No. 679,973. Patented Aug. 6, 1901.

D. LANCE, R. L. E. DE BOURGADE & L. SCHMITZ.

ELECTRIC FURNACE.

(Application filed Mar. 28, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1

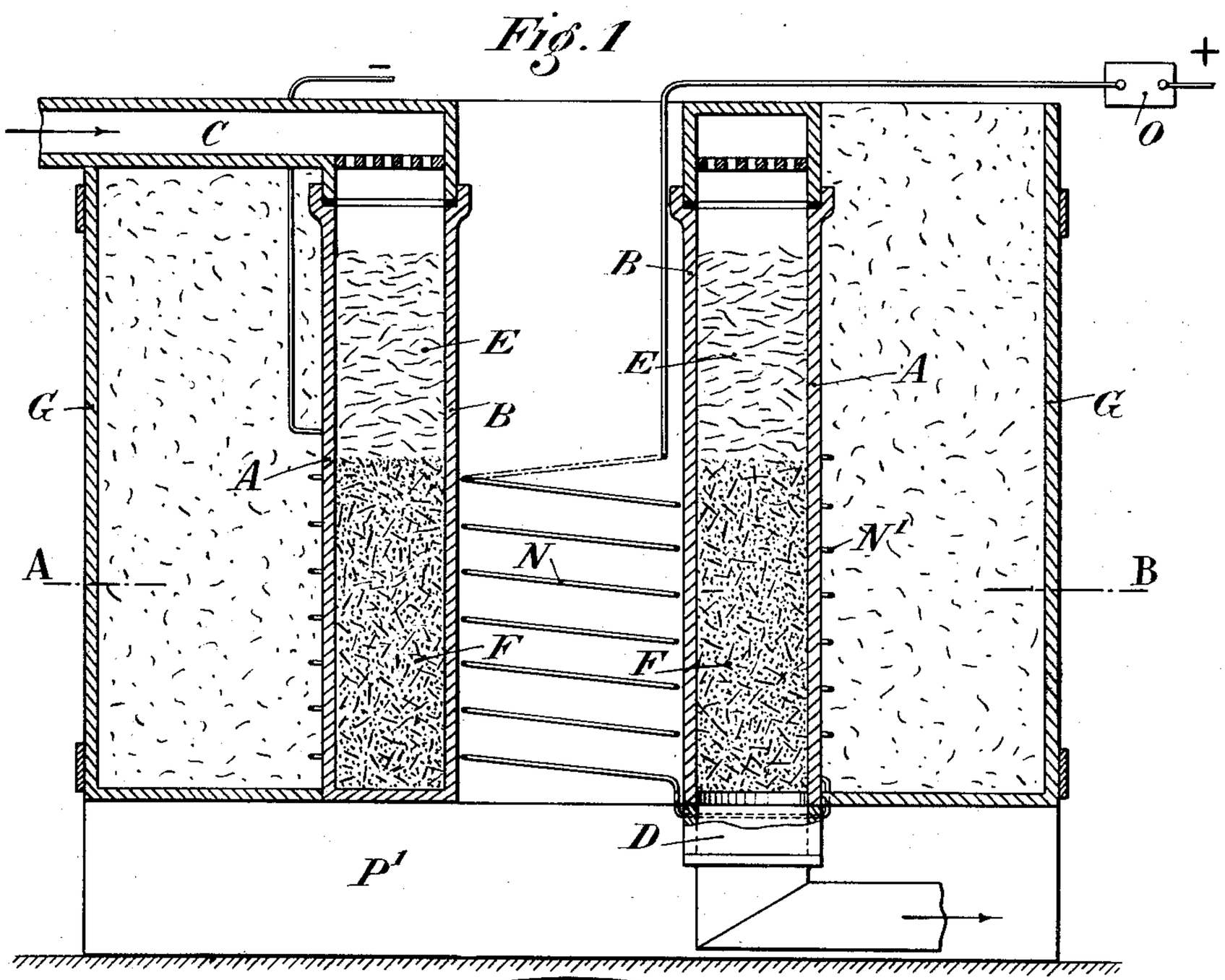
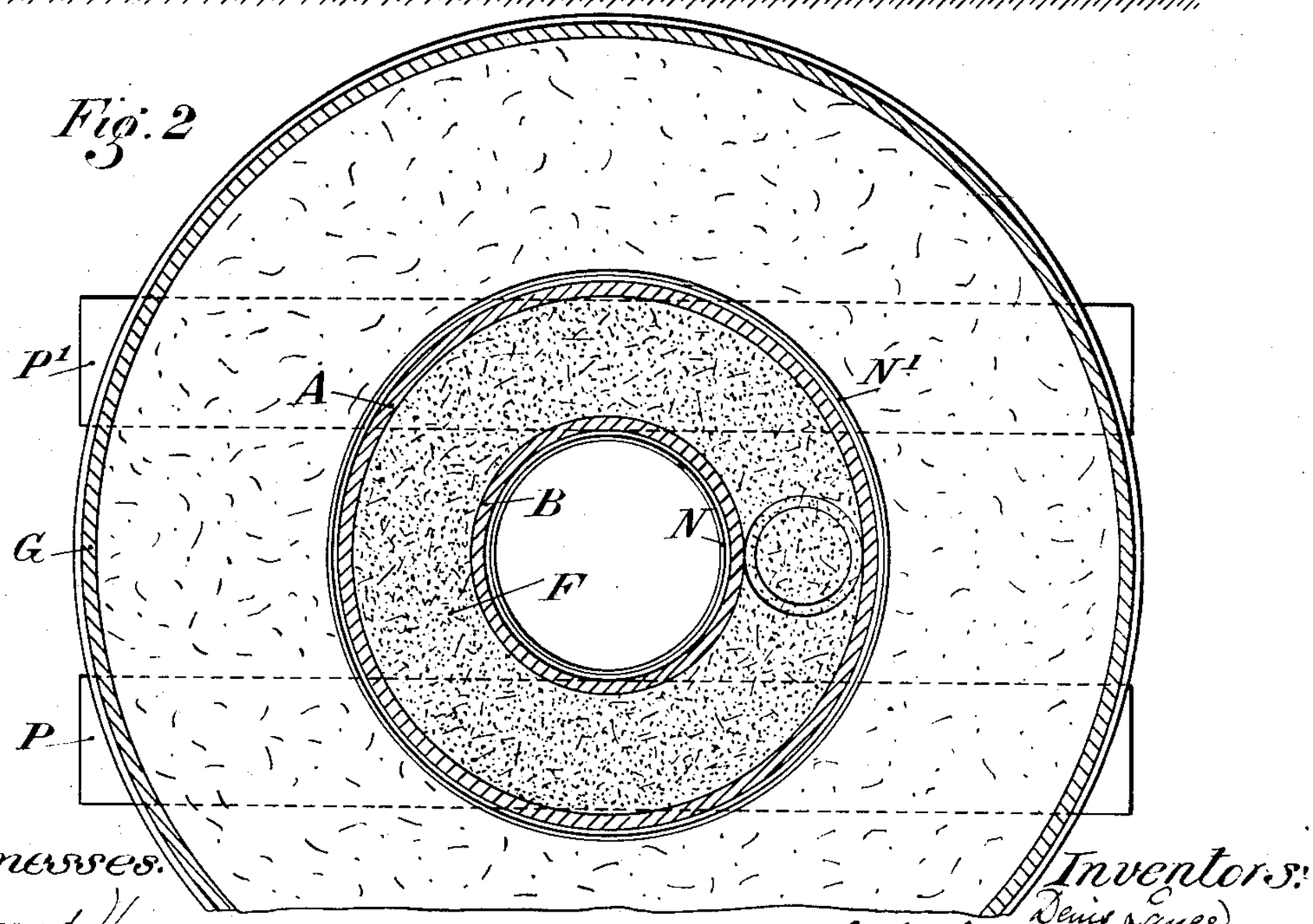


