

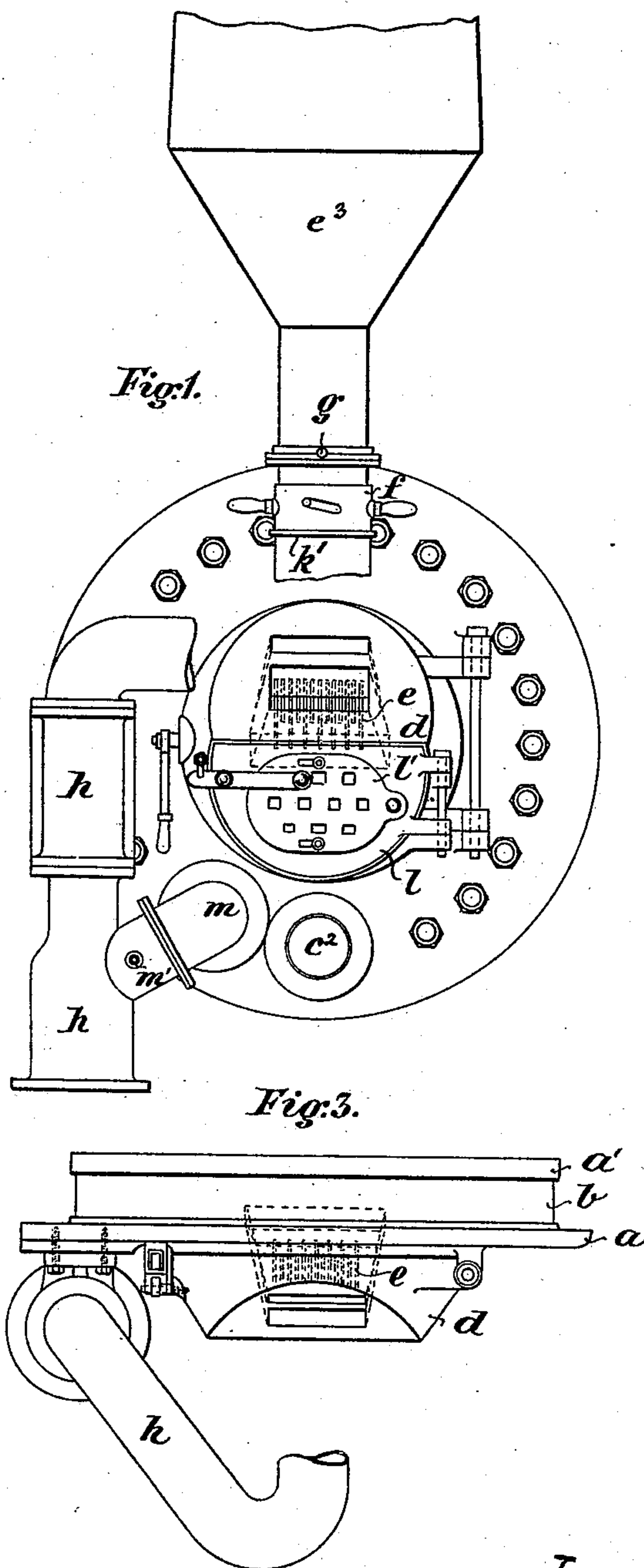
(No Model.)

3 Sheets—Sheet 1.

C. WEGENER.
FINE FUEL FURNACE.

No. 517,632.

Patented Apr. 3, 1894.



Witnesses:
Chas. E. Riordon,
Wm. B. Crowell.

Inventor:
Carl Wegener
By Butterworth & Downie
his attys

(No Model.)

3 Sheets—Sheet 2.

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Fig. 2.

