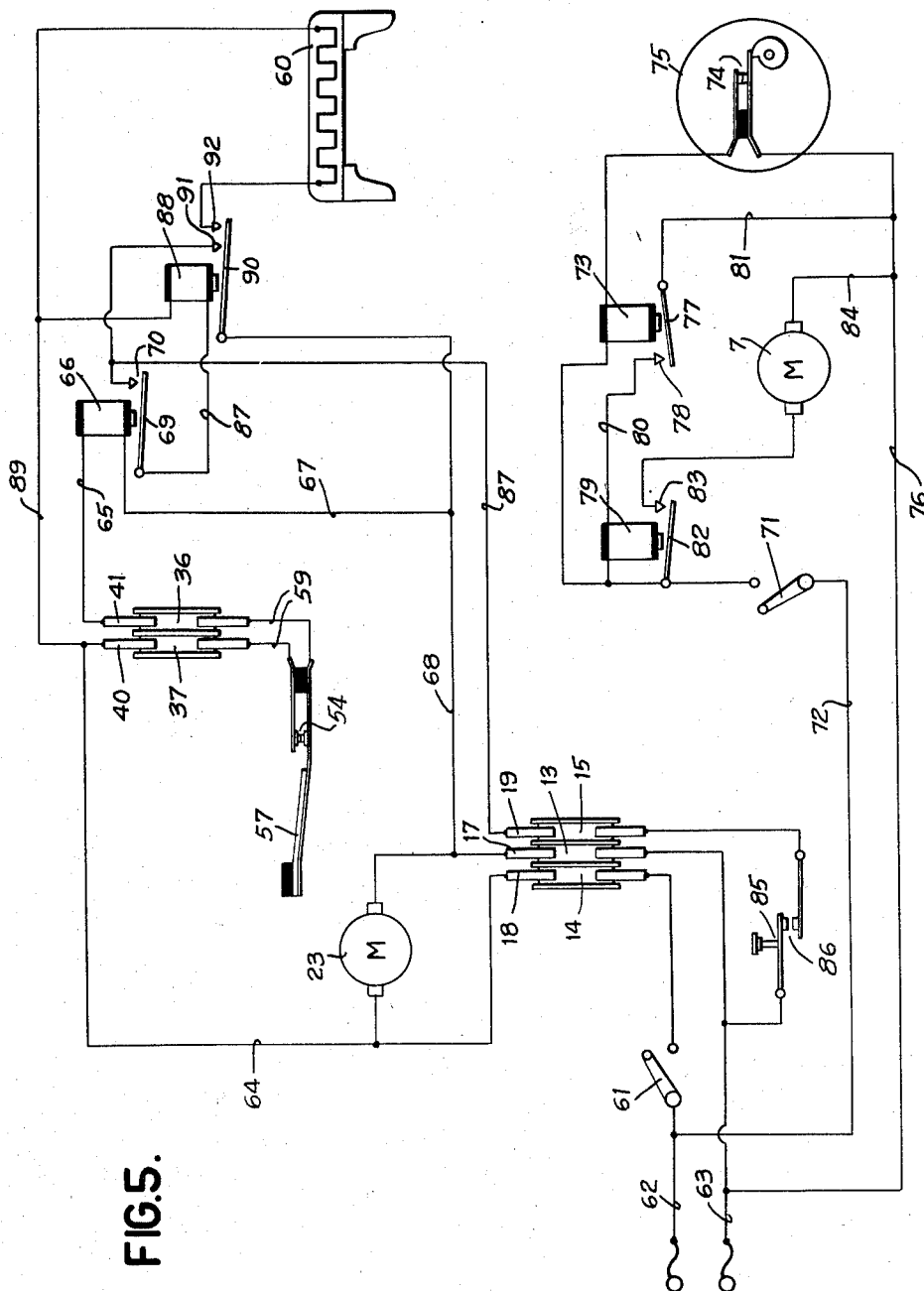


FIG. 5.

