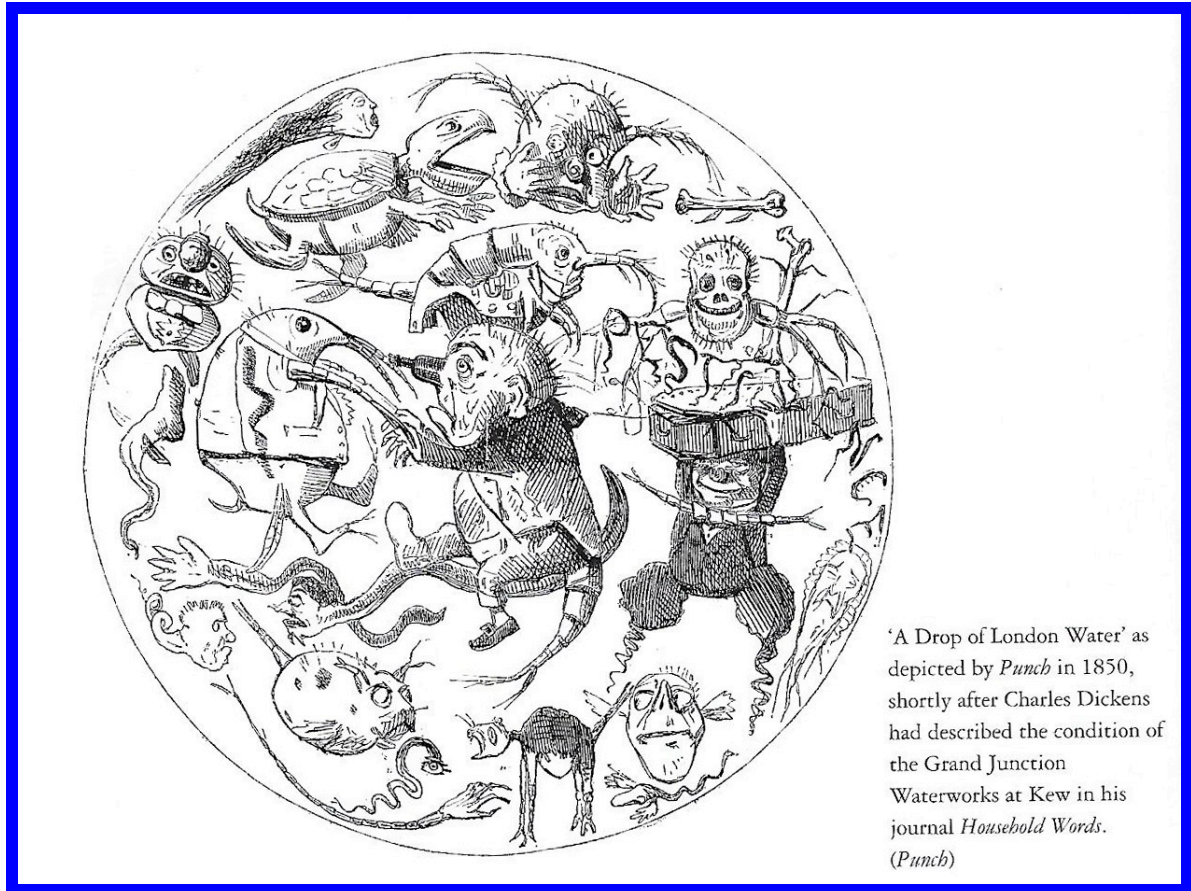


**PLUMBING & SANITATION
FROM EARLIEST TIMES**

London's Great Stink



'A Drop of London Water' as depicted by *Punch* in 1850, shortly after Charles Dickens had described the condition of the Grand Junction Waterworks at Kew in his journal *Household Words*.
(*Punch*)

