Aug. 23, 1966 F. O. BACH 3,267,848

OFFSET MASTER AND METHOD OF IMAGING

Filed Aug. 15, 1963

FIG. 1

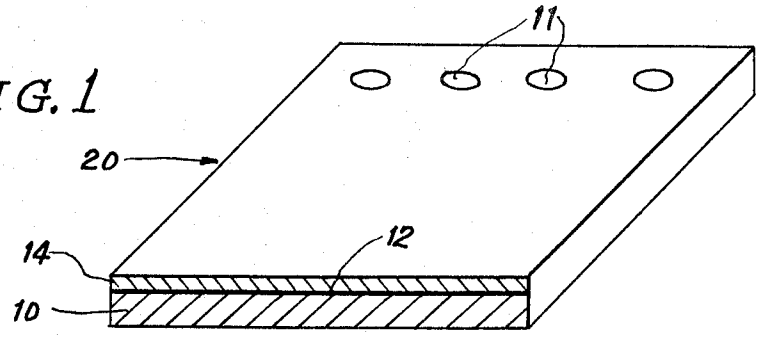


FIG. 2

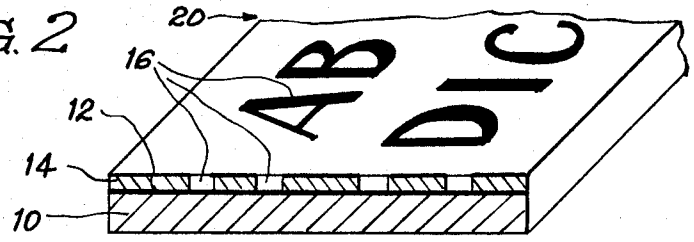
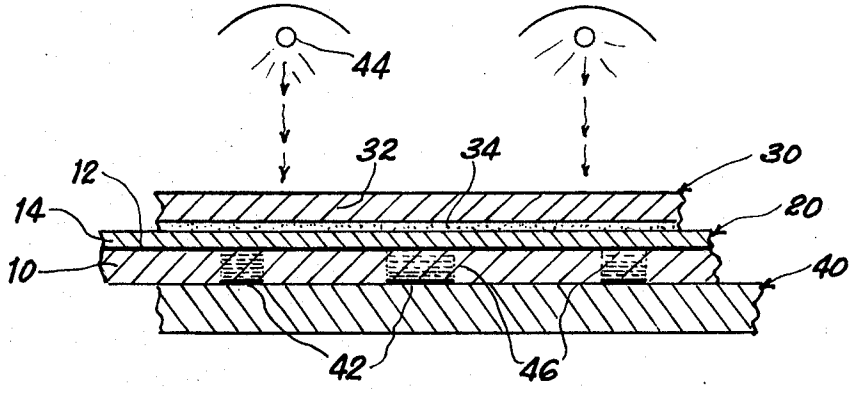


FIG. 3



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OFFSET MASTER AND METHOD OF IMAGING

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This invention relates to the art of lithographic or offset reproduction and more particularly to a new and improved offset master and method for producing an image thereon.

To the present, most offset masters are imaged by the direct application of an ink receptive, water repellent, hydrophobic imaging material onto the water receptive, hydrophilic, lithographic surface of the offset master whereby, when the imaged master is first wet with aqueous repellent and then with a hydrophobic or oleaginous ink composition, the aqueous repellent wets out the non-imaged portions of the master but not the imaged portions so that, when the master is subsequently engaged by the ink roller containing ink composition, the water wetted non-imaged portions repel ink while the unwetted, ink receptive imaged portions receive ink for subsequent transfer to copy sheets by direct or offset processes.

The retention of an oleophilic image on the hydrophilic lithographic surface during the wetting and inking steps is somewhat in conflict with the requirement that the water receptive lithographic surface be preferentially receptive to water and repellent to ink. As a result, the oleophilic image sometimes walks off of the master or is otherwise displaced by the aqueous repellent whereby the number of copies of good quality capable of being secured from the imaged offset master is oftentimes reduced.

The concept of this invention is to reverse the conditions whereby the ink receptive, water repellent, imaged portion is bonded or otherwise provided to form a more permanent part of the base sheet of the master while the ink repellent, water receptive, lithographic surface is present more or less as a protective outer coating on the ink receptive surface but wherein portions of the lithographic, water receptive surface coating are removed in the imaged areas to expose the underlying ink receptive and water repellent base thereby to provide a more or less permanent image on the formed offset master.

Thus it is an object of this invention to produce and to provide a method for producing a new and improved offset master and it is a related object to provide a new and improved process for imaging same.

More particularly, it is an object of this invention to produce a lithographic master in which the imaged portion of the master is more permanently and more strongly bonded to form an integral part of the master whereby the image will be retained on the master for the production of an increased number of copies of good quality; which can be used to produce an imaged master by simple and efficient means not heretofore employed thereby to open the offset reproduction procedures to new techniques for the production of an imaged master.

