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F. J. PETERSON

2,084,002

CARBURIZING FURNACE

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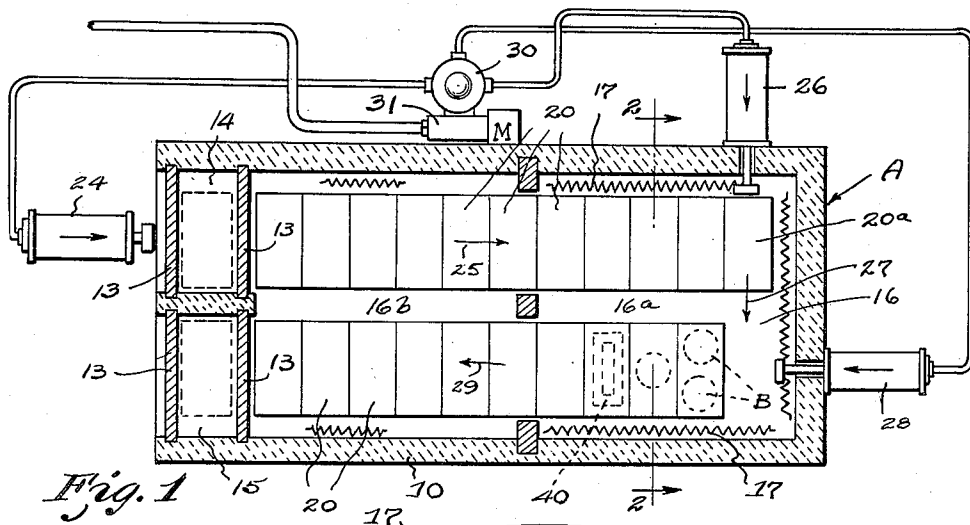


Fig. 1

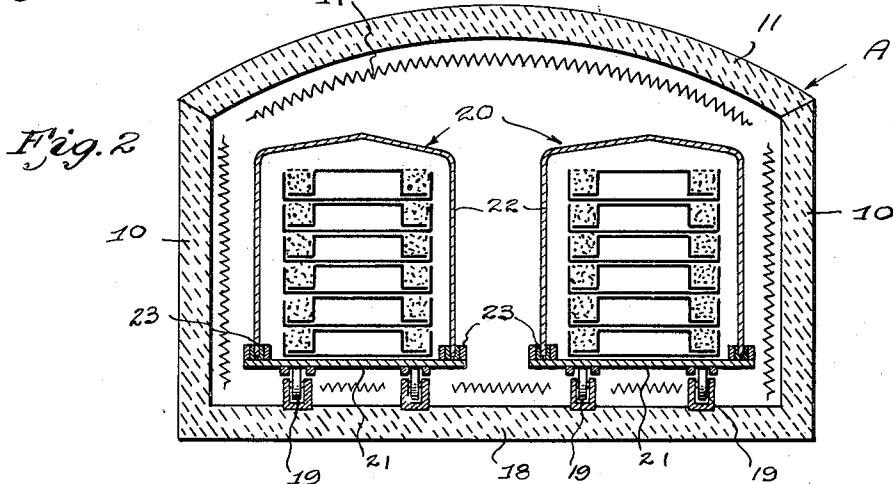


Fig. 2

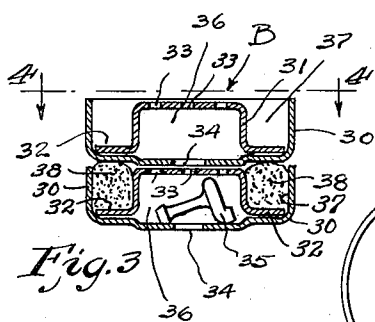


Fig. 3

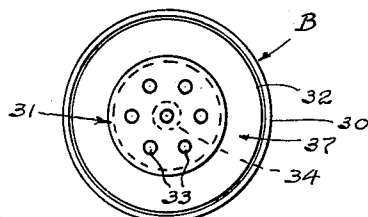


Fig. 4

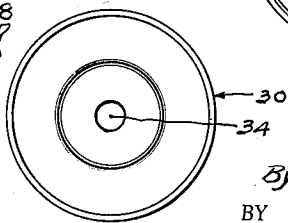


Fig. 5

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2,084,002

CARBURIZING FURNACE

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Application September 13, 1935, Serial No. 40,382

5 Claims. (Cl. 263—47)

This invention relates to carburizing furnaces and more particularly to an improved furnace construction facilitating the practical heat treatment of production quantities.

