UNITED STATES PATENT OFFICE.

OTTO CARL STRECKER, OF MENTZ, GERMANY, ASSIGNOR TO JOS. SCHOLZ, OF SAME PLACE.

PROCESS OF PRODUCING RELIEF-PLATES FOR PRINTING.

SPECIFICATION forming part of Letters Patent No. 567,926, dated September 15, 1896.

Application filed December 26, 1895. Serial No. 573,390. (No specimens.)

To all whom it may concern:

Be it known that I, OTTO CARL STRECKER, a subject of the Grand Duke of Hessen, residing at Mentz, Germany, have invented certain new and useful Improvements in Processes of Producing Relief-Plates for Reprinting Purposes, of which the following is a specification.

My invention consists of a process for producing relief-plates, for reprinting purposes, of zinc or aluminium or aluminium coated with another metal or with an alloy. This process is as follows: After the drawing, reprint, or impression has been applied to a plate of the said metal or a picture has been produced photographically upon it the plate is etched with diluted salt solutions of heavy metals which are electrically opposite to and hence act on the metal of the said plate, or with mixtures of the said solutions with suitable acids, or with suitable acids alone, until the color-supports, *i. e.*, those parts of the metal plate which are covered with ink, have attained the required height. In the case of preparing aluminium plates coated with another metal or with an alloy the etching is to be continued till the surface of the aluminium is reached or is also corroded. For this etching I employ, preferably, a solution of cupric chlorid or stannous chlorid or a mixture of cupric chlorid with very diluted sulfuric acid or only nitric acid, but I do not limit myself to a peculiar concentration or to a particular salt of metal or to a special acid. After the plate has been etched with the said solution or the said mixture it is necessary to dissolve or to oxidize those parts of the heavy metals or of heterogeneous substances which adhere to the plate mechanically or are combined with it chemically. This is attained by treating the plate with acid, preferably nitric acid, the concentration of which depends upon the kind of the etch previously employed. Then the dissolved or oxidized parts are removed by washing the plate with water. If the plate thus treated consists wholly of zinc and is designed for book-printing, it needs no further treatment any more than would an ordinary electro-plate. If, however, the plate consists of coated or uncoated aluminium, then it is to be polished with talc and a brush, in case the plate is roughened, and then the ground, *i. e.*, the exposed parts of the surface of the plate, are to be treated with liquids which contain phosphoric acids, combined phosphoric acids, hypophosphoric acid, phosphorous acid, hypophosphorous acid, hydrofluoric acid, combined hydrofluoric acids, or the oxyacids of sulfur, excepting sulfuric acid. By this treatment the exposed aluminium ground is coated with a layer of precipitated aluminium salt, which is insoluble in water, but which absorbs the latter and prevents the spreading of the fatty color. The coated or uncoated aluminium plate is then ready for printing.

Example 1: Upon an aluminium plate, on which the drawing, reprint, or impression is protected against etching in the usual manner, a solution of cupric chlorid in water is poured, which contains one part of crystallized cupric chlorid and five parts of water. Immediately after having done this the solution is distributed equally upon and spread uniformly over the plate by means of a bristle brush. A somewhat violent reaction takes place on the spot, and under development of heat scum and noise copper is separated in the form of a blackish-red layer. Immediately after the reaction has been terminated the plate is well rinsed with water. The operation is repeated until the color-support (the relief) has attained the desired or required height. This height can be previously approximately fixed by employing certain quantities of the solution. In this case for the calculation of the quantity it is to be noticed that one hundred grams of crystallized cupric chlorid dissolve about nine grams of aluminium. The height of the relief is ordinarily less than a tenth of a millimeter, which is sufficient when printing in a lithographic press, but it depends always upon the kind of the work in question. After the plate has been washed off it has a blackish-red appearance, originating from the copper and from the heterogeneous substances. The plate, however, immediately becomes of a white color upon dissolving these remains (residuum) with strong pure nitric acid. For this purpose nitric acid of a standard of twenty-five to forty-five per cent. is poured

upon the plate, which is washed off subsequently on the spot. Sometimes it is advisable to protect the fatty color or ink which is upon the plate against the influence of the nitric acid, before the latter is poured upon the plate, by heating it or melting it again with colophony, asphaltum, or the like. Then the plate is cleaned and afterward polished with talc, whereupon its ground, *i. e.*, the exposed parts of its surface, are treated with a solution of the phosphoric acids or the like, as and for the purpose already mentioned. (See the part of the description before the example 1.)

Example 2: If the plate of aluminium is coated or lined with another metal, as, for instance, zinc, the operation is the same as indicated in the example 1, when using the same etchers; but in this case before the treatment of the plate with nitric acid it is absolutely necessary to strengthen the drawing once more with colophony and then to melt the latter. Instead of proceeding in this manner the plate can first be gummed, then, after the gum has become dry, washed out with turpentine-oil or the like, and finally protected again and strengthened, as usual.

