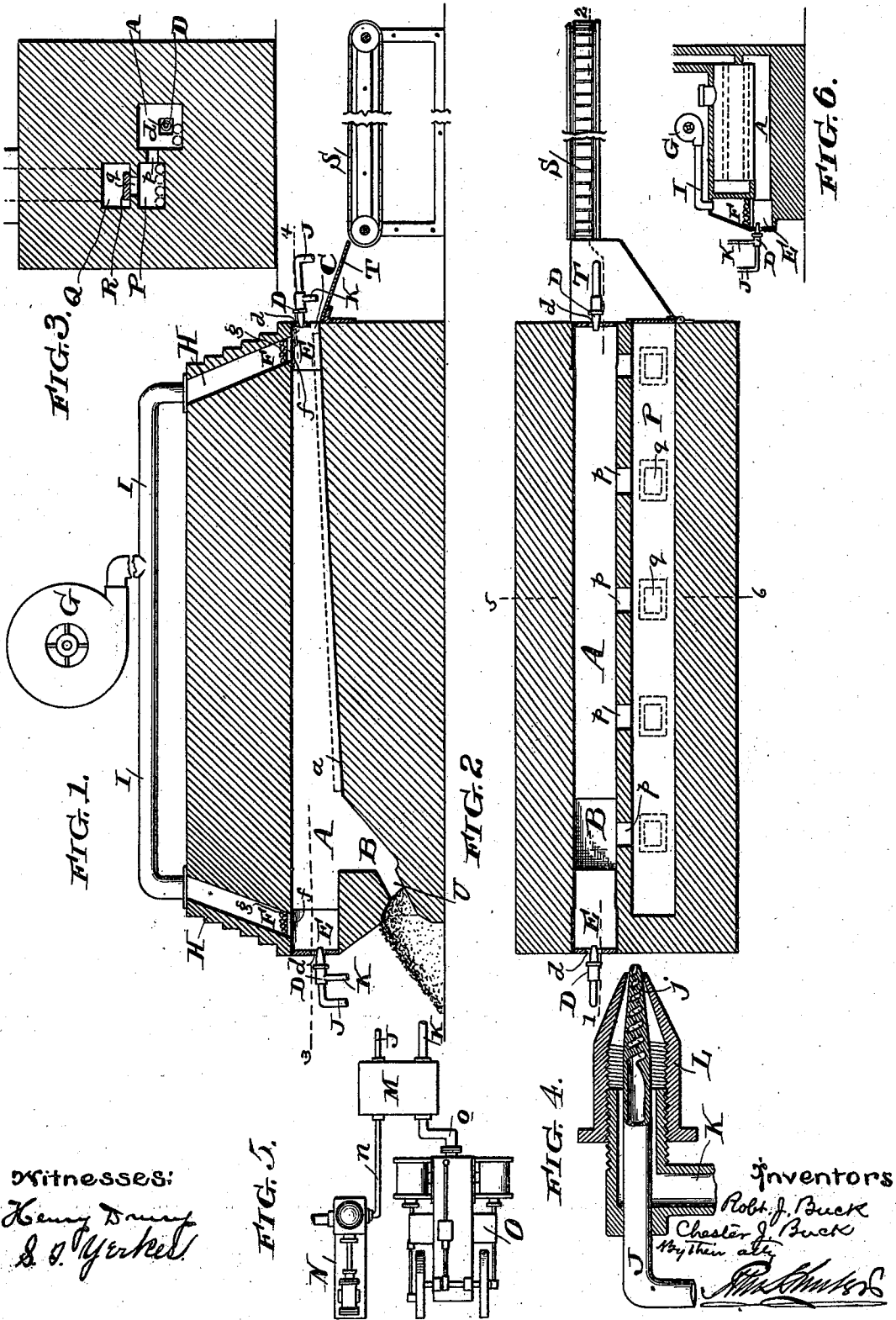


(No Model.)

R. J. & C. J. BUCK.
FURNACE FOR WELDING, &c.

No. 503,926.

Patented Aug. 22, 1893.



UNITED STATES PATENT OFFICE.

ROBERT J. BUCK AND CHESTER J. BUCK, OF BRIDGETON, NEW JERSEY.

FURNACE FOR WELDING, &c.

SPECIFICATION forming part of Letters Patent No. 503,926, dated August 22, 1893.

Application filed October 22, 1891. Serial No. 409,499. (No model.)

To all whom it may concern:

Be it known that we, ROBERT J. BUCK and CHESTER J. BUCK, of Bridgeton, in the county of Cumberland and State of New Jersey, have
5 invented an Improvement in Furnaces for Welding and other Purposes, of which the following is a specification.