5 An object of the present invention is to provide a novel improved furnace structure in which to take care of maximum production, and so arranged as to provide for a uniform quality of heat treated articles.

10 Another object of the invention relates to an improved apparatus for heat treating a mass production by providing a plurality of retorts and means for progressively moving same through the furnace.

15 A still further object of the invention relates to a tray structure for supporting the articles to be heat treated and for supporting the carburizing material.

For a more detailed understanding of the invention, reference may be had to the accompanying drawing illustrating a preferred embodiment of the invention, and in which:

Fig. 1 is a plan view of the furnace diagrammatically illustrating the improved conveying system.

Fig. 2 is a transverse sectional view through the furnace taken substantially on the line 2—2 of Fig. 1.

Fig. 3 is a detailed sectional view of the stacked trays for carrying the work and carburizing material.

Fig. 4 is a detailed plan view of said stacked trays as viewed from the line 4—4 of Fig. 3, and

Fig. 5 is a plan view of one of the outer tray elements.

The furnace structure A is preferably constructed of heat resisting fire brick or of other suitable material and comprises in general the side walls 10, top wall 11 and one rear end wall 12. There is no front wall, but it will be noted that the furnace is provided with movable doors 13, so spaced and arranged as to provide loading and unloading chambers 14 and 15 respectively. When the doors are closed the furnace chamber 16 is substantially closed to retain the heat, said furnace chamber being preferably heated by heating elements 17.

The floor 18 of the furnace is preferably provided with rollers 19 or other suitable anti-friction devices, which permits a plurality of retorts 20 to be readily and easily advanced through the furnace. These retorts 20 are preferably constructed of a floor 21 and an inverted bell shaped retort member 22 which may be placed on said floor portions 21 and joined or otherwise engaged

therewith to provide a pressure retaining retort. If desired, the edge of said bell shaped members may be seated in suitable sealing guides 23.

The retorts are arranged to be filled with the work or metal articles which are to be heat treated as well as the carburizing compound which produces a carburizing gas when heated. The particular tray structure which is preferably employed with an apparatus as herein described will be more fully explained hereafter.

A retort is loaded in the loading chamber 14, the doors 13 of said loading chamber are raised or otherwise removed and the prime mover such as a ram 24 is actuated to move the retort into the furnace chamber 16. This step is repeated and as a result, a train of retorts is progressively moved through the furnace as indicated by the arrow 25 toward the rear of the furnace. While the ram 24 is being retracted and a new retort is made ready in the loading chamber 14, the ram 26 is actuated to push the end retort 20a transversely of the furnace as indicated by the arrow 27 to a position in front of the ram 28. This last mentioned ram 28 serves to progressively advance the train of retorts longitudinally through the furnace chamber 16 as indicated by the arrow 29, in a direction opposite to the travel of the train of retorts moved by the ram 24. Preferably the ram 28 is actuated simultaneously with ram 24 and the doors 13 of the unloading chamber 15 are thus raised or otherwise removed at the same time the doors of the loading chamber are raised.

The rams 24, 26 and 28 are preferably actuated by a synchronized control, and their operation is so timed as to effect a progressive advancement of the retorts through the furnace chamber 16. The ram 26 is actuated in between the actuation of said rams 24 and 28. This is accomplished by means of any suitable control mechanism, and said rams may be hydraulically or otherwise suitably operated. The hydraulic control device preferably includes a motor M which is operated continuously and controls a valve or other suitable control device 30 and suitable mechanism such as a speed reducer 31 may be incorporated in said control apparatus if so desired.

The furnace chamber 16 may be divided, if so desired, into two chambers 16a and 16b, and it will be possible to thus maintain a different temperature in said sub-chambers. If desired, the heating elements in chamber 16b may be omitted, and thus the chamber will be heated indirectly from chamber 16a. The furnace is thus made readily adaptable for the heat treatment of vari-

ous types of work, and the quality of heat treatment may be readily varied to suit various conditions by regulating the time interval between successive actuations of the rams to vary the time said work is subjected to the heat treatment.

