iron service pipes hitherto in use were satisfactory. A method of producing tubes more cheaply and in greater lengths was urgently needed and it was in Wednesbury that this need was first met and the tube industry founded.

In 1811 John Russell (1783–1853), landlord of the Turk's Head Inn and gunbarrel maker, turned his attention to the making of tubes, in which he was assisted by his elder brother James (1774–1849).[70] The tubes were at first tapered like gunbarrels, which enabled them to be more easily joined although otherwise a disadvantage. James Russell hit upon the idea of a hand-forged wrought iron socket for joining parallel tubes and was taken on for this work by Aaron Manby at Moxley. In 1816 John Russell took his brother into partnership and a tube works was established on Church Hill. John left the management entirely to his brother and about seven years later left the business. James Russell then moved the works to High Bullen, where it became the Crown Tube Works (1823). John later recommenced making tubes independently at Church Hill, including tubes made under licence from James, who had meanwhile secured the patent of the invention which established the industry.[71]

This invention was the work of Cornelius Whitehouse (1795–1883), an Oldbury man who, after working at gunbarrels in Birmingham, had removed with his father to Cannock, where both took up outwork for an edge-tool maker. In 1819 Cornelius Whitehouse came to Wednesbury and secured employment with Edward Elwell at Wednesbury Forge.[72] It was here in 1825 that he carried out an improved method of making parallel wrought iron tubes. This had formerly been a very cumbersome process of laboriously welding with a hammer lengths of six or eight inches at a time. Then Henry Osborn had taken out patents improving the process and in 1824 James Russell himself produced for the first time tubes very smooth on the inside and capable of resisting the corrosive effect of coal gas.[73] This he secured by introducing the principle of the "butt weld" (i.e. one in which the edges to be welded are joined edge to edge without overlap) but his method of welding by the use of a hammer was not essentially different from Osborn's, whereas Whitehouse's method was a decisive improvement. Whitehouse heated the skelp or strip from which the tube was to be made in the "hollow fire" used by the edge-tool makers, instead of an ordinary smithy fire, thus securing equal heat throughout its length, and welded it not with a

[70] Langley, 12.
[71] Langley, 16–20.
[72] Hackwood in Ryder's Annual, 1898.
[73] Hackwood, *WW*, 89. James Russell's patent of 1824 was the first in which iron tubes for gas and other purposes are specifically mentioned ("Birmingham Inventors and Inventions," *Birmingham Post*, 19th June 1880).

Cornelius Whitehouse

hammer but by drawing it through a pair of semicircular dies or through pincers, each jaw of which had a semicircular groove. Russell's principle of butt welding was retained.[74]

On the suggestion of Edward Elwell, who had no use for the invention in the edge-tool trade, Whitehouse sent it to James Russell, who at once agreed to assist him to patent it and to purchase the patent from him, to take him into his employment and to pay him an annuity of £50 for the duration of the patent.[75]

The invention created a revolution in the trade. Prices were reduced by a third or even a half. Longer lengths of tube were now available and "the same men who made 25 lengths of 4 feet tubes under the old system, with the new one could make 200 lengths of 8 feet in the same time."[76] The Crown Tube Works soon made the name of Wednesbury known all over the world and "Tube Town" was the appellation frequently given to it during the publicity obtained by the various lawsuits in which Russell was later involved.

For some years both Russell and Whitehouse incurred much hostility from would-be manufacturers by the new method who resented Russell's monopoly and from barrel and pipe forgers who were thrown out of work. Whitehouse was fired upon by hostile demonstrators and kept a loaded gun by his bedside.[77] Russell had to take measures against rivals who were anxious to discover the operations carried on at the Crown Tube Works and to infringe the patent. Several times his workmen had to repel a hostile crowd at the factory gates. When Russell built a very high wall surmounted by iron spikes round the works, his enemies hired a row of houses standing alongside in the hope of observing from them what was going on behind it.[78]

Russell spent a large sum of money to protect his rights under the patent, for infringement of which he was awarded £6000 damages against Cowley and Dixon of Walsall in 1836.[79] Some other manufacturers were allowed the use of the new method by licence from James Russell; by 1838 eight were so licensed, one of whom was John Russell in the "old works" on Church Hill.[80]

