Daimler & Lanchester

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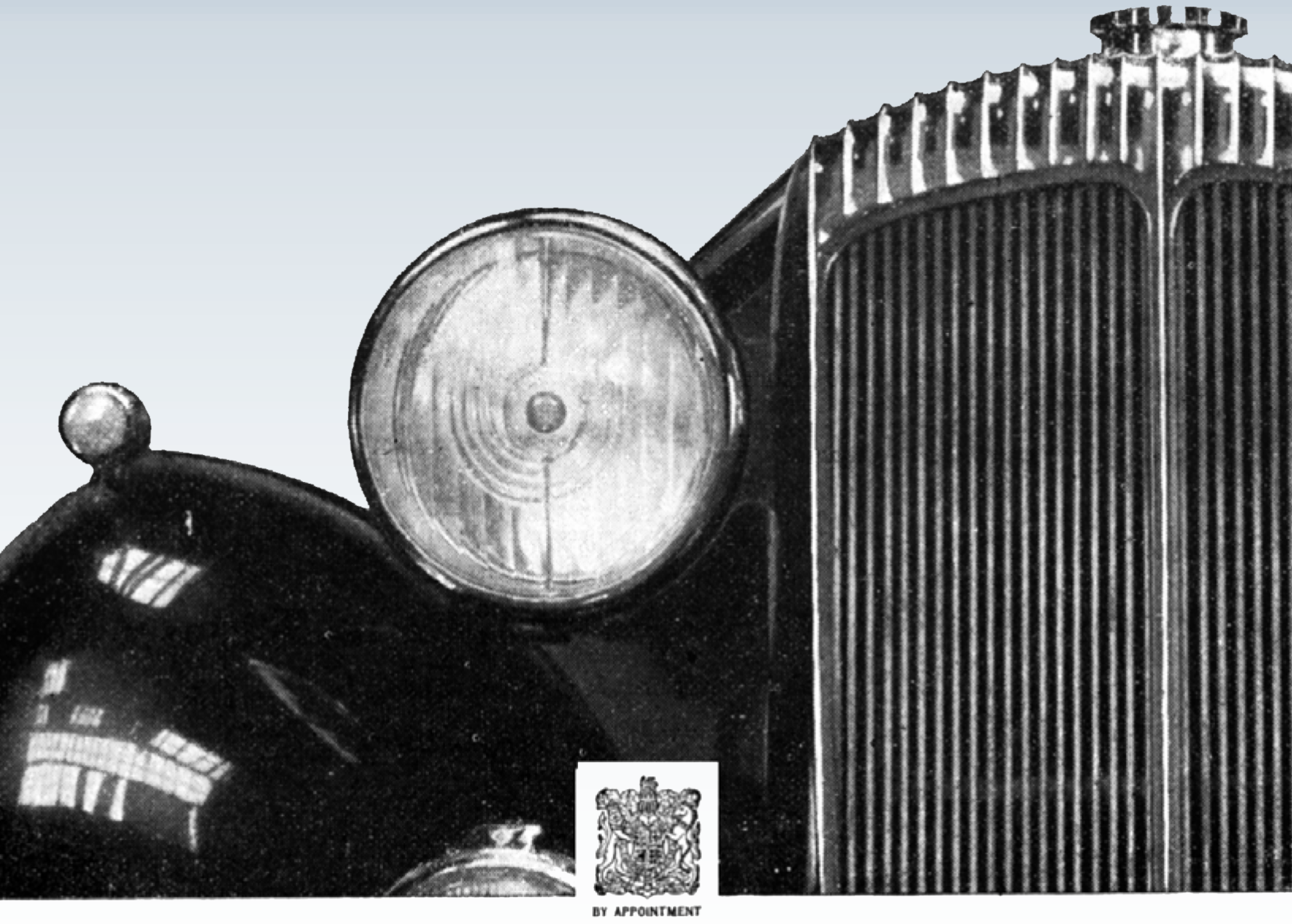
FLUID DRIVING



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A CLOCK TICKS AGAIN - RICHARD THWAITES

