

April 1967.

In reading these notes it should be remembered that they were written in 1965 as part of the preliminary record leading to the writing of the first 150 years of Haden History. Since then the facts have been revised and added to considerably. All this has been recorded under the Index of Documents, Drawings and Photographs in the Haden Archives.



HADEN

HISTORICAL NOTES

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THE FOUNDERS 1

(Exhibits marked P.H. are the property of Mrs. P. Haden.)

Exhibit

George Haden, Senior.

*(Since given in many cases to Haden's
for inclusion in their archives)
In*

The history of our Company might be said to commence with George Haden (Senr.). He was employed by Boulton & Watt, his sons George and James, our founders, received their training in the same Company and they were all intimately connected with James Watt in their work. Moreover, some of the letters suggest that the two sons had received much advice from their father in their work and in their decision to start their own Company at Trowbridge.

1. P.H. The earliest record we have of George Haden, Senr., is four folded sheets in the form of a diary covering the period July 1771, when he was aged 15, to September 1772. The principal object of this diary might have been to record the time spent on various jobs during his 12 hour working day, although he covers also weekends and holidays by mentioning visits by horse to Stourbridge, Kidderminster, Worcester, Dudley and Birmingham.
2. P.H. A white pigskin notebook, fastened by a metal clasp, with the words "George Haden, his book, Dudley" on the inside cover, and headed "Memorandum from 1776" when he would be 20 years of age. He records his employment up to 1783 and apparently first worked at the Soho Works, Birmingham, for Boulton & Watt for 15/- per week in 1780, being articulated to them for seven years at 18/- per week. There followed details of his finances, an annual statement of his capital, and also a record of the employment of his children over some years.

At the end of this notebook is a record of births and deaths, from which it appears that, ignoring two deaths in extreme infancy, George Haden, Senr. had five children, John, Mary, Sarah, George and James, the last two, our Founders, being the youngest born in 1788 and 1790.
3. P.H. There are a number of undated rough sketches of pieces of furniture, door frames, architraves, and templates of mouldings, together with a sheet dated 1794 to 1795, which appears to be connected with his work for James Watt, as it refers to notepaper and rollers that could have been used in James Watt's patent copying machine. James Watt, it may be remembered, went into partnership with Matthew Boulton for the purpose of manufacturing and marketing his patented condensing steam engines, but among other things he also invented and patented a letter copying press and formed a separate company - James Watt & Company - to exploit this. It was manufactured in Boulton & Watt's Soho Works, Birmingham, and George Haden, Senr., appears to have been made Foreman of that shop. He was evidently in close touch with James Watt as there are many references to him in letters that passed between George Haden and his sons, and he was undoubtedly very much respected by Watt who, in a codicil to his Will, left "to Mr. Geo. Haden, Senr. of the Copying Co.'s Warehouse, Soho, £21". It is perhaps significant that he drew up this Codicil in his own hand only nine days before his death on the 16th July, 1819. (This has been checked at Somerset House and there is no foundation for the "to George Haden, an honest man, Five Pounds" story.
5. Our Founders George and James.

A good deal about the early working lives of our two Founders can be gleaned from 44 letters written between 1810 and 1822. The majority of these are between the two sons and the father, and the fact that they were treasured by the latter, and in turn by the sons, is some indication of the closeness of the tie between them.

Exhibit.

George Haden
the per month

George Haden was apprenticed to Boulton & Watt in 1804 for five years starting at 8/- per week, whilst James was apprenticed to James Watt & Company for seven years starting at 6/- per week. These two were then 16 and 14 years of age respectively. John, their older brother, who never entered our Company, was articled to Boulton & Watt as Foreman for five years in 1808.

Reading these family letters it seems clear that George was an able and trusted workman. He had to be because much of his work lay in Scotland or other places very far from Birmingham, so that he would have little or no help or supervision from his employers, bearing in mind that railways did not exist and communications were very slow indeed. He must have been thrown entirely on his own resources when it came to site difficulties and obtaining ancillary materials, and probably dealing with defects in manufacture of steam engines and other machinery that he was given to erect, as manufacturing processes were unlikely to be very streamlined or consistent in those days. The letters also show that when he had been working for Boulton & Watt for about 10 years he became very dissatisfied with the way in which they, and Mr. Watt in particular, were treating him, and being enterprising and ambitious he was not prepared to continue travelling round the country erecting engines for them. In this matter he was having difficulty in bringing them up to scratch, and disentangling himself from the Company was probably a gradual process. The first stage was to get himself appointed as an agent in the west country covering Gloucestershire, Wiltshire and Somerset for Boulton & Watt engines and the erection of them, and this connection continued for 34 years. At the same time there must have been some agreement that he should obtain Millwright's work on his own account, and on this basis he established with his brother the firm of G. & J. Haden at Trowbridge.

Apart from the family letters the following exhibits throw some light on George Haden and his work.

6. "Excerpt from the Annual Report of the Institution of Civil Engineers
P.H. 1856-1857, being a memoir of Mr. George Haden, M.Inst. C.E. by Charles Manby, F.R.S. M.Inst. C.E. Secretary to the Institution."

George was a member of the Institution for 22 years, having joined it in 1834.

7. Cutting from the Wiltshire Times June 1st, 1835, entitled
P.H. "A Pioneer in Engineering - beginning of the Haden firm in Trowbridge". This is very much a repetition of the above memoir.

8. A letter written by W.N. Haden to a Mr. Patchel on the 11th December,
P.H. 1926 enclosing a photograph of a drawing of a pair of pumping engines built by Boulton & Watt which were erected by George Haden for the

- 9 & 10 Cranston Hill Waterworks at Glasgow, together with a photograph of
P.H. an inscription on the back of the drawing. These two photographs were taken of the original drawing and inscription framed, and held in our office.

11. A Memorandum by W.N. Haden resulting from information and some
P.H. anecdotes related to him by his father, George Nelson Haden, son of George Haden.

Exhibits 8 and 11 largely concern the installation of the pumping engines at Cranston Hill Waterworks, and the installation of a pair of Watts inverted 4 h.p. marine type engines driving the paddle wheels of a boat, which is believed to have been the Princess Charlotte and was launched on the Clyde at about the same time as the famous Comet. Exhibit 11 also records information given by George Nelson Haden concerning his development of heating installations for Prisons, and the building of treadmills and hard labour cranks for those institutions.

Exhibit.

George Haden is reported to have assisted Murdoch in developing town gas plants and to have installed the first gas works for the City of Leeds, but there is no direct evidence of this.

12
P.H. A thick notebook belonging to George Haden, and of rather mixed contents, the earliest and latest dates in it being November 1829 and 1836 respectively. In it there are very small scale drawings, or rather freehand sketches of buildings he surveyed, and lists giving the dimensions and cube of the rooms in them (the forerunner of our heat loss sheets). It was also used by him for making odd notes and rough sketches when visiting jobs. Sandwiched in between these items are scientific notes on such things as latent heat, the making of thermometers, the theory of the hydraulic ram, an explanation of stuttering or stammering, and hydraulics as related to the movement of boats through water.

13.
P.H. A notebook with "Cranston Hill Water Company" written on the inside cover and commencing with "List of the metal materials of two steam engines with 36" cylinders, 7 ft. stroke each engine to be furnished with the following articles". This lists the various materials contained in each box in which they are despatched. The notebook has also been used for odd site jottings, and at the end are two pieces of Scottish verse.

14
P.H. Correspondence between W.N. Haden and the publisher of the Glasgow Herald, 31st August 1912, and also A.K. Kirton Esq. of the Watt Museum, Cornwall Works, Birmingham, 2nd September 1912. The subject of these letters is The Comet, which boat was thought to be built and launched, and given its trials, at about the same time as the Princess Charlotte, and in which it is said George Haden installed two Watt engines. (See Exhibit 11.)

