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RECUPERATING BURNER BLOCK

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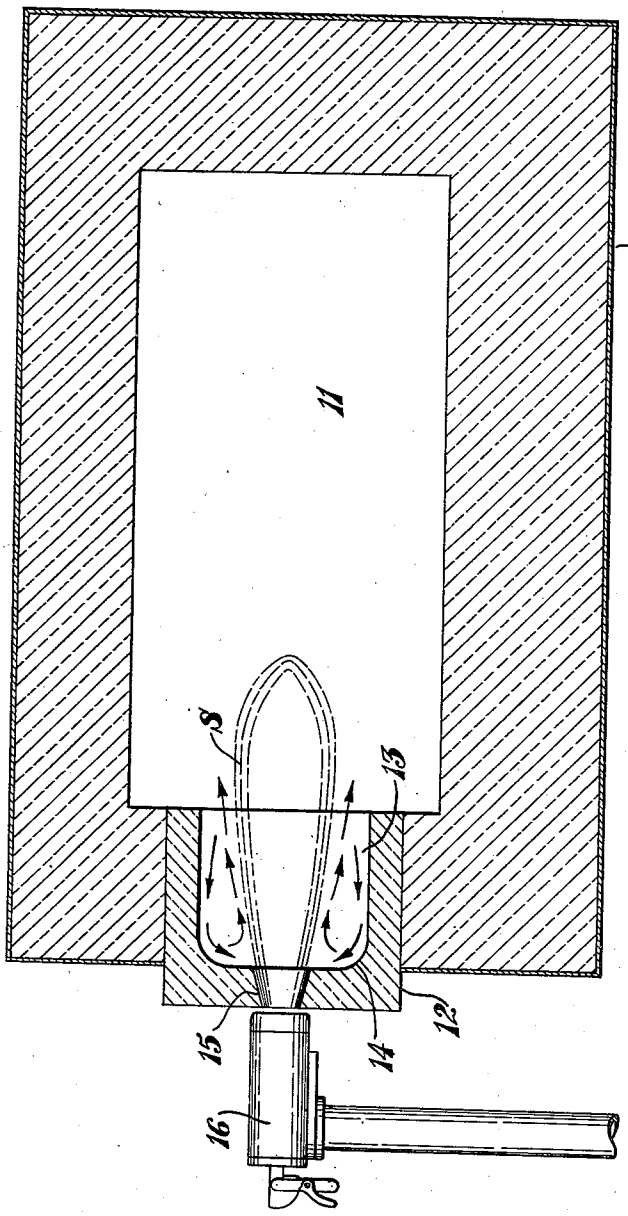

Fig. 1

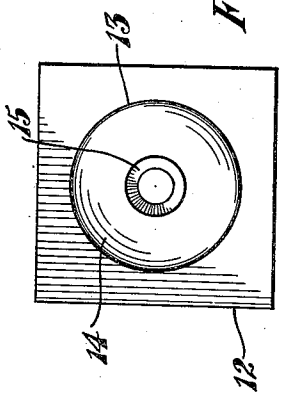

Fig. 2

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RECUPERATING BURNER BLOCK

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4 Claims. (Cl. 158—1)

The invention relates to the burning of oil and the like for fuel and more particularly to a recuperating burner block.

The term "oil burner" is probably a little misleading when considering the function and operation of the usual device so named, for the reason that it does not actually do any burning, the function of the device being primarily the breaking up of the oil or other fuel into very small particles, commonly called atomizing, and then mixing the atomized fuel with sufficient air for substantially complete combustion.

Liquid fuel will not properly burn unless converted into gas, and when oil is discharged into a furnace, even though it may be finely divided, or atomized, when mixed with the oxygen of the air, it is not yet ready for combustion, but must be converted into gas, and this is done solely by the application of heat.

The heat of the furnace warms the fuel up to the point where it is converted into a gaseous state, and it naturally follows that the more quickly this conversion is made, the sooner combustion will take place.

It is well known that many devices have been developed for preheating the fuel as well as the air, most of them utilizing the waste heat from the furnace.

The present invention contemplates the provision of a burner block having a substantially cyclindric cavity therein, shaped somewhat like the inside of a cask or barrel, communicating with the furnace chamber and having a restricted, central opening in its outer end through which the air, fuel and fire stream is discharged under pressure, this stream passing centrally through the cylindric cavity in the block, entraining the hot gases and carrying them on through the furnace chamber, setting up a partial vacuum between the stream and the walls of the cylindric cavity, inducing fresh, hot furnace gases to flow into the cavity, around the air and fuel stream, causing direct heating of said stream and also producing radiation from the burner block of heat which is absorbed and accumulated from this back flow of hot gases.

The objects of the invention may be attained by the use of a recuperating burner block as illustrated in the accompanying drawing, in which

Figure 1 is a vertical, longitudinal, sectional view of the improved recuperating burner block showing the same applied to a furnace; and

Fig. 2, a detail end view of the burner block.

Similar numerals refer to similar parts throughout the drawing.

A furnace is conventionally indicated at 10, and provided with a combustion chamber 11 which may be of any usual and well known design. The improved recuperating burner block to which the invention pertains is indicated generally at 12, and may be formed of suitable refractory material and for convenience in handling and installing within the furnace wall, its exterior may be of generally rectangular shape as shown, although it should be understood that the exterior form of this burner block is immaterial in so far as the present invention is concerned.