From the 1999 book

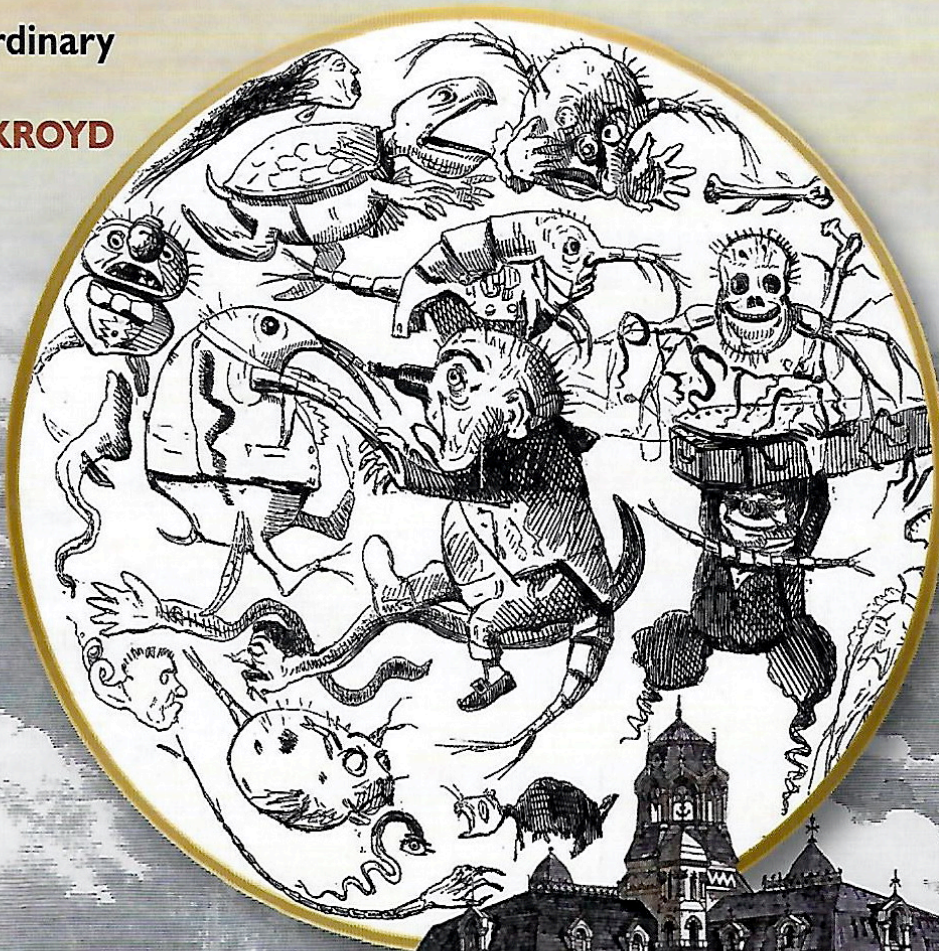
THE GREAT STINK of **LONDON**

SIR JOSEPH BAZALGETTE

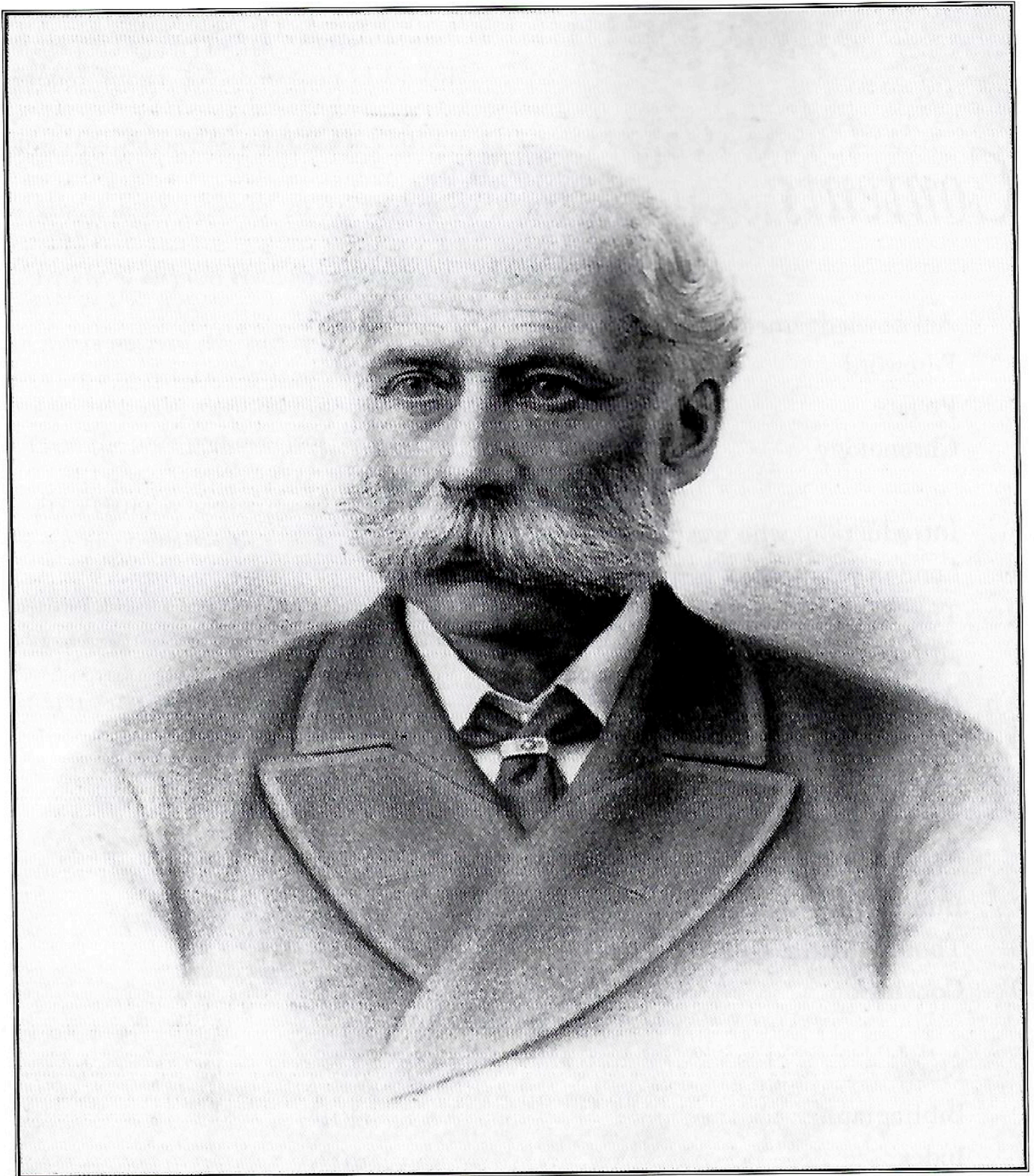
**AND THE CLEANSING OF THE
VICTORIAN METROPOLIS**

**'An extraordinary
history'**

PETER ACKROYD
The Times



STEPHEN HALLIDAY
FOREWORD BY ADAM HART-DAVIS



Sir Joseph Bazalgette, about 1880; from a picture in the possession of Rear-Admiral Derek Bazalgette, CB.
(Derek Bazalgette)

Chronology

- 1750 Jean-Louis Bazalgette born in Ispagnac, France
- 1778 Joseph Bramah patents a new design for the WC, produced in large numbers
- 1779 Jean-Louis in England; marries Katherine Metivier
- 1783 His son, Joseph born
- 1792 Jean-Louis becomes a British citizen
- 1796 Joseph enters the Royal Navy
- 1809 Joseph wounded in action against the French
- 1815 Connection of cesspools and house drains to sewers permitted for the first time
- 1819 28 March: Joseph William Bazalgette born at Enfield
- 1831–2 first cholera epidemic: 6,536 die in London
- 1836 Joseph William articulated as a civil engineer to Sir John MacNeill; works on land drainage and reclamation in Northern Ireland
- 1838 Joins the Institution of Civil Engineers
- 1842 Sets up an engineering practice in Great George Street; works on railway projects. Publication of Edwin Chadwick's *Report on the Sanitary Condition of the Labouring Population of Great Britain*.
- 1847 Bazalgette suffers breakdown through overwork
- 1848 Metropolitan Sewers Commission established; connection of house drains and cesspools to sewers required for the first time
- 1848–9 second cholera epidemic: 14,137 die in London; John Snow publishes *On the Mode of Communication of Cholera* arguing that cholera is water-borne
- 1849 Bazalgette appointed Assistant Surveyor to the Metropolitan Sewers Commission
- 1852 Frank Forster, engineer to the Commission, dies from 'harassing fatigues and anxieties of official duties'; Bazalgette appointed as his successor
- 1853–4 third cholera epidemic: 10,738 die in London; Committee for Scientific Enquiry rejects Snow's theory that cholera is water-borne
- 1855 Faraday writes to *The Times* about the condition of the Thames; the Metropolitan Management Act creates the Metropolitan Board of Works
- 1856 Metropolitan Board of Works takes office; appoints Bazalgette as Chief Engineer (January); Bazalgette submits his plan (June) and protracted dispute with Sir Benjamin Hall follows; Board invites entrepreneurs to propose schemes for the utilisation of Metropolitan sewage
- 1858 July: The Great Stink: Disraeli's Metropolitan Management Amendment Act allows Bazalgette to begin work; Bazalgette also proposes comprehensive programme of street improvements

