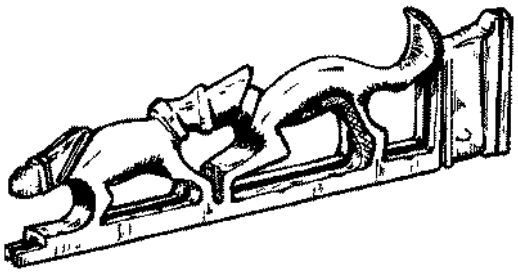
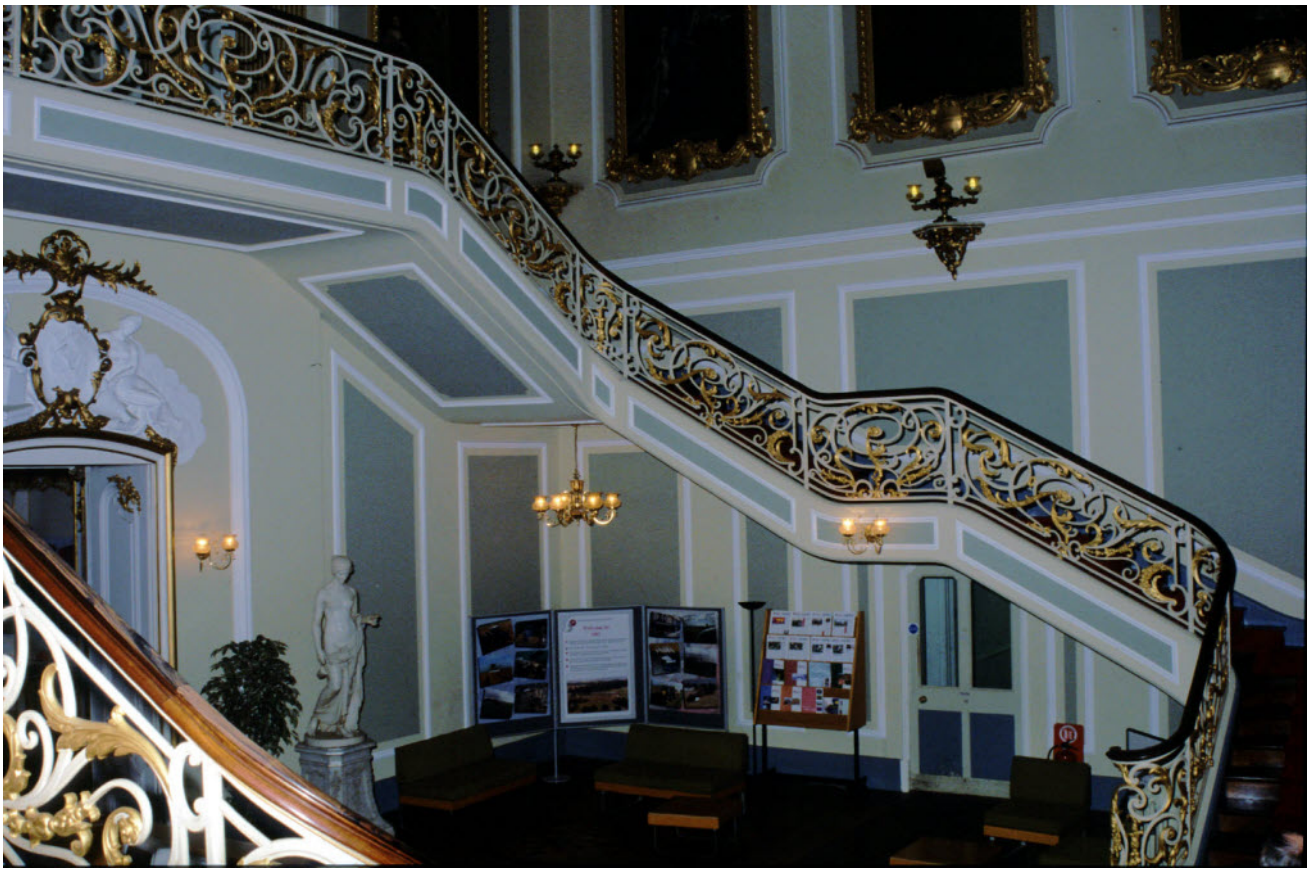
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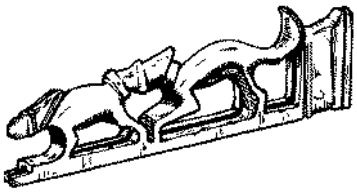
## Photographic Survey of an Early Nineteenth Century Heating System for the stairs and foyer of Wrest Park Mansion. Silsoe.

