Jan. 22, 1963 B. RONAY 3,074,704

PORTABLE FURNACE

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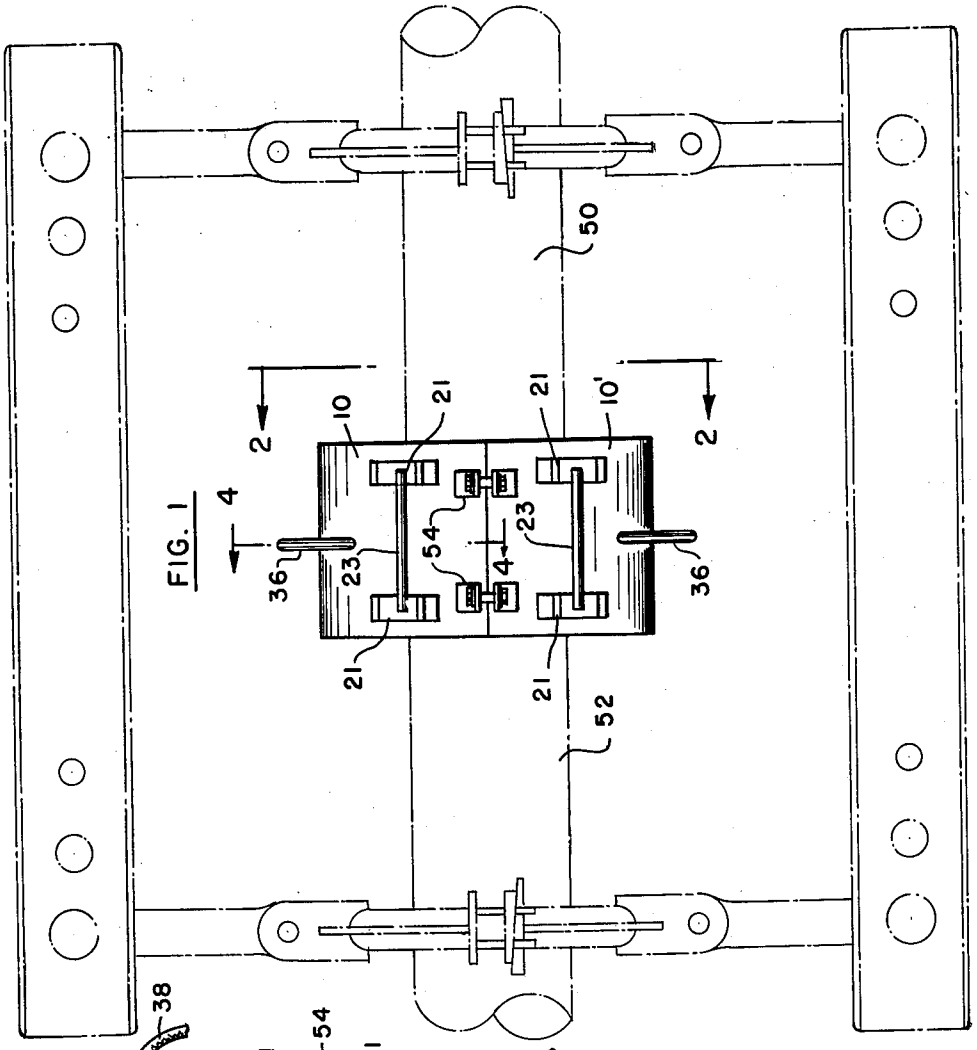


