

#### A PERSPECTIVE ON INDIAN INDUSTRIAL ARCHAEOLOGY

*This account is based on a visit made in the winter of 1986–87 mainly to see aspects of education so that items of industrial archaeological interest occurred as supplementary to the main itinerary and not as deliberately planned visits. Therefore the observations are unlikely to be truly representative of the area visited which in itself is only a very small part of India.*

#### INTRODUCTION

When considering industrial archaeology in India it is easy to think of aspects of that country's present working life as survivals of practices which have been replaced by later developments in the Western World. To use these examples to help understand and interpret the physical evidence of past industrial activities as found in Europe would be very misleading. It is therefore intended to make some general comments on working practices in India before considering three particular industries.

The contrast between industrial activities is more marked in India than in the West. Many small businesses are conducted under very simple conditions, for example people sitting on the pavement in a busy city using hand-driven blowers to heat metal for engineering production on a very small scale. However, the scale of other manufacturing activities makes India about the tenth in the world league of industrial nations.

Whereas nowadays in the United Kingdom a particular activity is carried out in more or less the same way wherever it is located in the country, in India regional variations are still pronounced. For example, brickmaking in the Delhi-Agra-Jaipur areas tends to be in large apparently permanent works firing bricks in large circular trenches. Further south, firing is in clamps and nearly always rectangular except around Udaipur where the usual shape is of a conical form.

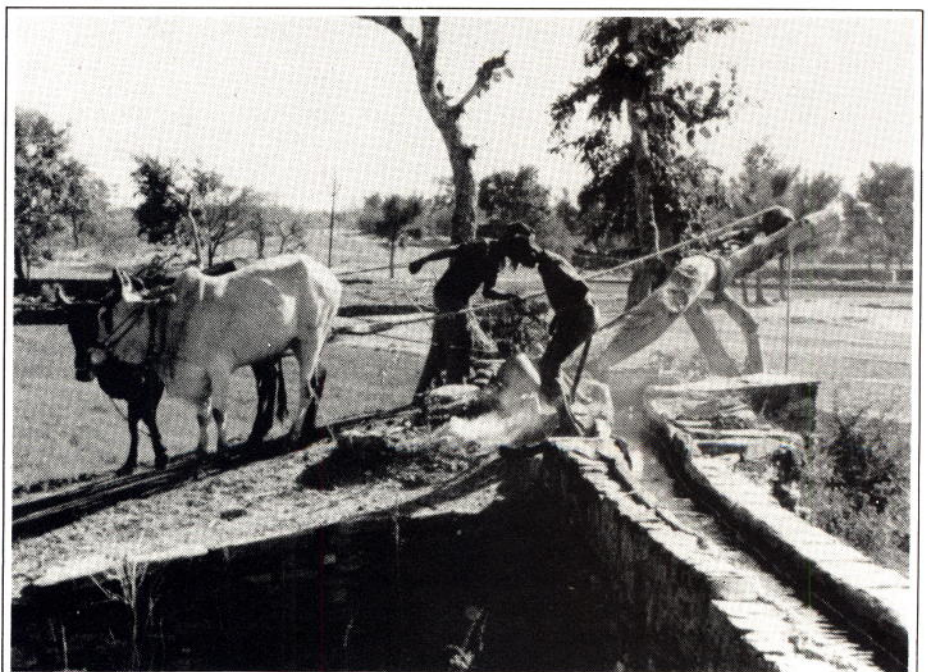
In India there are many instances where those practising the same craft or trade or selling the same type of commodity do so in adjacent premises: the same used to be the case in this country as evidenced by street names such as Skinners' Lane, Gold Street and so on. In Delhi a number of firework makers and their shops were next door to each other and a little further along the same street the makers and sellers of automobile replacement parts were side by side. In Agra along a road called The Strand there was a row of about six 'firms' all making

small millstones for grinding millet and similar. The situation in Jaipur was even more marked where whole areas of the city were given over to a single trade such as carpet weaving, jewellery making or stone cutting. From everywhere in the stone quarter came the sound of tools chipping on stone. One could stand at a street corner and whichever way one looked there were premises where stone was being cut—either in the open front of the building or outside in the street in front of the building. No wonder that vehicles bigger than the motorised tricycle rickshaws do not venture into the area. This same grouping of similar crafts also occurred in the villages. Badami, south of Bijapur, is a large village and the blacksmiths, again with open fronts onto the main road, were side by side. Elsewhere in the village at least four wheelwrighting businesses were grouped around the same open space. The use of human musclepower is widespread. Most habitations appear to have overhead electric cables but whenever there is a small-scale need for power it was met by man or woman power. Restoration of the inlaid work in the Rang Mahal inside the Red Fort at Delhi required the new pieces to be ground to fit. Four men were doing this, each squatting on the floor and moving a bow back and forth with the cord of the bow wound around the shaft