- 1859 Work begins on the system; Bazalgette specifies Portland cement; draconian quality control system introduced
- 1864 Metropolitan Board accepts the Hope-Napier scheme to convey London's sewage to Maplin sands
- 1865 MP proposes that £6,000 bonus be paid to Bazalgette for his work; Crossness pumping station opened by Prince of Wales (April); Southern system in operation; construction of Hope-Napier scheme begins
- 1866 Cholera epidemic ravages the East End of London which is not yet connected to Bazalgette's system; remainder of the Metropolis escapes; the theory that cholera is water-borne starts to become more widely accepted as a result of the East End epidemic
- 1867 Hope-Napier scheme in abeyance; never to be revived
- 1868 Abbey Mills pumping station opens; Northern system in operation
- 1869 Albert Embankment opens; Bazalgette designs drainage system for Budapest and Port Louis, Mauritius
- 1870 Victoria Embankment opens
- 1871 Native Guano Company starts to manufacture manure at Crossness
- 1873 Native Guano Company's process pronounced a failure
- 1874 Chelsea Embankment opens; Bazalgette knighted; newly landscaped Leicester Square opens
- 1875 Western drainage system in operation
- 1876 Northumberland Avenue opens
- 1878 Bazalgette installs London's first electric light on the Victoria Embankment; *Princess Alice* disaster; pollution of Thames estuary criticised; Waterloo bridge freed from tolls; Bazalgette proposes a new bridge at the Tower, a tunnel at Blackwall and a ferry at Woolwich
- 1879 Lambeth, Battersea, Chelsea, Albert and Vauxhall bridges freed from tolls
- 1880 Wandsworth, Putney and Hammersmith bridges freed from tolls; (Hammersmith later substantially rebuilt by Bazalgette)
- 1883 Robert Koch discovers the cholera bacillus in polluted water in India
- 1884 Bazalgette President of the Institution of Civil Engineers; Royal Commission criticises pollution of Thames Estuary
- 1886 Bazalgette's new Putney bridge opened
- 1887 Discharge of sewage to Thames ceases; practice of dumping at sea begins
- 1889 Metropolitan Board of Works replaced by London County Council; Bazalgette retires
- 1890 Bazalgette's new Battersea bridge opened
- 1891 15 March: death of Sir Joseph Bazalgette
- 1892 Hamburg ravaged by cholera; London escapes owing to Bazalgette's system
- 1998 Dumping of sewage at sea ends; incineration of sewage begins

CHAPTER ONE

London's Sanitation before 1850

The flood is now, below London Bridge, bad as poetical descriptions of the Stygian Lake, while the London Dock is black as Acheron . . . where are ye, ye civil engineers? Ye can remove mountains, bridge seas and fill rivers . . . can ye not purify the Thames, and so render your own city habitable?

(‘Quondam’, 1853)¹

From Complacency to Panic

In 1844 the influential contemporary journal *The Builder* published a pompous but reassuring letter from a Professor of Chemistry. Professor Booth wrote: ‘The free currents of air which are necessarily in constant circulation from their proximity to the majestic Thames . . . have been considered (and not improperly) as a great cause of the salubrity of the metropolis.’² This claim is significant for two reasons. First, it is a clear statement of the ‘miasmatic’ theory of disease which was prevalent at the time and which held that good and bad health were caused primarily, if not exclusively, by the properties of the air inhaled by the lungs. In the same passage Booth expressed a more extravagant version of the theory: ‘From inhaling the odour of beef the butcher’s wife obtains her obesity.’ The theory long survived the discovery that diseases like cholera were transmitted through water rather than air and Florence Nightingale, who died in 1910, went to her grave firmly believing in the miasmatic theory. The theory bedevilled many attempts by reformers to secure improvements in the water supply and sanitation of London, as will be seen in later chapters.

However, the greater reason for the significance for Booth’s claim about the ‘salubrity’ of London lies in its complacent view of the waters of the Thames. Fourteen years after Booth made this claim, in the hot summer of 1858, the drapes of the Houses of Parliament were being soaked in chloride of lime to act as a barrier, albeit an

‘From inhaling the odour of beef the butcher’s wife obtains her obesity’

ineffective one, against the foul odours arising from the river. Despite these precautions the leader of the House and Chancellor of the Exchequer, Disraeli, was seen fleeing from the chamber, his handkerchief to his nose and, as Bazalgette observed in his interview with the *Saturday Journal*, there was even talk of moving Parliament elsewhere. Henley upon Thames was considered.

Professor Booth's flattering assessment of the quality of London's air and the condition of its river was not unique in the eighteenth or early nineteenth century. Charles Lucas, an Irishman who qualified as a doctor in Paris, had written in 1756 that London's water 'undoubtedly is one of the principal causes why our capital is the most healthful great city in the world',³ and in 1818 another writer, Samuel Leigh, claimed of the capital:

Its healthfulness is equal to that of any other metropolis in existence; its plentiful supply of water which is furnished by different water companies, must also have an excellent effect on the cleanliness, and consequently on the health, of the inhabitants of London, while its system of sewers and drains . . . adds still more to the general causes which conduce to salubrity.⁴

In 1826 John Britton had written:

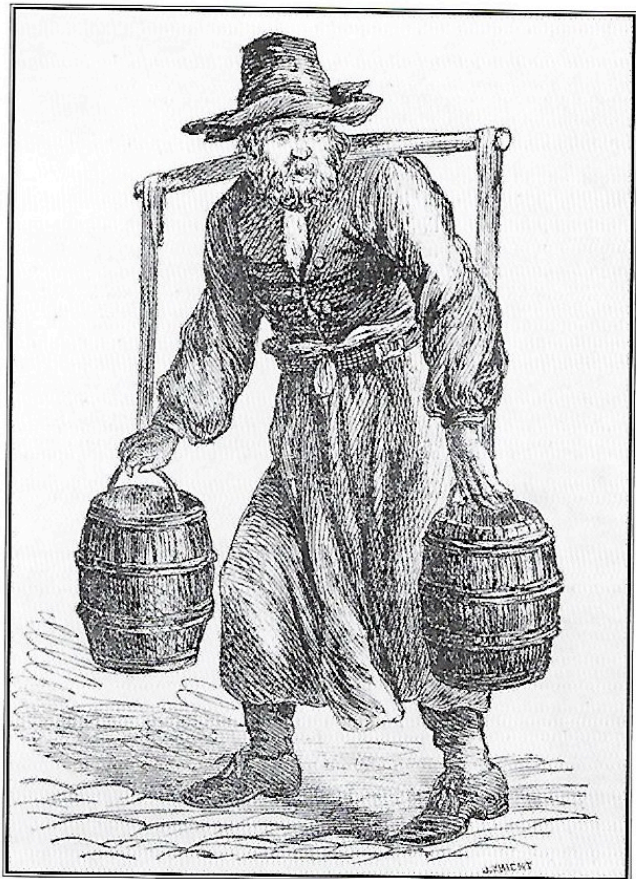
With regard to the diseases and proportion of salubrity usually attaching to London, it is a satisfaction to state generally, that since the complete extinction of the Plague by the Great Fire of 1666, this metropolis has fully deserved to be considered as one of the most healthy on earth; and that in consequence of the open mode of building that now prevails, its increase to an almost indefinite extent is not likely to be attended with additional unwholesomeness.⁵

