# UNITED STATES PATENT OFFICE.

FRANZ JOSEF BERGMANN, OF NEHEIM, GERMANY.

## METHOD OF DISTILLING WOOD-WASTE.

SPECIFICATION forming part of Letters Patent No. 504,264, dated August 29, 1893.

Application filed December 22, 1892. Serial No. 456,070. (No specimens.) Patented in Germany January 30, 1891, No. 65,447, and in France February 12, 1892, No. 219,347.

*To all whom it may concern:*

Be it known that I, FRANZ JOSEF BERGMANN, a subject of the King of Prussia, and a resident of Neheim, Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Methods of Distilling Wood-Waste, (for which I have obtained Letters Patent in Germany, No. 65,447, dated January 30, 1891, and in France, No. 219,347, dated February 12, 1892,) of which the following is a specification.

My invention relates to the distillation of wood waste and to apparatus therefor.

The extraction of wood-vinegar by distilling wood waste such as loose sawdust, according to the methods heretofore employed has not been found profitable. I therefore use another method according to which the wood waste is not as hitherto carbonized directly in the retort but is first powerfully pressed to a solid form, thereby depriving the same of most of the water which it contains. In this manner I obtain a largely increased proportion of wood-vinegar which possesses a much smaller proportion of water than if the wood waste were not pressed. When wood-vinegar is extracted from dry wood as hitherto practiced it contains very much water, (about eighty per cent.) The extraction of wood-vinegar of a high degree, such as is necessary for industrial purposes and especially for the preparation of picric acid, offers great difficulties, because wood-vinegar and water have the same boiling point. As a separation by evaporation is therefore impossible the acid contained in the dilute solution has to be separated by lime, while the acetic acid has to be subsequently expelled by sulphuric acid or nitric acid from the acetate of lime. But as nitric acid contains sixty-four per cent. and sulphuric acid thirty-four per cent. of water, the wood vinegar also contains a certain quantity of water.

According to my improved method acetic acid of a high degree is obtained from wood waste by depriving the latter of the water by a preliminary mechanical treatment. Even very dry wood contains fifteen per cent. of water, which can be removed in the above mentioned manner from the wood waste. Where the wood at disposal is not in the form of sawdust or small chips, it is expedient to convert the wood into such a form. By pressing in suitable apparatus the wood waste is changed to a solid form and deprived of most of its water by a high pressure up to about three hundred atmospheres. The blocks of compressed wood waste or sawdust deprived of the water are then placed in retorts and carbonized, the gases generated, acetic acid and others, being separately precipitated in cooling apparatus in the well-known manner. By reason of the enormous compression of the waste a great saving of space is effected in the retort, and as the compressed saw dust has been practically deprived of all water escape of acetic acid gases with water gases or steam will be prevented or largely diminished and thus a largely increased proportion of wood vinegar will be obtained. This improved method permits of utilizing the sawdust produced in saw mills, which is only possible in the above described manner. Previous trials made with the object of carburizing the sawdust directly or in a loose unpressed state have given unfavorable results, because the retorts have to be filled too often, and by reason of the large proportion of water in such loose saw dust wood vinegar cannot be produced therefrom with economy or on a large scale.

I am aware that it has been proposed to compress saw dust into blocks and bales for convenience of transportation. I am also aware that in the manufacture of fuel blocks from coal-dust, slack or culm such blocks have been subjected to coking and distillation under conditions adapted for the saving of ammoniacal products, gases, sulphur and hydrocarbons. I am further aware that it has been proposed to utilize tan or spent bark by forming it under pressure into cakes or bars to be subjected to a process of dry distillation, but from such material, which necessarily contains a large quantity of water, acetic acid or wood vinegar cannot be economically obtained on a commercial scale. My invention differs from those just named in comprising a novel and economical method of manufacturing wood vinegar from compressed saw-dust or similar wood-waste practically deprived of water and carbonized in

retorts to drive off the gases which are subsequently precipitated or condensed to obtain the wood vinegar.

Having thus described my invention, what I claim is—

1. The method herein described, of manufacturing wood vinegar, which consists in converting wood-waste, such as saw-dust or chips, into blocks under a pressure up to three hundred atmospheres and expressing water contained in the wood, and then carbonizing the pressed blocks in retorts, substantially as described.

2. The method herein described, of manufacturing wood-vinegar, which consists in converting wood waste, such as sawdust or chips, into blocks by comparatively high pressure up to about three hundred atmospheres, and expressing water contained in the wood, then carbonizing the pressed blocks in retorts, and precipitating the gases generated, substantially as described.

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

FRANZ JOSEF BERGMANN.

Witnesses:
WM. ESSENWEIN,
RUDOLPH FRICKE.