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Ross

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[54] AUTOMATIC ROUTING SYSTEM

[75] Inventor: **Donald K. Ross**, St. Louis County, Mo.

[73] Assignee: **World Color Press, Inc.**, Maryland Heights, Mo.

[22] Filed: **Oct. 2, 1970**

[21] Appl. No.: **77,539**

[52] **U.S. Cl.**.....**178/6.6 B**, 90/62 A, 178/6.7 R

[51] **Int. Cl.**.....**H04n 1/24**

[58] **Field of Search**.....90/62 A; 178/6.6 B, 178/6.7 R

[56] **References Cited**

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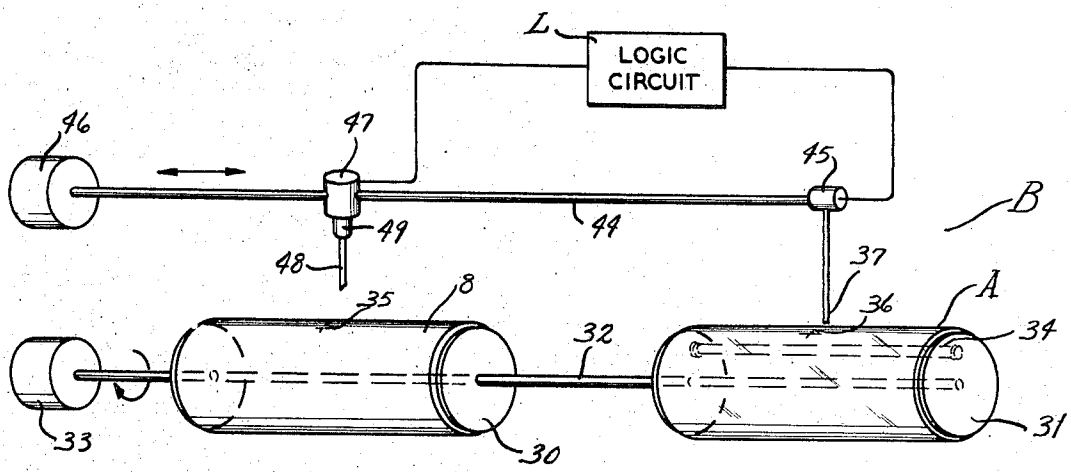
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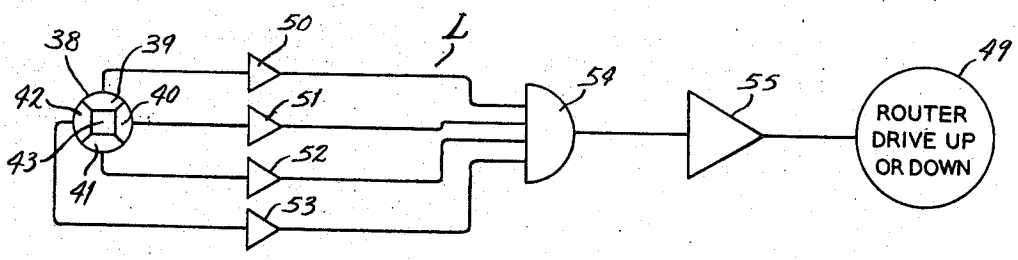
Primary Examiner—Francis S. Husar
Attorney—Ralph W. Kalish

[57] **ABSTRACT**

A system for effecting the automatic routing of metal from the non-printing areas of a printing press plate comprising preparing the art work negative to accord the portions thereof corresponding to the non-printing areas of the plate to have a discrete density, or a specific reversed dot percentage, subjecting the negative to a light source, causing a photocell head sensitive to the said discrete density to scan the negative, and providing a router controlled by said head being moved correspondingly with respect to the printing plate.

