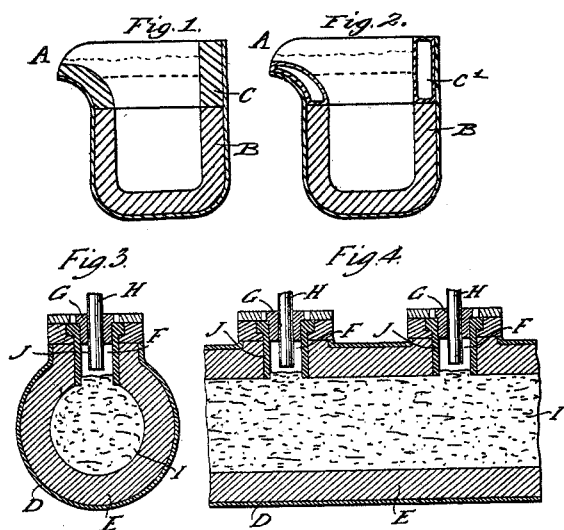


of electricity, motion and heat until the major part of the metal is deposited on the cathode 3.

979,337. Manufacture of Steel. ALLEYNE REYNOLDS, London, England.

This invention has for its object the economical production of steel ingots or castings of any desired analysis free from flaws. The patentee first produces a nearly pure iron free from foreign substances, and afterward, just previous to casting, alloy it with certain materials. For the overcoming of the oxidation unavoidable during casting, the extent of which may be ascertained by experience, there is always added the necessary amount of highly exothermic acid and basic-flue-forming additions, in general silicon and manganese.

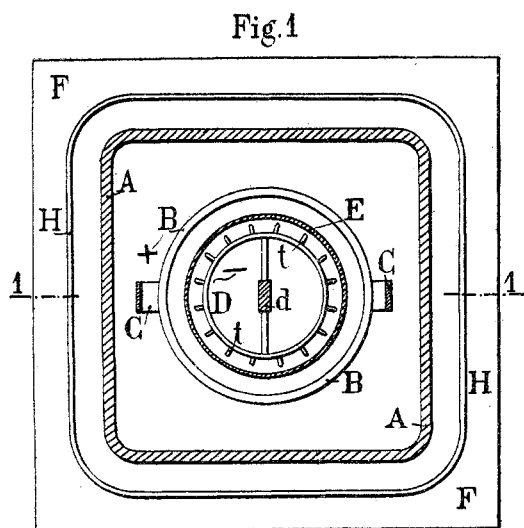
The process consists in producing a melted charge of iron containing iron oxide in a furnace, teeming and freeing the charge of slag, refining by reduction the slagless charge in a



second furnace teeming the refined charge and adding thereto melted alloys and a suitable flux heated in separate furnaces, and casting the charge into a mold.

979,497. Means for the Electrolytic Manufacture of Sodium. PAUL LEON HULIN, Grenoble, France.

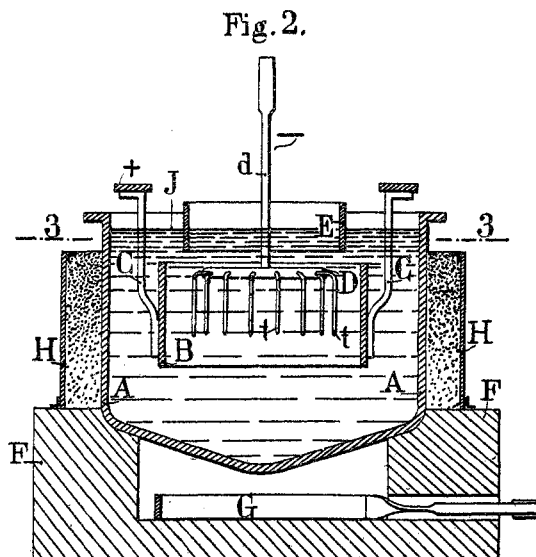
In order to set the apparatus in action the vessel A is filled with caustic soda in fragments and the electric current is caused



