Feb. 26, 1946. W. M. FULTON 2,395,733

ROTARY BURNER

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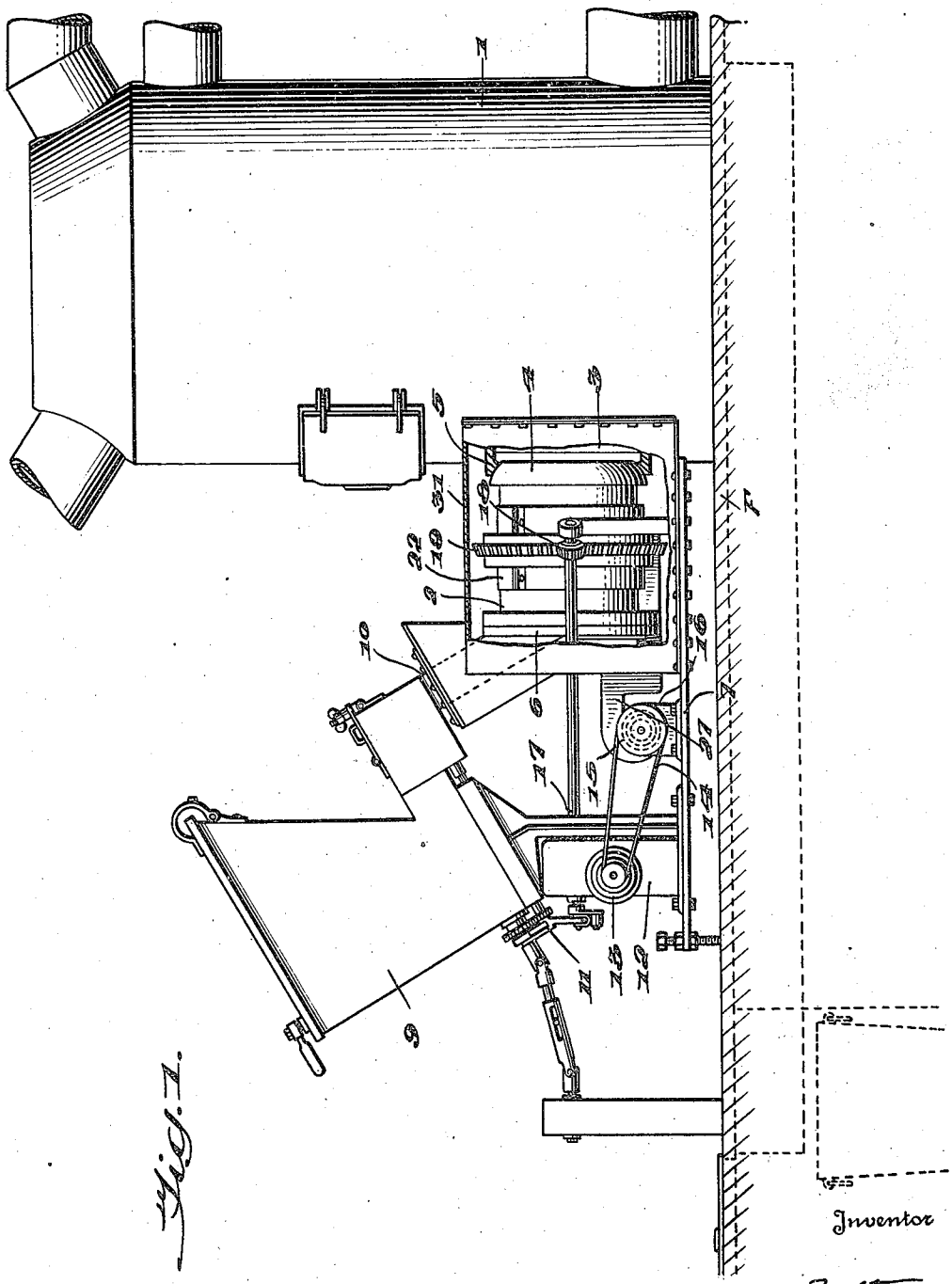


Fig. 1.

