Nov. 5, 1929. A. W. MORSE 1,734,871

HEAT TREATING OVEN

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Fig: 1

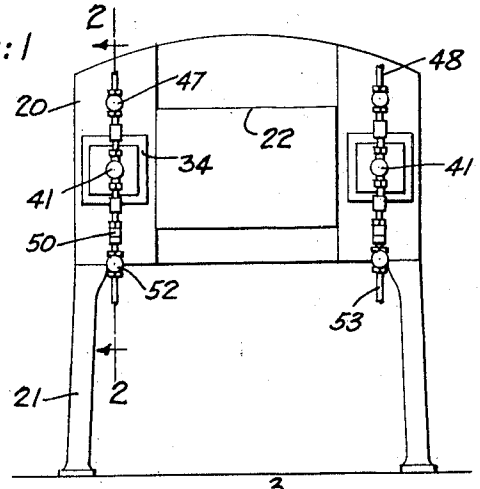


Fig: 2

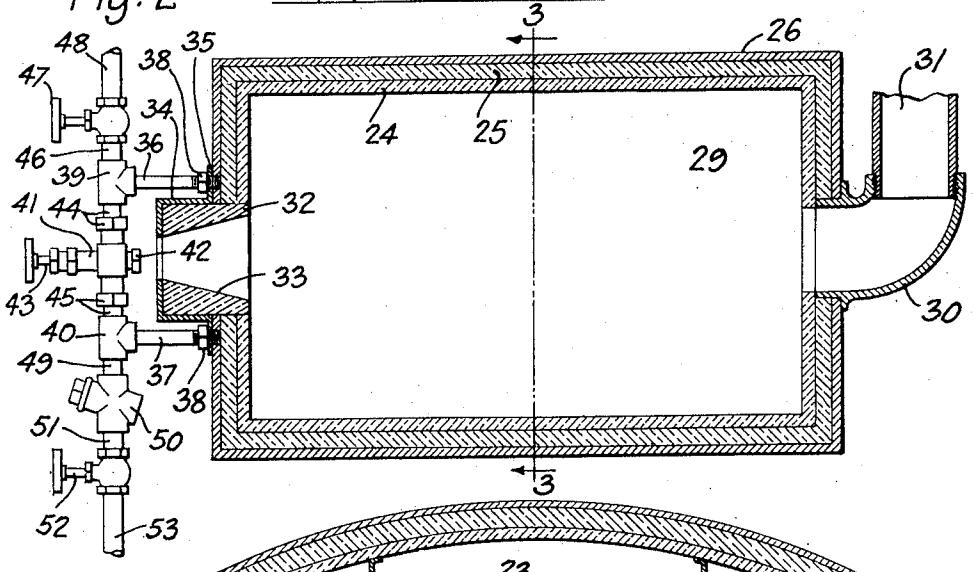
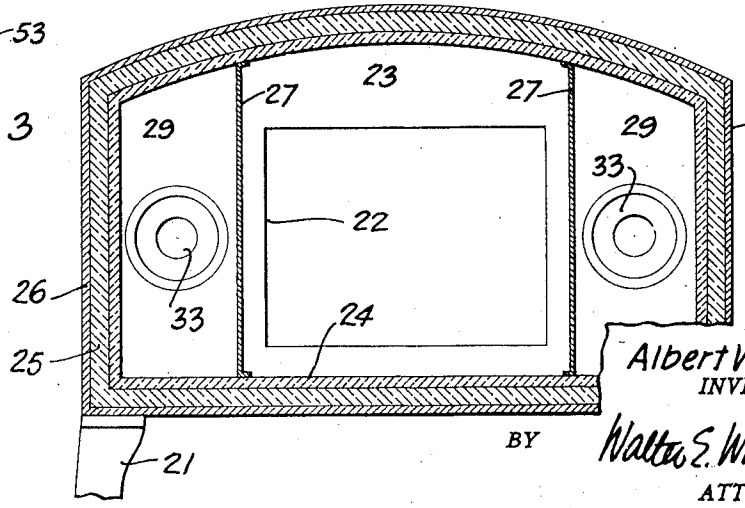


