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APPARATUS FOR PREPARING PLANOGRAPHIC OFFSET PRINTING PLATES

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4 Claims

ABSTRACT OF THE DISCLOSURE

Developer apparatus for developing offset printing plates having means for dispensing a developer solution on the plate, rubbing means for rubbing the solution onto the plate, washing means for removing the solution from the plate, and propelling means for moving the plate through the apparatus. A developer roller having an absorbent outer cover for use in plate developer apparatus.

Background of the invention

This invention relates to an apparatus for preparing planographic offset printing plates used in lithographic printing processes.

It has long been known in the lithographic industry that a wipe-one or presensitized offset planographic printing plate image may be developed by what is known as a one-step hand developing process. In such a process the offset planographic printing plate is first covered with a light sensitive diazo resin and then exposed through a negative stencil to a strong light source such as a carbon arc. The light sensitive diazo when subjected to such light is converted to an insoluble phenol while the shaded portion not illuminated remains water soluble. The application of a conventional developing agent and the rubbing into the surface of the offset planographic printing plate of such a developing agent, as for example, by a sponge, causes a removal of the unexposed diazo and a deposition onto the insoluble diazo resin of a protective vinyl or epoxy resin layer. The planographic plate is then ready for a printing press.

Where this hand developing process is used to produce newspaper printing plate, the following process is usually followed. A typewritten "setup" or "makeup" for one plate which is equivalent to one page of a newspaper is provided in any desired manner, and includes the typed articles, any pictures, various kinds of art work, and headlines of different size type, all assembled on a suitable cardboard or other support. The "setup" is photographed and after development of the photographic negative, it is transferred to or "burned into" a sensitized emulsion of diazo that has been spread over a grained aluminum alloy plate or other support, which plate later becomes the printing plate with letters, line illustrations, and halftones therein. The pictures are also readily transferred with the typed articles to the plate, and in the plates become the halftones under the broad term "artwork." The plate as thus prepared is then subjected to a developing operation using chemistry of the type discussed above. The chemistry of the developer is worked into the sensitive coating by rubbing by hand with a sponge until a visible image appears and a residual gum arabic molecular layer replaces the unhardened or unexposed diazo.

The disadvantages of a hand operation for offset printing plate development are: The process is slow and expensive; there is no uniformity of pressure in applying the protective coating due to the attempt to cover by hand rubbing large surfaces by either a circular or back and forth motion of the sponge; defective printing often results from inadequate depositing of the protective coating on large printing areas of illustrations or of solid

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color; drying of the developer on certain portions of the plate before it can be rubbed in due to the large and cumbersome size of the lithographic plate; and the time required for hand development.

A further disadvantage of the hand developing is that while hand methods give a coating of epoxy resin or vinyl lacquer over the printing areas, different types of images such as halftones, solids and line illustrations require additional hand rubbing and extra pressure on the sponge to apply the full thickness of protective material, and the results of such rubbing do not indicate the thickness of the material applied. A proper thickness of protective material is necessary in a lithographic printing plate to withstand the various abrasive actions subjected on the plate by the lithographic printing press blanket, ink and paper.

A still further difficulty with the hand method is in applying the developing solution. It is now the practice of the craftsman to pour an amount of developer supposedly sufficient to process the plate into the center of the plate and to work his sponge from that reservoir. Such procedure may cause and does cause contamination of the developing fluid by the removed diazo salt that is unexposed so that the process is slowed by resultant working of the contaminated developing solution over undeveloped image areas such that the remaining image may have inherent weaknesses.

Summary of the invention

Briefly, I overcome the difficulties associated with conventional hand developing by providing for a developer apparatus which has therein a receiving station for receiving a printing plate; a dispensing station whereby a developer solution may be dispensed evenly over the complete surface of one side of the plate, a rubbing station wherein a rubbing roller contacts the surface of the plate evenly over its complete width, a washing station wherein the complete plate is washed to remove the developer solution therefrom, and a discharge station. A propelling means is provided to propel the plate through all of the stations. The roller comprises a shaft which has thereon a plurality of annular discs which are made of a pliable absorbent material and which, in turn, are separated by annular spacers, wherein the spacers and discs are mounted concentrically on the shaft. The roller is also provided with compression means whereby the spacers and discs may be compressed axially, and also with locking means whereby the spacers are prevented from relative rotation with the shaft.

An apparatus constructed as outlined above will provide a uniform and even rubbing action of the roller with respect to the plate which will cause a uniform thickness of epoxy resin or vinyl to adhere to the printing image. Further, the uniform pressure of the developing roller on the printing plate causes an even and uniform deposition of the protective element of the developer onto the protected image surface in sufficient quantity and thickness to prevent abrasion by ink, paper or printing press blanket.

