

968,570.

P. J. & C. H. KRAETSCH.
SMOKE CONSUMING FURNACE.
APPLICATION FILED FEB. 8, 1910.

Patented Aug. 30, 1910.

2 SHEETS-SHEET 1.

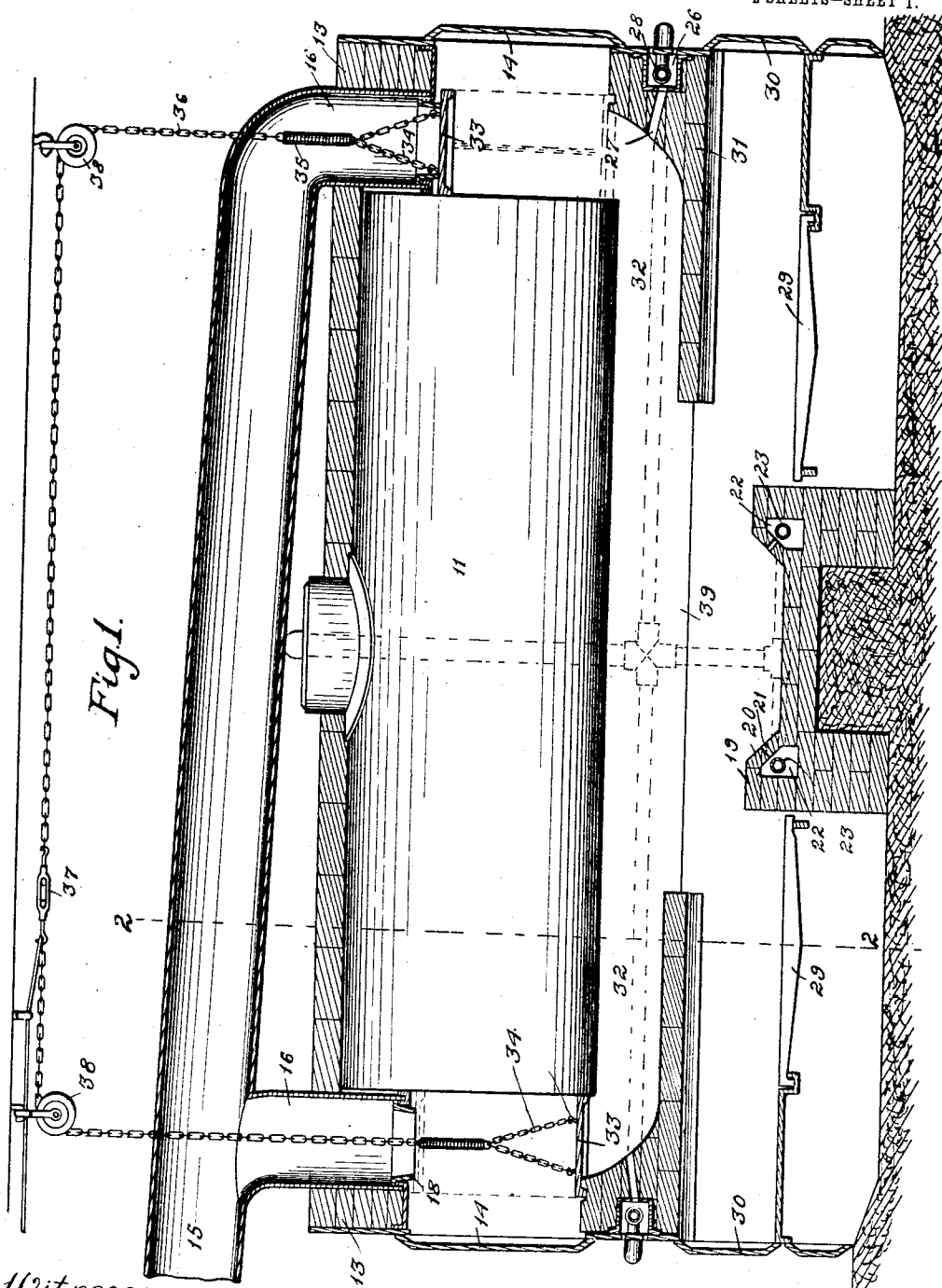


Fig. 1.

Witnesses.
W. A. Loftus.
F. C. Caswell

Inventors.
Paul J. Kraetsch & Carl H. Kraetsch.
by J. Ralph Onwig Atty.

