No. 830,513. PATENTED SEPT. 11, 1906.

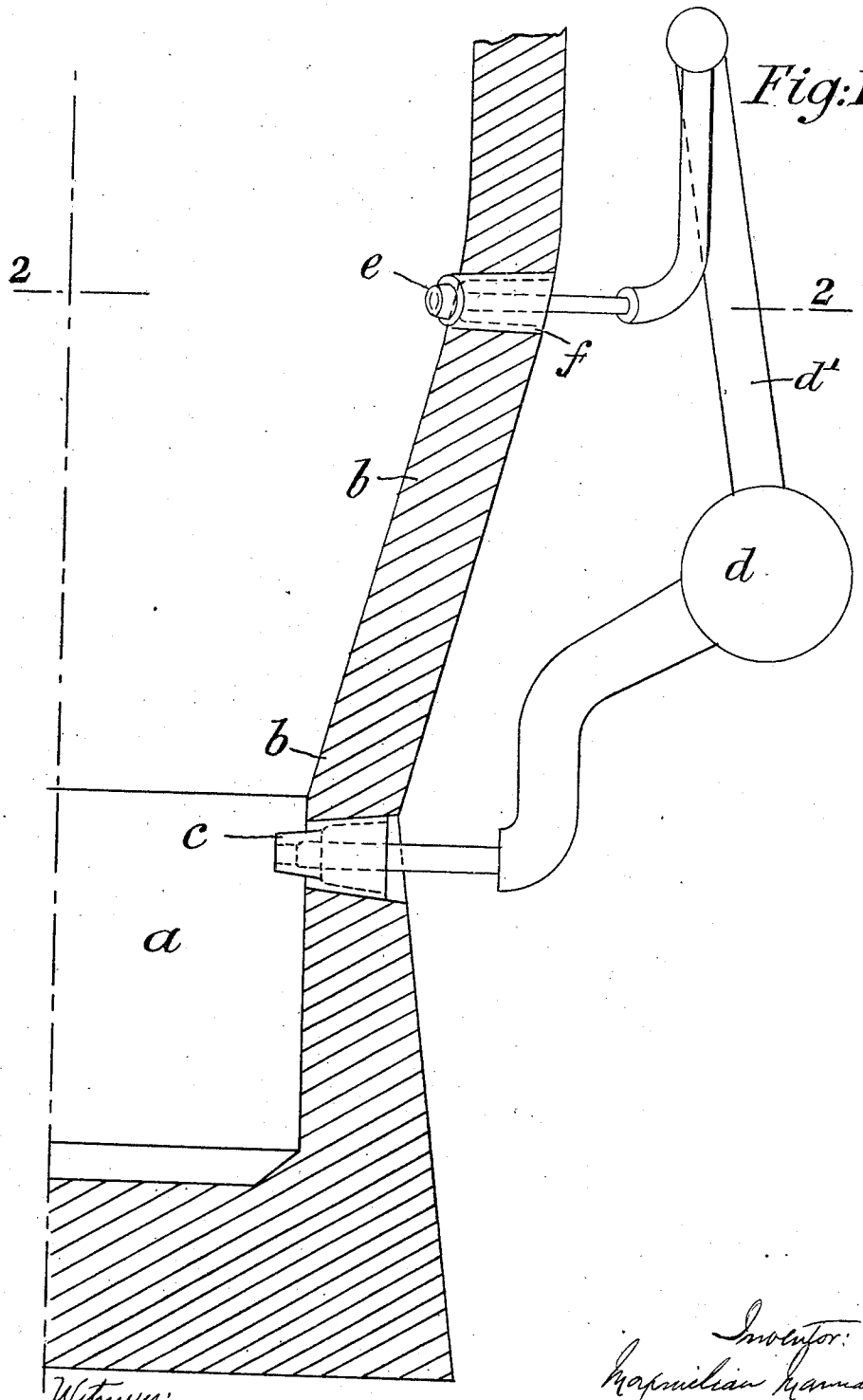
M. MANNABERG.

BLAST FURNACE.

