

# Gone but not forgotten

## Hydraulic Power in Sydney 1890 – 1975

**J.W. Gibson**

The predominant sources of energy in Sydney by the 1870s for industry were coal, and gas. Coal had been a source of energy since the early days of the colony, mainly as a source of heat and later to raise steam in industrial boilers. Gas was introduced in 1841 by the Australian Gas Light Co (AGL) primarily as a source of light for streetlamps and homes.

While the application of steam to produce mechanical power (linear and rotative) was reaching its peak in the middle of the nineteenth century, the development of gas powered engines was still on the horizon. Petroleum was relatively unknown, and whilst experiments with electricity were producing new applications, industrial power from electricity was still far in the future.

The continued application of steam posed two significant problems to the industrialists (i) it could not be readily reticulated over large distances and (ii) it was polluting the town “... *thousands of furnaces burnt millions of tons of wood and coal bringing with it the choking smog.*” (Birmingham, 2000, 197). What was needed was a new, readily reticulated, reliable power source from a centralised supply. As pointed out above gas could be reticulated but the engines for it to power did not exist. Steam could be reticulated but only to a limited extent as in hospitals and within factories.

The solutions available at the time were centralised power stations producing compressed air (pneumatics), or water power (hydraulics) with either power source being reticulated throughout the streets of the town. Each could be easily controlled and used in machines to produce linear or rotative mechanical power. Either of these solutions would see a significant reduction in the number of small steam boilers and hence a reduction in pollution, and a theoretical rise in overall efficiency.

Even though the prominent Australian engineer, Mr. Norman Selfe, prepared a strong case in support for compressed air in 1886, claiming it would be 1/10 the price of hydraulic power, the NSW government supported the establishment of a hydraulic power system as they had previously set up a hydraulic plant for the Bullock Is. dock cranes at Newcastle in 1877.

Experiments using hydraulics to power machinery had been carried out as early as 1802 in the United Kingdom. By the mid 1800s it was possible to supply water at pressures of 700 psi (4.8 MPa) upward over distances of up to 15 miles (24 km). The first public hydraulic power system commenced operation in Hull in 1876 and this was followed by London in 1884.

It is interesting to note that by 1878, only 2 years after the commencement of the Hull system, Edward Moriarty had produced a hydraulic system for the Newcastle dockyard (Bullock Island) in Australia. “*On 19 March 1878, the first shipment of coal loaded by hydraulic crane left aboard the ship Downiemount*” (Bairstow, 1986). Subsequent systems in Australia commenced in Melbourne in 1889 and Sydney in 1891.

### **Extant remains of Hydraulic Power in Sydney.**

A recent research project has uncovered a range of extant remains of hydraulic power in Sydney. In fact, parts of 8 independent systems have been located.

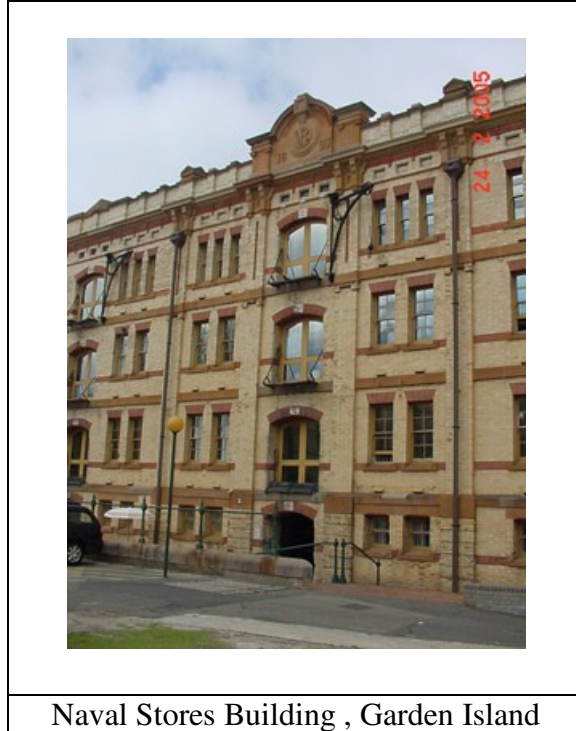
These remains are from the following;