The improved burner block is adapted to be installed in one end or side wall of the furnace, and is provided with a cavity indicated at 13 which may be of substantially cylindric shape, opening into the furnace chamber 11, and preferably slightly rounded at its rear, or outer, end as shown at 14, giving said cavity the general shape of a barrel or cask.

A restricted, central opening 15 is formed in the outer, or rear, wall of the burner block, communicating with the cavity 13 therein, and may be inwardly flared as best shown in Fig. 1 of the drawing.

A device commonly misnamed a burner, for injecting fuel and air or steam under pressure through the central opening 15 of the burner block, is generally indicated at 16 so as to project the fuel and air stream axially through the enlarged cavity 13 of the burner block and into the combustion chamber of the furnace, as indicated at S.

This flow of air or steam mixed with the fuel will act like an injector within this improved burner block. As the gases are entrained and discharged into the furnace, there will be a drop in pressure between the walls of the burner block and the fuel and air stream which flows through it, resulting in a lowering of the pressure or the setting up of a partial vacuum within the cavity 13 surrounding the fuel and air stream. This causes the hot gases from the combustion chamber of the furnace to flow back out of the furnace chamber into the cavity 13 around the fuel, air and fire stream, where these gases are entrained and expelled in a constant flow, as indicated by the arrows in Fig. 1.

This produces a heat exchange between the hot furnace gases flowing from the combustion chamber into the cavity of the burner block and the burner block itself, causing the interior of the burner block to become heated to the ap-

proximate temperature of the hot furnace gases which are thus induced.

With this operation of the invention, direct heating of the air and fuel stream is produced by direct contact with the hot furnace gases and at the same time, the radiation from the burner block walls of the heat which is absorbed and accumulated from the back flow of the hot gases further assists in heating the fuel and air stream so as to vaporize the fuel and provide for proper combustion thereof.

I claim:

1. In a furnace having an elongated combustion chamber surrounded by side walls and end walls, a burner block projecting through one end wall of the furnace, the inner end of the burner block being substantially flush with the inner wall of the combustion chamber said burner block having a substantially cylindric, straight sided, entirely unobstructed cavity therein open through the inside of the block and communicating with a reduced central opening through the outside of the block, and a fuel burner located outside of the burner block and adjacent to and axially aligned with said reduced central opening so as to discharge an air, fuel and fire stream from the burner axially through the center of said cavity in the burner block in a path spaced from the side walls of the cavity so as to set up a partial vacuum between said stream and the side walls of the cavity in order to cause hot gases from the combustion chamber of the furnace to flow back into said cavity around the walls thereof and then back into the furnace around the air, fuel and fire stream.

2. In a furnace having an elongated combustion chamber surrounded by side walls and end walls, a burner block projecting through one end wall of the furnace, the inner end of the burner block being substantially flush with the inner wall of the combustion chamber said burner block having a substantially cylindric, straight sided, entirely unobstructed cavity therein open through the inside of the block and communicating with a reduced inwardly flared central opening through the outside of the block, and a fuel burner located outside of the burner block and adjacent to and axially aligned with said reduced central opening so as to discharge an air, fuel and fire stream from the burner axially through the center of said cavity in the burner block in a path spaced from the side walls of the cavity so as to set up a partial vacuum between said stream and the side walls of the cavity in order to cause hot gases from the combustion chamber of the furnace to flow back into said cavity around the walls thereof and then back into the furnace around the air, fuel and fire stream.

3. In a furnace having an elongated combustion chamber surrounded by side walls and end walls, a burner block projecting through one end wall of the furnace, the inner end of the burner block being substantially flush with the inner wall of the combustion chamber said burner block having a substantially cylindric, straight sided, entirely unobstructed cavity therein open through the inside of the block and having a rounded outer end and communicating with a reduced central opening through the outside of the block, and a fuel burner located outside of the burner block and adjacent to and axially aligned with said reduced central opening so as to discharge an air, fuel and fire stream from the burner axially through the center of said cavity in the burner block in a path spaced from the side walls of the cavity so as to set up a partial vacuum between said stream and the side walls of the cavity in order to cause hot gases from the combustion chamber of the furnace to flow back into said cavity around the walls thereof and then back into the furnace around the air, fuel and fire stream.

4. In a furnace having an elongated combustion chamber surrounded by side walls and end walls, a burner block projecting through one end wall of the furnace, the inner end of the burner block being substantially flush with the inner wall of the combustion chamber said burner block having a substantially cylindric, straight sided, entirely unobstructed cavity therein open through the inside of the block and having a rounded outer end and communicating with a reduced inwardly flared central opening through the outside of the block, and a fuel burner located outside of the burner block and adjacent to and axially aligned with said reduced central opening so as to discharge an air, fuel and fire stream from the burner axially through the center of said cavity in the burner block in a path spaced from the side walls of the cavity so as to set up a partial vacuum between said stream and the side walls of the cavity in order to cause hot gases from the combustion chamber of the furnace to flow back into said cavity around the walls thereof and then back into the furnace around the air, fuel and fire stream.

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