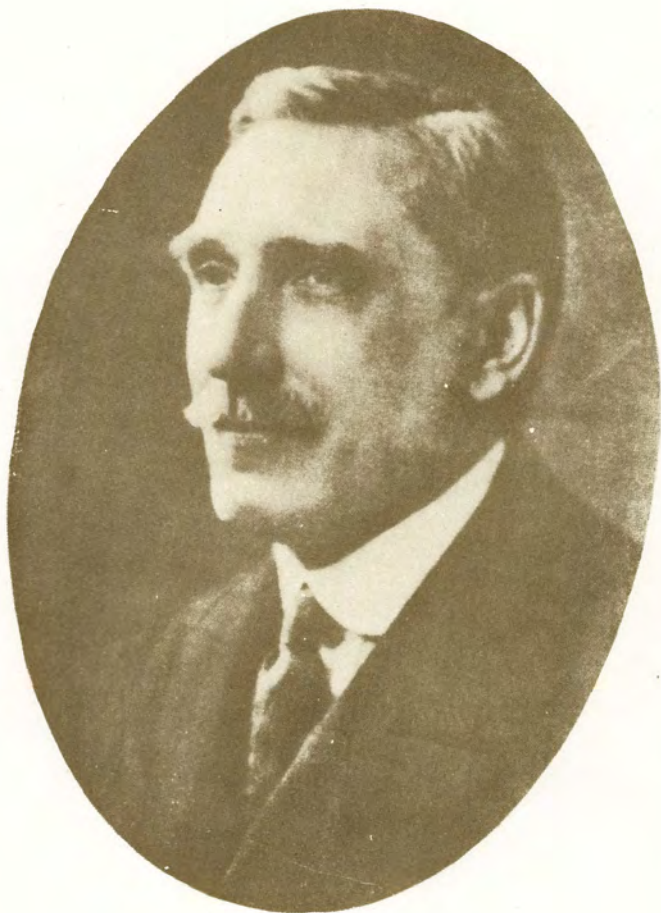


THE LIFE AND LETTERS OF  
SEBASTIAN ZIANI DE FERRANTI



J. K. de Ferranti.

*THE LIFE AND LETTERS OF*  
SEBASTIAN  
ZIANI DE FERRANTI

*by*

GERTRUDE ZIANI DE FERRANTI, M.R.I.

*and*

RICHARD INCE

*With a foreword by*

CAROLINE HASLETT, C.B.E.

*Companion I.E.E.*

LONDON  
WILLIAMS & NORGATE LTD

FIRST PUBLISHED 1934

REPRINTED 1956

PRINTED BY THE REPLIKA PROCESS  
IN GREAT BRITAIN BY  
LUND HUMPHRIES  
LONDON • BRADFORD

## PREFACE

THE author wishes to offer her thanks to all those connected with the firm of Ferranti Limited who have so kindly helped her in any technical details connected with her story. She wishes, in addition, to mention her brother, Richard Ince, without whose help she could not have written the book. Also she extends her very best thanks to Mr. W. D. Davidson, her Secretary (who has been with the firm and family for forty years), for his sympathy and great patience with her when she must have been most trying, and for the great help he has given her.

G. Z. DE F.

## FOREWORD

AMONGST my first personal friends connected with the electrical industry when I started on an electrical career were Dr. Ferranti and his family. I had opportunities on many occasions of seeing the great happiness of Dr. S. Z. de Ferranti's home life with his wife and children, of realizing his very great personal charm, of appreciating his extreme simplicity side by side with his great genius, and of learning much from his remarkable vision which amounted at times almost to the prophetic. With her great understanding and belief in his genius, Mrs. Ferranti contrived that the harmony of the home life should relieve her husband from all worry and leave him free to develop his scientific work.

It is not difficult to obtain the picture of a scientist as the world sees him, but it is unusual and more than interesting to get an accurate view of the other side of the picture—the portrait of a human being whose interest lay in scientific matters, and to hear how the world appeared to him. No one is more competent to write of this side than his wife, and I am honoured that Mrs. Ferranti has asked me in this Foreword to introduce to readers this portrait of a great man whose belief in the adaptation of science for the relief of the drudgery of domestic duties was a steadfast inspiration in the early days of the Electrical Association for Women, both to me personally and to the many others whose wavering interest his enthusiasm and vitality enlisted to the Movement.

CAROLINE HASLETT

*June 20, 1934*

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PART I

BIRTH, ANCESTRY, AND EARLY LIFE

By RICHARD INCE

## BIRTH, ANCESTRY, AND EARLY LIFE

IN writing of Sebastian Ziani de Ferranti one's thoughts naturally turn to sunlit Venice in her day of splendour. Sebastian Ziani, founder of an illustrious family, was born in 1102. After a distinguished career in the service of the Venetian Republic he was elected Doge in 1173, his family being then the richest and most influential in the State.

Ziani was a man of high intellectual and diplomatic attainments; in person handsome and prepossessing, and richly dowered with the kindness and courtesy that have always distinguished the Latin race.

There is a delightful story illustrative of his keen intellectual faculties and his retentive memory. When ambassadors arrived at his Court it was his custom, instead of giving them private interviews, to admit them all together. He would then bid them speak in turn. Clad in his robes of state and leaning back in his great chair, the Doge would close his eyes and appear to fall into a gentle doze. When the last ambassador had spoken and all were feeling somewhat resentful of this somnolent reception, Ziani would open his eyes, sit up and give the necessary reply to the speech of each envoy in turn.

Members of the family of Ziani continued to hold distinguished positions in the various City States of Italy throughout the Middle Ages. In the early nineteenth century we find Marc Aurelio Ziani (who in later years added "de Ferranti" to his name) residing at Bologna. Marc Aurelio was a man of wide culture and liberal opinions, a keen student of Dante, on whose works he lectured and wrote, and a musician of distinction. He translated *Les Sept Rois* of the

French philosophical and political writer, Lamennais, into Italian verse.

His later life was passed at the Court of the King of the Belgians, where he held the office of Guitarist to the King. In this capacity he came in touch with many of the famous musicians of his time. In 1834 Nicolo Paganini wrote of him :

J'ai entendu, à ma très grand satisfaction, quelques morceaux de guitare composés par M. de Ferranti et exécutés par lui avec une pureté et une expression sans pareilles; et j'affirme que cet artiste est supérieur aux autres guitaristes célèbres que j'ai entendus en Europe.

And Gioachino Rossini wrote to him in 1860 :

MON CHER MONSIEUR,

Bravo, bravissimo! Je ne vous laisserai pas partir sans vous exprimer tout le bonheur que j'ai éprouvé à vous entendre. Votre exécution savante donne à votre guitare toute la puissance de la lyre d'Apollon; vos compositions suaves et harmonieuses assurent une ère nouvelle à cet instrument qui tombait dans l'oubli.

Je vous en félicite comme ami et admirateur.

Paris, le 11 Novembre.

César de Ferranti, son of Marc Aurelio, was educated on the Continent but settled in England in early manhood. He had inherited the artistic faculties of his family and established a photographic art studio at Bold Street, Liverpool.

In the early days of the nineteenth century, photography was attracting a great deal of attention, not only among men of science but also among artists. It was as fashionable in 1860 to have one's photograph taken by a well-known photographer as it had been in the eighteenth century to have one's miniature painted by a famous artist. César de Ferranti's studio was



SEBASTIAN'S MOTHER, MADAME ZIANI DE FERRANTI AT THE AGE OF 20.

*From a picture painted by her father, William Scott.*

patronized by many distinguished people of the time. His skill as an artist in photography enabled him to produce pleasing portraits even of those to whom Nature had not been kind. He had taken out a patent for a photographic process by means of which he got results far ahead of his competitors in the profession.

While working at his studio in Bold Street, César de Ferranti made the acquaintance of the painter, William Scott, and his beautiful daughter, Juliana. Scott was among the leading portrait painters of his time, and was a frequent exhibitor at the Royal Academy. Many of his delicate water-colour drawings and portraits in oil are in private collections. His daughter Juliana studied music. She married early, her first husband being the Polish musician, Count Szczepanowski (pronounced Stephanoski). Both she and her husband were accomplished artistes. They toured Europe and gave concerts in all the capitals. On the death of Count Szczepanowski, Madame Julie Szczepanowski found herself left with slender resources and a family of young children to support. She became teacher of music to the family of the Ince-Blundells in Lancashire. The Ince-Blundells were Roman Catholics. It was while with them that Madame Szczepanowski's sympathies with the older faith led her to be received into the Catholic Church.

César de Ferranti fell in love with this beautiful, artistic, and accomplished woman, and they were married on November 4, 1860, at St. George's Church, Liverpool.

It was of this couple that Sebastian Ziani de Ferranti was born on April 9, 1864.

The arts were very decidedly in the blood of both parents. Madame de Ferranti's children by her first

husband were all strongly artistic. Wladziu, the eldest son, adopted a musical career and became a prominent figure in musical circles. Wanda studied painting at the South Kensington School of Art and did distinguished work for the Convent which she entered in early life. Juliet also was an accomplished artist. The younger son, Vincent, gifted also in music and painting, very early felt the call of the sea, entered the Merchant Service and rose rapidly in his profession.

By all the laws of logic and heredity it seemed certain that Sebastian Ziani de Ferranti, with the fine arts so strongly represented on both sides of the family, would become an artist. But the intentions of *Natura Mystica* in these matters are past finding out. By some strange alchemy the artistic nature in him was transmuted into science.

It was not surprising that the parents, Julie and César de Ferranti, were somewhat puzzled by the early inclinations of the son born to them.

For young Sebastian, as soon as he could walk and talk, showed very decidedly where his interests lay. The scrap-book made for him as a child, and still preserved in the family, is unlike all other scrap-books I have ever seen. It contains only engines. Here are engines of all kinds: locomotives, steam turbines, fire-engines, pumps, ships' engines, gas engines cut from various engineering papers and pasted on the page. For the ordinary scrap-book little Sebastian had no use at all. And when his nurse "Bysshë" (Elizabeth) took him for a walk in Liverpool there were frequent differences of opinion as to the direction they should follow. Bysshë might want to go to the shops but Basti took no interest whatever in the latest bargains. He must go to Lime Street Station to look at the locomotives. It was undoubtedly the sight of these



THE FIRST PICTURE OF SEBASTIAN DE FERRANTI AT ABOUT THE AGE OF  
12 MONTHS.

*From a sketch by his sister Wanda.*



BIRTH, ANCESTRY, AND EARLY LIFE

locomotives standing in the station that inspired Sebastian to make the wonderful sketch, as shown, of a locomotive, and which drew from Mr. Henry Fowler, afterwards Sir Henry, the Chief Mechanical Engineer to the L.M.S. Railway, the following letter to Dr. Ferranti dated October 30, 1928:

Reference "D.L./7"

DEAR DR. FERRANTI,

Referring to your letter of the 25th inst. I was sorry I was away when your letter and the very wonderful sketch you were good enough to send arrived.

Really, I think it is one of the most wonderful things I have seen, and, although from an electrical standpoint one must be very thankful you took up that line, it only accentuates the great loss the locomotive side of engineering sustained by your adoption of what may perhaps be looked upon as a much more up-to-date side of the profession. I shall keep the photograph and your letter with great care.

We are not able to decipher the name of the locomotive you made a drawing of, and do not know whether it was an imaginary one, showing as it does a conception of the use of various parts.

I thought you might be interested to have a photograph of a locomotive which somewhat resembles your sketch, which was built in 1847, and is still in existence, and I am taking the liberty of sending this herewith together with some notes regarding same.

With kind regards and all good wishes,

Believe me,

Your sincerely,

(signed) HY. FOWLER.

Enclos.

Dr. Ferranti,  
c/o Messrs. Ferranti,  
Electrical Engineers,  
HOLLINWOOD, LANCS.

When he was eight years old Sebastian and his sister Juliet were taken by their parents to Arlon, in Belgium, to learn French. George de Ferranti, brother of César, was a Professor of English at the University of Arlon. When their parents returned to England the children were left in the care of their uncle and aunt. They were to attend a school in the neighbourhood and to learn as much French as they could.

This was Madame de Ferranti's first separation from her beloved little son and she suffered severely. Her letters to him, which Juliet read aloud (for he had not yet mastered the art of reading), are full of maternal wistfulness and the sorrow of separation.

