

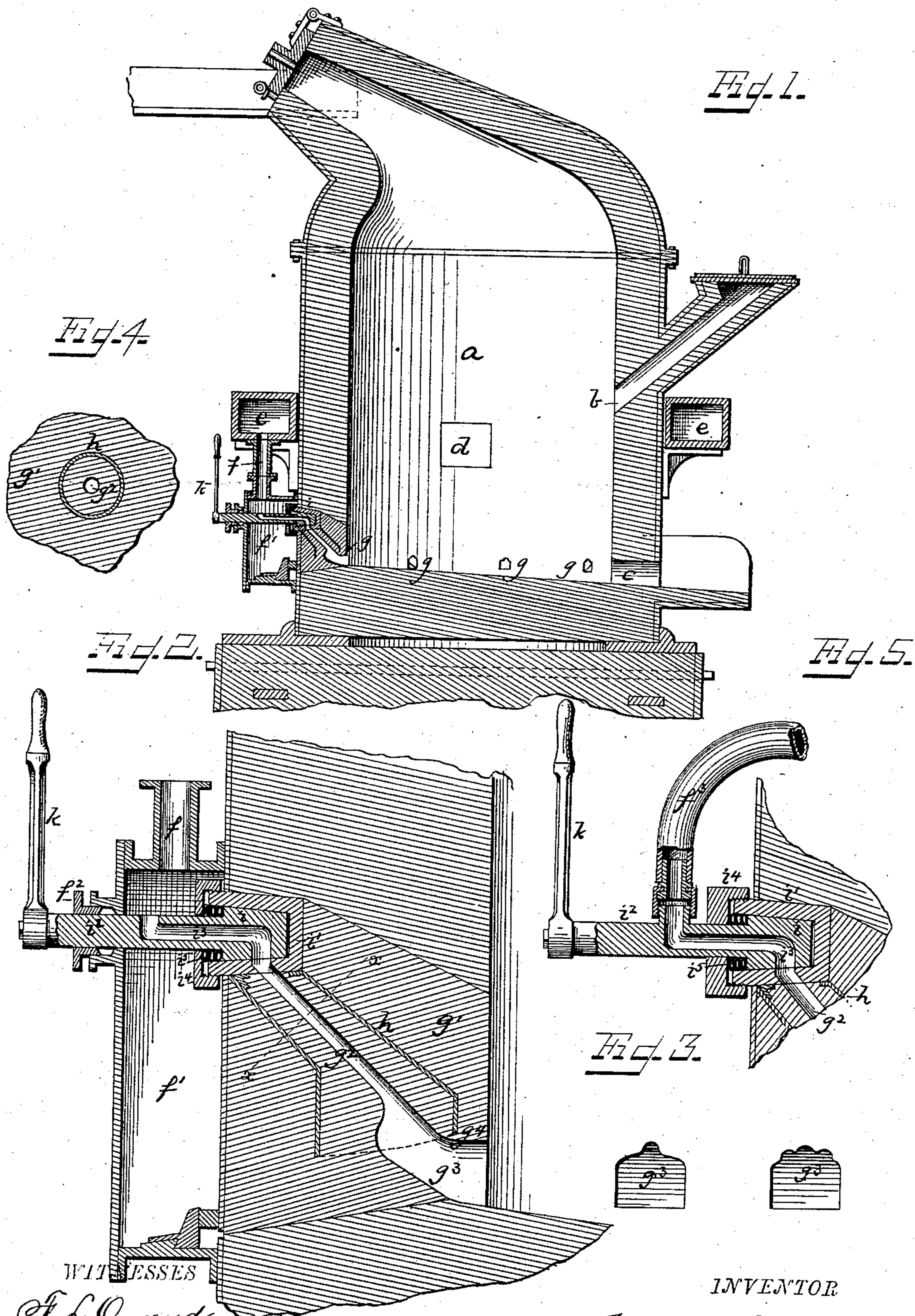
(No Model.)

H. SCHULZE-BERGE.

CONVERTER.

