Servicing the Houses of Bath 1714 - 1830: Water Supply

Alan Hardiman

Introduction
Here in Bath at the end of the twentieth century we take for granted the 'water cycle' which processes our waste products and recycles them to provide clean fresh drinking water. In the eighteenth century clean water was a rare and precious commodity.

Bath has been blessed with a plentiful and varied water supply and the editorial of the Bath Directory of 1791 describes the city as '*...surrounded by beautiful hills, abounding with springs of excellent water* '.

In the period 1714-1830 there were five sources of water in Bath:
1 rain water
2 river water from the Avon
3 pump water from the wells within the city
4 spring water brought from springs that rise on the hills that surround the city.
5 hot mineral springs upon which the fame of Bath is built.

The hot mineral water supply has never been used for domestic purposes and will not be considered further here.

Bath is situated upon several different rock layers, some porous and some impervious, causing water to drain down through the porous oolitic limestone layers and to emerge as springs at the juncture with impervious layers. This arrangement is complicated by the cracks in the impervious layer, which is Fullers Earth, allowing some water through into the second layer of oolite and down onto the marlstone.[1]

The springs emerging on the hills to the south of the city on Bathwick Down are described as shallow, thrown out by the impervious Fuller's Earth at the base of the Great Oolite. The latter being much jointed and fissured and the depth of the soil at the top of the hill being slight, the springs respond very quickly to rainfall. Below the Fuller's Earth are the Inferior Oolite and the Midford Sands resting on a bed of Lias Clay. Other springs arise from these water-bearing strata at their junction with the clay.[2]

Rainwater
Bath had such a plentiful supply of spring water that rainwater was little employed though, if carefully collected, it could be very useful in cooking and as shaving water when taken from the side boiler of the stove. The spring water in Bath is particularly hard and ladies preferred to wash their hair and faces with 'soft water' of which the only supply in Bath was rainwater.[3]
Where rainwater was a supplementary supply it was generally received in wooden or lead vessels and supplied by the pipes that ran down the sides of the houses to carry off this water. Often the large squared-headed rainwater hoppers that took the water from the lead lined gutters were decorated with the family coat of arms and date.

The uncertainty of the supply of rainwater meant that, if no other source of water were available, large volumes of water would have to be stored to ensure a constant supply. Wilts recommends a four-month supply.[4] At no 3 Mount Beacon on the slopes of Lansdown, the author's home, there was for many years no access to spring or well water: a stone-built underground tank measuring approximately 8ft x 8ft and 3ft deep was supplied by rainwater only from the roofs of the main house and coach house. Lead pumps, one in the scullery and one in the stable, were connected by pipes to the tank and this was the only water supply to the house.

Rainwater is often made foul, not only by soot, leaves and other vegetable substances being washed off the roofs but also from dissolved lead coming from the gutters and downpipes and it is not surprising to find that such pollution often tainted the water and made it disagreeable to the taste and unfit to be taken. After a heavy rainfall stored rainwater had to be let stand to allow the sediment to settle before a clean supply could be drawn and this was particularly so where small volumes of rainwater were being stored in, say, wooden butts.

River Water
The water of the Avon was very little used in diet, The river was subject to floods in the winter season which rendered it very muddy, and unfit for use, often for a long time together.

> *Its course is likewise in general very slow, so that it more resembles a stagnant pool than running water.*
> *It is never perfectly clear; which is indeed the case of most waters that run with a slow current. It lies likewise so much below the level of a great part of this city, that it would be a great force of engines to raise it to the height sufficient for general use, which would be very expensive whereas there are plenty of springs on the hills around the place that will supply it and by their elevated situation raise the water to any height that can be required without any trou~ble or expense on that account. For this reason the river water is now scarce ever applied to this purpose.*[5]

Whilst water from the river would once have been clean, as the waters became muddy it was possible to sink wells into the ground adjoining the river and draw clear water filtered by its passage through the gravel deposits.

River water was used for washing clothes particularly as the well water tended to be hard.

Well Water
In 1769 it was observed that

> *well water was formerly the water chiefly used in diet in*

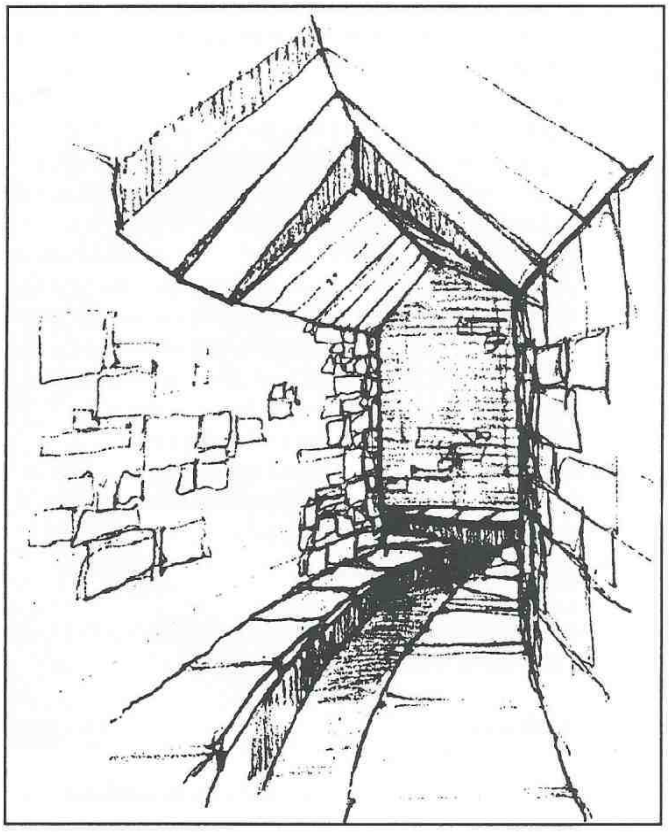
this place, and that it was still employed by some, though very few since the pipes have been laid into the town from the springs on the adjacent hills.[6]