Kevan J. Fadden
Michael J. B. Turner



# Photographic Survey of an Early Nineteenth Century Heating System for the stairs and foyer of Wrest Park Mansion.
# Silsoe.

January 2002



Ampthill & District Archaeological & Local History Society

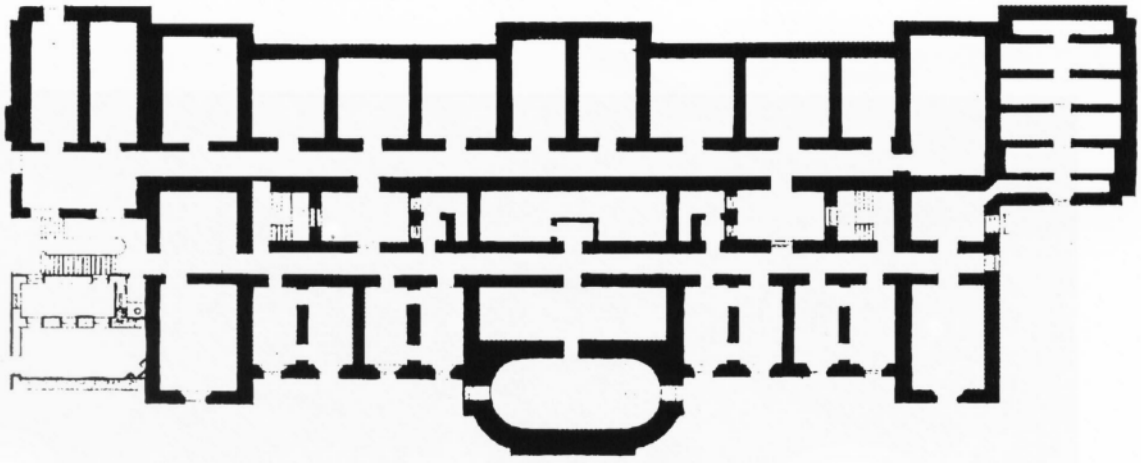


Fig. 1 Earl de Grey's plan for the cellar area c.1834.

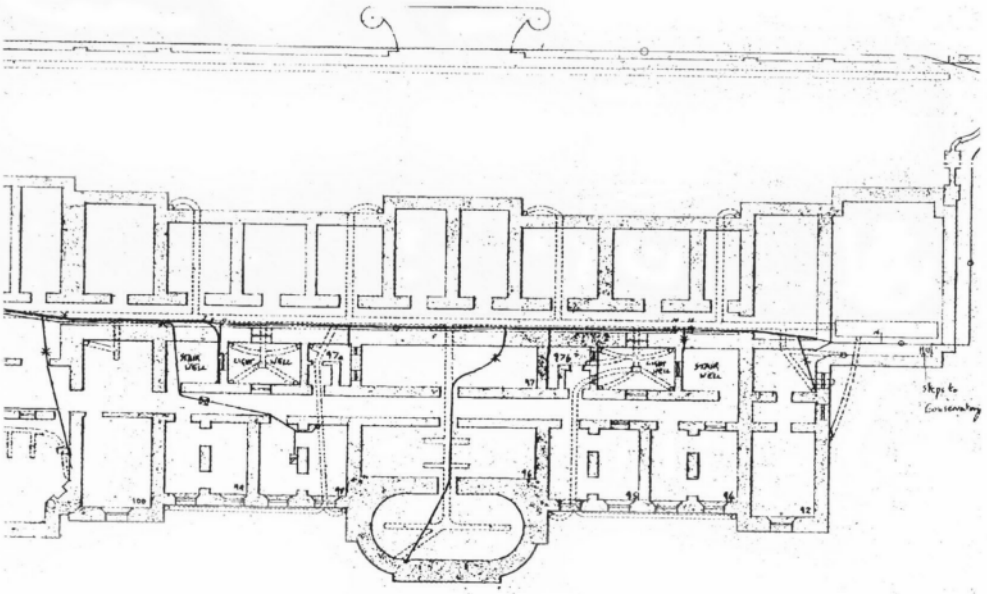


Fig. 2 James Clephan's drawing s of the water services and drains, c.1841.