15.
P.H. A cutting from the Trowbridge Advertiser, November 8th, 1856 concerning the death of Mr. George Haden at the age of 67. He had one son, George Nelson Haden, who took over the business.

James, being two years younger than George, was the junior partner and retired in 1855 at the age of 65 and remained a bachelor. His death occurred in 1872 at the age of 82.

His work seemed to be concentrated on the heating side, rather than on Millwright's work. He supervised, and on some occasions actually installed, warm air stoves all over the country and in Scotland and Ireland, and was probably responsible for improvements in their design, and the incorporation of coil boilers in them.

SYNOPSIS OF LETTERS BETWEEN MEMBERS OF THE
HADEN FAMILY DURING THE PERIOD 5/2/1810 AND 13/2/1822.

Note:- Originals of the 18 letters marked 'P.H.' are the property of Mrs. P. Haden. *(Since given to Haden and included in the bound volume Document 105 in Haden Archive)*

Exhibit.
No. 5.

These letters are written on sheets folded and sealed, presumably before envelopes were used. They are addressed, and also give the name of the sender and frequently the name of the carrier before the postal service existed. No street names appear, it being sufficient to give the name of the addressee, and the name of the town. It is doubtful whether many streets were named and unlikely that any houses were numbered before the introduction of the postal service.

Letter
No. Date.

- (1) 5/2/1810 From George Haden, (Jnr.) at Manchester, to his father at Soho, Handsworth, Birmingham. He would then be 22 years of age and describes the town with its "cotton manufactories eight storeys high, and some of them as large as Birmingham hospital the streets are very dirty indeed and house rent is very high, and provision very dear". He refers also to "the vanities of the world for this town is full of bad women and men as bad".
- (2) 12/6/1810 From George Haden, Jnr. at Manchester to his father at Soho, a letter about his work and the people he is lodging with.
- (3) 28/1/1811 From G.H. Jnr. at Manchester to his father at Soho. Apparently he has just come from the potteries as he refers to having been at Etruria, where he worked on an engine for Mr. Wedgwood, who was not at first very pleased with its performance.
- (4) 30/4/1811 From George Haden, Jnr. at Manchester to his father at Soho. George said that he has had word from James Watt requesting him to return (presumably to Soho) as soon as possible.
- (5) 24/8/1811 From John Haden (George's older brother) in London to his father at Soho, Birmingham. This is followed on the same sheet by a letter, from Sarah Shakespeare a cousin, with whom John was staying, to Mary his sister.
- (6) 1/9/1811 From George Haden, Jnr. at Ashburn, Derbyshire, to his father at Soho. Writes mostly about his work on erecting engines for Mr. Watt, and says that he has hardly time to eat.
- (7) 27/10/1811 From George Haden, Jnr. at Port Dundass, Glasgow, to his father at Soho. He has arrived there after a journey from Birmingham via Manchester, taking three days and nights. Writes much of various people he has met, his work, and of a visit by James Watt, with whom he seems to be on very good terms. He expresses the hope that Mr. Watt will come to see him to start up his engine.
- (8) 12/4/1812 From George Haden, Jnr. at Anderstone, near Glasgow, to his father at Soho. George says that "the lower orders of people are very dissatisfied indeed. Their wages are so low - labourers pay 13/- per week, and bread is 1/2d coarse, and 1/6d fine per quartern loaf, meal is selling at 2/2d per peck, potatoes 1/8d, butter at 1/9d per pound salt, and 2/- fresh". Writes of his difficulties with people on site and in erecting his engines, and non-delivery of the boiler.

Exhibit.No. Date.

- (9) 17/4/1812 To George Haden, Junior, at Anderstone, near Glasgow, from
P.H. Ann Nelson, his fiancée
- (10) 18/11/1812 From George Haden, Jnr. at Silver Mills near Edinburgh, to his father
at Soho. Mentions his journey from Birmingham to Edinburgh in very
bad weather during which the coach overturned and he was thrown into a
ploughed field but "I received no hurt. We soon got the coach up".
- (11) 23/3/1813 From George Haden, Jnr. at Silver Mills near Edinburgh, to his father
at Soho. George is apparently moving from job to job repairing or
erecting engines.
- (12) 7.8.1813. From George Haden, Jnr. at Johnston, to his father at Soho. Says he
learns that their Soho Works have an order for an engine for a
steamboat and hopes that he will have the job of fitting it. (This
may be the boat which figures in another story of George Haden's work).
He feels that Boulton & Watt are losing a lot of orders in Scotland
because they do not have an agent there with practical knowledge.
- (13) 18/1/1814 From George Haden, Jnr. at Milngavie to his father at Soho. George
makes some comment on the ending of the Napoleonic Wars and says
"I congratulate you on the happy events that have taken place with
our allies on the Continent, and also with our armies in the south
of France". He hopes that trade at Soho is much better in all branches
but particularly in the engine department as the cotton trade is
improving. Comments on the people and conditions in Scotland, and the
severe weather. "Thermometer has been down at 11° and very often down
at 14°. The river Clyde will bear a cart and horses to go over seven
miles below Glasgow without danger." He is apparently hard worked
having "travelled under these conditions for 290 miles in 10 days
besides repairing three engines. I was working both on Christmas and
New Year's Days." On the same sheet follows a second letter
reprimanding his father for not having written him, with a P.S.
"Excuse all rash words".
- (14) 14/4/1814 From Ann Nelson to George Haden at the house of Mr. Munn, Shipbuilder
P.H. of Greenock.
- (15) 22/9/1814 From George Haden, Jnr. at Glasgow, to his father at Soho. George is
very troubled, and has apparently arrived at the crossroads, but says
he won't make any decision until he has seen his father. He doesn't
know how Boulton & Watt will meet his expectations and has written to
Mr. Watt, "I told him very plainly that I did not intend to engage as
a general traveller any more for I was perfectly tired of it, and that
my wages were by no means adequate to the situation I held, but it
was not my intention to say anything respecting a fresh agreement until
I saw you. You said Mr. Watt had mentioned something about my wages.
I also told him I had several other grievances to mention when I saw
Mr. Watt, which I certainly have". He also says "the boat I have been
engaged with for the last two months will start in a few days". In a
note written on the same sheet a few days later he says "the boat is
started and does well". It is thought that this boat was The Princess
Charlotte which had its trials on the Clyde about the same time as the
famous Comet.

