

COUP D'OEILE ELECTRIC CLOCKS OR COLLECTELECTRIC

by
Charles K. Aked (UK)

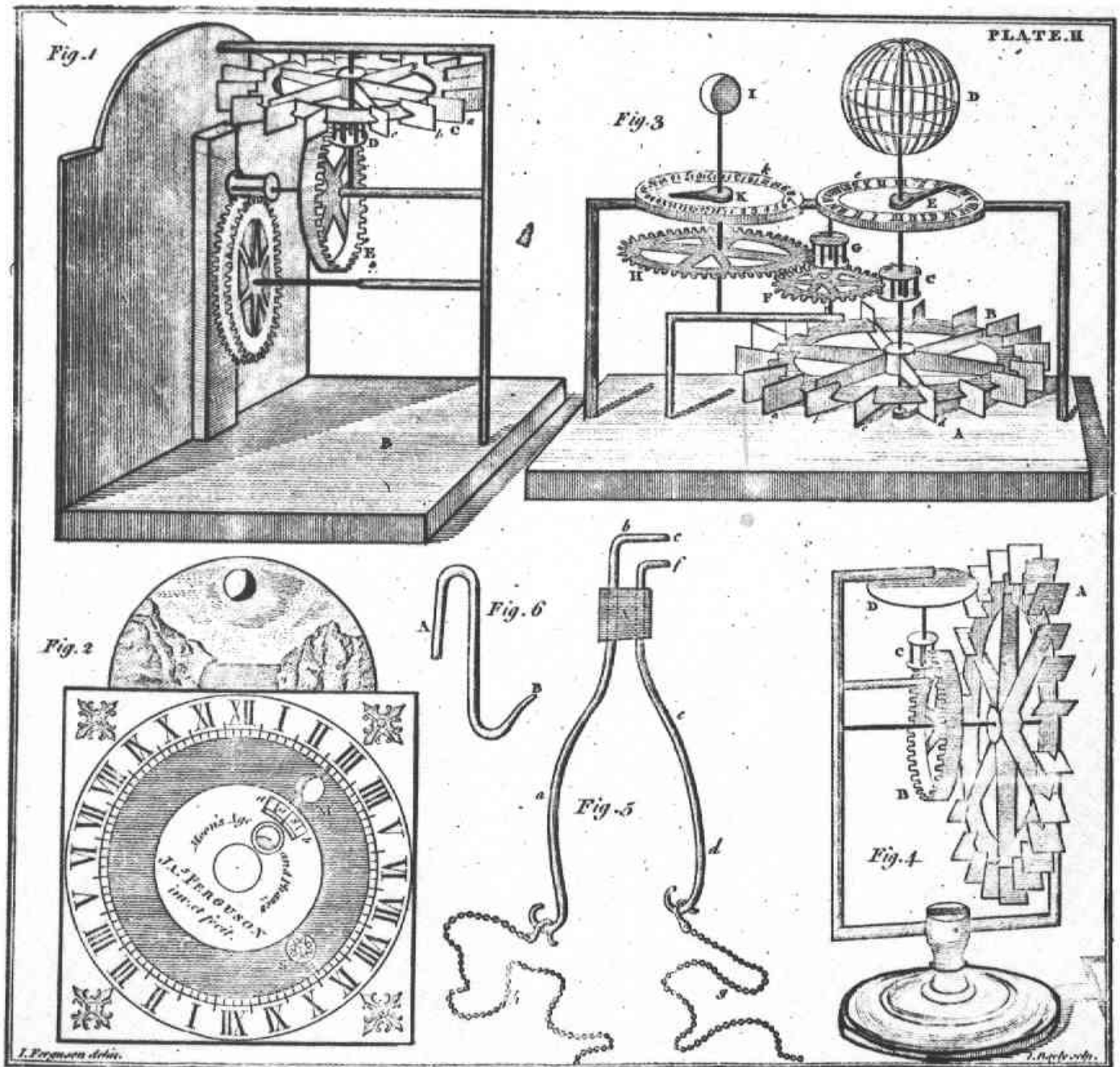


Figure 1. John Ferguson's electrically driven clock and orrery (used for demonstrations only).

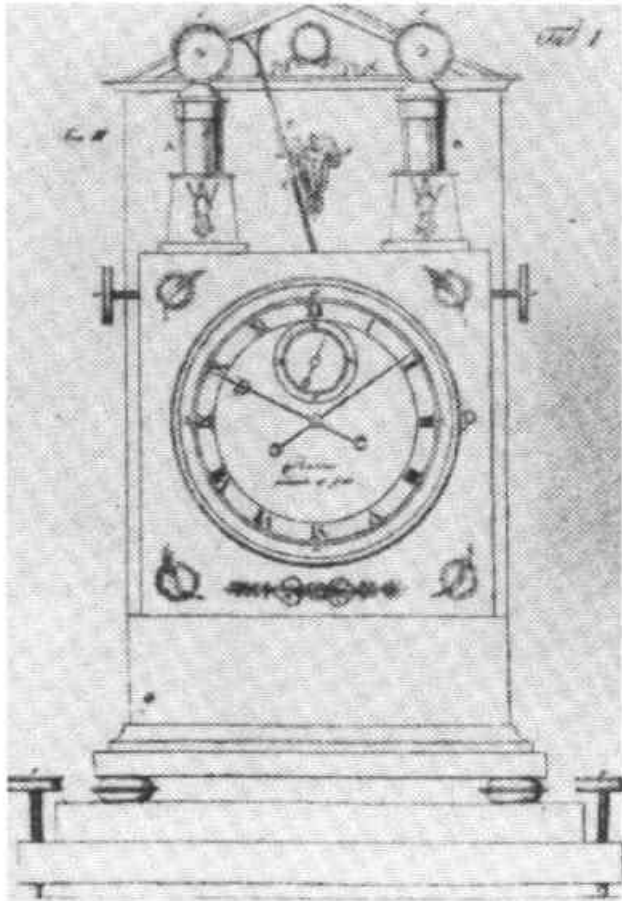


Figure 2. Professor Ramis's electric clock of 1815 (driven by electrostatic piles).

