E. F. EDGAR.

STEAM BOILER FURNACE.

APPLICATION FILED OCT. 31, 1905.

946,840.

Patented Jan. 18, 1910.

4 SHEETS—SHEET 1.

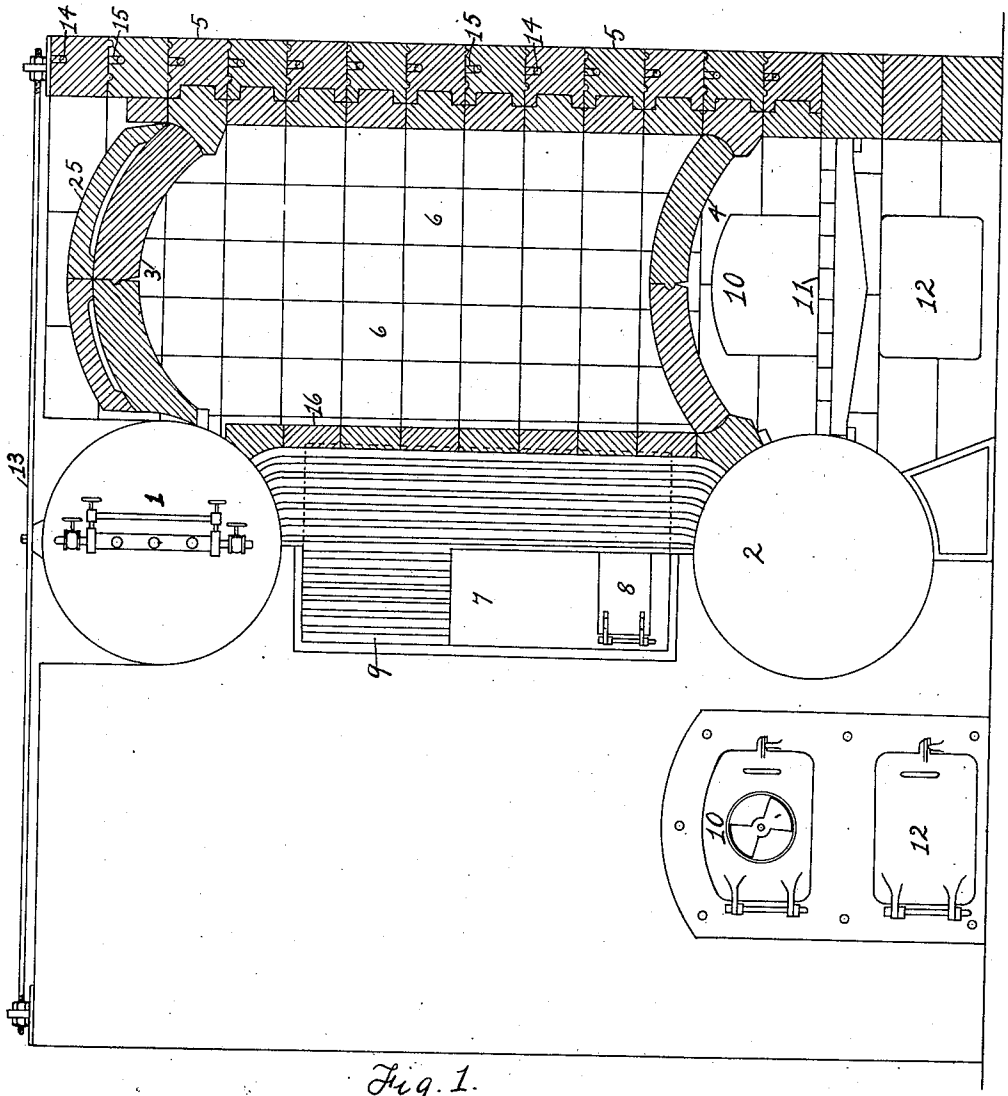

Fig. 1.