6 Claims, 9 Drawing Figures





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SHEET 1 OF 2

FIG. 1

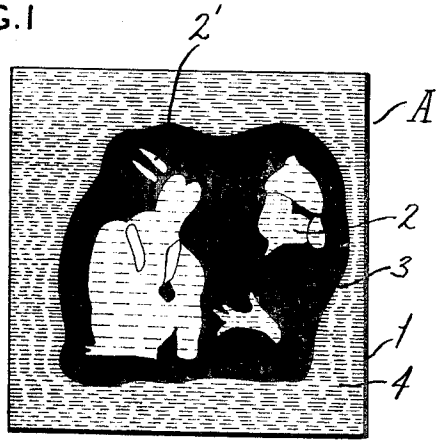


FIG. 2

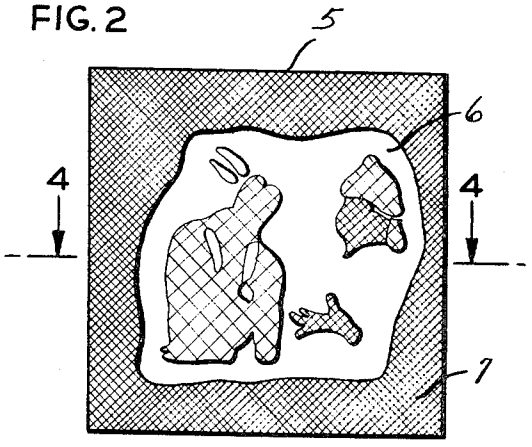


FIG. 3

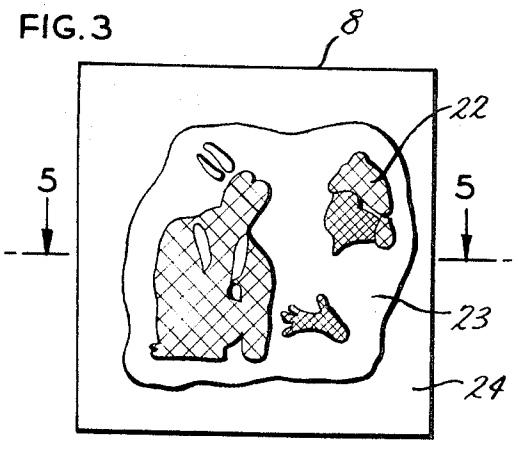


FIG. 4

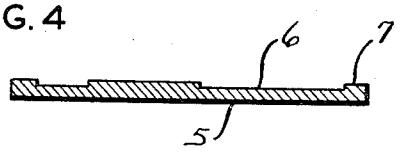


FIG. 5

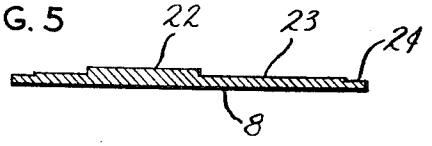
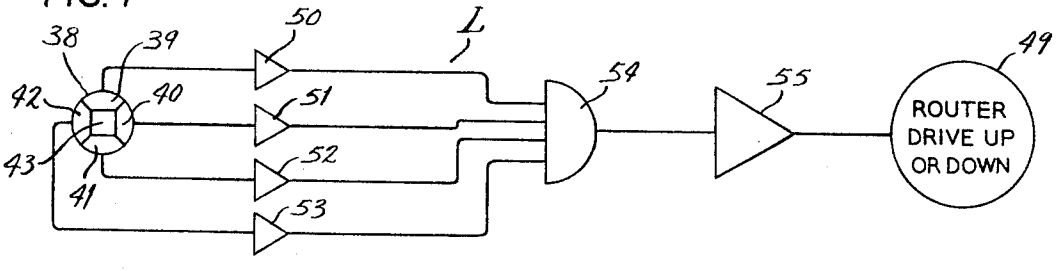


