G. FISCHER.

Crucible-Furnace.

No. 228,049. Patented May 25, 1880.

Fig: 5.

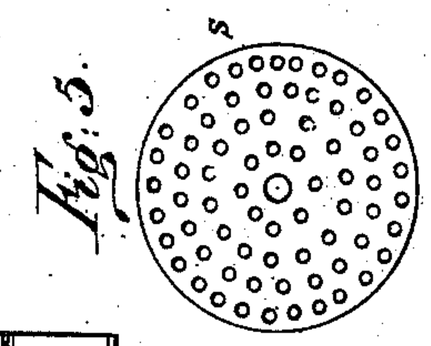

Fig: 6.

Fig: 2.

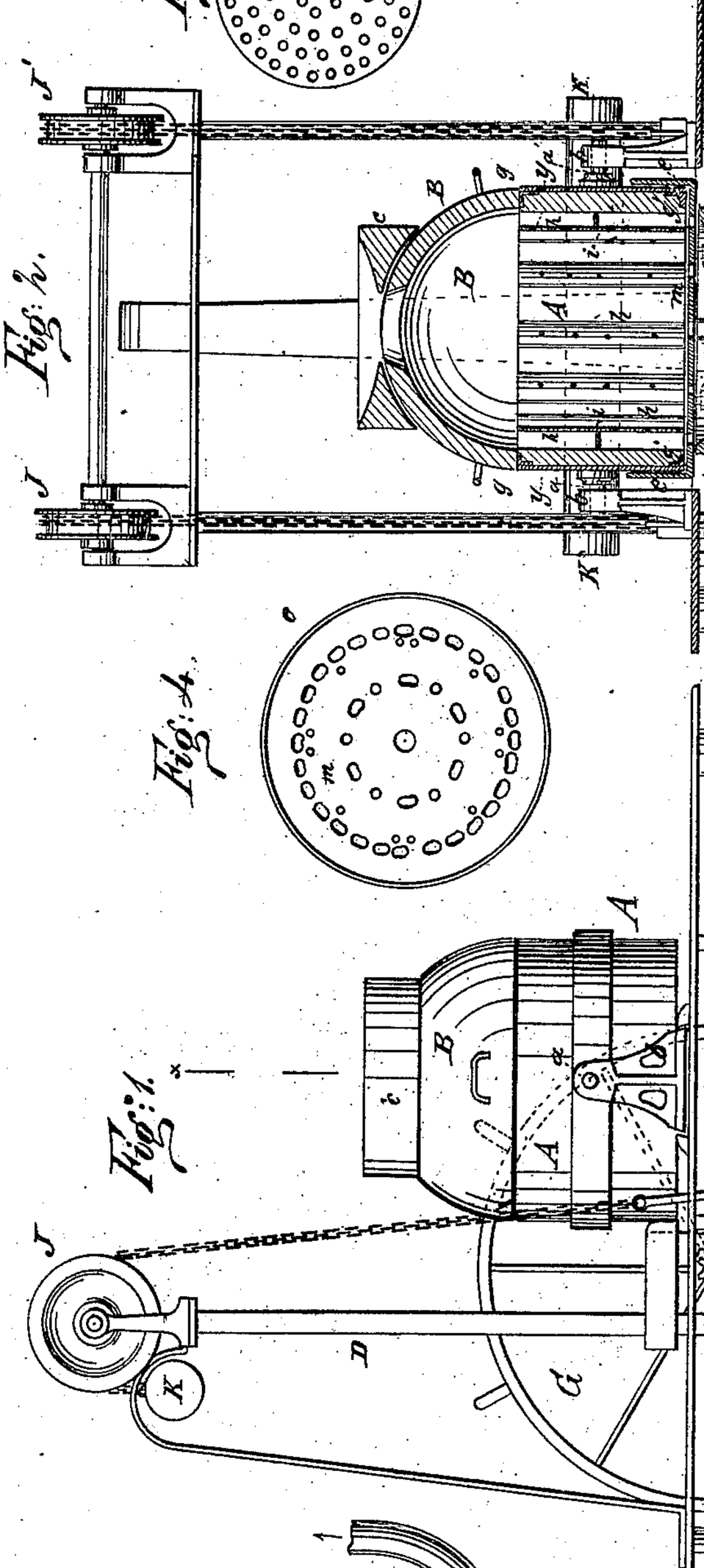

Fig: 3.

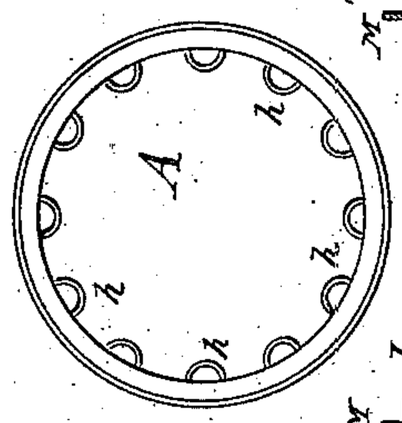

Fig: 4.

