No. 741,505. PATENTED OCT. 13, 1903.

E. KIRK.

MELTING FURNACE.

APPLICATION FILED FEB. 21, 1903.

NO MODEL.

FIG. 1.

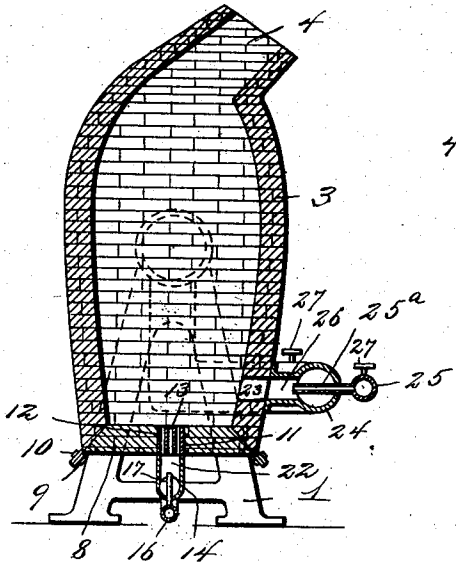


FIG. 2.

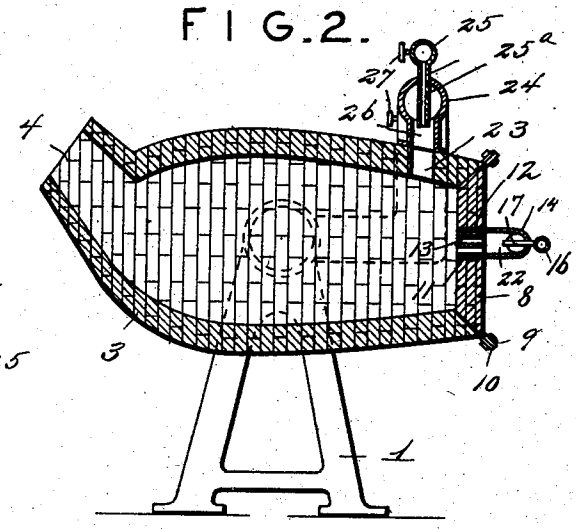


FIG. 3.

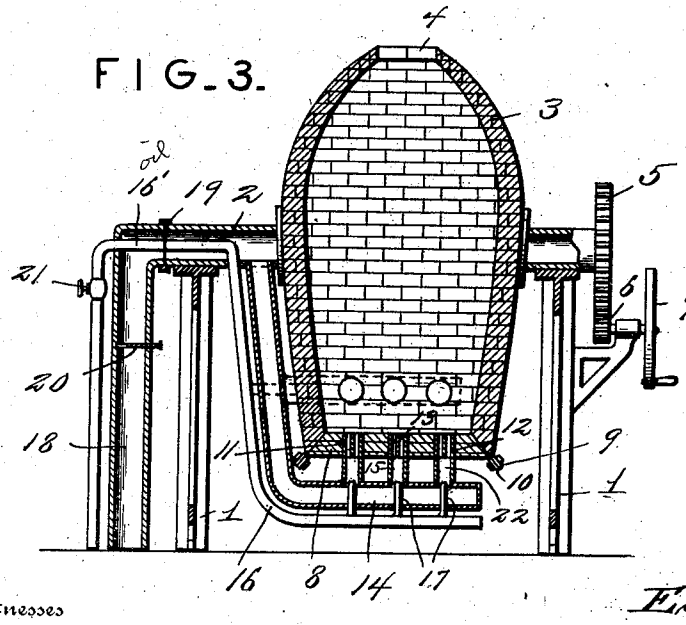


FIG. 4.

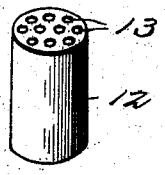
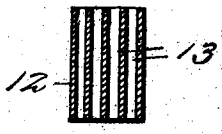


FIG. 5.



Witnesses

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No. 741,505. Patented October 13, 1903.

UNITED STATES PATENT OFFICE.

EDWARD KIRK, OF PHILADELPHIA, PENNSYLVANIA.

MELTING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 741,505, dated October 13, 1903.

Application filed February 21, 1903. Serial No. 144,413. (No model.)

To all whom it may concern:

Be it known that I, EDWARD KIRK, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Melting-Furnaces, of which the following is a specification.

My invention relates to new and useful improvements in melting-furnaces; and its object is to provide a device of this character adapted to utilize a mixture of oil and air as a fuel for reducing the metal to a molten mass, and the flames formed by the combustion of the gaseous mixture are adapted to be discharged directly upon the metal within the furnace.

The invention consists in providing a furnace preferably formed as an ordinary Bessemer converter and is provided in the bottom and sides with twyers adapted to be supplied with oil and air, both of which are under pressure. The furnace is provided with hollow trunnions, one of which serves as a conductor for the air, and pipes are suitably arranged for conveying oil to the twyers, where the same is mixed with the air and discharged into the furnace.

The invention also consists in the further novel construction and combination of parts hereinafter more fully described and claimed, and illustrated in the accompanying drawings, showing the preferred form of my invention, and in which—

Figure 1 is a vertical section through a furnace constructed in accordance with my invention. Fig. 2 is a similar view of the furnace in a horizontal position. Fig. 3 is a transverse section through the furnace, the same being provided with bottom and side twyers. Fig. 4 is a perspective view of one of the twyer-cylinders detached, and Fig. 5 is a vertical section through said cylinder.

Referring to the figures by numerals of reference, 1 1 are standards upon which are journaled hollow trunnions 2, which extend from the opposite sides of a furnace 3, lined with refractory material and preferably constructed in the form of an ordinary Bessemer converter.

