S. M. DARLING.

PROCESS FOR PREPARING LIGNITE FOR FUEL.

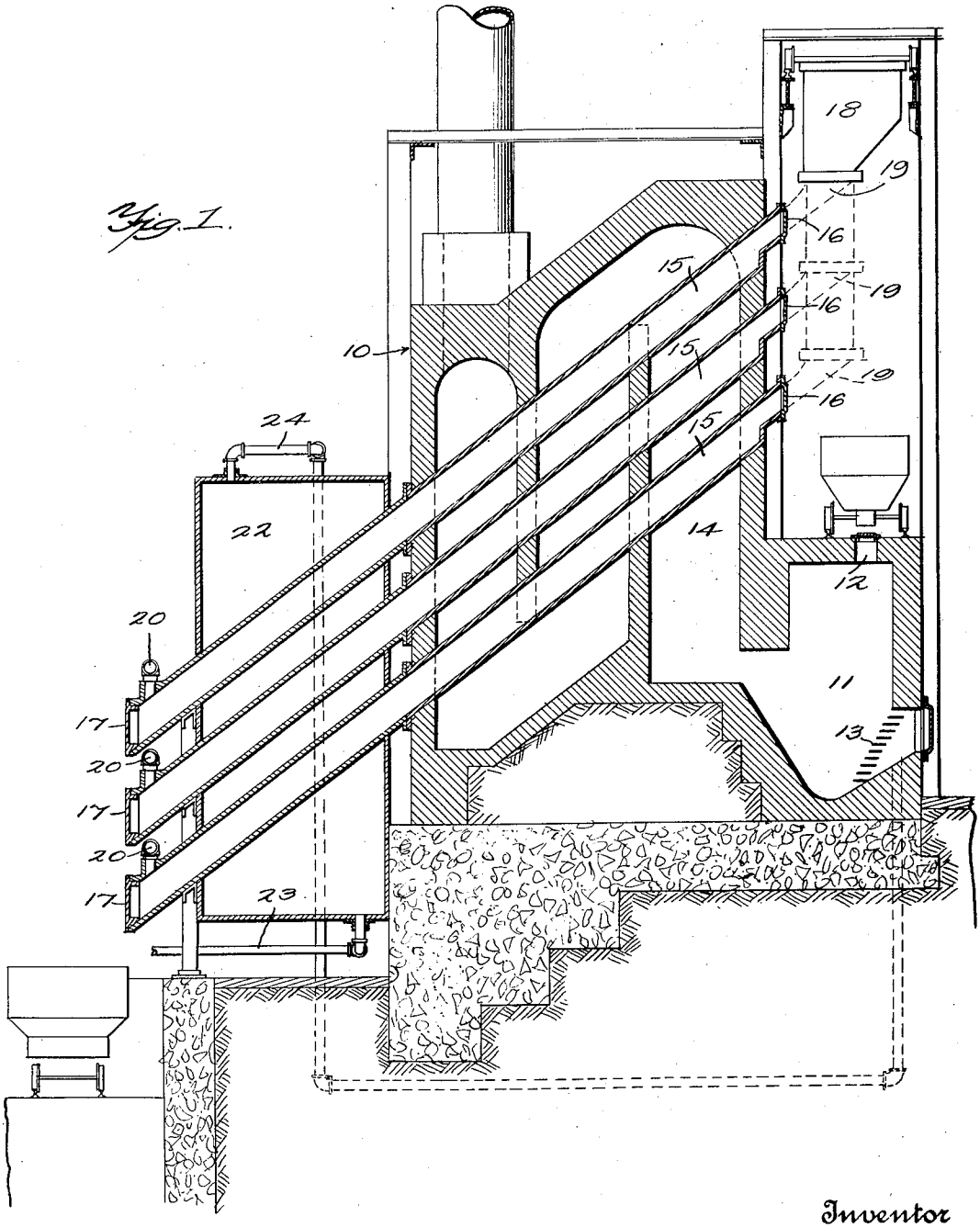
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1,382,629.

