

# Artículo breve/Short note

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## FARGA CATALANA

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### RESUMEN

La farga catalana es un horno del siglo XVII en el que se utilizó un chorro de aire producido por una trompa (efecto Venturi) y que supuso un paso intermedio en la producción de hierro. La trompa llegó a ser un dispositivo común para producir el chorro de aire, que sustituyó al fuelle con su correspondiente rueda hidráulica. Sin embargo, cuando el carbón reemplazó gradualmente al coque en el alto horno, este tipo de aire no fue suficiente y la trompa fue sustituida por grandes fuelles operados por las ruedas hidráulicas.

**PALABRAS CLAVE:** Hierro, farga catalana, historia de la metalurgia.

### ABSTRACT

The Catalan forge is a 17<sup>th</sup> century furnace that was an intermediate step in iron production in which an air blast from a trompe was used (Venturi effect). The trompe was a popular air blast device because it replaced both the bellows and the hydraulic wheel. When, however, charcoal gradually replaced coke in the furnace such air blast was not enough and large bellows operated by large hydraulic wheels replaced the trompe.

**KEY WORDS:** Iron, Catalan forge, history of metallurgy.

It was known since ancient time that blowing air increased the flame in a fire and thus a higher temperature could be achieved. The ancient Egyptians used blowpipes (Figure 1) and manually operated bellows made of goat skin for this purpose (Figure 2). In Roman

times the situation did not change much (Figure 3). In the Middle Ages large bellows made of wood and manually operated were described by Biringuccio in 1540 (Figure 4). Agricola described bellows operated by the water wheel to blow air in furnaces made of brick and as tall as a man (Figure 5). The water wheel is an old invention that was used in Roman times as a source of energy, for example, for lifting water from a low level to a high level.



Figure 1. Blowpipes.

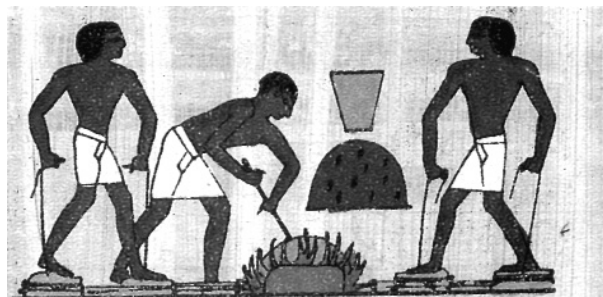


Figure 2. Bellows made of goat skin.

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Figure 3. Iron production in Roman times. Note the foot-operated bellows and the charcoal kiln at the left.

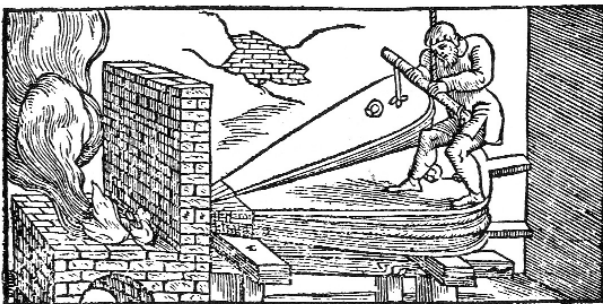


Figure 4. Manually-operated bellows (Biringuccio, 1540).

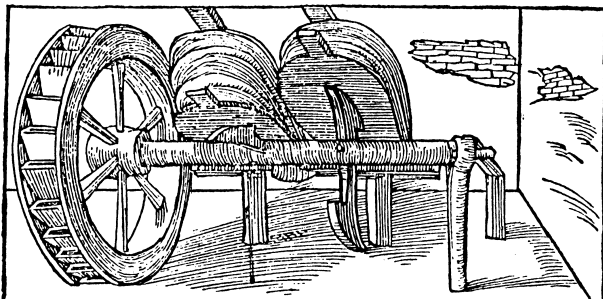


Figure 5. Water wheel operating bellows (Agricola, 1555).