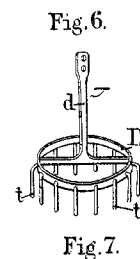
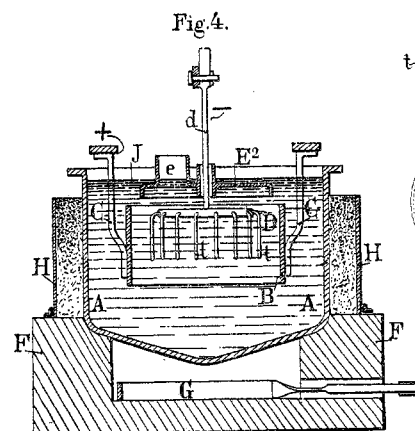
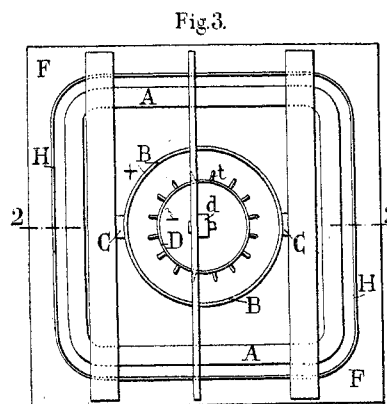
to traverse the conductor G; the intensity of the current is regulated so as to bring the conductor to red-heat. The heat

disengaged is absorbed by the metal of the vat, and the soda which it contains becomes fused. As soon as the vessel is full of liquefied soda the current is stopped flowing in the heating circuit G and the apparatus is ready for work.

The production of sodium is initiated by passing a continuous



current, whose intensity is proportioned to the dimensions of the apparatus and under a pressure of about 5 or 6 volts, the resistance which the current experiences in traversing the bath causing the development of sufficient heat to maintain



the soda in the fused state. Under the electrolytic action of the current free oxygen is formed at the anode and is disengaged at the surface externally of the separator E, while the hydrogen

and sodium simultaneously escape from the cathode in globules and both appear at the surface of the bath in the interior of the ring E. The sodium collects in drops resembling melted white wax, and it is removed by means of a perforated ladle which only permits the passage of the fused soda.

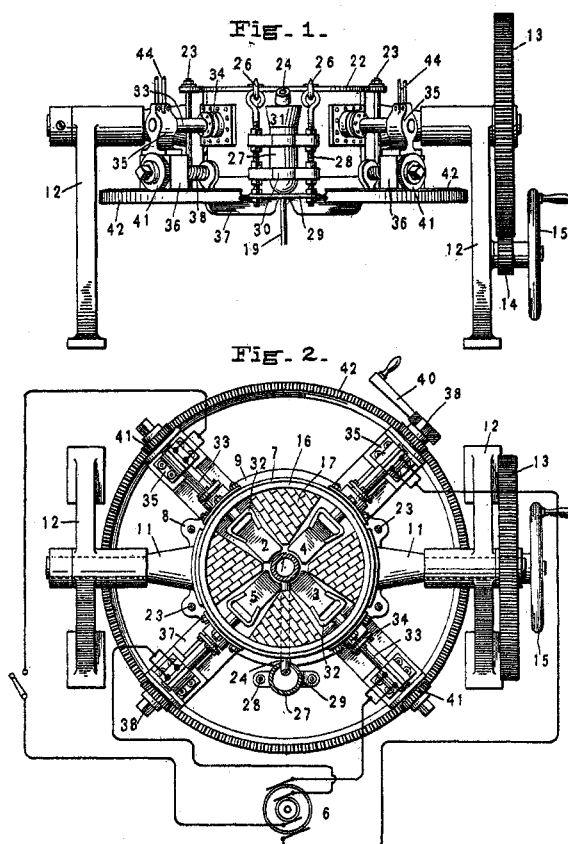
The apparatus is charged periodically with soda to replace that which has been decomposed. The mean level of the bath is indicated at J.

The accompanying illustration shows the patentees apparatus.

979,663. Electric Furnace. BAYARD GUTHRIE, Pittsburgh, Pa., AND JOSEPH P. KARCH, Plainville, Connecticut.