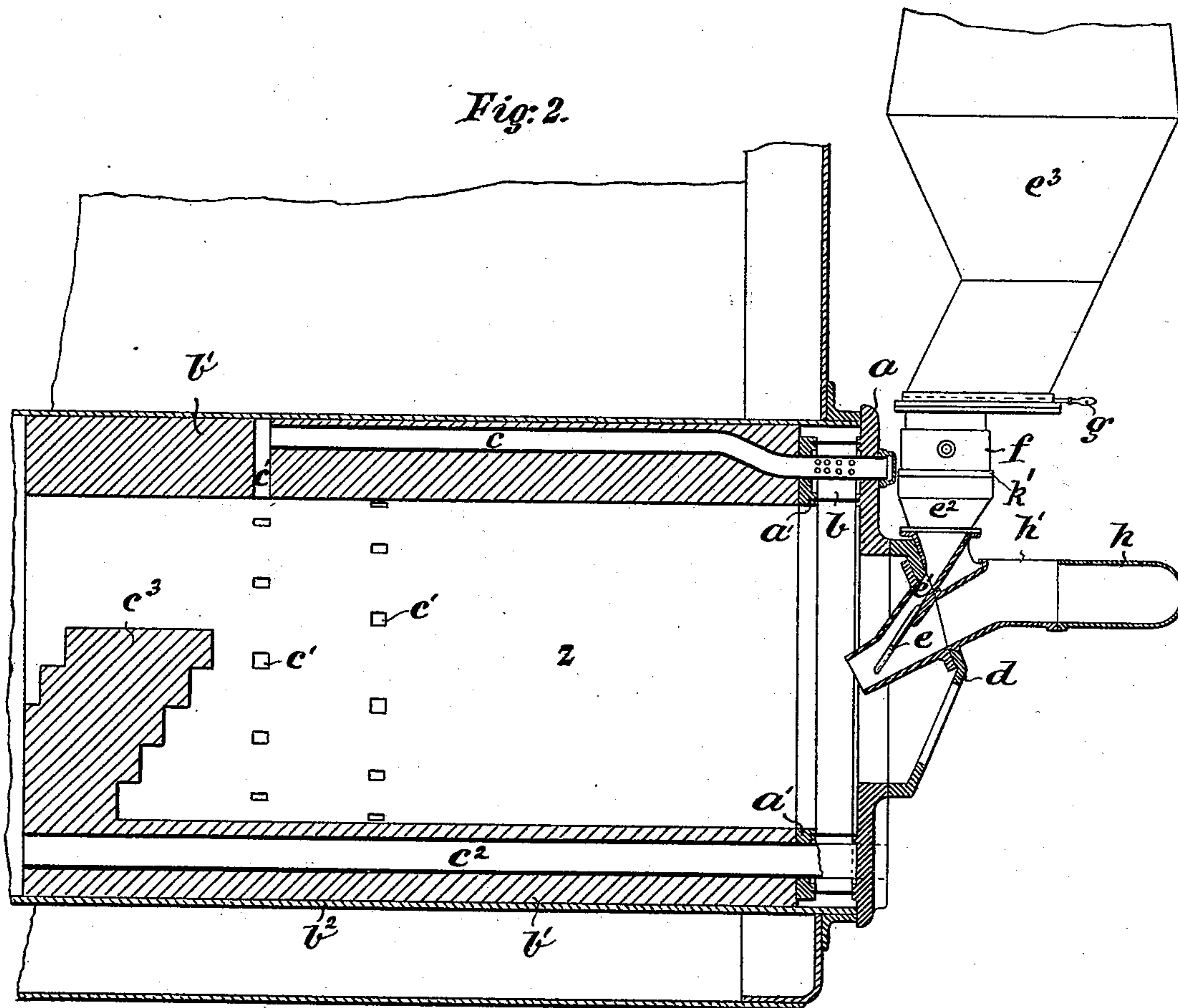


Fig. 4.