A new invention appeared in the Middle Ages when it was found that the system of water wheel and bellow can be replaced by a simple device known as trompe, or hydraulic air blast, that did not need a moving part (Figure 6 and 7). This device was first described in 1589 by

the Neapolitan scholar Giambattista della Porta (1535-1615) (Figure 8) in his *Magiæ Naturalis libri XX* (English translation London, 1658). This new system was introduced on large scale in the village of Ripoll, province of Gerona in Catalonia, Kingdom of Aragon in Spain around

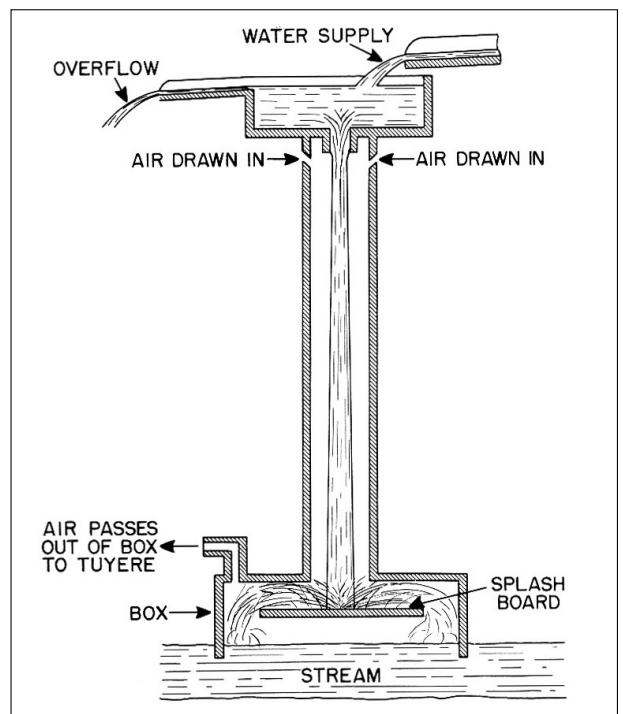


Figure 6. Principle of the trompe.

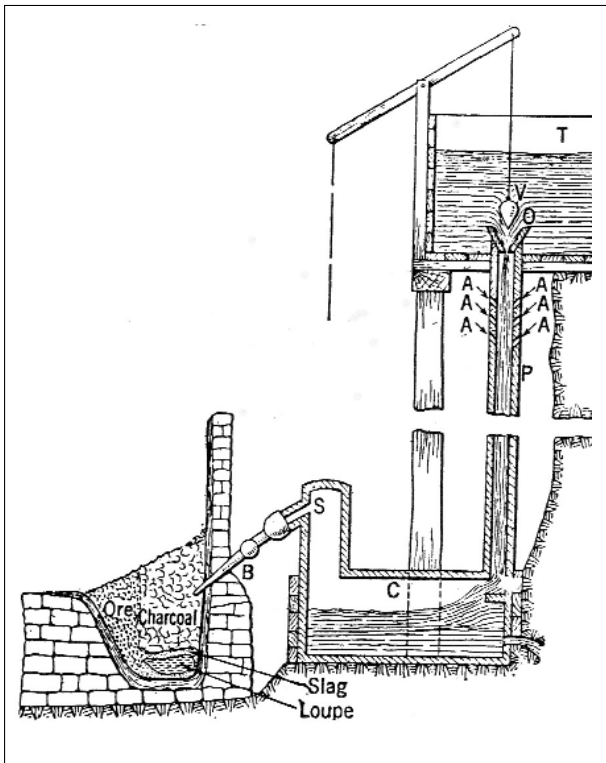


Figure 7. Farga Catalana.



Figure 8. Giambattista della Porta (1535-1615).

1650. It became known as Farga Catalana, i.e., the Catalan forge. The water from a river was caught in a small reservoir just above the furnace, and after the furnace was lighted the water was permitted to run down a pipe at the back of the furnace. It made use of the aspirating of a falling column of water inside a tube, to draw air in through holes in the sides of the tube near its

top, and expel the air into a closed chamber at the bottom. The air was introduced to the furnace from this chamber by means of a pipe. The air flow acted as a constant blast. Ripoll enjoyed a reputation throughout Europe for the production of firearms.