carrying the grinding wheel he was using to shape his piece of inlay. Sieving and sorting cereals (nearly always done on a family scale) were done by hand as was winnowing—often by throwing baskets of grain into the wind but also by hand-powered winnowing machines. However, with the growth of cooperatives there are some oil-engine powered winnowing machines appearing. Small roadside potteries, usually making earthenware water pots, had stick wheels operated from the squatting position.

This last observation highlights a realisation that one aspect of Indian working life would appear to have no parallel here, either in the recent or distant past. They make very little use of any artefact to support what they are working on. Apart from in the hand block printing of textiles in lengths suitable for sarees, no workbenches are seen. Everything else is done with the work on the ground and the workmen squatting alongside it.

This was the case with the blacksmiths at Badami working on their very small anvils, the previously mentioned inlay grinders, carpenters planing wood, handmade-brick makers and shoe repairers who use a sort of lasting jack but it stands on the ground and not on a bench. Indians appear to be able to squat for hours on end and chairs seem to be non-existent in



Lifting water from a well for irrigation using a pair of oxen walking down a slope. By side of road between Ajmer and Udaipur (Rajasthan).

many places. Is this ability to squat due to the looser clothing worn in hot countries which is less restrictive to limb movements? This agility is also shown in the way they manage to hold the work without recourse to artefacts such as vices. Carpenters would hold the wood with their bare feet whilst they sat on the ground to cut it with a saw. The millstone cutters supported 18" [45cm] diameter stones on their edges with one foot on the uppermost surface of the curved edge.

Animals are still used in India on a considerable scale both for transport and on animal-machines of various kinds. Although horses are used this is comparatively small scale in comparison with the variety of other animals employed. It is noticeable that despite the years of the British Raj there was no evidence of the padded horse collar and all the horses seen were harnessed using a breast band. The animals most frequently seen at work were oxen. They were being driven around circular trackways to operate edge rollers for preparing clay for brickmaking, for crushing stone and with wooden frame 'rollers' for separating grain from stalks of some cereal crops.

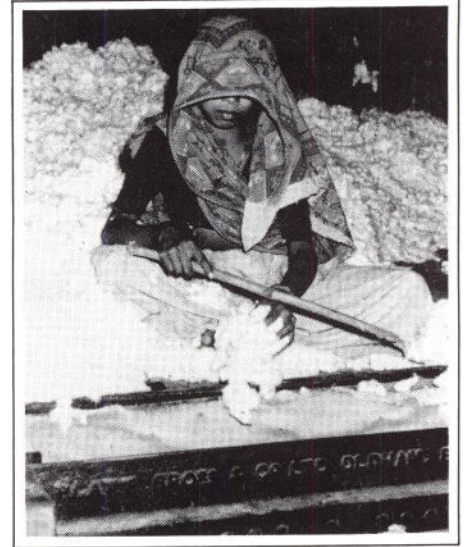
For most of the area visited, water lifting for irrigation by oxen involved them walking down an incline to pull a rope taken over a pulley and down to a leather bag in a well. Once the water had been emptied from the bag into a distribution channel at the top of the well, the oxen had to walk backwards up the incline to lower the bag down into the well ready for the next lift. Sometimes a single animal was used, more often two side by side and in one case three abreast were used to pull up two leather bags. Around Udaipur a different type of water lifting device was in use, the oxen walking continuously around a circular path to drive, by gearing, a chain of earthenware pots to lift the water from the well. There were many examples using primitive wooden protrusions meshing with each other but hardly qualifying for the term gearing. Others had iron gearing although the larger gear was of the peg type. Some were out of use where the water was being raised by small centrifugal pumps driven either by electric motors or by small oil engines.