The outlet 4 of the furnace is at the top thereof and is inclined, so that when said furnace is swung into a horizontal position, as indicated in Fig. 2, the molten metal therein will not flow from the outlet. A gear 5 may be secured to one of the trunnions and be operated by means of a smaller gear 6, connected to a crank-shaft 7.

The bottom 8 of the furnace is preferably made detachable by providing flanges 9 at the edges thereof, which are bolted or otherwise secured to flanges 10, extending at an incline from the lower edges of the sides of the furnace.

Within the bottom of the furnace are arranged a series of apertures 11, each of which is adapted to receive a cylinder 12 of refractory material, having a series of longitudinally-extending passages or twyers 13 therein. This cylinder is fastened securely within the aperture in any suitable manner, and its inner end is flush with the inner surface of the furnace. An air-pipe 14 extends from one of the trunnions 2 and has branch pipes 15 thereon, each of which is secured to the outer surface of the furnace and incloses the outer end of one of the cylinders 12. Air is thus permitted to enter the furnace through the twyers by way of pipes 14 and 15. An oil-supply pipe 16′ extends through the center of the trunnion from a suitable source removed from the furnace and opens into an oil-distributing pipe 16, which is arranged within the trunnion and extends therefrom in a line preferably parallel with pipe 14. Branch pipes 17 extend from the pipe 16 and through pipe 14, and the ends of these pipes are arranged within the inner ends of pipes 15, which form mixing-chambers 22, as illustrated in the drawings. Air is supplied to the trunnions 2, from which pipe 14 extends, from any suitable source by way of a pipe 18, which registers with the end of the trunnion, but is not rigidly connected therewith. The air is prevented from escaping through the joint between said trunnion and pipe in any suitable manner, as by means of a washer 19. A valve 20 is located in pipe 18 and a valve 21 in pipe 16, and by means thereof the proportions of air and oil supplied to the furnace may be varied.

Twyers 23, of ordinary construction, are formed in the sides of the furnace and are connected by air and oil pipes 24 and 25, respectively, with the pipes 14 and 16, before

referred to. The pipes 24 form mixing-chambers 26, as shown in the drawings, and the oil-pipe has branches 25ª, which project thereinto. Suitable valves 27 may be provided for shutting off the supply of air and oil to the pipes 24 and 25.

In use the metal to be melted is placed within the furnace and oil and air admitted under pressure to the pipes 15 by way of pipes 16 and 17 and 14 and 15. The two will be mixed in the chambers 22 and will be discharged through the twyers 13 into the furnace, where they are ignited. It is obvious that the flames will be thrown directly upon the metal and will quickly reduce the same to a molten mass. The heat of the furnace will be sufficient to vaporize the oil after the same has been discharged to chambers 22. The flow of vapor through the small passages in the cylinder 12 will be sufficient to prevent the molten metal from passing downward into chambers 22. If desired, the mixture of air and oil may be admitted through the side twyers and may be thrown upon the metal before the same is melted, and said metal will be carbonized thereby. The side twyers can also be employed for directing flame into the molten metal. It will be understood that by means of the crank-shaft 7 and gears 5 and 6 the furnace may be readily tilted into a horizontal position, as illustrated in Fig. 2, or in the reverse position to permit the molten contents to pass through the outlet 4.

In the foregoing description I have shown the preferred form of my invention; but I do not limit myself thereto, as I am aware that modifications may be made therein without departing from the spirit or sacrificing any of the advantages thereof, and I therefore reserve the right to make such changes as fairly fall within the scope of my invention.

Having thus described the invention, what is claimed as new is—

1. The combination with a furnace having an outlet in the top thereof and hollow trunnions; of an air-distributing pipe extending from one of the trunnions, an oil-distributing pipe arranged within and extending from said trunnion, cylinders extending through the bottom of the furnace and having twyers therethrough, pipes connecting the air-distributing pipes with the cylinders and forming vaporizing-chambers, pipes extending from the oil-distributing pipe into said chambers, and means for regulating the supply of air and oil to said chambers.

2. The combination with a furnace having an outlet in the top thereof, standards and hollow trunnions to the furnace journaled upon the standards; of an air-supply pipe opening into one of the trunnions, an air-distributing pipe extending from said trunnion, an oil-distributing pipe within and extending from the trunnion, refractory cylinders extending through the bottom of the furnace and having twyers therein, pipes connecting the air-distributing pipe and said cylinders and forming vaporizing-chambers, and pipes connecting the oil-distributing pipe with said chambers.

3. The combination with a furnace having an inclined outlet in the top thereof, a detachable bottom, standards, and a hollow trunnion to the furnace mounted upon one of the standards; of a stationary air-supply pipe opening into said trunnion, an air-distributing pipe extending from and movable with the trunnion, an oil-distributing pipe within and extending from the trunnion and movable therewith, a stationary oil-supply pipe opening into the oil-distributing pipe, refractory cylinders extending through the bottom of the furnace and having twyers therein, pipes connecting the air-distributing pipe and the twyers and forming vaporizing-chambers, pipes connecting said chambers with the oil-distributing pipe, and valves in the air and oil supply pipes.

4. The combination with a furnace having an outlet in the top thereof, standards, and hollow trunnions to the furnace journaled upon the standards; of an air-supply pipe opening into one of the trunnions, an air-distributing pipe extending from said trunnion, an oil-distributing pipe within and extending from the trunnion, refractory cylinders extending through the bottom of the furnace and having twyers therein, twyers in one side of the furnace, pipes connecting the air-distributing pipe and the twyers in the bottom and side of the furnace and forming vaporizing-chambers, and pipes connecting the oil-distributing pipe with said chambers.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD KIRK.

Witnesses:
J. W. RITTER,
ELLEN T. RITTER.