ExhibitNo. Date

- (16) 8/12/1814 From George Haden, Jnr. at Trowbridge, to his father at Soho. This is the first time that Trowbridge has been mentioned. George meets James Watt here, and it may be that at that time Boulton & Watt were considering the expansion of business in the west of England cloth making area, and sending George Haden down there on a semi permanent basis. He writes "Mr. Watt has been here two days and speaks very kindly as usual. I drank tea with them at the inn last night, and have had a particular charge on me to do what I can as they say there is something depending There are a great many engines to do here and within 20 miles of this place. Trade is very good indeed".
- (17) 30/3/1815 This is an interesting letter, and from it one gathers that George had been sent back to Trowbridge to erect a number of engines in the woollen mills, and also to continue to gather in as much business as he can. He has sleeping accommodation in Clarke's Mill, where he is erecting an engine, but has difficulty in getting proper lodgings, the place is apparently so prosperous and overcrowded. "It should contain 6,000 inhabitants, but I really believe there are 10,000 in it at this time. There is not a house to let of any description." It is now that he begins to think of settling in Trowbridge and creating a business of his own. "Several gentlemen in this town have offered to subscribe together so as to allow me £50 a year to take care of their engines, and as my time would not be half employed in this occupation I should have opportunity to transact other business, I think to my advantage, but I shall not engage until I have seen you, and also Boulton & Watt, whose silence I cannot endure much longer. I feel determined to trouble Mr. Watt with another letter in a few days, and I intend to address him very pointedly, as I think he is not behaving like a gentleman or a master to keep me in the dark so long. It would tire the patience of Job. At the same time you may rest yourself contented, for I shall not say anything that will prove injurious to our family". George may be pressing his employers to appoint him as an agent for them in the west country, or to improve his position in some other way, but is having difficulty in getting them to clarify the situation. He is still as yet unmarried, as he sends "greetings to A.N." (Ann Nelson of Handsworth, Birmingham).
- (18) 4/10/1815 Written by George from Bath where he met James on their way to Trowbridge. This is probably the beginning of the Trowbridge venture. They have had their belongings sent on to them and George says "I hope with Divine assistance we shall do well..... We slept in Bath and are both in good spirits we are now about to start for Trowbridge I have a horse on purpose to save".
- (19) 19/11/1815 Written by James from Trowbridge to his father at Soho. He and George are setting up a small workshop - "I have made myself a bench and have fitted up the lathe I bought to go by the foot. The shop will do very well to make patterns in and it may do well to fit up light iron work in but we must have a shop upon ground floor before we can do much heavy work "..... we have an old woman in the house who seems likely to make us comfortable Two beds and bedstead, two tables a wash hand stand, looking glass a few chairs a few articles of crockery ware $\frac{1}{2}$ doz. knives and forks a spoon each etc. in short what cannot be done without comprises the whole of the furniture we have or shall have at present". "..... tell A.N. that our house is called v.. 'Batchelors Hall' but I hope she will come and change the name." A.N. is Anne Nelson George's fiancée.

*By the house at
late lodgings*

Exhibit.

- | <u>No.</u> | <u>Date.</u> | |
|------------|--------------------|---|
| (20) | 10.1.1816
P.H. | From Ann Haden (now married) at Handsworth, Birmingham, to George at Trowbridge. |
| (21) | 15.6.1816 | From James at Trowbridge to his father at Soho. The brothers are very busy working on engines and machinery often from 5 a.m. until 10 p.m. George's wife has joined them, and also one of his sisters Sarah |
| (22) | 25.6.1816
P.H. | From George Haden, Snr. at Soho, Birmingham, to George at Trowbridge. |
| (23) | 28.7.1816 | To George Haden at Trowbridge from James, who was back at Soho. It would seem that he is installing some kind of heating apparatus in Mr. Boulton's home, Soho House. |
| (24) | 16.8.1817. | From George at Trowbridge to his father, telling of his business expectations, and his dissatisfaction with the way in which Boulton & Watt are filling orders for boilers and pipes. The wording suggests that he is now acting as agent for them. |
| (25) | 8.10.1816
)H. | From James to George at Trowbridge written from Great Tew House near Eastone Oxfordshire which was being prepared for Mr. and Mrs. Boulton. He was repairing agricultural machinery and installing warm air heating apparatus. This letter does throw some doubt on an actual partnership between the two brothers at this time. He writes "Father says the work there (at Soho Works) is very flat. I thought of asking Mr. Watts to let me go out but to work at the Foundry a few months first, but I am quite unsettled how to act and want your advice, if you think anything could be done at Trowbridge. I don't know why we should not try as well as others. I will do all that I can but I must leave that to you as you know how trade stands with you, and whether you think work can be got to do us any good". |
| (26) | 15.11.1816
P.H. | From James to George at Trowbridge written from Great Tew, where he was waiting for Mr. Boulton to come and inspect his work. |
| (27) | 20.5.1817.
P.H. | From James at Great Tew, to George at Trowbridge. He is putting in warm air stoves and picking up enquiries in the district. Mentions the fact that James Watt has recently visited George Haden in Trowbridge. |
| (28) | 1.6.1817
P.H. | From James at Great Tew to George at Trowbridge, asking for tools to be sent on to him. It seems that he is still directly employed by Mr. Boulton, and there is an amusing reference to a discussion with him on the subject of wages. |
| (29) | 19.1.1818. | From James at Trowbridge to his father at Soho. This tells of his return to Trowbridge via Bath and gives news of George, his wife and child. It is followed on the same sheet by a letter from George's wife Ann, which gives family news, but also talks of the way that business is progressing. "We had been anxiously expecting James for some time before he came, for George had more to do than he could attend to. They had the promise of a great deal of work in and about Trowbridge, and there seems little doubt at present but they will do well. A Mr. Webber, that George erected an engine for has promised them all his work, they are about to engage to make him a water wheel, indeed he has said he should have no objection to joining them with a £1,000 or £1,500 for he thinks there is no doubt but it will answer their expectations". |
| (30) | 23.4.1818. | From George at Trowbridge to his father, telling of orders he has received |

Exhibit.No. Date.

- (31) 29.4.1818. From George Haden, Senr. at Soho to George at Trowbridge. Mostly family news, but also news of Mr. Watt saying that whilst the engine business at Soho was very flat their business with the copying machines was better.
P.H.
- (32) 30.3.1819. From James at Trowbridge to his father at Soho, telling him of the state of business. They had been very busy all the winter employing 10 and sometimes 12 men.
- (33) 7.8.1819. From James at Trowbridge to his father telling of the death of George's wife Ann.
- (34) 19.12.1819. From Edward Nelson, George Haden's brother-in-law to him at Trowbridge. A purely domestic letter.
P.H.
- (35) 19.1.1820. From George Haden, Senr. at Soho to George and his sister, Sarah, who has gone to keep house for him after the death of Ann. He describes a device which he has seen that appears to be an early form of automatic coal stoker for burning the fuel smokelessly. "I have seen the smoke burner at Union Mill. I think it's a good thing. The grate is round and moves round very slow and the small coals fall upon it in very small quantity every two or three minutes from a hopper, so there is never much black coal upon it, except when first lighted so as to start the engine. The engine turns it. The first time I see Mr. Watt after George was here he asked very respectfully how he was, and was very sorry he could not see him".
- (36) 11.7.1820. From George's sister, Sarah at Trowbridge to George who was working at Messrs. W. & P. Playnes, New Mills, Near Nailsworth, Gloucestershire. Apparently Sarah was keeping an eye on the business at home and reports certain facts concerning it.
P.H.
- (37) 11.1.1820. From George at Eastington to his father at Soho. A letter giving details of work in hand and orders received, and in some cases the value of the orders. These include a 16 ft. diameter by 11 ft. wide water wheel, a large amount of work in a factory in Trowbridge, and the heating of a mill by steam.
- (38) 18.9.1820. From James Haden in London to George Haden in Trowbridge, saying that he had a very pleasant journey, although he was outside (the coach) all night, and arrived London at 8 a.m. A mention of James Watt's movements and a long story of his visit to Miss Boulton's house in Cavendish Square.
P.H.
- (39) 21.11.1821. From George and James at Trowbridge to their father. George says they are very busy on Millwright's work, and James has just returned from Wilton House near Salisbury where he has been installing the fountain and warm air stoves for Lord Pembroke.
- (40) 27.12.1821. From James Haden at Northaw House to George at Trowbridge. Says he had a very wet ride through the night as it rained all the way, that the coach was loaded "the same as the Frome coach from Trowbridge" with "40 barrels of oysters and fish in abundance" and he was dropped five miles from his destination at 7 p.m. was refused entrance to the house but eventually got a bed at an inn.
P.H.

Exhibit.No. Date.

- (41) 1.12.1821 From James at Trowbridge to his father. James has been offered a post through Mr. Boulton to manage the erection of machinery for the East India Company in connection with the Mint at Calcutta. He would be foreman mechanist at a salary of £400 per annum. James would like to take the job but seeks advice from his father, and also his brother. (Nothing more is heard of this).
- (42) 3.12.1821 From George at Sheffield to his sister at Soho, Birmingham, telling her of his movements.
- (43) 13.2.1822 From Mary Haden, George's sister to George at Dursley, Gloucestershire. P.H. Very much a family letter.
- (44) P.H. There is another letter from Anne Haden at Handsworth to George Haden but the year of writing is obscure. However the text suggests that it would be about 1818.

