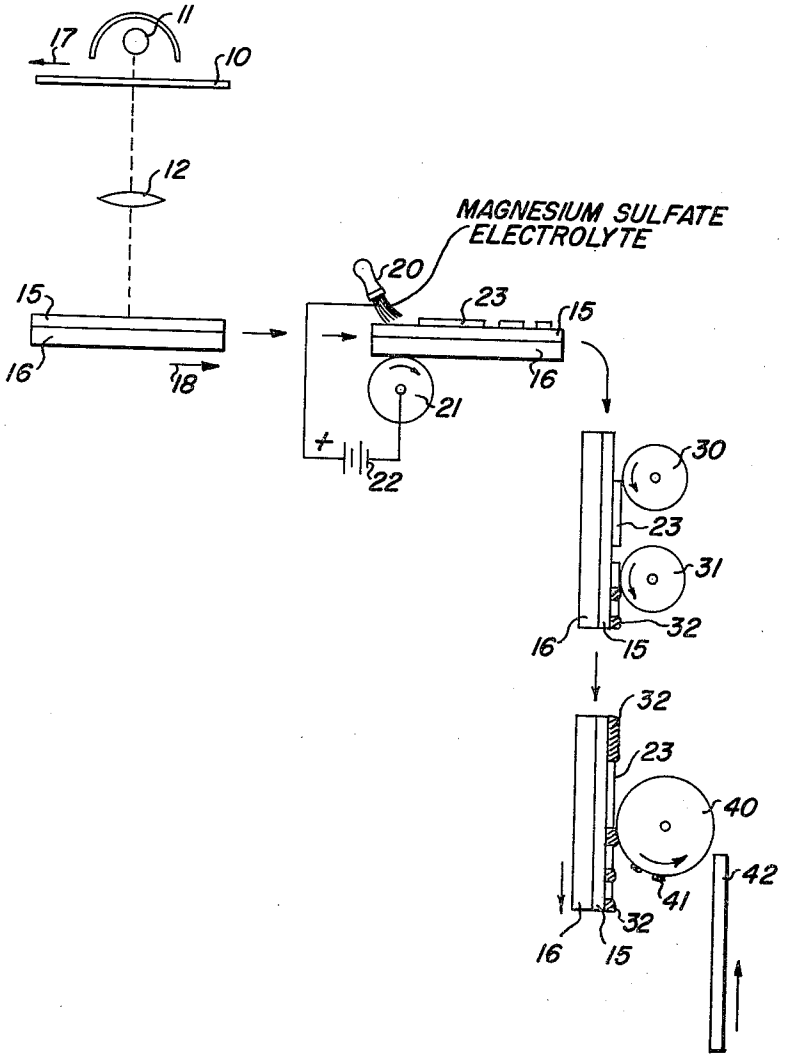
Sept. 11, 1962 R. F. REITHEL 3,053,179

PHOTOCONDUCTOLITHOGRAPHY EMPLOYING MAGNESIUM SALTS

Filed July 28, 1960



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United States Patent Office 3,053,179 Patented Sept. 11, 1962

3,053,179

PHOTOCONDUCTOLITHOGRAPHY EMPLOYING MAGNESIUM SALTS

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Filed July 28, 1960, Ser. No. 45,942
3 Claims. (Cl. 101—149.2)

This invention relates to photoconductography.

Photoconductography forms a complete image at one time or at least a non-uniform part of an image as distinguished from facsimile which at any one time produces only a uniform dot.

Cross reference is made to the following series of cofiled applications:

Serial No. 45,940, John W. Castle Jr., "Photoconductography Employing Reducing Agents."

Serial No. 45,941, Raymond F. Reithel, "Photocondutolithgraphy Employing Nickel Salts," Continuation-in-part Serial No. 120,863, filed June 7, 1961.

Serial No. 45,943, Raymond F. Reithel, "Photoconductography Empolying Spongy Hydroxide Images," Continuation-in-part Serial No. 120,035, filed June 27, 1961.

Serial No. 45,944, Raymond F. Reithel, "Method for Making Transfer Prints Using a Photoconductographic Process."

Serial No. 45,945, Raymond F. Reithel, "Photoconductography Employing Manganese Compounds."