Our invention relates to furnaces for welding and other purposes, and consists of certain improvements which are fully set forth
10 in the following specification and are shown in the accompanying drawings which form a part thereof.

Our invention is particularly designed for
15 furnaces in which a great heat is to be obtained having a practically uniform temperature throughout.

Our furnace is designed to employ oil as a fuel and includes certain improvements
20 whereby a perfect and uniform combustion of the oil is obtained. Oil as a fuel possesses great advantages over coal and coke by reason of its greater cheapness, but obstacles
25 have usually attended its use because of the difficulty of obtaining a complete combustion and a uniform heat throughout the combustion chamber. The extent of combustion and the resultant degree of heat depend upon
30 the extent of vaporization of the oil. Vaporization is usually obtained by air or steam blasts introduced with the oil and at the point of the introduction of the air or steam there is an area of comparative coolness. Our invention is designed to avoid the presence of
35 such an area of coolness within the combustion chamber of the furnace by so introducing the oil and air that a thorough vaporization of the oil takes place and a complete and uniform combustion of the vaporized oil is
40 produced throughout the entire extent of the combustion chamber with a proportional increase in the degree of heat.

Our invention also relates to certain improvements in the furnace whereby it is particularly adapted to use for welding skelp for
45 pipe, but it is also adapted to any furnace or combustion chamber where great heat is to be obtained and may be used for the generation of steam in a steam boiler.

50 We will now refer to the drawings; wherein our improvements are set out with greater particularity.

Figure 1 is a vertical sectional elevation of a heating furnace embodying our invention taken on the line 1—2 of Fig. 2. Fig. 2 is a
55 horizontal sectional view of the same on the line 3—4 of Fig. 1. Fig. 3 is a transverse vertical sectional view of the same on the line 5—6 of Fig. 1. Fig. 4 is a sectional view on an enlarged scale of the oil feeding nozzle. 60 Fig. 5 is a plan view on a reduced scale of the oil pump, air compressor and pressure equalizing reservoir; and Fig. 6 is a sectional side elevation of a furnace embodying our invention as applied to a boiler for generat- 65 ing steam.

A is the combustion chamber of the furnace, the walls of which may be constructed entirely of fire brick.

When the furnace is employed for the purpose of welding skelps, &c., we prefer to construct the bottom *a* of the combustion chamber inclined toward the rear and terminating in a pocket or depression B to receive the cinders, &c. 70

C is the front opening of the furnace to permit the pipe, &c., to be inserted in the combustion chamber and withdrawn from it. 75

D is the oil nozzle for introducing a mixture of oil and air into the furnace. This
80 oil nozzle is located adjacent to the end of the furnace having access to the interior through a small aperture or opening *d*. With a furnace of considerable extent we find it preferable to employ two nozzles D, D, one
85 located at the front and the other at the rear of the furnace as shown. Immediately within the furnace and at the end of the combustion chamber A thereof, is a chamber or compartment or vaporizing chamber E which opens
90 into but does not form a portion of the combustion chamber proper. With two nozzles D there is a compartment or vaporizing chamber E at each end of the furnace. The oil and air emerging from the nozzle D under
95 pressure enter this chamber E and pass thence into the combustion chamber A after having been thoroughly vaporized in the said chamber E.

F is an opening in the chamber E preferably in the top thereof from which a fan blast
100 of air from the fan G is blown through the passageway H.

I are air pipes leading from the fan.

Located in the opening F is a grating *f* upon which may be placed broken fire brick *g*, to thoroughly separate the air and cause the currents to emerge in all directions from the opening so as to produce a more perfect vaporization of the oil.

When two nozzles D are employed we prefer to arrange them pointing in slightly different lines as shown in Fig. 1 so that the oil vapor from one pipe will be blown through the combustion chamber past the vapor from the other, and the two currents will not be blown directly one against the other.

The particular construction of the nozzles D is not material to our invention. Any convenient construction may be employed. We prefer, however, to employ the construction shown having an oil pipe J terminating in a spiral outlet *j*, with the surrounding air pipe K and a tapered adjustable nozzle L which may be turned to adjust the size of the aperture for the air and thus regulate the amount thereof introduced with the oil. The oil and air are introduced under pressure, and to equalize the pressure of the oil and air from the nozzle D, we prefer to construct the respective oil and air pipes J and K with an equalizing reservoir M, into which the oil is forced by a pump N through a pipe *n* and the air by an air compressor O through a pipe *o*.

P is a heating oven extending through the body of the furnace adjacent to the combustion chamber A and having communication therewith through openings *p*.