In the operation of this furnace the crucible 1 is charged, the car placed on top and the electrodes 2, 3, 4 and 5 are all moved up into contact with the crucible. Current is then turned on and the crucible and its contents are in the circuits. This warms up the crucible and contents but as the electrodes are purposely made large and as the crucible and contents are relatively good conductors the heat is not great. The handle 40 is then applied to the end of one of the screws, 38, and the electrodes are slowly withdrawn from contact with the crucible. Arcs immediately form between the pair of electrodes 2 and 3 and the pair 4 and 5 with the crucible in the center of intense heat.

The great heat soon melts the contents of the crucible. The



electrodes are then closed into contact with the crucible, the arcs gradually decrease and the current is turned off. The mold 27 being hung on the hooks 26, 26, the hand wheel 15 is rotated so as to tilt the furnace and pour the contents of the crucible into the mold. The electrodes hold the crucible while pouring. When one mold is filled it can be quickly removed and another substituted and pouring continued until the crucible is empty. The furnace is then returned to its horizontal position and the operation repeated.

When it is particularly desired to avoid oxidation of the contents of the crucible a neutral or inert gas may be supplied through the pipe 19 and which will pass through the perforated stand 18, up around the crucible 1, and out through the opening in the top of the casing surrounding the crucible mouth. This will prevent the air from reaching the contents of the crucible. Similarly a combustible gas may be supplied and burned as it escapes from the opening in the top of the casing. This will have a tendency to withdraw oxygen from the contents of the crucible and thus act as a reduction agent.

INDUSTRIAL AND TRADE NOTES.

ADVANCE CHAPTER FROM MINERAL RESOURCES OF THE UNITED STATES.

LITHIUM IN 1909.

Lithium is one of the alkali metals and is the lightest known solid element. Its specific gravity (0.585) is so low that it will float on kerosene. Although traces of lithium are found in nearly all igneous rocks¹ and in many springs, and notable quantities of several lithium minerals occur in the United States at widely separated points, such minerals are not at all common.

In all places where lithium minerals visibly occur they are associated with granitic rocks and generally, if not always, with the latest phases of granitic intrusions, either in pegmatites or in granites and adjacent rocks which have been altered by hot gaseous emanations—a process known as pneumatolysis or pneumatolytic action. In some places large masses of lithium minerals which can be worked commercially are found in pegmatites, but in the altered granites only minor quantities of lithia mica are found. The places of occurrence of lithium are practically those of tin, but the large deposits of tin seldom contain workable deposits of lithium minerals. In the pegmatites, which may carry large quantities of lithium minerals, the tin deposits are generally small.

Lepidolite.—Lepidolite ranges in color through glistening white, yellowish, violet and lilac tints. It occurs generally in small indistinct plates but in places forms six-sided crystals belonging to the monoclinic system. At Pala, Cal., and at other places it forms an outer rim around muscovite plates several inches across.

In the United States lepidolite is found in Hebron, Auburn, Norway, Paris, Rumford, and other places in western Maine; in South Dakota in considerable quantities in connection with the tin deposits of the southern Black Hills; and in great quantity with the beautiful red tourmaline, rubellite, in the neighborhood of Pala, San Diego County, Cal. At the Stewart mine, 2 miles north of Pala,² a mass of delicately tinted lilac-colored lepidolite showed a lenticular surface exposure 90 feet broad and 25 feet thick. In 1907 a drift at right angles to the exposure had been driven 125 feet in the lepidolite. Several hundred tons were mined and shipped from this deposit. Rubellite, also containing lithia, forms beautiful radial aggregates enclosed in the mass of lepidolite. Many thousand specimens obtained from this locality are distributed through the mineral collections of the world. After the spodumene and amblygonite deposits in the Black Hills of South Dakota were opened up it no longer paid to operate the Pala deposits. In the Black Hills lepidolite also was at one time worked to a small extent for its lithia content. At many other localities lepidolite is found in occasional flakes or small masses. At Wakefield, Canada, lepidolite occurs in plates several inches across.

Other lithium micas are cookeite, zinnwaldite, cryophyllite, polyolithionite, and protolithionite. Zinnwaldite containing

¹ Clarke, F. W., "The Data of Geochemistry," *Bull. U. S. Geol. Survey*, 330, 17 (1908).

² Personal communication from W. T. Schaller, U. S. Geol. Survey.