FIG. 7



INVENTOR

DONALD K. ROSS

BY Ralph W. Kalish

ATTORNEY

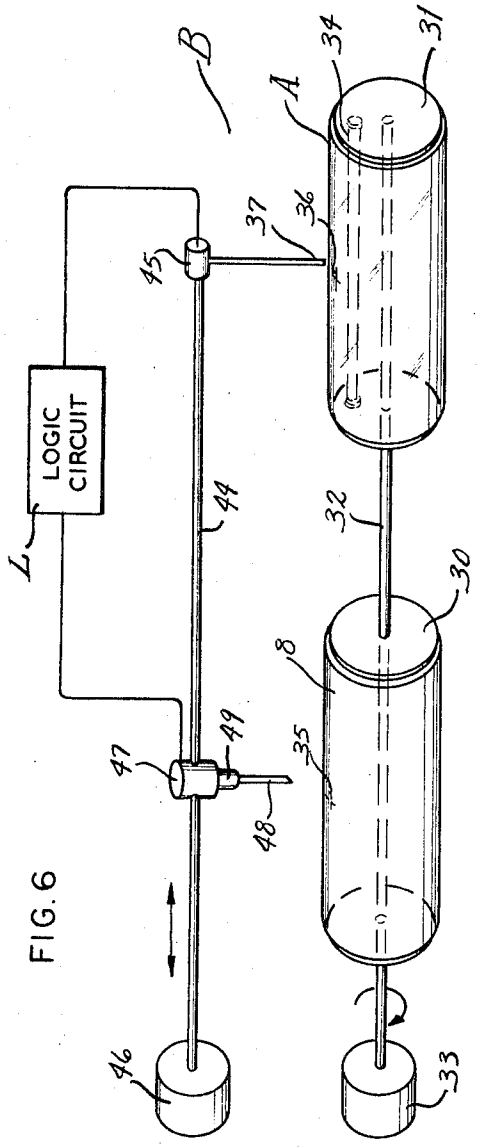


FIG. 6

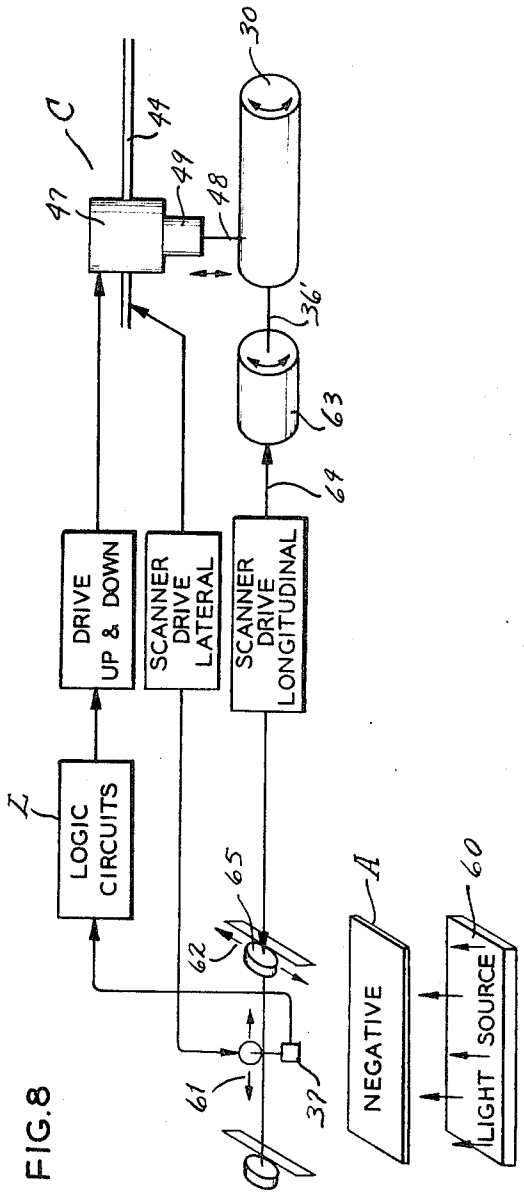


FIG. 8

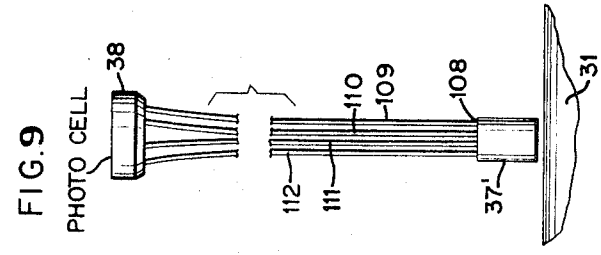


FIG. 9

INVENTOR
DONALD K. ROSS
BY Ralph W. Kalish
ATTORNEY

AUTOMATIC ROUTING SYSTEM

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates in general to relief printing processes and, more particularly, to a system for automatically routing the normally unwanted or "dead" metal from the printing press plate.

In the development of printing press plates such as used for letterpress printing wherein such plates are of the raised surface type, a separate plate is required for each of the primary colors, as well as one for black and white. In the manufacture of each plate, black and white art work is prepared for the impression of each color, with each such art work being developed as a black and white negative with the differences in intensities of the amount of color or shading, as it were, being provided by varying densities. Customarily, a single negative may include a multiplicity of printable portions arranged spacedly upon such negative with the intervening zones being non-printable but presented for providing an integrity to the negative for proper handling as well as for according the necessary strength to the matrix and ultimately to the final printing plate. Such negatives are used for making a positive zinc plate by an etching process well known to the industry, such as of photochemical character. Variations in the depth of the zinc or variation in number and size of "dots" ultimately determine the corresponding color density. The positive zinc plate is then used, as in a heated press, to prepare a paper matrix negative of the image on the zinc plate. This matrix is curvate, being used as a mold for preparation of the final lead printing plate which is then adapted for use in a rotary press.

Heretofore, the strength producing non-printable areas of the negative caused the development of corresponding depressed areas in the paper matrix negative which, in turn, caused a like portion of the surface of the final lead printing plate to comprise unwanted metal which, if not removed, would cause a printing of an undesired color for the entire area. Conventional practice causes this portion of the negative to be completely transparent which would result in the inhibition of etching of the zinc plate. The removal of this dead or unwanted metal has to the present time been effected only by manual operation involving the use of a routing machine controlled in two dimensions by the operator together with the lowering and raising of the router head through operation of a foot pedal. Thus, manual routing requires an operator with exceedingly well developed manual dexterity which can only come about through long periods of training. At the present time, operators with the requisite skill are becoming increasingly relatively few in number and with the costs for such labor mounting considerably.