FIG. 1

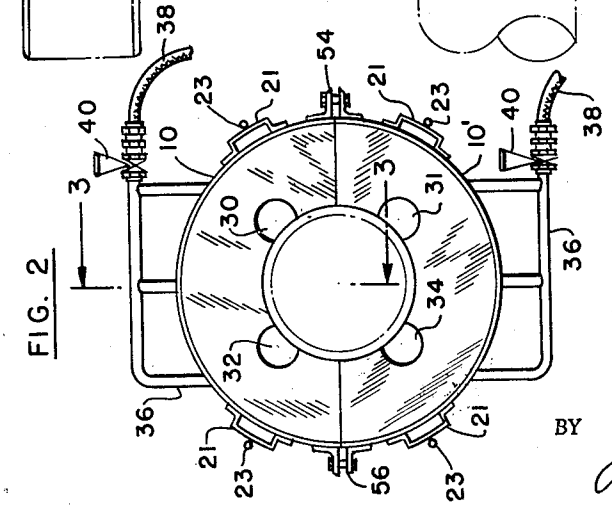


FIG. 2

INVENTOR

BELA RONAY

BY

ATTORNEY

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FIG. 3

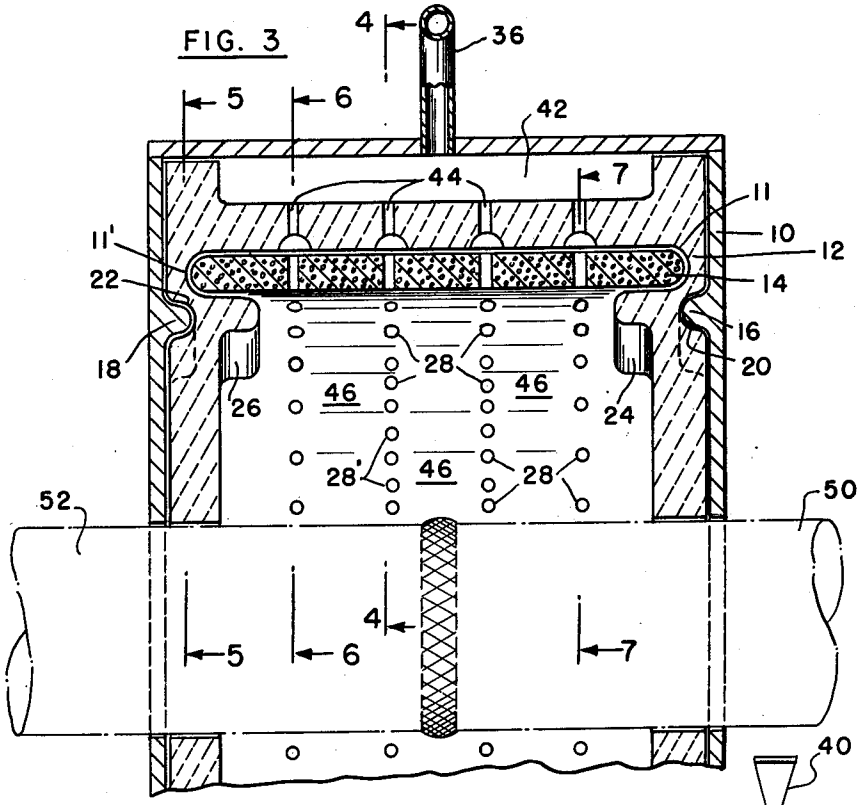
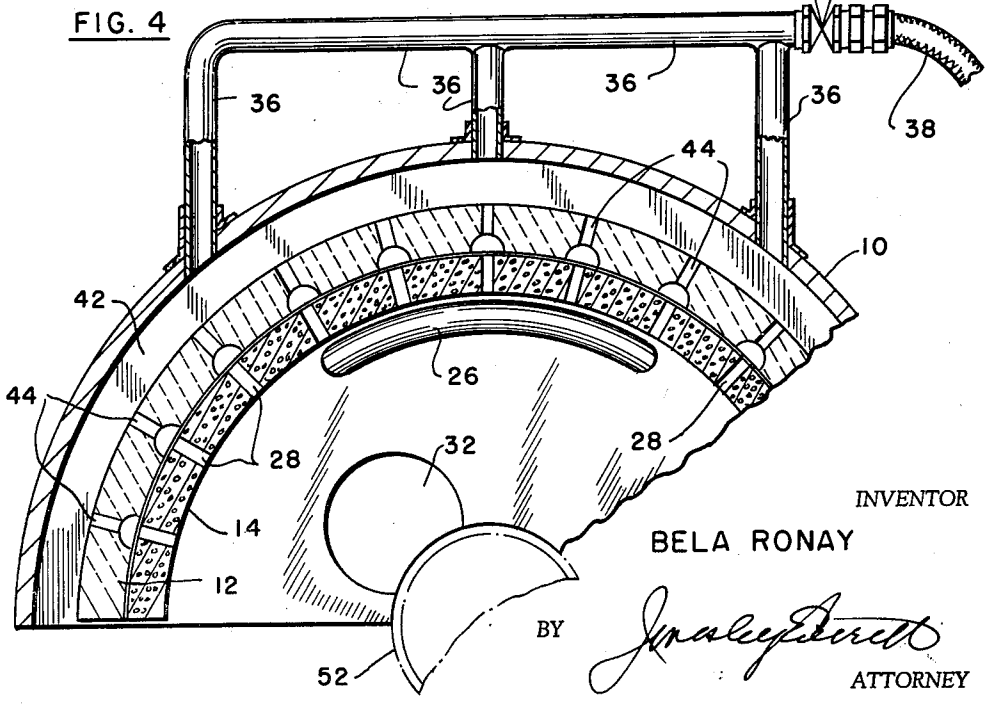


