

# UNITED STATES PATENT OFFICE

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## IMPROVEMENT IN METHODS OF PRODUCING PRINTING-SURFACES.

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*To all whom it may concern:*

Be it known that I, JOHN HENRY BANKS, of 11 Lavender Road, Battersea, in the county of Surrey, England, gentleman, a subject of the Queen of Great Britain, have invented or discovered new and useful Improvements in the Production of Printing-Surfaces, and of engraved metal surfaces applicable for other purposes; and I, the said JOHN HENRY BANKS, do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof—that is to say:

The object of my invention is mainly to produce from a drawing upon paper, or a letter-press, copper-plate, or lithographic print or drawing, a raised surface-block applicable for type-printing, or a plate similar to an engraved copper or steel plate, applicable for printing by the ordinary copper-plate or lithographic press.

The raised surface-plates can be produced either flat, or they may be cylindrical, for the purpose of printing upon calico, and such like purposes, metal dies to be used as seals, or for stamping paper and such like uses, or to be used as embossing-plates for book-binders for stamping or embossing book-covers or leather or other substances in high relief, or for other purposes connected with the printing, bookbinding, die-sinking, or embossing trades, where printing or embossing is used.

To produce the above results either from a drawing, letter-press print, photograph, or any work of art on paper, or painting, I first obtain a photographic negative in the ordinary way by means of a rectilinear lens and ordinary camera, upon glass, No. 1, except that I lastly develop it with a solution of bichloride of mercury, wash this off with cold water, and then put iodide of potassium; wash this off with cold water, and then put hydrosulphuret of ammonia—say, one dram to two ounces of water—for the purpose of making all the white parts in the print or drawing as opaque and black as possible on the glass, so that the sun or artificial light used in printing the design upon the prepared glass No. 2 (which I here-

after describe) shall not act upon the white parts, but only on the drawing.

I afterward prepare a glass, No. 2, by laying it perfectly flat, and, according to the quality of the lines or work on the design, so I make the thickness or thinness of the film of gelatine or chondrine, which I prepare as follows: I take two ounces of gelatine, chondrine, best Russian or French glue, made from the pates of the buffalo or from parchment cuttings, and cut it into small shreds, and then pour upon it one pint and a half of cold water and let it stand until it is dissolved, say about ten hours, and then gently make it hot, not to boil nor burn, and, after laying the glass flat, I pour on the glass, if twelve inches by ten inches, three ounces, and then leave it to dry. After it is dry I then make up in a bath a solution composed of one ounce of bichromate of potash or other bichromate, or peroxide of chromium, to one quart of cold water, with about half a dram of hydrate of lime. I then place the glass containing the dried gelatine film upon it into the bath, taking care that the mixture covers it entirely, and when it has remained in three or four minutes I take the glass out and put it on its end to drain and dry, taking care that no daylight enters the room—only gas or dark yellow light. When this prepared glass No. 2 is perfectly dry and the film hard, I take an ordinary pressure-frame with a plate-glass front, and on the plate-glass I lay the photographic negative glass No. 1, with the silvered side upward, and upon this side I place the film side of the glass No. 2 upon it, and then I place a piece of black velvet upon the back of glass No. 2, press the whole tightly together, and expose the glass to the sun's rays, or to a magnesium, electromagnetic, or other white light, for about five, ten, or twenty minutes, and then I obtain a printed impression—that is, the design upon the gelatine. The negative glass being transparent and the white parts being black, the sun or other light can only go through the transparent parts, and so converts the printed portion of the gelatine into an almost insoluble compound, leaving the white portions perfectly soluble. I then take it into the dark-

ened room and immerse it in cold water—one quart mixed with ten grains of iodine or sixteen grains of iodide of potassium—from a quarter to half an hour. I then take it out and put it into a bath of cold water—two quarts mixed with twenty drops of ammonia—for about a quarter of an hour; then take it out and place it in a bath of two quarts of cold water mixed with one ounce of acetic acid for about five or ten minutes, to develop the edges of the design that have not been raised up. By this means I obtain a gelatine surface mounted on glass and having the white portions of the drawing raised up to a very great height—quite as high as any wood engraving is cut in depth—and the drawing is level and suuk. The gelatine surface has also been strengthened and toughened, so that a cast can afterward be readily taken from it, whereas heretofore the casts taken from gelatine plates have been very imperfect.