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Fig. 2.

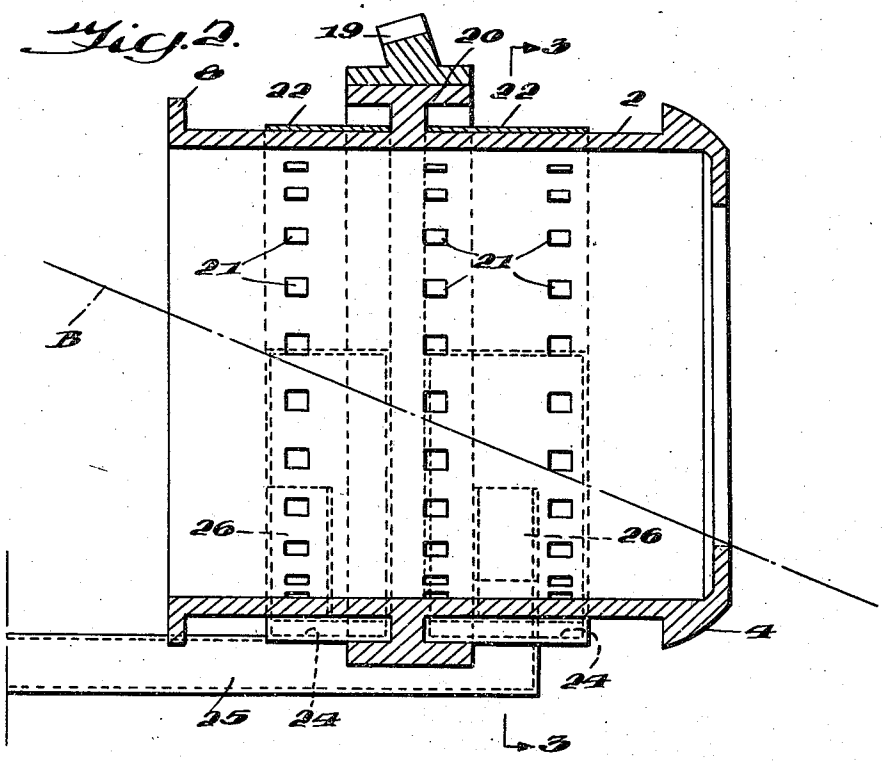
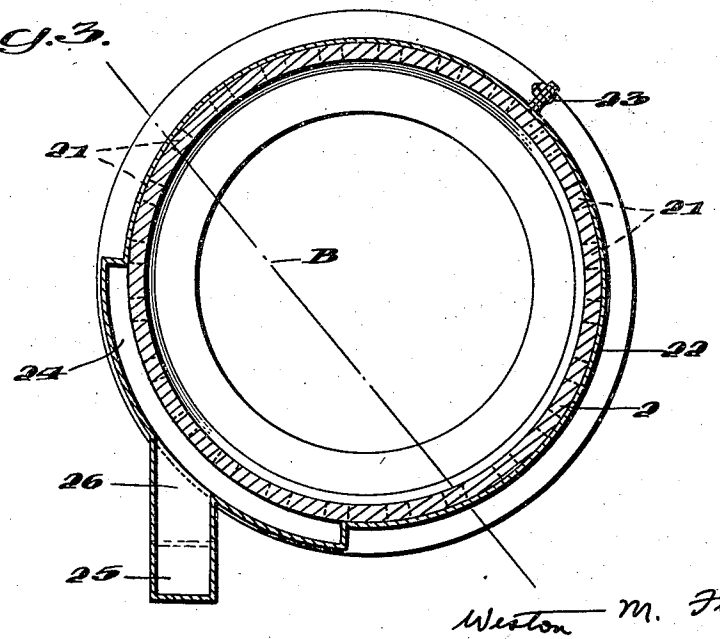


Fig. 3.