WITNESSES:

E. B. Edgar.

J. B. Edgar

INVENTOR

Ellis F. Edgar

E. F. EDGAR.

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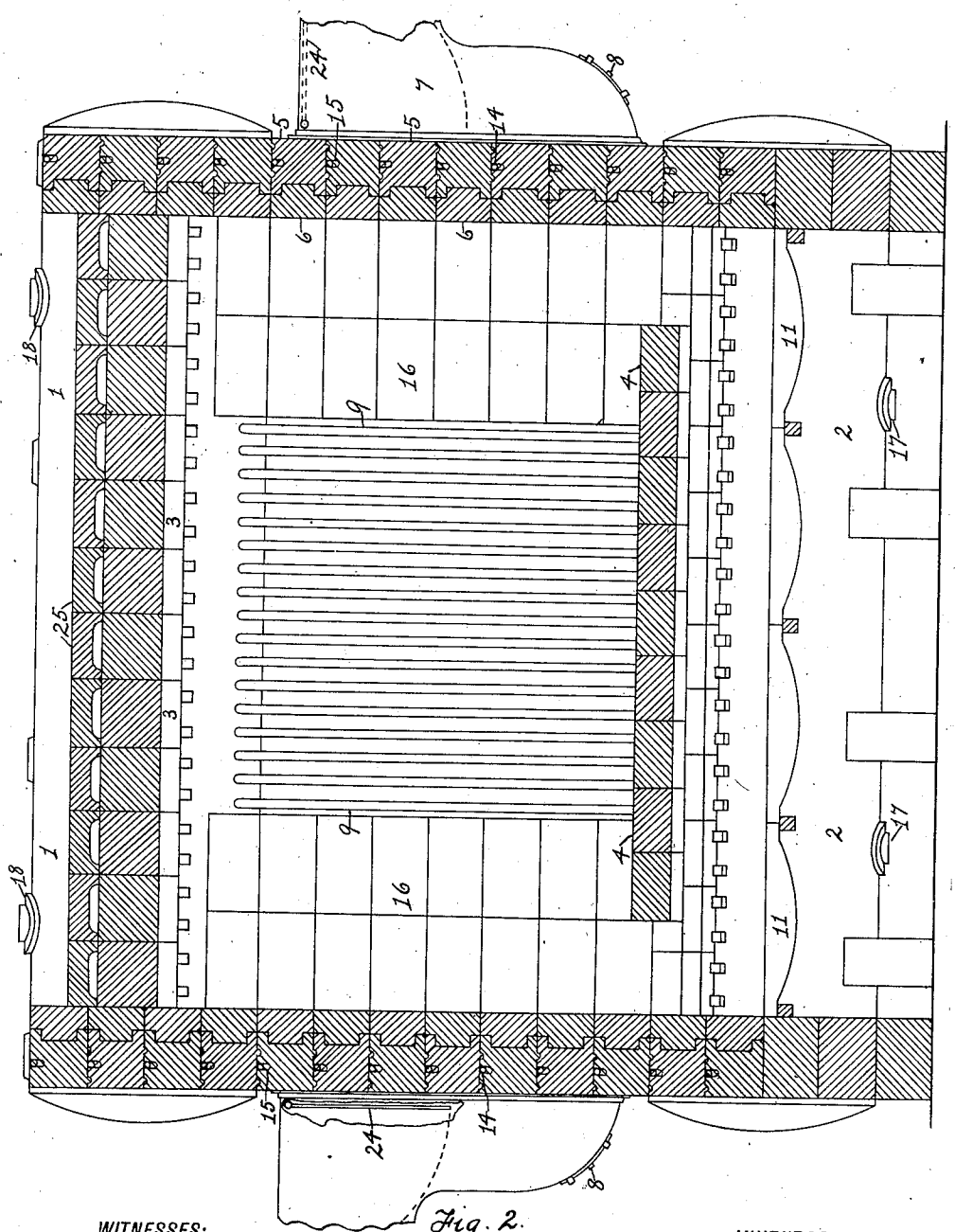

Fig. 2.

WITNESSES:

E. B. Edgar.

J. B. Edgar

INVENTOR

Ellis F. Edgar

E. F. EDGAR.

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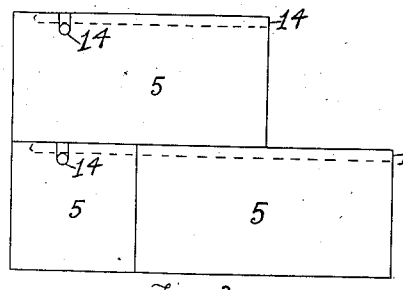
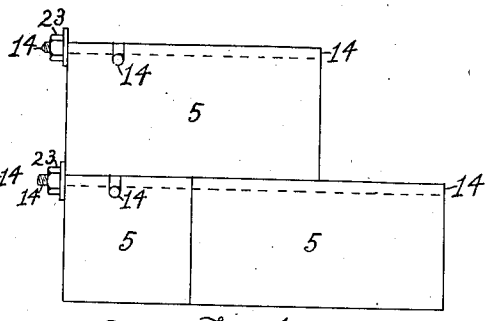


Fig. 3.