Fig. 2



Witnesses:
Edward Neese
George Barry Jr.

Inventors:
Denis Lance
Rathel Louis Emmanuel Eugène de Bourgade
Léon Schmitz
by attorneys
Brown & Seward

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Fig. 5

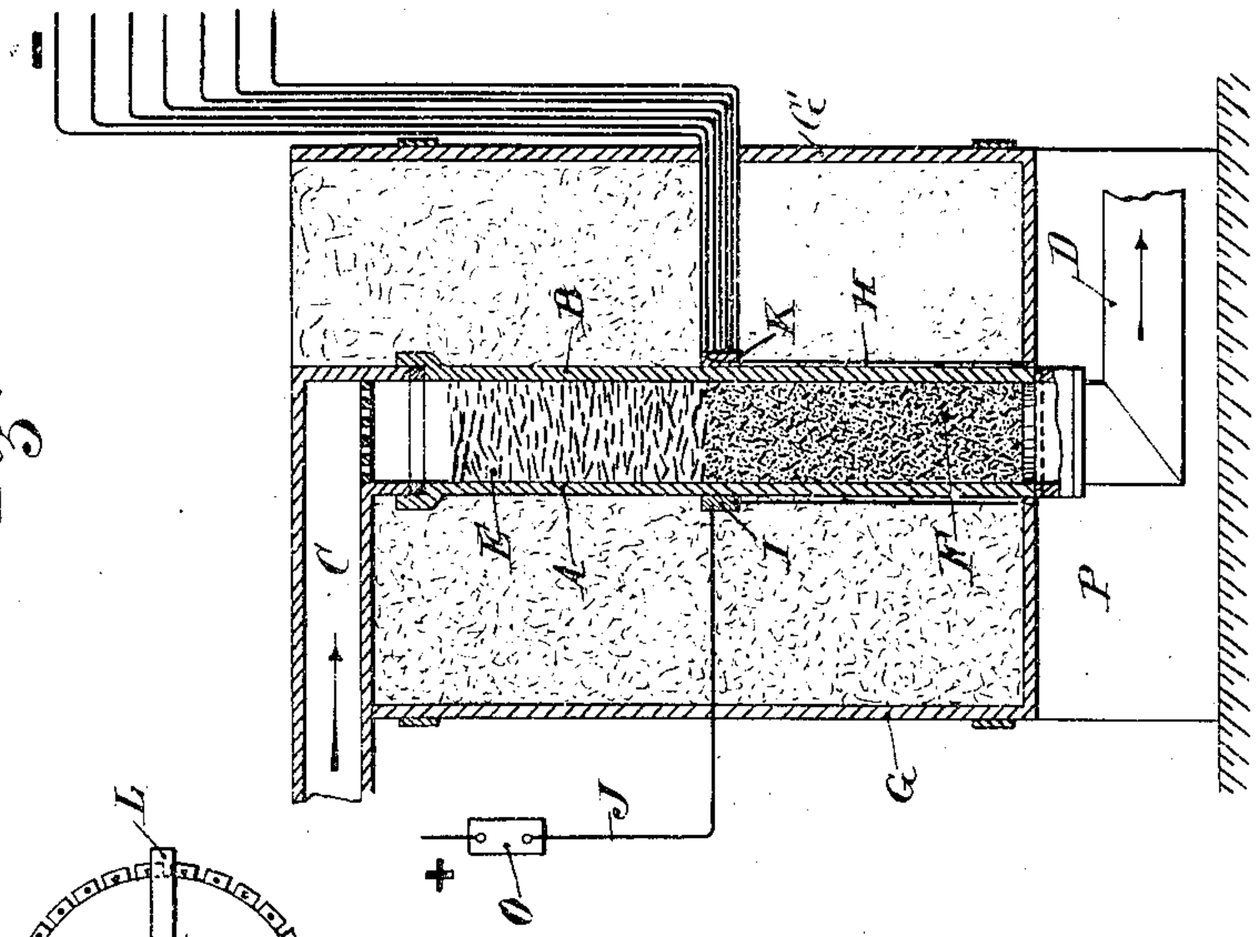


Fig. 4

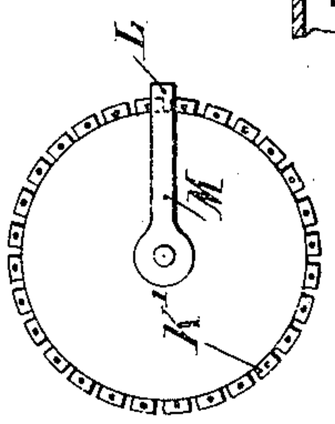
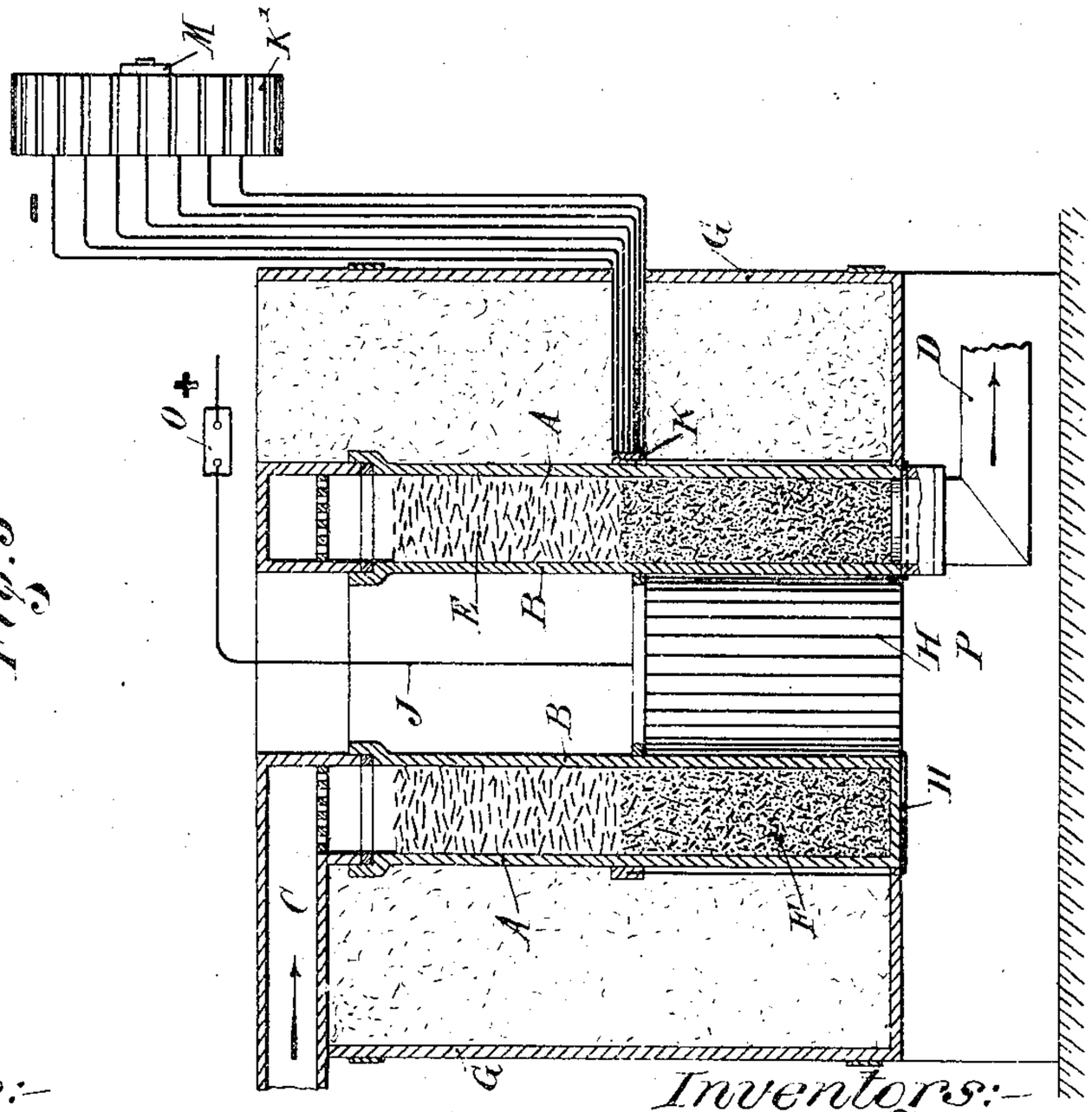


Fig. 3



Witnesses:-
Edward Vieser
George Barry Jr.

Inventors:-
Louis Lance
Raphael Louis Emmanuel de Bourgade
Léon Schmitz
by attorneys Howard & Howard

UNITED STATES PATENT OFFICE.

DENIS LANCE, RAPHAÉL LOUIS EMMANUEL DE BOURGADE, AND LÉON SCHMITZ, OF PARIS, FRANCE.

ELECTRIC FURNACE.

SPECIFICATION forming part of Letters Patent No. 679,973, dated August 6, 1901.

Application filed March 28, 1899. Serial No. 710,822. (No model.)

To all whom it may concern:

Be it known that we, DENIS LANCE, doctor of sciences, RAPHAÉL LOUIS EMMANUEL DE BOURGADE, doctor of medicine, and LÉON SCHMITZ, engineer, citizens of the Republic of France, and residents of Paris, France, have invented new and useful Improvements in Electric Furnaces, of which the following is a specification.

