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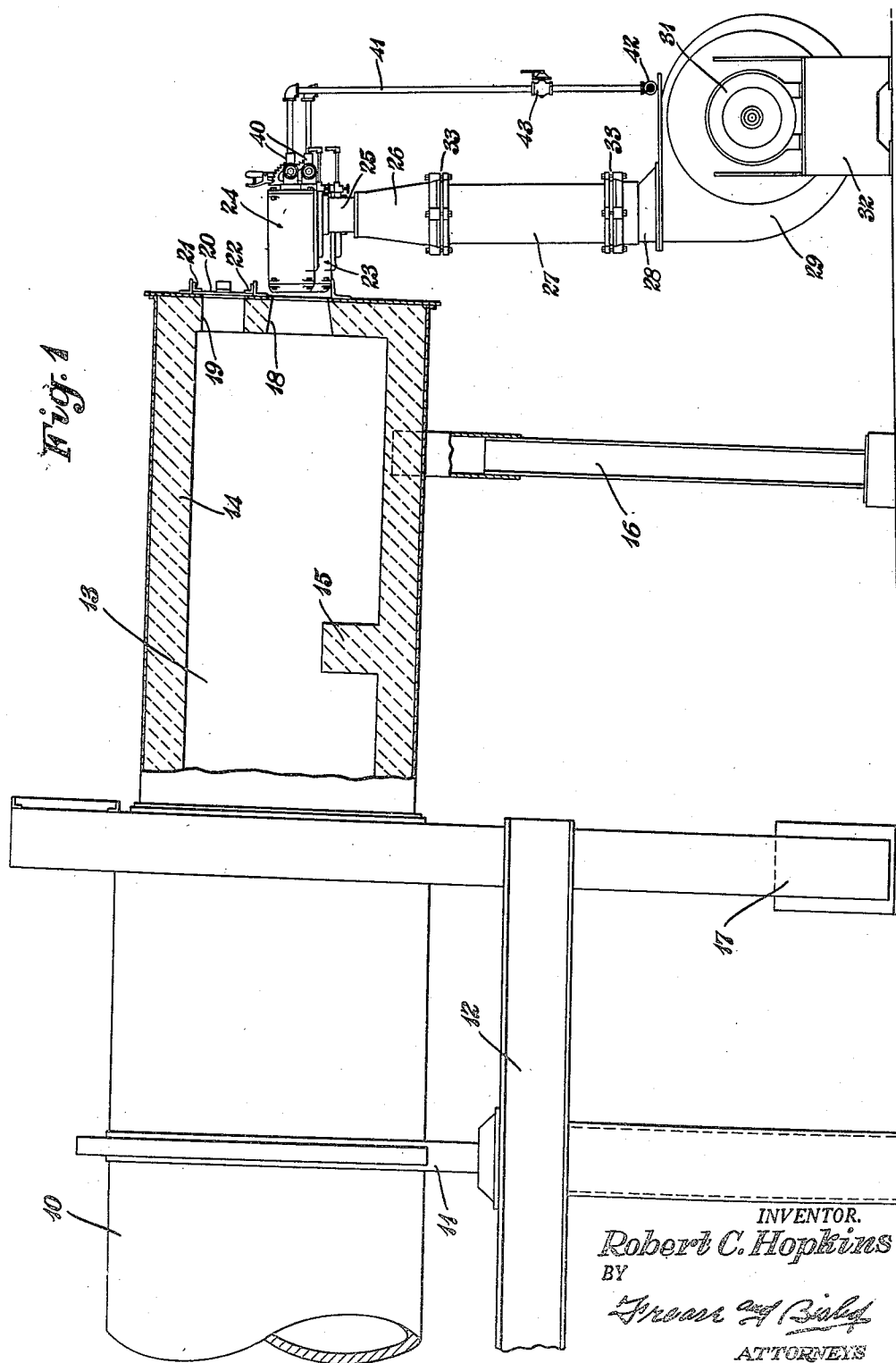
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BURNER EQUIPMENT FOR ROTARY DRIERS FOR AGGREGATES