I am [she wrote in April 1873] continually looking out *in imagination*, on that Arlon garden and over the beautiful plain beyond, and catching glimpses of my darling boy playing there with his little friends. I am so thankful that I have been to Arlon and can thus recall to mind the house, the garden, the street, and everything that surrounds you. . . .

Madame de Ferranti was not happy during that year of separation. She tormented herself wondering whether the children were well; accidents might befall them on the way to school; they might be ill and need her love, her presence. . . .

Mothers are always secretly afraid lest their children should be "backward" and compare unfavourably with other children of their age. Were they really making progress at the Belgian school? In the course of a long letter to Basti she wrote:

First I must speak about your school. Juliet says you do nothing when there but play marbles. Now surely this cannot be quite exact. Do you not go on with your writing and learn at least your letters while there? You do not, I



SEBASTIAN AT THE AGE OF 4, BEING READ TO BY HIS MOTHER.

*From a sketch by his sister Wanda.*

## BIRTH, ANCESTRY, AND EARLY LIFE

hope, just sit still *doing nothing*, whilst the other boys are studying? If so I cannot understand your liking your school so much.

In after life Sebastian never looked back to his days at Arlon with much pleasure. He was home-sick; it was difficult to play with these Belgian children who spoke only French. In the latter part of the year he fell ill with a poisoned leg and, greatly to his satisfaction, was brought home to England.

As soon as he was well again there came another separation from home and parents. Young Ferranti was sent to St. Stanislas' School at Hampstead. It was kept by a French lady, Mademoiselle Flon. Though he was, on the whole, happy at the school, Sebastian's recollections of Mademoiselle Flon were not flattering to that lady. He had the misfortune to encounter her one evening without her wig. The idea that "old people" (Mademoiselle Flon being well over thirty appeared to him "old") went in continual danger of becoming bald as an egg haunted his dreams. When would this revolting hairless condition overcome his father, his mother, himself? If schoolmistresses must wear wigs they should be securely fixed, otherwise the sensitive young may suffer nightmares in tongue-tied silence. . . .

At Mademoiselle Flon's establishment he enjoyed the games, the walks on Hampstead Heath and occasional excursions to the Polytechnic, the Alexandra Palace, and Madame Tussaud's. On November 14, 1875, he wrote to his sister Wanda: "We went to Madame Tussaud's and into the room of horrors. The worst of the things there was Marat in his bath, he looked so horable with the knife sticking into him."<sup>1</sup>

In summer the Alexandra Palace was a paradise for

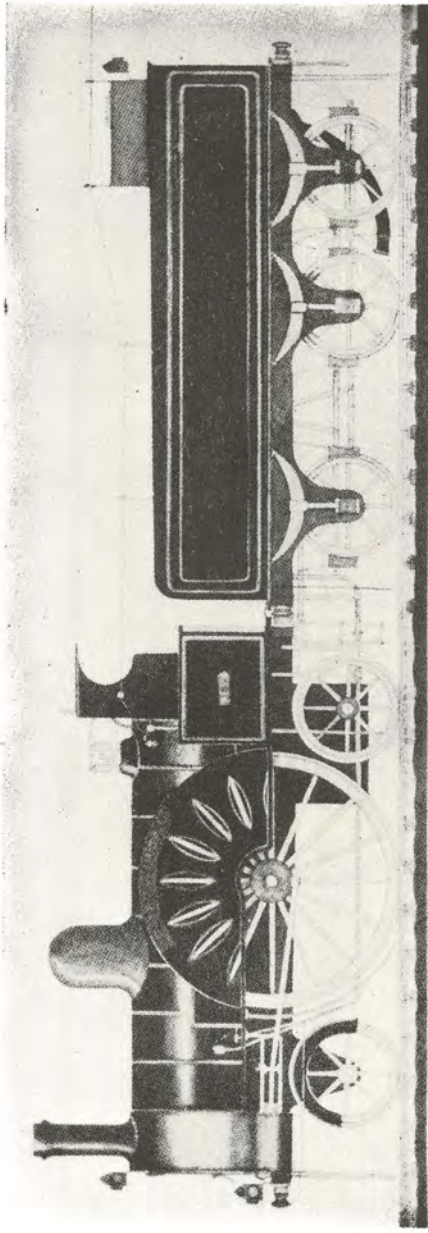
<sup>1</sup> In these early letters I have kept his own spelling and punctuation.

the boys—a paradise a little dimmed because they could not stay to see the fireworks:

I and some of the other boys [he wrote to Juliet] had a drive round the place. We went on swings and roundabouts. We could not stay for the fireworks because it was too late but a little time after we got into bed they began so Miss Balfré let us look at them they were the finest I have ever seen. . . .

His letters from Miss Flon's are full of references to his half-brother Wladziu Szczepanowski, to whom he was devotedly attached. Every Saturday, when the weather was not too bad, Wladziu would call at the school and take him for a walk or to some place of amusement. Another recurring interest in these early letters, interspersed among references to stamps, crests, and cricket, is the subject of engines and engineering. To Juliet he writes in October 1875: "I have drawn four more engines since I came back. . . . Will you please send me the paper<sup>1</sup> after the one you sent me because it has so many nice pictures of engines in it." And to his mother: "I want Wanda to send me that book of the engines that she bought me in Bromton." And again, "I would be very glad if Papa could get me a small picture of a steam fire engine something like the one we saw at the Alexandra Palace." His interest in engines was not merely the interest of the child (or grown-up) that has chosen haphazard a particular article for the purpose of collecting, as a child will collect shells or an eccentric millionaire will ransack Asia in search of gold Buddhas. Young Ferranti was already beginning to dream some of those dreams that were to haunt him for the rest of his life. He always knew quite definitely what he

<sup>1</sup> I.e., *The Engineer*.



Photographed from an original  
drawing (coloured) executed by  
Sebastian Train de Ferrante, aged 11 years  
at Liverpool in January 1826

FACSIMILE INSCRIPTION BY HIS MOTHER

## BIRTH, ANCESTRY, AND EARLY LIFE

wanted and knew why he wanted it. In February 1876 he wrote to his sister: "Please ask Vincent if he can get me a book on 'Compound' steam illustrated so that I can see about the condenser because I want to see about it for a particular reason I have thought of. I also thought of it in 1874, 1875 the last Xmas holidays. . . ." And to Wanda he wrote: "I have seen some very cheap engines to put together so I am going to get one and get a safety valve and an indicator of water and get them put on and then I can put them together at school. . . ."

All these early letters are written in a large, thick, childish hand. The spelling is often more phonetic than correct. They are perhaps a little under the average orthography for a boy of ten. The only unusual trait in them is the continual harping upon engines, locomotives, and engineering magazines and newspapers.

The fate of letters is strange and past calculation. How is it that some are preserved to float down the stream of Time while others find almost instant destruction? Shakespeare's letters (and manuscripts also) have all gone—not a scrap written by him in boyhood, youth, or age remains. And yet, in the Bodleian Library at Oxford there is a letter in Greek of the second century A.D. inscribed on papyrus that has become thin and brown almost as a withered leaf. It was written by an unknown Egyptian boy to his father who had gone on a visit to Alexandria and left him behind:

Theon to his father Theon, greeting. It was a fine thing of you not to take me with you to the city! If you won't take me with you to Alexandria I won't write to you, or speak to you, or say good-bye to you, and if you go to Alexandria I won't take your hand nor ever greet you

again. That is what will happen if you won't take me. Mother said to Achelaus: "It quite upsets him to be left behind." It was good of you to send me presents . . . on the 12th, the day you sailed. Send me a lyre, I implore you. If you won't, I won't eat, I won't drink; there, now!

Why has that letter defied the fires of Time for nearly two thousand years? Probably because the boy's mother fenced it and guarded it with a flame fiercer even than the flames of Time; a protecting devotion that has pursued it down the centuries and still watches over it in our great Oxford library.

So it is with these letters of Sebastian de Ferranti. Every scrap of them was treasured by his mother. He was the Wonder-child of her heart and of her mind. All her thoughts gathered about him; all her hopes; all her dreams.

Madame de Ferranti was a tall, handsome woman, of a most gracious presence, with masses of dark hair, a high complexion, strong features and dark eyes, large and glowing. Her artistic and sensitive nature is very apparent in the portraits William Scott painted of her. All her friends were among the artists and musicians. She loved and valued the culture of an age that was already in its death-throes. In later life her artistic feelings and aspirations found an outlet in her most sympathetic rendering of the masterpieces of the great musicians and in her religious devotions. All her children had been richly dowered by the Muses. And this, the youngest and best beloved, what would he become? Poet? Painter? Musician? The mists of time are baffling, but she felt convinced that little Sebastian had been born to do great things. At times she was puzzled. All he seemed to care about, for the present, was engines. In every one of his prized and carefully treasured letters this persistent interest rose





SEBASTIAN AT THE AGE OF 7.  
*From a sketch by his sister Wanda.*

above all others. "I would like you to send me," he wrote to his father on June 7, 1874, "a model drawing of one of the engines on Great North Western"; and on June 24th comes a similar appeal. "Let me ask you a great favour, that is to give me a little model of a steam fire engine working by steam. It would be the greatest favour; there is nothing I would like better than that." In his writing and reading he seemed to his mother to be sadly backward, preferring to be read to rather than to read to himself. In a mood of maternal anxiety she wrote to him from Bold Street, Liverpool, on February 24, 1875: "Your writing is decidedly improving, but you have spelt a number of words wrong in the letter to Juliet. I suppose it is because you write in too great a hurry. Your dear little head seems as full as ever of engines and boilers and such things. . . ."

No wonder his mother was puzzled, for instead of the musician or painter she had expected, she had a son who wrote to her when he was twelve years old: "I have made a picture of a water heater and condenser combined which I have invented, so that hot water from the condenser will run into the water reservoir and then into the boiler, instead of the steam coming out of the funnel." In the summer term of 1877 Sebastian said good-bye to Mademoiselle Flon, the Lady of the Wonderful Wig, and, his head "full as ever of engines and boilers and such things," became a pupil at the Roman Catholic College of St. Augustine at Ramsgate.

Young Ferranti entered the school with a book in his pocket. It was Ganot and Pepper's *Book of Science*. So soon as the day's lessons were over and he could find a quiet corner he would coil himself there with Ganot and Pepper. His schoolmates would chaff him

about this book and sometimes (when they could get hold of it) hide it away. On these occasions Sebastian would wander round seeking in his accustomed haunts and conscious of mischievous eyes following his movements. But his native serenity and good temper were never seriously ruffled by these pranks. For even if Ganot and Pepper was lost, his mind was stored with scientific problems concerning a certain engine that he was constructing, or would construct, and these problems were sweet to him as grass to the chewing kine.

Immediately on his arrival he wrote to his mother a letter in which he gives the following programme of the day's work:

Get up at 6.  
 Lessons: 6.30 to 7.30.  
 Hear Mass, have breakfast and play until 9.  
 From 9 to 12 $\frac{3}{4}$  (with  $\frac{1}{4}$  hour's recreation between) Class.  
 1-2.30: Dinner and recreation.  
 2.30 to 3: Study.  
 3-4: Class.  
 4-6: Tea and recreation.  
 6-7.30: Study.  
 7.30 to 9: Recreation and supper.  
 9: Bed.

To his sister Wanda he wrote soon after his arrival:

ST. AUGUSTINE'S COLLEGE,  
 RAMSGATE.

*Sept. 11, 1877.*

. . . Everything seems very good here. We have coffee, bread and butter for breakfast. We dine with the monks and get a very good dinner. I have had a lot of beautiful new books; amongst which are three fine dictionaries, Latin, French and English. . . .

I have drawn five nice Engines on your block already

Dec 19th 1872

My dear Mims

I will not say  
a great many thi-  
=ngs, but I love you

with my whole  
heart, and I send  
you a great many  
kisses for your birth-  
= day

Your dear boy  
Sebastian

Arlon 19<sup>th</sup> December 1842

## BIRTH, ANCESTRY, AND EARLY LIFE

which look very nice. I am the only one in the drawing class and the father teaches me very well.

Sebastian's parents had not been entirely happy about his progress at Mademoiselle Flon's. They hoped that the change to the College at Ramsgate would prove stimulating. Perhaps by way of getting in a first word on the vexed question of handwriting and spelling, he wrote to his father on October 21, 1877:

For the writing master if he can be so called I really cannot say much. All he is able to say is how to hold your pen and he *once* told me not to write so thick in my copy book, so he is nothing much. . . .