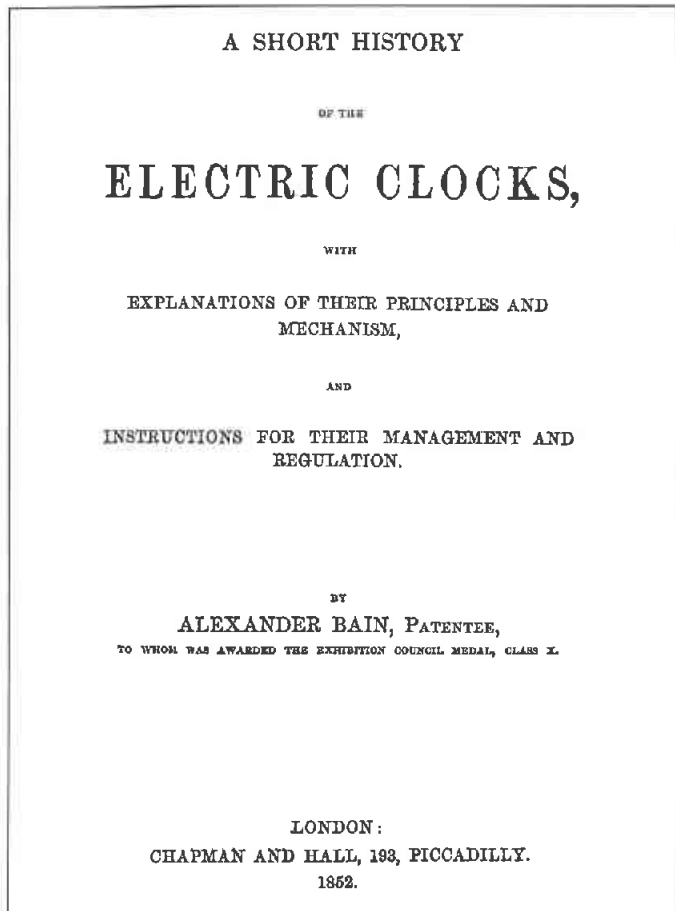


Figure 3. Title page of Alexander Bain's book published in 1852. In spite of its title, it is an account of Bain's work only.

Surprisingly, to most people, the history of electric clock goes back well over two centuries. James Ferguson, the noted astronomer, in his book *Introduction to Electricity*, first edition 1770, includes a plate illustrating an electrically driven clock showing phases and age of the moon, and an electrically driven orrery which he used in his lectures. The first pendulum clock in the world to be driven by electricity, was set going in December 1814 by Sir Francis Ronalds at his house in Hammersmith, using electrostatic forces generated by a dry pile. This type of clock (and there were many made on the Continent of which a few have survived) never fulfilled the promise of accurate timekeeping. In 1810 the Royal Society offered a prize to the person who could discover the connection between electricity and magnetism; it was demonstrated,

almost accidentally by Professor Hans Christian Oersted, to a class of students in 1819. Andre M. Ampere, the distinguished French scientist devised the solenoid, a spiral coil of wire which acts like a magnet when an electric current flows through it; while Dominique Arago, another distinguished Frenchman, found the magnetic effect could be greatly enhanced when a soft iron bar was placed within the solenoid. These advances were made in 1819 and 1820, respectively. However it was not until 1838 that the temporary magnetism induced in soft iron by a conductor carrying an electric current was actually applied to timekeeping, commencing the true era of the electric clock. Alexander Bain, the Scots genius, in that year was considering how the newly fangled electric telegraph could be exploited. Having been trained as

a clockmaker, his mind turned to combining the telegraph and clocks in some way; from which contemplation arose the idea of having an accurate clock in some central position from which time signals could be sent over the telegraph lines to indicators or "companion" clocks. Eventually the network would extend over the whole of the British Isles. By 1841 he had succeeded in producing the first electromagnetically driven pendulum clock in the world, an achievement of the first magnitude since the first practical steady voltage cell had been invented by Professor Daniell only in 1838. The units for potential and current flow in a circuit were not defined until almost a half century later, no data on electric contacts existed, and insulated wire had to be made by hand by winding cotton or silk thread on the copper wire. Since,

