

UNITED STATES PATENT OFFICE.

BRUNO RICHARD SEIFERT, OF RADEBEUL, GERMANY, ASSIGNOR TO DR. F. VON HEYDEN NACHFOLGER, OF SAME PLACE.

PROCESS OF MAKING DISINFECTANTS.

SPECIFICATION forming part of Letters Patent No. 482,101, dated September 6, 1892.

Application filed July 5, 1890. Serial No. 357,861. (No specimens.)

To all whom it may concern:

Be it known that I, BRUNO RICHARD SEIFERT, chemist, of Radebeul, near Dresden, in the Kingdom of Saxony, German Empire, have invented a new and useful Improvement in the Manufacture of Disinfectants or Antiseptics, of which the following is a specification.

It is known that cresol is far superior as a disinfectant to phenol and all other bodies of the aromatic group. The insolubility of cresol in water is an impediment to its employment for clinical, medicinal, surgical, and like purposes as a substitute for the higher-priced phenol.

Laplace, Jäger, Fränkel, and Ohlmüller discovered that cresol solutions could be obtained in diluted hydrochloric and sulphuric acids and that they were a remarkably efficient protection from moldiness and decomposition; but this strongly-acid liquid is incapable of being employed medically. Besides these dilute mineral acids, soap is the only known dissolving agent for cresol.

Soluble mixtures of cresol with soap are known in commerce as "sapocarbols." Mixtures of various proportions of soap phenols of high boiling-point and hydrocarbons are sold as nostrums or secret remedies under the name of "creoline." These solutions of cresol in soap solutions certainly admit of being employed medicinally, but compared to the ordinary watery carbolic-acid solutions they present the following disadvantages, namely: First, they have an alkaline reaction and oxidize in consequence when exposed to the air, as all the alkaline solutions of phenols do; second, the hands or any surface with which they come in contact are rendered slippery or greasy in a manner which is liable to interfere with the work of a surgeon.

A model or perfect disinfectant for medical purposes would be obtained if such an effective agent as cresol could be obtained in the form of a watery solution in the same way as phenol. The solution of this problem has been accomplished by me and forms the object of the present invention. I have discovered, in the first place, that a disinfectant

containing cresol, xylol, and the like, capable of being diluted with water without separation of cresol, &c., can be obtained with the aid of salts of alkalies or earthy alkalies, as hereinafter described. This disinfectant is the subject of my application for United States Patent, Serial No. 440,272, filed July 16, 1892. For example, it is found that a nearly-concentrated watery solution of salicylate of soda can be mixed with cresol in any proportion, and that with sufficient quantities of the salicylate the cresol does not separate again in diluting the solution. When to twelve kilograms, for example, of sodium salicylate ten kilograms of water are added, no solution takes place at low temperatures; but when five kilograms of cresol are mixed with these ingredients a clear solution results, which can be diluted as required without separation of the cresol. It makes little difference whether ortho, meta, or para cresol or mixtures thereof with one another or with phenols of higher boiling-point be employed. In place of the higher-boiling phenols of coal-tar it is possible to employ the phenols of brown coal-tar, wood-tar, blast-furnace tar, and the like. Solutions are likewise obtained with salicylate of soda and such phenols as contain neutral hydrocarbons; but I prefer those tar phenols which are free from hydrocarbon. The salicylate of soda may be replaced by other salicylates—such, for example, as ammonium, potassium, or calcium salicylates or by the salts of any of the ortho-oxybenzene carbon acids. The dissolving power of the ortho-oxybenzene sulpho-acids is somewhat less. On the other hand, the salts of para-oxybenzene carbon acids and para-oxybenzene sulpho-acids exert no remarkable influence on the solubility of the higher-boiling phenol in water. The benzoic acid-salts and their homologues benzene sulpho-acid salts and their homologues act somewhat less strongly than salicylates. The corresponding naphthalene derivatives of all the bodies above mentioned as producing the solution of cresol operate in the same way and mostly in a higher degree.

The following table gives the organic salts that are found to be available. The propor-

tions of the mixture required for obtaining the solution of the cresol are also given for those salts which possess the greatest practical importance. The mixture is effected simply by stirring the materials together.

Solutions which when diluted to any desired extent with water do not separate from the cresol, xylenol, and the like are obtained with the following materials, namely:

- 10 *Ortho-oxybenzene carbon-acid salts*.—1, twelve kilos sodium salicylate, five kilos cresol, ten kilos water; 2, thirteen kilos ammonium salicylate, five kilos cresol; 3, fourteen kilos potassium salicylate, five kilos cresol; 4, calcium salicylate; 5, magnesium salicylate; 6, eight kilos ortho-cresotinic-acid salt of sodium, five kilos cresol, ten kilos water; 7, seven kilos mono-cresotinic-acid salt of sodium, five kilos cresol, eight kilos water; 8, eight kilos para-cresotinic-acid-salt of sodium, five kilos cresol; 9, eight kilos crude cresol carbon-acid salt of sodium, five kilos cresol, eight kilos water; 10, xylenol carbon-acid salts of sodium; 11, carbonate of sodium from high-boiling phenols of coal-brown, coal-wood, and blast-furnace tars; 12, chloro-salicylate of sodium; 13, chloro-cresotinate of sodium.

- Ortho-oxybenzene sulpho-acid salts*.—14, twenty-two kilos ortho-phenol sulpho-acid salt of sodium, five kilos cresol; 15, ortho-cresol ortho-sulpho-acid salt of sodium; 16, thirty kilos mono-cresol ortho-sulpho-acid salt of sodium, five kilos cresol; 17, twenty kilos para-cresol ortho-sulpho-acid salt of sodium, five kilos cresol; 18, crude cresol ortho-sulpho-acid salt of sodium; 19, xylenol cresol ortho-sulpho-acid salt of sodium; 20, the sodium salts of the corresponding chlorinated acids.