Patented June 28, 1921.

2 SHEETS—SHEET 1.

Fig. 1.



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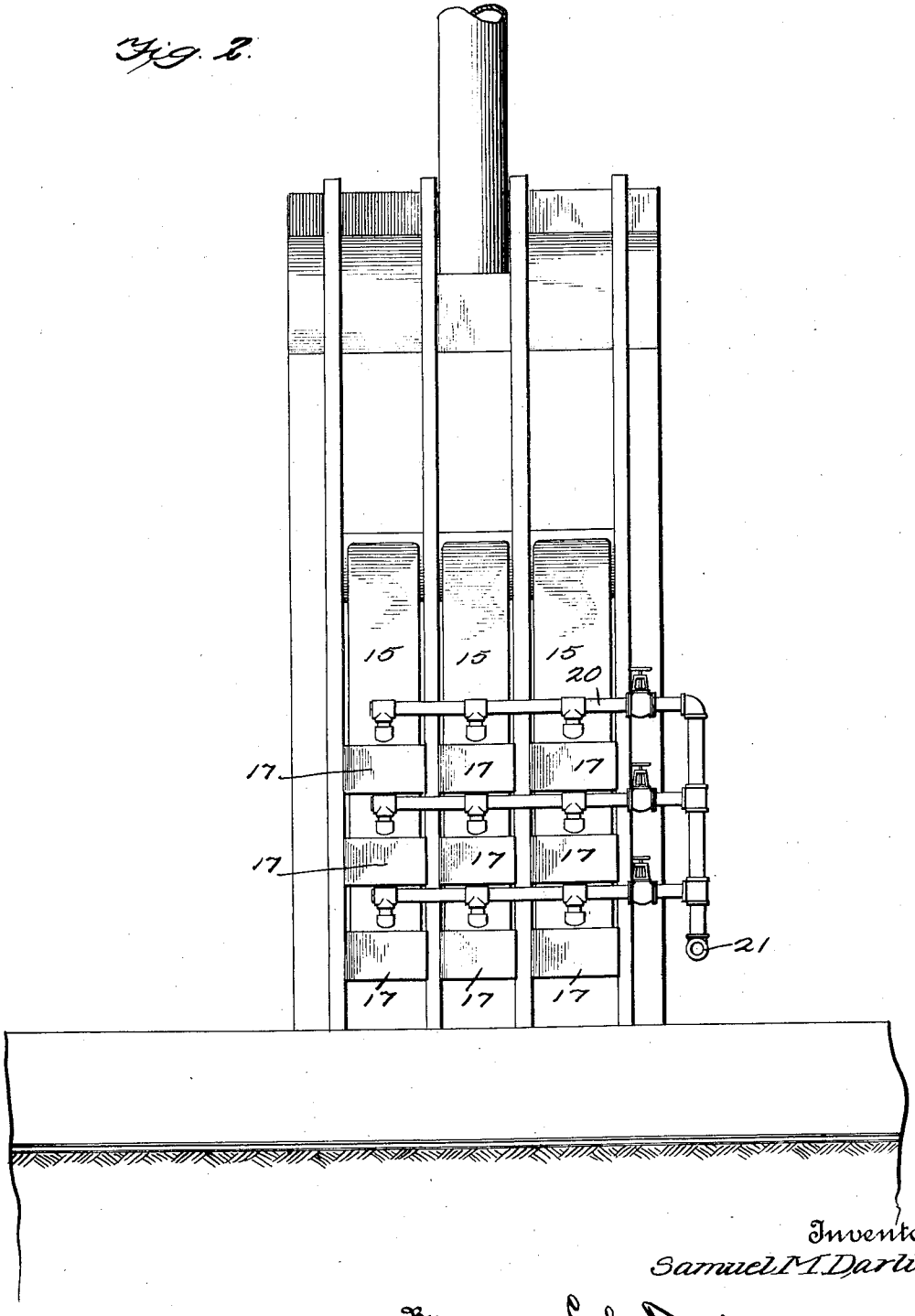
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

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PROCESS FOR PREPARING LIGNITE FOR FUEL.

