June 27, 1933. F. J. PETERSON 1,915,949

FURNACE

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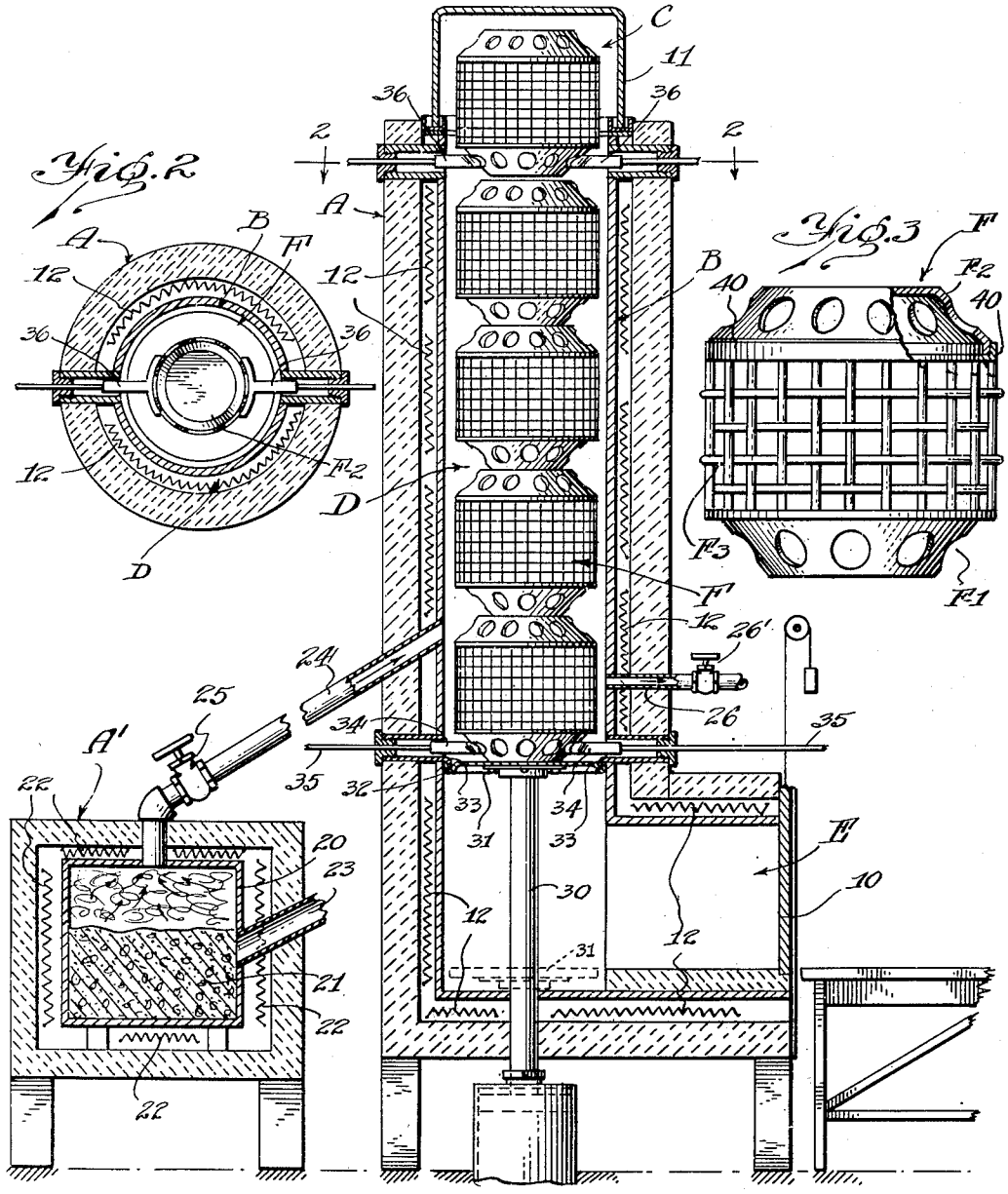


Fig. 2

Fig. 3

Fig. 1

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FURNACE

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My invention relates to heat treating furnaces and particularly to furnaces for carbonizing metallic articles. More particularly my invention is related to a furnace in which the work is progressively moved through the furnace in the presence of a carbonizing gas generated in an auxiliary furnace and conducted to the work and circulated in proximity thereto in a manner calculated to produce a product of uniform quality.