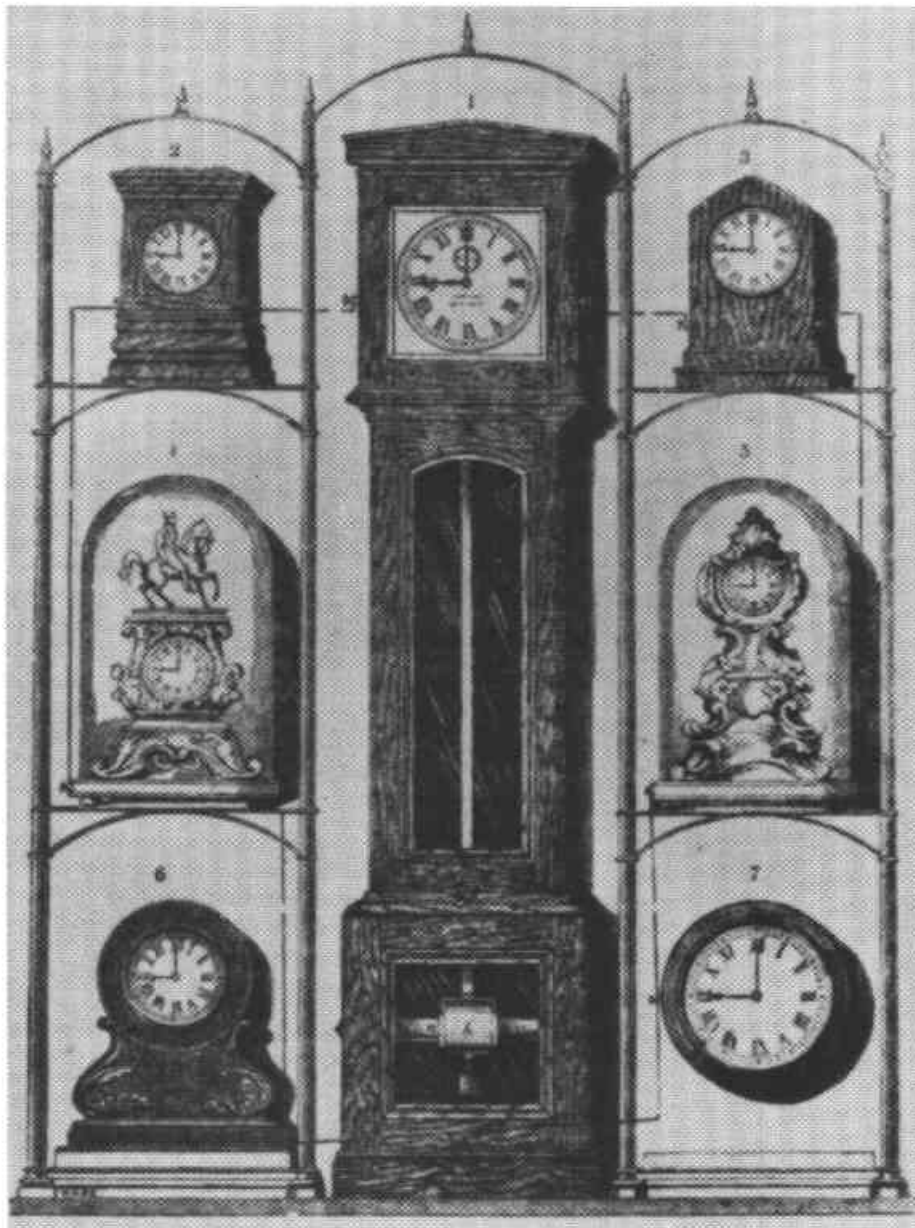


Figure 4. A 1 1/4 second pendulum master clock and some of the "follower" dials made by Alexander Bain in the 1850s. An "earth" battery was used to drive the master pendulum.

however, there are several books covering the historical details of electrical horology, it is intended to confine this article mainly to the electric clocks themselves; hopefully it will alert collectors to what is already a diminishing field. Only a few years ago electric clocks were despised by all but a few enthusiasts. Often fine examples were thrown into the dustbin as being completely worthless. The formation of a group by the writer for those interested in electric clocks in 1970 to alert collectors to the danger of the loss of historical

specimens soon changed this situation, and prices escalated rapidly.

Very few of the early electric clocks have appeared on the market; those from the earliest days to the start of the 20th century are mostly in museums. Occasionally examples do turn up, and an early Alexander Bain electric clock made about the mid-19th century was unearthed in time to appear in the Electrifying Time exhibition, held December 1976 to May 1977, at the Science Museum, London, as a result of a suggestion by the writer to the Director that

the centenary of Alexander Bain's death should be honored in some way. Appropriately enough, the first section of the exhibition was devoted to Alexander Bain himself, and a finely restored longcase electric clock by Bain was the focal point of interest. Nearby was the Bain wall clock normally displayed in the Time Gallery at Greenwich Old Observatory, housed in a bird's eye maple case with a pleasant patina. What is probably the finest electric wall clock by Alexander Bain is exhibited in the Time Gallery at the Science Museum. It is illustrated in Figure 5. Another nice example of an electric wall clock by Bain went from Scotland to the Museum of Time, Rockford, IL some years ago. The writer is convinced that there must be others awaiting discovery.

Another early worker was Charles Shepherd who exhibited his electric clock at the Great Exhibition in 1851; his premises were in Leadenhall Street, London. The writer has never seen any of his electric clocks for sale. An excellent example of his work may be seen in the gallery at the Old Observatory, Greenwich; it served as the clock providing the time signal at Greenwich until 1893. At the entrance gate to the observatory may be seen Shepherd's slave clock which has been working since 1852 and shows Greenwich time to thousands of tourists each year even today. It has a twenty-four dial, and the mechanism may be inspected at the rear through a glass inspection panel.

On the Continent, many of the greatest names in horology interested themselves in electric clock systems—Breguet, Paul Garnier, Wagner, Verité, to mention a few. However, the most outstanding electric clock designer was Matthaus Hipp of Neuchâtel who invented his famous "Hipp toggle" contact system for pendulum clocks. Hipp constructed the first model in 1842, although he maintained in later life that he actually

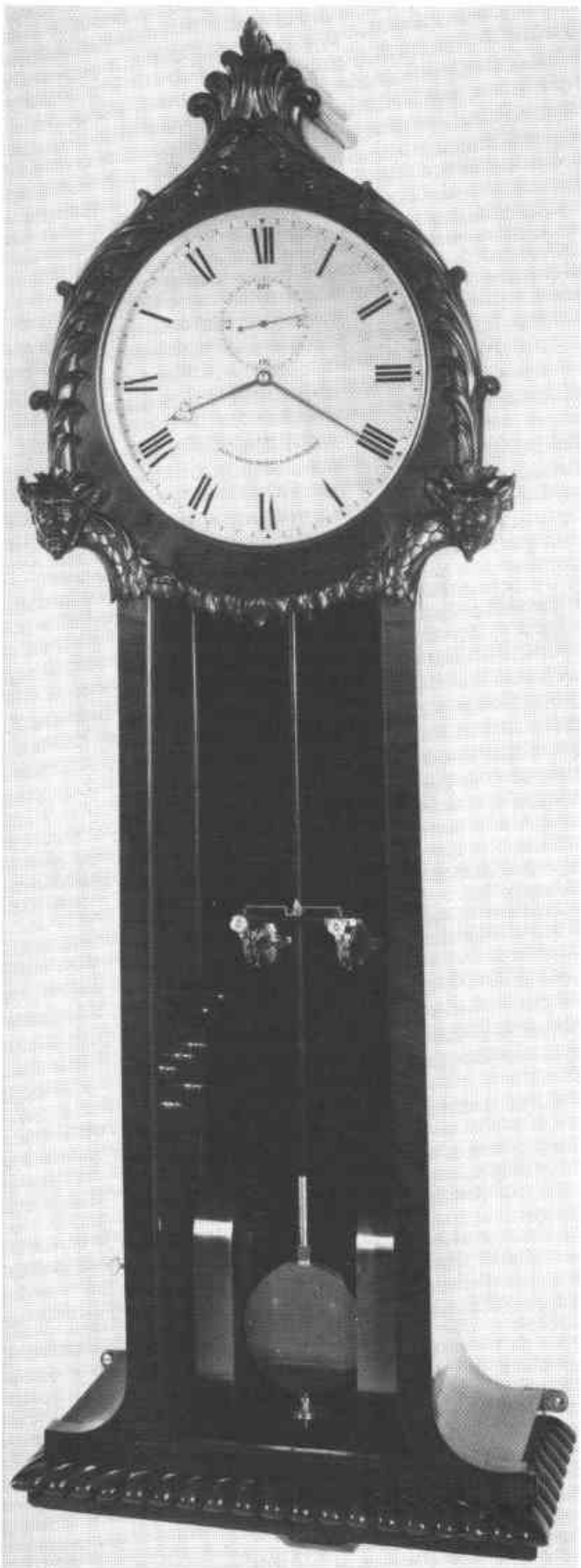


Figure 5. Electric wall clock, circa 1850, signed on dial "Alex. Bain's Patent Electric Clock," serial number 113.



