

which the blast is conducted to the furnace, are from two to four inches in diameter. They pass through the water-jacket and extend eight to ten inches into the furnace at about 6" to 8" from the bottom. Sometimes they are water-jacketed but more frequently are just cast-iron nozzles. To prevent the blast from reaching the outside crucible, it is arranged to have the slag-lip about 12" to 18" above the outlet from the furnace; thus when the molten metal runs from the furnace to the crucible, the level is soon raised above the opening and will continue to rise until the slag-lip is reached, the matte and slag standing at the same level in both crucible and furnace, and thus the blast is effectually cut off from the crucible. This state may be maintained provided the crucible is not, when tapped, emptied of all its contents; if such should occur a blast of cinders, slag and matte at once appears at the tap-hole. The blast supplied is from a Baker blower, No. 4½, which at 115 revolutions per minute will supply ten ounces per square inch of blast. This may appear a small blast, but when it is understood that the heat obtained is only to fuse the ore, not to reduce it, it will readily be seen that a stronger blast is not necessary.

Two different systems of blowers have been used:

I. Those producing a positive blast, and which, if obstructed, must result in the bursting of some part of the apparatus or the stopping of the blower.

II. Centrifugal fan-blowers which, even if obstructed, continue revolving. They consume much less power, the air being simply beaten by the vanes but not passing out of the pipe.

One advantage of the first kind lies in the fact that sometimes the matte becomes cooled on the tuyere pipes, forming what are called noses, which will continue to grow until the opening is closed, unless a strong blast be produced to keep it open.

Figure 2 shows the principle of the first kind of blower.

Here A is a large cast-iron cylinder accurately turned on the inside, in which the piston P works up and down, and made air-tight at the piston opening. The cylinder is closed at both ends by carefully-fitted iron plates. The cover is provided with two lateral openings V and V', one of which V communicates with the outside air and is furnished with a valve opening inwards; the other V', on the contrary, opens outwards and communicates with another chamber, B, also of cast-iron. The lower end of the cylinder is constructed exactly like the top.

To understand the action of this machine, let us suppose the piston has been raised to the full extent and has begun to be again forced down. If the valves V and V' of the upper chamber are closed, the air contained in the upper portion will gradually become more and more rarified, and the