1,382,629. Specification of Letters Patent. Patented June 28, 1921.

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To all whom it may concern:

Be it known that I, SAMUEL M. DARLING, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Processes for Preparing Lignite for Fuel, of which the following is a specification.

This invention relates to a process of preparing lignite for fuel.

Large tonnages of lignite are found in parts of the United States which have no other solid fuel. This lignite is little used, and high prices are paid all over the lignite sections for imported bituminous coals. The reason for this is found in certain physical characteristics of the lignite itself. As it lies in the ground it contains 30 to 40 per cent. water. The necessity for the evaporation of this water in the stove or furnace is, of course, an enormous handicap upon the fuel. When the lignite is mined and exposed to warm air and sunlight, the evaporation of the water causes the coal to disintegrate or slake very rapidly; it also fires very quickly from spontaneous combustion; hence it is not practicable to ship it long distances or to store it. Its light gases distil before the fixed carbon reaches the temperature of ignition and, in the ordinary furnaces, escape unconsumed. The lignite has no "coking" quality whatever, and when thrown upon the fire crumbles very quickly, giving rise to difficulties in firing and substantial loss through the grate bars.

My methods of preparation eliminate all of these objections to the lignite as a fuel. When prepared according to my process, as hereinafter described, the fuel is free from water, it will not slake or disintegrate in any condition of weather; it is free from the danger of spontaneous combustion; it can be burned readily without loss in stoves and furnaces; and it can be stored for any length of time and shipped any distance without deterioration. In fact, when so prepared it is the equivalent in all respects of good bituminous and anthracite coals, and will supersede the use of these fuels in the sections of the country tributary to these lignite deposits.

The accompanying drawings illustrate a preferred apparatus by which my process may be carried out.

In the accompanying drawings Figure 1 is a sectional view taken through the furnace, and

Fig. 2 is a rear elevation.

In accordance with my process I combine lignite with pitch, or pitch and coal and briquet the resulting mixture. The briquets are then placed in a retort or oven and heated. The degree of this heating may be merely carried to a point at which the volatile matter in the pitch binder of the briquet is distilled off or may be carried to the point of complete carbonization of the briquet. In either event the by-products passing off in the form of gases are recovered.

The lignite may be in its raw condition, in which state it contains a high percentage of water and light volatile gases and oils, dry or carbonized.

Where the lignite is combined with pitch alone, I prefer to mix the pitch with the lignite in about the proportions of 8 to 10 per cent. pitch and 90 to 92 per cent. lignite. The pitch may be that derived from coal tar, water gas tar, lignite tar or any other similar hydrocarbon or asphaltic pitch. The lignite is preferably pulverized and then combined with the pitch. This mixture is then briqueted in the usual way and the briquets are placed in an air tight container and their temperature raised by means of externally applied heat to a temperature between 600° and 700° Fahrenheit.

This serves to dry the fuel in event the lignite is used in its raw state and to distil off the volatile matter in the pitch and to coke it. The pitch coke is thus thoroughly disseminated throughout the briquet and serves to hold it together in all weathers and under all reasonable methods of handling. The lignite as previously stated may be combined with the pitch either in a raw, dried or carbonized state, and while I have stated above that the lignite briquet is heated to 700° Fahrenheit, in some instances it may be desirable to carry the heat to a point at which the briquet is completely carbonized.

After passing through the heating chamber the briquets are placed in a cooling chamber and the volatile matter which has been distilled therefrom is passed over the briquets. Some of this volatile matter condenses upon the surfaces of the briquets and has the quality of improving their appearance and heating value and rendering the briquets weather and waterproof.

Where the lignite is combined with pitch and coal I prefer to mix the ingredients in about the following proportions:

8 per cent. pitch,
12 per cent. coal,
80 per cent. dried lignite.

