W. N. BEST.

HEATING AND MELTING FURNACE.

APPLICATION FILED JULY 29, 1905.

941,609.

Patented Nov. 30, 1909.

2 SHEETS—SHEET 1.

Fig. 1

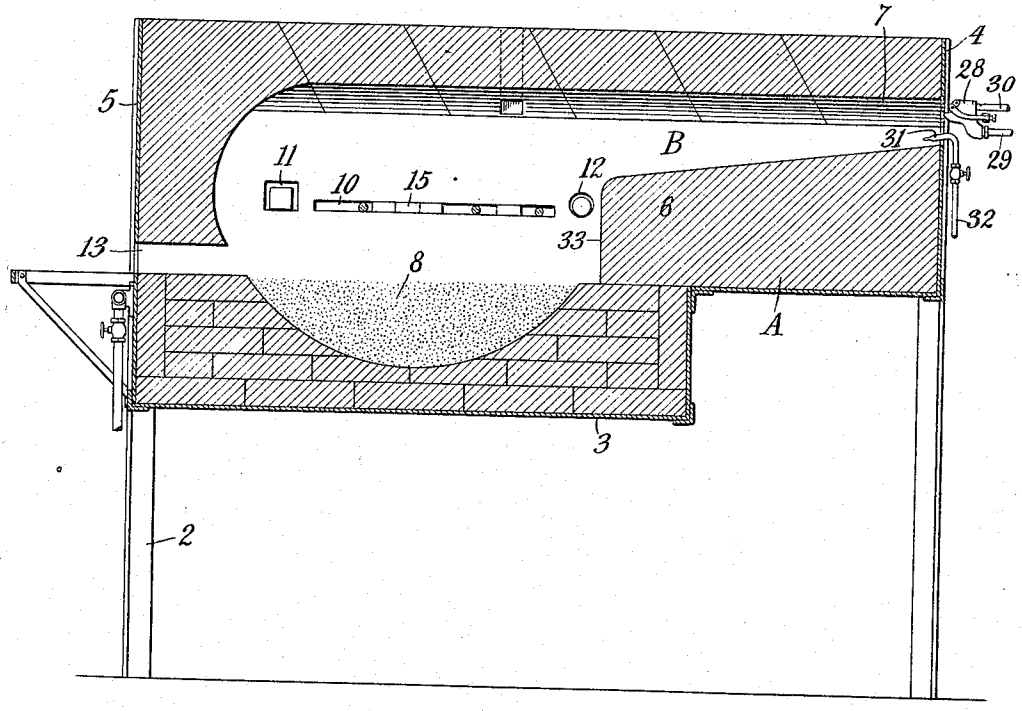
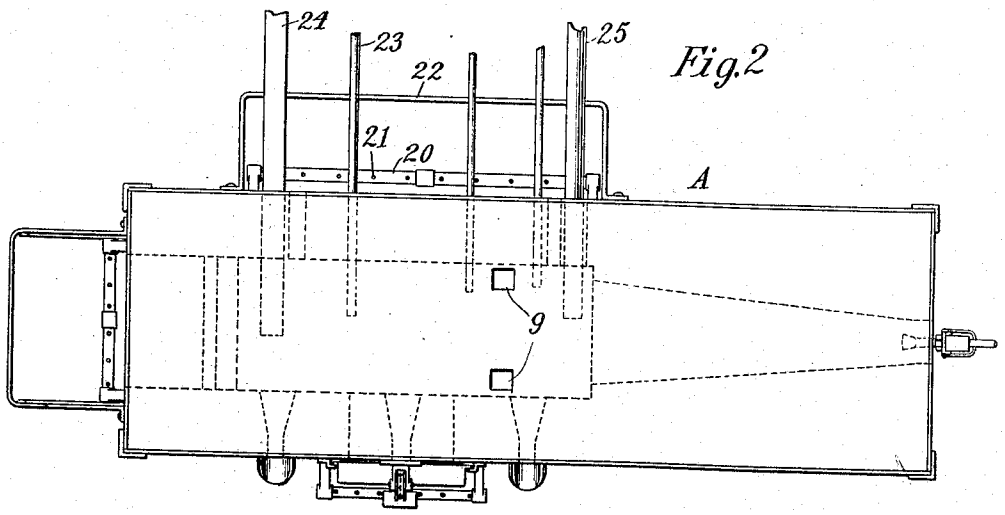