Letters between George Nelson Haden and his father George Haden.

- (45) 8.3.1850. From G.N.H. to his father George Haden on attaining his 33rd Birthday. P.H.
- (46) 8.3.1853 " " " " " " " on attaining his 36th Birthday. P.H.

- (47) 7.11.22. ¹⁹¹² Letter from G.N. Haden in St. Louis, Mo. U.S.A. to his father W.N.H. at Trowbridge. G.N.H. then aged 22 was working for the American District Steam Company North Tonawanda NY laying steam and condense mains in the streets of St. Louis for a district steam distribution scheme. He describes the method of trenching laying and jointing mains, lagging, anchoring, provision for expansion and enclosing the insulated pipework.

*Not in bound volume of letters
Document No 5 but kept
separate under document
No 167*

FOUNDATION OF THE COMPANY AT TROWBRIDGE -
ST. GEORGE'S WORKS AND FOUNDRY

Exhibit.

Haden's first contact with Trowbridge was probably in the spring of 1814, since Exhibit No.22 "Extracts from the Stock Books of John and Thomas Clark 1804 - 1824" state that this Company wrote to James Watt asking him to go to see them about supplying one of his engines. "Watt sent Haden, one of his ablest assistants, in place of himself and it was Haden who supervised the installation of the engine". He had it working during the Autumn of 1815. For some time, however, George had been restless and dissatisfied with the way in which he was being treated (reference Letter No.15 Exhibit 5, dated 22/9/1814,) and meeting James Watt in Trowbridge at the end of 1814 (reference letter No.16, Exhibit 5, dated 8/12/1814) in connection with the engine business, future arrangements between them were discussed. It must have resulted eventually in George Haden becoming appointed Boulton & Watt's agent for the West Country with permission to set up in the business of Millwrighting on his own account. It is, however, not clear whether this decision was taken at that time, as George later refers to trouble with James Watt in Letter No.17, Exhibit 5 dated 30/3/1815, but does not want to embarrass his father so far as his relationship with Watt is concerned in his work at Soho, Birmingham. George is very much attracted to Trowbridge, which then appeared to be a prosperous and growing town with the prospect of much engine business and Millwrighting to be carried out.

George was married to Anne Nelson at some time between November 1815 and January 1816 (Ref. Letters 19 & 20) and this event would mark the permanent settlement of the family in Trowbridge and the founding of the Company.

The installation of the engine at Clarks Mill was completed in the autumn of 1815 and letters Nos.18 and 19 Exhibit 5 dated the 4th October, and 19th November 1815 suggest that George and James were already preparing to go into business on their own account having provided themselves with a small workshop, rooms, furniture and a woman to housekeep for them.

There is no record to show how we came into possession of our Silver Street premises, or whether in fact the Company occupied part of them at its formation in 1816. Workshops we must have had from the very beginning to carry out our trade of Millwrighting, which involved not only the repair of steam engines but the manufacture and maintenance of power transmission equipment in the form of shafting, bearings, pulleys, couplings, bevel gearing, water pumps, water tanks and cylinders, water wheels and machinery used in the preparation and dressing of woollen cloth in the local mills.

Although it is doubtful whether George Haden had any intention of entering the heating business when the Company was founded, we became interested in the warm air stove at an early date and probably at the instigation of either Boulton or Watt. This side of our work expanded pretty rapidly and soon accounted for a large proportion of the Works production. Boilers and pipework must have been purchased from outside suppliers, and there are references to delays in delivery of such articles by Boulton & Watt who would in any case have provided their beam engines. Drawings in our possession showing smaller engines in the 4 h.p. to 14 h.p. range dated in the 1840s, suggest that we did perhaps actually manufacture these machines ourselves. As the heating side of our business occupied more and more of our capacity, and probably proved to be more profitable than Millwrighting, the latter work gradually fell away to negligible proportions.

Exhibit.

24 Figures copied from the Wages Books before they were destroyed at Trowbridge, show that the Works employed 20 men on the 1st October 1821.

We have seven documents concerning five Patents taken out by George Haden between the years 1830 and 1842, but all these, with the exception of one, are in connection with improvements in machinery for cloth making, the last one being for improvements in apparatus for warming and ventilating buildings, but there are no drawings or specification to show precisely what these improvements were concerned with. We also hold the specification and drawings for Patent No.1420 taken out in 1853 for cast iron pipe couplings.

32 This invention is in the name of S. Frankham, but appears to have been marketed under our name and afterwards known as Hadens Rubber Joint.

41 George Nelson Haden the son of George Haden registered
42 designs of treadmills and hand labour cranks for use in the Prisons
43 & of this country and our Colonies, and it seems that a fair amount of
44 business came from this source. No doubt it arose from our connection with the Prison Authorities as we were then heating a number of their buildings on the warm air stove principle.

A large amount of cast iron products must have been required and it is unlikely that we had our own foundry in the early days. Perhaps we obtained them from the well known firm of Cockey of Frome. In 1874, however, George Nelson Haden entered into partnership with John Penny Woodfin, the latter presumably already owning St. George's Foundry in Bythesea Road, Trowbridge. This property covered over an acre, of which 32,000 sq. ft. was under cover. We were then able to make our own cast iron pipes and fittings, cast iron fronts and fire bars for warm air stoves, decorative air gratings and radiator casings and miscellaneous objects required in our trade as heating and general engineers. Later on there must have been a heavy demand for cast iron radiators of our own design, also castings for the cooking equipment shown in Exhibit No.57 "Catalogue of Specialties", together with castings for accelerators, centrifugal pumps, calorifier chests, etc.

57
63 & The Foundry employed over 200 men but was sold in February 1910,
63A and it is believed that its closing down by Hadens was largely due to the opening up of a factory in Hull by the National Radiator Company of U.S.A. (now Ideal Boilers Limited) for the manufacture of cast iron radiators, thus rendering production at Trowbridge uncompetitive.

In addition to the items of cooking equipment shown in the Catalogue of Specialties, Exhibit 57, our Works made storage and non-storage calorifiers with plain, galvanised or copper shells, accelerators, circulating pumps were also made together with a number of items for institutions and hospitals, such as sterilisers and towel rails.

With the greater availability of electric power in buildings Hadens produced their screw type accelerator early in this century. As it was nothing more than a simple archimedian screw working in a casing, it only produced a very low head. Three size 6" are still in operation in the Calico Printers Association Building in Manchester. Later we designed and manufactured our own Centrifugal Pumps to several designs and for many years these were fitted on most of our heating installations.

Exhibit.

During the 1920s when the largest cast iron boiler was rated at about 1,000,000 B.T.U.s. per hour, the need was felt for boilers of greater output and what was more important, boilers capable of withstanding the heads imposed by the taller buildings being built at that time. In 1922 Hadens designed the UNIFLOW water tube boiler with ratings up to about 2 million B.T.U.s per hour (sometimes known irreverently in London as the "Uxbridge Kettle"). As the need for larger boilers of steel construction was gradually filled by specialist boiler makers, competition made this boiler uneconomic, but many were fitted, including those at Bush House, London, Ship Canal House, Manchester, Timpsons of Kettering, Rylands Manchester etc. A number of these boilers are still operating.

From about 1932 to 1939 Trowbridge Works manufactured the Victory automatic oil burner, but production was not resumed after the War.

During the 1914 - 1918 War Trowbridge Works were turned over to the manufacture of munitions. Production started in 1915 and figures of production are given in Exhibit 58.

58

In the 1939 - 45 War the Works again reverted to the production of munitions.

