

A NEW ARCHIVE OF GISBERT KAPP PAPERS

with special reference to his Autobiography

By Gordon Tucker

(Presented at the Weekend Meeting by Lenore Symons)

PART 1

Introduction

Gisbert Kapp (1852-1922) was a well-known pioneer of electrical engineering, particularly in the field of dynamo design, from 1882 onwards. He was particularly associated with the concept of the magnetic circuit, developed independently by him and John Hopkinson in 1885. He was manager of R.E.Crompton's Chelmsford electrical works from 1882 to 1884, and then as an independent consulting electrical engineer did a great deal of design work for W.H.Allen & Co. His design notebook (like that of his successor at Allen's, C.C.Hawkins) is now in the IEE Archives. From 1891 to 1894 much of his time went in designing the new central electric lighting station at Temple Back, Bristol, officially as assistant to W.H.Preece (later Sir William Preece, F.R.S.), who paid him what was probably half his commission for doing nearly all the work and getting little of the credit: there is a letter setting out the agreement between them in the new archive. From 1894 to 1905 Kapp was in Berlin as General Secretary of the Verband Deutscher Elektrotechniker and also as part-time lecturer in the Technischen Hochschule in Berlin (Charlottenburg) - all this while maintaining private practice. In 1905 he was invited to the new Chair of Electrical Engineering at the University of Birmingham, which he occupied with distinction until 1919.

Kapp married in 1884 a woman of only 20, and they had two sons, one (Reginald Otto) becoming in 1935 the Professor of Electrical Engineering at University College, London. (His son, in turn, is an electrical engineer.). Kapp's wife, Teresa (generally known as Treacey), while being a good hostess and singer, was said to have been a difficult woman. After Kapp's death in 1922, she moved to Italy, having quarrelled with her surviving son Reginald, who in consequence never saw the autobiography written by Kapp, which is the main subject of this paper and which was intended for his sons to read. After Treacey's death, her Italian maid retained her papers, and in the 1980s, in her old age, succeeded in tracing Reginald's daughter, Dr.Elinor Kapp, through the Public Trustee, and sent her the collection of papers. Dr.Kapp contacted the present author, and it was arranged for the papers to be deposited in the Archives of the University of Birmingham. Photocopies are available in the IEE Archives.

Content of Archive

The papers are basically of three types:

- (1) Gisbert Kapp's baptismal certificate,
- (2) A large collection of letters received by Kapp during the years from 1887 up to his death, with a few letters received by Mrs.Kapp in 1923 and some (drafts or copies) written by her.
- (3) Kapp's autobiography, either unfinished or with a later part missing.

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To go into a little more detail:

(1) The baptismal certificate, dated 19 September 1852, was written in a mid-19th century German script which proved difficult to decipher, but with the help of Dr. Richard Littlejohns of the German Department at Birmingham, a transcript and translation were eventually obtained. Kapp was born on 2 September 1852 at Mauer, near Vienna, and on 15 September was baptised as Gisbert Johann Eduard Karl Kapp. It is believed that this is the first time that his full name has been revealed. He never, in his professional career, called himself by any forename other than Gisbert.

(2) The letters have been sorted into four groups:

- (i) letters in English, 1887-1899,
- (ii) letters in English, 1900 onwards,
- (iii) letters in a foreign language (almost all in German),
- (iv) miscellaneous undated letters.

The letters in Group (iii) are very difficult to read and have not yet been transcribed or translated, and thus their importance has not yet been assessed. Group (i) is important in showing Kapp's professional standing, and his correspondence with Preece over the Bristol consultancy is particularly interesting. Group (ii) is comprised mainly of letters of a slighter character, often concerning social activities, and invitations to visiting distinguished people to accept the Kapps's hospitality.

(3) The Kapp autobiography is very interesting as well as important. It was prepared during Kapp's period at Birmingham solely for a family readership. It amounts to nearly 10,000 words. In consequence, the first 40%, concerning Kapp's family background and his pre-professional days, together with approximately 10% of the later part, have been presented in Part 2 below only as a summary. The rest, which covers all Kapp's period of professional engineering activity from September 1872 up to his leaving Crompton's Works in 1884, is presented as a full transcription with only very minor editing.

