

Feb. 13, 1923.

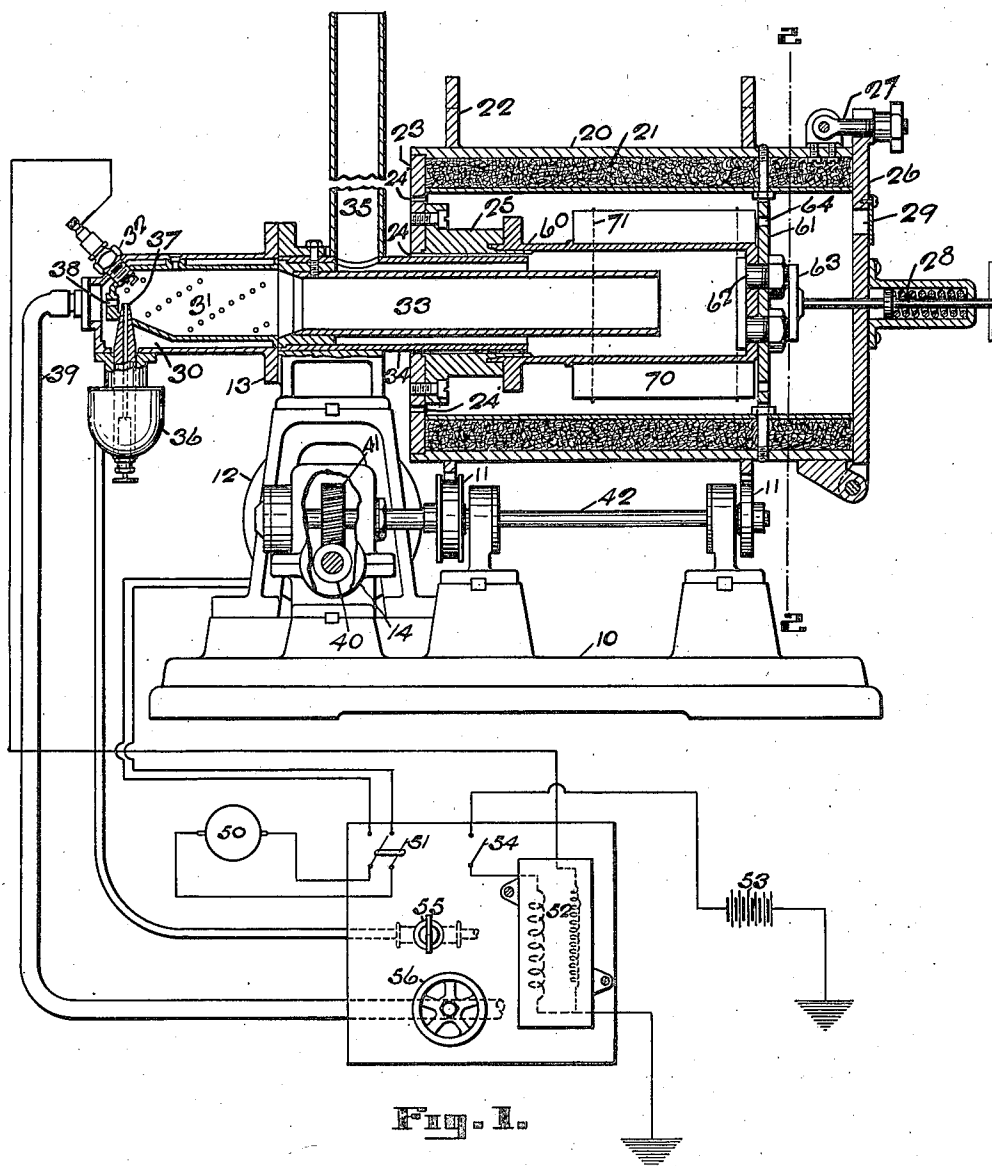
1,445,220

C. L. LEE

FURNACE

Filed July 14, 1920

2 sheets-sheet 1



Witnesses
Edwin James
L. E. Enrick

By

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Charles L. Lee
Francis D. Hardesty
Attorney