Fig: 1.

Fig: 7.

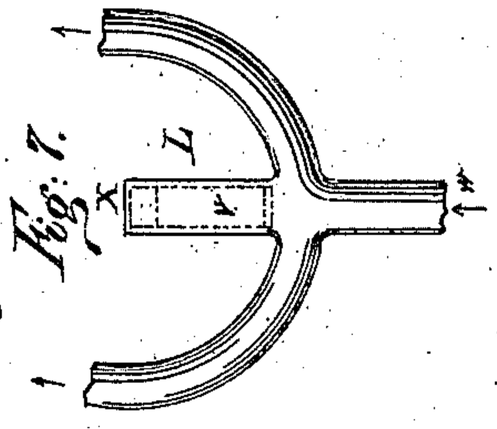

Fig: 8.

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UNITED STATES PATENT OFFICE.

GEORG FISCHER, OF HAINFELD, AUSTRIA.

CRUCIBLE-FURNACE.

SPECIFICATION forming part of Letters Patent No. 228,049, dated May 25, 1880.

Application filed August 2, 1879.

To all whom it may concern:

Be it known that I, GEORG FISCHER, of Hainfeld, Austria, have invented a new and Improved Cast-Steel Furnace, of which the following is a specification.

My improvements relate to cast-steel or crucible furnaces, and, when compared with other furnaces for smelting steel, the chief advantages of my improvements are ease and economy of working.

The lower part of the furnace containing the crucibles and fuel is fitted to be raised by means of an elevator and put in connection with the middle portion of the furnace, or let down upon a track on the floor of the smelting-house for removal and replaced by another lower portion previously heated and charged with crucibles.

The object of the invention is to produce a continuously-working furnace by allowing the lower part of the furnace to be raised and put in connection with the middle part or separated therefrom and lowered on a track leading to the foundry. In this way separate charges of crucibles are being heated, raised into the furnace, and being taken to the foundry, whereby the operation is rendered continuous, while time and labor are economized.

The accompanying drawings illustrate the practical method of carrying the invention into effect; but I do not limit myself to the precise forms and details shown, as they may be varied without departing from the invention.

In the drawings, Figure 1 is a side view of my crucible-furnace with its lower part let down on the track. Fig. 2 is a sectional elevation of the same on line *x x* of Fig. 1, with the lower portion raised. Fig. 3 is a horizontal section on line *y y* of Fig. 2, exhibiting the arrangement of the tuyeres. Fig. 4 is a plan view of the melting-plate. Fig. 5 is a plan view of the wind-sieve. Fig. 6 represents a tuyere on larger scale. Figs. 7 and 8 show the blast-conduct pipe and blast-controlling apparatus.

Similar letters of reference indicate corresponding parts.

A is the middle part or melting-chamber of the furnace. It is suspended by two hollow axles, *a a'*, turning freely in bearings on two pillow-blocks, *b b'*, arranged upon an upper floor in the melting-room. B is the upper part or cap, with its top funnel, *c*. C is the lower part of the furnace, consisting of an air-chamber, *d*, the melting-plate *m*, the wind-sieve *s*, and the jacket *e*.

D D' are two posts, of iron or steel, suitably connected by cross-rails. They rise from the bottom of the smelting-room, passing through the ceiling to the requisite height, and form, together with a shaft, E, pinions F F', hand-wheel G, toothed racks H H, table or platform I, pulleys J J', and counter-weight K, the elevating apparatus.

The melting-chamber A is made of a strong sheet-iron cylinder, lined inside with any refractory material, *f*, which is held firm by angle-iron rings *g g'*.

The hollow axles *a a'* lie in opposite directions to each other and in a horizontal line of gravity of the middle part, A, to facilitate the tilting of the latter.

The tuyeres *h* are gutter-shaped and arranged inside the lining of the melting-chamber A in such a manner that the spaces between them are as large as the outer diameter of the same, or nearly so, and they extend the whole length of the chamber A. Each tuyere is divided by a cross-partition or diaphragm, *i*, into two portions, the lower one of which serving at each time as a tuyere or blast-pipe, while the upper half is kept in reserve.

The tuyeres are perforated with conveniently-shaped holes *k k*, through which the air passes into the melting-chamber.

The axles *a a'* are made hollow to allow the melting process to be observed and watched through them.

The upper part, B, consists of a dome-shaped cap of sheet metal and of the top funnel, *c*. When the melting-chamber is tilted the cap must first be removed and replaced after the chamber is turned.

The lower part, C, of the furnace is fitted to be raised by means of the elevator, and is thereby connected with the melting-chamber,

or it may be lowered or let down on the track M M′, arranged on the bottom.