Wells were often dug to provide a supplementary water supply in the better quality houses but, in the poorer houses who could not afford to take corporation water, wells may have formed the only water supply. Unfortunately the poorer districts of the city tended to be low-lying and much of the pollution filtering into the subsoil from dead-wells and leaking sewers meant that well water in these areas was often unsafe to drink. It would not be uncommon for a householder to dig a well only a few feet away from the necessary house!

Dorothy Hartley gives a short description as to how a well may have been dug and managed:

Use a stick and string to mark out a circle and then start digging. If a soft patch is encountered some masonry or brickwork is employed. A bucket on a string is used to remove the excavated material and a ladder to climb out. Near the bottom of the well it will begin to fill with water and become very muddy and difficult to dig. There will be a period of waiting for the water to clear and find its level followed by clearing of silt. Finally a mason is called in to build the coping and a carpenter to build the windlass or plumber to supply a pump. A new well could be used through the first winter but in the spring it would have to be cleared again and the loose material removed and the well made deepen Every few years further clearing will be necessary gradually making the well deeper.[7]

Wells in Bath varied in depth considerably, dependent on the geology. In Dolemeads one had to dig around 16ft to find water whereas in America Buildings, Lansdown, a well may have to be as deep as 174 ft (no wonder they stored rainwater in parts of Lansdown instead of digging for water). At Twerton Mill a man sunk through the lias (23 ft) and had plenty of good water, but doubting whether his supply would continue through the summer he cut through the subjacent marl into the red ground and lost all his water!



Spring Water and its Distribution

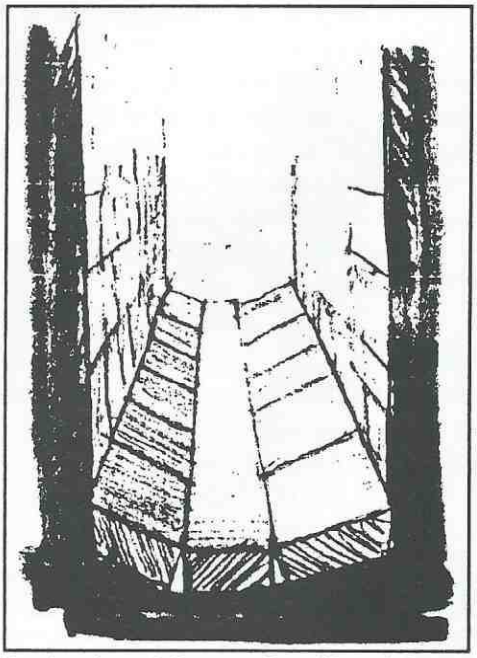
John Wood gives a rather poetic description of Baths cold water springs in his 1765 essay:

Springs of soft sweet crystal water issue out of the ground at the very tops of the hills of Bath and when united in the Combs sunk into their sides they form little rills which in their decent to the larger vales below are increased by flesh springs to brooks of no inconsiderable size in some places.[8]

From time immemorial two sources of water supply have been the property of the corporation, the one to the south on Beechen Cliff and the other to the north on Beacon Hill. Originally the water from these two sources appears to have been utilised by means of public stand pipes or conduits.[9]

The actual supply of water at Bath was plentiful. One Harry Chapman in 1673 speaks of a southern suburb of the city where springs were so numerous that almost every house had a spring to itself and that the water was brought to the city supplied not only the public conduits but also a few private houses at easy rates. There were at that time seven conduits: Camwell in Walcot Street, Stall's conduit, St. James conduit, one in Broad Street, St. Mary's conduit with an elegant quadrangular building the water coming out from the corners, High Cross conduit, and St Michael's, also with an elaborate housing, surmounted by an hour-glass and with the water issuing from niches.

John Wood wrote that in 1726 there had been ten conduits in the city and suggested that the water supply needed an urgent overhaul.



Section through large and small conduits

By 1739 most of the conduits had become useless and some were replaced by single taps placed against the houses. All were removed when the streets were widened and improved and before any care was taken to ensure a proper public supply.

An Act of 1766 gave power to the city to provide fresh water from the springs and to enter into contracts with contractors to lay pipes up to two miles from the city centre including a right of entry to private ground. Reservoirs, conduits, water houses and engines were to be built to allow the water to be distributed around the city. All the pipes, conduits, engines, buildings, etc, were the property of the council and anyone damaging them or causing water to be wasted or polluting them with '*filth, dirt, rubbish, soil, gravel, stones, dogs, cats, dead carcasses or carrion*', or found washing in the water or cleaning clothes, hemp, flax, had to pay a fine of 20/ -. Seventy-six years later this Act of 1766 was praised by Edwin Chadwick as the very model of conditions for the public control of water supply to cities.

