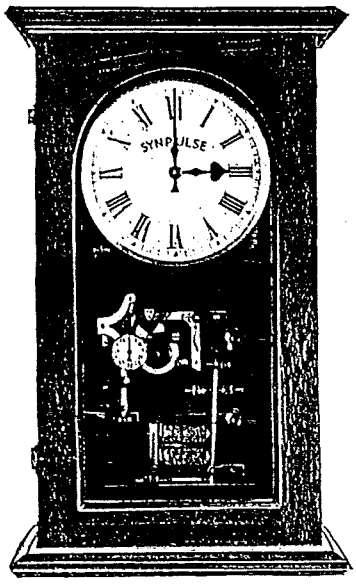
The Synchronome Principles

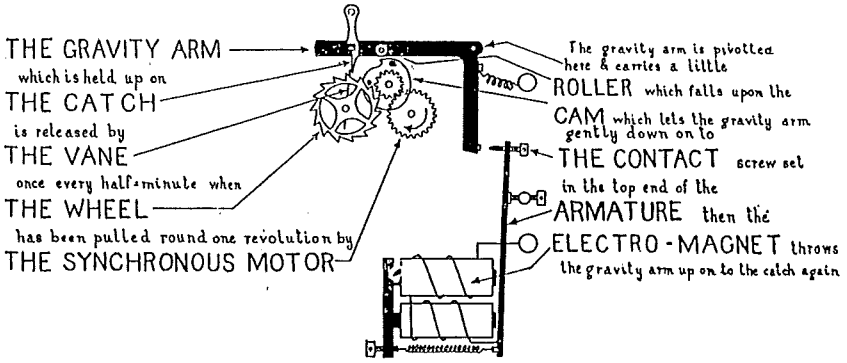


The electric supply services of the country are now so accurately timed to a frequency of 50 cycles per second average G.M.T. that the SYNPULSE Master Clock with synchronous A.C. motor may be used with confidence in place of the famous Synchronome seconds pendulum.

If the current is interrupted, it is instantly substituted by its own little "local generating station" behind the dial. An audible warning is given at the same time as an indication that the clock is running on the reserve supply. When the main supply is resumed the driving motor is automatically and instantaneously re-connected and the reserve generator switched off.

The **SYNCHRONOME SWITCH** which made a success of **ELECTRICAL IMPULSE DIALS** from 1895 to 1935 under the control of a pendulum may now be operated on the A.C. Supply Mains, and becomes

The SYNPULSE Master Clock



This Automatic Switch, combined with a synchronous motor, is an electrical time transmitter or Master Clock which will operate any number of electrical impulse dials.

giving

UNIFORM AND ACCURATE TIME

The Synchronome Principles

THE SYNCHRONOME MASTER CLOCK, with its own pendulum, was always distinguished for its remarkable accuracy.

Thanks to the "Grid," that accuracy is now improved and passed on to all through the electricity supply services. This National time service is derived from the famous Synchronome Shortt free pendulum at Greenwich Observatory and is transmitted by the wireless time signals originated by Mr. Hope-Jones to the generating stations to check their frequency controlling clocks, most of which are also Synchronome Master Clocks with pendulums.

AS A SWITCH.

Observe its virtues as a switch from the Electrical Engineer's point of view.

It consists of two pivotted levers, shown in black in our illustration, the gravity arm and the armature.

The gravity arm sails into contact with the armature at the speed dictated by the contour of the cam quickly enough to prevent preliminary sparking, but not quickly enough to cause a bounce. The first effect of the passage of current is to draw the armature into harder contact in the act of lifting the gravity arm.

The two moving members of the switch travel together until the armature comes up with a rush against the poles of the magnet and the gravity arm flies off by its momentum; thus at each half-minute, contact is perfectly clean and precise in the make and break.

All the energy derived from the electro-magnet is mechanically transmitted through the surfaces of the contact.

Here is a photograph of the electrical impulse which passes through all the dials every half-minute.

Observe the clean "make," and precipitous "break." When the current has risen to ·25 amp.—and it takes 4/100ths of a second to reach it—all the dials operate, and the little dent or depression shows they have done so. Not until the current has risen to a higher figure is the switch automatically thrown open. Thus the switch is bound to transmit sufficient electrical energy to operate every dial; it cannot work at all without doing so.