### BRICKMAKING

Brickworks abound in India or perhaps brick-making sites would be a better term since in many instances there are no permanent buildings, structures or machinery. Reference has already been made to the circular trough kilns of the Delhi-Agra-Jaipur area. The troughs were approximately 60' [18m] mean diameter, the

cross-section of the channel being about 10' [3m] wide and 8–10' [2.4–3m] high. The bricks were being stacked, fired and unloaded at various places around the trough and from the middle of the circle rose one or two cylindrical metal chimneys. There was no opportunity to investigate the connection between the channel and the chimneys but these kilns might be an Indian open-air variation on the Hoffman-type kiln.

In all cases where bricks could be seen being formed it was by hand and in the open. If machines were used they were probably in some shed and therefore hidden from view, but at most of the sites there were no sheds! At every site the green bricks were laid out in the open to pre-dry—one advantage of having a rain-free climate for long periods of the year. Since there was usually only one layer of bricks the pre-drying process covered a considerable area. There was an opportunity to observe operations at a brickmaking site close to the road between Dharwad and Haliyal. As one man dug the clay, using a mattock, others brought up water from a nearby stream and tipped it in the hole. The fellow paddled in this with his bare feet as he continued to chop out the clay, so carrying on the function of a pug-mill. Periodically the semi-fluid material was scooped out of the hole and added to the pile by each of the two brickmakers. The piles were covered with cloths to retain the moisture as the sun was shining all day, even in January. The brickmakers worked in teams of three. One was a woman, resplendent in brightly coloured saree, who took the clay from the pile worked it up into very nearly the right amount before passing it to the moulder. He threw it into a wooden mould having a bottom with the initials of the company for whom they were working. After scraping the excess clay from the top of the mould he tipped it onto a wooden flat by which the third member of the team carried it to the pre-drying rows. Apart from this third member, the other two carried on their work from the squatting position to which reference has been made previously, so that there was no other equipment or artefact on the site other than the brick moulds, flats, mattocks and water-carrying vessels. This site was one of about five in close proximity to each other, and the construction of the clamp for firing the bricks had not started. Some of the other clamps under construction and the clamp which was burning stood in isolation, the other brick making activities having moved to another site. The burnt clamp, standing on its own, was quite a common sight giving the impression that the bricks



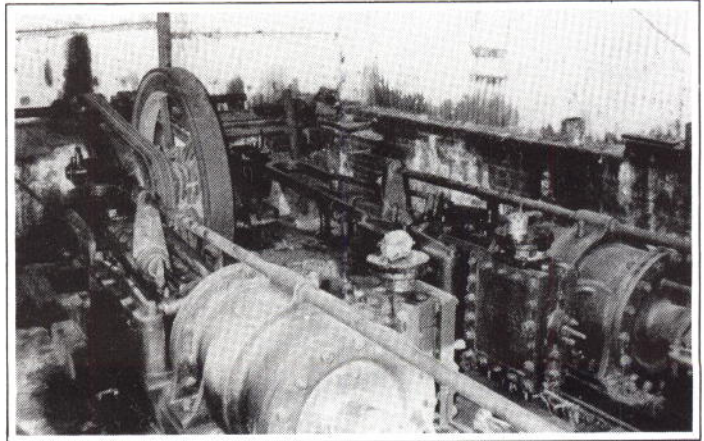
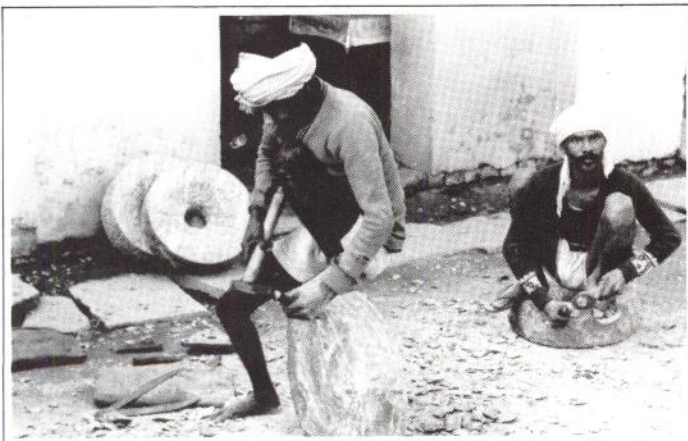
Feeding cotton into a gin, made by Platt Brothers & Co of Oldham and dated 1905; Bodeli gin mill (Gujarat).

are left in the clamp until they are required for use so that the clamp remains, through its gradual demolition, for a considerable time.

