

[54] APPARATUS FOR PROCESSING TWO SIDES OF A PRINTING PLATE

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[58] Field of Search 95/89 R, 89 A, 94 R; 118/103, 109, 120, 122, 411

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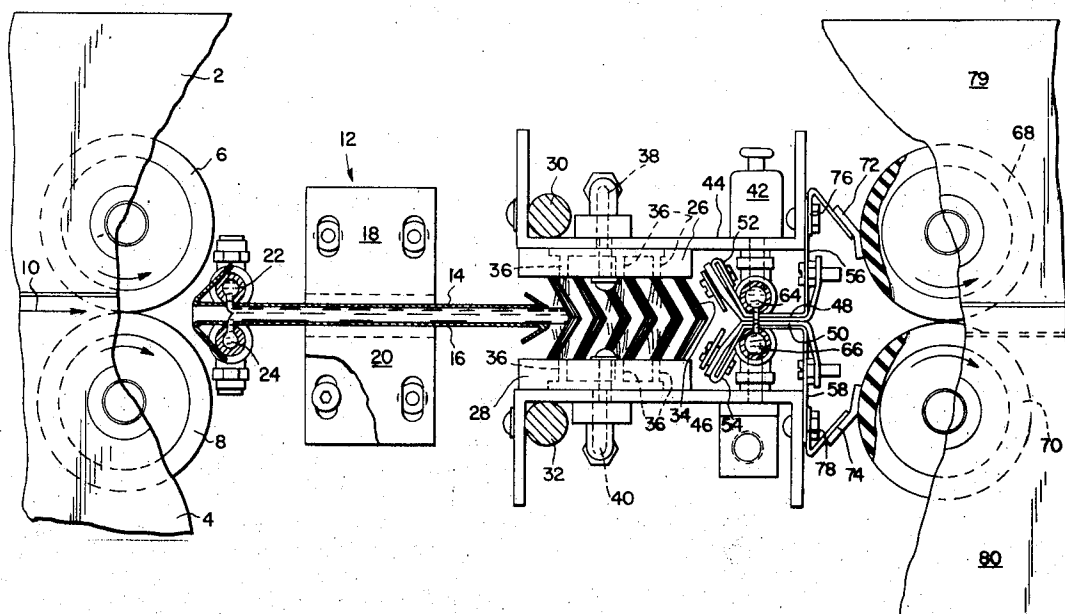
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[57] ABSTRACT

An apparatus for processing two sides of a printing plate. The apparatus includes a chamber for pre-soaking both sides of a printing plate with developer, reciprocatable opposed brushes mounted adjacent the pre-soaking chamber and adapted to contact both sides of the plate, and opposed scrubber pads mounted adjacent the brushes.