Persons taking water from the corporation supply were allowed only an agreed volume of storage and were charged accordingly. There were many abuses of the system and at the end of this section are some examples of the problems being dealt with on a regular basis. Water rents were made payable to the Chamberlain of the City.

Whilst these springs were controlled by the corporation they were subject to certain preferential rights of claims of user, the Duke of Kingston for the Beechen Cliff supply and the Rivers Family for the Beacon Hill supply. Concessions had to be made to these and other interested parties: the Duke of Kingston, for example was entitled to a supply of water defined to be as much as would flow through a pipe of 1¼ in diameter for four hours each day. About 1769 an agreement was made between the Rivers family and the corporation with regard to the Beacon Hill supply by which the water was to be equally divided, and accordingly the following effective, if cumbersome, arrangement was made: the channel was divided near the spring head into two small culverts of equal size and the water was thus conducted as to one half for the use of the houses on the Rivers estate, and as to the other into a reservoir erected by the corporation.[10]

In 1770, William Johnstone Pulteney in his negotiations to have a new bridge linking his estate with the city agreed to convey to the city three of the springs which rose on Bathwick Down just below the Castle (owned by Ralph Allen) and give the council a piece of land on which to build a reservoir. At this time the city were desperate for more water and lost no time in getting a new supply across the bridge to serve, among others, Green Street and Bond Street and, for a while, the shops on the bridge. The corporation was somewhat over-eager in developing these springs and abstracted water from other springs belonging to the Earl of Darlington, the then owner of the estate. Chancery proceedings ensued, which in the year 1809 were terminated by an arrangement that the corporation would retain four of the minor springs they had tapped and surrender the entire use of four other springs also interfered with to the Earl.

The Bathwick Waterworks were expensive to construct and maintain but for the consumer things were reasonably smooth. Breakdowns did occur and in dry weather water was sometimes in short supply. But this was also the situation elsewhere. There were pollution problems but these were dealt with one way or another. By 1870 the waterworks supplied 855 houses each with its own cistern with a ball-cock and was supplied on the 'intermittent system'. This meant that the water was turned on for a certain number of hours each day by watermen whose job it was to go round regulating the stop-cocks. Most of the flat areas of Bathwick were served with water from the reservoirs below Sham Castle. A second main brought water down Bathwick Hill from the Combe Royal springs. This main provided water for part of Bathwick Hill and for the terraces and streets leading off it. By 1870 a supply had also been piped across to lower Bathwick Hill from the Sham Castle springs as an alternative to the Combe Royal water which was particularly prone to pollution. Not all the Bathwick Hill houses got their water like this: some were allowed to take a free supply from the mains over flow which ran down the hill in a stone gutter-course beneath the pavement. The houses between North Road and Bathwick Hill were fed by a pipe along North Road and springs on the uphill side of north Road. Fourteen houses right at the top of the hill were too high to have a spring supply: they paid no water rent and got their water locally by their own endeavour. In addition the Smallcombe Wood springs supplied a stand-pipe near the Dolemeads.

The springs on Beechen Cliff, Beacon Hill and Bathwick Down all arose from the Oolite, and made up all the water over which the corporation had control up to the passing of the Municipal Corporations Reform Act in 1835.

It must not be taken that this was the total water supply available for the use of the city. As the different streets and blocks of houses sprung up beyond the limits of the old city, the landowners reserved water rights, built themselves reservoirs and started their own waterworks from which they received a further income.

In 1835 the number of water tenants of the corporation was 2,381 and the total yield of the springs amounted to only 94,000 gallons a day, which meant with around 6.5 persons per house around 6 gallons per head per day. The difficulty in providing an adequate supply lay not so much in the aggregate total of the yield of the springs but in the inadequacies of the storage accommodation. During winter and spring supplies were generally satisfactory but in a long hot summer cisterns sometimes ran dry with the natural consequence of domestic inconvenience and sanitary danger.

Private developers who were forming their own water companies to supply the houses they were building, varied in size from Dr Hensley's supplying four houses at Bloomfield Place to that of the Bathwick Estate supplying 885 houses. The Circus Waterworks took springs below Lansdown Crescent into a reservoir in the butty piece (now in the Bath High School grounds) which supplied the Royal Crescent, Brock Street, the Circus, Gay Street, and Queen Square (301 houses). The

hump in the middle of the circus marks the location of the secondary reservoir to give local storage and reduced pressure (high pressure couldn't be coped with?) and was last used in the second world war as a static water tank when it was filled with 25,000 gallons of river water.

An engineer's report of 1876 concerns the water supply to Richmond Hill in Bath. A small spring arising by Wesleyan College on Lansdown, and belonging to a Dr Hensley, collected water into a tank and conveyed it by pipes to a reservoir some way away and holding 20,000 gallons. From the reservoir a 2 in pipe ran to Richmond Hill where it served 11 houses and a cottage and a garden and produced a rental of £26 15s 6d. The water was found to be unfit.[11]

Water committee minutes, which may be seen at the Bath Record Office, give an insight into the abuses and misuses of the corporation water supply which the committee had to deal with. The following are just some of the items mentioned:

1769 Mr J. Howard of the *Full Moon* public house to provide himself with a reservoir not to exceed 5 hogsheads for the use of his own house and tenement occupied by Mary Ford washerwoman.