London's Water Supply

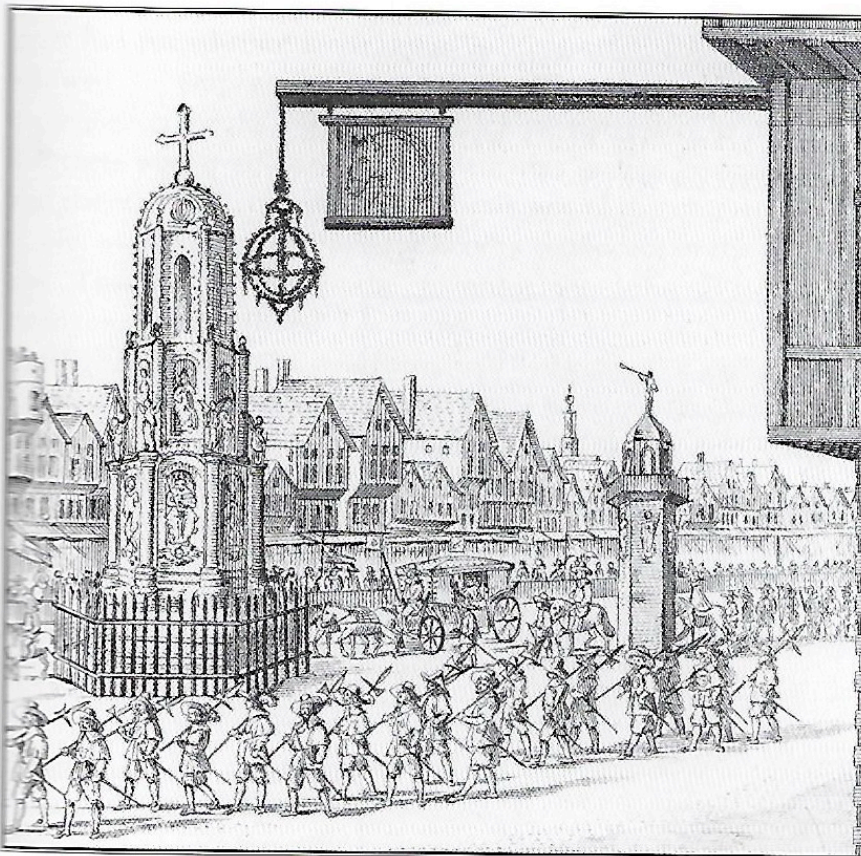
For many centuries the condition of London's water supply had been a cause of some pride to its inhabitants. The Romans had laid clay pipes throughout the City, conveying the waters of the Walbrook to public conduits and baths like the ones discovered in Upper Thames Street. During the medieval and Tudor periods water was drawn from the Thames, from its tributaries and from the numerous natural wells which are remembered in modern street and district names such as Well Court, near St Paul's Cathedral; Wellclose Square, off Cable Street; and the Clerks' Well, or Clerkenwell. Other important wells were found at Holywell, near Blackfriars, and St Clement's Well, close to St Clement's Inn. Most inhabitants drew and carried

London's water 'is one of the principal causes why our capital is the most healthful great city in the world'

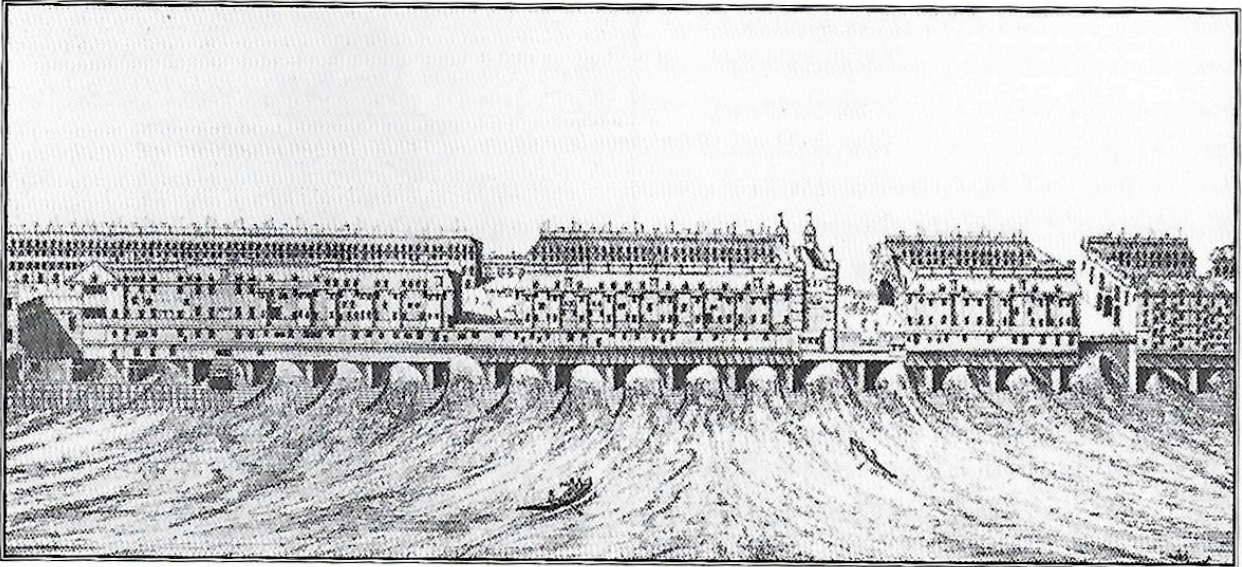
their own supplies from these sources while wealthier citizens employed the services of water-carriers who in 1496 formed themselves into a guild of their own called 'The Brotherhood of St Cristofer [sic] of the Waterbearers'.⁶ From the thirteenth century onwards civil engineering projects of increasing complexity were undertaken to supplement local supplies using pipes of clay, sandstone, lead and hollowed-out elm trees. Thus in 1237, during the reign of Henry III, Gilbert de Sandford granted to the City all the springs in his fief of Tyburn at Mary le Bourne (now Marylebone), the water from which was carried to the great conduit in Cheapside by lead pipes. The water was freely available to householders but some revenue had to be collected to maintain and repair the pipes so in 1312 certain citizens were appointed 'to faithfully collect the money assessed upon brewers, cooks and fishmongers at their discretion for the easement they enjoy



A medieval water-carrier; most families were dependent on such men before the advent of water piped direct to houses. (Thames Water plc)



