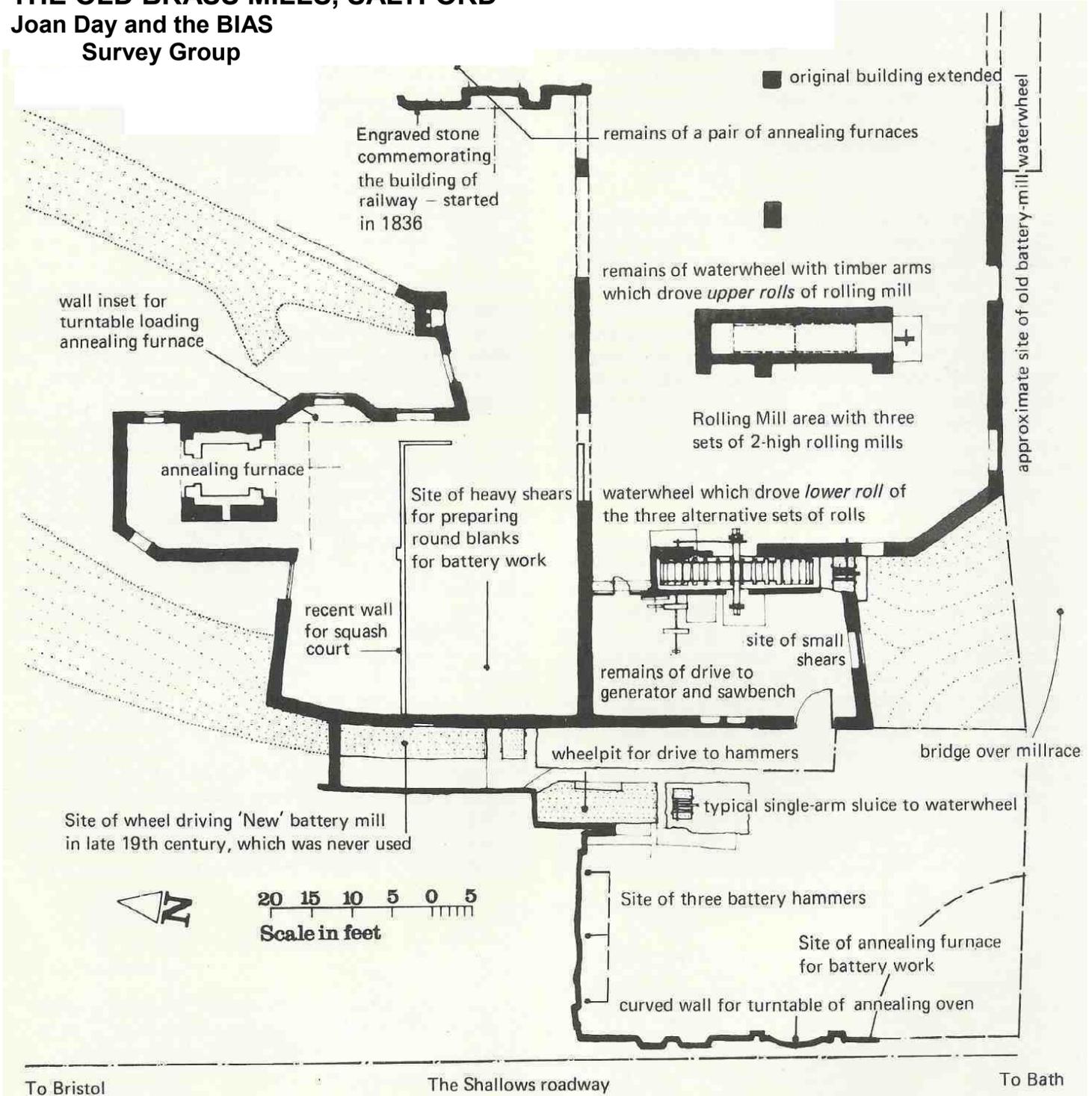


THE OLD BRASS MILLS, SALTFORD

Joan Day and the BIAS Survey Group

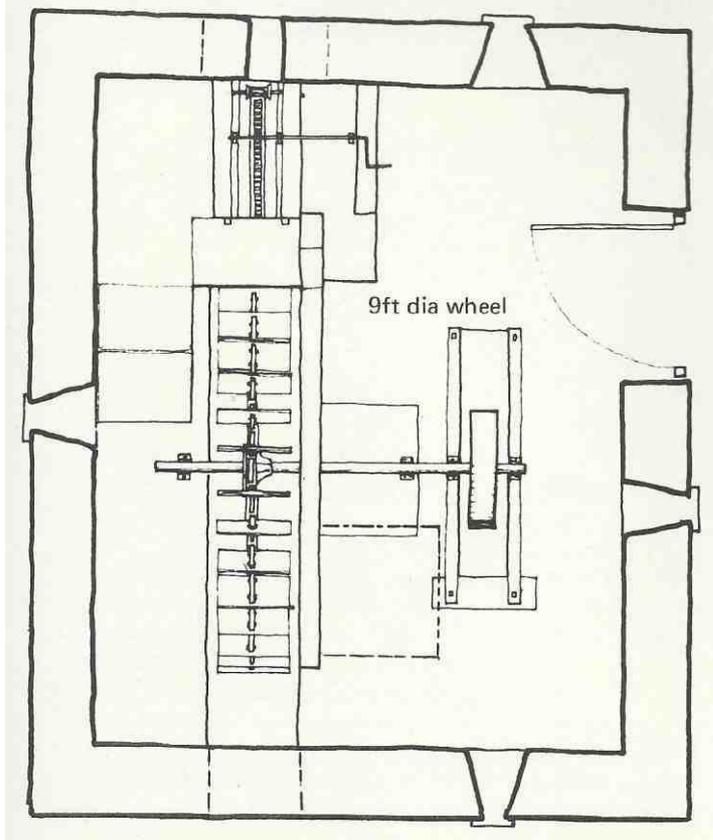
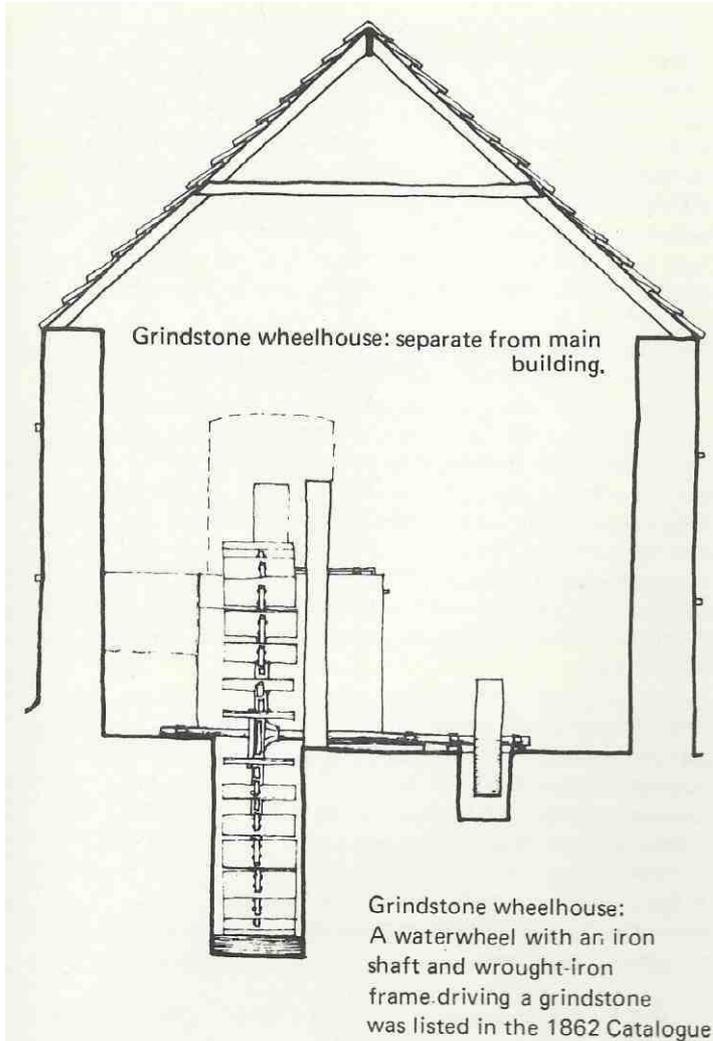


Situated on the upper of the two Saltford weirs on the Avon the Old Brass Mills at ST 687670 can be approached by The Shallows, a river-side road which used to be called Brass Mill Lane. The remaining mill fabric consists of a much-altered and partly-demolished structure of local limestone, with a complicated pantiled roof which, with study, may well yield indications of the original core of the building. Apart from waterwheel remains there is little surviving evidence of the machinery employed for brassmaking over a period of 200 years.