Q is an outlet passage leading to the smoke stack for the products of combustion located adjacent to the oven P and communicating therewith through opening *q*, which may be closed by suitable coverings or dampers R to regulate the draft through the oven P.

S is a carrier for carrying the pipe, &c., to and from the furnace.

T is a guide for guiding the pipes in their passage to and from the combustion chamber and oven.

U is an outlet from the depression or pocket B for the cinders, &c. While the furnace is in operation this opening is closed or banked up with ashes.

In Fig. 6 we have shown our furnace applied to a boiler for the generation of steam. In this construction a single or double nozzle is employed with a single or double vaporization chamber E.

The operation of the apparatus is as follows:—Air and oil under pressure pass from the reservoir M through the pipes J and K to the nozzle D, and emerge therefrom under equal pressures. With the particular form of nozzle shown in the drawings the oil emerges in a spiral jet and is mixed with the air passing out with it from the pipe K. This produces a partial vaporization of the oil. The mixed oil and air pass into the chamber E and there receive the fan blast from the opening F, which is blown down upon the jet of par-

tially vaporized oil, at an angle to its line of movement, and thoroughly vaporizes it before it passes into the combustion chamber A. By this means the most complete vaporization of the oil and the resultant high degree of heat are obtained throughout the entire chamber A. While the oil and air from the nozzle D are introduced under preferably high pressure the air blast from the fan is blown upon the jet at a comparatively low pressure. The skelps or unwelded pipe are placed in the oven P where they are heated to a cherry red heat. They are then successively withdrawn and inserted in the chamber A where they are subjected to a welding heat prior to being subjected to the welding operation.

While we prefer the minor details of construction which have been here shown we do not limit our invention to them as it is apparent that they may be modified if desired.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In combination a furnace having a combustion chamber and a vaporization chamber communicating therewith and provided with an opening F, a nozzle opening into the vaporization chamber transversely to the opening F therein, pressure creating devices to blow a blast of oil and air into the vaporization chamber under pressure, and independent air moving devices for blowing a second blast of air through the opening F transversely upon the blast of oil and air and independently of the device for introducing the oil under pressure.

2. A furnace having a combustion chamber A and a vaporization chamber E directly in line with but forming no part of the combustion chamber proper and provided with an opening F transversely to the passage of the vapor and gases through the vaporization chamber, and located immediately adjacent to the entrance of the combustion chamber combined with an oil nozzle opening into said vaporization chamber E, directly in line with the combustion chamber a grating in said opening F, means to blow a jet of oil under pressure from the nozzle into the vaporization chamber, and a fan or blower to blow air through the opening F transversely upon the jet of oil and independently of the means for introducing the oil whereby the oil is thoroughly vaporized in the vaporization chamber immediately before it enters the combustion chamber.

3. The combination of an oil pump, air compressor, pressure equalizing reservoir, pipes leading from the oil pump and air compressor respectively to the reservoir, an oil nozzle D, an oil pipe and an air pipe leading from the reservoir to the nozzle, a furnace into which said nozzle opens adapted to receive a jet of more or less vaporized oil and air from said nozzle, and a fan or blower for blowing a second blast of air upon said jet of oil and

air transversely to its line of movement at a comparatively low pressure substantially as and for the purpose specified.

4. A furnace for heating &c. having an
5 opening or aperture in one end and a second
opening or aperture in the body of the fur-
nace adjacent thereto, an obstruction in said
second aperture to form a series of small pas-
sageways or openings, a fan or blower to blow
10 air through said second aperture, an oil noz-
zle adjacent to the aperture in the end of the
furnace, and means to blow a jet of oil and
air from said nozzle into the furnace past the
second aperture, independently of the air
15 blast through the second aperture and at a
relatively high pressure.

5. In a furnace, the combination with a
combustion chamber of a vaporizing chamber
located in line therewith and immediately ad-
20 jacent to the end thereof, a nozzle opening

into said vaporization chamber and having
its orifice in line with the vaporization and
combustion chambers, oil and air pipes lead-
ing to said nozzle to introduce a mixture of
oil and air thereto, pressure creating and 25
equalizing devices to force a jet of oil and air
from said nozzle into the vaporization cham-
ber and in line with the combustion chamber,
and means independent of the pressure cre-
ating devices for the nozzle for introducing a 30
blast of air upon the partly vaporized jet of
oil transversely to its line of movement and
at a relatively lower pressure.

In testimony of which invention we here-
unto set our hands.

ROBT. J. BUCK.
CHESTER J. BUCK.

Witnesses:

JOEL FITHIAN,
THOMAS R. JANVIER.