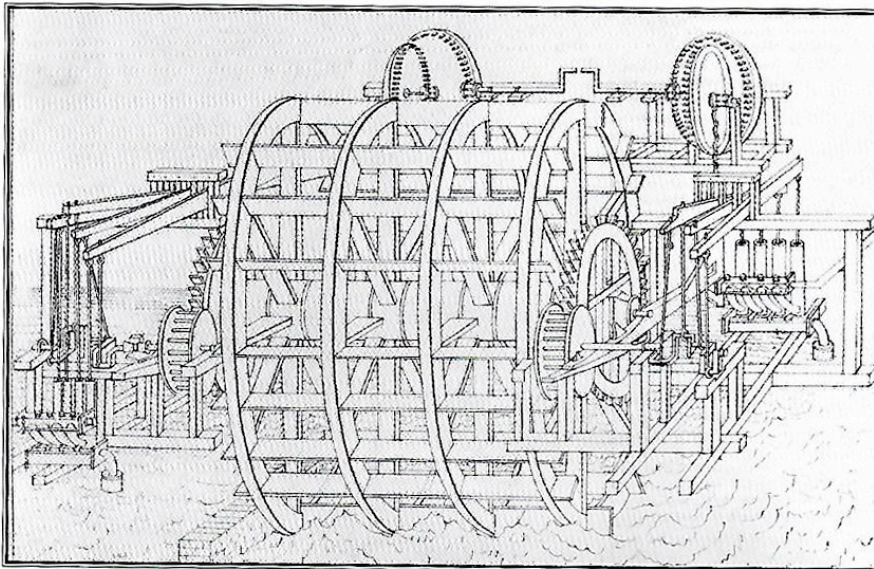
Cheapside Cross, 1798, with Gilbert de Sandford's conduit of 1236 visible in the background. (By courtesy of the Guildhall Library, Corporation of London)



of the water of the conduit of Chepe, and to expend the same upon the repairs and maintenance of the said conduit’.

In the following century, in 1439, the abbot and monks of Westminster made a similar grant to the City, allowing them ‘to erect a fountain-head with fountains, vents, cisterns and other works in the manor of Paddington’ for the purpose of increasing the City’s water supplies. In 1582 a Dutchman called Peter Morice leased from the City for £25 10s a year the first arch of London Bridge, within which he constructed a waterwheel which drew water from the Thames and piped it to premises in the City. This continued in use for 240 years until 1822 – seven years after house waste was permitted to be carried to the Thames via the sewers.

London Bridge about 1750; the waterwheel which drew drinking water from the river is visible to the left of the picture. (Thames Water plc)



A diagram of the waterwheel on London Bridge. (Thames Water plc)



THE SILENT HIGHWAYMAN
'Your money or your life'.

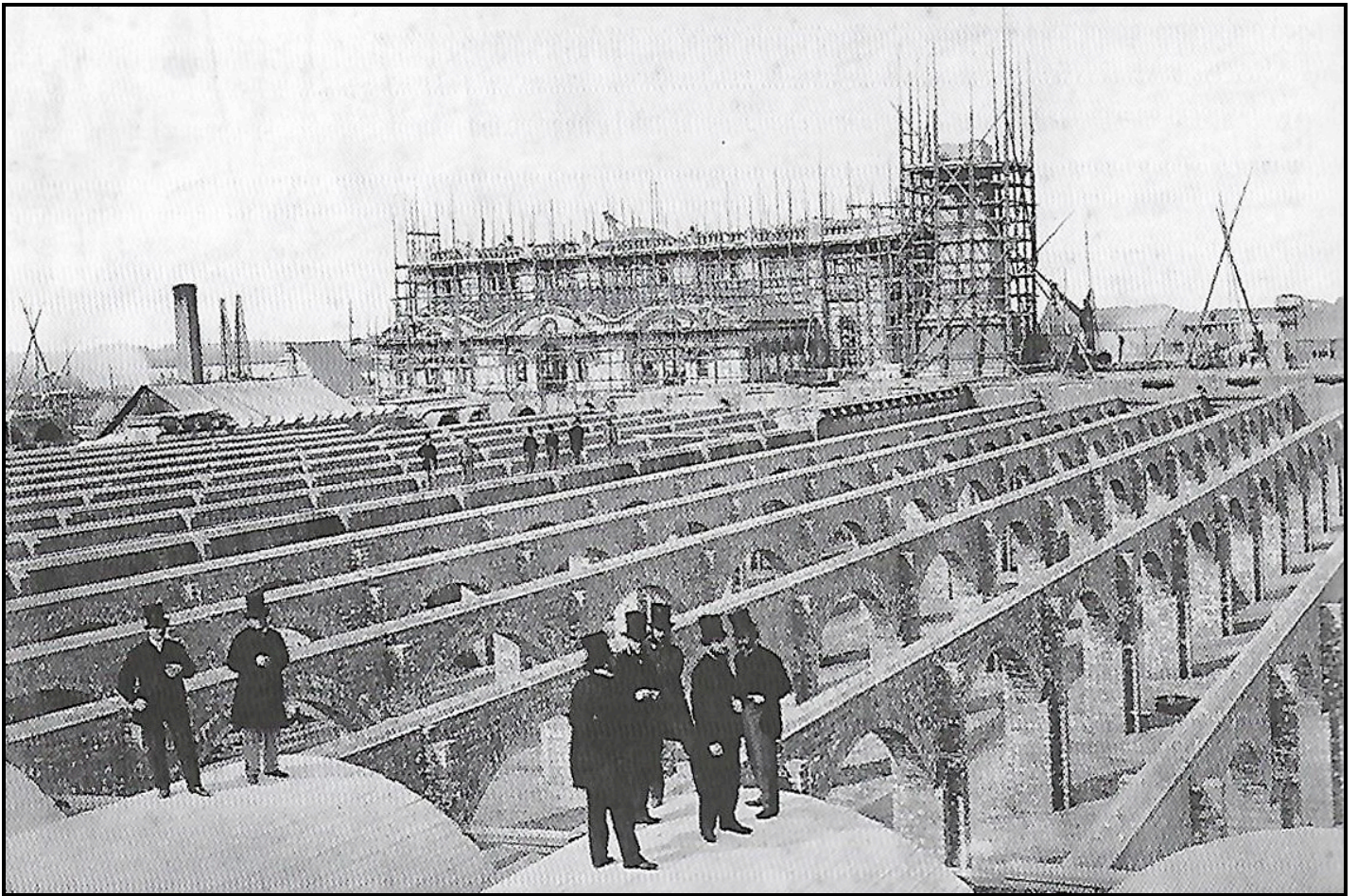
'The Silent Highwayman' –
Punch's view of cholera on the
Thames at the height of the
Great Stink, July 1858. (Punch)



Cartoon by Cruikshank, about 1830



DEATH'S DISPENSARY.
Open to the Poor, Gratis, by Permission of the Parish.