The brass company which established itself at Bristol in 1702 started to expand within a few years. Brass metal continued to be made at the original premises at Baptist Mills but additional watermills were required to operate water-powered hammers for *beating* the metal to form

sheet and to shape up hollow-ware vessels. In the first thirty years of the century sites were leased for these *battery mills*, as they were called, at Keynsham, Saltford, Woollard and Weston, Bath, (a list that was later to be extended). Land for the Saltford battery mill was taken, in 1721, on a site that had probably been occupied in former times by a long-established fulling mill.

During the first half of the eighteenth century the company replaced the battery method of producing metal sheet by the use of water-powered rolling mills but, throughout its existence, continued to use hammers to manufacture hollow-ware vessels. When a valuation was made of company property in 1830, Saltford Mill then contained a rolling mill powered by two waterwheels (the upper and lower rolls of the mill would have been driven by *separate wheels*) and two



battery mills with a further two waterwheels, each one operating three hammers. A surveyor's report of 1855 described Saltford Mill as very old and in a decaying state, but it is quite clear from a Sales Catalogue of 1862 that, by then, little had altered. An additional iron waterwheel was listed but the four wheels mentioned earlier for driving the rolling and battery mills were described as 15 ft by 3 ft 6 in, complete with wooden shafts and gearing. For the first time, however, the catalogue refers to features of the mill which were an integral part of the premises, the four annealing ovens which, undoubtedly, had been in existence from the previous century.

Such annealing ovens, (or furnaces, as they are more correctly called) were standard equipment at the local brass mills where frequent annealing was required at all stages of the work. The severe mechanical treatment of rolling and battery production caused distortion in the crystal structure, making the brass hard and brittle. This could only be rectified by a process of heat treatment which softened, or normalised, the metal. Those furnaces used in the Bristol area were developed by the local industry and do not appear to have been built elsewhere. In consequence, the almost-complete furnace still remaining at Saltford together with the two outer shells of furnaces still standing at Kelston brass-mill site are believed to be the only remains of this type of structure in existence anywhere. Coal-fired, and dating from the eighteenth century, they have a place in the development of coal technology in this country.

Coal had already been used successfully, first to smelt lead, and then copper in Bristol in the latter part of the seventeenth century. By 1710 there is evidence that coal was the fuel being employed by the brassmakers of the Bristol industry, probably for the first time. In 1723, Nehemiah Champion the manager of the brass company, patented 'A New Way of Nealing the Plates and Kettles with Pitt Coale, which softens and makes the Brass as Tough and Fine-coloured as any nealed with Wood and Wood Coale'. He protected brass from the sulphur fumes of the coal by placing it in wheeled cast-iron containers which were then sealed with clay. The furnace interior was 5ft square with a 4ft high arched roof and 1½ ft thick side walls. The fire entered the furnace through apertures in these side walls and was drawn up, and reverberated from the arched roof on to the protected boxes below. The oven door could be raised and lowered by a chain which suggests a similar arrangement to the horizontal balance beam used in the later development. (see drawing) This early coal-fired annealing furnace was, therefore a type of reverberatory furnace, (in which there had been much previous local innovation in the smelting of non-ferrous metals) but which required the wares being annealed to be very well protected.

Between 1764-8, when Nehemiah Champion's son William built his own company's new battery mill at Kelston on the next weir downstream to Saltford Mill, a more sophisticated type of coal-fired annealing furnace appeared, the two shells of which still remain. In this structure the furnace gases were kept in quite separate outer cavities in the side-walls along the length and above the furnace roof. The inner surface of the interior was kept well smeared with clay by the furnaceman to prevent sulphur fume from penetrating to spoil the brass. Thus, the work being annealed no longer required the protection of a sealed container. The furnace load could

simply be stacked in the oven on trolleys to facilitate handling and it was these trolleys, or dilleys, which were manoeuvred into place on a revolving turntable.

