April 16, 1940. M. L. KAUFMANN 2,197,216

DOOR HANGER AND FUEL CHARGING MEANS FOR ROTARY FURNACES

Original Filed Sept. 3, 1937 2 Sheets-Sheet 1

Fig. 2.

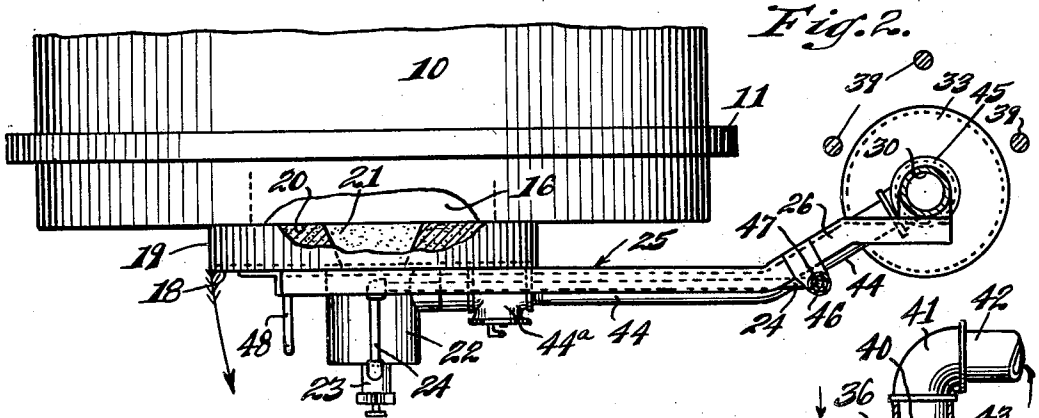
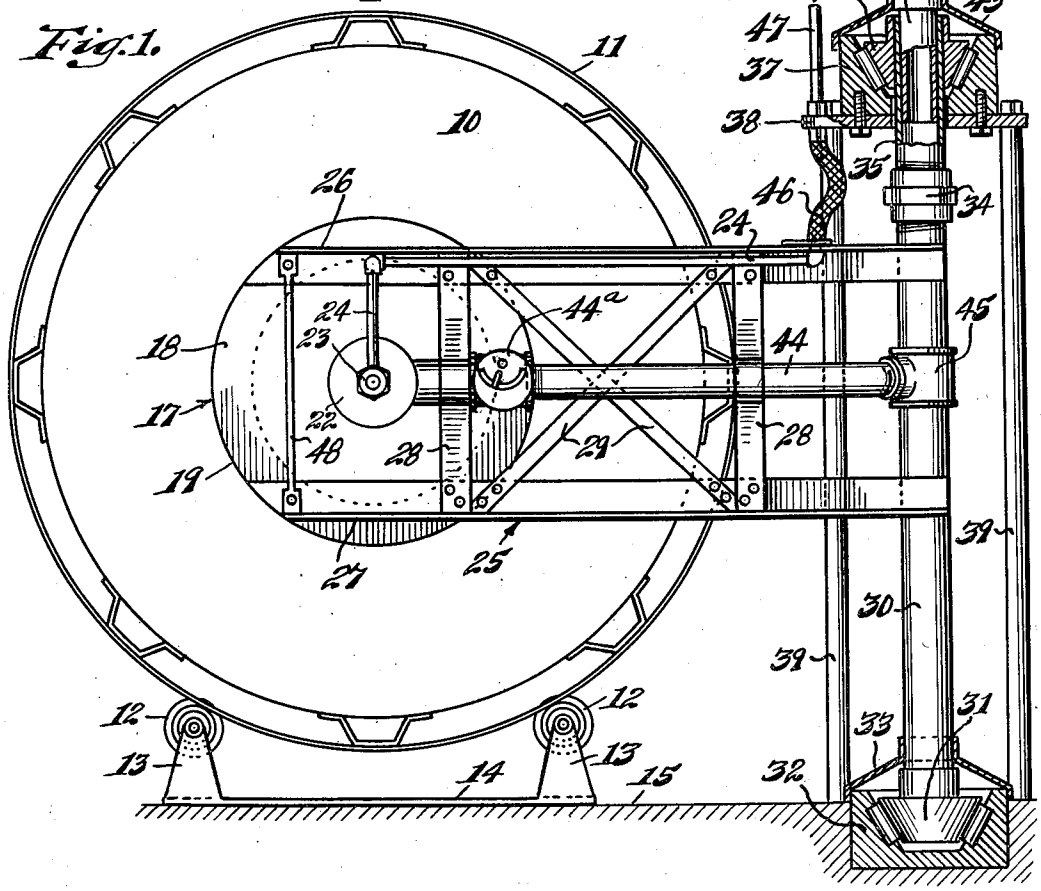