After the Munich crisis in 1938 when the country commenced to re-arm, the Admiralty, by this time largely based on Bath, started to place quite a number of small contracts with us at Trowbridge. By the beginning of the war we were working on 15 or 20 different contracts for all sorts of war like stores ranging from flare canisters to "tongs, shell, for the extraction of" that is to say a sort of overgrown pair of pinners that you could pull jammed shells out of breeches blocks with. These and other contracts gradually took over most of the productive capacity of the Works during 1940 and 1941. By the early part of 1942 the Admiralty were pressing very hard for a much higher rate of production and they also wanted us to produce shell fuses for navel anti aircraft guns. We agreed to do this and the Government provided a considerable number of British and American machine tools, including in particular a very large automatic multi-spindle lathe. Within a few months the Works were operating a 3-shift system producing these fuses in tens of thousands.

We also produced mainly for the War Department a "de-lousing" unit using hot air which had been invented by Mr. Cross as the result of an enquiry from the Government as to what we could do to deal with a problem which was apparently causing some distress in the Middle East.

With a view to more efficient working, and to provide greater accommodation, the old engine house and stores building, together with the caretaker's cottage, were demolished and a new building was erected and used for stores and despatch purposes. The old smith's and warm air stove shop and metal working shop, were also reconstructed.

When the war ended we realised that the enlarged Works could not be utilised to full capacity merely for the production of our heating components. Messrs. Newman Hender, the valve manufacturers of Woodchester, Gloucestershire, who we had known for some years as makers of valves for the Heating and other industries, required greater manufacturing capacity, particularly in connection with forged steel valves for the oil industry. A jointly owned Company called N.H. Engineering Limited was therefore formed and managed by Newman Hender

Exhibit.

thereby using their manufacturing experience to produce products required by us as well as their forged steel valves. As the demands for our own products was diminishing, and for forged steel valves increasing we eventually sold our remaining interest in the Works to Newman Hender in 1947, and so ended Haden's connection with Trowbridge over a period of 131 years. As a post script, however, one might add that in the old Works is still being made a product that we commenced manufacturing just after the war - the Ben Nevis Egg Grading Machine! It was invented by a citizen of Trowbridge who, with his three sons, manufactured it on a small scale in a back yard shed. It appeared to be very simple but very ingenious and was selling readily, so we agreed to make the machines under licence. These machines have been made in the Works ever since, but have been developed and are now sold to egg grading stations not only over this country, but almost literally all over the world.

TROWBRIDGE AS OUR HEAD OFFICE AND MAIN CONTRACTING DEPARTMENT.

Exhibit.

We possess so much evidence of our Works in the form of brochures, photographs and references to its products that the existence of Head Office at Trowbridge tends to be obscured, likewise the fact that until comparatively recent times our largest contracting office was situated there. Contracting work increased in volume, whilst that of the manufacturing side diminished, except possibly during the two wars, and reached its peak under the administration of William Nelson and Charles Ingham Haden. Immediately following the first world war, however London Office expanded very rapidly with Francis Horton as its manager, and by 1925 its turnover and profit had outstripped that of Trowbridge Works and Contracting Departments combined. In 1929 Mr. G.N. Haden transferred to London Office, and in 1933 Head Office, together with some of its locally born staff, left Trowbridge for London.

In its heyday the Trowbridge Contracting Department were responsible for many installations which were large when judged in the light of the standards of those times. Most of these were connected with Institutions and Hospitals, and there is no doubt that our proposals for combined power and heat generation, in which Hadens were pioneers, were largely responsible for securing such orders.

51

William and Charles Haden were also keenly interested in the subject of district heating, and plans for forming separate Companies to exploit these ideas in various areas were well advanced as Exhibit 51 will show. Of the few schemes which were carried out one of the most noteworthy was that in connection with Manchester's first Electric Generating Station where in 1912 we took steam from their engines and heated many large buildings in the vicinity. Some of our proposals included heat production from municipal waste, and in this Trowbridge were probably in advance of their time. A well known member of our Trowbridge staff in the early part of this century was A.H. Barker, later to become Consulting Engineer and Lecturer at University College, London. He was the recognised authority on heating and ventilation in this country, and his book "Barker on Heating" remained a standard work for very many years. His brother was our agent in Johannesburg, South Africa.

The eventual unprofitability of Trowbridge Works, arose from the growth of specialist firms manufacturing in large quantities what we could only make for our own consumption, whilst the decline in Trowbridge contracting work was brought about by the fact that as the heating industry grew, its centre of gravity moved to London and a few provincial cities where the leading architects had direct contact with the principals of the firms of their choice. With the removal of Head Office, the technical and erection staffs of Trowbridge Contracting Department became absorbed by Bristol Office in 1935.

Recollections of L.H. Blanchard and F. Simpson.

L.H. Blanchard joined the Trowbridge Works as an apprentice in 1907, receiving his technical education first of all in Trowbridge and latterly at Swindon Technical School to which he travelled several nights a week. He remembers Mr. Leak, Manager of the Electrical Department, and the electrical generating plant which was already installed in the Works before he arrived. He was loaned to the Air Ministry during the 1914-18 War mainly to handle some large installations designed at Trowbridge, afterwards returning there. In 1929 he was appointed Chief Draughtsman in London, but following a breakdown in health returned to Trowbridge as Works Manager.

Frank Simpson joined the Technical Department at Trowbridge in 1911, subsequently serving in His Majesty's Forces from 1914 to 1919, and on the retirement of Mr. Adlam was appointed head of the Technical Department, which position he held until he opened Lincoln Office in 1926 and became its first Manager.

EXHIBITS IN CONNECTION WITH TROWBRIDGE WORKS & FOUNDRY.Exhibit.

- 24 Details copied from the Wages Books before they were destroyed at Trowbridge. In this are given the names of 20 men on our books on the 1st October 1821, followed by a further list of the names of men added from time to time with the dates on which they joined the Company between October 15th 1821 and June 1841.
- 56 Cutting from the Wiltshire Times dated March 25th, 1905 describing the building fronting on Silver Street purchased during that year. Our Works adjoined it at the rear, and it was converted into a suite with offices. This article describes the various rooms, which included on the top floor "A noble apartment lit by numerous windows and by a north skylight is the drawing office where so much of the intricate work of the firm is carefully set out". We had installed a gas engine, dynamo, switchboard and battery for power and lighting purposes, and the article says that electrical work was a somewhat new departure for us.
- 57 A "Catalogue of Specialties" G.N. Haden & Sons, Trowbridge, London, Manchester, Birmingham and Johannesburg. The partners are named as J.P. Haden, W.N. Haden and C.I. Haden, so that it must have been printed before J.P. Haden's retirement in 1909. The addresses of our Branches are given as 123, Cromer Street, W.C. London, 4, Albert Square, Manchester, 15, Burlington Chambers, New Street, Birmingham, and the address of our agent for South Africa, Mr. J.P. Barker, 93, Permanent Buildings, Johannesburg. It gives illustrations of equipment made by us, mostly cooking equipment, and lists of important buildings heated by the Company. There are also photographs of some of these buildings, together with an aerial view of St. George's Works, Silver Street, and interior views of the workshops and of St. George's Foundry in Bythesea Road.
- 57A A Catalogue produced about 1930 to 1935 showing our works manufactures.
- 58 Sheets headed "Munitions" giving statistics of Works production on munitions during the 1914-18 War.
- 59 A photograph of the Works' staff engaged during that time.
- 60 A pamphlet entitled "Souvenir of Munitions work 1915-1918.
- 61 Photograph of a representative exhibition of shells, etc. made at Trowbridge Works during 1915 - 1918.
- 62 Cutting from the Wiltshire News 27th December, 1918 reporting a gathering at Trowbridge Town Hall held as a reception of munition workers to mark the close of contracts under the Ministry of Munitions.
- 63 Particulars, plan, and Conditions of Sale of St. George's Foundry in February, 1910.
- 64 A photograph of a warm air stove made for St. Paul's Cathedral, London, in 1911 (the photograph is the property of Mr. A.H. Keates, 90, Bradford Road, Trowbridge for many years, and until the closing down of the Works, the Stove Shop Foreman, now a very elderly gentleman who worked under three generations of Hadens.