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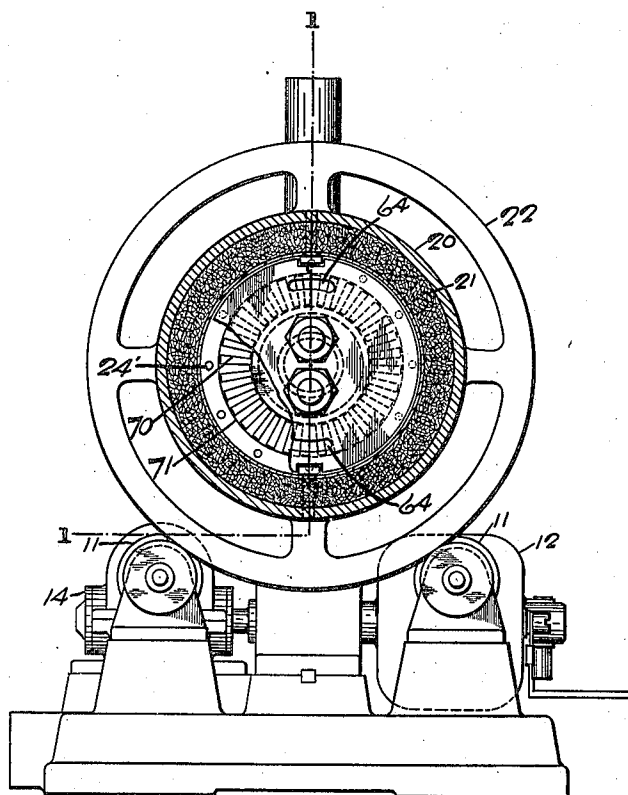


Fig. 2.

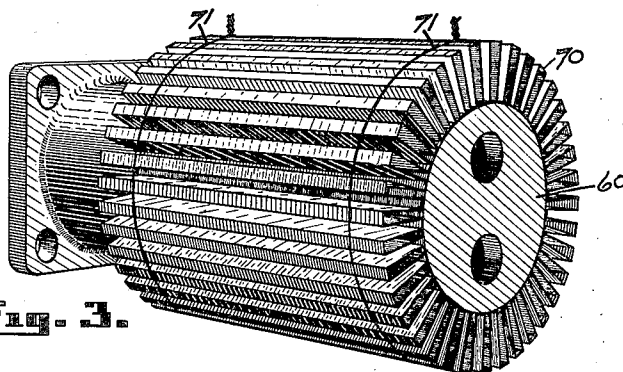


Fig. 3.

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UNITED STATES PATENT OFFICE.

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FURNACE.

Application filed July 14, 1920. Serial No. 396,276.

To all whom it may concern:

Be it known that I, CHARLES L. LEE, a citizen of the United States of America, residing at Dayton, county of Montgomery, and State of Ohio, have invented certain new and useful Improvements in Furnaces, of which the following is a full, clear, and exact description.

The present invention relates to furnaces for special work and in its preferred form of embodiment to a furnace for carrying out a process of attaching cooling fins to internal-combustion engine cylinders, which form of embodiment of the invention has been chosen as a convenient form for the purpose of description and explanation.

Among the objects of the invention is the provision of a furnace which will allow the application of the required heat to the work without allowing access thereto of harmful gases, for example, products of combustion when the heating element is a hydrocarbon burner.

Another object is the provision of a furnace which will substantially prevent the deleterious action of the outside air upon the work.

Further objects of the invention include the arrangement of the furnace so that the heat is applied to one portion of the work, and by conduction carried to that portion where it is to be utilized for the accomplishing of the desired result. In the preferred form, that is, in a fin attaching furnace, the heat is applied to the inside of a cylinder, say of ferrous metal, then carried by conduction to the outside of the cylinder to the plane of attachment of the fins, which may be of non-ferrous metal easily affected by the air or by hydrocarbon gases or their products of combustion, but which in the present invention are, as above indicated, sufficiently protected from the action of such gases and air.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein the preferred embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 shows a side elevation of the furnace assembly with the furnace itself in section along line 1—1 of Fig. 2, and also shows

the accessory apparatus, illustrated diagrammatically;

Fig. 2 is an end view of the furnace from the right of Fig. 1 with a section of the furnace casing along the line 2—2 of Fig. 1, certain of the accessory apparatus having been omitted; and

Fig. 3 is a perspective view of a cylinder-fin assembly ready to be bolted to the partition plate and inserted in the furnace.