Figure 6. An early example of a Hipp toggle electric clock made at Neuchâtel, Switzerland, the only reliable electric clock of the mid-nineteenth century.

conceived the idea in 1834 as a modification of a mechanical clock whose pendulum was impulsed on the same principle. Hipp was a fine clockmaker and so his electric clocks are most beautifully made and of far better quality than most English examples. An early example with the Hipp toggle arrangement below the pendulum bob is shown in Figure 6. Hipp's clocks occasionally come on the market and are well worth acquiring.

From about 1865 onwards electric clocks had little success in En-

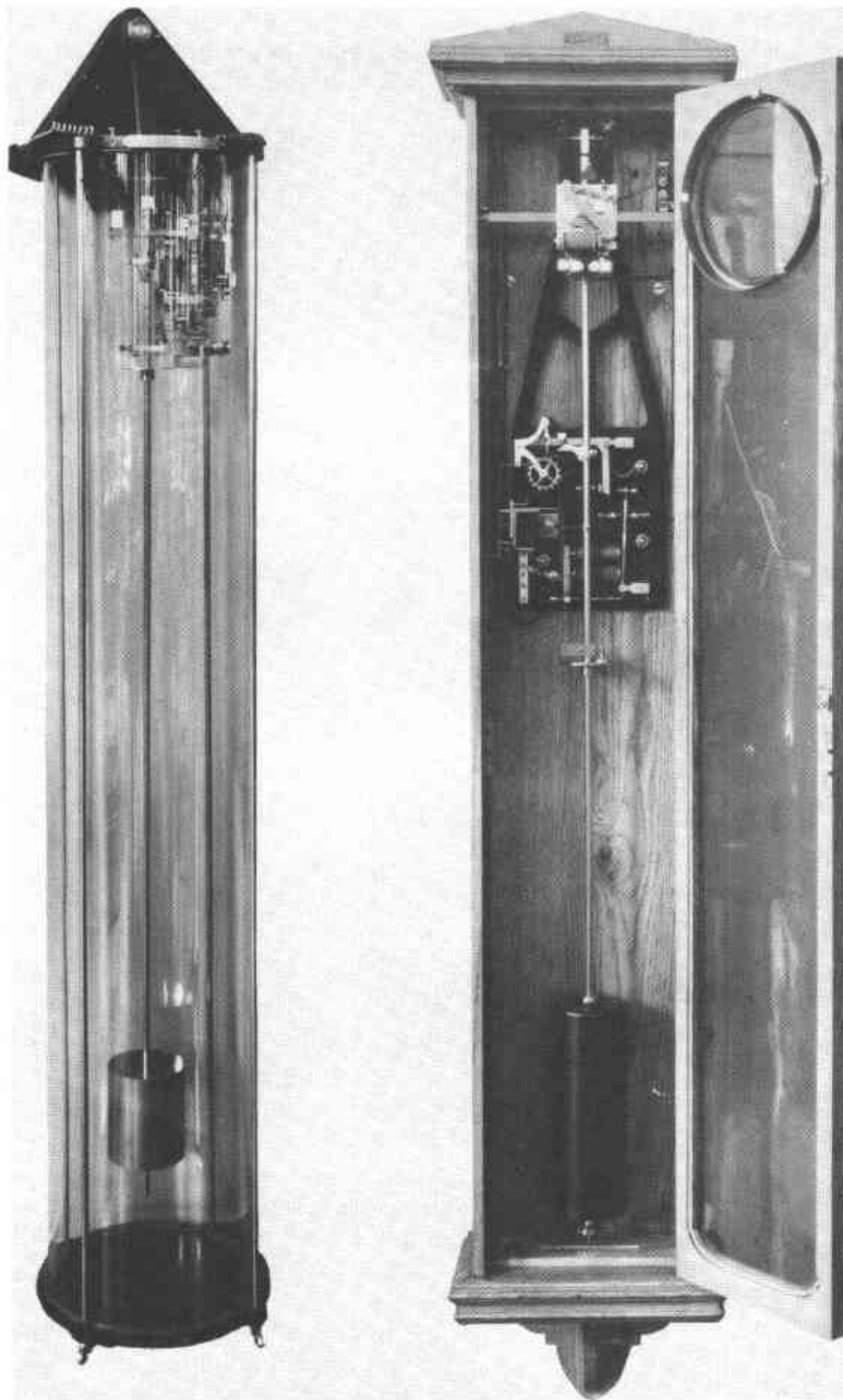


Figure 7. Left—Shortt Free Pendulum, right—Synchronome Slave Pendulum. This combination was the most accurate timekeeper until the advent of the quartz crystal clock.

gland because the contact problems were never successfully overcome, giving them a reputation of unreliability. Cheap, reliable mechanical clocks from America, France, and Germany dominated the mass market, making electric clocks too expen-

sive. Sir Charles Wheatstone, of telegraph fame, installed a system in London University and the Royal Institute. The master clock was devised by his clever mechanic Augustus Stroh and manufactured by Gillett and Johnston, Croydon. It was like a turret clock; the slave

clocks were made in Wheatstone's company, the British Telegraph manufactory, Great Portland Street, London. Only about six masters were made. The system was a complete failure and shortly after 1875, the year of Wheatstone's death, the systems were removed. Two of these masters are in museums; perhaps there are survivors awaiting discovery. The slave clock, incidentally, is the first synchronous clock that was ever made.

Towards the end of the 19th century, electric clocks took on a new lease of life when the electrician Frank Hope-Jones invented his "Synchronome Remontoire" in which the contact system, up to then the bane (not Bain) of electric clock designers and users, was rendered 100% reliable by transmitting the mechanical force to reset the escapement driving weight *via* the electrical contact surfaces. His master clocks, with thousands of slave dials, were fitted in many large buildings; during the development of London after the last war, many came on the market and were bought cheaply. These are excellent clocks of good quality and will probably last for several centuries. Hope-Jones, in conjunction with the railway engineer W. Hamilton Shortt, produced the most accurate electro-mechanical clock in 1921 and it became the standard timekeeper for all the great astronomical observatories of the world. Only one hundred of these were made, all by one man, and they occasionally come on the market as they no longer serve the purpose for which they were made. The "Free Pendulum Clock" as it was called, is accompanied by a slave clock. The personal example owned by Hamilton Shortt went to the Time Museum at Rockford, separated from its slave clock, which was auctioned at Sotheby's and successfully bought by the writer for a relatively low sum since the clock dealers present thought it of no value. The Shortt-

Synchronome Free Pendulum Master Clock is shown on the left in Figure 7. It is normally in a metal cylinder surmounted by a bell jar; the accompanying slave clock is on the right and is virtually a standard Synchronome master clock fitted with a synchronizing device to keep the slave clock pendulum running at the correct rate. The slave clock performs all the functions and relieves the master pendulum of all duties, hence the term—"Free Pendulum."