In 1838 Russell applied for a renewal of the patent, which was granted on condition of a £500 annuity being paid to Whitehouse during the six years extension. There were public rejoicings in

[74] Langley, 23. Patent 5109 (26th February 1825). Whitehouse's Specification. (In Langley, 108–11.)
[75] Langley, 24–5.
[76] Hackwood, *WW*, 91.
[77] Hackwood in Ryder's Annual, 1898.
[78] Hackwood, *WW*, 91.
[79] Langley, 30–1.
[80] Langley, 29. In 1834 John Russell was still described as manufacturing hammered tubes. White's Directory (1st ed. 1834).

Wednesbury, processions parading the streets with bands playing and bearing banners displaying the name CORNELIUS WHITEHOUSE in large letters.[81] The growth of the Crown Tube Works had brought increased opportunities of employment in the town by this time. Infringement of the patent, however, still continued. In 1841 Russell instituted legal proceedings against Daniel Ledsam of Birmingham which lasted for seven years and are reputed to have cost the parties in all half a million pounds. The case ended in the House of Lords, where the final judgement was in Russell's favour.[82]

The railways were now creating a demand for multi-tubular locomotive boilers. The butt-welded tubes used by the gas industry could not withstand the pressure developed in the tubes of these boilers; lap-welded tubes were needed. Some boiler tubes were made in Wednesbury by Whitehouse at the Crown Tube Works as early as 1842 and sixteen years later more than half a million feet of such tubes were produced there.[83] But James Russell & Sons had never had for the production of lap-welded tubes the long period of protection under patent which they enjoyed till 1845 in making butt-welded tubes by the Whitehouse method. Wednesbury gained only a secondary place in the making of lap-welded boiler tubes.[84] Meanwhile the production of butt-welded tubes by James Russell & Sons had increased from 3000 feet in 1824 to 793,000 feet in 1838 and 4,228,000 feet in 1858. In 1865 it was 5,314,000 feet.[85]

James Russell died in 1849 at Endwood Court, Handsworth, whither he had removed from Bescot Hall. The Crown Tube Works, which then employed 200 men, passed under the control of his son John James Russell (1807–71).[86] John Russell, who had begun the making of tubes in Wednesbury and had subsequently founded the firm of John Russell & Co., died at Bloxwich in 1853. The firm of John Russell was transferred to Walsall but continued to have a branch at Church Hill.[87]

Cornelius Whitehouse is stated by Hackwood to have remained with James Russell until the latter's death. However this may be, he is described in 1834 as a whitesmith and machine maker at Dudley Street[88] and is found from 1835 onwards as a gunbarrel maker of

[81] Langley, 32–5. Privy Council, 12th December 1838. See evidence of J. Hobbins, Russell's clerk. For Lord Brougham's remarks in giving judgement extending the patent rights see Carpmael's Law Reports: Russell *v.* Leadsam (Court of Exchequer, 1844–45).
[82] Langley, 35–6, where it is pointed out that Hackwood's reference (*WW*, 96) to *lap-welded* tubes in Russell *v.* Ledsam is erroneous.
[83] Langley, 39–42.
[84] Langley, 42.
[85] Hackwood, *WW*, 94.
[86] Pedigree of Russell of Wednesbury (Rev. W. G. D. Fletcher) in Miscellanea Genealogica.
[87] See previous note and Langley, 20, 49.
[88] White's Directory, 1834; Langley, 26.

Wednesbury, Wolverhampton and London. After Russell's death he opened the Globe Tube Works at Wednesbury Bridge on his own account (1849).[89] It was the first business in Wednesbury to be run as a joint stock limited company and was known in the town as "the Limited."[90] Whitehouse had no aptitude for the management of a business and in the last thirty years of his life had a chequered career. When he died in 1883 he was a poor man.[91]

In the years following James Russell's death in 1849 new tube works appeared in Wednesbury, founded by former employees of his. An increasingly important branch of the tube industry was the making of tube fittings, a work requiring skill (since the fittings were hand forged) but little capital and therefore a suitable sphere for the operation of a putting-out system. Such a system was used by James Russell & Sons and several outworkers of theirs eventually saved sufficient money to open small factories of their own. Among these were John Knowles (1850), Edward Smith (1850) and Isaac Griffiths (Griffiths and Billingsley 1858; Isaac Griffiths & Sons 1868). John Knowles for long confined himself to fittings and his works became the principal establishment devoted to that branch of the trade.[92]