As will be readily seen, the furnace assembly comprises a base 10 upon which, on suitable pedestals, are mounted rollers 11, carrying the furnace casing, a motor 12 and a burner, designated as a whole by the numeral 13. Also mounted upon the base 10, is a suitable worm drive reducing gear 14 which is driven by the motor 12 and rotates the rollers 11 upon which the furnace casing rests.

Referring more particularly to Fig. 1, it will be seen that the furnace proper consists of an outer metal drum or casing 20 lined with a heat insulating material 21 and provided on its periphery with the bearing rings 22 adapted to rest upon and cooperate with the rollers 11, being rotated thereby. This drum 20 is provided at one end with a fixed closure plate 23 which has a central opening 24 and which has around it, inside of the furnace, the sleeve 25. This sleeve is attached to the closure plate 23 by means of suitable bolts or screws and has its inner end so shaped as to permit making a substantially gas tight joint with the open end of an engine cylinder. The other end of this drum 20 is provided with a detachable cover or closure 26 which may be hinged as shown in the drawings or may be secured to the end of the drum by any other suitable easily detachable means such as a plurality of bolts like the one indicated at 27. This closure plate 26 is also provided with a central spring pressed plunger indicated by the numeral 28, the purpose of which will be indicated later, and a peephole 29.

In order to provide means for escape of any products of combustion or unburned gases from the casing without their having to pass over the fins and through openings in the opposite end, closure member 23 is preferably also provided with a series of small openings 24' arranged around the central opening 24. Besides permitting the

escape of gases, these openings 24' also tend to equalize the temperature of the ends of the cylinder under treatment, thus producing a more uniform attachment of the fins.

5 Mounted also upon the base 10 as indicated is a burner designated as a whole by the numeral 13 and so positioned as to be opposite the central opening 24 in the closure plate 23. This burner is, as shown, preferably of the "Good" type and consists of
10 an air chamber 30, a combustion chamber 31, communicating by means of suitable perforations with the air chamber, and supplied with ignition means, such as the spark plug
15 32. Communicating with the combustion chamber, and forming in effect an extension thereof, is a tube or pipe 33 which is of sufficient length to project some distance through the opening 24 and into the furnace.
20 Surrounding said pipe 33 and spaced therefrom is another tube or pipe 34 which also communicates with the interior of the furnace through the opening 24 but which is closed with respect to the combustion chamber.
25 This pipe 34 should be of only slightly less exterior diameter than the opening 24 and is intended to act as a return pipe for the combustion gases from the furnace to the chimney or stack 35, with which it communicates. Attached to the burner is a carburetor 36 having a jet 37 for supplying
30 fuel to the chamber 31, and an air supply conduit 39. From conduit 39, air under pressure is delivered to the end of chamber 30 opposite the rear end wall of the combustion chamber 31. This end wall is provided with a small passage 38 which leads a jet of air directly across the end of the fuel
35 jet 37, thus atomizing the liquid fuel into the combustion chamber when it is mixed with additional air from the perforations in the walls of chamber 31 communicating with chamber 30, to form a suitable combustible mixture.
40 Also mounted on the base 10, as has already been indicated is a motor 12. The shaft of this motor is attached through suitable couplings to the worm 40 of the worm drive designated as a whole by the numeral
45 14. This worm 40 drives the corresponding gear 41, which is keyed to an extension of shaft 42 carrying rollers 11.

The accessory apparatus, shown diagrammatically, comprises a suitable source
55 of current, shown conventionally at 50, and controlled by switch 51, for supplying current to the motor 12. It also comprises a spark coil 52, the primary winding of which is supplied with current from a battery 53,
60 and the secondary winding of which is connected at one end with the spark plug 32 and at the other end with a ground. The battery circuit through the primary winding may be controlled by a suitable switch
65 as indicated by numeral 54. This accessory

apparatus also includes suitable sources of fuel and compressed air controlled respectively by the valves 55 and 56.