13 Claims, 2 Drawing Figures



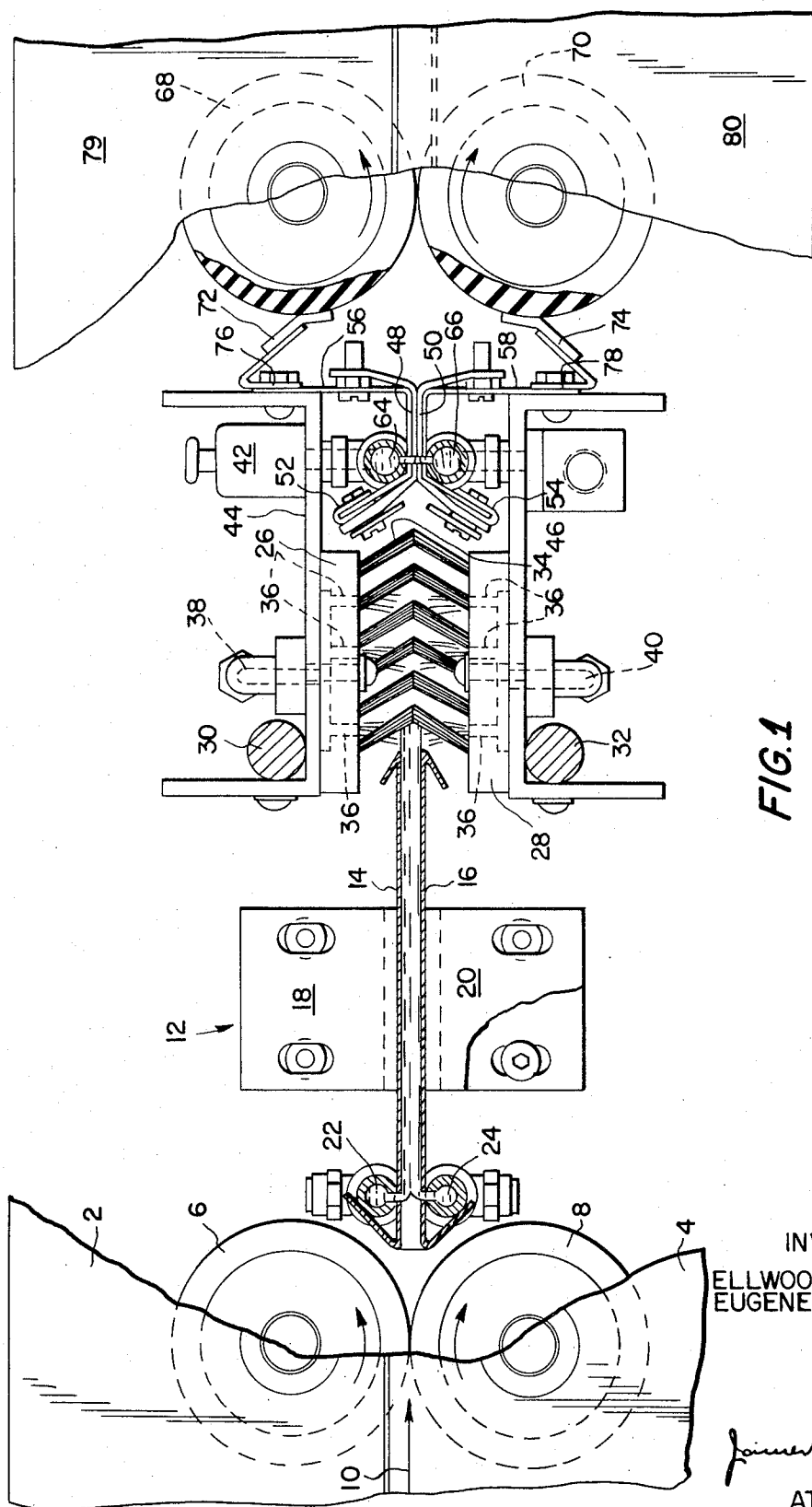
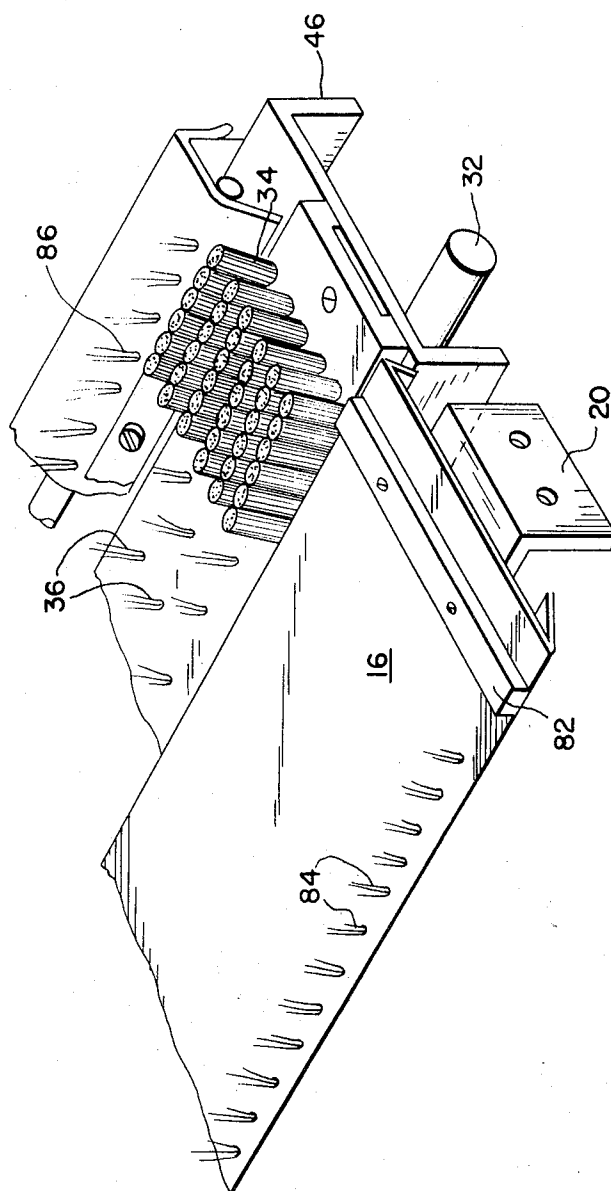


