June 14, 1938. J. PETERS ET AL 2,120,471

APPARATUS FOR DRYING PRINTING PLATES

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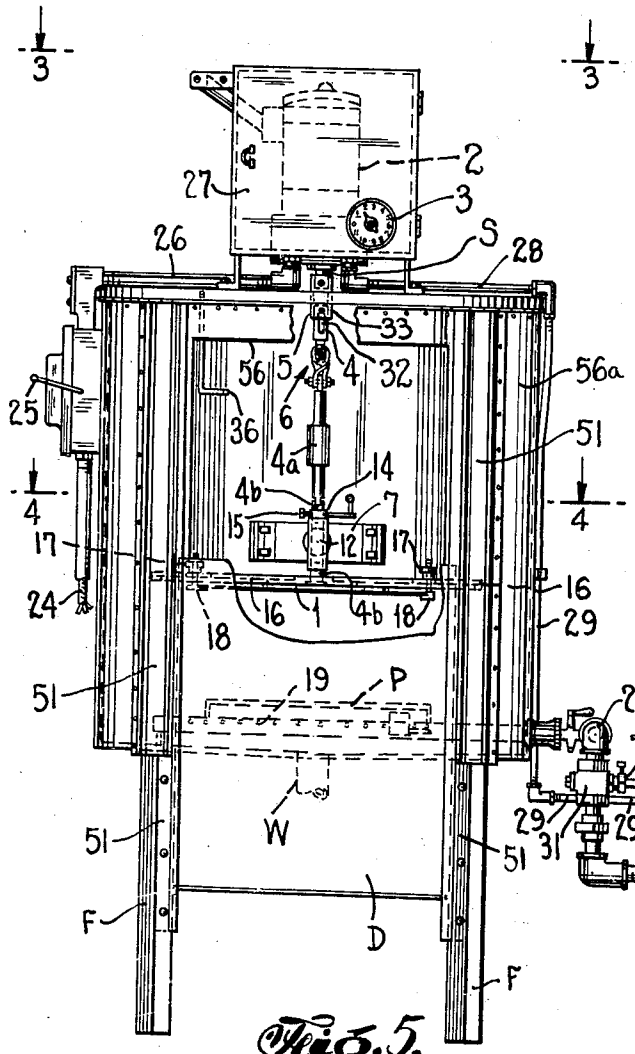


Fig. 2.

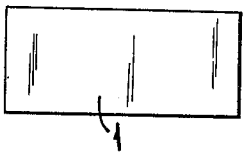
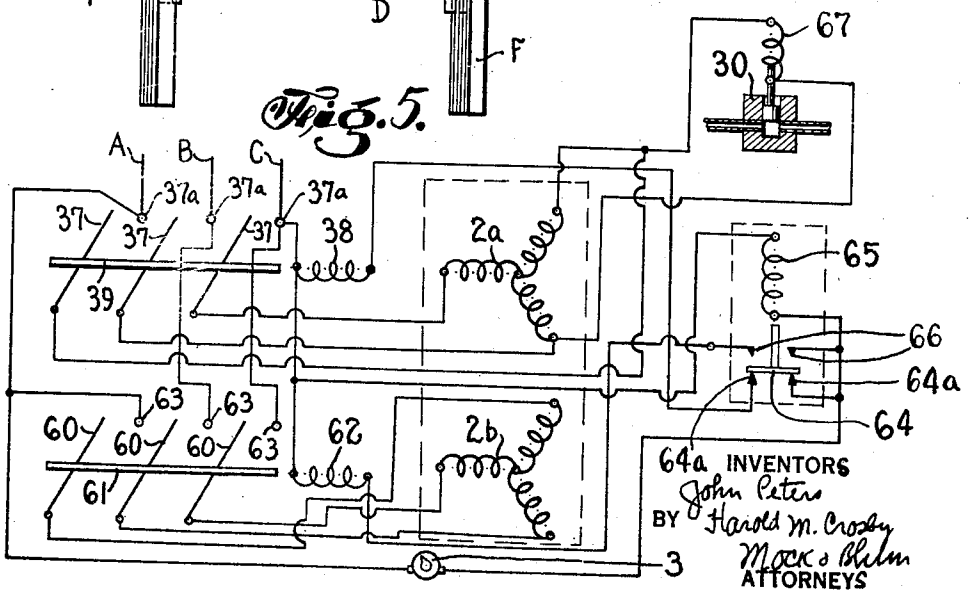


Fig. 1.

