

July 24, 1934.

J. E. KENNEDY

1,967,673

PULVERIZED COAL BURNER

Filed Oct. 8, 1928

2 Sheets-Sheet 1

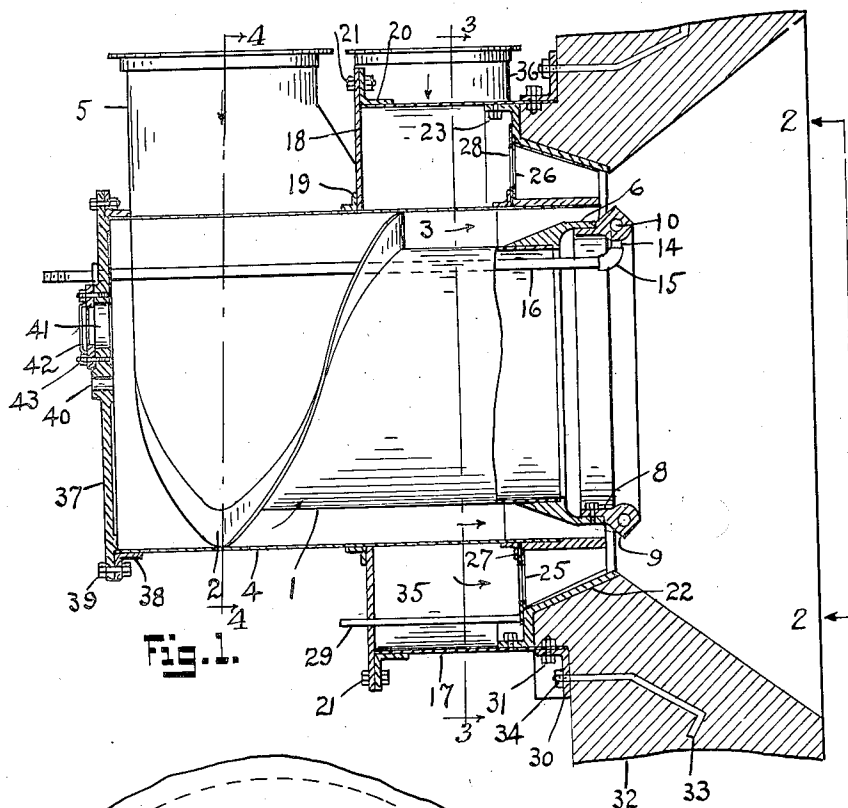


Fig. 1.

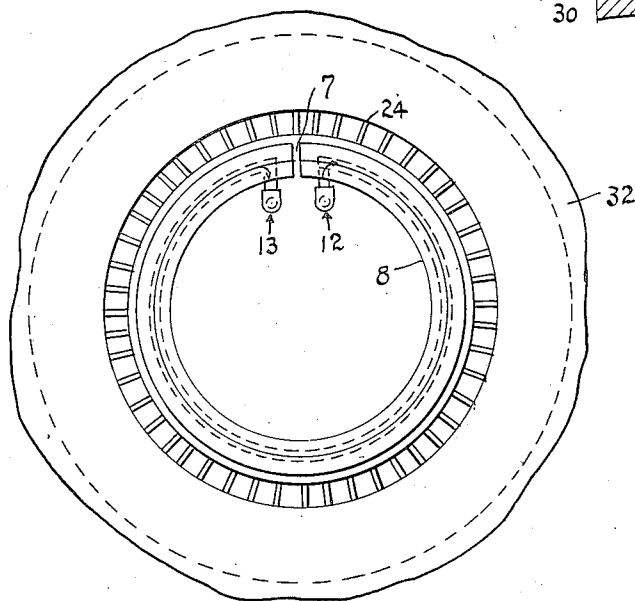


Fig. 2.

Joseph E. Kennedy
Inventor

Charles A. Clark.

By Attorney

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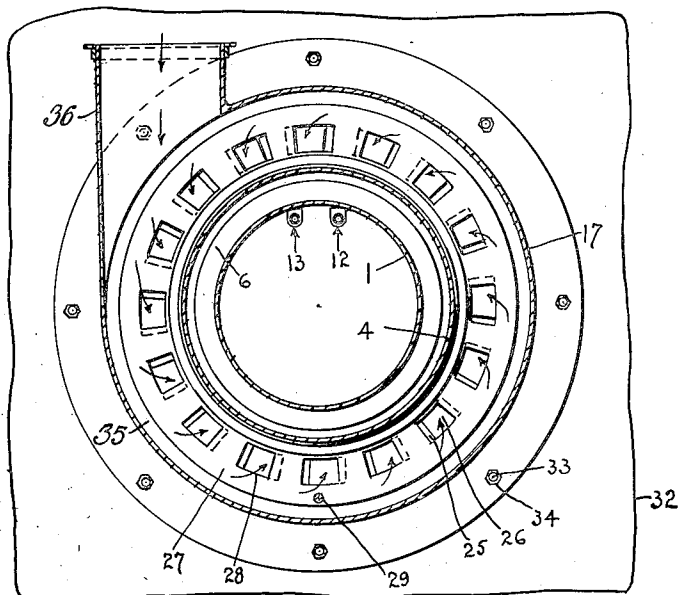


Fig. 3.

