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SAWDUST-BURNING FURNACE

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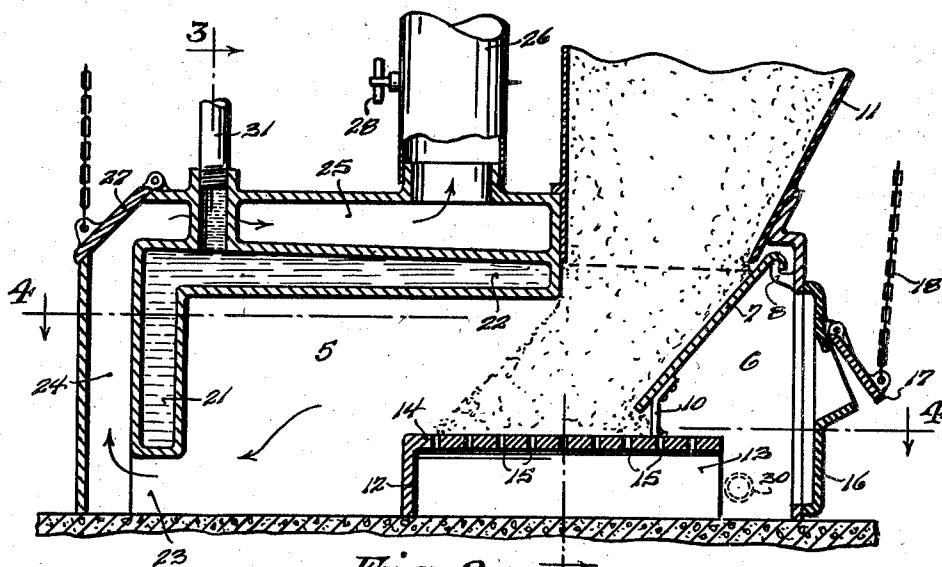


Fig. 2.

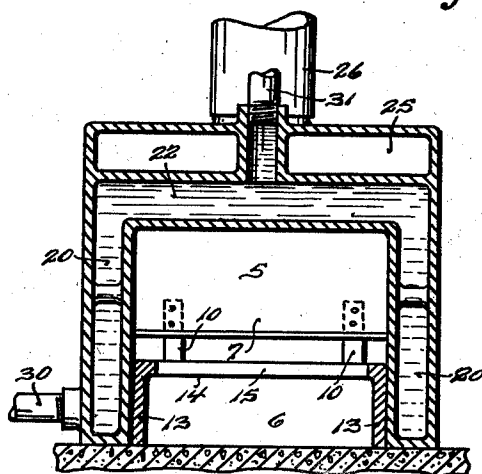


Fig. 3.

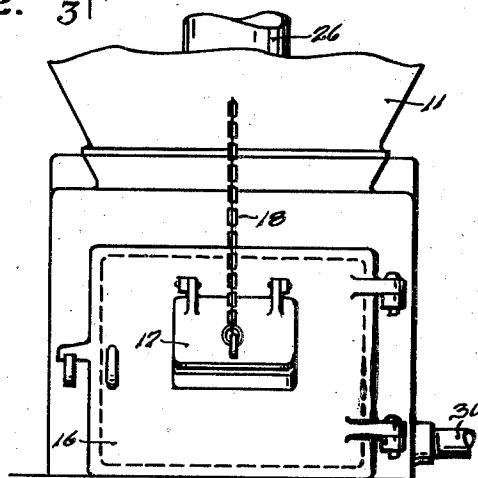


Fig. 1.

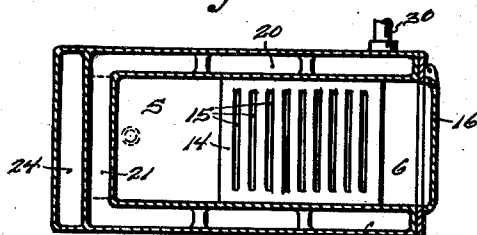


Fig. 4.

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SAWDUST-BURNING FURNACE

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3 Claims. (Cl. 122—136)

This invention relates generally to furnaces and particularly to that class of furnace in which saw-dust and other comminuted fuels are used as the heat-generating medium.

5 The principal objects of the present invention are to provide a water-jacketed type of furnace peculiarly adapted to the specific requirements of a wood-refuse burner and so applied, through the employment of the water-jacketing as the
10 water-heating plant of a circulating hot-water system, either for heating or draw-off purposes, or both, that the generated heat is utilized to the fullest possible extent, that the life of the furnace is prolonged in that the intense heat
15 generated by a saw-dust burner, heat which has heretofore been concentrated on a furnace lining incapable of rapidly dissipating the same, is rapidly conducted from the point of heat concentration, and otherwise to provide a saw-dust
20 burning furnace of generally improved and simplified construction.

It is a further and particular object of my invention to so adapt such water-jacketing to a saw-dust burning furnace as to permit a practical
25 utilization of a down-draft in the travel of the gases of combustion from the fire-box to the flue.

The foregoing and still further and more particular objects and advantages of the present
30 invention will be apparent in the course of the following description and claims, the invention consisting in the novel construction, adaptation, and combination of parts hereinafter described and claimed.

35 In the drawing—

Figure 1 is a front elevational view and Fig. 2 a section taken on the longitudinal median line thereof to illustrate a furnace constructed according to the now preferred embodiment of the
40 invention.

Fig. 3 is a transverse vertical section taken on the jogged section line 3—3 of Fig. 2; and

Fig. 4 is a horizontal section taken on the jogged line 4—4 of Fig. 2, the scale being reduced
45 from that employed in the preceding views.