However, at the end of the 18<sup>th</sup> century, the need for increased iron production and the switch from charcoal to coke in furnaces necessitated the construction of larger 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 9). This gradually replaced the Catalan forge which also fell into decline due to the exhaustion of the local charcoal supplies. All this came to an end when the steam engine was introduced to operate blowers to introduce air in the furnace (Figure 10).

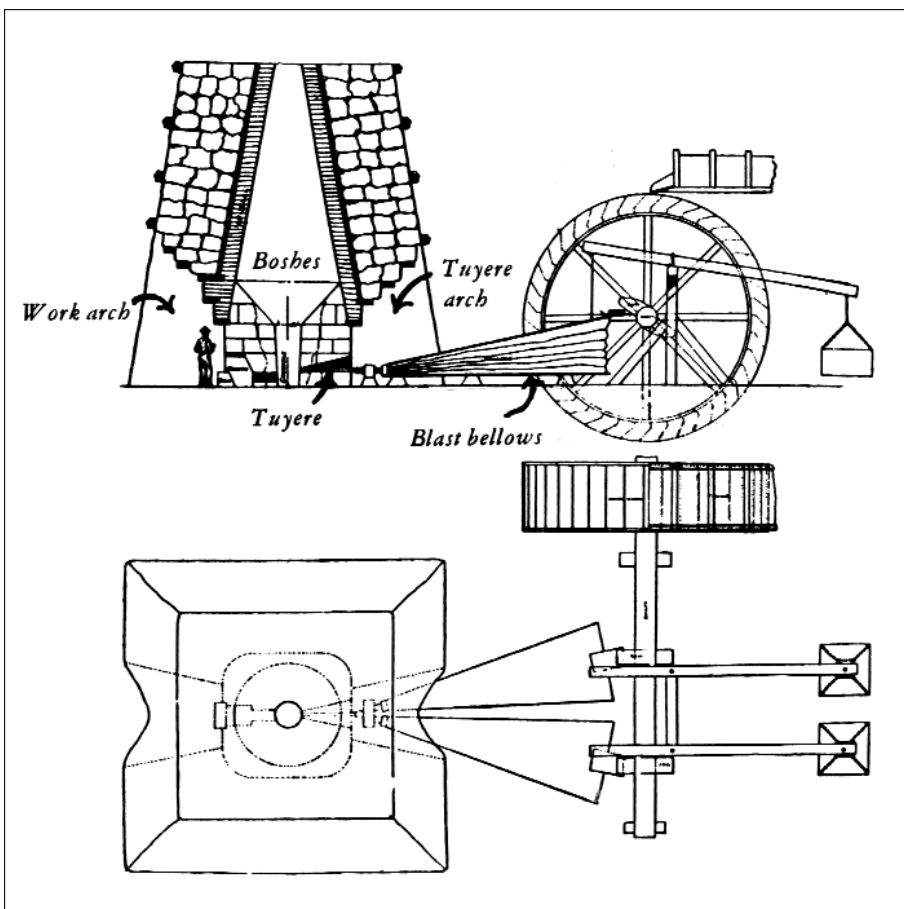


Figure 9. Large water wheel to activate bellows.

