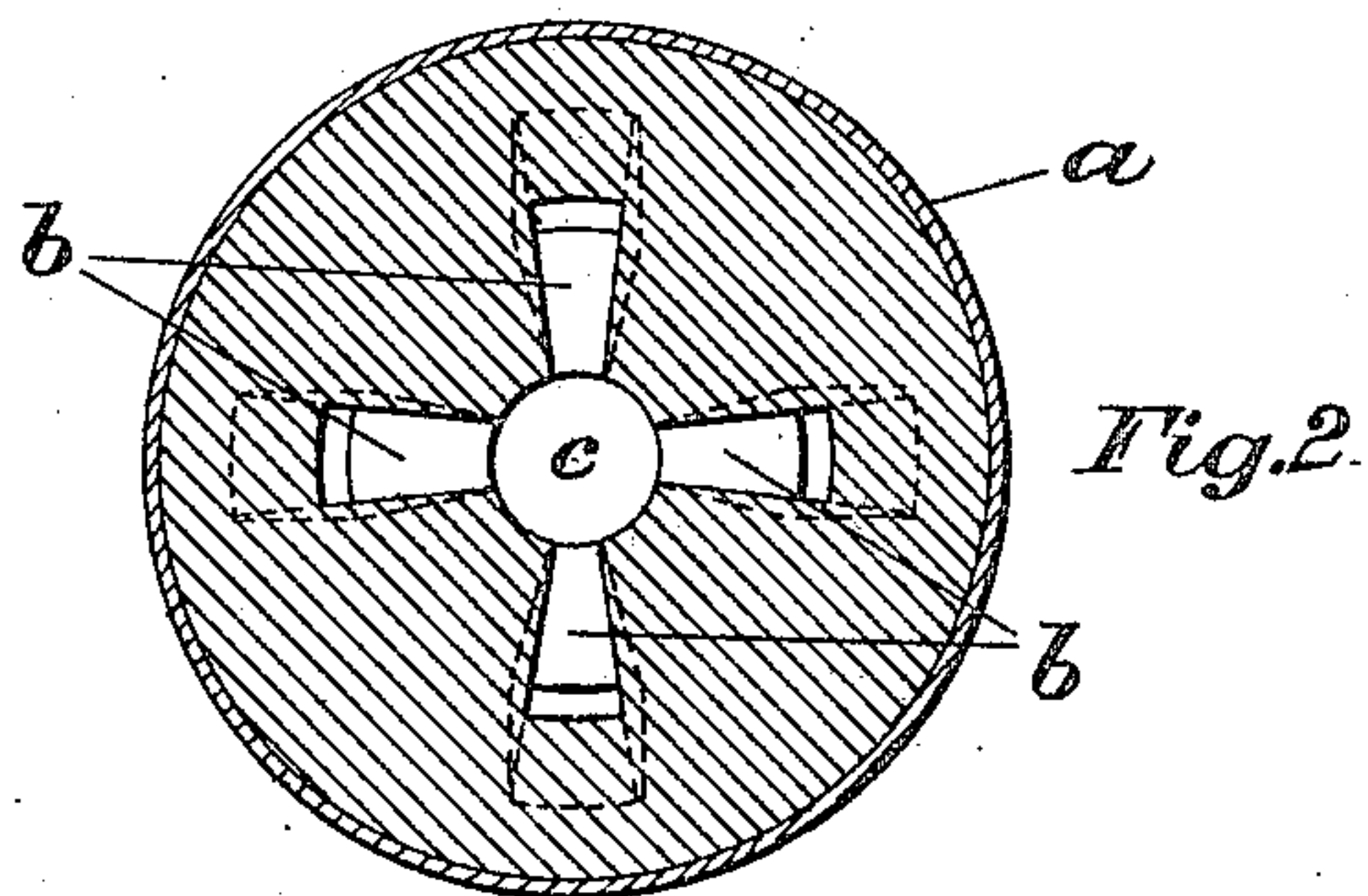
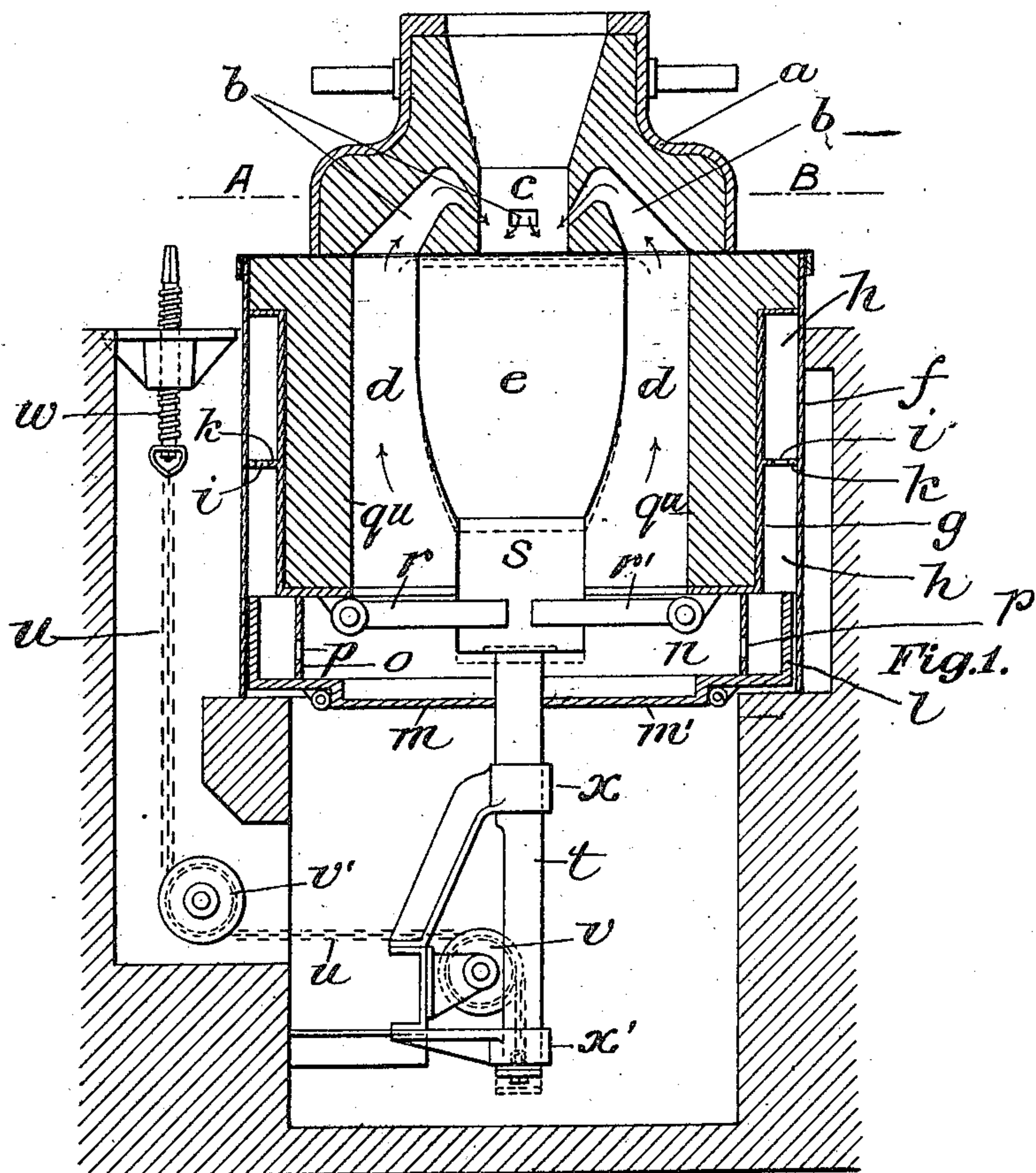


