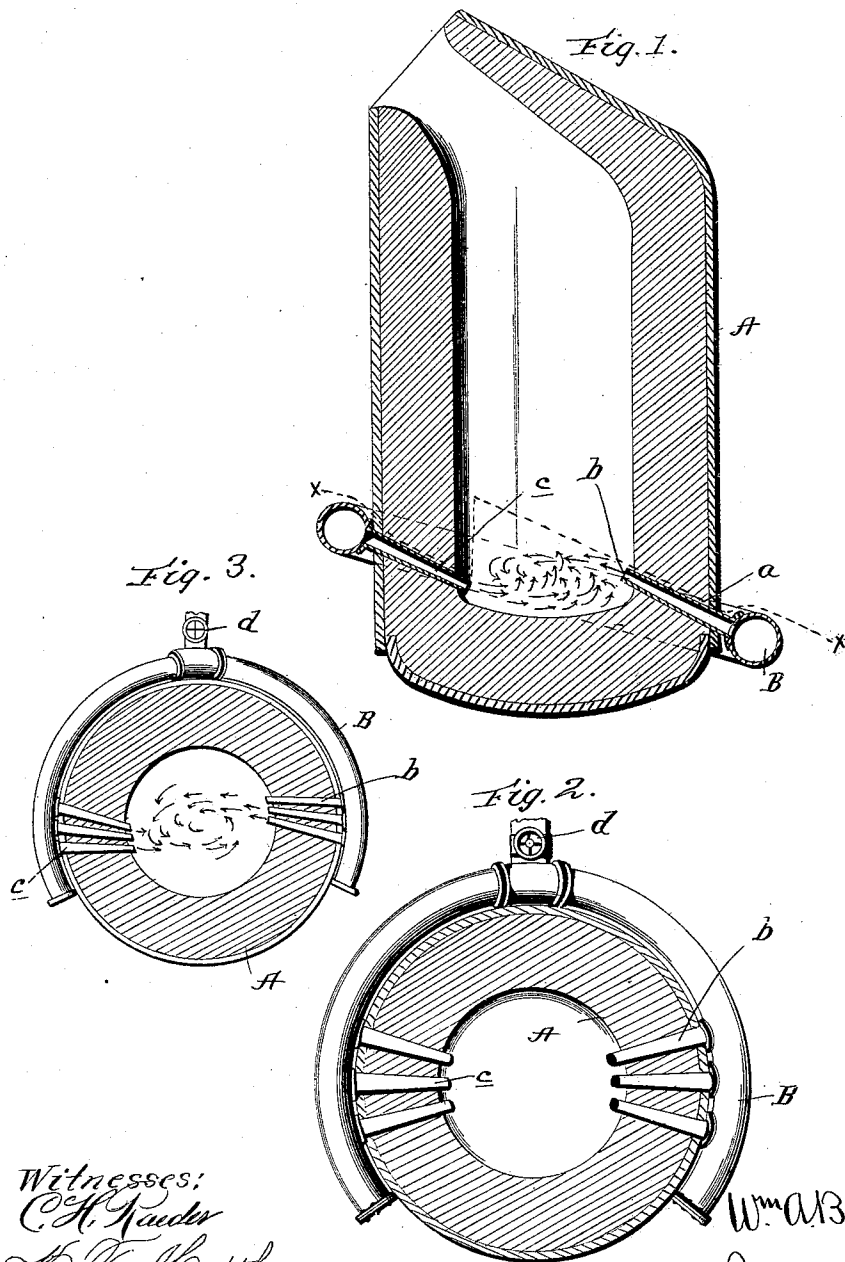


(No Model.)

W. A. BALDWIN.
CONVERTER.

No. 484,770.

Patented Oct. 25, 1892.



Witnesses:
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Inventor
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UNITED STATES PATENT OFFICE.

WILLIAM A. BALDWIN, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO
ROSWELL D. SAWYER, OF SAME PLACE.

CONVERTER.

SPECIFICATION forming part of Letters Patent No. 484,770, dated October 25, 1892.

Application filed October 10, 1891. Serial No. 408,283. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. BALDWIN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Converter-Furnaces; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improved method of and apparatus for decarbonizing iron and liberating the impurities contained therein for the purpose of rendering such iron in a condition to be recarbonized by fluxing therewith a suitable recarbonizing agent—such as spiegeleisen—so as to convert the same into malleable or wrought iron or into steel.

Heretofore atmospheric air has been introduced into the molten mass in the form of a powerful blast by the use of heavy and expensive machinery, so as to force the particles of the metal apart and present the same to the action of the oxidizing agent, while the silicon, carbon, and other combustible elements are intended to be brought into that intimate contact with the oxidizing agent which is essential to insure a complete and uniform combustion by producing both at the surface and in the body of the metal violent air-currents, which increase the agitation of the mass so that the eliminated impurities are mixed and forced by the currents so as to be returned repeatedly to the mouth of the tuyeres and there exposed to the action of the blast and driven back into the body of the metal.