These and other objects and advantages of this invention will hereinafter appear and for purposes of illustration, but not of limitation, an embodiment of the invention is shown in the accompanying drawing, in which

FIG. 1 is a perspective view partially in section of an offset master prepared in accordance with the practice of this invention;

FIG. 2 is a perspective view similar to that of FIG. 1 showing the master of FIG. 1 after it has been imaged; and

FIG. 3 is a sectional elevational view of the arrangement of elements using the master of FIG. 1 and illustrating the method of imaging directly from an original by thermographic technique.

The lithographic master prepared in accordance with the practice of this invention comprises a base sheet **10** formed of paper, plastic, metal and the like, thin and flexible sheet material having openings **11** at one end for receiving pins for mounting the master on the cylinder of an offset duplicating machine. The sheet has a surface **12** in the form of a coating or surface treatment with is substantially permanently bonded or otherwise formed to become a part of the base sheet and which is characterized by being hydrophobic, water repellent and ink receptive. The desired characteristics on the surface of the base sheet **10** may be achieved (1) by selection of the base sheet of a metal such as copper, silver and the like hydrophobic, ink receptive and water repellent metallic substance, or of a metal having a surface coating which is hydrophobic, ink receptive and water repellent, or (2) a base sheet formed of a synthetic resinous plastic which is ink receptive, water repellent and hydrophobic, such for example as of polystyrene, polyester, polypropylene and the like, or (3) by the treatment of the surface of the base sheet of paper, plastic, metal or laminate to make it hydrophobic, ink receptive, and water repellent, i.e. coating, laminating or plating the surface with wax, polyethylene, polystyrene, copper, etc.

The water repellent, ink receptive, oleophilic surface is provided with an overcoating **14** preferably weakly bonded thereto in the form of a continuous coating which is lithographic and characterized by being hydrophilic, water insoluble, water receptive, and ink repellent.

The following is an example of a base sheet and lithographic composition which may be applied thereon to provide a master embodying the features of this invention:

Example 1

A sheet **10** of cellulose triacetate which has a water repellent, ink receptive surface **12** is overcoated with the following composition:

	Parts by weight
Vinylidene chloride emulsion (Daran 202 of Dewey and Almy)	100
Colloidal silica (Ludox HS)	1100
Water	1100

The coating composition, having a pigment to binder ratio of about 6 to 1, is applied onto the surface of the base sheet in a coating weight of about 0.1 to 3.0 pounds per 3000 square feet of surface area and then allowed to air dry or else drying is accelerated by elevated temperature in the range of 150–300° F. The applied coating dries into a layer **14** which is water insoluble, hydrophilic, ink repellent and water receptive, and which is fairly weakly bonded to the underlying surface **12**.

Instead of the foregoing composition for the preparation of the lithographic coating, the coating can be formulated and applied in accordance with the teachings of the following patents, namely, U.S. Patent No. 2,760,431 for a zinc polyacrylate coating; U.S. Patent No. 2,542,784 for a coating based upon the colloid carboxymethylcellulose; U.S. Patent No. 2,534,650 for a lithographic coating based primarily on casein but which includes lithographic coatings which may be produced of other hydrophilic colloids; U.S. Patent No. 2,806,424 for a lithographic coating based upon an alginate colloid, and the like. The foregoing patents describe compositions which may be used as the lithographic coating **14** and the method of application of such coatings to form a lithographic surface which may be used as the coating **14** in the practice of this invention.

In use, the lithographic coating is adapted to be displaced from the master in the imaged areas to expose the underlying ink receptive, water repellent imaging material while the coating **14** remains in the non-imaged portions of the master to define the surface that is preferentially wet by aqueous medium or repellent during the conventional lithographic reproduction process. Thus the imaged portion **16** is protected from the water repellent with which the master is continuously wet and there is little, if any, tendency for the imaged portion to be displaced from the master. Additionally, the slight inset formed in the surface of the master in the areas corresponding to the exposed imaged portion **16** provides a well in which the ink can be retained further to protect the image and to provide more ink for the copy.

Displacement of the lithographic coating **14** in the areas corresponding to the imaged portion of the master can be effected in a number of ways, depending somewhat upon the composition and characteristics of the coating.

When the lithographic coating **14** is of the type illustrated in Example 1 or is otherwise formulated to be brittle, or fracturable in response to impact or force, the portions of the coating in the imaged areas can be disrupted by such stencilizing techniques as die impression, typewriter key impact, stylus work, and the like, to expose the underlying ink receptive, water repellent surface **12**.

Displacement of the coating can be effected to image the master directly from an original by a new and novel process which makes use of radiation techniques of the type which have heretofore been employed in other copy processes, such as are described in the U.S. Patents No. 2,808,777, No. 2,764,085 and No. 2,970,534.