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Fig. 4.

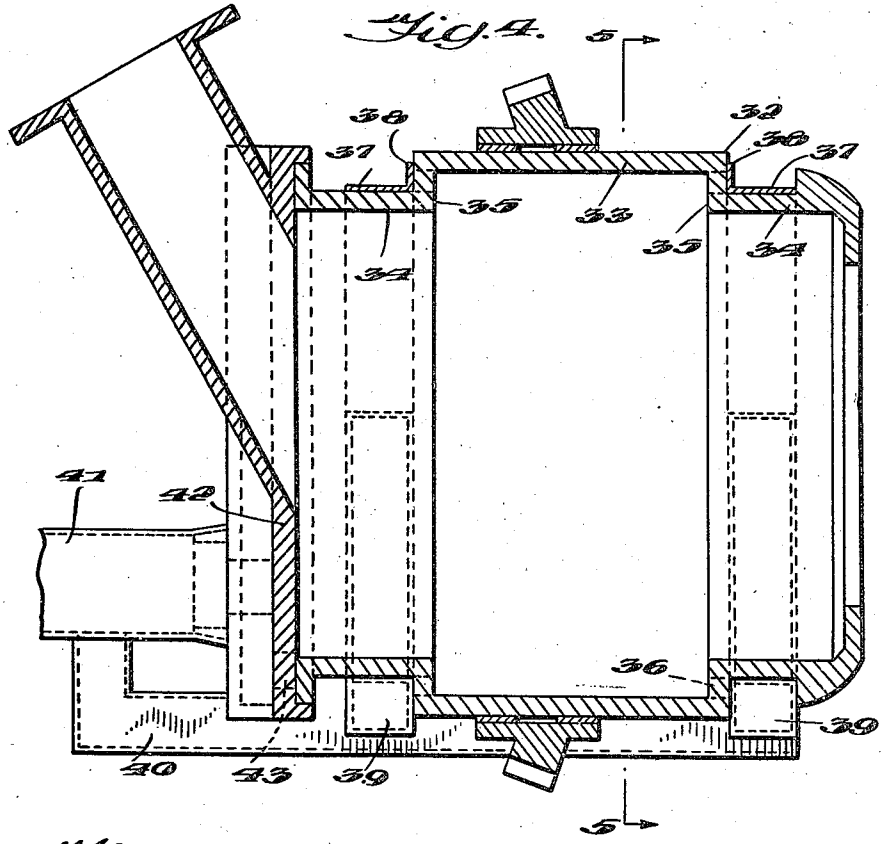
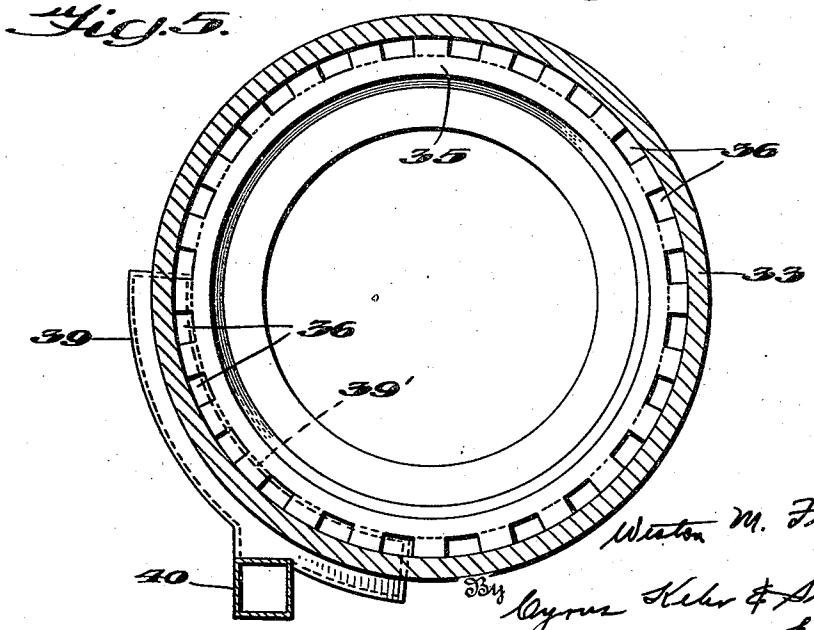


Fig. 5.