By having the dispensing means extend across the complete width of the plate, a proper amount of developing solution is assured over the entire surface of the plate with the result that the possibility of contamination of the solution is reduced and that a stronger film of vinyl or epoxy resin remains after the developing cycle.

Description of the drawings

FIG. 1 is a diagrammatic sectional side view of an apparatus constructed according to the invention;

FIG. 2 is a diagrammatic side view of the opposite side of the apparatus of FIG. 1;

FIG. 3 is an enlarged partial sectional view of a developer roller constructed according to the invention.

Description of the preferred embodiment

Referring to FIG. 1, there is illustrated a developer apparatus 1 which has therein a receiving station 2 for receiving a planographic printing plate P, a dispensing station 3 where a developing solution is dispensed onto one surface of the plate, a rubbing station 4 where the solution is rubbed into the plate, a washing station 5 where the developing solution is removed from the plate, and a discharge station 6 where the plate P is discharged from the apparatus.

The receiving station 2 has shelf 7 which is attached to the side wall 8 of the apparatus and on which a plate may be supported. The wall 8 has an opening 9 in the side thereof through which a plate may be pushed so as to engage a propelling roll 10 which will pull the plate into the apparatus and propel it into the dispensing station 3.

Dispensing station 3 has therein a propelling roll 11 and a backup roll 12 which pull the plate through the nip area formed therebetween and pass the plate beneath a dispensing conduit 13. Conduit 13 extends above the passage of the plate and over the complete width of the plate. A developing solution is dispensed or sprayed onto the plate with any excess falling into the sump 14 from whence it is recirculated back to the conduit 13 by the pump 15. Make-up solution may be added by means not shown to insure that a proper level of solution is maintained in the sump or reservoir 14.

The plate P is propelled from the dispensing station 3 by propelling roll 11 into the rubbing station 4 where it is engaged by the propelling roll 16 which pulls the plate into the nip area formed by the roll 16 and rubbing roller 17. As more fully described hereafter, the rubbing roller 17 comprises in part a plurality of annular discs 18 made of pliable, absorbent sponge-like material which rubs the upper surface of the plate onto which the developing solution was dispensed thus removing unexposed diazo while at the same time depositing a protective vinyl or epoxy resin layer onto the unexposed portions of the plate. A pivotable splash guard 19 is mounted on the side walls of the apparatus ahead of the rubbing station 4 and is adapted to rise up and down on a plate as the plate passes into the rubbing station and to prevent any of the developing solution being dispensed by the conduit 13 from being splashed into the rubbing station.

The plate is propelled from the rubbing station 4 by the roll 16 to propelling roll 20 and backup roll 21 which move the plate into the washing station 5. Spray conduits 22 and 23 extend over and below the plate and over the complete width of the plate such that both sides of the plate may be completely washed to remove contaminated developing solution and any unexposed diazo remaining on the plate. The conduits 22 and 23 are joined by a conduit 24 which in turn connects with a conduit 25 connected to a conventional water tap, not shown. A valve 26 is included in conduits 25 to regulate the flow of water therethrough. The bottom of the apparatus has a sump 27 in which the water from the washing station falls as well as any developing solution that does not fall into the sump 14. Sump 27 leads to a conventional drain, not shown.

Propelling roll 30 and backup roll 31 which are mounted in the washing station and after the conduits 22 and 23 move the plate to the discharge station 5 through an opening 32 contained in the side wall 33 of the apparatus onto a shelf 34 mounted on the side wall 33. Shelf 34 serves as a discharge station from where the developed plate may be removed and applied to a press. A flexible apron 35 is mounted over the opening 32 and serves to contain the spray within the washing station and also to assist in wiping rinse water from the plate.

Propelling rolls 10, 11, 16, 20 and 30 are all operatively joined by a drive belt 40 which passes over pulleys 41, 42, 43 and 44 connected on the shafts of all the propelling rolls except for roll 10. Drive belt 40 in turn

is driven by a drive pulley contained within a speed reducer 46. Speed reducer 46 in turn is connected to driving motor 47 by means of a drive belt 48.

Drive motor 47 is connected by means of a drive belt 49 to rubbing roll 17 by means of pulley 50 mounted on the shaft 51 of the rubbing roll. Propelling roll 10 is also driven by the belt 49. The pulley 52 is mounted on a wall of the apparatus and serves to position the belt 49.