Fig. 1.



Witnesses:
C. E. Wessels
Anita E. Matteu

Inventor;
Marvin L. Kaufmann,
By Joshua R. H. Potts
his Attorney.

April 16, 1940. M. L. KAUFMANN 2,197,216

DOOR HANGER AND FUEL CHARGING MEANS FOR ROTARY FURNACES

Original Filed Sept. 3, 1937 2 Sheets-Sheet 2

Fig. 4.

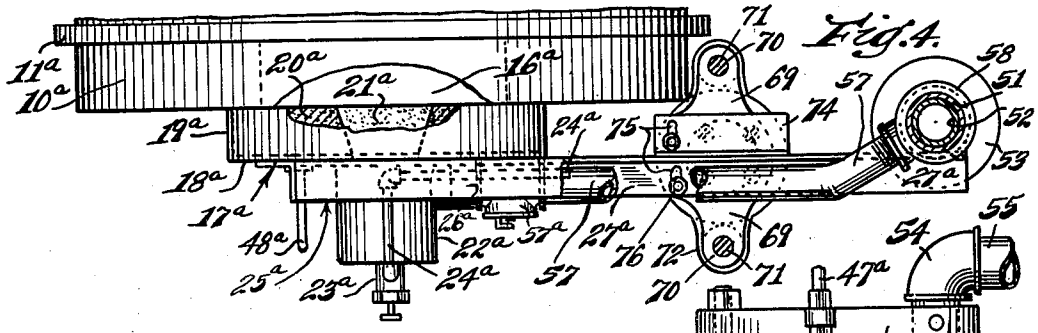
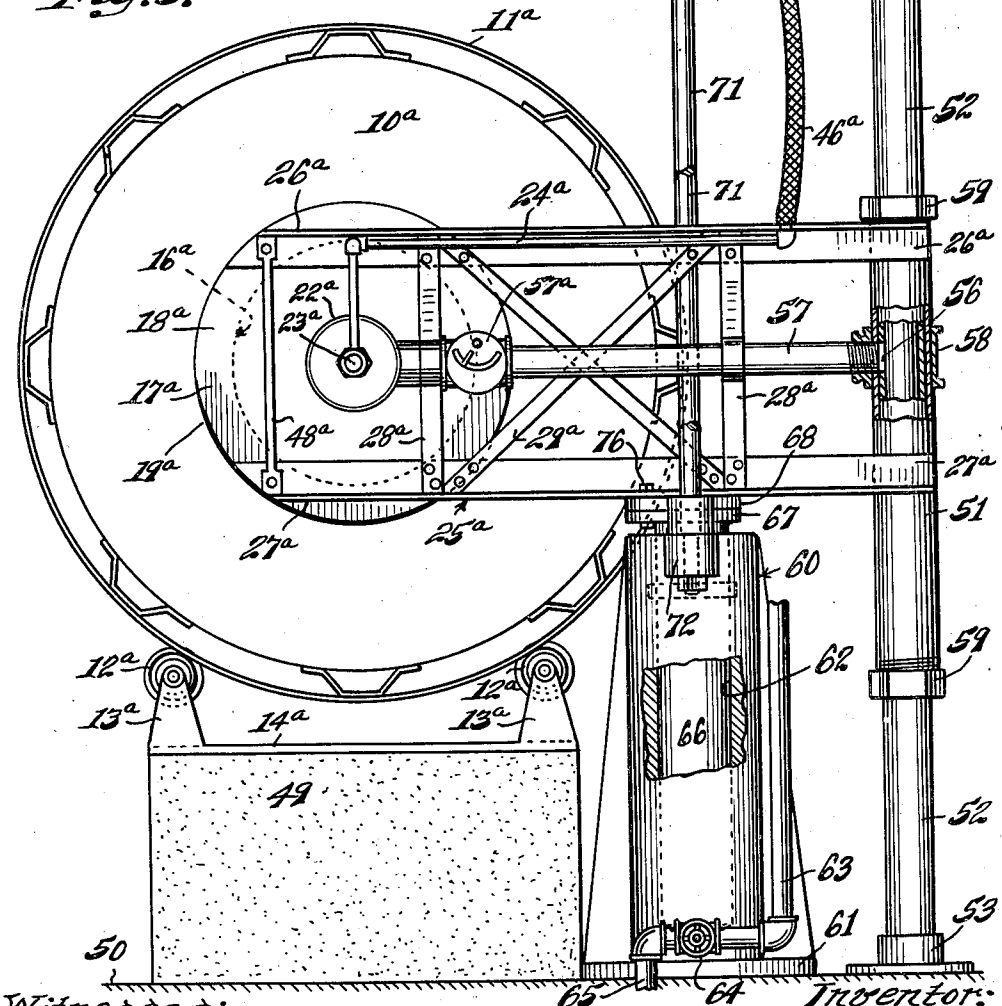