For this purpose, use is made of an adhesive sheet **30** formed of a base **32** having a coating **34** in which adhesiveness is activated in response to heat. A sheet of this type may be fabricated of a film base of paper, plastics and the like having a thin coating **34** of a thermoplastic adhesive, as represented by the Shawinigan Chemical Company resin D383, applied in a coating weight, when dry, of about 3–8 pounds per 3000 square feet of surface area. The Shawinigan 383 resin may be applied onto the base sheet from solution in alcohol and water in a concentration of 5–25 percent of solids. Instead of the Shawinigan 383 resin, use can be made of an acryloid resin such as Acryloid B82 of the Rohm & Haas Chemical Company, in corresponding amounts, or use can be made of other adhesives, with and without tackifiers or plasticizers, which become adhesive in response to being heated to elevated temperature. Such resinous materials or elastomeric materials can be formulated to embody plasticizing agents or tackifiers which improve adhesiveness at elevated temperature and such formulations are well known to those skilled in the adhesive and resinous arts.

The elements, including the coated master **10–14** and the adhesive sheet **30** are fabricated to be relatively transparent to infrared or other radiations which generate heat in response to absorption.

In use, the adhesive sheet **30** is positioned with the adhesive coating **34** adjacent the lithographic coating **14** on the offset master **20** and with the original **40**, having its image formed of an infrared ray absorbing heat generating material, positioned adjacent the underside of the master with the image **42** uppermost. Instead, the original can be positioned adjacent the top side of the adhesive sheet with the image outermost. The assembly is then radiated by a source rich in infrared such as bulbs **44**, to direct radiations rich in infrared onto the original. Infrared radiations are absorbed less in the non-imaged portions and adsorbed more in the imaged portions and converted into heat whereby a heat pattern **44** is developed which corresponds to the infrared ray absorbing original.

The heat pattern transfers to the adhesive coating **34** of the adhesive sheet **30** to activate the adhesive whereby,

when the adhesive sheet is thereafter removed from the offset master, the portions of the lithographic coating **16** originally in contact with the portions of the coating **34** which have been rendered adhesive are removed with the adhesive sheet to expose the underlying imaging material **12**.

These same concepts for removal of portions of the lithographic coating by means of an adhesive enable the process of imaging to be adapted to other methods wherein use is made of a pressure-sensitive adhesive which, when pressed onto the surface of the lithographic coating **16** and separated, will pull portions of the lithographic coating off of the master to expose the underlying image.

This concept may be adapted to a sheet which is formed with a continuous pressure-sensitive adhesive coating and which is pressed into surface contact with the lithographic coating by die impression, typewriter key or stylus to inscribe the imaged areas. It may be adapted to a system wherein an adhesive pattern corresponding to the image is previously formed onto a plate or surface which is pressed onto the lithographic coating to remove corresponding portions of the coating upon withdrawal.

It will be apparent from the foregoing that I have provided a new and novel construction in an offset master which is capable of use in developing an image which is more permanently retained on the surface of the master thereby to enable use of the master in the production of a much larger number of copies of good quality.

The new and novel master of this invention is adapted to being imaged directly from an original or otherwise by techniques heretofore unavailable to the lithographic art.

It will be understood that changes may be made in the details of construction, formulation and method without departing from the spirit of the invention, especially as defined in the following claims.

I claim:

1. In the method of imaging a lithographic offset master formed of a base sheet having a surface which is water insoluble, water repellent, oleophilic and ink receptive, and a continuous releasable coating weakly bonded to the underlying water repellent and ink receptive surface on the surface which coating is water insoluble, water receptive, hydrophilic and ink repellent, the steps of contacting the coated surface with a surface having an adhesive pattern corresponding to the image to be formed on the master, and then separating the surface from the coated surface whereby portions of the coating corresponding to the adhesive pattern are removed by the adhesive to expose the underlying ink receptive, water repellent imaged portion while the remainder of the coating remains to define the water receptive, hydrophilic non-imaged portion.

2. In the method of imaging a lithographic offset master formed of a base sheet having a surface which is water insoluble, water repellent, oleophilic and ink receptive and a continuous removable coating on the surface which coating is water insoluble, water receptive, hydrophilic and ink repellent, the steps of forming an assembly by positioning a sheet having a continuous coating which is rendered adhesive in response to heat with the adhesive coating in surface contact with the coated side of the master, providing an original containing an infrared ray absorbing-heat generating material in the imaged portions to be reproduced, directing radiations rich in infrared onto the original whereby radiations are absorbed in the imaged portions and converted into heat to form a heat pattern corresponding thereto, said heat pattern transferring to the adhesive coating to render the latter adhesive, and separating the adhesive surface from the master whereby portions of the coating corresponding to the original image are removed with the adhesive surface to expose the underlying ink receptive, water repellent portions on the base sheet while the remainder of the coating remains to define the water receptive, hydrophilic, non-imaged portions.

3. The method as claimed in claim **2** in which the original is a sheet separate and apart from the master.

4. The method as claimed in claim 2 in which the adhesive coating, the surface on which the adhesive coating is formed, and the master are substantially infrared transparent and wherein the elements are arranged with the master between the adhesive layer and the original.

5. A method in accordance with claim 2 wherein said original is provided in overlying surface contact with said assembly.

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