1769 John Palmer, who was brewer, had a 22 hogshead cistem (1155 gallons), he was told to provide a boy lock (ball cock) to his pipe and to have a cock (tap) to draw but from the reservoir only.

1769 Mr Thomas Harris at his house now in possession of Mr John Harris, ironmonger, to reduce his reservoir to 3 hogsheads and to have proper entrance made so that the ball cock may be inspected at any time.

1769 All houses valued at under £15 year to pay 10/- a year

£15-25	15/-
£25-50	£1
£200+	£3

All public houses, livery stables and brewers to be rated at the discretion of the committee.

1769
Oct Walter Taylor has an underground reservoir for the supply of his three houses but the entrance was not convenient for inspection and if he didn't improve it within four weeks he would have his feather cut off.

Many other threats were made to cut off supplies but the minute book for 1769 shows most of these threats were not acted upon.

1770
May Several proprietors in Alfred Street having applied for City Water it is agreed that they shall be served on the condition that they pay for the branch main at their expense from the principal main in Lansdown Road.
Sep Proprietor of the Ambury is allowing water to run to waste in such quantities that it was feared that water would be drained off too much from the old tenants.

177 1
May Mr Lee gets a new feather having complained that in his house in Cook Lane, Mr Strange, in the house below, draws all the water before it reaches his house.

1772
Feb Duke of Kingstone to provide a ball cock to his cistern in Bath House as it is going to waste in great quantities for the four hours that it continues.

Note l hogshead = 52½ gallons so this meant a tank of 262 gallons which would be about 4 ft x 4 ft x 2 ft 6 in high.

In 1804 Bath Authority threatened to cut off the supply of one Mr Melmouth unless he discontinued the supply to his water closet. The use of hard-won potable water was not countenanced for use in toilets, and in 1838 proposals were considered for supplying water from the Avon for water closets and fire plugs.

Water Pipes

The distribution of water from the springs on the hill sides around Bath was initially by way of small stone holding tanks linked to open paved channels and, later, by wooden pipes and lead pipes collectively known as 'conduits'. The water could be shut off at night by inserting a 'tampkin' or plug in the end of the conduit.

The Beechen Cliff water to the south of the city was initially brought from its source to the riverside through the fields in stone water courses with and without covers and there would have been intermediate small reservoirs with an inlet at low level and an outlet at high level allowing the silt to settle out and requiring regular clearance. The joints in the stone were far from perfect and losses were considerable.[12]

The water brought into the city by conduits served strategically placed 'fontems' or dipping tanks from which inhabitants could take their supply. For those wealthy enough, a water carrier could be employed to fetch the water for you either by bucket, tankard or water cart pulled by horses.

In the 'conduit age' -the sixteenth and seventeenth centuries- the water carrier was ubiquitous and a common sight. These rough sturdy fellows were hired to supply the houses of the rich. Most old prints show the water carriers carrying tapered wooden and banded churns carried horizontally on the shoulder and steadied by means of a staff or stick crossing the other shoulder and passing under the vessel.[13] In the Georgian period, leather and wooden pails would have been commonly used to carry water. Water carriers were still working in Bath in 1850 when a pail of water cost three halfpence.

From the middle of the eighteenth century, large underground stone tanks were constructed to serve groups of dwellings and the water was conveyed from the spring to these reservoirs through 'addits' which are stone tunnels with central channels or wooden pipes.

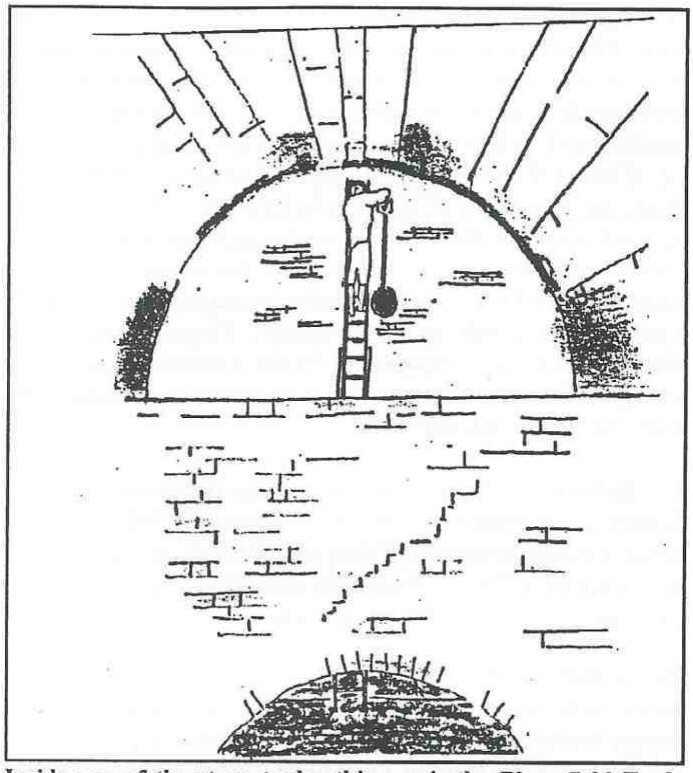
Wooden pipes were invariably made of elm: the whole trunks were bored out with one end shaped like a pencil so that it could be pushed into the adjacent pipe. Some wooden pipes had

tongues of wrought iron bars ¾ in wide x $^{3}/_{16}$ in thick set into the blunt end of the trunks to prevent splitting. In London trunks have been found butt-jointed with a circular tongue of iron set into the end of each pipe which were then knocked together. There is an excellent model of a simple machine for boring out elm pipes as well as examples of elm pipes at Kew Bridge Engine Trust in London. The exhibits of pipes at Kew point out that expressions such as 'trunk road', 'trunk main', 'trunk call' derive from these early trunk pipes. An elm pipe was discovered during excavations near the river in Bath in 1962.

