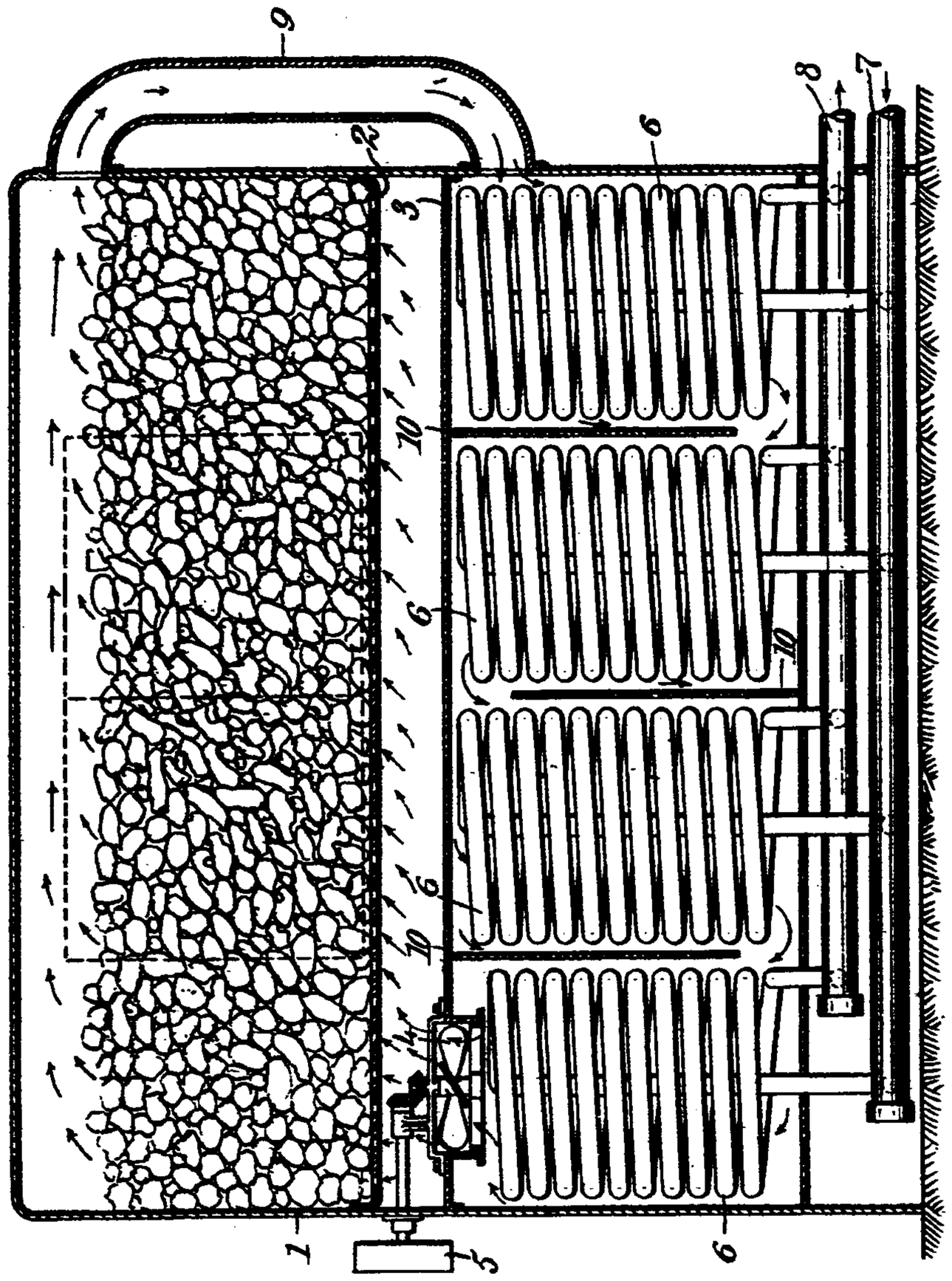
No. 842,747. PATENTED JAN. 29, 1907.

C. E. ARNOLD.

PROCESS FOR COOLING COKE.

APPLICATION FILED AUG. 30, 1906.



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PROCESS FOR COOLING COKE.

No. 842,747. Specification of Letters Patent. Patented Jan. 29, 1907.

Application filed August 30, 1906. Serial No. 332,685.

To all whom it may concern:

Be it known that I, CHARLES ELWOOD ARNOLD, a citizen of the United States, and a resident of Wilmington, in the county of Newcastle and State of Delaware, have invented a new and Improved Process for Cooling Coke, of which the following is a full, clear, and exact description.

This invention relates to a process for cooling or quenching coke after it is removed from the coke-ovens, and comprises the employment of certain steps by which the temperature of the coke is rapidly reduced and combustion prevented even while the coke is at a high temperature.

