

THE BRITISH COAL UTILISATION RESEARCH ASSOCIATION

Information Circular No. 73

Downjet Coke Burner and High-Speed Heating of Metals

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SUMMARY

In recent years gas-fired furnaces have been developed for high-speed heating of metals in hot working and heat treatment processes. Furnace D.J.L.51 was designed and built to demonstrate that Downjet Coke Firing could be used for this purpose. Construction and operation of the furnace are described.

Experiments were made at Leatherhead on steel billets to find heating times, efficiencies, and the effect of high-speed heating on the quality of the steel, and to find the time taken for the billets to soak through to an approximately uniform temperature, and whether the soaked temperature would be satisfactory for forging.

The fuel costs should be lower than those for gas firing.

(1) Introduction

During the recent war gas-fired furnaces were developed in the U.S.A.¹ and in Great Britain² for high-speed heating of small billets and blooms for hot-working. In these furnaces the pieces to be heated are brought rapidly to an outside temperature above that required for working, and on their way from the furnace soak through to an approximately uniform forging temperature. For small sections the large ratio of surface to volume of metal gives a rate of heat transfer from the outside to the centre high enough for burning and decarburising of the surface layers to be avoided. Upper size limits of 8 in. dia. for non-ferrous metals, and 5½ in. square for ferrous metals, have been reported.¹ Mention has been made³ of a continuous pusher-type furnace in which steel billets weighing up to 10 lb. were heated to 2 300°F (1 260°C) in 4 min, and of another in which steel blooms for piercing, 5 in. dia., were heated to 2 300°F in 14 min.