FIG. 4



INVENTOR

BELA RONAY

BY

ATTORNEY

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FIG. 5

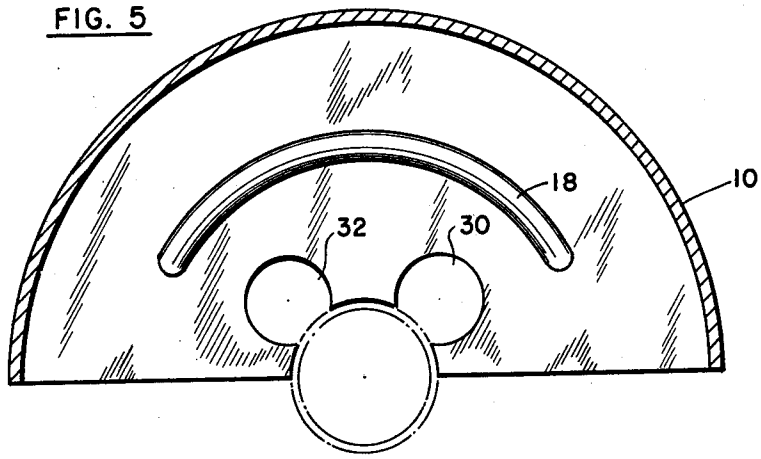


FIG. 6

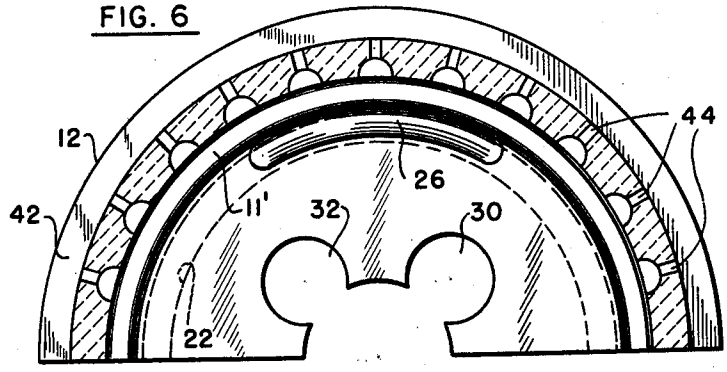


FIG. 7

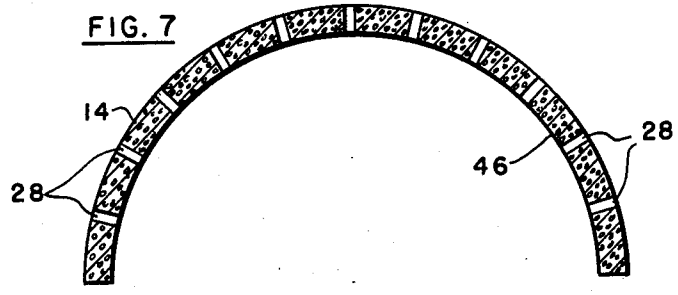
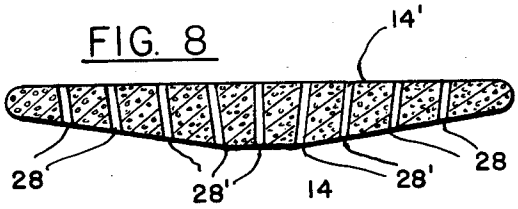


FIG. 8



INVENTOR

BELA RONAY

BY Jaworski & Secrest

ATTORNEY

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PORTABLE FURNACE

Bela Ronay, 1201 Guilford Road, Glen Burnie, Md.

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8 Claims. (Cl. 263—4)

The present invention relates to furnaces and in particular to a solid fuel muffle furnace for butt welding the ends of work pieces such as pipe, tubing, bars, rails, etc.

The present furnace is fully automatic when equipped with a timing device to regulate the rate of oxygen or air admission to the combustion chamber. The furnace is effectively a muffle furnace, wherein the muffle itself is the heating element which is consumed by combustion during each application and which is easily replaceable.

One object of the invention is to provide a furnace in which a solid fuel unit may be held in a predetermined position about a work piece.

Another object of the invention is to provide means for regulating the combustion of the fuel unit throughout the surface of its burning area.

A further object of the invention is to provide a furnace that may be easily serviced and supplied with fresh heating units.

A still further object of the invention is to provide a furnace in which the several parts are interlocking, requiring a minimum of operating parts.

A still further object of the invention is to provide a furnace that may be easily portable and put to practical use in the field and which requires a minimum of associated apparatus for its operation.