- Benzene carbon-acid salts*.—21, twelve kilos benzoic acid salt of sodium, five kilos cresol, twenty kilos water; 22, toluylic acid salt of sodium; 23, dimethyl benzoic acid salt of sodium; 24, anisic acid salt of sodium; 25, chlorobenzoic-acid salt of sodium, chloro-toluylic acid salt of sodium.

- Benzene sulpho-acid salts*.—26, seventeen kilos benzene sulpho-acid salt of sodium, five kilos cresol; 27, toluol sulpho-acid salt of sodium; 28, xylol sulpho-acid salt of sodium; 29, trimethyl benzene sulpho-acid salt of sodium; 30, chlorinated benzene, toluene, xylol, or trimethyl benzene sulpho-acid salts.

Also with the naphthaline derivatives corresponding to the four above-mentioned groups.

- 31, four kilos alpha-oxynaphthoic acid salt of sodium, five kilos cresol, nine kilos water; 32, beta-oxynaphthoic acid-salt of sodium.

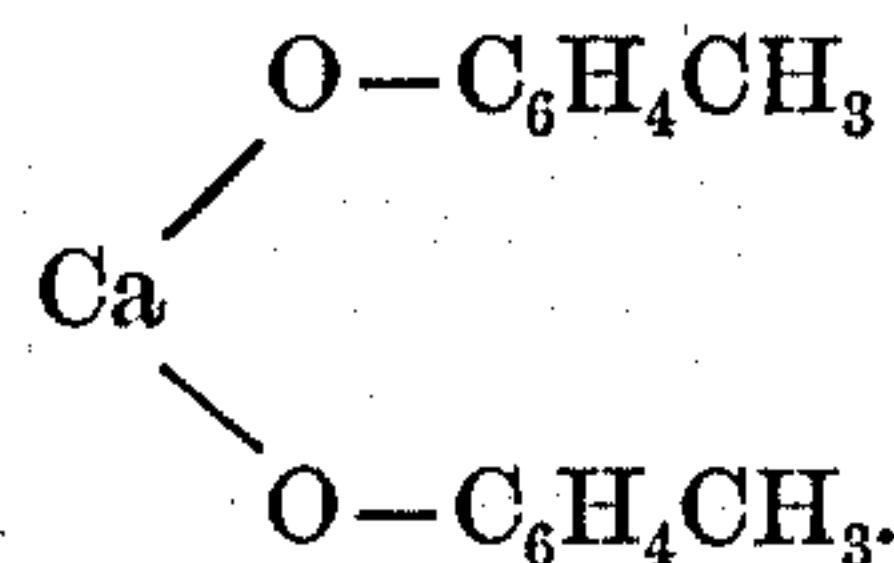
- 33, alpha-naphthol sulpho-acid salt of sodium; 34, thirteen kilos beta-naphthol sulpho-acid salt of sodium, (Bayer,) five kilos cresol; 35, beta-naphthol sulpho-acid salt of sodium, (Schäfer;) 36, naphthoic acid-salt of sodium.

- 37, naphthaline sulpho-acid salt of sodium

and chloro naphthaline sulpho-acid salt of sodium; 38, anthracene sulpho-acid salt of sodium.

It is of course immaterial whether the prepared salts be employed in making the mixture or the free acids with corresponding quantities of the base or carbonate. Either absolute or diluted alcohol can be employed as the dissolving agent in place of water.

It has further now been discovered that in addition to the above-mentioned salts of organic acids, the salts of phenols and naphthols are also very well adapted for obtaining watery solutions of cresols and the higher phenols. With thirty-four kilos of cresol, eight kilos of caustic soda, and thirty-two kilos of water, for example, a solution is obtained containing eleven kilos of free cresol, and which can be diluted as required without separation of cresol. A corresponding solution results when ten kilos of calcined lime are employed in place of the sodium hydroxide. This solution contains from twelve to thirteen kilos of free cresol and from nineteen to twenty kilos of cresol in the form of a readily-soluble cresol calcium



This can likewise be easily diluted without separation and forms a disinfecting or antiseptic agent suitable for other than medical purposes, in which the disinfecting power of the disinfecting carbolic acid of commerce (mainly composed of cresols) is perfectly utilized, contrarily to what takes place in the case of carbolic lime of commerce. This consists chiefly of lime mixed with basic cresol calcium, the latter being almost insoluble in water, the disinfecting action of carbolic lime is apparently to be ascribed to the excess of lime.

In place of the cresol and crude carbolic acid of commerce higher-boiling phenols from suitable tars and naphthols can also be employed in the preparation of these disinfecting agents. Instead of mixing these bodies with water and with a base in quantity insufficient to form a salt, as in the above-mentioned example, the saturated alkaline or earthy alkaline salt of the phenols employed may be prepared in the first instance and then mixed with water and with the free phenols to form a solution.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is—

The process herein described for converting phenols which are difficultly soluble in water into disinfecting mixtures which are easily soluble in water, said process consist-

ing in taking difficultly-soluble phenols, such
as the so-called "crude carboic acid" of a
higher boiling-point than pure carboic acid,
and consisting mainly of cresols, and mixing
5 them with water and with a metallic salt of
an aromatic compound of the classes of aromatic acids and phenols, substantially as herein set forth.

In testimony that I claim the foregoing as
my invention I have signed my name in presence of two subscribing witnesses.

BRUNO RICHARD SEIFERT.

Witnesses:

WILHELM WIESENHÜTTER,
RICHARD KUNZE.