- Naval Stores on Garden Island
- Argyle Stores in The Rocks
- Walsh Bay System
- Railway Workshops, Eveleigh
- Railway Workshops, Chullora
- Dockyard, Cockatoo Island.
- Birt's Wharf, Pyrmont.
- Sydney and Suburban Hydraulic Power Company (SHPC).
- Sydney and Suburban Hydraulic Power Company - Consumers

### **Naval Stores, Garden Island.**

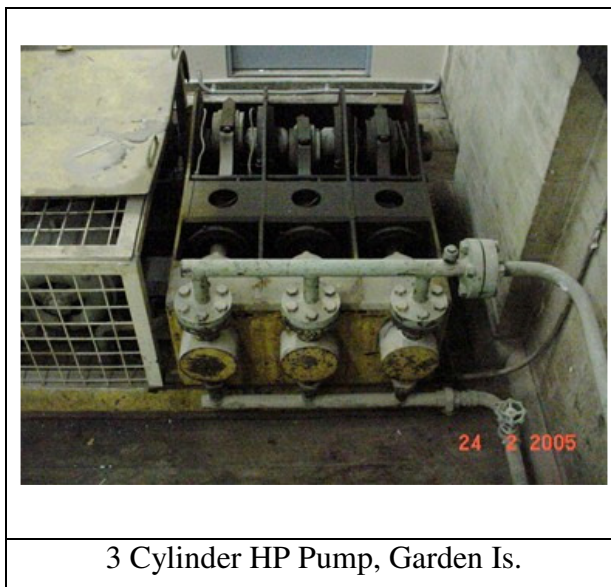
The most significant remains by far is the hydraulic system in what was the Naval Victualling Stores building at Garden Island – building 89. The original equipment was supplied and installed by Mort's Dock & Engineering Co in 1893. Before it was shut down water pressure was raised by a three stage reciprocating pump driven by electric motor through a worm and wheel drive. Working pressure was approximately 1200 psi (8.3MPa) and this pressure was maintained by an accumulator with a 17.5" (445 mm) diameter cylinder and 16' (4.88 m) stroke. Pressure was supplied to 5 whip cylinders on the inside of the building connected by cables to the jibs on the northern face of the building.

Most of the equipment is still in-situ, and due to the work of Industrial Archaeologist, Don Godden much of it has been well conserved. With some relaxation of public access to the north end of Garden Island it may be possible to see the whip jibs on the north face of building 89 from near the new Naval Heritage Centre.



Naval Stores Building , Garden Island

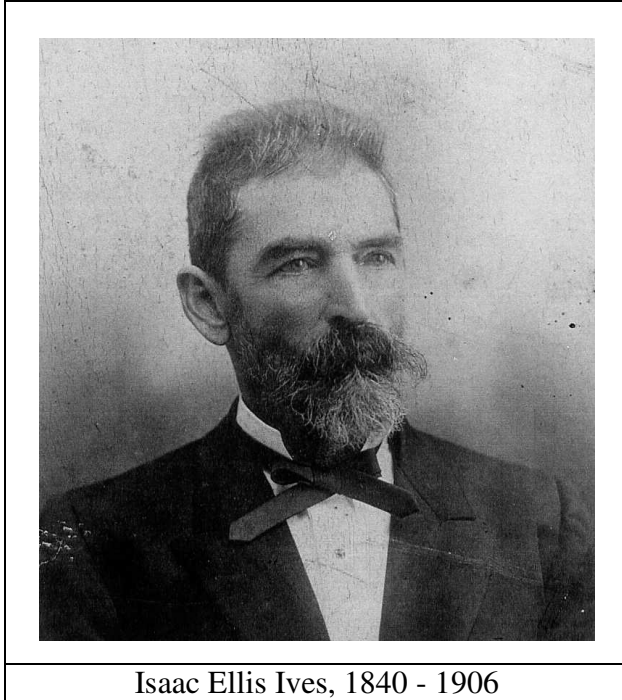
This equipment played a major role in Naval Storage between 1894 and its closure in the 1970s.