Therefore, it is an object of the present invention to provide a system for effecting the automatic routing or removal of unwanted metal from printing plates which obviates the need for skilled personnel thereby bringing about a marked economy in the preparation of printing plates and relieving companies of the attendant problems of trying to locate adequately trained and skilled individuals.

It is another object of the present invention to provide a system of the character stated whereby a routing head presented to a printing plate may be controlled

automatically by photosensitive or other means so that a multiplicity of procedures are rendered available by such basic system.

It is a further object of the present invention to provide an automatic routing system for printing press plates which comprises controlling a routing head by the optical density of the particular art work negative from which the plate is formed.

It is a still further object of the present invention to provide a system of the type stated which comprises a relative simplicity of components which promote reliability and durability in performance.

It is another object of the present invention to provide a system of the type stated which brings about the dead metal removal from printing plates in a fashion more rapid than by manual operation as to permit of a relatively high volume production, and which will allow one individual to provide the operation of a multiplicity of units performing in accordance with the system.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of an art work negative prepared in accordance with the present invention.

FIG. 2 is a plan view of a positive zinc plate prepared from the negative shown in FIG. 1.

FIG. 3 is a plan view of a lead printing plate having a non-printable portion routed in accordance with the system of the present invention.

FIG. 4 is a transverse sectional view taken on the line 4—4 of FIG. 2.

FIG. 5 is a transverse sectional view taken on the line 5—5 of FIG. 3.

FIG. 6 is a schematic view of an automatic routing system constructed in accordance with and embodying the present invention.

FIG. 7 is a wiring diagram of the logic circuits of the system shown in FIG. 6.

FIG. 8 is a schematic diagram of another form of the system of the present invention.

FIG. 9 is a schematic view of a detector head incorporating optical fibers.

DESCRIPTION OF PRACTICAL EMBODIMENTS

The present invention contemplates a system for the automatic routing of unwanted or dead metal from lead printing plates as used in letterpress printing by photosensitive control means so as to render unnecessary the use of manual labor for such metal removal. Certain preferably variations of this system are based upon a predetermined preparation of the negatives made from the original art work to allow for controlled detection for operating the router.

Referring now to FIG. 1, A designates a black and white negative as used for black and white or four color work comprising a flat film body 1 with printing portions, as indicated at 2, and being of varying optical densities, ranging from complete transparency, as at 2', so as to conduce to the desired shading of the particular color. Immediately surrounding printing portions 2 is a so-called guard band 3 which is fully opaque so as to provide a non-colored zone surrounding the printing portions 2 in the final work. Such guard band 3 normally forms a border of about one-fourth inch to three-eighths inches between the printed portions 2 and the surrounding portion of the negative, as indicated at 4,

which constitutes a non-printable area. It will be appreciated that for purposes of illustration only negative A constitutes a single integrated printable entity, as at 2. However, in normal practice negatives utilized in letterpress processes may include a multiplicity of discrete printing portions 2, each having a related guard band 3 and with the non-printable portions 4 surrounding the latter and being continuous with like portions throughout the negative. Thus, negative A is presented for a simplicity of comprehension.

Heretofore with art work negatives, the non-printable portions 4 have normally been completely transparent. However, in the present invention the said portion 4 has a discrete optical density, predetermined so as not to coincide with, or be in immediate relation to, the density of any part of the printed portion 2; it being recognized that guard band 3 is fully opaque or 100 percent density. In actual practice it has been discovered that a density within the range of 75 to 99 percent is available and thus without conflict to the density of any other zone of negative A so that the density within such range is the density of choice for portion 4. It is this density which will ultimately assure of the appropriate cutting signal to the router.

In conventional fashion, negative A is utilized to make a positive zinc plate, designated 5, by an etching process well known to industry whereby the guard band or opaque portion 3 will produce the greatest depth of etching, as at 6, and whereby the transparent areas 2' of printing portions 2 will permit a sealing of the zinc against etching. The density of non-printable portion 4 will cause some etching of the dead metal portion of zinc plate 5, as indicated at 7, but such will not bring about any increase in the normal production time for zinc plate 5 by reason of the fact that the etching of the relatively deep "border" 6 about the printed portion will control the etching time. Also, the etching of this dead metal portion, albeit in a limited degree, does not interfere with the preparation of the paper matrix negative. Therefore, the rendition of the zone 4 with a prescribed density, as distinguished from the heretofore accepted complete transparency, resulting in no detraction in the process for the formation, or in the qualities, of the ultimate lead printing plate. Due to the predetermined density of portion 4 the depth of etch of the portion 7 of zinc plate 5 will be distinct from that of other portions of said plate.