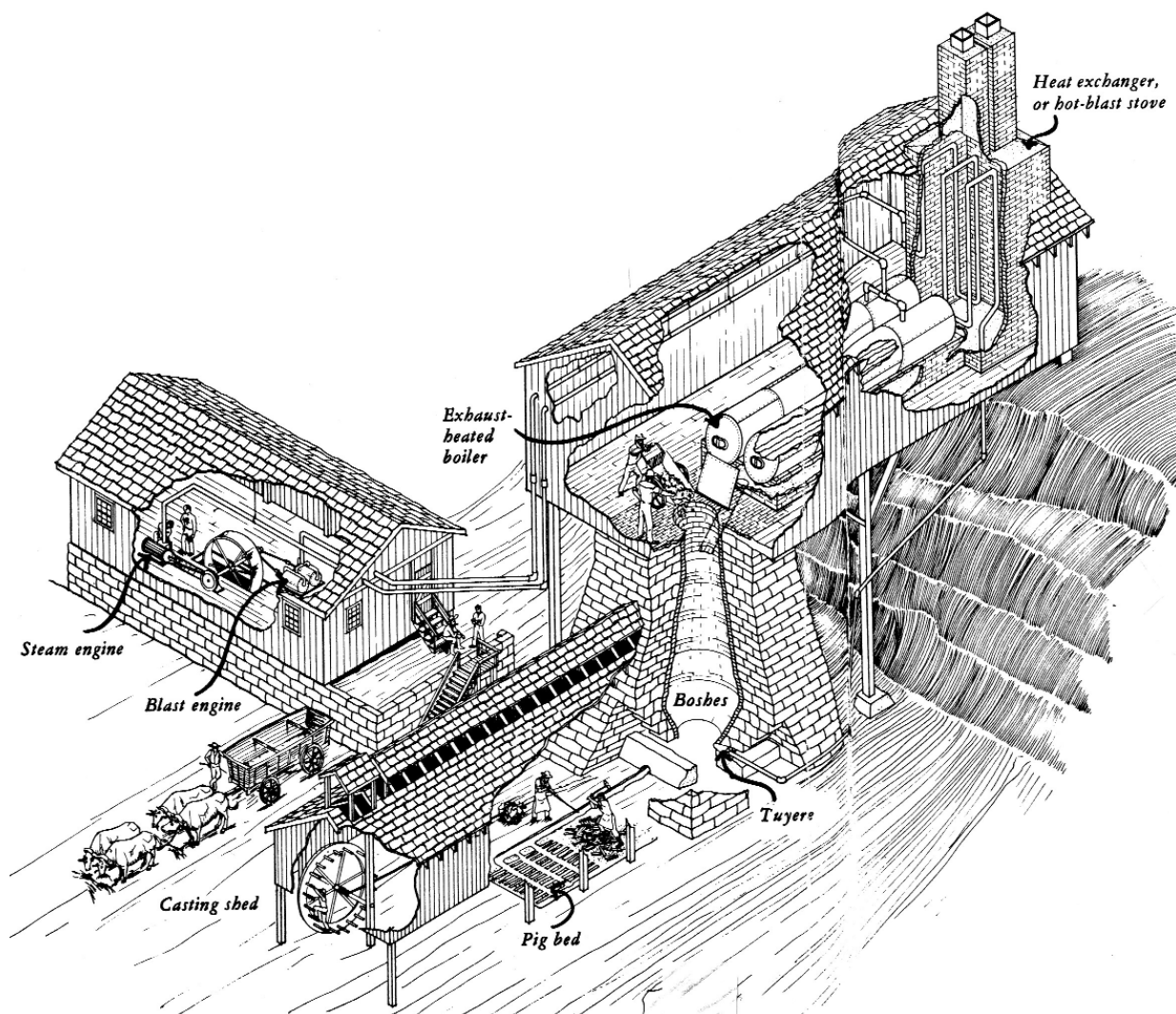


Figure 10. The steam engine replaced the trompe as well as the water wheel.

The Pyrenees region is rich in iron ore and has a long iron making tradition. This activity has produced economic wealth dating from the beginning of the 17<sup>th</sup> century to the end of the 19<sup>th</sup> century. Forestry, mining, and processing factories have left substantial traces as much in the landscape. The Iron Route set up in 1996 offers visitors the opportunity to explore the places connected to the process of obtaining and transforming iron. The objectives of the project launched in the 1970s by the Andorran government were to make the public aware of all the different aspects of this heritage: the mines, charcoal kilns and ironworks, as well as miner's and

ironworker's homes and some typical features of architecture of ironworks.

### SUGGESTED READINGS

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