3 Cylinder HP Pump, Garden Is.

### **Argyle Stores, The Rocks**

The whip that remains in the courtyard of the Argyle Stores building was part of a small private system that supplied power for lifts and a whip. The whip was made by Tannett Walker (Leeds) in 1885 and was installed by Mr. Isaac Ellis Ives following the rebuilding of the south wing c.1878. Isaac was Mayor of Sydney between 1897 and 1898.



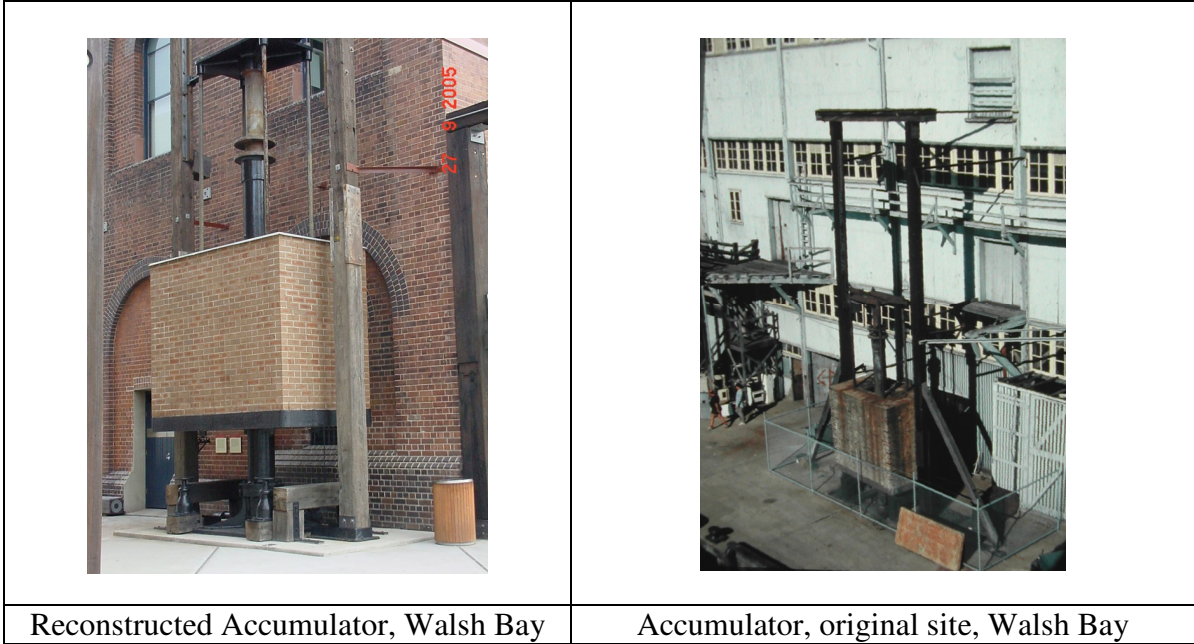
Isaac Ellis Ives, 1840 - 1906

The system comprised a small gas engine driving a 3 cylinder pump. Pressure was controlled by an accumulator and fed to the whip on the wall of the south wing, and at least one, possibly two, other lifts inside the north wing. The whip is all that remains of the system and it has recently had significant conservation work carried out by the author for its owner, Sydney Harbour Foreshore Authority.

### **Walsh Bay, Darling Harbour**

Another independent hydraulic plant served the wharves of Walsh Bay, off Hickson Rd. The system supplied hydraulic power to lifts, wool presses, and possibly to wharf conveyors. The conveyors that remain on the redeveloped wharf were electrically driven by the end of their life.

A twin cylinder double acting reciprocating pump driven by a 65HP (48.5 kW) electric motor is still in-situ as a feature in the Ventuno cafe on ground level in the Central Wharf Stevedoring building (wharf 8/9). The accumulator is outside this same building but is not in its original position as an early photograph shows the accumulator closer to the water on wharf 7/8. A hydraulic wool bale lift with its adjustable loading table has been relocated to this building as well. The remains of an in-situ hydraulic goods lift is at the western end of the same building.



