

A miniature time ball from Synchronome

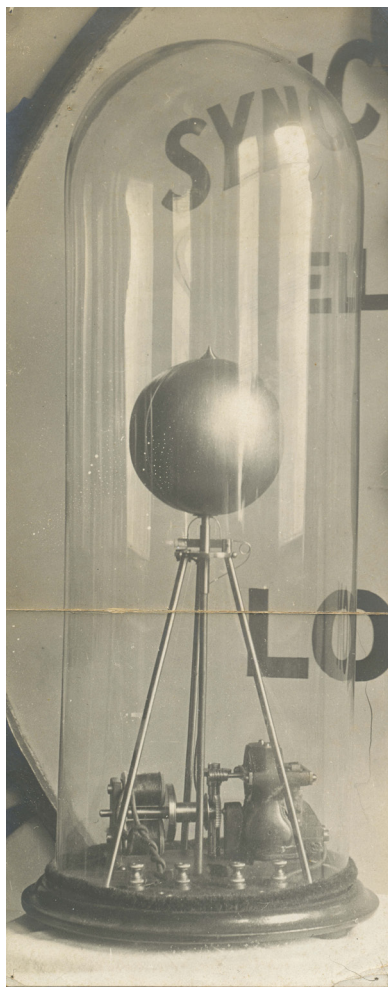
Norman Heckenberg* and Anthony Roberts**

In the first decades of the twentieth century, several electric clock manufacturers offered miniature time balls to be used in shop window displays. We have restored one made by Synchronome and used by Prouds Electric Clocks and Scientific Instruments, Sydney, Australia. We also describe a period-style controller we made to operate it automatically.



Fig. 1. The relic we found.

Fig. 2. A mysterious object in an old photograph.



remembered a photograph (Fig. 2) from the files of the Synchronome Electrical Co of Australasia in Brisbane that showed a device

While helping to clean out the garage of a deceased clockmaker in Sydney, Australia, we found the strange object shown in Fig. 1. Although it was clearly incomplete, it had an early Synchronome London name badge. Nothing similar can be found in the late Robert Miles's encyclopedic book.¹ Presently we

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1. Robert H. A. Miles, *Synchronome, Masters of Electrical Timekeeping* (AHS, 2011).

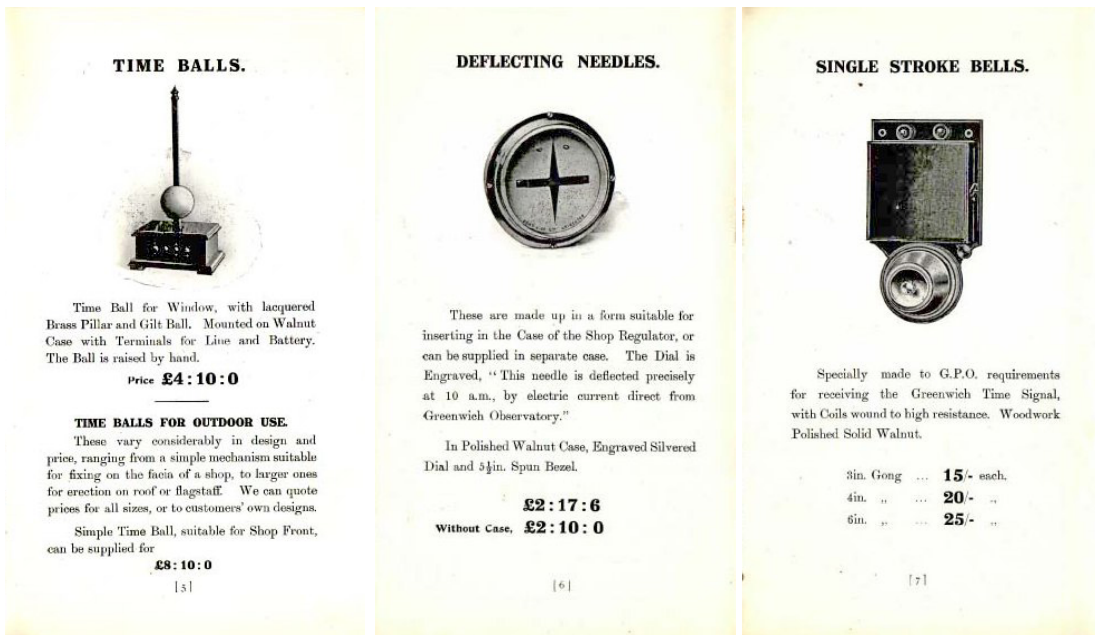


Fig. 3. Standard time signal indicating devices offered by Gent & Co. Ltd in their Catalogue 14. Images courtesy of Colin Reynolds.