Fig. 2



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Frank W. Peeke

William Newton Best Inventor
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Fig. 3

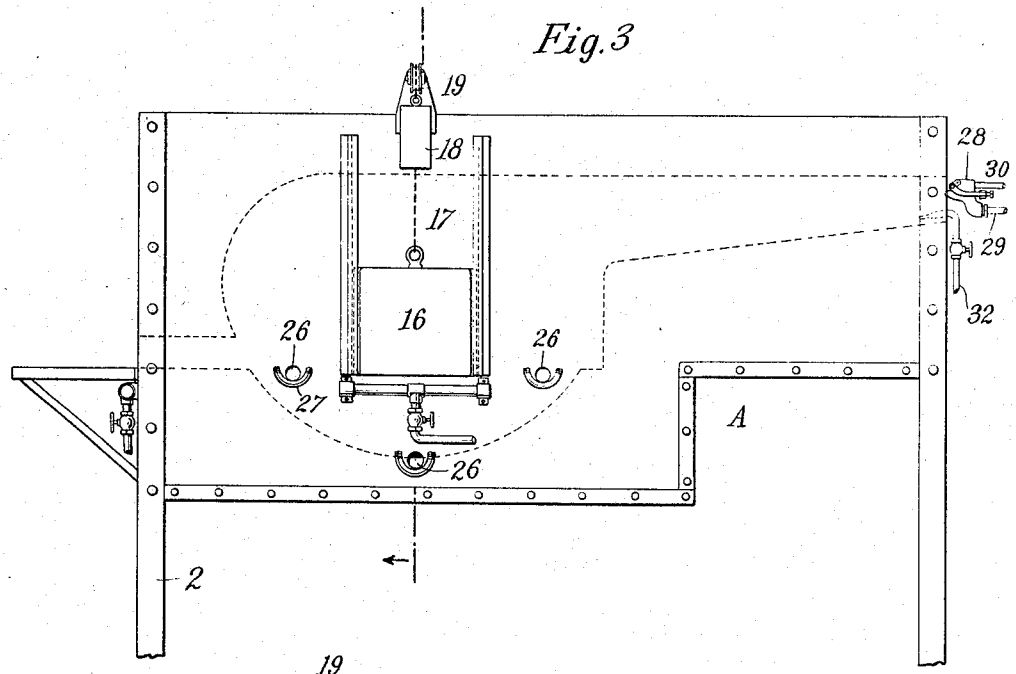
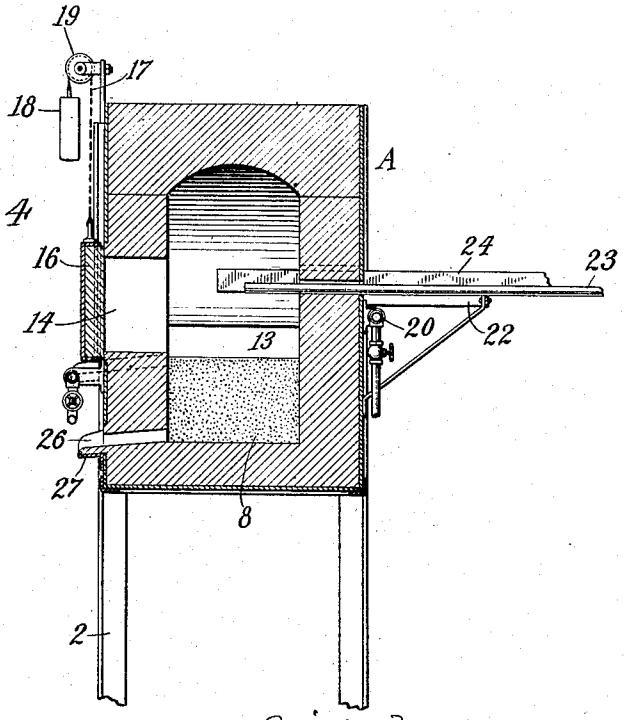


Fig. 4



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UNITED STATES PATENT OFFICE.

