Patented Aug. 30, 1932 1,875,292

UNITED STATES PATENT OFFICE

ROBERT JOHN, OF LONG BRANCH, NEW JERSEY, ASSIGNOR TO AQUATONE CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE

LIGHT SENSITIVE FILM, SENSITIZER THEREFOR AND PROCESS OF PRODUCING SAME

No Drawing. Application filed May 26, 1927. Serial No. 194,535.

This invention relates to light sensitive films such as are used to obtain photographic reproductions and the production of such films.

Solutions of chromic acid salt have been used as sensitizing solutions for rendering gelatinous or albuminous or collodial films sensitive to the action of light, the action of the light thereon being to harden or desolubilize such portions of said sensitive films as are exposed to light. Such sensitive gelatinous, albuminous films are commonly employed in photoengraving, photolithography, photogravure, rotogravure, photogelatine printing, carbon printing and other photomechanical photographic process and the chromic acid salt is employed in such cases to render the surfaces of the films sensitive to the action of light. In such cases the films are usually sensitized either by incorporating a chromic acid salt, such as potassium bichromate or ammonium bichromate, in solution with the film itself before coating the carrier or support with the film, or by affixing the film to the support and then sensitizing the film, as by bathing, with an aqueous solution of potassium or ammonium bichromate. Certain accelerating agents, such as sodium carbonate and ammonia, have been incorporated in the chromic acid salt solutions to increase the amount of salt incorporated in the film thereby increasing the sensitivity of the resulting product.

I have discovered that when ammonium nitrate is used in conjunction with a chromic acid salt and then the film is sensitized with the mixture of the chromic acid salt and ammonium nitrate, the effect is greater than if any other salt of which I have knowledge, were used in conjunction with the chromic acid salt. The ammonium nitrate may be used as any other salt that is, the ammonium nitrate may be mixed with the chromic acid salt and both incorporated in solution with the film before the film is affixed to the carrier or support or a solution of ammonium nitrate and chromic acid salt may be made and then the film with its carrier may be bathed in the solution to sensitize the film in the usual manner. One of the objects of the invention therefore is a new composition of matter for producing light sensitive films; another object of the invention is a process for producing such light sensitive films by the use of said sensitizer; another object of the invention is the light sensitive film so produced. Other objects and features of the invention will more fully appear from the following description and will be particularly pointed out in the claims.

As stated above the sensitizer may be utilized in many different ways but successful results have been obtained by proceeding in the following manner using the ingredients in the proportions stated. It is to be understood however, that the following description is merely to illustrate the features of the invention and is not intended to limit the scope thereof nor the scope of the appended claims.

A film of gelatinous, albuminous, collodial or other suitable matter is applied to a carrier or support, for instance a plate or a flexible base such as is used in the so called roll or pack "films" intended to be used in cameras. The base or carrier may be either transparent so that it is adapted for the usual photographic printing or it may be of an opaque material such as copper or zinc so that the resulting product may be used for photoengraving or photolithography, etc. The film is affixed to the plate in any suitable manner.

The sensitizer is prepared by making a solution of approximately 64 ounces of water having dissolved therein 1600 grains of ammonium bichromate and 160 grains of ammonium nitrate and the film is sensitized by immersing it, together with its carrier, in the sensitizing solution. With a sensitizing solution composed of the ingredients given the film is effectively sensitized by immersion in the solution for less than 5 minutes. The solution is preferably agitated while the film is immersed in it either by stirring the solution or moving the film within the solution so that fresh solution constantly passes in contact with the film. In this way the film is given uniform treatment and it has been found that when the solution is agitated the film is sufficiently sensitized if it remains in contact with the solution for approximately

2 minutes. The film absorbs the water and salts while immersed in the solution in substantially the proportions in which the salts are present in the solution and the sensitized film is then withdrawn from the solution and dried in any suitable manner as by being hung in a drying room or dried on one of the well known drying machines.

The sensitized film may also be prepared by mixing together 10 parts dry ammonium bichromate and 1 part of dry ammonium nitrate and incorporating a suitable amount of the mixed salts into the material from which the film is to be prepared. The salts are preferably powdered before they are incorporated into the film material and may either be powdered separately and then mixed in the proportions of 10 parts of the bichromate to 1 part of the nitrate or they may be mixed in the proper proportions and then powdered prior to their incorporation into the film material.

It has been found that by treating or preparing a film in this manner the sensitized effect is increased far beyond that obtained by the use of any other sensitizer and the result is a film in which the hardening effect of light exposure is materially increased, not only over the use of the plain chromic acid salt, but also over the use of such chromic acid salt in conjunction with other agents such as sodium carbonate and ammonia.