Example 3: A plate of aluminium coated or lined with another metal, such as zinc, can be prepared also in the following manner: The coating of zinc should be freed from all adhering impurities, and then upon or to the surface of the coating of zinc the drawing, reprint, or impression is imposed or applied in the usual manner. Then this drawing, reprint, or impression is strengthened against the influence of acids, as usual, whereupon the parts of the metallic coating which are not protected by the fatty color are etched with an acid which does not corrode aluminium, as, for instance, nitric acid, until the said parts of the coating are removed and the corresponding parts of the aluminium plate are exposed. This etching can be performed in one or more times. In the latter case between two succeeding etching operations the drawing, reprint, or impression is to be strengthened again. To best perform this etching, I use a moderately strong nitric acid. In ordinary cases a diluted etcher of a standard of five to eight per cent. of nitric acid will answer the purpose, but I do not limit myself to a fixed dilution. After the etching has been performed the plate is washed out, rolled with fresh color, and treated with a solution of phosphoric acids or the like, as before mentioned, in order to obtain upon the exposed parts of the aluminium a precipitation of aluminium salt insoluble in water, but absorbing the latter and preventing the spreading of the fatty color.

Example 4: If the plate consists wholly of zinc, the preparation is the same as said in the examples 1 and 2, but in this case the exposed parts of the plate need no treatment with a solution of phosphoric acids or the like.

Example 5: When the plate is provided with a picture by means of one of the known photographic processes, then it is to be etched in the manner previously described, after having it protected with resin or the like or not, according to the employed process. Subsequently the plate, when required, is to be made susceptible to fat by rolling, rubbing, and the like.

Finally it may be remarked that in case the relief-plates produced as described are to be used in book-printing those parts of the plate which would be a hindrance are to be sawed out.

By the expression "electrically opposite" as used herein is meant that with relation to the known electromotive series of all bodies the heavy metals referred to must be electrically opposite to the metal of the relief-plate.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A process of producing relief-plates for reprinting purposes, of zinc or aluminium or aluminium coated or lined with another metal or an alloy, consisting in etching a plate of the said metal, after having imposed thereon a drawing, reprint or impression or having produced photographically a picture upon it, with suitable diluted salt solutions, preferably chlorids, of such heavy metals as are electrically opposite to the metal of the said plate, until the color-supports have attained the required height, and then removing the remains adhering to the plate with suitable acids, substantially as described.

2. A process of producing relief-plates for reprinting purposes, of zinc or aluminium or aluminium coated or lined with another metal or an alloy, consisting in etching a plate of the said metal, after having imposed thereon a drawing, reprint or impression or having produced photographically a picture upon it, with a mixture of suitable acids and diluted salt solutions, preferably chlorids, of such heavy metals as are electrically opposite to the metal of the said plate, until the color-supports have attained the required height, and then removing the remains adhering to the plate with suitable acids, substantially as described.

3. A process of producing relief-plates for reprinting purposes, of aluminium or aluminium coated or lined with another metal or an alloy, consisting in etching a plate of the said metal, after having imposed thereon a drawing, reprint or impression or having photographically produced a picture upon it, with suitable diluted salt solutions, preferably chlorids, of such heavy metals as are electrically opposite to the metal of the said plate, until the color-supports have attained the required height, and then removing the remains adhering to the plate with suitable acids, whereupon the ground or exposed parts of the plate after having been polished when required with talc, are treated with such liquids as will form on the ground a precipitate

of aluminium salt insoluble in water, but absorbing the latter and preventing the spreading of the fatty color, substantially as described.

4. A process of producing relief-plates for reprinting purposes, of aluminium or aluminium coated or lined with another metal or an alloy, consisting in etching a plate of the said metal, after having imposed thereon a drawing, reprint or impression or having produced photographically a picture upon it, with a mixture of suitable acids and diluted salt solutions of such heavy metals, as are electrically opposite to the metal of the said plate, until the color-supports have attained the required height, and then removing the remains adhering to the plate with suitable acids, whereupon the ground or exposed parts of the plate, after having been polished when required with talc, are treated with such liquids as will form on the ground a precipitate of aluminium salt insoluble in water, but absorbing the latter and preventing the spreading of the fatty color, substantially as described.

5. A process of producing relief-plates for reprinting purposes of aluminium coated or lined with another metal or an alloy, consisting in etching a plate of the said metal, after having imposed thereon a drawing, reprint or impression or having produced photographically a picture upon it, with an acid, preferably nitric acid, which does not corrode aluminium, until the non-protected parts of the coating are removed and the ground or corresponding parts of the aluminium plate are exposed, whereupon the ground is treated with such liquids, which form on the ground a precipitate of aluminium salt insoluble in water, but absorbing the latter and preventing the spreading of the fatty color, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

OTTO CARL STRECKER.

Witnesses:
WILHELM STRECKER,
CARL ED. HALZ.