With the above and other objects in view the invention consists in the novel construction, combination and arrangement of parts shown in the accompanying illustrations and described in the following specifications.

In the drawings:

FIGURE 1 is a view in side elevation of the furnace illustrating its use in butt welding two work pieces, such as two pieces of pipe.

FIGURE 2 is a view in side elevation of the furnace, as seen from 2—2 in FIGURE 1.

FIGURE 3 is an enlarged fragmentary sectional view taken on line 3—3 of FIGURE 2.

FIGURE 4 is a fragmentary sectional view taken on line 4—4 of FIGURE 3.

FIGURE 5 is a sectional view taken on line 5—5 of FIGURE 3.

FIGURE 6 is a sectional view of the refractory lining taken on line 6—6 of FIGURE 3.

FIGURE 7 is a sectional view of the combustion muffle, or heating unit, taken on line 7—7 of FIGURE 3.

FIGURE 8 is a sectional view of a modified form of fuel unit.

In describing the invention like reference characters are used to point out like and similar parts throughout the several views.

The furnace comprises primarily a steel housing 10, a refractory lining 12 and a combustible muffle or fuel element 14. The housing 10 is provided with bosses 16 and 18 for engaging recesses 20 and 22 in the sides of the refractory lining for retaining the lining within the housing. It will be noted that these elements, that is, the housing, the refractory lining and the fuel element are shown circular in form, or substantially so, and are formed in two parts as shown in FIGURES 1 and 2.

The refractory lining is provided with bosses 24 and 26 located on each side thereof for supporting the heating element 14. These bosses are located in each of the separate sections of the refractory lining for holding a corresponding section of the fuel unit. The same is

true with the bosses 16 and 18 carried by the housing; each section of the housing supports a corresponding section of the refractory lining.