that we had not been able to identify. The photograph had been sent to the founder of that company,^{2, 3} Alfred George Jackson, in 1916, by Prouds Electric Clocks and Scientific Instruments in Sydney, in a package describing their products. In 1903, Jackson had negotiated rights to build Synchronome clocks in Australia, but an attempt to spread their operations south to Sydney had failed. Subsequently, Prouds, a well known Sydney jeweller and watch retailer, employed English horologist and engineer Thomas John Murday to head their workshop and started building their own 30s impulse master clocks, sometimes using the name 'Synchronome'.⁴ By 1916, given the 1000 km separating the two operations, they seemed to have been coexisting peacefully, although the false claim in one Prouds brochure in the package that 'ours is the only ELECTRIC CLOCK FACTORY IN AUSTRALIA' has been marked with a large cross in pencil.

With the device in our hands, and the photograph before us, we could see that it had been a miniature time ball. The late Lawrence Taprell, whose garage we were helping clear, had served his apprenticeship at Prouds and had collected other relics from the time. It is almost certain that this was the very time ball in the old photograph.

Some research revealed that miniature time balls were offered by several manufacturers at the start of the twentieth century. They were just one type of device made to be installed in clockmakers' windows to attract attention. Others included magnetic needles and bells, all triggered by electrical signals from a master clock, or better still, by a telegraphic signal from an observatory like Greenwich. One can imagine people checking their pocket watches and taking them in for service if they were too far out. Although we have not been able to find any accounts of

2. Norman Heckenberg and Anthony Roberts, 'The Synchronomes at the End of the World', *Horological Journal*, October 2006, 383-385 and November 2006, 415-417.

3. G. Bianchi et al, *Synchronome Brisbane 1903-1991*, NAWCC Chapter 104, Brisbane 1998. We still have copies of this 32 page booklet and would be happy to make them available to any interested reader for the cost of postage and packing.

4. Anthony Roberts and Norman Heckenberg, 'Perfectly Simple and Simply Perfect', *Horological Journal*, February 2009, 72-76.

APPLICATIONS
OF
Greenwich Mean Time Signals.

**KINGSWAY AUTOMATIC
TIME BALL.**

Raised by an
electro-motor before
each hour. Dropped every hour
from Greenwich
Observatory.



INSTALLED IN 1910 BY
THE SYNCHRONOME COY.,
32-34, CLERKENWELL ROAD,
LONDON, E.C.

Telephone: HOLBORN 4643.

KINGSWAY TIME BALL.

Excerpted from THE BRITISH HOROLOGICAL JOURNAL, January, 1911.

London's happy-go-lucky time-keeping is a by-word. Almost every community on the Continent, above the rank of a village, has its Municipal Time Service, because their City fathers recognise street timing to be so much their duty as street cleaning and street lighting. Our Electrical Engineers have been telling us this for years, and none with more persuasive tongue and pen than Mr. Hope Jones, the inventor of the modern method of "Synchronous" Electrical Time Service, which is so generally adopted now in large buildings, but neither the City Corporation, nor the London County Council, have yet felt the growing pressure of public opinion. They have built a fine street in Kingsway, but they have left it to private enterprise to give it time.

Thanks to Messrs. S. H. Benson, Ltd., the well-known Advertising Contractors, of Kingsway Hall, this has not long been wanting.

A Time Ball of 4ft. diameter has been provided on the summit of the dome of their lofty building, on the west side of the new street, and the ball is dropped precisely at each hour by electric current direct from Greenwich Observatory.

Unlike other time balls, which only work once a day, and require to be set up daily by hand before their fall, this one is wound up quite automatically by an electro-motor shortly before each hour of daylight, and is released precisely at every hour by the Greenwich Time Signal. A little electro-motor, no bigger than a hat (man's), raises it slowly by means of what is called a double worm reduction gear. The ratio of reduction is 1 to 10,000, which means that the motor revolves ten thousand times whilst turning the hoisting drum once.

Messrs. Benson's had their offices equipped, when they were built two years ago, with the "Synchronous" System of Electric Clocks, whereby uniform and accurate time is secured throughout them without any of the clocks having to be wound up, and that installation is now charged with the additional duty of switching on the electro-motor to raise the Time Ball at ten minutes before each hour, a function easily performed by a programme clock, or "Ball Controller", customarily used by them to ring electric bells at pre-arranged times.