Consistent with currently used techniques, zinc plate 5 is utilized, as in a heated press, to produce the customary paper matrix negative (not shown), which matrix is suitably curved so as to provide a mold for the lead printing plate formed therefrom and designated 8 in the drawings, but being illustrated in planar or flat condition for illustration only. The curvature of printing plate 8 in actual practice conduces same to appropriate disposition upon a printing roller. The matrix negative thus serves as a form for the final lead printing plate which will be a positive. Printing plate 8 thus comprehends the raised printing areas 22, which correspond to the printing portions 2 of negative A, with a surrounding, depressed border 23 corresponding to guard band 3 of negative A and with the latter being in turn surrounding by the unwanted or dead metal portion 24. Said portion 24 is in direct correspondence to non-printable portion 4 of negative A. Upon the development of lead printing plate 8 immediately from the paper matrix negative, dead metal portion 24 will have the same depth relative to printing areas 22 and depressed border 23, as portion 7 of zinc plate 5 bears to the other zones thereof. Such dead metal portion 24 must be removed, or in other words, depressed to the extent necessary to prevent inking thereof during the printing operation so as to avoid undesired printing. It is this particular unwanted metal portion 24 which has prior to the present invention been subjected to manual routing and which, as will be shown hereinbelow, may be removed or routed through automatic operation dependent upon the particular optical density of the corresponding portion 4 of negative A. FIG. 5 represents a transverse sectional view of printing plate 8 subsequent to the routing operation so that the portion 24 is seen as being depressed even slightly below border 23 so as to be effectively withdrawn from any inadvertent inking during the printing process.

Referring now to FIG. 6, B generally designates a system, presented schematically, for automatically effecting the routing of the unwanted or dead metal from the portion 24 of a printing plate 8 as by detection of the corresponding portion 4 of negative A. System B comprises a pair of drums or cylinders 30,31, being mounted in spaced-apart, axially aligned relationship upon a common shaft 32 for unison rotation thereon. Shaft 32 is connected beyond drum 30 to a prime mover 33 which is adapted by conventional means for periodic, intermittent operation so as to be rotated through a predetermined arc with an intervening dwell period whereby said drums 30,31 will be "stepped", as it were, during their rotation. Drum 30 is of requisite outside diameter for mounting upon its circumferential face the normally arcuated lead printing plate 8 so that said drum 30 thus serves as a router carriage bed; there being customary well known means to lock said plate 8 against undesired end-wise and circumferential displacement. Drum 31 is admittedly of like outside diameter as drum 30 to assure direct one to one correspondence in rotation; said drum being preferably of transparent material, such as a suitable plastic, so as to allow for light transmission therethrough as from a suitable interior light source as suggested at 34. Negative A is thus engageable upon the exterior face of drum 31; there being requisite clips or other means for retaining said negative against displacement. Plate 8 and negative A must be mounted in appropriate interrelationship upon their respective drums 30,31 which latter are provided with locating markers, as at 35,36, respectively, for alignment with like indicia on plate 8 and negative A.

Presented for reciprocal lengthwise travel of drum 31 along its upwardmost portion is a scanner or detector head 37 of light-sensitive character. It is thus critical that light be presented evenly throughout the portion of negative A subject to the path of travel of scanner 37 so that the light impinging upon scanner 37 through the underlying portion of the negative A will be commensurate with the varying densities thereof. It is apparent that any suitable light source may be utilized whether the same be a single, suitably mounted fluorescent tube, or whether the entire interior of drum 31 be illuminated.

Manifestly, various types of scanners 37 with potential desired sensitivity may be utilized within system B. However, it has been found that the cluster-type photocell, as indicated at 38 in FIG. 7, has proved particularly efficacious in operation. The photocell 38, as exemplary of the cluster-type, comprehends four discrete photocell portions, as indicated at 39,40, 41 and 42 with a central intervening inactive zone 43. The diameter of photocell 38 is predetermined for direct correspondence with the diameter of the routing tool to be described below and thus may be in the order of one-fourth to three-eighths of an inch. In the present system scanner 37 is of general elongated, rod-like character with the lower exposed end being presented in most immediate proximity to the underlying negative A for maximum sensitivity of response.