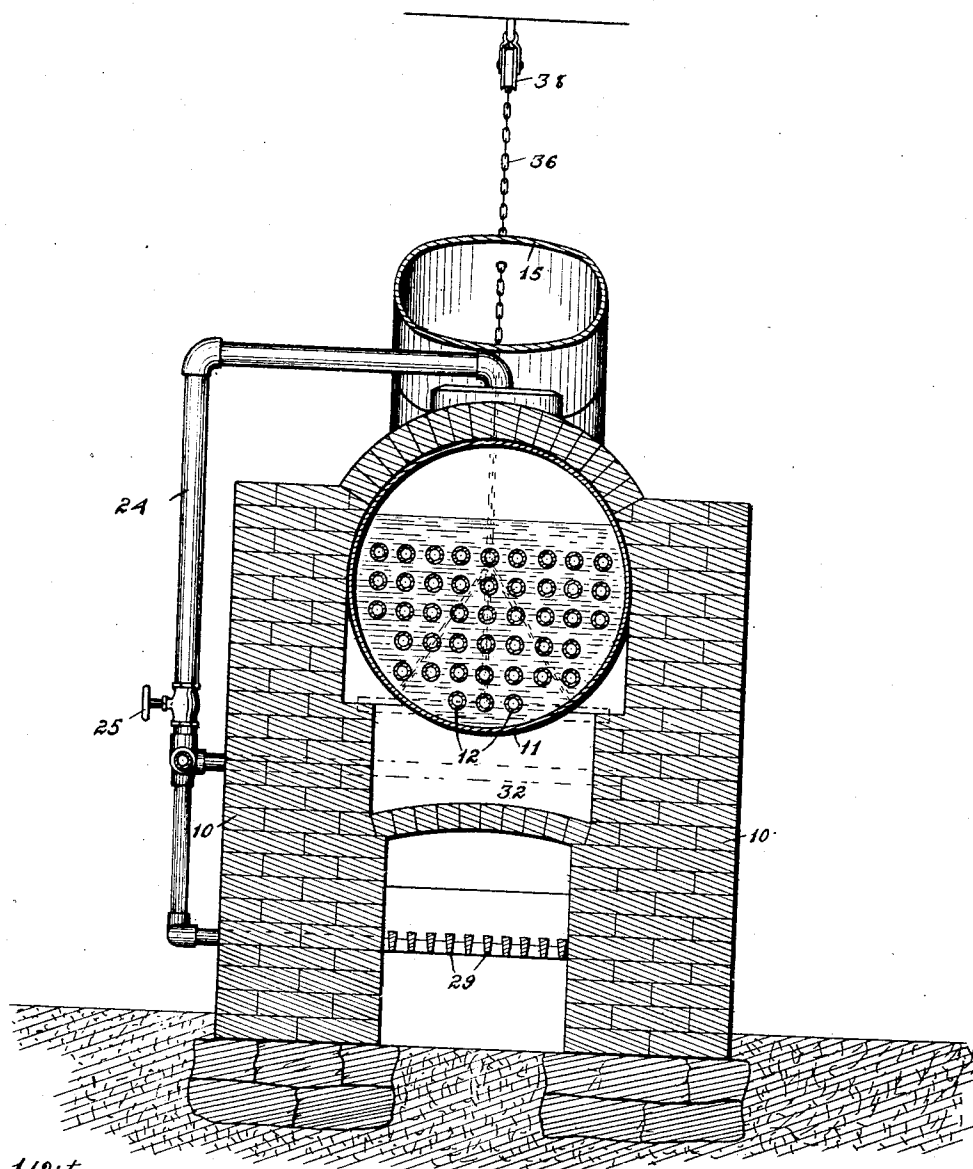
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2 SHEETS—SHEET 2.

Fig. 2



Witnesses.

W. A. Loftis.

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Inventors

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UNITED STATES PATENT OFFICE.

PAUL J. KRAETSCH AND CARL H. KRAETSCH, OF DES MOINES, IOWA.

SMOKE-CONSUMING FURNACE.

968,570.

Specification of Letters Patent. Patented Aug. 30, 1910.

Application filed February 8, 1910. Serial No. 542,792.

To all whom it may concern:

Be it known that we, PAUL J. KRAETSCH and CARL H. KRAETSCH, citizens of the United States, residing at Des Moines, in the county of Polk and State of Iowa, have invented a certain new and useful Smoke-Consuming Furnace, of which the following is a specification.

The object of our invention is to provide a smoke consuming furnace of simple, durable and inexpensive construction provided with two chambers at the ends of a furnace and also with a central combustion chamber between them and with arches over the two end combustion chambers and with flue passageways over both of said arches, whereby the smoke arising from one of the combustion chambers to which fresh fuel has been fed must first pass to the central combustion chamber where it will be commingled with the heat arising from the other one of the combustion chambers at the ends of the furnace so that the smoke and gases will be consumed principally directly under the center of a boiler to thereby apply the heat in an advantageous manner to the center of the boiler instead of to the ends, and also to thoroughly commingle the products of combustion from both of the first combustion chambers, and also to provide means for protecting the ends of the boilers and the ends of the flues from the excessive heat from either of the first combustion chambers.