Filed June 11, 1949

2 SHEETS—SHEET 1



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2 SHEETS—SHEET 2

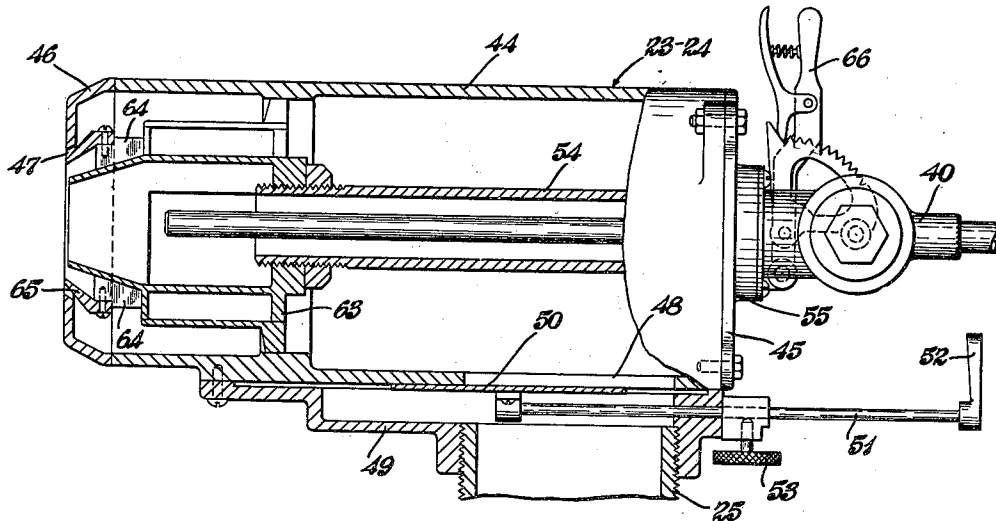


Fig. 3

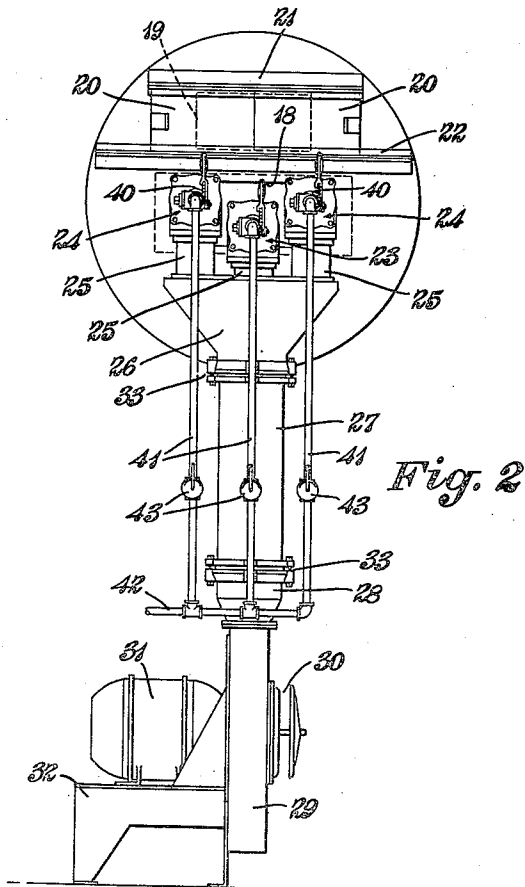


Fig. 2

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BURNER EQUIPMENT FOR ROTARY DRIERS
FOR AGGREGATES

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9 Claims. (Cl. 263—19)

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The invention relates to apparatus for drying gravel, sand, slag and other aggregate, preliminary to mixing with asphalt for building black top roads, and more particularly to a novel burner equipment for use in connection with such rotary driers for drying and heating the aggregate for either cold mix or hot mix.

In the building of so-called black top roads, which are formed of asphalt and aggregate such as gravel, sand or slag, there are two processes generally used, one known as cold mix and the other as hot mix.

In each case the gravel, sand, slag or other aggregate used in the mixture is heated to a certain predetermined temperature in a rotary drier, preliminary to mixing with the asphalt. For making the cold mix, the aggregate is heated to 110° F. and in at least some States this temperature must be very strictly adhered to. The hot mix requires a higher temperature which may be 375° to 400° F.

