(No Model.) 2 Sheets—Sheet 1.

J. P. WITHEROW.

STEEL PLANT APPLIANCE.

No. 327,425. Patented Sept. 29, 1885.

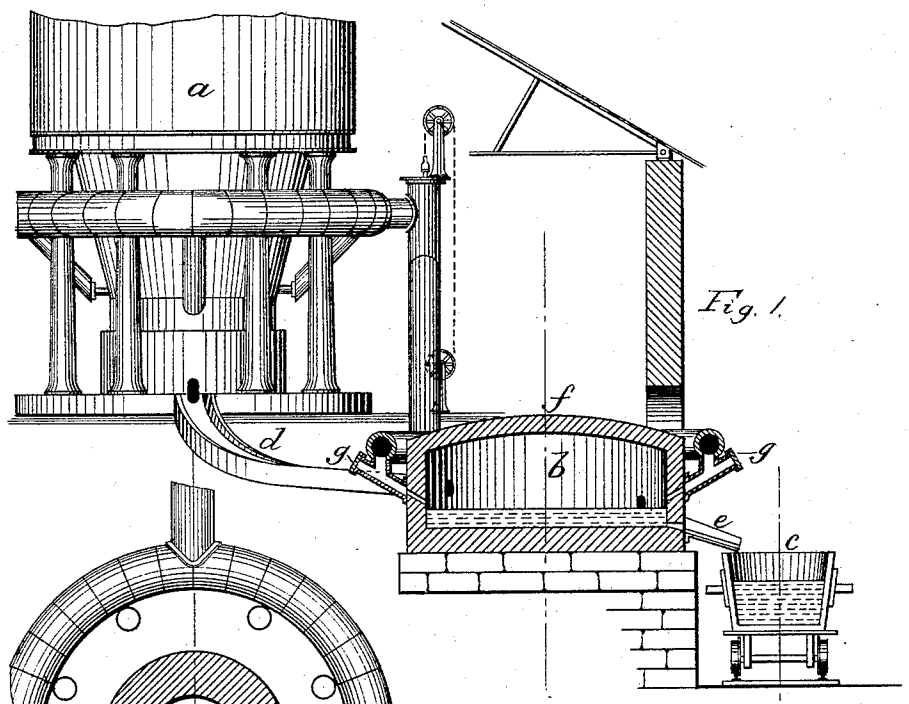


Fig. 1.

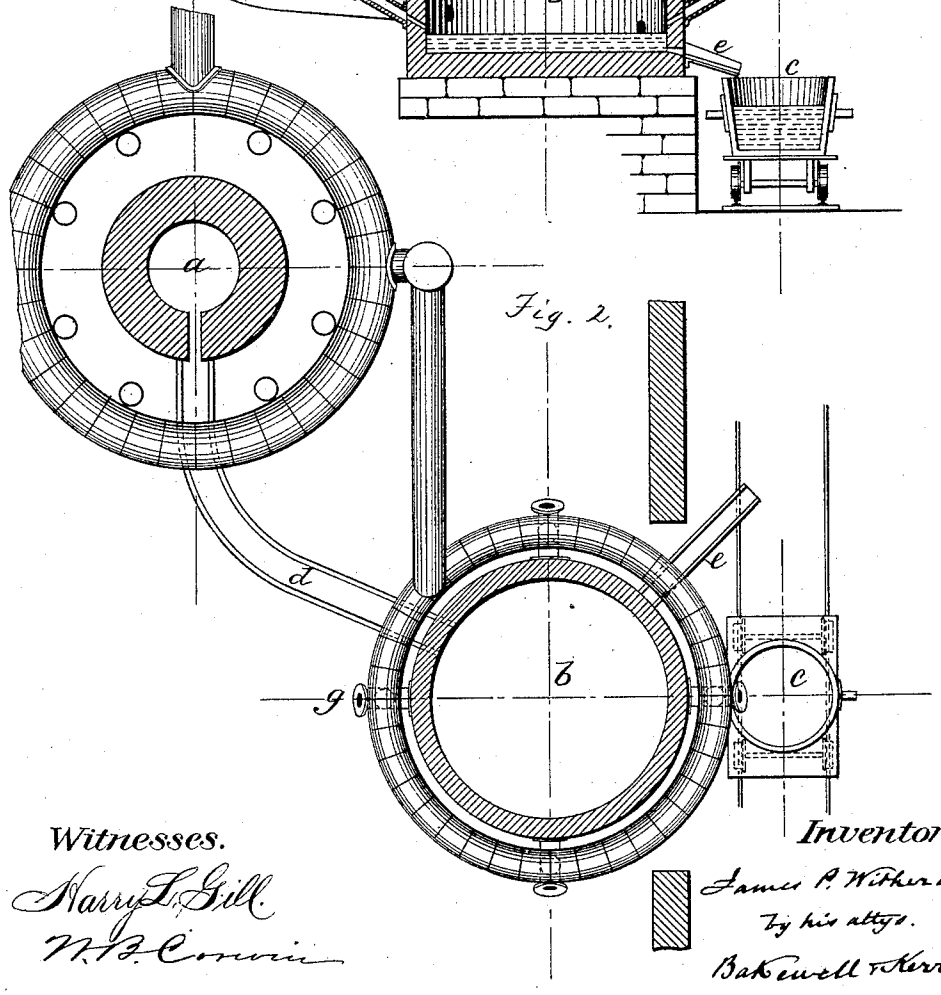


Fig. 2.