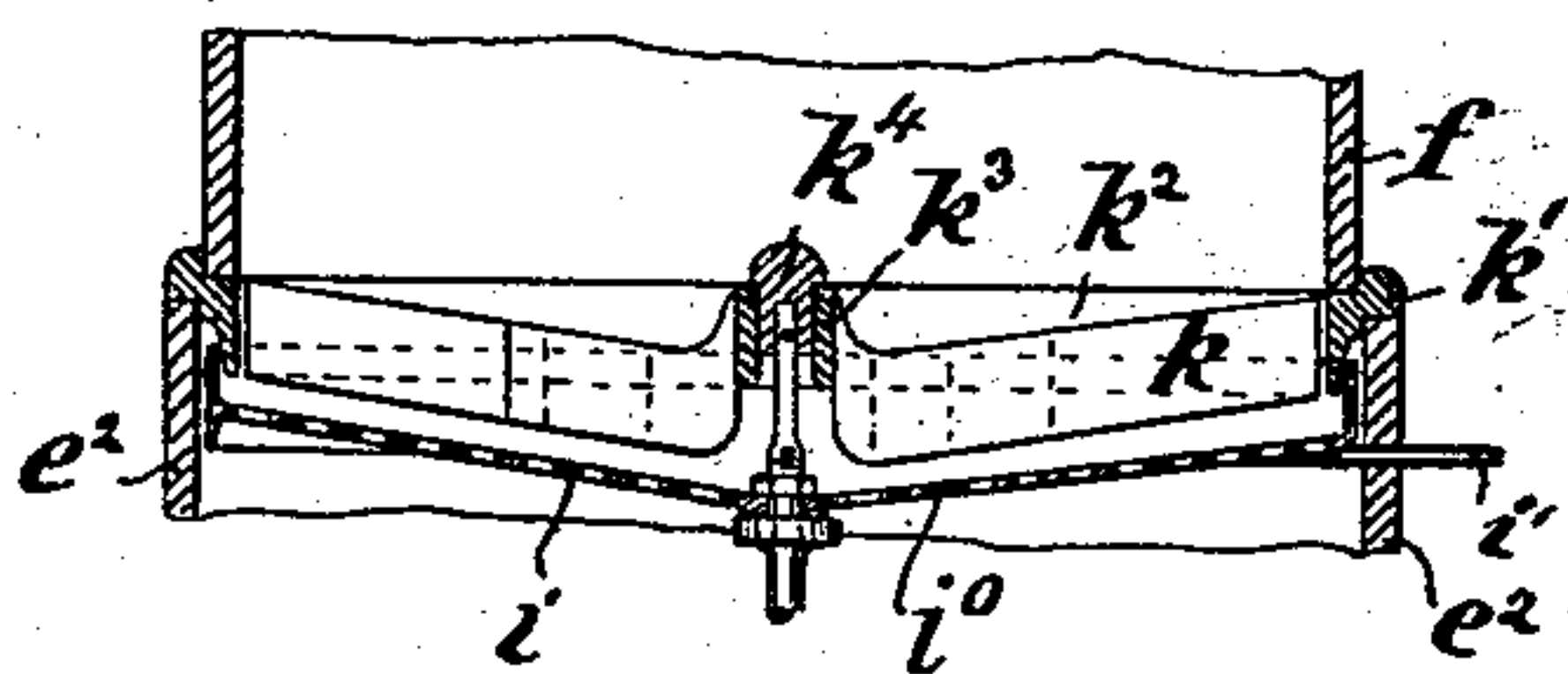