The Ball, having been lifted to the top of the mast, an operation which takes the electro-motor about five minutes to accomplish, the latter gracefully retires, unclutching itself from the winding drum, and leaving the ball held up on a hair trigger ready for releasing by the Greenwich Time Signal, which is transmitted over the lines of the Standard Time Company, Ltd.

It was laid down as a condition by the architects that there should be no shock or jar occasioned by the fall, and this has been overcome by an ingenious but simple method of counter-balancing, whereby this acceleration due to gravity is neutralized just before the ball reaches the bottom. It is then also that the switches are replaced, leaving the motor ready to raise the ball before the next hour. The simplicity of the apparatus appears to preclude the possibility of anything going wrong, but safety switches are provided, which will stop the motor in the event of any irregularity occurring.

The whole of this original undertaking was designed by Mr. Hope Jones, M.I.E.E., carried out by the Synchronome Company, of 32-34, Clerkenwell Road, E.C.

SPECIAL ANNOUNCEMENT TO THE TRADE.

For Watchmakers and Jewellers, who have taken advantage of the recent great reduction in the subscription, and receive the daily Post Office Time Signal, we offer a

**SMALL WORKING MODEL OF
THE KINGSWAY TIME BALL,**

which forms a most attractive shop window novelty. It is made to the scale of 1 inch to 1 foot, the Ball being of brass or celluloid, 4in. diameter, and standing 2ft. high when raised.

An ordinary 4 volt accumulator, such as is used on motor cars, is suitable for operating the little electro-motor.

If desired, the model may be set to work automatically every hour, being dropped at the 60th second of the 60th minute by a contact applied to the shop regulator.

Price, **£7 10 0**

DEFLECTING NEEDLES, indicating on a circular dial, lettered "This needle is deflected precisely at 10 a.m. (or 1 p.m., as the case may be), by electric current direct from Greenwich Observatory."

PRICES.

With silvered engraved Dial and cast Bezel ... **£2 9 6**
With painted Dial and spun Bezel ... **1 18 6**

These instruments are suitable for placing in Regulator Clock Cases. If separately cased in wood, add 7/.

SINGLE STROKE BELLS, as in the case of the instruments above described, have their electro-magnets specially wound to a high resistance, in accordance with the Post Office requirements.

PRICES.

3in. Bells	£0 10 0
4in. Bells	0 13 6
6in. Bells	1 0 0

Fig. 4. Brochure describing the Kingsway time ball and the miniature working model. Courtesy R. H. Miles.

their use, there are examples in several museums. The National Museums of Scotland have a very elegant gilt brass example, possibly made by Robert Bryson in Edinburgh as early as 1855 (Museum reference T.2005.75). Another is on display at the National Maritime Museum, Greenwich, London (ZAA0636), and is illustrated in Derek Howse's book *Greenwich Time and the discovery of the longitude*,⁵ as well as on the museum website. It was used in the offices of Gledhill-Brook, triggered by a signal from the Standard Time Company. One of their catalogues⁶ offers 4-foot diameter balls for outside installation, as well as:

No.2. Small Model Time Balls

For shop windows, etc. A most attractive advertisement. Made to drop every hour (if within radius of our wires), otherwise once a day from Post Office signal
Price from **£7 10 0** according to size and style.

Similarly triggered single stroke bells and magnetic needles were also offered.

In their *Booklet 14, Greenwich Time Control*, Gent & Co. Ltd offered a more economical:

Time Ball for Window, with lacquered Brass Pillar and Gilt Ball. Mounted on Walnut Case with Terminals for Line and Battery. The Ball is raised by hand. Price **£4:10:0** (Fig. 3).

Gent's deflecting needles

are made up in a form suitable for inserting in the Case of the Shop Regulator, or can be supplied in a separate case. The Dial is Engraved, "This needle is deflected precisely at 10 a.m., by electric current direct from Greenwich Observatory".

Single stroke bells are 'Specially made to G.P.O. requirements for receiving the Greenwich Time Signal, with Coils wound to high resistance.'

Our Synchronome version seems to have been introduced as part of the publicity surrounding their installation of a four-foot

5. Derek Howse, *Greenwich time and the discovery of the longitude* (Oxford: OUP, 1980), p. 103.
6. James Nye and David Rooney, 'Such great inventors as the late Mr Lund', *Antiquarian Horology*, December 2007, 501-523.

diameter time ball in the Kingsway in London. In a description in the *Horological Journal*,⁷ Synchronome made much of the fact that this time ball was automatically raised as well as released, and fell every hour rather than just once per day. In a brochure reprinting the description (Fig. 4), they also promoted 'a small working model of the Kingsway Time Ball that forms a most attractive shop window novelty'. In the model, the four inch diameter ball was available in brass or celluloid. Synchronome also offered deflecting needles and single stroke bells.