William Champion may well have been responsible for this development in furnace construction, which today, would be called a 'muffle' furnace, with its heating cavities surrounding but separate from the interior. In Champion's Patent No. 867, enrolled in 1767, he included with other processes, a method 'for Manufacturing Brass into Brass Wire by Stone or Pit Coal instead of Wood now used'. As brass was always worked cold during the eighteenth century, whether to roll sheet, form hollow-ware, or draw narrow strips into wire, it is difficult to imagine any other purpose for heat treatment, and so for the above patent, other than for the annealing process. Members of the Champion family were past masters at obtaining patent protection for their inventions by giving deliberately vague or misleading descriptions of the processes in the specification.

The building of Kelston Mills must have been one of the final phases of expansion by William Champion before being declared bankrupt in 1769. All the premises of his company were eventually taken over by the old Bristol brass company, who used them, but far less extensively, before eventually disposing of the properties. The basic design of the remaining coalfired annealing furnace at Saltford is the same in overall measurement apart from a few minor details, suggesting that it was probably copied from that at Kelston by the old Bristol company.

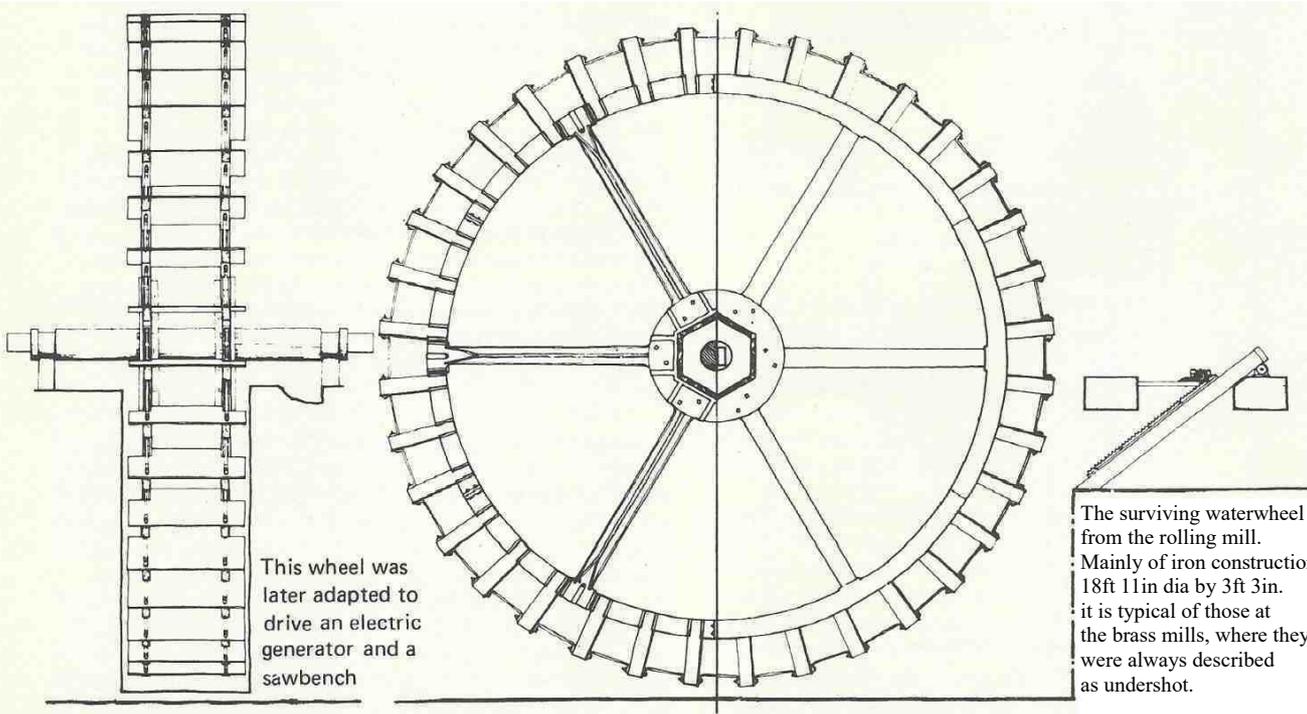
At the front of the furnace an archway at the base of the tapering squared stack gives access to the interior. A heavy fire-brick lined door would have been mounted between the arch and the inner chamber and raised by a horizontal timber beam. This was counter-balanced at the opposite end so that the door could be opened easily by lowering a chain, while the movement of the pivoted beam was accommodated by