Kapp's career after 1884, together with addition detail of his early life, is described in the booklet 'Gisbert Kapp, 1852-1922' prepared by the present author in connection with the naming in 1973 of the then new building of the Department of Electronic and Electrical Engineering at the University of Birmingham, which became the Gisbert Kapp Building. A few copies are still held by the author, who will supply one to any interested person as long as stock remains.

PART 2

Summary of the parts of Kapp's Autobiography which are not presented in full in Part 3

Kapp's account of his family history was derived from his mother by verbal communication, and is therefore not very precise. His mother's branch. Her family was of Scottish origin, and her father's name was Young. His father was a Jacobite and had to flee from Scotland, taking service in the Bavarian army and marrying a Bavarian lady. Kapp's mother had three brothers; one became a painter and was 'persona grata' at the Danish court; the other two were also well-off. There was also a step-brother who was not much older than Gisbert, and was a good friend.

Kapp's mother, when in England, saw Lord Palmerston and was told that her eldest brother Eduard had a good chance of recovering the Young's Scottish estates if he argued the case in Parliament.

Eduard also had the chance of inheriting the property of a more distant relative in Australia, but he did not follow up either opportunity.

Kapp's father's branch. His great-grandfather had an estate near Mannheim. The son who was Gisbert's grandfather was appointed tutor to the sons of Prince Lobkowitz in Silesia, and became a personal friend and then estate manager of the Prince, who in the 1810s gave him in gratitude an estate in Austrian Silesia. He had several children who seemed to do quite well. Gisbert was very fond of his uncle Johann (generally called Borle) and saw a lot of him. Gisbert's father became a civil servant in charge of the docks at Trieste, but died in 1856 when Gisbert was only four years old.

Gisbert's early life. His father's death left his mother rather poor and she earned what she could by giving singing lessons. She determined to become an operatic singer, and in pursuit of this career she moved about Europe, so that Gisbert spent only a part of his early life with her, staying long periods with relatives. His education started in the Loewenburgisches Convent, but the curriculum was too narrow, and he moved to the 'elementary school' in Vienna, and then to the Realschule in Prague. He did not get on well with the relations with whom he stayed in Prague, became 'lazy and naughty' (to quote his own words) and failed the third year. It was his uncle Borle who persuaded him to reform, and he did quite well thereafter.

It was in Prague that Gisbert started to learn the piano, and developed the interest in music that he retained for the rest of his life.

He left the Realschule just before he was 17, and went to the Polytechnicum in Zurich for his engineering education. He spent three years there, made good friends, had good vacations, and at the end was found a job by Prof. Veith at the Maschinenfabrik Augsburg ('at £1 a week'), which he started on his 20th birthday.

Throughout his early life, Gisbert showed a sense of adventure, and in the autobiography he tells some good tales of adventure, including bursting into a hut at the top of a mountain at midnight to be confronted violently by one of a gang of smugglers!

PART 3

Transcription of part of Kapp's Autobiography

His professional engineering activity, 1872-1884

At Augsburg, another Zurich man, Alois Bock, also entered with me and we lived together in the same house. Bock was in the turbine department and I was under Herr Bissinger on printing machines and Sulzer valve engines. The printing machines did not interest me much, but I made a special study of the Sulzer gear and applied Zeuner's Valve Diagram to this mechanism. I published the theory in Bornemann's 'Der Civilingenieur' and it appeared some months afterwards when I was in Vienna. By a curious coincidence I boarded the same tramcar on which was Proell of valve gear fame and he and I had a number of the paper under the arm which had reached us

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simultaneously. Proell had an article in it on his gear and my article was on the Sulzer Gear. Thus we became acquainted during the Vienna exhibition in 1973, but I have not seen Proell since then.

My stay in Augsburg was short, for I got an appointment as 'Inspector in the Agrikulturhalle West' at the Vienna exhibition; I believe chiefly through the intervention of a Mr. Depretis, an old friend of my father's. When I got to Vienna and called on Mr. Depretis he asked me whether I wanted money, for my salary would only be paid at the end of the month which was still a fortnight to wait. Very foolishly I said no, but I had only very little money left and how to manage a whole fortnight was a difficult problem. I restricted my food to bread and cheese, but even with this economy there came a day when I had to starve. Then I wrote to my Uncle Pepi and by return of post I got a banknote from him. In Vienna I made the acquaintance of Max Eidth, a man of great and ready humour.

