

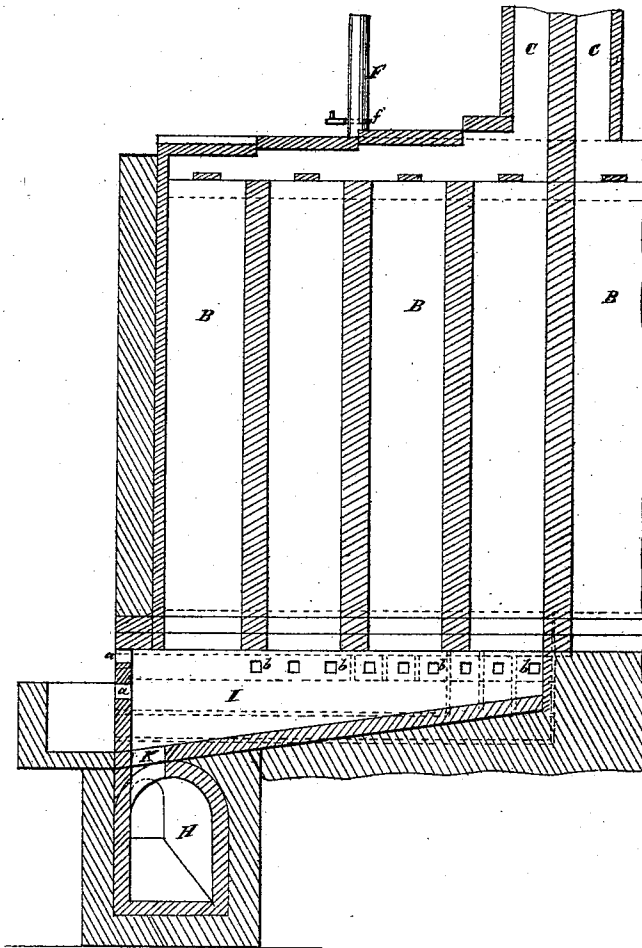
H. ENGELMANN.

Process of Making Coke from Lignites.

No. 136,592.

Patented March 11, 1873.

Fig 1



witnesses
Engels & Co. New York.
John W. Willecomb

Henry Engelmann,
per
James M. Whitely,
Atty.

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Fig. 2.

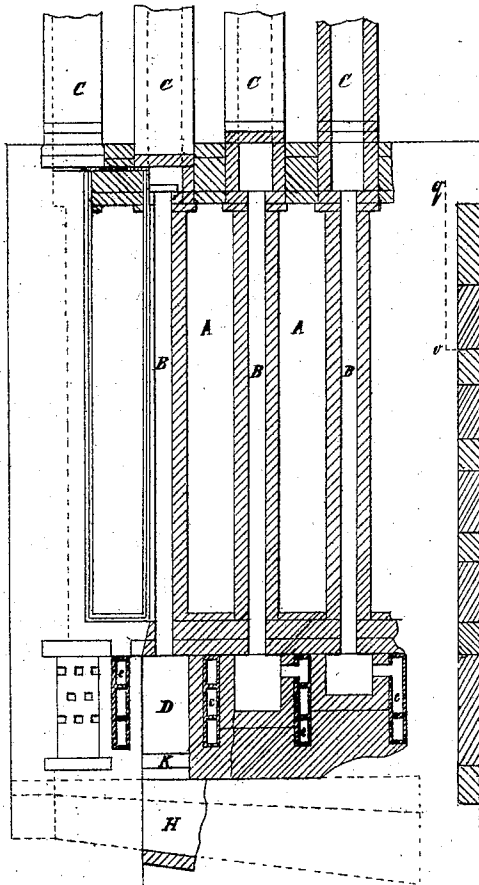
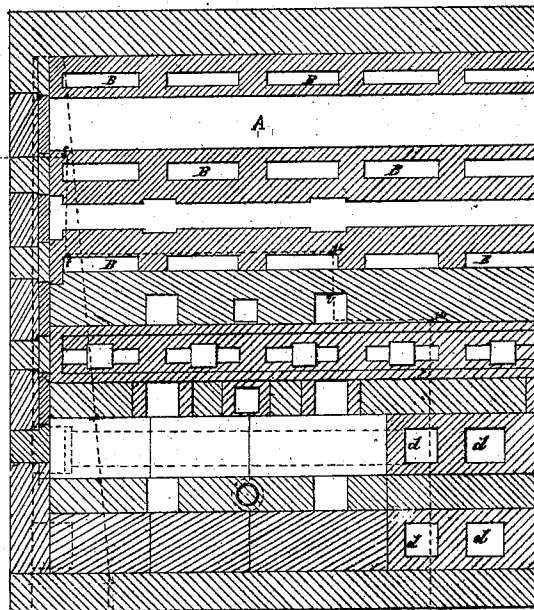