Fig. 5.



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Fig. 3.

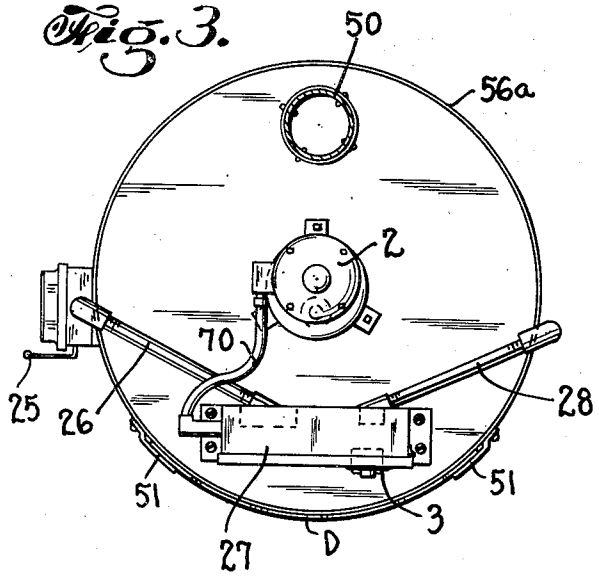


Fig. 6.

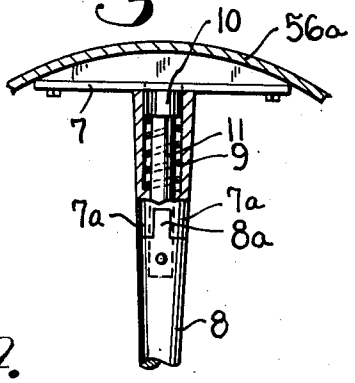
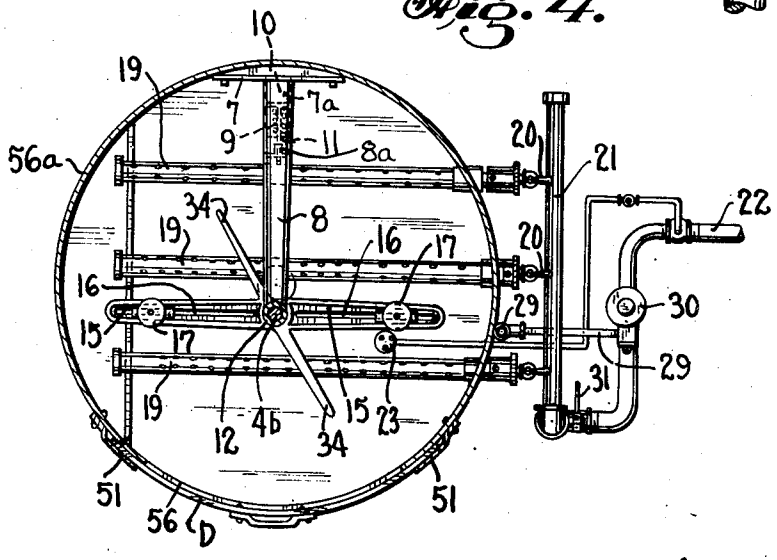


Fig. 4.



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UNITED STATES PATENT OFFICE

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APPARATUS FOR DRYING PRINTING PLATES

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Application June 14, 1935, Serial No. 26,552

5 Claims. (Cl. 34—26)

Our invention relates to a new and improved apparatus, and a new and improved method of drying printing plates.

One of the objects of our invention is to provide a method whereby the printing plate is whirled or otherwise agitated in a heated atmosphere for a specific period of time and said plate is subsequently whirled or otherwise agitated after the supply of heat has been shut off.

Another object of our invention is to provide a method and apparatus of this character whereby the plate is turned more rapidly, after the supply of heat has been shut off.

Another object of our invention is to provide apparatus whereby the supply of heat is automatically shut off after a predetermined interval and the plate is then whirled or otherwise agitated at a higher speed.

Another object of our invention is to provide an improved control whereby gas heat can be utilized, the supply of gas being automatically shut off after a specified time interval and the whirling of the plate being then continued at a higher speed for an additional and predetermined time interval.

Another object of our invention is to provide improved time-switch means for said apparatus.