Just before the turn of the present century, Herbert Scott of Bradford, Yorkshire, re-invented the Hipp toggle and applied it to a small pendulum clock. The pendulum swings fore and aft instead of the usual to and fro! Most models have a rear mirror to enhance the visual effect; the driving battery was housed in the base. Not more than a thousand were made. The venture was not successful, however they are much sought after.

Another electrical firm which branched out into electric clock production was Gents of Leicester. An example of a master clock and slave is shown in Figure 8. Again, these are well made, but a trifle noisy in operation. Their first electric clock was made for Thornbridge Hall and was so successful that a number of master clocks on similar principles were devised. The system used was a variation of that invented by Frank Hope-Jones.

One of the most desirable master clocks to acquire is that made by Lowne Electric of Catford. It is most complicated in action and yet so reliable that some were still in use up to a few years ago. One of the most extensive systems fitted by this firm was at Woolwich Arsenal in 1903. The master clock was removed about ten years ago but the slave dials were retained. Few of these master clocks appear for sale, should you see one—buy it. The cases of the master clocks,

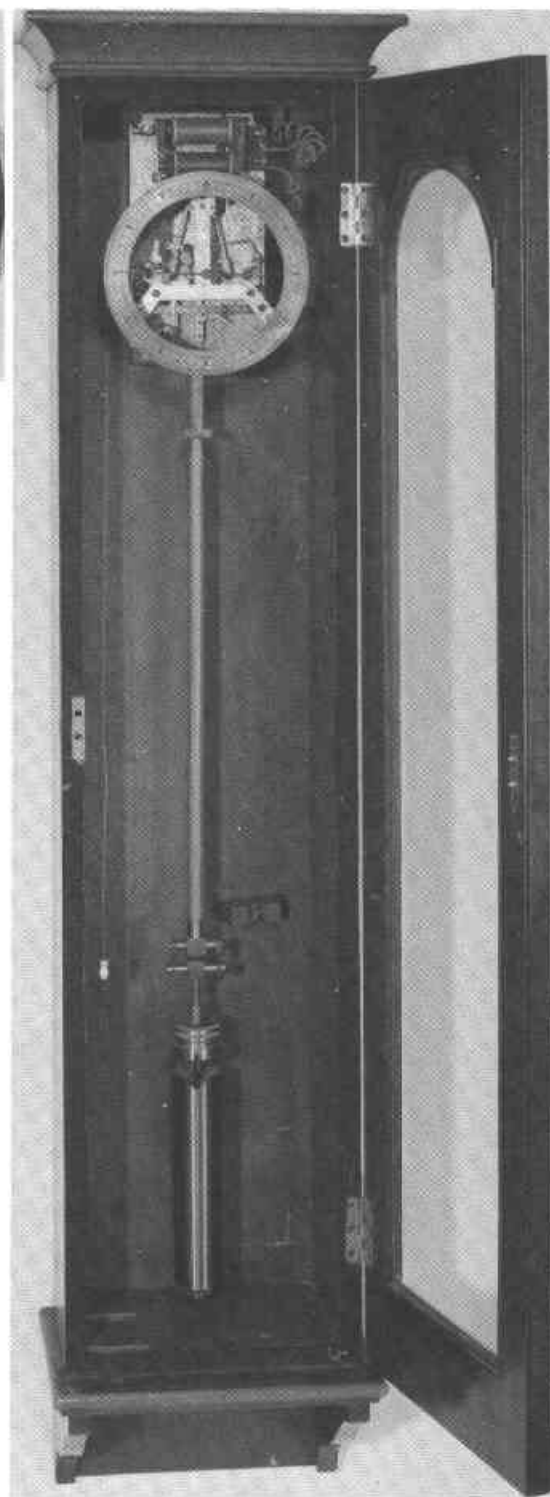
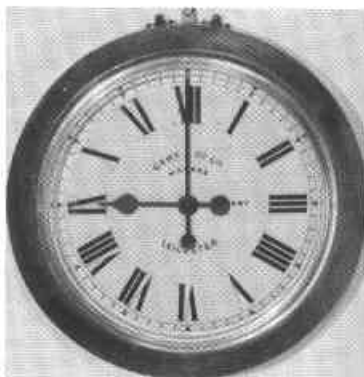


Figure 8. The Gent's "Thornton Hall" master clock made about 1905, with one of the slave dials.

in common with most firms, were often made to the design and quality specified by the customer.

Hope-Jones' former partner, G. B. Bowell, a brilliant electric clock designer who never quite achieved success, formed a company of his own after a dispute

with his former colleague. It was called the Silent Electric Company. The specialty of the firm was the design and manufacture of electric clocks which could be used in hospitals, wireless studios, and the like, where inaudibility of action was essential; for, to tell the