Exhibit.

- 65 Copies of the Wiltshire Times for Saturday, December 6th 1941, describing the visit of Queen Mary to the Trowbridge Works. Three photographs of the royal party, directors and Works staff, on the occasion of the above visit.
- 67 A cutting from the Wiltshire News, April 27th, 1945 describing with photographs the visit of an Artillery unit to our Trowbridge Works during which they gave to the Works staff a description of a gun and ammunition.
- 68 Copper Plate for printing the dial for the hard labour crank machine used in Prisons.
- 69 "Rules of the Sick Society for the benefit of workmen in the employ of Messrs. G.N. Haden & Sons, Engineers etc. Trowbridge, Wiltshire, established April 1869". The entrance fee was 1/- and the subscription varied according to age, rising from 1d to 2d per week, with the proviso that if the funds of the Society should at any time rise so high as £70 the contributions would be lowered one halfpenny per week per member.
- 70 A description in book form dated 21st February, 1913 written by Mr. Charles Ingham Haden describing various methods of heating of all types of building dealt with by Hadens.

RECORDS OF ORDERS AND SOME ESTIMATES
ACCOUNTS AND CORRESPONDENCE WITH CLIENTS.

Exhibit.Orders.

- 92 The earliest records consist of 16 sheets detailing orders in hand between January 1st, 1821 and December 31st, 1823. The work consisted mainly of Millwrighting in the form of manufacturing and repairing of cloth making and dressing machinery, such as "broad gigs", together with gearing, shafting, etc. The orders also cover the provision and repair of steam engines, steam and water piping, and one or two warm air stoves.
- 93 Order Book No.1 commencing January 1824 and finishing December 1827. Here again the nature of the work is very much that covered during the period 1821 to 1823, but warm air stoves are more frequently mentioned and include two installed for His Majesty's private apartments at Windsor Castle in April 1826. These cost £60 each.
- Order Book No.2 is missing. It would have covered the period from January 1828 until the end of 1829 or sometime during 1830.
- 94 Order Book No.3. This covers the period August 1830 to December 1838.
- 95 Order Book No.4. Covering the period January 1839 until January 6th, 1845.
- 96 Order Book No.5. Covering the period January 1845 to December 1852.
- 97 Order Book No.6. Covering January 1853 to December 1868.
- 98 Order Book No.7. Covering January 1869 to December 1877.
- 99 Order Book No.8. Covering January 1878 to December 1890.

These Order Books show the changing pattern of our business. Millwright's work gradually fell away and was replaced by heating work, most of which consisted of the manufacture and installation of our warm air ventilating stoves. By the early 1840s Millwrighting is only mentioned occasionally in the Order Books.

100 Copies of estimates and letters.

These estimates appear to cover installations which are already mentioned in the Order Books. There also seems to have been a rather short term attempt on the part of James to keep copies of correspondence with clients at this time. The book was James' property and went with him on his travels. In it he entered copies of letters to clients, and also to his brother at Trowbridge. They all indicate that he was almost running the warm air stove business on his own, with the exception of manufacture, which took place at Trowbridge, visiting buildings to take preliminary details, sending in estimates, ordering the stoves from Trowbridge, laying out builders work ducts, and finally putting the stoves in or at any rate supervising their installation. He seemed to be very hard pressed, going from one end of the country to the other, over to Ireland and into Scotland trying to deal with both enquiries and installation work. 1826 seems to have been a particularly hectic year for him, but fortunately he had an alibi for his failure to adhere to promised dates of contract completion inasmuch as he was installing warm air stoves in the private apartments of King George IVth at Windsor Castle, and also at his Fishing Temple at Virginia Water. He made good use of this excuse

particularly in his dealings with the "Nobility". When one considers the difficulties that we have today in timing the arrival of materials with our modern transport system, and even the transmission of letters, it is surprising how well James seemed to dovetail his jobs together when they were so spread over the U.K. and Ireland. Most of our warm air stoves were put on the Kennet and Avon Canal either at Hilperton or Bradford-on-Avon and conveyed to Bristol Docks. Many of the letters quote the name of the sailing vessel and its master on which they were taken to ports such as Liverpool, Glasgow, Dublin, Belfast and thence to site by road. Materials for the eastern side of Scotland were often taken by sea from Bristol to London and then transhipped to another vessel.

The satisfaction which our warm air system gave is shown by sales which were made as a result of recommendations from users. There is, however, one letter in this book written by a client who had removed our warm air stove and installed another. This hurt James very much and he was incensed by rumours spread by someone that he had connected the fresh air intake to the "common sewer".

101

Account Book.

This is a record of all accounts submitted between February 1824 and January 1843. It is, however, almost entirely restricted to accounts for Haden's Warm Air Apparatus, which may indicate the growing importance of this side of the business. Most of the Millwrighting work for this period may have been unrecorded. Evidently Haden had by that time employed a clerk as the account book is, for the most part, written in a perfect script. The majority of the accounts show the cost of the equipment delivered to the port of Bristol, it being the client's responsibility for getting it sent on from there. James Haden's time is charged separately at 10/- per day, plus travelling expenses which were, by to-day's standards, very high in relation to the cost of actually doing the work, i.e. from half to twice the latter. Coach travel seems to have been an expensive way of getting about and some interesting travel details are given on pages 19, 23, 38, and also for January 2nd, 1843. Cash collection appears to have been quite a problem and the nobility in particular seem to have taken great liberties with credit, settlement of accounts being made anywhere between 1 and 6 years after completion of the work. This may explain the notes frequently pencilled in to the effect that either G. or J. Haden "took the account and were paid".

This Account Book, and also the book of letters and estimates, (Exhibit 100) show that our equipment was in demand by famous Architects of the period, such as James Wyatt, Sir Robert Smirke, R.A. and Sir Geoffrey Wyattville, R.A. Reference books quote the latter as having "by means of his alterations made Windsor Castle more comfortable", presumably this would be with Haden's help. Other well known Architects mentioned are W. Butterfield, A. Waterhouse, and Charles Barry.

THE HADEN WARM AIR VENTILATING STOVEExhibit.

There is little doubt that the warm air Ventilating Stoves played a great part in establishing us as Heating Engineers. When George and James Haden founded our Company in 1816 they probably had no thought of entering this branch of engineering, their main concern being in Millwright's work, such as the installation and maintenance and, in some cases, the actual manufacture, of steam engines, water wheels, power transmission equipment in the form of shafting, bearings, pulleys, couplings, bevel gearing, also water pumps, water tanks, cylinders, boilers, pipework etc. and in fact most things including cloth working machinery used in the local mills. From the installation of an engine with boiler and steam pipework there would naturally follow the extension of pipework for heating and process purposes to various parts of mill premises. The Warm Air Ventilating Stove System adopted by Hadens with such marked success was probably relatively inexpensive to install, and very easy to operate as it did not involve either steam or water boilers and long runs of pipework. It would therefore be most suitable for large private houses, or "mansions" as they were referred to in those days, because although the heating was probably patchy it was a tremendous advance on the open fire system. It was in fact from the wealthy owners of these buildings that our first orders came. A very large proportion of this part of our business in the early years was concentrated in Scotland and Ireland, and it would appear that the fame of our apparatus must have passed from one nobleman's residence to the next, with the result that James spent most of his time very far indeed from Trowbridge. That the Haden brothers were aware of the increasing importance of heating work and of the warm air stove in particular to the growth of their business is evidenced by the pamphlets, trade cards, and other advertising media used in the last century.

