

(No Model.)

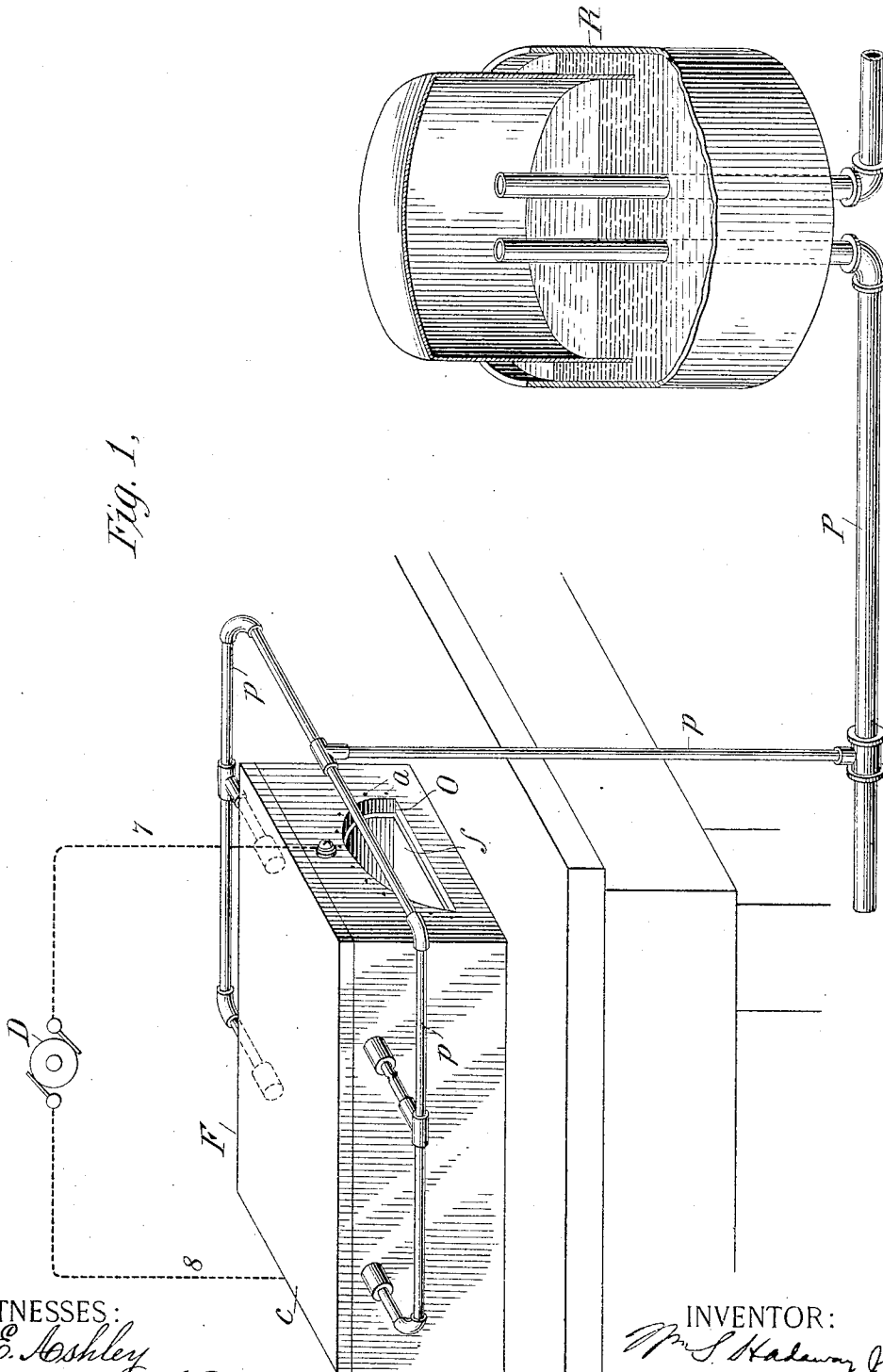
2 Sheets—Sheet 1

W. S. HADAWAY, Jr.
ELECTRIC FURNACE.

No. 579,324.

Patented Mar. 23, 1897.

Fig. 1.



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(No Model.)