Other objects of our invention will be set forth in the following description and drawings which illustrate a preferred embodiment thereof, it being understood that the above statement of the objects of our invention is intended to generally explain the same without limiting it in any manner.

Fig. 1 is an elevation of the improved apparatus.

Fig. 2 is a diagrammatic representation of the printing plate which is to be dried.

Fig. 3 is a top plan view on the line 3—3 of Fig. 1.

Fig. 4 is a sectional view on the line 4—4 of Fig. 1.

Fig. 5 is a diagrammatic representation of the wiring circuits.

Fig. 6 illustrates a detail of the mechanism.

Heretofore and in preparing photo-mechanical printing plates, it has been customary to dry said plates after they have been cleansed, by whirling said plates in a heated atmosphere. According to previous practice, the plate has been whirled about a vertical axis, with the wet coating material at the bottom surface of the plate.

According to our improved method the plate is whirled in a heated atmosphere, and the supply of gas or other heating medium is then discontinued, and the whirling of the plate is continued until the temperature to which the plate is exposed has dropped from about 50° C. to 35° C. In treating the plate according to our improved method, the plate is whirled about a vertical axis in the usual manner and the coating solution or material may be at the bottom surface of the plate.

The improved machine has a frame F, provided at its top with a cylindrical compartment 56*a*, which has an open portion 56 at the front thereof. A slidable door D can be provided if desired, and this door D can be moved vertically in guides 51.

The door D may be closed or it may be held open or partially open, while the apparatus is being used.

The upper end of the apparatus is provided with a motor 2, which may be a three-phase electric motor. Said motor may have two speeds, as will be later more fully described.

The time switch 3 is also mounted at the top of the frame.

The motor shaft S is connected to a collar 5 by means of a suitable pin, so that the collar 5 turns with the motor shaft S. At its lower end the collar 5 is provided with a pin 33, which is located in the slot 32 of a shaft extension 4. The shaft extension 4 can be moved up and down relative to the collar 5, and the engagement of the pin 33 with the slot 32 of the shaft extension 4, causes said shaft extension 4 to turn in unison with the shaft S.

The shaft extension 4 is connected by a universal joint 6 with a second shaft extension 4*a*. Said shaft extension 4*a* has a reduced bottom portion, which is located within the groove of a third shaft extension 4*b*, so that the members 4*b* and 4*a* turn in unison. The shaft extension 4*b* is provided with a collar 14, which is clamped thereto by means of a screw 15.

The collar 14 rests upon the upper end of a cylindrical bearing 12. If desired, any suitable antifriction means can be used, in order to permit the collar 14 to turn freely relative to the bearing 12.

As shown in Fig. 4, the cylindrical bearing 12 is connected to the outer end of a rod 8, which is slidable in a sleeve 7*a*. The sleeve 7*a* is connected to the interior wall of the compartment 56*a*, by means of an arm or bracket 7.

The slidable rod 8 is provided with a reduced shank 11, which is provided with a head 10. A coil spring 9 surrounds the reduced shank 11. One end of the coil spring 9 abuts the head 10,

and the other end of the coil spring 9 abuts a shoulder of the sleeve 7a. The coil spring 9 therefore yieldably retains the slide rod 8 in the position shown in Fig. 4, but said slide rod 8, together with the bearing 12, can be pulled outwardly, if desired.

As shown in Fig. 6, the rod 8 is provided with an extension 8a which fits within a corresponding groove of the sleeve 7a, when the parts are in the position shown in Fig. 4 and Fig. 6. However, when the rod 8 is pulled to its outer position, the extension 8a moves out of said groove of sleeve 7a, so that the sleeve 8 can be turned in unison with the head 10. If desired, the shank 11 could be made turnable relative to the head 10, so as to eliminate friction. Hence the vertical cylindrical bearing 12 can be turned around an axis which is perpendicular to the plane of Fig. 1, if the shaft member 4a is released from the shaft member 4b. The shaft member 4a can be released from the shaft member 4b by pushing the shaft member 4a upwardly, this being permitted by the pin 33 and the grooves or slots 32.

When the shaft member 4a is moved upwardly so as to release the collar 14, the shaft member 4a can be turned by means of the universal joint 6, until said shaft member 4a is engaged by the resilient latch-member 36. This makes it possible to turn the bearing 12, in the manner previously stated.

Referring to Fig. 4, the lower end of the shaft member 4b is integral with a slotted arm 15.