Among buildings of note equipped with Haden's warm air heating apparatus are the British Museum, The Custom House, London, Lambeth Palace, Windsor Castle, George IV's Fishing Temple at Virginia Water, York House, St. Paul's Cathedral, Westminster Roman Catholic Cathedral and Liverpool Cathedral. In the case of the last two installations automatic oil burners were applied to these in 1929 and 1930 respectively. These stoves are still in use, although the oil burners have been renewed. After the early flush of residential installations mostly in mansions of the wealthy the use of our stoves spread into Prisons, Houses of Correction, Lock-ups, Police Stations, Lunatic Asylums, Schools, Cathedrals, Churches, Chapels, Colleges and Banks.

Hadens were not the inventors of the Warm Air Stove, since local heating by some form of stove had been carried out for a very long time, but the method by which warm air was conducted to large areas at some distance from the heating stove, through ducts which also recirculated a portion of the air, was probably an innovation and gave some meaning to the words Central Heating as distinct from heating rooms by individual stoves or fireplaces. We cannot, however, be certain of the exclusiveness of our system. We have, for instance, a drawing, Exhibit No.70 which shows two circular Grundy stoves in a brick chamber through which fresh air passes on its way to a duct leading to the building, in other words an adaption of the free-standing Grundy stove which one sees in churches to this day. Unfortunately the drawing is undated so that we cannot say whether Grundy's copied our idea or not.

Exhibit.

99

Another feature of the Haden stove was the manner in which heat transmission from the furnace section was increased by the fitting of baffles or 'W's as they were called which rendered the flow of air over the metal surfaces more effective. The increased velocity reduced both the metal and air temperatures hence George and James' oft repeated claim that their apparatus produced no unpleasant smell which was caused by the overheated metal in some other makes. An illustration of this is given by James Haden's letter of November 1st, 1822 to the Architect Robert Smirke in which he compares our stove with that of Sylvesters design. This letter makes it fairly obvious that the Haden Warm Air Stove was not designed by our founders but by Boulton & Watt as James says "the stoves are on the same principle as Mr. Sylvesters but improved by Mr. Boulton of Soho so as to render it almost impossible the air can be heated to give it that unpleasant smell commonly called the smell of the iron and also to heat with much less fuel." The only patent document we hold (Exhibit 107) which refers to heating apparatus, probably covered improvements to these warm air stoves, and in particular to the fitting of coil or pipe boilers within the stove furnace. This would have been an attractive feature as it permitted the heating by pipes or radiators, of rooms which would be too far from the stove to allow adequate air circulation.

First mention of the stove is (by inference) in a letter written to George by James in 1816, when he was installing "apparatus" at Soho Hall near Birmingham, the home of Matthew Boulton. This also suggests Boulton's particular interest in the system. The earliest order records go back to 1821, and warm air-stoves are certainly mentioned then. It would seem that James began to concentrate on their installation leaving George to carry on with the main business of Millwrighting, and presumably making the stoves among other general engineering products at Trowbridge.

Hadens made a point of giving a number to every stove they manufactured, and its dimensions were also recorded in the Order Book. This numbering system shows that a total of nearly 7,000 were manufactured at Trowbridge Works, and the attached graph has been based on Order Book numbers from 1821 until our Works were sold in 1947. When this occurred three of our employees Messrs. H.J. Earney, D. Kibblewhite and G.V. Sims, decided to set up their own business in Trowbridge in the name of Treeman Brothers (three men) and with our blessing and the help of the old records and patterns, continued to manufacture, among other things, Haden warm air stoves. Most of those made since they took over manufacture have been to replace old ones, and many of those removed have been in use for 50 to 70 years and in a few cases even longer. This business is, however, dying because in spite of the high efficiency of this apparatus, the costs of renewing a worn out stove, replacing it with a new one, and applying oil firing equipment, is much higher than that of a modern packaged oil fired air heater.

MISCELLANEOUS DOCUMENTS 21

Exhibit.

- 22 Extracts from "The Woollen Industry as illustrated by the Stock Books of John and Thomas Clark 1804 - 1824". In paragraph 3 this reads "On the 7th April 1814 the Clarks thought it necessary to erect a steam engine which with steam house, would cost upwards of £800". They sent a letter to James Watt inviting him to visit them, but Watt sent Haden "one of his ablest assistants" in place of himself and it was Haden who supervised the installation of the engine. The extract then goes on to give details of the engine which, costing nearly a thousand pounds, was pretty expensive for its 10 h.p. as this figure did not include the boiler, piping, and the building of the engine house.
- Clark's engine marks the coming of George Haden to Trowbridge and the establishment of our Company there. We subsequently made and repaired various machinery in connection with cloth working for this particular factory, and many others in the town.
- 25 A printed document entitled "Copy of Testimonials referring particularly to the ventilation and warming of Prisons". There is an extract from the 3rd and 4th reports of the Inspectors of Prisons for the Home District presented to Parliament in the years 1838 and 1839. This mentions that "we have had the advantage of the practical experience of those eminent engineers Messrs. Haden of Trowbridge". There is also a copy of a letter from Major Jebb, Royal Engineers, dated 17th February, 1843 directed to Messrs. G. and J. Haden giving the results of his experience of our heating system in Pentonville Prison, statistics as to ventilation quantities, coal consumption and costs, with a final paragraph praising our skill, ability and "straightforward integrity."
- 26 Printed document listing the "Mansions of the Nobility and Gentry and Public Buildings warmed and ventilated by G. & J. Haden, Engineers, Trowbridge, Wiltshire." This is undated but was probably printed in the early 1850s because James retired in 1855 when the business was re-named George Haden & Son.
- 31 Two letters headed British Museum November 16th, 1858, and November 18th, 1858 from S. Frankham concerning the faulty operation of the job and suggesting the payment of £10 to put it right. This is probably the S. Frankham who invented the rubber coupling joint for our cast iron pipes. (See Patent specification A.D. 1853 No.1420.) He was probably the chargehand on the job and acting as our representative in London. His address is given as Greenland Place, Judd Street, which was the address of our London Office, & Stores. There is also a cryptic note in the same envelope dated London April, 20th 1858, relating a rather strange conversation between S. Frankham and J. Cray, concerning his treatment by the company.
- 30 "A song for the occasion". This was presumably written to celebrate the coming of age of Joseph Poynton Haden, son of George Nelson Haden, and is dated December 29th, 1869.
- 27 P.H. Indentures of Joseph Poynton Haden dated 21.8.1863.
- 28 P.H. Indentures of William Nelson Haden dated 1.10.1875.
- 29 Indentures of Francis Herbert Horton dated 4.6.1887.
- 29A Indentures of William Carter dated 7.12.1896.
- 29B Indentures of Miss Burrows as a tracer dated 1908. Later to become Mrs. Simpson wife of Frank Simpson head of Trowbridge Technical Department and eventually first Manager of Lincoln Office.

Exhibit.