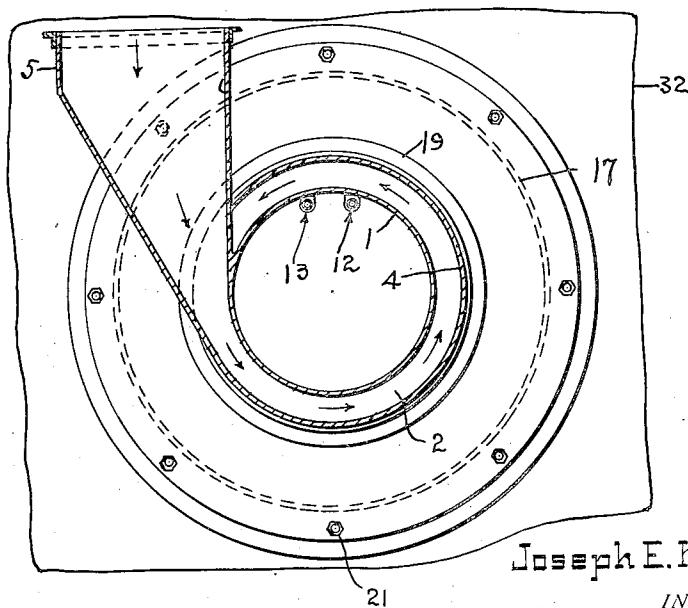


Fig. 4.

Joseph E. Kennedy
INVENTOR

BY

Charles A. Clark
ATTORNEY

UNITED STATES PATENT OFFICE

1,967,673

PULVERIZED COAL BURNER

Joseph E. Kennedy, New York, N. Y., assignor to
Nellie Kennedy, New York, N. Y.

Application October 8, 1928, Serial No. 310,938

4 Claims. (Cl. 110—104)

My invention relates to coal burners and refers more particularly to burners for pulverized coal, gas and oil.

One object of my invention is to provide a pulverized coal burner wherein the primary air and pulverized coal are given a whirling motion in an annular space between two tubes or cylinders.

Another object of my invention is to provide a pulverized coal burner wherein an annular primary air and pulverized coal transmitting space between two tubes or cylinders is provided at its discharge end with annular deflectors.

A further object of my invention is to provide a pulverized coal burner adapted to deflect a stream of primary air and pulverized coal outwardly into the path of an inwardly directed stream of secondary air.

A still further object of my invention is to provide a pulverized coal burner having a tip provided with water cooling means.

Another further object of my invention is to provide a pulverized coal burner having a tip provided with a cooling means and deflectors.

One valuable feature of my invention is to provide a pulverized coal burner having a tip formed to provide for thermal expansion.

Another valuable feature of my invention is to provide a pulverized coal burner consisting of three co-axially arranged tubes or cylinders providing an inner co-axial annular space adapted to transmit primary air and pulverized coal and an outer co-axial annular space provided with deflectors, a fixed disc with a plurality of openings therein and a movable, adjustable disc adapted to register with said fixed disc.

Still another valuable feature of my invention is to provide a deflecting means on the burner tip for directing the primary air and pulverized coal across the incoming secondary air.

With these and other objects in view, my invention consists of the novel construction, arrangement and formation of parts, the particular utility and specific application of the device and the novel method of operating the same, herein-after referred to and described and claimed substantially as illustrated in the accompanying drawings, wherein similar numerals refer to like parts throughout the several views, in which:—

Figure 1 is a sectional view of a burner embodying the invention taken substantially centrally through the burner.

Figure 2 is an end elevation looking at the right of and taken substantially on the line 2—2 of Figure 1.

Figure 3 is a sectional view taken on the line

3—3 of Figure 1 looking in the direction of the arrows; and

Figure 4 is a sectional view taken on the line 4—4 of Figure 1 looking in the direction of the arrows.

The burner consists of an inner cylinder 1, carrying a spirally arranged member 2, providing a spiral passage 3, between said inner cylinder 1, and an outer cylinder 4, said passageway communicating with a primary air and pulverized coal feeding pipe 5, preferably arranged tangentially to said space.

The discharge end of the said tube 1, is provided with and fitted to a ring 6, which carries a ring 8, preferably split or interrupted, as at 7, formed to provide a deflecting surface 9, and having a passage therein 10, said passage having an inlet 12 and an outlet 13, the inlet being connected with a source of a cooling medium, such as water, by a pipe 16 connected with the inlet through a nipple 14 and elbow 15, the pipe being extended through the rear of the burner, and the outlet having a pipe connected thereto similar to the connection of pipe 16 with the inlet, the outlet pipe also being extended through the rear of the burner.