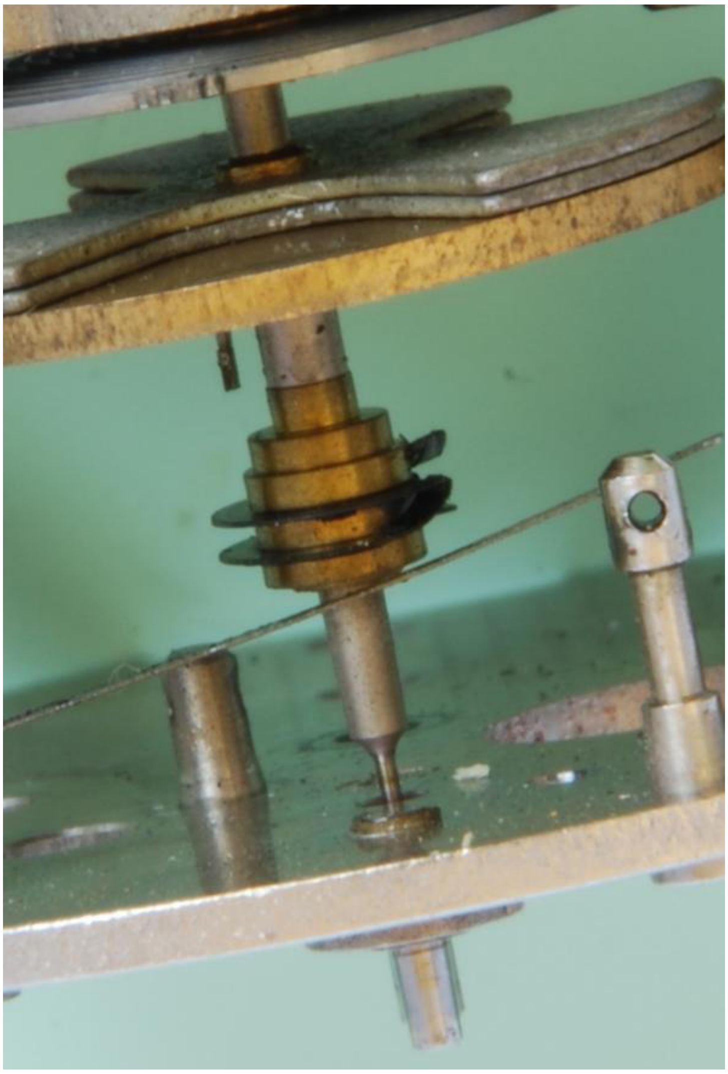
A certain British luxury marque used to boast that "at 100mph, the loudest noise is the ticking of the dashboard clock".

Modern dashboard clocks don't tick at all. Sadly, many of the fine Smiths ticking clocks installed in Daimlers have also ceased to tick.

The Smiths "pin clock" mechanism was fitted to a wide range of British marques over a long period (including the E-type Jaguar,) behind a range of dials from 4" (in some Rileys) down to 1" dials set into the speedos of some Jags. It is a simple and robust design, ingenious for its time before modern electronics, but with an inevitable single point of failure.

This electric clock has no spinning motor. Instead, the mechanism is driven by the sort of hair-spring balance wheel that you would find in most spring-driven wind-up clocks. In a spring-driven clock, the balance wheel and escapement limit the speed at which the spring's stored energy can turn the clock hands. By contrast, in the Smiths pin clock, the balance wheel actually drives the clock mechanism "backwards" through the gear trains to eventually move the hands.

It does this by means of an electromagnetic solenoid that imparts a pulse of energy to permanent magnets attached to the rim of the balance wheel, giving the wheel a brief push, then letting go to allow the hairspring to reach its limit and then swing the wheel back in the reverse direction.

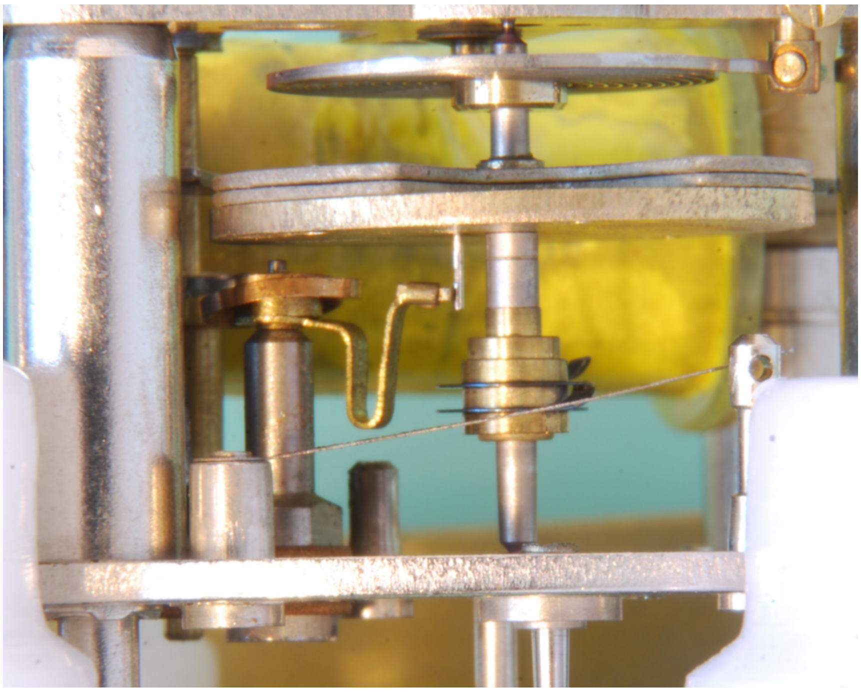


Catching blades – note the pin on the wheel.
Other gears removed in this picture.