In operating the furnace, a cylinder 60 is first assembled with the fin material 70 suitably folded or crimped as indicated in Fig. 3, by placing the fin material around the cylinder with a sheet of brazing brass interposed and the whole bound together with wires 71. Two of these wires have
75 been illustrated but usually more are used. After the addition thereto of suitable fluxes, the plate 61 is attached by means of bolts 62 extending through the valve ports. This plate 61 is of such size that it fits snugly
80 within the furnace and acts as a partition therein to prevent too free circulation of air around the fins and also serves to center the cylinder. Plate 61 is also provided with
85 openings 64 which permit observation of the heating through the peephole 29.

When the cylinder and plate have been placed within the furnace, the closure plate 26 is secured in place and when this is done, the mounted plunger rod 28 carrying a foot
90 piece 63 presses against the ends of the bolts 62 and so holds the cylinder firmly in place and centered within the furnace, while permitting the cylinder to expand longitudinally.
95

When the cylinder has been properly positioned within the furnace and the end plate 26 closed, the current is turned on the motor 12 by closing switch 51, the fuel and air are supplied to the burner and the switch
100 54, controlling the current to the spark plug, is closed. The furnace will thus be rotated and the cylinder heated by means of the burner.

The regulation of the temperature in the furnace depends, of course, upon the metal being treated and may be readily accomplished by regulating the air and fuel supply and time of heating.
105

The electric motor and the "Good" burner, shown as parts of the device chosen for specific description, have been found convenient and satisfactory means for the rotating and heating, but other suitable
110 means for accomplishing the rotating and heating may be substituted therefor without departing from the invention.
115

While the form of mechanism herein shown and described constitutes a preferred form of embodiment of the invention, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.
120

1. A furnace of the character described, comprising a casing, closure means for one
125 end thereof, the closure means being provided with a central opening, means for centering and securing the work piece within said casing and over said opening, a closure
130 for the other end of said casing, and means

for supplying a heating medium through said opening to and within the work piece.

2. A furnace of the character described, comprising a rotatable casing, closure means for one end thereof, the closure means being provided with a central opening, means for centering a cylinder within said casing and over said opening, a closure for the other end of said casing, means for supplying a heating medium through said opening to and within the cylinder, and means for rotating the casing.

3. A furnace of the character described, comprising a casing, closure means for one end thereof, the closure means being provided with a central opening, means for centering and securing a cylinder within said casing and over said opening, a closure for the other end of said casing, means for supplying a heating medium through said opening to and within the cylinder, and means for preventing free access of gases to and circulation within said casing around the cylinder.

4. A furnace of the character described, comprising a rotatable casing, closure means for one end thereof, the closure means being provided with a central opening, means for centering a cylinder within said casing and over said opening, a closure for the other end of said casing, means for supplying a heating medium through said opening to and within the cylinder, means for preventing free access of gases to and circulation within said casing around the cylinder, and means for rotating the casing.

5. A furnace of the character described, comprising a heat insulated casing, closure means for one end thereof, the closure means being provided with a central opening, means for centering and securing a cylinder within said casing and over said opening, a closure for the other end of said casing, means for supplying a heating medium through said opening to and within the cylinder and means for preventing access of said medium to the exterior of said cylinder.

6. A furnace of the character described, comprising a heat insulated casing, closure means for one end thereof, the closure means being provided with a central opening, means for centering and securing a cylinder within said casing and over said opening, a closure for the other end of said casing, means for supplying a heating medium through said opening to and within the cylinder, and means for preventing free access of gases to and circulation within said casing around the cylinder.

7. A furnace of the character described, comprising a rotatable heat insulated casing, closure means for one end thereof, the closure means being provided with a central opening, means for centering a cylinder within said casing and over said open-

ing, a closure for the other end of said casing, means for supplying a heating medium through said opening to and within the cylinder, means for preventing free access of gases to and circulation within said casing around said cylinder, and means for rotating the casing.