Our invention consists in certain details, in the construction, arrangement and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in our claims and illustrated in the accompanying drawings, in which:

Figure 1 shows a central, longitudinal, vertical sectional view of a furnace embodying our invention, and Fig. 2 shows a transverse, sectional view of same on the line 2-2 of Fig. 1.

Referring to the accompanying drawings, we have used the reference numeral 10 to indicate the side walls of a furnace. 11 indicates a boiler of ordinary construction having boiler flues 12 supported between the side walls. The ends of the furnace wall are indicated by the numeral 13 and each wall is provided with a door 14. The smoke stack is indicated by the numeral 15 and is provided with two branches 16, which

branches communicate with the chambers at the ends of the boiler. In the lower end of each of said branches is a flange 18 against which the dampers hereinafter described may rest to close either one of said branches.

At about the central portion of the furnace is a double bridge wall 19 having two inclined surfaces 20 provided with perforations at 21 to discharge upwardly toward the center of the boiler. These perforations lead from the chambers 22 which are open at their ends to the exterior of the furnace and through which air may be admitted. In each of said chambers is a steam pipe 23 through which steam may be admitted to the chambers to provide means for forcing fresh air into the fire. The steam pipes 23 communicate with a steam pipe 24 that communicates with the top of the boiler. A valve 25 is provided in the steam pipe 24 for controlling the passage of steam through it.

Formed in each end wall of the furnace is an air chamber 26 and openings 27 are provided in the wall leading from said air chamber to the space below the boiler. The said chamber 26 communicates with the outside atmosphere through openings in the end of the furnace and a steam pipe 28 is arranged in each of said air chambers and communicates with the pipe 24 below the valve 25 so that when said valve is opened steam will be admitted from the boiler into both of the air chambers 22 and both of the air chambers 26 and said steam will serve the purpose of forcing air into the interior of the furnace. At each end of the furnace between the central bridge wall and the adjacent end of the furnace is a grate 29 accessible through an opening in the end of the furnace wall covered by the fuel door 30. Above each grate is an arch 31 which arch extends from the adjacent end of the furnace over the grate to a point spaced apart from the central bridge wall, thus leaving above each arch a passageway 32 between the arch and the boiler leading to the spaces at the ends of the boiler.

In each of the spaces at the ends of the boiler we have mounted a damper plate 33, and each of these dampers is supported by the chains 34 which connect with a spring 35. The two springs 35 are connected by a single chain 36 having a turn buckle 37 therein to adjust their length and which chain is supported by the pulleys 38. The

said chain 36 is so arranged that when one of the damper plates 33 is in its elevated position it will engage the flange 18 and thus open the passageway 32 so that the products of combustion may enter the boiler flues and the other plate will then be in position resting on top of the outer end of the arch, as shown at the left in Fig. 1, to thereby close the passageway 32 and to permit the products of combustion going through the boiler flues to enter the adjacent branch of the furnace stack. By a movement of the chain 36 the positions of the damper plates may be reversed to thereby force the products of combustion to reverse their movement through the boiler flues.

For convenience in description we have termed the combustion chambers above the grates the end chambers, and the combustion chamber above the bridge wall the central combustion chamber as indicated in Fig. 1 by the reference numeral 39.

In practical use and assuming that the dampers are in the position shown in Fig. 1, and assuming that fires are burning upon both grates, then the operator may place a quantity of fresh fuel upon the grate at the left in Fig. 1, and the products of combustion arising therefrom will be compelled to pass upwardly toward the center of the boiler and then through the passageway 32 at the right in Fig. 1. At the point between the right arch 31 and the adjacent end of the bridge wall, the heat and products of combustion from the grate at the right will intercept those passing from the grate at the left and will commingle with them in such a manner as to consume the smoke and voluble gases, thus making the point of most intense heat near the center of the boiler; then the products of combustion from both grates will continue out through the passageway 32 to the chamber at the right end of the boiler and then through the boiler flues to the branch stack 16. If it is desired to place fresh fuel on the grate at the right the position of the dampers is reversed and the products of combustion from the right grate will pass toward the left under the boiler and will be commingled with the heat and flame from the grate at the left before passing to the right passageway 32; then the combined products of combustion from both furnaces will pass through the boiler flues to the stack branch at the right of the figure. The arches 31 perform several valuable and important functions, first, they serve to direct the products of combustion from the end combustion chambers away from the ends of the boiler and toward the center of it. In this way the gases are consumed principally in the central combustion chamber so that the most intense heat is applied to the center of the boiler. The arches also prevent any smoke and unburned gases from

passing direct from the end combustion chambers to the nearest flue without first meeting and being commingled with the heat from the other of the end chambers which is essential in obtaining thorough combustion. The arches also perform an additional valuable function in that they protect the damper that is in its closed position over the passageway 32 from the direct heat of the adjacent combustion chamber. In this connection it has been found that without such protection it is difficult to provide any kind of a damper plate that will not burn out.