Clamping members 17 are slidably mounted in the slots or grooves of the slotted arm 15, and said members 17 can be clamped in position relative to the slotted arm 15.

As shown in Fig. 1, the clamping members 17 are provided with flanges 18 which engage the underside of the printing plate 1. Hence the printing plate 1 can be clamped firmly in position at the bottom of the shaft member 4b.

The compartment 56a is provided with a series of gas burners 19 and it is also provided with a flue 50, in order to permit the escape of the products of combustion. The burners 19 are connected by means of hand operated valves 20, to a gas pipe 21. The gas pipe 21 is connected to a gas supply pipe 22, and a hand operated valve 31 can be operated in order to shut off the supply of gas to the burners.

The supply of gas to the burners is also controlled by an automatically operated valve 30, this being operated by a solenoid or by other suitable electro-magnetic means. A pilot light 23 is also provided and this is connected to the pipe 22.

By means of this apparatus it is possible to whirl the printing plate 1 in a heated atmosphere so as to thoroughly dry the same. The electric motor 2 is provided with current through the cable 24 which passes through a conduit 26.

The apparatus is provided with a hand switch 25 for opening and closing the circuit of the motor.

As shown in Fig. 3, a cable which is located in a conduit 70, connects the motor to the switches which are diagrammatically shown in Fig. 5, and which are located in a switch casing 27. The conduit 70 carries the six leads from the two switches in the control box to the windings of the motor.

On the other side of the switch casing 27, a conduit 28 is provided for the cable of a branch control circuit to which the solenoid 67 (shown in Fig. 5) is connected.

The wiring diagram shown in Fig. 5 may be analyzed as follows:—

Since the specific embodiment has a three-phase motor, we have shown three leads A, B, and C. A switch 37, having three arms, is connected to a rod 39 which is operated by means of the usual solenoid 38. When the switch 37 is in the operative position the three arms thereof contact with the three contact points 37a.

Another and similar switch 60 is provided, and this is operated by means of a rod 61, which is operated by means of the solenoid 62. When the switch 60 is in the circuit-closing position, its three arms contact with the points 63.

The lead A passes through the time switch 3 and its circuit includes the armature 64 which is operated by means of the solenoid 65. Said parts 64 and 65 diagrammatically illustrate a time-delay relay which may be of any suitable conventional construction, so that a predetermined period of time must elapse before the relay 64 is moved so as to close contact between the points 66, when solenoid 65 is energized.

When the armature 64 is in the circuit-closing position which is illustrated in Fig. 5, the current passes through solenoid 38, to the lead C. Hence, when the time switch 3 first closes the circuit, the solenoid 38 is energized, thus moving the rod 39, so that the switch 37 moves to the circuit-closing position, in which position the coils 2a of the motor 2 are in circuit, thus driving the motor at a relatively low speed, of about 600 R. P. M., for about one-half minute. Of course this period of one-half minute can be varied, in order to meet any given conditions.

While the coils 2a are in circuit, the solenoid 67 is energized, in order to operate the magnetically controlled gas supply 30, so as to supply heat to the apparatus. When the relay armature 64 is operated, it closes the circuit between the relay points 66, and it opens the circuit between the relay points 64a.

The coil 38 is now cut out of the circuit and the solenoid coil 62 is now put into the circuit, so that the switch 37 will open, and the switch 60 will close, so that its arms touch the points 63. This will de-energize the solenoid 67 so that the gas control valve 30 will move to the closing position. The open position of said gas control valve is shown in Fig. 5.

Current is now supplied to the motor coils 2b, thus driving the motor at a relatively higher speed, as for example about 1200 R. P. M. The motor can be driven at this higher speed, while the supply of heat is shut off, for any desired period, which may be from two minutes to two and a half minutes. In any event the period during which the motor is operated while the heat supply is shut off is preferably longer than the first period.

After the predetermined period of operation, the time switch 3 moves to open the circuit completely.

In order to protect the pipes 19 from the dripping of liquid, said pipes are covered by a pan P which becomes heated by the gas burners and this heat is transmitted upwardly.

The bottom of the compartment 56a is provided with a drain pipe W through which the waste liquid can escape.

The apparatus and method specified herein

can be utilized for drying any printing plate, which is subjected to a coating operation, etc.

