UNITED STATES PATENT OFFICE.

ALFRED ROST, OF HALBSTADT, AUSTRIA-HUNGARY.

COATING FOR MIRRORS AND METHOD OF PRODUCING SAME.

SPECIFICATION forming part of Letters Patent No. 594,758, dated November 30, 1897.

Application filed February 11, 1895. Serial No. 538,029. (Specimens.) Patented in Germany October 13, 1894, No. 77,725.

To all whom it may concern:

Be it known that I, ALFRED ROST, merchant, a subject of the Emperor of Austria-Hungary, residing at Halbstadt, Austria-Hungary, have invented a certain new, useful, and Improved Universal Looking-Glass and Daylight-Reflector and Method of Manufacturing the Same, of which the following is a specification.

This invention has been patented to me in Germany under date of October 13, 1894, No. 77,725.

My invention relates to an improved process of coating mirrors; and the object of the invention is to provide a process by which mirrors and reflectors of all kinds may be provided with a coating of platinum and silver.

The looking-glasses with a coating of platinum and silver unite in them all the advantages of other looking-glasses hitherto known and used. They even by far surpass all other looking-glasses in respect to their extraordinary resistance against all influences of the atmosphere, as also against the chemical action of acids, gases, and the like. They further have the particular quality that they can be made with any desired degree of transparency or translucency, just the same as the known silver looking-glasses.

The transparent looking-glasses with a coating of platinum and silver excellently reflect on one side and act as mirrors, but at the same time they allow the light to pass. Such looking-glasses accordingly may be employed for admitting light into rooms into which persons outside are not desired to peep through the glass, or they may be employed where persons on one side of the glass wish to look through the same without being observed by those outside.

For the manufacture of ordinary looking-glasses flat plates of glass are used; but for daylight-reflectors corrugated plates are preferred. In all cases where the looking-glass is made transparent or translucent the coating of platinum and silver or of nitrate of silver is covered by a fine transparent coating of weather-proof varnish, and, further, if necessary, with a transparent plate of glass, or in some cases a wirework of wide meshes may be employed.

The new method of manufacturing the coating of platinum and silver by the wet process is as follows: Of a compound of nitrate of silver and platinum salts I prepare a solution which, through the agency of reducing means, I apply to the glass. To prepare the compound salt before mentioned, an alloy of platinum and silver is during a considerable time boiled in concentrated nitric acid. The platinum which has not entered into solution by said boiling process is separated by filtration, and then the pure solution is concentrated by evaporation up to the state of crystallization. According to the standard of platinum of the coating-salt which it is desired to obtain, a corresponding platinum-silver alloy is taken in such manner that, for instance, in order to obtain a coating-salt of ninety-five per cent. of silver and five per cent. of platinum an alloy is used of ninety per cent. of silver with ten per cent. of platinum, &c. This alloy is, as hereinbefore indicated, boiled for a considerable time in concentrated nitric acid. The platinum which has not entered into solution by said boiling process is separated by filtration, and the pure solution is concentrated by evaporation up to the state of crystallization, and the crystals thus obtained contain silver and platinum in the proportion as indicated hereinbefore and serve for the production of the solutions which will now be described. From the crystals thus obtained I then prepare immediately previous to their application the following two solutions, viz:

1. The proper coating fluid by dissolving one part, by weight, of the crystals before described in ten parts, by weight, of distilled water.

2. The neutralizing fluid, which is exactly the same as that specified under 1, but of smaller quantity.

To the solution described above under 1 I add ammonia under constant agitation. In the end said addition is made by drops until the sediment which had first been formed has been dissolved again and the fluid gets clear. To obtain this, ammonia must be added in excess, but this being objectionable in the following process, so much of the neutralizing fluid before described is added till the smell

of ammonia is no more perceptible and the fluid is again muddy. After this I add upon one part, by weight, of the crystals employed in preparing the solution before stated under 1 one hundred parts, by weight, of distilled water, and thereupon I continue filtering till the fluid is obtained fully clear. The coating fluid is now ready for use, but it cannot be preserved, because in keeping it during a period of some extent it will again become muddy by decomposition, the platinum being deposited on the ground of the reservoir in the form of a lemon-colored powder.

To prepare the reduction fluid, I proceed as follows: 0.8 parts, by weight, of Rochelle salts are boiled with three hundred and eighty-four parts, by weight, of distilled water, and to the boiling solution I gradually add a solution of one to three parts, by weight, of nitrate of silver in eight to ten parts, by weight, of distilled water.