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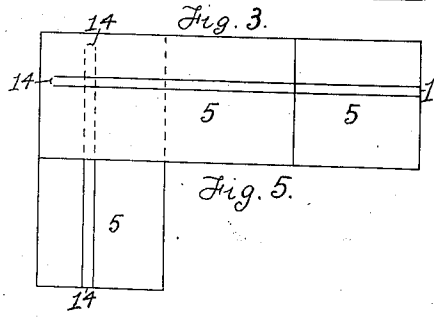

Fig. 5.

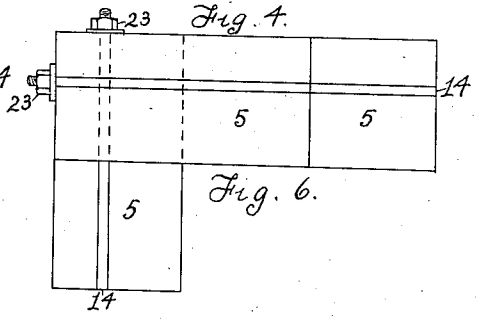

Fig. 6.

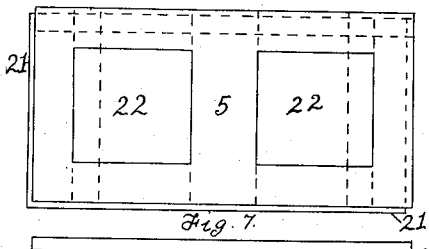

Fig. 7.

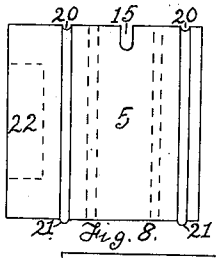

Fig. 8.

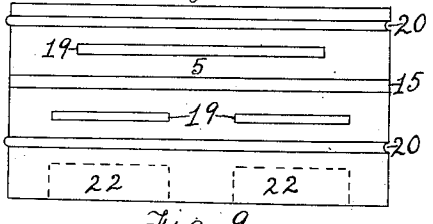

Fig. 9.

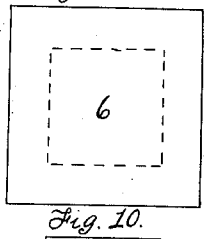

Fig. 10.

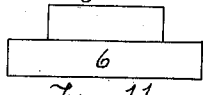

Fig. 11.

WITNESSES:

E. B. Edgar.

I. B. Edgar

INVENTOR

Ellis F. Edgar

E. F. EDGAR.

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946,840.

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4 SHEETS—SHEET 4.