Heretofore the blast has been introduced into the vessel upward vertically through the mass of molten iron. The blast has also been introduced horizontally into the mass and has been introduced at an angle, so as to be discharged violently upon the surface of the mass. It has been introduced tangentially into the mass or bath, and it has been introduced at an angle upon the surface of the mass and the angle of the tuyere or inlet adapted to be changed, so as to vary the places of contact and project the currents uniformly over the surface of the bath.

My invention differs from all of these meth-

ods in that the current or currents are introduced from opposite sides of the vessel and projected upon the mass at or beneath the upper and lower surfaces, respectively, and at different angles, so as to impart a horizontal and gyratory motion to the molten mass and to bring every particle of the same to the action of the air-currents as they are introduced at the tuyeres.

In order to enable those skilled in the art to which my invention appertains to practice the same, I have illustrated by Figure 1 in the accompanying drawings a vertical central sectional view of a converter such as usually employed with my improved means of projecting the blast or currents; and in Fig. 2 I have illustrated a cross-sectional view of the same, taken in the plane indicated by the dotted line X X on Fig. 1. Fig. 3 is a cross-sectional view of a modification.

Referring by letter to said drawings, A indicates a receptacle for the molten mass, commonly known as the "converter." This converter is lined with refractory material to enable it to withstand the heat of the metal, and may be of an ordinary or approved construction. This vessel or converter, which is designed to receive the molten iron from the cupola or any known melting-furnace, is provided in one of its lower sides with a suitable number of tuyere-holes *a*, there being three shown in the present illustration, although I may employ more or less. These tuyere-holes, which are provided with tuyere-tubes *b* of suitable material, are arranged in an upwardly oblique or inclined position, so that the currents introduced through the same will act upon the upper side or slightly below the surface of the molten mass in an angular manner. On the opposite side of the vessel or converter I provide similar tuyere-holes and tuyeres; but instead of inclining them upwardly I incline them downwardly or in an opposite direction and have them enter the interior of the vessel at a less altitude. These tuyere-tubes *c* are designed to direct the blast into the body of the mass and slightly above the bottom, so that the blast is simultaneously introduced in the mass in opposite directions and at different angles upon or slightly below the upper and lower surfaces, respect-

ively, so as to produce a thorough agitation of the particles of the metal and the impurities therein and liberate the latter.

B indicates the wind box or pipe, which leads from the blast-operating mechanism and has its inlet controlled by a suitable valve *d*. This wind-pipe may be of a spiral form, although I have illustrated the same as a broken spiral having its ends securely capped, as by such construction I am enabled to get better results by more effectively utilizing the force of the blast. This air-pipe may be connected with the outer ends of the tuyere-tubes in the usual manner.

In the illustration of my apparatus I have shown the tuyere-tubes on one side of the vessel arranged upon an angle of about twenty degrees, while those on the opposite side are arranged at an angle of about forty degrees, although I do not wish to confine myself to such angles as shown, as they may be varied, if desired.

In operation when the molten metal has been placed in a vessel and the air-blast turned on the air-currents will take the courses indicated by the arrows, so as to impart a whirling or gyratory motion to the mass and thoroughly agitate every particle of the metal and rapidly eliminate all of the impurities.

In the modification illustrated in Fig. 3 of the drawings I have shown the tuyere-tubes slightly deflected from diametrical points in opposite directions, so that the currents will be directed upwardly on one side of the mass and downwardly on the other side and also at a slight angle to the right and left, respectively, thus giving to the molten mass a double action.

Having described my invention, what I claim is—

1. The method described of converting crude iron into malleable iron or steel, consisting in violently agitating or imparting a gyratory motion to the molten mass by simultaneously projecting air-currents upon the molten mass from one side of the vessel upwardly at an angle thereto and from the opposite side of the vessel into the mass and downwardly at an angle, substantially as specified.

2. The combination, with a suitable vessel adapted to hold molten metal, having tuyeres entering the interior from one side and upwardly at an angle and tuyeres entering from the opposite side downwardly at an angle, of a suitable air box or pipe connected with the tuyeres, substantially as specified.

3. The combination, with a suitable vessel adapted to hold molten iron, of tuyeres entering the vessel from one side and arranged upwardly at an angle, tuyeres entering the opposite side of the vessel and arranged downwardly at an angle, and the air-pipe of a spiral form connected with the tuyeres, substantially as specified.

4. The combination, with a converter-vessel, of tuyeres in opposite sides thereof, said tuyeres entering the opposite sides at different angles to a horizontal plane, and a suitable air-pipe connected with the tuyeres, substantially as specified.

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

WILLIAM A. BALDWIN.

Witnesses:

HOLMES E. OFFLEY,
K. F. MATTHEWS.