2 Sheets—Sheet 2.

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Fig. 2,

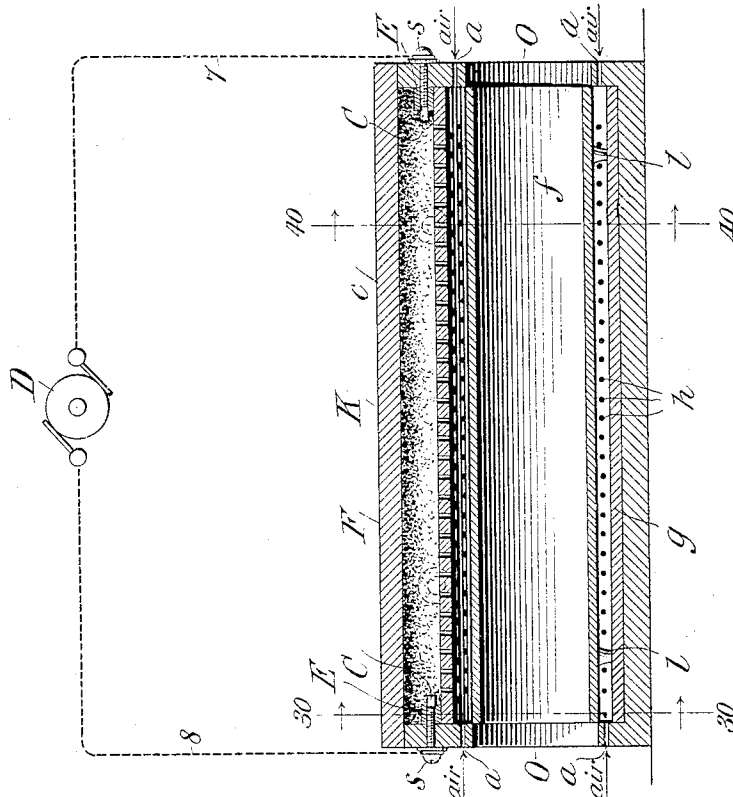


Fig. 3,

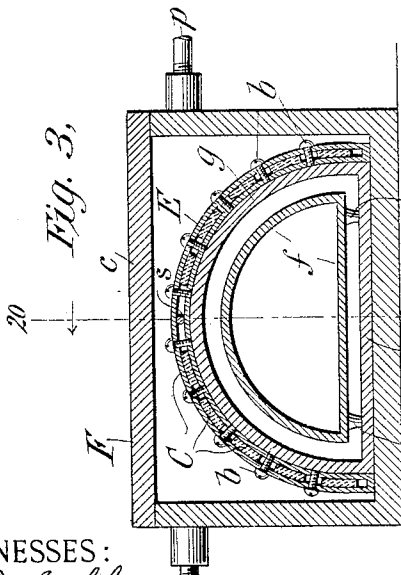
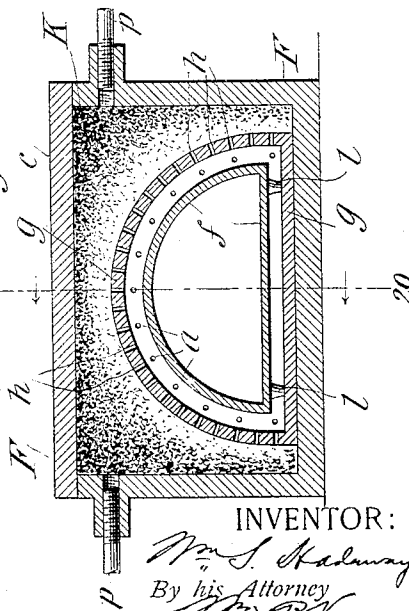


Fig. 4,



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UNITED STATES PATENT OFFICE.

WILLIAM S. HADAWAY, JR., OF NEW YORK, N. Y.

ELECTRIC FURNACE.

SPECIFICATION forming part of Letters Patent No. 579,324, dated March 23, 1897.

Application filed May 8, 1896. Serial No. 590,657. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. HADAWAY, Jr., a citizen of the United States, residing at New York, in the county and State of New York, have made certain new and useful Improvements in Electric Furnaces, of which the following is a specification.

My invention is an improvement in the method of and apparatus for generating and uniformly distributing heat over or upon a given surface, and is useful in burning the finer qualities of porcelain, in which the presence of carbon in the heated chamber or oven in any form or quantity is fatal to successful results.

The method consists in providing a mass of conducting fragments, such as carbon fragments, passing a current of electricity through such mass, so as to raise the temperature thereof, and subjecting the glowing mass to the action of a hydrocarbon gas, such as marsh-gas. As the hydrocarbon gas is decomposed the carbon element is deposited at the points of highest temperature, which points are the points of greatest electrical resistance, and such deposit of carbon lowers the resistance and equalizes it at all such points because the greater heat at such points does the greater amount of the work of reduction. Coincidentally with such deposit a gas containing oxygen at a suitable temperature is caused to combine with the hydrogen element of the dissociated hydrocarbon gas, forming a vapor which passes off through openings into the atmosphere at a rate in accordance with its rate of combination and the variations in pressure due to the operations in the decomposing-chamber.

The apparatus employed by me is best described by reference to drawings.

The accompanying drawings illustrate my invention.