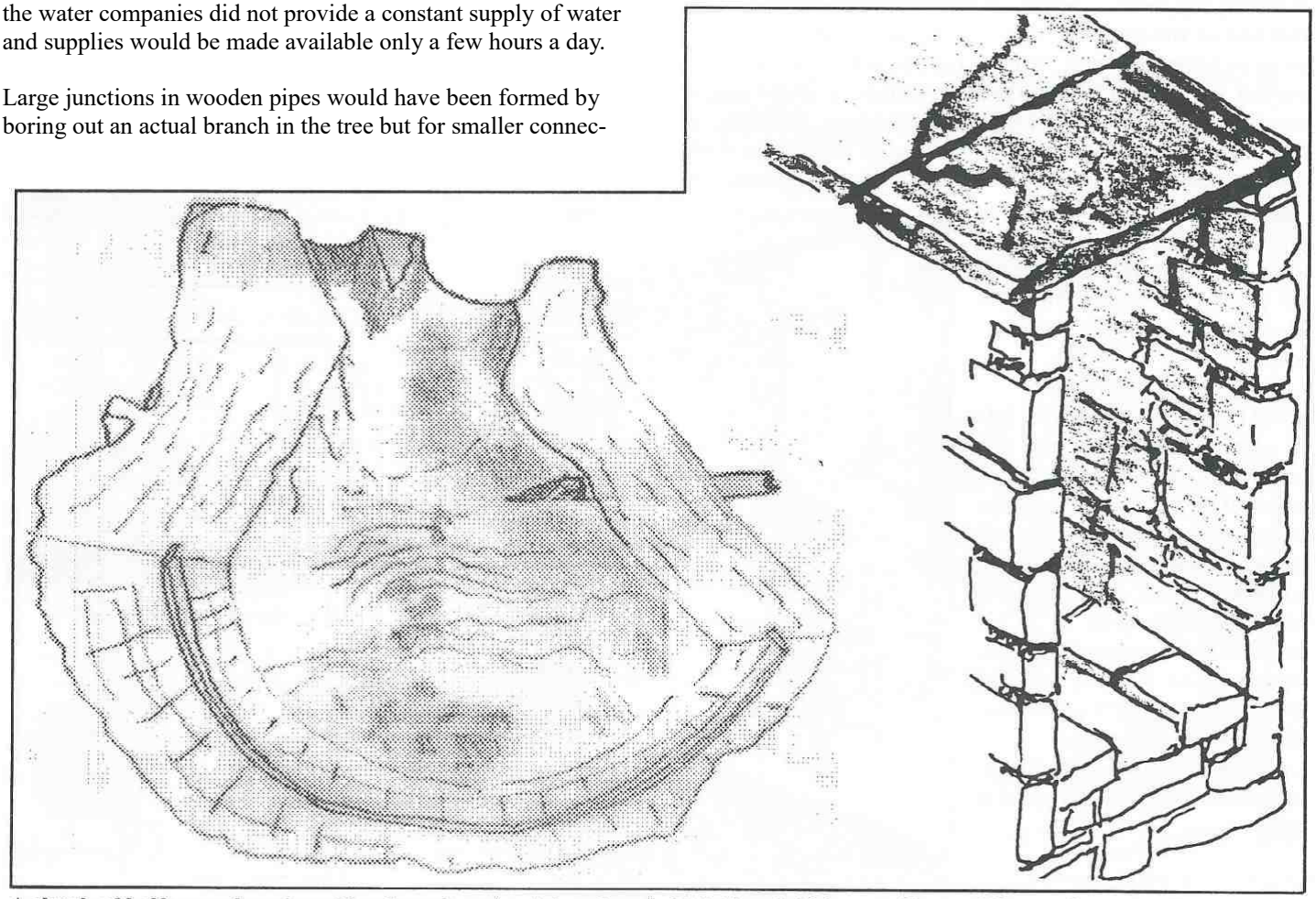
The elm water mains, though very thick, would not have stood a great deal of pressure and there would have been leakage at the joints which were stopped with pitch, tallow and rosin, the whole being bound together with canvas and cord. Sometimes two iron rings would be driven into the base of the trunk to prevent it from splitting. Knots, it seems, were burnt to make them secure.

While the water remained gravity-fed the losses were tolerable, but wooden pipes could not cope with a pressured supply which became possible with the introduction of steam pumps late in the eighteenth century. The water companies had to reduce pressure according to the pipes supplying the water and consequently were not able to supply to the upper stories until such time as all the wooden pipes had been replaced with iron. Because of the substantial losses through leakage and misuse the water companies did not provide a constant supply of water and supplies would be made available only a few hours a day.