The tray structures B, which are arranged to be stacked within the retorts 20, preferably consist of complementary cup-shaped tray elements. This structure is clearly illustrated in Figs. 3 to 5 inclusive and it will be noted that the outer tray element 30 receives the inner inverted tray element 31, said inner tray element being provided with the annular outwardly extending flange 32 which rests on the bottom of said outer tray element 30, while the next adjacent outer tray element will rest on the inverted bottom of the inner tray element (see Fig. 3). The inner and outer tray elements are provided with openings or other suitable perforations 33 and 34 respectively to permit the ready circulation of the carburizing gas in contact with the work or metal article to be carburized. In Fig. 3 an article to be carburized is designated by the reference character 35. It will be noted that the side annular wall of the inner cup-shaped tray element defines a central space 36 in which the articles to be heat treated or carburized may be contained, and also cooperates with the side wall of the outer tray element to define an annular chamber 37 surrounding said space 36 in which the carburizing or heat treating compound 38 may be contained. This compound in the present instance preferably comprises a specially prepared carburizing compound. Any suitable carburizing compound may be used, such compounds in general being composed mainly of barium carbonate, calcium carbonate, coke, barium and charcoal. This compound, when subjected to heat sufficient to heat treat the metal article, will produce an active carburizing gas, and in this improved structure, the gas is readily circulated in contact with the articles to be heat treated.

The bottom wall of cup or tray element 30 is slightly spaced from top wall of cup or tray element 31 (see Figs. 2 and 3) to permit free circulation of the carburizing gas from annular chamber 37 into the central space via perforations or openings 34 and 33.

It is noted that the heating elements are supported exteriorly of the retorts and that the articles to be heat treated and the carburizing compound are supported in spaced relation within the retort. The compound and work may be readily loaded into the retorts and the work is readily and easily removed from the retort after passing through the furnace, since the stack of trays is readily and easily removed from the retort. Such trays may be generally circular in plan or rectangular as shown at 40 in Fig. 1. Although but one embodiment of the invention is shown, it will be apparent to those skilled in the art to which this invention pertains, that various modifications and changes may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

It is claimed:

1. A stacked supporting apparatus for supporting within a retort metal articles to be heat treated and a carburizing material producing a carburizing gas when heated, said apparatus comprising oppositely faced cupped shaped members

telescopically assembled, the side wall of the inner member being spaced from the side wall of the outer member, whereby to provide a central space for supporting metal articles to be heat treated and an annular chamber surrounding said space for supporting the carburizing material.

2. A stacked supporting apparatus for supporting within a retort metal articles to be heat treated and a carburizing material producing a carburizing gas when heated, said apparatus comprising oppositely faced cupped shaped members telescopically assembled, the side wall of the inner member being spaced from the side wall of the outer member, whereby to provide a central space for supporting metal articles to be heat treated and an annular chamber surrounding said space for supporting the carburizing material, said annular chamber and central space being thereby arranged to support said articles and carburizing material in spaced relation within said retort.

3. A stacked supporting apparatus for supporting within a retort metal articles to be heat treated and a carburizing material producing a carburizing gas when heated, said apparatus comprising oppositely faced cupped shaped members telescopically assembled, the side wall of the inner member being spaced from the side wall of the outer member, whereby to provide a central space for supporting metal articles to be heat treated and an annular chamber surrounding said space for supporting the carburizing material, said cup shaped members having perforated bottoms permitting the circulation of carburizing gas into contact with the articles to be heat treated.

4. A stacked supporting apparatus for supporting within a retort metal articles to be heat treated and a carburizing material producing a carburizing gas when heated, said apparatus comprising oppositely faced cupped shaped members telescopically assembled, the side wall of the inner member being spaced from the side wall of the outer member, whereby to provide a central space for supporting metal articles to be heat treated and an annular chamber surrounding said space for supporting the carburizing material, said cup shaped members forming complementary elements and providing sub-assemblies which may be stacked one on top of the other.

5. A stacked supporting apparatus for supporting within a retort metal articles to be heat treated and a carburizing material producing a carburizing gas when heated, said apparatus comprising oppositely faced cupped shaped members telescopically assembled, the side wall of the inner member being spaced from the side wall of the outer member, whereby to provide a central space for supporting metal articles to be heat treated and an annular chamber surrounding said space for supporting the carburizing material, said annular chamber and central space being thereby arranged to support said articles and carburizing material in spaced relation within said retort, one of said cup shaped members having a smaller diameter than the other and cooperating therewith when assembled together to provide a wall separating said annular chamber from said central space.

SADIE F. PETERSON, 70

*Executrix of the Estate of Fredolf J. Peterson,
Deceased.*