In December of the same year César de Ferranti had written to say that he was considering having the house in Bold Street lighted by electricity. Sebastian wrote with enthusiasm in reply:

What a capital idea that is of lighting the house by electricity. About what sized engine would it take to do it? I hope very much that you will have it; not only for the engine, but for the beautifully pure white light it gives; and it seems to me that it must be a good deal cheaper, as the engine would not cost much to work, especially if it was made to go by coke and charcoal mixed, or it might have a self-feeding boiler and lamp, which, with a very little calculation, is very easy to be made and worked with safety with comparatively no looking after, except to oil the different parts.


And in the same letter he refers to an idea for an invention:


I have thought of another kind of stationary slide valve cylinder, which would take up much less room and yet have just as much power, for a ship.

Young Ferranti was conscientious in his school work

but showed no particular enthusiasm for any subject—not even for mathematics, which he did not find difficult. But the ordinary subjects—Latin, Greek, English, History, Geography—seemed to him an unnecessary waste of time. His mind was already in a turmoil. There were so many inventions and mechanical devices crying out to be made. While perforce constructing *Caesar De Bello Gallico*, ideas—all connected with wheels and pistons and valves and pipes—fluttered like beautiful butterflies in his brain. To his sister Wanda he wrote:

I have just thought of an instrument for the whale fishery. You know when you run along with an umbrella

one way  A the wind catches in it and makes great resistance wherefor if you push it along the opposite

way  B it shuts up (if it is not

fastened out by the spring) and gives no resistance to the wind, and can be shut up into very small space. Now if these were made in metal or very strong steel on a larger scale and attached to a whale line when it went along, these things would retard its progress a great deal (as at A) but when the line is pulled in (as at B) it would shut up and offer little or no resistance. (N.B. I thought of this during writing class yesterday.)

That "N.B." by way of postscript was too good to be left out of his letter, but it was ill-advised. Parents who pay school fees naturally like to see some definite results. In the light of later events it is delightful to contemplate young Sebastian dreaming of a new device for catching whales during the writing lesson. And no doubt if conscience pricked him he salved it easily by

Nonnintencressant 8

June the 24 1874

My dear papa I hope  
you are out well  
and mama ~~also~~. dear papa  
let me ask you a  
great favor of you  
that is to give me a  
littel model of a stime  
fire ~~ingun~~ wath coin  
by stime it woud be



the greatest favor  
there is nothing that  
I would like better  
than that.

I am ever glad  
that you are going  
to stop in Lunden  
I would sum  
pick them for judy

now dood by dear.

Pis I remane

your afachpit son

Sebastian.

the recollection that the writing master, "if he could be called so," was "nothing much." Soon after the receipt of that letter to Wanda about the whale fishing his mother wrote to him:

Indeed I would almost rather you should not write to Wladziu, if your letter is to be so full of wrongly spelt words as the one to Wanda. I was quite ashamed of it on that account, and very sorry Pa should see what little use you appear to make of the instruction he is paying so very much money for you to receive. There are generally some faults of spelling in all your letters, but the last to Wanda was fearfully bad. I suppose you wrote in a great hurry, and had not time to think about the words being right or wrong; still it is a great pity, because persons may be suspected of having had no education whatever if they make mistakes in spelling. The composition and wording of your letters is very excellent, but still that is not enough. You must have had quite a grand day on the feast of St. Benedict but surely you boys must have got very weary of the dinner since it lasted so long, even though there were so many good things to eat?

The latter part of this letter refers to the long description he had written his sister of the school's doings on St. Benedict's Day. The spelling is certainly weak in places, but the letter is amusing and gives a vivid account of the proceedings:

*March 22, 1878.*

Yesterday being the feast of St. Benedict I could not write as there was very little time and (I was too full). In the morning (21st) we got up at 6 o'clock and had prayers, then Mass and we all went to H. Communion (that is, all who go). After this we had breakfast which consisted of rolls and coffee (N.B. not extra good). At 11 o'clock we had high Mass and I was up in the organ loft to tell the organist some things he wanted to know respecting the position of the priests etc. At 1 o'clock we had a grand

dinner—perhaps you would like to know what it consisted of? Well, it was this. 1st vermacelli soup—2nd mutton and caper sauce. 3. roast beef. 4th sausage and rolls (so as not to keep us waiting) 5th Mince pies. 6th and last Topsy cake which was the best of all, it has sugar of different sorts on the outside and chocolates and inside jam and custard and sponge cake, altogether making a very nice mixture. When we had finished it was four o'clock so we had been two hours and a half and then it was time for Compline and Benediction so when it was all over I did not feel up to writing although it was for your birthday. . .

There is another letter of slightly later date to Juliet, in which Sebastian describes his duties as sacristan. In his careful attention to detail his strongly practical bent is seen, so useful to him in his later work as a scientist:

Perhaps you would like to know what I have to do as sacristan. In the morning after Mass, I and the other fellows have to take the papers off 20 flower-pots, and then carry them outside, we have also to scrape off whatever wax runs down the 28 candles that we have burnt the previous Benediction and then fold up the vestment that the priest used at Mass that morning. Well, this takes up about half an hour of the first recreation (1st recreation  $\frac{3}{4}$  of an hour). In the evening after supper we have to put the paper back again upon the pots and then carry them in, put some turpentine on the candles to make them light quick and then put the lot on the Altar in order.

Ferranti was not, either as a boy or in later years, a reader. The books he studied were the people of all kinds with whom he came in contact and the beloved machines which he was always striving to bring to a greater and a greater perfection. But in one letter home there is a reference to the school library:

St Stanislaus

April 25<sup>th</sup> 1878

My dear Mama

I received  
your nice letter. Madz  
in brought the engine  
while I was out I  
also received the statue  
of st joseph. thank  
sister Winifred for it.

I am very glad to hear

that you are all well  
at home I like the  
engine very much  
We went to the Zoo  
on Saturday I had a  
rod on the neck of the  
Elephant We also saw  
the polar bears fed.  
As I think I have  
now told you all the  
news I will say good

bye. I remain your  
loving son  
Sebastian Liari.

## BIRTH, ANCESTRY, AND EARLY LIFE

We have a library at the College so we can get books to read, they let them out for a penny a week. I am now reading Dr. E. Kent Kane's *Exploration in Search of Franklin*: it is very interesting. I have already read *Captain Cook's Voyages*. . . .

Although he was steadily developing in all directions, young Ferranti's preoccupation with "engines and boilers and such things" was by no means on the wane. He took his share with complete good humour in all the activities of the school, its work and games. But these things were only on the surface; his real life was far away in that strange world where perfect machines accomplish their mysterious purpose with a frictionless precision—the world of Watts, Stephenson, Faraday, and that many-sided genius of the Renaissance, Leonardo da Vinci. Ideas for inventions were continually springing up in his mind, some of which led to the construction of little models. On February 8, 1880, he wrote to his father:

You know that a revolver is a very dangerous thing to keep loaded in a box, unless it is securely locked, but on the other hand if it is not locked or loaded, it takes some time to get it out and fire it—perhaps too long for it to be of much service. I will now tell you what I have done. I have invented a revolver box with an electro-magnetic lock and bell combined. This is its action. When the circuit is completed by a robber opening either a door or a window, a bell in the box begins to ring, at the same time drawing back the catch of the lock. This of course would awake the gentleman and open the box with the loaded revolver. Therefore if a robber attempted any part of the house the owner would be instantaneously aroused and placed with a loaded revolver in his hand ready to meet the intruder. I hope soon to send you a working model. I am also confident that Dynamo-Magnetic machines (for



producing the electric light) can be improved, and I am going to make a few experiments on a small scale in that way.

Probably Ferranti could not have been sent to a better school, for they had the intelligence not to press upon him the subjects for which he showed no inclination. And he was fortunate in coming under the jurisdiction of the most excellent of head masters. Abbot Egan very early made a discovery (which would probably never have been made at Eton or Harrow), viz. that he had a genius to deal with. Long afterwards Abbot Egan wrote:

During the last two years of Sebastian de Ferranti's course, he spent all his indoor recreation in making electrical experiments, and building up and testing batteries of his own construction. That he was an original genius soon became perceptible. It was no use trying to make him during his spare time follow the usual horary. He forced us to let him have full scope for his ingenuity, and we willingly assigned him a room where all by himself he could work at the practical problems exercising his budding genius. Personally I was blamed for this departure from the school regulations, but all the same I felt I was right in making an exception in his case, and the result proved the wisdom of the step, for during those two years the small inventions and discoveries he made are too numerous to mention, and I can confidently add that this freedom from the ordinary routine, and the valuable use he made of his time, laid the foundations of his brilliant success as one of the most eminent electricians of the century.

Abbot Egan also gives a delightful description of him among his schoolmates:

The little boys would crowd round him if, as sometimes

St Stanislaus

My dear Mamma

I am quite well

now and I hope you

are quite well also

We had snow at  
the same time you  
had. It is now quite  
fine. I want Banda  
to send me that book

of the engines that  
she bought me in  
Bromton.

Good-bye dear  
Mamma as I have

no more to say

Your affectionate son

until death

Sebastian Tranti

## BIRTH, ANCESTRY, AND EARLY LIFE

happened, he brought one of his wonderful little electrical contrivances into the playroom and showed them the sparks it emitted or the bells it set ringing when the wires were attached to them. His extraordinarily clear and simple explanation of these little marvels quite captivated them, and they would listen sometimes with mouths open for over half-an-hour to his stories of what electricity could do and would do in the future if his own theories ever materialized. The arrival of "Basti," as they affectionately called him, in the playroom after supper was always hailed with delight.

In his letters home he describes many other electrical devices, either constructed or in process of construction. But the idea which most fascinated him during the later years of his course at St. Augustine's was the magnetic machine he was constructing.

The origin of the famous Ferranti alternator patented in 1882 is to be found in an invention on which Ferranti was busy when he was fourteen. On November 17, 1878, he wrote to his father:

I have thought of a magnetic machine so simple that if it worked it would, I am sure, carry all other ones before it. The reason of its being good in my opinion, is that it does away with a great deal of friction by not having cranks, connecting-rods, pistons and piston-rods, all of which often want repairing and take up space, and are of great weight. If I go to London in the Christmas holidays I shall get the casting (notice that it is only one and very simple) made for this machine, which will cost me very little. I have made a drawing of it, and will send it to you with an explanation as soon as possible.

He wrote a full and detailed description of this magnetic machine to his mother:

SEBASTIAN ZIANI DE FERRANTI

ST. AUGUSTINE'S.

*November 24th, 1878.*

MY DEAR MAMMA,

I was very pleased to receive your long and interesting letter. As you have asked me to give you an explanation of my machine I will tell you a few things about it, as I want some tracing paper to do the separate plans on.

The first thing which is well known and has often been proved is, that the North pole of one magnet attracts the South pole of another, but drives away the other's North pole. Another thing is that glass, when put between two magnets, nullifies their power altogether. Upon these two principles I have made my machine. It is circular, and is ten inches in diameter; it is also three inches deep, so will work in a glass cylinder of the above dimensions, in which there will be a complete vacuum. The reason of working it in a vacuum is that the air, which has great resistance to bodies going at a high speed, would here have no force against it. There is one thing which I will tell you about the machine, that is that it has always the power of 32 horse-shoe magnets at a 4 inch leverage, being worked by 16 other magnets, which are not on the wheel but fixed. This machine would, I have calculated, drive a boat 5 feet long with the greatest ease, and out of the 5 feet only take up 3 inches, one-twentieth of the boat's length. Again there is no smoke; no place wanted for coal, and above all things, it does not cost a penny to work when it is once made.

The sub-prefect, who teaches me Physics, says that he thinks it will work very well. It would have to be cast in about 50 pieces of steel and bars, and about 40 of glass. I think it would cost me about £2.

Machines worked by magnets have always been given up by learned men, as they did not (in my estimation) know how to make them, and when they did come to anything they had to use a "galvanic battery," which was very costly. So magnetic machines are pretty well useless,



St Augustine's College  
Bramsgate Dec 2<sup>nd</sup> 1877

My dear Mama!

