

perature without coming into contact with the fuel or products of combustion employed for heating the apparatus and reducing and refining the metals in one operation by the aid of the fluxes and reagents, which are selected in the proportions as hereinbefore explained according to the nature of the materials to be operated upon, in such a manner as to enable the chemical reactions and combinations to take place, which are necessary to insure the volatile and other elements forming suitable combinations, in order to liquify the charge and enable the desired metal to be run off or collected separately and in a state of purity, substantially as hereinbefore described. 2nd. A furnace or apparatus constructed with a reducing or working chamber or crucible provided with a closable charging orifice at the upper part, and with a closable tapping or discharging orifice at the lower part, and provided with means for heating it externally, substantially as hereinbefore described. 3rd. For extracting metals from ores and the like according to the method or process hereinbefore described, and claimed: a furnace or apparatus, constructed with a continuous or annular combustion chamber diminishing in width from the lower to the upper part, and surrounding a central chamber or crucible for containing the ore or materials to be treated, the said chamber or crucible being provided with a closable charging orifice at the upper part, and with a closable discharging orifice at the lower part, and with means for heating it externally, substantially as hereinbefore described with reference to the accompanying drawings. 4th. A furnace or apparatus constructed with a reducing or working chamber, or crucible made of refractory composition, and provided with a closable charging orifice at the upper part, and with a closable tapping or discharging orifice at the lower part, and with means for heating it externally, substantially as hereinbefore described. 5th. This furnace or apparatus, and the chamber or crucible made of a refractory material or of any compound of refractory substances, substantially such as herein described, or of any other simple or combined material capable of resisting the degree of heat required for each metal to be reduced in the crucible.

**No. 39,592. Magneto-Electric Ignator for Vapour Engines.** (*Appareil d'ignition magnéto-électrique pour machines à vapeur.*)

Leonidas Gorham Woolley, Grand Rapids, Michigan, U. S. A.,  
1st August, 1892; 6 years.

*Claim.*—1st. In a device of the class described, in combination, with an armature rotating between the poles of a permanent magnet and periodically producing electrical tension in a coil around said armature, a rotating shaft in the head of the combustion chamber, a T-head on the end of the shaft adapted to engage a brush in the circuit arranged within the combustion chamber, and a flexible connection between said shaft and the armature shaft, arranged substantially as and for the purposes set forth. 2nd. In a device of the class described, in combination with an armature rotating between the poles of a permanent magnet, and a sparker arranged within the combustion chamber adapted to break the circuit the instant the tension is on, as set forth, a brush in the circuit attached to the stationary parts, and a circuit closing device attached to the moving parts of the engine, substantially as set forth. 3rd. In a device of the class described, in combination with an armature rotating between the poles of the permanent magnet, and periodically producing electrical tension in a coil around said armature, a sparker consisting of a rotating head engaging with a brush in the circuit insulated from the rest of the machine, arranged within the combustion chamber, a brush insulated from but attached to the stationary parts and connected to the brush inside the chamber, and a plate attached to the moving parts of the engine, adapted to periodically engage the brush for closing the circuit and holding it closed by producing a succession of sparks, substantially as set forth. 4th. In combination, with a combustible vapour engine, an electric machine adapted to produce a pulsating current and a current breaker located within the combustion chamber of said engine, moving synchronously with the armature of said electric machine and adjusted to break the circuit, only at the point of the highest tension of said current, substantially as described. 5th. In combination, with a combustible vapour engine, an armature rotating between the poles of a magnet and periodically inducing electrical tension in a coil, and an electric circuit permanently connected to said coil and to a sparker within the combustion chamber of said engine, said sparker adjusted to break said circuit at the time of highest electrical tension in said coil and at no other time, substantially as described. 6th. In combination, with a combustible vapour engine, an armature revolving between the poles of a magnet and periodically inducing electrical tension in a coil, an electric circuit permanently connected to said coil, and to a sparker located in the combustion chamber of said engine, adapted to break the circuit at the time of highest tension in said coil and at no other time, and a closer in said circuit attached to the moving parts of said engine, adapted to close said circuit at the proper time to fire the charge of combustible vapour, substantially as described.

**No. 39,593. Apparatus for Making Bi-Sulphate of Lime.** (*Appareil pour la fabrication de bisulfate de chaux.*)

William Harmon Howell, Thorold, Ontario, Canada, 1st August, 1892; 6 years.