FIG. 2



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APPARATUS FOR PROCESSING TWO SIDES OF A PRINTING PLATE

The invention relates to an apparatus for simultaneously processing two sides of a printing plate, for example a planographic printing plate as is used in the lithographic printing process. It has long been known in the lithographic industry that a subtractive presensitized offset printing plate may be developed by what is known as the "hand developing process." In this process, the carrier, which is usually a thin sheet of aluminum, is first coated by the manufacturer with a light-sensitive coating usually containing, among other things, one or more resins and the plate is then sold in the presensitized condition to the customer.

Some printing plates are available with such a subtractive coating on two sides thereof. In this case, the customer exposes one side at a time or, in suitable equipment, both sides simultaneously, through a master, to a source of strong actinic light such as a carbon arc, for example. The light-sensitive coating when subjected to such a light is converted in such a manner that, after development, the image areas are retained on the plate surface and the non-image areas are removed. After development, for example by rubbing a developing agent into the surface of the plate by means of a sponge, the plate may be fixed and/or washed and finally a coating of gum arabic or similar material is applied to the surface of the plate to protect the image-free areas thereof. The plate is then ready for the printing press.

Where this hand developing process is employed to produce a printing plate, the following procedure is generally followed: From a typewritten set-up or make-up equivalent to the material to be printed and provided in any desired manner with typed articles, pictures of various kinds of art work of different sizes and the like, all assembled onto a suitable cardboard or other support, a master is prepared in the conventional manner. The image of the master is then transferred onto the sensitized printing member, such as is described above, by a suitable exposure means.

The printing member thus prepared is then subjected to a developing operation using the "chemistry" prescribed by the manufacturer of the printing member. This "chemistry" is worked into the exposed coating by hand rubbing, for example with a sponge, and the non-image areas are subtracted or removed from the carrier leaving an exact replica of the image on the plate carrier. The printing member is then fixed and/or washed and a solution of gum arabic, or a similar solution, is applied to the plate surface, resulting in a printing plate which is ready for the press.

As described above, some plates have a light-sensitive coating on two sides of the carrier or support, thus resulting in advantages to the printer who is then able to print two different jobs from a single printing member. This means that each side of the printing member must be exposed, as described above, and each side must be hand developed and processed in a sink, as described above.