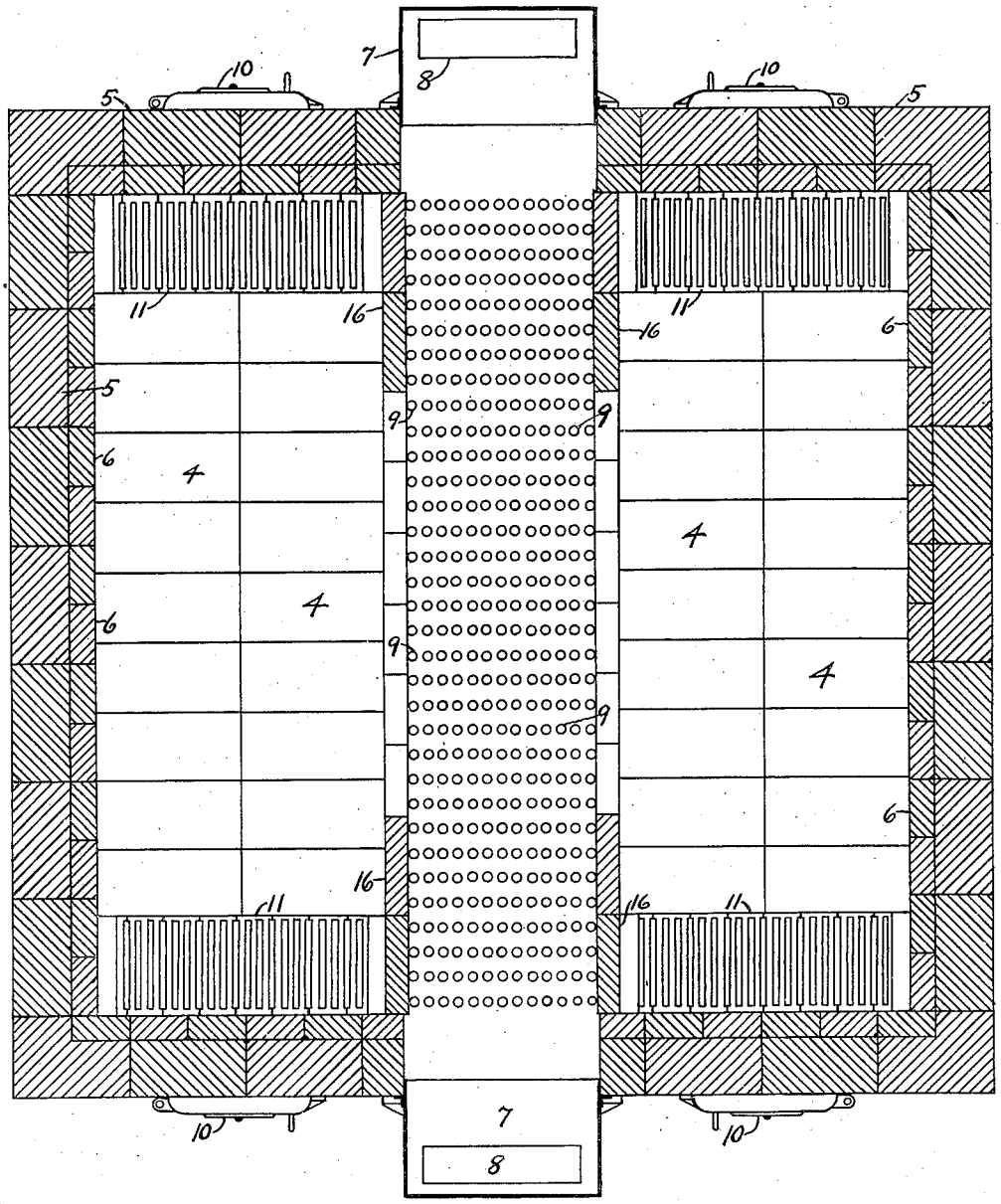

Fig. 12.

WITNESSES:

E. B. Edgar.

I B Edgar

INVENTOR

Ellis F Edgar

UNITED STATES PATENT OFFICE.

ELLIS F. EDGAR, OF WOODBRIDGE, NEW JERSEY.

STEAM-BOILER FURNACE.

946,840. Specification of Letters Patent. Patented Jan. 18, 1910.

Application filed October 31, 1905. Serial No. 285,252.

To all whom it may concern:

Be it known that I, ELLIS F. EDGAR, a citizen of the United States, and resident of Woodbridge, in the county of Middlesex and State of New Jersey, have invented certain new and useful Improvements in Steam-Boiler Furnaces, of which the following is a specification.

Figure 1 is a front elevation view part in full, and part in section, of a boiler embodying my invention. Fig. 2 is a section side elevation view. Fig. 3 is an outside view of a corner of the casing. Fig. 4 is another outside view of a corner of the casing. Fig. 5 is a plan view of a corner of the casing. Fig. 6 is another plan view of a corner of the casing. Fig. 7 is a side elevation view of one of the blocks of which the casing is constructed. Fig. 8 is an end view of one of the blocks. Fig. 9 is a plan view of one of the blocks. Fig. 10 is a front view of one of the lining bricks. Fig. 11 is a side view of one of the lining bricks. Fig. 12 is a sectional plan view a short distance above lower arch 4 and clean out doors 8, which are located in the bottom of uptake 7.

In inventing this boiler, I had in view several objects; a large furnace with a boiler section through the center of said furnace, providing a grate on each side of said boiler section, preferably the length of the furnace; vertical water tubes connecting two longitudinal drums, forming the boiler section, preferably a draft exit at each end of the section, thereby doubling the draft over having a draft at one end only, and facilitating the cleaning of tubes while the boiler is in operation with less loss of steam than with the draft at one end only; a changeable draft baffle, located at the end or ends of the boiler section, preferably double end fired, preferably lower arch 4 covering that part of the grate exposed to the refrigerating effects of the water tubes, and preferably open at each end to the combustion chamber lying between this arch 4 and upper arch 3, substantially as shown.

Another, and one of the principal features, is the construction of the casing from special blocks, and the method of making and staying these blocks forming the casing in such a manner as to prevent air from entering the furnace or heat from escaping, and giving an opportunity of lining said casing with individual bricks easily removed and replaced and spaced slightly apart in construction, to prevent bulging and cracking of the casing when the furnace is operated at a high temperature.