a vertical slit in the stonework of the stack. At the opposite end of the furnace another higher arch housed two fireholes which extended along either side of the chamber, allowing heat and gases to be drawn up through the cavities and flues around the chamber to be discharged over the roof into the tall square chimney. It has not been possible to investigate the remaining cavities and flues at Saltford as such work would have damaged the fabric of the structure, but they have been described from the memories of the men who last worked the furnaces in the 1920s.

These men had seen many alterations to the equipment over the years and could tell of others before their time. For instance, of the completely unsuccessful attempt to modernise one of the sets of battery-mill hammers in the late nineteenth century by replacing timber with wrought and cast iron. The project was abandoned eventually but these and other modifications left their mark on the mill building and make the remains difficult to interpret. One set of the older hammers continued working until 1908 but the rolling mill did not come to a halt until 1925. When the mill finally closed the remaining annealing furnace was still capable of good service.

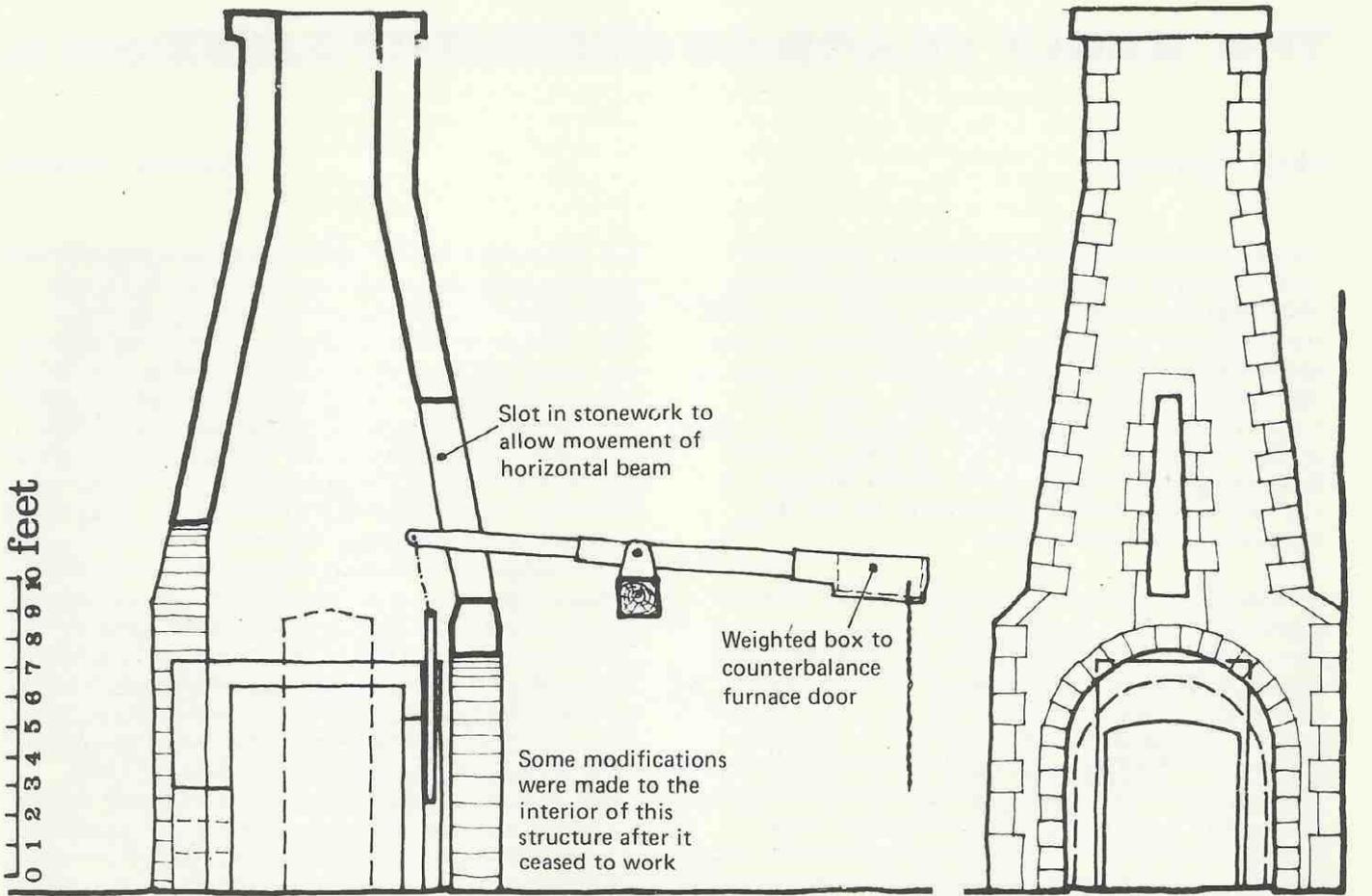
After the brass mills ceased to work a bungalow was built on part of the site and the old buildings were adapted for various purposes. One section was used as a squash court, the annealing furnace was modified for the storage of wine whilst the large waterwheel was employed to generate electricity. These alterations have created further difficulties in the interpretation of the remains. In more recent times the whole island site has been used for the building and storage of boats, its function at the time of writing.