### MANUFACTURING

Production of goods on a small scale can be easily seen in India since it is usually carried on in the open by the side of the road or in open-fronted buildings. Even activities needing a large space, such as ropemaking, are carried on in public places and at Ramdurg, between Badami and Goa, this was in the crowded main thoroughfare. Children are employed in the majority of cases to do the tedious work although women seemed to do most of the fetching and carrying and nearly always on their heads.

Whilst sites and buildings play so small a part in the small scale production activities, there is evidence of the change in style of plant for processing industries such as sugar refining. In the sugar growing area around Ramdurg there were several clusters of buildings each having an open fronted building over large diameter but shallow open-topped pans with squat curved tapering sided chimney. Further north, the older style refineries had a row of small cane boilers, each with its own tall metal chimney protruding through the roof of the open sided long shed. A visit to a modern refinery, operated by a cooperative between Aurangabad and Ajanta—more famous for its caves than its industrial archaeology—provided a contrast between very modern plant engineering and the older ways of handling material. Although



2 One of the grinding stone cutting establishments along Strand Road, Agra (Uttar Pradesh). Note that there is no use of work holding devices apart from the ground and their own limbs.

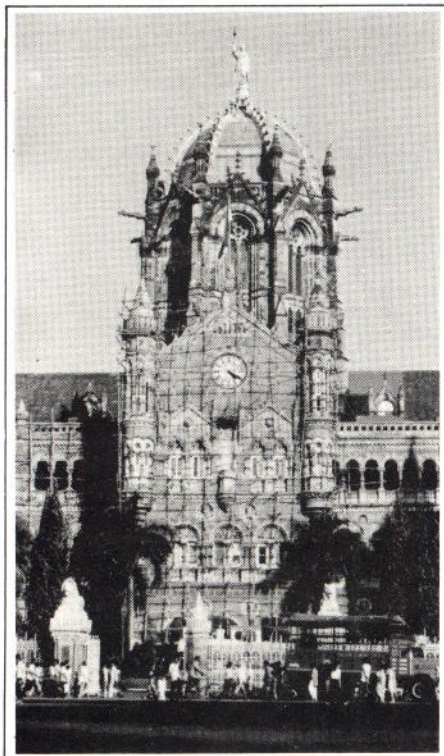
Pumps on a system built to Wilson's patent by Nasmyth & Co, Manchester, to provide hydraulic power for the baling press at Bodeli cotton gin mill (Gujarat).

most of the sugar cane was delivered by lorry, some came by oxen-hauled carts. Women worked barefoot on the raw cane moving along a conveyor feeding the up-to-date processing plant and after the produced sugar had been automatically bagged into sacks these were lifted, one at a time by six sweating men onto the back of another man who ran about 20 yards [18m] and up an inclined plank to load it onto a lorry.

The oldest example of the physical evidence of manufacturing activity was that associated with the cannon-founding in the old Jaigarh Fort, overlooking Amber, a short distance from Jaipur. The fort is high up in the hills and displays the largest wheeled cannon ever made—a magnificent weapon, disappointingly displayed under a low metal canopy. The cannon was made in the foundry in the fort and one can only guess at the labour needed to bring up the raw materials to this height. There does not seem to be much evidence of the foundry itself although a number of foundry tools are exhibited. Many of these were unusual but interpretative material was lacking. Still in situ is the man-powered cannon boring machine. Men turned a capstan, the vertical shaft of which extended down into the space below the platform on which the men walked. Wooden gearing connected the vertical capstan shaft to the horizontal shaft for turning the cannon. Although the capstan and the point of attachment for the cannon are visible at ground level it was not possible to see the gearing below but a rather crude model was very helpful in showing the arrangement.

#### TEXTILES

Activities seen relating to textile manufacture ranged from a cotton gin mill with heavy machinery to weaving and hand-block printing on virtually a craft scale. The cotton gin at Bodeli (in Gujerat between Dabhoi and Chota Udaipur) was one of ten owned by a Bombay industrialist. Ox-carts brought the raw cotton from the fields and at the mill were unloaded



Administrative building at Victoria Terminus, Bombay, formerly the headquarters of the Great Indian Peninsula Railway, embraced by scaffolding of bamboo poles lashed together with rope.

into huge white heaps—so white in the Indian sun that it was disconcerting to the eye. From the heaps the cotton was taken in large shallow baskets on men's heads into the gin itself.