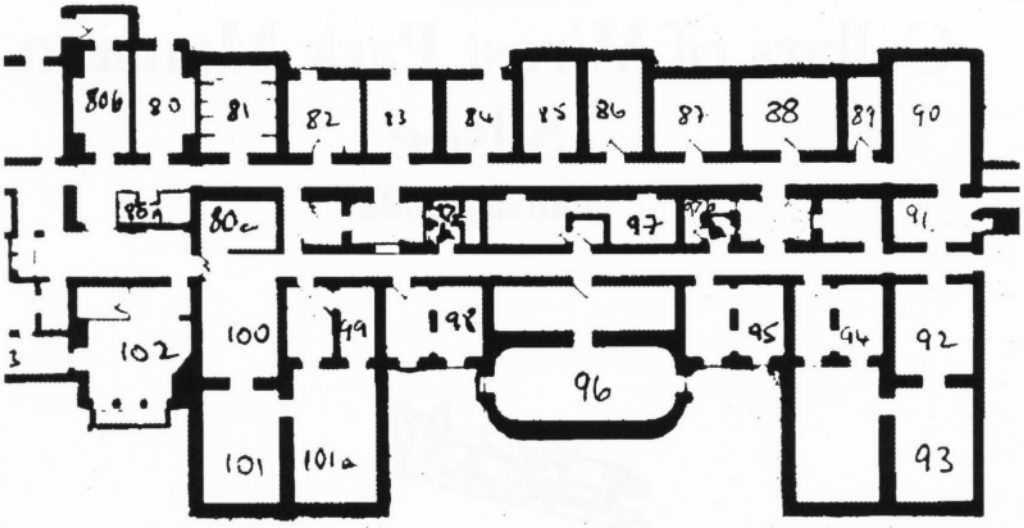



Fig. 3 A Silsoe Research Institute drawing of the cellars with numbers, C.1950.

# Investigation of an Air Heating System in Cellar 97 at Wrest Park

M J B Turner and K Fadden
Ampthill and District Archaeological and Local History Society
22 November 2004

Our attention was drawn to this area during a survey of the cellars under the Mansion at Wrest Park in the year 2002, Ref.1. The heating system had not been in use for at least forty years and much of it had been stripped out but there were still interesting features visible which are described in this report. Figure 1 shows the Earl de Grey's original sketch for the cellar area, dated 1834. Figure 2 shows the layout of water services and drains as drawn by James Clephan in 1841 and Figure 3 show the layout circa 1950 with the cellars numbered. Cellar 97 contains the most interesting features. It appears that hot air from this cellar, No. 97, was ducted into the main hall above via six large sheet metal ducts capable of controlled opening, Figure 4. A control rod, Figure 5, runs along the centre of each half of the cellar and operates the duct covers by means of chains and pulleys. It is not clear where exactly the control rod was operated from but clearly it was from somewhere on the ground floor above. The neighbouring cellar on the east side, 97a, contains a control pulley and signs of another, Figure 6. The neighbouring cellar on the west side, 97b, contains two pulleys and a control chain. Clearly the operator was not expected to enter cellar 97 to make adjustments.



Fig. 4 One of six air ducts showing operating mechanism. The duct shown is blocked off with plywood.



Fig. 5 One of the control rods and pulley.

The heat was provided by a Hartley and Sugden White Rose Boiler Series F installed in a sub-cellar accessed by four steps 1 foot 11 inches wide just in front of the main cellar

