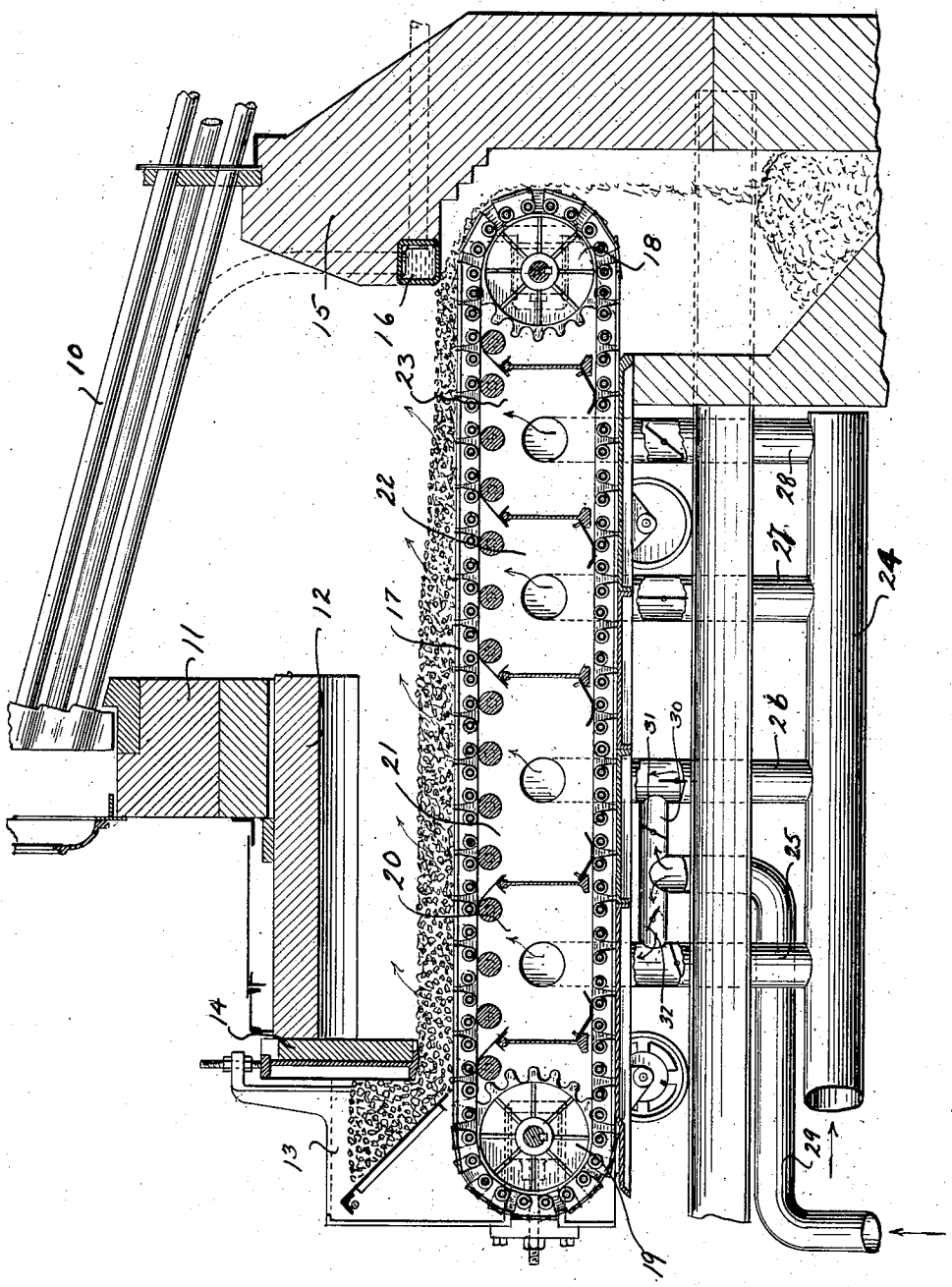
May 31, 1927. 1,630,387

D. S. JACOBUS

METHOD AND APPARATUS FOR BURNING FUEL

Filed July 19, 1921



INVENTOR
David S. Jacobus
BY
Gifford + Bull
ATTORNEYS.

Patented May 31, 1927. 1,630,387

UNITED STATES PATENT OFFICE.

DAVID S. JACOBUS, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO THE BABCOCK & WILCOX COMPANY, OF BAYONNE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

METHOD AND APPARATUS FOR BURNING FUEL.

Application filed July 19, 1921. Serial No. 485,869.

My present invention relates to a method and apparatus for burning fuel by which more efficient results can be obtained, especially with fuels of certain characteristics.

It has been proposed to enrich the air supply for combustion so that such air will have an oxygen content greater than normal. In the following description and the appended claims, I have, for brevity, called such oxygen-enriched air "superoxygenized" or "superoxygenated". The production of such enriched air takes energy, however, and it is one of the purposes of my invention to provide a method and apparatus by which such enriched air may be used advantageously and with a minimum consumption of such enriched air to accomplish the desired results.

As illustrative embodiment of my invention, I have shown it applied to a chain-grate mechanical stoker used in connection with a water tube boiler.