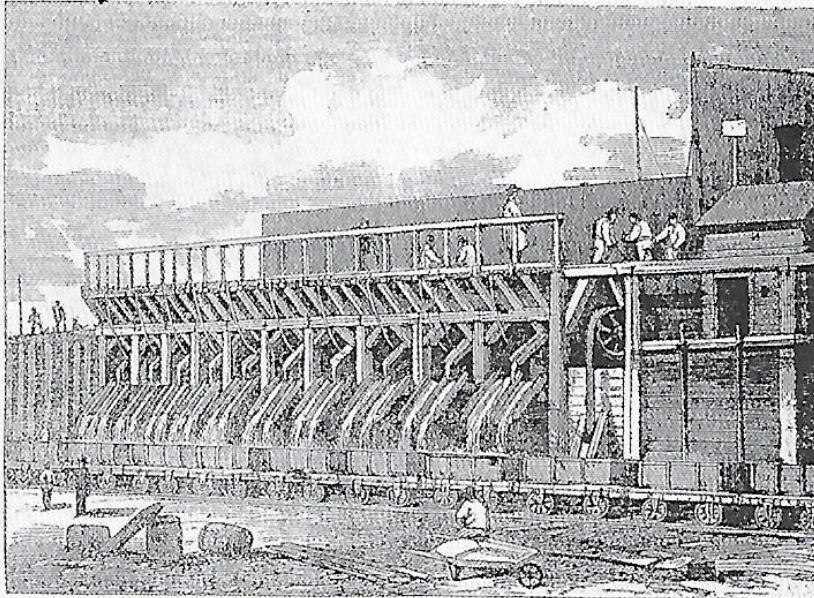


Crossness Sewage Works under construction in 1865

L O N D O N M A I N D R A I N A G E .

Forty years ago good salmon were taken in the upper reaches of the Thames, and good fish of various kinds caught between Vauxhall and London Bridge; indeed, a thriving community of fishermen resided there in those picturesque old streets about the Archbishop's Palace, who prosecuted their calling in the immediate neighbourhood. The walks along the shores of the Thames were pleasant places in those days, where the Londoners wandered on summer evenings to enjoy fresh air. The river was a comparatively clear stream, bearing on its surface hundreds of pleasure-boats; and the houses which had back gardens or lawns extending down to the river were highly prized as dwellings by the wealthiest citizens. How changed now is both the river and its banks! The former has become a filthy sewer, the fish have been destroyed, and those who travel on it do so only as a matter of business; on the latter the dwellings are abandoned and properly humbly deteriorated in value, unless occupied by workmen and others whose necessities compel them to locate there. And what has brought all this great change about? Simply the fact that there is poured into the River Thames every day about sixty millions of gallons of sewage, the filthy washings, scummings, and excrements of three millions of people who inhabit the mighty city that has grown up on its banks.

It is with not a little pleasure, then, that we have taken up for illustration and description the magnificent works now being carried out, because, according to the



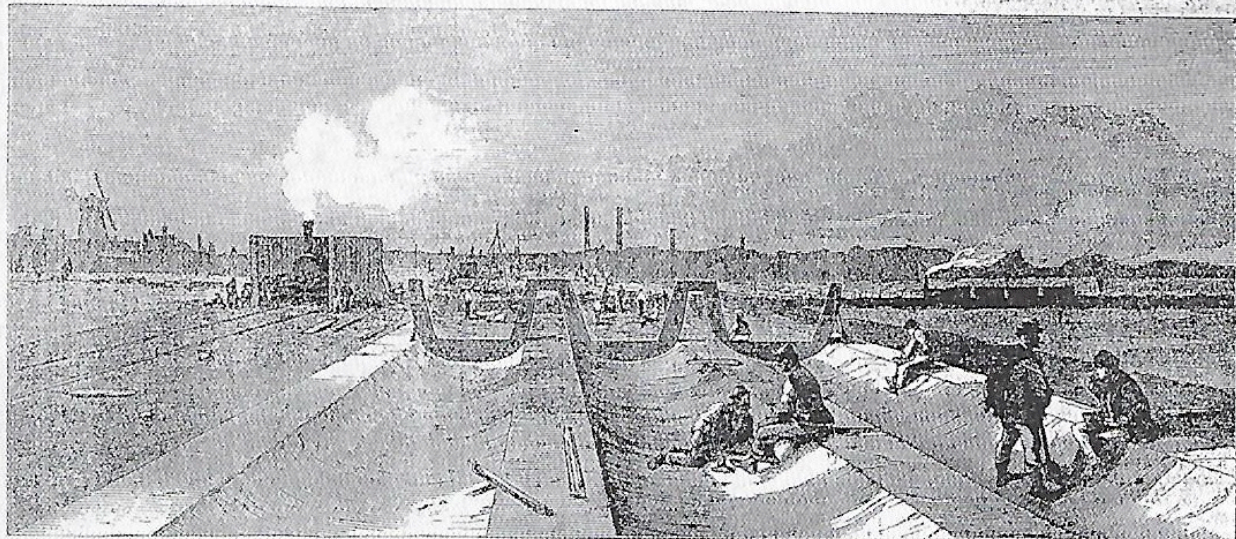
THE CONCRETE MILLS AT DARTOW.

report of the engineer who superintends them, we may hope in the course of two years or thereabout to see the Thames assume its original character. We cannot make sure of catching salmon at London-bridge as soon as that, but we may certainly expect at the expiration of the time stated to see the Thames a clear, wholesome stream, attractive for its natural beauty and 'adapting' to the healthiness of the metropolis generally.

