

S. S. DEEMER.

PROCESS OF AND APPARATUS FOR TREATING MOLTEN METAL.

APPLICATION FILED OCT. 14, 1908.

987,704.

Patented Mar. 28, 1911.

2 SHEETS—SHEET 1.

Fig. 2.

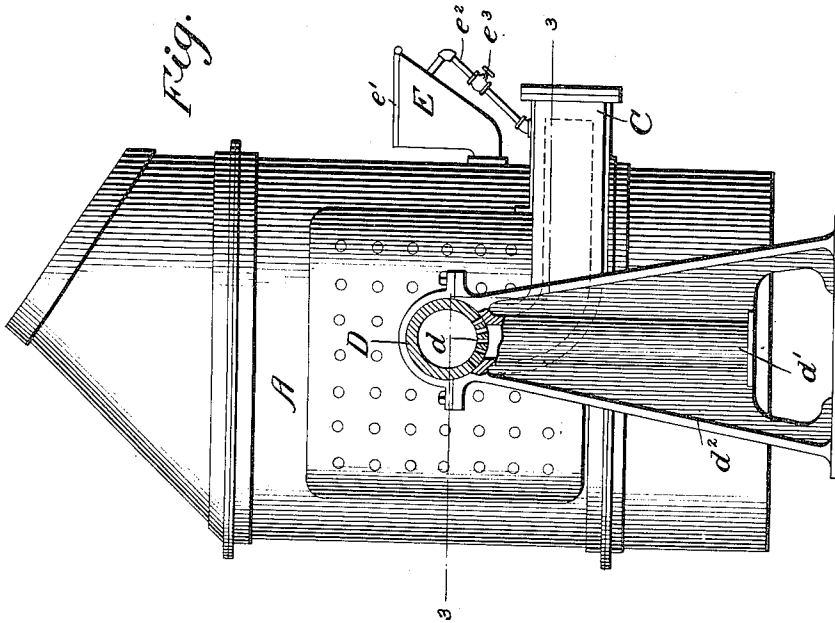
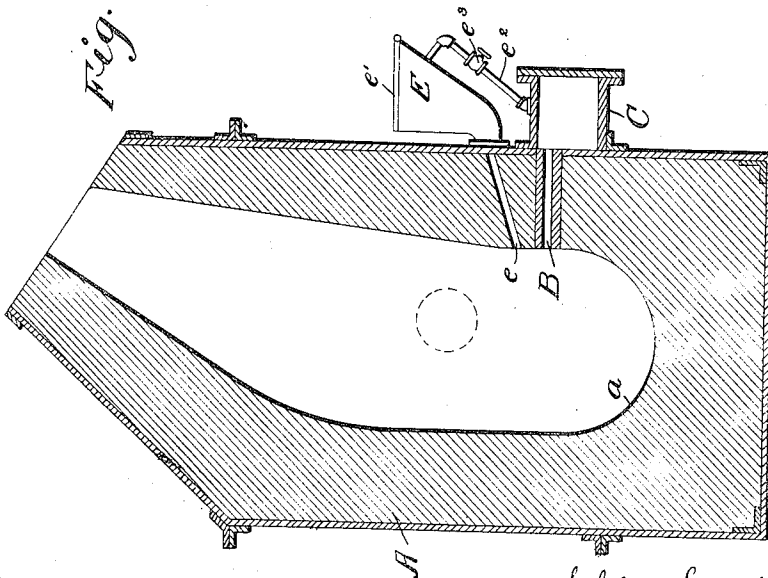


Fig. 1.