I was very pleased  
to receive your's and Vanda's letters on  
Saturday. How is it you do not  
mention anything about Vanda's  
Trips as I suppose she got some.  
The first and most impor-  
tant thing I have to tell you  
is. . . . The holidays commence  
on the 1<sup>st</sup> of December 1877!  
they last about two weeks and  
I think are up on the 5<sup>th</sup> of Jan



mary 1878.

(To the perfection)  
I received the bottle of  
stuff Pa sent me I think it  
is very good; my chilblains are  
already much better: I must tell  
you that they never burst as  
Pa's did at school. I never  
had them before, some fellows  
have them frightfully, Thank  
Vanda very much for the Amer-  
nack. What a capital Idea  
that is of lighting the house by  
Electricity about what sized engine  
would it want to do it. I hope  
you will have it, very much  
Not only for the engine but

for the beautifully pure white  
light it gives and it seems to  
me it must be a good deal cheaper  
as the engine would not cost much  
to work especially if it was  
made to go by coke and char-  
coal mixed; or it might have  
a self-feeding boiler and lamp  
which with a little calculation is  
very easy to be made and  
worked with safety with com-  
paratively no looking after ex-  
cept to oil the different parts  
(~~It is not more~~) I will enclose  
Monti's letter in this as I have  
not his full address. I hope

you are all well at home  
How is poor Aunt Emily getting  
on. I hope she is better. I have thought  
of an other kind of stationary  
slide valve cylinder which  
would take up much less room  
and yet have just as much power  
for a ship. I am very glad  
to hear that Vincent is safe  
although I was certain she would  
feel something of that terrible  
gale. lately there were seventeen  
weeks at Margate I must no  
say good bye and believe me ever  
your most affectionate son  
Sebastian.  Judy will have  
a letter next.

## BIRTH, ANCESTRY, AND EARLY LIFE

but if Papa will let me go to London for the holidays, and be generous when he does, the world will soon see something which will surprise them much more than either the steam engine or the Electric Light.

With much love,

I remain,

Your affectionate son,

S. F.

The construction of this machine was occupying all his spare time. The idea haunted him and would give him no rest. Like the unborn symphony in the mind of the musician, it was ever near, almost to be grasped and yet half-heard, half-seen, elusive as a butterfly and as ready to take wing and flutter off into the blue. He had sent ten magnets to London to be magnetized; they did not come and waiting was torment:

I have read all my books through and through and I have done all to my machine that I can do at present. That is I have made two plans of it, which show every part and its working. So that now I am left without anything to do but sit by the fire, for it is rather cold again now. I am ever anxiously waiting for my magnets as, if it succeeds, it will be one of the greatest inventions of the Nineteenth Century.

Later in the same month of March he is still waiting:

It is a great pity that I have to wait so long for my magnets, as it keeps me rather in suspense. When I consider all the principles of my machine (for there are a great many to think of) I am assured of success. But again, when I think of what a wonderful thing it is, and how it is that I, who am only a boy, should bring so many theories together, and out of them make so wonderful a machine (yet so simple) it quite takes me aback, and makes me think what strange and wonderful changes in commerce and manufacture would occur through its suc-

cess. . . . In your letter you said that you did not understand it, but if I explained it, it would take too long and might reach other people's ears. The best explanation that I can give you of it is that it would produce motion without cost. That is, it would do what the steam engine does without coals and water or anything else, as the power is produced by the permanent magnets—not electro-magnets as Papa supposed.

Sebastian wrote to his mother asking that he might be allowed to spend the Easter holidays in London with his brother Wladziu and his wife. His mother replied:

I was very pleased with your letter to me. . . . I read it to Pa this morning and he did not say anything about granting your request, and I was almost afraid he would keep to his refusal. However this evening he said he supposed he must let you spend your Easter holidays in London, since the other boys were going and you seemed to wish it so very much. He told me to write and inquire how much money you would want for your journey and other things. . . . I am glad Papa allows you to have this desire gratified, as I know you want so much to see after things connected with your great invention—and if the unfortunate magnets do not reach you before you leave Ramsgate you will be able to go about them yourself.

Then follows an amusing postscript to the letter showing that the young inventor is sometimes a nuisance in a house without a workshop:

Wladziu and Annie will be pleased to have you with them again but I hope you will not make quite such a mess in their room this time. Vincent told me it was awful!

During this visit to London he wrote home (in April 1879):

## BIRTH, ANCESTRY, AND EARLY LIFE

The first thing that I did when I got there was to buy some steel for my magnets and some tools in the same shop. . . . On Tuesday I took the steel to be cut into the shape for my magnets. . . . There was an electric light exhibited in Tottenham Court Road in front of a general dealer's shop. So I went in to buy a mousetrap in order to see what machine they used but the fellow that I bought the trap of knew nothing about it.

Despite his visit to London to hasten matters, in May he was still waiting for his magnets:

My machine has to stand still at present until the magnets come. With them I will be able (I think) to perform the last experiment which may decide a point which, if it succeeded would be a blessing to the world. There would be no more smoky tunnels nor dirty railway stations, and when people put their heads out of the windows they would not get blacks in their eyes. It would then no longer be a nuisance to have a railway passing through some fine estate, and the trees which grow near to a busy railway would not look withered and black, as many do."

On this anticipation of a smokeless world his mother commented:

Your description of the benefits that this latter would confer upon the world if it could be satisfactorily applied is quite poetical. That there should be no smoke nor dirt, nor blacks to fly in the eyes of people who *will* put their heads out of carriage windows when they travel by railway, would be most delightful, and as the immortal Shakespeare says "A consummation devoutly to be wished."

Unhappily the magnetic machine that was to revolutionize the world, though it led to other inventions, had in the end to be set aside. He found, as others have found who have played with the idea, that there appears to be no satisfactory means of cutting off the magnetic field.

perfection in everything will pass muster nowadays and it should always be our ambition to excel in everything. . . .

Perhaps César de Ferranti took rather too exalted a view of calligraphy. For a schoolboy of fifteen, Sebastian's handwriting was flowing and easy, and though his spelling was not always correct, fathers who turn the screw of paternal authority should be careful to set a good example. César de Ferranti certainly set a bad one in his mis-spelling of "hieroglyphics."

In 1880 education was almost as over-ridden with the examination system as it is to-day. The London Matriculation was regarded as the golden gate admitting to the paradise of a successful career in the City and the professions. Yet it is admitted by psychologists that many of the most gifted men have been quite incapable of passing an examination with credit, even in their own subject. Dr. Opimian, in Thomas Love Peacock's *Gryll Grange*, voices this view very neatly: "Brindley would not have passed as a canal-maker, nor Edward Williams as a bridge-builder. I saw the other day some examination papers which would have infallibly excluded Marlborough from the Army and Nelson from the Navy. . . . Fancy Watt being asked how much Joan of Naples got for Avignon when she sold it to Pope Clement the Sixth and being held unfit for an engineer because he could not tell!"

Sebastian himself did not oppose the idea of Matriculation. In view of his father's enthusiasm, objections would have been of no avail. But that it aroused no ambition in him is clear from his letters to his father:

The boy who is studying for the Matriculation examination with me is going up for it at the end of June about six months before mine. The hardest part of the Examina-

March 1880.

My dear Father,

I am very sorry.

that my accident has caused you  
so much anxiety. But you can  
now console your self as no injury  
has been done to my eyes & there are  
now left only a few little marks  
which a short space of time will  
render no longer visible. I will  
now tell you exactly how it happened  
I had broken a carbon of one of my  
batteries & wished to join it again  
as it was a good one. In order to do  
this I made two holes in it A & B.



~~into the~~ & having held the two pieces  
together in a vice poured hot lead into  
the hole at A which "on account of my being<sup>g</sup>  
'neglected to drag the carbon" squirted into  
my face out of the hole B. From this  
you can clearly see that there were  
no "dangerous chemicals" & also that it  
was no fault of my masters. Accidents  
happen to the most careful, & will come  
sooner or later; indeed there are few at  
my age who have not experienced sim-  
ilar things. For example - both the doctor  
& the sub-prefect had their faces severely  
burnt with gunpowder when they

were boys. One of the accidents when  
he was a boy was putting a ring  
into a wet stone with ~~the~~ some lead  
& it flew in his face & burnt him severe-  
ly because ~~it~~ the stone was wet.

Now one of my school-fellows was  
~~try~~ filling up a wet gas pipe with  
some lead when it blew out on to  
his coat & chin. From these few exam-  
ples you can see that what has happened  
to me is not at all wonderful. & that  
it may happen to any one whether  
working as I do or not. It may also  
have saved me something far worse.

which might have happened to me in  
after life when I would be working on a  
larger scale. I sincerely hope that you  
will revoke the order which you gave  
the Superior, as to deprive me of what I  
love so dearly would be ~~the~~ the greatest  
harm you could do me, for I must work  
in that direction sooner or later; & also  
consider to yourself "what is life to a person  
who has lost heaven if it be not for long)  
what they love best." Admit the ~~only~~  
again I have suffered which I have  
~~suffered which~~ been like this was the  
thought of that when I got well I was  
no longer to continue my work.

## BIRTH, ANCESTRY, AND EARLY LIFE

tion will be the Greek and Mathematics; but the French is very easy, as the principle thing is a piece of French to translate, which of course is not hard to do.

And a little later he writes, *à propos* of a suggestion that he might make better progress at another school:

The reason why I think that I will be better prepared here than at another school is because there are not many boys here at present and consequently I and another who are preparing for Matriculation have a master who devotes all his time and great trouble to preparing us and of course knows best what we are most deficient in and what is the best way to teach us having been our master before the exam. . . .

However, the wisdom of the head master prevailed. Concerning these matters Abbot Egan wrote:

Though Ferranti conscientiously prepared his lessons, he showed no enthusiasm for them, and through the absence of this, he never shone in any subject—not even in mathematics, the nearest allied to science to which he was devoted. To put him in for any examination, such as the Oxford Local, was out of the question. In his third year we urged him to prepare for Matriculation and offered him private lessons, especially in his weak subjects. There was no response; he pleaded successfully to be excused the effort, declaring that he found it impossible to concentrate his mind sufficiently on the various subjects set for this examination, such as Latin, Pure Mathematics and even Theoretical Chemistry. His mind was set on Science. . . .

It is a strange reflection that for many of the best minds and finest capacities our system of education leading up to the golden gateway of examination is still a hindrance and not a help. Common sense insists that examinations (used very sparingly) were made

£20, which was, he argued, "absurdly cheap" for such a wonderful machine. But £20 is £20. His mother administered a slight dash of cold water:

As to your having a Lathe, if they are so very expensive, I do not know when that will be, so do not think too much about it at present. The time for you to have a Lathe and other necessary implements for carrying out your inventions, will come some day I have no doubt, but you are a very young boy yet and cannot expect to have everything you wish for.

In February 1880 Ferranti met with an accident that threatened to put a stop to his scientific researches. While joining two pieces of carbon together some hot lead spurted into his face, threatening injury to his eye. His father was very upset when the news reached him and in his anxiety was inclined to blame everybody concerned:

I cannot help thinking that in the first place you ought never to have endangered yourself as you have done, and in the second, that surrounded as you are by persons who know something of chemistry, such dangerous materials as those you have evidently been experimenting with, ought never to have been left in your hands.

I trust that your great desire to play with dangerous materials will cool down a little after this, and that, although somewhat late, you will now understand that you must know the nature of chemicals—their action, reaction etc. before you attempt to meddle with them. The most dangerous materials in skilled hands are harmless, whereas in those of the uninitiated they are always dangerous and often have fatal effects. . . .