Under present practice it is common to use a long piece of 12" pipe extending through the combustion chamber and into the rotary shell, with an oil or gas burner mounted near the inner end of this pipe so that the one burner located well forward in the shell produces a controlled temperature of 110° F.

When it is desired to change over to the hot mix, it is necessary to remove this section of 12" pipe, with its burner and connections, considerable time being required in making the change.

The present invention contemplates the provision of burner equipment for this purpose, in which three burners are located at the entrance to the combustion chamber, the middle burner being preferably located below the horizontal center line of the combustion chamber and the two outer burners on the horizontal center line of the combustion chamber.

Another object is to provide a triple Y branch connection between the three burners, and a blower with means for controlling the blast of air from the blower to each burner.

A further object is to provide an air inlet opening in the combustion chamber above the burners, with means for controlling the same.

A still further object is to provide a bridge wall in the combustion chamber for deflecting the hot gases from the lower burner upward.

Another object is to provide means for blowing cold air through the two outer burners while the middle burner is operated, in order to control the temperature within the rotary shell.

The above and other objects, apparent from the

drawings and following description, may be attained, the above described difficulties overcome and the advantages and results obtained, by the apparatus, construction, arrangement, combinations and parts which comprise the present invention, a preferred embodiment of which, illustrative of the best mode in which applicant has contemplated applying the principle, being set forth in detail in the following description and illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation of a portion of a rotary drier, with stationary combustion chamber, showing the improved burner equipment associated therewith, parts being broken in section for the purpose of illustration;

Fig. 2 a front elevation of the improved burner equipment and combustion chamber; and

Fig. 3 an enlarged elevation, partly in section, of one of the burners.

Referring now more particularly to the drawings, in which similar numerals refer to similar parts throughout, the rotary drier is shown comprising the cylindrical shell 10 rotatably mounted in conventional manner upon supports 11 mounted upon a structural frame work 12.

The stationary combustion chamber 13, having a refractory lining 14 and bridge wall 15 extending upward from its lower side, is mounted at the discharge end of the rotary shell and supported as upon the frame work 16.

As shown in Fig. 1, both the rotary shell and combustion chamber may be tilted slightly relative to the horizontal so that material fed into the charging end of the rotary shell will be gradually carried forward and discharged therefrom through the discharge spout 17, in usual and customary manner.

An inwardly flared opening 18 is formed in the front wall of the combustion chamber, extending from a point slightly above, to a point some distance below, the horizontal center thereof, and so positioned that the burners, to be later described, may fire therethrough into the combustion chamber.

In the upper portion of the front wall of the combustion chamber is located another opening 19 for admitting excess air when necessary, this latter opening being controlled by the sliding doors 20, which are preferably slidable toward and away from each other in angle guideways 21 and 22, so that a greater or lesser amount of cold air may be admitted in the upper portion of the combustion chamber to suit conditions.

The burner equipment provided for the pur-

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pose of the invention comprises the middle burner, indicated generally at 23, which is preferably located some distance below the horizontal center line of the combustion chamber, and the two outer burners 24, both preferably

The burners 23 and 24 are each supported upon air supply ducts 25, which are connected to a triple Y-branch connection or fitting 26, which is in turn connected to the upper end of the vertical air duct 27, the lower end of which is connected to the discharge end 28 of a centrifugal blower 29.

The inlet to the blower is indicated at 30 and the blower may be driven in usual manner by an electric motor 31, both the motor and the blower being supported upon the base 32.

The upper and lower ends of the duct 27 may be connected to the Y-fitting 26 and the discharge end 28 of the blower respectively, by means of adjustable ring flange connections 33 which permit a certain amount of vertical adjustment for properly positioning the burners 23 and 24 relative to the combustion chamber inlet opening 18.

A fuel supply connection 40 is connected to the outer end of each burner 23 and 24, individual fuel pipes 41 connecting the several fuel supply connections 40 with the main fuel supply pipe 42. Manually operable valves 43 are provided in the fuel pipes 41 for independently controlling the admission of fuel to each of the burners.