door, Figures 7 and 8. The sub-cellar was 4 feet 9 inches wide at its widest point and appears to stretch to the far side of the cellar above. Due to the rubble infill it was not possible to measure this. At 2 feet 9 inches from the steps the width of the sub-cellar reduced on the east side, Figure 9. The boiler front was about 4 feet 9 inches from the steps. The boiler had six segments which we presume provided the heated water to be carried in pipes running around the main cellar. We also presume the boiler was put into a sub-cellar to allow for more effective circulation of the hot water by gravity. The unit stood on a plinth ten inches off the floor. At its base the boiler was 18 inches wide tapering to 14 inches at the top which had radiused corners. The height above the plinth was 29 inches giving an overall height of 39 inches. The ash-pan was 3.5 inches above the plinth, Figure 10, and was 6 inches deep by 8 inches wide. The raking hole above it was 5 inches deep and about 8 inches wide with a top-pivoted flap. The coke filling stoke hole, Figure 11, was 6 inches deep and 8.5 inches wide covered by a top-pivoted flap. There appeared to be a flue brush hole, Figure 12, approximately 6 inches square in the wall at the rear of the boiler on the left hand side above what may be a soot collecting area. There was no sign of any water pipes or header tank or water supply in the cellar. It is possible that the inlet and outlet pipes would have been at the rear of the boiler. Nor was the flue pipe visible. It is presumed that the flue would have led to the chimney stack serving the north east corner of the present library annex on the floor above. The rubble would have



Fig. 6 The pulley on the end a control rod in cellar 97a. The axle of a missing pulley can be seen.



Fig. 7 The boiler with six segments.



Fig. 8 The steps down to the boiler showing the recent wooden covering partially removed.



Fig. 9 The sub-cellar showing the reducing width to the left .



Fig. 10 The raking point & ash can.




Fig. 11 The stoking hole cover.

to be cleared out and the flue probed to confirm this.

The main cellar itself seems to have been modified several times. The walls are of sandstone about 2 feet 6 inches thick and rising to about 6 feet 6 inches. The ceiling is barrel vaulted probably in brick similar to the surrounding cellars to a peak height of 8 feet 6 inches. The whole of the interior has been plastered over; the plaster showing signs of severe cracking in the area above the rear of the sub-cellar possibly indicative of the extra heat from the flue. If so it means that the plaster was in place at the same time as a boiler, probably an original feature. Perhaps the cellar doubled as a clean drying room for laundry when not in use for heating the main hall.

In the Clephan drawing of 1841, showing the water services and drains, the cellar is shown as having the existing doorway on its north side and a drain running north-south across its centre just to the east of the steps. However, close inspection shows that there were probably two other doorways, both 4 feet 3 inches wide, on the south side now bricked in, Figure 13. These doorways have dimensions and lintels which match very closely the design and construction of that on the north side and therefore may have been original although they are not shown on the Earl de Grey's plan or the Clephan drawing. It is worth noting that the Clephan drawing was basically done to record the location of the water services and

drains and was drawn some 7 years after the construction of the basement. The location of the services and drains may therefore have been superimposed on a simplified original plan and not on the as-built drawings if any of the latter existed. It is worth noting also that it shows incorrectly two windows in the east wall of cellar 97. These should have been shown in cellar 97a leading to the light well in a similar way to those in cellar 97b.

The sub-cellar was almost certainly constructed at the same time as the original cellars. The fuel storage area, Figure 14, on the west side of the boiler is barrel vaulted and rendered. It would have been difficult to construct such a feature at a later date. The small room, Figure 15, surrounding the steps down to the sub-cellar is brick built and appears to have been built upon the slabs of the original floor. This small room is shown on the Earl de Grey's original scheme drawings c.1834 but is not shown on the Clephan drawing of 1841. The sub-cellar is now covered over its entire length by wooden boards both inside and outside the small room; however the boards over the steps are a recent addition. They run east-west whereas those in the passage to the south of the small room run north-south. The recent wooden boarding may have been installed after the boiler went out of use so that the small room could also become usable as a store room. The original cellar was approximately 40 feet long and 10 feet wide. The small room divides it into two areas; the one to the east is about 17 feet long and the one to the west about 14 feet long. The passage at the south side of the small room, Figure 16, is about 3 feet 9 inches wide. The two blocked doorways are inset approximately 1 foot 11 inches. The inner door clad in corrugated iron, Figure 17, leading from the small room into the main cellar, is probably contemporary with the small room. The door and insulating sheeting clad partition at the east end of the rear passage on the south side appears more recent.

The north wall of the cellar contains a floor level grille about 9 inches wide, Figure 18, leading into the east side of the cellar, and a grille of about twice the width, Figure 19, leading into the west side.