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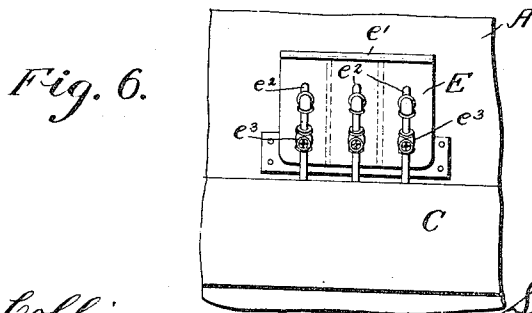
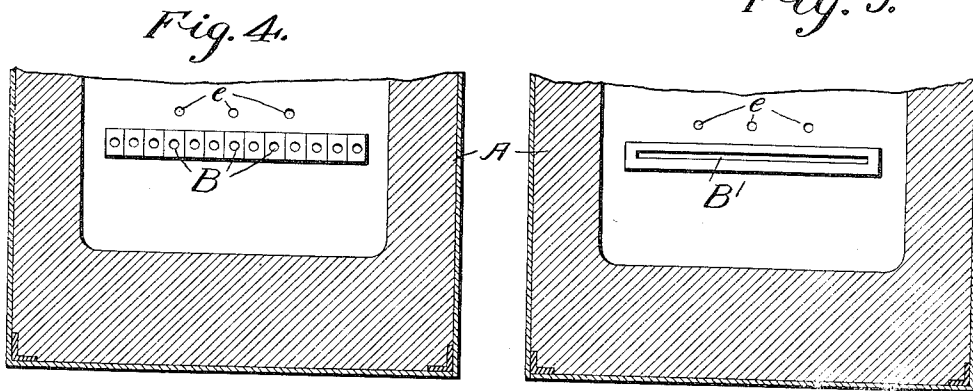
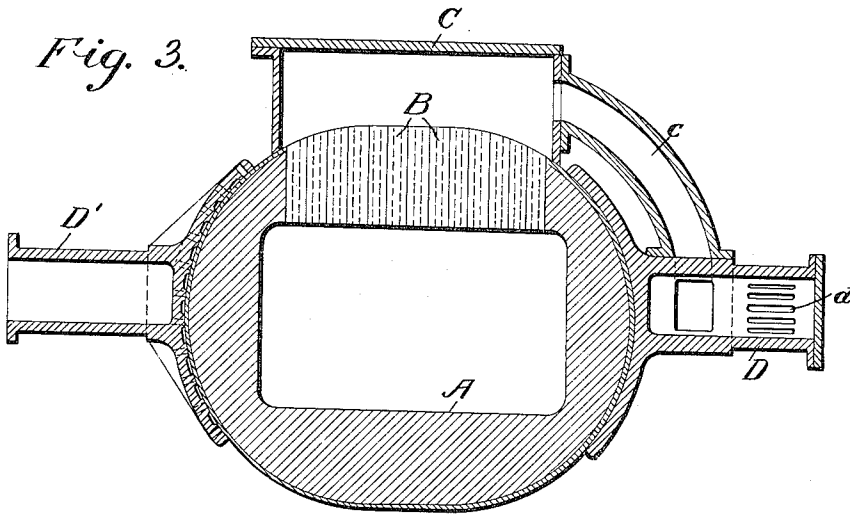
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UNITED STATES PATENT OFFICE.

SELDEN SCRANTON DEEMER, OF NEW CASTLE, DELAWARE.

PROCESS OF AND APPARATUS FOR TREATING MOLTEN METAL.

987,704.

Specification of Letters Patent.

Patented Mar. 28, 1911.

Application filed October 14, 1908. Serial No. 457,720.

To all whom it may concern:

Be it known that I, SELDEN SCRANTON DEEMER, a citizen of the United States, residing at New Castle, in the county of New-castle and State of Delaware, have invented certain new and useful Improvements in Processes and Apparatus for Treating Molten Metal, of which the following is a specification.

My invention relates to treating molten metal, and particularly the conversion of iron into steel, and especially to that type of process and apparatus in which the conversion is effected by means of a surface blow. In this process as heretofore practiced, and such apparatus devised prior to my invention, there has been considerable loss by inefficiency due to the sluggish movement of the fluid metal under the influence of the air currents, resulting in retardation of the process with consequent waste in oxidizing metal and burning out of the converter lining. A further difficulty is found in the introduction into the fluid metal at different stages of the blow, of suitable reagents for desulfurizing, dephosphorizing, decarburizing, and recarburizing the metal, particularly where the body of molten metal treated is comparatively small, as in small and moderate sized converters.

The objects of my invention are to facilitate the movement of the molten metal by improving the form of the converter bottom or hearth, and provide for a more effective delivery of the blast to the metal, thereby securing a rapid and efficient conversion; to provide means for introducing reagents at the proper stages in the blow in such manner as to secure their thorough and rapid incorporation in, and reaction with, the molten metal, and at the same time augment the blow and facilitate the movement of the metal; to provide for the ready and efficient control of the introduction of such reagents; and to improve the air pressure connection with the converter.