The burners may be either gas or oil operated and each burner, as shown in Fig. 3, includes a substantially cylindrical housing 44, having a closure plate 45 secured to its rear end. The front end of the housing has a substantially conical nozzle portion 46 having the central discharge opening 47. An air inlet 48 is provided at the under side of the housing 44, adjacent to its rear end, for receiving the air blast from the air duct 25, which is attached to the blast gate housing 49. A blast gate 50 is slidably mounted within the housing 49, and a rod 51 is secured to the blast gate, for adjusting the blast gate, and has an operating handle 52 at its outer end, a set screw 53 being provided for holding the blast gate in adjusted position.

The fuel supply connection 40 is carried on the rear end of a gas conduit 54 extending axially through the burner housing 44, and the conduit 54 is slidable through the boss portion 55 of the closure plate 45. An atomizing barrel 63 is carried on the front end of the conduit 54, and the convergent discharge portion of the atomizing barrel has outer radial ribs 64 on which is mounted an annular deflecting ring 65. The gas conduit 54 and atomizing barrel can be adjusted longitudinally in the burner housing by means of a hand lever 66.

In the operation of the apparatus, in the preparation of cold mix for black top roads, the fuel valve 43 for the middle or lower burner 23 is opened and this burner alone is operated, the burner being adjusted to admit the proper amount of air for combustion.

No fuel is admitted to the outer or upper burners 24, but these two burners are opened sufficiently to permit the proper amount of cold air to flow therethrough to regulate the temperature within the rotary shell at 110° F.

The fire stream from the middle or lower burner 23 will strike the bridge wall 15 which deflects the hot gases upward, these hot gases

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being sufficiently cooled by the flow of cold air through the two outer burners to hold the temperature down to 110° F. or whatever temperature may be required.

For preparing a hot mix the same apparatus is used and both the fuel and air blast to the middle or lower burner 23 may be shut off, and the two outer or upper burners 24 are lighted and these two burners may be regulated to control the admission of air.

Whatever excess air may be necessary is admitted at the top of the combustion chamber through the air inlet 19, by properly regulating the sliding doors 20. In the event that it may be desirable to speed up the heating of the material, the middle or lower burner 23 may also be lighted, although this is not usually required.

From the above it will be evident that disadvantages of present practice are eliminated as there is no delay or loss of time, and no labor required, to adjust the burner equipment for making either hot mix or cold mix, the only adjustment required being the operation of the fuel valves and blast gates of the several burners to produce the desired result.

I claim:

1. Burner equipment for rotary driers for selectively producing relatively high temperature or relatively low temperature, comprising a horizontal, elongated combustion chamber communicating at one end with the rotary drier and having a burner opening in its opposite end, a middle burner and two outer burners positioned to discharge through said burner opening into the combustion chamber, said outer burners being located at the horizontal center of the combustion chamber and the middle burner being located below said horizontal center line, a Y-branch connection supporting the burners, a blower communicating with the Y-branch connection, fuel pipes connected to the burners, means for independently controlling the admission of air from the blower to the middle burner and the outer burners, and means for independently controlling the admission of fuel to the middle burner and the outer burners.

2. Burner equipment for rotary driers for selectively producing relatively high temperature or relatively low temperature, comprising a horizontal elongated combustion chamber communicating at one end with the rotary drier and having a burner opening in its opposite end, a middle burner and two outer burners positioned to discharge through said burner opening into the combustion chamber, said middle burner being located below the plane of the outer burners, a bridge wall in the combustion chamber for deflecting the fire stream of the middle burner only upward, a Y-branch connection supporting the burners, a blower communicating with the Y-branch connection, fuel pipes connected to the burners, means for independently controlling the admission of air from the blower to the middle burner and the outer burners, and means for independently controlling the admission of fuel to the middle burner and the outer burners.

3. Burner equipment for rotary driers for selectively producing relatively high temperature or relatively low temperature, comprising a horizontal, elongated combustion chamber communicating at one end with the rotary drier and having a burner opening in its opposite end, a middle burner and two outer burners positioned to discharge through said burner opening into the combustion chamber, said outer burners be-

ing located at the horizontal center of the combustion chamber and the middle burner being located below said horizontal center line, a bridge wall in the combustion chamber for deflecting the fire stream of the middle burner only upward, a Y-branch connection supporting the burners, a blower communicating with the Y-branch connection, fuel pipes connected to the burners, means for independently controlling the admission of air from the blower to the middle burners and the outer burners, and means for independently controlling the admission of fuel to the middle burner and the outer burners.