**Railway Workshops, Eveleigh (Australian Technology Park )**

Two HP pumps, the remains of two accumulators, the Davy Press and Intensifier, and numerous supply pipes remain located within the NSWGR workshops, now Australian Technology Park, at Eveleigh. Whilst the Davy press and its intensifier are in public space, the two pumps are in a pump-house near to the set of steam boilers on the south side of the workshop buildings. One is a twin cylinder steam driven Fielding and Platt engine/pump in excellent condition. The other is an electrically driven 3 cylinder Hathorn pump. A pressure gauge on the wall suggests a red-line hydraulic pressure of 2500 psi (17.2 MPa).



There are also a number of hydraulically powered machines (strikers, presses, spring formers) conserved within the building.



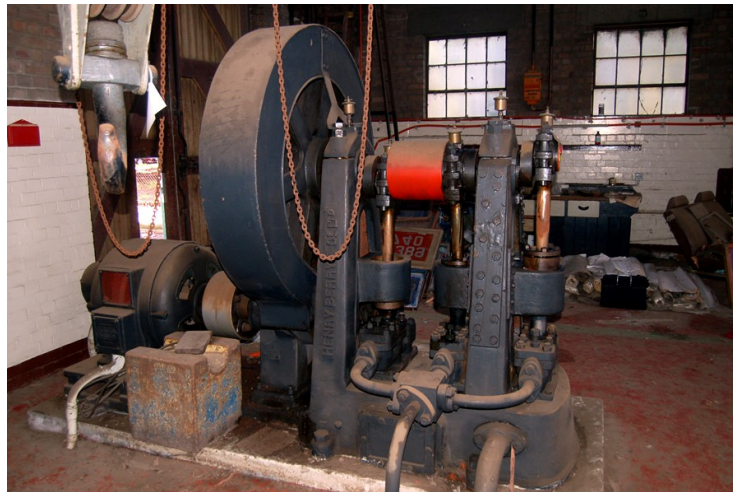
Hydraulic Powered Allen Striker, Eveleigh

### **Railway Workshops, Chullora**

The pneumatic and hydraulic powerhouse for the railway workshops at Chullora still stands. The building is red brick with a galvanised steel gable roof and a galvanised steel wall on the southern side. There is an hydraulic accumulator on the western side of the building and a water tank and 4 compressed air storage cylinders on the eastern side. The building is located at S33° 53.104', E151° 3.670'. Inside the building there are three air compressors, each electrically driven. Also, there are three electrically driven HP hydraulic pumps labelled 1, 3 and 4. Pump 1 is a two cylinder horizontal Worthington pump (2.75" (698 mm) bore and 7.5" (190 mm) stroke driven by a 50HP AGE motor. Pump No. 3 is a 3 cylinder vertical pump made by Henry Berry of Leeds. Pump 4 is a 3 cylinder vertical Henry Berry pump of 2.25" (57 mm) bore and 5" (127 mm) stroke.



Pumphouse, Railway workshops, Chullora



3 cylinder, Henry Berry Pump, Chullora

### **Cockatoo Island Dockyard.**

The hydraulic system on Cockatoo Island operated at 1500 psi (10.3 MPa) and this was reticulated throughout the island to power presses and other machinery rather than whips and lifts. Hydraulic pressure was supplied from two 3 cylinder Ruwolt Pumps driven by 170 BHP (127 kW) electric motors. Pump bores were 4" (102 mm), with a stroke of 8" (203 mm). The only remains of the system on Cockatoo Island are two HP Pumps and electrical controllers located in the powerhouse which is not public space.

### **Birt's Wharf, Pyrmont**

The only remnant of hydraulic power from Birt's wharf that has been located is an engineering drawing by Mr. E. G. Stone of the Sydney Harbour Trust dated 29 August 1903. The drawing shows the location