In the drawing which shows a vertical section of such a grate and portions of the surrounding furnace and boiler, 10—10 represent the boiler tubes. The furnace front wall 11 has a combustion arch 12 below it on which is supported a hopper 13 provided with an adjustable gate 14 through which the fuel may flow to the grate. A bridge wall 15 is provided with a water cooled fuel back 16.

The chain-grate 17 is mounted on sprocket wheels 18, 19 which are moved either intermittently or continuously in the well-known manner.

The space between the upper and lower runs of the chain 17 is divided into a plurality of air supply boxes 20, 21, 22 and 23 provided with suitable means for keeping the air supply in each separate from the other boxes, the grate being arranged so that the air in a given air supply box will pass up only through the portion of the grate above it.

Below the grate is a forced-draft air supply box 24 connected by ducts 25, 26, 27 and 28, respectively, with the several air supply boxes 20, 21, 22 and 23.

A duct 29 through which the enriched "superoxygenized" air will be supplied under pressure is provided, the duct 29 being connected, in the illustrative form, to the ducts 25 and 26 by a cross duct 30, dampers 31 and 32 being provided in the duct 30.

If desired, the duct 29 could be connected with either or both of the ducts 27 and 28 also. Preferably, dampers will be provided in each of the ducts 25, 26, 27 and 28, all of the dampers having provision by which they may be individually operated by the operator of the furnace.

In operation, the upper run of the chain will be moved from the left to the right of the figure, the fuel being supplied from the hopper 13 on the left-hand end and the ashes and refuse being deposited in the ash-pit at the right-hand end of the grate.

With the dampers set in the position shown in the figures, normal air will be supplied through the ducts 26, 27 and 28 to the boxes 21, 22, and 23, so that the fuel bed above such boxes will be supplied only with air having a normal oxygen content. By reason of the closure of the damper in the duct 25 and the opening of the damper 32, as shown in the figure, superoxygenized air will be supplied to the box 20 and the fuel above that box will therefore be supplied with enriched air only. If desired, the relative amounts of enriched air and the number of boxes to which it is to be supplied may be regulated by the dampers in the ducts 25, 26 and 30. it being apparent that if, for instance, the damper 31 is partly open and the damper in the duct 26 is also partly open, the box 21 will be supplied with air somewhat richer in oxygen than the normal air but less in oxygen content than the air supplied to the box 20 with the dampers in the position shown in the figure.

By the arrangement which I have described, the fresh fuel is ignited in the presence of the superoxygenized air, and as such ignited fuel is carried successively over the different air supply boxes, the oxygen content of the air supply will be decreased to normal, so that the remaining portions of the fuel bed will be consumed in the presence of a smaller proportion of oxygen.

Such an arrangement is particularly advantageous in connection with certain fuels which are comparatively difficult to ignite, but which burn readily after they are ignited. By my method such fuels may be more readily ignited so that the capacity of the grate may be greatly increased.

It will also be seen that since I use the superoxygenized air under only a portion of the fuel bed, the total amount of such enriched air used is greatly decreased over

what would be used if such superoxygenized air were supplied under the entire fuel bed.

While I have illustrated my invention in connection with a chain-grate furnace, it will be understood that it may be applied to other forms of mechanical stokers and, indeed, to any form of fuel bed in which the different parts of the fuel bed may be supplied with different qualities of air and in which the fuel may be moved from one kind of air supply to another. My invention will also be applicable to wet fuels, in which case the excess oxygen would first effect the rapid ignition and consequent drying of the fuel before the fuel is carried to the portions of the grate which have a supply of normal air.

I claim:—

1. In a furnace, a grate on which the fuel is burned, means whereby superoxygenized air may be supplied to one part of the fuel on said grate and air with a normal oxygen content supplied to the remainder of the fuel, and means whereby the oxygen content of superoxygenized air may be varied by the operator of the furnace.

2. In a furnace, a grate on which the fuel is burned, means whereby superoxygenized air may be supplied to one part of the fuel on said grate and air with a normal oxygen content supplied to the remainder of the fuel, and means whereby the area of the fuel to which the superoxygenized air is supplied may be varied by the operator of the furnace.

3. In a furnace, means for supplying superoxygenized air to a part of the fuel bed and air with a normal oxygen content to the remainder of the fuel bed, and means to move the fuel so that it will first be contacted by the superoxygenized air and then by the normal air.

4. In a furnace, a mechanical stoker and means to supply superoxygenized air to selected parts of the grate of said stoker, said stoker being arranged to present the fresh fuel to the superoxygenized air supply and then to a normal air supply.

5. In a furnace, a mechanical stoker arranged to support fuel on a grate and move it into the furnace, and ducts to supply superoxygenized air to the fuel as it enters the furnace and then normal air after the fuel has been ignited in the presence of the superoxygenized air.

6. A chain-grate stoker having separate air supply boxes between the upper and lower runs on the grate, conduits for supplying atmospheric air and superoxygenated air separately to said boxes, and means for regulating the supply of each sort of air to said boxes.

7. The method of burning fuel which comprises igniting the fuel in the presence of air with an ogygen content greater than normal and then completing the combustion in the presence of air with less ogygen content.

8. The method of burning fuel which comprises igniting the fuel in the presence of air with an oxygen content appreciably in excess of normal atmosphere and then moving the ignited fuel into the presence of air with less oxygen content to complete the combustion.

DAVID S. JACOBUS.