

UNITED STATES PATENT OFFICE.

EDOUARD HECKEL, OF MARSEILLE, FRANCE.

COMPOSITION OF MATTER.

994,922.

Specification of Letters Patent. Patented June 13, 1911.

No Drawing.

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To all whom it may concern:

Be it known that I, EDOUARD HECKEL, a citizen of the French Republic, and a resident of Marseille, in the Department of the Bouches du Rhone, France, have invented a new and useful composition of matter to be used in processes of binding coal dusts and disintegrated coals, slacks of every description and quality, mineral and vegetal, cokes, and easily employed with any kind of machinery intended for the making of coal briquets of all shapes, rectangular, ovoid, ball-shaped, etc., the composition producing no disagreeable smoke or odor and being very strong and perfectly waterproof, of which the following is a specification.

My composition consists of the following ingredients: fecula (starch) or flour of hard rice, or corn or any other flour containing plenty of starch and amylopectin; bichromate of potassium, ($\text{Cr}_2\text{O}_7\text{K}_2$;) Portland cement, (natural or artificial;) water, substantially pure.

Amylopectin is a name given by Professor Macquenne to the amylocellulose, which was thought to exist, in small quantities only, in the starch of the cereals, but may be formed spontaneously in the starch, under the influence either of the weather or of some mineral or organic matter, as shown by recent researches of the above named Professor Macquenne et Roux—*Annales de physique et Chimie* 1906—and *Reports Rendus de l'Académie de Science de Paris* 1903 p. 42.

The ingredients forming my composition are to be thoroughly mixed and reduced into a paste by boiling with water.

It is very simple to make coal briquets with the said composition of matter: only to add the coal dust or slacks of any description to the above ingredients. They may be mixed and reduced into paste either separately or all together, great advantage permitting the effective use of this binder with any kind of existing processes and of briquetting machinery.

Briquets are now made with pitch and two processes are principally employed: In one, the pitch is melted into a tank, then carried to several mixers where it is thoroughly mixed with the coal dust, preparatory to go into the presses producing the desired shape. For that process, the three ingredients forming my composition are re-

duced into paste by boiling with water in a similar tank or any other suitable recipient, the paste is conveyed to the mixers where it is thoroughly mixed with the coal dust and when being of a fit consistency and very homogenous, is directed into the presses. In the second process, the pitch and coal dusts are cracked and mixed when dry in a special mixer, conveyed to a second mixer where they are converted into paste by means of live steam, the paste goes then into the presses. For that process, the three ingredients forming my composition are mixed, being in powders, with the coal dust and reduced into paste in the second mixer by means of the live steam, the paste is then conveyed into the presses. The briquets, after their compression, must be left in a dry stove or oven, or passage kept at a temperature of 100°C ., during half an hour for the ovoids or ball-shaped forms of small weight, one hour for the briquets of ten pounds, one hour and a half for the briquets of twenty pounds. After that necessary desiccation, the briquets have acquired a sufficient hardness to stand rough handling and their coherence increases in the course of time, they remain in good condition in damp places and even when completely immersed in water, finally they burn without producing any smoke or disagreeable smell, as briquets made with pitch do. The ashes, left by the combustion are 1.25% (per cent.) higher in weight than the ashes normally contained in the coal or the mixture of coal used for the manufacture of briquets.

There is a very great variety of different coals, anthracite, bituminous, lignite, etc., and each kind varying in its composition, the formula for the employment of this binder varies accordingly on account of the coal used. For the anthracite briquets, it is in weight as follows:

Fecula (starch) or flour of hard rice, or of corn, etc.	46 pounds	100
Portland cement (natural or artificial)	20 pounds	
Bichromate of potassium ($\text{Cr}_2\text{O}_7\text{K}_2$)	10 ounces	
Water (about)	45 gallons	105

All that for 1940 pounds of slack or coal dust.

For lignite briquets, the most difficult to

bind, the formula must be altered as follows:

	Fecula (starch) or flour of hard rice, or of corn, etc.	64 pounds
5	Portland cement (natural or artificial)	5 pounds
	Bichromate of potassium ($\text{Cr}_2\text{O}_7\text{K}_2$)	10 ounces
10	Water (about)	40 gallons

All that for 1920 pounds of lignite powder or dust.

With and between these two formulas, any quality of coal may be successfully briqueted. 15 The manipulations, care for mixing, with any kind of coals are quite the same, varying only a little in accordance with the machinery used, but for the desiccation of lignite briquets, the temperature in the ovens 20 must be kept between 50 and 60° C., and the operation must last about half an hour more than the time previously fixed for the various

kinds of anthracite. The quality of the coal employed necessitates only slight changes in the proportioning and the preparation of the ingredients, and it will be found more useful and convenient in use in the briquetting establishments.

I claim:

The herein-described composition of matter, consisting of flour of any cereals, vegetables and plants containing starch and amylopectin, bichromate of potassium ($\text{Cr}_2\text{O}_7\text{K}_2$), Portland cement (natural and artificial), water, substantially as described and for the purpose specified. 30 35

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

EDOUARD HECKEL.

Witnesses:

EBERLIN PHILIPPE,
OLLARY FRANÇOIS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."