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UNITED STATES PATENT OFFICE

2,395,733

ROTARY BURNER

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Application April 4, 1944, Serial No. 529,501

4 Claims. (Cl. 110—35)

This invention relates to an improvement in rotary burners of the character designed primarily for the burning of solid fuel, such as coal, coke and other combustion products.

I have set forth in my copending application on Fuel burners, Ser. No. 529,503, filed April 4, 1944, the method of burning solid fuel in rotary burners and controlling the rate of combustion by controlling the speed of rotation of the burner and the amount of air supplied thereto. In the burner set forth in said application, the air supplied to the burner was admitted to air passages leading lengthwise through the wall of the burner and discharged into the burner through slots at the inner sides of the air passages. Under some conditions it may be desirable to utilize other forms of burners and to control the supply of air thereto in other ways.

The object of this invention is to simplify and improve the construction of the burner and the manner of admitting air thereto from around the sides of the burner without passing lengthwise through air passages in the walls of the burner.

This object is accomplished by forming perforations in the periphery of the burner, according to the preferred embodiments thereof, and controlling the air admission through certain of the perforations by surrounding bands that enclose the burner and regulate the portion thereof through which air is admitted.

These embodiments are set forth in the accompanying drawings, in which:

Fig. 1 is a side elevation, partly in section, showing the invention applied to a heater and stoker system;

Fig. 2 is a longitudinal sectional view through the burner;

Fig. 3 is a cross section therethrough on the line 3—3 of Fig. 2;

Fig. 4 is a longitudinal sectional view through a modified form of burner made according to this invention; and

Fig. 5 is a cross section therethrough on the line 5—5 of Fig. 4.

Although the invention may be applied in various forms of heaters, stokers, and the like, it is shown in Fig. 1, as applied to a fuel burner for a furnace, of the character set forth generally in my copending application on Fuel burners, Ser. No. 529,503. The furnace is designated generally by the numeral 1 and is shown as of the hot air type having a surrounding heating chamber for receiving products of combustion from the burner, designated generally at 2. The burner 2 is cylindrical and has one end open into a chamber 3 for discharging products of combustion therefrom, through which they are directed into the furnace 1.

One end of the burner is provided with a spherical portion 4 mounted in a seating ring 5 that is supported beside the furnace 1 about the open side of the chamber 3. The opposite end of the burner 2 is supported against a burner head 6 which in turn is supported by a base 7 adjustably supported by the floor F of the furnace room. The head 6 covers the inlet open end of the burner 2 in bearing relation thereagainst, the burner having a flange 8 surrounding said open end for bearing relation against the inner face of the burner head 6.

The burner head 6 is adapted to supply fuel to the burner for combustion therein. The fuel is supplied from a hopper 9 containing conveyor feeding means for directing the solid fuel from the hopper into a down-spout 10 that discharges the fuel directly through the burner head 6 into the open end of the burner near the bottom thereof. This conveying mechanism is driven by ratchet means 11 operated by gearing enclosed within a gear box 12, which gearing is driven by a step-cone pulley 13, belt 14, and step-cone pulley 15 from a motor 16.

The gearing located in the gear box 12 also drives shafts 17 which extend to opposite sides of the burner 2 and carry pinions 18 thereon, meshing with a ring gear 19 fixed on the periphery of the burner 2, by means of a T-flange 20 (see Fig. 2). The burner 2 is rotated during operation, and is shown as being rotated in clockwise direction.