In reply to this letter from his father, Sebastian wrote a detailed account of the accident:

I am very sorry that my accident has caused you so

much anxiety. But you can now console yourself, as no injury has been done to my eyes, and there are now left only a few little marks which a short space of time will render no longer visible. I will now tell you exactly what happened. I had broken a carbon of one of my batteries and wished to join it again, as it was a good one. In order to do this, I made two holes in it—A and B, and having held the two pieces together in a vice, poured hot lead into the hole at A which, “on account of my having neglected to dry the carbon,” spurted into my face out of the hole B. From this you can clearly see that there were no “dangerous chemicals,” and also that it was *no fault of my master’s*. Accidents happen to the most careful and will come sooner or later; indeed there are few at my age who have not experienced similar things. For example, both the Doctor and the Sub-prefect had their faces *severely* burned with gunpowder when they were boys. One of the monks when he was a boy was putting a ring into a *wet* stone with some lead and it flew in his face and burnt him severely because the stone was wet. Also one of my schoolfellows was filling up a *wet* gas pipe with some lead when it blew out on to his coat and chin. From these few examples you can see that what has happened to me is not at all wonderful, and that it may happen to anyone, whether working as I do or not. It may also have saved me something far worse which might have happened to me in after life when I would be working on a larger scale. I sincerely hope you will revoke the order which you gave the Superior, as to deprive me of what I love so dearly would be the greatest harm you could do me, for I must work in that direction sooner or later, and also consider to yourself “what is life to a person who has lost (even if it be not for long) what they love best.” Almost the only pain I have suffered whilst I have been like this was the thought that when I got well I was no longer to continue my work.

Ferranti suffered little physical pain from the accident, although it necessitated his remaining in a

dark room for over six weeks, but it filled him with a great dread lest he should be debarred from the only pursuit in which he found any pleasure. As a result of the accident he was forbidden to resume his labours in the little workshop at the top of the building. In despair he wrote home :

ST. AUGUSTINE'S.

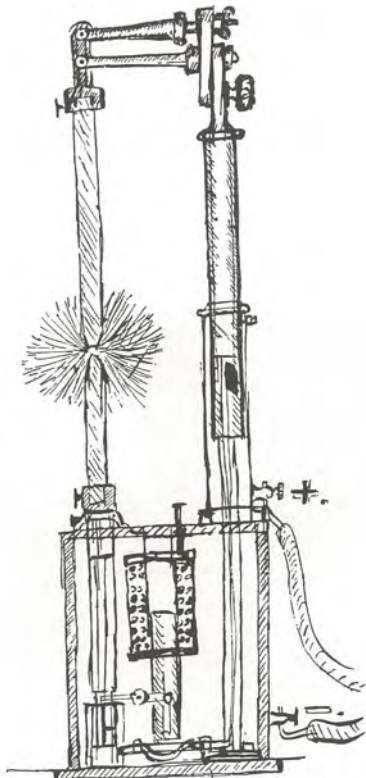
March 14, 1880.

MY DEAR FATHER,

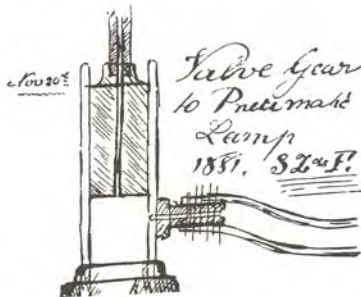
I was very pleased to receive your last letter. I have come to the conclusion that it caused you far more pain than it did me, as after Monday evening I had no pain at all and was comfortably settled in bed. You may rest assured that I will never do anything with chemicals (and that I never have done). All that I want you to allow me to do is "making little machines either in wood or brass" as I have been doing; as you know there is nothing dangerous in this, for it consists simply in drawing a plan; cutting the wood or filing the brass and drilling holes in it. If there is anything with which I am not fully acquainted (as I *was not* with the different metals in casting) Father Osmond says I must consult Mr. Jarman. As things stand at present the Superior will not let me touch *anything* so I do hope that you will let it be settled as I have said above. And on my part I promise you the "strictest care and attention and also not to do anything with chemicals with which I am not thoroughly acquainted. . . ." As you mention something about giving me some money (always money eh?) to buy carbons, I may tell you that a little money is always *very acceptable* to me as it enables me to carry out my plans with less trouble and better results than when I have to make things out of old things which have been thrown away. . . .

A fortnight later he wrote again :

I would very much like you to give me an answer to the question on which I have written you so many letters



$14 \frac{20}{2} B.C. 13 \frac{1}{2}$   
 $9 \frac{1}{2} 16 \frac{1}{2} \dots 7.5 \dots 91.5 = 1 \frac{1}{2} \text{ for}$   
 8 inches

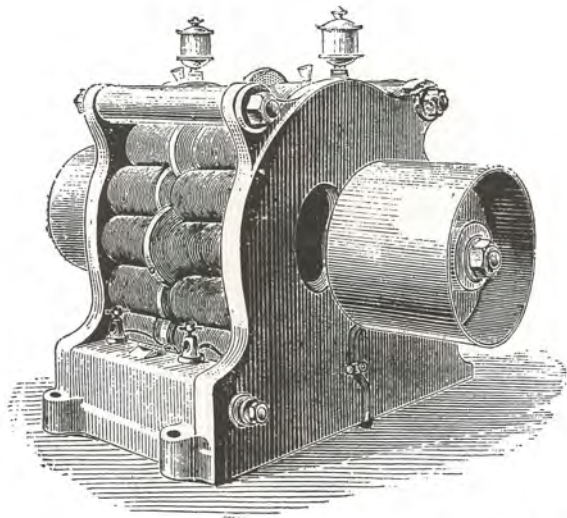


*Valve gear  
 to Preliminary  
 Lamp  
 1881. S.L.F.*

ARC LAMP, 1881

(Original now in Mrs. Ferranti's Possession  
 From Original Sketch in Rough Sketch Book)





1,000 LIGHT DYNAMO BY FERRANTI, THOMPSON & INCE

## BIRTH, ANCESTRY, AND EARLY LIFE

without receiving an answer, and which has caused me far more pain than the accident *could* have caused you or me. Are you not going to let me do what I asked in my last letter, as there is really nothing dangerous in what I want to do, and the accident which happened to me was of the most exceptional character. . . .

It was not until May that he was enabled to continue work upon his little machines.

I am very sorry [he wrote to his father] that I have so long neglected to write to you but it is not on account of your last letter. On the contrary I ought to have written to you to thank you for it as it was quite sufficient for them to allow me to continue my work with which I am extremely careful now. . . . I have made two electric lamps, one of which I tried at Mr. Jarman's and worked very well. . . .

Ferranti left St. Augustine's College after the summer term of 1881. It had been decided that he was to become a manufacturing engineer, but the future looked decidedly vague. His father could not provide him with capital nor pay high fees for further training and apprenticeship. It was obvious that if he was to succeed he must succeed by his own efforts. He had received no commercial education and the financial and commercial worlds were entirely alien to his type of mind. The first step taken on leaving school was a commendably practical one: he was measured for a new suit. He wrote to his father on May 5, 1881:

I am going to get the suit next week. . . . I have just completed my electric lamp and am waiting to try it. I have heard from Mr. Grout to-day and he sends me an official introduction to Siemens & Co. from Mr. Alex Siemens, so I will go and present myself next week when I get the suit. . . .

On June 1st he was in London looking for a job. He did not find it easy. There always have been a great number of engineers in the world, and Messrs Siemens, not being gifted with second sight, saw nothing out of the ordinary in this tall, dark youth who presented himself, week after week, and asked to be taken on. Unhappily, in this world genius must be aided by destiny or it can do nothing. Young Ferranti, too, had all the modesty of genius. He was by nature retiring, and though genial and moving with ease in all classes of society, he was happiest when inventing, or busied about the machines he had brought into being. In June he wrote to his father:

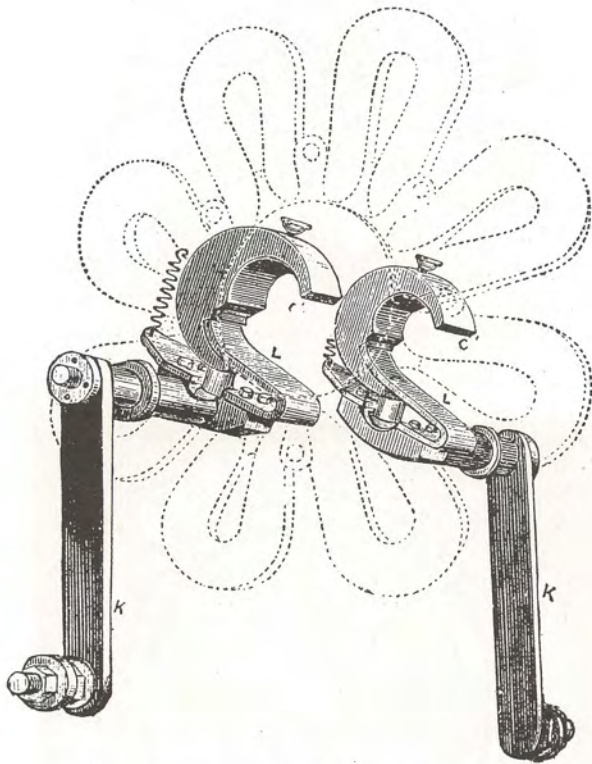
On Monday last I went to the offices of the British Electric Light Co. (having heard that they were taking on electricians) and applied for a place as such. Mr. Ward (their engineer) asked me a good many questions about myself and other things and finally said he would write to you about it. So I think that I stand a good chance of getting a place provided they pay me well enough. He also said that he would let me know by the end of this week.

In the same letter he tells of his first commercial success: the sale of the small dynamo he had made:

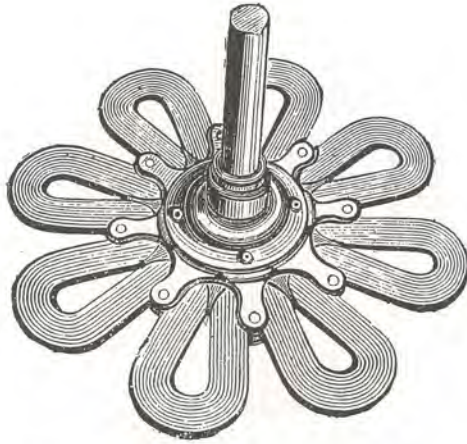
While in the Euston Road I went in to Caplatzi and found that my machine was sold and also got the £5.10.0. If I get employment next week I shall put £7.0.0 or so in the Post Office. . . .

By July perseverance had claimed its reward. He wrote to his mother from Siemens' works at Charlton on July 12th:

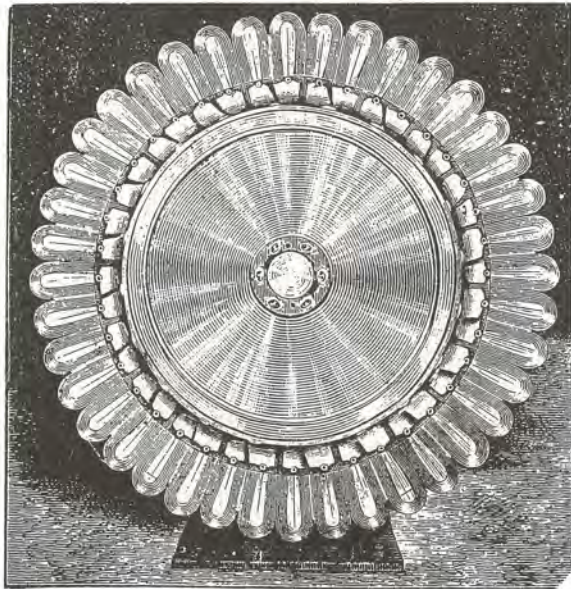
As I suppose you want some general news respecting myself and surroundings I will begin by telling you that the room which I now inhabit is a top one, and is exactly



COLLECTOR GEAR OF FERRANTI DYNAMO



ZIGZAG ARMATURE, FERRANTI DYNAMO



ARMATURE WHEEL

opposite the works, at some little distance; on each side of them I can see the river. In the evening the left side has the sun on it and looks like a sheet of gold. . . . There is a very nice eating house a few doors lower down, at the corner, where I get everything that I require at the following rate viz. Breakfast: 1 cup of coffee, bread and butter and eggs and 1 egg and one rasher for 4½d. Dinner: roast beef, mutton, ham and veal, beefsteak pie or the like, with peas and potatoes and some pie or pudding (rhubarb, gooseberry etc.) for 9d. Tea, 1 cup, 2 eggs and B and B for 5½d. I am very well satisfied with all that I get as I always find it very good. I go to the works in the morning at 8.30 and leave for dinner at 1; return at 2 and leave finally at 6, so that I do not have a bit more than I care for and am rather sorry when the time comes to leave. The only thing which I should like would be to be a bit better paid; which I hope will be the case later on.