We claim as our invention:

1. In a furnace, the combination of walls, a boiler having flues therein with its ends spaced apart from the ends of the furnace walls, a bridge wall below the central portion of the boiler, two grates on opposite sides of the bridge wall, an arch over each grate extended from the end wall to a position toward the bridge wall and arranged to form a passageway between it and the boiler leading to the space at the adjacent end of the boiler, two smoke stack members communicating respectively with the ends of the furnace, said parts being so arranged that the products of combustion from the hotter of the two fires will first enter the adjacent end of the boiler and the products of combustion from the other fire will commingle with those of the first below the central portion of the boiler and travel with them through the boiler before entering the smoke stack.

2. In a furnace, the combination of walls, a boiler having flues therein with its ends spaced apart from the ends of the furnace walls, a bridge wall below the central portion of the boiler, two grates on opposite sides of the bridge wall, an arch over each grate extended from the end wall to a position toward the bridge wall and arranged to form a passageway between it and the boiler leading to the space at the adjacent end of the boiler, two smoke stack members communicating respectively with the ends of the furnace, said parts being so arranged that the products of combustion from the hotter of the two fires will first enter the adjacent end of the boiler and the products of combustion from the other fire will commingle with those of the first below the central portion of the boiler and travel with them through the boiler before entering the smoke stack, and two damper plates, each designed in one position to close the adjacent end of the smoke stack and in its other position to close the passageway between the boiler and the arch.

3. In a furnace, the combination of walls, a boiler having flues therein with its ends spaced apart from the ends of the furnace walls, a bridge wall below the central por-

tion of the boiler, two grates on opposite sides of the bridge wall, an arch over each grate extended from the end wall to a position toward the bridge wall and arranged to form a passageway between it and the boiler leading to the space at the adjacent end of the boiler, two smoke stack members communicating respectively with the ends of the furnace, said parts being so arranged that the products of combustion from the hotter of the two fires will first enter the adjacent end of the boiler and the products of combustion from the other fire will commingle with those of the first below the central portion of the boiler and travel with them through the boiler before entering the smoke stack, two damper plates, each designed in one position to close the adjacent end of the smoke stack and in its other position to close the passageway between the boiler and the arch, and means for connecting and supporting them, said means being arranged to permit one of them to close against the smoke stack and the other to be closed against said passageway.

4. In a furnace, the combination of walls, a boiler having flues therein with its ends spaced apart from the ends of the furnace walls, a bridge wall below the central portion of the boiler, two grates on opposite sides of the bridge wall, an arch over each grate extended from the end wall to a position toward the bridge wall and arranged to form a passageway between it and the boiler leading to the space at the adjacent end of the boiler, two smoke stack members communicating respectively with the ends of the furnace, said parts being so arranged that the products of combustion from the hotter of the two fires will first enter the adjacent end of the boiler and the products of combustion from the other fire will commingle

with those of the first below the central portion of the boiler and travel with them through the boiler before entering the smoke stack, two damper plates, each designed in one position to close the adjacent end of the smoke stack and in its other position to close the passageway between the boiler and the arch, means for connecting and supporting them, said means being arranged to permit one of them to be closed against the smoke stack and the other to be closed against said passageway, and a yielding element in said connecting means, for the purposes stated.

5. In a furnace, the combination of furnace walls, two combustion chambers at the ends of the furnace walls, two arches, one over each of said combustion chambers extending toward the central portion of the furnace, a central combustion chamber between the said end combustion chambers and communicating with them, and a smoke stack at each end of the furnace above the adjacent arch.

6. In a furnace, the combination of furnace walls, a boiler, two combustion chambers, one at each end of the furnace, an arch over each combustion chamber extending toward the central portion of the furnace, a central combustion chamber between the arches and below the boiler, said arches being so arranged as to provide passageways from the central combustion chamber over the arches to the ends of the boiler, and smoke stacks above the arches at the ends of the boiler.

Des Moines, Iowa, Jan. 20, 1910.

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Witnesses:

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M. WALLACE.