difference of density of the air inside and out will cause the valve V′ to apply itself firmly against the metallic bearing before which it is hung. The valve V, on the contrary, which opens inwards, will be lifted and air will pour into the chamber from the outside. The motion which causes the air above the piston to dilate will evidently at the same time compress that which is beneath, causing the valve V to close, the valve V′ to open, and forcing the contained air to the chamber B, from whence it escapes through the aperture O to the pipes connecting with the tuyeres. In this way the upper portion of the cylinder draws the air from without during the descent of the piston and forces that which is beneath into the pipes with which it connects, and when the piston is raised these operations are reversed in the upper and lower chambers. Thus there will be an almost continuous blast supplied to the tuyeres; the only time when any irregularity will be shown is when the piston is at the end of the stroke; but to prevent the check thereby caused, the pipe leading from the chamber B is made to connect with a large closed reservoir, where the variations referred to is lost through the elasticity of the air itself. The cylinder is about six feet in diameter and nine feet long, while the piston makes about thirteen strokes a minute, furnishing about 12,000 cubic feet of air per minute to be discharged through the tuyere area.

Fig. 3 is a diagram of a water-jacketed tuyere showing a vertical section through it. It consists of a conical tube of cast-iron, in which an annular space is preserved in the metal composing the sides. Through this opening a current of cold water is made to circulate by means of two tubes t and t′, one of which t supplies the cold water, while the other t′ carries off that which has become hot. In this is placed the nozzle N, made either of thin copper or sheet-iron, and connected with a leather hose or otherwise with the pipes leading from the the blower. The pipes are set pointing slightly downwards, so as to prevent one tuyere blowing into another.

Now to follow the ore through the process, starting from the weighing and mixing. The ore, flux, and fuel are cast into the furnace from iron barrows, which are wheeled up alongside of the charging door and dumped. As the mass settles down it becomes heated up, and then the mixed fuel, at the tuyeres, creates a powerful heat, by which the ore and flux is melted, and the slag being taken up by the flux, the whole sinks to the bottom and runs out into the crucible, where the matte and slag separate, the slag floating and the molten metal sinking to the bottom. When the level reaches the slag-lip, which is always open, the slag flows out and into a slag buggy placed to catch it. After a time the metal will begin to show itself at this opening, and is indicated by a greater fluidity