These enterprises destroyed the Russell monopoly in Wednesbury but they did not overthrow the ascendancy of the Crown Tube Works, which continued for many years to be the leading works in the butt-welded tube trade. By 1866 the annual production of tubes, both lap-welded and butt-welded, was over 6 million feet and the number of employees had risen to 400, twice as many as at James Russell's death in 1849. Tube fittings were now made on the premises and the firm now had its own foundry.[93] Under John James Russell a Mechanics' Institute had been formed, for which he had recently built premises adjoining the works and offering exceptional facilities at that time – a news room, library, classrooms and a "handsome and capacious" lecture hall. There was a well-attended night school and Saturday evening concerts which drew audiences of 400, workmen and their wives.

In this very year, however, not wholly through his own fault, Russell became involved in financial difficulties as a result of which he became bankrupt and was compelled to transfer the works to a limited company (James Russell & Sons Ltd.) of which he became chairman but the shares in which were largely subscribed by his employees.[94]

[89] Hackwood in Ryder's Annual (1898) and *WW*, 94.
[90] Hackwood, Newspaper Cuttings No. 2 (WCL).
[91] Hackwood in Ryder's Annual (1898).
[92] Langley, 43–5; Hackwood, *WW*, 104–9.
[93] *Birmingham Post*, 26th February 1866, "Industry at Wednesbury."

The new company faced more formidable competition from outside than could be offered by the new tube factories in Wednesbury. In 1859 Samuel and Edward Lloyd had entered the tube trade by establishing the Albion Works in Birmingham and in 1860 Andrew Stewart had begun making tubes in Glasgow.[95] Stewart and Lloyd were to be heard of again. Between 1868 and 1873 the number of firms in the tube trade doubled but there was only one new one in Wednesbury in that time. Nevertheless in 1873 Wednesbury was still "the seat of the gas tube trade" and James Russell & Sons Ltd. "the largest and most celebrated makers, exporting their tubes in increasing quantities year by year to the Great Republic, Russia, France and Germany and other markets where their name is well known."[96]

8. THE LLOYDS AT THE OLD PARK WORKS: 1818–67

The great family of Lloyd, to which Britain owes so much in iron, in banking and in marine insurance, has had a continuous connection with Wednesbury since 1727. The family, said to be descended from a Welsh prince, was settled at Dolobran in Montgomery from the beginning of the fourteenth century. In the seventeenth century they joined the Society of Friends and George Fox preached in the meeting house at Dolobran which they built. Thus it came about that Sampson Lloyd (1664–1724) was born in Welshpool Gaol. It was his elder brother Charles who began the Lloyd connection with the iron industry when he opened a small iron-foundry near Dolobran in 1719. Sampson Lloyd himself removed to Birmingham in 1698 and opened an iron warehouse. His son, Sampson Lloyd the Second (1699–1779), besides operating forges at Burton on Trent and Powick on Tame, began the Lloyd connection with banking when in 1765 he formed with John Taylor the firm of Taylor and Lloyd at Birmingham. Taylor and Lloyd were among the promoters of the canal which in 1769 brought Wednesbury coals to Birmingham. It was Sampson Lloyd also who began the family connection with Wednesbury when in 1727 he married Sarah, daughter of Richard Parkes, formerly of Oakeswell Hall, Wednesbury, where he owned much mining property.[97] Richard Parkes died in 1729, leaving his four daughters as coheirs.[98]

The only child of this first marriage of the second Sampson Lloyd, Sampson Lloyd the Third (1728–1807) inherited his mother's share of the Wednesbury property of Richard Parkes and eventually the property, also in Wednesbury, of his cousin Betsy Fidoe.[99] Sampson's

[95] Langley, 114.
[96] Langley, 48.
[97] Ernest Allison, *Family Heritage* (a short history of the Lloyd family).
[98] Samuel Lloyd, *The Lloyds of Birmingham*, 36.
[99] *Ibid.*, 106.