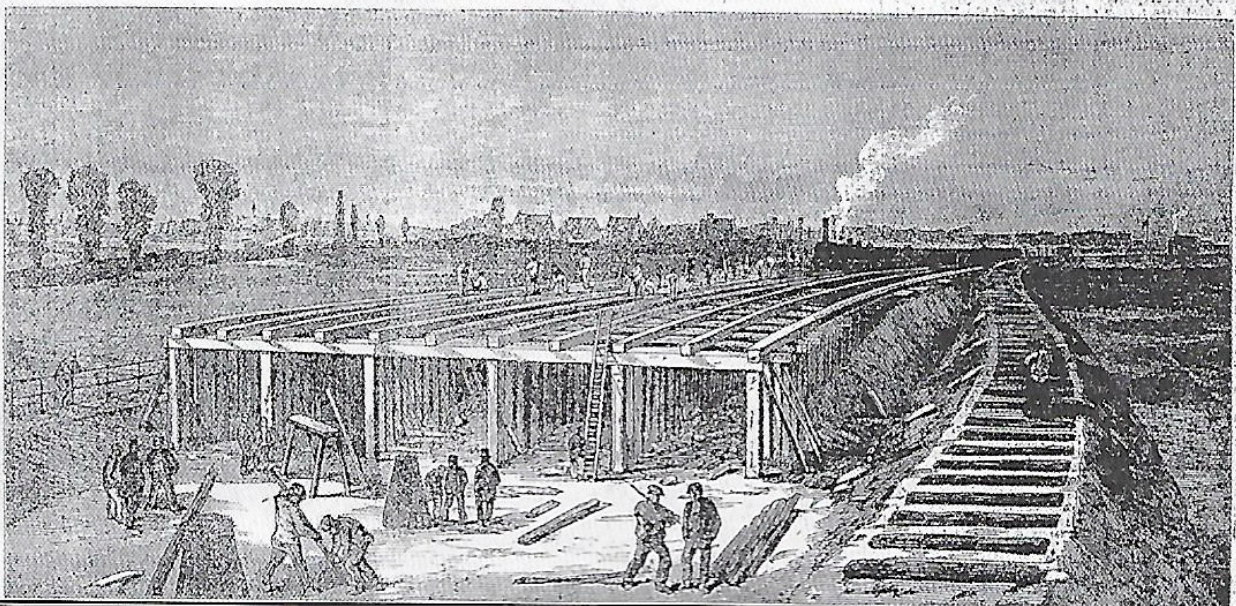
The object sought to be carried out by the works called the London Main Drainage is to intercept the sewage in its progress towards the river, and divert it by covered channels to Barking Creek, on the north side, and Erith Marshes on the south. These points are about fourteen miles below London-bridge, and it is intended that the entire mass of sewage shall be cast into the bottom of the river here during the first two hours of the ebb tide only. The period of discharge is restricted to these hours because then the sewage would be decomposed and diluted by a volume of water twenty times greater than that which now dilutes it at London, and because each ebb tide would, in returning to the sea, convey it to points twelve miles below the outfalls, or twenty-six miles below London-bridge, through a constantly-enslaving flood.

When once this system is put into working order there will be no reason why the Thames may not ebb and flow through London a perfectly clean stream, as the whole of the sewage launched at the first of the ebb will have got so far down before low water that

(Continued on page 555.)

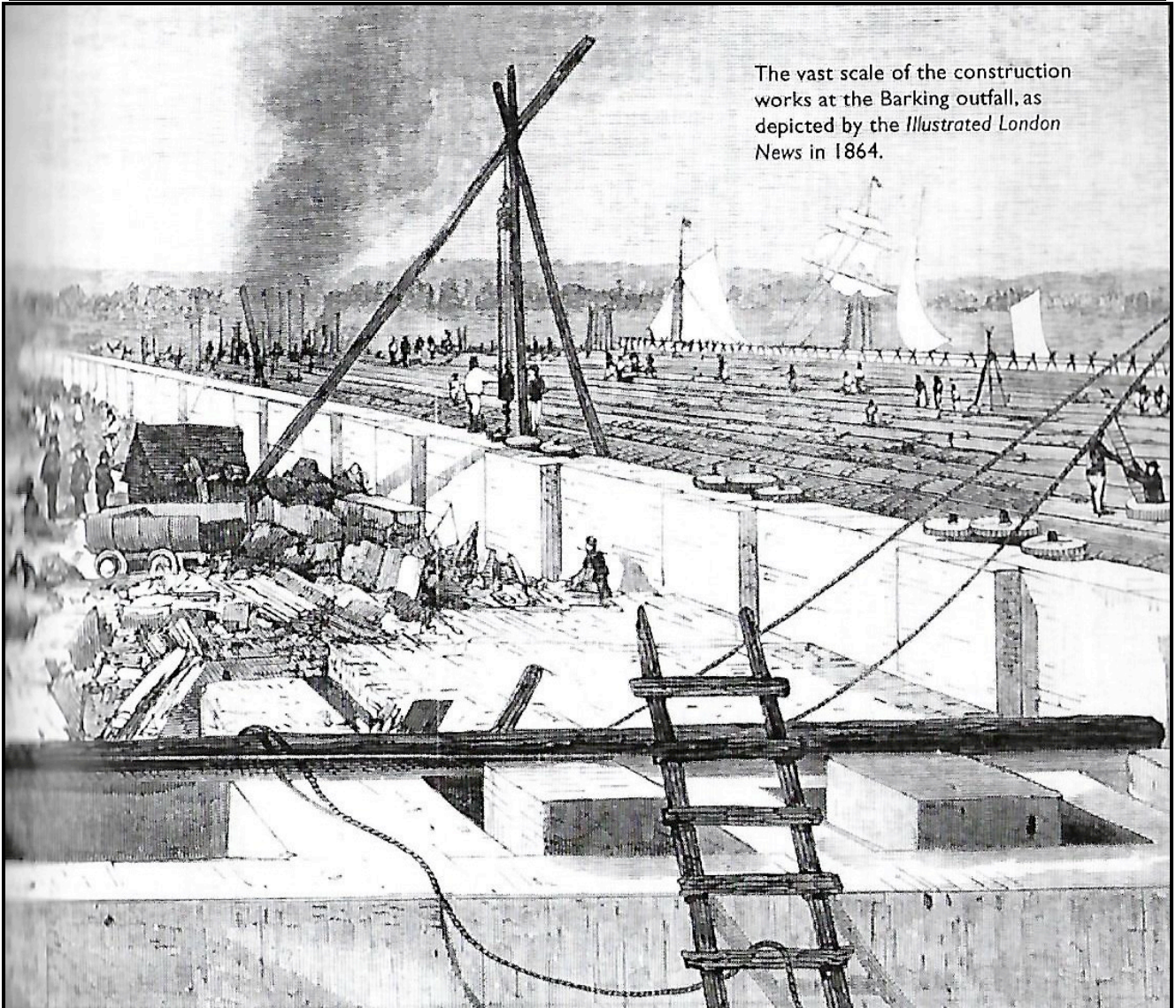


CONCRETE FOUNDATION FOR THE NORTHERN OUTFALL TUNNELS.





The concrete mill at Crossness, 1865. The Southern outfall sewer may be glimpsed in the distance. (Thames Water plc)



The vast scale of the construction works at the Barking outfall, as depicted by the *Illustrated London News* in 1864.

