A Seven Year Itch

Peter Barker describes a long-term problem, now solved – or is it?

Introduction

SEVEN YEARS ago I restored an uncased 1920s single fusee movement, which had once been in a dial clock. It was not particularly distinguished, it had no maker's name, but it was well made and extremely robust. I had earlier fancied making up an English dial clock with a salt-box case, a simple automaton, and a passing strike and, since the mainspring of this movement appeared to have power enough to drive a tank up a vertical wall, it seemed ideal for my purpose.

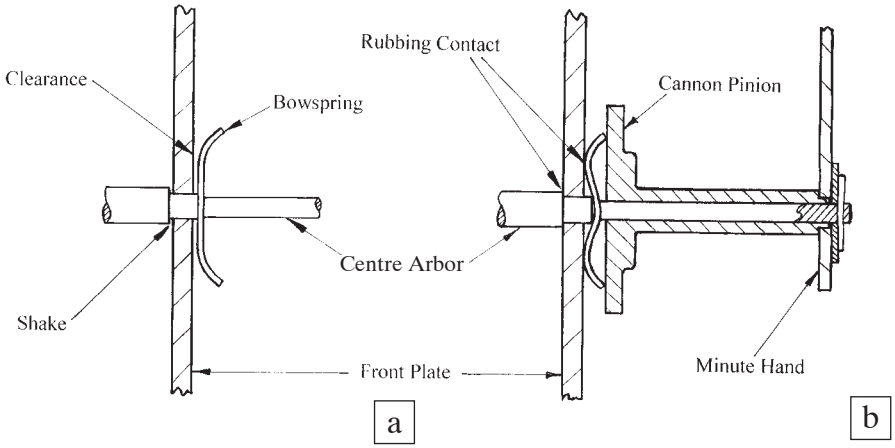
The Problem Emerges

The movement was dirty but there was not a lot wrong with it. The centre arbor had apparently been shortened a little at some time, but that seemed of no consequence. More important, I thought, was the substantial wear on the recoil escapement pallets. It seemed that this might be due to the escapement geometry being not quite right. The pivot centre distances suggested the escapement should have been 'square' which, with its 33-tooth escape wheel, would have required an anchor with an $8^1/2$ tooth span. The seemingly original pallets spanned only $7^1/2$ teeth. Nevertheless, when a few pivot holes were bushed and the pallets carefully stoned, the movement couldn't wait to go.

And it kept on going, not even noticing the addition of a nodding Father Time and a suitably sepulchral passing strike on a single long gong-rod. It kept going for something over three years. Then it stopped.

The minute hand was at quarter to, and the escapement seemed to have hung up. In trying to feel what was wrong, it started again and kept going for about another 6 months. After that, for a few years, it continued to stop in a similar fashion about every 6 months, though not always when lifting the minute hand.

I took it apart, but could find nothing wrong. I re-assembled it with the passing strike disconnected, but again the clock stopped after a few months. After more stoppages, stripping it down again revealed nothing untoward and, after oiling and re-assembly, it again went happily; but only for a few more months. I then disconnected the automaton but with no more success, just a growing awareness that the time intervals between stopping were decreasing. Each time it stopped, the escapement seemed to have hung up and it was almost as though there was insufficient power, in spite of the massive mainspring.



Over compression of the bow spring resulting from a short centre arbor.

The Cause?

A few months ago I stripped the clock down yet again. There was a good deal more wear on the pallets than one would have expected after only 7 years' going and, in the absence of any other conceivable explanation, I convinced myself that the erratic behaviour was due to poor escapement geometry.

So I made a new anchor, this time 'square', spanning $8^1/2$ teeth, and – as with the old anchor – it couldn't wait to go. After a couple of weeks on bench test, minus hands, I fitted the hands, without the dial, as a routine check that it continued to go with the hands on. I had done this originally but, till now, it had not seemed necessary to repeat it.

It was at this point that the thing did me a favour. It refused to go at all.

I have only been working with clocks for about 12 years and I know I have a lot to learn, but how could just fitting the hands stop the clock? If the dial had also been fitted, assembly would have been blind, and problems might have been hidden, but here I could see everything and it was obvious that there was nothing wrong. Or was there?

I had previously checked that nothing was binding and that there was ample shake in all the arbors but now, with the hands on, I found that all shake in the centre-shaft had disappeared. Taking the motion-work down and examining the back of the bow-spring revealed a single tiny (about $^1/4$mm diameter) burnished spot at about half the spring's tip radius. Now I knew what to look for, I could just make out a feint annular mark around the centre-shaft, at a radius corresponding to the bright spot on the bow-spring.

In this movement, the forward extension of the centre arbor protrudes through the front plate by a relatively small amount. On re-assembly, it could be seen that, with the hands fitted, the pressure from the canon pinion was sufficient to cause the bow-spring to deflect backwards enough to rub on the front plate. In doing so, it effectively clamped the centre-arbor to the front plate, (see **1a** and **1b**).

There had never seemed to be any reason to touch the bow-spring, so it should still have been in its original condition (when it went for three years). However, to judge from the observed behaviour of the clock over the last four years or so, the frictional load that the spring was now clearly inducing in the centre-arbor must have been steadily increasing with time, presumably due to continuing creep in the bow-spring material.

Oh, Happy Day!

With a slight reduction in the set of the bow-spring, Father Time was again nodding happily. It is gratifying that he has been doing so for a while now, but I have not yet had the courage to re-connect the passing strike.

Conclusion

While it is good to get the clock going again, it is at such times that one feels very silly. Years elapsed before I found a fault that a proper horologist (and probably most amateurs) would have spotted at once – well, one likes to think so anyway. I now wonder whether it was actually the

real, and only, fault or whether the clock will revert to type and stop again in about 6 months' time, due to the real problem; one that has yet to be identified.

Come what may, I have learnt the lesson that, while we all know an inadequately set bow-spring will allow the minute hand to slip, an inadvertently over-set bow-spring can cause a clock to stop; frequently.

What a pity that the possible adverse effects of a shortened centre arbor didn't dawn on me seven years ago.