The fuel element is provided with a plurality of tuyeres 28 extending radially through the fuel element. These tuyeres may be more closely spaced in one area than in another as shown at 28' for controlling the heat being supplied to the work piece. For example, the tuyeres shown at 28' are nearest the abutted ends of the work piece to give to the area more combustion of the fuel element and consequently more heat to the immediate welding zone than would be furnished to the area adjacent the sides of the furnace.

The housing and the refractory lining are provided with openings 30, 32 and 34 spaced about the work piece for allowing the combustible gases to be released to the atmosphere.

Extending about the housing are pipes 36 leading into the housing for conveying air, or other gases such as oxygen, for supporting and controlling the combustion of the fuel element. These gases are supplied through a supply line 38 under pressure and may be controlled automatically, or by hand by the proper type valve shown at 40. The pipe 36 leads into a chamber 42 formed in the outer circumference of the refractory lining, but may be a part of the housing if desired.

The refractory lining is provided with tuyeres 44 extending radially therethrough which correspond and register with the tuyeres 28 and 28' formed in the heating element in order that the air or oxygen occupying the chamber 42 under pressure will be fed to the inner surface 46 of the fuel unit to support combustion at any predetermined degree of pressure.

In operation, the furnace sections 10 and 10' are secured about the abutted ends of the work pieces 50 and 52 by suitable fastening means, shown at 54 and 56, the air or oxygen supply lines 38 are connected and the combustible fuel element 14 lighted. The rate of combustion is controlled by the amount of air, or oxygen furnished the fuel element, which, as said before, may be either automatic or manual. The muffle also referred to as the fuel element is also constructed so that the amount of heat it may give off within a given period may be determined by its rate of combustion, which in turn depends on the rate of air or oxygen supplied. Accordingly, the regulation of the furnace, when once calibrated, consists of controlling the rate and duration of the air, or oxygen flow. For example, a welding operation generally consists of two stages, namely, heating the work pieces up to the welding point and holding this heat for a predetermined period. For handling the furnace, it is provided with handles 21 and bars 23 for applying and removing the furnace to the work pieces, as shown in FIGURES 1 and 2.

The muffle may take several variations as shown in FIGURE 8 at 14' for controlling its heat output. It may have a greater thickness at its center, as shown at 14'', that is, it may provide more fuel at the center adjacent the abutted ends of the work pieces and it may contain a greater number of tuyeres adjacent its center than at its side zones, as shown at 28'. Also the thickness of the fuel element and the number of tuyeres may be regulated about the circumference of the fuel element to apply a predetermined heat to certain areas about the circumference of the work pieces, particularly where the ends of the work pieces are of different thicknesses, such as a rail. Any foreign matter such as ashes, scale, etc. are blown out the openings 30 to 34 along with the exhausted gases.

The furnace may be used with any type of means for holding the work pieces in line.

The combustible fuel element or muffle is easily replaced in the furnace. When the furnace sections are separated, that is, when each half is separate from the other half, the semi-circular solid fuel element member 14, as shown in FIGURE 7 or FIGURE 8 may be fed about the grooves 11 and 11' and in back of the bosses 24 and 26, which is adapted to fit the groove and back of the bosses with a reasonable amout of clearance. When the fuel unit is inserted it will likewise push out any remaining portions, if any of the previously used fuel element is not fully consumed in the previous welding operation. Both halves of the furnace are of the same construction and are refueled in identially the same manner.

The muffle is composed of charcoal, coke or carbon, or any other carbonaceous substance. The muffle is ignited by a low ignition temperature igniter placed within the combustion chamber before the oxygen is admitted. With the first admittance of air etc. the igniter flares up and lights off the inner surface of the heating element 14 which is consumed radially toward its outer surface as said before. By making the muffle of different forms, thickness, etc. about its periphery it is practical to heat one portion of the work piece more than another portion, such as a railroad rail etc. in order that the head may be heated at the same rate as the thinner web and base portion.

