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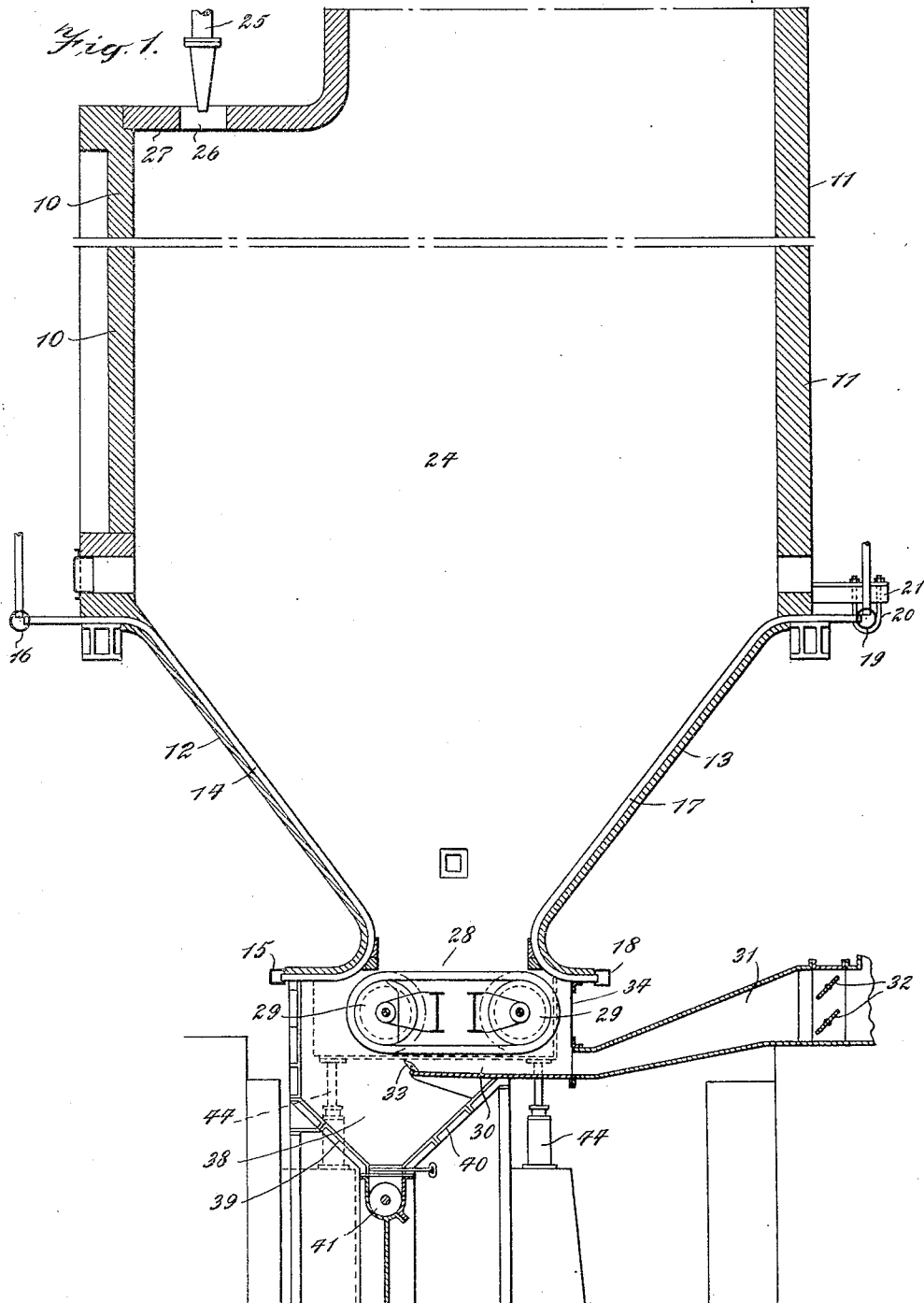
E. G. BAILEY