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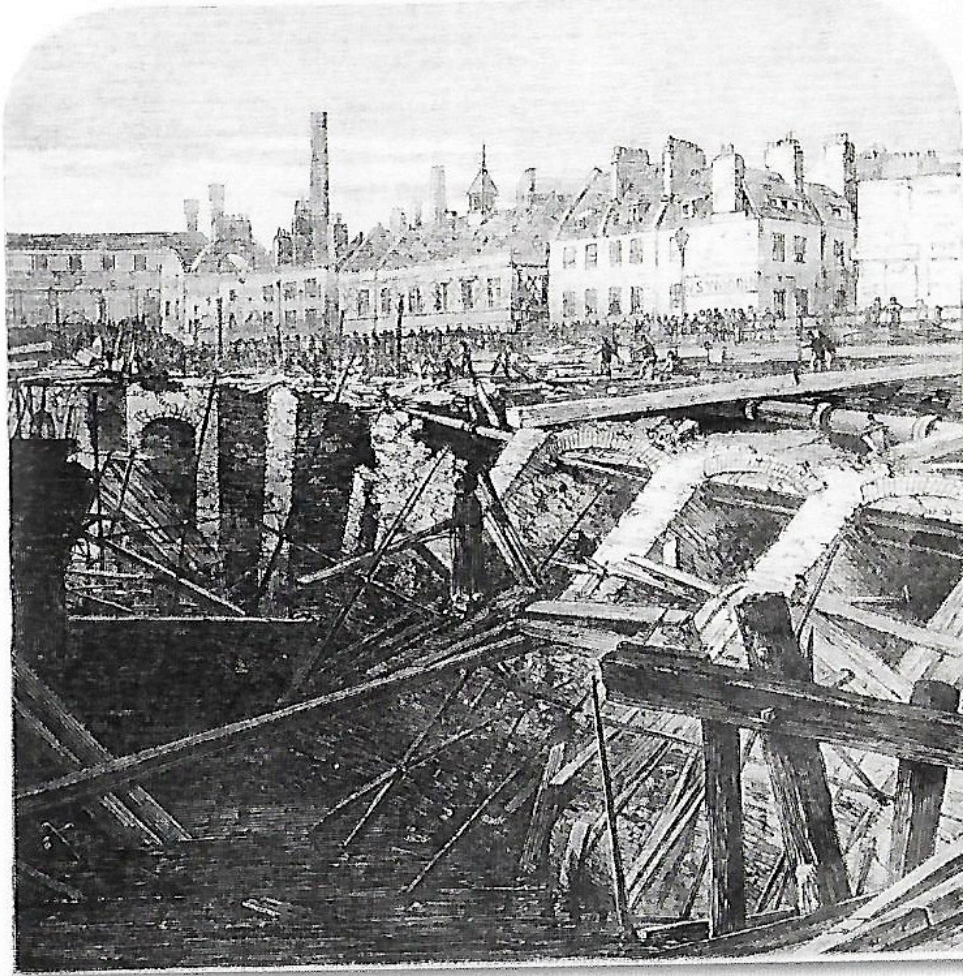
THE ILLUSTRATED LONDON NEWS.



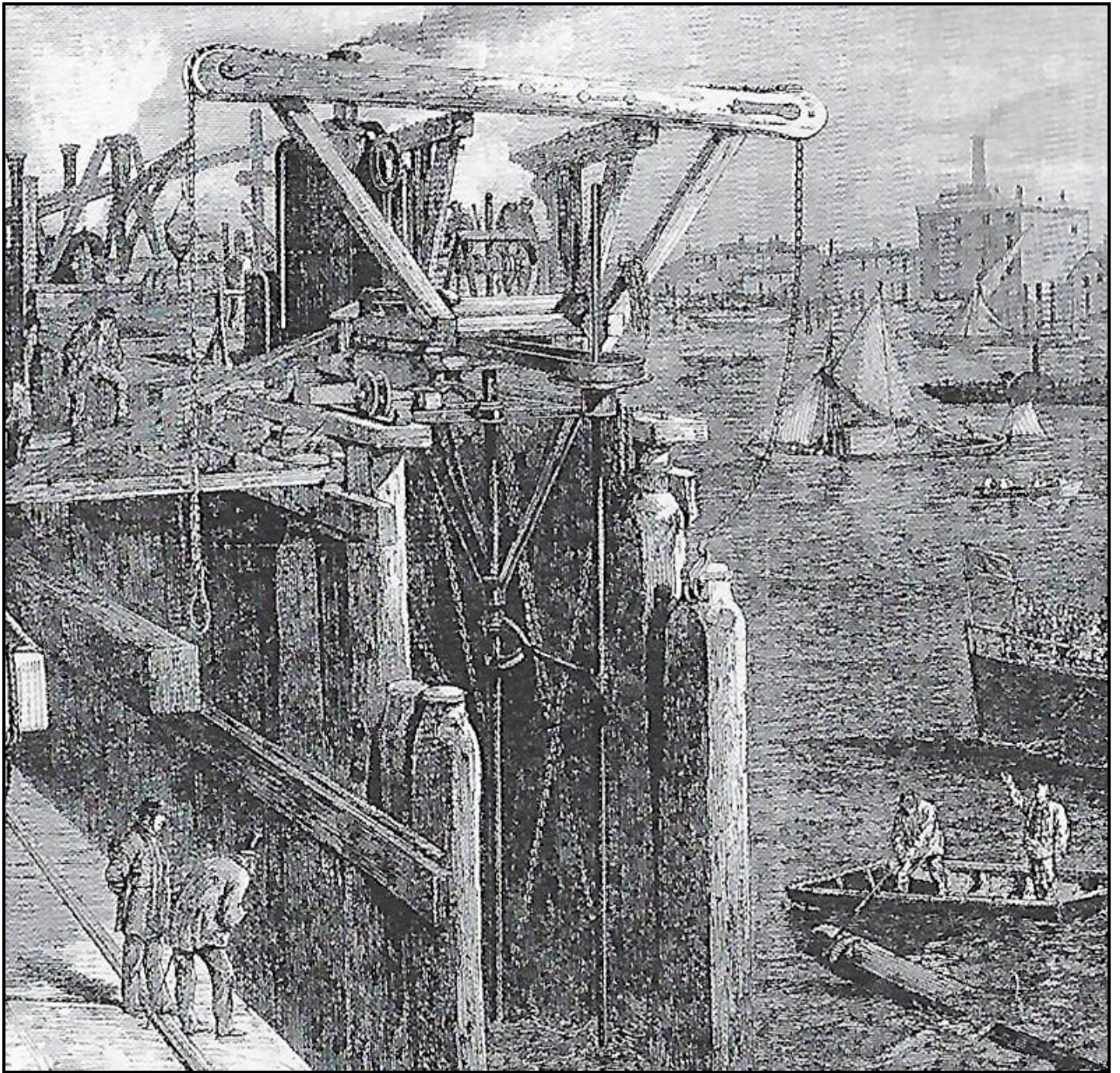
No. 1151. VOL. XLII.

SATURDAY, JUNE 28, 1862.

[WITH A SUPPLEMENT, FIVEPENCE]



The front page of the *Illustrated London News* depicts the scene of destruction in Clerkenwell when the Fleet sewer burst through its walls after heavy rain in June 1862.



Coffer dam being formed on the Victoria Embankment in London,
1866