An object of my present invention is to facilitate the carbonizing of articles by providing a furnace structure adapted for progressively carbonizing the work relatively quicker and more uniformly than is possible with individual carbonizing retorts.

A further object of my invention is to provide a heat treating furnace structure in which case hardened articles may be produced of substantial uniform quality at a minimum of expense.

Other features and objects of my invention will be made more apparent as the description progresses in which like characters refer to like parts in the accompanying drawing illustrating a preferred embodiment of my invention, and in which:

Fig. 1 is a vertical sectional view of a furnace constructed in accordance with my invention,

Fig. 2 is a cross-sectional view taken substantially on the line 2—2 of Fig. 1, and

Fig. 3 is a detail view of one of the work containers or cradles.

In the illustrated embodiment of my invention I have provided for purposes of illustration a furnace structure A which in general is constructed of fire clay or other suitable heat resisting material and which encloses a retort B of a heat resisting metal or alloy. The furnace structure A is preferably constructed in such a manner as to permit the work to be stacked therein, and in general provides a loading zone C, a heat treating zone D and an unloading zone E.

The work to be heat treated or carbonized is preferably stored in a plurality of containers or cradles F, which are preferably adapted to be stacked in the furnace (see Fig. 1). The retort, constructed of suitable heat resisting material and open at both ends preferably extends from adjacent the bottom of the furnace to the top, one end of the retort being closed by the door 10, while the other end, the top, is closed by a removable cover 11. The retort B enclosed within the furnace structure is spaced from the walls thereof and heating devices, such as electrical heating units 12 are suitably located and supported in said space surrounding the retort.

The present construction is preferably arranged to permit the progressive movement of the work through the retort. In the illustrated embodiment, it will be evident that the work may be passed through from the top to the bottom or from the bottom to the top as desired. The heat treating or carbonizing gas is preferably produced from a material which generates a carbonizing gas when subjected to heat. Thus I preferably employ an auxiliary furnace A′ constructed to support a retort 20 in which the gas producing material 21 is contained, the retort being heated by any suitable means such as electrical heating units 22. The material may be introduced into the retort 20 through the chute or other suitable filling device 23. The gas generated therein may be conducted to the retort B through the pipe 24, the flow of gas being preferably regulated by a suitable control valve 25. I preferably introduce the gas into the retort B at a point adjacent to the bottom thereof so as to facilitate the circulation of the gas through the same, said retort having an outlet 26 and associated valve 26′ suitably located so as to exhaust the gas after the same has been circulated longitudinally through said vertical retort.

The work is moved longitudinally through the retort under the influence of a ram or plunger 30 which may be hydraulically operated if so desired. The plunger is provided with a head 31 having a circumferential groove 32 about the peripheral edge adapted to engage a downturned flange 33 around the inside wall of the retort so as to seal the main portion of the retort from the delivery chamber E when the plunger is raised.

I do not desire to support the stack of cradles F solely by the plunger 30, and have provided a plurality of retractable supports or brackets 34 adapted to be moved into engagement with the lowermost cradle, said supports engaging the downwardly and inwardly extending tapered portion F—1 of the cradle. These supports are preferably slidably supported by the furnace structure and may be moved by means of rods 35. One manner in which the work can be progressively moved through the retort is to progressively lower the stack of work containers or cradles. The supports 34 are thus first retracted and the plunger is lowered until the lowermost cradle is aligned with the laterally extending delivery chamber E. Any suitable means may be employed to remove the lowered cradle, through the opened door 10 but prior to removing same the supports 34 are projected and engaged with the cradle immediately thereabove to support the remaining cradles.