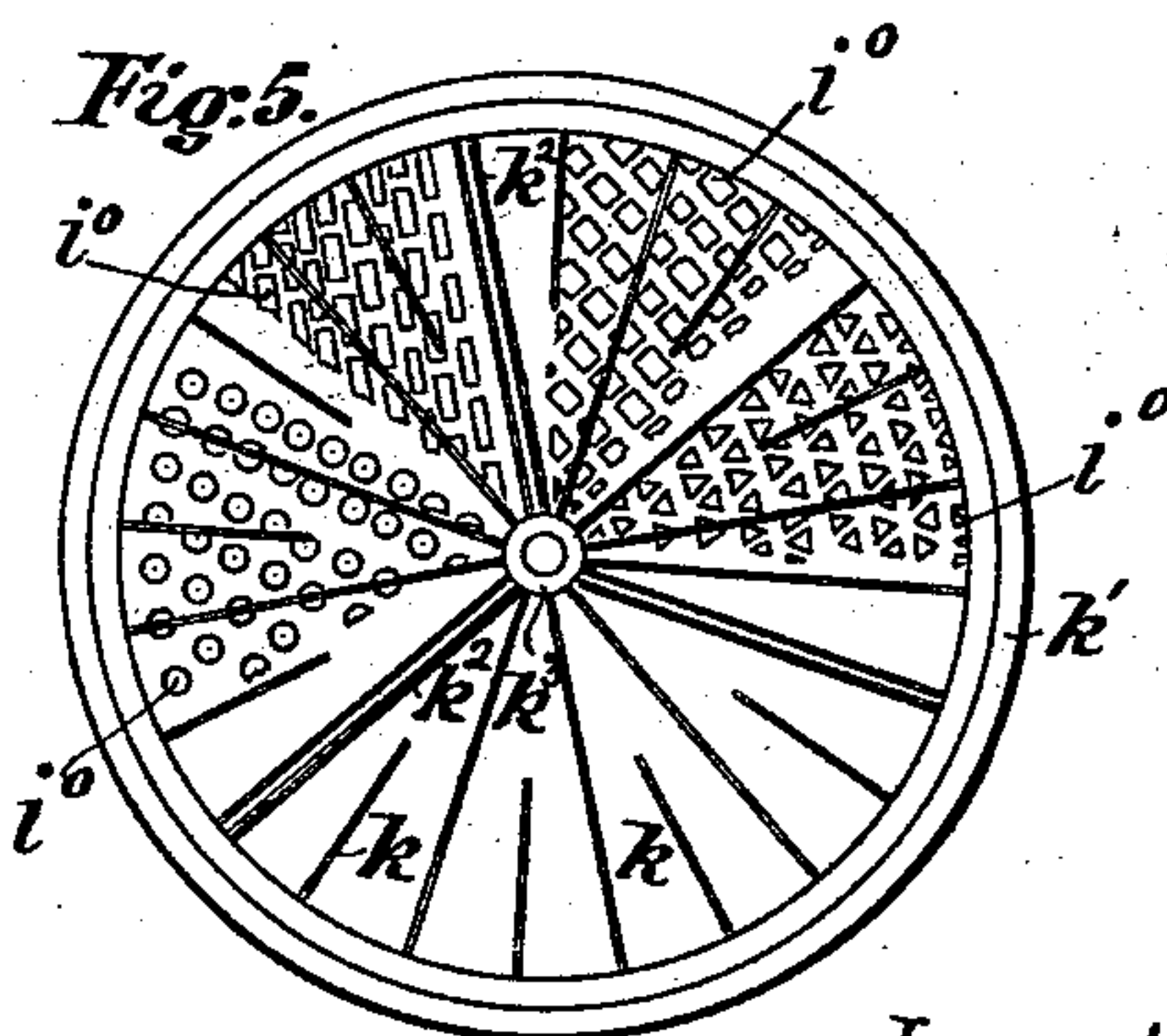