*Claim.*—1st. In an apparatus for producing bi-sulphite of lime, the combination, with a retort or furnace for burning sulphur, of a receiver for containing a solution of milk of lime and having an inlet pipe for the solution, a pump, whereby the solution is delivered through said inlet pipe, and a nozzle or jet pipe arranged in said inlet pipe and connected with the retort or furnace, whereby the gas issuing from said nozzle is enveloped by the milk of lime flowing through said inlet pipe, substantially as set forth. 2nd. In an apparatus for producing bi-sulphite of lime, the combination, with a retort or furnace for burning sulphur, of a cooler or condenser connected with said retort and receiving the acid fumes from the same, a receiver for containing a solution of milk of lime having an inlet pipe for the solution, a pump, whereby the solution is delivered through said pipe, and a nozzle or jet pipe arranged in said inlet pipe and receiving the sulphurous acid gas from the cooler, substantially as set forth. 3rd. In an apparatus for producing bi-sulphite of lime, the combination, with a retort or furnace for burning sulphur, of a cooler or condenser connected with said retort and receiving the acid fumes from the same, a receiver for containing a solution of milk of lime having an inlet pipe for the solution, a pump, whereby the solution is delivered through said pipe, a nozzle or jet pipe arranged in said inlet pipe and receiving the sulphurous acid gas from the cooler, and a valve arranged in said inlet pipe, whereby the velocity of the inflowing liquid is regulated, substantially as set forth. 4th. In an apparatus for producing bi-sulphite of lime, the combination, with a retort or furnace, of a receiver for containing milk of lime, having an inlet pipe provided with a valve casing, a pump, whereby the solution is directed through said inlet pipe, a tapering nozzle or jet pipe arranged in said valve casing and receiving the sulphurous acid gas from the retort, and a tubular regulating valve sliding in said inlet pipe, and having an actuating rod or stem extending through said valve casing, substantially as set forth. 5th. In an apparatus for producing bi-sulphite of lime, the combination, with a retort or furnace for burning sulphur, and a cooler which receives the sulphurous acid gas from the retort, a receiver for containing milk of lime having an inlet pipe for the solution, a nozzle arranged in said inlet pipe and receiving the gas from the cooler, a pump, whereby the solution is circulated through the receiver and a cooler applied to the pipe or conduit between the pump and the receiver, substantially as set forth.

**No. 39,594. Pulp Digester.** (*Pourrissoir de pâte à papier.*)  
William Harmon Howell, Thorold, Ontario, Canada, 1st August, 1892; 6 years.

*Claim.*—1st. A pulp digester or boiler, consisting of a metallic shell having an interior lining or coating composed of cement, sand, galena and asphaltum, substantially as set forth. 2nd. The combination, with the shell of a pulp digester, of a heating coil arranged in the same and connected with a water supply and an injector, whereby water is forced through said coil, substantially as set forth. 3rd. The combination, with the shell of a pulp digester, and a heating coil arranged in said shell, of a water chamber communicating with said coil and an injector, whereby the water in said chamber is circulated through the heating coil, substantially as set forth. 4th. The combination, with the shell of a pulp digester, and a heating coil arranged therein, of a water supply chamber, inlet and return pipes connecting the heating coil with said chamber, and a steam injector arranged in said inlet pipe, whereby the water in said chamber is directed through the heating coil, substantially as set forth. 5th. The combination, with the shell of a pulp digester, and a heating coil arranged therein, of a water supply chamber having an exit or overflow pipe and an automatic valve applied to said pipe, inlet and return pipes connecting the heating coil with said chamber, and a steam injector arranged in said inlet pipe, whereby the water in said chamber is directed through the heating coil, substantially as set forth. 6th. The combination, with the shell of a pulp digester, and a heating coil arranged therein, of a water supply chamber having an exit or overflow pipe, a valve applied to said pipe and controlled by a float arranged in the water chamber, an inlet pipe connecting one end of said coil with the interior of the water chamber and having a suction pipe, a steam injector arranged in said inlet pipe, and a return pipe connecting the other end of the coil with the water chamber, substantially as set forth.

**No. 39,595. Furnace and Method for the Treatment of Refractory Ores.** (*Fourneau et méthode pour le traitement des minerais réfractaires.*)

Charles James Fauvel, London, England, 1st August, 1892; 6 years.

*Claim.*—1st. A furnace for the treatment of refractory ores, comprising an oxidizing tower wherein a series of inclined slabs and flues in connection therewith are so arranged, that the slabs are heated progressively in the downward direction, by an upwardly flowing current of furnace gases passing through the flues beneath the slabs, and wherein the falling stream of ore is gradually heated, and subjected to the oxidizing and "sweetening" action, by falling over and down said series of heated slabs and by meeting a current of air