Normally the fuel bed would be maintained in the lower portion of the burner with its level indicated in Figs. 2 and 3 at B, having the major portion thereof at one side of an upright plane extending longitudinally through the central axis of the burner. Provision is made for admitting air into the burner to support the combustion, at intervals along the length of the burner, but only in the region thereof covered by the fuel bed B. Perforations 21 are formed in a series at each of a plurality of points spaced lengthwise of the burner 2, forming air intake ports to admit air to the interior of the burner at desired points along the length thereof.

The periphery of the burner is cylindrical and smooth. Bands 22, preferably of sheet metal, are fitted snugly around the circumference of the burner and are held in place by having their ends drawn together and secured by bolts 23

extending through the out-turned end portions thereof. Although these bands fit snugly on the burner, they are sufficiently loose to permit rotation of the burner relative thereto while the bands are held stationary. Each of the bands is provided with a wind box 24 extending in arcuate direction about the periphery of the burner, but through a shorter segment than the segment of the fuel bed B. The inner side of each wind box 24 is open to the perforations 21, so as to supply air therethrough to the interior of the burner throughout the circumferential region of the burner covered by the wind box 24. One of the bands 22 is shown to be of greater width than the other, to cover two rows of perforations or ports 21, and the wind box 24 of said burner extends over both sets of ports, as shown.

The wind boxes 24 have a common air intake duct 25 that has lateral passages 26, leading to the respective wind boxes 24. The duct 25 extends from the wind boxes 24 to a blower 27 mounted beside the motor 16 and having the rotor thereof fixed on the armature shaft of the motor. Thus the blower 27 will supply air to the burner through the duct 25 whenever the motor is operated to feed fuel into the burner.

The burner will be operated substantially in the manner set forth more in detail in my copending application on Fuel burners, Ser. No. 529,503. It wil lbe evident that after the fire is started in the burner, the motor 16 may be operated to drive the fuel feeding conveyor in the hopper 9 and also the blower 27 to supply air to the burner. At the same time, the burner 2 will be rotated by the operation of the ring gear 19, fixed on the T-flange 20. The bands 22 and wind boxes 24 will be retained in fixed positions during this rotation of the burner, so as to allow the burner to turn relative thereto.

During this operation of the burner, air will be supplied by the blower 27 to the wind boxes 24, which will then supply air through the ports 21 underneath the fuel bed B within the segment of the wind boxes which is less than the segment of the burner covered by the fuel bed. This air will pass upward through the fuel bed causing combustion of the fuel and of the gases therein, substantially as described more in detail in my copending application on Fuel burners, Ser. No. 529,503. The air should be admitted to the burner at the desired intervals along the length thereof, three rows of air ports being shown, although it is evident that any desired number of rows may be used. The bands 22 and wind boxes 24 are held in place on the burner in proper positions over the air ports 21 by extending into the spaces underlying opposite sides of the T-flange 20.

The smoke and products of combustion pass out through the open end of the burner into the chamber 3, thence into the furnace 1 to heat the air in the air chamber of the furnace or other medium to which the heat should be supplied. This furnace air chamber is shown as formed with an extension 31 which encloses the burner 2 to circulate the air from the air chamber of the furnace into heat exchange relation with the periphery of the burner. This air in the chamber 31 is heated by radiation from the burner 2 as it is circulated through the air chamber 31 around the burner, thus obtaining maximum efficiency in the operation of the burner and effective heating of the air thereby.

Another form of burner is shown in Figs. 4 and 5, also shown to be substantially cylindrical, and in which the burner is designated generally 32. This form of burner is shown as composed of a middle section 33 and end sections 4. The middle section 33 is larger in diameter than the end sections 34 and has offset shoulders 35 extending radially of the burner and joining said sections together, said shoulders being integral with these sections.