Our improvement has a twofold object—first, to obtain an internal temperature sensibly uniform in all parts of the furnace and capable of being regulated as desired, and, second, to insure the uniform distribution through the furnace of gases admitted to it for any reaction and bring them to the same pressure on the substances in the furnace on which they have to act, and, further, to provide that the gaseous products of reaction escape as soon as the reaction is completed, so as to avoid secondary objectionable reactions, this being a most important point. We thus produce a continuously-acting electric furnace providing the best conditions, even in respect of economical heating, for effecting reactions requiring well-regulated temperatures, and, on the other hand, producing bodies which would furnish new combinations and so compromise the result of the operation were the gases left in the furnace.

In order to attain the first of the objects above mentioned, we give the furnace a form which may be annular or straight, very narrow, with its two walls heated externally by electrical resistance, the current traversing the wires or strips to produce the heat being regulated by any suitable means—for instance, by employing a rheostat. Owing to the small distance between the walls of the furnace the internal temperature is practically the same in the middle as at the sides. On the other hand, all parts of the length are equally heated.

In order to attain the second object mentioned above, we admit the gases to the furnace under the following conditions: The gases are admitted at the top, and before they reach the substances on which they are to react they become diffused in the part of the furnace above these substances, this part containing fragments of porcelain or other material to divide the gases and cause uniform pressure throughout. Then only do they reach the substances intended to produce the reaction, which are arranged on the bottom in a more or less thick layer, according to the operation to be performed and the time during which the chemical substances placed on the bottom of the furnace and the gas admitted to the latter by the upper opening must remain together. An opening at the bottom allows the gaseous products to escape.

Figure 1 of the annexed drawings is a vertical section of an improved furnace, in annular form, in which the heating is understood to be obtained by means of two wire coils arranged near the external surfaces of the two furnace-walls. Fig. 2 is a horizontal section on the line A B of Fig. 1. Fig. 3 is a view like Fig. 1, on a reduced scale, provided with a distributer which sends the current successively through the parallel wires or strips arranged against the furnace-walls. Fig. 4 is a side view of the distributer. Fig. 5 is a transverse section, to the same scale as Fig. 3, of our furnace in straight form furnished with a current-distributer, as in Figs. 3 and 4.

In all the figures like letters denote like parts.

A and B are the two walls, which are at a very small distance apart and made of porcelain or other suitable material.

C is the gas-admission tube.

D is the outlet for gas.

The upper part E of the space between the walls A and B is filled with fragments of porcelain or other material for the purpose stated above and constitutes the gas-supplying chamber. The lower part F of this space is the reaction-chamber, containing the substances on which the gases are to act. If, for instance, cyanides are to be produced, this chamber contains either fragments of carbon or small perforated plates or rods of carbon.

G, Figs. 1 and 3, is an envelop of refractory material containing sand and asbestos or other suitable material.

When the furnace is of the straight kind, as shown in Fig. 5, a similar lining G G′ is applied to both walls, unless several furnaces

are arranged side by side, in which case they give heat to one another and no lining is required except on the two outer walls. In the furnaces shown in Figs. 3, 4, and 5 the reaction-chamber F is heated over all its surface and the two sides by a set of wires or strips H, conductors of electricity, all fixed at one end to a conducting-bar I, to which the current is conducted by a conductor J, and each of them is attached to a post K, respectively connected to different contacts K′ of the current-distributer. Over these contacts a contact L, fixed on an arm M, revolves, so that the current is sent successively to the wires H. The contact L may be of such length as to be always in contact with two of the contacts K′, so that there is no interruption of the current. The current might also pass continuously through all the wires H, in which case the distributer would of course be dispensed with.

In the furnace, Fig. 1, the heat is obtained from two conducting-coils N N′, which are in connection with each other and with the source of electricity, with a rheostat O interposed, as in the former case.

P′ indicates low walls or other suitable supports on which the furnace is mounted.

We claim—

1. In an electric furnace, a reaction-chamber having a gas-inlet in its upper part and a gas-outlet in its lower part, means in the upper part of said chamber for subdividing the gases therein, resistance-wires adjacent to the walls of said chamber, and electrical connections with the said wires, substantially as herein described.

2. In an electric furnace, an annular reaction-chamber the walls of which are composed of refractory material which is a non-conductor of electricity, a resistance-coil adjacent to the outer wall of said chamber, a resistance-coil adjacent to the inner wall of said chamber, and electric connections with the two coils, substantially as herein described.

In testimony that we claim the foregoing as our invention we have signed our names, in presence of two witnesses, this 15th day of March, 1899.

DENIS LANCE.
RAPHAËL LOUIS EMMANUEL DE BOURGADE.
LÉON SCHMITZ.

Witnesses:
EDWARD P. MACLEAN,
ALCIDE FABE.