Details of construction: 1—upper drum; 2—lower drum; 3—upper brick arch; 4—lower brick arch; 5—special blocks forming casing; 6—special bricks for lining casing; 7—up-takes or draft exits connecting boiler section to draft flue; 8—door for cleaning tubes; 9—water tubes forming the heating surface of the boiler; 10—fire doors; 11—grates; 12—ash pit doors; 13—stay rods; 14—rods for staying casing; 15—recess in blocks for the reception of stay rods 14; 16—baffle walls; 17—blow-off on bottom of lower drum; 18—steam exit on top of upper drum; 19—dead air space in special casing block; 20—groove on special casing block; 21—tongue on special casing block; 22—recess in special casing block in which to secure special lining brick 6; 23—washer and nut on end of stay rods running through casing blocks 5; 24—changeable draft baffle in uptake or draft exit 7; 25—platting arches.

Operation: In operating a boiler it is important that the casing should be always kept tight and constructed to prevent radiation as near as possible. To attain this end, I first construct my casing blocks preferably tongued and grooved, and preferably with dead air spaces, and preferably with stay rods laid in the recesses in the special casing blocks embedded in silica cement composed of two parts clay, and one of Portland cement mixed with silicate of soda as shown in Figs. 3 and 5. In some cases I might extend these stay rods through the casing blocks as shown in Figs. 4 and 6 and secure them at the ends with washers and nuts 23. It is important that the stay rods be placed in the blocks substantially as shown, so that as the blocks become heated, the stay rods become heated also, and expand with them. In building this casing with these blocks, I preferably use a mortar or cement constructed of two parts clay and one part cement mixed with silicate of soda, moistened with rain water when obtainable, and made thin enough to apply with a brush. This can be made to stand a temperature of over two thousand before melting. I make my casing blocks preferably of two parts clay and one part Portland cement mixed with water and

molded. These blocks can be made to stand over twenty-five hundred temperature. Lining brick 6 should be made from the best fire clay mixture, also arches 4 and 3 capable of withstanding a temperature of over three thousand, also baffle wall 16. Platting bricks 25 may be made of cheaper material capable of withstanding only a lower temperature; they may be made of the same material as special casing blocks 5 are made.

This boiler is capable of evaporating more water per square foot of heating surface than any boiler I know of when forcing, with a fair economy, and by dropping draft baffle 24 in uptake 7 can be operated on a basis of ten feet of heating surface per H. P. with an efficiency of 80 per cent. With a two hundred and fifty foot stack and draft baffle 24 wide open, burning good soft coal, an engine H. P. can be obtained from every square foot of heating surface, and with escaping gases below seven hundred degrees Fahrenheit. That these results both in economy and high rates of evaporation can be obtained, depends very largely on having the heating surface of the boiler clean, more so than is generally understood, and a boiler should be so constructed that the tubes may not only have the dust blown off of them with steam or compressed air while in operation, but that the heating surface may be scraped if necessary while in operation and without greatly affecting the H. P. of the boiler. This is one of the important features of this boiler, as the cleaning door 8 may be opened and draft baffle 24 swung up and the tubes may be either blown or scraped one end of the boiler at a time, while the boiler is in operation, and with very little loss in H. P.

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

1. The combination of a water tube boiler composed of upper and lower drums connected by water tubes and a furnace having an outer casing, said furnace comprising a grate or floor, a non-combustible arch in said furnace, located a short distance above said grate or floor and extending almost the length of said furnace leaving a space between the end of said arch and outside casing, and a baffle wall extending from the lower drum to the upper drum and extending from the outside casing beyond the end of said arch as much as the space between the end of said arch and outside casing, all substantially as set forth.

2. The combination of a water tube boiler composed of upper and lower drums connected by water tubes and a furnace, said furnace comprising a grate or floor, a non-combustible arch in said furnace located a short distance above said grate or floor and extending almost the length of said furnace leaving a space between the end of said arch and outside casing, and a baffle wall extending from the lower drum to the upper drum and extending from the outside casing beyond the end of said arch as much as the space between the end of said arch and outside end casing, said furnace having also an outside side casing, all substantially as set forth.

Signed at New York city in the county of New York and State of New York this 27th day of October A. D. 1905.

ELLIS F. EDGAR

Witnesses:
DAVID GRANT,
E. B. EDGAR.