The crucibles are to be placed on stands upon the melting-plate *m*, covering the air-chamber *d*. The said melting-plate is perforated with as many holes as are necessary to secure thorough and complete combustion of the fuel without excess of air, and according to the number of crucibles to be placed in the furnace. The arrangement shown in Fig. 4 would answer for twenty-two crucibles.

Through the melting-plate *m* passes the central tuyere, *n*, also provided with side holes and serving as a stand to the central crucible, which may be placed somewhat higher than the others, which are arranged in concentric circles upon small stands, and so spaced as to provide room for the requisite fuel.

The melting-plate has a flange or rim, *e*, at its outer edge, which surrounds the lower part of the melting-chamber to protect the same against loss of heat, and it also acts to catch and retain the fuel rolling down when the air-chamber is lowered, and prevents the crucibles from falling or upsetting during their transport on the track. Besides these functions the flange or jacket *e* serves as a fulcrum for the lever used to discharge the crucible.

The melting-plate *m*, flange *e*, and the whole charge are supported by the air-chamber *d*. This consists of a hollow cylinder closed at the bottom, provided with four rollers or wheels, *q q*, and lined inside with refractory material.

The outer diameter of the air-chamber is slightly smaller than that of the melting-chamber, so that an annular portion of the melting-plates remains free, from which heat may radiate to keep the melting-plate at as low a temperature as possible.

The air-chamber is divided by a wind-sieve, *s*, into a lower and an upper chamber. The sieve *s* is perforated with numerous holes to regulate the distribution of the blast. The air enters the air-chamber through two short feed-pipes, *t t*, that are cut obliquely and provided with flanges to facilitate the connection of the blast-conduct pipes. The air passes through the perforations of the wind-sieve and melting-plate, and through tuyeres *h h* and *n*, into the interior of the melting-chamber.

To regulate the wind-pressure I employ an automatic wind-controlling device of simple construction, which is shown in Figs. 7 and 8. This consists of a prismatic tube, L, open at the ends, preferably of glass, the interior of which is divided diagonally by a hinged plate, *v*, into two parts, so that the blast entering at *w* is prevented by plate *v* from escaping at *x* unless it is strong enough to raise the plate *v*, with its adjustable load *y*. The load *y* is fitted for being shifted according to the wind-pressure required, and the pressure augmenting from any cause will raise plate *v*, and the blast will escape at *x* until the pressure again falls, and the pressure in the conduit-pipe is therefore maintained nearly constant.

The elevator for raising and lowering the crucibles is composed of two vertical posts, D D′, of iron or steel, serving as guides to the movable platform I. On turning hand-wheel G the said platform I, carrying the lower part of the furnace, with the crucibles, is raised or lowered by means of pinions F F′ and the toothed racks H H.

K is a counter-weight for facilitating the movement. It is fixed on one end of chains or ropes which pass over pulleys J and are connected to rods *l*, that are connected to platform I.

A brake or locking mechanism of suitable construction may be employed for arresting and holding the platform, or a ratchet-wheel and pawl may be arranged on the hand wheel or shaft for that purpose.

It is evident that the elevator described may be replaced by a hydraulic or other apparatus worked by any suitable prime mover without departing from my invention.

N is a device for holding the air-chamber and its imposed parts in its upper position, so that the platform may be lowered to the track, while the air-chamber is firmly connected to the melting-chamber.

The track M M′ will be arranged on the floor of the foundry, passing between posts D D′. From one end of this track the loaded air-chambers are carried to the furnace and the molten material carried from the furnace to the other end of the track.

The crucibles are held on the perforated plate by the well-known small hollow side-perforated stands.

The middle section of furnace is only tilted when the lower half of its fire-proof lining has become worn out, or when the lower halves of the tuyeres are damaged. It is then that the top piece or cap is taken off, the inferior part lowered, and the middle part tilted by hand or otherwise.

The top piece or cap serves as a cover to the furnace, and through its funnel-shaped opening the fuel is fed.

In regard to feeding and working the plant, there are in each melting-house two lower parts on wheels, so that while the melting goes on in one the other is charged with crucibles and fuel, to be raised by the elevator and connected with the middle part as soon as the metal in the other has been melted and lowered to be carried back to the foundry.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A crucible-furnace consisting of the funneled cap B, the melting-chamber A, suspended on axles *a*, and the lower part, C,

formed of air-chamber *d*, melting-plate *m*, wind-sieve *s*, and jacket *e*, as shown and described.

2. In a crucible-furnace, the tuyeres *h*, divided by the partition *i*, in combination with the melting-chamber A, hung on the axles or trunnions *a a'*, substantially as and for the purposes set forth.

3. In a crucible-furnace, a melting or grate plate, in combination with an air-chamber of smaller diameter, so that there is an annular space for the radiation of heat from the melting-plate, substantially as described and shown.

GEORG FISCHER.

Witnesses:
HEINRICH PALM,
RÜDOLF MAYER.