

## UNITED STATES PATENT OFFICE

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## PROCESS FOR RENDERING FUEL BRIQUETTES HARD AND SMOKELESS

No Drawing.

Application filed December 31, 1929. Serial No. 417,824.

The principal object of this invention is to render fuel briquettes made from ground anthracite coal or bituminous coal which has been previously carbonized hard and smokeless. This has been attempted before but I have discovered that in order to secure this result at low temperatures it is essential that oxygen or air, in whatever form provided, should penetrate to the core of the briquette. This I have discovered can best be accomplished by creating a partial vacuum within the interstices in the body of the briquette so as to assist the oxygen or air in working in through the pores so that treatment can be applied throughout the entire briquette.

I have found in practice that in order to secure the most efficient penetration of the oxygen or air, the briquettes should be subjected to a decreasing temperature which causes the gases within the pores to contract. This results in a partial vacuum, or an atmospheric tension, which assists or causes the inrush of any oxygen, air or other gases which may be in contact with the surface of the briquette and this oxygen and air is required to effect the treatment within the interior of the briquette to render it hard and smokeless throughout.

Ordinary cooling of the briquette is not sufficient, as it will not accomplish the desired result unless and until any distillable product contained in the briquette, such as moisture or light oil fractions which will not solidify as a binder by the action of the oxygen or air, have been driven off. While distillation of such products is still taking place inside the briquette, the gases escaping through the pores prevent the inrush of oxygen, air or other gases or vapors from the outside. If the inside of the briquette is cooled below the boiling point of the distillable products referred to before they are driven off, they remain imprisoned in the briquette. Therefore the briquette will remain soft inside and will not be smokeless. The more completely these products are distilled off, the more uniformly hard and smokeless to the core is the resulting briquette.

I also find that the presence of oxygen or air or of products of combustion containing them, tends to raise the boiling point of the hydro-carbons in the briquette. Therefore I prefer to carry the distillation as far as desired by indirect or radiating heat at first and then apply the oxygen or air treatment while the briquettes are being subjected to a lowering temperature. The amount of oxygen introduced can be regulated by a CO<sub>2</sub> instrument.

In view of the fact that the admission of oxygen or air into the baking chamber when the briquettes are still hot, tends to render more difficult the accurate control of temperatures, the oxygen or air may be diluted with inert gases such as products of combustion.

It will be seen, therefore, that the process consists in first driving off, preferably by indirect heat at about 500° F. the distillable products contained in the briquette, such as light oil fractions or moisture, which will not solidify by the oxygen or air treatment. The heavier fractions of the heavy oil remain as a binder. The gases within the briquette are then contracted by lowering the temperature to below the boiling point of said distillable product so as to create a partial vacuum within the briquette. Then the briquettes are brought into contact with a very small percentage of oxygen or air or products of combustion containing the same at about 300° F. and the partial vacuum will cause the same to rush in through the pores of the briquettes. This treatment results in a hard and smokeless briquette throughout the mass thereof.

Although I have described only a single method of treatment, I am aware of the fact that modifications can be made therein by any person skilled in the art without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited to the exact order of steps herein described, but what I do claim is:—

1. The process of rendering previously formed fuel briquettes hard and smokeless, which comprises driving off by indirect heat the moisture and lower boiling point oil

fractions, retaining the heavier fractions to serve as a binder and then cooling the briquettes to contract the gases and vapors contained within them and thereafter subjecting the briquettes at the same time, to the action of oxygen or air, for the purpose described.

2. The process of rendering previously formed fuel briquettes hard and smokeless, consisting in first driving off the moisture and lighter oil fractions in the briquettes by heat, then cooling the briquettes enough to contract the gases contained within them and finally subjecting the surfaces of the briquettes while they are still hot to the action of the oxygen or air so that the partial vacua caused by the cooling will assist the penetration of the briquette by the oxygen or air.

3. The process of rendering previously formed fuel briquettes hard and smokeless which consists in heating them by indirect heat to a high enough temperature to drive off the moisture and light oil fractions contained in the briquettes, then lowering the temperature below the boiling point of light oil fractions to contract the gases in the briquettes, and thereafter introducing oxygen or air, or products of combustion containing them, into the interior of the briquettes through the pores so as to render the briquette hard and smokeless throughout their mass.

4. The process of rendering previously formed fuel briquettes hard and smokeless which consists in heating them by indirect heat to a high enough temperature to drive off the moisture and light oil fractions contained in the briquettes that will not solidify on treatment by oxygen, then lowering the temperature gradually for the purpose of creating partial vacua within the briquettes, thereafter subjecting the briquettes to the presence of oxygen or air, or products of combustion containing them, which will rush in through the pores impelled by the vacua so as to introduce throughout the interior of the briquettes the oxygen or air.

In testimony whereof I have hereunto affixed my signature.

HENRY F. MAUREL.