Two little steel rings on the balance-wheel shaft end in small blades, set at opposite angles, which alternately catch the teeth of a cog as the balance-wheel swings clockwise or anti-clockwise, pushing the mechanism always in the forward direction.

The clock "ticks" as each blades catches the cog, rather than humming or grinding as do inferior clocks with rotary electric motors.

The switching of the electromagnet must be precisely synchronised to the movement of the balance wheel. The Smiths design has a tiny steel peg projecting about 3mm from the underside of the balance wheel close to the axle, and this brushes against a spring-loaded contact on an insulated post, thus closing the 12-volt circuit for the coil that energizes the electromagnet.



The pin and sprung contact, in original form.

This works brilliantly, but notice the word "coil". As in an ignition system, each time the coil circuit is broken, the coil discharges its stored energy. Though small in total energy, this is at a very high voltage and creates a visible spark between the contacts. Now consider that this occurs five times per second and we see that with the clock continuously running the little steel contact pin is copping 1.8 million arcs per week at the point of contact. And after thirty years of that….

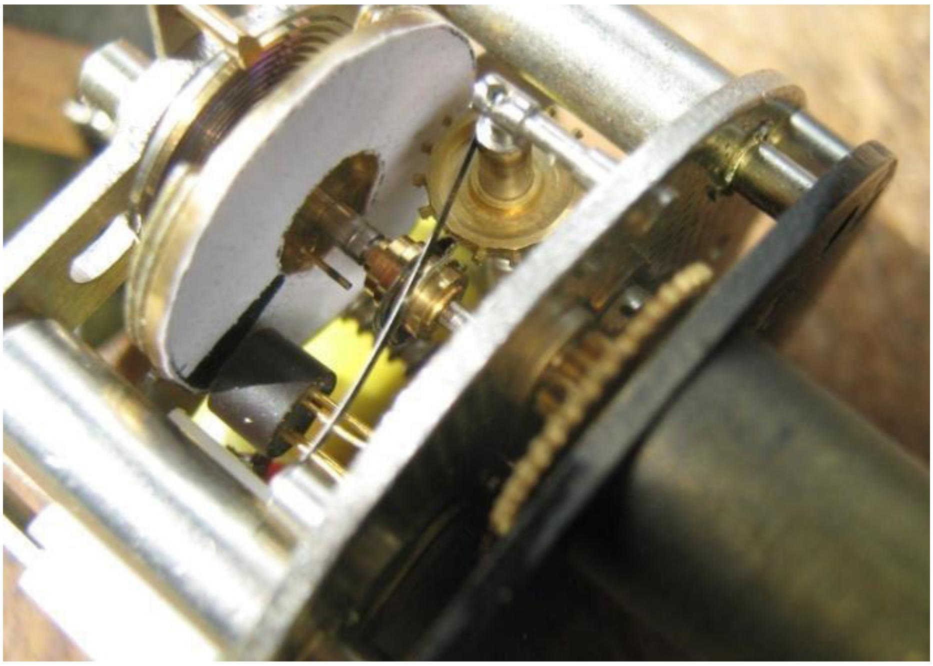
When I got mine out for inspection I could see that the pin was cut through about 80% of its thickness, with the end flopping about. My local horologist wasn't even interested in quoting on replacing that pin. Superglue or solder did not appeal in that situation. How about electronic switching to bypass that burnt-through contact?

I experimented with various homebrew pulse-generator circuits, and even found a miniature electronic metronome that could trigger the electromagnet. Some experiments sort of worked for a while, on the bench. It became evident that any regular pulse operating without feedback from the balance-wheel would end up out of sync with the balance-wheel, due to the variations of temperature, voltage and motion in the vehicle affecting the circuit and the hairspring differently. I wondered whether I might be able to rig up some sort of opto-electrical feedback, and went online to look for parts.

This pin is about 50% burnt through by many millions of sparks..

Whenever I have a good idea, I soon discover that somebody else had it before. This time, I was excited to find Graham Willows' "Clocks4Classics.com" website describing an optoelectronic solution specifically for the Smiths pin clock burnt contacts problem. There was clear discussion of the issues, and best of all, a ready-made kit available, for either positive or negative earth systems.