The Vienna International Exhibition proved an indirect stepping stone for my coming to England eighteen months later. Whilst in Vienna I got a letter from Gwynnes in London asking whether I would put up their exhibit of centrifugal pumps and gas exhausters. It appears that my mother in her desire to help me on had called on Gwynnes and asked whether they had a job for her son. They had not, but on hearing that I was in Vienna they thought this a good opportunity of saving the cost of sending one of their men there to put up the exhibit and that is why they asked me to do it. There was no pay, but simply re-imbusement of expenses. The absence of pay I did not mind for my salary at the exhibition of 180 fl. a month appeared to me in those days so ample that I had no need to supplement it. I did however supplement it in a small way by writing articles on the exhibition in Italian for some paper the name of which I cannot remember. The pay was probably rather low, but considering that my Italian must have been from a literary point of view very imperfect, the pay was probably adequate to the service rendered. An attempt to write for the Neue Freie Presse in Vienna failed. The Editor sent for me and asked whether I would write technical articles for his paper. They were to be on exhibits of merit. I agreed and said I would select such as had real novelty or other merit. 'Oh no', said the Editor, 'you must not select anything, but give favourable notice on those exhibits which I shall indicate to you'. These terms I refused. It was my first glimpse of the journalistic dishonesty on the Continent; later on I had other examples, notably in Berlin. I remember once complaining to Mr. Rathenau about the shabby way the Vossische treated me. He said that all papers were run on dishonest lines. He boasted that he could if he chose make a paper say one day a thing was white and on a subsequent day make the same paper say that the same thing was black.

The few months I stayed in Vienna were very enjoyable. I had little work in the exhibition and could study many things there at leisure. Also I made excursions into the Wiener Wald with my Uncle Gustav and I met many jolly people. Among the visitors to the exhibition came a Mr. Hudson, the chief draughtsman of Gwynnes to see how the exhibitions of his firm looked amongst all the other things. Hudson was not of the jolly sort, but rather gloomy,

except when we got jolly at some country inn. Then Gustav would break out into verse and say to him: 'Herr Hetzen, sie haben an Fetzen'.

In September 1873 I had to join the Austrian Navy and went to Pola. (Editorial note: This place is now called Pula, and is on the north-eastern Adriatic coast.) At first six weeks drill and barrack life, then into the technical office and private lodgings. In Pola I had to present myself to the Port Admiral. His name was Bourgoyne and his wife was an Englishwoman. In those days the English were admired by Austrians. I met a good many Engineers, generally a rough lot who resented the preferential social position of the deck officers. There was, however, not very strict military discipline. We Freiwillige mixed pretty freely with the naval officers and quite intimately with the engineers who held captain's rank. We also had much freedom in our private life. One of my colleagues (an Iстриan) and I used to go for long walks to some remote bay and have a swim. One day we swam across an arm of the sea and on the return my friend exclaimed that a shark was after us. I had also seen a commotion in the water and as our regular bathing place was protected against sharks by wire netting it seemed not unlikely that my friend was right. We swam frantically and reached the shore in safety, but our scare became known and after a few days there came an Appell and an order that henceforth no one was allowed to bathe outside the protected water.

My work in the drawing office at Pola was mostly the arrangement of pipes in warships. I had also to assist in trial trips, being generally told off to one of the indicators. I devised a clip for adjusting the length of the cord and as I found this very useful I thought it might have some value generally. So I sent one of my clips to Schaeffers in Magdeburg (makers of indicators) and in return got a letter from them including a bank note (I believe it was 100 M) and the intimation that the firm of Schaeffer and Budenberg would at any future time be pleased to hear from me if I had other inventions to submit. So this was the first payment I got for an invention.

In those days the correct form of the propellor was a favourite subject for the marine engineer's speculation. I was bitten with the same craze and as I had to pass on my way through the arsenal one wing of a Griffith propellor that stood on the quay I often stopped and tried to understand why this particular form should have advantages. I had a kind of instinctive feeling that there must be a scientific reason for making the blade narrow at the boss and tip and wide midway. These cogitations finally crystallised in my studying the theory mathematically and I found that at a particular distance from the axis the angle of incidence between the surface of the blade and the stream line of the water striking it is a maximum. This means greatest force with least surface friction. The unit of surface at that particular radius is therefore more valuable than at any other radius and it is natural that one should make the surface as wide as possible at that part; hence the peculiar form. I published my theory in the journal 'Der Civilingenieur' and also an article on compound engines for warships. In the second article I took the wrong view, but my article on the propellor was all right and later on it has been the means of getting me on to the staff of abstracters of the

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Institution of Civil Engineers whereby I was able to supplement my income when I came to London. At the end of my year's service in the Navy I was offered the post of Third Engineer (Lieutenant's Rank) if I would stop permanently in the Navy, but I had meanwhile received an offer from Gwynnes to enter their drawing office so I preferred to come to London.