Serial No. 45,946, Raymond F. Reithel, "Photoconductography Employing Molybdenum or Ferrous Oxide," Continuation-in-part Serial No. 120,037, filed June 27, 1961.

Serial No. 45,947, Raymond F. Reithel, "Photoconductography Employing Cobaltous or Nickelous Hydroxide," Continuation-in-part Serial No. 120,047, filed June 27, 1961.

Serial No. 45,948, Donald R. Eastman, "Electrophotolithography."

Serial No. 45,949, Donald R. Eastman, "Photoconductolithography Employing Hydrophobic Images."

Serial No. 45,950, Donald R. Eastman and Raymond F. Reithel, "Photoconductography Employing Electrolytic Images to Harden or Soften Films."

Serial No. 45,951, Donald R. Eastman and Raymond F. Reithel, "Photoconductography Employing Absorbed Metal Ions," Continuation-in-part Serial No. 120,038, filed June 27, 1961.

Serial No. 45,952, Donald R. Eastman and Raymond F. Reithel, "Photoconductography Employing Spongy Images Containing Gelatin Hardeners."

Serial No. 45,953, John J. Sagura, "Photoconductography Employing Alkaline Dye Formation."

Serial No. 45,954, John J. Sagura and James A. VanAllan, "Photoconductography Employing Quaternary Salts."

Serial No. 45,955, Franz Urbach and Nelson R. Nail, "Uniform Photoconductographic Recording on Flexible Sheets."

Serial No. 45,956, Franz Urbach and Nelson R. Nail, "High Contrast Photoconductographic Recording."

Serial No. 45,957, Nicholas L. Weeks, "Photoconductography Involving Transfer of Gelatin."

Serial No. 45,958, Donald R. Eastman, "Photoconductolithography Employing Rubeanates."

Serial No. 45,959, Donald R. Eastman and Raymond F. Reithel, "Electrolytic Recording With Organic Polymers."

Serial No. 46,034, Franz Urbach and Donald Pearlman, "Electrolytic Recording."

Electrolytic facsimile systems are well known. Electrolytic photoconductography is also known and is described in detail in British 188,030 von Bronk and British 464,112 Goldmann, modifications being described in British 789,309 Berchtold and Belgium 561,403 Johnson et al.

This invention relates particularly to photoconductolithography wherein a lithographic plate is made by photoconductographic methods.

The object of the present invention is to provide a much sturdier lithographic plate than has been produced by previous photoconductolithographic methods.

Another object of the invention is to provide a lithographic plate having better discrimination between ink-bearing and non ink-bearing areas.

Another object of the invention is to provide a higher speed process for the manufacture of the litho plates. Two factors affect speed. One of these is of course the photo sensitivity of the photoconductor. A photoconductor is said to be faster if a given amount of light (intensity times time) produces a greater change in conductivity. The intensity-time function is not linear. However, there is a second factor involved in any photoconductography process. For a given change or difference in conductivity, one development process may be quite different from another in the amount of electrolytic effect produced. For example, the density increase, or the solubility increase, or the hydrophilicity increase, or the pH change may be quite different for two electrolytes even though the electric current differential is the same. Thus one process may be faster than another even though the same photoconductor is used in both.

According to the invention any of the standard photoconductographic methods may be used, except that the electrolytic development is from an electrolyte containing magnesium ions. The photoconductographic image is magnesium hydroxide, which term here includes hydrated oxides of magnesium, and the image is deposited on a hydrophobic photoconductive layer such as the usual zinc oxide in resin binder.

This invention employs the photoconductive layer itself as the litho plate and hence differs from my cofiled applications (two of them jointly with Eastman) having to do respectively with "Spongy Hydroxide Images," "Electrolytic Images To Harden or Soften Colloids," and "Spongy Images Containing Gelatin Hardeners" since in each of these three cofiled cases, the litho plate is made on a sheet separate from the photoconductor.

However, the magnesium hydroxide images on zinc oxide resin photoconductors given as examples in the above mentioned cofiled applications can be used for litho printing and when so used, constitute examples of the present invention.