In 1956 Mr Hemmings of Stockwood Vale who had purchased the mill some three years before, offered it to the Council for £1,250, (half the cost of his acquisition) 'or the enjoyment of local residents'. The council rejected his offer.



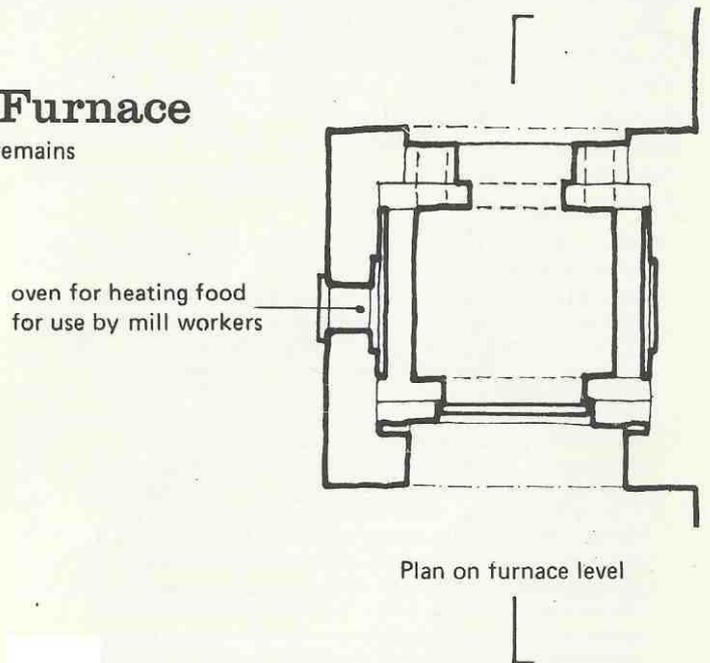
This wheel was later adapted to drive an electric generator and a sawbench

The surviving waterwheel from the rolling mill. Mainly of iron construction 18ft 11 in dia by 3ft 3in. it is typical of those at the brass mills, where they were always described as undershot.



The Saltford Brass Annealing Furnace

Furnace door and balance beam reconstructed from the visible remains



Source

Day, Joan Bristol Brass: a history of the industry, 1973.

Acknowledgements I am indebted to members of the survey group for measuring the site; to Roy Day, Philip Penson, Martin Watts and Roger Wilkes for providing drawings; to Mr and Mrs Charles Sheppard for allowing us access and to George Watkins and the late Tom G Shellard for information on its use.