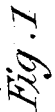


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2 SHEETS—SHEET 1.



Raphaël-ketter
SS Dunhano.

Walter T. Griffin
Inventor

By his Attorneys
Kerr, Page & Cooper

W. T. GRIFFIN, DEC'D.

J. E. BLAKE, I. S. GRAVES & C. H. CLARKE, EXECUTORS.

METHOD OF BRIQUETING CARBONACEOUS MATERIALS.

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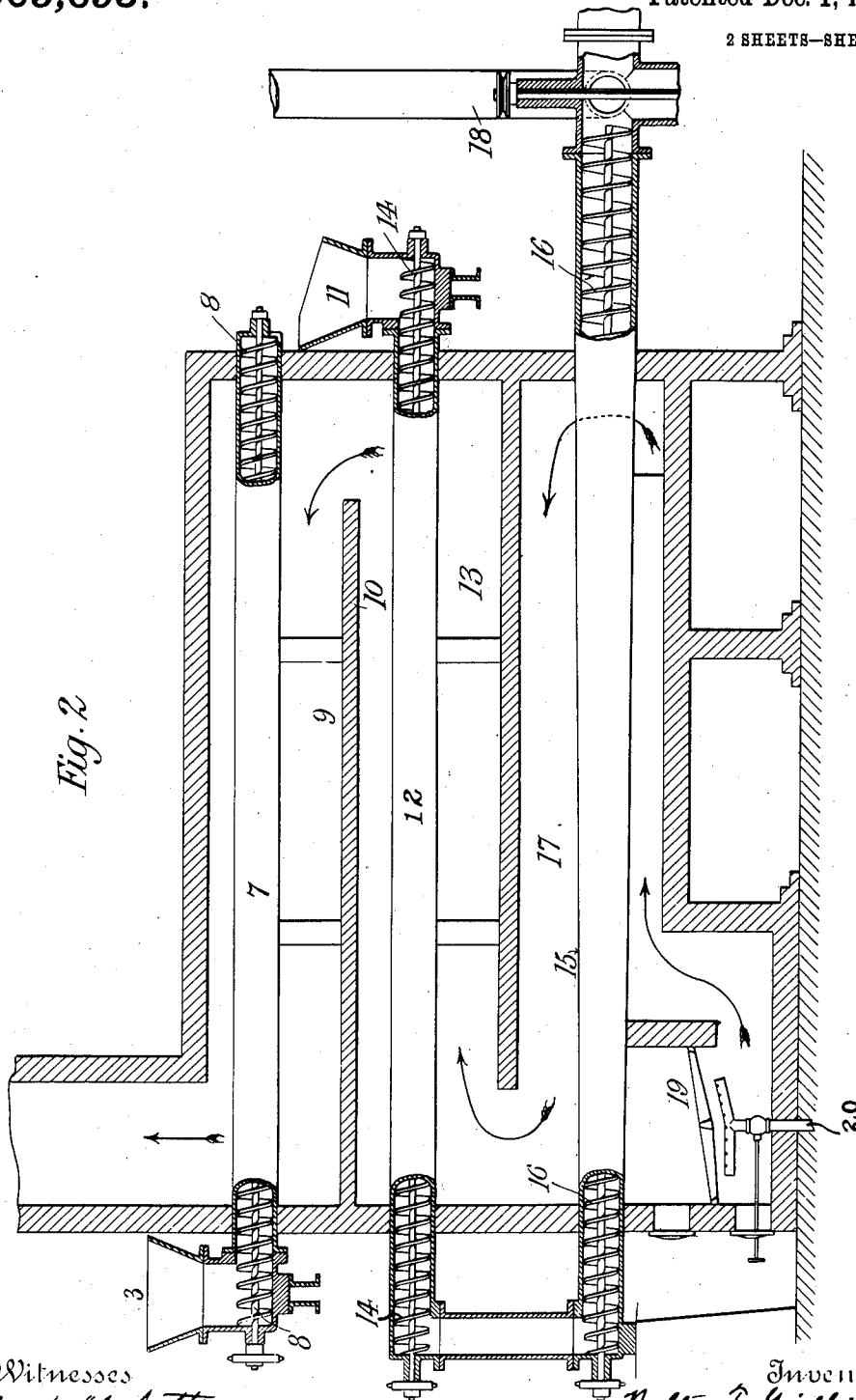


Fig. 2

Witnesses
Raphael Ketter
A. S. Dunham

Inventor
Walter T. Griffin
By his Attorneys
Kerr, Barr & Cooper

UNITED STATES PATENT OFFICE.