Scanner 37 is carried upon a shaft 44 by means of a mounting head 45; said shaft being suitably connected to a prime mover, as indicated at 46, with which are associated suitable means (not shown) for causing said shaft 44 to be axially reciprocal so as to cause scanner 37 to traverse negative A in the manner above indicated. Also carried upon shaft 44 above drum 30 is a mounting head 47 for a depending router tool 48 projecting toward the upper surface of drum 30; there being a hydraulic motor 49 supported from said mounting head 47 to control movement of said routing tool 48 toward and away from drum 30; whereby when said routing tool 48 is lowered, it will be in operative, cutting relationship with respect to the metal on the underlying printing plate 8 and when in elevated or raised condition will be inoperative. It will thus be seen that routing rool 48 will be caused to follow a path with respect to printing plate 8 which corresponds directly to the path being traversed by scanner 37 with respect to negative A; there being a direct one to one relationship. To assure of appropriate co-ordination, routing tool 48 and scanner 37 may be accurately aligned, with the indicators on the respective printing plate 8 and negative A before operation is instituted. In view of the foregoing, it will be seen that shaft 44 in its reciprocal movement will cause routing tool 48 and scanner 37 to move throughout the length of their respective drums and then to follow a reciprocal path returningly. However, in view of the stepping operation of prime mover 38, drums 30,31 will remain in a dwell period during the traverse in one direction of router tool 48 and scanner 37 and at the termination of such, said drums 30,31 will be rotated through the next arcuate increment to present the immediately adjacent portions of the respective printing plate and negative A to the reciprocal travel of said router 48 and scanner 37. Through conventional means prime mover 46 is adapted for delaying at each end of the travel of shaft 44 to accord a requisite interval for drums 30,31 to be stepped. It is to be observed that the arc of each step will not exceed the diameter of scanner 37 or the width of tool 48 although there may be some limited overlap to assure of full coverage.

It is evident that shaft 44 be of any selected character, such as, for example, of screw type wherein mounting heads 45,47 may entail engaging nuts for travel responsive to the rotation of such screw shaft. For illustration purposes only, motor 49 has been referred to as being of hydraulic character. However, it is quite apparent that other types of motors will perform the desired function of raising and lowering the spindle carrying the router 48. Therefore, there is no intention herein to restrict motor 49 to one which is hydraulic.

Scanner 37 is operatively connected to motor 49 so as to cause router 48 to be moved into operative relationship with respect to printing plate 8 for removal of the dead metal therefrom. Such connection is effected by logic circuits, indicated generally at L, and shown diagrammatically in FIG. 7. Each photocell portion 39, 40, 41, 42 is in circuit with an amplifier 50, 51, 52, 53, respectively; said amplifiers being of the level-type having level selecting circuits which may be adjustable whereby a "unity" output is effected whenever the input voltage from the related photocell portion is between two preset reference voltages. Should the voltage from the associated photocell portion be either above or below such preset reference levels, a "zero" output is brought about for such amplifiers. Amplifiers 50, 51, 52, 53 are adapted for gain adjustment to correct for any slight differences in the sensitivity of the photocell portions 39, 40, 41,42.

Each of said level amplifiers 50, 51,52,53 is in circuit with an "and" amplifier 54, the output of which is "zero" unless the input from each of the connected level amplifiers 50, 51, 52, 53 are unity; in which event the output of said "and" amplifier 54 is also unit. The output from "and" amplifier 54 is amplified by a power amplifier 55 and operatively connected to hydraulic motor 49 for causing the spindle head (not shown) mounting router 48 to be lowered and maintained in such lowered operating condition while the output of "and" amplifier is unity and to be raised and maintained in such inoperative condition while the output of "and" amplifier 54 is zero.

The reference voltage levels of amplifiers 50,51,52,53 are adjusted so that a "one" or "unity" output is obtained at any time the photocell portions 39, 40, 41, 42 read a light intensity corresponding to the density of negative portion 4, that is, within the aforesaid range of 75 – 99 percent. Thus, when photocell 38 is traveling across portion 4 of said negative A "unity" output is effected so as to cause router 48 to be lowered into metal removing operative relationship with respect to the underlying lead printing plate 8. Due to the one to one relationship involved, router 48 will be removing metal in the precise portion of printing plate 8 corresponding to the exact area being simultaneously traversed by photocell 38 upon negative A.

The cluster photocell arrangement has been found to provide relatively marked sensitivity for automatic operation of router 48. Such arrangement together with the 30 mil deep guard band etched on lead plate 8, as at 23, prevents router 48 from cutting material, that is, requisite to be left on plate 8. It is apparent that even greater sensitivity may be obtained by increasing the number of photocell portions with their attendant logic, or by altering the pattern of the clustered portions.

Thus, system B provides for the automatic routing of the dead metal from a printing plate 8 through circuitry controlled by the optical density of the corresponding portion of the related negative. The system thus is one of extreme sensitivity and which is productive of the

desired results rapidly and without danger of damage to printing portions of the plate **8**.

Although negative A has been heretofore described with respect to relative density of particular zones, it is to be understood that the negatives may be of the reverse dot character wherein a white dot is provided upon a black background and with the relative percentage corresponding to a desired optical density. It has been found that approximately a **10** percent reverse dot arrangement provides the requisite density for according the necessary output voltage of the photocell portions to cause an automatic operation of the router.