The disadvantages of hand development of offset printing plates are numerous. The process is slow and expensive. Uniformity of pressure in applying the developing solution to remove the undesired coating is almost impossible to attain and exposure to the developing solution is uneven. Thus, defective printing often

results from an inadequate development or underdevelopment of an area or from applying varying pressure by hand, which may adversely affect the desired printing image. Drying of the developer on certain portions of the plate before it can be rubbed in to remove the undesired coating also may leave a residue on the plate. A further difficulty with the hand method is in the application of the developing solution. It is presently the practice of the craftman to pour a quantity of developer onto a developing sponge or pad and onto the center of the plate, which quantity is supposedly sufficient to process the plate, and the craftman then works his sponge from the "reservoir." This procedure may lead to a high degree of contamination of the processing fluids by the removed photosensitive coating as well as a change in the "chemistry" of the fluid because of evaporation, which will, in turn, either reduce the efficiency of the "chemistry" resulting in incomplete removal of the undesired coating in highly critical areas of halftones, or increase its potency resulting in image attack.

Further, the development of a two-sided plate by developing one side at a time in a sink and turning the plate over can result in damage to the first developed side by pieces of contaminated material in the sink being forced back into the image or non-image areas of the first developed side when the second side is developed. These defects may not become apparent until the plate is clamped into a printing press and the expense of developing the plate has been incurred. All of these problems become more critical with increasing plate sizes.

The present invention overcomes the difficulties associated with the conventional hand development of such plates by providing an enclosed developer apparatus which includes a receiving station for receiving a printing plate, a continuous transport system, a developing station in which the developer is applied to both sides of the plate simultaneously and evenly over the complete surface of both sides, including a pre-soak section to soften the coating, a rubbing or scrubbing section consisting of a free-floating assembly of a set of cleaning brushes and a set of velour type cloth coated scrubber pads mounted one above and one below the plate in such a manner as to facilitate easy entrance of the plate between the cleaning brushes and scrubber pads. The entire cleaning and scrubbing assembly is further capable of a reciprocating movement transversely across the surface of the plate, each half in a direction opposite to the other. When no plate is in the developing system, the top and bottom cleaning and scrubbing devices rub against each other. Attached to the end of the assembly are furthermore squeegee means which contact the following transport-squeegee rollers for reasons described below.

Prior to entering the cleaning and scrubbing section as just described, the developer is applied onto both sides of the plate in a unique pre-soak chamber. While the plate is being moved forward through the pre-soak chamber, the coating on the non-image areas is softened, enabling the following cleaning and scrubbing assembly to effectively clean or remove all unwanted coating even in the smallest areas. This assures a highest quality image. Developer is further applied to the plate continuously in the cleaning and scrubbing section, both through the actual cleaning brushes and between the scrubber pads. By reciprocating this entire

assembly whereby the top half floats and moves in direction opposite to the lower half and by continuously introducing developer through the cleaning brushes and into the scrubber pads, the removed coating which would eventually foul the cleaning brushes and scrubber pads is effectively and continuously washed away. However, should small bits of removed coating remain on the plate after exiting the scrubber pads, this coating will be picked off by the following nip rolls which carry the plate from the developing station into the adjacent stations of the processing unit. To accomplish this, the roller pair is covered with a synthetic soft material which has a greater affinity for the removed coating than the metal of the plate. The particles picked off by the roller pair, in turn, are continuously removed by the reciprocating squeegee assembly attached to the scrubbing unit. This roller pair, in addition to propelling the plate forward, serves furthermore as nip rolls to remove excess developer from the plate.

The pre-soak chamber is of such a length that at the speed of travel of the plate, the coating in the non-image areas will be thoroughly softened prior to entering the cleaning and scrubbing section. The developer in this chamber is continuously recirculated and refilled, thus any material dissolved away in this station is automatically removed from the system.

In the cleaning and scrubbing unit assembly, the plate is continuously supplied with additional developer, as described above, in order to obtain maximum developing efficiency. This developer is also continuously recirculated and continuously filtered in order to keep the developer clean at all times. Specifically, in the brush section of the unit, the developer which is forced in under pressure from both sides adds to the developing action by the hydraulic forces created. These hydraulic forces are also used in conjunction with a weight on the top floating half of the cleaning and scrubbing section to regulate the desired work force exerted by the brushes and pads on the plate surface to attain optimum development. A further benefit of these hydraulic forces which are applied to both sides of the plate resides in helping keep the plate in the center line of travel.