4. Burner equipment for rotary driers for selectively producing relatively high temperature or relatively low temperature, comprising a horizontal, elongated combustion chamber communicating at one end with the rotary drier and having a burner opening in its opposite end, a middle burner and two outer burners positioned to discharge through said burner opening into the combustion chamber said outer burners being located at the horizontal center of the combustion chamber and the middle burner being located below said horizontal center line, a Y-branch connection supporting the burners, a blower communicating with the Y-branch connection, fuel pipes connected to the burners, an air opening in the upper portion of the combustion chamber, means for selectively operating only the middle burner and for simultaneously admitting air from the blower through the outer burners, and means for selectively operating only the two outer burners and simultaneously admitting air through said air opening.

5. Burner equipment for rotary driers for selectively producing relatively high temperature or relatively low temperature, comprising a horizontal, elongated combustion chamber communicating at one end with the rotary drier and having a burner opening in its opposite end, a lower burner and two higher burners positioned to discharge through said burner opening into the combustion chamber, a Y-branch connection supporting the burners, a blower communicating with the Y-branch connection, fuel pipes connected to the burners, an air opening in the upper portion of the combustion chamber, means for selectively operating only the lower burner and for simultaneously admitting air from the blower through the higher burners, and means for selectively operating only the two higher burners and simultaneously admitting air through said air opening.

6. Burner equipment for rotary driers for selectively producing relatively high temperature or relatively low temperature, comprising a horizontal, elongated combustion chamber communicating at one end with the rotary drier and having a burner opening in its opposite end, a middle lower burner and two outer higher burners positioned to discharge through said burner opening into the combustion chamber, a Y-branch connection supporting the burners, a blower communicating with the Y-branch connection, fuel pipes connected to the burners, an air opening in the upper portion of the combustion chamber, means for selectively operating only the middle burner and for simultaneously admitting air from the blower through the outer burners, and means for selectively operating only the two outer burners and simultaneously admitting air through said air opening.

7. Burner equipment for rotary driers for se-

lectively producing relatively high temperature or relatively low temperature, comprising a horizontal, elongated combustion chamber communicating at one end with the rotary drier and having a burner opening in its opposite end, a lower burner and two higher burners positioned to discharge through said burner opening into the combustion chamber, a bridge wall in the combustion chamber for deflecting the fire stream of the lower burner only upward, a Y-branch connection supporting the burners, a blower communicating with the Y-branch connection, fuel pipes connected to the burners, an air opening in the upper portion of the combustion chamber, means for selectively operating only the lower burner and for simultaneously admitting air from the blower through the higher burners, and means for selectively operating only the two higher burners and simultaneously admitting air through said air opening.

8. Burner equipment for rotary driers for selectively producing relatively high temperature or relatively low temperature, comprising a horizontal, elongated combustion chamber communicating at one end with the rotary drier and having a burner opening in its opposite end, a middle lower burner and two outer higher burners positioned to discharge through said burner opening into the combustion chamber, a bridge wall in the combustion chamber for deflecting the fire stream of the middle lower burner only upward, a Y-branch connection supporting the burners, a blower communicating with the Y-branch connection, fuel pipes connected to the burners, an air opening in the upper portion of the combustion chamber, means for selectively operating only the middle burner and for simultaneously admitting air from the blower through the outer burners, and means for selectively operating only the two outer burners and simultaneously admitting air through said air opening.

9. Burner equipment for a rotary drier having an elongated, horizontal combustion chamber provided with a burner opening in one end, said burner equipment comprising a blower, a vertical air duct connected to the discharge side of the blower, a Y-branch connection, means adjustably attaching the Y-branch connection to the vertical air duct, a middle burner and two outer burners mounted upon the Y-branch connection, said outer burners being located at the horizontal center of the combustion chamber and the middle burner being located below said horizontal center line, fuel pipes connected to the burners, means for independently controlling the admission of fuel to the burners and means for independently controlling the admission of air from the blower to the burners.

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