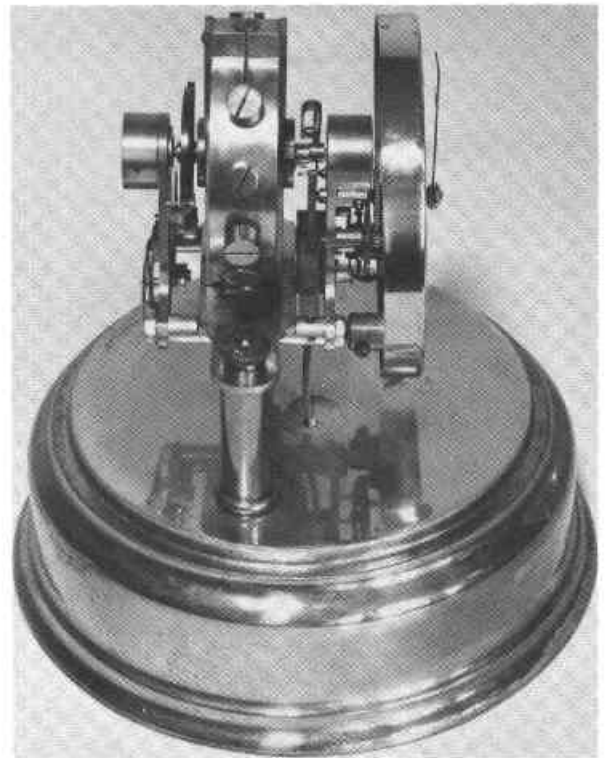
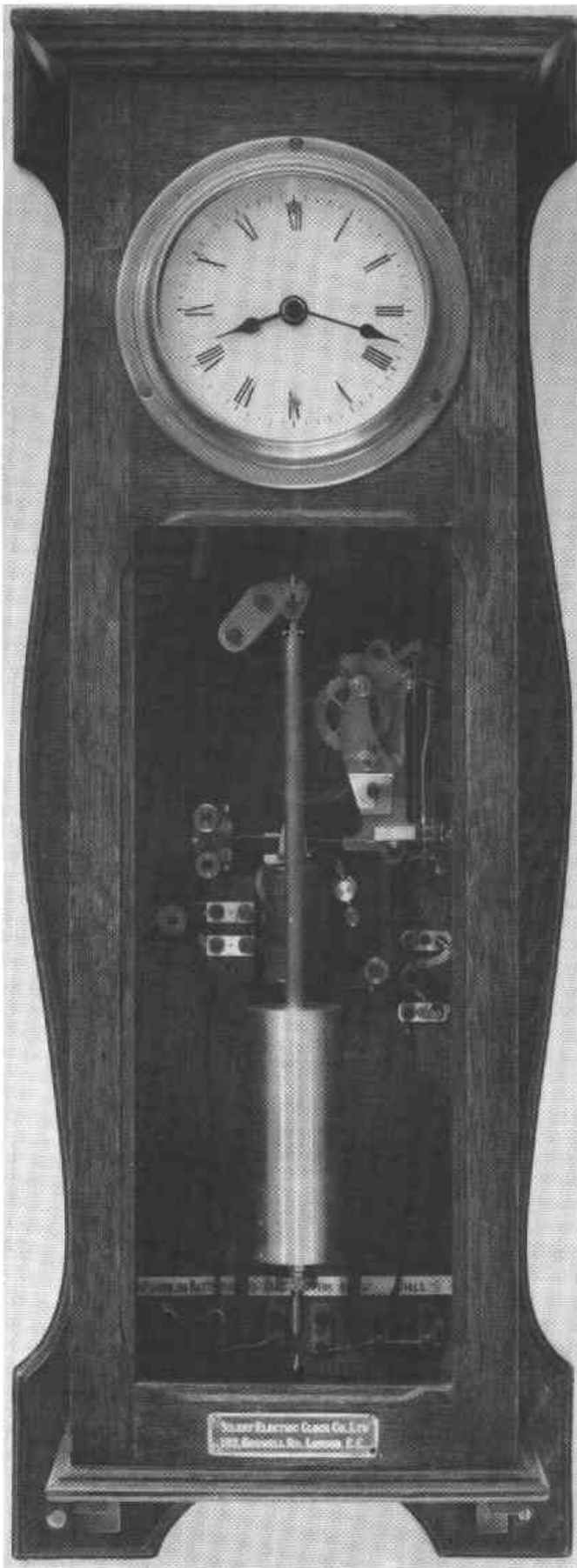
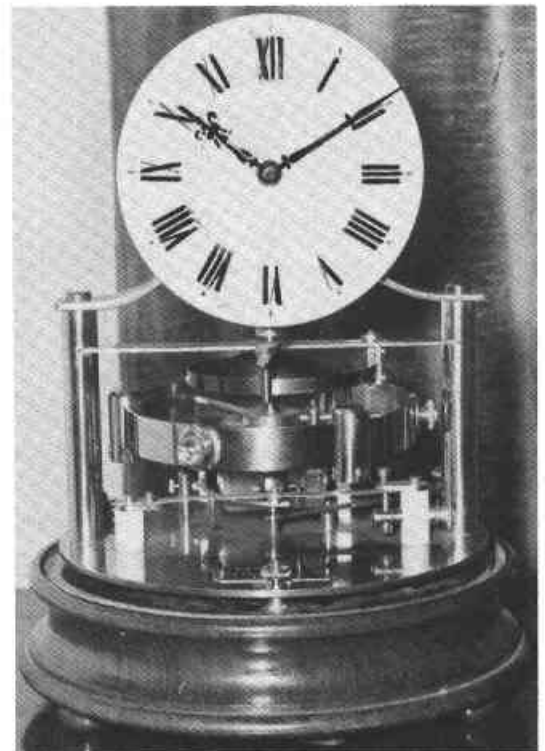


Figure 10. Side view of an early electric balance-wheel clock—the Eureka, made about 1910. A glass dome fits over the clock.

Figure 9. The Silent Electric Company master clock with half-seconds pendulum made the early twentieth century.

Figure 11. The Murday electrically driven balance wheel clock, an example made in 1911. Only about eighty of these were made.



truth, most electric clocks give out a concatenation of thumps and clicks. The example illustrated in Figure 9 has a half-second pendulum. The contact mechanism reverses the current to the slave clocks at each impulse as the drive comes from a rotating polarized armature in the slave clock which is locked by a strong magnetic field instead of the usual mechanical clicks and detents which generate undesirable noise.

The first decade of the 20th century saw several attempts to produce portable electric clocks, for although Alexander Bain had proposed electromagnetically driven balance wheel clocks in the 1840's, no one had produced one. One of the most successful was invented by T. B. Powers in America, patent dated 1906; and he was so confident that he had invented the perfect timekeeper that he called it the "Eureka Clock", (Greek *heureka—I have found it*). It was not produced until 1909 because of technical difficulties, when the Kutnow Brothers in England set up a manufactory in City Road, London. They were actually manufacturing chemists whose specialty was aperient salts as supplied to King Edward VII himself, no less! Possibly some ten thousand Eureka clocks were made, individually hand-crafted. Manufacturing ceased with the outbreak of World War I in August 1914, the workers being in demand by the army and navy for their electrical and mechanical knowledge. The Eureka is one of the most popular of old electric clocks and was produced in every conceivable design of case, from lantern to English dial; the only omission being a longcase model. Many of the early models were arranged to display the mechanism. Others in wooden cases have had the center of the dial trepanned in recent years for the same purpose. The four-glass cased Eureka's are most attractive, although even the plainest Eureka will cost several hundred pounds.



