

# UNITED STATES PATENT OFFICE

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## PHOTOGRAPHIC DEVELOPER FOR USE AT HIGH TEMPERATURES

No Drawing.

Application filed February 12, 1930. Serial No. 427,944.

This invention relates to a photographic developer, especially to one capable of use at relatively high temperatures and more particularly to one which contains a well-known hardening agent, namely, formalin, but which contains a developing agent such that the developer gives no appreciable fog at the temperatures used. This is a specific application of the ideas broadly claimed in the co-pending application Serial No. 435,954 filed March 14, 1930, by John I. Crabtree and John F. Ross.

An object of the invention is to avoid excessive fog when formalin is used to harden the film.

The use of formalin as a hardening agent in developers or other photographic baths, especially for use in the tropics or at relatively high temperatures, has been known for many years, there being many references to its use in the literature and text books of photography. In the art of photographic developing, temperatures very much in excess of 70 degrees Fahrenheit are usually termed high temperatures and the term is so used here. When formalin is used with any of the ordinary developers for high temperature work it usually produces a heavy fog or veiling of the image which is, of course, objectionable. This cannot be overcome by the use of any of the agents usually employed for reducing fog, such as potassium bromide, and the use of formalin for high temperature development has therefore been greatly restricted. This is particularly true of alkaline developing solutions.

I have found that by using only a certain class of developing agents in a formula for a photographic developer including formalin that no appreciable fog is produced even if the solution is alkaline. The developing agents which I use are the halogen substituted hydroquinones, such as monochlorhydroquinone, dichlorhydroquinone, trichlorhydroquinone, mono- and di-bromhydroquinone and iodohydroquinone. It is only necessary to make up a suitable developer containing these substances together with formalin to prepare a developer giving the desired results. Development, of course, is

carried out in the usual manner after which the plate or film is washed and fixed, preferably in a hardening-fixing bath of a well known type.

In carrying out my invention the formaldehyde may be used in the form of the 40% solution sold on the market or in the form of the dry powdered trioxymethylene which with water under the conditions employed yields formaldehyde. Two formulæ which are illustrative of a number which may be used are:

### Formula 1

Dichlorhydroquinone.....	5.0 grams	65
Sodium sulphite, anhydrous.....	25.0 grams	
Sodium carbonate, anhydrous.....	25.0 grams	
Potassium bromide.....	1.5 grams	
40% formaldehyde.....	12.5 cc.	
Water to.....	1.0 litre	70

### Formula 2

Chlorhydroquinone.....	5.0 grams	
Sodium sulphite.....	25.0 grams	
Sodium carbonate.....	25.0 grams	75
Potassium bromide.....	1.5 grams	
Trioxymethylene.....	5.0 grams	
Water to.....	1.0 litre	

While particularly useful at higher temperatures the advantages are also inherent whatever the temperature. Formalin is not, however, often used at low temperatures. I consider as within my invention all equivalents and modifications coming within the scope of the appended claims.

What I claim is:

1. A photographic developer substantially free from fogging effects when used at high temperatures including formalin and a halogen substituted hydroquinone.

2. A photographic developer substantially free from fogging effects when used at high temperatures including formalin and a chlorhydroquinone.

3. A photographic developer substantially free from fogging effects when used at high temperatures including formalin and monochlorhydroquinone.

4. A photographic developer substantially free from fogging effects when used at high

temperatures including formalin, an alkali and a halogen substituted hydroquinone.

5. A photographic developer substantially free from fogging effects when used at high temperatures including formalin, an alkali and a chlor-hydroquinone.

6. A photographic developer substantially free from fogging effects when used at high temperatures including formalin, an alkali and mono-chlor-hydroquinone.

Signed at Rochester, New York, this 1st day of February, 1930.

LOWELL E. MUEHLER.

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