The present invention itself will be more fully understood from the accompanying drawing which shows:

A schematic flow chart of a preferred embodiment of the invention.

In the drawing a transparency **10** illuminated by a light source **11** is focused by a lens **12** on a zinc oxide, resin, photoconductive layer **15** carried on a conducting support **16**. Many such photoconductors are well known, including those discussed in the above mentioned cofiled applications. The transparency is moved to the left as indicated by the arrow **17** and the photoconductive layer is moved to the right synchronously with the image of the transparency, as indicated by the arrow **18**. The zinc oxide layer retains temporarily the photoconductive image thus produced and this is electrolytically developed in a bath containing magnesium sulfate. This electrolyte is applied by a brush **20** as the exposed layer passes over a roller **21**, the difference in potential between the brush **20** and roller **21** being provided by a D.C. source

indicated schematically at 22. This deposits a magnesium hydroxide image 23 which is hydrophilic. Since the zinc oxide layer 15 is hydrophobic the sheet constitutes a lithographic plate. A.C. potential may be used since the zinc oxide layer in contact with the electrolyte acts as a rectifier.

This plate is then lithoprinted by standard methods indicated schematically in the drawing. The fountain solution is applied by a wetting roller 30 to the hydrophilic image 23. The plate is then inked with a greasy ink 32 by a roller 31. The ink adheres to the areas of the zinc oxide layer 15 which are not covered by the image 23.

The plate is then pressed against an offset drum 40 so that some of the ink 41 transfers thereto and in turn is transferred to a sheet of paper 42 in the usual way. All of this lithoprinting is conventional and is usually done in a standard office litho press.

One preferred example of the invention is as follows:

Example 1

A piece of the photoconductive material was exposed for 20 seconds to 15 ft. c. tungsten radiation incident upon a silver (neutral) step tablet in contact with the photoconductive surface, and then electrolytically developed, with an aqueous solution of 1.0 percent, by weight, of magnesium sulfate heptahydrate. The print surface was rinsed with water, "wetted-out" with a standard fountain solution and inked by hand. The areas which received 300 ft. c. seconds exposure repelled the ink; the unexposed areas, or those receiving less than 20 ft. c. seconds held the ink.

In the cofiled Sagura application mentioned above, having to do with magnesium hydroxide control images for alkaline dye formation and in my cofiled application having to do with spongy images (some of which are magnesium hydroxide) the magnesium examples given

can be used according to the present invention as litho plates.

The direct dyeing of a photoconductographic image is of interest in comparison with Example 1 above. An exposed zinc oxide in resin photoconductor was processed with a viscose sponge held at 80 volts positive with respect to the aluminum support for the photoconductor. The sponge was wet with a solution containing two percent by weight of aluminum sulfate octohydrate and one percent sodium chloride. The aluminum hydroxide image deposited was not visible until it was rubbed with a wet sponge carrying a pigment-indigo. This colored the zinc oxide layer but did not adhere to the aluminum hydroxide. In another example dyes were applied which colored the aluminum hydroxide image but which did not affect the background. The present invention using magnesium hydroxide and litho printing gives much better prints however.

Having described preferred arrangements of the invention, it is pointed out that the invention is not limited to these specific examples but is of the scope of the appended claims.

I claim:

1. In a photoconductolithographic process the steps comprising electrolytically depositing on a hydrophobic photoconductive layer a hydrophilic image consisting essentially of magnesium hydroxide and lithoprinting from the layer and hydrophilic image.

2. The process according to claim 1 in which the photoconductive layer is zinc oxide in resin binder.

3. The process according to claim 1 in which said depositing is from an electrolyte containing magnesium sulfate.

References Cited in the file of this patent

UNITED STATES PATENTS

1,759,956 Reed et al. ---------- May 27, 1930

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,053,179 September 11, 1962

Raymond F. Reithel

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the grant, line 1, and in the heading to the printed specification, line 4, name of inventor, for "Raymond F. Reither", each occurrence, read -- Raymond F. Reithel --; column 1, line 32, for "Serial No. 120,037" read -- Serial No. 120,036 --; line 36, for "Serial No. 120,047" read -- Serial No. 120,037 --.

Signed and sealed this 8th day of January 1963.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents