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FLUORESCENT LITHOGRAPHING INK

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The object of my invention is to provide a fluorescent lithographing ink capable of being used upon an ordinary lithographing press and containing such properties that proper proportions thereof will adhere to and not injure the waxed portions of the lithographing plates, and which ink will be repulsed by and not adhere to the wetted portions of the lithographing plates, in the same manner as the present lithographing inks now in general use, and which, after being used in a lithographing process and when subjected to the action of ultra violet rays, will become brilliantly fluorescent in many colors, and further to provide an ink of this character which may be successfully employed for numerous other purposes where an oil base is required.

A further object is to provide an ink of this character in which two or more fluorescent color substances are combined in such manner as to increase the brilliancy of the fluorescence.

In an ink of this character some of the ingredients are soluble only in spirit solvents and it is essential that these spirit solvents be substantially removed in the preparation of the ink, and in this connection it is my object to provide means whereby these spirit solvents may be removed and an oil base substituted therefor without impairing the fluorescent qualities of the finished product; and further in this connection it is my object to provide means for rapidly effecting the removal of the spirit solvents and at the same time minimize the creation of fumes from the spirit solvent which might be objectionable or dangerous as part of the process of manufacturing my improved ink; and still further in this connection it is my object to provide means whereby a portion at least of the spirit solvent may thus be removed and saved for further use.

A further object is to provide means for retarding the rapid evaporation of the spirit solvent during the milling of the ink to thereby prevent the rapid hardening of the fluorescent materials and making it possible in a milling operation to maintain the fluorescent materials and the gum like materials in finely divided condition.

My invention consists in the selection of the materials employed and in the treatments to which they are subjected in the manufacture of the improved ink, and whereby the objects contemplated are attained.

In the practice of my improved art of manufacturing luminescent lithographing ink I have had satisfactory results in actual operation upon a lithographing press by compounding my improved ink as follows: I first mix four and one-half parts by weight of dry white shellac, three and one-half parts by weight of pure methyl alcohol, seven sixty-fourths parts by weight of auramine O, one and one-half parts by weight of butyl lactate, one thirty-second part by weight of rhodamine B extra. This mixture is stirred thoroughly until the dye and the shellac are dissolved in the alcohol. I then add three parts by weight of aluminum hydroxide and seven parts by weight of saponified linseed oil, and the mass is again thoroughly stirred.

In order to make a successful lithographing ink it is necessary that substantially all of the spirit solvent be removed and the oil remain as the base for the ink. I have successfully removed this spirit solvent as follows: By placing the mixture in an ordinary ink mill and during this milling operation the ink is spread out in thin layers on the rolls of the mill, and the spirit solvent is then evaporated and vaporized, and in that manner removed from the ink sufficiently for lithographing purposes.

I have also successfully removed the spirit solvent or alcohol from the ink by adding to the ink before applying it to the milling operation, three and one-half parts by weight of water, and thoroughly mixing the water with the ink. Under these conditions the water and the spirit solvent or alcohol unite in solution, and when subjected to the milling operation the water prevents the rapid evaporation of the alcohol and thereby avoids the creation of objectionable alcoholic fumes from the mill which might injure the operators or create a fire hazard. I have found in practice that when the water and alcohol are thus combined and the ink subjected to a milling operation, the water and alcohol are together very rapidly removed from the ink, because when thus united they are totally non-miscible with the remaining elements of the ink.

When the alcohol is thus removed in the presence of water it may be drawn off into a separate receptacle, and thereafter the water and alcohol may be separated by distillation and the alcohol again used, thus effecting a saving.

I have found in practice that by thus mixing the water and alcohol elements a considerable saving in time is effected in the milling operation because the combined water and alcohol are removed from the ink during the first run of the ink across the mill rolls.

I have found in practice that it is desirable to have a retarding substance in the ink, and for this purpose I have successfully employed butyl lactate in the manner and amount before mentioned, and find that with this butyl lactate as an element of the ink, the hardening of the combined dye and shellac is delayed so that during this milling operation and the removal of the spirit solvent the remaining particles of the ink are continuously subjected to the milling operation which prevents the formation of any of the particles thereof into large masses and results in finely dividing the combined fluorescent material and shellac and incorporating them homogeneously in the oil base.

For the purpose of obtaining a maximum brilliancy of fluorescence of my improved ink under the action of ultra violet rays I have demonstrated in actual use that when a dye of a single color, such, for instance, as rhodamine B extra, is employed, there is a point of saturation, that is to say, rhodamine B extra may be added to the ink to a point where the ink contains a maximum of fluorescence under the action of an ultra violet lamp. If more rhodamine B extra is added, the fluorescence decreases, and I have referred to this point as the fluorescent saturation point.