This mixture is then briqueted in the usual manner and the briquets are placed within a sealed container retort or oven and the temperature thereof raised by means of heat externally applied to the point of intumescence of the bituminous coal or about 700° Fahrenheit, as is the case where the raw lignite is combined with pitch. This heating operation serves to dry the lignite and distil off the volatile matter in the pitch. The briquets are subsequently cooled and are preferably treated with the volatile gases as above explained. The pitch coke and intumesced bituminous matter are thus thoroughly disseminated throughout the briquet and serve to hold it together, forming a very strong briquet and one having a great crushing strength.

The lignite may be combined with the pitch and coal either in a raw, dry or carbonized condition, and the briquts may be either heated to the point of intumescence of the coal or this heating may be carried to the point of complete carbonization of the briquet.

Referring now to the drawings, the numeral 10, indicates a furnace as a whole, having fire box 11. In the present instance this fire box is shown as being provided upon its upper surface with an opening 12 through which fuel may be supplied to the grates 13 thereof.

Arranged in the combustion chamber of the furnace are inclined ovens or retorts 15 provided at their upper ends with gates 16, and at their lower ends with gates 17. It is to be noted that approximately one-half of each of the retorts projects beyond the rear wall of the furnace. Upon the front of the furnace is arranged a suitable traveling carrier 18, provided with chutes 19 opening adjacent to the doors 16 upon the upper ends of the inclined retorts. Adjacent to their lower ends and without the furnaces the retorts 15 are provided with collector pipes 20, for the purpose of carrying off the gases formed by volatile matters within the retort. These pipes are connected with a header 21 which may in turn be connected with any suitable condensing apparatus, or the volatile gases may be lead into the furnaces and burned as desired.

Arranged about the lower end of the inclined retorts without the furnace is a chamber 22 having an air inlet pipe 23 and an outlet pipe 24. This outlet pipe may be arranged to supply a force draft under the grates 13 of the fire box 11 of the furnace, the pipe 23 being connected with any suitable source of air pressure supply.

In practising the process, the briquets are placed in the traveling container 18 and distributed by means of the chutes 19 to the various retorts 15. The briquets are heated within the upper ends of the retorts or that portion lying within the furnace to the desired temperature and are then allowed to pass to the lower end of the retort or that portion lying without the furnace and a fresh charge is supplied to the upper end of the retort. It will be seen that the volatile gases distilled off of the briquets within the upper end of the retorts pass over the briquets lying within the cooling chamber 22 and that the heavier condensates of these gases will be precipitated upon the briquets. After the briquets have been in the furnace a sufficient period they are removed from the retorts through the gates 17.

It is to be understood that the above disclosure is the preferred method of practising the process but that various changes may be made in the details of procedure and proportions of materials employed and that I do not limit myself to the exact disclosure set forth, but that various changes may be made without departing from the spirit of the invention or the scope of the subjoined claims.

What I claim is:

1. The herein described process for preparing lignite for use as fuel consisting of mixing the lignite with pitch in the proportions of 8 to 10 parts of pitch to 80 to 82 parts of lignite, briqueting the mixture, heating the briquets to distil off volatile matter therein in the form of gases and cooling the briquets in the presence of said gases.

2. The herein described process for preparing lignite for use as fuel, consisting of mixing the lignite with pitch in the proportions of less than 10 parts of pitch and more than 80 parts of lignite, briqueting the mixture, heating the briquets to distil off volatile matters therein in the form of gases and cooling the briquets in the presence of such gases.

3. The herein described process of preparing lignite for use as fuel, consisting in mixing the lignite with pitch and coal in approximately the proportions of 8 per cent. pitch 12 per cent. coal and 80 per cent. lignite, briqueting the mixture, and heating the briquets to distil off volatile matter therein and collecting the gases given off by such volatile matter.

In testimony whereof I affix my signature in presence of two witnesses.

SAMUEL M. DARLING.

Witnesses:
JOHN B. WATKINS,
JOHN L. PROUDFOOT.