In the accompanying drawings I have illustrated a preferred apparatus for carrying my process into effect, but it will be understood that various changes may be made in details of construction without departing from the invention.

In these drawings, Figure 1, is a central vertical section through the converter; Fig. 2, is view in side elevation, the bearing being shown in section; Fig. 3, is a horizontal

section taken on line 3—3 of Fig. 2; Fig. 4, is fragmentary view in vertical section showing the arrangement of the twyers; Fig. 5, is a similar view showing a slight modification of the same; and Fig. 6, is a fragmentary view showing the charging box and air pressure connections in front elevation.

Referring to the drawings, A is the body of a converter having the usual outer shell and inner lining, and having a length much greater than its width. The bottom or hearth, *a* is made rounded in the direction of its width, and preferably semi-cylindrical, so as to present as little resistance or friction as possible to the revolving movement of the molten metal.

Above the bottom or rounded portion are located the twyers B for supplying a blast of oxidizing agent to the molten metal, preferably against and across the surface thereof so as to constitute a "surface blow." These twyers extend substantially entirely along one side of the converter and are arranged to deliver the blast over the whole surface of the body of the metal in the direction of its width. This main blast may be delivered by a series of individual twyers B, as shown in Fig. 4, or by a single long one in the form of a narrow slot, as shown at B¹ in Fig. 5, and is supplied with oxidizing agent under pressure such as air, from a "wind box" C which communicates by duct *c* with one of the hollow trunnions, D. The lower portion of trunnion D is provided with slotted openings *d*, to register with air connection *d*¹, running up through the center of housing *d*² and its bearing, this housing being connected at the bottom with a wind box leading from the blowing engine, not shown. Slotted openings *d* preferably overlap opening *d*¹ in the bearing, so that pressure may still be supplied in full force when the converter is tilted to the proper angle for the blow. The other trunnion D¹ has no air pressure connection, but carries the worm wheel (not shown) and coöperates with suitable mechanism for tilting the converter.

In order to provide for the introduction of suitable reagents for desulfurizing, dephosphorizing, decarburizing and recarburizing the metal efficiently at the proper stages in the blow, I arrange a charging box E upon the front of the converter above the wind box C, and connected with the interior of the converter by charging twyers *e* above main twyers B. Charging box E

is provided with a suitable cover e^1 , by which it may be hermetically closed, and is preferably divided into compartments for the reagents, as shown in Fig. 6, one for each charging twyer. Each compartment is supplied with pressure through a pipe c^2 , connected with the source, as at the wind box C, and controlled by a valve e^3 . The charging twyers are preferably arranged to deliver their blast, containing the pulverized or comminuted reagents, to the surface of the molten metal at an oblique angle greater than, and to supplement that of, the main blast delivered by the twyers B.

15 The operation will be readily understood from the foregoing. Molten low grade metal, such as pig iron, being introduced into the converter to the proper depth, and pulverized reagents to be used in the process having been placed in the compartments of the charging box E, the converter is preferably tilted slightly. The air blast is turned on and is delivered from the wind box through twyers B, acting on the molten metal and causing it to circulate rapidly across the converter, down around the bottom and up again. This motion is greatly facilitated by the rounded or semi-cylindrical shape of the bottom.

30 At the proper stages in the blow, air blast is admitted to the various sections of the charging box, and the reagents are blown

through twyers e against the molten metal, this blast aiding the main blast besides thoroughly incorporating the reagents with the metal. When the blow is completed the converter is tilted and its contents discharged in the usual way. 35

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is— 40

1. The process of converting molten metal, which consists in supplying a main blast obliquely across the surface of the molten metal, and supplying an auxiliary blast containing comminuted reagents to the surface of said molten metal obliquely in the same general direction and at a greater angle to the surface. 45

2. In a converter, twyers for supplying a blast to the surface of a charge of molten metal, a wind box with which said twyers communicate, a reagent charging box, additional twyers for delivering the contents of said charging box to said metal, and 55 controllable air pressure connection from said wind box to said charging box.

In testimony whereof I have affixed my signature, in presence of two witnesses.

SELDEN SCRANTON DEEMER.

Witnesses:

J. ERNEST SMITH,
EDWARD T. PRICE.