WILLIAM NEWTON BEST, OF NEW YORK, N. Y., ASSIGNOR TO JOHN H. BEST AND EZRA BEST, OF QUINCY, ILLINOIS.

HEATING AND MELTING FURNACE.

941,609. Specification of Letters Patent. Patented Nov. 30, 1909.

Application filed July 29, 1905. Serial No. 271,855.

To all whom it may concern:

Be it known that I, WILLIAM NEWTON BEST, a citizen of the United States, residing at No. 136 Washington avenue, borough of Brooklyn, Kings county, city and State of New York, have invented a new and useful Heating and Melting Furnace, of which the following is a specification.

My invention relates to improvements in heating and melting furnaces employing liquid, gaseous or pulverized fuel, its object being to provide an improved construction of furnace and method of burning said fuel, and consists in the features of construction, hereinafter described.

In the accompanying drawings, forming part of this specification, Figure 1 is a vertical longitudinal section of one of my improved furnaces; Fig. 2 is a plan view of the same; Fig. 3 is a side elevation, and Fig. 4 a cross-section of same.

In the drawings, the furnace A is shown mounted upon suitable standards 2, and the brick work inclosed by sheet metal walls, 3, 4, and 5. The inclosed walls, 6 of the furnace are made of refractory brick of suitable character.

7 is the inlet portion of the combustion chamber B, narrowed and constricted toward its inlet. The bottom of the portion 7 of the combustion chamber slopes downwardly, and the side walls are flared, as shown best in Figs. 1 and 2, the dimensions and proportions being adapted for the capacity and uses of the furnace for the purpose hereafter set forth.

The charging part of the furnace is of curved and substantially elliptical form in vertical, longitudinal section, as shown in Fig. 1, the bottom of the same being adapted to receive a supply of sand 8 when the furnace is employed for its usual work of heating metals for welding, or the sand can be removed to furnish a receptacle for the metal when it is desired to use the structure as a melting furnace.

Through the roof of the furnace and close to the side walls thereof are arranged vents 9 which serve to assist in igniting the furnace by carrying off the products of combustion. In the side walls of the furnace are provided suitable openings, 10, 11, 12, 13 and 14. The opening 10, as shown, is a horizontally extended narrow slot through which can be inserted small rods for heating, the intermediate space being closed by means of removable blocks 15. The openings 11, 12 and 13 are for larger bars and masses of metal, any or all of which can be simultaneously used, as the requirements of the case may demand, and may severally be closed when not in use. The opening 14 being of largest dimensions is preferably closed by means of a slab 16 of refractory material having cable 17, having a counterweight 18 running over a pulley 19. Outside and underneath the several openings 10 to 14, are arranged pipes 20, having openings, 21, through which air may be forced to protect the workmen from the heat of the furnace in the well known manner.

22 are suitable supports projecting laterally from and underneath the bar openings to support the outwardly projecting ends of the bars 23, 24 and 25, as shown in Fig. 2.

26 and 27 are slag vents and spouts for discharging the slag formed by the metal melted from the bars and fusing sand.

At the inlet end of the combustion chamber, is arranged the burner 28, adapted to deliver into the combustion chamber a uniform film or sheet of liquid gaseous or pulverized fuel from the pipe 29, the pipe 30, supplying a blast of air or steam for the atomizing or spreading of the fuel as it is forced out of the burner. Beneath the burner 28, is the nozzle 31, of the air blast pipe 32 adapted to deliver a blast of air underneath the flame or sheet of fuel to support combustion. The burner 28 is adapted in size and shape of outlet to the dimensions of the furnace and combustion chamber, proper air or steam pressure being employed to drive the fuel from the burner in a substantially horizontal fan shaped sheet or film filling the entire width of the combustion chamber, and extending to the rear end of the furnace, were it not consumed before reaching such point, while from the air blast nozzle sufficient air is supplied to insure complete combustion of the fuel at the desired point, such blast being carried substantially parallel with the flame of fuel and similarly spread, more combustion supporting air being required when steam instead of air is employed to vaporize the fuel. The proper proportioning of the furnace and the fittings thereof, and the supply and pressure of fuel and air result in the projecting of a flame from the burner to