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COATING MACHINE

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7 Claims. (Cl. 91—42)

This invention relates to an improved method of applying a sensitizing medium to cylinders which are subsequently exposed to receive an image of data which is to be reproduced thereon by etching processes, and more particularly to machines for evenly distributing and drying the sensitized coating on the outer surface of a cylinder such as may be used in a rotary printing press.

In the process of photo-etching type characters it is necessary to flow a sensitized film or coating which may be of various consistency, and may include albumen or collodion, together with any suitable reagent which is acted upon by light, over the surface of the material to be etched. In the present embodiment a cylinder of brass, copper, or other suitable material may be provided over which a light sensitive emulsion is flowed. In order to render the thickness of this coating as even as possible over the entire surface of the cylinder, the cylinder must be kept in motion while the emulsion is drying. If the cylinder was merely set aside to dry and remained stationary the emulsion would naturally tend to flow downwardly to the lowest part of the cylinder so that the result would be a very thin coat at the upper surfaces of the cylinder gradually increasing in thickness to a maximum at the lower surfaces. Therefore, the application of heat is desirable to increase the rapidity of the drying action, but the temperature must be kept under control so as not to exceed the critical point where it may injure the emulsion.

It is therefore one object of this invention to provide a device for drying a sensitized emulsion on a cylindrical form.

Another object is to provide a device for rotating a cylindrical form in two directions simultaneously to evenly distribute the emulsion thereon.

Another object is to provide a device for heating a cylindrical form while turning in two directions.

A further object is to provide a device for controlling the temperature of the cylindrical form while said form is rotating in two directions.

Various other objects and advantages of my invention will be obvious from the following particular description of one form of mechanism embodying the invention or from an inspection of the accompanying drawings and the invention also constitutes certain new and novel features of the construction and combination of parts hereinafter set forth and claimed.

In the drawings:

Fig. 1 shows a front elevational view of the device.

Fig. 2 shows a detailed section through the cylinder arbor of the machine.

Fig. 3 shows a detail of the mechanism for fastening the cylinder unto the arbor.

Fig. 4 shows a detailed view of the collector rings for transmitting current to rotating members.

Fig. 5 is a wiring diagram of the device.

Referring to Fig. 1, the device is mounted on a base comprising a rigid box-like structure having one side open. On the bottom plate 1 of the base structure is mounted a thrust bearing 2 in which is journaled a vertical hollow shaft 3, provided with a bearing plug 3a fixed in its lower end, extending upwardly and supported by a bearing 4 mounted on the top plate 5 of the base structure. Fixed to the back plate 6 of the base structure is a motor 7 and integral with the motor casing is a housing 8 containing a worm and gear drive by means of which a pulley 9 fixed to the worm wheel shaft 9a, is rotated.

The worm wheel shaft 9a is journaled at its lower end in a bearing 10 also fixed to the back plate 6. A pulley 11 fixed to the shaft 3 is adapted to be driven by means of a belt 12 cooperating with pulley 9. Fixed to the vertical shaft 3 are insulated collector rings 13, 14, and 15. Conductors (Fig. 5) extend from each of the collector rings upwardly through the hollow shaft 3 for purposes hereinafter described. Insulated roller contacts 17, 18 and 19 cooperate with said collector rings to conduct the current supplied from an external source. Suitably fastened on the top of shaft 3 is a flange 20 on which is mounted a flat plate 21. Suspended from this plate is a bracket 22 on which is mounted a motor 23 with a housing 24 enclosing a worm and gear drive. A shaft 25 is fixed to said gear and extends through a bearing 26 which is mounted on a bracket 27 likewise suspended from the plate 21. A bracket 28 mounted on the plate 21 supports a housing 29 in the ends of which are mounted ball bearings 30 (Fig. 2), in which is journaled a hollow shaft 32 having integral with one end thereof a hollow arbor 33 on which a cylinder 34 may be pressed. The opposite end of the shaft 32 has fixed thereto a pulley 35 and insulated collector rings 36 and 37. The pulley 35 is adapted to be driven by means of a belt 38 from the pulley 9 which is fixed to the shaft 25. Insulated roller contacts 40 and 41 (Figs. 1 and 4) cooperate with the collector rings 37 and 36 respectively. These roller contacts are the same construction as the rollers

