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Farga Catalana and the Industrial Revolution
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INTRODUCTION

It was known since ancient time that blowing air in a furnace increased its temperature. The ancient Egyptians used manually operated bellows made of goat skin for this purpose (Figure 1). The Romans used the water wheel as a source of energy (Figure 2). The water wheel was also described by Georgius Agricola (1494-1555) in 1556 (Figure 3) in connection with activating bellows to blow air in a furnace (Figure 4).

![Figure 1 - Principle of a bellow](image1)

![Figure 2 - The water wheel as a source of energy](image2)

![Figure 3 - Georgius Agricola (1494-1555)](image3)

![Figure 4 - A water wheel drives bellows as described by Agricola](image4)

THE TROMPE

In 1599 the Italian scholar Giambattista della Porta (1535-1615) (Figure 5) found that the system of water wheel and bellow can be replaced by a simple device known as trompe (Figure 6). In this system, water falling from a box behind the furnace, forcing air into the charcoal and keeping the furnace hot. This system was introduced on large scale in the village of Ripoll in Catalonia, Kingdom of Aragon (Figure 7) around 1650. It became known as Farga Catalana, i.e., the Catalan forge (Figure 6).
The water trompe was a simple device that did not need a moving part like the water wheel and had the advantage that it could be used to blow air in a furnace without the need of bellows. The trompe received wide application because of its efficiency. The Pyrenees region was rich in iron ore and had a long iron making tradition. This activity had produced economic wealth dating from the beginning of the 17th century to the end of the 19th century. The Principality of Andorra is a small country located in the eastern Pyrenees Mountains and bordered by Spain and France. Stamps illustrating iron making in Andorra is shown in Figures 8 and 9.
Ripoll on the confluence of the Ter River and its tributary Freser had an abundance of coal and iron ore, coupled with the ample water supply of the rivers, encouraged a metal-working industry in the early Middle Ages. The furnaces of Ripoll were a prime source of nails for the peninsula and it enjoyed a reputation throughout Europe for the production of firearms (Figures 10).

The Industrial Revolution in England is marked by the shift from charcoal to coke in a blast furnace. The use of coke necessitated a more powerful blast because of its higher ignition temperature. Also, the need for increased iron production necessitated the construction of larger blast furnaces. The air blown by the trompe was too weak for such furnaces. As a result, large water-wheels were constructed to drive large bellows to obtain higher pressures and higher air flow (Figure 11). This gradually replaced the trompes. All this came to an end when the steam engine was introduced to operate blowers to introduce air in the furnace.