A casing having an annular chamber 35 is disposed about the cylinder 4, and consists of a tubular member 17, an end wall 18 secured to the cylinder 4 by an angle member 19 and to member 17 by an angle member 20 and bolts and nuts 21. The other end is secured to the member 17 by bolts 23 and has a cone-shaped portion 22 disposed about the outlet of the passage 3 and converges toward the cylinder 4, whereby air discharged from the casing chamber will be directed toward the stream delivered from the passage 3.

The casing chamber has an air inlet through a tubular portion 36 secured to the outer wall 17 of the casing tangential to the casing chamber 35. To control the delivery of air from the air chamber, a partition in the form of an annular plate 25 having equidistantly spaced openings 26 is secured in the casing chamber within the outlet 22, and an annular plate 27 juxtaposed to the partition is supported to have rotative adjustment, said plate having openings or perforations 28 therein corresponding with the openings in the partition, which openings by the adjustment of the plate are adapted to be placed in register with the partition openings, or the plate may be adjusted to variably or entirely cover the partition openings, and to adjust the plate it is provided with an arm 29. The casing is also sup-

ported from the wall of the furnace by an angle bracket 30 anchored to the furnace wall 32 by bolts 33 and nuts 34, and the casing secured to said bracket by bolts 31. The outer ends of the burner cylinders are closed, as by a head or plate 37, releasably secured to the outer cylinder 4 by an angle member 38 and bolts 39, the closure having a central opening 40 to which a gas supply pipe (not shown) may be connected, and a sight opening 41 having a closure 42 releasably secured to the plate, as by bolts 43.

The direction of flow of the stream of a primary air laden with pulverized coal is through the inlet 5 and passage 3, and the flow of the secondary air is through the inlet 36 to and through the casing chamber 35, as indicated by the arrows in Figures 3 and 4, the pulverized coal laden air stream delivered from the passage 3 being deflected or directed outwardly by the surface 9 of the ring member 8, and the secondary air being directed by the converging wall 22 inwardly toward the pulverized coal laden air stream issuing from passage 3.

Having thus described and illustrated the preferred embodiment of my invention, I do not wish to limit myself to the exact construction or arrangement of parts shown, since it is evident that modifications may be made therein without departing from the spirit of the invention or scope of the claims.

I claim:—

1. In a pulverized coal burner, a pair of cylinders of different diameters arranged one within and in spaced relation to the other to provide an annular passage between the cylinders having an outlet from one end of the cylinders and the outer cylinder having an inlet opening adapted for connection with a source of pulverized coal carrying air, means to connect said inlet to the annular passage and direct the pulverized coal stream in a spiral course, a casing arranged with an annular chamber surrounding the cylinders having an air inlet through and tangential to the outer chamber wall and an outlet disposed about the outlet of the annular passage arranged to deflect inwardly the stream delivered therefrom, an annular partition arranged within the outlet of the casing chamber having spaced openings disposed about the same, an annular plate having openings therein to correspond with the openings in the partition supported to have rotative adjustment in juxtaposed relation to said partition and adapted to be adjusted to register the openings therein with the partition openings to open the casing chamber to the outlet and to cover and variably uncover said openings, and an

annular member at the end of the inner cylinder arranged to deflect outwardly the stream of pulverized coal carrying air delivered therefrom.

2. In a pulverized coal burner, cylinders of different diameters one arranged within and in spaced relation to the other to provide an annular passage between the cylinders having an outlet at one end of the cylinders, means for supplying a pulverized coal laden air stream to said passage, a casing arranged with an annular chamber surrounding the outer cylinder and having an air inlet and an annular air outlet disposed about the outlet end of the annular passage arranged to deliver the air therefrom in an annulus and direct it inwardly, and an annular member at the tip of the burner arranged to deflect outwardly the stream of pulverized coal laden air delivered therefrom, said annular member having a passage therein for a cooling medium extending approximately throughout the entire circumference thereof.

3. In a pulverized coal burner, a series of cylindrical members of different diameters arranged one within the other to provide passages between said members, each passage having an outlet at one end of said members and the outer passage having an air inlet tangential to the outer wall thereof and its outlet arranged to deflect inwardly the stream delivered from said passage, means for supplying a pulverized coal laden air stream to the inner passage, an interrupted annular member at the outlet end of the inner cylindrical member arranged to deflect outwardly the stream of pulverized coal laden air and having a passage therein for a cooling medium extending approximately from end to end thereof.

4. In a pulverized coal burner, a pair of cylinders of different diameters arranged in concentric spaced relation to provide an annular passage between the cylinders having an outlet from one end of the cylinders, means connected with the opposite end of said passage for supplying and directing a pulverized coal laden air stream in a spiral course thereto, an annular air chamber disposed relative to the annular passage having an air inlet and an air outlet substantially concentric with the outlet of the annular passage, and an annular member at the tip of the burner having a passage therein adapted for connection with and flow of a cooling medium there-through, and said member and the outlet of the air chamber arranged to cause the streams from the air chamber and annular passage to converge toward each other.

JOSEPH E. KENNEDY.