In 1913, the magazine *Harmsworth Popular Science* carried a photograph of the model with the claim that the Kingsway time ball was 'the only automatic time-ball in the world'.⁸

To learn more, we decided to restore or reconstruct the model, based on the information we had. The old photograph was immensely helpful in making and reinstating the missing parts and will assist the reader to understand the following account of the operation of the device.

How it works

Unlike the other model time balls we have mentioned, the Synchronome one has all of its mechanism exposed to view, allowing the process to be observed. A short video of the time ball in action can be seen at <https://vimeo.com/159726707>.

A few minutes before the hour, the motor is switched on by a controller. Driven through two worm gears, the main shaft begins to rotate slowly. A spring-loaded dog clutch engages with the brass drum that takes up a thread that runs up to a tiny pulley at the top of the tripod and then down to the lower end of the vertical staff that carries the ball. The staff and ball rise until a knife switch on the tripod is opened, turning off the motor and thus automatically terminating the 'raise'. The controller opens the external motor switch a few minutes later. On the hour, the two solenoids are energised, attracting the steel part of the clutch, thus allowing the spool to turn freely so the ball can drop. There

is no warning function as described in the Kingsway system. The fall of the ball is arrested by a buffer which also closes the knife switch on the tripod, so that current will be able to flow to the motor just before the next hour to raise the ball again.

Restoration

The old photograph showed a small DC motor of the sort used to power mechanical toys at that time and we were able to source one of very similar appearance from an online auction. The mounting holes almost lined up but it was necessary to make an adaptor plate (just visible in Fig. 5) that also served to improve the vertical alignment. Another worm was made based on the surviving one. One release coil was missing, so we made a replacement to match the surviving one and wired them in series. Unfortunately, the insulation on much of the wiring was no longer serviceable so it had to be replaced with sympathetic cloth covered wire. The brass parts were cleaned and lacquered and the steel parts de-rusted and painted black. The trigger for the switch on the tripod was missing but we were able to make a new one from spring wire based on the old photograph. We were unable to source a brass ball, but noting that celluloid balls were also used, we were able to press a large plastic Christmas decoration into service. It is not clear from the old photograph which sort was there originally, but the lightness of the plastic one means much less stress when the device is operated.

Controlling the time ball

We wanted to demonstrate how the time ball could operate automatically but its original controller has not survived. Nowadays, the easiest way to make a controller would be to program a microcontroller, but we were interested to explore how it might have been done at the time. The brochure refers to the use of a bell controller. These typically had a wheel driven by a slave movement into which pins could be inserted.⁹ The pins pushed sets of contacts together to switch circuits at the

7. 'Kingsway Time Ball', *Horological Journal*, January 1911, 75.

8. *Harmsworth Popular Science*, Vol. 6, 1913, page 3732.