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SMELTING FURNACE.

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934,892.

Patented Sept. 21, 1909.



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UNITED STATES PATENT OFFICE.

CHRISTIAN DEBUS AND JOSEF DEBUS, OF HÖCHST-ON-THE-MAIN, GERMANY.

SMELTING-FURNACE.

934,892.

Specification of Letters Patent. Patented Sept. 21, 1909.

Application filed May 2, 1908. Serial No. 430,547.

To all whom it may concern:

Be it known that we, CHRISTIAN DEBUS and JOSEF DEBUS, subjects of the German Emperor, residing at Höchst-on-the-Main, Germany, have invented a certain Improved Smelting-Furnace, of which the following is a specification.

The present invention relates to an arrangement of smelting furnaces in which entire use is made of the escaping gases for the preliminary smelting process and by which a more rapid smelting of the metals is effected than is the case when the process is performed in furnaces of the type at present in use. A saving of fuel is also effected and the crucibles are protected.

In smelting furnaces at present in use, for a preliminary smelting process the gases escape in a vertical direction through the charge hole for charging the crucibles, provided in the center of the furnace cover.

In consequence of the size of the goods to be smelted the charge hole must be of a large diameter, so that the gases escape at a very low or no pressure and give very little heat to the metal which is to be smelted in the charge hole, so that the metal receives a very slow preliminary smelting.

In order that the gases which escape can reach the charge hole above the center of the crucibles, which are surrounded by the combustion space, a free space must be provided between the crucible and the furnace covering. When charging the crucible it may happen in this arrangement, that the metal, instead of falling into the crucible falls into the combustion space and is here burned. In order to obviate this, furnaces have been constructed in which a special arrangement was provided by means of which more effective use was made of the escaping gases, for example, the furnace was provided with a special charge hole above the crucible, in which the preliminary smelting was to take place. In this arrangement the heating gases pass through apertures provided in the charge hole into the preliminary heating chamber. By this arrangement an effective working of the furnace is not possible.

In order to obviate the disadvantages of the first described furnace and make more effective use of the escaping gases, also in comparison with the described furnace, as also facilitate the action of the furnace the furnace is constructed as shown in the accompanying drawing.