Referring to the drawing, which illustrates a vertical longitudinal section through an apparatus designed for the carrying out of n y process, it will be seen that said apparatus comprises a large rectangular receiver subdivided into two main compartments, one of which receives the coke or other material to be cooled, while the other compartment incloses the cooling medium, and means are provided for circulating inert gases between the cooling medium and the material to be cooled.

More in detail, the apparatus comprises a main casing 1, having a perforated partition 2, upon which the material to be cooled is supported and directly below a solid partition 3, spaced therefrom and having a single passage or port in which is located a gas-circulating fan or pump 4. This fan may be supported in any suitable manner and connected by any desired form of gearing to a pulley 5, located outside of the main casing 1. The space between the two partitions above referred to constitutes a gas-distributing space and serves to produce an even circulation of gas throughout the entire mass which is supported upon the perforated partition. Beneath the partition 3 are located a plurality of coils 6, each connected to a main supply-pipe 7 and to a main return-pipe 8, so that the flow to the coils may be independently controlled and the cooling effect varied at will. A branch conduit 9 connects the upper end of the coke-receiving chamber to the cooling-chamber at an end opposite to the fan, and a plurality of partitions 10 are located between the coils in the cooling-chamber, the apertures in such position being alternately at the top and bottom, so that the gas entering the cooling-chamber through the pipe 9 passes over one coil throughout its length, then beneath the partition and over the second coil throughout its length, and so on throughout the series to the last, from which the fan forces it to the distributing-chamber beneath the perforated partition 2. The casing is thus seen to include a closed circuit and means for forcing gas in a constant stream from the cooling-chamber to the coke and back again to be recooled. The casing is provided with a suitable entrance-opening for the coke to be cooled, and this opening is provided with an air-tight closure. (Shown in dotted lines in the drawing.)

In carrying out my improved process the coke after having been removed from the coke-ovens is forced, by means of a suitable ram, into the cooling-chamber before said coke has had time to become oxidized or burned to any considerable extent. The closure is thus secured in place, and the air which was admitted to the casing during the insertion of the coke soon becomes deoxygenized, and thus rendered inert as far as its effect upon the coke is concerned. Water or other cooling fluid is circulated through the coils 6, and as the circulating-fan is started in operation the cold inert gas which was retained in contact with the coils during the filling operation is brought into contact with the hot coke and very quickly lowers the temperature of the latter. No oxygen is admitted to the cooling-chamber save during the time the coke is inserted, and as this soon becomes exhausted further combustion of the coke is impossible. The coke is thus prevented from burning, save to a very slight extent, by reason of the exclusion of the oxygen while its temperature is being brought beneath the point of ignition through the action of the cooling-coils and the gas circulating in contact therewith. The small amount of oxygen which is admitted to the casing while the latter is being filled with the coke soon becomes converted into carbon dioxid and carbon monoxid, and these gases, together with the nitrogen, are circulated continuously over the cooling-coils and the coke until the temperature of the latter is reduced to a point far enough below the point of ignition to enable the coke to be readily handled and all danger of spontaneous combustion in the presence of the atmosphere obviated.

It is evident that this process may be employed for the cooling or quenching of other substances than coke, in fact may be used for any substance which rapidly deteriorates when at a high temperature in the presence of oxygen. It is very important that the same gas be used repeatedly and circulated back and forth between the cooling means and the material to be cooled, as thus any oxygen which might accidentally be present would soon be eliminated and further combustion be impossible.

It is evident that the process may be carried on with various different forms of apparatus, as the process is not at all dependent upon the specific features in the apparatus, although the apparatus herein illustrated constitutes the form which appears most advantageous at the present time.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The process of cooling combustible substances, which consists in inclosing them within an air-tight casing containing a cooling medium and inert gases, and circulating said gases in a continuous circuit in contact with the combustible substances and the cooling medium.

2. The process of cooling and quenching combustible substances, which consists in inclosing said substances within an air-tight casing containing a cooling medium, excluding the air from said casing, and circulating the gases within said casing in a continuous circuit in contact with the combustible substances and the cooling medium.

3. The process of cooling and quenching coke, which consists in inserting said coke while in an incandescent state in a casing, excluding the air from said casing, cooling an inert gas, and circulating said gas in contact with the coke.

4. The process of cooling coke, which consists in inserting said coke while in an incandescent state in an air-tight casing containing a cooling medium, and circulating the inert gases resulting from the slight combustion of the coke, in intimate contact with the cooling medium and the coke.

5. The process of cooling coke, which consists in inserting said coke while in an incandescent state in an air-tight chamber containing a cooling medium, forcing the inert gases which are within said casing and resulting from the slight burning of the coke, into contact with the cooling medium, and blowing said gases through the coke, whereby further burning of the coke is prevented and the temperature thereof reduced below the point of ignition.

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

CHARLES ELWOOD ARNOLD.

Witnesses:

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