Fig. 3.



Witnesses:
C. E. Wessels
Anita E. Matieu

Inventor:
Marvin L. Kaufmann,
By Joshua R. H. Potts
His Attorney.

Patented Apr. 16, 1940

2,197,216

UNITED STATES PATENT OFFICE

2,197,216

DOOR HANGER AND FUEL CHARGING MEANS FOR ROTARY FURNACES

Marvin L. Kaufmann, Chicago, Ill., assignor to Henry Lindenberger, Chicago, Ill.

Application September 3, 1937, Serial No. 162,390
Renewed February 16, 1940

14 Claims. (Cl. 158—2)

This invention relates to door hangers for rotary furnaces. The object of the invention is to provide a simple, practical and efficient hanger for the doors of rotary furnaces.

More specifically, the object of the invention has been to provide means for opening and closing the door of a rotary furnace without it being necessary to engage or disengage the burner and the air supply and fuel supply connections of a rotary furnace. Heretofore it has been necessary to disengage the burner assembly, including the air supply and fuel supply, before opening the door of the furnace, and it has also been necessary to engage the same after closing the door of the furnace. As a result of my invention, means have been provided whereby, when the door is closed, the burner and air supply and fuel supply are moved automatically into position with the door in one operation, by the mere closing of the door, and, on the other hand, when the door is opened, it is not necessary to disengage the features mentioned, it being necessary only to open the door, the hanger serving not only to support the door, but also the burner and the air and fuel supply means.

As a result, it will be manifest to those skilled in the art, that a great saving in the time and labor, which was necessarily consumed in making the engagements and disengagements for the features mentioned with the furnaces heretofore used, is effected as a result of my invention, especially when it is realized that as many as eight men were required in such operations with types heretofore used.

Another object is to provide a door hanger construction that is adjustable and retractable so as to permit speedy unobstructed access to the charging aperture of the furnace.

Other objects and advantages will appear and be brought out more fully in the following specification and drawings, wherein:

Fig. 1 is a front view of a rotary furnace and door hanger structure embodying my invention;

Fig. 2 is a plan view of the same;

Fig. 3 is a view similar to Fig. 1 illustrating a modified form of my invention; and

Fig. 4 is a top view of the same.