As represented in the drawing, the furnace provides that which is ordinary in saw-dust burners, a tunnel-like cavity forming a combustion chamber 5 at the front end and an air
50 chamber 6 at the rear end, the chambers being separated by a shiftable grate and a sloping plate 7 suspended from fixed lugs 8 to lie above the rear portion of the grate. Toe elements 10 on said plate 7 elevate the lower edge of the
55 plate and provide an interstice between the plate

and the grate. A hopper which feeds through a roof opening for delivering fuel over the plate 7 to the surface of the grate is indicated at 11.

As is customary in advanced saw-dust burners, the grate which I employ is desirably in the
5 form of an open-end drawer providing closed front and side walls 12 and 13, respectively, and a horizontal fuel-supporting upper wall 14 in which are slots or other suitable grate openings
15. Removal of the grate is permitted through
10 an end opening in the furnace closed by the door indicated at 16, said door carrying the conventional hinged draft gate 17 which is controlled by a chain 18.

With respect to the water-jacket provisions of
15 the furnace, water chambers are provided to lie at each side of, above, and at the front end of the combustion chamber and of these water chambers, those laterally disposed and indicated
20 by 20 extend vertically the full depth of the combustion chamber and horizontally approximately the entire length of the furnace to laterally enclose the air chamber 6 as well as the combustion
25 chamber 5. The forwardly disposed end cavity of said water chambers, represented by
25 21, is of less depth than the side chambers and provides a restricted throat below the same permitting escape of the products of combustion. From this throat, represented by 23, the gases
30 rise through a vertical flue duct 24 and thence
30 through a horizontal flue duct 25 which overlies the upper water chamber 22 pass into a smoke pipe 26 fitted with a damper 28.

Hingedly suspended at the juncture of the flue ducts 24 and 25 is a gate 27 which may be employed as a check-draft and which is disposed
35 to operate as a clean-out door for each of the flue ducts.

30 denotes a cold-water inlet pipe and 31 a hot-water outlet pipe connecting the water-jackets in a circulating heating or draw-off system, the pipe 30 connecting with one of the side chambers 20 in proximity of the lower limits thereof and adjacent the rear of the furnace while the pipe 31 connects with the chamber 22
45 directly above the point of maximum heat concentration, which is to say the apex of the L-angle produced between the water chambers 21 and 22. The upper wall of said lateral chambers 20 and the ceiling chamber 22 have a progressive
50 rise toward the outlet pipe 31 to prevent the development of steam pockets within the water chambers.

The principal objection to saw-dust burning furnaces has been the intense concentration of
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heat on that portion of the fire-box ceiling which lies above the point of combustion of the gases, causing warping of the ceiling plate and necessitating frequent replacement. A refractory-brick lining the heat-sustaining characteristics of which are sufficient to withstand the excessive spot temperatures in a saw-dust burner are too costly, the commonly-used fire-brick being invariably destroyed by fusion. It is by reason of the fact that any developed down-draft still further intensifies this application of heat far beyond the ability of the ordinary wall structure to dissipate the same which accounts for the failure to have heretofore evolved any saw-dust burning furnace in which this desirable feature has been practically applied. In the few instances in which a down-draft has been attempted heretofore, a more rapid depreciation of the fire-box lining results and the partitioning walls used to effect the down-draft have burned out at frequent intervals.

The present invention provides what constitutes a completely water-jacketed furnace for household use of saw-dust as the combustible fuel, a furnace in which the chambers are so designed as to obtain a rapid dissipation of heat from the walls to the readily mobile and effective heat-conducting agent, water. The life of the furnace is prolonged, the heating efficiency increased and, through the provision of heating tanks of large capacity in direct heat-conducting relation to the fire at the point of maximum development of heat in the latter, this as distinguished from the necessarily remote location of coils of small water-capacity, an abundance of hot water is obtained for use either in a circulating heating system or for draw-off purposes, or both.

I do not necessarily limit myself to the structure which I particularly describe with reference to the illustrated preferred embodiment and intend that the claims be given a breadth in their interpretation commensurate with the state of the advance in the art.

What I claim, is:

1. A furnace having a wall at the outlet end of the combustion chamber extending from the ceiling

ing of the combustion chamber into proximity of but spaced from the floor of the chamber to form a down-draft delivery throat through which the products of combustion pass from the chamber and providing return-flow flue ducts leading from said throat to have the gases pass upwardly over the rear surface of the end wall and horizontally therefrom over the upper wall of the chamber, the furnace at the juncture of said flue ducts having an opening aligned with and common to each of the flue passages, and a chain-operated hinged door for said opening acting as a check damper for the furnace, the positioning of said opening at the juncture of said vertical and horizontal flue ducts in alignment with both of the same permitting use of the opening as a clean-out for the flue ducts.

2. A furnace providing a combustion chamber of which the roof is water-jacketed for the conduction of heat and wherein the cell forming said jacket has its lower wall approximately horizontal and the ceiling disposed at an oblique angle thereto and located such that the narrow end of the figure produced by said horizontal lower wall and oblique ceiling lies at the end of the chamber remote from the gas-discharge end, said cell being provided with connections for the hot and cold water pipes of a water-circulating system, the hot water connection thereof lying in the ceiling of the cell at the deep end of the latter.

3. A furnace having a wall at the gas-discharge end of the combustion chamber which extends from the roof of the combustion chamber into proximity of but spaced from the floor of the chamber to form a down-draft delivery throat through which the products of combustion pass from the chamber, the upper wall of said chamber providing a water cell therein of which the floor lies in a substantial horizontal plane and the ceiling rises progressively from the rear combustion-initiating end toward the forward gas-discharge end of the combustion chamber, said cell being provided with connections for the hot and cold water pipes of a water-circulating system, the hot water connection thereof lying in the ceiling of the cell at the deep end of the latter.

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