8. A furnace of the character described, comprising a casing, closure means for one end thereof, the closure means being provided with a central opening, means for centering a cylinder within said casing so as to form a substantially gas tight closure for said opening but permitting free access to the interior of the cylinder, a closure for the other end of said casing, and means for supplying a heating medium through said opening to and within the cylinder.

9. A furnace of the character described, comprising a casing, closure means for one end thereof, the closure means being provided with a central opening, means for centering a cylinder within said casing so as to form a substantially gas tight closure for said opening but permitting free access to the interior of the cylinder, a closure for the other end of said casing, means for supplying a heating medium through said opening to and within the cylinder, and means for preventing free access of gases to and circulation within said casing around the cylinder.

10. A furnace of the character described, comprising a rotatable casing, closure means for one end thereof, the closure means being provided with a central opening, means for centering a cylinder within said casing so as to form a substantially gas tight closure for said opening but permitting free access to the interior of the cylinder, a closure for the other end of said casing, means for supplying a heating medium through said opening to and within the cylinder, means for preventing free access of gases to and circulation within said casing around the cylinder, and means for rotating the casing.

11. A furnace of the character described, comprising a casing, closure means for one end thereof, the closure means being provided with a central opening, means for centering and securing a cylinder within said casing and over said opening, a hydrocarbon burner positioned so as to direct a heating flame through said opening to and within the cylinder and means for leading off combustion products without their having access to the outside of the said cylinder.

12. A furnace of the character described, comprising a casing, closure means for one end thereof, the closure means being provided with a central opening, means for centering and securing a cylinder within said casing and over said opening, a hydrocarbon burner positioned so as to direct a heating

flame through said opening to and within the cylinder, and means for preventing free access of gases to and circulation within said casing around the cylinder.

- 5 13. A furnace of the character described, comprising a casing, closure means for one end thereof, the closure means being provided with a central opening, means for centering and securing a cylinder within said casing and over said opening, a hydrocarbon burner positioned so as to direct a heating flame through said opening to and within the cylinder, means for substantially preventing access of hydrocarbons and products
10 of combustion to the outer side of the cylinder.

14. A furnace of the character described, comprising a casing, fixed closure means for one end thereof, the closure means being
20 provided with a central opening, means for centering and securing a cylinder within said casing and over said opening, a closure for the other end of said casing, means for supplying a heating medium through said
25 opening to and within the cylinder and means for preventing access of said medium to the exterior of said cylinder.

15. A furnace of the character described, comprising a rotatable casing, fixed closure
30 means for one end thereof, the closure means being provided with a central opening, means for centering a cylinder within said casing and over said opening, a closure for the other end of said casing, means for supplying a heating medium through said opening to and within the cylinder, and means
35 for rotating the casing.

16. A furnace of the character described, comprising a rotatable casing, fixed closure
40 means for one end thereof, the closure means being provided with a central opening, means for centering a cylinder within said casing and over said opening, a closure for

the other end of said casing, means for supplying a heating medium through said opening to and within the cylinder, means for preventing free access of gases to and circulation within said casing around the cylinder, and means for rotating the casing. 45

17. A furnace of the character described, comprising a heat insulated casing, means for retaining a cylinder therein in position, means for directing a heating medium against the interior of said cylinder, and means for preventing contact of harmful
50 gases with the outside of the said cylinder. 55

18. A furnace of the character described, comprising a heat insulated casing, means for retaining a cylinder therein in position, a burner for directing a heating flame into
60 said cylinder and means for preventing contact of the exterior of said cylinder with the products of combustion from the burner.

19. A furnace for attaching non-ferrous metal fins to the exterior walls of ferrous metal vessels comprising means for enclosing the fins and exterior walls of the vessels while allowing access to the interior of the said vessels. 65

20. A furnace of the character described comprising a rotatable heat insulated casing; means for positioning a hollow work-piece therein, a hydrocarbon burner; and means for directing the flame from the burner against the interior of the work piece. 75

21. A furnace of the character described comprising a rotatable heat insulated casing; means for positioning a hollow work-piece therein, a hydrocarbon burner; means for directing the flame from the burner
80 against the interior of the work-piece; and means for protecting the outside of the work-piece from combustion products.

In testimony whereof I hereto affix my signature.

CHARLES L. LEE.