- 23 Letter from W.N. Haden to G. Tangye Esq., Cornwall Works, Birmingham, giving an outline of our Founder's work with James Watt, and also mentioning the fact that he did a certain amount of experimental work for Dr. Murdoch in connection with the use of coal gas, having worked on the installation at Leeds, which was thought to be the first commercial gas making plant.
- 33 "The Mission at the Market House, Trowbridge". Re-printed from the Wiltshire Times, May 2nd, 1908, details of a temporary heating installation erected at very short notice.
- 50 Royal Commission on Coal Supplies. Evidence by W.N. Haden August 1903.
- 47 Heating and Ventilation - "A remarkable record - from 1816 to 1911 by the War Office Times and Naval Review." - an account of our company's progress.
- 48 Pamphlet on The Reck Patent Heating System.
- 49 Notes on Air Washing by G.N.H. to W.N.H.
- 32 Patent Specification AD.No.1420 of Samuel Frankham for Pipe Couplings (Hadens rubber joint), together with certificate for provisional protection.
- 54 Letter from G.N.H. dated 3rd July, 1939 to C. Lansdowne of the Wiltshire Times, Trowbridge, concerning the expansion of the Company at that time, the moving of head office from Trowbridge to Kingsway in 1933 and the occupation of new offices in 29, Woburn Place on June 5th, 1939, also a cutting from the Wiltshire Times of 8/7/39 which resulted from it.
- 35 Printed introductory notes in letter form issued by G. & J. Haden to prospective clients headed "Apparatus for ventilating and warming public buildings, Churches, mansions, prisons, etc. It describes the recently designed and patented "combined radiating warm air apparatus."
- 34 Letter (dated London 2nd March, 1827 ?), from a Mr. W. Newton, presumably a Patent Agent, forwarding a patent to Mr. G. Haden. He refers to models of machines which George Haden had already made, so this patent was probably in connection with cloth working machinery.
- 36 A pamphlet advertising Haden's patent drying machine for drying woollen, cotton and other fibrous materials in the manufactured and unmanufactured state, also for clothes in laundries etc. It mentions the fact that machines could be seen in operation at the premises of our agent, Henry Furnell, 279, Parliamentary Road, Glasgow.
- 37 Leaflet concerning "Haden's Drying Machine" for wool, cotton and other fibrous materials, in the manufactured and unmanufactured state. G. & J. Haden Engineers and Patentees, Trowbridge, Wiltshire, and 8 St. Andrew Square, Edinburgh.
- 38 Leaflet concerning "Barker's Patent "Cable" System of low pressure Hot Water Heating, Section 2. - For Utilization of Exhaust Steam." There is also a separate sheet showing the arrangement of heaters, pipework and radiators, in connection with the "Cable" system.
- 39 Pamphlet giving a short description of the heating and ventilation installation carried out by Hadens at St. Paul's Cathedral, London. This was a combined warm air and hot water system.

Exhibit.

- 45 Green file containing :- A price list giving dimensions and heating surfaces of Haden "Improved Hot Water Radiators". Three lists of flanged C.I. Pipes to L.P. British Standard Templates. Three sheets of Notes on ordering radiators. Five sheets showing different types of radiator.
- 40 A pamphlet on Haden's Patent System of Floor Heating, in which warm air is forced along channels beneath the floor, and also in vertical ducts in the walls by use of patent flue blocks. This is accompanied by a drawing of Haden's Patent System of floor heating which was used in the first section of the Liverpool Cathedral's building programme.
- 41 Drawing of "Hadens' Registered Hard Labour Machine for Prisons". This was sometimes known as the hard labour crank.
- 42 Print of Indicator Dial for Haden Hard Labour Machine. The dial recorded the number of revolutions made by the Hard Labour Machine which was operated by the prisoner in his cell. The dial was visible to the warder in the corridor and is engraved with the words "Breakfast" "Dinner" and "Supper" against the number of revolutions which had to be completed before each repast was served. The warder could apply a brake or artificial load to suit the physique of the prisoner or perhaps the magnitude of his crime. Maybe the authorities regarded it as an inexpensive form of central heating!
- 43 A drawing of a Treadmill and Gears made for St. Vincent (presumably the island), by G. Haden & Son.
- 44 Letter dated 19th July, 1928 to Hugh Davies, Esq., Board of Education, Whitehall, S.W.1. concerning treadmills and hard labour machines (cranks) for prisons, and giving a list of prisons, mostly in the Colonies, to which they had been sent. It also gives further details and dimensions, and the use to which this apparatus was put. Copy of the indicator dial for the hard labour crank machine is attached. There is also a further letter to Mr. Davies dated the 19th January, 1929 referring to the use of treadmills for pumping water, grinding flour, stone crushing, or even as an effort wasting machine for punishing prisoners. In a letter to Mr. Haden from Mr. Livesey Manager at Manchester Office dated the 17th January, 1929, he discusses the treadmill at Strangeways Prison saying that he used to repair this machine every two or three years, and the last time the wheel was dealt with was in 1900. He also adds "As no doubt you are aware, we supplied them (treadmills) to the Colonies after they had been abandoned here" (presumably in England).
- 53 A re-print from the Architects Review, August 1929 concerning radiant panel heating by Hadens, and giving a list of a few prominent buildings in which this work is being carried out.
- 51 Documents and drawings (originals in possession of Mrs. P. Haden) relating to Hadens proposals to form the National District Heating Companies.
- (1) Preamble and outline of scheme in general.
 - (2) Scheme relating to the City of Westminster.
 - (3) " " " " " " Southwark.
- 52 Correspondence between W.N. Haden, "The Ironmonger" and the H. & V. Association on the subject of the oldest firm in our industry.

Exhibit.

- 55 References to Hadens work extracted by P.C. Jamieson from the records of St. Pancras Station London. This installation was carried out to the instructions of Mr. Giles Gilbert Scott.
- 37(a) Pamphlet (dated in pencil 1843) describing "Apparatus for Ventilating and Warming Public Buildings, Churches, Mansions, Prisons etc. - G. & J. Haden, Engineers and Patentees, Trowbridge Wiltshire and 6 St. Andrew Square, Edinburgh." There follows a description of the apparatus and testimonials which refer to the ventilation and warming of prisons, also a description of Hadens Drying Machine for cloths and silks.
- 71 A booklet reproducing "Testimonials received by George Haden, Engineer, Manufacturer of Ventilating Warm Air Stoves, Warm Water and Steam Apparatus etc. for Churches, Mansions, Banks, Conservatories, Vineries, Public Buildings etc. with a List of Buildings Warmed and Ventilated" 6 St. Andrew Square, Edinburgh 1856.
- 72 A booklet on "The Langfield Patent Automatic 'Moist Air' Heating & Ventilating Apparatus" with a letter inside from a J.E. Sutcliffe Manchester dated 5/8/1896 comparing it with 'ours'. Presumably Mr. Sutcliffe was in our employ.
- 73 Draft of a pamphlet no doubt intended to describe the various types of heating apparatus designed and installed by Hadens with particular reference to their Warm Air Ventilating System. This would appear to have been written by Mr. G.N. Haden about 1870.
- 74 A book entitled "Four Essays on Practical Mechanics, the first on Water Wheels, the second on the Steam Engine, the third on Mills and the fourth on The Simplification of Machinery" by Thomas Fenwick Coal Viewer 1801.
- This may have been the property of George Haden and used by him in the early days of our Company.
- 75 An old price book covering a large number of engineering supplies. Date unknown.
- 76 An old cast name plate "G.N. Haden and Sons, Engineers, Trowbridge London Manchester Birmingham & Johannesburg".
- 77 Extract from Heating & Ventilating Engineer and Journal of Air Conditioning for November 1958. Notice of retirement of Mr. G.N. Haden. (the second).
- 78 Two obituaries of Mr. G.N. Haden. The Times 16/8/1960.
- 79 Two obituaries of Mr. G.N. Haden presumably from the Wiltshire Times.
- 80 Letters between Mr. J.R. Paterson, Mr. G.N. Haden and the Chairman of the National College dated 28th and 29th April 1959 concerning the G. Nelson Haden Lecture Theatre at the College.
- 81 G.N. Haden & Sons Ltd. Membership Card of the Social Club - St. George's Works, Trowbridge.
- 82 Large leather bound book dated December 1879 containing photographs of ornamental gratings used in connection with our warm air system.
- 83 Ditto - but in this case the photographs show the complete enclosures incorporating these gratings around radiators or pipe coils. There are also shown a series of monograms which were incorporated in the design of these surrounding grills or gratings wherever they were called for as in the case of mansions of the titled gentry and municipal buildings.