Each of the shoulders 35 has a series of air ports 36 therethrough in position for communication from the exterior to the interior of the burner, which ports 36 extend through the wall of the burner in a direction that is substantially parallel with the central axis of the burner. Bands 37 fit loosely about the circumference of the respective end sections 34 and have flanges 38 thereon which cover the ports 36, being slidable in contact with the intake sides of the ports.

The bands 37 are provided with wind boxes 39 extending throughout the lower segment of the burner in the region underlying the fuel bed but of shorter circumferential extent than the normal width of the fuel bed, as shown in Fig. 5. The flanges 38 have open slots 39' therethrough in the region covered by the wind boxes 39 throughout the length of the latter in open communication from the wind boxes to the interior of the burner through all of the air ports 36 registering with the wind boxes.

The bands 37 and wind boxes 39 remain stationary while the burner 32 is rotated, having a sliding fit about the periphery of the burner, as described above. Air is supplied to the wind boxes 39 through an air duct 40 leading to a source of supply, such as a blower, as shown in Fig. 1. The duct 40 is shown as extending to a main duct 41 that supplies air also to the burner head 42 which has an air chamber therein adapted to supply air at 43 into the open end of the burner, if desired.

This form of burner operates substantially in the same manner as described above in connection with Figs. 1 to 3, to admit air to the under side of the fuel bed during the rotation of the burner and at intervals along the length of the burner.

I claim:

1. A rotary burner comprising a cylindrical structure adapted to contain a fuel bed therein, means mounting said structure for rotary movement about an approximately horizontal axis, said structure having a surrounding T-flange with out-turned flange portions spaced from the periphery of the tubular structure, means connected with said T-flange for rotating the tubular structure, said tubular structure having a plurality of series of ports in the surrounding wall thereof spaced apart axially of said structure and with the ports of each series spaced circumferentially of said structure, a band extending about the burner over each series of ports and rotatably receiving the burner therein, said band having an edge portion thereof underlying the adjacent flange portion of the T-flange, said band extending over the ports enclosing said ports throughout a substantial portion of the circumference of the structure and having an opening therethrough registering with the ports in a segment of the burner, and a wind box connected with the band and enclosing said opening for supplying air thereto, said wind box underlying the flange portion of the T-flange of the burner and confined thereby.

2. A rotary burner comprising a cylindrical structure adapted to receive a fuel bed therein, means mounting said structure for rotary move-

ment about an approximately horizontal axis, said structure having axially spaced offset wall portions, each of said offset wall portions having a series of circumferentially spaced ports therethrough for admitting air into the tubular structure, bands enclosing the tubular structure for rotation of said structure relative thereto, each of said bands having a flanged portion thereon covering the ports throughout a portion of the circumference of the burner and having an opening in said flange extending through a segment of the burner for admitting air through the ports in said segment, and a wind box enclosing said opening for supplying air therethrough.

3. A rotary burner comprising a cylindrical structure adapted to receive a fuel bed therein and mounted for turning movement, said structure having an off-set wall portion, said off-set wall portion having a series of circumferentially spaced ports therethrough for admitting air into the tubular structure, a band enclosing the tubular structure for rotation of said tubular structure relative thereto, said band having an off-set portion thereon covering the ports throughout a portion of the circumference of the burner and having an opening in said portion of the band extending through a segment of the burner for admitting air through said opening and through the ports registering therewith into the structure.

4. A rotary burner comprising a cylindrical structure adapted to contain a fuel bed therein, means mounting said cylindrical structure for rotary movement about an approximately horizontal axis, said cylindrical structure having a series of ports through the surrounding wall thereof, said series extending circumferentially of the structure, and a substantially flat band extending about the cylindrical structure and directly engaging the surrounding wall and closely fitting said wall throughout the major portion of the width of the band and rotatably receiving said cylindrical structure therein, said band having a portion thereof covering the ports throughout the major portion of the circumference of the cylindrical structure, and a windbox connected with the band and extending throughout the remaining segment of the circumference of the cylindrical structure for admitting air only through the ports in said segment.

WESTON M. FULTON.