UNITED STATES PATENT OFFICE.

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PROCESS OF SIMULTANEOUSLY DEVELOPING AND FIXING PHOTOGRAPHIC PLATES.

SPECIFICATION forming part of Letters Patent No. 634,137, dated October 3, 1899.

Application filed March 21, 1899. Serial No. 709,972. (No specimens.)

To all whom it may concern:

Be it known that I, PAUL HANNEKE, a subject of the King of Prussia, German Emperor, residing in Berlin, Prussia, German Empire, have invented certain new and useful Improvements in Processes for Simultaneously Developing and Fixing Latent Photographic Images, of which the following is a specification.

The usual photographic process has hitherto been considered defective in that the image produced in the developing is not at the same time rendered permanent, but only acquires that quality by the subsequent fixing operation. Endeavors have therefore long been made to simplify the photographic process by uniting the developing and the fixing operations into one. The various attempts in this direction have in some special cases led to interesting results, but not as yet to a really generally applicable practical process. Of recent labors in this direction I may mention those of Punnett, who on page 126 of the *British Journal of Photography* for 1898 describes the obtaining of a fixed image with some kinds of diapositive or lantern plates (gelatin plates containing silver chlorid and bromid) by the application of a strongly-caustic alkaline ortol developer in the presence of a fixing-salt; but with the best diapositive plates in the market and strictly following Punnett's directions I obtained an image of only very small intensity, and the gelatino-silver-bromid dry-plates used for producing negatives and therefore much more important gave no image at all when used according to Punnett's process. W. B. Bolton describes on page 804 of the *British Journal of Photography* for 1898 and on pages 20 and 52 of the same journal for 1899 a developing, strengthening, and fixing in one operation, (not, however, for simplifying the process, but for obtaining perfect negatives;) but he denies from his own experiments the possibility of applying successfully the process to silver-bromid dry-plates. It is also known that sodium thiosulfate (hyposulfite) easily dissolves silver-bromid exposed to light, and none of the heretofore-used developer solutions, including the so-called "rapid developers," have been able to surpass in effect the said thiosulfate (hyposulfite) or to yield a useful image in the presence of thiosulfate (hyposulfite) in excess. The pyrocatechin in the form heretofore used forms no exception in this application. It is further known that slowly-acting alkaline developers can be to some extent rendered into rapid developers by substituting caustic alkalies for the carbonates; but while, for instance, with the isomeric hydrochinon three to four parts of potassium hydrate are required for one part of hydrochinon in order to produce a rapid developer, (which owing to its strongly-alkaline character has only a limited application) pyrocatechin, on the other hand, (and this is new,) with the amount of alkali hydrate required for forming the di-alkali-salt or with a still less amount of alkali hydrate forms an extremely rapid developer.

The developer is, in a concentrated form, composed as follows: I.—Seven grams pyrocatechin, six grams potassium hydrate, thirty grams crystallized sodium sulfite, seventy-five grams water.

The application of the pyrocatechin alkali-developer also in combination with sodium (thiosulfate—*i. e.*, hyposulfite) gave at once a splendid result.

For a dry-plate of thirteen by eighteen centimeters is used: II.—Ten cubic centimeters of the concentrated developer I, twenty cubic centimeters of sodium thiosulfate solution one to five, twenty cubic centimeters of water.

Without prolonging the time of exposure beyond the usual one obtains by instantaneous or by time exposure in the course of three to five minutes (all according to the kind of plate used) a perfect, well-developed, (modulated,) nicely-covered, and perfectly-fixed negative. An unexpected advantage of the process shows itself here at once in that the whole process is completed in a fraction of the time which, supposed also the success of the process, should be considered as to be required for it.

The used developer may be used for a second and third plate.

The fixing-developer equalizes various degrees of exposure, so that even a much over-exposed plate when treated with a freshly-formed developer yields a negative that can

be printed. Like the ordinary developer it may easily adapt itself to various cases by dilution, by applying used developer, or by suitable additions—such, for instance, as potassium bromid and the like. The fixing-developer may thus also be successfully used for films, silver-bromid paper, or lantern-plates. Very remarkable results are obtained with the latter while using a developer composed, for instance, as follows: III. Five cubic centimeters of the concentrated developer I, forty cubic centimeters of sodium thiosulfate solution one to five, ten cubic centimeters of water. A perfectly glass-clear and good image is thus obtained in the shortest possible time.

Instead of the potassium hydrate I may with quite similar success employ sodium hydrate or lithium hydrate or a mixture of two or three of these bases, and I may also let other thiosulfates of alkali partly or wholly take the place of the sodium thiosulfates, (hyposulfite.)

The aforesaid relative amount of alkali in the developer is only chosen as an example. It may be varied within rather wide limits without rendering the success of the process doubtful.

The technical value of the described new process would thus not only depend upon its at once solving the old problem by developing to obtain enduring photographic images in a surprisingly simple and yet complete manner, thus effecting a material saving to the amateur and the professional photographer in time, labor, and tools, but also on the circumstance that it gives results so distinctly good as not to be attained so easily and certainly by the heretofore usual process.

Having fully described my invention, what I desire to claim and secure by Letters Patent is—

A process for simultaneously developing and fixing latent photographic images consisting in treating the exposed photographic gelatin plates, films, or papers with a solution containing an alkali compound or alkali compounds of pyrocatechin and a fixing agent, especially a thiosulfate (hyposulfite) or thiosulfates.

Signed at Berlin, Prussia, German Empire, this 9th day of March, 1899.

PAUL HANNEKE.

Witnesses:
WOLDEMAR HAUPT,
HENRY HASPER.