But I must say that I have got a most fortunate place, that is I am alone with a very nice gentleman in the Experimental Department which is as good for me as if I was spending piles of money weekly on experiments. Our work is to try all the experiments for the Electric Light Department; also all the new machines and different combinations of different lamps; to measure the strengths of currents given out and Horse-power absorbed by the same, etc. etc. Three workmen do all that we require or tell them to do, so that there is no hard work and we can keep fairly clean and are supposed to look and act as gentlemen only. . . . The principal thing that a thorough electrician wants, besides a good knowledge of electricity, is mathematics and algebra so that I will be very glad if you can send me all my books on those subjects as I will set to studying them. . . .

As I am now writing I see that the lights which light up the works during the whole of the night have just started and I suppose that the twenty-one lights which light up three miles of the Victoria Docks over the water will start soon. The lights at Siemens shine into my

window and when I am lying in bed I see their light on the wall. . . . I think this is rather different to gas. In the evening I go for a walk in the beautiful country which lies at our back or go and sit down on the Charlton landing stage until bedtime.

Ferranti was gaining useful practical experience at Siemens, but there was little time for him to carry on his own independent research work. In such spare time as he had he attended classes at London University or worked at his models or made drawings of inventions in embryo. During the summer of 1881, at the age of seventeen, he invented his first alternator. It was made at the workshop of Mr. A. J. Jarman, of Richmond Street, St. Luke's, London, and is now in the scientific collection at the South Kensington Museum. A patent for the machine was taken out in July 1882 by Sebastian de Ferranti and Alfred Thompson.

During his short time at Siemens, Ferranti was sent out to superintend the installation of electric light in different parts of the Kingdom. In September he was at Wolverhampton in charge of the lighting arrangements at an Industrial Exhibition. In November he had returned to Town and was at work at South Kensington.

While at Wolverhampton, Ferranti went into an hotel one afternoon to get tea. In the tea-room was an engineer with whom he was slightly acquainted—Mr. Alfred Thompson. Mr. Thompson was keenly interested in young Ferranti.

“By the way,” he said, as they parted, “you ought to get in touch with a friend of mine—Mr. Francis Ince. He's a lawyer in London.”

“But I'm going in for engineering—not the law,” Ferranti objected.

“Oh, but unless you've met Mr. Ince you won't

understand. He's not the ordinary sort of lawyer. And what he doesn't know about electricity isn't worth knowing."

When Ferranti returned to London, Mr. Alfred Thompson took him to St. Benet Chambers, Fenchurch Street—the offices of Messrs. Ingledew, Ince & Colt, and introduced him to Francis Ince. They talked; Alfred Thompson left and Mr. Ince took young Ferranti to lunch.

From that first eventful meeting Sebastian de Ferranti came away somewhat dazed. He was only eighteen, the City was a place hitherto unknown to him. He had never before lunched with a lawyer, and this one fascinated him, for he had the technicalities of electrical science at his finger-tips. Mr. Francis Ince was an enthusiast who pursued law for his livelihood and science for his diversion. He had a large and rapidly growing practice in Fenchurch Street; his brother, Edward Brett Ince, was at the Bar and soon to become one of the leading Q.C.s. Unlike many enthusiasts, Mr. Francis Ince was, before all things, a practical man who believed and succeeded in getting things done.

In 1881 London was still lighted mainly by gas, oil-lamps, and candles. Electricity was beginning slowly to make its way. In Ferranti this enterprising lawyer saw a young genius and a genius after his own heart.

"And you mean to tell me you're content to be at Siemens," he said, "earning £1 a week! Good God!"

Lawyers see life on the seamy side; small wonder, then, that they become suspicious of all men.

"Ferranti," he said, "if you continue at a job like that I'll tell you what will happen. As soon as they discover you've got inventive ability they'll offer you



£5 a week and proceed to rob your brains. You'll do the inventing and they'll collect the cash."

This was rather bewildering, but it chimed in with certain thoughts that had arisen in Ferranti's own mind.

"Perhaps I'd better ask for a rise," he suggested.

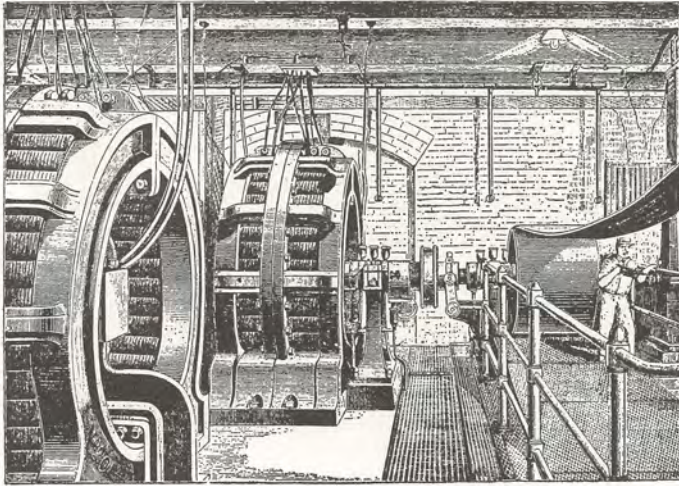
"For God's sake don't do anything of the sort," Francis Ince advised. "Just clear out. That's no place for you. You might stay there till your teeth fall out and never get a dog's chance of doing anything. There's only one thing for you to do. You must start right away on your own."

Ferranti objected that he had no capital.

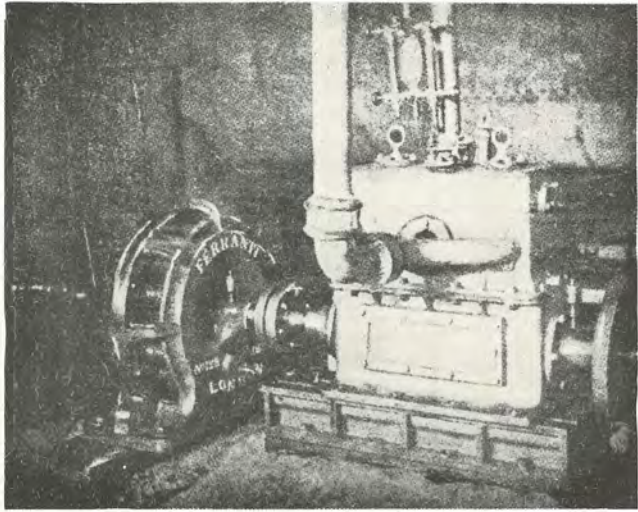
"Leave that to me," said his new friend.

As a result of this meeting, Ferranti's invention of the zigzag armature for dynamos was taken in hand by Mr. Alfred Thompson and Mr. Francis Ince. The first company (Ferranti, Thompson and Ince, Ltd.) in which Ferranti was interested was formed in 1882; he being given the post of engineer to the company though only eighteen years of age. On investigation it was found that Lord Kelvin, then Sir William Thomson, had invented a machine which, in many respects, was identical with the Ferranti alternator, and an arrangement was made by which Sir William was guaranteed a minimum royalty of £500 per annum, the machine to be known as the Thomson and Ferranti alternator.

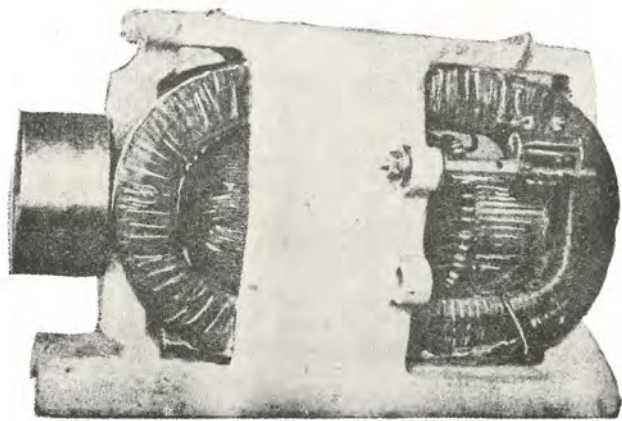
The Ferranti dynamo proved to be a marked advance on what had been accomplished, and created a sensation in the electrical world. Even the public Press of the day was impressed by the fact that the new machine gave five times as much light as other machines of the same size. Genuine alarm was felt among the owners of other electrical machines, the Brush generator being the most prominent. An article appeared in *The Times* of September 22, 1882, in



VIEW OF ENGINE-ROOM AT GROSVENOR GALLERY



A FERRANTI SHIPLIGHTING SET



DYNAMO, NICKNAMED THE "RABBIT"

*(Made Entirely by Sebastian  
First Commercial Success)*

which attention was drawn to the disturbance Ferranti's machine had created in the industrial world:

Electrical scientists have been diligently at work trying to improve upon the bulky and expensive dynamo machines now in use, and we understood that Sir William Thomson patented a new invention for a simpler and more efficient dynamo machine only a short time before an electrician in Messrs. Siemens establishment hit upon much the same thing. The great feature in the new machine is the absence of iron in the revolving armature, very greatly decreasing its weight, and, by enabling the field magnets to be brought very close together, greatly increasing its efficiency. In fact it is stated that a Ferranti machine to produce 10,000 incandescent lights can be manufactured for less than one-fifth of the cost of the cheapest dynamos at present before the public. The increased efficiency of the new machine is aided by the abolition of the commutator. The announcement of the new machine has been, we are informed, greeted with incredulity, and naturally some perturbation has been caused among those interested in existing dynamo machines, leading to letters having been addressed to us raising points in reference to engagements entered into with subsidiary companies.

A long article appeared in *Engineering* of December 1, 1882, on the Ferranti-Thomson machine, in which it was stated:

It is impossible to see, for the first time, this remarkable little machine running, without being struck with its exceptionally small size as compared to the work it is capable of doing, for on the occasion of its first exhibition to the public it was illuminating on one circuit no less than three hundred and twenty "twenty-candle" Swan lamps, to a luminous intensity which we should estimate at from fifteen to seventeen candles, although its total weight is under 12 cwt., and the whole machine measures only 24 in. × 20 in. × 18 in.

Many other references to the machine appeared in the London Press, and so general was the uneasiness felt at the results which would follow from Ferranti's invention that the Kensington Vestry had a bad attack of nerves. For we read in the *Kensington News* of October 4, 1882:

The Kensington Vestry is being drawn into the question of electric lighting; and the whole subject of electric lighting is in a state of utter confusion, and may be revolutionized at any moment by such inventions as that of the Ferranti Dynamo.

Towards the end of 1883 the Hammond Company, which owned Ferranti's patents, went into liquidation. Ferranti, however, succeeded in buying back the patents, and having purchased a few tools started manufacturing on his own account.

It was at this time that Ferranti became acquainted with the promoters of the Grosvenor Gallery lighting, an association that was destined to have a far-reaching influence on the public supply of electricity.

The station originated from Sir Coutts Lindsay's determination to light the Grosvenor Gallery by electricity, but demands from neighbours for current became so great that the plant soon became of considerable magnitude. The system, however, proved to be exceedingly difficult to work, and after negotiations Ferranti was called in, at the beginning of 1886, to act as engineer to the Grosvenor Gallery Company.

Ferranti, on his appointment to the Grosvenor Gallery, put in hand immediate measures of reform. The whole system was converted from a series into a parallel one. The Siemens alternators which ran the installation were rearranged, switchgear was designed and erected, and a voltmeter, in the shape of twenty-

## BIRTH, ANCESTRY, AND EARLY LIFE

four 100-volt lamps in series, was put into use, a Siemens dynamometer measuring the current. The overhead system was entirely remodelled, the leather thong for holding cables from a suspender wire was devised and adopted, oil insulators were used throughout, and eventually, after about a twelvemonth, the first machines were replaced by two Ferranti 700-horsepower alternators.

In addition to improving the generating plant, transformers were designed and made in various sizes and erected in the houses. The whole question of danger from fire was exhaustively considered, and by the aid of Mr. Musgrave Heaphy fire rules were framed which satisfied the authorities and placed no onerous conditions on the consumer.

Long before the Grosvenor Gallery had achieved success, Ferranti had laid down the principle that power generation should be done on a big scale, outside the great centres supplied, in places where land was cheap and water and coal available. Impressed with the soundness of these ideas and alive to the great future of electric lighting, the owners of the Grosvenor Gallery system decided to embark on a far larger enterprise than they had at first intended.