If it is desired to obtain opaque platinum-silver looking-glasses of particular beauty and whiteness I prepare, besides the coating fluid proper, an additional fluid which I obtain by boiling 1.8 grams of Rochelle salts with nine hundred and ninety cubic centimeters of water. To the bubbling mass I add a solution of one gram of nitrate of silver in eight cubic centimeters of water.

Another modification in manufacturing opaque looking-glasses consists in diluting the coating fluid above described under 1 by two hundred parts, by weight, of water upon one part, by weight, of the crystals employed in preparing the solution 1. For the rest the particular reduction fluid before described is not essential in the process of my invention. Other reducing agents which are generally known may be employed alone or in combination with each other. The preference of one or the other of such reducing agents will depend on the particular purpose to be obtained—viz., of the greater or minor quantity of platinum desired to be deposited and, consequently, of the desired degree of opaqueness or transparency to be produced, and, further, of the desired shade of color of the looking-glass and of the extent of time within which the operation is desired to be completed.

The operation of forming the coating or deposition on the glass plate is as follows: A mixture is prepared of equal volumes of the coating fluid and the reducing fluid above described, or three volumes of the coating fluid may be mixed to one volume of the reducing fluid and two volumes of the additional fluid before described, the mixture being prepared by stirring or shaking the fluids in a common receptacle. The said mixture then is poured upon the glass plate, which previously has been carefully cleaned and arranged in horizontal position, or the glass plate may be submerged in the mixture, as usual in the manufacture of looking-glasses. The operation of coating the glass should be carried on at a temperature of at least 25° centigrade, and the fluids employed should be kept at least at the same temperature.

In coating the opaque looking-glasses ordinarily in use attention will be had to obtain the layer of platinum and silver, or of nitrate of silver, of great density, and for this purpose the operation of pouring the coating fluid on the glass plate needs to be repeated one or several times; but in the manufacture of transparent looking-glasses the formation of the metallic deposition, on the contrary, must be interrupted at the proper time by drawing off the coating fluid or by removing the glass plate from the bath, after which the said plate is carefully cleaned by rinsing it with distilled water.

In the beginning before practice has determined the exact time during which the operation of forming the transparent coating must be carried on an approximate scale for observing the degree of translucency may be obtained by spreading a sheet of white paper below the glass plate. It is essential that the coating should be distributed as uniformly as possible, as clear as possible, and not too dark of color, but nevertheless of sufficient density to constitute a fine and good looking-glass, which allows the light to penetrate and through which one may look from behind the glass. As soon as the fresh coating on the glass plate has been rinsed with distilled water the glass is put upright for drying, and when completely dry the coated side is covered with a fine colorless varnish, which may be poured over the surface or applied by dipping the glass plate into a bath of such varnish. When the said coating of varnish is completely dry, a transparent glass plate of corresponding thickness is laid over it and the whole then put into a frame. It is preferable to cement the mirror in its frame in order to prevent dust from entering between the two plates.

The transparent looking-glasses and daylight-reflectors of this kind may be applied everywhere in the place of other looking-glasses and daylight-reflectors, and where it is desired that the light penetrate the glass, or where the person behind the glass desires to look through it without being seen from without. The application accordingly is particularly indicated for the panes of shops, magazines, warehouses, and the like, or to fill the back of casings in shops and magazines, also for panels and panes of doors in by-rooms, bath-rooms, and any other places into which daylight is desired to enter, while persons without are not suffered to look in, or where persons within desire to look out through the glass without being seen from the outside.

Having now particularly described and ascertained the nature of my invention and in what manner the same is to be performed, I declare that what I claim is—

1. The herein-described process of coating

mirrors consisting in dissolving platinum and silver in nitric acid and filtering the same, evaporating the solution to obtain crystals dissolving the crystals in water and adding ammonia, and finally a reducing fluid and coating the glass with the resulting solution, substantially as described.

2. As an article of manufacture, a mirror of transparent material having a thin coating of an alloy of platinum and silver of such thickness as to be partially transparent by transmitted light and reflective by reflected light, substantially as described.

Signed at United States consulate general, Vienna, Austria, this 12th day of January, 1895.

ALFRED ROST.

Witnesses:
HARRY BELMONT,
JOSEPH LEHETURN.