In the main entrance hall above there are twelve square ornamental brass grilles set over lead-lined air ducts, Figures 20 and 22. They appear to be connected in pairs, Figure 23. There are also two circular ornamental brass grilles, Figure 21, which are also set



Fig. 12 The flue brush hole and soot receiver.




Fig. 13 One of the blocked doorways with its lintel.



Fig. 14 The coke storage area.

over air ducts which appear to be linked with the two ducts on the south side. The gross total area of these outlet grilles is of the order of 9 square feet. This area would need to be matched by the air inlets to the cellar. The actual layout of the air ducts under the floor of the main entrance hall could not be ascertained. There is also a large ventilation grille set in the skirting board in the corridor to the east of the entrance hall. Whether this is related to the system is not known.

There is no definite sign of the water supply, header tank and pipe-work for the existing boiler although the Clephan plan does show a water pipe running through the cellar supplying water from a cistern on the roof.

It is possible that the existing boiler replaced an earlier boiler in the sub-cellar but as yet this cannot be confirmed.

The small room appears to have functioned as an airlock leading to the main cellar so that hot air would not be lost when the boiler was attended to. The supply air for the boiler presumably was drawn from the northern corridor.



Fig. 15 The small room as viewed from the north corridor showing the steps to the right.

It is unlikely that the two small ventilation grilles were the only sources of inlet air for the convective heating of the entrance hall above. It is more likely that the blocked doorways originally had vents or louvres allowing air to be drawn from the southern corridor.

It was observed that many of the floor slabs in the main cellar were numbered begging the question whether the floor had been re-laid. It was also noted that four of the slabs had slots in them.

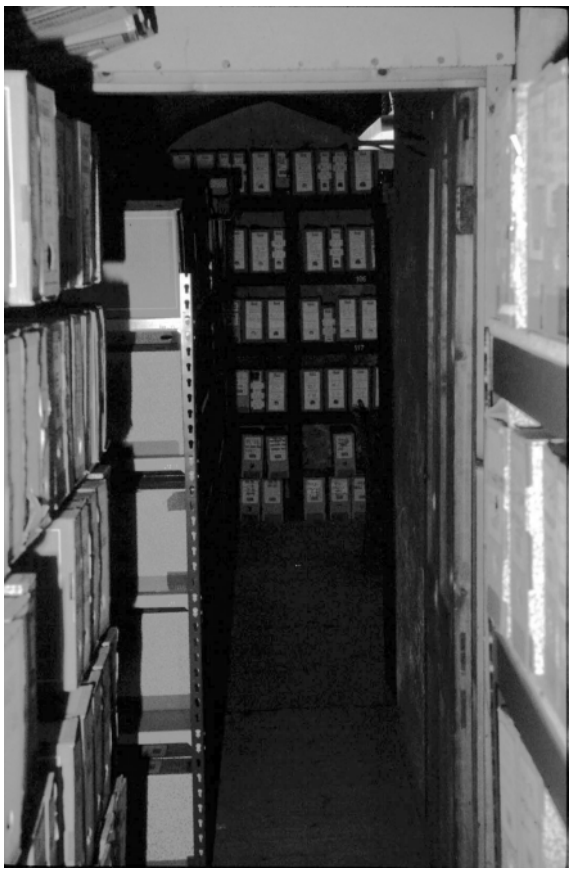


Fig. 16 The passage to the rear of the small room.



Fig 17 The door between the small room and the main cellar to the east, clad in corrugated iron sheeting.



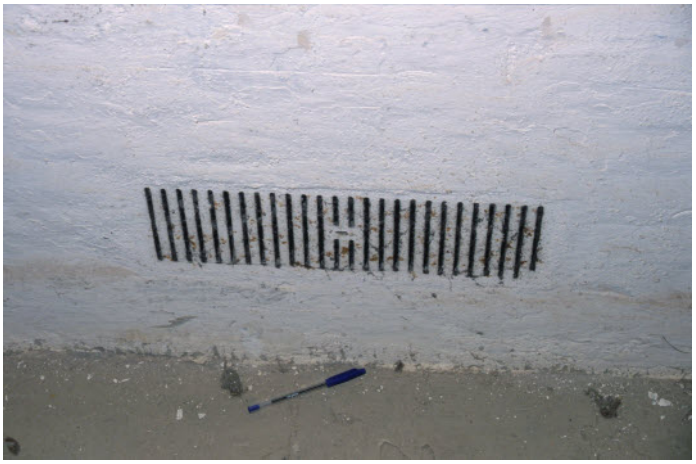


Fig. 18 & 19 Small grille leading into eastern half of cellar and larger grille to the western half.