Referring more particularly to the drawings, I show a rotary furnace 10 having a circular supporting trackway 11 mounted on flanged rollers 12 in brackets 13 carried by a base plate 14 on a floor 15. The furnace has a circular hatch or charging aperture 16 and a circular door 17 which consists of a circular plate 18 of steel or equivalent material having a flange 19, the plate and flange being lined with fire brick 20, there being a tapered fuel and air charging aperture or opening 21. A fuel burner 22 is suitably mounted on the exterior of door 17 and is provided with a fuel valve 23 in communication with a fuel pipe 24. The door 17 is mounted on a hanger frame 25 which consists of an upper angle member 26, lower angle member 27 and brace members 28 and 29 respectively, and pipe 24 is suitably secured to angle member 26. Frame 25 is suitably secured as by welding to a tubular stanchion 30 to the lower end of which is secured a bearing cone 31 mounted on a roller bearing 32. A suitable bearing shield 33 may be secured to stanchion 30 for the protection of bearing 32. A union, or similar coupling, 34 secured the hollow stanchion 30 to a tubular extension 35 which in turn is provided with a bearing cone 36 mounted in a roller bearing 37 which is supported by supporting plate 38 carried by posts 39 anchored to the floor 15, or in any other equivalent manner. A sleeve 40 extends downwardly into the top extension 35 and is connected by an elbow 41 to an air supply pipe 42. A suitable bearing shield 43 may be secured to elbow 41 for the protection of bearing 37. An air supply pipe 44 provided with an air control valve 44a, is secured to frame 25 and connects fuel burner 22 with stanchion 30 by means of a T 45. A flexible hose 46 provides suitable connection between pipe 24 and a fuel supply pipe 47 and a handle bar 48 is secured to frame 25 adjacent the door 17.

The operation of my invention as described above should be obvious. The hollow stanchion 30 is seen to provide a pivoted support for the door hanger frame 25 which carries the door 17, as well as the fuel inlet pipe 24 and air inlet pipe 44. The door 17 and burner 22 as well as fuel inlet pipe 24 and air inlet pipe 44 may thus be easily and readily swung clear of the furnace 10 during the charging and discharging operations. While I have shown the door hanger pivoted at one side of the furnace, it will be apparent that the pivot axis could be horizontal either above or below the furnace or at any other convenient angle, as desired.

In Figs. 3 and 4, I show a modified form of door hanger which is adapted to be slidable vertically on a stanchion member, the furnace being indicated at 10a having trackway 11a, flanged rollers 12a on brackets 13a on base member 49 on floor 50. The furnace is provided with the hatch 16a and a circular door 17a which consists

of a circular plate 18a of steel or equivalent material having a flange 19a, the plate and flange being lined with fire brick 20a, there being a tapered charging aperture 21a for fuel. A fuel burner 22a is suitably mounted on the exterior of door 17a and is provided with a fuel valve 23a in communication with a fuel pipe 24a. The door 17a is mounted on a hanger frame 25a which consists of an upper angle member 26a, lower angle member 27a and brace members 28a and 29a respectively, and pipe 24a is suitably secured to angle member 26a. Frame 25a is welded or otherwise secured to a sleeve 51 slidably mounted on a hallow stanchion 52 which rests on a flanged base plate 53. The upper end of stanchion 52 is connected by elbow 54 to an air supply 55 and has an aperture 56 aligned with the end of a pipe 57 which is equipped with a suitable control valve 57a secured on frame 25a when the door 17a is in proper position aligned with hatch 16a. A T 58 connects pipe 57 to sleeve 51 and suitable packing glands 59 are provided for the ends of sleeve 51 and stanchion 52. A hydraulic jack 60 is mounted on a base plate 61 on floor 50 and has a cylinder 62 which is supplied with water or other liquid under pressure which is supplied from a supply pipe 63 having a two-way control valve 64 and a drain pipe 65. Piston 66 is contained in cylinder 62 and has a flanged head 67 which carries a bearing plate 68 on which frame 25a may rest. Plate 68 has guide extensions 69 having apertures 70 therein to receive guide rods 71, the latter being secured in apertured ears or lugs, or a hub 72 on the top of jack 60 and secured adjacent their upper ends to a brace block 73 anchored to stanchion 52. An angle plate 74 is attached to the rear of angle 27a and angle 26a and angle plate 74 are each provided with an arcuate slot 75 to receive stud bolts 76 by which arrangement a limited pivoting action may be provided on stanchion 52 for frame 25a sufficient for clearance of door 17a and hatch 16a. A flexible hose 46a connects fuel pipe 24a with fuel supply pipe 47a.