WALTER T. GRIFFIN, OF LIMOGES, FRANCE; JAMES EDDY BLAKE, ISABELLE S. GRAVES, AND CHARLES H. CLARKE EXECUTORS OF SAID WALTER T. GRIFFIN, DECEASED.

METHOD OF BRIQUETING CARBONACEOUS MATERIALS.

No. 905,693.

Specification of Letters Patent.

Patented Dec. 1, 1908.

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To all whom it may concern:

Be it known that I, WALTER T. GRIFFIN, a citizen of the United States, residing at Limoges, Department of Haute-Vienne, France, have invented a certain new and useful Method of Briqueting Carbonaceous Materials, of which the following is a specification, reference being had to the drawings accompanying and forming part of the same.

In the manufacture of "briquets" from pulverized or granular carbonaceous materials it has heretofore been necessary to employ as a "binder" some material other than the carbonaceous material itself, such as tar, molasses, etc. I have found, however, that with the possible exception of anthracite, the coals may be briqueted satisfactorily without the use of a special binder. I have also found that bituminous coal may be used as a binder for anthracite coal with the most satisfactory results.

In carrying out my method I heat the bituminous coal to a point below the temperature at which coking takes place, but at which the coal acquires a slightly plastic consistency. The temperature at which the desired degree of plasticity is produced cannot be stated with definiteness, as it depends entirely on the proportion of bituminous material in the coal. Thus very soft cannel may not require more than 200° F., whereas a harder coal may need to be heated to something like 500° F. The degree necessary for the best results may in any case, however, be readily ascertained by heating a small portion or sample of the coal which is to be briqueted, and observing the temperature at which it becomes sufficiently plastic. After the coal has been heated I chill it slightly, either by artificial means or by simple exposure to the atmosphere, until it begins to harden again, that is, until it begins to lose its plastic or sticky consistency. It is then in condition for compression into blocks or briquets. The briquets thus prepared will be found to be firm and durable, and to retain their form well while burning. I have also found that by mixing with the carbonaceous material, which is to be briqueted, a quantity of anthracite coal heated to a temperature about one hundred to two hundred degrees above the other, the coherence of the particles is much more tenacious. In fact the coherence is so great that the briquets may be substantially all anthracite, with a

comparatively small proportion of bituminous coal as a binder. I have obtained excellent results with 95% anthracite heated to about 500°, and 5% cannel heated to about 300°. The best proportions for particular coals may readily be ascertained by testing samples thereof, as will be understood.

The heating of the coal has another striking advantage, in that the more volatile hydrocarbons are driven off during the heating. These hydrocarbons, when the coal is burned in the ordinary way, are volatilized by the heat of the furnace before the temperature of the coal has been raised to the point of ignition, and they then pass off in the form of smoke. Afterwards the coal ignites, and later these hydrocarbons, if any still remain in the coal, are consumed in the furnace instead of passing off as smoke. But in the case of briquets which have been heated, as above described, these hydrocarbons have already been driven off, leaving only the less volatile ones, which burn without being volatilized, or at least without being volatilized at a more rapid rate than the supply of oxygen necessary to consume them. My briquets may, therefore, be termed "smokeless", or practically so. At the same time the volatile hydrocarbon gases driven off in the heating of the coal or other briqueting material are not wasted, but are conducted from the oven to the furnace itself and there burned, heating other quantities of briqueting material; or they may be conducted elsewhere to be utilized in any desired manner.

Any suitable apparatus may be employed for carrying out my process, but that shown in the accompanying drawings gives excellent results and is the one I prefer.

Figure 1 is a diagrammatic view thereof, and Fig. 2 is a longitudinal section of a heating apparatus.

1, 2, are two furnaces, so that two different kinds of coal may be heated simultaneously. The materials are fed into the hoppers 3, 4, from which they are carried through the ovens and finally discharged into the conduit 5, where they are mixed together, preferably by suitable mechanical means, as a stirrer 6.