My first employment in London - 1874. On quitting the Navy I went first to Milan, where my mother and sister were, and then went through France to London. The journey third class through France was very tedious. From Paris I went by the Dieppe route as being the cheaper and arrived in London by mid-day. I went straight to Gwynnes, where I met Mr. Allen who told me how my mother had walked into his office two years previously to ask for a job for me. Mr. Allen was evidently impressed by my mother's quest and spoke with admiration of her. I was to start work the next morning. I found lodgings through a chance acquaintance I had made on the journey. The house he directed me to was in Cloudesley Road, Barnsbury, about an hour's walk from the Gwynne works in Essex Street and I stopped with the same people all the time I was in London, that is up to 1879. My salary was £2 a week and my position that of Chief Draughtsman. It appears that Mr. Hudson had had a dispute with the firm and had left before I came. So the firm put me into his place. My work at Gwynne's was very interesting. At that time the Dutch windmill-pumps were beginning to be discarded and steam pumps put in their place. Gwynne's so-called Patent Pump was quite unsuitable to deal with large quantities and low lifts, but he had the reputation of being a pump maker and so he managed to get orders, but to carry them out on the lines of his patent (the tips of the blades curved forward) would have been a dismal failure. I set myself to study the centrifugal pump on the basis of Zeuner's turbine theory and designed on these lines. Later I published my theory of centrifugal pumps in Der Civilingenieur and I also wrote a few smaller things (I forget now on what subjects) in Dinglers Polytechnisches Journal. Together with the work I got on the Scientific Abstracts of the Inst. C. Eng. this helped me to make a little more than at Gwynne's office. But my £2 a week soon increased and by the time I left Gwynne's my salary was £4 or £5 a week, I forget the exact figure. I had frequently to go to Holland to test the pumps I had designed and I had also to travel in Britain in connection with turbines, gas exhausters and pumps, the latter for dry docks. In pumps for dry docks the lift is generally quite suitable for a centrifugal pump, but sometimes we got enquiries for high lift pumps. To get over this difficulty I wanted to make a multiple stage pump; the water would be taken from the outlet of the first pump into the inlet of the second and so on. Mr. Gwynne would not hear of this and so my suggestion was never carried out. Nowadays multiple stage pumps have become quite common.

One of the jobs I had to attend to was a turbine in Killarney on the estate of Mr. Parnell. I had generally to deal with his cousin and agent, a Mr. Herbert (I believe he was assassinated by moonlighters a few years later) but on one occasion I met Mr. Parnell. In those days the English papers could say nothing bad enough of the Irish in general and of Mr. Parnell in particular and I quite expected that I would meet a villain armed with pistols and daggers. I was surprised to meet a perfectly well bred and kindly gentleman with agreeable manners even to such a lowly

individual as a mechanical draughtsman. One of my jobs was the design of the pumping plant for the Amsterdam floating dock, the dock itself having been designed by a Mr. Schermund of Dortmund and made by the Union Co. of that town.

In a floating dock it is essential that the delivery of all the pumps should be under perfect control so that the dock should rise out of the water on an even keel. Before the test in Amsterdam I spent a sleepless night, because a storm was raging and the chance of the dock blowing over if any pump failed was not quite remote. The pumps behaved, however, quite well and the test passed off successfully. Many years later I met Mr. Schermund in Dortmund and in talking of those days he confessed that he also had spent a sleepless night before the official test. On that occasion he asked me if I had a relation who wrote books. He evidently did not credit me with the ability to do such a thing; in his opinion it must be someone else, not the man he knows. Gwynne's agent in Holland was a Mr. Aloys Bock. At that time there came up several problems of pumping polders where the lift was very low (a metre or so) and the quantity very large. The ordinary centrifugal pump, even with the improvement of a spirally expanding case and a diffuser and siphon at the discharge, is not suitable for such cases. I designed an axial pump, but Gwynne as usual would not hear of any newfangled thing. So I spoke to Mr. Bock about it, who saw the advantage immediately and had a model pump built to my design. We tested it at his house and it worked perfectly. Bock was delighted and we both thought that we would make a fortune out of this pump. But as far as I know he never got an order, or at least he never sent an order for such a pump to Gwynnes and I have never made anything out of it. The same principle I applied to the propulsion of ships and a propellor with guide blades was built to my design by Yarrows and tested on a launch. By the time these tests were made I had left England and I do not know what has become of this propellor. I have not patented it.

