United States Patent

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[33] **Austria**
[31] **7184/68**

[54] **EQUIPMENT FOR FIRING CERAMIC AND OTHER KILNS OR FURNACES**
4 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **263/28, 263/52**
[51] **Int. Cl.** **F27b 9/00**
[50] **Field of Search** 263/28, 7, 52; 25/142

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ABSTRACT: A kiln or the like is heated by two oppositely placed burners whose supply with air and/or fuel is regulated by two valves which are offset in phase, e.g. by 180°.

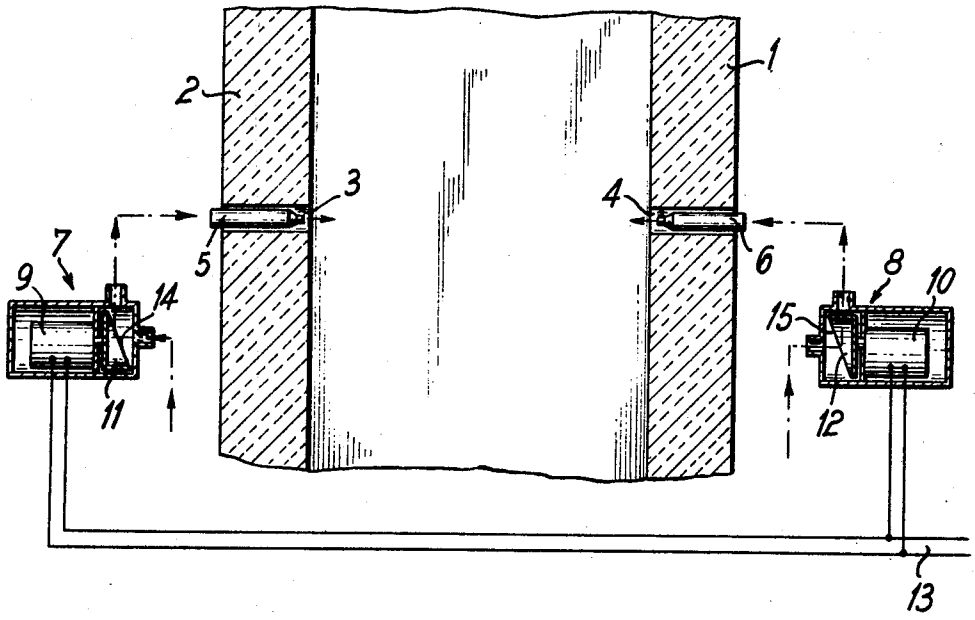

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FIG. 1

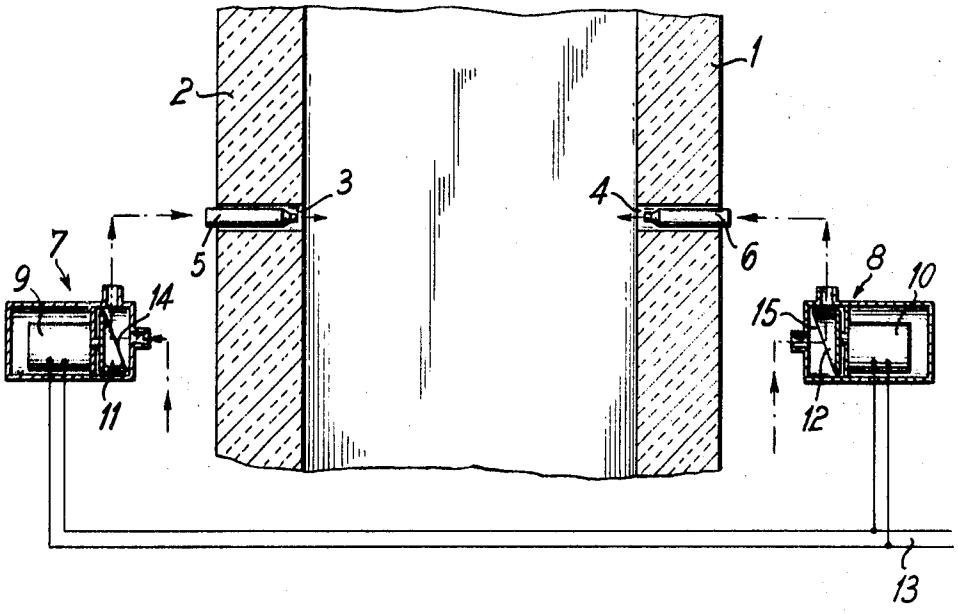

FIG. 3

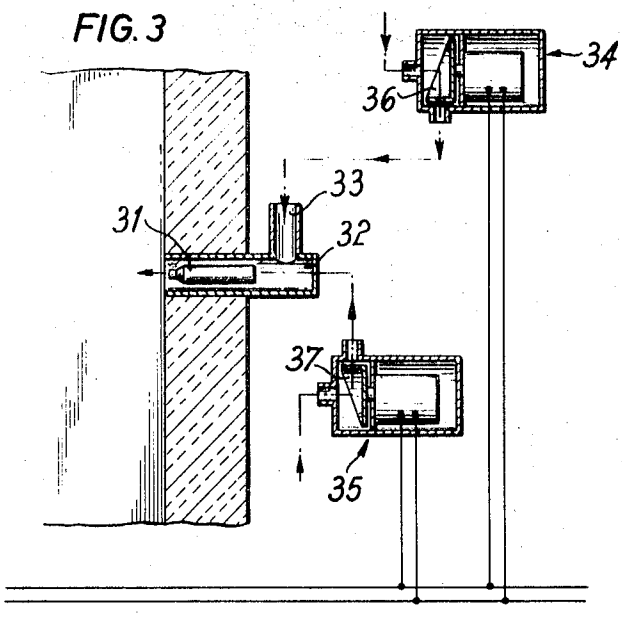

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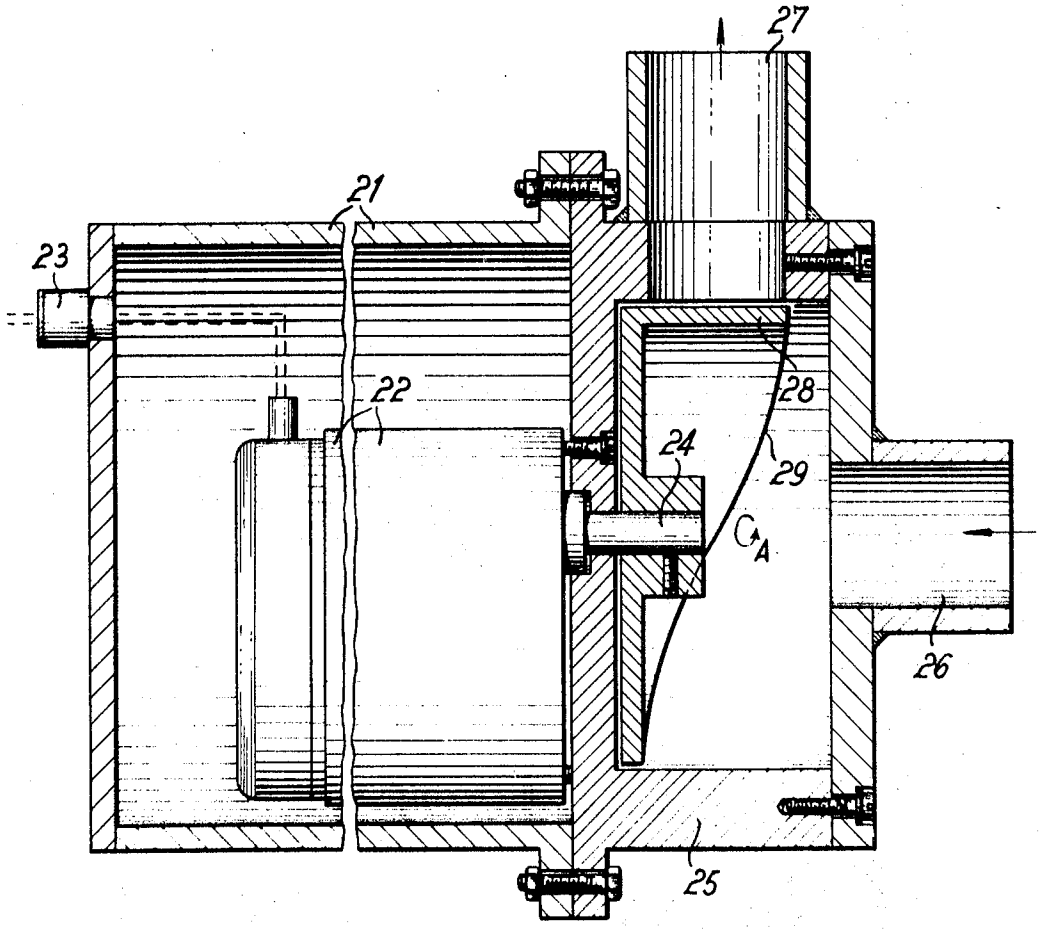
FIG. 2



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EQUIPMENT FOR FIRING CERAMIC AND OTHER KILNS OR FURNACES

The maintenance of a substantially even temperature in large kilns using burners operating on liquid or gaseous fuel is something which gives rise to substantial difficulties which in prior art equipment have not been fully satisfactorily disposed of.

The volumes of ceramic firing kilns can be extremely large and may amount to several hundred cubic meters. Large tunnel kilns may have internal widths of 6 meters and more. A representative temperature in such kilns may be 1,250° C. with a permissible fluctuation of ±½ SC. The permissible temperature error at every position of a tunnel kiln or its cross section thus amounts to ±10° C., a requirement which it has been practically impossible to fulfill. However, even in the case of substantially smaller firing kilns, such as small kilns with trolleys having a volume less than 10 cubic meters, it is difficult to ensure that the temperature is properly held at every position in the firing space.