Figure 1 is a vertical section through the oven and Fig. 2 is a horizontal section on line A B Fig. 1.

The furnace cover *a*, which simultaneously acts as preliminary heater, is provided with a number of knee shaped and nozzle formed channels *b* arranged in such a manner and of such longitudinal section that the escaping or heating gases, respectively, are guided vertically into the channels and alter their direction after they have entered the channels so that they act downward upon the goods to be smelted. These nozzle formed channels terminate in the side walls of the charge hole *c* and guide the escaping gases from the combustion space and to the charge hole *c* during the preliminary smelting, when the escaping gases from the various channels *b* all act upon one point so that the metal in the charge hole *c* is quickly smelted. This action is due to the special longitudinal section of the channels which compel the gases to act downward and it is increased by the fact of the channels *b* being in the form of nozzles of decreasing cross section so that the gases are forced out under pressure. In order to force the escaping gases, during the preliminary smelting, through the channels *b* and not allow them to pass directly upward through the charge hole *c*, the crucible *e* is arranged in such a position during the preliminary smelting process that there is no free space between the said crucible and the furnace covering *a*. The channels are therefore also so arranged in the furnace covering that the heating gases must enter these channels in a vertical direction and not, as in the hitherto arrangements, first change their direction and then enter from the side or perhaps in some other direction. The outer sheet metal covering *f* forms around the sheet metal covering *g*, a circular space *h* which is divided by a partition wall *k* provided with holes *i*. At its lower end the outer covering *f* is connected to a ring *l* of L section. The ring *l* with the door halves *m* and *m'* forms the lower closing of the furnace and also that of a chamber *n* in which partition walls *o*, having perforations *p* are provided. The firing space *d* itself is formed of a highly fire resisting and easily exchangeable lining *q* *u* and closed at the bottom by the grate halves *r* and *r'* revolvably mounted in the chamber *n*. The grate halves *r* and *r'*, as also the door halves *m* and *m'*, are provided with cuttings through

which the column *t* of the support *s* for the crucible passes. The column *t* is by means of a chain *u* which passes over the rollers *v* and *v'* connected to the screw spindle *w*, so that by means of the spindle *w*, the column *t* and the crucible support *s* are raised and lowered. The guides *x* and *x'* allow the column to move only in a vertical direction. After the preliminary smelting process in the furnace, according to the present invention, has terminated, the crucible *e* is slightly lowered. The gases now partly pass directly from the firing space between the crucible *e* and the furnace covering *a* and partly through the channels *b* and downward into the charge hole. A whirling about of the highly heated gases is thus produced immediately above the crucible whereby the said gases again give out heat to the preliminarily smelted material in the crucible and also heat the said material well from above which is not the case with the hitherto constructed furnaces.

The furnace is a blast furnace and the air forced in by a ventilator enters the space *h* and by means of the apertures in the partition *k* it is distributed over the whole surface of the furnace. Here the air receives the radiated heat of the inner covering *g* and it then enters the chamber *n*, passes through the holes *p* of the partition *o*, and then through the two grate halves *r* and *r'* into the firing space *d*.

What we claim as our invention and desire to secure by Letters Patent is—

1. In a smelting furnace the combination of a crucible, a combustion space around the crucible, a cover arranged over the crucible; said cover provided with a charge hole adapted to serve as a preliminary heater, knee shaped channels which are first directed upward and then downward provided in the said cover, said channels leading from the combustion space to the charge hole and being adapted to cause the heating gases to act downward upon the material to be melted in the charge hole, the heating gases being only diverted from their upward direction after having entered the channels, substantially as described.

2. In a smelting furnace the combination of a crucible, a combustion space around the crucible, a cover arranged over the crucible, said cover provided with a charge hole adapted to serve as a preliminary heater, knee shaped channels, which are directed first upward and then downward, provided in the cover, said channels leading from the combustion space to the charge hole and being reduced in the manner of nozzles for the purpose of increasing the action of the gases, substantially as described.

3. In a smelting furnace the combination of a crucible, a combustion space around the crucible, a cover arranged over the crucible, said cover provided with a charge hole and adapted to serve as a preliminary heater, knee shaped channels which are first directed upward and then downward provided in the said cover, said channels leading from the combustion space to the charge hole and being adapted to cause the heating gases to act downward upon the material to be melted in the charge hole, the heating gases being only diverted from their upward direction after having entered the channels, and means for raising and lowering the crucible, substantially as described.

4. In a smelting furnace the combination of a crucible, a combustion space around the crucible, a cover arranged over the crucible, said cover provided with a charge hole and adapted to serve as a preliminary heater, knee shaped channels which are directed first upward and then downward, provided in the cover, said channels leading from the combustion space to the charge hole and being reduced in the manner of nozzles for the purpose of increasing the action of the gases, and means for raising and lowering the crucible, substantially as described.

In testimony whereof we have hereunto signed our names to this specification in the presence of two subscribing witnesses.

CHRISTIAN DEBUS.
JOSEF DEBUS.

Witnesses:

ERICH HERZOG,
CARL VOLK.