17, 18 and 19 previously mentioned and the description of the structure of one will suffice. The roller contact 41 is rotatably mounted on an axis 42 fixed to an arm 43, said arm being pivotally mounted at 44 to a bracket 45 suitably mounted on the supporting structure of the machine. The roller contact 41 is held in contact with the collector ring 37 by a suitable insulated spring such as indicated at 46.

10 Pivotally mounted within the hollow arbor 33 (Figs. 2 and 3) at 47, on the post 48 fixedly attached to the arbor 33 at 49, are the arms 50 having projections 51 suitable for a spring 53 as indicated in Fig. 3 tending to urge arms 50 outwardly against the arbor 33. Integral with the arms 50 are fingers 52 extending beyond the arbor suitable to hold a cylinder 34 in position on the arbor 33. Extending downwardly (Fig. 2) and forming part of the arms 50 are pins 54 which may be grasped to aid in forcing the arms 50 together by compressing spring 53 in order to remove the cylinder 34. Fixedly mounted within the hollow arbor 33 are insulated contacts 54 (Figs. 2 and 5) held in position by bracket 55 which is fastened to arbor shell by screw 56. Cooperating with contacts 54 is a thermo-couple 57 mounted on an insulator 58 fastened to arbor 33 and so adjusted that below a predetermined critical temperature within the hollow arbor the contacts 54 are permitted to remain closed and upon a temperature rise beyond the said critical value the thermo-couple operates in a well known manner to open the contacts 54 which are conductively connected to the collector rings 36 and 37 by wires 59 (Figs. 2 and 5) through the hollow shaft 32. Thermostatic contacts 54 as will be explained hereinafter control the heater element 60 (Figs. 1 and 5) mounted on the flat plate 21.

40 Referring to Figs. 1 and 5, the operation of the device is as follows: The horizontal arbor 33 is rotated by closing switch 61 which permits current to flow from the line 62 to collector ring 14, contact roller 18, and motor 23 through contact roller 17, collector ring 13 and to the return side of the line 63. Current is also conducted by line 64 through contact roller 40, collector ring 37, normally closed thermostatic contacts 54, collector ring 36, contact roller 41, line 65, relay coil 66, line 67, line 68, contact roller 17, collector ring 13 to the return side of the line 63.

50 From the above circuits traced the closing of switch 61 causes motor 23 to rotate and through its shaft 25, pulley 39, belt 38 cooperating with pulley 35 rotates shaft 32 and arbor 33. It is seen from the above circuit traced that since the thermostatic contacts 54 are normally closed the relay coil 66 is energized to attract its armature 69 closing its contact 70.

60 While the arbor 33 with a suitable cylinder 34 mounted thereon is rotating, the light sensitive liquid is poured onto the cylinder. Motor 7 which as explained rotates shaft 3 and the fixed plate 21 to which is attached the heating element 60, motor 23 and rotating arbor 33 with the mounted cylinder 34, is started by closing switch 71, current is then conducted by wire 72 to relay coil 73 normally closed contacts 74 of a suitable timing device 75 located on plate 1 of the base structure to the return wire 76 to energize relay coil 73. Energization of relay coil 73 attracts its armature 77 to close its contact 78 allowing current to flow from line 72 through relay coil 79, wire 80, contact 78, armature 77, wire 81 to return line 76 to energize relay coil 70. Energi-

zation of relay coil 70 attracts its armature 82 closing its contact 83 closing the motor circuit and starting motor 7 by current conducted from line 72, armature 82, contact 83, motor 7, wire 84 to return line 76. The arbor 33 with its mounted cylinder 34 is now rotated in two directions or planes by virtue of its rotation by motor 23 rotating its direct connected shaft 32 and by the rotation of shaft 3 by motor 7, so that the horizontally revolving arbor 33 is whirled around the vertical shaft 3. Rotating the mounted cylinder 34 in this manner insures that the applied emulsion on the cylinder is evenly distributed thereon.