It is also to be understood that if desired a fiber optic system in which the pattern of the individual fibers may be similar to the character of clustering of photocell portions **39, 40, 41, 42** may be used for transmitting the impinging light to related photocells which may be located at some distance from the fibers and are individually related thereto. This type of light transmitting means conduces to certain preferred packaging methods, as well as enhancing the selection in the type of photocells that may be utilized together with certain versatility in the detection pattern for increased sensitivity. FIG. **9** schematically illustrates a scanner **37'** incorporating a fiber optic detector as indicated generally at **108** which is illustrated in this instance for example only as constituting four separate bundles of fibers **109, 110, 111, 112**, which are suitably engaged to photocell **38**. In this illustration the four sets of fibers would be individually connected to the discrete portions of photocells **38**. However, it is understood that a unicellular photocell could easily be used with a single conduit of optic fibers. By the utilization of optic fibers, the photocell may thus be located at a suitably remote point from the negative for convenience of operation.

Referring now to FIG. **8**, C designates another form of system, according to the present invention, for effecting the automatic routing of unwanted metal from a printing plate, but being particularly designed for operation in conjunction with negative A being maintained in a flat or planar condition. To facilitate comprehension, components of system C which are common to system B will be identified by like reference numerals.

System C comprises a light source **60** having an area at least equal to the area of negative A so as to provide an even distribution of light through the extent of said negative A. Light source **60** may, of course, be provided as by a light table with negative A presented in overlying relationship. Disposed immediately upon negative A is a scanner **37** being as of the photocell cluster type and adapted for travel both laterally (indicated by arrows at **61**), and longitudinally or lengthwise (in the direction of the arrows indicated at **62**), of negative A so as to effect a complete coverage thereof. The lateral movement of scanner **37** is effected by a reciprocally movable shaft **44** on which is carried a mounting head **47** for router **48** which is adapted for raising or lowering by means of a hydraulic motor **49**. Router **48** is disposed over the uppermost portion of a drum **30** which thus constitutes a carriage bed for the printing plate to be routed. Said drum **30** is mounted upon a shaft **36** which is engaged to a prime mover **63** similar to prime mover **46** in that it is adapted for effecting a stepping of drum **30** about its longitudinal axis to effect increments of rotative movement at a predetermined periodicity for successively presenting portions of the printing plate **8** to router **48**. Said prime mover **63** is also operatively connected as by a shaft **64** to a mounting component **65** for scanner **37** to cause a longitudinal stepping of negative A for presentation for travel laterally of negative A along a portion corresponding to that of printing plate **8** disposed for routing. Thus, scanner **37** moves across negative A in a direct one to one relationship with the travel of router **48** across printing plage **8**. However, it will be seen that due to the flat character of negative A and the fixed disposition of the same, scanner **37** will alternately move laterally of negative A, then be stepped longitudinally thereof for moving reciprocally laterally over the next adjacent portion. The longitudinal stepping of scanner **37** will correspond in time and distance with the rotation of drum **30** as the same is stepped between sequential travel movements of router **48**.

Scanner **37** is operatively connected to hydraulic motor **49** through logic circuits L so that router **48** may be operated in the same manner as above described in conjunction with system B, responsive to the predetermined output voltage of scanner **37** corresponding to the density of portion **4** of negative A. Thus, system C presents a modification adapted for utilizing, wherever desired, a negative in flat form.

The systems hereinabove described provide for the removal of dead metal from the lead printing plate in an automatic fashion wherein the router and the scanner or detector travel in synchronism respectively across the entire surface of the negative and the lead printing plate developed therefrom. By the physical separation of the router and scanner in the systems above described, there is eliminated any possibility of interference caused by flying chips cut from the lead plate by the routing head.

It is to be recognized that the principle of the present invention may be utilized in a system wherein the dead metal portions of the lead printing plate may be manually colored, or provided with a non-conductive coating, so that a scanner might be utilized to detect the presence of such color or such insulation and through logic circuits cause the router head to be operated for the cutting function. In a system of this type the scanner would necessarily precede the router by predetermined distance and with appropriate adjustment in the equipment being effected based upon the rate of travel of the router so as to cause the same to be depressed at a time juncture allowing for the interval transpiring between the position of the scanner when the particular cutting information is sensed and when the router is in position to act thereupon. It is evident that any of the various positives and negatives used in the process producing the lead printing plate could be coated in a like fashion, rather than the printing plate itself, so that the scanner may travel thereover with the router moving with relation to the printing plate and the operative connection being of the character described in conjunction with systems B and C above described.

Thus, the present invention provides a highly effective, rapidly performed system for bringing about the automatic routing of unwanted metal from lead printing plates and thus eliminating the heretofore accepted

industry need for exceedingly skilled, relatively high salaried personnel.