the upper portion of the rear wall of the furnace and by which it is deflected downward for a short distance to the point where it is designed that combustion shall be complete and perfect, and the maximum heat produced. Thence the flame extends forward until it is met and deflected upward by the cross wall 33. The inward rush of air from the nozzle 31, carries the flame rearward, thus inducing eddying currents around the bars inserted through the side openings. Thereby owing to incomplete combustion adjacent to the arch and upper rear wall of the furnace, these parts are protected from excessive heat by the presence of the carbon monoxid. The whirl or eddy of flame or heat within the charging portion of the furnace and around the metals to be treated causes such diminution of the blast as to prevent any abrasive effect upon the metals while they are uniformly heated being within this field of perfect combustion.

The flared walls of the combustion chamber are proportioned so as to accommodate the expanding gases and prevent "back lash" of flame at the burner opening. The cross wall also prevents the deflected or eddying blast pouring outwardly through the combustion chambers.

I claim:

1. In a furnace of the class described, a laterally flaring combustion chamber, a fuel vaporizing jet, adapted to deliver a film of vapor filling the entire width of said chamber, and an air blast jet underneath said vapor jet, adapted to deliver a blast of air in substantially the same direction as said vapor jet.

2. A furnace of the class described, having a substantially horizontally disposed arch, a vertically curved rear wall, a depressed charging chamber having curved walls, a combustion chamber having its bottom and side walls flaring, a burner adapted to deliver the vaporized fuel in a sheet or film filling the width of the combustion chamber, and an air jet underneath said burner adapted to deliver an air blast, substantially parallel with said vapor film.

3. A furnace of the class described having a substantially elliptically shaped charging chamber with a vertically curved wall, a combustion chamber leading to said receptacle having laterally and downwardly flaring walls, means for delivering an air blast into said combustion chamber and means for delivering a film of vapor into said chamber between said air blast and the arch of the chamber, and filling the space between its side walls.

4. In combination, a fan-shaped combustion chamber, a burner adapted to deliver a flame of like form thereinto, and means for delivering a blast of combustion supporting air under said flame.

5. The combination, with a laterally flared combustion chamber, of a fuel vaporizing jet adapted to deliver a fan-shaped film of vapor into said chamber, and an air jet adapted to deliver a blast of combustion supporting air underneath said vapor film.

6. In a furnace of the class described a metal receptacle with vertically curved rear wall, means for directing an air blast toward said rear wall and means for delivering a sheet of vapor above said air blast and between it and the arch and rear wall of said furnace.

7. In a heating and melting furnace, in combination, a flaring combustion chamber, a hydro-carbon burner at the entrance thereof adapted to produce a fan-shaped flame conformed to the shape and dimensions of said combustion chamber, and an air nozzle adapted to produce a fan-shaped blast of combustion supporting air beneath and parallel with said flame.

8. A fluid fuel burning furnace having its charging part of substantially elliptical form in vertical longitudinal section, a combustion chamber located above the level of and opening into said charging part, means for supporting articles to be heated in mid-position in said charging part, and means for directing a flame from said combustion chamber in vertically eddying current around such articles.

9. A furnace having the rear wall of its charging part vertically curved, a combustion chamber above the level of and opening into such charging part, a cross-wall underneath said combustion chamber, means for directing a flame from said combustion chamber against and down along said rear wall of said furnace, and means for supporting articles to be heated in mid-position in said charging part so as to permit the eddying or reverberating of the flame around and against such articles.

In witness whereof, I have hereunto set my hand at the city of New York, this 25th day of July, 1905.

WILLIAM NEWTON BEST.

Witnesses:

CHARLES L. KINGSLEY,

T. D. MERVIN.