Fig. 3.
1/2 Length



witnesses
Agersold Lockwood
John W. Wilcomb

Henry Engelmann
 Per *James H. Whitney*
D. Atty.

UNITED STATES PATENT OFFICE.

HENRY ENGELMANN, OF SALT LAKE CITY, UTAH TERRITORY.

IMPROVEMENT IN PROCESSES FOR MAKING COKE FROM LIGNITES.

Specification forming part of Letters Patent No. 136,592, dated March 11, 1873.

To all whom it may concern:

Be it known that I, HENRY ENGELMANN, of Salt Lake City, in the Territory of Utah, have invented certain Improvements in Processes of Coking Lignite and Similar Coal-Like Materials, of which the following is a specification:

The object of this invention is to provide a process of effectually coking brown coal, lignite, and other coal-like material incapable of being coked in the usual operation of an ordinary coking oven or retort. It consists in mixing with the lignite or other refractory material to be coked coal-tar or certain varieties of bituminous coal or asphaltum, or analogous substance, and subjecting the material thus prepared to an initial and sustained heat above a cherry-red, so termed, laterally applied, sufficient not only to volatilize the hydrocarbons and eliminate the volatile matter contained in the mass, but also to decompose the aforesaid hydrocarbons into gases that may be conducted away and carbonaceous matter, that, being distributed through the mass, serves to cement the fragments of lignites or equivalent material together to form a compact product capable of use in the same manner as coke made wholly from "coking" or "caking" coal, this result being in contradistinction to that shown in the fragmentary and comparatively uncoked product obtained by subjecting lignite or like substance to the action of the coking apparatus hitherto in use. The invention also includes compacting the charge during or after its introduction to the coking-furnace, by subjecting it to pressure, as by compressing-rollers, whereby the relative solidity of the mass and its integrity when used or applied for fuel purposes are materially enhanced.

Figure 1 is a vertical longitudinal section of the furnace used in carrying my improved process into practice. Fig. 2 is a transverse section of the same taken in the line *q r s t u w x* of Fig. 3. Fig. 3 is a ground plan of the same.

The furnace being capable of separate use for other purposes, I propose to make it the subject of another and independent application for Letters Patent; and, therefore, here describe the construction and operation of the same only so far as is essential to a full un-

derstanding of my improved process of coking lignites and like substances refractory to common methods of coking.

The furnace comprises a series of coking-ovens, A, arranged side by side, and each having about the proportions of twelve feet in height, eighteen inches in width, and from twenty to thirty feet in length. Provided in the walls between these ovens are vertical flues B, shown in cross-section in Fig. 3. The flues B connect at their upper ends with up-takes or chimneys C and at bottom with a chamber, D, which connects, by a passage, E, with a gas-generating furnace, in which combustible gas is formed by the imperfect combustion of fuel. Air is admitted to the chamber D through openings *a* in the front, through other openings *b* in the sides, and through the conduits shown at *c*, these last so arranged that the air, in passing through them, shall absorb a portion of the heat from the walls of the chamber, and thereby conduce to the durability of the same. The material to be treated is passed into the ovens through openings *d* in the top, provided with removable covers. Each oven has at its top an exit-pipe, F, for the outflow of the gases generated from the material in the process of coking, this exit-pipe, furthermore, being provided with a slide or valve, *f*, for throttling or stopping such outflow in order to maintain any desired pressure within the oven. The combustible gases introduced from the generator, as hereinbefore set forth, to the chamber D, are fired in the latter, and the flame, passing up into the flues B, rapidly heats the ovens to subject the contained material to the high initial and sustained heat which constitutes an important part of my process.