In accordance with a prior proposal a kiln was to be constructed in such a manner that the problem posed was solved in a simple manner substantially completely so that at all points the same temperature was held in a firing space.

In this known proposal the firing arrangement made use of at least two burners operating on gaseous or liquid fuels and arranged opposite each other so as to be directed towards each other. In accordance with the proposal the quantity of fuel-air mixture and/or the heat output of the two opposite burners was to be varied periodically in a fluctuating manner in order to prevent the formation of steady currents associated with a steady blowing in and thus, owing to the continuous movement of the currents, prevent the occurrence of temperature differences.

One object of the present invention is to provide a device which can be advantageously used for carrying out the method.

The present invention contemplates a device for the regulation of the heat output of two opposite burners for the firing of heating spaces, more particularly for ceramic kilns, using gaseous or liquid fuel with the two opposite burners directed towards each other. The invention is characterized by the feature that ducts for the fuel and/or the air are provided with synchronously driven check valves which are offset with respect to their opening times in phase, preferably by 180°.

Preferably the check valves are in the form of rotating discs with oblique edges.

The drive of the valves can be carried out by electrical synchronous motors which are connected together. The motors which drive the discs or plates of the valves, can be provided in explosionproof housings.

An arrangement in accordance with the invention is now described with reference to the accompanying drawings.

FIG. 1 is a partial section through a tunnel kiln which is provided with apparatus in accordance with the invention.

FIG. 2 is an enlarged sectional view of the drive motor assembly with the valve driven by it.

FIG. 3 shows an embodiment of the invention in which both air supply and also fuel supply are controlled by means of separate valves.

Referring now to the drawings and more particularly to FIG. 1, it can be seen that reference numerals 1 and 2 denote the sidewalls of, for example, a tunnel kiln which has openings 3

and 4 for receiving burners 5 and 6. These burners are supplied with fuel and air, for example oil and air, via shut off valves 7 and 8 with their associated drive motors 9 and 10. The direction of flow of this fuel-air mixture is indicated by arrows. It runs via a check or shutoff valve 11, 12, as is shown in detail in FIG. 2. It can be seen that the two drive motors 9 and 10 for the valves 11 and 12 are driven synchronously via a common line current supply 13.

The position of the shutoff valves 11 and 12 is so chosen in the embodiment of the invention shown that the shutting-off times are offset in phase by 180°, that is to say the burner 5 is functioning when the supply to the burner 6 is shut off. Owing to the oblique construction of the locking edge 14 and 15, the supply of the burners 5 and 6 with fuel-air mixture is such that on starting the burner 6 the burner 5 produces a diminishing flame and vice versa.

FIG. 2 shows one form of the apparatus in accordance with the invention in detail.

An electric motor 22 is mounted in an explosionproof housing 21 and has a current supply 23. The electric motor is connected with a shaft 24 in a housing 25 which has opening into it a duct 26 for the supply, for example, of a fuel-air mixture. The housing also has a discharge duct 27 connected to it. Although the form of shutoff valve is shown which acts both for the fuel and also for the air, it is also possible to provide separate shutoff valves in separate fuel and air ducts. On the shaft 24 there is a rotary disc 28 with an obliquely shaped control rim 29 so that on rotation of this disc 28 in the direction of the arrow A the opening of the connection duct 27 is opened to a greater or less extent.

The principle of using such valves for controlling the supply of air and of fuel separately is shown in FIG. 3. In this construction in accordance with the invention the burner 31 comprises a surrounding air supply sleeve 32, into which an air supply conduct 33 opens. The passage of air along this duct is controlled by the shutoff valve 34. The construction of this valve can be in accordance with that shown in FIG. 2. A further shutoff valve 35 is mounted in the fuel supply duct or, if required, a supply duct for mixed fuel and primary air, secondary air only being provided by means of the sleeve 32. In this case as well there is a phase displacement between the shutoff valve discs 36 and 37 for changing the quantity of fuel-air mixture and/or the heat output.

We claim:

1. Heat regulation for tunnel kilns, or the like, having oppositely disposed spaced walls, comprising a burner in each wall directed toward each other, fuel supply including ducts for said burners respectively, valves for said ducts respectively for controlling the fuel supply to said burners, each valve being movable and constructed and arranged to cause the fuel supply to the respective burners to vary gradually from zero value to a maximum value and then back to a zero value, and means for imparting continuous movement to the respective valves in such manner that their opening and closing times are offset in phase.

2. An installation in accordance with claim 1 in which the valves are offset in phase by 180°.

3. An installation in accordance with claim 1 in which each valve comprises a rotary disc with an obliquely set edge, and means defining a port arranged to be opened and closed by the edge during rotation of the disc.

4. An installation in accordance with claim 3 comprising explosionproof housing means enclosing the motors.