One of the problems which I had to solve whilst at Gwynnes was pumping gas from the Beckton Gasworks to the Vauxhall gas-holder. The erection of new gasholders in London was forbidden by an Act of Parliament (so Mr. Allen told me) and as the requirements of South London had outgrown the capacity of the original holder, it was necessary to convey gas from Beckton. The Beals exhauster, which is the most convenient form of gas pump, causes a certain amount of fluctuation in the pressure and before it could be used for this purpose, it was necessary so to modify it that the stream of gas coming from it should be absolutely steady. I solved the problem by arranging a by-pass which lets just enough gas to slip back to prevent pulsation. This was made and worked quite well. One day I saw in the patent record of the paper that Gwynne had patented my invention. When I remonstrated, he said that I had made the invention in his time for which I was paid and that all work done whilst I received my regular salary belonged to him. This is a point which has often been debated. The German firms have a clause in the agreement which the employees have to sign to the effect that inventions made by any individual belong to the firm. It seems to me an unfair position and if I had gone to law it is possible that Gwynne would have lost because in English patent law the patentee must declare that he is the true inventor. Gwynne was certainly not the true inventor and in

patenting and subscribing to this declaration he had perjured himself. He might, therefore, have lost the case, but law is an expensive thing and I would certainly have been beggared by an action. I therefore resolved to accept another position which luckily had been offered to me just at the time and so I left Gwynne in 1879 after five years' employment there.

Agricultural Machinery. The opportunity of another employment was procured me by Uncle Eddy who was at that time British Vice-Consul in Milan. Mr. Cantoni was the consul and had an agency for agricultural machinery of Hornsby's make. The business did not go very well and on Mr. Cantoni's suggestion Hornsby's resolved to employ a technical man to go to Italy and work up the agency. A few years previously Cantoni had offered me to become manager of a small engineering works he had established in Legnano. This I had refused and one of my schoolfellows of the Zurich days, Franco Tosi, had taken on this work and made a splendid success of it. Poor Tosi was shot by one of his own workmen about the year 1897.

As I knew nothing about agricultural machinery I went first for a few months to Grantham and learned to plough, mow, reap and thrash. I then went to Italy and worked up the business. I travelled about a good deal visiting existing agents and establishing new agencies. Cantoni had bought a large number of reaping machines and refused to pay for them. I had, therefore, to bring a lawsuit against him. He lost, but far from bearing malice he came to me after the trial and in the most friendly way asked me to become identified with him in one of his numerous industrial undertakings. After a year spent in Italy, Hornsby's sent me to Algiers, Egypt, Cyprus and Russia. All this was interesting enough, but not quite the kind of work I really wanted. The pay was reasonably good - £300 a year and a commission on the sales. In fact Hornsby's found that the pay was too good, for after I had established the agencies and everything went well, there was as they thought no more for me to do and they discharged me. It is true that in their letter of discharge they expressed appreciation of what I had done for the firm, but still they discharged me. This did not come as a severe blow, for I had made up my mind that in electrical engineering there was more to gain than in old industry and I had an idea that if I could enter the field at the beginning I would have a better chance not only of interesting work, but of better pay.

Electrical Engineering - 1882. My first experiences were discouraging. I did not find it so easy to enter a new profession as I had thought. In 1881 on my way to Russia I had passed through Paris and visited the electrical exhibition there. This visit had become the immediate cause of my resolving to become an electrical engineer as it had been in the case of many others. When passing through Vienna, I called at the Polytechnikum and saw the professor of Physics to ask him what book he would recommend to study electricity. He recommended Ferrini (translated into German by Schroeder) and Wuellner. I bought these books and on the long and slow train journeys through Russia I studied them. The mental equipment I got out of these books was not very large, but it was not worse than that of other men who had entered the profession. Yet when I came to ask for a job in the city I found that scientific equipment in those days counted for nothing; all the heads of the various companies which had sprung up asked me whether I could bring capital or induce others to invest. Day after day I

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got home to my lodgings in Euston Square discouraged until one day through the introduction of Mr. Pawnall the London Agent of Hornsbys I met Mr. Crompton. After reading the letter in which Hornsbys gave me my congé he said that he wanted a manager for his Chelmsford Works and would take me on in that capacity. I told him that I was a mechanical and not an electrical engineer and that I knew nothing about electrical engineering beyond what is to be found in physics text books. 'That does not matter, I'll teach you' was his reply, 'Come along'. We jumped into a cab and drove to Liverpool Street Station and took the next train to Chelmsford.