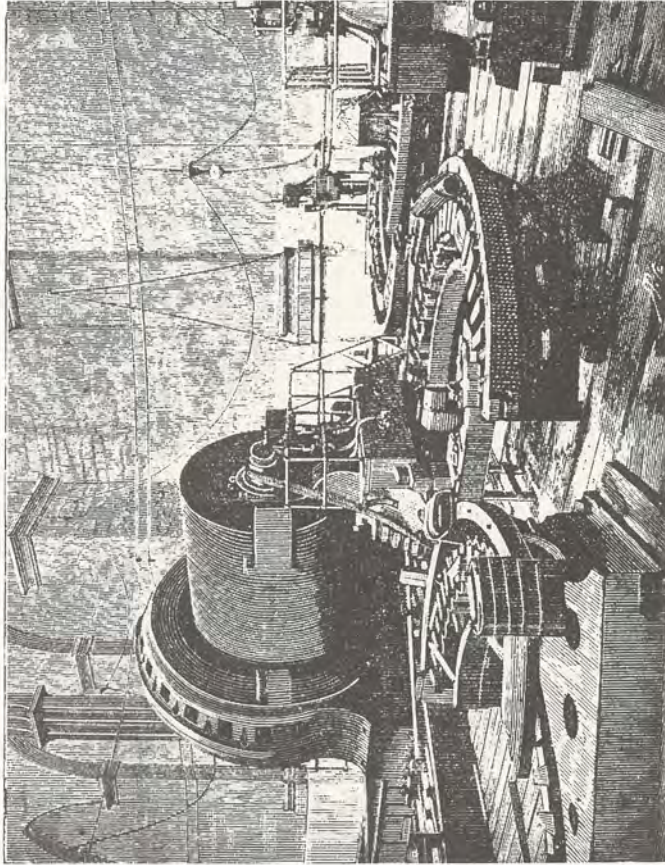
To find a suitable site would be easy. The difficulty lay in finding a perfectly safe means of handling the high-pressure currents which Ferranti advocated. Ferranti's solution of the difficulty was that it should be done by means of concentric mains with the outer conductor connected to the earth. This was rank heresy and—which was more important—it was contrary to the Board of Trade Regulations. So satisfied was Ferranti, however, that it was the only safe way of working that he took the responsibility of disregarding the Regulations, so as to force home the

correctness of the principle. His courage and determination carried the day and established what is now generally considered the only safe system for all high pressures.

Thus it happened that the Grosvenor Gallery works became merged into the London Electric Supply Corporation, a limited company with a subscribed capital of £375,000, and on the Board of Directors were the Earl of Crawford, Sir Coutts Lindsay, Lord Wantage, and Mr. Francis Ince; all of whom believed in Ferranti's ideas and in his ability to carry them out.

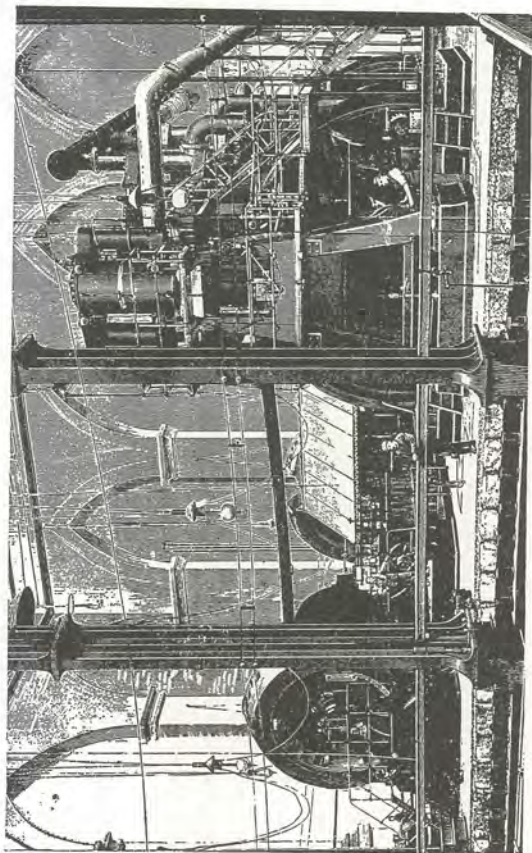
While acting as engineer to the Grosvenor Gallery Company in 1886-87, Ferranti was confronted with a difficulty that threatened to wreck the expanding business.

Some two or three years prior to this an ingenious French engineer, Monsieur Gaulard, had brought to England a system of electrical distribution which involved the transforming of high-pressure into low-pressure alternating currents. The alternating-current transforming was no new thing, for it had been suggested long before. But Gaulard, with whom Gibbs was associated, was the first to show the principle in actual practice. The system was received with much incredulity by many scientific men. There were others, however, who exhibited enough faith in the apparatus to adopt it for actual work, and the founders of the famous Grosvenor Gallery station commenced a system of lighting which depended on the Gaulard and Gibbs method of distribution. The result of this was that the owners of the Gaulard and Gibbs patents were continually threatening an injunction. It seemed as though Sir Coutts Lindsay's company must either contest the claim or submit to the payment of heavy royalties.



ENGINES AND DYNAMOS UNDER ERECTION AT DEPTFORD





FERRANTI DYNAMOS THAT LIGHTED LONDON

(*"Electrical Times"*)

Mr. Ince was consulted, and as a result of his advice a startling and dramatic change in the position was effected. Gaulard and Gibbs suddenly found the tables turned upon them. Instead of being the assailants they were called upon to show the justice of their claims. On July 10, 1888, Ferranti presented a petition to the Chancery Division of the High Court of Justice for revocation of the letters patent granted to Gaulard and Gibbs in respect to their system of distributing electricity on the grounds that the invention was not novel, that the patent would prevent the sale of secondary generators, and that it was injurious to the public.

Ferranti won his case. At the close of a long summing up Mr. Justice Kekewich gave his decision:

I am of opinion that what Messrs. Gaulard and Gibbs describe in their amended specification as their invention and for which they claim a monopoly, is not the proper subject matter of a patent, that, therefore, the patent granted to them ought to be revoked, and I must make an order for revocation as asked by the petitioner. The respondents must pay the costs, to be taxed on the higher scale.

Messrs. Gaulard and Gibbs took their case to the Court of Appeal. The higher Court upheld the finding that the patent was bad in law, and judgment was again given against them.

The promoters of the Deptford scheme were now free to go ahead. The scientific world was startled at the magnitude of Ferranti's plans. It was proposed to supply all-comers with electric light, and the scheme included plants which would supply energy for two million incandescent lamps. In every respect the works were to be a complete departure from existing practice.

Electric lighting had hardly achieved commercial success even on the smallest scale, and there were not more than a dozen supply works in England; and the the United States, with all its rapid progress, had comparatively few establishments.

Engineers were not very familiar with 500-horse-power engines for electric lighting purposes. Yet at Deptford it was proposed to employ 10,000-horse-power machines, while 1,500-horse-power alternators were spoken of as small units. Moreover, the few stations which in those days employed alternating-current systems were experiencing the greatest difficulty, not only in running the machines but in distributing electric energy. A potential difference of 2,500 volts was viewed by many with alarm; yet on the advice of a man whose age was scarcely twenty-four a large undertaking was created to work a system at 10,000 volts.

The establishment of the Deptford works and the history of their development are of permanent interest not only as a triumph in Ferranti's life, but as a new departure in the story of electrical progress.

The following article on Deptford, reprinted from the *Electrical Engineer* of October 26, 1888, gives an excellent account of Ferranti's work at that time:

The designer of the great Deptford installation was laughingly dubbed the Michael Angelo of that installation, because from first to last, from foundation to top of highest turret, architecture, materials, foundations, and machines, all were specified or designed by one man, and the credit of the success of the really first central station in England will have to be given, without detracting one iota in favour of any other person, to Ferranti. As our readers well know, we have pretty consistently spoken of the perseverance and energy shown at the Grosvenor Gallery

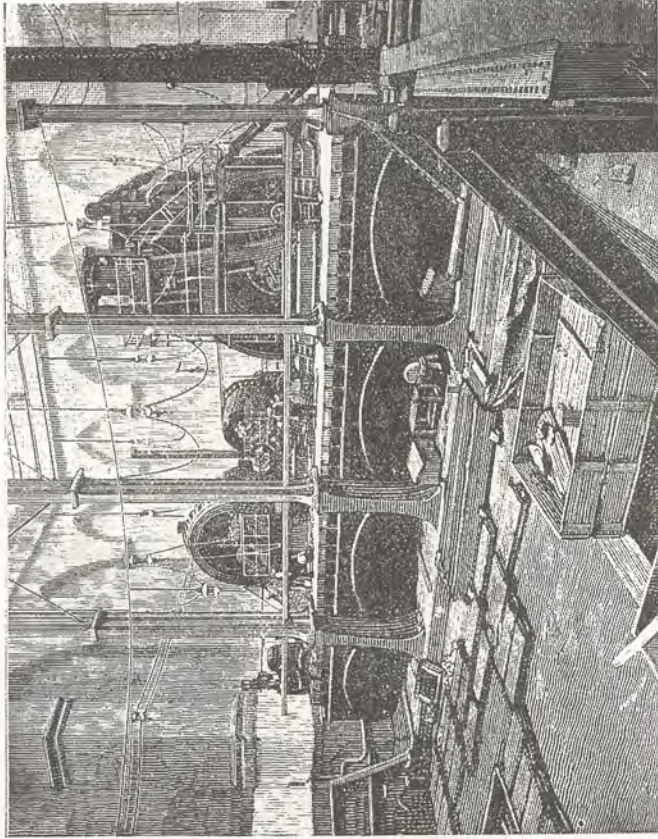
installation. Quietly and unostentatiously—too quietly from our point of view, for we could never obtain consent to say much about it—that installation has been carried to success. First undertaken as a private installation, it grew till it reached a plant designed for twenty thousand lamps, but that point has long been passed, and over thirty-three thousand lamps are lighted from this centre. Its capacity is reached. The promoters of the installation, however, confident in the possibilities of the electric light, confident in their business abilities, and supremely confident in their engineer, determined to erect what may really be termed a central station. It required some courage to jump from supplying tens to supplying hundreds of thousands of lamps, to put electric lighting upon the same footing as gas lighting, to supply an area as large as that supplied by the largest gas company. It required not only courage on the part of the engineer, but also a degree of confidence in himself that few men possess in the earlier days of industrial development. The question of distribution presented formidable difficulties, but it was met; experiments were made and a new design of main cables selected. A voltage unheard of in the previous history of the industry was determined upon, as were machines that even now frighten the cautious movers by infinitesimal steps. Nervous individuals talk of the danger to life and limb, but are met with a cool, calm, and confident assertion that you cannot get a shock accidentally, and it is doubtful if even a competent electrician could get one wilfully. Still, there is an old axiom that usually asserts itself when least expected—that the most probable is the unforeseen. So far the care taken in designing this installation seems to have left no loophole for dangerous shocks, but whether anything has been overlooked the future alone will prove. At any rate it may safely be predicted that the work will either be a gigantic success or a gigantic failure. If the former, as seems most probable, the future of electric lighting will be assured, for when the light is supplied at  $7\frac{1}{4}$ d. or less per unit there can be

no question of its power to compete successfully with the illuminant already in the field.