No. 316,837.

Patented Apr. 28, 1885.



WITNESSES
J. L. Curand.
C. L. Curand.

INVENTOR
Hermann Schilze-Berge
by his attys
Bakerwell & Kerr

UNITED STATES PATENT OFFICE.

HERMANN SCHULZE-BERGE, OF ROCHESTER, PENNSYLVANIA, ASSIGNOR TO
HENRY W. OLIVER, JR., AND JAMES P. WITHEROW.

CONVERTER.

SPECIFICATION forming part of Letters Patent No. 316,837, dated April 28, 1885.

Application filed March 11, 1884. (No model.)

To all whom it may concern:

Be it known that I, HERMANN SCHULZE-BERGE, of Rochester, in the county of Beaver and State of Pennsylvania, have invented a new and useful Improvement in Converters; and I do hereby declare the following to be a full, clear, and exact description thereof.

In certain metallurgical operations tuyeres or pipes are used to introduce air or other gaseous or fluid substances into a fluid bath of metal. In the case of converters and vessels or hearths of like character for treating fluid metals the mouths of tuyeres, when fixed, are below the metal line, so that if the blast is stopped the molten metal will enter them, usually with the result of solidifying therein and clogging them up, so that they have to be replaced with others. To obviate this difficulty, it is customary to do one of the following three things, viz: first, to keep the full pressure of blast on until the metal is tapped off sufficiently to fall below the tuyeres; or, second, to make use of a tipping converter in which the blast is kept on until the tuyeres are turned up out of the metal; or, third, to provide the tuyeres with stoppers to prevent the metal from entering and solidifying therein. The first plan is objectionable, because the whole charge is not blown to an equal extent and the product varies in character; the second, partly for the same reason, but mainly on account of the force of blast necessary, because of the arrangement of the tuyeres in the bottom and of the enormous cost of such a plant, and the third, because the stoppers are liable to get out of order, and because it is desirable to have the tuyeres free from all other devices.

The object of my invention is to overcome these difficulties and gain the advantages of a fixed converter without the necessity of tuyere-stoppers or danger of the tuyeres being clogged or destroyed by the molten metal.

To enable others skilled in the art to make and use my invention, I will now describe it by reference to the accompanying drawings, in which—

Figure 1 is a vertical section of a fixed converter having my improved tuyeres. Fig. 2 is an enlarged vertical section of one of the tuyeres. Fig. 3 shows front views of two

forms of tuyere-mouths. Fig. 4 is a section at *x x*, Fig. 2. Fig. 5 is a modification.

Like letters of reference indicate like parts.

The converter *a* is provided with a charging-hole, *b*, tapping-hole *c*, cinder-opening *d*, blast-main *e*, and blast-pipe *f*, all of a usual construction. The tuyeres *g* are formed in removable sections or blocks *g'*, of refractory material, each inclosed at the outer end by an air-chamber, *f'*, to which a blast-pipe, *f*, connects. The block *g'* is formed on or around a metallic tube, *h*, and the tuyere-opening *g²* extends through the tube, which at its upper end is fastened to the metal barrel *i'* of a stop cock or valve, *i*, to stay said barrel in place. The latter may, however, be otherwise secured. The plug or valve *i* has a stem, *i²*, which extends across the chamber *f'* and through a stuffing-box, *f²*, on its outer side. A port, *i³*, runs through the stem *i²* from the air-chamber *f'* to and communicates with the tuyere-opening *g²* by means of a port in the barrel *i'*. The plug or valve *i* is kept in the barrel *i'* by a screw-cap, *i⁴*, and is packed or stuffed, as at *i⁵*, to make it air-tight. The valve-stem of each tuyere has an operating-lever, *k*, or equivalent device, and, if desired, the levers of the tuyeres may all be connected together and operated simultaneously. The lower end or mouth, *g³*, of the tuyere is of much greater area or cubical capacity than the tubular part *g²*, being made wide and deep. The cubical capacity of the mouth part *g³*, which is above the lower end of the point *g⁴* of the block *g'*, should be at least double that of the tubular part *g²*, and, if found desirable, may be greater. The point *g⁴* acts as a trap to inclose air in the tuyere-openings when the converter is filled with metal above the tuyeres, so that even when the valves *i* are closed the molten metal can rise above the point *g⁴* only far enough to compress the entrapped air sufficiently to establish an equilibrium between it and the weight of the column of molten metal in the converter. The latter will probably be never equal to one atmosphere, so that the compression of the air in the tuyere-openings will not or need not be sufficient to permit the molten metal to rise into the narrow air-tube *g²*. The wide deep mouth *g³* will