By the term "light sensitive film" appearing in the claims is meant the film such as is on a base or carrier or support, for instance, the film on a glass or similiar carrier either transparent or opaque, said film being composed of gelatinous, albuminous, collodial or other similar materials either along or combined with one another and with or without a light sensitive compound such as silver salts, etc.

Athough a particular and preferred form of the invention has been described, it is recognized that modifications may be made and it is distinctly to be understood that the invention is to be construed as broadly as the limitations in the claims taken in conjunction with the prior art may allow.

I claim:

1. A solution for producing light sensitive films including substantially 64 ounces of water, 1600 grains of ammonium bichromate and 160 grains of ammonium nitrate, the bichromate and nitrate radicals not being in excess over the ammonium radicals.

2. A sensitizer for producing light sensitive films including ammonium bichromate and ammonium nitrate in the proportions of 10 parts of bichromate to 1 part of nitrate, the bichromate and nitrate radicals not being in excess over the ammonium radicals.

3. In the process of producing light sensitive films, the step which includes treating the films with an aqueous solution containing ammonium bichromate 10 parts and ammonium nitrate 1 part, the bichromate and nitrate radicals not being in excess over the ammonium radicals.

4. In the process of producing light sensitive films, the step which includes treating the films for less than five minutes with an aqueous solution containing ammonium bichromate and ammonium nitrate, the bichromate and nitrate radicals not being in excess over the ammonium radicals.

5. In the process of producing light sensitive films, the step which includes treating the films for less than five minutes with a solution including 64 ounces of water, 1600 grains of ammonium bichromate, and 160 grains of ammonium nitrate, the bichromate and nitrate radicals not being in excess over the ammonium radicals.

6. In the process of producing light sensitive films, the step which includes treating the films for two minutes with a solution containing 64 ounces of water, 1600 grains of ammonium bichromate, and 160 grains of ammonium nitrate, the bichromate and nitrate radicals not being in excess over the ammonium radicals.

7. In the process of producing light sensitive films, the step which includes treating the films for two minutes with an aqueous solution containing ammonium bichromate 10 parts and ammonium nitrate 1 part, the bichromate and nitrate radicals not being in excess over the ammonium radicals.

8. In the process of producing light sensitive films, the step which includes treating the film for two minutes with an aqueous solution containing ammonium bichromate 10 parts and ammonium nitrate 1 part while agitating the solution in contact with the film, the bichromate and nitrate radicals not being in excess over the ammonium radicals.

9. A light sensitive film including as a sensitizer 10 parts of ammonium bichromate to 1 part of ammonium nitrate, the bichromate and nitrate radicals not being in excess over the ammonium radicals.

10. An alkali chromate solution for producing light sensitive films, in which is incorporated ammonium nitrate, the acid radicals in the solution not being in excess over the basic radicals.

11. An alkali bichromate solution for producing light sensitive films, in which is incorporated ammonium nitrate, the acid radicals in the solution not being in excess over the basic radicals.

12. A solution for producing light sensitive films including an ammonium chromate and ammonium nitrate, the chromate and nitrate radicals not being in excess over the ammonium radicals.

13. An aqueous solution for producing light sensitive films including ammonium bichromate and ammonium nitrate, the bi-

chromate and the nitrate radicals not being in excess over the ammonium radicals.

14. In the process of producing light sensitive films, the step which includes treating the films with an alkali chromate solution containing ammonium nitrate, the chromate and nitrate radicals not being in excess over the alkali radicals.

15. In a process of producing light sensitive films, the step which comprises treating the films with an alkali bichromate solution containing ammonium nitrate, the bichromate and the nitrate radicals not being in excess over the alkali radicals.

16. In the process of producing light sensitive films, the step which comprises treating the film with a solution containing ammonium bichromate and ammonium nitrate, the bichromate and the nitrate radicals not being in excess over the ammonium radicals.

17. In a process for producing light sensitive films, the step which comprises treating the films with an aqueous solution of ammonium bichromate and ammonium nitrate, the bichromate and the nitrate radicals not being in excess over the ammonium radicals.

18. A light sensitive film including as a sensitizer an alkaline chromate and ammonium nitrate, the chromate and the nitrate radicals in the film not being in excess over the alkali radicals.

19. A light sensitive film including as a sensitizer an alkaline bichromate and ammonium nitrate, the bichromate and the nitrate radicals in the film not being in excess over the alkali radicals.

20. A light sensitive film including as a sensitizer ammonium bichromate and ammonium nitrate, the bichromate and the nitrate radicals in the film not being in excess over the ammonium radicals.

In testimony that I claim the foregoing, I have hereunto set my hand this 23d day of May, 1927.

ROBERT JOHN.