When both the motors 7 and 23 are operating to rotate the cylinder 34 in both planes, key 85 is depressed momentarily to close the heating element circuit as follows: Closing of key contacts 86 conducts current from line 63 to collector ring 15, contact roller 19, wire 87, the closed contact 70 as traced hereinbefore, armature 69, wire 87, relay coil 88, wire 89, wire 64, contact roller 18, collector ring 14 to the other side of the line 62, energizing relay coil 88 causing it to attract its armature 90 and the double contacts 91 and 92. A locking circuit is then established to continue energization of relay coil 88 after the key 85 has been released opening its contacts 86, as follows: Current from line 63 is now conducted through collector ring 13, contact roller 17, wire 68, armature 90 closed, contact 70, armature 69, wire 87, relay coil 88, wire 89, wire 64 to the other side of the line 62. The heating element 60 is then energized by closing of contact 92 by current from line 63, collector ring 13, contact roller 17, wire 68, armature 90, contact 92, heating element 60, wire 89, wire 64, to the other side of the line 62. The energization of the heating element 60 is continued until the emulsion coating is dried and the cylinder attained a certain predetermined temperature. At this critical temperature the thermostatic contacts 54 are opened by the operation of thermo-couple 57 to open the heating element circuit, as follows: Opening of contacts 54 deenergizes relay coil 66, opening its contact 70, deenergizing relay coil 88 in turn opening its contacts 91 and 92 to deenergize the heating element 60.

At a suitable predetermined period which may be variable due to various emulsions applied to the cylinder 34 the circuit for motor 7 is opened by operation of the timing element 75 opening its contacts 74, as follows: Opening of contacts 74 deenergizes relay coil 73 causing its contact 78 to be opened in turn deenergizing relay coil 79 opening its contact 83 opening the circuit to motor 7. The operation of the timing element to open its contacts 74 may be set to operate any time during the emulsion distributing cycle or at the end of the emulsion drying cycle depending on the particular characteristics of the materials used. The circuit of motor 23 is then opened by opening switch 61 deenergizing motor 23 and stopping rotation of arbor 33 with its mounted cylinder.

From the above description it is seen that the emulsion distributing process is attained by first, rotating the cylinder about an axis in rotation longitudinal of the cylinder, then during the rotation about this said axis applying the sensitized emulsion thereon, then rotating the cylinder for a predetermined time thereby evenly distributing the same thereon by spreading aided by the spinning of the cylinder (the time element required for the rotation in the one said direction varies with the different emulsions to be used), then

rotating the cylinder in two planes, and during the distributing cycle the emulsion is dried and automatically controlled so that the critical temperature of the emulsion is never exceeded. Rotation of the cylinder in one plane or direction is automatically controlled by the timing element with its predetermined control setting. At the proper moment rotation of the vertical shaft and its attached arbor is stopped, and at some suitable period the heating element is de-energized. At the completion of this process the cylinder when cooled is removed and ready for exposure.

While there has been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention therefore to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In a machine for coating cylinders with a sensitized emulsion, a rotatable supporting member for a cylinder, driving means adapted to rotate said supporting member and cylinder about an axis of rotation longitudinal of the cylinder, means to initiate operation of said driving means to rotate the said member and cylinder, independent driving means adapted to rotate the said rotating member and cylinder about an axis of rotation transverse of the cylinder, and separate means to initiate operation of the last mentioned driving means thereby effecting rotation of the cylinder about two axes concurrently to evenly distribute the emulsion applied to the said cylinder.

