

COMBE HAY CAISSON LOCK *a BIAS project report*

by Angus Buchanan

The Somersetshire Coal Canal was made to link the coal mines of the Cam and Wellow Brook valleys with the Kennet and Avon Canal at Dundas Aqueduct. An Act of Parliament was obtained for its construction in 1794 and the main line up the Cam Brook valley to Hallatrow was completed in 1805. The projected branch line up the Wellow Brook valley was never finished, and was replaced by a tramway connecting with the canal at Midford. The major engineering problem in the construction of the canal was the considerable change in level, amounting to about 130 ft, over its ten mile length. Following the canal building practice of the period, the engineer William Smith planned to concentrate the lift from the low level to the high level in the neighbourhood of Combe Hay, giving two long reaches uninterrupted by locks above and below this point. His first plan was for a caisson lock, about which more in a moment. When this failed an inclined plane was built, but as this did not prove satisfactory, a flight of 22 narrow (7 ft gauge) locks was constructed, and it was the opening of this which marked the completion of the canal in 1805, long after the rest of the work had been finished. In this form the canal enjoyed a prosperous career until the end of the nineteenth century, commercial traffic ceasing in 1893 as a result of competition from the railways.¹

Much of the alignment of the canal can still be traced, and the remains of the flight of locks at Combe Hay are amongst the most interesting industrial monuments of the region. The site of the caisson lock, however, has become a matter of doubt and controversy, and it was to elucidate this problem that BIAS made an excavation of one of the suggested sites in the summer of 1968. But before describing the results of this exercise it will be useful to give an account of the remarkable apparatus which was the subject of investigation. Robert Weldon took out a patent for a caisson lock in 1792, and an experimental lock of this type was constructed at Oakengates in Shropshire in 1794². Its success persuaded the proprietors of the Somersetshire Coal Canal to use the device to make the change of levels necessary on their canal at Combe Hay'. - The plan appears to have been to construct two or even three caisson locks, as the one which was actually completed only had a lift of 45ft. One of the proprietors of the canal, John Billingsley, gave a valuable account of the lock together with an illustration which forms the basis of Fig. 2.³ In this, 'A' consisted of a "trunk or caisson made of wood" which was partially filled with water and was large enough to receive a barge of 25-30 tons burthen, with a door ('C') at each end which could be sealed to make the caisson watertight, in which condition the admission or expulsion of a small amount of water would so alter the specific gravity of the caisson that it would sink or rise in the stone-lined chamber or cistern ('B') filled with water through which it was intended to move like an air-bubble or balloon. 'D' is the lower aperture in the masonry, provided with a sliding door which was only opened (by the rack and pinion at 'F') when the caisson exit door ('C2', hidden) was fixed tightly against it. The movement of the caisson could be controlled by the "chains and rollers" operating on the two vertical shafts 'E'.

The principle of this extraordinary apparatus seems to have been quite sound, for there is no doubt that it was made to work, as the lock at Combe Hay operated smoothly for days or even weeks. A newspaper account of April 1799 reported:

We stopt the press last Friday being happy to communicate to the public that the Caisson had succeeded in some trials made that morning, and was proceeding in them when the messenger left Combhay, we have now on authority to announce that during the remainder of the day, till near six o'clock, the different evolutions of that stupendous machine were continued nothing was out of order, no jarring, no difficulty of any sort occurred. A boat was taken in at the upper level and let out into the tunnel below from the Caisson, in less than TEN minutes with the greatest ease, and without any extraordinary exertion. This immense machine loaded with upwards of 200 tons weight was found to be so manageable, that a boy of 12 years old, by being made acquainted with the nature of the valves, could either raise or depress it; and a most interesting sight it was to see this unwieldy machine sinking rapidly to the bottom, and then at the word of command, arrested in its course, and instantly rising up again to the top of the water. Its operations are conducted with so much silence, that at the distance of 3 or 4 yards from the cistern, it would be impossible to discover whether the machine were in motion or at rest. The cistern which contains the Caisson, we are sorry to learn, is so leaky that it is impossible to continue any trials for a longer period than 3 or 4 hours at a time, arising from some deficiency in the masonry, which it is feared a new cistern alone can remedy. At all events however, as water is accumulated in the reservoir, the public will have such opportunities as can be afforded, of witnessing the immense powers and utility of this ingenious invention, and see the great controul to which the largest bodies of nature are subjected by the discoveries and applications of human art.⁴

Another trial was conducted in May,⁵ but the hint about defective masonry proved to be only too true, and by the end of that month there was an advertisement in the paper asking for a mason to work on the rebuilding of the caisson lock.⁶ In the event, the proprietors decided that the work would be too expensive and turned to other and less novel methods of solving their problems, as we have seen. A contemporary observer put the matter neatly:

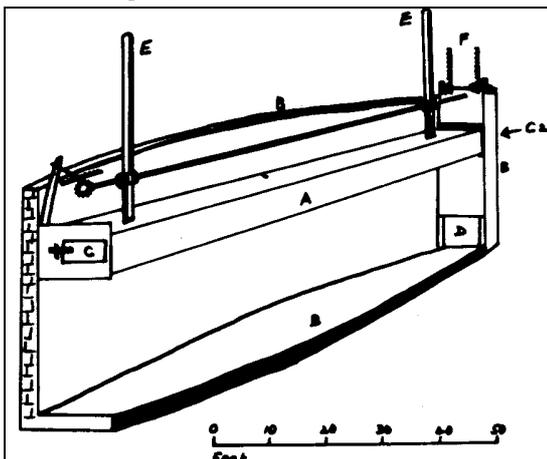
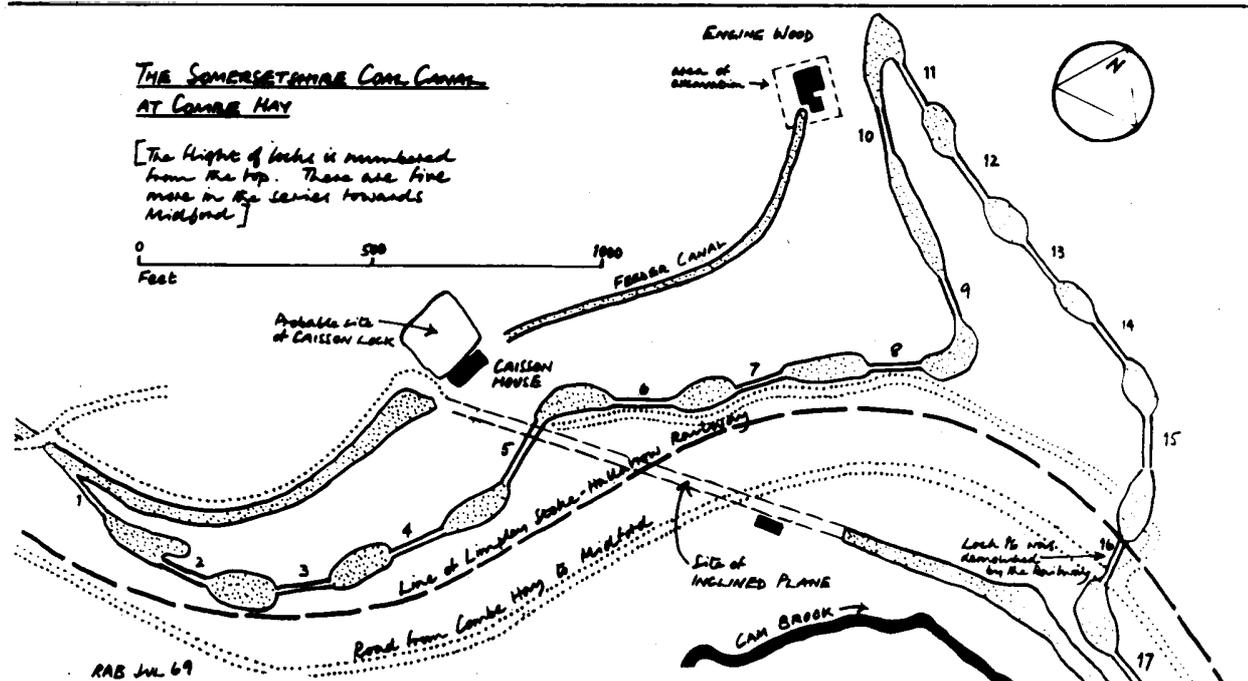
Unfortunately, however, for the inventor, the subscribers to the canal, and the public in general, the cistern in which this surprising body was to move, (a machine upwards of seventy feet in length, and eight in height) was not rendered sufficiently tight to hold the water necessary for its operations, the masons being either too ignorant or too remiss in their part of the work; a defect which was not discovered till the season of remedy was past. In this dilemma, the only resource was to rebuild the cistern entirely, to which the canal proprietors would not consent, on account of the enormous expense attending it; the machine, therefore, was consigned to destruction, but not to oblivion, since it will ever remain a memorable proof of the superior mechanical abilities of its very ingenious inventor. ⁷