While one form of the invention has been illustrated and described in detail it is not intended as a limitation of the scope of the invention, as the invention is best defined in the appended claims:

I claim:

1. A welding furnace for welding abutted ends of work pieces comprising, a sectional housing adapated to be clamped about and enclosing the abutted ends of the work pieces, a solid combustible fuel element of arcuated sheet form or segments of an arc adapted to be carried within the housing, means carried within the housing adapted to support the fuel element outwardly at a predetermined distance from the abutted ends of the work pieces, the fuel element having a plurality of apertures traversing the element throughout its area and means carried by the housing adjacent the convexed surface of the fuel element for uniformly supplying oxygen through the said apertures of the fuel element to its concaved surface for supporting combustion of the fuel element in the area between the fuel element and the abutted ends of the work pieces.

2. A welding furnace for welding abutted ends of work pieces as claimed in claim 1 in which the fuel element comprises a plurality of segments of arcuated sheet form.

3. A welding furnace for welding abutted ends of work pieces comprising, a housing of two semi-circular sections, adapted to be clamped about and enclosing the abutted ends of the work pieces, a solid combustible sheet like fuel element of substantial semicircular form, means in each section of the housing for releasably engaging the fuel element adapted to support the same at a predetermined distance from the abutted ends of the work pieces, fuel element having a plurality of apertures traversing the fuel element for emitting gases therethrough and means carried by the housing adjacent the convexed surface of the fuel element for uniformly supplying oxygen through the said aperatures of the fuel element to its concaved surface for supporting combustion of the fuel element in the area between the fuel element and the abutted ends of the work pieces.

4. A welding furnace for welding abutted ends of work pieces comprising, a sectional housing adapted to be clamped about and enclosing the abutted ends of the work pieces, a solid combustible fuel element of a predetermined fuel capacity of arcuated sheet form adapted to be carried with the housing, means carried by the housing adapted to support the fuel element outwardly at a predetermined distance from the abutted ends of the work pieces, the fuel element having a plurality of apertures traversing the element throughout its area, means carried by the housing adjacent the convexed surface of the fuel element for uniformly supplying oxygen through the said apertures of the fuel element to its concaved surface for supporting combustion of the fuel element in the area between the fuel element and the abutted ends of the work pieces, said housing having openings adjacent its clamping area for allowing gases from the combustible fuel to escape from the housing.

5. A welding furnace for welding abutted ends of work pieces comprising, a sectional housing adapted to be clamped about and enclosing the abutted ends of the work pieces, a refractory lining extending about the inner surface of the said housing having a plurality of apertures therethrough, means for detachably securing said lining to the individual sections of the housing, a unitary solid combustible fuel element of such form and means adapted to detachably secure the fuel element to the refractory lining, the inner surface of the lining, the fuel element having a plurality of apertures traversing the element throughout its area, the openings in said fuel element arranged to register with the openings in the lining and means for supplying oxygen through the openings in the lining and fuel element for supporting combustion of the fuel element in the area between the fuel element and the abutted ends of the work piece.

6. A welding furnace for welding abutted end of work pieces comprising, a sectional housing including parallel side portions adapted to be clamped about and enclosing the abutted ends of the work pieces, a sectional refractory lining having at least one of its inner faces arcuated, said refractory lining having a plurality of apertures throughout its arcuated section area for admitting a combustion supporting fluid, lugs carried by the side portions of the housing adapted to support the refractory lining in a predetermined position, a unitary solid combustible fuel element having an arcuated outer surface adapted to be supported adjacent the inner arcuated surface of the lining, the fuel element having a plurality of openings therethrough registering with the openings in the lining, the refractory lining having means formed thereon adapted to support the refractory lining.

7. In a welding furnace as claimed in claim 6 in which the central area of the fuel element is provided with a greater number of apertures than the area adjacent its outer edges for increasing the heat delivered to the central area of the furnace.

8. In a welding furnace as claimed in claim 6 in which the central area of the fuel element is of greater cross-sectional area that that adjacent its sides whereby the area adjacent the center of the furnace is supplied with a higher degree of temperature than the area adjacent its sides.

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