The preferred construction of the furnaces is illustrated in Fig. 2. As will be seen therein, the hopper 3 empties into a pipe 7, containing a screw conveyor 8, which carries the material through the upper chamber 9 of the

oven, above the baffle 10. The comparatively low heat of this chamber converts into steam such moisture as the material contains, and as the warmed material drops into the second hopper 11 the steam escapes into the air. This extraction of the moisture is of special value in dealing with lignite, which contains a considerable proportion of water. From the second hopper the material is carried through the pipe 12 in the middle chamber above the baffle 13, by the screw 14, and is there subjected to a higher temperature. Here the lighter hydrocarbons begin to volatilize, but are carried along with the material to the third conduit 15. The latter also contains a screw, 16, which carries the material through the lower chamber 17, in which the temperature is still higher. In this chamber the material receives its final heating and still more of the hydrocarbons are freed. At the end of the conduit 15 the gases pass out through a pipe 18 and may be delivered therefrom to the grate 19, by a pipe 20, or may be conducted to a gas holder or other device not shown. From the conduit 15 the semi-plastic sticky material is discharged into the conduit 5, where it may be mixed with material from the other furnace 2. If the coal treated in the latter is of same kind as in the other it may be heated to the same temperature and carried through the furnace at the same speed, but if the materials in the two are different, as soft and hard coals, or different kinds of soft coal, one furnace may be heated less than the other and the speed of the material therethrough regulated (as by varying the rate of rotation of the screw conveyers), so that the heated material will be delivered to the conduit in the proportion desired for the best combination with the other. The conduit 5 discharges into one or more briqueting machines, as for example, those indicated diagrammatically at 21 and 22.

As before stated, I prefer to chill the material slightly before briqueting. This may occur in sufficient degree in the conduit 5; during the passage therefrom into the hoppers 23, 24; in the briqueting machines themselves; by means of an air blast, as diagrammatically indicated at 25; or in any other convenient manner. The mixing of cooler material with the more highly heated mass may of itself be sufficient to effect the desired chilling, or will at least assist in the same.

I prefer to provide the supply conduit 5 with two valves, as 26, 27, so that it need not be at any time in communication with air. The charge for the briqueting machines accumulates above the valve 27, during which the hydrocarbon gases have time to escape into the pipe 18. Where the proper quantity has been deposited, the upper valve is closed and the lower one opened, delivering

the charge to the briqueting machines without waste of gases, which have had time to pass up into the pipe 18. The momentary detention in the valve chamber also facilitates the chilling of the heated material. Of course the material may be discharged directly into the briqueting machines, if desired, the valves 26, 27 being left open for that purpose, but for the reason stated I prefer the method just outlined.

From the foregoing it will be seen that my method produces briquets which contain only coal, (or other carbonaceous material), without the use of a special "binder". At the same time the briquets thus made are firm, wear but slightly in handling, retain their form admirably in burning, and they are also practically smokeless. The method itself is inexpensive in practice.

It will be understood, of course, that the method may be varied somewhat without departure from the proper scope of my invention; and that being a method or process, the invention is independent of any particular apparatus for performing it.

What I claim is:

1. The herein described method of briqueting carbonaceous materials, which consists in heating the material to evaporate substantially all the moisture therein, permitting the evaporated moisture to escape, continuing the heating at a higher temperature to volatilize the lighter hydrocarbons contained in the material and bringing the material to a semi-plastic or sticky condition short of coking, and then forming the material into blocks, as set forth.

2. The herein described method of briqueting carbonaceous materials, which consists in heating the material to evaporate substantially all the moisture therein, permitting the evaporated moisture to escape, continuing the heating at a higher temperature to volatilize the lighter hydrocarbons and bring the material to a semi-plastic or sticky condition short of coking, conducting off the volatilized hydrocarbons, chilling the material till it begins to set, and then forming it into blocks, as set forth.

3. The herein described method of briqueting carbonaceous materials, which consists in heating one material to a semi-plastic or sticky condition short of coking, heating to a different temperature another material having a different proportion of bitumen, mixing the materials, and forming the mixture into blocks, as set forth.

4. The herein described method of briqueting carbonaceous materials, which consists in heating one material to a semi-plastic or sticky condition short of coking, heating to a higher temperature another material containing a smaller proportion of bitumen, mixing the materials, and forming the mixture into blocks, as set forth.

- 5 5. The herein described method of making fuel briquets, which consists in heating bituminous material to a semi-plastic or sticky condition short of coking, heating a non-bituminous material to a higher temperature, mixing the materials, and forming the mixture into blocks, as set forth.
6. The herein described method of making fuel briquets, which consists in heating bituminous coal to a semi-plastic or sticky condition short of coking, heating anthracite coal to a temperature higher than the other, mixing the two, and forming the mixture into blocks, as set forth.

WALTER T. GRIFFIN. [L. S.]

Witnesses:

I. S. GRAVES,
G. GOUTERON