9. Miles, *Synchronome, Masters of Electrical Timekeeping*, p. 136.

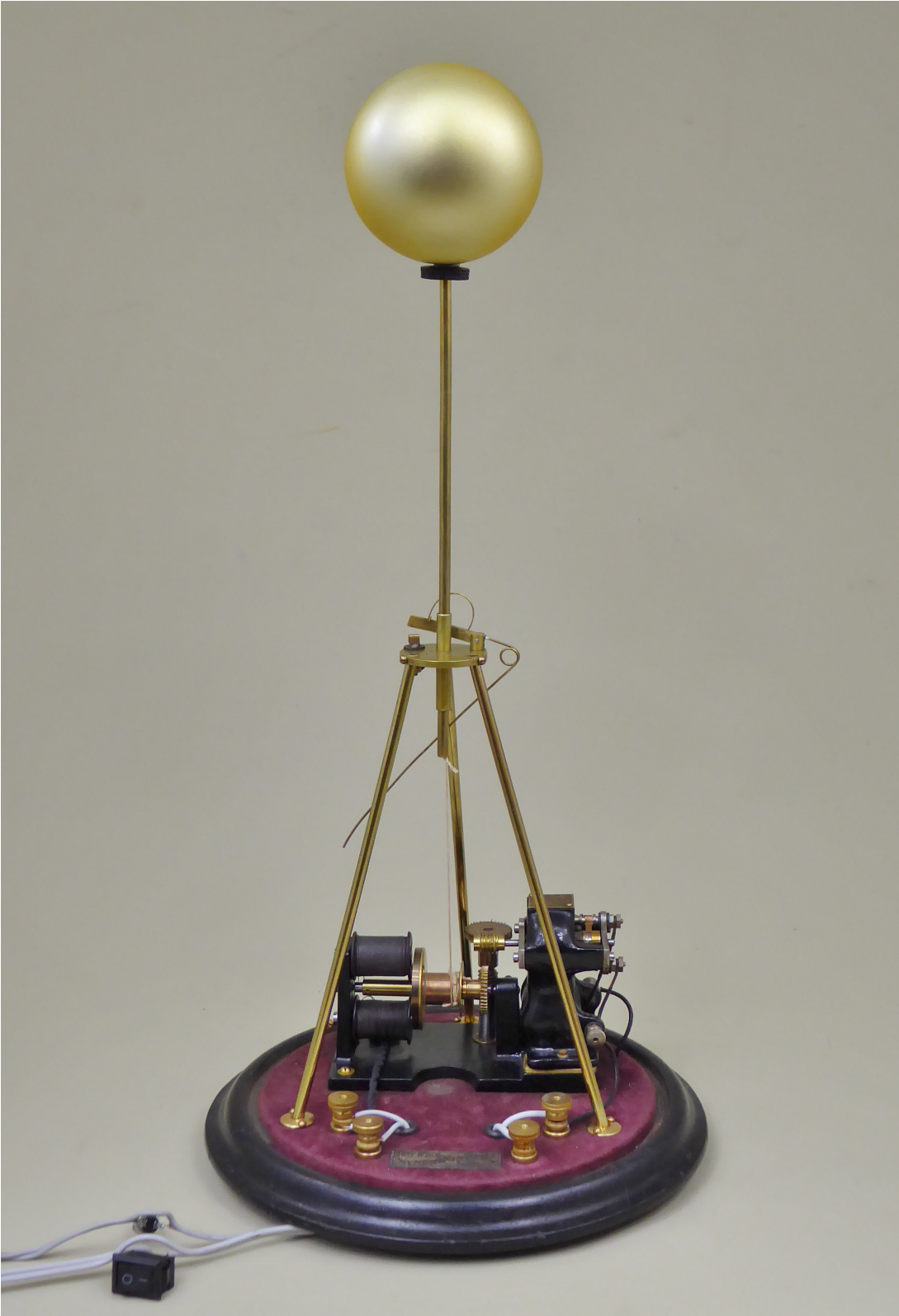


Fig. 5. The restored time ball ready to drop.



Fig. 6. Our controller is based on a Synchronome No.3 slave movement and parts of PO relays. The movement rotates a 100 mm diameter wheel (not visible in this photograph) that carries an insulating pin near its edge.



Fig. 7. The 'drop' switch is visible in the top centre of the image with the actuating pin to the left, holding the 'raise' switch in the ON state. The wheel rotates clockwise in 3 degree steps. The actual contacts are platinum pads soldered to the inner faces of the two spring leaves near the ends of the wider parts.

appropriate times. We built something similar using a Synchronome No.3 slave movement and parts of post office relays (Fig. 6). To ensure reliable switching on and off, we used a contact configuration described by Frank Hope-Jones, principal of The Synchronome Company, in his book *Electrical Timekeeping*, that he credits to Professor Arzberger of Bruenn.¹⁰ We had seen something similar on a timer made by Jackson's company. Rather than a cam and pivoted contacts, we used two leaf spring contacts activated by an insulating pin on a wheel driven by the 30s impulse slave movement (Fig. 7). The switch is OFF when neither leaf is pushed up **and** when both are pushed up. The switch is ON in the time between the fall of the first finger and the fall of the second longer one as the pin moves underneath. The ON-time can be set in units of 30 seconds by adjusting the lengths of the fingers. Three units is enough to raise the ball, while one unit is much longer than is needed to release the ball but does no harm. It is of the

nature of Synchronome slaves that the hands move only after the end of the current pulse from the master clock, so with this arrangement, the ball will fall as the minute hand moves to the hour. If an independent time signal pulse was available, it could be routed to the time ball through appropriately adjusted 'drop' contacts, or even directly.

Conclusion

Thanks to the generosity of the Taprell and Jackson families, and the assistance of the late Robert Miles and the late Arthur Mitchell, we have been able to reconstruct what may be the only surviving example of an unusual Synchronome product from the golden era of electric clock systems. On the other hand, the fact that the mechanical part is based on a casting suggests that a number were made and may still be out there somewhere. We would like to thank Colin Reynolds for the information on Gent's products and Miranda Heckenberg for assistance with images.

10. F. Hope-Jones, *Electrical Timekeeping* (London: N.A.G. Press), London, Chapter VII (p. 51 in the first edition of 1940).