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# UNITED STATES PATENT OFFICE.

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PHOTOMECHANICAL PRINTING SURFACE AND PROCESS.

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This invention comprises improvements in or relating to photo-mechanical printing surfaces and processes.

As is well-known, off-set printing processes comprise the fixing of the image on a surface such as that of a sheet of copper zinc or aluminum, the transference of an impression from such sheet to an off-set sheet, usually of rubber, and the transference of the impression from the rubber to the paper to be printed. Printing from the off-set sheet has the advantage that any inequalities or roughness of the paper are of no account owing to the resilience of the rubber or other sheet during the impression. Heretofore, off-set processes have not been successful when fine half-tone or grain screens are used, because of the instability of the printing surfaces. We have discovered that this instability is due to the chemical, physical and electro-chemical action of the rubber sheet upon the coating of albumen or glue which are used in the preparation of the plates. It appears that when the rubber sheet is in close contact under pressure with the sensitized and fixed albumen or glue coating, decompositions sets in which is known in the trade as "rot". The result of this decomposition is that the plate is spoilt and rendered useless. The deleterious action of the rubber sheet is caused by the sulphur which has been employed for its vulcanization.

The principal object of the invention is to remedy the defects above described and to make photo-mechanical off-set printing a success, so that it may be possible to print satisfactorily without half-tone blocks, electros and stereos. The object of this invention is achieved by the present improvements which are the result of research, investigation and experiment in connection with the problem above stated. Others have failed to achieve this object for the reason that they have not paid attention or have paid insufficient attention, to the chemical, physical or electro-chemical action above described. It was well-known in practice that aluminium sheets had the drawback that the metal became bare when in use on the off-set machine, the lines or dots appearing to become brittle and breaking away so that the shadows opened up unduly. Also, that zinc sheets had a drawback, which was the reverse of that experienced with the aluminium, namely, that the shadows or heavy

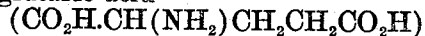
parts tended to block up so that the work came up "heavy". These faults were ascribed wholly or mainly to the many operations to which the plates were subjected before being made ready for the machine and diverse processes carefully devised from this point of view failed to produce success.

An important feature of the present invention is the employment of lactic casein, legumin, gluten or fibrin obtained as a highly purified precipitate which is dissolved in a suitable acid or acid solution, the product being a hyaline gelatinous neutral solution which is made use of in the production of printing surfaces, as hereinafter explained.

According to one part of this invention, the chemical physical and electro-chemical actions of the rubber sheet are prevented by a coating of a thin solution of prepared casein, legumin, gluten or fibrin with an addition of ingredients or reagents the said coating resulting in a stratum which is leather-like and permeable to liquids. The said solution is employed also in the preparation of the plates, as will appear from the following practical examples.

The first example is that of the preparation of a printing plate by coating a sufficiently grained sheet of copper, zinc, aluminium, celluloid or other suitable material. For the coating solution, lactic casein, legumin, gluten or fibrin is treated and purified of fat and albumen and finally precipitated by oxyglutaric acid ( $C_5H_7(OH)O_4$ ). The precipitate is then washed to separate from the lactic casein the soluble lime salts, or in the case of legumin and vegetable fibrin being precipitated, to separate the insoluble gluten. Any one of these pure precipitates is then dissolved at a low temperature in

$\alpha$ -aminoglutaric acid



and dilute ammonia, the result being a hyaline gelatinous neutral solution. This solution is mixed with a 20% solution of semi-gluten or sericin, in the proportion of one part of the latter to five parts of the casein, legumin or vegetable fibrin solution. This solution mixture is allowed to stand for five hours at a temperature not exceeding 90° C. and is then tested for its molecular refractive power. Also, it is tested for wave length transmission in accordance with the generally known practice in connection with

the preparation of sensitized surfaces for photography, this wave length being dependent upon the molecular weight of the compound. After these tests, there is added  
 5 to the solution mixture 1% metaterebenthenes ( $C_{10}H_{16}$ ) and 3% to 5% propenyl or glyceryl alcohol ( $C_3H_7O_3$ ) and filtration is then performed. Finally, the solution is sensitized with a chromate. The plate of  
 10 sheet material is then treated in the usual photo-mechanical manner with the said solution, and the printing object is fixed, rolled up with printing ink and developed. After this, the plate is washed and scrubbed  
 15 with a stiff brush in cold water and then immersed in weak solution of any metallic halide or formaldehyde. The fine etching can then be carried out as in the half tone process and to such a depth as is comparable  
 20 with that of the ordinary relief process block. The etched plate is now cleaned and gummed up on the margins and other non-printing parts, and rolled up with ink and the gum washed off, and the plate is ready  
 25 for use.

The second example is that of the coating of a plate of polished copper, zinc, or aluminium. The coating is performed with the solution described in the first example  
 30 and the etching is performed in the same manner.

After cleaning, the plate is grained on the margin and non-printing parts. The margin and non-printing parts are now gummed up,  
 35 and the whole plate is rolled up with suitable ink, leaving the plate ready for use on press or machine.

The plates produced according to the foregoing examples are suitable for three colour work in the off-set process and are adapted  
 40 for giving great depth of colour and sharp definition in printing.

The third example is that of coating a rubber off-set sheet. For this purpose, the casein or like solution, prepared as described  
 45 in the first example, is mixed in the proportion of 5 to 1 with a 20% solution of liquefied gluten or serecin, a 10% solution of formaldehyde being added in the proportion  
 50 of 1 to 10, and propenyl alcohol being added in the proportion of 1 to 50. The stratum

resulting from this coating is leatherlike and permeable to liquids.

I claim:—

1. A surface coating for use in off-set  
 55 printing, said coating being obtained by the application to the surface of a hyaline gelatinous neutral solution of a protein.

2. A surface coating for use in off-set  
 60 printing, said coating being obtained by the application to the surface of a hyaline gelatinous neutral solution of a protein, the latter being employed in the form of a highly pure precipitate which is dissolved in the  
 65 presence of an acid.

3. A surface coating for use in off-set  
 printing said coating being obtained by the application to the surface of a hyaline gelatinous neutral solution of a protein, the latter being employed in the form of a highly  
 70 pure product obtained by precipitation with oxyglutaric acid which product is dissolved in the presence of an acid.

4. A surface coating for use in off-set  
 75 printing, said coating being obtained by the application to the surface of a hyaline gelatinous neutral solution of a protein, the latter being employed in the form of a highly pure product obtained by precipitation which product is dissolved at a low  
 80 temperature in  $\alpha$ -aminoglutaric acid and dilute ammonia.

5. A surface coating for use in off-set  
 printing, said coating being obtained by the application to the surface of a mixture of a  
 85 20% solution of serecin and a hyaline gelatinous neutral solution of a protein, the latter being employed in the form of a highly pure product obtained by precipitation which product is dissolved in the presence  
 90 of an acid.

6. A surface coating for use in off-set  
 printing said coating being obtained by the application to the surface of a mixture of a  
 95 20% solution of serecin, small percentages of metaterebenthenes, and a hyaline gelatinous neutral solution of protein, the latter being employed in the form of a highly pure product obtained by precipitation, which product is dissolved in the presence  
 100 of an acid.

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