Having provided for use a furnace constructed and operating substantially as just described, I prepare the brown coal, lignite, or other non-bituminous or only slightly bituminous coal-like material by intimately mixing with it a quantity of coal-tar, sufficient to moderately saturate the material at a temperature sufficient to slightly liquefy the tar or equivalent bituminous or asphaltic substance, the coal-like material absorbing the same, and therefore becoming, so to speak, bituminized preliminary to the operation of coking.

In some cases, where a good coking or rich bituminous coal is easily available, a proportion of the same may be used in lieu of the tar to communicate to the non-coking material those properties which, under the conditions involved in the use of the improved furnace, enable the same to be effectually coked; or coal-tar and bituminous coal may be used together as the mixing agent; or asphaltum or analogous material. No definite proportions of the several substances can be specified, as these will vary according to the character of the lignite or other substance to be coked; but enough must be used to insure the permeation of the lignite, &c., previous to its subjection to a high heat with bituminous or tarry substance.

When the material is made ready, as aforesaid, it is placed in the ovens, and, the latter being closed, the combustion in the chamber D is raised as rapidly as possible to a temperature above a cherry-red—or, in other words, above that required for the slow distillation into gases of the light hydrocarbons contained in the tar or equivalent material, this being sufficient to rapidly volatilize all the volatile matter in the mass and to decompose the vapors thus formed into light gases, which pass off through the exit-pipes F and into carbon, which is deposited in large quantities between and within the fragments of lignite or like material, and, very much as if the whole mass had softened and partially run together, unites the whole in the form of a consistent and tolerably-firm product, not liable to split into fine pieces, as is the case with lignite, &c., treated in the usual way at ordinary coking temperatures.

It will be seen that by this process the refractory or non-coking coal is first brought approximately to the condition of a bituminous coking coal; that subjected to a high heat, initial and sustained, it is fluxed together by the deposited carbon; and that the elimination of the volatile matter effectually cokes the mass.

When the coking process is completed the mass is removed from the ovens and either passed through or between pressure-rollers, or subjected to the action of a press in such manner as to compact it, and by diminishing its porosity fit it for more effective use as fuel for any of the purposes for which coke may be employed. Furthermore, by this my improved method, the time required in coking, as compared with that involved in ordinary coking, is reduced many hours, and the capacity for work of the furnaces of any given size is proportionally increased.

By the means afforded for controlling the heat in the ovens A, (by regulating the pressure therein and adjusting the supply of combustible gas to the chambers D,) the heat may be maintained at the requisite high temperature for the period required, and then gradually reduced to enable the coked product to be drawn from the ovens at a comparatively low heat, by which means the splitting up or disintegration incident to the common practice of drawing the charge at a high heat and suddenly cooling with water is wholly avoided.

What I claim as my invention is—

1. The process of coking brown coal, lignite, and analogous coal-like material incapable of effective coking by the usual practice with ordinary coking-ovens by mingling the same with coal-tar, asphaltum, or analogous substances, or with bituminous coking coal, or with coal-tar and coking coal together, and subjecting the whole to an initial and sustained heat above a "cherry-red," so termed, and applied laterally throughout the mass, substantially as herein set forth.

2. The process herein described of solidifying by pressure the coked product formed by mingling coal-tar or equivalent material and subjecting the same to a heat above a cherry-red, for the purpose specified.

HENRY ENGELMANN.

Witnesses:

C. A. GOULD,
D. WILKIN.