Figure 12. Dr. Margaret Weston, Director of the Science Museum, London; and Dr. L. Essen who produced the first caesium atomic clock at the National Physical Laboratory, Teddington, admiring a Bentley "earth" driven electric clock made about 1912.

Another electrically driven balance wheel clock appeared in 1910, the Reason or Murday clock; the former from it being made by the Reason Manufacturing Company of Brighton, the latter from the name of its designer Thomas John Murday of Hounslow, Middlesex. Figure 11 shows the example in the writer's possession; it has an enamel dial, whereas normally the clock is fitted with a glass annulus on which is reverse painted the chapter figures, so that the whole mechanism is clearly visible. Its working action is impressive with the huge five" diameter nickel steel balance rotating majestically.

Possibly eighty examples were made. No museum in Britain possesses one.

An anachronistic design of electric clock was developed in 1910 by P. A. Bentley of Leicester, being in all respects similar to Alexander Bain's design of 1845. A fine example is illustrated in Figure 12. It was specially made for one of the directors of Liberty's, the well-known London Store. Because of Bentley's improved contact arrangement, these clocks perform very well, and one now in the museum at Leicester went for years on the original earth battery until leakage currents from the



Figure 13. Left and middle—the two most commonly found Bulle clocks, right—a cheaper version of the Bulle manufactured by Tempex, the base is of bakelite. In the foreground are samples of the driving batteries.

tramway system caused it to behave erratically and it had to be connected to an ordinary cell to isolate it. Perhaps five have appeared for sale in the last twenty years.

A French electric clock which had a vogue in England up to the second World War was invented by Professor Favre-Bulle in 1921, an exact replica of Bain's system in miniature for impulsing the pendulum. Because the amplitude of the swing of the pendulum depends upon the voltage of the driving cell, and this varies with temperature and age, it is fitted with an isochronous spring, in an inge-

nious device which clockmakers had sought for centuries to achieve. Thousands of the clocks shown left and center of Figure 13 were made, the smaller model being known as a Bulle clochette or Bullette. On the right is an example made by Tempex. It has a bakelite base and other features to reduce manufacturing costs. Bulle clocks were once a central theme at an Ideal Home Exhibition, London. In view of the numbers made, it surprises the writer that the price is so high. Bulle clocks were produced in a fantastic range of case designs in order to sell in a very competitive market, some being of

the most elegant design and quality. A collector could specialise in this one aspect alone.

Major C. E. Prince, in the year of the British Empire (of happy memory) Exhibition 1924, introduced his system, of which the master clock is shown in Figure 14. He called it the "Princeps" (Latin—the first) and it was designed as a cheap but reliable electric clock system for offices and factories. An even cheaper version which he called his "cottage system" used a half second pendulum master clock. It was intended for domestic premises. These clocks perform well and occasionally appear for

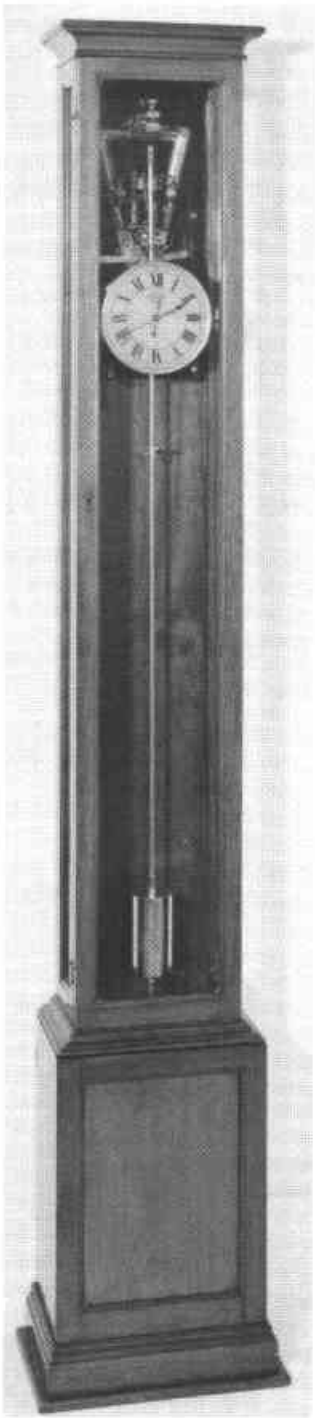
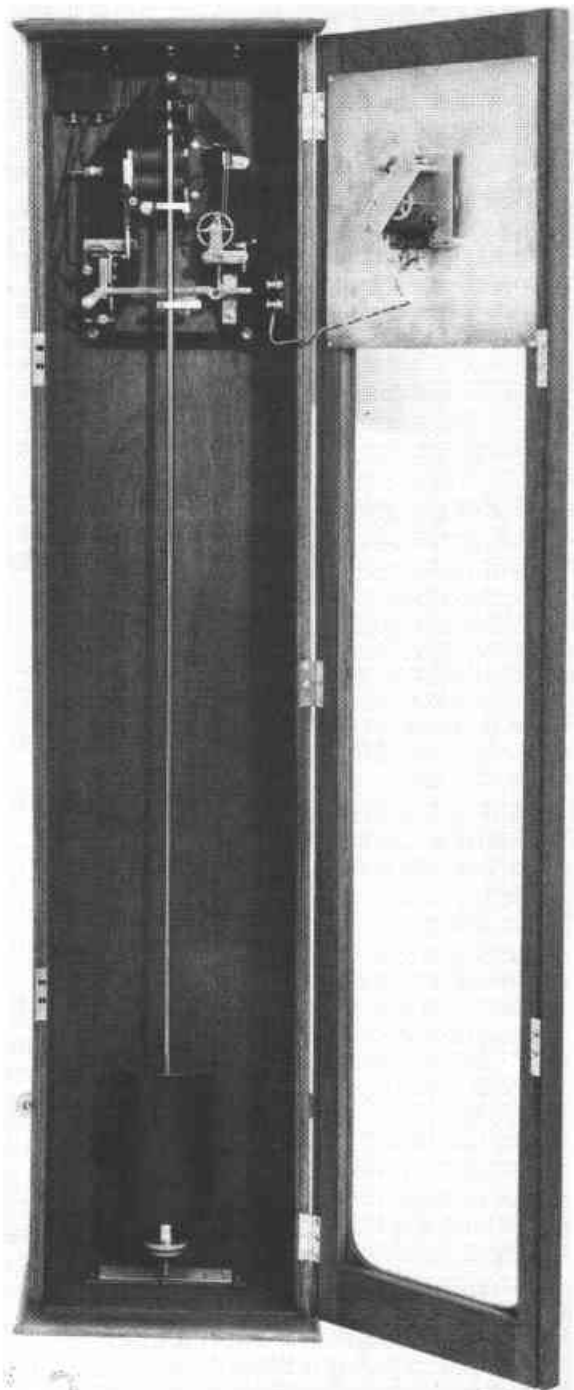


Figure 14. The master clock of the Princeps electric clock system. These are very accurate timekeepers.