It is difficult to believe that such a substantial piece of masonry as the Combe Hay caisson lock could have disappeared without trace, but this appears to have been the case. When BIAS became interested in establishing its location, the first assumption was that it was somewhere in the wood significantly named "Engine Wood" on the O.S. map. In favour of this assumption were the facts that: (i) there was an upper branch of the canal going to a dead-end in the wood, (ii) there were fragments of masonry near the end of this upper reach of the canal, (iii) there was an apparent quarry face in the wood into which the caisson could conceivably have been built, and (iv) this site had the advantage of a steeper slope than any other point in the neighbourhood. Consequently, the Society decided to excavate the area round the end of the upper reach of the canal, which was done with the kind permission of the owners, Mr. and Mrs McArthur, on Saturday, 22nd June 1968. It was a wet day, but this did not prevent a vigorous piece of work which established that: (i) the canal appeared to have been intended to end at this point in a terminal basin with a small slipway - there was no suggestion of a connection with a lock; and (ii) that the masonry on the site bore little relationship to the probable shape or orientation of the caisson lock (see Fig.3.). The discovery of boiler house waste on the site, moreover, confirmed the suspicion

that the site had nothing to do with the caisson but was a means of supplying the upper level of the canal with water recovered from the middle lock of the 1805 flight at a point where this could be replenished from a stream coming down the tributary valley north of Combe Hay. On this interpretation, there must have been a steam engine in "Engine Wood" pumping up water into the feeder canal which ended at the top of the hill, and the surviving masonry would thus be associated with this engine house. Such a feeder canal and engine house would certainly have been built after the caisson lock, as the greatest single argument in favour of the caisson was its economy of water.

The disappointment of not finding the caisson lock led to a careful search of the available documentary evidence on the Coal Canal, which included a map in the possession of Bath Reference Library (Fig.1 is based upon this). This did not mark the caisson itself, as it had been made at a time when the flight of locks was already complete, but it did indicate (i) "Caisson Field", approximating roughly with the house and gardens of the present "Caisson House"; (ii) an "Old Reservoir", roughly behind the site of the present house; and (iii) an "Engine House" in the wood where the BIAS excavation had been made. It now seems fairly certain, therefore, that the caisson was much closer to Caisson House than we had previously imagined, and that it was in fact either on the site of the house itself or immediately in front of or behind it. The lock could have been the "Old Reservoir", roughly coterminus with the tennis court behind the house. It is possible that the house was constructed in part with masonry from the cistern. There must, however, have been a lot of in-filling of the ground at some stage, for the cistern of the caisson was 56 ft high which made necessary a cutting and tunnel in order to approach the lower portal of the lock. Much more clarification of these details is desirable, but it now seems unlikely that any substantial remains of Richard Weldon's weird but wonderful "hydrostatic machine" will be discovered.

1. For a general account of the Somersetshire Coal Canal, see R.A.Buchanan and Neil Cossons: Industrial Archaeology of the Bristol Region, pp. 189-193.
2. There is a useful entry on Robert Weldon and the Caisson Lock in Rees's Cyclopaedia of 1819, vol.6. I am grateful to Tony and Jane Woolrich for this reference.
3. John Billingsley: General view of the Agriculture of the County of Somerset, Bath 1795, 2nd edition 1798, pp. 316-8.
4. Bath Herald 13 April 1799
5. Bath Herald 4 May 1799
6. Bath Herald 23 May 1799
7. Rev. Richard Warner: Excursions from Bath, 1801, p.16.



SECTION OF ROBERT WELDON'S
CAISSON LOCK AT COMBE HAY

After BILLINGSLEY: "Agriculture of the County
of Somerset" p.316
[For key see text]

RAB Jul 1969



Outer walls,
largely rubble.
Inside overgrown.



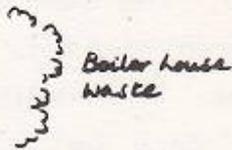
SITE IN ENGINE WOOD
COMBE HAY, SOMERSET
(ST 742 606)

Feet
0 5 10 15

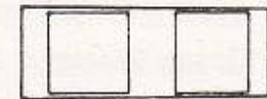
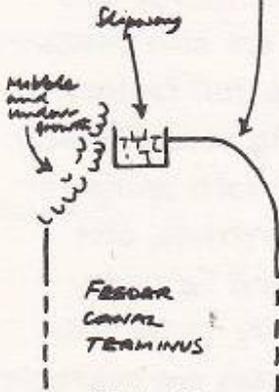
Slope to Stream
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masonry wall to basin,
3/4 course visible @
12 ins each.

masonry foundations
with arch: main
entrance of excavation



Boiler house
waste



ELEVATION



masonry 3 courses
visible @ 12 ins each
Arch: Stone key. Spaced
with brick in spans.