I have found that by adding another fluorescent dye of a different chemical composition, such, for instance, as auramine O, this auramine O dye may be added to the ink up to the fluorescent saturation point of the auramine O dye, and by this means the brilliancy of the fluorescence of the ink is greatly increased, that is to say, the fluorescence of one dye is added to the fluorescence of the other dye, and the total effect is substantially double the amount of fluorescence that can be obtained from the use of one dye only.

It is well known that some aniline dyes have the capability of fluorescing under the application of ultra violet light with characteristic colors, and I have successfully employed such dyes in my improved ink. I have obtained a brilliantly fluorescent red color by the use of rhodamine B extra; a fluorescent orange by a mixture of auramine O and rhodamine B extra; green by the use of auramine O; blue, by the use of thioflavine S dye.

I have found that with my improved ink, after the removal of the spirit solvent, the resultant ink is of stable character and will not evaporate dry or harden rapidly, and in that respect is similar to the ordinary lithographing ink.

I have also found in practice that my improved ink will operate on a lithographing press in the same manner as the lithograph inks now in use, that is to say, it will adhere to but not in any way injure the waxed portions of the lithographing plates and will be repulsed by and not adhere to the wetted portions thereof.

By the use of the term in the accompanying claims "fluorescent materials or dyes" I mean that these materials become fluorescent under the action of ultra violet or other radio-active waves from an extraneous source.

By the use of the term "retarder" I mean butyl lactate or any other slow drying solvent with similar characteristics, such as butyl cellosolve, di-butyl phthalate, etc.

By the use of the term "water" in the accompanying claims, I do not wish to be understood as limiting my claims to H_2O, but wish to include other substances which have the capability of combining with the alcohol or other spirit solvents in a similar manner.

By the term "spirit solvents" as used in the accompanying claims I mean alcohol or any other solvent that is capable of dissolving the fluorescent dyes and gum used, such as acetone, amyl-acetate, ethyl alcohol, cellosolve, etc., and by the use of the term "gum" in the accompanying claims I mean to include pure white shellac and other gummy like substances such as nitro cellulose, cellulose acetate, synthetic resins and other natural spirit soluble organic gums.

By the use of the term "oil base" in the accompanying claims, I mean to include pure linseed oil, saponified linseed oil and other oil soluble resins, such as dammar, and the like.

In practice I have prepared lithographs in numerous colors and have placed same in a frame containing ultra violet lamps with reflectors for reflecting the ultra violet rays and evenly distributing them throughout the area of the lithograph, and when this lithograph is placed in a room semi-dark or having little light, the lithograph becomes brilliantly fluorescent, each separate color being distinct from every other color, and the action of these ultra violet rays creates within the ink and causes the emission from the ink of rays of visible light, thereby producing a highly spectacular picture.

I claim as my invention:

1. The method of making lithographing ink, which consists in providing a dye which is visibly fluorescent under ultra violet rays, mixing therewith a substantially colorless resin, mixing therewith a volatile solvent for said dye and said resin, mixing therewith a drying oil, mixing therewith aluminum hydroxide, then subjecting the mixture to a milling operation for expediting the volatilization of the volatile solvent and for maintaining said ingredients in finely divided condition in the oil during such volatilization.

2. The art of making fluorescent lithographing ink, which consists in providing auramine O, rhodamine B extra, pure methyl alcohol, butyl lactate, dry white shellac, stirring the said ingredients until the dye and shellac are dissolved in the alcohol, adding aluminum hydroxide, adding saponified linseed oil, and removing the alcohol and maintaining the ingredients in finely divided condition in the oil by subjecting the mixture to a milling operation.

3. The method of making lithographing ink, which consists in providing a dye which is visibly fluorescent under ultra violet rays, mixing therewith a substantially colorless resin, mixing therewith a volatile solvent for said dye and said resin, mixing therewith a drying oil, mixing therewith aluminum hydroxide, then subjecting the mixture to a milling operation for expediting the volatilization of the volatile solvent and for expediting the adsorption of the said dye upon the aluminum hydroxide and for maintaining said ingredients in finely divided condition in the oil during such volatilization.

4. The method of making lithographing ink which consists in providing a dye which is visibly fluorescent under ultra violet rays, providing a second dye of a different color and which is also fluorescent under ultra violet rays, mixing therewith a substantially colorless resin, mixing therewith a volatile solvent for said dyes and said resin, mixing therewith a drying oil, mixing therewith aluminum hydroxide, then subjecting the mixture to a milling operation for expediting the volatilization of the volatile solvent and for

expediting the adsorption of the said dyes upon the aluminum hydroxide and for maintaining said ingredients in finely divided condition in the oil during such volatilization.

5. The method of making lithographing ink which consists in providing rhodamine B extra dye, also auramine O dye, mixing therewith a substantially colorless resin, mixing therewith a volatile solvent for said dyes and said resin, mixing therewith a drying oil, mixing therewith aluminum hydroxide, then expediting the adsorption of the dyes upon the aluminum hydroxide and the resin to the saturation point of each dye by subjecting the mixture to a milling operation during the volatilization of the solvent.

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