Figure 1 is a perspective view of the exterior of my furnace and its connections with sources of hydrocarbon gas and electricity. Fig. 2 is a longitudinal cross-section on the line 20, Figs. 3 and 4. Fig. 3 is a cross-section on the line 30, Fig. 2; and Fig. 4 is a cross-section on the line 40, Fig. 2.

My furnace embodies two concentric tubular sections of fire-clay. The interior one, *f*, is open at both ends and constitutes the heated

chamber in which porcelain, for instance, is burned. These tube-sections are half-round and have one flat or plane wall each.

1 indicates the legs on which the section *f* is supported inside the section *g*. The space separating *f* and *g* is substantially uniform. The upper or semicircular wall of *g* is perforated with numerous small perforations *h*. There is an exterior case of fire-clay *F*, having a removable cover *c* and a series of coupling-pieces near the upper edge to receive the piping *p*. There are doors or openings *O* in the end wall of *F* of about the same size as (and coincident with) the diameter of the tube-section *f*, and there are a series of air-inlet holes *a* in the end walls of *F*, coincident with the space separating the tube-sections *f* and *g*.

Two electrodes *E*, semicircular in form, are located upon the curved wall of the tube-section *g* at each end thereof. Each electrode consists of a series of carbon blocks *C*, connected by strips of copper united by bolts *b*, placed between each pair of carbon blocks *C*.

D is a dynamo the terminals of which are connected to the electrodes *E* by suitable screw-posts *s* and conductors. The curved and perforated wall of the tubular section *g* is covered with a mass of broken fragments of carbon *K*.

R is a reservoir of hydrocarbon gas. I prefer to employ marsh-gas whenever it is obtainable. The reservoir *R* connects with pipes *P*, and smaller pipes *p* connect with the space between the exterior case *F* and the perforated wall of the tubular section *g*, more or less completely filled or occupied by the fragments of carbon.

When the current from *D* is turned on, the resistance offered by the interposed carbon fragments varies at different points and the course of the electric current in passing from one electrode *E* to the other varies. I have found that I am able to restrict the variations of the current by confining it to a comparatively narrow path, and for this reason I prefer to make the tube-section *g* narrow as compared with its length, that is to say, its diameter is a fractional part of its length. The variation in resistance at different points is due to variations in contact between adjacent carbon fragments. The hydrocarbon gas in-

produced under pressure burns at these points of high resistance and operates to equalize the temperature at all points. Some of the gas is forced through the interstices of the carbon into the space separating tube-sections *f* and *g*, where it mixes with atmospheric air entering through the holes *a*, and combustion takes place in the space separating the two tube-sections. No carbon in any form can gain access to the interior of the tube-section *f*, and the porcelain to be baked is placed therein and completely protected. The heat due to the electric current and the combustion of the gases is extremely high and results obtained by me are nearer perfection than any one has attained so far as I can learn.

What I claim, and desire to secure by Letters Patent, is—

1. The method of generating and uniformly distributing heat over a given surface which consists in passing a current of electricity through a mass of conducting fragments placed in close contact, subjecting the glowing mass to the action of a hydrocarbon gas and coincidently combining the carbon element of said gas with the glowing mass and the hydrogen element thereof with a free gas containing oxygen, substantially as described.

2. The combination of two concentric tube-sections of fire-clay separated by an air-space, a series of perforations in the upper wall of the exterior section, a mass of conducting fragments distributed uniformly upon said surface, two electrodes extending along said surface at opposite ends thereof forming the terminals of an electric circuit, respectively, a source or reservoir of hydrocarbon gas and openings in the exterior wall at the space be-

tween the tubular sections, substantially as described.

3. The combination in an electric furnace of two concentric semicircular sections of fire-clay united at their ends by a perforated wall and separated between said ends by an air-space, a series of perforations in the upper semicircular wall of the exterior section, a mass of carbon fragments located on said perforated wall, an inclosure for the upper surface of the exterior section two semicircular electrodes extending along the line of the ends of the exterior section each electrode forming the terminal of an electric circuit, a source of gas, and a pipe connection between said source and the space containing the fragments, substantially as described.

4. The combination in a furnace of two concentric tubular sections of fire-clay, an exterior case of fire-clay inclosing both said sections, a door or opening in the exterior case communicating with the interior tube-section, air-passages in the exterior case communicating with the space between the two tube-sections, a series of perforations in the upper wall of the outer tube-section, a mass of carbon fragments located on said upper wall, two electrodes, one extending across each end of said upper wall, an electric circuit including said electrodes and the interposed carbon fragments, a reservoir of hydrocarbon gas and a pipe connecting the space between the exterior case and the outer tube-section with said gas-reservoir, substantially as described.

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Witnesses:

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