Large junctions in wooden pipes would have been formed by boring out an actual branch in the tree but for smaller connec-



Inside one of the stone tanks, this one is the Bloomfield Tank, from an illustration of 1957. There are other similar tanks elsewhere in the city.



A sketch of half a wooden pipe with a branch and a driven ferrule (right hand side) to connect a lead feather to a pipe

Stone addit carrying water from a spring to a reservoir

tions to, say, private supplies, bronze driving ferrules were used. These ferrules were short tubes with pointed ends which were driven into the elm pipe to tap into the water and then fitted with a small lead pipe which would be taken to the holding tank in the basement of the house. These small bore branches of the main supply became known as 'feathers'. In Bath the limitations of quantity and pressure in the conduits did not allow for the indiscriminate insertion of feathers for individual houses and in 1667 such rights as were let out to a local plumber for this purpose had to be withdrawn in order to maintain the supply at the 'fontems'. These feathers were charged for by the corporation. In the seventeenth century a charge of 20/- a year was made thus making it affordable by only the richest inhabitants.

On Bathwick Hill there was a wooden main and initially houses had branches off this which they controlled with crude wooden bungs: if too many houses at the top of the hill left their bungs out those lower down were starved of water, which, as one may imagine, caused some friction!

In the eighteenth century, lead pipes for both feathers and mains were laid within the city but in 17 61 the wooden mains were to replace many of the lead mains as it was found that they were less prone to leaking. Lead pipes were initially folded and soldered but later were cast and drawn. In casting lead pipes a mould was made of brass and down the middle a core of iron is loosely supported. The molten lead was poured in and when this had set the core was removed and the cylinder opened so as to withdraw the pipe, which was much thicker than was needed and had to be lengthened by drawing it through a succession of holes in steel plates, diminishing gradually in diameter. Initially the machinery produced pipes of uneven wall thickness. Pipes were laid with suspra (ie vents) at intervals as it was feared that the pipes would burst if subjected to too much pressure. The lead for the pipes came either from the Mendips or sheet lead taken from roofs.

Some lead pipes which were full of water developed a green deposit which was protective against action of the water whereas those pipes which were only intermittently wet tended to dry out and crumble to dust. In Bath, with water hardness up to 23°, lime scale could prove a problem with lime deposits building up and restricting flow. To this day some of the old lead pipes which still serve many houses in Bath are considerably constricted by lime scale.

Generally speaking, wood pipes with some lead continued to be used during the greater part of the eighteenth century. Cast iron pipes competed against wooden pipes from the end of this century. In 1817 the Metropolitan Paving Act compelled all water companies to lay their pipes in iron and by 1820 wooden pipes were a thing of the past.[14]

Ball valves came in around 1740, invented by Newcomen, and meant that servants would not have to remember to open the main tap and turn it off when the tanks were full.[15]

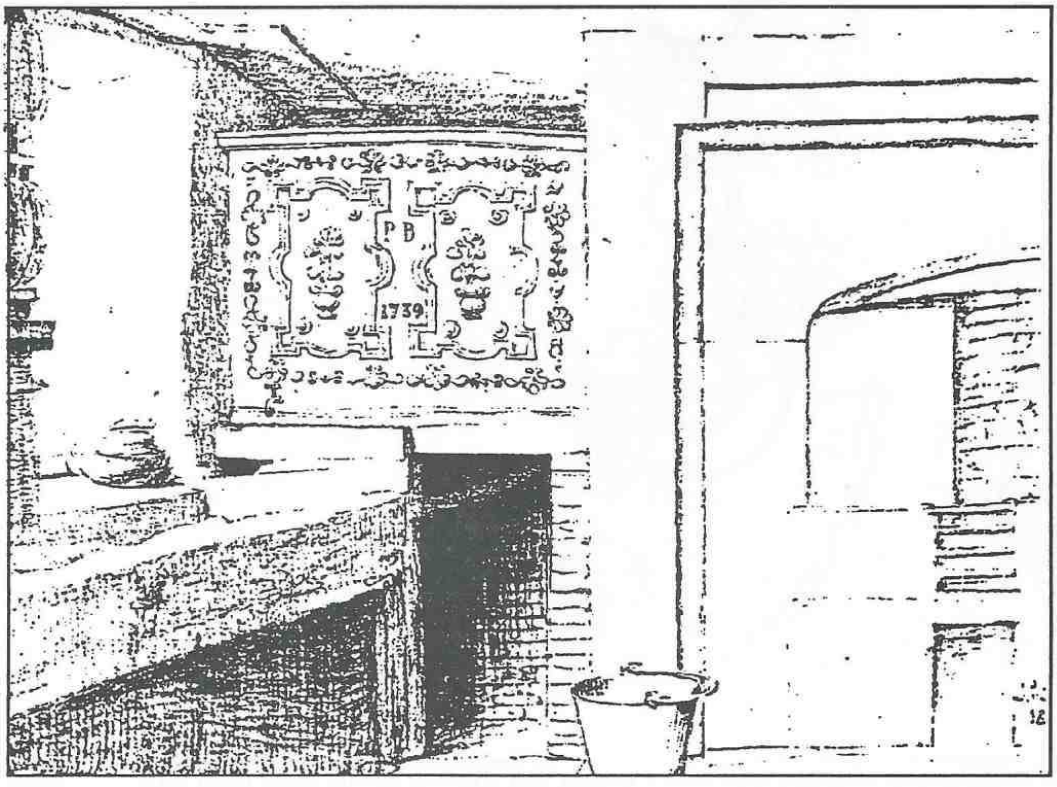
Directions for lagging pipes for winter are given in Wilts. Bands of hay and straw are to be wrapped around lead pipes serving water closets, the pipe to be pierced to prevent it from bursting and then plugged with a small peg in the warmer months.[16]