The preferred arrangement of the cleaning brushes is a whisk broom arrangement providing spacings in between the tufts which are mounted at an angle to the plate surface. This type of arrangement offers optimum cleaning efficiency with a minimum of hang up since the spacing of the tufts allows removed material to be washed away continuously by the developer being supplied as the coating is removed. The slanting angle of the tufts offers a minimum of resistance in the direction of plate travel without losing the cleaning efficiency of the brush. The reciprocating action, as mentioned above, is a further aid in accomplishing optimum development.

The invention will be further illustrated by reference to the accompanying drawings in which

FIG. 1 is a view in elevation, partially in section, of one embodiment of the apparatus of the invention, and

FIG. 2 is a perspective view of the lower developing section shown in FIG. 1.

Referring to FIG. 1, the apparatus comprises the left upper side plate 2 and left lower side plate 4, which side plates support the infeed rollers 6 and 8, respectively, between which a plate 10 may be passed or transported into the apparatus. Upon entering the apparatus, the

plate passes first through a pre-soak assembly 12, which is formed of the upper and lower plates 14 and 16, respectively, and which are mounted on the pre-soak assembly mounting plates 18 and 20, respectively. A liquid developer is passed into the chamber formed by the plates 14 and 16 through the developer supply conduits 22 and 24 which are connected to a suitable source of developer under pressure, now shown.

Upon exiting from the pre-soak assembly, the plate 10 is passed between a pair of reciprocable cleaning brushes 26 and 28 which are reciprocated by the shafts 30 and 32 respectively. These brushes rub against each other when no plate is between them and the bristles 34 of the brushes are inclined in the direction of plate travel.

The developer also is supplied between the tufts of the brushes, through the orifices 36, which orifices are supplied by the conduits 38 and 40 respectively, which are connected to a suitable source of developer under pressure, not shown. The pressure of the cleaning brushes 26 and 28 against a plate passed between them may be varied by adding one or more weights 42 to the top supporting bracket 44 of the cleaning brushes. Also secured to the upper bracket 44 and the lower bracket 46 are a pair of scrubber pads 48 and 50 respectively, which reciprocate together with the brackets 44 and 46 and the cleaning brushes 26 and 28 secured thereto. These scrubber pads are covered with a suitable soft material such as velour, for example. The scrubber pads are secured to the brackets 44 and 46 by means of appropriate mounting brackets 52 and 56 and 54 and 58, between which the pads 48 and 50 are connected. Developer is supplied between the scrubber pads through the conduits 64 and 66 which are connected to a suitable source developer under pressure, not shown.

Upon exiting from the reciprocating scrubber pads, the plate passes between the squeegee rollers 68 and 70 respectively. If any coating particles remain on the surface of the plate they usually will attach themselves to the surface of the squeegee rollers since these rollers are covered with a material such as synthetic rubber, for example, which has a greater affinity for the particles of the coating than does the metal of the plate. Particles adhering to the squeegee rollers 68 and 70 are removed by the cleaning pads 72 and 74 respectively, which are secured to the brackets 44 and 46, respectively, by the mountings 76 and 78 respectively. These cleaning pads 72 and 74 reciprocate together with the scrubber pads and cleaning brushes and thus traverse the surface of the squeegee rollers, effectively cleaning them. The squeegee rollers are mounted in the right upper side plate 79 and right lower side plate 80.

Referring to FIG. 2, a fragmentary perspective view of the lower section of the presoak assembly, cleaning brushes, and scrubber pads is shown. As shown in FIG. 2, the lower plate 16 of the pre-soak assembly has a raised side bar 82 at the right-hand side thereof which cooperates with a similar side bar on the upper plate 14, shown in FIG. 1, so that when the apparatus is closed a chamber is formed between the plates 14 and 16. The developer contacts a printing plate between the plates 14 and 16 in the chamber formed. Developer is supplied between the plates 14 and 16 through the orifices 84 in the lower plate and through corresponding orifices in the upper plate 14. Also shown in FIG. 2 are the orifices 36, through which the developer is

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supplied between the tufts 34 of the brushes, and the orifices 86 through which developer is supplied through the lower scrubber pad 50 from the supply conduit 66, shown in FIG. 1. Similar orifices 36 are provided in the upper cleaning brush 26 and similar orifices to those denoted 86 are provided in the upper scrubber pad 48.