Fig. 5.



Witnesses:

Chas. E. Riordan

Wm. D. Crowell

Inventor:

Carl Wegener
By Butterworth &
Dowell, his attys

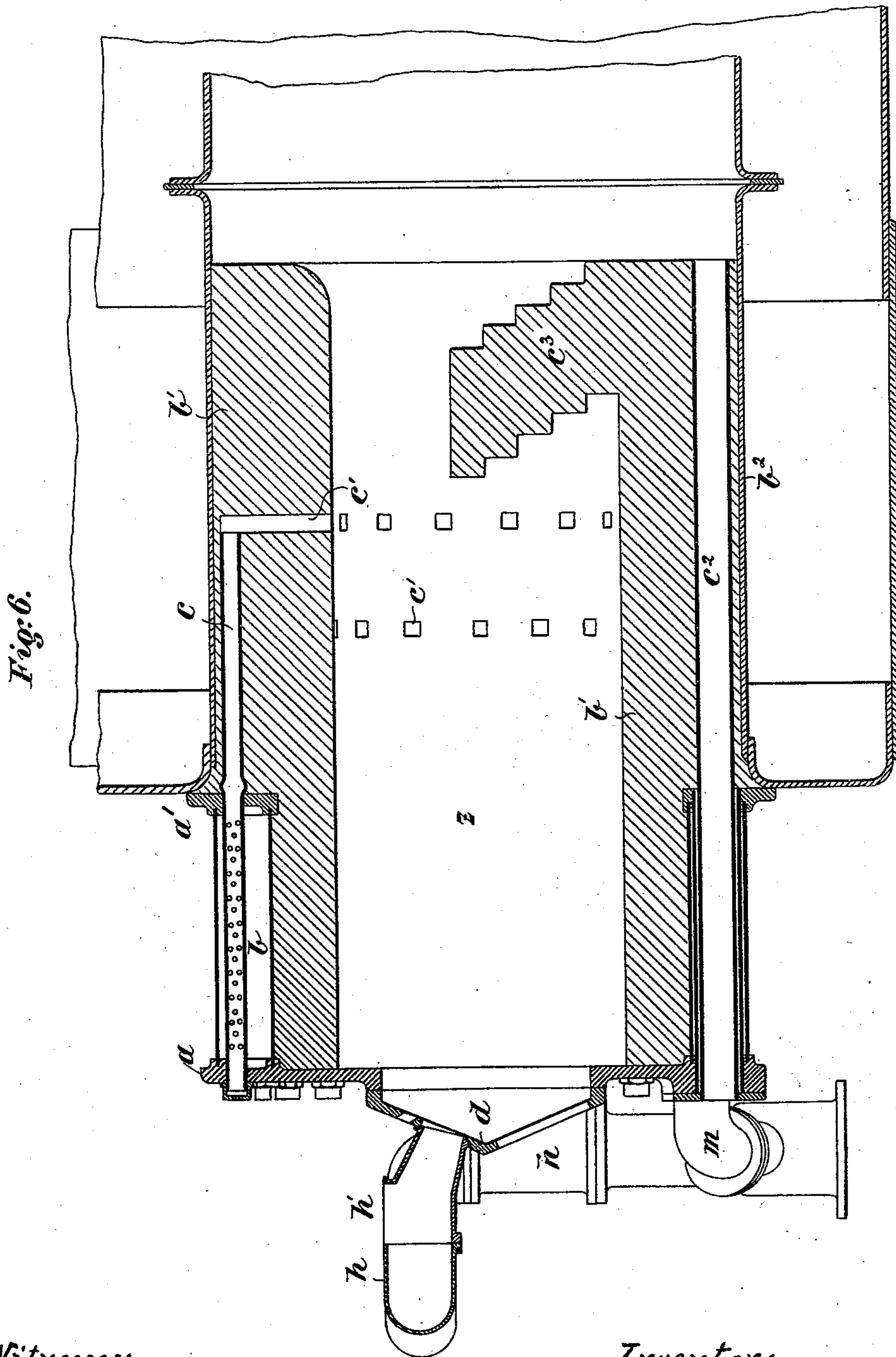
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UNITED STATES PATENT OFFICE.

CARL WEGENER, OF BERLIN, GERMANY.

FINE-FUEL FURNACE.

SPECIFICATION forming part of Letters Patent No. 517,632, dated April 3, 1894.

Application filed October 12, 1893. Serial No. 487,978. (No model.) Patented in France April 26, 1893, No. 218,265; in Belgium May 5, 1893, No. 104,531; in Italy May 15, 1893, LXVI, 485, and in Luxemburg August 29, 1893, No. 1,882.

To all whom it may concern:

Be it known that I, CARL WEGENER, a subject of the King of Prussia, residing at Berlin, in the Kingdom of Prussia, German Empire, have invented a new and useful Internal Boiler-Furnace for Fine Fuel, (for which I have obtained patents in Belgium, No. 104,531, bearing date May 5, 1893; in France, No. 218,265, bearing date April 26, 1893; in Italy, No. 485, Vol. LXVI, bearing date May 15, 1893, and in Luxemburg, No. 1,882, bearing date August 29, 1893,) of which the following is a specification.

This invention relates to that kind of firing apparatus described in the Patent No. 475,715 and in which coal dust or the like is used as fuel, and consists in an internal furnace for steam boiler flues appropriate to the combustion of fine fuel.