The operation of the invention, according to Figs. 3 and 4, should be obvious. The hydraulic jack 60 is adapted to raise and lower hanger frame 25a carrying the door 17a and burner assembly including air and fuel inlet pipes. It will be clear that by appropriate mounting of the jack 60 the door and hanger may be lowered from the closed position as readily as raising it with respect thereto.

It will thus be seen that by the means that I have provided, it is not necessary to disengage the burner or air conduit or fuel conduit from the door in order to open the same, nor is it necessary to engage the same or connect it to the door after the door has been closed. Instead, by means of my invention, by one operation, the door is closed and, at the same time, the burner and the air and fuel conduits are automatically in place for operation. Only one skilled in the art can fully appreciate the saving that will be effected in time and labor by the elimination of the engaging and disengaging operations in respect to the burner assembly heretofore required.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, these are capable of variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. An adjustable closure for rotary furnaces having a charging aperture comprising a door, a structural support for said door, and adjustable mounting means for said support for moving said door laterally in and out to engage the furnace over the aperture or to clear the furnace, and edgewise vertically to open and close the aperture.

2. An adjustable closure for rotary furnaces comprising a door having a fuel charging aperture, a structural support for said door extending at one side only opposite the edge of the door, a fuel conduit for said door secured to said door and said support to move with the latter, and adjustable mounting means for said support and conduit, adapted to permit the door to be opened and closed without disengaging the conduit.

3. An adjustable closure for rotary furnaces comprising the combination with a rotary furnace having a hatch, a door having a fuel charging aperture, a fuel conduit secured to said door and adapted to discharge into said aperture, a structural support for said door and conduit rigidly secured thereto to move together as one unit, said parts extending at one side of the furnace and offset rearwardly, and adjustable mounting means for said support, said means including a stanchion, adapted to permit the door to be opened and closed without disengaging the conduit, said stanchion constituting an air supply and having a pipe leading therefrom at the support and communicating with the aperture.

4. An adjustable closure for rotary furnaces comprising the combination with a rotary furnace having a hatch, a door having a charging aperture, fuel conduits secured to said door and adapted to discharge into said aperture, an elongated horizontal structural support for said door and conduits, said door being mounted at one end of said support, and adjustable mounting means for said support at the opposite end thereof, said means including a pivoted stanchion on which the support is mounted to move, said stanchion being disposed laterally at one side of the furnace and offset rearwardly of the support, adapted to permit the opening and closing of said door without disengaging the conduits.

5. An adjustable closure for rotary furnaces comprising the combination with a rotary furnace having a hatch, a door having a charging aperture, fuel and air conduits secured to said door and adapted to discharge into said aperture, said conduits extending laterally beyond the side of the furnace, an elongated structural support for said door and conduits, said door being mounted at the inside of the support and one end of said support, and adjustable mounting means for said support at the opposite end thereof, said means including a vertically pivoted stanchion, adapted to permit the opening and closing of said door without disengaging the conduits.

6. An adjustable closure for rotary furnaces comprising a door having an aperture, a fuel conduit secured to said door and adapted to discharge into said aperture, an elongated structural support for said door and conduit, said door being mounted at one end of said support, and adjustable mounting means for said support at the opposite end thereof, said means including

a stanchion pivoted on an axis displaced from said furnace laterally and rearwardly, said stanchion having an air passage therein, and adapted to permit the opening and closing of said door without disengaging the conduit.

7. An adjustable closure for rotary furnaces comprising a door having an aperture, a fuel conduit connected to said door and adapted to discharge into said aperture, an elongated structural support for said door and conduit, said door being mounted at one end of said support, and adjustable mounting means for said support at the opposite end thereof, said means including a stanchion and a sleeve slidable on said stanchion, adapted to permit the opening and closing of said door without disengaging the conduit.

