

UNITED STATES PATENT OFFICE.

EDUARD MEUSEL, OF LIEGNITZ, GERMANY.

PROCESS OF CHEMICALLY MODIFYING OILS.

SPECIFICATION forming part of Letters Patent No. 794,373, dated July 11, 1905.

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To all whom it may concern:

Be it known that I, EDUARD MEUSEL, a subject of the Grand Duke of Coburg-Gotha, residing at 8 Breslauerstrasse, Liegnitz, Silesia, in the Kingdom of Prussia and Empire of Germany, have invented a new and useful Improved Process of Chemically Modifying Oils, of which the following is a specification.

My invention relates to a process for chemically modifying oils.

In the year 1875 I reported on the action of bacteria upon sugar and other saccharine compounds in the presence of nitrates in an aqueous solution, stating that the oxygen bound up with the nitrate was transferred by the bacteria and that the formation of nitrite increased with the growing putrefaction.

The present invention has for its object the industrial application of denitrifying bacteria for breaking up the nitrogenous substances to permit of the oxygen therein contained uniting with the fatty oils to change their chemical constitution, whereby modified oils are produced suitable for many varied uses in the industrial arts due to the peculiar qualities imparted thereto by this chemical change.

Thorough and extensive experiments have shown that fatty oils, particularly linseed-oil, castor-oil, colza-oil, olive-oil, poppy-oil, cotton-oil, palm-oil, cocoanut-oil, hemp-oil, wood-oil, &c., are so decomposed by the work denitrifying bacteria at the cost of the oxygen of the nitrate that not only a decomposition into glycerin and acid but also a simultaneous partial oxidation of the glycerin and of the several unsaturated oleic acids takes place. The modified oils produced in this manner exhibit a peculiar behavior. For instance, in the case of modified linseed-oil the resulting acid number is found to be 185, which corresponds to the saponification number of common linseed-oil, and the iodine number is only 79. Thus it will be seen that in this instance no common linoleic acid, whose iodine number varies between 152 and 155, is formed, such as is produced by the well-known process of decomposing fat by the combined action of enzymes and acid.

In carrying this improved process into ef-

fect a culture of denitrifying bacteria—such as, for instance, cheese bacteria—is mixed with one kilogram of a fatty oil and two liters of a five-per-cent. solution of niter, with addition of suitable nutritive salts, the mixture being thoroughly shaken for the purpose of effecting a good airing. It is expedient to add chips of wood in order to accomplish as thorough a mingling as practicable of the oil with the solution of salt and the denitrifying bacteria and to effect an energetic airing. The reaction takes place in the best and quickest manner at about 30° centigrade. According to the kind of denitrifying bacteria and oils the reaction takes a longer or shorter time. After the modified oil produced has been freed from the aqueous solution containing glycerin it possesses a more or less modified consistency, the acid number is very high, and the iodine number is often greatly changed. The products obtained in this manner are easily soluble in a dilute solution of soda.

Any salt of nitric acid may be used; but I prefer to employ nitrates the bases of which do not—like lime and magnesia, for instance—form insoluble fatty salts. In lieu of nitrates use may also be made of nitrites.

The modified oils are excellently adapted for the manufacture of degreas, lacquers, mordants for dyes, and like substances.

On the termination of the reaction the modified oil—for instance, castor-oil—may be used directly as a first-rate degreas for chamoising. Together with minium, chalk, and the like it gives a coating which dries almost instantaneously, in any case much more quickly than varnish.

By gently heating the modified oils together with dilute nitric acid yellowish to reddish bodies are produced with a vivid reaction and with generation of gas, such bodies possessing a strong adhesive property. They remain easily soluble in soda and alcohol and form an excellent admixture to lacquers and varnish and a substitute for shellac, particularly when mixed with wax. The oils which have not been modified do not exhibit these properties when treated with nitric acid.

By dissolving the modified oils in a dilute solution of soda I obtain compounds which

may be used directly as mordants for cotton—
for example, in turkey-red dyeing. Apart
from the great saving of mordant and dye-
stuff the colors produced possess a more
5 glossy and intense tint than when use is made
of a common oleic-acid soap as a mordant, or
of the old oil emulsion process which, as is
well known, has the drawback of necessitat-
ing a considerable consumption of oil.

10 For preparing lacquers the modified oils
dissolved in a soda solution are mixed with
dyes, such as alizarin, and then precipitated
with alum or lime salts.

It will thus be seen that the process herein
15 described contemplates the modification of
fatty oils by treating the same with nitrates
in aqueous solution or other nitrogenous sub-
stances and introducing denitrificating bacte-
ria to the mixture, allowing the same to break
20 up the nitrates to free oxygen, whereby not
only does saponification take place, but also
a partial oxidation of the glycerin and of
the oleic acids, resulting in a chemical change
of these oils which especially adapts them to
25 use for the purpose hereinbefore set forth.

What I claim as my invention, and desire
to secure by Letters Patent, is—

1. The herein-described process of modify-

ing fatty oils which consists in mixing ni-
trates in aqueous solution with the oils and 30
subjecting the same to the action of denitrifi-
cating bacteria whereby the glycerin and
oleic acids of said fatty oils are oxidized, sub-
stantially as set forth.

2. The herein-described process of chemic- 35
ally modifying fatty oils which consists in
introducing to the oils a solution of nitrates,
mixing a culture of denitrificating bacteria
therewith, whereby the nitrates are deoxi-
dized and the glycerin and oleic acids of the 40
oils partially oxidized, and finally drawing
off the modified oils; substantially as described.

3. The herein-described process of chemic-
ally modifying fatty oils consisting in chang- 45
ing the chemical structure of the fatty bodies
of the oils by subjecting the same to the ac-
tion of denitrificating bacteria in the presence
of nitrates in aqueous solution, substantially
as described.

In testimony whereof I have signed my name 50
to this specification in the presence of two sub-
scribing witnesses.

EDUARD MEUSEL.

Witnesses:

LON H. WATZ,
ALBERT SHENK.