The new furnace will now be fully described with the aid of the accompanying three sheets of drawings.

Figures 1, 2 and 3 show a front elevation, a longitudinal vertical section and a plan view respectively of a furnace of a boiler with the invention applied to it, while Fig. 6 shows a longitudinal vertical section of a somewhat modified form of construction. Fig. 4 is a vertical section and Fig. 5 a plan of the coal dust supplying device.

The combustion chamber z (Fig. 2) is inclosed or surrounded by a wall b' of firebrick or other refractory substance and which, as will be seen from the drawings, is in the form of a hollow cylinder; this wall serves for a lining to the front part of the fire tube or flue b^2 and forms at its rear a bridge c^3 . This bridge is of the construction shown in the drawings, that is to say, it leans forward or stands out projectingly, and it thus successfully prevents the passage into the rear part of the flue b^2 of any large and unburned quantities of the material which may be employed in the first instance for setting the coal dust alight, besides which, the bridge will aid or promote the whirling motion of the gases in the combustion chamber z . This combustion chamber has at its front end and around the edge of the flue a suitable plate a and the current of air carrying along with it the coal

dust passes into the furnace through this plate a hereinafter called the furnace front. The other portion of the air, which is necessary for the combustion, is introduced by means of small passages c' . These small channels or passages c' pass, as will be seen from Fig. 2, through the wall b' , and open out of and are at right angles to the longitudinal passages or tubes c , the latter c passing from the space b , inclosed between the furnace front a and the ring a' which is placed at the front face of the wall b' . The front ends of the passages or tubes c , are, as shown, perforated and thus the air coming from a suitable conduit h , and a branch conduit m , Fig. 1, (provided with a regulating appliance m') passes through the annular chamber b and along the passages c c' to the furnace. This air is subjected to considerable preliminary heating or warming owing to its passage through the annular space b and especially through the longitudinal passages or tubes c and it is by reason of this that a complete combustion of the coal dust takes place. The fire-brick wall incloses further at its lower end a longitudinal passage or tube c^2 , the rear end of which opens into the flue while to its front end, passing through the ring a' and the annular space b , is fitted a removable cover. By this means, the flue b^2 of the furnace can be cleared of any small ash or soot by means of a blast of air or steam.

The parts by which the coal dust is blown into the furnace and which for convenience of description will be hereinafter referred to as the blast feed may, in a similar manner to that described in the above mentioned Patent No. 475,715, be so applied to the furnace front a that they can be swung round therefrom, for example on the vertical axis of the conduit h (Fig. 1) serving for the introduction of the air. The hopper e^3 does not however take part in this movement but is rigidly fixed in any suitable manner to the boiler. It is therefore only connected with the blast-feed by means of an easily loosened collar or sleeve f fitted under the valve g .

The furnace front a is fitted with a sufficiently large door d ; so that, when the blast feed is turned aside, there will be convenient

access to the combustion chamber. In the normal position of the blast feed it lies tightly against the upper part of this door which is suitably broken away, while there is fitted to the under part of the door a second and smaller door *l* for preheating and for cleaning the combustion chamber *z*. Into this latter, air of atmospheric tension can be let by means of a register *l'* which is fitted to the door *l*.

The construction of the furnace, shown in Fig. 6, only differs from the one just described in respect of the ring formed air space *b*. This is here projecting from the flue and lined with refractory material in the same manner as the front part of the flue. Of course either of these forms of air space (that is, as in Fig. 2 or as in Fig. 6) or a combination of the two may be employed, according to the space available at the front of the boiler, or to the diameter of the flue.

The means for introducing the coal dust are also shown in Figs. 1 to 3. The lower extremity of the supply hopper *e*³ which is provided with the valve *g*, is of a knee shape so that the disintegrating and supplying device *i*, Fig. 4, situated below the collar or sleeve *f*, receives only a slight and uniform pressure independent of the amount of coal dust which may happen to be in the hopper. Further there is shown an appliance to cause the disintegrated or powdered fuel to be evenly discharged into the current of air. The sloping channel *e'*, into which enters the powdered fuel coming from the funnel *e*², arranged under the disintegrating and distributing appliance, terminates for this purpose in a number of narrow gutters *e*, arranged in form of a comb with intervening spaces. The current of air passing between these gutters *e* carries along with it the powdered fuel in a uniform and regular manner.