Figure 15. A master clock and slave of the Mercer "Octo" system.



sale. They take up less room than other types.

Thomas Mercer's of St. Albans, the well known marine chronometer makers (the only firm in the world today), produced Rolls Royce examples of electric clocks. A pendulum master clock and slave of the Octo system is shown in Figure 15. These were made with disregard to the cost of production,

being beautifully made with stainless steel components. For use at sea where pendulum clocks are obviously useless, the elegant electrically rewound chronometer-controlled timekeeper, shown in Figure 16, was employed, controlling hundreds of slave clocks fitted throughout the luxury liners in which the systems were fitted in the 1930's. Many of these were

made available when the liners eventually went to the scrapyard. Well worth acquiring, as such electric clocks will never again be made.

Even the modern electric clocks, such as that in Figure 17, the Kundo of 1957, are interesting since these clocks were fitted with transistors to replace the troublesome electrical contacts of earlier

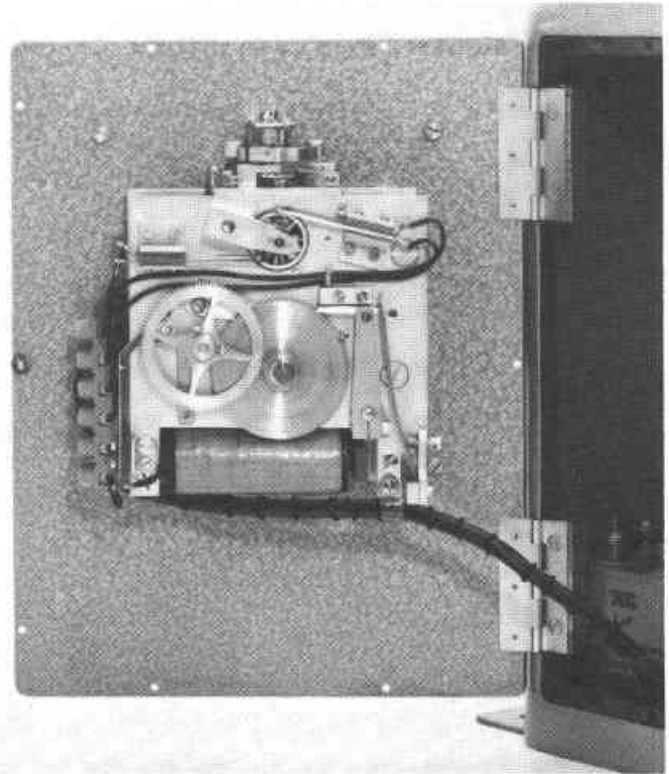
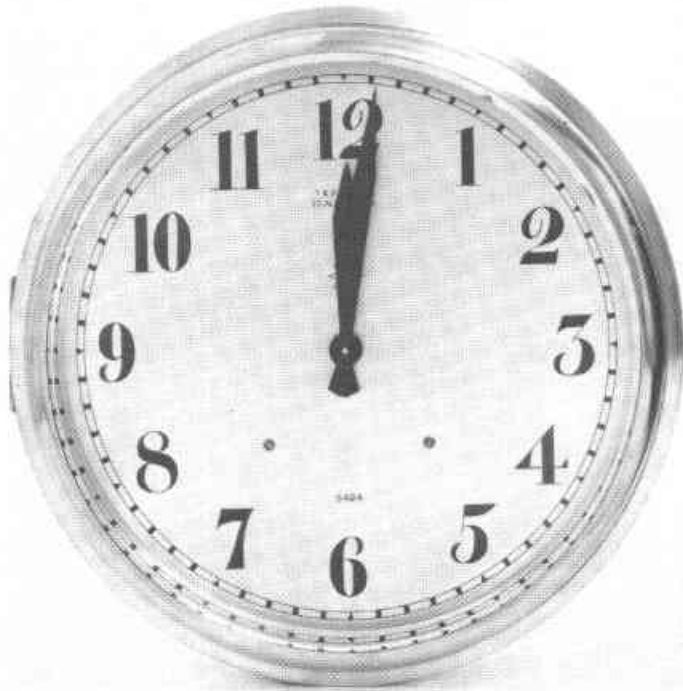


Figure 16. Electrically driven chronometer master clock for use at sea with slave dial made by T. & F. Mercer, St. Albans.

days, yet they have already passed into history. Having surmounted all the problems and produced almost silent mechanisms, they were completely supplanted by the development of the ubiquitous quartz crystal clock which condemned all

other clocks to limbo. Therefore, the normal rules for determining the eligibility of these artefacts for collecting cannot be applied when a single decade can herald appearance and demise.

To keep this article within bounds, only the sketchiest of outlines has been included. The interested reader can consult the following list of works for the technical details, and an exposition of the historical details of an interesting facet of timekeeping, which from the humblest of beginnings has developed until the whole world derives absolute time by electricity, even supplanting the rotation of the earth itself for time measurement.

Electrifying Time, a catalogue of the Exhibition held at the Science Museum. Published by the Antiquarian Horological Society, Ticehurst, Sussex, 1976.

A Short History of Electric Clocks

... , Alexander Bain, London, 1852; reprinted by Turner and Devereux, London, 1973.

La Bulle-Clock Horlogerie Electrique, H. L. Belmont, Besançon, 1975.

Electrical Timekeeping, F. Hope-Jones, Facsimile reprint, N.A.G. Press, London, 1976.

Electrical Horology, Langman and Ball, First Edition 1923, Third Edition reprinted 1946.

The finest collection of electric clocks is displayed at the Science Museum, London; there are others at Birmingham, Royal Scottish Museum, Edinburgh; and the Old Observatory, National Maritime Museum. What is believed to be the oldest Bain electric clock is to be found in Watten Hall, Watten, Caithness, Scotland, and there are about half a dozen in private hands.



Acknowledgements

Figures 5-10, 12-14 and 16-17, Crown Copyright, Science Museum, London.



Figure 17. The "Kundo" electric clock made in Germany, one of the first to be fitted with transistor switching, circa 1957.