UNITED STATES PATENT OFFICE.

BERNHARD HEYMANN, OF ELBERFELD, GERMANY, ASSIGNOR TO FARBENFABRIKEN OF ELBERFELD CO., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PROCESS OF DYEING ON THE FIBER.

SPECIFICATION forming part of Letters Patent No. 688,999, dated December 17, 1901.

Application filed April 19, 1901. Serial No. 56,615. (No specimens.)

To all whom it may concern:

Be it known that I, BERNHARD HEYMANN, doctor of philosophy, chemist, (assignor to the FARBENFABRIKEN OF ELBERFELD CO., of New York,) residing at Elberfeld, Germany, have invented a new and useful Improvement in Processes of Preparing New Sulfurized Dyestuffs on the Fiber; and I hereby declare the following to be a clear and exact description of my invention.

I have found that the so-called "sulfurized" substantive coloring-matters, which are obtained by treating different aromatic compounds with sulfur and sulfids or polysulfids of alkalies or the like, can be transformed into alkylated or alphylated substitution products when they are treated with alkylating agents. I point out distinctly that I intend to denote under the name "alkylating agents" as well "alkylating" as "alphylating" agents.

The process is especially valuable for dyeing purposes. The materials dyed with sulfurized dyestuffs are subsequently treated on the fiber with alkylating agents. For this alkylation process such materials can be used which are directly dyed with sulfurized dyestuffs, or goods which after dyeing with these sulfurized dyestuffs are further oxidized on the fiber either by exposing them to the air while still wet or by treating them with potassium bichromate or the like. The process of alkylation is carried out by handling the dyed goods for some time in a bath containing the alkylating agents. It is advisable to add to the bath bodies with alkaline reaction, such as caustic-soda lye, sodium sulfid, or the like. By these means the tints are in most cases essentially changed and fastness to boiling is increased. Such alkylating agents can be used as react in a neutral or an alkaline solution or suspension—as, for instance, ethyl bromid, benzyl chlorid, dimethyl sulfate, or the like. As the employment of these substances entails great inconveniences in dyeing on account of their volatility and small solubility in water, it is of great advantage to employ the same in the shape of their ammonium compounds, which are soluble in water and not volatile. The alkylation by means of these compounds takes place with a splitting off of the tertiary base. Thus, for instance, on employing phenyldimethylbenzylammonium chlorid the same result is obtained as by means of benzyl chlorid, the tertiary base being split off during the process. Phenyldimethylbenzylammonium chlorid, which can be obtained by the action of benzyl chlorid on dimethylanilin, (described in the *Berichte der Deutschen Chemischen Gesellschaft*, Vol. X, page 2,079,) has proved to be particularly valuable for this process, because it reacts with the greatest ease on the dyed goods. Chloroacetamid can also be employed with advantage as alkylating agent. It reacts also with great facility and is also easily soluble in hot water.

The following examples may illustrate my new process:

Example I: The cotton dyed with ten per cent. of the dyestuff obtained from dinitro-para-oxydiphenylamin (according to the process described in Letters Patent No. 610,541) and rinsed is introduced into a bath containing five per cent. of phenyldimethylbenzylammonium chlorid and ten per cent. of caustic-soda lye of 40° Baumé. It is handled for an hour at a temperature of about 80° centigrade. By these means the greenish-black shade of the goods burns slowly into a brilliant indigo-blue, distinguished by its fastness to boiling.

Example II: The cotton dyed in the usual manner with ten per cent. of the same dyestuff which has been employed in Example I is rinsed and then introduced into a bath containing three per cent. of chloroacetamid. It is handled for a quarter of an hour at a temperature of about 90° centigrade. After having added two per cent. of crystallized sodium sulfid it is further handled for a quarter of an hour at the same temperature. The dull greenish-black shade of the cotton has turned during this operation into a brilliant reddish blue of great fastness.

The process proceeds in an analogous manner if other sulfurized dyestuffs or other alkylating agents are employed. As I have above said, also such dyed goods can be employed on which the dyestuffs have been oxidzied after dyeing.

Having now described my invention and in

what manner the same is to be performed, what I claim as new, and desire to secure by Letters Patent, is—

The herein-described process for producing on the fiber new dyes, which consists, in treating textile fabrics dyed with sulfurized dyestuffs with alkylating agents, substantially as hereinbefore described.

In testimony whereof I have signed my name in the presence of two subscribing witnesses.

BERNHARD HEYMANN.

Witnesses:
OTTO KÖNIG,
J. A. RITTERSHAUS.