The disintegrating or powdering and distributing appliance (Figs. 4 and 5), which, in the main, are similar to those described in the aforesaid patent No. 475,715 consists of the circular sieve *i* provided with perforations *i*⁰ of any suitable shape and moved to and fro on a vertical axis by means of a pin *i'*. The layer of coal dust lying on the sieve or grating *i* tends to partake of the to and fro motion of the said sieve, whereby the disintegrating and sieving effect is impaired. To avoid this, strips *k* are fastened radially and vertically to the ring *k'* which lies between the hopper *e*² and the above collar or sleeve *f* so that it can be easily removed on the blast feed being turned sidewise. It is further connected with a nave *k*³ by means of webs *k*², a cap *k*⁴ being provided on the nave *k*³, which will then serve as a guide for the vertical axis of the grating or sieve *i*.

What I claim is—

1. An internal boiler flue furnace for fine fuel consisting of a fire brick cylinder (*b'*) arranged within the fore part of the flue and

forming the combustion chamber, a furnace front (*a*) closing the entrance of the combustion chamber, an annular air chamber (*b*) fed with air and connected with air conduits (*c c'*) leading through the walls of the said cylinder into the combustion chamber and means for blowing the coal dust into the latter, substantially as described and shown.

2. An internal boiler flue furnace for fine fuel, consisting of a fire brick cylinder, a furnace front, an annular chamber and conduits in the walls of the said cylinder for supplying the combustion chamber with air, means for blowing the coal dust into the combustion chamber and a tube passing longitudinally through the lower part of the fire brick cylinder for the purpose of clearing the flue by means of compressed air or steam, substantially as shown and described.

3. An internal boiler flue furnace for fine fuel consisting of a fire brick cylinder, an annular air chamber and air conduits in the walls of the cylinder, a central door in the front of the furnace provided with openings and with a supplemental smaller door, a blast device arranged to swing upon a vertical axis in front of said central door, and resting in contact with the upper part of the latter when not swung aside, and a fixed coal dust hopper joined to the blast device by a sleeve or collar, substantially as described.

4. An internal boiler flue furnace for fine fuel consisting of a fire brick cylinder, an annular air chamber and air conduits in the walls of the said cylinder, a blast for feeding the coal dust into the combustion chamber arranged on the furnace front plate and a forwardly projecting fire bridge at the rear end of the combustion chamber, substantially as shown and described.

5. The combination with an internal boiler flue furnace for fine fuel, consisting of a fire brick cylinder, an annular air chamber and air conduits in the walls of the said cylinder and a blast for feeding the coal dust through the furnace front plate into the combustion chamber, of a coal dust disintegrating and supplying device and a hopper above the same provided at its lower end with an angular extension, substantially as shown and described.

6. The combination with an internal boiler flue furnace for fine fuel, consisting of a fire brick cylinder, an annular air chamber and air conduits in the walls of the said cylinder and a blast for feeding the coal dust, of a coal dust disintegrating and supplying sieve (*i*) rocking on a vertical axis and radially arranged strips (*k*) fitted immovably above this sieve, substantially as shown and described.

7. The combination with an internal boiler flue furnace for fine fuel, consisting of a fire brick cylinder, an annular air chamber and air conduits in the walls of the said cylinder and a blast for feeding the coal dust, of a coal dust disintegrating and supplying device,

and dust channel (e') underneath the same
directed slopingly downward to the combus-
tion chamber and gutters (e) in continuation
of the said dust channel projecting into the
5 entrance of the combustion chamber, sub-
stantially as shown and described.

In testimony whereof I have hereunto set

my hand in the presence of two subscribing
witnesses.

CARL WEGENER.

Witnesses:

W. H. EDWARDS,

W. HAUPT.