APPLICATION FILED JAN. 20, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

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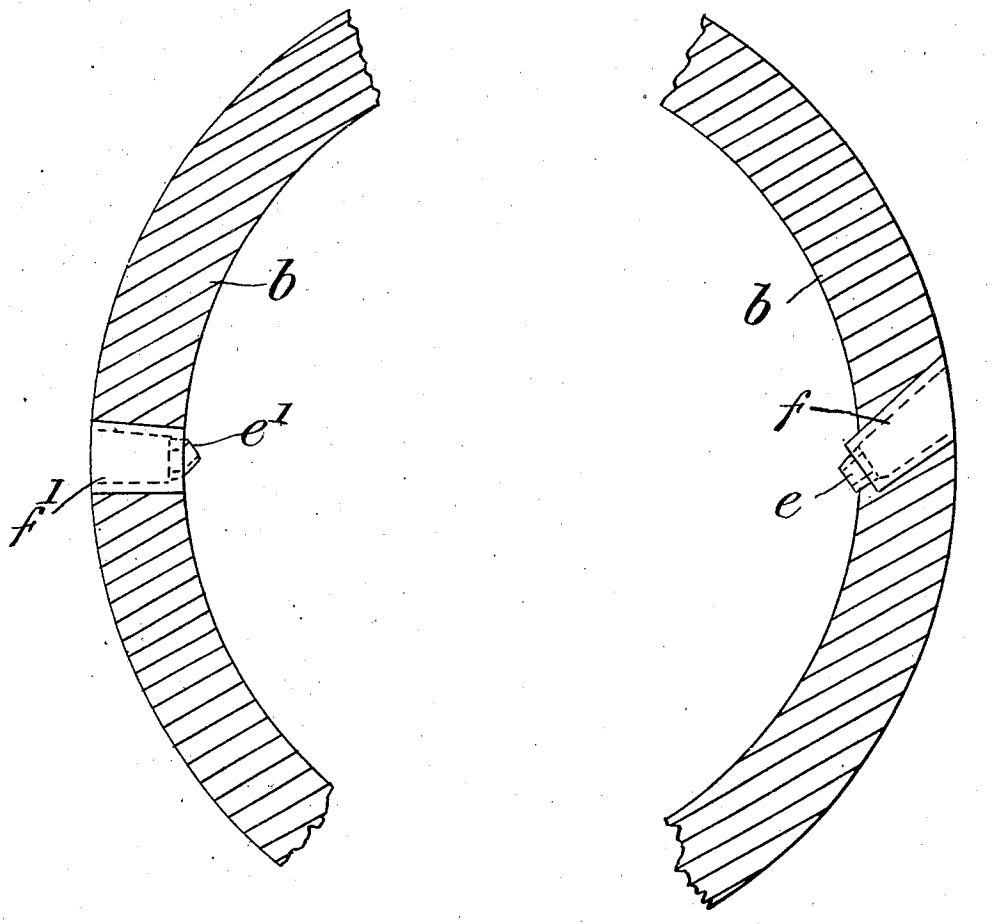
2 SHEETS—SHEET 2.

*Fig: 2.*

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# UNITED STATES PATENT OFFICE.

MAXMILIAN MANNABERG, OF FRODINGHAM, ENGLAND, ASSIGNOR TO FRODINGHAM IRON AND STEEL COMPANY, LIMITED, OF FRODINGHAM, ENGLAND.

## BLAST-FURNACE.

No. 830,513. Specification of Letters Patent. Patented Sept. 11, 1906.

Application filed January 20, 1906. Serial No. 297,063.

*To all whom it may concern.*

Be it known that I, MAXMILIAN MANNABERG, a subject of the King of Great Britain, residing at Frodingham, in the county of Lincoln, England, have invented new and useful Improvements in Blast-Furnaces, of which the following is a specification.

This invention relates to an improvement in blast-furnaces with a view to cleaning the bosh-walls thereof.

It has been found that in the working of a modern blast-furnace with high blast-pressures and fine ores there is a great tendency for the building up on the bosh-walls of the fine ores and coke-dust and deposited carbon, thus forming a "scaffold." This is very detrimental to the working of the furnace and has the effect of reducing its output and the quality of iron made, thereby causing a loss of economy. By the present invention this difficulty is overcome and a more regular and economic working is obtained. For this purpose one or more twyers are arranged somewhere in the bosh-walls with its or their nose or noses turned to the necessary angle to direct a blast against any obstacle that may be likely to form on the bosh-walls, the effect of which is to burn away the said obstruction and restore the furnace to its original capacity and efficiency. The proper position of these twyers on the bosh-walls depends on the dimensions of the furnace and on the position where the tendency for accumulation or "scaffolding" is likely to be.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of one-half of the lower parts of a blast-furnace; and Fig. 2 is a horizontal section of the furnace, drawn on the line 2 2 of Fig. 1.

*a* is the furnace-hearth; *b*, the bosh-wall; *c*, the ordinary radial twyers delivering the blast into the hearth, and *d* the blast-main supplying blast to the twyers *c*.

*e e'* represent two twyers arranged in convenient positions in the bosh-wall *b* with their noses placed at an angle to cause the blast to blow tangentially into the furnace.

*f f'* are the coolers through which the noses of the twyers *e e'* pass. The coolers, which are of ordinary construction, may be built into the bosh-wall at an angle, as shown at *f*, in which case the twyer *e* is made of the ordinary shape and fits the mouth of the cooler in the manner well understood. If desired, however, the coolers may be built, as shown at *f'*, into the furnace radially, as for the ordinary twyers *c*, in which case the nose of the twyer *e'* will be at an angle to the body thereof, as shown. These bosh-twyers *e e'* may be supplied with blast from any suitable source; but a convenient arrangement is shown in Fig. 1, in which a supplemental blast-main *d'*, receiving its blast from the main *d*, is connected with the twyers *e e'*.

It will be understood that the bosh-twyers *e e'* may have their noses turned to any angle necessary to burn away any deposit, and thus clean the bosh of the furnace.

I am aware that it is old in furnaces for reducing Franklinite ores to employ additional twyers arranged tangentially in the walls at or near the contraction at the top of the furnace, and I make no claim to such a construction of furnace.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

In a blast-furnace the combination of a blast-main, twyers communicating with the hearth of said furnace and connected to said blast-main, a supplemental blast-pipe connected to said blast-main, and twyers located in the bosh-walls of said furnace and connected to said supplemental blast-pipe, said twyers being so arranged as to direct the blast tangentially onto the bosh-walls of the furnace.

In witness whereof I have hereunto set my hand in presence of two witnesses.

MAXMILIAN MANNABERG.

Witnesses:
W. W. NICHOLLS,
LEWIS DEXTER.