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METHOD OF PREPARING ALUMINUM PLATES TO RECEIVE SILVER HALIDE EMULSION

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This invention relates to improvements in method of preparing aluminum plates to receive silver halide emulsions. Commercial sheet aluminum as it comes from the manufacturer contains impurities, particularly on the surface thereof, of iron, copper, manganese, and nickel. These impurities, even though the aluminum is treated with various etches and neutralizing dips, do not successfully prepare the surface of the aluminium plate to receive a silver halide emulsion without having spontaneous, spotty, desensitization blisters, injured spots and other deleterious effects.

Some of the attempts which were made before arriving at successful procedures, are the following: The aluminum was reacted with potassium hydroxide, sodium hydroxide, sodium carbonate, potassisum carbonate, potassium bichromate in water at elevated temperatures. These chemicals were tried by themselves and in combination in the solution as well as with subsequent neutralizing dips at different temperatures. Acid hydrochloric, nitric phosphoric, chromic, sulphuric, acetate, tannic, and maleic, were also used with various combinations and kinds of washing, such as with hot water, cold water, and swabbing.

In attempting to coat aluminum plates by depositing a neutral substratum on the surface in situ with the reacting alkali, or acid, or both, I have used peroxide, potassium bichromate, ammonium bichromate, ammonia, alum, chrome alum, and permanganate of potash.

When coated with the silver halide emulsion all of the aluminum surfaces prepared as above produced a spontaneous spotty desensitization, which shows up in the developer as a black spot, and after the final wash, after fixing, as a crater of black silver particles. Also the gelatin has a boiled up, blistered and injured appearance in these spots. This apparently is due to the action of the carbonate in the developer reacting with particularly susceptible spots, or particles, in the aluminum surface, and the gas, when reacting with the aluminum, apparently produces a reducing agent which is many times stronger than the developer.

I also have noted that sometimes spots, which do not appear when the plate is being developed, will appear after the final wash. Apparently this generally occurs in emulsion which is thicker than would be used normally on my plate, and I believe that this is due to the penetration of the developer to the surface of the aluminum plate after it has been transferred to the hypo

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bath, but before the acid in the hypo bath is able to penetrate to the metal through the emulsion. The above effects are apparent and it must be realized that everything pointed out above is a conjecture, because I do not actually know the causes of all of the phenomena.

I have, however, discovered that by using disodium phosphate to treat the surfaces of the aluminum plates these surfaces are made relatively very inert to the reacting constituents of the silver halide emulsion, the alkali of the developer, and the acid of the hypo bath.

All of the following procedures in processing the surfaces of plates made from commercial sheet aluminum were successful, and in these procedures all plates were formed of sheet aluminum, 3SH "Alcoa" .095 inch thick.

1. Samples of the above sheets were placed in a bath formed of 4 ounces of disodium phosphate in 2000 cc. of distilled water at a temperature of 180° F. The reaction caused the surface of the aluminum to turn yellow-brown all over. The sheets were then removed from the solution and rinsed under a hot tap. No reaction was experienced when silver halide emulsion was so applied to these plates.

2. The temperature of the above solution was raised to 208° F., and some of the plates were placed in this solution for a period of ten minutes. They were then removed and rinsed in distilled water at room temperature, and it was found that the reaction was less violent than it was in the above test. The surfaces of the above plates did not react with the silver halide emulsion.

3. With the above solution at a temperature of 180° F., some of the aluminum plates were treated for a period of thirty minutes. They were then removed and washed and there was no reaction with the silver halide emulsion.

4. An aluminum plate was placed in the above bath for a period of forty minutes and during this time the temperature of the solution was raised from 180° to 208°, and during this period I added additional water (H_2O) to bring the level of the solution back to its original level and added an additional ¾ ounce of disodium phosphate. The surface of the plate turned a dark yellow-brown (much darker than No. 1 above); reaction, however, appeared light and non-violent. There was no reaction of the surface so treated with the silver halide emulsion—in fact, the emulsion applied to this surface seemed the most perfect of all.

The plates so formed and coated with emulsion were used in a printing process wherein the plate

was placed in a camera and matter to be printed was photographed thereon. After exposure in the camera the plate is then placed in a developer, and developed; then in a stop bath, thence into an acid hypo solution. After the plate has been completely fixed it is then thoroughly washed and subsequently is subjected to a solution for making the portions of the developed plate which contain reduced metallic silver, sensitive to greasy ink. The portions which do not contain reduced metallic silver remain soft, and/or porous, and are adapted to absorb and adsorb aqueous repellent which, in the printing press, repels the greasy ink. The plate, after it has been formed, is placed in the press and it is traversed by rollers carrying the aqueous repellent and by rollers carrying greasy ink, and impressions are taken therefrom either directly to the paper or they are transferred to a blanket and thence to the surface of the paper.

What is claimed is:

1. The method of treating the surfaces of aluminum plates to condition them to be substantially impervious to the reacting constituents of a silver halide emulsion which includes the step of subjecting said surface to the reaction of aqueous solution of disodium phosphate at an elevated temperature until said surface is discolored, the further step of washing said plate with hot water, and the final step of applying a coating of said emulsion.

2. The method of treating the surfaces of aluminum plates to condition them to be substantially impervious to the reacting constituents of a silver halide emulsion coating, which consists of subjecting said surfaces to the action of a solution of water and disodium phosphate for a period of time greater than ten minutes, said solution being at an elevated temperature, the further step of thoroughly washing said surface, and the final step of applying said coating to said surface.

3. The method of treating the surfaces of aluminum plates to condition them to be substantially impervious to the reacting constituents of a silver halide emulsion coating, which consists of subjecting said surfaces to the action of a solution of water and disodium phosphate for

a period of time greater than ten minutes, said solution being at an elevated temperature, the further step of thoroughly washing said surface, and the final step of coating said surface with said emulsion.

4. The method of treating the surfaces of aluminum plates to condition them to be substantially impervious to the reacting constituents of a silver halide emulsion coating, which consists of subjecting said surfaces to the action of a solution proportioned on the order of 4 ounces of disodium phosphate to each 2000 cc. of distilled water at a temperature of not less than 150° F. for a period of time greater than 10 minutes, the step of washing said surface in hot water after reaction has changed the color of said surface, and the final step of coating said surface with said silver halide emulsion.

5. The method of treating the surfaces of aluminum plates to condition them to be substantially impervious to the reacting constituents of a silver halide coating, which consists of subjecting said surfaces to the action of a solution proportioned on the order of 4 ounces of disodium phosphate to each 2,000 cc. of distilled water at a temperature of not less than 150° F. for a period of not less than 30 minutes, the temperature of the solution being raised to approach the boiling point the while, the step of washing said surface in hot water after reaction has changed the color of said surface, and the final step of coating said surface with said silver halide emulsion.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,312,855	Thompson	Mar. 2, 1943

FOREIGN PATENTS

Number	Country	Date
547,795	Great Britain	Sept. 11, 1942
549,647	Great Britain	Dec. 1, 1942