Fig: 3



Albert W. Morse
INVENTOR

BY Walter E. Wallheim
ATTORNEY

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HEAT TREATING OVEN

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Fig: 4

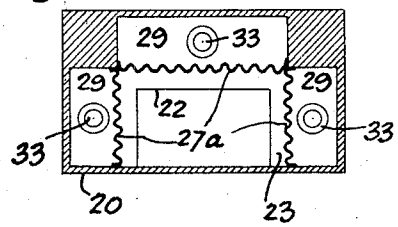


Fig: 5

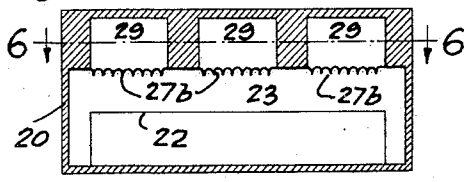


Fig: 6

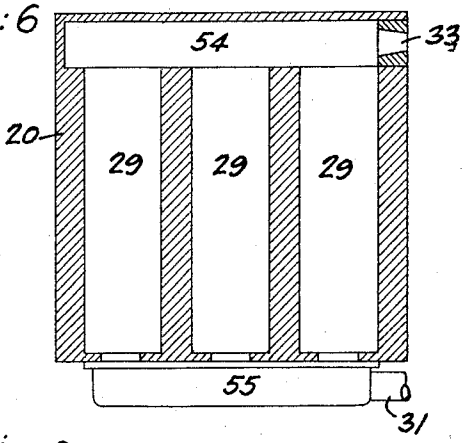


Fig: 7

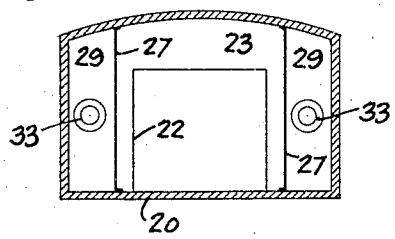


Fig: 8

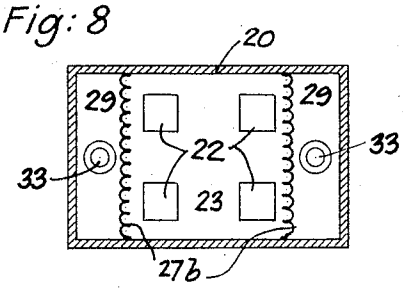
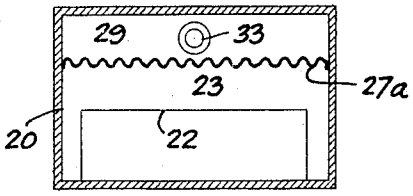


Fig: 9



Albert W. Morse
INVENTOR

BY Walter E. Wollheim
ATTORNEY

Patented Nov. 5, 1929 1,734,871

UNITED STATES PATENT OFFICE

ALBERT W. MORSE, OF LONG ISLAND CITY, NEW YORK

HEAT-TREATING OVEN

Application filed September 2, 1926. Serial No. 133,198.

This invention refers to ovens used in the heat treatment of metal and other materials, and has for one of its objects to provide an oven in which the flame does not come in direct contact with the material to be treated, but is projected into chambers or passages within the oven which have those sides which are exposed to the work made of heat resisting metal or the like which becomes radiant and thus diffuse the heat from the passages uniformly throughout the inner part or work chamber of the oven. Another object is to make an oven of this kind particularly adaptable for the use of oil or gas fuel. Still another object is to provide a structure which is easy to erect and economical to maintain owing to its simplicity of parts. Still further objects will become apparent in the following specification and the accompanying drawings, in which

Fig. 1 is a front elevational view of an oven embodying a preferred form of my improvements;

Fig. 2 is an enlarged vertical longitudinal sectional view through the oven and one of its heating elements along the plane of line 2—2 in Fig. 1;

Fig. 3 is a vertical cross sectional view along the plane of line 3—3 in Fig. 2;

Fig. 4 is a diagrammatic vertical cross sectional view through a modified form of an oven;

Fig. 5 is a similar diagrammatic view and Fig. 6 a horizontal sectional view along the plane of line 6—6 in Fig. 5, showing a modified form of flame inlet and outlet; and

Figs. 7, 8 and 9 illustrate diagrammatically still further modifications of the oven structure.

Like characters of reference denote similar parts throughout the several views and the following specification.

Referring more particularly to Figs. 1, 2 and 3, 20 is an oven mounted upon a base 21 having a door 22. The inner part of the oven is lined with refractory material 24 which is surrounded by suitable insulating material 25 and an outer metal housing 26 of the oven. A work chamber 23 is defined within partitions 27 at both sides of, preferably, a heat resisting metal which becomes radiant when subjected to heat. These partitions thus form longitudinal heat chambers or passages 29 at both sides of the oven. At the rear of each of these passages is an elbow 30 fastened to the oven wall which has a pipe 31 leading to the atmosphere, stack or suitable recuperator.

32 is a combustion chamber block at the front of the oven and in each of the front walls of the passages 29, made of fire brick or other refractory material, having an inwardly diverging circular opening or combustion chamber 33 in its center and, preferably, in alignment with the outlet elbow 30. The outside of this block which is partially projecting outwardly of the oven wall is square shaped and surrounded by a supporting metal shell 34 which covers the front and part of the sides of the block 32, leaving the small end of the combustion chamber 33 exposed, and which shell is flanged at 35 at its rear end to lie against the front wall of the oven.

36 and 37 are tie rods screwed into the front oven wall through corresponding holes in the flanged portion 35 of the shell 34. Nuts 38 engaging the threaded ends of the tie rods furnish additional means besides the usual bolts (not shown) to hold the supporting shell 34 and with it the block 32 tightly against the oven wall.

39 and 40 are T fittings engaging, respectively, with their center connections outwardly extending threaded ends of rods 36 and 37.