Fig. 20 One of the square outlet grilles in the main entrance hall.



Fig. 21 One of the two circular outlet grilles in the entrance hall.

In conclusion it appears that the sub-cellar, heating system and entrance hall floor were original features of the mansion.
The doorways on the south side may have been blocked up after the heating system went out of use and the cellar became a store room.



Fig. 22 The main entrance hall containing the heat outlet grilles, set into the wooden pattern on the floor.

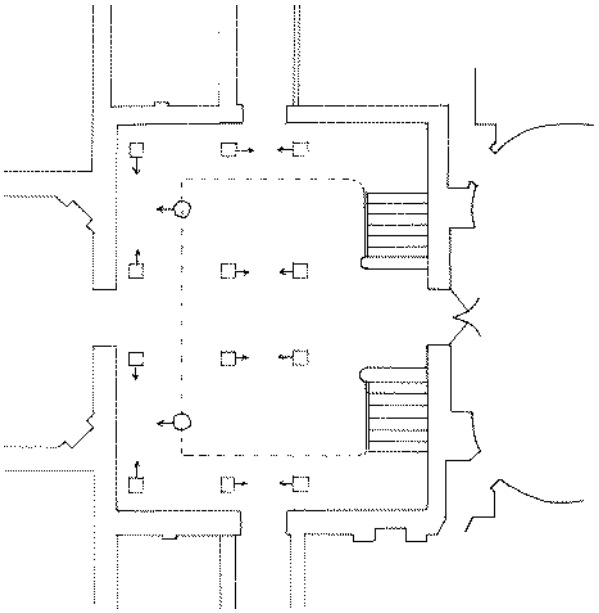


Fig. 23 Sketch plan of main entrance hall showing approximate location of outlet grilles and the direction of lead lined ducts linking them into six groups matching them with the six inlet ducts in the cellar below.

Note 1: In the "Abstract of Expenditure for Building Wrest House and Appurtenances from Feb 1834 to Oct 1840 for the Rt. Hon. Thomas Philip Earl de Grey" we find on page 4 under "Engineering" the following:-

Heating the Mansion, Conservatory, Hot houses, Coach House, Mushroom and Apple House, Drying Sheds, Laundry store and Drying Closet, two hot baths and necessary apparatus for supplying hot water up stairs, copper in the Dairy Scullery and pipes in the linen room etc. etc. .... £1212-8s-2d

Bedford and Luton Archives and Record Office, Ref X219/1

The authors wish to acknowledge the help and encouragement given them by the staff at Wrest Park during this brief investigation.

## References

1. M J B Turner and K J Fadden, Results of an inspection and photographic survey of the cellars of Wrest Park Mansion, Silsoe, 10th Jan 2002.

## Distribution:

A&DA&LHS archive.
A Ely, Wrest Park Library, Wrest Park.
Bedford and Luton Archive and Records Service.
English Heritage (2 copies).

Foot note.

Since this report was written Mr. Andrew Robinson of the Halifax Antiquarian Society sent us photo copies from the Hartley & Sugden catalogue of 1909. The following is an excerpt:

*"In 1904, we produced the "WHITE ROSE" Cast-iron Sectional Boiler for central warming, and we were the first firm to commence manufacture some years ago of a cast-iron sectional boiler for direct domestic supply. The present series of "White Rose" Sectional Boilers for both heating and domestic supply are, we claim, the most robust and efficient on the market, and their ever-increasing popularity has necessitated considerable extension to our works."*

A six section boiler would have had a heating power of 70,000 B.T.U. per hour. With an asbestos cement covering and stoking tools the cost was quoted at £ 10.19.0.

This confirms our suspicion that the boiler was a replacement. The lack of evidence for alterations in the brick-work around the pipes and louvres in the cellar walls, supports the theory that the heating system was an original feature of the house.
There was no mention of the Series F Boiler in the 1938 catalogue.

We are very grateful to the Halifax Antiquarian Society.

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