There were two lines of gins, manufactured by Platts of Oldham and carrying the date 1905. They were fed by women sitting on top of the machines. Cotton dust was everywhere—no extraction plant thought necessary here. After separating out the seeds, which were put in piles to await transport to the oil mills, the cotton was baled in a hydraulic press, by Richardsons, for which the hydraulic power came from a system built to Wilsons patent by Nasmyth & Co, Manchester.

Weaving and hand-block printing of fabric are carried on in many regions of India even though only a few places have a reputation for a particular type. There is also a problem in that many so-called factories are merely places to demonstrate the techniques to attract tourists in and persuade them to purchase from the shop which is the main concern of the proprietors, often selling products made elsewhere. As an example, a small building by the road between Jaipur and Amber claimed to be premises for hand-block printing and carpet weaving. The latter was done by a young boy working at amazing speed whilst the visiting party watched—he obviously gets plenty of practice at this—but he stopped as soon as the party went into the shop and started buying. On another occasion, this time in Aurangabad, the guide took the party in the evening to the 'Himroo Hand-loom Weaving Factory'. Because it was evening, perhaps all that could be expected was just a demonstration of silk-weaving and an invitation to purchase wares from the shop—and for which the guide would get his commission for leading the party there. Nevertheless there were about eight looms, all set up with the working portions covered as would be expected to protect the silk until work started next morning. The shuttles passed through the warp at no more than a foot above floor level so that there was a hole in the floor beneath each loom for the treadles to open or close the shed in the warp. The operator sat on the edge of the hole with his feet in the pit to work the treadles. Not seeing inside other 'hand-loom factories' it is not possible to say whether this was common practice.

#### CONCLUSION

The foregoing are only a few of the wealth of items in India of interest to industrial archaeologists. The romance of the Indian railway system is well-known. Road transport has its fascination in the lorries, nearly all of the same size but decorated in a highly individualistic manner—painted flowers, elaborate lettering and geometric patterns, with a similarity to canal boat painting in England. Even visits to the centuries-old forts and palaces offer industrial archaeological interest because water supply has always been a problem and there are 'tanks' (man-made reservoirs) such as in Krishk-i-Feroz in Delhi, at Fatehpur Sikri and Badami—now famous for the echoes from the surrounding hills of the sound from women beating out their dirty clothes against the steps of the dam. Presumably there were Victorian pumping installations in the larger cities but the only one seen was the Love Lane Pumping Station in Bombay and that looked as if it was being demolished. Even in India things do not survive for ever.

Geoffrey Starmer



### MUSEUM NEWS

#### THE MUSICAL MUSEUM

This museum, established by Frank Holland, originally as a piano museum, is now celebrating the 25th anniversary of its foundation at Brentford. A Silver Jubilee Appeal for funding a move to new premises has been launched.

#### BATH INDUSTRIAL HERITAGE CENTRE

The Centre houses a reconstruction of the shop, offices and workshop of the aerated water manufactory of J B Bowler who set up in business in Bath in 1872. The firm continued under his family's control for 97 years. The material was moved from the original premises in Corn Street to Camden Works, Julian Road. Other displays include the story of Bath Stone. The Centre is open daily 2.00–5.00PM from February to November and for the same hours on Saturday and Sunday during December and January. Enquiries: ☎ 0225 318348.

#### THE BOAT MUSEUM, ELLESMERE PORT

The former Shropshire Union Canal Company icebreaker *Marbury* which was built in 1888, has been relaunched following extensive restoration.

#### THE NATIONAL WATERWAYS MUSEUM

To be officially opened by HRH The Prince of Wales on August 5, the Museum will offer late opening on selected days during the summer months, remaining open until 9.00PM on August 3, 16 and 25 and September 6.

A major working exhibit is the Fielding diesel engine restored by the Gloucestershire Engine Preservation Society. The engine, built by Fielding and Platt of Gloucester, originally drove a generating set at the Quenington factory of Godwin Pumps. It has been placed in a new building in the Museum's replica canal maintenance yard and will be run on Sundays and special occasions by members of the Society.

#### WALSALL LEATHER CENTRE

This working museum, depicting tanning, the work of the currier and horse collar and saddle making, is located at 56/57 Wisemore, Walsall. Opening hours are Tuesday to Saturday and Bank Holidays, 10.00 to 5.00PM, and Sundays 12.00 to 5.00PM. Enquiries: ☎ Walsall 721153.