1,863,181

FURNACE

Filed July 6, 1928

2 Sheets-Sheet 1



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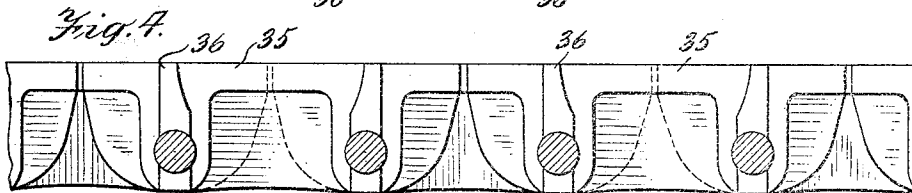
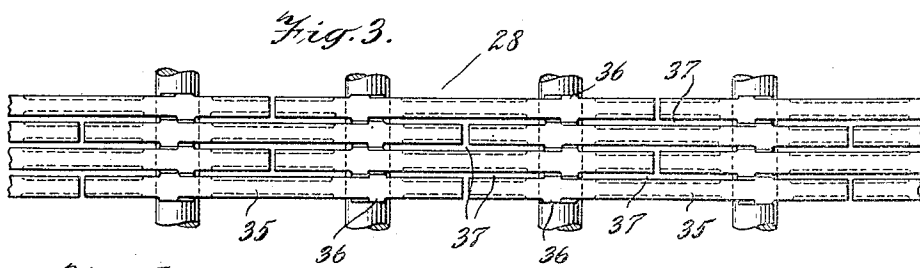
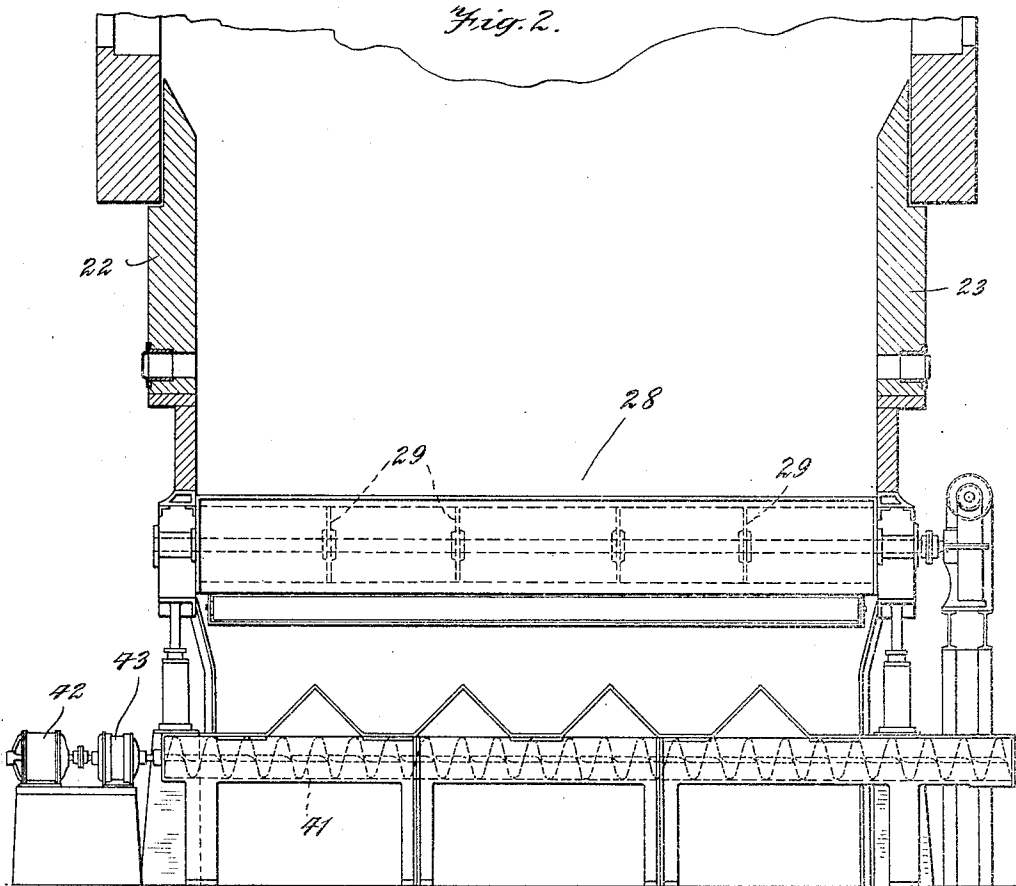
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2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

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## FURNACE

Application filed July 6, 1928. Serial No. 290,808.

My invention more particularly relates to a furnace adapted to burn finely divided anthracite or other fuel, though it will be understood that it is not necessarily limited thereto. The present invention is closely related to the invention disclosed and claimed in my copending patent application, Serial No. 290,807, filed July 6, 1928.

My invention will best be understood by reference to the accompanying drawings, in which Fig. 1 is a vertical sectional view in part diagrammatic, through a furnace embodying my invention, Fig. 2 is a section, likewise diagrammatic in part, at right angles to Fig. 1, Fig. 3 is a fragmentary plan view of a stoker adapted for use in my invention, and Fig. 4 is a side view of the parts shown in Fig. 3.

Like reference characters indicate like parts throughout the drawings.