The advantage of the double speed whirling is that while the lower speed is being used, the heat sets some of the coating solution on the plate. The subsequent high speed whirls off the excess of the solution, and the coating is thoroughly dried during said high speed operation. Hence a more even coating is secured by the two-stage operation, than by whirling the plate at a uniform and low speed.

While we have specified the whirling of the plate in the description and claims, it is to be understood that this is intended to include any suitable mechanical movement whereby the moisture is driven off by mechanical force.

We have shown preferred embodiments of our invention, but it is clear that numerous changes and omissions can be made without departing from its spirit.

We claim:

1. Apparatus for drying a printing plate, comprising an electric motor having a shaft, means for clamping a printing plate to said shaft, said electric motor having first driving means and also having second driving means, first switch mechanism for controlling the circuit of the first driving means, second switch mechanism for controlling the circuit of the second driving means, said switches being normally in the open position, first electro-magnetic means for moving the first switch to the circuit closing position, second electro-magnetic means for moving the second switch to the circuit closing position, the circuit of said motor also including a time switch, a time-delay relay having an armature which closes the circuit of the first electro-magnetic means when in normal position, said armature being moved to a position in which it closes the circuit of the second electro-magnetic means after a predetermined interval which is less than the effective interval of said time switch, said time-delay relay opening the circuit of the first electro-magnetic means when it is moved to the last mentioned position, heating means adapted to heat the atmosphere in which the printing plate is located, and electromagnetic means for shutting off the supply of heat and in circuit with the first driving means.

2. Apparatus for drying a printing plate, comprising an electric motor having a shaft, means for clamping a printing plate to said shaft, said electric motor having first driving means and also having second driving means, first switch mechanism for controlling the circuit of the first driving means, second switch mechanism for controlling the circuit of the second driving means, said switches being normally in the open position, first electro-magnetic means for moving the first switch to the circuit closing position, second electro-magnetic means for moving the second switch to the circuit closing position, the circuit of said motor also including a time switch, a time-delay relay having an armature which closes the circuit of the first electro-magnetic means when in normal position, said armature being moved to a position in which it closes the circuit of the second electro-magnetic means after a predetermined interval which is less than the effective interval of said time switch, said time-delay relay opening the circuit of the first electro-magnetic means when it is moved to the last mentioned position, heating means adapted to heat the atmosphere in which the printing plate is located, and electro-magnetic means for shutting off the supply of heat and in circuit with the first driving means, the second driving means being adapted to turn the motor at a higher speed than the first driving means.

3. In apparatus for drying a printing plate, a vertical shaft and means for turning the same, a first shaft extension vertically movable relative to said shaft and turnable in unison therewith, a second shaft extension turnably in unison with the first shaft extension, the second shaft extension being turnable relative to the first shaft extension around an axis which is inclined to the axis of rotation of said shaft, a third shaft extension and a bearing therefor, the second shaft extension being releasably connected to the third shaft extension, said third shaft extension having clamping means for clamping a printing plate thereto, and time-control mechanism for controlling the turning of said vertical shaft in two stages having different speeds.

4. In apparatus for drying a printing plate, a vertical shaft and means for turning the same, a first shaft extension vertically movable relative to said shaft and turnable in unison therewith, a second shaft extension turnable in unison with the first shaft extension, the second shaft extension being turnable relative to the first shaft extension around an axis which is inclined to the axis of rotation of said shaft, a third shaft extension and a bearing therefor, the second shaft extension being releasably connected to the third shaft extension, said third shaft extension having clamping means for clamping a printing plate thereto, said bearing having turnable means supporting the same, said turnable means being turnable around an axis which is perpendicular to the central axis of said bearing, and time-control mechanism for controlling the turning of said vertical shaft in two stages having different speeds.

5. In apparatus for drying a printing plate, a vertical shaft and means for turning the same, a first shaft extension vertically movable relative to said shaft and turnable in unison therewith, a second shaft extension turnable in unison with the first shaft extension, the second shaft extension being turnable relative to the first shaft extension around an axis which is inclined to the axis of rotation of said shaft, a third shaft extension and a bearing therefor, the second shaft extension being releasably connected to the third shaft extension, said third shaft extension having clamping means for clamping a printing plate thereto, said bearing having turnable means supporting the same, said turnable means being turnable around an axis which is perpendicular to the central axis of said bearing, and means for holding said supporting means in fixed position, and time-control mechanism for controlling the turning of said vertical shaft in two stages having different speeds.

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