contain a sufficient quantity of metal to keep it from chilling therein during the short time the molten metal remains in the converter after the blast is stopped. At the inner end 5 the mouth part g^3 tapers or converges gradually into the tube g^2 , so that all the air from it shall be forced toward or into the tube by the advance of the molten metal into the tuyere-mouth. It is preferable to turn on 10 the blast before the metal is charged into the converter, because then the pressure in the tuyeres will prevent the momentum of the falling metal from unduly forcing its way into them.

15 The pressure and volume of blast in the tuyeres are regulated as desired by moving the valves, which may be applied to the tuyere-pipes of any stationary converter having side tuyeres arranged at intervals in the 20 sides below the metal-line, so as to blow into and through the charge, and are so claimed.

I do not limit myself to the construction of valve or stop-cock shown. Any suitable one will do. Nor do I limit myself to the construction of tuyere shown, except in so far as 25 it forms an air-trap to keep the tuyere clear of metal when the valves i are closed. The mouth should be large enough to provide for any reduction of the bulk of the air by reason of combustion of the oxygen thereof by 30 contact with the metal. This, however, would not exceed one-fourth of the entire volume, even if the oxygen be completely consumed.

In Fig. 5 I show the use of a flexible blast-pipe, f^3 , instead of the rigid pipe f shown in 35 Fig. 1. The flexible pipe f^3 may be connected directly to the valve-stem i^2 , thus doing away with the necessity of having an air-chamber, f' . The valves and tuyeres must be air-tight to preserve the air-cushion when the 40 valves i are closed. The metallic tube h not only acts as a core to the refractory material of the block g' and supports the barrel i , but also enables the tuyere-tube g^2 to be made perfectly air-tight.

45 The converter is operated in the usual way. The air-tube g^2 may run down at an angle, as shown, or it may be curved or zigzag; but in

all cases where it is desired to prevent the metal from entering the tuyeres when the 50 valves are closed it must preserve the trap-construction.

I am aware of the patent of L. Witthofftt, No. 195,196, dated September 11, 1877, for converters; but such converter differs from mine 55 in not having valves arranged between the tuyeres and blast-pipe to regulate the blast at the tuyeres, as well as in details of construction. I am also aware of the patent of Wilson, No. 39,364, dated July 28, 1863; but such converter 60 differs from mine in that it is provided with a blow pipe or nozzle situate at one end of an extension of the metal chamber, which blows down on the surface of the metal, and is not provided with tuyeres which blow up through 65 or around the same.

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

1. A stationary converter having a series of independent tuyeres extending through its 70 sides below the metal-line, so as to blow up through or around the same, in combination with a blast-main, independent pipes connecting said blast-main with the tuyeres, and independent valves arranged on a different level 75 than the tuyere-nozzles, and between the blast-main and tuyeres, to regulate and control the blast supplied to each tuyere, substantially as and for the purposes described.

2. A converter or other furnace having a 80 number of independent tuyeres extending through its sides, each tuyere constituting an intercepting air-trap consisting of an air-tight tube having enlarged mouth of equal or greater cubical capacity above its lower end 85 than that of the tube above the mouth and an air-tight stopper or valve at its other end, substantially as and for the purposes described.

In testimony whereof I have hereunto set 90 my hand this 17th day of February, A. D. 1884.

HERMANN SCHULZE-BERGE.

Witnesses:

W. B. CORWIN,
THOMAS B. KERR.