8. An adjustable closure for rotary furnaces comprising a door having a fuel and air charging aperture, fuel and air conduits connected to said door and adapted to discharge into said aperture, an elongated horizontal structural support for said door and conduits disposed edgewise vertically and adapted for slight lateral movement, said door being mounted at one end of said support, and adjustable mounting means for said support at the opposite end thereof, said means including a stanchion and a sleeve slidable on said stanchion, said stanchion having an air passage therein, and adapted to permit the opening and closing of said door without disengaging the conduits.

9. An adjustable closure for rotary furnaces comprising a door having an aperture, a fuel conduit connected to said door and adapted to discharge into said aperture, an elongated structural support for said door and conduit, said door being mounted at one end of said support, auxiliary supporting means for said support comprising an hydraulic jack operatively connected to the support, and adjustable mounting means for said support at the opposite end thereof, said means including a stanchion and a sleeve slidable on said stanchion, adapted to permit the opening and closing of said door without disengaging the conduit.

10. In combination a furnace having a charging aperture, a door adapted to close the charging aperture of the furnace, a structural support for the door and rigidly connected thereto, said support extending laterally a considerable distance beyond the side of the furnace, a burner carried by the support, a fuel pipe leading thereto from near the outer end of the support, a hollow vertical stanchion on which the outer end of the support is mounted and constituting air supply means, an air pipe leading from said stanchion to the burner along the support and movable therewith to cause the door to cover and uncover the aperture, and posts connected to the stanchion and relative to which the support is movable.

11. The combination with a rotary furnace having a charging aperture, of a door having a fuel charging aperture, a vertical tubular stanchion having a fixed connection with an air supply and a rotatable part, a structural frame disposed on edge and anchored at its outer end to said rotatable part and secured at its inner face against the outer face of the door, a supporting frame for the stanchion, a fuel conduit mounted on the door, a burner on the door at the charging aperture and connected to the fuel conduit, an air conduit rigid with and leading from the stanchion and also connected to the burner, and a fuel supply pipe carried by the frame and having a flexible connection to the fuel conduit.

12. In combination with a rotary furnace having a hatch, a door for said hatch having a charging aperture for fuel, a fuel burner mounted on the door and provided with a fuel valve, a tubular stanchion having a movable portion, a hanger frame on which the door is rigidly mounted, a fuel pipe rigidly supported on the frame, a stationary air supply pipe leading to said stanchion and movable portion, and an air supply pipe leading from said stanchion and movable portion and connected to the fuel burner and provided with an air control valve, the frame and door adapted to be moved to open and closed positions while the parts are connected at all times.

13. In combination with a rotary furnace having a hatch, a door for said hatch having a charging aperture for fuel, a fuel burner mounted on the door and provided with a fuel valve, a tubular stanchion having a movable portion, a hanger frame on which the door is rigidly mounted, a fuel pipe rigidly supported on the frame, a stationary air supply pipe leading to said movable portion of said stanchion, an air supply pipe leading from said movable portion of the stanchion and connected to the fuel burner and provided with an air control valve, a bearing rotatably supporting the lower end of the stanchion, an upright frame receiving the upper end of the stanchion, and a bearing supported thereby rotatably mounting the stanchion.

14. In combination with a rotary furnace having a hatch, a door for said hatch having a charging aperture for fuel, a fuel burner mounted on the door and provided with a fuel valve, a hanger frame to which the door is secured, a tubular stanchion, a sleeve slidable on the stanchion, a horizontal air pipe on the frame connected to the burner and having a control valve, said pipe being connected to the sleeve and communicating with the interior of the stanchion when the door is closed, said frame being connected to the sleeve, an upright frame supporting the stanchion, a hydraulic jack mounted beneath the hanger frame and provided with a cylinder connected to the upright frame and having a fluid supply and discharge, a piston in the cylinder having a head, guide means for the piston on which the hanger frame rests and an adjustable connection between the hanger frame and the piston allowing angular adjustment of the hanger frame and door relatively to the furnace and the stanchion.

MARVIN L. KAUFMANN.