Midway between the T fittings 39 and 40, and in central alignment with the combustion chamber 33, is an oil burner 41, having an outlet nozzle 42 and a regulating valve 43. This burner is, preferably, of the kind which may use either oil or gas for fuel. Union connections 44 and 45 are interposed between the T fittings 39 and 40 and the burner to facilitate the assembling of the parts. Into the other end of T 39, opposite the one into which union 44 is screwed, is connected a short pipe nipple 46 which in turn is threaded to a stop valve 47 of commercial form for the purpose of regulating the air supply admitted through a pipe 48. The other end of T 40, opposite the one into which union 45 is screwed, is also provided with a short pipe

nipple 49 connected to an oil strainer 50 of standard design, another short nipple 51, and a stop valve 52 which regulates the oil admitted through a pipe 53.

The arrangement of parts, exterior of the oven, just explained, is similar to the one disclosed in Patent #1,574,839, issued to me on March 2, 1926.

In Figs. 2 and 3 are shown heat passages 29 at both sides of the work chamber, each individually fired. In the modification, illustrated in Fig. 4, there are shown heat passages at both sides and at the top of the work chamber. In Figs. 5 and 6 are shown a plurality of passages at the top of the chamber, their inlets connected to a common manifold 54, in alignment with the combustion chamber 33, and their outlets to a common exhaust manifold 55, preferably, exteriorly of the oven.

Figs. 7 to 9 show various types of ovens and combination of heat passages to suit different kinds of work to be treated at different temperatures.

The characteristics of the shape of the partitions 27 may be either plain, as shown in Figs. 3 and 7, or corrugated, as shown at 27^a in Figs. 4 and 9, or finned, as shown at 27^b in Figs. 5 and 8.

The operation of the device is as follows: Oil is admitted, under pressure, from supply pipe 53, through valve 52, whence it passes through nipple 51, strainer 50, nipple 49, T fitting 40, and union connection 45 into the burner 41 by way of regulating valve 43.

Air is admitted, also under pressure, from pipe 48, controlled by valve 47, through nipple 46, T fitting 39, and union connection 44 into the burner 41. The air and oil are thoroughly mixed within the burner 41 and discharged in form of a vapor through nozzle 42 into the combustion chamber 33 where the vapor is ignited by burning waste or other suitable means. The resulting flame is then projected into the heat passage 29, the partition 27 of which becomes incandescent or radiant and radiates heat into the work chamber. No products of combustion come in contact with the material being treated in the work chamber, but they are carried off at the far end of the passage 29 either directly to the atmosphere or to a stack or recuperator. Various kinds and forms of heat resisting metal may be used for the partitions and any suitable sectional shape may be employed. By regulating the flame, a greater or lesser degree of radiant heat may be obtained.

Transmission of heat is thus entirely effected by radiation, no flame coming in direct contact with the work, nor is heat concentrated upon any point. Besides by regulation of the flame, the heat may be controlled by choice of materials for the partitions separating the heat passages from the work chamber. This enables the use of the highest combustion temperature to obtain the best fuel economy without damage to the product by overheating.

It is also pointed out that the initial cost of an oven made according to the principles of my invention is a very low one, and that it is very economically maintained, owing to the simplicity of its construction and the cheap fuel used.

The particular construction disclosed lends itself especially to ready replacement of the radiant partitions. If gas be substituted for oil, the manner of operation will be the same as the one described above for oil.

It is understood that various changes in the form, proportion and minor details of construction may be resorted to, without departing from the principles or sacrificing any of the advantages of the invention, as defined in the appended claims.

What I claim as new, is:

1. In a heat treating oven having a chamber, heat passages along the walls of the chamber, each being lined with a refractory backed with a heat insulating medium and having means for admitting a flame at one end and discharging products of combustion at the other end, and each of the passages being separated entirely from the said chamber by a wall of heat resisting material of radiant characteristics when heated, each of the said passages being adapted to reflect the heat from the flame toward the said wall of heat resisting material to increase its normal radiance.

2. In a heat treating oven having a chamber lined with a refractory and surrounded externally with a heat insulating medium, channels in the walls of the said chamber, partitions of corrugated heat resisting metal of radiant capability at the open sides of the said channels forming heat passages therewith independent of the said chamber, means to admit a flame at one end of each of the passages and means to discharge products of combustion at the other end.

3. In a heat treating oven having a chamber, channels having refractory walls formed in the sides and the top of the said chamber, removable partitions of heat resisting material of radiant capability, closing the said channels longitudinally and separating them from the said chamber forming passages thereby, and means, externally of the oven, to admit a flame into one end of each of the said passages and means to discharge products of combustion at each of the other ends.

4. In a heat treating oven having a chamber, a plurality of heating elements along the walls of the said chamber, the said elements consisting of channels in the said walls, open toward the chamber but separated therefrom by thin removable partitions of heat resisting metal of radiant capability, the channels being lined with a refractory backed with a

heat insulating medium, means to admit a flame into one end of each of the said heating elements, and means to discharge products of combustion at each of the other ends, the said channels serving as reflectors of radiant heat toward the said partitions.

In testimony whereof I have hereunto set my hand.

ALBERT W. MORSE.