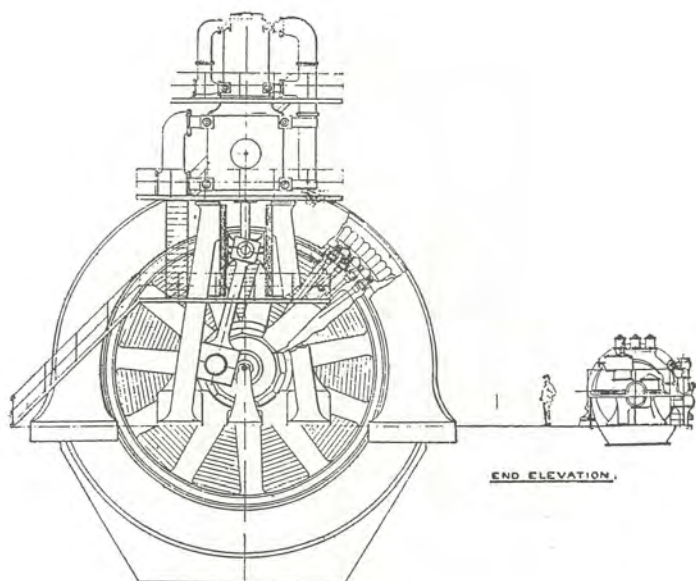
The *London Daily News* of September 23, 1889, in an article on "The Electric Lighting of London," paid high tribute to Ferranti's ability:

Mr. Ferranti, who is a young man, made some of his most striking inventions while he was still in his teens. Even the architectural plans of the Deptford works are Mr. Ferranti's. The Ferranti "mains" are believed to be one of the most valuable discoveries yet made in electric lighting. Here we must explain what is an electric "main." The electric "main" is simply the electric cable. And the Ferranti "main" or cable has the following characteristics—it contains, within the same casing, both the conductor for the "out" current and the conductor for the "return" current; and it may be laid down in the earth without any protection whatever. In other words, the Ferranti main consists of two copper tubes, one within the other; the two are separated by an "insulating" substance. Outside the outer tube there is another layer of insulating substance (Mr. Ferranti's invention); and then the whole is inserted into a protecting tube of iron. The "mains" thus completed, are laid down in lengths of twenty feet each. They now extend from Deptford, through Charing Cross to the distributing station at Maiden Lane. This is the section which will be ready to supply some twenty thousand glow lamps of ten-candle power each on the 1st October, as already said.

The world has heard a great deal of Edison; it has heard far less of Ferranti. The reason is probably to be found mainly in the fact that Edison came of a nation that sets a high value on self-advertisement and "boost," whereas Ferranti, with his mingled English and Italian blood, had all the reserve and something even of the shyness of the artist. He loved



VIEW OF ENGINES AND DYNAMOS AT DEPTFORD



ONE OF THE FERRANTI DYNAMOS AT DEPTFORD THAT LIGHTED  
LONDON  
(*"Electrical Times"*)

to talk of his work: he never spoke of himself or of his achievements if he could possibly avoid it. But, man for man, he was probably more highly endowed with the elusive qualities called "genius" than his better known American contemporary. This "odious comparison" is made because the *Pall Mall Gazette* of September 26, 1889, referred to Ferranti as "The Edison of England."

It was a great day at the Deptford works when, on September 25, 1889, Mr. Edison, then on a visit to England, visited the premises. A full report of his visit appeared in the *Daily News* of September 26, 1889, and is of interest for the information it gives concerning the progress of electrical science in England at that date, no less than for the light it throws on Edison and Ferranti, with their curiously different ideas and outlook.

In accordance with private arrangements made on the preceding day, Mr. Edison visited the Deptford works of the "London" Electric Supply Corporation yesterday morning. In front of the works there was a gay and liberal display of bunting in honour of the distinguished visitor. Among those who accompanied him from town, or who were on the spot to meet him, were Sir John Pender, with whom Mr. Edison has been staying during his short visit; Mr. Forbes, Mr. Ferranti, the London Company's engineer, whom we have dubbed the Edison of England; Colonel Gouraud, Mr. Verity, Mr. Pender, Dr. Hopkinson, Mr. Gordon, Mr. Ince, Mr. Pyke; Mr. Claremont, of the "Metropolitan Company"; Mr. Cunliffe Owen, Mr. Bain, Sir Coutts Lindsay, of whose place in the history of electric lighting we have formerly spoken; and the present writer. It was a delightful day—for a sharp walk; but the wind from the river "bit shrewdly." Mr. Edison felt it, for he was still suffering from his severe cold. He looked a dozen years older when, escorted by Mr. Ferranti and Sir



John Pender, he entered the gateway, with his coat-collar up to his ears, a white muffler about his neck, and his hands stuck in his pockets. His face was much paler than usual. But he soon appeared to forget his indisposition when he began his inspection of the wonderful machinery. He spent a long time minutely examining the immense engine and dynamo which it is hoped, will in a few days begin to supply lighting current over one section of the London region which has been assigned to the Company. But as to the outfit of the works, as they will be several months hence, when the ten thousand horse power engines are erected in the lower area of the building, Mr. Edison could only infer what it will be from the plans on the spot and from Mr. Ferranti's description. . . .

The great Edison was certainly impressed—probably rather unwillingly—by much that he saw at Deptford. There was a great deal of which he disapproved. But then Ferranti had not been trained in the States—a cardinal error!

The article continues:

Mr. Edison's own system of lighting in America is the low-pressure system; the London Company's is the high-pressure; Mr. Edison's is the system of direct current, the London Company's is the alternating current. "Our New York tension wires," said Mr. Edison, "are so absolutely safe that even a child may play with them," and suiting the action to the word, he held up his hand, moving the fingers. Then he spoke of the risks of "an enormous pressure through a narrow wire." In the London Company's system the wire is replaced by a hollow tube. But I must carefully guard the reader against supposing that Mr. Edison thinks the "London" Company's method "won't do." It is a question of how to obviate the risks, the existence of which Mr. Ferranti himself fully admits. And Mr. Edison himself, when summing up his impressions, exclaimed in his hearty way:

## BIRTH, ANCESTRY, AND EARLY LIFE

"Oh, it will go." "In American towns," said Mr. Edison, replying to another question of mine, "we have a number of small stations instead of one or two huge ones, like the one at Deptford. A very high tension necessitates the use of a large single central station."

The mistakes of great men are instructive. Certainly Edison came a severe cropper in his criticism of the Ferranti system. The conversation was tactfully turned to the United States. Mr. Edison immediately cheered up:

"How many lights have you in New York?" I asked. "Seven hundred thousand," replied Mr. Edison. "Seven hundred thousand all going at once." I had just been saying to him that although London had been slow to move, the two London Companies whose works he had been inspecting hoped to be able, by and by, to supply London with two and a half million of lights. "Yes," Mr. Edison said, "but the population of New York proper is about one million, and seven hundred thousand in a million is a higher proportion than yours."

So that was that.

The engineering papers and even the general Press during 1889 are full of references to the battle that was raging between the advocates of the high-tension and the advocates of the low-tension systems of electrical supply. In the West End regions of London there were companies which had adopted the low-tension system. Mr. R. E. Crompton, M.I.C.E., was the leading exponent in London. Mr. Crompton was consulting engineer for nearly all the low-tension systems in the capital. Ferranti was the leader of the high-tension school, but Mr. Crompton had Edison on his side. Looking back on the history of the struggle it is interesting to note how keen the controversy was.

And, characteristically, Ferranti contributed very little to it. Like Brer Rabbit, "he lay low and said nuffin," but his ideas most triumphantly won the day despite the big guns of Edison.

Even *Punch*, least technical of journals, found it impossible to keep Deptford and the Ferranti-Edison controversy out of its pages, and on October 5, 1889, the following verses appeared:

SWEET SPIRIT, HEAR MY PRAYER

JOHN BULL

Stay, spirit of light, the most scintillant star,  
In the glorious star-spangled banner—by far,  
Stay, spirit of light, yet awhile, and convince  
Ferranti, and Pender and Gordon and Ince,  
And other my own lesser lights, if you may,  
That obscurantism—in Lighting—won't pay.

EDISON

Nay, Bull, my well-meaning but blinkered old 'oss,  
You must do that yourself or put up with the loss,  
I have dropped you some tips, you must just make the  
best of them;  
Time—at your own plodding pace—must be the test of  
them.  
I've kindly admitted you still have some go,  
You haven't yet mastered the big dynamo.

JOHN BULL

No, that's what I fear; my own knowledge is scanty,  
And I can't decide between you and Ferranti;  
But, if we are licked by Berlin I must try  
To stir up the slugs of the "London Supply."

## BIRTH, ANCESTRY, AND EARLY LIFE

EDISON

Ah, do so, dear boy; you are slow to begin,  
But when you have once made a start, you MAY win—  
Oh, that wink was quite friendly?—you ask, Sir John  
Pender—

And I wouldn't tread upon corns that are tender.  
The sprite electricity's wide in its action,  
Why shouldn't YOU use it for lifts and for traction?  
Electrical railroads—we've thousands of miles  
In the States—you ignore, and a Yankee it riles  
To travel half-choked in your "Underground Tophet,"  
Which lasts in defiance of pleasure and profit.  
Britons must have a love for discomfort and mull, for  
They stick like grim death to dark, choke-damp and  
sulphur!

JOHN BULL

Then stay, Spirit, stay, till my guides are enlightened!

EDISON

Great Scott, what a prospect, I feel fairly frightened!  
No, no, John, I'm off. You're muddled no doubt,  
By monopoly, prejudice, all the old rout  
Of obstructives that tangle your pathway like wires,  
But putting your foot down is all it requires.  
Au revoir, I can't stay any longer this bout,  
I'm off to invent something else; and no doubt  
By the time I come back with a startler or two,  
You'll have got London lighted. But, hurry up do  
For I can't make a pause in the Progress I love  
Till the British Behemoth chooses to move.  
Ta-ta! You can do fairly well if you try.  
For the present, you dear darned old country, good-bye.

In view of the ignorance (and consequent nervousness) of the general public concerning matters electrical, a fire which occurred at the Grosvenor Gallery station

in November 1890 was a serious set-back to development. In an interview, Ferranti gave the following account of the disaster:

The accident occurred at 6.30 on Saturday morning owing to the action of a linesman in plugging on a fresh set of converters. The man was not sufficiently cool for this particular purpose. Hesitating in putting on the switch, it arced slightly: instead of pushing it in, he drew it back and broke the contact. The heated surfaces, together with the 5,000 volts pressure, which was being used, caused the arc to maintain. It ran up the woodwork and set light to the ceiling, which was composed of cross boards with tar between for the purpose of keeping out moisture from the tank which formed the roof. The whole place was burnt down in the brief space of twenty minutes. An hour after the accident occurred the whole place was quiet and fairly cool. The linesman had ample opportunity of entirely stopping any damage from his first carelessness, because the switch which he put on was only a plug, and meant for connecting a circuit, there being a large switch within a yard's distance for breaking the supply passing through the plug switches. If he had been too frightened to turn off the switch, he had again another safeguard in the safety switch at the end of the room, which would cut off the whole supply from Deptford. He also had the option of signalling to Deptford to stop the supply, but this was stopped before the man could have finished signalling, as they saw by the action of the ammeters and voltmeters at Deptford that something was wrong in London. We believe that the cost of the destroyed apparatus amounts to between £15,000 and £20,000, all of which was uninsured.

This accident had nothing whatever to do with the high-tension or low-tension system, and in this connection it is interesting to record one of the experi-

## BIRTH, ANCESTRY, AND EARLY LIFE

ments that was made to show how perfectly safe Ferranti's concentric mains were, even when conveying currents of 10,000 volts, if the outer was only "earthed." The experiment was made before representatives of the Board of Trade and many of the London vestries, and consisted in Mr. Kolle, one of Ferranti's assistant engineers and a lifelong friend, holding an uninsulated chisel while it was driven by means of a sledge-hammer through a concentric main in which a current of 10,000 volts was passing. The chisel short-circuited the main, the supply was cut off by the fuse of the machine burning, and Mr. Kolle is still alive.

Of the trials and difficulties that beset Ferranti in his magnificent efforts to build up the Deptford supply station, none can speak without wonder. It was all pioneer work. There was no experience to guide him, no knowledge to which to appeal. There was simply a deep conviction of success to help him in his single-handed attempts to grapple with a subject full of most subtle difficulties. Engineers of the highest skill and of world-wide reputations again and again insisted that what he was trying to do was an impossibility. Electricity in such high power could not be successfully transmitted. But Ferranti, wasting no time in argument, persevered, assured of ultimate success. In 1891 Mr. Staat Forbes, Chairman of the Electrical Supply Company, stated:

I do not know of any man who has had a more terrible responsibility upon his back than Mr. Ferranti. He pledged his reputation, his future, his labour—day and night—to achieve the result he promised to the directors. He has achieved it greatly and has done so much in redeeming what a year ago seemed a most difficult position and a most uncertain one, that he is justified in his present opinion which is expressed in this paragraph:

SEBASTIAN ZIANI DE FERRANTI

"I desire to call attention to the fact that from the commencement of your operations to the present time, no engineering or electrical difficulties whatever have arisen which I have not been able to overcome."

On April 24, 1888, Sebastian de Ferranti married Gertrude, the second daughter of Mr. Francis Ince, and it is her pen that continues the narrative of his life and work.