Storage Tanks

Water could be stored above or below ground in tanks made of wood, stone or lead. Wilts advises that cisterns should not be put where the sun can get on them as vegetation in the water sometimes ensues.[17]

The supply of wooden water butts depended on local industries. Tar barrels were often burnt out and used. The barrels were usually mounted on bricks or stones to prevent the base from rotting and should have been provided with a cover with a hole to take the down spout or pipe. The cover was intended to prevent accidents and pollution from outside sources but as water was more often drawn off by 'dipping' (ladle or other small vessel) the lid would often be missing. The better butts had taps below to allow water to be drawn off with less disturbance to the sediment.[18]

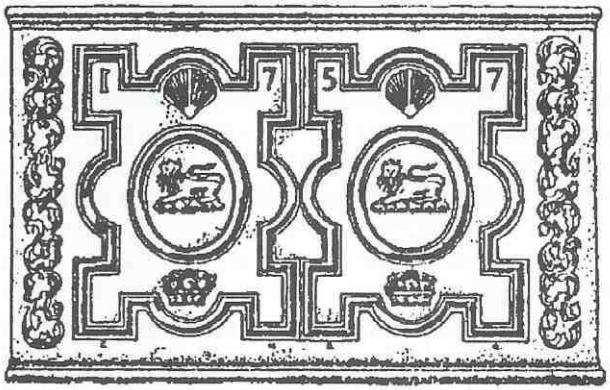
Lead cisterns would have had the sides cast separately and then all soldered together. Sand was spread on the casting table and



A Cast lead cistern in situ

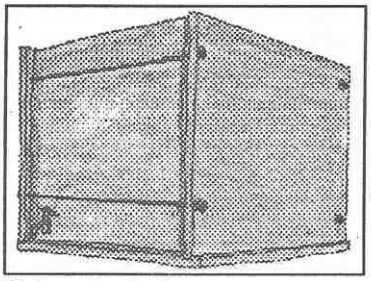
the molten lead poured on. The earlier lead tanks were made without a wooden support framework and required some bracing to prevent them from distorting; the thickened rims, braced comers and ties of pattern across the large flat expanses (where water pressure will be greatest) all added strength. In the better houses lead tanks were sometimes decorated with devices either cast on the sand bed using stock moulds or secured by paleing (soldering of embossed figures). Many of these wonderful lead tanks have been melted down, to recover the silver content. The danger of lead poisoning was appreciated by some and the green deposit that soon formed on the inside of a lead tank was thought to protect against action on the water. Wilts advises thus on the care of lead tanks:

'Pure water dissolves lead and the more impure it is the better the lead will be protected. A new cistern should be allowed to form a coating by the water standing in it for some time without being renewed. To expedite the action a little phosphate of soda or iodide of potassium or a few drops of sulphuric acid may be added The lid or cover of cisterns should not be lead as the vapour condensing in it possesses all the solvent power of distilled water. '[19]



Detail of a panel from a cast lead cistern dating from 1757.

Slate tanks held together with threaded iron bars may be late Georgian but are more likely to be Victorian. The slate had to be carefully chosen to ensure that it was not porous.



Slate water tank

Wooden tanks lined in lead can still be found in some Bath houses (there is a small lead lined tank, partly recessed in the wall at first floor landing level, in no 100 Sydney Buildings). Small tanks such as these may have provided water for the toilet flush. After the introduction of iron pipes in the nineteenth century there was sufficient pressure available to allow tanks to be located at the top of the buildings and with this improvement came the introduction of tank-fed water to a number of outlets throughout the house. But these advances were only just beginning at the close of the Georgian period.

Stone tanks were generally of much larger proportions than the lead tanks and nearly always constructed underground. The *Old Builder Journal* of c1780 gave some instructions on building a stone tank, recommending that approximately one quarter part of dry brick dust be incorporated in the lime mortar as this tended to cause some expansion and ensure watertight joints.

The construction of the reservoir on Beacon Hill in 1769 is well documented in the Bath City Council Water Committee minutes and the following information is given between July and September of that year:

The tank was to be constructed of free stone common ashlar not less than 7' thick at the thinnest end, the price to be given in before the delivery of any stone and be measured after setup. The tank was to measure 40ft long 16ft wide and 9ft deep to the spring of the semi-circular arch and as perfectly watertight as the sides can be made on the spot of ground today surveyed by the committee and to be forwarded with all expedition. In order to strengthen the sides of the new reservoir a wall be carried across the same of 8" ashlar not higher than the spring of the arch, a small doorway in the centre 2ft x 4fl with circular head.[20]

This tank is still intact and can be found adjacent to the lower block of the Bath High School just below Lansdown Crescent. Other similar large tanks can be found behind Camden Crescent and to the south of the city on Beechen Cliff.
The stone reservoir under the land enclosed by the Circus was reported in the *Bath Journal* in 1758 as 60ft diameter and 7ft high. These large reservoirs, located close to the houses which they served, proved to be an asset for fire-fighting; the large tank in Queen Square was used to extinguish a fire in nearby Prince Street in 1749.[21]

In an indenture of 1766 John Wood mentioned a huge reservoir in the centre of the ground in front of the Royal Crescent which was to be a 300 ft diameter semi-circle and supply water to the City and Walcot. It was never built.

