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PATENT SPECIFICATION



Convention Date (Austria): May 9, 1936.

501,003

Application Date (in United Kingdom): May 10, 1937. No. 26472/38.

(Divided out of No. 500,826).

Complete Specification Accepted: Feb. 10, 1939.

COMPLETE SPECIFICATION

Process of Colour Photography

We, KODAK LIMITED, a Company registered under the Laws of Great Britain, of Kodak House, Kingsway, London, W.C.2 (Assignees of KARL SCHINZEL, of Otten-
5 dorfergasse 12, Troppau (Silesia), Czechoslovakia, formerly residing in Vienna, Austria, a citizen of the Republic of Austria), do hereby declare the nature of this invention and in what
10 manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to processes of colour photography and in particular to
15 the colour processing of multi-layer three-colour photographic elements.

It is known that the selective colour processing of reversed silver halide images in three layers, not containing colour
20 formers, carried on a single support, can be accomplished by the controlled penetration of processing baths (see Specifications Nos. 427,518; 427,520; 454,498; 454,499 and 454,622).

The present invention is concerned with processes in which the selective processing of the residual silver halide images resulting from the reversal process is
25 accomplished by selectively rendering images in the different layers developable.

According to this invention, a multi-layer colour photographic process wherein the first latent images are developed to silver and removed and the residual
30 images are selectively processed to colour, is characterised by rendering some or all of the residual images developable, developing them to silver and then re-converting the silver to silver chloride,
40 in a fine state of subdivision, before selectively processing them to colour. Silver chloride, in a fine state of subdivision, is particularly susceptible to colour development and coupling development, more so
45 than coarse-grained silver chloride or even highly dispersed silver bromide.

In a three-layer element, the middle layer is usually yellow and green sensitive and the lower layer red sensitive. This
50 order of the layers may be changed, if a very sharp blue image is desired, by having the middle emulsion sensitive to red and orange and the lower emulsion to

yellow and green. This variation has been made possible by the fact that red
55 sensitizers which do not sensitize to green and yellow but very strongly sensitize to the extreme orange red, in addition to the genuine red, can now be made; 4:4'-
60 dichloro-2:2':8-triethylthiacarbocyanine chloride is suitable. The three layers may be coated on the same side of the support or the red or yellow-green sensitive emulsion can be situated alone on the back of the support and the two others on the
65 front. Alternatively the element may have two emulsion layers one of which contains a mixture of silver halide emulsions respectively sensitized for the red and green regions of the spectrum while
70 the other contains not specially sensitized silver halide emulsion.

The process of the invention is carried out as follows:—

After camera or printing exposure, the
75 superimposed latent images are first of all developed to the three black component silver images by an ordinary, non-tanning preferably neutral developer, such as ferrous oxalate, amidol or
80 diamido-*o*-cresol. Most other organic developers in solutions containing sodium carbonate are also suitable, since they do not noticeably harm the colour sensitivity. and, if necessary, this can be at least
85 partially restored by a known reagent, such as an alkali sulphite or bisulphite.

In order to avoid the undesirable effect of local under-exposure in the lower layers it is best to saturate all three layers first
90 in a solution of the developing agent (which does not act in the absence of alkali) of a considerably stronger concentration than usual, and then to develop in solutions of sodium carbonate,
95 ammonia or other weak alkalies such as alkali bicarbonate, borax, trisodium phosphate or sodium aminoacetate. Alternatively, a concentrated developing solution can be allowed to diffuse into all the
100 layers at as low temperature as it is possible to employ without alteration in composition of the solution, and the development process started or accelerated by warming the layers to room temperature
105 or above.

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The metallic silver formed on first development of the latent images can be removed by completely dissolving it up with oxidising agents and washing it out.

5 The residual silver halide in some or all of the layers is then reduced to silver.

The reduced silver of the residual images can now be converted into highly dispersed silver chloride by treatment
10 with potassium ferricyanide and sodium chloride or with lead chloride or with mercuric chloride.

Further treatment may be carried out in different ways, and depends upon
15 whether filter layers are provided, or the sensitizers are stable to silver-oxidising baths or only to photographic developing baths, or whether the upper layer consists of silver chloride. Thus it can be

20 carried out by processes described in Applications Nos. 33290/38 (Serial No. 500,793), 24633/38 (Serial No. 499,185), 13250/37 (Serial No. 500,826), 26469/38 (Serial No. 501,000), or 26470/38 (Serial
25 No. 501,001).

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be

performed, we declare that what we claim is:—

30 1. A multi-layer colour photographic process wherein the first latent images are developed to silver and removed and the residual images are selectively processed to colour, which is characterised
35 by rendering some or all of the residual images developable, developing them to silver and then reconverting the silver to silver chloride, in a fine state of subdivision, before processing them to colour. 40

2. Process as claimed in claim 1, in which for the first development all the layers are impregnated with the developing agent in high concentration and are then treated with weak alkali to effect
45 development.

3. Process as claimed in claim 1, in which for the first development all the layers are impregnated at a low temperature, as herein described, with concentrated developing solution and are then
50 heated to effect development.

Dated this 9th day of September, 1938.

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