Witnesses.
Harry L. Gill.
W. F. Cowin

Inventor.
James P. Witherow
by his attys.
Bakewell & Kerr

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

J. P. WITHEROW.

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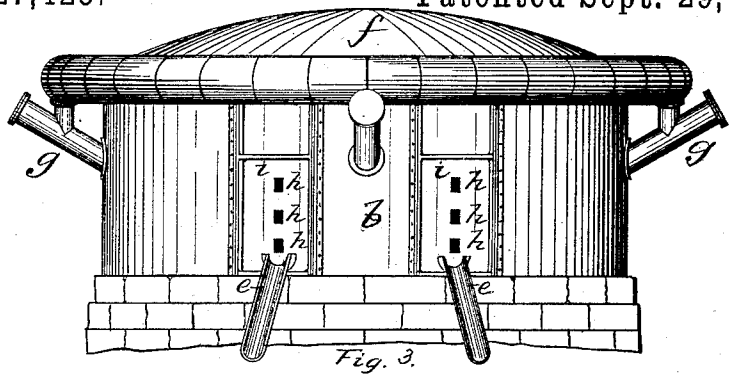
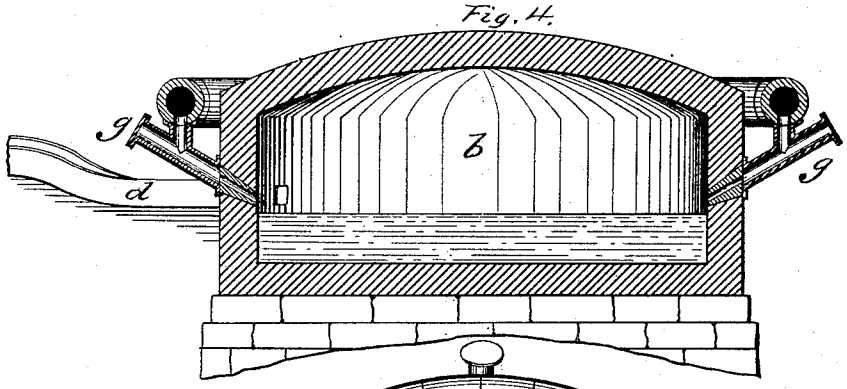


Fig. 3.

Fig. 4.



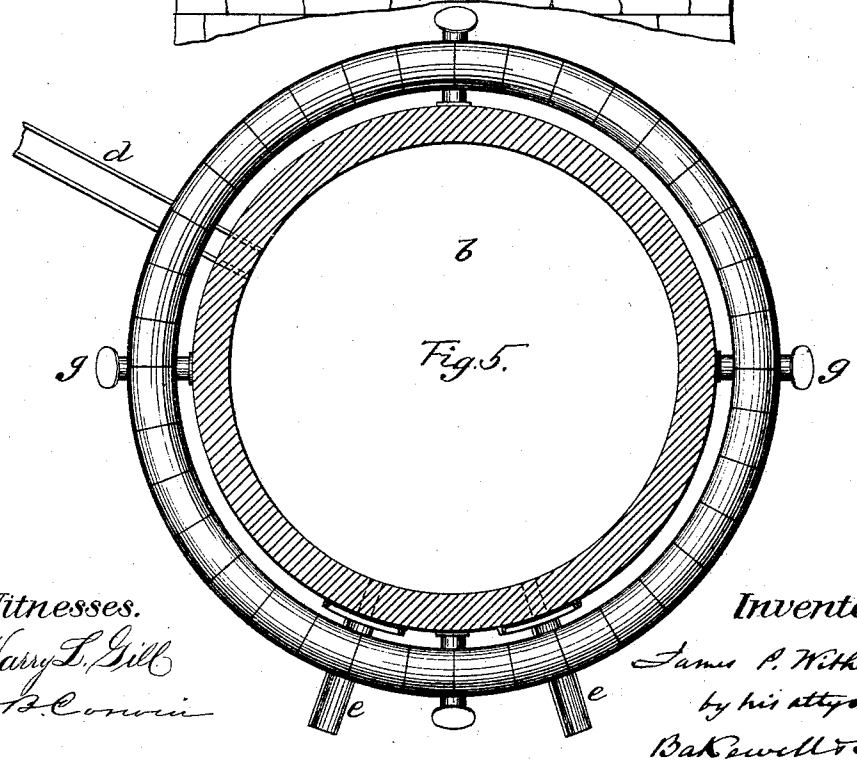


Fig. 5.