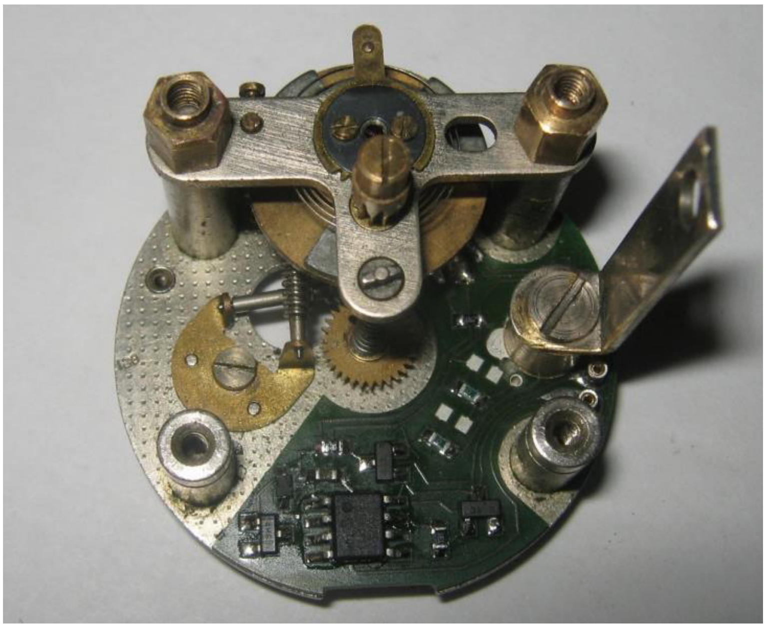
The Clocks4Classics kit replaces the arcing metal contacts with an optoelectrical switch. Instead of brushing and sparking, an infra-red sensor reads the movements of a black segment on a white paper disk stuck to the bottom of the balance-wheel.



The infra-red sensor gazing intently at the black segment.

A miniature printed circuit board fits neatly into the base of the clock mechanism. The 12volt battery power, and the electromagnet leads, plug into that board, and the timing is managed by a programmed integrated circuit on the board. It includes an automatic startup routine, whereas the original clocks require a push on the adjustment knob to get them going if power has been disconnected.

I like to bite off more than I can chew, and this project provided some chewing opportunities. No soldering is involved, unless you break the delicate wires that connect to the solenoid coil windings. The work is very small scale, so tools needed are jeweller's screwdrivers, tweezers, needlenose pliers, a good magnifying glass on a stand or magnifying goggles, and a hair-dryer for heat-shrink tubing on a couple of small connection points.



How the circuit board fits, with balance wheel and worm gears in place. Solenoid and coil install back over this.

While the Smiths mechanism is common to many clocks, there can be differences in the location of some cogs depending on whether the clock hands are on the central axis (as in my Conquest) or offset (Jags), and also whether the time-adjusting knob is front (Rileys), rear (Jags) or side (Daimlers). For side and rear adjustment knobs, the internal adjustment gear needs to be removed from the back of the main shaft, and this can be a bit tricky. Not all variations are covered in the generally-comprehensive kit instructions, but I found that Mark Willows was very prompt and helpful in responding to any query.

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My greatest blunder was attempting to bench-test the kit with a power supply that showed 12volts on a multimeter, but was actually delivering brief spikes of more than double that voltage – enough to burn up at least one component on the circuit board. The kit should NEVER be connected to anything but a BATTERY supply.

In factory configuration, the clock connects unswitched to the fusebox and runs 24/7/365. But because the adjustment knob is effective and convenient, and my Conquest runs little more than an hour a week on average, I have added a little toggle switch under the dash next to the clock's adjustment knob, so that the clock can be switched off for long idle periods and save the little brass teeth on its cogs until they are really needed.

It's a pleasure to hear the clock ticking away and see it keeping very good time. At about $100 for the kit and postage, I think this was good value for a DIYer like myself. However, I doubt it would be the loudest noise I hear if I ever have my Conquest up to 100mph.

Photo credits: 1) Shots of the kit were lifted from the instruction docs that are available online from www.clocks4classics.com. Thanks to Mark Willows.

2) Other shots of the clock internals, including damaged pin, were lifted from the thread

https://omegaforums.net/threads/bringing-a-smiths-car-clock-to-life.29521/ by "ChrisP. This is a horology discussion site but "ChrisP" was working on a clock from one of his Jags. Thanks to "ChrisP".

DAIMLER DISPLAY AT RECENT ALL BRITISH DAY

A display of Daimlers owned by the South Australian register of members, Fred Butcher's SP 250 and Howard Parslow's Special Sports not in the photo but also present on the day.