I then mix some plaster-of-paris or cement and take a cast, which gives the design raised up and the white portions indented similar to wood engraving. Should any of the white portions not be sufficiently deep, I then proceed to deepen them. One method I have is to roll over the raised portions of the plaster cast a mixture of printing-ink and copal, or some one of the varnishes now in use commercially, and when dry I dip the plaster mold into a bath of very weak soap one part and cold water five hundred parts, and brush away with a soft brush the unprotected plaster; and afterward I harden the plaster with weak alum and pyrogallie acid and water until the air-bubbles cease to rise from it.

Another way I have is to cut away with a gouge all the whites that are not sufficiently deep enough; but if I require to take a casting in plaster-of-paris for stereotyping purposes, I do not use the soap water, but harden the first cast by immersing it in a bath of hot size, a little treacle, and peroxide of chromium until the air-bubbles cease to rise from it, and then expose it to light, and while wet I lay a frame upon it, pour in the plaster-of-paris, and just before it sets, I put it under pressure, and the loose water being pressed out gives a much sharper casting.

If an electrotype is required instead of a stereotype casting, I then take the plaster cast that has been taken from the gelatine film and soak it in cold water until bubbles cease to rise from it; or, by preference, I lay the plaster cast in a bath of cold water, face upward, with the water reaching nearly to the face, and keep the block in the water until the water has permeated through the block to the face. I then make the face of the plaster hot by placing it over a gas flame, and put a frame on the face, and pour on it a preparation of hot wax mixed with resin and lard, which mode I prefer, and thus take an impression in wax from the plaster mold. I afterward polish this wax impression in the

usual way with black lead, or coat it with metal by using mercury. By washing the mold with spirits of wine, and when nearly dry allowing the fumes of mercury to settle on the face, I get a metallic covering, which readily receives a surface of copper without being brushed, whereby the fine lines are kept intact.

In a similar manner the surface of the gelatine plates themselves may be coated with a thin film of mercury to enable an electrotype to be taken direct from them.

To produce a copper plate similar to a copper-plate engraving, I take a negative with the lights and shades reversed, and by adapting the same portion of the process of glass 1 and 2, which relates to the printed representation on glass No. 2, and raising the surface with acetic acid and water only, I then take a plaster mold, and from it a casting in wax to electrotype, and so produce a copper plate, as thick as an ordinary engraved copper plate, with the drawing indented exactly similar to an engraved plate, which can be printed by the ordinary copper-plate press.

For some work I modify the mode by not taking a negative, but by placing the print in contact on glass No. 2, it acts as the negative, and after it is reproduced on glass No. 2, and proceeding as already described, a plate is produced which can be printed from in the ordinary manner.

Having now described the nature of my invention, and the manner of performing the same, what I claim is—

1. The herein-specified improvement in the art of preparing gelatine surfaces upon glass for receiving the imprints of photographic negatives, from which imprints printing-surfaces are to be obtained, which improvement consists in pouring warm gelatine on the glass, and after it becomes dry soaking it in a solution of bichromate of potash, or other bichromate or peroxide of chromium, hydrate of lime, and cold water, and then drying without exposure to daylight, as and for the purposes set forth.

2. The herein-specified improvement in the art of treating gelatine surfaces upon glass after an imprint from a photographic negative has been made upon them, in order that a printing-surface may be obtained, which improvement consists in taking the glass, with its imprinted gelatine surface, into a darkened room, and bathing it, successively, in a solution of iodine or iodide of potassium, a solution of ammonia, and a solution of acetic acid, as and for the purposes set forth.

3. The herein-specified improvement in the art of producing printing-surfaces, which consists in preparing the plaster cast by soaking it in water, or laying it in a bath, face upward, in cold water nearly to reach the face, and when the water has permeated to the face, removing the cast from the bath, and thoroughly drying its face by the application of heat prior

to pouring melted wax upon it for obtaining a cast of the surface in wax, as described.

4. The herein-specified improvement in the art of producing printing-surfaces, which consists in hardening the plaster casts by immersing them in hot size, treacle, and oxide of chromium, as described.

5. The herein-specified improvement in the art of producing printing surfaces, which consists in pressing the plaster-casts, as described, just at the time of setting, and when exposed to the light after a bath of hot size, treacle, and peroxide of chromium, for the purpose specified.

6. The herein-specified improvement in the art of producing printing-surfaces, which consists in preparing plaster casts, gelatine plates, or wax impressions for electrotyping, by causing vapor or fumes of mercury to settle on and form a thin film upon the surface, substantially as and for the purposes set forth.

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