UNITED STATES PATENT OFFICE.

JOANNY AGARITHE DEJEY, OF CHARENTON, FRANCE.

PROCESS OF ENGRAVING AND ETCHING METAL.

No. 797,668. Specification of Letters Patent. Patented Aug. 22, 1905.

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To all whom it may concern:

Be it known that I, JOANNY AGARITHE DEJEY, engineer, a citizen of the Republic of France, residing at 25 Rue Gabrielle, Charenton, in the Republic of France, have invented certain new Improvements in Processes of Engraving and Etching Metal, of which the following is a specification.

The process which forms the object of the present invention is intended to enable metals—such as copper, brass, and zinc—employed for printing fabrics, wall-paper, ordinary paper, and the like to be engraved or etched with great facility. These engravings may be made either on cylindrical surfaces or on flat surfaces, and by this process rollers for printing newspapers and the like, fabrics, phonograph-rolls, gramophone-disks, and the like may be obtained, as well as any suitable engraving, with a greater facility, rapidity, and economy than has hitherto been possible.

In order that a process of etching may be suitable for the purpose above stated, it is essential that the resist be of such a nature as to be perfectly impermeable to the etching-bath and so perfectly adherent to the surface to be etched that the etching may not extend laterally under it, whereby the edges of the lines of the design would lose their sharpness or the lines would be of less thickness than is desired. It is also essential that the deposit of the resist should be strictly limited to those parts of the surface on which it is desired. Both these ends are attained in the process hereinafter described.

The process employed consists, essentially, in transferring onto plates or rollers the subject or design which has been made with greasy so-called "lithographic" inks or any other ink which resists washing and forms a thickness on the plate or rollers. The transfer having been completed, the plate or roller is subjected to repeated washing, having for its object to remove any trace of the gum or size which the transfer-paper contains and to clean the metal which is to receive the metallic deposit hereinbefore described, as this deposit will only adhere to an absolutely-clean surface. For this purpose any acidulated water or other liquid capable of dissolving the size or gum which the paper contains may be employed. The roller or plate is then ready to receive the metallic deposit forming the resist, such deposit being made by electrolysis. The metal employed is tin.

The operation is carried out with the aid of heat, and the bath is preferably composed of two parts of melted pyrophosphate of soda and one part of melted protochlorid of tin, these two salts being dissolved in distilled water. Other formulæ may be employed yielding the same result, and the deposit may also be obtained by the exchange method. The deposit of tin being made in an almost boiling bath has an adherence and solidity which can not be obtained with the other resists, as various impurities which resist cold washing disappear under hot washing. The roller or plate to be engraved after having received the layer of tin forming the resist is subjected to the action of a solvent which removes the ink (essence of terebenthine, benzin, or the like) and is then ready for engraving. This engraving is done by acids or liquids which do not attack tin, but only the copper, brass, or zinc exposed by the dissolving of the ink which was on the part to be engraved. These agents or acids are numerous, the more important being the double cyanids of copper and potassium, chromic acid, and the like, and they may be employed with or without an electric current. The operator must make a judicious selection of the acid or liquid to be employed, according to the nature of the design to be engraved and its depth or fineness.

For engravings of very great depth the operation may be repeated several times—that is to say, the engraving may be carried out in the manner as hereinbefore described until the maximum depth is reached without affecting the resist—*i. e.*, the layer of tin. When it is considered that this reserve or part not acted on by the acid or the like is about exhausted, the piece is cleaned, and then the engraving already obtained is covered with a solution of Jews'-pitch in benzin or varnish of any suitable kind, and then the deposition of the layer of tin is recommenced, which in this case may acquire a considerable thickness, and finally the roller is cleaned in order to remove the varnish which has been placed thereon, and the engraving may be deepened at will. This process of deepening the engraving is much more rapid than that which consists in remilling the rollers, as is done at present, and constitutes in itself alone an industrial application of the first importance. It is more particularly applicable for printing patterns on foulards or other fabrics requiring the engravings to be very deep.

The process is applicable for engraved plates

or rollers whether used for relief or intaglio printing.

This method of engraving allows of any reproductions of photographs, portraits, landscapes, drawings of all kinds, and the like to be rapidly and economically obtained. Its importance is more particularly remarkable for reproduction in large numbers—such, for instance, as illustrated catalogues, post-cards, postage-stamps, checks, vignettes, and the like printed on continuous paper by means of engraved rollers, and also for printing paper-hangings and reproductions by processes derived from photography of pictures, engravings, or any kind of subjects on plates or metallic rollers. It also allows rollers to be employed for printing newspapers and other publications on rotary printing-presses to be rapidly obtained, this process enabling the making of blocks of antimonial lead at present customary to be dispensed with. For this purpose it is sufficient to set up on a sheet of paper the text to be printed in a greasy ink and transfer it to the roller in the manner hereinbefore indicated.

I claim—

A process for engraving or etching metal surfaces consisting in transferring the design in greasy ink onto the metal surface, washing with liquid to remove the gum and other impurities, applying a tin by electrolytic process under heat, removing the ink by a solvent, and etching by a liquid which does not attack the tin but only the metal surface aforesaid, covering the engraving with a varnish, repeating the deposit of tin, cleaning the roller to remove the varnish placed thereon, and repeating the engraving process as described.

In testimony whereof I have hereunto set my hand, in presence of two subscribing witnesses, this 22d day of July, 1904.

JOANNY AGARITHE DEJEY.

Witnesses:
PIERRE EUGÉNE BENOIST,
HANSON C. COXE.