My salary was £300, that is no better than the salary I had at Hornsbys, but I had at last entered the profession and I was satisfied. So at the end of 1882 I became manager of Crompton and Co., and went heart and soul into the business of electrical engineering. Crompton and I worked very hard at it. When I joined him he was making the Buerger dynamo and experimenting with this machine shunt excited. The usual run were of course series machines for arc lighting. They were useless for glow lamps, and as then a demand had come for country house lighting the shunt machine was the best he could do at the time. It was then I conceived the idea of compound winding, but Crompton would not hear of it and said it was a waste of money to try such a machine. Brush had used it and called it a teaser, but had given it up. I was not convinced by Crompton's arguments and in spite of his prohibition, resolved to try it. I would pay the cost if a failure out of my own pocket; but it was not a failure, and when I called Crompton to see the machine and satisfy himself that it kept the voltage far more even than the shunt machine with which he had experimented so long he exclaimed 'We must patent this'. So we patented compound winding and for a year the firm had the market for country house plant practically to itself.

One of the difficulties we had to face was the lack of measuring instruments. In those days there was the Thomson Balance and another instrument of Thomson's, neither of them portable or cheap enough for general use. There were also the ammeters and voltmeters made by Patterson and Cooper to Ayrton and Perry's design, but the firm was so busy that one had to wait months for delivery. Also the instruments depending on a permanent magnet were not reliable. In those days people did not know how to make magnets permanent (it was Madame Curie who taught us that) and therefore the calibration was unreliable, especially if the instrument had been exposed to a magnetic field. I, therefore, conceived the idea to make instruments with oversaturated electromagnets. These were patented by myself and Crompton under the name current and potential indicators. One might stand the instrument on the poles of a dynamo and yet it would not be spoiled. But to use it one had to be careful to place it in a position removed from magnetic influences. With this precaution the calibration remains the same for ever. A department for the manufacture of these instruments was established at Cromptons and we had quite a run of business with them. The men in this department had a percentage of the selling price besides their wages and it was a great satisfaction to me to see how these men by degrees altered in appearance. As the business developed they became better dressed and prosperous looking. I also had a small royalty on the instruments and so everybody was satisfied. All this came from the fact that Patterson and Cooper who fancied

they had a monopoly had refused to let me have instruments when I was in need of them and had almost been rude in their refusal. When I left Cromptons a partner of his, a Mr. Albright, bought my share of the patent for I believe £150. So I have done fairly well out of this little invention. The day on which I made this invention is in my memory because of a far more important and pleasant event, namely that it was the day on which I asked my wife to marry me and was accepted. Having made the instrument, the next question was how to calibrate it. Today such a problem presents no difficulty, but in the year 1883, it was not so easy. The potentiometer was unknown in engineering works, or at least it was unknown to Crompton and myself, and I had no confidence in the few Patterson and Cooper instruments I had been able to secure. I therefore wrote to Lord Rayleigh at Cambridge and asked him whether he could help me. He did. I took three potential indicators down to Cambridge (the current indicators I could calibrate by the Thomson balance) and he calibrated them in his laboratory. These were kept as standards and all the other instruments were calibrated by their aid. Many years later when Crompton had instructed Fleming to put up a potentiometer at the Chelmsford works, Fleming tested the three original potential indicators and found them correctly calibrated. This proves two things, the accuracy of Rayleigh's work and the permanency of calibration if the magnet is a highly oversaturated soft iron wire.

This is the end of the autobiography as started on 14 October 1914. On 26 June 1918, Kapp started a new section by saying that there had been 'a long pause'. The object now was to put down an account that was much more personal. The work breaks off halfway through a sentence of the first paragraph. Whether the account was ever completed is not known, for no other parts have been found.

Thanks are gratefully offered to Dr.Elinor Kapp for so generously presenting the papers to the University of Birmingham.