Having described my invention, what I claim and desire to obtain by Letters Patent is:

1. A system for automatically routing metal from the non-printing areas of a printing press plate comprising a routing tool for normal disposition above the printing plate to be routed, means for lowering said routing tool into operative, metal-removing disposition upon, and for raising same into inoperative position above, said printing press plate, a negative having a design of like arrangement and size as said printing press plate being in direct correspondence therewith, said negative having portions corresponding to the non-printing areas of said plate, said corresponding portions having a predetermined optical density, means for illuminating said negative, a light-sensitive detector head responsive to the predetermined optical density of the non-printing areas of said negative, means for causing said detector head and said routing tool to traverse simultaneously corresponding paths along said negative and said printing press plate, respectively, and means interconnecting said detector head and said routing tool for causing the latter to effect removal of metal from the non-printing areas of the printing press plate upon detection by said head of the said predetermined optical density, said detector head comprising a multiplicity of photocells unitarily movable with said head, each of said photocells being responsive to the predetermined optical density of the portions of said negative corresponding to the non-printing areas of said printing plate, and means for effecting operation of said interconnecting means when all of the photocells of said head are responsive to said predetermined optical density.

2. A system for automatically routing metal from the non-printing areas of a printing press plate as defined in claim 1 and further characterized by said means interconnecting said detector head and said routing tool comprising a logic circuit corresponding to each photocell in said detector head, each logic circuit having an amplifier with level selecting circuits for "unity" output when the input voltage from the related photocell is between two preset reference voltages, an "and" amplifier connected to each of said logic circuits, providing a "unity" output only when the input from each of the associated amplifiers is unity, a motor, said "and" amplifier being connected to said motor, and means engaging said motor and said routing tool whereby said latter is maintained in operative condition while the output of said "and" amplifier is unity whereby said routing tool will be operatively disposed only during periods when all of the photocells within said detector head have a "unity" output.

3. A system for automatically routing metal from the non-printing areas of a printing press plate as defined in claim 1 and further characterized by the optical density of the non-printing areas of the negative being within the range of 75 percent to 99 percent.

4. A system for automatically routing metal from the non-printing areas of a printing press plate as defined in claim 1 and further characterized wherein the optical density of the non-printing areas of the negative is between 5 percent and 15 percent of the reverse dot character.

5. A system for automatically routing metal from the non-printing areas of a printing press plate comprising a routing tool for normal disposition above the printing plate to be routed, means for lowering said routing tool into operative, metal-removing disposition upon, and for raising same into inoperative position above, said printing press plate, a negative having a design of like arrangement and size as said printing press plate being in direct correspondence therewith, said negative having portions corresponding to the non-printing areas of said plate, said corresponding portions having a predetermined light identifiable character, means for illuminating said negative, a light sensitive detector head responsive to the predetermined light identifiable character of the non-printing areas of said negative, means for causing said detector head and said routing tool to traverse simultaneously corresponding paths along said negative and said printing press plate, respectively, and means interconnecting said detector head and said routing tool for causing the latter to effect removal of metal from the non-printing areas of the printing press plate upon detection by said head of the said predetermined light identifiable character, said detector head comprising a multiplicity of photocells unitarily movable with said head, each of said photocells being responsive to the predetermined light identifiable character of the portions of said negative corresponding to the non-printing areas of said printing plate, and means for effecting operation of said interconnecting means when all of the photocells of said head are responsive to said predetermined light identifiable character.

6. A system for automatically routing metal from the non-printing areas of a printing press plate comprising a routing tool for normal disposition above the printing plate to be routed, means for lowering said routing tool into operative, metal-removing disposition upon, and for raising same into inoperative position above, said printing press plate, a negative having a design of like arrangement and size as said printing press plate being in direct correspondence therewith, said negative having portions corresponding to the non-printing areas of said plate, said corresponding portions having a predetermined light identifiable character, means for illuminating said negative, a detector head of fiber optic character responsive to the predetermined light identifiable character of the non-printing areas of said negative, means for causing said detector head and said routing tool to traverse simultaneously corresponding paths along said negative and said printing press plate, respectively, a light sensitive member, means connecting said light sensitive member and said detector head, means interconnecting said light sensitive member and said routing tool for causing the latter to effect removal of metal from the non-printing areas of the printing press plate upon detection by said head of the said predetermined light identifiable character, said light sensitive member comprising a multiplicity of photocells, each of said photocells being responsive to the predetermined light identifiable character of the portions of said negative corresponding to the non-printing areas of said printing plate, and means for effecting operation of said interconnecting means when all of the photocells of said head are responsive to said predetermined light identifiable character.

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