Witnesses.
Harry L. Gill
W. B. Corwin

Inventor:
James P. Witherow
by his attys
Baldwell & Kerr

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

JAMES P. WITHEROW, OF ALLEGHENY CITY, PENNSYLVANIA.

STEEL-PLANT APPLIANCE.

SPECIFICATION forming part of Letters Patent No. 327,425, dated September 29, 1885.

Application filed July 8, 1885. (No model.)

To all whom it may concern:

Be it known that I, JAMES P. WITHEROW, of Allegheny City, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Steel-Plant Appliances; and I do hereby declare the following to be a full, clear, and exact description thereof.

In the manufacture of steel by the pneumatic process the converters are charged with molten metal, the product of the blast-furnace. This metal is usually cast in the form of pigs, and then remelted in a cupola as needed before being charged into the converter. The metal is usually tapped from a blast-furnace once in every six hours, and the quantity thus cast is many times in excess of the charge of a converter. Economy of manufacture forbids more frequent casting, and particularly the casting of the comparatively small quantity necessary for a converter-charge, and with the frequency required therefor, the periods of the operations of which are comparatively much shorter than those of the blast-furnace. It is very desirable to take advantage of the molten condition of the metal as it comes from the blast-furnace for its use in the converter, because thereby the remelting of the metal and the expense of the construction of a cupola may be avoided. The charge of a converter is from one to five tons, and the cast of a blast-furnace runs usually from ten to fifty tons. The difficulty of using the molten metal from the furnace in the converter consists in keeping the large quantity of metal from the latter in a proper molten condition for use in the former. The time between charges of the converter is usually twenty minutes and upward, and the metal from the furnace must be kept in condition to be tapped from time to time into the converter as needed. This is the object of my invention, to explain which, so that others skilled in the art may make and use the same, I will now refer to the accompanying drawings, in which—

Figure 1 is an elevation of a blast-furnace and a vertical section of a receiving-receptacle and distributing-ladle. Fig. 2 is a sectional plan view of the same. Figs. 3, 4, and 5 are views of the receiving-receptacle.

The blast-furnace *a* is used to reduce the iron from its ores in the ordinary way.

The receptacle *b* is designed to receive and hold the entire cast of the furnace *a*, being of a sufficient size for that purpose.

The ladle *c* is designed to receive and convey to the converter or converters (not shown) a proper charge or charges of the metal from the receptacle *b*.

Suitable troughs, *d* and *e*, are provided between the furnace *a* and receptacle *b* and between the latter and the ladle *c*, to conduct the molten metal from one to the other. The receptacle *b* is provided with a suitable cover, *f*, and with tuyeres *g*, which blow down upon the surface of the metal for the purpose of maintaining its heat and fluidity. I prefer to use hot or cold air or gas for this purpose. When natural gas is accessible, it may be used; but it should not be blown below the surface of the metal. The effect of the blast of air is to produce an agitation of the bath, accompanied with more or less oxidation of the metal and the production of a base, which, uniting with the silicic acid, forms a slag on the surface of the bath. This covering of slag serves to protect the metal from excessive oxidation, and reduces the loss of temperature by radiation. The receptacle is also provided with a series of tapping-holes, *h*, arranged at different heights in its sides. The holes are preferably made in a vertical cast-iron stave, *i*, and when the vessel is in use are stopped with clay. In tapping, the clay stopper of the proper hole is punctured, and the metal permitted to run out.

The tapping-holes may be arranged as to relative height with reference to the capacity of the vessel, so that the opening of any particular hole will insure the delivery of a determined quantity of metal. In this way the use of a weighing-ladle or other means of determining the charge of the converter may be rendered unnecessary.

If it is desired to tap off the slag it may be done by opening the proper tapping-hole *h*.

I do not limit myself to the use of several tuyeres in connection with the receptacle *b*, nor to placing the tuyeres in the side of the vessel, but desire also to include the use of one tuyere, while the tuyere or tuyeres may be inserted from the top or from the bottom, if desired, and may be fixed or movable, as preferred.

The amount and pressure of the blast in the tuyere or tuyeres will be regulated to suit the

purpose for which it is supplied and the quantity of metal present.

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

1. The combination of a blast-furnace with a storage-receptacle provided with tuyeres for receiving and holding the fluid cast of the furnace, a distributing-ladle, and conducting-spouts for transferring the metal from one to another, substantially as and for the purposes described.

2. A storage-receptacle for containing and dispensing fluid metal provided with a tuyere or tuyeres for supplying a blast of air or gas to maintain the metal in a fluid condition and a suitable tapping-hole, substantially as and for the purposes described.

3. A storage-receptecle for containing and dispensing fluid metal provided with a tuyere or tuyeres for supplying a blast of air or gas to maintain the temperature of the metal and a series of metal tapping-holes arranged at different heights in the sides of the same, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 30th day of June, A. D. 1885.

JAMES P. WITHEROW.

Witnesses:

THOMAS B. KERR,

W. B. CORWIN.