Why? Because the duration of the contact is dependent upon the dials' **self-induction,** which is the electrical equivalent of **Inertia.**

The inertia of a body is the measure of the power required to move it. Each dial asks for AND GETS what it wants.

This vital principle was unknown until the Synchronome Invention was launched in 1895, and the best practice in modern electrical time service is based upon it.

Thereon depends that wonderful compensatory action by which the duration of the contact is increased with failing current, and leads us to the consideration of its automatic **Battery Warning.**

BATTERY WARNING.

We have seen that the consumption of current is negligible—so small, in fact, that it has no effect upon the life of the battery—but a time will come when the magnet will be unable to throw up the gravity lever.

When this happens, the cam in its revolution will assist the magnet, and the increased duration of the electrical contact which results, is immediately noticeable on all the clocks, yet the installation will continue to work perfectly for some days in this battery warning condition.

For those who want something which compels attention still more forcibly, a lamp or bell is included in the circuit, with the charming yet paradoxical result that the weaker the battery the brighter will the lamp glow and the louder will the bell ring.

If this attention-compelling Battery Warning is neglected and the installation allowed to stop, the motor is stalled and the battery is automatically disconnected so that it cannot commit suicide as a result of your neglect, by remaining in closed circuit.

Variation of Battery Power cannot affect time-keeping, which is dependent upon the periodicity of the A.C. If there is enough current to throw up the gravity arm, then there is enough to operate the dials ; more will do no harm ; less will read the Riot Act in ample time.

The area embraced by the oscillograph curve on the previous page is the measure of the current consumed ; it means that 1 B.O.T. unit will run a circuit of 25 clocks for 10 years.

ELECTRICAL SUPPLY.

Plug in the Master Clock on the A.C. supply at any point where it is not liable to disconnection by switches or fuses.

Any source may be used for operating the circuit of electrical impulse dials, excepting only alternating current, in which case a rectifier is necessary.

The current required being so trivial, a primary battery can be used ; good dry cells are the best. They require no attention and will die of old age.

Small storage cells are recommended for large and responsible time circuits. They may be given an occasional small charge or permanently floated across the main, but if a continuous current electric light supply is available, batteries can be dispensed with. A carbon filament lamp is used as working resistance and so little current is consumed that no electricity meter is able to measure it.

THE WIRING.

is of the simplest possible kind, consisting merely of the connection of each dial with its nearest neighbour in a series circuit, preferably carried as a single wire from the Master Clock to each dial in turn, returning to it *via* some shelf in a cool cellar convenient for the battery.

The conductor should be of substantial material such as 3/·036in. electric light wire. Large buildings may be served by a separate loop around each floor or wing whose ends are brought to a terminal or assembly board near the Master Clock. Loops exposed to special danger of breakdown are provided with automatic cut-outs for the protection of the other loops.

One volt is required for each dial and there is no limit to the number of dials which can be operated from one pendulum except that dictated by the available voltage. When this is exceeded, parallel loops may be arranged.

The Synchronome Principles

TURRET CLOCKS.

Turret Clockworks were formerly made on a large engineering scale just because the hands they had to drive were large! All that has been altered since the Synchronome Company revolutionised them by their "one wheel" electrical impulse dial movements which merely push the hands half-a-minute at a time. No winding, and ready access for cleaning.

BELL CONTROLLERS. Synchronome Clocks bring ORDER out of CHAOS.

In WORKS they keep the Employees' Time Recorders in perfect synchronism with the Clocks and the Bells which are worked automatically by a Programme Ringer.

In SCHOOLS the same automatic apparatus is used to ring bells in the class-rooms or corridors to announce class changes.

EVERYWHERE the system facilitates the change of the hour in April and October. The simple "N.R.A." lever (Normal, Retard, Accelerate) in the Master Clock was invented by Mr. Hope-Jones in 1907 to assist Mr. William Willett in his championship of Daylight Saving.

CONCLUSION. The Synchronome system represents forty years' devotion of Mr. F. Hope-Jones to the applications of Electricity to Horology.

It is given to few men to see their ambitions so fully realised. Not only is the world's time determined with the assistance of Synchronome clocks throughout Greenwich Observatory, but they are used to transmit the wireless time signals which he originated and are received at the Synchronome frequency checking clocks in the Generating Stations, thus establishing the Engineers as the time-keepers of the nation.

THE SYNCHRONOME CO., LTD., 32 and 34 Clerkenwell Road, E.C.1.

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