Referring now to the drawings, 10 and 11 indicate the front and rear walls, respectively, of a furnace chamber, the lower portion of the walls sloping downwardly and inwardly at 12 and 13 to form a V-shaped lower portion. The inclined wall 12 is preferably cooled by cooling tubes 14 connected to headers 15 and 16 which may, in turn, be connected into the boiler circulation in a known manner. Similarly, the wall 13 is preferably cooled by tubes 17 connected at their lower and upper ends to headers 18 and 19, respectively. The headers 19 may conveniently be supported by U-shaped straps 20, which are secured to fixed members 21 as shown in Fig. 1. Side walls for the furnace are illustrated at 22 and 23 (Fig. 2).

Anthracite or other fuel preferably crushed to comparatively small size, for example a quarter of an inch in diameter or less, is introduced preferably into the upper portion of the furnace chamber 24 through a feeder pipe or feeder pipes 25 through an opening 26 which is shown as formed in an arch 27 extending across the upper part of a portion of the furnace chamber.

At the bottom of the furnace is located an ash conveyor of the chain grate type indicated generally at 28. The ash conveyor of the chain grate type comprises the usual

sprocket wheels 29, which receive the chain in a well known manner. Air enters a chamber 30 beneath the ash conveyor by means of a duct 31, the flow of air into which is controlled by a damper or dampers 32 which may, if desired, be manually operated. The end of the chamber 30 is preferably sealed by a damper 33 as best shown in Fig. 1, while the right-hand portion of the chamber is enclosed by a portion 34 of the casing, the upper portion of the ash conveyor being substantially sealed against the walls 17.

The links 35 of the ash conveyor are spaced apart by ribs or lugs 36, which extend vertically along the links and provide spaces 37 therebetween through which the air entering from the duct 31 is introduced to the furnace and with sufficient velocity to cause the fuel of the proper degree of fineness to rise and float in the furnace, the fuel being maintained in suspension, practically none of it ever reaching the conveyor, and even if it does reach the conveyor, the higher velocity at the conveyor itself would cause the fuel to rise, the heavier particles naturally floating nearer the bottom of the furnace chamber while the lighter particles rise higher where the velocity of the air and rising gases is lower. In operation, some fuel may work off to one side and drop onto the V-shaped walls of the furnace, float down the smooth, cooled, inclined floor, until it reaches the high velocity zone, where it is again thrown up into the furnace. This action results in keeping the fuel in what has the appearance of being a boiling, seething mass, and continually in motion, with the air for combustion continually contacting the surface of each particle, thereby producing a very rapid rate of combustion. There is a decided tendency to unify the density of fuels throughout the width and length of this zone, so that there are no thick or thin zones where excess or deficiency of air will result.

Another phenomenon which takes place in a furnace of this kind is the coagulation of the particles of ash after the carbon has been burned free from them. These particles get in a semi-fused state, and when one contacts with another they cement together forming a nodule of ash considerably larger than any

of the particles of coal originally fed to the furnace. These larger particles finally grow until they are heavy enough to fall down through the high velocity zone and rest upon  
5 the conveyor, and they are then carried by the conveyor to the ash pit 38, the bottom of which is preferably closed by sloping walls 39 and 40 and in the bottom portion of which is preferably located a screw conveyor 41  
10 which may be operated from a motor 42 through a suitable reduction gearing 43.

The height of the ash conveyor may be adjusted by means of hydraulic lifts 44 or any other suitable device.

15 I claim:

1. In a furnace, walls sloping downwardly and inwardly, means for projecting pulverized fuel downwardly, an ash conveyor in the  
20 bottom of said furnace having openings therein, water tubes in said walls providing a cooling zone above said conveyor, and means for keeping fuel from said conveyor, said means comprising a duct for conveying combustion air under pressure beneath said con-  
25 veyor, said conveyor serving merely for removal of nodules of ash to an ash-pit.

2. In a furnace, walls sloping downwardly and inwardly, means for projecting pulverized fuel downwardly, an ash conveyor in the  
30 bottom of said furnace having openings therein, water tubes in said walls providing a cooling zone above said conveyor, and an air-box beneath said conveyor for projecting combustion air upwardly through the open-  
35 ings in said conveyor, all of the fuel being burned in suspension above said conveyor and said conveyor serving merely for removal of nodules of ash to an ash-pit.

3. In a furnace, walls sloping downwardly and inwardly, means for projecting pulverized fuel downwardly, an ash conveyor in the bottom of said furnace having openings therein, and water tubes in said wall provid-  
45 ing a cooling zone above said conveyor, in combination with an air-box beneath said conveyor for projecting combustion air upwardly through the openings in said conveyor, and an ash-pit beneath said conveyor and  
50 said air-box, all of the fuel being burned in suspension above said conveyor, said conveyor serving merely for removal of nodules of ash from said furnace to said ash-pit.

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