Previously to lowering the stack of cradles an additional cradle is preferably introduced at the top, the same being normally supported by the retractable supports or brackets 36 or similar construction as brackets 34 and similarly actuated. On lowering the stack of cradles the supports 36 are retracted to permit the most recently added cradle to follow the others into the heat treating zone D. The supports 36 may then be again projected and another cradle loaded with work to be heat treated placed therein, after which the cover 11 may be again set in place.

Obviously, the above operation can be readily reversed and the work passed from chamber E to C if so desired.

Thus it will be seen that the work is progressively moved through the heat treating retort in the presence of a heat treating or carbonizing gas. The length of time each cradle is in the retort depends on the length of the furnace and the time interval between each cradle removal. It will be obvious that a very uniform heat treatment can be produced, resulting in articles of uniform quality and strength as desired.

The cradle or container F is preferably provided with a frusto-conical base F—1 and a removable frusto-conical cover F—2 adapted to seat on an annular seat 40 carried by the body portion F—3. The cover preferably supports another cradle when in the furnace retort, the frusto-conical base and cover being preferably perforated as at 41 and 42 respectively to permit the gas to circulate through the interior thereof, the sides of the body portion F—3 being also perforated or formed of lattice work.

I find that a system such as shown in the accompanying drawing illustrating a preferred embodiment of my invention is very economically constructed and operated. Furthermore the same may be very readily and easily controlled and provides a furnace in which various types of work can be quickly and uniformly carbonized or case hardened with a minimum of expense and labor and with a minimum of waste.

Although I have illustrated but one form of my invention and have described in detail but a single application thereof, it will be apparent to those skilled in the art to which my invention pertains that various modifications and changes may be made therein without departing from the spirit of my invention or from the scope of the appended claims.

I claim:

1. In a device of the character described including a pair of associated furnace structures each having a retort, means for heating said retorts, means interconnecting said retorts including gas conducting means for transferring carbonizing gas from one retort to the other, said retorts being otherwise closed, one of said retorts having removable closure members and constructed to support work to be carbonized and the other constructed for supporting a material producing carbonizing gas when subjected to heat.

2. In a device of the character described including a pair of associated furnace structures each having a retort, means for heating said retort, means interconnecting said retorts including gas conducting means for continuously transferring carbonizing gas from one retort to the other, said retorts being otherwise closed, one of said retorts constructed to provide means movably supporting work to be carbonized and the other constructed for supporting a material producing carbonizing gas when subjected to heat.

3. In a device of the character described including a pair of associated furnace structures each having a retort, means for heating said retorts, means permanently interconnecting said retorts including gas conducting means for transferring carbonizing gas from one retort to the other, said retorts being otherwise closed, one of said retorts constructed for supporting a material producing carbonizing gas when subjected to heat, and means associated with said other retort for progressively moving the work therethrough in the presence of the carbonizing gas.

4. In a device of the character described including a pair of associated furnace structures each having a retort, means for heating said retorts, means interconnecting said retorts including gas conducting means for continuously transferring carbonizing gas from one retort to the other, said retorts being otherwise closed, one of said retorts constructed for supporting a material producing carbonizing gas when subjected to heat, a plurality of containers for supporting the

work, and means associated with said other retort for progressively moving said work containers through said retort.

5. In a device of the character described including a pair of associated furnace structures each having a retort, means for heating said retorts, means interconnecting said retorts including gas conducting means for transferring carbonizing gas from one retort to the other, said retorts being otherwise closed, one of said retorts constructed for supporting a material producing carbonizing gas when subjected to heat, a plurality of containers for supporting the work, said other retort constructed for supporting said containers one above the other, and means associated with said second mentioned retort for vertically moving said work containers through said retort, said second mentioned retort having loading and unloading chambers associated therewith, said loading and unloading chambers respectively located adjacent the upper and lower ends of said associated retort.

In testimony whereof I affix my signature.

FREDOLF J. PETERSON.