2. In a machine for coating cylinders with a sensitized emulsion, a rotatable supporting member for a cylinder, driving means adapted to rotate said supporting member and cylinder about an axis of rotation longitudinal of the cylinder, means to initiate operation of said driving means to rotate the said member and cylinder, independent driving means adapted to rotate the said rotating member and cylinder about an axis of rotation transverse of the cylinder, separate means to initiate operation of the last mentioned driving means to effect rotation of the cylinder about the two axes concurrently to evenly distribute the emulsion over the said cylinder, means for heating said cylinder while rotated, and means for rendering the heating means inoperative at a predetermined temperature during the said rotation of the cylinder.

3. In a machine for coating cylinders with a sensitized emulsion, a rotatable supporting member for a cylinder, driving means adapted to rotate said supporting member and cylinder about an axis of rotation longitudinal of the cylinder, means to initiate operation of said driving means to rotate the said member and cylinder, independent driving means adapted to rotate the said rotating member and cylinder about an axis of rotation transverse of the cylinder, separate means to initiate operation of the last mentioned driving means to effect rotation of the cylinder about the two axes concurrently to evenly distribute the emulsion over the said cylinder, means for heating the said cylinder during its rotation, and means including a thermostatic device disposed within the rotatable supporting member for

rendering the heating means inoperative at a predetermined temperature during the said rotation of the cylinder.

4. In a machine for coating cylinders with a sensitized emulsion, a rotatable supporting member for a cylinder, driving means adapted to rotate said supporting member and cylinder about an axis of rotation longitudinal of the cylinder, means to initiate operation of the said driving means to rotate the said member and cylinder, independent driving means adapted to rotate the said rotating member and cylinder about an axis of rotation transverse of the cylinder, separate means to initiate operation of the last mentioned driving means thereby effecting rotation of the cylinder about two axes concurrently to evenly distribute the emulsion applied to the said cylinder, and means for automatically rendering the last mentioned driving means inoperative upon completion of the distribution of the emulsion over the cylinder.

5. In a machine for coating cylinders with a sensitized emulsion, a rotatable supporting member for a cylinder, driving means adapted to rotate said supporting member and cylinder about an axis of rotation longitudinal of the cylinder, means to initiate operation of the said driving means to rotate the said member and cylinder, independent driving means adapted to rotate the said rotating member and cylinder about an axis of rotation transverse of the cylinder, separate means to initiate operation of the last mentioned driving means to effect rotation of the cylinder about the two axes concurrently to evenly distribute the emulsion over the said cylinder, means for heating the said cylinder during its rotation, means for rendering the heating means inoperative at a predetermined temperature during the said rotation of the cylinder, and means for automatically rendering the last mentioned driving means inoperative upon completion of the distribution of the emulsion over the said cylinder.

6. The method of coating the outside surfaces of cylinders with a sensitized emulsion in preparation for a photoetching process which comprises, first, rotating a cylinder about an axis of rotation longitudinal of the cylinder, then during the rotation about this said axis applying the sensitized emulsion to the outside surface of the cylinder, then rotating the cylinder for a predetermined time thereby distributing the same thereon by spreading aided by the spinning of the cylinder, and thereafter rotating the cylinder about an axis of rotation transverse of the cylinder simultaneously with the first mentioned rotation and applying heat to the rotating cylinder to congeal the emulsion while it is evenly distributed over the cylinder.

7. The method of coating the outside surfaces of cylinders with a sensitized emulsion in preparation for a photoetching process which comprises, first, rotating a cylinder about an axis of rotation longitudinal of the cylinder, then during the rotation about this said axis applying the sensitized emulsion to the outside surface of the cylinder, then rotating the cylinder for a predetermined time thereby distributing the same thereon by spreading aided by the spinning of the cylinder, and thereafter rotating the cylinder about a different axis in another direction simultaneously with the first mentioned rotation thereby evenly distributing the emulsion thereon while the cylinder is rotated about both axes.

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