Water Treatment

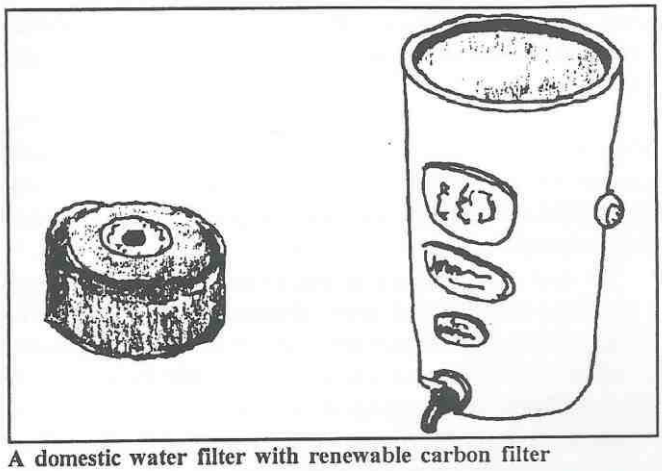
The Complete Servant, first published in 1825, had advice for those using wooden vessels for water storage

Nothing has been found so effectual for preserving water sweet as charring the insides of the casks well before they are filled. When the water becomes impure and offensive, from ignorance of the preservative effect produced on it by charring the casks previous to their being filled, it may be rendered perfectly sweet by putting a little fresh charcoal in powder into the cask or by filtering it through fresh burnt and coarsely pulverized charcoal.

Where water was suspect, water filters were often used whereby water percolated through a renewable carbon filter. Improved filtration at the waterworks was first introduced around 1829, but use of a home filter remained popular.

Water Quality

Throughout the Georgian period water supply was a prime cause of epidemic, endemic and contagious diseases. Discharges which characterised the disease were most likely to be impregnated with the fever and poison from sewage matter was the most common cause of the spread of typhoid.



A domestic water filter with renewable carbon filter

Falconer compared the goodness of the water from the various reservoirs and other sources in the city. It was felt that the spring waters collected in underground reservoirs were hard to distinguish with regard to quality but that probably the water from the Circus reservoir was best, that from the City Reservoir and Beacon Hill were nearly alike and that the water from Beechen cliff was little worse. Clean river water was too hard to ascertain due to floods and so could not be tested. Pump water was much the worst of any. The essay concluded that:

> *we have reason to think that the health of those who inhabit or resort to this place will be likely to be improved from what it was formerly, by the introduction of better water for use in diet*.[22]

In the eighteenth century the supply was such that many of the higher houses were supplied from private springs and even in the middle of the nineteenth century a Bath man is quoted as saying that good water had then to be fetched from the public pumps in Bath:

> *It is as valuable as strong been We can't use it for cooking or anything of the sort, but only for drinking and tea. For cooking and washing water we obtain water from the river but it is muddy and often stinks.*

As late as the 1860s only 65% of the houses in Bath had a piped water supply, the remainder relying on wells or street pumps or rainwater. In 1866, the mayor said:

> *my chief objection to compelling the poor to rely entirely on wells and pumps is that besides the uncertain supply and the labour of getting it they often have to put up with very poor quality water as a result of pollution from nearby drains and cesspools*. [23]

The heart of the problem of poor quality water supplies was seepage and throughout the Georgian period this problem persisted and was the main contributory factor to much of the pollution of the spring water supplies. If springs were a possible source of pollution, then wells were even more so. The water they trapped stood the chance of being polluted by the seeping of contamination from the many ‘dead wells’, leaking pipes, cemeteries, pigsties and slaughterhouses. Overcrowding only added to the problems of providing a potable supply of water. In the 20-yard space between the backs of the houses in Milk Street and Avon Street there were 30 houses and courts which could only be entered through other houses. There were also in this space more than 20 pig sties and a pottery, with 868 people living in the 74 surrounding dwellings. It is small wonder that epidemics of such things as smallpox and scarlatina were common and that 134 children under the age of five died from such causes in the year beginning October 1863.[24] If the wells were bad the river was even worse. The Avon took the sewage of seven towns and many villages before reaching Bath. All the Bath sewers found their way into the river which at this time might be better described as a sewer.

In the eighteenth century, plumbing was still primitive and many would not trust theses new piped supplies and would fetch drinking water from some outside spring or well, as grandmother said ‘*water that has been so harassed about in pipes cannot be wholesome'*.[25]

Filters were sometimes used, large and utilitarian in the kitchen and more ornamental in the dining room. These were pottery containers with charcoal filters which need frequent recharging or renewal.

Potable water supplies in Georgian Bath were of unreliable quality. It is little wonder that many poor people died through water related diseases and that much beer was drunk, which in turn, made gout a common disease among the wealthier classes.

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