The various pulleys connected to the rollers and the dimensions of the speed changer 46 are so proportioned that roll 17 is rotated at a speed such that its peripheral speed at the area of its engagement with a printing plate is greater than the lineal speed of the plate passing through the rubbing station. This results in the roll or roller engaging the plate with a rubbing action thus assuring that unexposed diazo will be removed from the plate while at the same time causing a protective layer to be deposited onto the exposed portions of the plate. Since the roll extends the width of the plate, the rubbing action over the width of the plate will be uniform.

Referring to FIG. 3, it is seen that the roller 17 comprises a plurality of annular discs 18 which are positioned concentrically on the shaft 51 and which are separated by a plurality of spacers 60 with a spacer 61 and a spacer 62 being mounted on the outer ends of the roll. The spacers themselves are locked with respect to the shaft 51 by either a key or other conventional means so that relative rotation between the shaft 51 and the spacers is prevented. The end spacer 61 abuts against a stop 63 contained on the shaft 51 while the opposite end spacer 62 abuts against a nut 64 threaded onto the shaft 51. Thus nut 64 serves as a compression means by which the spacers and discs 18 may be compressed axially on the shaft.

The spacers have a substantially I-shaped cross section in order to firmly grasp the annular discs. As the spacers are moved axially by the nut 64, the I-shaped configuration digs or bites into the annular discs thus serving to lock the discs to the spacer and thus preventing relative rotation of the discs with respect to the shaft. The spacers are provided with curved or tapered portion 65 adjacent the shaft which assist in assembly of the roller and particularly with the initial contact with the annular discs.

The roll is initially assembled by first mounting the spacer 61 onto the shaft 51 such that it abuts the stop 63. A rubber disc 18 is then positioned onto the shaft against the spacer 61, a further spacer 60 inserted onto the shaft, and then another disc 18 and so on until the roll is of the desired width. Finally the spacer 62 is inserted and the nut 64 is screwed on. As the nut 64 moves the parts axially against the stop 63, the tapered portion 65 will cut into the annular opening of the disc and act to insure uniform compressibility on the internal portion of the disc such that the outer diameter of the disc will have a comparatively firm, solid surface throughout the length of the roll which would not necessarily be the case if a single, long cylindrical portion of a sponge material were compressed at both ends.

An advantage of the apparatus as shown is that a planographic plate is maintained substantially flat during processing thus reducing any tendency of bending of the plate which could result in difficulty in attaching the plate to a press. A further advantage is that as sections of the roll 17 become worn, they may be easily replaced simply by replacing individual worn discs by new discs.

Having described my invention, I claim:

1. In apparatus for preparing planographic offset printing plates wherein the apparatus has a propelling means for moving a printing plate into, through and out of the apparatus; a receiving station for receiving a plate; a dispensing station having a dispensing means for dispensing a developing solution onto one surface of the plate; a rubbing station having a rotatable roller with a pliable absorbent cover on the outer periphery thereof

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adapted to engage a surface of a plate to rub said solution onto said plate and means for rotating the roller; a washing station having washing means whereby opposite sides of said plate are washed to remove the solution therefrom; and a discharge station where a plate is discharged from said apparatus; the improvement which comprises having said dispensing means extend across the width of a plate such that when a plate passes through said dispensing station, developing solution will be dispensed over a complete surface of the plate.

2. In apparatus for preparing planographic offset printing plates wherein the apparatus has a propelling means for moving a printing plate into, through and out of the apparatus; a receiving station for receiving a plate; a dispensing station having a dispensing means for dispensing a developing solution onto one surface of the plate; a rubbing station having a rotatable roller with a pliable absorbent cover on the outer periphery thereof adapted to engage a surface of a plate to rub said solution onto said plate and means for rotating the roller; a washing station having washing means whereby opposite sides of said plate are washed to remove the solution therefrom; and a discharge station where a plate is discharged from said apparatus; the improvement which comprises the roller having a roller shaft, a plurality of annular discs positioned concentrically of said shaft to form said absorbent cover where each disc is made of a pliable absorbent material, means for compressing said discs in an axial direction with respect to said shaft, and means for

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locking the discs with respect to the shaft to prevent relative rotation thereto.

3. In apparatus according to claim 2 wherein said locking means comprises a plurality of annular spacers positioned concentrically on said shaft and being locked against relative rotation with respect thereto, with a spacer between adjacent discs and an outer spacer at the outer end of each outer disc at the two ends of the roller.

4. In apparatus according to claim 3 wherein said compression means comprises a stop on said shaft for engaging one of said outer spacers and a nut threaded onto said shaft to engage the other of said outer spacers whereby turning of the nut will cause said spacers to move toward each other to compress said discs and to lock said discs with respect to said shaft.

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