The apparatus is constructed so that the upper section is pivoted at the right-hand end thereof and thus may be opened and closed in a clam shell fashion. When closed, the pre-soak assembly, cleaning assembly, brush assembly, and scrubber pad assembly appear as shown in FIG. 1.

The lower rollers 8 and 70 may be driven in order to transport a plate through the apparatus.

It will be obvious to those skilled in the art that many modifications may be made within the scope of the present invention without departing from the spirit thereof, and the invention includes all such modifications.

We claim:

1. Apparatus for processing two sides of a printing plate, comprising; a pre-soak chamber having an inlet and outlet adapted to maintain a body of developer in continuous contact with both sides of a printing plate and having a length such that the coating, on the areas of said plate which are to be removed, is softened during the passage of said plate through said pre-soak chamber, and a pair of cleaning and scrubbing means forming an entrance end and a discharge end, mounted directly opposite one another adjacent the outlet of said pre-soak chamber, adapted to contact both sides of said plate and subject both sides of said plate to identical mechanical action and including means for continuously supplying equal amounts of developer to both sides of said plate.

2. Apparatus in accordance with claim 1 wherein the cleaning and scrubbing means includes brush means mounted adjacent the outlet of the pre-soak chamber and scrubber pad means mounted adjacent the discharge end of said cleaning and scrubbing means.

3. Apparatus in accordance with claim 2 wherein the brush means are reciprocatable transversely with respect to the direction of travel of the plate.

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4. Apparatus in accordance with claim 3 wherein the pair of brush means are reciprocatable in opposite directions.

5. Apparatus in accordance with claim 3 wherein the scrubber pad means are reciprocatable with the brush means.

6. Apparatus in accordance with claim 2 wherein the brush means includes a plurality of spaced tufts and the means for supplying equal amounts of developer to both sides of the plate includes means for supplying said developer under pressure between said tufts of said brush means.

7. Apparatus in accordance with claim 6 wherein the tufts of the brush means are staggered in a manner to permit said tufts to flex and free themselves of removed coating.

8. Apparatus in accordance with claim 2 wherein the brush means form acute angles with respect to the trailing portion of a plate passing between said brush means.

9. Apparatus in accordance with claim 2 wherein the scrubber pad means are soft cloth covered pads and the means for supplying equal amounts of developer to both sides of the plate includes means for forcing said developer under pressure through said pads.

10. Apparatus in accordance with claim 1 wherein the cleaning and scrubbing means includes complementary upper and lower sections and said upper section is free-floating, whereby the pressure applied to a plate passing therebetween is proportional to the weight of said upper section.

11. Apparatus in accordance with claim 10 wherein the cleaning and scrubbing means includes means for applying additional pressure to the upper section.

12. Apparatus in accordance with claim 1 which additionally includes squeegee roller means mounted adjacent the discharge end of the cleaning and scrubbing means and having a greater affinity for loose coating material than does the plate being processed.

13. Apparatus in accordance with claim 12 wherein the cleaning and scrubbing means additionally includes wiper means for cleaning loose coating material from the surfaces of the squeegee roller means.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,771,428

Dated November 13, 1973

Inventor(s) Ellwood J. Horner and Eugene J. Gaisner

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Cover page, item 75 , line 2 thereof, "Eugene J. Gaisner" should read - - - Eugene J. Gaisner - - -.

Column 4, line 8, "now" should read - - - not - - -.

Signed and sealed this 19th day of March 1974.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

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Commissioner of Patents

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UNITED STATES PATENT OFFICE
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