termines the size of the furnace which can be operated. The method of supplying this gas to the ore undergoing reduction has gone through the following main stages:

Blowing the breath on the heap of iron ore and burning wood;

Blowing through a hollow tube onto the piled up ore and burning wood, and later using a similar device by blowing into an aperture at the base of a crude furnace;

Using crude hand bellows;

Using hand bellows rigged up in such a way that a mechanical advantage was had, even though they were still hand operated;

Using bellows operated by water power (see illustration, page 6);

Using air blasts sent into the base of the furnace generated by the steam engine.

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CAST IRON

Cast iron, or iron as it comes from the blast furnace, contains four to five per cent of carbon, together with a small amount of other impurities which have not been removed during the smelting. On account of its high content of carbon, it is quite hard and brittle and is therefore easily broken. Cast iron can therefore not be used by the blacksmith because it would break if hammered on the anvil. It would also be of no value for making bridges or in other places where it would have to bear great weights or withstand sudden shocks.

Cast iron can, however, be cast into molds, because it has the particular virtue of expanding slightly when it solidifies from the molten condition. This causes it to force itself into the details of a mold.

In making articles of cast iron, the metal is melted and poured into molds made of a particular sort of sand. These molds are prepared by pressing into the sand a model of the piece to be cast. Cast iron is used for making stoves, radiators, pipes, and many other articles which demand hardness rather than particular strength.

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WROUGHT IRON

Wrought iron may be made from cast iron by taking out most of the carbon and other impurities. The cast iron is treated in a special furnace with a small amount of iron oxide and a suitable flux. The oxygen of the iron oxide unites with the carbon and other impurities forming either gases which escape, or liquids which separate with the slag.

Wrought iron is the purest commercial form of iron. It contains less than three-tenth per cent carbon, and as a result it has none of the brittleness of cast iron. It is very tough, and it can be stretched and bent without breaking. Wrought iron is used by the blacksmith because it can be forged and